

City of Sandy

Agenda

Planning Commission Meeting

Meeting Location: Hybrid - 39250 Pioneer Blvd. and Zoom

Meeting Date: Monday, February 27, 2023

Meeting Time: 6:30 PM



1. MEETING FORMAT NOTICE

This meeting will be conducted in a hybrid in-person / online format. The Commission or a portion of the Commission will be present in-person in the Council Chambers and members of the public are welcome to attend in-person as well. Members of the public also have the choice to view and participate in the meeting online via Zoom.

To attend the meeting in-person
Come to Sandy City Hall (lower parking lot entrance).
39250 Pioneer Blvd., Sandy, OR 97055

To attend the meeting online via Zoom
Please use this link: <https://us02web.zoom.us/j/82898397793>
If you would rather access the meeting via telephone, dial +1 346 248 7799. When prompted, enter the following meeting number: 828 9839 7793

2. ROLL CALL

3. INTRODUCTION TO NEW PLANNING COMMISSIONERS

4. APPROVAL OF MINUTES

- 4.1. Draft Minutes for January 30, 2023 3 - 7
[Planning Commission - 30 Jan 2023 - Minutes - Pdf](#)

5. REQUESTS FROM THE FLOOR - CITIZEN COMMUNICATION ON NON- AGENDA ITEMS

The Commission welcomes your comments at this time. Please see the instructions below:

- If you are participating online, click the "raise hand" button and wait to be recognized.
- If you are participating via telephone, dial *9 to "raise your hand" and wait to be recognized.

6. DIRECTOR'S REPORT

- 6.1. Director's Report for February 27, 2023 8 - 9
[Director's Report for February 27, 2023 - Pdf](#)

7. COUNCIL LIAISON & PLANNING COMMISSIONER DISCUSSION

8. NEW BUSINESS

- 8.1. 22-052 CPA Water System Master Plan Adoption (Legislative) 10 - 273
[22-052 CPA Water System Master Plan Adoption - Pdf](#)
[Exhibit A 2022 Water System Master Plan](#)
[Exhibit B 2016 Water Management and Conservation Plan](#)
[Exhibit C Chapter 13.04 Water System Rules and Regulations](#)
- 8.2. 22-031 DR/VAR/TREE State Street Homes Mixed-Use Development (Quasi-Judicial) 274 - 525
[22-031 DR/VAR/TREE State Street Homes Mixed-Use Development - Pdf](#)
[Exhibit A Land Use Applications](#)
[Exhibit B Narrative](#)
[Exhibit C Plan Set](#)
[Exhibit D and E Lighting Plans and Cut-Sheets](#)
[Exhibit F Stormwater Report](#)
[Exhibit G Transportation Analysis Letter](#)
[Exhibit H Arborist Report](#)
[Exhibit I ODOT Memo](#)
[Exhibit J Indenture of Access](#)
[Exhibit K and L Easements](#)
[Exhibit M Parks Comments](#)
[Exhibit N Fire Marshal Comments](#)
[Exhibit O ODOT comments](#)
[Exhibit P City Transportation Engineer DKS Comments](#)
[Exhibit Q PW Comments](#)
[Exhibit R Third Party Arborist Review](#)
[Exhibit S ODOT Comments State Street Homes pre-app](#)
[Exhibit T Email from ODOT](#)
[Exhibit U Sandy Multi-Family Site Plan Revisions \(rcvd Feb 9, 2023\)](#)
[Exhibit V Dennis Petross Public Comments \(received February 14 2023\)](#)

9. ADJOURNMENT



MINUTES
Planning Commission Meeting
Monday, January 30, 2023 Hybrid - 39250
Pioneer Blvd. and Zoom 6:30 PM

COMMISSIONERS PRESENT: Jerry Crosby, Commissioner, Steven Hook, Commissioner, Jan Lee, Commissioner, Breezy Poulin, Commissioner, and Darren Wegener, Commissioner

COMMISSIONERS ABSENT: None

STAFF PRESENT: Kelly O'Neill Jr., Development Services Director, Shelley Denison, Associate Planner, Emily Meharg, Senior Planner, and Josh Soper, City Attorney

COUNCIL LIAISON PRESENT: Chris Mayton, Councilor

1. MEETING FORMAT NOTICE

Instructions for electronic meeting

2. ROLL CALL

Chair Crosby called the meeting to order at 6:31 p.m.

3. PLANNING COMMISSION DISCUSSION

Commissioner Lee nominated Chair Crosby for Chair. Commissioner Wegener seconded the nomination. Chair Crosby clarified this would be his second year. Commissioner Hook expressed interest in Vice Chair. Commissioner Lee seconded the nomination.

Motion: Motion to appoint Chair Crosby as Chair and Commissioner Hook as Vice Chair.

Moved by: Commissioner Wegener

Seconded by: Commissioner Poulin

Yes votes: All Ayes

No votes: None

Abstentions: None

4. APPROVAL OF MINUTES

4.1. Draft Minutes for November 28, 2022

Chair Crosby asked for any edits. With no requested edits, Crosby declared the minutes approved.

5. REQUESTS FROM THE FLOOR - CITIZEN COMMUNICATION ON NON-AGENDA ITEMS

Development Services Director O'Neill asked if Councilor Mayton had anything he'd like to share as the Council Liaison. Councilor Mayton introduced himself as the new Council liaison to the Planning Commission.

6. DIRECTOR'S REPORT

Development Services Director O'Neill reiterated that Councilor Mayton will be the new Council liaison to the Planning Commission. O'Neill mentioned there is an employment opening for a permit technician in the Building Division.

O'Neill provided an update on the moratorium and the number of ERUs issued and projected the City will be down to 70-80 ERUs at the end of March. Based on sewer flows, it appears the fixes at the sewer treatment plant and the pipe replacement project are working, which will result in more ERUs being available after the stress test. However, the Council will likely need to extend the moratorium based on the timing of the stress test.

O'Neill gave an update on ongoing projects. The clear and objective code audit is still occurring. The final Transportation System Plan document is in the process of being written and should be adopted in May or June. The Comprehensive Plan update is also continuing and there will be work sessions in the near future.

O'Neill provided an update on the Planning Commission recruitment to fill the two vacant seats. There were 12 applicants, but four people didn't meet the residency requirements. The selection committee narrowed the candidates down to five people to be interviewed later this week.

Commissioner Lee asked if there will be a backlog of land use applications due to the moratorium. O'Neill stated he doesn't have an answer but thinks that once Bell/362nd is extended, there will be development in that area. In addition, there may be a subdivision or two that will move forward.

7. NEW BUSINESS

7.1. Johnson RV Canopy Cover (22-037 DR/VAR):

Chair Crosby opened the public hearing on File No. 22-037 DR/VAR at 6:46 p.m. Crosby called for any abstentions, conflicts of interest, ex-parte contact, challenges to the jurisdiction of the Planning Commission, or any challenges to

any individual member of the Planning Commission. No challenges were made, and no declarations were made by the Planning Commission.

Staff Report:

Associate Planner Denison summarized the staff report and presented a slideshow. Denison gave a brief overview of the proposal and provided additional information on the proposed landscaping and driveway/site access. Denison explained the applicant's requested Type II Variance request to roof pitch and staff's support. Denison provided background on the Type III Special Variance request, which requires Planning Commission review, and presented the staff recommendation. Denison also summarized the applicant's requested change to draft condition of approval D.3 in the staff report.

Commissioner Lee asked a clarifying question about the future realignment of Industrial Way. Denison explained that the alignments in the Transportation System Plan (TSP) are conceptual, but that the project is on the Capital Improvement Project list. Commissioner Wegener asked about the timeline for the Industrial Way realignment. O'Neill stated it would be at least 5 years out based on the budget. O'Neill speculated it would most likely be completed in the 20-year TSP horizon. Commissioner Lee noted there's not a lot of foot traffic on Industrial Way. O'Neill mentioned the path along Highway 26 as an alternate. Denison noted there are sidewalks on the north side of Industrial Way.

Applicant's Presentation:

Tracy Brown
Tracy Brown Planning Consultants LLC
17075 Fir Drive
Sandy, OR 97055
Tracy Brown introduced the project team.

Robert Murray
Johnson RV
41777 Highway 26
Sandy, OR 97055

Robert Murray from Johnson RV gave some background on Johnson RV, the proposed use of the site, and stated the public would not be accessing this property.

Tracy Brown further explained the applicant's requested change to draft condition of approval D.3.

Public Testimony in favor:

None

Public Testimony against:

None

Public Testimony neutral:

None

Staff Recap:

None

Applicant Rebuttal:

None

Discussion:

Commissioner Wegener asked about the 20-foot tree buffer on the north side of the site in relation to the sidewalk variance and future sidewalk location. O'Neill explained that realignment of Industrial Way will reconfigure the site and will likely require removing an existing building, which will decrease the value of the site. Wegener questioned why the applicant is investing in improvements to the site if it will be impacted by the future alignment and wondered if the sidewalk should go in now since the City doesn't really know when the Industrial Way extension would go in. O'Neill explained the money would be set aside for the future improvements and that the City could install the sidewalk sooner if it's decided Industrial Way won't be reconfigured in the near future.

Chair Crosby asked to review the proposed change to condition D.3. Crosby asked at what point the RV becomes "for sale." Council liaison Mayton suggested the Planning Commission authorize RVs to be able to be stored on the lot. Denison specified the site would not be used for RVs for sale, only for those being washed or repaired. O'Neill explained the transportation analysis is based on a repair facility and not RV sales, as is the sidewalk variance recommendation. Commissioner Poulin asked if "and/or related materials" could remain in the condition? Commissioner Wegener expressed concerns about all of the additional things that could be stored outside the building in addition to the RVs themselves. Robert Murray stated that the RV parts can't be left outside and the intent is not to store any parts outside. The outdoor area will just be for RVs that are waiting to go in and out of the repair/wash area. O'Neill stated he could always authorize a special request, if needed,

based on the language in the condition. The Commissioners agreed on adding “and/or related materials” to revised condition D.3

Motion: Motion to close the public hearing at 7:32 p.m.

Moved By: Commissioner Wegener

Seconded By: Commissioner Poulin

Yes votes: All Ayes

No votes: None

Abstentions: None

Motion: Motion to approve the proposal with the staff recommendations and the discussed change to condition D.3.

Moved By: Commissioner Poulin

Seconded By: Commissioner Wegener

Yes votes: Wegener, Poulin, Hook, Lee, Crosby

No votes: None

Abstentions: None

The motion passed at 7:34 p.m.

8. ADJOURNMENT

Chair Crosby adjourned the meeting at 7:34 p.m.



Chair, Jerry Crosby



Planning Director, Kelly O'Neill Jr



Staff Report

Meeting Date: February 27, 2023

From Kelly O'Neill Jr., Development Services Director

SUBJECT: Director's Report for February 27, 2023

BACKGROUND / CONTEXT:

The Development Services Department is very busy with building permits and inspections, long range planning projects (Comprehensive Plan, TSP, and the Clear & Objective Audit), and current planning applications (including a few large projects submitted in September right before the moratorium was adopted). We are also getting ready for annual goal setting and the 2023-2025 biennial budget. In addition, we are in the process of recruiting for a permit technician, as Marisol Martinez decided to leave the City for another employment opportunity.

Upcoming meetings:

- **March - likely no meeting**
- **April 3 at 6:00 PM - Joint work session with the City Council to discuss the Comprehensive Plan**
- **April 17 at 6:00 PM - Joint work session with the City Council to discuss the Transportation System Plan**
- **April 24 at 6:30 PM**
- **May 22 at 6:30 PM**
- **June 26 at 6:30 PM**

Applications of note:

- **Industrial Design Code Standards:** On February 6, 2023, the City Council approved the ordinance with a vote of 6:1. The code modifications become effective on March 8, 2023.
- **Self Storage Code Amendments:** On January 17, 2023, the City Council approved the ordinance with a vote of 6:0. The code modifications become effective on February 16, 2023.
- **Cascade Creek Apartments (22-039 DR/VAR/MP/TREE):** This application for an 80 unit mixed-use multi-family development with 10 office spaces [north of Bornstedt Park](#) has been deemed incomplete. Staff has requested additional materials from the applicant needed for review. This will be reviewed by the Planning Commission.
- **Barlow Trail Veterinary Clinic (22-041 DR/ADJ):** This application for the new location of Barlow Trail Veterinary Clinic to the [south of Pioneer Blvd.](#) is being reviewed by staff. This application will not be reviewed by the Planning Commission unless upon appeal.

- **Ron Johnston Subdivision (22-053 SUB):** This application to create a manufactured dwelling park subdivision per ORS 92.830-92.845 in an already existing manufactured home park has been deemed incomplete. Staff is currently standing by for additional information from the applicant.

Other items of note:

- **Clear and Objective Code Audit:** City staff is working closely with MIG/APG on the code audit. As you can imagine, it is a very challenging process and is slowly moving forward. We are hopeful that new code provisions will be brought forth this summer.
- **Transportation System Plan (TSP):** City staff is working closely with DKS Associates and ODOT to complete the final analysis for the TSP. DKS Associates has started to work on the final document for the TSP. The TSP is scheduled to be adopted in June of 2023. We are on the home stretch!
- **Comprehensive Plan update:** Staff is currently working through “Block 1” of goals and policies related to two chapters: Community & Culture and Transportation & Infrastructure. We are acquiring input from relevant departments and stakeholders and will be submitting them for Council review and input in mid-February. There will be a joint Planning Commission/City Council work session in April to review and approve these goals and policies.



Staff Report

Meeting Date: February 27, 2023

From Emily Meharg, Senior Planner

SUBJECT: 22-052 CPA Water System Master Plan Adoption

DECISION TO BE MADE:

Forward a recommendation to the City Council or reconvene at a future meeting date to discuss additional modifications prior to forwarding to the City Council.

BACKGROUND / CONTEXT:

City staff from the Public Works Department will be presenting the 2022 Water System Master Plan (WSMP) for adoption by the City Council as an amendment to the Comprehensive Plan. The purpose of the WSMP is to perform an analysis of the City of Sandy's water system, including existing conditions and future recommended improvements. The planning and analysis efforts presented in the WSMP are intended to provide the City with the information needed to inform long-term water supply and distribution infrastructure decisions. This plan complies with water system master planning requirements established under Oregon Administrative Rules (OAR) for Public Water Systems, Chapter 333, Division 61.

Per Oregon Statewide Planning Goal 11, Public Facilities and Services, cities and counties are required to develop and adopt a public facilities plan for areas within an urban growth boundary containing a population greater than 2,500 persons. The public facilities plan is a support document (or documents) to the comprehensive plan that describes the water, sewer, and transportation facilities that are to support the land uses designated in the comprehensive plan. The water system component of the public facilities plan pertains to the provision of piped water for human consumption subject to regulation under ORS 448.119 to 448.285.

In addition, the 2016 Water Management and Conservation Plan (WMCP) will be adopted as an addendum to the 2022 WSMP in compliance with OAR 690-086.

Sandy Municipal Code Title 13, Water and Sewer, and Title 17, Development Code, will be updated to include specific references to the 2022 Water System Master Plan and the 2016 Water Management and Conservation Plan. The Title 13 amendments are included as part of this application; the Title 17 amendments are being included as part of the Clear and Objective code audit, which is expected to be adopted later in 2023.

The adoption of the 2022 WSMP, the 2016 WMCP, and the Title 13 amendments will be completed through the adoption of an ordinance. Notice of the proposed adoption was

submitted to the Oregon Department of Land Conservation and Development (DCLD) on January 18, 2023, published in the Sandy Post on February 8, 2023, and posted to the City's social media page prior to the hearing date.

RECOMMENDATION:

Staff recommends that the Planning Commission hold a legislative hearing, seek public input, and forward a recommendation of approval to the City Council.

LIST OF ATTACHMENTS/EXHIBITS:

Exhibit A 2022 Water System Master Plan

Exhibit B 2016 Water Management and Conservation Plan

Exhibit C Chapter 13.04 Code Amendments

EXHIBIT A



City of Sandy

Water System Master Plan

December 2022

PREPARED BY:

Conсор
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Portland, OR 97204
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PREPARED FOR:

City of Sandy, Oregon

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Water System Master Plan

City of Sandy

December 2022



RENEWS June 30, 2023

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- A Groundwater Supply Evaluation for City of Sandy Water Master Plan Update, GSI Water Solutions, July 2022
- B Presentation to Sandy City Council
- C CIP Cost Estimates

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CHAPTER 1

Existing Water System

1.1 Introduction

The purpose of the Water System Master Plan (WSMP) is to perform an analysis of the City of Sandy's (City's) water system and:

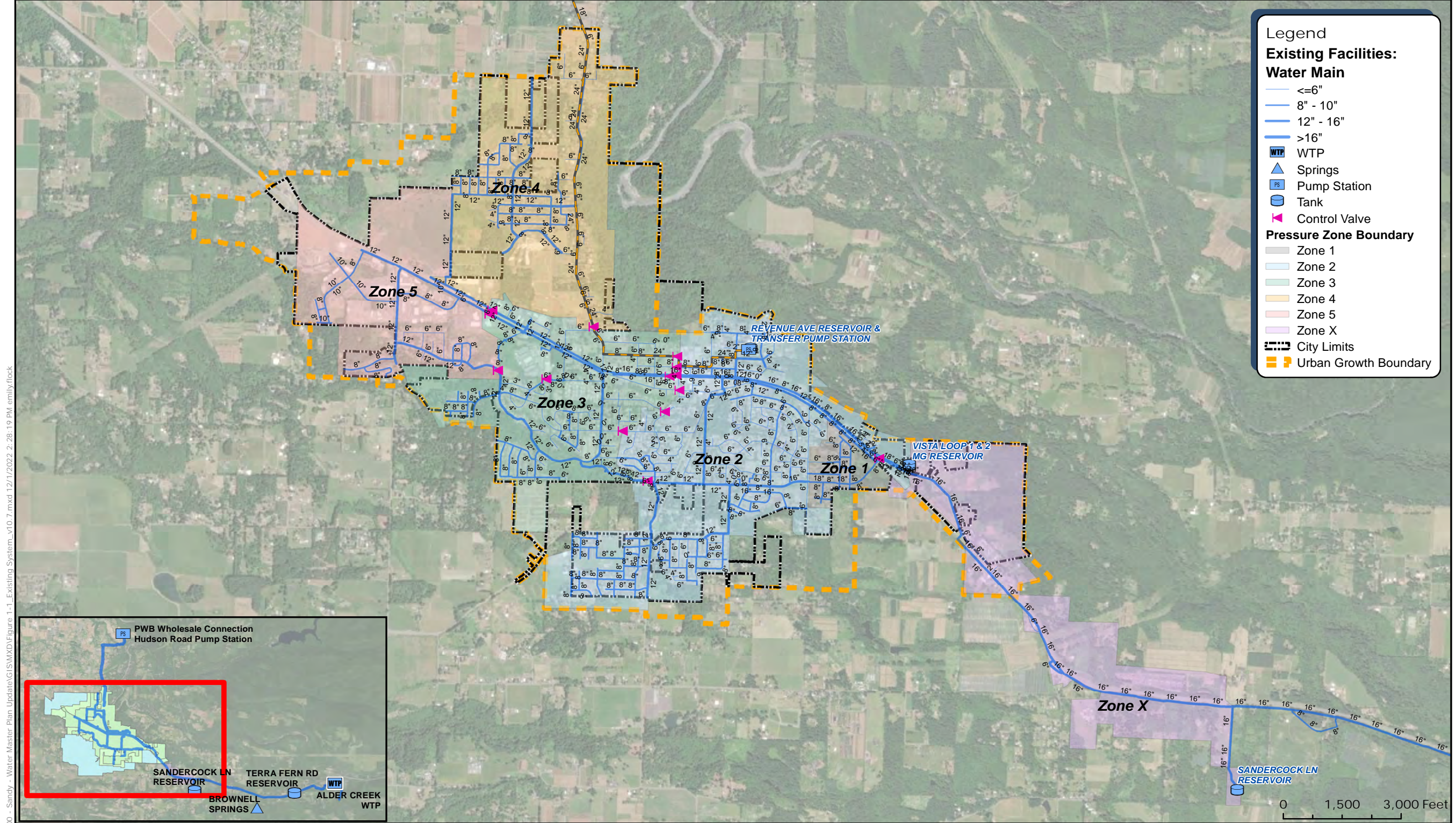
- Document the existing water system including improvements completed since the 1991 WSMP and 1999 WSMP Update.
- Develop and calibrate a new water system hydraulic model.
- Estimate future water requirements including potential water system expansion areas.
- Identify deficiencies and recommend water facility improvements that may correct system deficiencies and provide for growth.
- Recommend an updated water system capital improvement program (CIP) for the water system.
- Develop a document which will support future review of system development charges (SDCs) and water rates based on the updated CIP.
- Document the City's supply strategy and potential change to the current wholesale water supply agreement with the City of Portland.

In order to identify system deficiencies, existing water infrastructure inventoried in this section will be assessed based on the existing and future water needs summarized in **Chapter 2** and water system performance criteria described in **Chapter 3**. The results of this analysis are presented in **Chapter 4** and **Chapter 5**. **Chapter 6** provides recommendations for system improvements and a 20-year capital improvement program. The planning and analysis efforts presented in the WSMP are intended to provide the City with the information needed to inform long-term water supply and distribution infrastructure decisions.

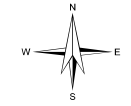
This plan complies with water system master planning requirements established under Oregon Administrative Rules (OAR) for Public Water Systems, Chapter 333, Division 61.

1.2 Service Area

The City is located in Clackamas County, southeast of the City of Portland. The water system provides potable water to approximately 13,000 customers within city limits and some surrounding areas through about 4,100 single-family residential, multi-family, and commercial/industrial service connections. Future growth of the water service area will encompass the current urban growth boundary (UGB). The City also sells water to three wholesale customers: Section Corner Water District (WD), Alder Creek-Barlow WD, and Skyview Acres Water Company. The City is the sole source of water for the Section Corner and Alder Creek-Barlow WDs; Skyview Acres serves part of its system through a connection to Portland Water Bureau (PWB). An overview map of the water service area can be found in **Figure 1-1**.



G:\IPDX_Projects\20A\2800 - Sandy - Water Master Plan Update\GIS\MXD\Figure 1-1_Existing System_V10.7.mxd 12/1/2022 2:28:19 PM emily.flock



City of Sandy
Water System Master Plan

Figure 1 - 1
Existing System

December 2022

20-2800

1.3 Supply Sources

The City's supply sources and current operation are described in the following paragraphs. Future supply options, strategy, and limitations are discussed in more detail in **Chapter 5**. The locations of all supply connections are shown in **Figure 1-1**.

The City currently receives its water from three sources: Alder Creek (a tributary of the Sandy River), Brownell Springs (a tributary of Beaver Creek), and PWB, which receives its water supply from the Bull Run Watershed. The water purchased from PWB is subject to minimum purchase requirements in accordance with the Water Supply Agreement. During fall and winter, approximately two-thirds of the City's water supply is purchased from PWB (492,000 gallons), while Alder Creek and Brownell Springs supply the remaining one-third to meet the total demand of approximately 700,000-800,000 gallons. During the summer and fall, PWB continues to supply 492,000 gallons while more water is drawn from Alder Creek and Brownell Springs, fulfilling increased warm weather demands.

1.3.1 Alder Creek WTP

Since 1971 the City has held water rights on Alder Creek. In 1977, the City constructed the Alder Creek Water Treatment Plant (WTP) to treat 1.0 million gallons per day (MGD) of water from Alder Creek. In 1998, they expanded the WTP and its capacity to 2.0 MGD. Shortly thereafter, in 2001, a more efficient system replaced the old treatment unit, increasing the WTP's capacity to 2.6 MGD. While the sustainable capacity of this source is unknown as there are no stream gauges located on Alder Creek, it is believed that at peak capacity it is capable of supplying the 2.6 MGD flow rate allowed by the City's water right.

The Alder Creek raw water intake is located approximately 4,000 feet upstream of the WTP. An intake structure directs water into a 12-inch raw water main and is pumped to the plant via an 1,800 gallon per minute (gpm) duplex booster pump station (two 20 horsepower (hp) pumps with variable frequency drives (VFDs)). Based on anecdotal information from City and Veolia staff (contract operator of the WTP), the firm capacity of the raw water pump station (capacity with the largest pump out of service) is approximately 1,800 gpm.

The WTP is a Trident MicroFloc package, direct-filtration plant. The filters are dual media (sand and anthracite) and backwash is accomplished by gravity flow from the Terra Fern Road Reservoir. The WTP does not use sedimentation or coagulation; pretreatment consists only of flocculation by hydraulic mixing, with no rapid mixing.

The WTP consists of three packaged filtration units – Filters #1 and #2 each have a capacity of approximately 0.5 MGD but have not operated in more than a decade due to control panel issues and instrumentation failures. Filter #3 operates at an approximate capacity between 1.2 MGD and 1.6 MGD.

Finished water is pumped to the distribution system via pumps at the WTP, which send water to the Terra Fern Road Reservoir and Pump Station. Filters #1 and #2 have three submersible turbine pumps with an estimated capacity of 1,050 gpm. These pumps have not been operated since Filters #1 and #2 were in operation (over a decade). Filter #3 has one vertical turbine pump with an approximate capacity of 1,100 gpm (1.6 MGD). The Filter #3 pump has a spare motor, but there is no backup pump. Additionally, this pump is oversized and does not have a VFD.

The WTP site has a standby generator, though the current transfer switch is manual. There is an ongoing project that will convert this to an automatic transfer switch (ATS) and prevent City staff from having to drive to the site to transfer the power source to the generator.

1.3.2 Brownell Springs

Approximately six miles east of Sandy, a series of eight springs, known as Brownell Springs, are located on 22 acres of City-owned land on Lenhart Butte. Water from the individual springs is collected in open-bottom concrete boxes and piped to a 1,000-gallon concrete holding tank where the spring water is disinfected with sodium hypochlorite. Turbidity, disinfectant residual monitoring, and supervisory control and data acquisition (SCADA) communications equipment are housed in a nearby building with a separate room for sodium hypochlorite storage and pumping equipment.

The Springs consistently produce between 0.3 and 0.5 MGD year-round. While peak flows from the Springs occur during the early summer, by late summer, the City is typically regulated down to 90 gpm (0.13 MGD) due to impacts on senior water rights.

From the common holding tank, the chlorinated water blends with water traveling from the Terra Fern Road Reservoir and Pump Station to the Sandercock Lane Reservoir and Vista Loop Reservoirs.

There are three customers downstream of the holding tank who have grandfathered water rights to Brownell Springs water from the City. Their usage is metered, but they do not pay the City for water usage.

1.3.3 Portland Water Bureau

Since a wholesale water supply agreement was established in 2008, the City acquires 0.5 MGD to 3.0 MGD from the PWB. The City is required to pay for at least 0.5 MGD regardless of how much water is actually used, the Guaranteed Minimum Purchase amount stipulated in the current City's wholesale water supply agreement with PWB. This interconnection allows the City to supplement their Alder Creek and Brownell Springs sources, as well as providing redundancy to the system in case of emergency. The PWB receives water from the Bull Run Watershed, located approximately 3 miles northeast of the City at the base of the Cascade Mountains. Water is supplied from Bull Run Lake and Bull Run Reservoirs No. 1 and No. 2, with a combined storage capacity of approximately 17 billion gallons. Water is delivered to the City of Portland and various wholesale customers in the Portland metro area through three large-diameter conduits. The City receives water from the PWB at the Hudson Road Intertie and through a master meter that the PWB is responsible for maintaining and calibrating. The current contract with the PWB expires in 2028 and a new long-term wholesale water supply agreement is currently being developed.

The Hudson Road Intertie is located between the headworks, where chlorine is added to the Bull Run surface water source, and the Lusted Hill Facility where ammonia is added to the water (to create a more stable disinfectant residual in the water, called chloramines) and the pH of the water is adjusted for corrosion control. As discussed further in **Chapter 5**, the Hudson Road Intertie is located upstream of the future PWB water treatment plant meaning that the water supplied to the City of Sandy at the Hudson Road Intertie will be unfiltered and untreated, and PWB will discontinue chlorination of the water at the Bull Run headworks.

The Hudson Road Intertie with the PWB was established in 2014 approximately 4 miles north of the City. The City cannot convey water back to the PWB from this interconnection. Nearby, the Hudson Pump Station pumps water through approximately 27,000 feet of 18 and 24-inch diameter pipeline to the Revenue Avenue Reservoir, which is located within city limits. On the same site, the Transfer Pump Station pumps water from the reservoir into the distribution system in Zone 2 and up to the Vista Loop Reservoirs. Customers east of Langensand Road, between the Vista Loop Reservoirs and the Alder Creek WTP, cannot currently be served by the PWB source because the pump stations are not configured to pump up to these elevations.

1.3.4 Salmon River

The City holds Permit S-48451 for use of up to 25.0 cubic feet per second (cfs) (16.1 MGD) from the Salmon River, which is currently undeveloped and has an extension of time to October 1, 2069. This water right is intended to provide a long-term water supply to accommodate the City's growth. In the *Agreement for Instream Conversion* (executed October 24, 2002) associated with Portland General Electric's decommissioning of Marmot Dam, the City voluntarily agreed to reduce this permit from 25.0 cfs to 16.3 cfs (16.1 MGD to 10.5 MGD) when the flow available in the Sandy River near Brightwood, OR is 600 cfs (387.8 MGD) or less, but can still divert up to 25.0 cfs when the flow available is more than 600 cfs. No gauge is currently operating near Marmot, OR to provide a picture of the flow in the Sandy River at that location.

1.4 Distribution System

The City's existing water distribution system consists of six pressure zones, five storage reservoirs, four pump stations, and 15 pressure-reducing valve (PRV) stations throughout the City's service area. These components and the supply sources are shown in the existing water system hydraulic schematic included as **Figure 1-2**. The City's distribution system and current operational strategy are described in further detail in **Chapter 4**.

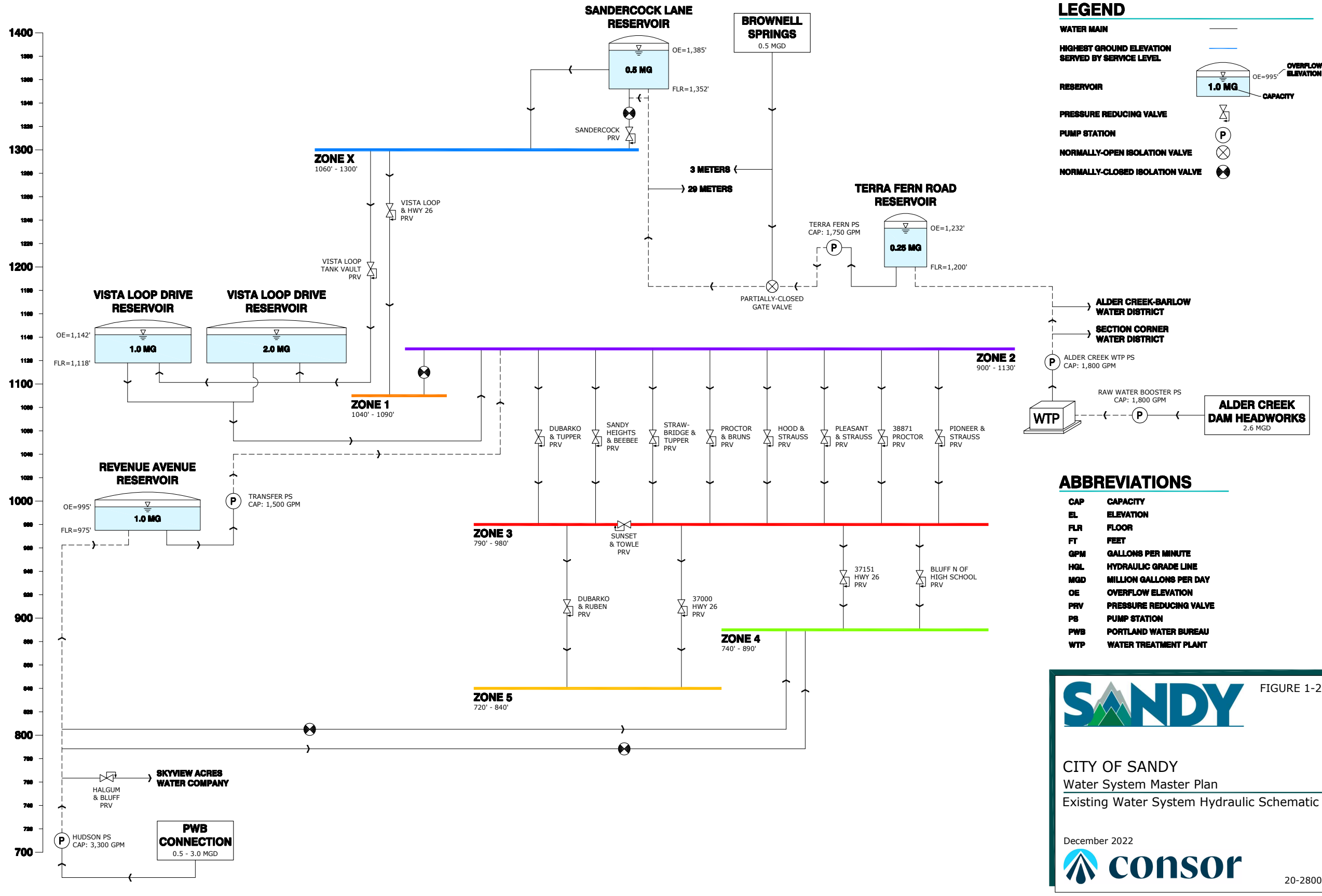
1.4.1 Pressure Zones

Pressure zones are defined by ground topography and their hydraulic grade lines (HGLs) are determined by overflow elevations of water storage reservoirs, discharge pressure at pump stations, or outlet settings of PRVs. Pressure zone boundaries are defined in order to maintain an acceptable range of service pressures to all customers and fire hydrants.

The City's water distribution system is divided into six pressure zones. They are identified simply as Zone X and Zones 1 through 5. The topography of the City's water service area generally slopes down from southeast to northwest, with Sandercock Lane Reservoir acting as the high point in the distribution system. Water from Alder Creek WTP is pumped up to the Sandercock Lane Reservoir while water from Brownell Springs flows by gravity to the reservoir. From here, water flows directly into Zone X, into Zone 1 via PRV, and into the Vista Loop Reservoirs through the Vista Loop Control Valve. From the PWB intertie, water is transmitted to the Revenue Avenue Reservoir where it is blended with Alder Creek and Brownell Springs source water to control disinfection byproduct formation. Water from the Revenue Avenue Reservoir is pumped into Zone 2 from the Transfer Pump Station. From Zone 2, water travels by gravity throughout the remaining pressure zones, passing through PRVs as necessary.

In addition to these six established and named pressure zones, the City supplies water to the three aforementioned wholesale customers, as well as 29 meters above the Sandercock Lane Reservoir, and three meters supplied by gravity between Brownell Springs and a partially-closed gate valve, located near Highway 26, that regulates the flow rate from the springs to the City's allowed water right capacity.

G:\PDX_Projects\20\2800 - Sandy - Water Master Plan Update\CAD\20-2800-OR Hydraulic Schematic.dwg FIG 1-2 12/7/2022 1:06 PM TAYLOR.SPENCER 23.0s (LMS Tech)



SANDY FIGURE 1-2

CITY OF SANDY
Water System Master Plan
Existing Water System Hydraulic Schematic

December 2022

consor

20-2800

Figure 1-1 shows the geographical locations of the pressure zones. **Table 1-1** summarizes approximate ground elevations served, HGLs, and service pressures, as well as facilities supplying each pressure zone. The information included in **Table 1-1** is depicted visually in **Figure 1-2**.

Table 1-1 | Pressure Zone Summary

Pressure Zone	Elevation Range Served (feet) ¹	Supply Source	Pressure Control (Reservoir/Pump Station/PRV)	Controlling HGL (feet)	Approximate Pressure Range (psi)
Zone X	1,060 to 1,300	Sandercock Lane Reservoir	Sandercock Lane Reservoir	1,385	37 to 141
Zone 1	1,040 to 1,090	Sandercock Lane Reservoir	Vista Loop & Hwy 26 PRV	1,206	50 to 72
Zone 2	900 to 1,130	Vista Loop Reservoirs, Revenue Avenue Reservoir/Transfer Pump Station	Vista Loop Reservoirs	1,228	42 to 142
Zone 3	790 to 980	Zone 2	Several PRVs	1,098	51 to 133
Zone 4	740 to 890	Zone 3	37151 HWY 26 PRV, Bluff Road PRV	980	39 to 104
Zone 5	720 to 840	Zone 3	Dubarko & Ruben PRV, 37000 HWY 26 PRV	987	64 to 116

¹ Individual services with pressures above 80 psi are assumed to have individual PRVs.

1.4.2 Storage Reservoirs

The City’s water system includes five active storage reservoirs with a total capacity of 4.75 million gallons (MG). Key information on these reservoirs can be found in **Table 1-2**. See **Figure 1-1** for the geographical locations of the reservoirs.

Located outside of city limits, the easternmost reservoir, Terra Fern Road Reservoir, is of welded steel construction and has a capacity of 0.25 MG. It is filled from the Alder Creek WTP finished water pumps. Water is then boosted by the adjacent Terra Fern Pump Station to the Sandercock Lane Reservoir.

Sandercock Lane Reservoir, another steel reservoir, is the highest reservoir in the City’s system and is the second reservoir located outside city limits. Access to the site is unreliable as it is steep and can be subject to downed trees and hazardous driving conditions during winter months. It has a capacity of 0.5 MG and is filled by the Terra Fern Pump Station as well as water from Brownell Springs. Sandercock Lane Reservoir serves Zone X, pressure regulated Zone 1, and supplies the Vista Loop Reservoirs.

The Vista Loop Reservoirs are an older 1.0 MG capacity steel tank and a more recently constructed 2.0 MG prestressed concrete tank. The Vista Loop Reservoirs directly serve Zone 2 and provide the supply to pressure regulated Zones 3, 4, and 5 through Zone 2 distribution piping. Neither the Sandercock Lane nor Vista Loop sites have generators, ATs, manual transfer switches (MTs), or back-up power available onsite.

The fifth and final tank is the newest and the lowest in the system. The concrete Revenue Avenue Reservoir receives water from the Hudson Road Intertie with the PWB. Water is pumped directly to the tank from the Hudson Pump Station located more than five miles north. The Transfer Pump Station pumps water from the reservoir to Zone 2. From here, a series of PRVs supply Zones 3, 4, and 5.

Table 1-2 | Reservoir Summary

Reservoir Name	Pressure Zone	Overflow Elevation (feet)	Volume (MG)	Diameter (feet)	Height to Overflow (feet)	Material	Year Constructed
Revenue Avenue	2	995	1.0	92	20	Concrete	2014
Vista Loop	2	1,142	1.0	86	24	Steel	1975
Vista Loop	2	1,142	2.0	122	24	Concrete	2001
Terra Fern Road	N/A	1,232	0.25	32	32	Steel	1978
Sandercock Lane	X	1,385	0.5	51	33	Steel	1966

1.4.3 Pump Stations

The City’s existing water system includes four distribution system pump stations and a raw water booster pump station. **Table 1-3** presents a summary of all existing pumping facilities. See **Figure 1-1** for the geographical locations of the pump stations.

The first pump station is the raw water booster pump station which was constructed in 1996 to provide additional capacity to the Alder Creek WTP from the 12-inch diameter raw water intake pipeline. The pump station consists of two 20-hp pumps with VFDs. The pump station provides the WTP with approximately 1,800 gpm (2.6 MGD). Back-up power for the raw water booster pump station is provided from the generator at the WTP.

The WTP houses four finished water pumps. Three submersible turbine pumps operate with Filters #1 and #2. Filter #3 operates with one vertical turbine pump. If all three filter trains are operating, three of the finished water pumps can convey a total of approximately 1,800 gpm (2.6 MGD). The Filter #3 pump has a design capacity of 1,100 gpm (1.6 MGD).

From the WTP, finished water is pumped to the Terra Fern Road Reservoir. The Terra Fern Road Reservoir controls the WTP operation by pressure transducer level transmitters. There is a generator onsite at the WTP, but it does not have an ATS and requires manual override. There is an ongoing project that will install an ATS at the WTP.

The Terra Fern Pump Station shares a site with the reservoir and pumps water to the Sandercock Lane Reservoir, picking up water from Brownell Springs along the way. The pump station was constructed in 1977 and houses five submersible turbine pumps for a capacity of 1,750 gpm (2.5 MGD).

Wholesale water purchased from the PWB at the Hudson Road Intertie is pumped to the City’s water system by the Hudson Pump Station. From here, three pumps, two duty and one standby, can supply up to 3,300 gpm (4.8 MGD) of water through 27,000 feet of pipe to the Revenue Avenue Reservoir, located within city limits. There are also hydrated lime chemical feed facilities to adjust the pH of the supply from PWB at this pump station, though it has never been necessary to implement the chemical equipment.

The fifth and final pump station is the Transfer Pump Station, which can convey up to 2,100 gpm (3 MGD) via three pumps, two duty and one standby, into Zone 2. The Terra Fern, Hudson, and Transfer pump stations all have a generator and ATS onsite.

Table 1-3 | Pump Station Summary

Pump Station	Pumping To	Pumping From	Pump No.	Approximate Capacity (gpm)	Emergency Back-up Power	VFD or Constant Speed	Year Constructed
Raw Water Booster	Alder Creek WTP	Alder Creek Intake	2	3,600	Manual Transfer Switch / Control Switch ¹	VFD	2018 (upgraded)
Alder Creek WTP	Terra Fern Road Reservoir	Alder Creek WTP	4	1,800	Manual Transfer Switch / Control Switch ¹	Constant Speed	1977
Terra Fern	Sandercock Lane Reservoir	Terra Fern Road Reservoir	5	1,750	Automatic Transfer Switch / Control Switch	Constant Speed	1977
Hudson	Revenue Avenue Reservoir	PWB Intertie	3	3,300	Automatic Transfer Switch / Control Switch	Constant Speed	2014
Transfer	Zone 2	Revenue Avenue Reservoir	3	2,100	Automatic Transfer Switch / Control Switch	Constant Speed	2014

¹ There is an ongoing project at the WTP that will upgrade this to an automatic transfer switch.

1.4.4 Pressure-Reducing Valves

A total of 15 pressure-reducing stations, installed throughout the distribution system, divide it into pressure zones, providing customers with appropriate water pressures. Of these, 13 PRVs are used to reduce pressure from Zone 2, directly and indirectly supplying Zones 3, 4, and 5. One PRV reduces pressure from the Sandercock Lane Reservoir, supplying Zone X. One more PRV serves Zone 1 from Zone X. The pressure zones served and settings of the PRVs are shown in **Table 1-4**. The geographic location and hydraulic configuration of these PRVs are illustrated in **Figure 1-1** and **Figure 1-2**, respectively.

Table 1-4 | Pressure Reducing Valves Summary

PRV Name	Elevation (ft)	Main Valve			Bypass Valve			Pressure Zone
		Setting (psi)	Size (in)	Grade (ft)	Setting (psi)	Size (in)	Grade (ft)	
Sandercock (Tank Bypass)	1226	75	6	1399	80	2	1411	Zone X
Vista Loop and US 26	1089	55	8	1216	60	3	1228	Zone 1
Sandy Heights South of Beebee	958	53	6	1080	64	1.5	1106	Zone 3
Pleasant and Strauss	960	55	6	1087	-	-	-	Zone 3
Pioneer and Strauss	970	50	4	1086	-	-	-	Zone 3
Towle and Sunset	824	65	6	974	68	1.5	981	Zone 3
Strawbridge and Tupper	903	60	6	1042	60	1.5	1042	Zone 3
Hood and Strauss	954	55	6	1081	-	-	-	Zone 3
Dubarko and Tupper	896	70	8	1058	80	2.5	1081	Zone 3
Proctor and Bruns	960	55	8	1087	-	-	-	Zone 3
38871 Proctor	966	50	10	1082	55	3	1093	Zone 3
37151 Hwy 26	840	56	10	969	61	3	981	Zone 4
Bluff North of High School	870	50	6	986	50	2	986	Zone 4
Dubarko East of Ruben	793	60	10	932	65	3	943	Zone 5
37000 SE Hwy 26	832	57	10	964	65	4	982	Zone 5

1.4.5 Distribution Piping

The City’s water transmission and distribution system contains approximately 67 miles of piping and is composed of various pipe materials ranging in size from 2 to 24 inches in diameter. The majority of the piping is 6, 8, 12, and 16 inches in diameter. Most of the pipes are ductile iron (75 percent) or cast iron (CI) (16 percent), in addition to other materials, including steel, polyvinyl chloride (PVC), and asbestos cement. The City has exclusively been installing ductile iron since 1979. **Table 1-5** presents an inventory of existing pipes by diameter.

Table 1-5 | Distribution System Pipe Summary

Diameter (inches)	Length (feet)	Percentage of All Pipe
2	1,616	0.5%
4	9,657	2.7%
6	88,126	24.9%
8	110,865	31.3%
10	4,810	1.4%
12	61,146	17.3%
16	47,787	13.5%
18	16,067	4.5%
24	14,124	4.0%
TOTAL	354,197	100%

CHAPTER 2

Water Requirements

This chapter characterizes current water demands and summarizes future growth scenarios, population projections, and projected future water demands for the City's water service area. Water demand forecasts presented in this chapter are used with performance criteria presented in **Chapter 3** to evaluate the existing water system's capacity to serve current customers and future growth. Demand forecasts are developed from historical water consumption and production records, regional planning data, current land use designations, and previous City water planning efforts.

2.1 Water Service Area

2.1.1 Existing Service Area

The existing City water service area includes approximately 80 percent of the land within the city limits. The City also provides service to three wholesale customers outside of the City's service area: Section Corner WD, Alder Creek-Barlow WD, and Skyview Acres Water Company. The service area is shown in **Figure 1-1**.

2.1.2 Future Service Area

Based on existing development types in the area, some re-development and densification is expected within the existing water service area, particularly in the central portion of the city. The City expects growth and expansion within its UGB, which is expected to be mostly low density residential. Subdivisions in the east are actively being developed and will affect Zone X in particular. The proposed future service area is illustrated in **Figure 1-1**.

2.2 Planning Period

The planning period for this WSMP is 20 years, through the year 2043, which meets the requirements for WSMPs outlined in the OAR 333-061. Water supply capacity is evaluated through 2050, to accommodate long-range supply development planning.

2.3 Water Demand Description

Water demand refers to all potable water required by the system including residential, commercial, industrial, city, and public uses. Water demands are described using three water use metrics: average daily demand (ADD), maximum (peak) day demand (MDD), and peak hour demand (PHD). Each of these metrics is stated in MGD.

- ADD is the total annual water volume used system-wide divided by 365 days per year.
- MDD is the largest 24-hour water volume for a given year. MDD typically occurs each year between July 1st and September 30th.
- PHD is estimated as the largest hour of demand on the peak water use day.

Water demand can be calculated using either water consumption or water production data. Water consumption data is taken from the City's Advanced Metering Infrastructure (AMI) data and includes all

revenue metered uses. This data can be analyzed by geographical location and customer type, which is useful for quantifying typical water use for different pressure zones and land uses. However, consumption data does not capture any water loss or unmetered uses, making it less useful in determining system-wide peak demands.

Water production is calculated as the sum of water supplied from the Alder Creek WTP, Brownell Springs, and the PWB connection. This includes unaccounted-for water such as loss through minor leaks and unmetered, non-revenue uses such as hydrant flushing. Total water production is recorded daily, making it useful for analyzing seasonal water demand trends, supply, and storage capacity.

2.4 Historical Water Demand

For the purposes of this WSMP, daily water production data is used to calculate system-wide historical water demand in order to account for all water uses including those which are not metered by the City and to develop peaking factors. Customer consumption and water service location data are used to distribute water demands throughout the hydraulic model, to estimate demands by pressure zone, and to quantify average water use by customer type for future demand projections described later in this chapter.

2.4.1 System-Wide Water Production

System-wide historical water production is presented in **Table 2-1**. The historical ratio of MDD:ADD, or peaking factor, is used to estimate future MDD from ADD. In addition, to understand the effect of outdoor water usage during the summer, Peak Season Demand (PSD) is calculated as the ADD between July 1st and September 30th.

Table 2-1 | Historical System-Wide Water Demand

Year	ADD (MGD)	PSD (MGD)	MDD (MGD)	MDD:ADD Peaking Factor
2016	1.15	1.49	2.36	2.1
2017	1.16	1.54	2.33	2.0
2018	1.22	1.67	2.87	2.3
2019	1.09	1.42	2.49	2.3
2020	1.24	1.59	2.47	2.0
2021	1.38	1.81	2.57	1.9
Average	1.21	1.59	2.51	2.1

¹ Based on City staff observations, actual demands may be less due to routine historical overflow of Revenue Avenue Reservoir when Hudson Pump Station supplied the City system from the PWB that has since ceased occurring. Consor was unable to identify a clear quantification of the overflow volume. It is recommended that the City investigate the impact of the recurring overflow event on demand forecast at the end of the year 2022.

2.4.2 Water Consumption by Pressure Zone

As described in **Chapter 1**, water systems are divided into pressure zones to provide adequate service pressure to customers at different elevations. Each pressure zone is served by specific facilities such as reservoirs, pump stations, or PRVs, which supply water to customers within an acceptable range of service pressures. To assess the adequacy of these facilities, it is necessary to estimate demand in each pressure zone. System-wide water consumption from 2020 was distributed uniformly within the City's pressure zones and with respect to the number of meters in each pressure zone. The percentage of water

consumption by pressure zone is summarized in **Table 2-2**. The maximum day peaking factor was applied to these demands to determine MDD.

Table 2-2 | 2020 Water Consumption by Pressure Zone

Pressure Zone	Percent of Demand
Zone X	5.0%
Zone 1	2.7%
Zone 2	46.5%
Zone 3	25.3%
Zone 4	13.4%
Zone 5	7.1%

2.4.3 Water Consumption by Customer Type

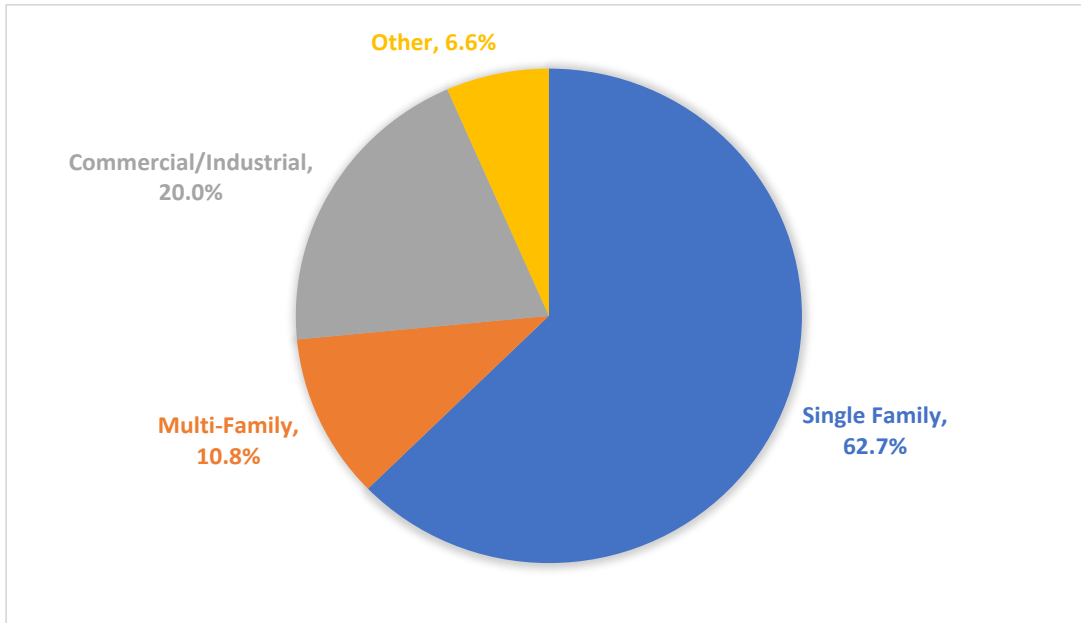
City AMI data provided historical average daily water consumption by customer type including single-family residential, multi-family residential, residential outside of city limits, commercial, industrial, and other (wholesale and public use). Historical use by customer type is presented in **Table 2-3**. The percentage of total 2020 average daily water consumption for each major customer type is presented in **Figure 2-1**.

Residential customer use makes up the majority of demand in the City. This category is assumed to be predominantly comprised of single-family homes, duplexes, and triplexes. Multi-family residential and industrial/commercial customer use also contribute significantly to overall demand. Combined (Other) wholesale, outside city limits residential, public, and City use constitutes approximately 6.6 percent of the total customer use.

Table 2-3 | Historical Water Consumption by Customer Type

Year	Water Consumption by Customer Type (MGD)				Total
	Single-family	Multi-family	Commercial/Industrial	Other (Wholesale, Outside City Limits Res. Public, etc.)	
2017	0.62	0.10	0.22	0.06	1.00
2018	0.62	0.10	0.23	0.06	1.02
2019	0.56	0.09	0.22	0.05	0.92
2020	0.61	0.10	0.19	0.07	0.98

Figure 2-1 | 2020 Water Consumption by Customer Type



2.4.4 Equivalent Dwelling Units (EDUs)

Sandy’s public water system serves a significant number of single-family residential customers as well as multifamily housing developments and commercial customers. Single-family residential water services generally have a consistent daily and seasonal pattern of water use or demand. Water demands for multifamily residential, commercial, and industrial users may vary significantly from service to service depending on the number of multifamily units per service or the type of commercial enterprise. When projecting future water demands based on population change, the water needs of non-residential and multi-family residential customers are represented by comparing their water use volume to the average single-family residential unit. The number of single-family residential units that could be served by the water demand of these other types of customers is referred to as the number of “equivalent dwelling units” (EDUs). EDUs differ from actual metered service connections in that they relate all water services to an equivalent number of representative single-family residential services based on typical annual consumption.

In order to establish the average consumption per EDU, the total number of single-family residential service connections is compared to the total consumption by single-family residential customers. Residential ADD divided by the number of base size meters is the average demand per EDU (ADD/EDU in gpd/EDU). Average consumption per EDU (ADD/EDU) is anticipated to remain constant through time and based on the calculations using 2017 to 2020 water consumption records, assumed to be 182 gpd/EDU.

2.5 Future Water Demand Forecast

Future water demands were projected based on historical data, population forecasts, and growth trends. Projections take into account anticipated growth in new development areas and estimated water loss. Specific criteria used to forecast future water demands are listed below.

Actual demands may be less than projected. At one time, Hudson Pump Station supplied the City system from the PWB. During this time, City staff observed routine overflow of Revenue Avenue Reservoir. This overflow has since ceased occurring. Consor was unable to identify a clear quantification of the overflow volume. It is recommended that the City investigate the impact of the recurring overflow event on demand forecast at the end of the year 2022.

2.5.1 Residential Water Demand

Population projections were the basis for estimated residential water demand. The Coordinated Population Forecast for Clackamas County published by the Portland State University (PSU) Population Research Center (PRC, June 2020) includes US census population data from 2010 and estimated populations and growth rates for 2020 through 2070 for the City. Historical and projected populations are summarized in **Table 2-4**. The population projections do not include areas served by the Alder Creek Barlow WD, Section Corner WD, or Skyview Acres Water Company.

Table 2-4 | Historical and Projected Populations

Year	Population	Source
2010	9,980	U.S. Census
2022	12,991	PSU-PRC Population Estimate
2023	13,415	Projected using 2.1% AAGR (PSU PRC)
2025	13,985	Projected using 2.1% AAGR (PSU PRC)
2030	15,516	Projected using 2.1% AAGR (PSU PRC)
2035	17,215	Projected using 2.1% AAGR (PSU PRC)
2040	19,100	Projected using 2.1% AAGR (PSU PRC)
2043	20,329	Projected using 2.1% AAGR (PSU PRC)
2045	21,192	Projected using 2.1% AAGR (PSU PRC)
2050	22,942	Projected using 1.6% AAGR (PSU PRC)

Using the 2020 city-wide population estimate and residential water consumption data provided by the City for 2017 through 2020, the average use per capita per day was calculated. Note that this is for single- and multi-family consumption combined. The average per capita use was 65 gallons per capita per day (gpcd) between 2017 and 2020. The same value of 65 gpcd is used to estimate future residential water demand.

2.5.2 Non-Residential Water Demand

Commercial, industrial, wholesale, outside city limit residential, public, and City water use projections are based on consumption data from 2017 through 2020. Average 2020 consumption data for Commercial/Industrial and Other were used as basis of demands for 2023. Commercial and industrial demands are expected to increase proportional to residential demand as described in **Section 2.5.1**. Other (wholesale, outside city limit residential, and public and City water) usage is expected to remain constant through the planning period.

2.5.3 Non-Revenue Water Demand

Non-revenue water is the amount of water produced that is not billed to a customer. This generally includes water losses in the distribution system, unauthorized use, and authorized unbilled use such as hydrant flushing for water quality. This water must be accounted for in demand projections to ensure proper

infrastructure sizing. Non-revenue water is estimated as the difference between billed consumption and production.

Non-revenue water is projected using historical data, based on the difference between billed consumption and production data from 2017 through 2020. Average annual non-revenue demand was estimated at 15 percent of system production volume. This is on the high end of typical system-wide non-revenue water. It is expected that the City could decrease water loss as they continue to update and repair water system infrastructure. Additionally, water loss will be reduced in newly constructed water system infrastructure. For these reasons, non-revenue water demand is not expected to increase over the planning period proportional to growth. A constant, average non-revenue water demand was applied to the demand projections in **Table 2-5**. The demand is based on 15 percent of 2020 annual production (equivalent to 0.184 MGD).

2.5.4 Water Demand Projections

Table 2-5 presents future demand projections by customer type, as well as total ADD and MDD through 2050. A peaking factor of 2.3 (maximum peaking factor from 2017-2020 historical data, **Table 2-1**) was used to estimate MDD from ADD projections.

Table 2-5 | Future Water Demand Projections by Customer Type (MGD)

	Single-family Residential	Multi-family Residential	Commercial/Industrial	Other (Wholesale, Outside City Limits Res., Public, etc.)	Total ADD	MDD
2023	0.74	0.12	0.22	0.07	1.33	2.59
2025	0.77	0.13	0.21	0.07	1.38	2.69
2030	0.86	0.14	0.24	0.07	1.50	2.95
2035	0.95	0.16	0.26	0.07	1.64	3.23
2040	1.06	0.18	0.29	0.07	1.79	3.55
2043	1.13	0.19	0.31	0.07	1.88	3.75
2045	1.17	0.20	0.33	0.07	1.95	3.90
2050	1.27	0.21	0.36	0.07	2.10	4.21

¹ Accounts for 0.184 MGD constant, average non-revenue water demand through projections. Historical data shows average system non-revenue water demand as 15 percent of production volume. 2020 production volume used to estimate 0.184 MGD average non-revenue demand.

² Based on City staff observations, actual demands may be less due to routine historical overflow of Revenue Avenue Reservoir when Hudson Pump Station supplied the City system from the PWB that has since ceased occurring. Consor was unable to identify a clear quantification of the overflow volume. It is recommended that the City investigate the impact of the recurring overflow event on demand forecast at the end of the year 2022.

2.6 Future Water Demand by Pressure Zone

Due to the limited available water consumption data, projected future water demand by pressure zone cannot be accurately forecast without a reliable spatial allocation of current water usage. As presented in **Chapter 5**, future water demands by pressure zone will be estimated using an estimate of developable land by land use type (residential – single-family or multi-family, commercial/industrial, and other uses). While the Oregon House Bill 2001 Middle Housing implementation rules could result in increased residential housing density in some areas, the increase is anticipated to be minimal. The City should review housing density increases on a case-by-case basis during the plan development process. If a situation arises where increased housing density would be limited by available fire flow in the area, the City may require additional sprinkling requirements on structures to meet fire codes and allow for development. This methodology will

provide a rough forecast by pressure zone to support capacity analyses and future water system facility sizing.

It is recommended that the City work with their AMI provider to extract detailed records of annual usage by customer, to support future refinement of hydraulic model demand distribution and pressure zone demand allocation.

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CHAPTER 3

Planning and Analysis Criteria

3.1 Introduction

This chapter documents the performance criteria used for analyses of the City's water supply and distribution system presented in **Chapter 4** and **Chapter 5**. Criteria are established for evaluating water supply, distribution system piping, service pressures, storage and pumping capacity, and fire flow availability. These criteria are used in conjunction with the water demand forecasts presented in **Chapter 2** to complete the water system analysis.

3.2 Performance Criteria

The water distribution system should be capable of operating within certain performance limits under varying customer demand and operational conditions. The recommendations of this plan are based on the performance criteria developed in this chapter and summarized in **Table 3-1** at the end of this chapter. These criteria have been developed through a review of City design standards, State of Oregon requirements, American Water Works Association (AWWA) acceptable practice guidelines, the *Ten States Standards*, the *State of Washington Water System Design Manual*, and practices of other water providers in the region.

3.2.1 Supply

Supply adequacy is measured based on firm capacity. For a treatment plant, this is the total plant capacity with the largest single treatment train out of service. For wholesale supply, it is based on the wholesale supply agreement and the firm capacity of the City facilities transmitting supply to the water system. For a pump station, such as the Hudson Road Intertie, this is the capacity with the largest pump out of service.

The City's total firm supply capacity must equal, or exceed, the MDD of the water system.

3.2.2 Service Pressure

Water distribution systems must provide water to customers within a limited pressure range, generally 40 to 80 pounds per square inch (psi). To do this, systems are divided into pressure zones which provide water to customers within a band of ground elevations. Pressure zones are typically served by one or more reservoirs with the same overflow elevation. The ground elevation band is limited by the pressure available from the HGL within each level. The HGL in each pressure zone is set by the water level in the reservoirs or settings of PRVs serving the level. Areas of the system can also be hydraulically connected to another pressure zone by a PRV or pump station.

The City's acceptable service pressure range under normal operating conditions, or ADD, is 40 to 80 psi. However, due to ground elevations in some pressure zones, some customers receive service pressures outside this range. Where mainline pressures exceed 80 psi, services are equipped with individual PRVs to maintain their static pressures at no more than 80 psi in compliance with the Oregon Plumbing Specialty Code. During a fire flow event or emergency, the minimum service pressure is 20 psi as required by Oregon Health Authority, Drinking Water Program (OHA) regulations.

3.2.2.1 Distribution System Evaluation

The distribution system is evaluated for adequacy under two key demand scenarios: MDD plus fire flow and PHD. The distribution system should provide the required fire flow to a given location under MDD conditions while maintaining a minimum residual service pressure of 20 psi at any customer meter in the system as required by OHA regulations.

3.2.2.2 Main Size

Typically, new water mains should be no smaller than 8 inches in diameter. However, 8-inch mains may cause water quality concerns in areas with small, non-emergency demands and minimal looping. Pipe may be 6 inches in diameter if it is directly connected to an 8-inch or larger loop and as long as no hydrants are connected to the 6-inch diameter pipe. For areas with commercial or industrial use or fire flows exceeding 1,000 gpm, a minimum of 12-inch diameter pipe is recommended.

3.2.3 Storage Capacity

Water storage reservoirs should provide capacity for four purposes: operational storage, equalization storage, fire storage, and standby or emergency storage. A brief discussion of each storage element is provided below. Adequate storage capacity must be provided for each set of hydraulically connected pressure zones. Storage volume for closed pressure zones served through PRVs or by constant pressure pumping is provided by the upstream pressure zone supplying the PRV or pump station. The City does not currently have any constant pressure pumped pressure zones but has four PRV-fed constant pressure zones.

3.2.3.1 Operational Storage

Operational storage is the storage in reservoirs between the on and off set points for the supply sources under normal operating conditions. It is calculated by actual reservoir geometries; a typical variation in reservoir level is 3 to 5 feet. An operational range of 5 feet is recommended.

3.2.3.2 Equalization Storage

Equalization storage is the volume of water dedicated to supplying demand fluctuations throughout the day. Per the *Washington Water System Design Manual*, water systems must provide equalization storage when source pumping capacity cannot meet the PHD. It is recommended that the City plan for equalization storage equal to approximately 25 percent of MDD. This is consistent with the practices of similar water utilities in the region.

3.2.3.3 Fire Storage

Water stored for fire suppression is typically provided to meet the single most severe fire flow demand within each pressure zone. Fire services in the City's water service area are provided by Sandy Fire District No. 72, which uses the Oregon Fire Code (OFC) as a standard for addressing general requirements by building construction and development type.

Required fire flows vary depending on the type of development and building construction. Zoning is used as an analog for development type when evaluating required fire flows for planning within the City's water service area as discussed in **Section 3.2.5**. According to the 2019 OFC, the largest required fire flow for buildings in areas with adequate and reliable water systems, like the City, is 3,000 gpm for a recommended

duration of 3 hours. The recommended fire storage volume is determined by multiplying the fire flow rate by the duration of that flow.

3.2.3.4 Emergency Storage

Emergency storage is provided to supply water during emergencies such as pipeline failures, equipment failures, power outages, or natural disasters. The amount of emergency storage provided can be highly variable depending upon an assessment of risk and the desired degree of system reliability. An emergency storage volume of twice the ADD is recommended and is consistent with practices of other utilities in the region.

3.2.4 Pump Stations

Pumping capacity requirements vary depending on the water demand, volume of available storage, and the number of pumping facilities serving a particular pressure zone.

3.2.4.1 Pumping to Storage

When pumping to storage reservoirs, a firm pumping capacity equal to the pressure zone's MDD is recommended. Firm pumping capacity is defined as a pump station's pumping capacity with the largest pump out of service.

3.2.4.2 Backup Power

It is recommended that pump stations supplying gravity storage reservoirs include, at a minimum, MTSS and connections for a portable back-up generator. The emergency storage volume in each reservoir will provide short term water service reliability in case of a power outage at the pump station. On-site back-up generators with ATSS are recommended for pump stations critical to the operation of the system.

3.2.5 Required Fire Flow

The water distribution system provides water for domestic use and fire suppression. The amount of water required for fire suppression purposes at a specific location is associated with the local building size and construction type. Zoning and land use are used as analogs for building size when evaluating required fire flows for planning within the City's water service area.

Fire flow requirements are typically much greater in magnitude than the MDD in any local area. Therefore, fire flow must be considered when sizing pipes to ensure adequate hydraulic capacity is available for these potentially large demands. Sandy Fire District No. 72 has generally adopted the 2019 OFC as its own standard.

3.2.5.1 Single-Family and Two-Family Dwellings

The 2019 OFC guidelines specify a minimum fire flow of 1,000 gpm for single-family and two-family dwellings with square footage 3,600 square feet or less. For residential structures larger than 3,600 square feet, the minimum fire flow requirement is 1,500 gpm. The actual fire flow requirement is based on building construction and size and can be found in Table B105.1(2) in Appendix B of the OFC.

For the purposes of this WSMP, distribution piping fire flow capacity will be tested in the water system hydraulic model with a minimum requirement of 1,500 gpm to accommodate the range of potential future residential development in the City. Where deficiencies are identified in the existing system based on this

1,500 gpm requirement, existing homes that are less than 3,600 square feet will be evaluated at a 1,000 gpm fire flow to confirm if a potential deficiency exists for current customers.

3.2.5.2 Other Dwelling Types

For buildings that are not single- and two-family residential dwellings, the fire flow requirement is based on building type and size and can be found in Table B105.1(2) in Appendix B of the OFC. The fire flow rate and duration requirements are reduced if a building has an automatic sprinkler system. Section B106.1 of the OFC sets the maximum fire flow requirement at 3,000 gpm. This applies to any new, altered, moved, enlarged, or repaired building. Buildings that require more than 3,000 gpm need approval from the fire code official.

Table 3-1 | Performance Criteria Summary

Water System Component	Evaluation Criterion	Value	Design Standard/Guideline
Water Supply	Primary Source Capacities	Firm Capacity >= MDD ³	Ten States Standards, Washington Water System Design Manual
	Normal Range, during ADD ¹	40-80 psi	AWWA M32
Service Pressure	Maximum (without PRV)	80 psi	AWWA M32, Oregon Plumbing Specialty Code Section 608.2
	Minimum, PHD ²	30 psi	Consor Recommended
	Minimum, during fire flow	20 psi	AWWA M32, OAR 333-061
Distribution Mains	Maximum Pipe Velocity	Not to exceed 12 fps	Consor Recommended
	Minimum Pipe Diameter	8-inch unless specific criteria is met	City Standard
Storage	Operational Storage	Tank level set points	Consor Recommended and Washington Water System Design Manual
	Equalization Storage	25% of MDD ³	
	Fire Storage	Required fire flow x flow duration	
	Emergency Storage	2 x ADD	
Pump Stations	Firm Capacity Pump to Storage	MDD	Consor recommended
	Backup Power	Automatic transfer switch and on-site generator	
Required Fire Flow and Duration	Single- or Two-Family Residential <=3,600 square feet	1,000 gpm for 2 hours	2019 Oregon Fire Code
	Residential >3,600 square feet and other Buildings	Use OFC criteria for building size and type up to a maximum of 3,000 gpm for 3 hours	
	Commercial and Industrial	Use OFC criteria for building size and type up to a maximum of 3,000 gpm for 3 hours	

¹ ADD: Average daily demand, defined as the average volume of water delivered to the system or service area during a 24-hour period.

² PHD: Peak hour demand, defined as the maximum volume of water delivered to the system or service area during any single hour of the MDD.

³ MDD: Maximum day demand, defined as the maximum volume of water delivered to the system or service area during any single day.

CHAPTER 4

Distribution System Analysis

4.1 Introduction

This chapter provides an evaluation of the City's water service distribution system, including storage reservoirs, pump stations, control valves, and distribution system piping. As discussed in **Chapter 1**, the City's distribution system consists of six pressure zones, five storage reservoirs, four pump stations, and 15 PRV stations. System facilities are analyzed for adequacy in both existing (2023) and near-term (2030) conditions within the 20-year planning horizon (2043), as well as build-out (2050) conditions beyond the planning period. These analyses inform the City's recommended CIP, presented in **Chapter 6**.

This section documents the distribution system analysis according to the performance criteria outlined in **Chapter 3** and water demand forecasts summarized in **Chapter 2**. The analysis assesses overall system performance including service pressures, pipeline velocities, storage and pumping capacities, and emergency fire flow availability. An analysis of the City's existing water supply system is presented in **Chapter 4**.

4.2 Pressure Zone Analysis

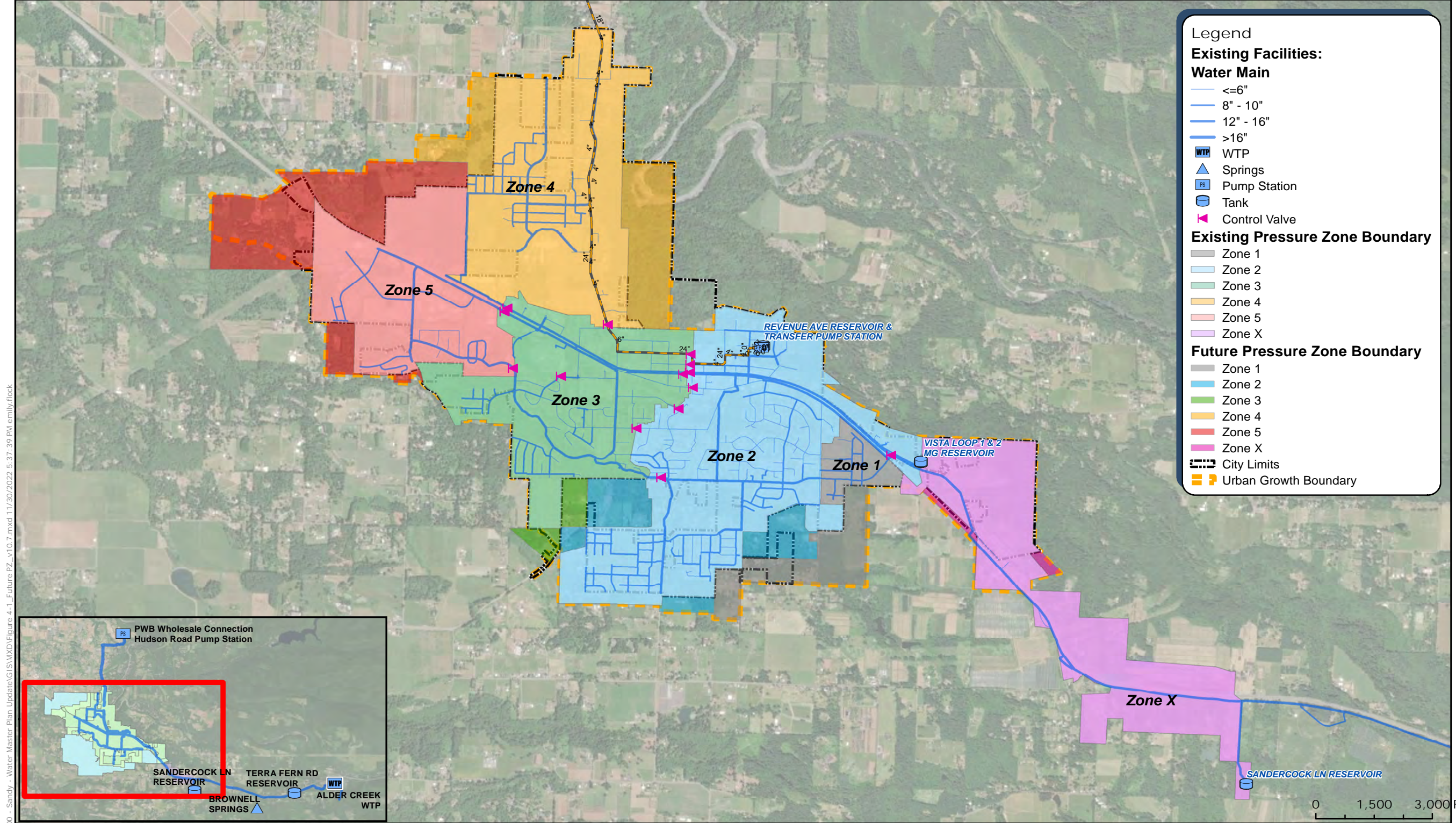
4.2.1 Existing Pressure Zones

As presented in **Chapter 1**, the City's current water service area includes all properties within city limits and some surrounding areas, including three wholesale customers. The City's distribution system is divided into six pressure zones. In addition to customers within zone boundaries, the City provides water to the three wholesale customers, 29 meters above Zone X and the Sandercock Lane Reservoir, and three meters supplied by gravity from Brownell Springs. Zones 1, 3, 4, and 5 are currently served by 14 PRVs. The Sandercock Lane and Vista Loop Reservoirs serve Zones X and 2, respectively.

4.2.2 Pressure Zone Findings

Under existing PHD conditions, the City's six pressure zones provide adequate minimum services pressures of at least 30 psi throughout the system. The maximum acceptable pressure at a water main within the system is 80 psi. Where water main pressure exceeds 80 psi, PRVs are required on individual service connections.

As discussed in **Chapter 2**, future development and densification is expected within the City's UGB. New customers are anticipated to be served primarily by expansion of the existing six pressure zones. Future pressure zone boundaries are illustrated in **Figure 4-1**. Boundaries were developed based on contour and tax lot data.



Legend

Existing Facilities:

Water Main

- ≤6"
- 8" - 10"
- 12" - 16"
- >16"

WTP
 Springs
 Pump Station
 Tank
 Control Valve

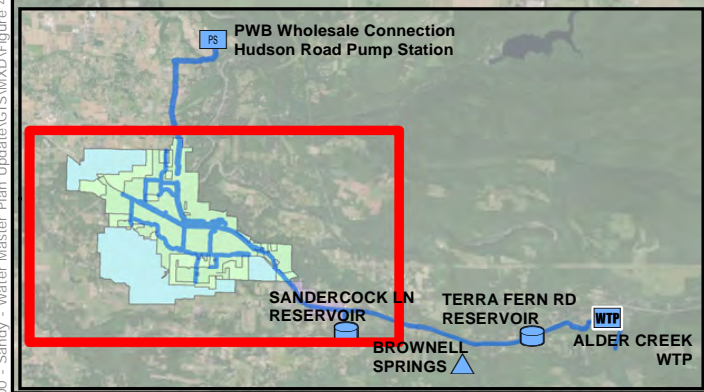
Existing Pressure Zone Boundary

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5
- Zone X

Future Pressure Zone Boundary

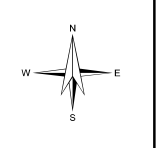
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Zone 5
- Zone X

City Limits
 Urban Growth Boundary



0 1,500 3,000 Feet

December 2022



City of Sandy
Water System Master Plan

Figure 4 - 1
Future Pressure Zone
Boundary

20-2800

4.3 Storage Capacity Analysis

4.3.1 Existing Storage Facilities

This section details the City’s existing and future storage capacity needs. Storage projects are identified to accommodate long-term demand projections and improve overall resiliency, reliability, and operational efficiency. As discussed in **Chapter 3**, required storage capacity is calculated as a sum of operational, equalization, fire, and emergency storage. **Table 4-1** summarizes current and projected storage capacity analyses performed for each of the City’s pressure zones.

For these analyses, the existing reservoir storage volumes were summed and associated with pressure zones accordingly. The Terra Fern Road and Sandercock Lane Reservoirs provide storage to Zone X, which supplies Zone 1 via a PRV. The two Vista Loop Reservoirs and the Revenue Avenue Reservoir supply Zone 2. Zone 3 is served from Zone 2 by a system of eight PRVs. Zone 3 then serves Zones 4 and 5 via two PRVs per zone. In summary, the Terra Fern Road and Sandercock Lane Reservoirs are associated with Zones X and 1, while the Vista Loop and Revenue Avenue Reservoirs are associated with Zones 2, 3, 4, and 5.

The existing Sandercock Lane Reservoir and the Vista Loop Reservoirs serve customers in Zone X and Zone 2, respectively, by gravity. The City’s remaining pressure zones are supplied by PRVs. There must be adequate storage volume to meet customer demands in the zones served directly from reservoirs, as well as smaller zones served through PRVs from the higher level zones with reservoirs.

Table 4-1 | Storage Capacity Analysis

Scenario	Pressure Zone	Required Storage Volume (MG)					Existing Storage Available (MG)	Storage Deficit (MG)
		Operational	Equalization	Fire Flow	Emergency	Total		
2023	Zone X	0.05	0.03	0.54	0.13	0.76	0.75	0.69
	Zone 1	0.05	0.02	0.54	0.07	0.68		
	Zone 2	0.23	0.30	0.54	1.24	2.30	4	2.12
	Zone 3	0.23	0.16	0.54	0.67	1.60		
	Zone 4	0.23	0.09	0.54	0.36	1.21		
	Zone 5	0.23	0.05	0.54	0.19	1.00		
	System	1.01	0.65	3.24	2.66	7.56		
2030	Zone X	0.05	0.04	0.54	0.15	0.78	0.75	0.77
	Zone 1	0.05	0.03	0.54	0.12	0.75		
	Zone 2	0.23	0.31	0.54	1.29	2.37	4	2.46
	Zone 3	0.23	0.17	0.54	0.70	1.64		
	Zone 4	0.23	0.11	0.54	0.44	1.31		
	Zone 5	0.23	0.08	0.54	0.30	1.14		
	System	1.01	0.74	3.24	3.00	7.99		
2043	Zone X	0.05	0.05	0.54	0.18	0.82	0.75	0.96
	Zone 1	0.05	0.06	0.54	0.23	0.89		
	Zone 2	0.23	0.34	0.54	1.40	2.51	4	3.24
	Zone 3	0.23	0.19	0.54	0.76	1.71		
	Zone 4	0.23	0.16	0.54	0.62	1.55		
	Zone 5	0.23	0.14	0.54	0.56	1.47		
	System	1.01	0.74	3.24	3.00	7.99		

Scenario	Pressure Zone	Required Storage Volume (MG)					Existing Storage Available (MG)	Storage Deficit (MG)
		Operational	Equalization	Fire Flow	Emergency	Total		
	System	1.01	0.94	3.24	3.76	8.95	4.75	4.20
2050	Zone X	0.05	0.05	0.54	0.20	0.85	0.75	1.07
	Zone 1	0.05	0.08	0.54	0.30	0.97		
	Zone 2	0.23	0.36	0.54	1.47	2.59	4	3.69
	Zone 3	0.23	0.20	0.54	0.79	1.76		
	Zone 4	0.23	0.19	0.54	0.73	1.68		
	Zone 5	0.23	0.18	0.54	0.70	1.65		
	System	1.01	1.05	3.24	4.20	9.50	4.75	4.75

4.3.2 Storage Capacity Findings

As shown in **Table 4-1**, the existing water distribution system is lacking in storage for the current 2023 scenario by approximately 2.81 MG, system wide. By the build-out scenario in 2050, the system has a storage deficit of about 4.75 MG.

The City identified three City-owned tax lots that could serve as potential reservoir sites: 24E13BD00101 (Site 2), 24E14DA00700 (Site 1A), and 24E14DB07300 (Site 1B). A summary of these sites and their potential uses is provided in **Table 4-2**.

Site 1A is located at a ground elevation of approximately 850 feet. On Site 1A, the City could construct a buried tank to serve Zone 5 at its current HGL. They also have the option of constructing a tank that would raise the HGL of Zone 5. For the purposes of this WSMP, a reservoir with a floor elevation of 802 feet and a volume of 1.7 MG was modeled at this site to serve Zone 5 at its current HGL. A reservoir at this site would require approximately 1,200 feet of supply piping and 2,000 feet of outlet piping.

With a ground elevation of approximately 900 feet, Site 1B is too high to serve Zone 5 and too low to serve Zone 3. This site could be utilized to provide storage for Zone 4. This would require approximately 3,000 feet of transmission main. Use of this site would be limited by its small size.

Site 2 is the largest by area and has the widest range of ground elevations. One potential use for this site is to construct an elevated storage tank to supply Zone 3. The site could also be used to supply storage to Zone 4 by raising the zone's HGL, which would allow it to be tied directly into the PWB transmission main. For this WSMP, a reservoir was modeled on this site to supply Zone 4, with a floor elevation of 882 feet and a volume of 1.7 MG. This reservoir would require about 300 feet of supply piping and 3,200 feet of transmission main.

In addition to the undeveloped potential reservoir sites, the Sandercock Lane site could be utilized to increase available storage for Zones X and 1 and provide gravity supply to lower elevation pressure zones. An additional reservoir could be constructed on the site or the existing reservoir removed and replaced with a larger one.

Table 4-2 | Potential Reservoir Sites

Tax Lot ID (Address)	Site Name	Ground Elevation Range (feet)	Potential Uses for Site
24E13BD00101 (17255 Smith Ave)	Site 2	890 to 970	<ul style="list-style-type: none"> ➤ Construct an elevated reservoir to provide storage for Zone 3 ➤ Raise the HGL of Zone 4 by providing storage from this site; Zone 4 could then be directly tied in to the PWB transmission main ➤ Construct a ground-level reservoir and pump station to supply the system where needed
24E14DA00700 (Sunset St and University Ave)	Site 1A	840 to 860	<ul style="list-style-type: none"> ➤ Construct a buried reservoir to serve Zone 5 ➤ Raise the HGL of Zone 5 by providing storage from this site ➤ Construct a ground-level reservoir and pump station to supply the system where needed
24E14DB07300 (37615 Sandy heights St)	Site 1B	895 to 905	<ul style="list-style-type: none"> ➤ Construct a reservoir to serve Zone 4

4.4 Pumping Capacity Analysis

4.4.1 Existing Pumping Facilities

As described in **Section 1.4.3**, the existing distribution system includes four pump stations. The Alder Creek WTP, Terra Fern, and Hudson Pump Stations pump directly to the Terra Fern Road, Sandercock Lane, and Revenue Avenue Reservoirs, respectively. Aside from a handful of customers served above Zone X from the Terra Fern pump station discharge piping, the Revenue Transfer pump station is the only one that pumps directly into the distribution system piping.

Pressure zones with the benefit of gravity storage are also referred to as open zones. All six of the City’s pressure zones are open. Operational and fire storage supplied by open zone reservoirs make it unnecessary to plan for fire flow or peak hour capacity from pump stations or other supplies, assuming adequate storage is available. Open zone pump stations must have sufficient firm capacity to meet the MDD for all customers in the zone.

4.4.2 Pumping Capacity Findings

The pumping capacity analysis was completed for the entire system, rather than by pressure zone, and accounted the capacities of the Terra Fern and Transfer Pump Stations. **Table 4-3** summarizes the analysis of the City’s existing and future pumping requirements. The existing pump stations provide adequate capacity to supply existing and future demands.

Table 4-3 | Pumping Capacity Analysis

Scenario	Existing Total Capacity (MGD)	Required Capacity, MDD (MGD)	Pumping Deficit (MGD)
2023	4.68	2.59	-2.09
2030	4.68	2.95	-1.73
2043	4.68	3.75	-0.93
2050	4.68	4.21	-0.47

Though the system’s existing pumping capacity is sufficient to meet existing and future demands, adequate fire flow is not being provided for the system above the Sandercock Lane Reservoir. In order to meet MDD

plus fire flow demands, it is recommended that upgrades be completed at the Terra Fern Pump Station. A 1,000 gpm fire flow pump should be added to supply current and future demands.

In addition to upgrades at the Terra Fern Pump Station, a pump station should be constructed at the Vista Loop site to provide redundancy to the system. Currently, if the Alder Creek WTP supply is unavailable, Brownell Springs may not supply sufficient capacity to customers above Zone 2 that the Transfer pump station cannot serve. A Vista Loop Pump Station would be able to supply Zones X and 1 as well as customers above Sandercock Lane Reservoir in case of an emergency. The Vista Loop Pump Station should be sized to provide 400 gpm, which will meet Zone X plus Zone 1 demands. It should provide 310 feet of head so that it can pump up to Sandercock Lane Reservoir, which is the highest point in the system.

4.5 Distribution System Analysis

4.5.1 Hydraulic Model

A hydraulic model was developed using the City’s GIS data. This included utilizing shapefiles provided by the City. **Table 4-4** presents the shapefiles used to create the hydraulic model.

Table 4-4 | City GIS Data

File Name	Model Element	Notes
Water_Mainlines(1).shx	Pipes	Determined pipe length, diameter, material, and pressure zone from shapefile
PRV_Valves(1).shx	Valves	Determined PRV location and size from shapefile

In addition to the model build, the meter shapefile and tax lot shapefile were utilized to allocate demands to the system. The Demand Allocation used the 2020 consumption data to allocate the demand based on meter type and meter size. **Table 4-5** presents the demand allocation by meter type and meter size.

Table 4-5 | Demand Allocation

Land Use	Meter Size	Number of Meters	Total Demand (gpm)	Demand per Meter (gpm)
Single Family	¾ and 1-inch	3,623	435.37	0.12
Single Family	2-inch	4	2.17	0.54
Multi Family	¾, 1, 1½, 2, and 4-inch	47	72.85	1.55
Commercial/Industrial	¾, 1, 1½, and 2-inch	253	136.76	0.54

¹ Meter data was obtained from December 2020 billing data provided by the City.

Once the demand was spatially allocated per the known meter locations, it could be scaled to simulate ADD, MDD, and PHD. **Table 4-6** presents the demands within the system scaled to meet the required simulation conditions.

Table 4-6 | Demand Scenarios

Scenario	System-Wide Water Demand (MGD)		
	ADD	MDD	PHD
Existing (2023)	1.33	2.59	4.26
Near-Term (2030)	1.50	2.95	4.83
Build-Out (2050)	2.10	4.21	6.85

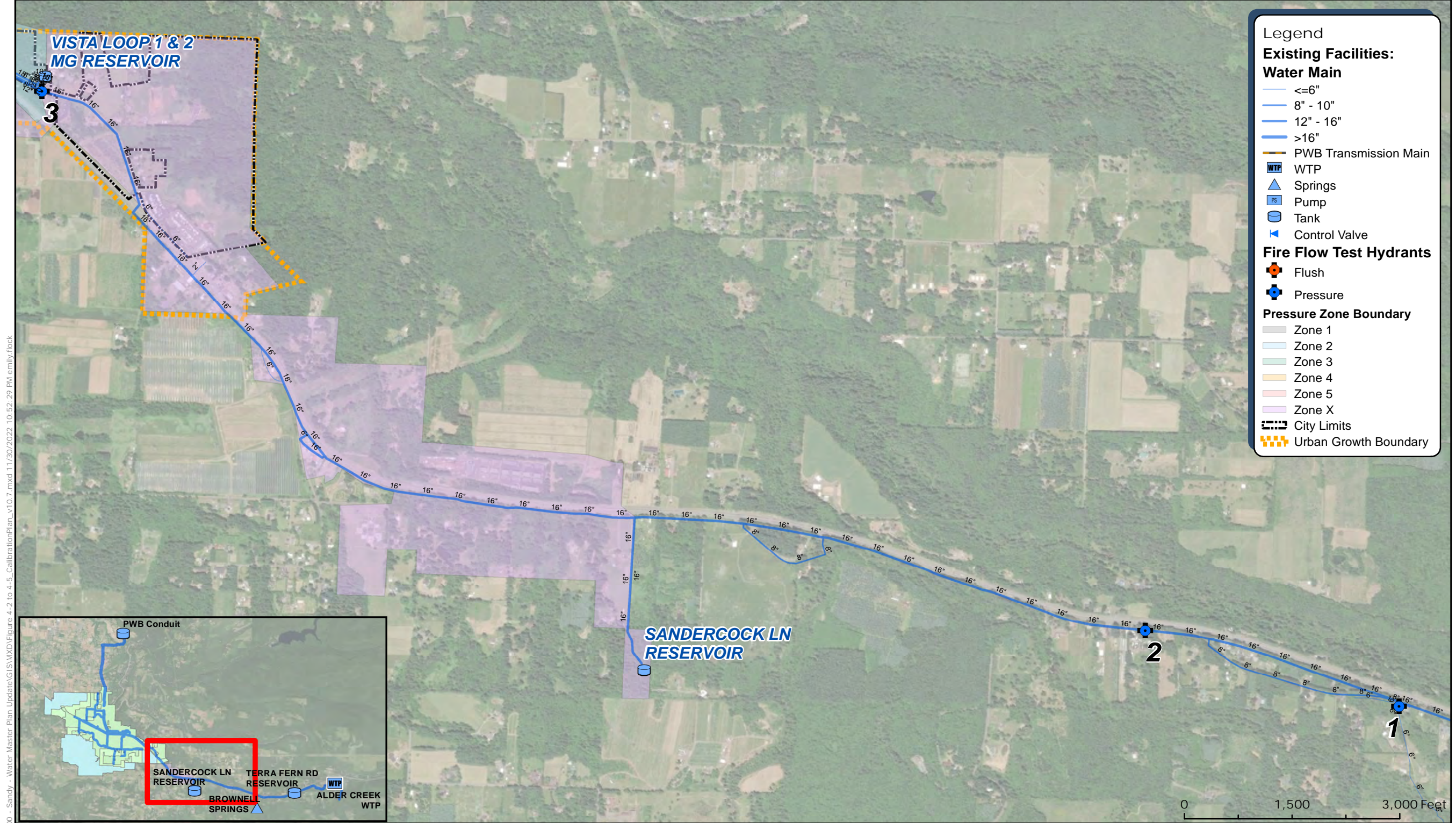
4.5.2 Model Calibration

4.5.2.1 Fire Flow Testing

Conсор provided the City with the proposed locations for hydrant testing to be conducted for the purpose of hydraulic model verification and calibration. Some of the test locations provided static pressure to verify the HGL of specific areas of the system. At the majority of locations, fire hydrants were operated to stress the system to calibrate the model. The data obtained when the system is stressed can be used to determine required changes to the boundary conditions and pipe roughness factors within the hydraulic model. The City provided fire flow test results conducted over the course of three days. **Table 4-7** presents an overview of the fire flow test locations and purpose of the test. **Figure 4-2**, **Figure 4-3**, and **Figure 4-4** provide maps of the fire flow test locations.

Table 4-7 | Fire Flow Test Location Overview

Date of Test	Test #	Pressure Zone	Approximate Test Location	Time of Test
01/20/2022	1	X	Mt Hood Hwy & SE Wagoneer Loop	10:25
	2	X	Mt Hood Hwy & SE Rainbow Hill Rd	10:35
	3	X	SE Vista Loop Dr & SE 412th Ave	10:51
	4	1	Antler Ave & Dubarko Dr	11:00
	5a	2	Langensand Rd & McCormick Dr	11:31
	6a	2	Pacific Ave & Dubarko Dr	13:55
	7a	2	Cork Ave & Cascadia Dr	14:13
	8a	2	Revenue Ave & Idleman St	15:00
	9	3	Sandy Heights St & Nettie Connett Dr	15:31
	10a	3	37695 HWY 26	15:52
	14	5	36535 Industrial Way	16:10
15	5	Skogan Rd & Aubin St	16:26	
01/24/2022	11	4	Coralburst St & Jewelberry Ave	14:05
	12	4	Jefferson Ave & Olson St	14:21
	13	5	Kelso Rd & Shalimar Dr	14:38
	16	PWB	SE Bluff Rd & SE Hauglum Rd	15:06
	17	PWB	SE Bluff Rd & SE Hudson Rd	15:23
	18	PWB	39175 SE Hudson Rd	15:32
01/25/2022	5b	2	Langensand Rd & McCormick Dr	14:13
	6b	2	Pacific Ave & Dubarko Dr	15:02
	7b	2	Cork Ave & Cascadia Dr	15:37
	8b	2	Revenue Ave & Idleman St	16:10
	10b	3	37695 HWY 26	16:37



G:\IPDX\Projects\20\2800 - Sandy - Water Master Plan Update\GIS\MXD\Figure 4-2 to 4-5_CalibrationPlan_v10.7.mxd 11/30/2022 10:52:29 PM emily.flock

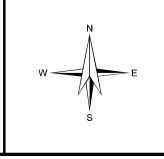
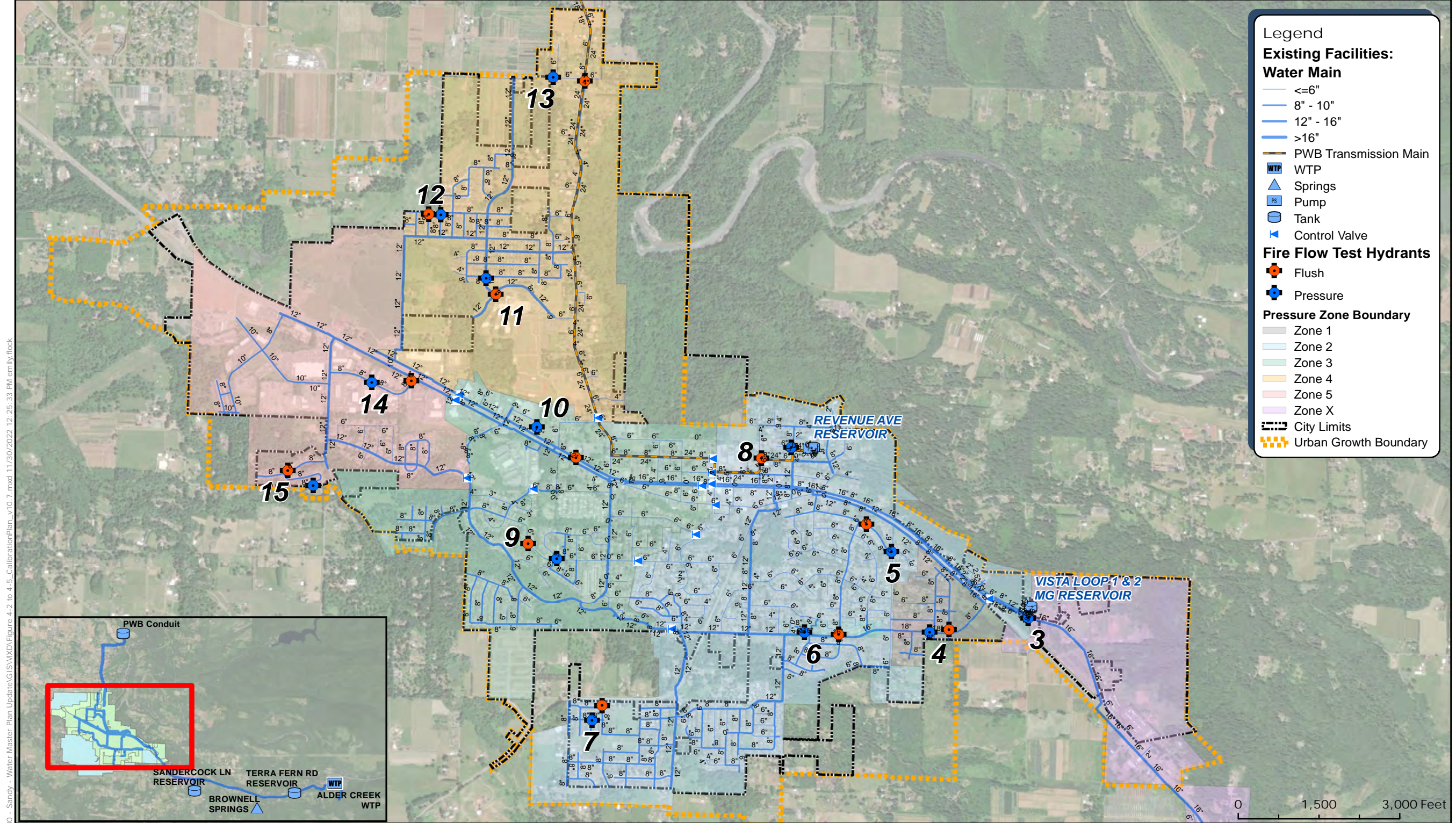
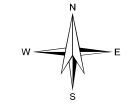
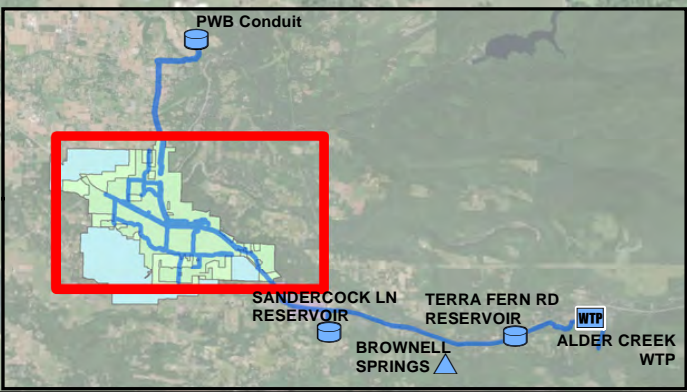


Figure 4-2
Field Fire Pressure and Flow
Test Locations 1-3



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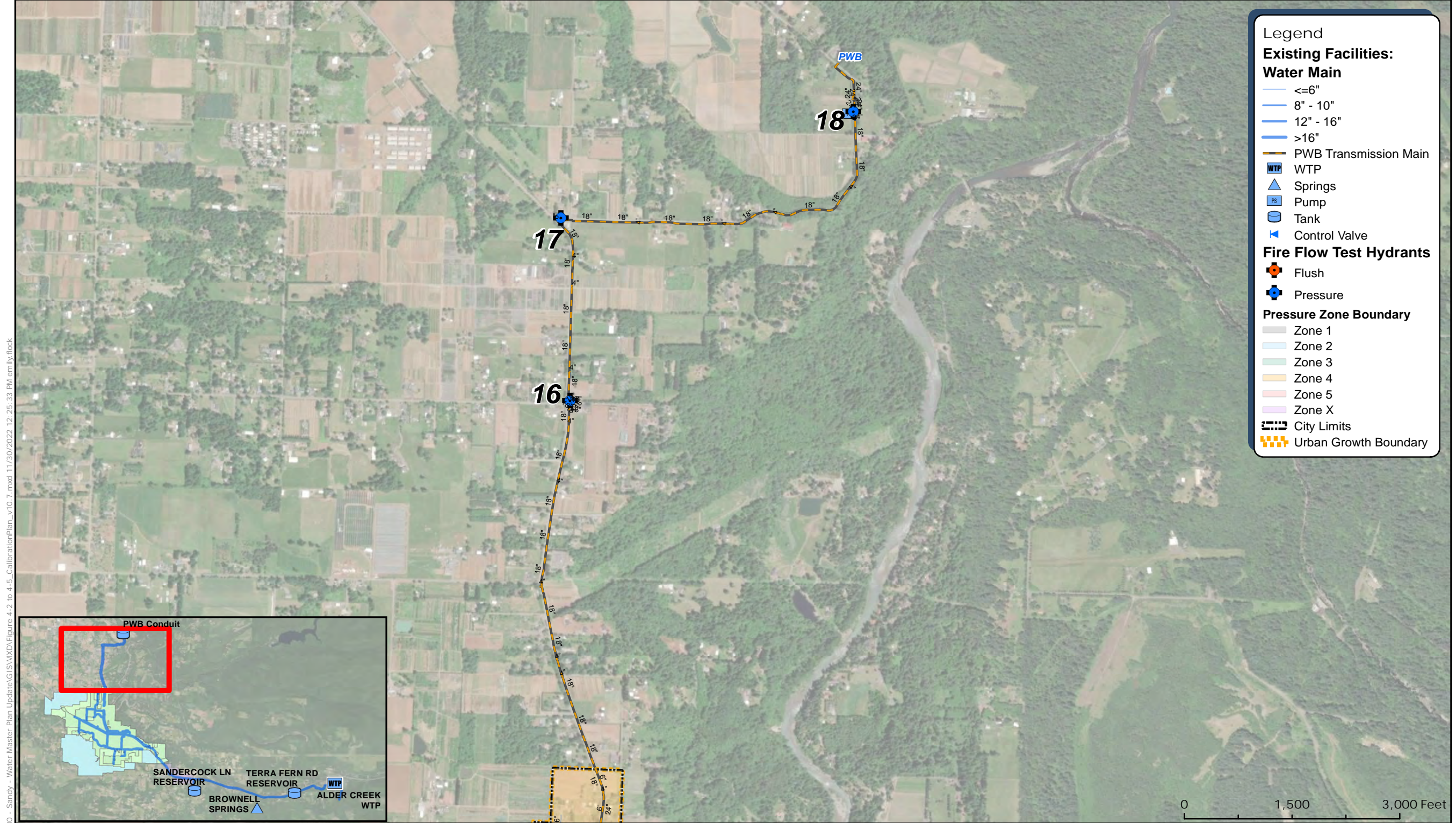


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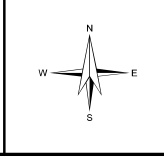
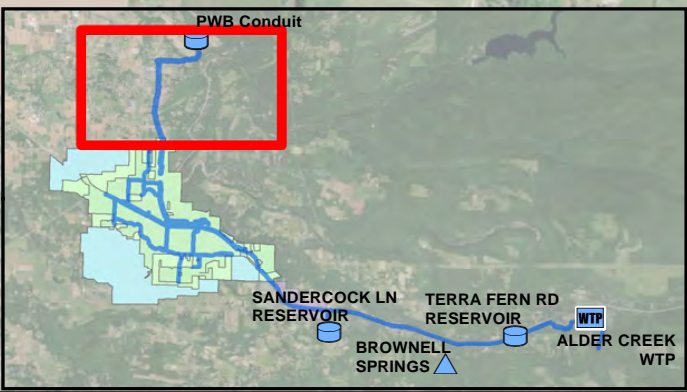
Figure 4-3
Field Fire Pressure and Flow
Test Locations 3-15

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Figure 4-4
Field Fire Pressure and Flow
Test Locations 16-18

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4.5.2.2 Calibration Results

In addition to providing the results of the hydrant tests, the City provided the boundary conditions of water system facilities at the time of each test. The boundary conditions were used to calculate the demand observed during each test. The boundary conditions were also input into the model for each hydrant test to accurately simulate the conditions of the test. **Table 4-8** presents the boundary conditions for each hydrant test.

Table 4-8 | Fire Flow Test Boundary Conditions

Date of Test	Test #	Reservoir Water Level (feet)			
		Terra Fern Road	Sandercoc Lane	Vista Loop	Revenue Avenue
01/20/2022	1	8.8	19.6	19.9	12.49
	2	8.8	19.7	20	12.07
	3	8.7	19.7	20.1	11.64
	4	8.6	19.7	20.3	11.2
	5a	8.6	19.6	20.5	10.34
	6a	14	20.1	21.5	6.56
	7a	17.5	20.1	21.7	5.91
	8a	22.7	20.4	22	4.5
	9	26.1	20.5	21.8	4.5
	10a	29.4	20.6	21.7	4.5
	14	29.4	20.6	21.6	4.5
15	30.1	20.6	21.5	4.5	
01/24/2022	11	28.4	27.7	21.6	5.58
	12	28.4	27.8	21.7	5.04
	13	28.3	27.9	21.8	4.61
	16	28.2	29.9	22	3.85
	17	28.2	27.9	21.9	3.85
	18	28.2	28	21.8	3.85
01/25/2022	5b	29.3	27.8	21.7	5.37
	6b	29.2	28	21.6	3.85
	7b	29.1	28.2	21.4	3.85
	8b	29	28.2	21.1	3.85
	10b	29	28.2	21.1	3.85

A fire flow calibration scenario was set up within the model and each of the hydrant test locations was simulated. **Table 4-9** provides the field flow data compared to the flow data input into the model. **Table 4-10** provides a comparison of the static pressures and pressure drops observed at each hydrant test.

Table 4-9 | Fire Flow Test Flow Comparison

Date of Test	Test #	Flow Hydrant			Notes
		Flow (gpm)	Model Flow (gpm)	Difference (gpm)	
1/20/2022	1	---	---	---	
	2	---	---	---	
	3	---	---	---	
	4	740	740.68	0.68	Difference due to demand on Node
	5a	812.5	813.3	0.8	Difference due to demand on Node
	6a	700	701.02	1.02	Difference due to demand on Node
	7a	650	650.8	0.8	Difference due to demand on Node
	8a	937.5	937.5	0	
	9	962	962.34	0.34	Difference due to demand on Node
	10a	914	916.28	2.28	Difference due to demand on Node
	14	760	762.36	2.36	Difference due to demand on Node
15	990	990.46	0.46	Difference due to demand on Node	
1/24/2022	11	760	760	0	
	12	974	974.71	0.71	Difference due to demand on Node
	13	500	500	0	City indicated "Low Flow" for this hydrant test
	16	---	---	---	
	17	---	---	---	
	18	---	---	---	
1/25/2022	5b	1940	1940.77	0.77	Difference due to demand on Node
		740	740.66	0.66	Difference due to demand on Node
	6b	1680	1680.99	0.99	Difference due to demand on Node
		675	675.44	0.44	Difference due to demand on Node
	7b	1880	1880.77	0.77	Difference due to demand on Node
	8b	2380	2380	0	
	10b	2380	2382.21	2.21	Difference due to demand on Node

Table 4-10 | Fire Flow Test Pressure Comparison

Date of Test	Test #	Pressure Hydrant					
		Static Pressure (psi)	Model Static Pressure (psi)	Difference (psi)	Pressure Drop (psi)	Model Pressure Drop (psi)	Difference (psi)
1/20/2022	1	110	110.52	0.52	---	---	---
	2	52	53.81	1.81	---	---	---
	3	105	104.27	-0.73	---	---	---
	4	60	60.65	0.65	3	5.83	2.83
	5a	57	57.37	0.37	0	1.52	1.52
	6a	62	62.73	0.73	0	1.78	1.78
	7a	85	83.39	-1.61	5	7.12	2.12
	8a	88	89.01	1.01	2	1.39	-0.61

Date of Test	Test #	Pressure Hydrant					
		Static Pressure (psi)	Model Static Pressure (psi)	Difference (psi)	Pressure Drop (psi)	Model Pressure Drop (psi)	Difference (psi)
	9	93	88.48	-4.52	7	4.13	-2.87
	10a	88	90.83	2.83	4	1.2	-2.8
	14	77	75.58	-1.42	17	9.77	-7.23
	15	70	71.13	1.13	22	17.15	-4.85
1/24/2022	11	67	67.11	0.11	13	7.65	-5.35
	12	80	84.44	4.44	11	8.94	-2.06
	13	59	53.95	-5.05	39	41.35	2.35
	16	73	78.53	5.53	---	---	---
	17	93	97.56	4.56	---	---	---
1/25/2022	18	29	24.69	-4.31	---	---	---
	5b	56	57.9	1.9	8	11.37	3.37
	6b	59	61.96	2.96	5	12.58	7.58
	7b	81	82.45	1.45	22	40.27	18.27
	8b	83	84.59	1.59	7	6.64	-0.36
	10b	87	90.83	3.83	3	4.17	1.17

4.5.2.2.1 Test 1

The purpose of this test was to confirm the HGL at a location in Zone X downstream of Brownell Springs. In order to satisfy the HGL of this test, the HGL of Brownell Springs was adjusted to 1545 feet.

4.5.2.2.2 Test 2

The purpose of this test was to confirm the HGL at a location in Zone X upstream of Sandercock Lane Reservoir. In order to satisfy the HGL of this test, additional losses were required in the pipeline upstream of the reservoir. It was determined that the pipeline into the reservoir was incorrect. Based on field investigations, the diameter of the pipeline into Sandercock Lane Reservoir was reduced to 8 inches. Even with this change, the losses observed in the field did not match the losses in the model. It was determined that C-factor adjustments and/or adding minor losses in the model would not provide the required losses in the pipeline to simulate the additional losses observed in the field. Therefore, a pressure sustaining valve was added to the model to set the appropriate HGL in the area upstream of Sandercock Lane Reservoir.

4.5.2.2.3 Test 3

The purpose of this test was to confirm the HGL at a location in Zone X upstream of Vista Loop Reservoir. In order to satisfy the HGL of this test, additional losses were required in the pipeline upstream of Vista Loop Reservoir. The losses observed in the field did not match the losses in the model. It was determined that C-factor adjustments and/or adding minor losses in the model would not provide the required losses in the pipeline to simulate the additional losses observed in the field. Therefore, a pressure sustaining valve was added to the model to set the appropriate HGL in the area upstream of Vista Loop Reservoir.

4.5.2.2.4 Test 4

The purpose of this test was to stress the system in Zone 1. Based on the observed static pressure and pressure drops, the following changes were made to the model.

- Vista Loop & Highway 26 PRV
 - Lowered the 3-inch PRV setpoint from 60 psi to 53 psi
 - Lowered the 8-inch PRV setpoint from 55 psi to 48 psi

4.5.2.2.5 Tests 5 – 8

The purpose of these tests was to stress the system in Zone 2. Tests 5 through 8 had to be retested due to insufficient pressure drops observed in the field. Based on the observed static pressure and pressure drops, the following changes were made to the model.

- Raised the concrete Vista Loop Reservoir floor elevation from 1,114 feet to 1,136 feet
- Raised the steel Vista Loop Reservoir floor elevation from 1,118 feet to 1,136 feet
- Adjusted elevation of pressure fire hydrants 5, 6, and 7 to match Digital Terrain Model

Even with these changes, there were still locations where the model could not simulate field conditions. Test 6B observed a higher pressure drop in the model than what was observed in the field at the second observation hydrant. As the pressure drop in the model was higher than what was observed in the field, the C-factor adjustment required would smooth the pipe (i.e. increase the C-factor) and would make the other tests and observation hydrants out of range. In addition, the C-factor for specific pipe types would be outside of acceptable ranges (i.e. too high). In addition to test 6, the two observation hydrants for test 7B observed a higher pressure drop in the model than what was observed in the field. This area is fed by a single pipeline. The only plausible explanation for the pressure drop observed in the field is a second feed to this area (i.e. there is a unknown pipeline supplying water to this area that completes a loop). Further field investigations would be required to rectify this error.

4.5.2.2.6 Tests 9 – 10

The purpose of these tests was to stress the system in Zone 3. Test 10 had to be retested due to insufficient pressure drops observed in the field. Based on the observed static pressure and pressure drops, the following changes were made to the model.

- Dubarko & Tupper PRV
 - Raised the 2.5-inch PRV setpoint from 80 psi to 81 psi
 - Lowered the 8-inch PRV setpoint from 80 psi to 76 psi
- Sandy Heights & Beebee PRV
 - Lowered the 1.5-inch PRV setpoint from 57 psi to 55 psi
 - Lowered the 6-inch PRV setpoint from 57 psi to 50 psi
- Strawbridge & Tupper PRV
 - Kept 1.5-inch PRV setpoint at 80 psi
 - Lowered the 6-inch PRV setpoint from 85 psi to 83 psi

- 38871 Proctor PRV
 - Lowered the 3-inch PRV setpoint from 55 psi to 53 psi
 - Lowered the 10-inch PRV setpoint from 55 psi to 50 psi
- Adjusted elevation of pressure fire hydrant to match Digital Terrain Model

4.5.2.2.7 Tests 11 – 13

The purpose of these tests was to stress the system in Zone 4. Based on the observed static pressure and pressure drops, the following changes were made to the model.

- 37151 HWY 26 PRV
 - Lowered the 4-inch PRV setpoint from 65 psi to 58 psi
 - Lowered the 10-inch PRV setpoint from 58 psi to 55 psi
- Bluff, north of high school, PRV
 - Lowered the 2-inch PRV setpoint from 55 psi to 43 psi
 - Lowered the 6-inch PRV setpoint from 55 psi to 37 psi
- Adjusted elevation of pressure fire hydrant to match Digital Terrain Model

Test 11 had more pressure drop observed in the field than what was simulated in the model. However, further C-factor adjustments would adversely affect other hydrant tests. Therefore, the C-factors were not adjusted further to increase losses at this test. Test 13 had a static pressure that was different from the field, but further PRV Setpoint adjustments were not completed as Test 12 static pressure would then be out of range.

4.5.2.2.8 Tests 14 – 15

The purpose of these tests was to stress the system in Zone 5. Based on the observed static pressure and pressure drops, the following changes were made to the model.

- Dubarko & Ruben PRV
 - Raised the 3-inch PRV setpoint from 65 psi to 75 psi
 - Raised the 10-inch PRV setpoint from 65 psi to 70 psi
- 37000 HWY 26 PRV
 - Kept 3-inch PRV setpoint at 61 psi
 - Raised the 10-inch PRV setpoint from 61 psi to 65 psi

Tests 14 and 15 had less pressure drop observed in the field than what was simulated in the model. However, further C-factor adjustments would adversely affect other hydrant tests. Therefore, the C-factors were not adjusted further to increase losses at these tests.

4.5.2.2.9 Tests 16 – 18

The purpose of these test was to confirm the HGL along the PWB upstream of Revenue Avenue Reservoir. Tests 16 and 17 had static pressures that were approximately 5 psi too high while Test 18 had a static pressure that was approximately 5 psi too low. No model changes were made due to these tests.

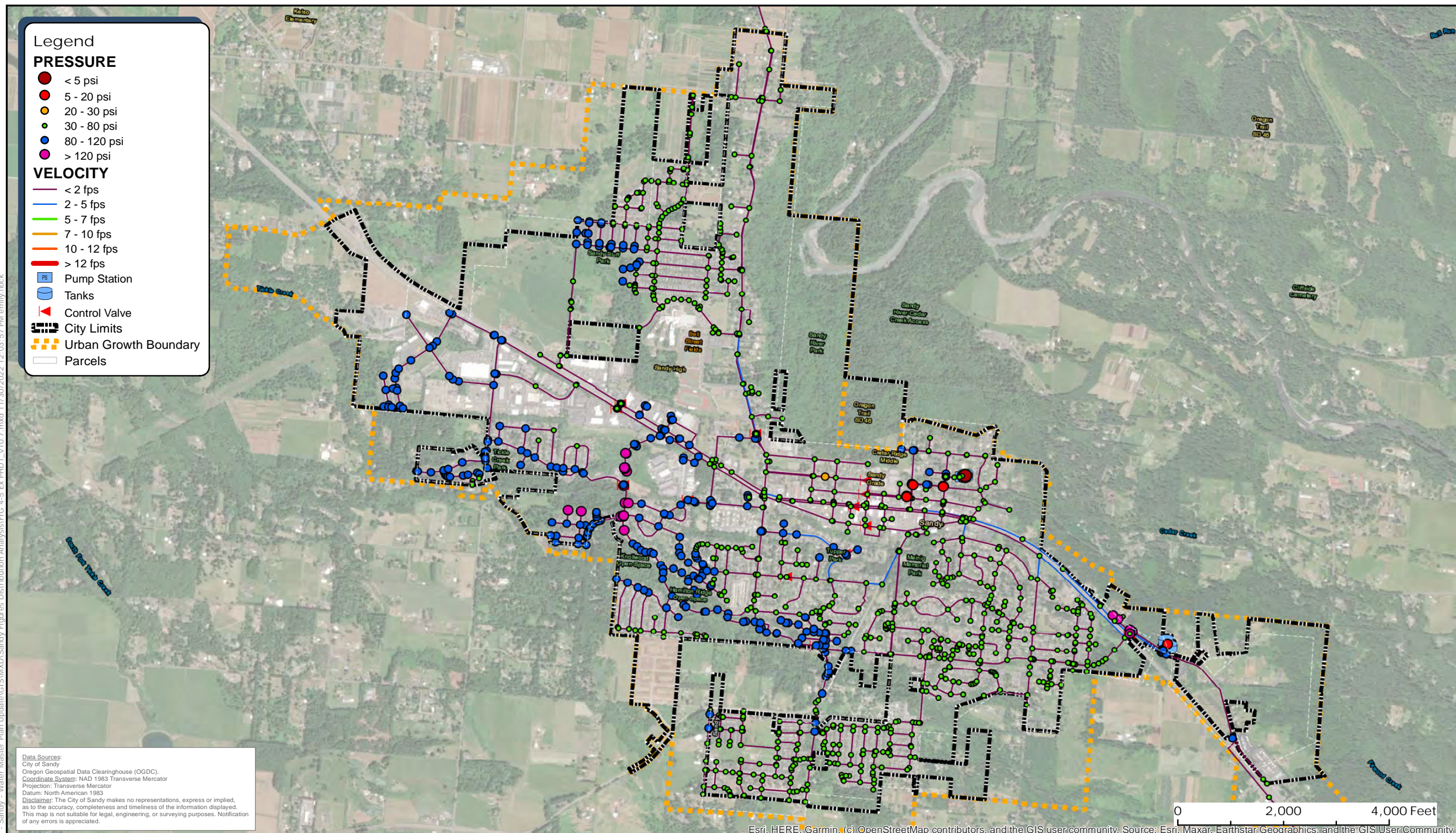
4.5.3 Distribution System Analysis

The distribution system was analyzed using the demands shown in **Table 4-6** above. **Table 4-11** presents the scenarios created and boundary conditions.

Table 4-11 | Distribution System Scenarios

Scenario	Demand (MGD)	Facilities	Notes
Existing ADD	1.33	Existing system	Placeholder scenario
Existing MDD	2.59	Existing system	Placeholder scenario
Existing MDD+FF	2.59	Existing system	Analyzed available fire flow
Existing PHD	4.26	Existing system	Analyzed pressure and velocity
Near-term ADD	1.5	Existing system with CIP improvements	Placeholder scenario
Near-term MDD	2.95	Existing system with CIP improvements	Placeholder scenario
Near-term MDD+FF	2.95	Existing system with CIP improvements	Analyzed available fire flow in 2030
Near-term PHD	4.83	Existing system with CIP improvements	Analyzed pressure and velocity in 2030
Buildout ADD	2.1	Existing system with CIP improvements	Placeholder scenario
Buildout MDD	4.21	Existing system with CIP improvements	Placeholder scenario
Buildout MDD+FF	4.21	Existing system with CIP improvements	Analyzed available fire flow in 2050
Buildout PHD	6.85	Existing system with CIP improvements	Analyzed pressure and velocity in 2050

Figure 4-5 through Figure 4-10 present the results of distribution system analysis.



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Figure 4-5
 Existing PHD
 Pressure and Velocity

- Legend**
- Available Fire Flow**
- No Hydrant (Low FF)
 - Not Tested
 - < 500 gpm
 - 500 - 750 gpm
 - 750 - 1000 gpm
 - 1000 - 1500 gpm
 - 1500 - 2000 gpm
 - 2000 - 3000 gpm
 - > 3000 gpm
 - PS Pump Station
 - Tanks
 - Control Valve
 - Pipe
 - City Limits
 - Urban Growth Boundary
 - Parcels

Data Sources:
 City of Sandy
 Oregon Geospatial Data Clearinghouse (OGDC)
 Coordinate System: NAD 1983 Transverse Mercator
 Projection: Transverse Mercator
 Datum: North American 1983
 Disclaimer: The City of Sandy makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

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Figure 4-6
 Existing MDD
 Available Fire Flow

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Legend

PRESSURE

- < 5 psi
- 5 - 20 psi
- 20 - 30 psi
- 30 - 80 psi
- 80 - 120 psi
- > 120 psi

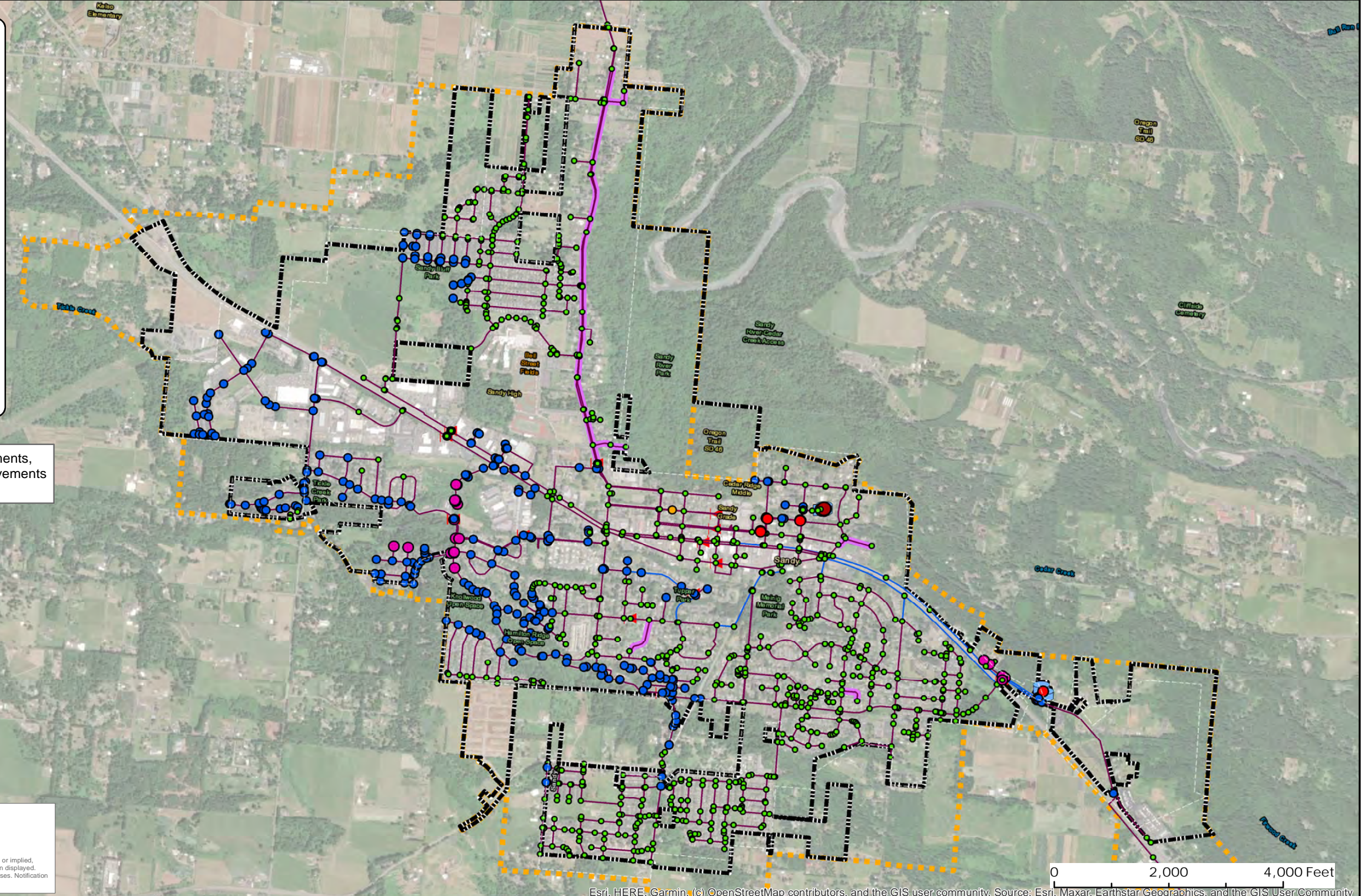
VELOCITY

- < 2 fps
- 2 - 5 fps
- 5 - 7 fps
- 7 - 10 fps
- 10 - 12 fps
- > 12 fps

- PS Pump Station
- Tanks
- ▲ Control Valve
- Pipe Improvement
- City Limits
- Urban Growth Boundary
- Parcels

Note: Existing System Improvements, fire flow pipe and storage improvements are assumed to be completed.

Data Sources:
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 Oregon Geospatial Data Clearinghouse (OGDC)
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Figure 4-7
 Near-Term PHD w/ Prop Improv
 Pressure and Velocity

- Legend**
- Available Fire Flow**
- No Hydrant (Low FF)
 - Not Tested
 - < 500 gpm
 - 500 - 750 gpm
 - 750 - 1000 gpm
 - 1000 - 1500 gpm
 - 1500 - 2000 gpm
 - 2000 - 3000 gpm
 - > 3000 gpm
 - PS Pump Station
 - Tanks
 - Control Valve
 - Pipe
 - Pipe Improvement
 - City Limits
 - Urban Growth Boundary
 - Parcels

Note: Existing System Improvements, fire flow pipe and storage improvements are assumed to be completed.

Data Sources:
 City of Sandy
 Oregon Geospatial Data Clearinghouse (OGDC)
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December 2022



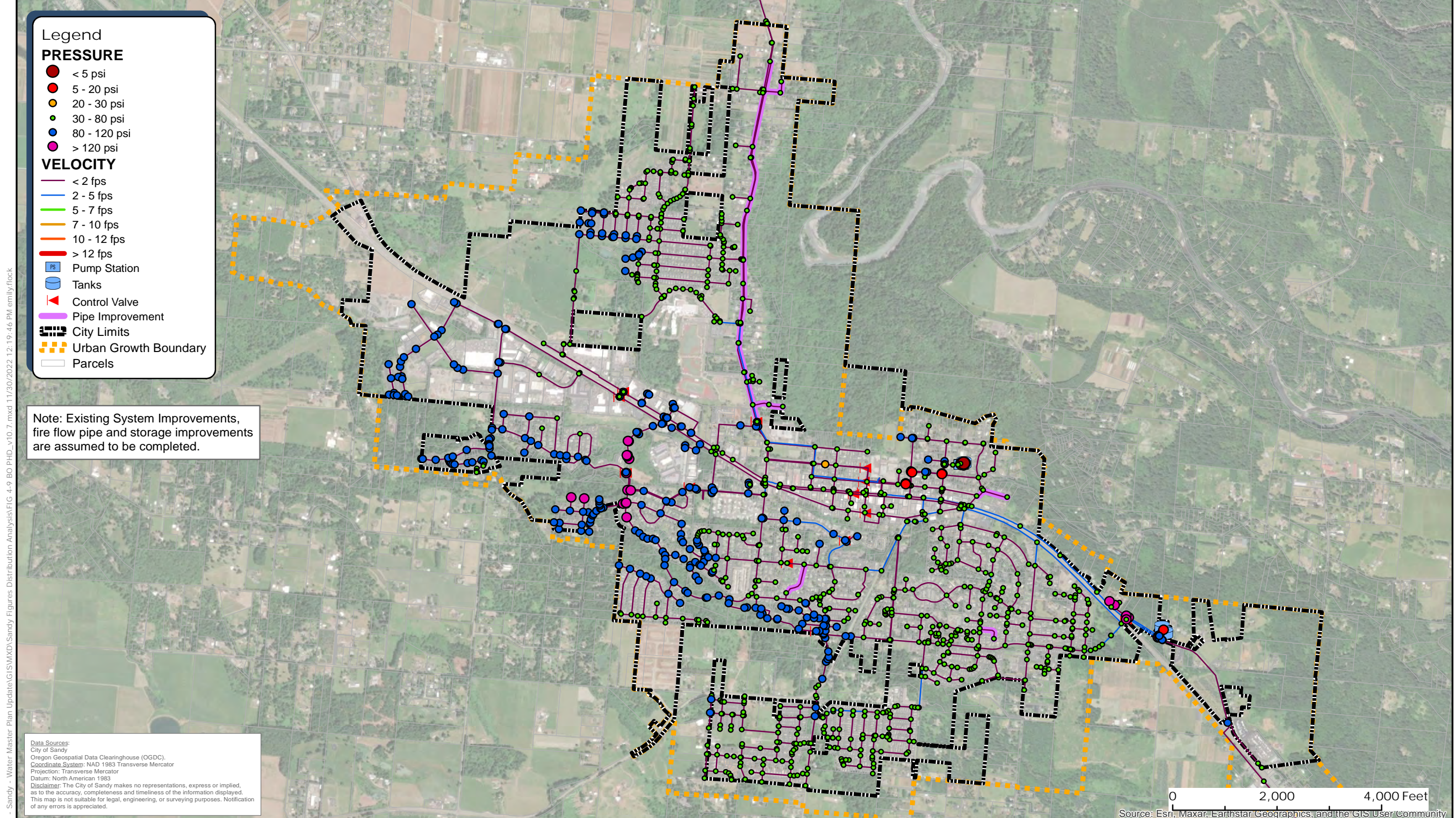
City of Sandy
 Water Master Plan Update

Figure 4-8
 Near-Term MDD w/ Prop Improv
 Available Fire Flow

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20-2800



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Figure 4-9
 Buildout PHD w/ Prop Improv
 Pressure and Velocity

December 2022

20-2800

- Legend**
- Available Fire Flow**
- No Hydrant (Low FF)
 - Not Tested
 - < 500 gpm
 - 500 - 750 gpm
 - 750 - 1000 gpm
 - 1000 - 1500 gpm
 - 1500 - 2000 gpm
 - 2000 - 3000 gpm
 - > 3000 gpm
 - PS Pump Station
 - Tanks
 - Control Valve
 - Pipe
 - Pipe Improvement
 - City Limits
 - Urban Growth Boundary
 - Parcels

Note: Existing System Improvements, fire flow pipe and storage improvements are assumed to be completed.

Data Sources:
 City of Sandy
 Oregon Geospatial Data Clearinghouse (OGDC)
 Coordinate System: NAD 1983 Transverse Mercator
 Projection: Transverse Mercator
 Datum: North American 1983
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Figure 4-10
 Buildout MDD w/ Prop Improv
 Available Fire Flow

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4.5.3.1 Peak Hour Demand

The PHD was analyzed for Existing, Near-Term, and Buildout Scenarios. Based on the analysis, there were no service connections that were below 30 psi for each of these scenarios. The Near-Term and Buildout scenarios were retested using floating storage at the sites identified by the City. With appropriate pipeline transmission from the floating storage sites, the service connections all maintained higher than 30 psi. There are some locations of low pressures observed in each of these scenarios, which occur on the PWB Transmission pipeline and near existing storage facilities. No improvements are recommended at this time to maintain 30 psi under peak hour conditions for each of the scenarios tested.

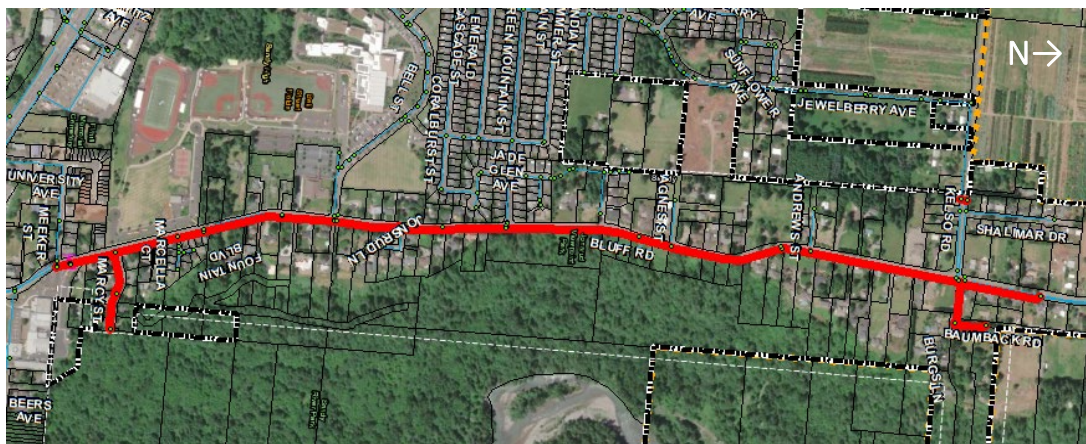
4.5.3.2 Fire Flow Availability

The available fire flow was analyzed for Existing, Near-Term, and Buildout Scenarios. The analysis focused on Demand Nodes, to simulate the conditions observed at service connections. Based on the analysis, there were multiple locations that failed Fire Flow under Existing Conditions. These locations also failed under Near-Term and Buildout Conditions. Each of the failed locations were reviewed to determine if a hydrant was nearby. Where hydrants were not in the vicinity of the failed node, no improvements are recommended. Improvements were identified to provide adequate fire flow to locations where a hydrant was near the failure.

4.5.3.2.1 Bluff Road Fire Flow Improvements

This project consists of improving the pipelines on Bluff Road, Burgs Lane, Kelso Road, and SE Baumback Avenue. There is also a hydrant in the GIS on Marcy Street, which is being reviewed by the City to determine if improvements are required to serve. For cost estimating purposes, it is assumed that Fire Flow service is required on Marcy Street. **Figure 4-11** shows the location of the Bluff Road Improvements.

Figure 4-11 | Bluff Road Improvements



Based on comments from the City, it was determined that there is already a 12-inch diameter pipeline in Kelso Road. It is recommended that the hydrant in Kelso Road be connected to this 12-inch diameter line in lieu of a new pipeline. This pipeline is connected to the PWB Pipeline in Bluff Road with a normally closed isolating valve. The services and hydrant on Kelso Road and the pipeline on Shalimar Drive can be connected directly to the 12-inch diameter pipeline, which will also back feed the 6-inch diameter Zone 4 pipeline in Bluff Road. **Figure 4-12** shows the recommended connection on Kelso Road.

Figure 4-12 | Kelso Road Improvements



4.5.3.2.2 Hood Street Fire Flow Improvements

This project consists of improving the pipelines on SE Ten Eyck Road and Hood Street to meet fire flow requirements. A new 8-inch pipeline is needed to provide the required fire flow to the hydrant on Hood Street. See **Figure 4-13** for the location of the Hood Street Improvements.

Figure 4-13 | Hood Street Improvements



4.5.3.2.3 Mitchell Court Fire Flow Improvements

This project consists of improving the pipelines on Mitchell Court to meet fire flow requirements. A new 8-inch pipeline is needed to provide the required fire flow to the hydrant on Mitchell Court. **Figure 4-14** shows the location of the Mitchell Court Improvements.

Figure 4-14 | Mitchell Court Improvements



4.5.3.2.4 Seaman Avenue Fire Flow Improvements

This project consists of improving the pipelines on Seaman Avenue to meet fire flow requirements. A new 12-inch pipeline is needed to provide the required fire flow to the hydrant on Hood Street. Alternatively, a new 8-inch pipeline may be installed in the walkway between Seaman Avenue and Miller Road. It is unknown if it is possible to install a pipeline at this location without a site investigation. See **Figure 4-15** for the location of the Seaman Avenue Improvements.

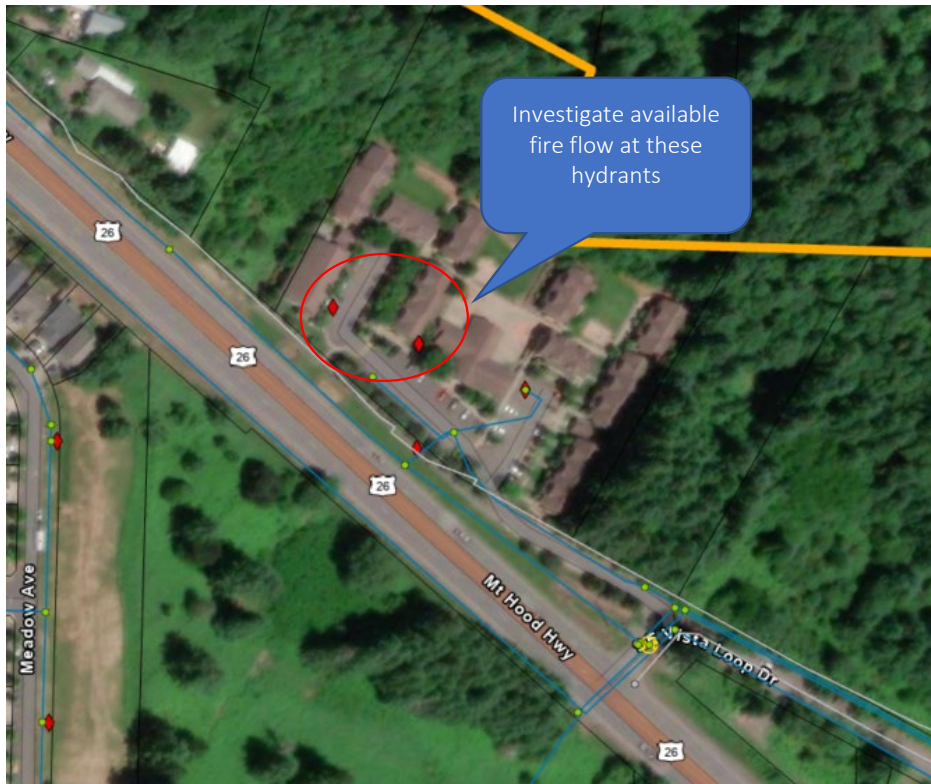
Figure 4-15 | Seaman Avenue Improvements



4.5.3.2.5 Area North of Mt Hood Highway near Vista Loop Drive

This area north of Mt. Hood Highway near Vista Loop Drive has multiple hydrants and pipelines from both Zone X and Zone 2. It is unknown how these hydrants are connected to these pipelines. If the hydrants are connected to the Zone X pipeline, then the hydrants would not meet fire flow requirements. The 6-inch and 4-inch Zone X pipelines would need to be upsized to 12 inches. It is suggested that flow testing be conducted in this area to determine the available fire flow at these hydrants. See **Figure 4-16** for the location of the hydrants in question.

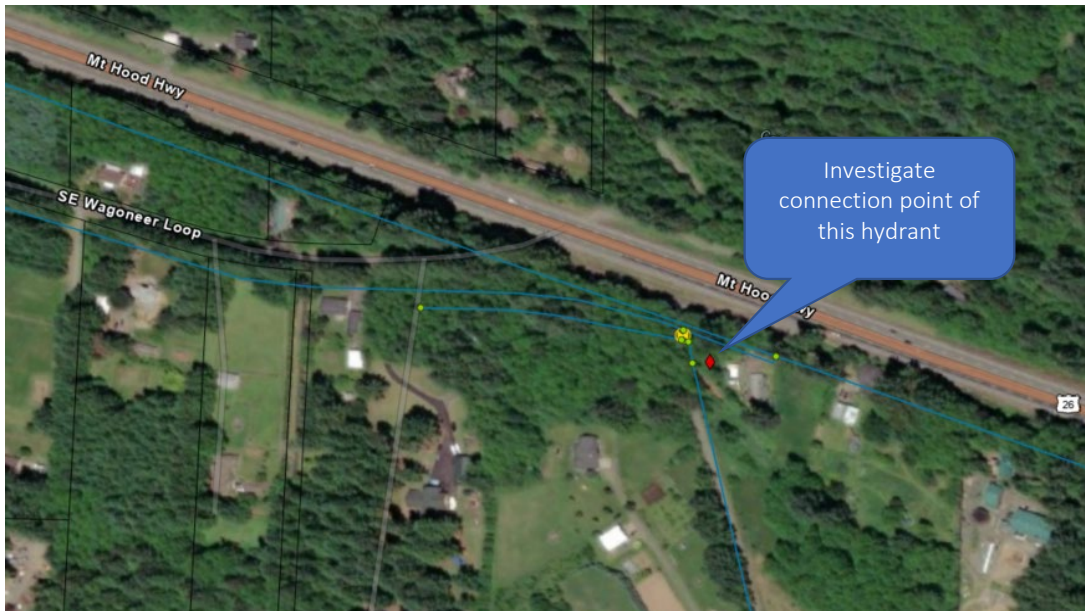
Figure 4-16 | Area North of Mt Hood Highway near Vista Loop Drive



4.5.3.2.6 Area South of Mt Hood Highway on Wagoneer Loop

The area south of Mt Hood Highway on Wagoneer Loop has a hydrant where the connection is unknown. If the hydrant is connected to the pipeline to the west (which connects to Brownell Springs Source), it should be reconnected to the 16-inch pipeline located to the north (parallel to Mt Hood Highway). A site investigation should be conducted to determine where the hydrant connects to the distribution system. See **Figure 4-17** for the location of the hydrant in question.

Figure 4-17 | Area South of Mt Hood Highway on Wagoneer Loop



4.6 Summary

The current boundaries of the City's six pressure zones allow the system to provide water during peak hour conditions to customers within the acceptable range of 30 psi and 80 psi, with the use of individual PRVs as needed. Adjustments of these boundaries are recommended to accommodate future growth within city limits and the UGB.

The storage capacity analysis concluded that the City currently has a storage deficit of 2.81 MG, which will increase to 4.75 MG at buildout conditions in 2050. It is recommended that the City construct an additional 5.0 MG of storage to overcome this deficiency.

The City's current pumping capacity was determined to be sufficient to meet current and future demands. Though the construction of an additional pump station is recommended, it is not necessary to meet pumping capacity requirements.

Four areas within the existing distribution system exhibit pressures below 20 psi under MDD plus fire flow conditions. Piping improvements are recommended to mitigate these deficiencies. Two additional areas require further investigation to determine if deficiencies exist.

- Bluff Road Improvements – New pipelines on Bluff Road, Burgs Lane, Kelso Road, Marcy Street, and SE Baumback Avenue
 - Kelso Road – Connect hydrant to the existing 12-inch pipeline in Kelso Road
 - Marcy Road – Determine if the hydrant in Marcy Road is required to provide fire flow
- Hood Street Improvements – New 8-inch pipelines on SE Ten Eyck Road and Hood Street
- Mitchell Court Improvements – New 8-inch pipeline on Mitchell Court
- Seaman Avenue Improvements – New 12-inch pipeline on Seaman Avenue
 - Alternative – New 8-inch pipeline in the walkway between Seaman Avenue and Miller Road
- Area north of Mt Hood Highway near Vista Loop Drive – Conduct fire flow test for the hydrants in this area
- Area south of Mt Hood Highway on Wagoneer Loop – Investigate the connection of the hydrant to the distribution system

CHAPTER 5

Water Supply Analysis

5.1 Introduction

This chapter presents an assessment of the City’s current water supply system, a summary of existing water rights and analysis of future supply development needs. Due to the age and condition of the City’s surface water and springs supply source, and the PWB’s planned modifications to the Bull Run surface water supply, the City needs to make major supply improvement decisions to meet projected future water demands presented in **Chapter 2**.

5.2 Supply Source Evaluation

5.2.1 Water Rights

The City holds water rights associated with three water supply sources: three certificated water rights for Brownell Springs, a certificated water right for Alder Creek, and an undeveloped permit for the Salmon River. **Table 5-1** summarizes these water rights.

Table 5-1 | City of Sandy Municipal Water Rights

Source	Permit	Certificate	Priority Date	Authorized Rate (MGD)	Authorized Date of Completion	Notes
Brownell Springs	S-6597	5427	7/11/1924	0.13	--	Limited to 0.13 MGD during summer season
	S-21879	26132	11/10/1952	0.45	--	
	S-35394	91156	7/23/1970	1.19	--	
Alder Creek		93884	11/11/1971	2.6	--	
Salmon River		--	4/28/1983	16.1	10/1/2069	Limited to ~10.5 MGD during summer season

A further detailed discussion of the City’s water rights is included in **Appendix A**, *Groundwater Supply Evaluation for City of Sandy Water Master Plan Update (GSI Water Solutions, July 2022)*.

5.2.2 Source of Supply – Capacity and Condition

5.2.2.1 Brownell Springs

The City’s Brownell Springs source provides a reliable 0.3 MGD of supply year-round, but is limited by interference with senior water rights, resulting in frequent notification by the Water master to reduce flows to 0.13 MGD during the summer. As a result, the reliable peak season capacity of the springs source is 0.13 MGD.

Brownell Springs remains a low-cost, low-maintenance gravity source of supply feeding the system with the only treatment required being the addition of sodium hypochlorite (chlorine) to serve as residual disinfectant in the distribution system.

The primary deficiencies at the Brownell Springs site involve access and maintenance of equipment in a remote location. Improved vehicular access to the site and control of vegetation for operator access to the spring boxes and reservoir are the highest priority improvements.

5.2.2.2 Alder Creek

The City's Alder Creek source was the primary source of supply to the City until approximately 2014 when the City began purchasing wholesale water supply from the PWB due to anticipated capacity limits to meet peak summer demands. The existing constructed infrastructure provides a total supply capacity of 2.6 MGD, but the condition of several components of the supply and treatment system reduces the current operational capacity of the Alder Creek source to approximately 1.4 MGD. In addition, both scenarios lack redundancy to provide firm capacity as all available filter trains are needed to provide the capacities stated. For the purposes of this analysis, an existing capacity of 1.4 MGD is assumed, with the understanding that incremental operation and deferred maintenance improvements to existing facilities could increase this capacity back to 2.6 MGD, with further improvements to increase the reliability and redundancy of this source phased over time. A list of the major deficiencies limiting the reliable capacity is presented below.

5.2.2.2.1 Raw Water Intake and Pump Station

City staff have observed that the intake structure, which is almost entirely unchanged from the original construction, is experiencing many of the access and age-related issues that are typical of this type of stream intake, including:

- Access is challenging during high flow and wet weather season.
- Both the screen frame and screens are showing signs of deterioration.
- Diversion dam wooden beams are failing.
- Aging control valve operators
- The raw water intake pipeline has reached its expected life and should be rehabilitated or replaced.
- The seismic stability of the raw water intake pipeline should be evaluated.
- The raw water booster pump station should be rehabilitated or replaced.
- The site of the stream intake is silted in with deposits and debris.

In addition, there is no stream gauge on Alder Creek to track seasonal and annual variation in creek flows. Stream gauge data would be beneficial in validating the reliable supply from Alder Creek, as the anticipated reliable capacity from the Alder Creek source is currently based on anecdotal information from operation of the Alder Creek WTP at full capacity over 15 years ago. A record of seasonal low flow rates over a longer period of time will also help inform the reliability of this supply under future conditions due to the impacts of climate change.

The Raw Water Pump Station, which is required to deliver the full water right capacity of 2.6 MGD to the Alder Creek WTP, lacks firm capacity to supply 2.6 MGD, as both of the pumps must operate to convey the full capacity. In addition, the pump station electrical and mechanical equipment is reaching the end of its service life. The site also needs to be redesigned to allow easier service of pumps.

5.2.2.2.2 Alder Creek WTP

The Alder Creek WTP has fallen into disrepair over the past 15 years, as the City has focused on the investments necessary to transmit the wholesale water supply from the PWB to the City. As a result, the WTP is currently operating at a reduced capacity with only one train in operation and without prudent redundant equipment. Redundancy to the water system is currently provided by the PWB connection. However, use of this connection for redundancy must include facilities to treat for cryptosporidium after September 30, 2027. In order to return the WTP to an operational capacity of 2.6 MGD, a number of deficiencies must be addressed. The initial list of upgrades to address existing deficiencies includes:

- Replace programmable logic controller to allow for operation of Filter #1 and #2. Once Filters #1 and #2 are operational, further upgrades, including replacement of control valving may be required.
- Repair Filter #3 pneumatic control valves. Currently, operation of the filter valving requires manual control by an on-site operator.
- Full filter media replacement and package treatment unit assessment for all three packaged filter units. The condition of the structure of the packaged water treatment units is unknown and requires a thorough investigation with the filter media removed. Once Filters #1 and #2 are operational and high priority improvements have addressed Filter #3 to allow for automatic operation, the City should proceed with a thorough assessment of the condition of each filter unit to determine if repair or replacement is the best course of action.
- Upgrade the chemical feed systems to include:
 - Automated control
 - Replacement of containment systems
 - Re-configuration of storage and feed pumps to fully utilize stored chemical volumes
- Upgrade standby power systems to include an ATS
- Evaluation and replacement of SCADA communication system to allow for reliable remote monitoring and operation of the Alder Creek WTP
- General site improvements to maintain access and minimize the risk of power and communications disruption, including clearing trees along the access roadway and evaluating the resiliency of the power feed to the site

The findings of the investigation of the filter units may result in a determination that rehabilitation and upgrade of the existing facilities is not cost effective. If this is the case, the City should complete the minimum improvement required to maintain effective operation at 2.6 MGD and begin planning for full replacement of the Alder Creek WTP.

5.2.2.2.3 PWB Wholesale Supply

In 2008, the City signed a 20-year wholesale supply agreement with the PWB. Over the next several years, the City completed major infrastructure improvement projects to transmit this wholesale supply to the City distribution system. These improvements included 4 major components.

- *Hudson Road Intertie and Pump Station:* The intertie at Hudson Road provides a metered connection to the PWB's water supply conduits which deliver chlorinated water from the Bull Run Watershed to terminal reservoirs at Powell Butte and Kelly Butte. The City's Pump Station boosts water from the intertie into a dedicated transmission main that extends from Hudson Road to the Revenue Avenue Reservoir.
- *Transmission Main:* An 18/24-inch diameter transmission main transmits the boosted supply from the Hudson Road Intertie to the Revenue Avenue Reservoir.
- *Revenue Avenue Reservoir:* The 1.0 MG reservoir is the terminal reservoir for the City's PWB wholesale supply and is where supply from PWB and the Alder Creek WTP is blended before being transmitted to customers in the distribution system to minimize the aesthetic impact of highly chlorinated PWB water.
- *Transfer Pump Station:* The Transfer Pump Station boosts the blended supply from the Revenue Avenue Reservoir into Pressure Zone 2 and the Vista Loop Reservoirs.
- *Service Area:* PWB supply cannot be transmitted to Zones 1 and X (above the Vista Loop Reservoirs).

The PWB is currently in the process of completing a major improvement to the Bull Run water supply, as required by the OHA-DWS. In order to comply with the Long-Term 2 Enhanced Surface Water Treatment Rule, the PWB must begin filtration of the Bull Run supply by September 30, 2027, as documented in a Bilateral Compliance Agreement.

The result of these improvements is that the City's Hudson Road Intertie will be located on a connection to the PWB conduits that is transmitting raw water (un-filtered and un-disinfected) to the new PWB filtration plant, currently under construction. The City also has a bilateral compliance agreement with the OHA-DWS, requiring the City to address this deficiency by either relocating the point of wholesale supply to the PWB filtration plant or treating the wholesale water supply before transmitting it to the City's distribution system.

The existing wholesale water supply contract expires in 2028. The City is currently negotiating a new wholesale water supply contract with PWB. The terms of this agreement and the anticipated cost of wholesale water supply should be considered as the City prioritizes investment in existing and future water supply sources.

The wholesale supply connection provides for a current capacity of approximately 3.1 MGD, limited by the firm capacity of the Hudson Road Pump Station. The intertie facilities and transmission main are sized to provide approximately 10 MGD of wholesale supply in the future.

5.2.2.2.4 Salmon River

The City has not completed detailed investigations of the feasibility of developing the Salmon River as a water supply source. Several potential alternatives exist, including development of a surface water intake at the currently identified point of diversion near to Highway 26 at Brightwood, transfer of the water right

to a new diversion location downstream on the Sandy River, or potential transfer of the right to a groundwater use to support local development of groundwater. The memorandum in **Appendix A**, *Groundwater Supply Evaluation for City of Sandy Water Master Plan Update (GSI Water Solutions, July 2022)* includes a more detailed discussion of these options.

While the Salmon River water right presents an opportunity for long-term water supply development to meet the City's needs, the actions required to develop this source cannot be feasibly completed prior to the City's deadlines outlined in the Bilateral Compliance Agreement. Therefore, it is recommended that the City further investigate this alternative water supply source as a long-term alternative to wholesale water supply from the PWB beyond the 20-year planning horizon. Investigations should include a detailed assessment of water diversion locations, water rights and environmental permitting constraints, treatment approaches, and transmission alignments.

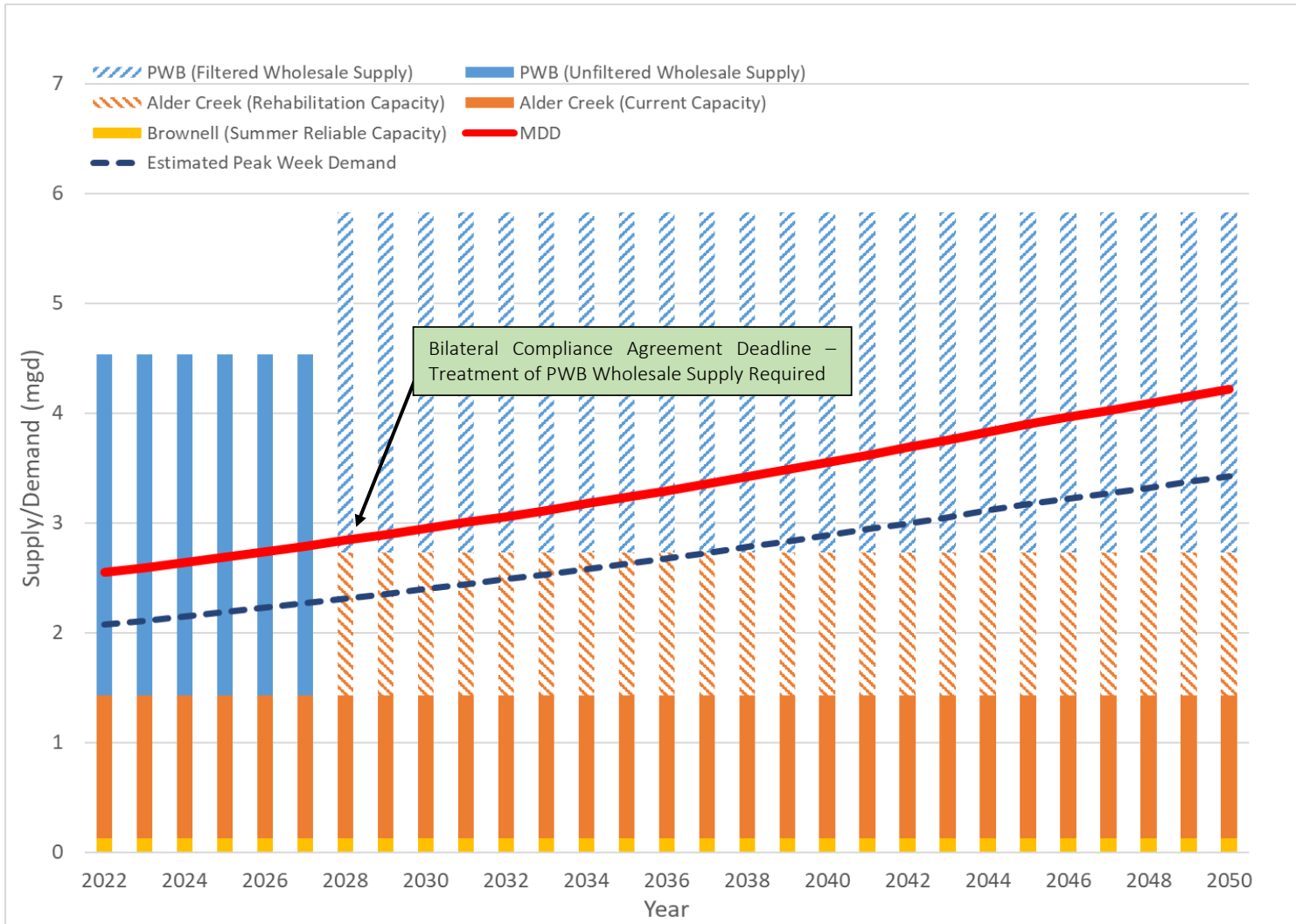
5.3 Water Supply Needs

As described in **Chapter 3**, it is recommended that the City maintain a firm supply capacity that equals or exceeds the City's MDD. While the City currently has adequate supply capacity to meet existing demands, there are three conditions that threaten the City's ability to meet its water supply requirements.

- Future development within the City's UGB is expected to increase the MDD of the City's water system customers from 2.6 MGD to 4.2 MGD by 2050.
- Reliable operation of the Alder Creek supply at 2.6 MGD. Currently, the WTP is limited to approximately 1.3 MGD and has nearly no redundancy.
- Major infrastructure improvements are required to continue accessing the PWB wholesale supply.

Figure 5-1 illustrates a comparison of existing supply capacities with the projected City water demands. This chart illustrates the three conditions listed above. As this comparison shows, it is critical that the City advance a water supply strategy that addresses the near-term water supply needs triggered by the changes to the PWB wholesale supply by 2028 and further develop a long-term water supply strategy that balances wholesale water supply with continued development of City-owned water supply sources and provides system redundancy.

Figure 5-1 | Water Supply and Water Demand Comparison



5.4 Water Supply Strategy

5.4.1 Initial Decision Regarding PWB Wholesale Supply (Spring 2021)

The City began developing a water supply strategy in 2021 to respond to the requirements of the Bilateral Compliance Agreement. An initial investigation was conducted to inform City policy makers of the terms of the Bilateral Compliance Agreement and to provide information to allow them to decide if the City would construct the infrastructure necessary to purchase treated wholesale water supply from PWB or purchase raw water and construct a separate facility to treat the unfiltered wholesale supply from the existing Hudson Road Intertie. This limited analysis was prepared to meet the PWB's identified deadline of July 2021. While the analysis demonstrated that the long-term total cost (capital investment, wholesale water purchase and operations and maintenance (O&M)) was expected to be similar, based on the information provided, the City Council directed staff to proceed with planning for the purchase of raw water supply from PWB and development of a new WTP for the City's supply.

5.4.2 Updated Analysis, Findings and Recommendations

In the Spring of 2022, as the WSMP progressed and further information became available, City staff re-evaluated the decision to purchase unfiltered wholesale supply from PWB. The decision to re-evaluate was driven by a number of factors, including:

- Dramatic increases in the cost of public infrastructure construction
- Refined understanding of the alternatives available to deliver filtered wholesale supply from PWB
- Assessment of the development schedule for a City-owned WTP for the PWB unfiltered supply
- Updated analysis of life-cycle costs, considering capital investments required for the Alder Creek source and the significant benefit of maximizing use of City-owned sources

Based on this refined analysis, City Council was presented with the new findings on June 6, 2022, and as a result, directed City staff to plan for and implement connection to the new PWB WTP for treated water purchase from PWB. In order to achieve this objective, the City must construct a new pump station at or near to the PWB WTP and a pipeline from the PWB WTP to the existing Hudson Road Intertie transmission main.

A summary of the analysis and presentation to the City Council is included in **Appendix B**.

5.4.3 Next Steps

In order to meet the requirements of the Bilateral Compliance Agreement and maintain adequate and reliable water supply, the City should proceed with the following immediate action items.

1. *Confirm that PWB wholesale supply of unfiltered water will remain uninterrupted through September 30, 2027.* As shown in **Figure 5-1**, the City is at risk of being unable to meet MDD in the summer of 2027 without the full developed capacity of the Alder Creek source and wholesale supply from PWB. The City should obtain written confirmation from PWB that unfiltered supply will remain available through the summer of 2027.
2. *Coordinate with PWB to secure property on the PWB WTP site for a new Booster Pump Station and Transmission Main alignment (and necessary easements) extending south to Bluff Road.* In

preliminary discussions, PWB has indicated that siting of the new booster pump station on the PWB WTP site is feasible, and further indicated that access easements being obtained to the south of the PWB's property to SE Bluff Road could accommodate the City's new wholesale supply transmission main. The City should confirm the current status of these opportunities and take steps necessary to formalize this arrangement. If either becomes infeasible, then the City will need to identify both a booster pump station property and transmission main alignment and begin securing the necessary property and easements.

3. *Continue participation in regional wholesale contract negotiations before September 30, 2027.* With the expiration of the current PWB wholesale water supply contracts in the upcoming years (the City's contract expires in 2028), current efforts are underway to negotiate a new wholesale contract and rate structure. The City's wholesale water supply situation is unique and requires active participation in the negotiations to protect the City's interest in this process and ensure a fair and equitable wholesale contract for the City.
4. *Complete near-term improvements to address Alder Creek supply deficiencies before September 30, 2027.* As described earlier in this chapter, much of the Alder Creek supply facilities are approaching the end of their useful life, have fallen into disrepair, or lack sufficient redundancy to provide reliable supply. It is recommended that the City begin a program of addressing the identified deficiencies and further assessment to ultimately achieve a reliable 2.6 MGD supply from Alder Creek. The initial actions include:
 - a. Control Panel upgrades to return Filters #1 and #2 to operation
 - b. Filter #3 maintenance (once Filters #1 and #2 are back on-line)
 - c. Upgrade of standby power systems with an automatic transfer switch
These improvements restore the WTP to an operational capacity of 2.6 MGD
 - d. Detailed assessment of the condition of all structural, mechanical, and electrical systems at the Alder Creek WTP
 - e. Cost-benefit analysis of rehabilitation versus replacement of the Alder Creek WTP
 - f. Development of an Alder Creek Source Improvement Plan
5. *Design and construction of the PWB filtered wholesale supply connection before September 30, 2027.*
6. *Long-term water supply study.* Investigation of the feasibility and cost of developing the Salmon River water supply source as a long-term alternative, or supplement, to the City's existing supply sources should be completed. Development of the Salmon River as a source of supply for the City will take several years to advance from evaluation of feasibility through permitting, design, and ultimately construction. As the new PWB wholesale contract is completed and the City develops a better understanding of the investments required in the Alder Creek source, the potential benefit of adding the Salmon River to the City's water supply portfolio can be better defined.
7. *Implement Long-Term Supply Study Recommendations.*

CHAPTER 6

Capital Improvement Program

This chapter presents recommended improvements for the City's water system based on the analysis and findings presented in **Chapter 4** and **Chapter 5** and projects identified in the City's current water CIP projects list. These improvements include supply, storage reservoir, water main, and seismic resilience projects. The CIP presented in **Table 6-3** summarizes recommended improvements and provides an approximate timeframe for each project. **Appendix C** contains planning level cost estimate details for each project. Proposed improvements are illustrated in **Figure 6-1**.

6.1 Project Cost Estimates

An estimated project cost has been developed for each recommended improvement consistent with previously identified projects from the City's current CIP and current preliminary design work, as applicable. Cost estimates represent opinions of cost only, acknowledging that final costs of individual projects will vary depending on actual labor and material costs, market conditions for construction, regulatory factors, final project scope, project schedule, and other factors.

6.2 Timeframes

A summary of all improvement projects and estimated project costs is presented in **Table 6-3**. This CIP table provides for project sequencing by showing prioritized projects for the 5-year, 6 to 10-year, and 11 to 20-year timeframes defined as follows.

- 5-year timeframe - recommended completion through 2027
- 6 to 10-year timeframe - recommended completion between 2028 and 2032
- 11 to 20-year timeframe - recommended completion beyond 2032

6.3 Storage Reservoirs

As presented in **Table 4-1**, the City currently has a deficit in storage capacity serving the water system. The existing Sandercock Lane site can accommodate construction of an additional reservoir or replacement with a larger storage facility to add 1.0 MG of storage above Zone X. As discussed in further detail in **Section 4.3.2**, three City-owned sites were identified that could serve as potential reservoir sites. It is recommended that the City construct at least two reservoirs to add 4.0 MG of storage to the system, for a total of 5.0 MG, as identified in Project No. R.1. Further investigation is required before design and construction of these reservoirs can occur. A Storage Siting Study is presented as Project No. R.2. These reservoirs will all require altitude control valves, additional supply and transmission main piping, and it is recommended that they be of prestressed concrete tank construction.

In addition to constructing new storage, the City should conduct a Reservoir Seismic and Condition Assessment of their existing reservoirs, which is included in this CIP as Project No. R.3. It is recommended the Seismic and Condition Assessment be completed before any new reservoir projects as it could inform system storage improvement plans. For example, if the assessment indicated a tank needed major refurbishment, building a new, larger tank could be an alternative to refurbishing the existing tank.

6.4 Pump Stations

As noted in **Table 4-3**, the City has adequate distribution system pumping capacity through the build-out scenario (2050) and no additional capacity is required. However, as discussed in detail in **Section 4.4.2**, it is recommended that the City complete upgrades to the Terra Fern Pump Station so that fire flow demands are met above the Sandercock Lane Reservoir, which is included as Project No. PS.1.

It is also recommended that the City construct a pump station at the Vista Loop site that can supply Zones X and 1 with PWB wholesale supply in the event that Alder Creek WTP and Brownell Springs sources are unable to supply sufficient flows. The Vista Loop Pump Station is included in this CIP as Project No. PS.2.

6.5 Distribution Mains

As presented in **Chapter 4**, hydraulic modeling of the City's water distribution system revealed few areas of low pressure. There were no service connections below 30 psi for the existing, near-term, and buildout scenarios. Modeled low pressures were located along the PWB transmission mains and near existing storage facilities. No improvements are recommended to raise low pressures.

Multiple areas failed fire flow conditions under existing conditions. Proposed distribution piping projects are presented as Project Nos. D.1, D.2, D.3, and D.4. These pipeline improvement projects will take place near Bluff Road, Hood Street, Mitchell Court, and Seaman Avenue to provide fire hydrants with sufficient fire flows.

6.6 Supply

As described in **Chapter 5**, the City is currently in the process of coordinating regional wholesale contract and source changes with the PWB as well as evaluating and updating the Alder Creek WTP before September 2027. In order to maintain an adequate and reliable water supply, the City should proceed with the steps detailed in **Section 5.4.3** and summarized below. The short-term improvements (first four bullets below) should be completed before September 30, 2027, the date the PWB is guaranteeing unfiltered wholesale water through.

- Coordinate with the PWB and participate in regional wholesale contract negotiations.
- Complete near-term Alder Creek WTP improvements to restore the WTP to an operational capacity of 2.6 MGD.
- Complete a detailed assessment of the Alder Creek WTP and its associated infrastructure, evaluate alternatives, and develop an Alder Creek Source Implementation Plan.
- Design and construct the PWB Filtered Wholesale Supply Connection.
- Refurbish or replace the raw water intake infrastructure.
- Complete a Long-Term Water Supply Study.

These improvements are included in **Table 6-3**. Implementation of recommendations from the Long-Term Supply Study should be evaluated in the study and included in an updated CIP as recommended. It is expected that some or many of the recommendations may extend beyond the planning period of the WSMP.

6.7 Other Projects

6.7.1 Water System Master Plan Update

It is recommended that the City continue to update this WSMP every ten years. An updated WSMP is required by the State of Oregon for a 20-year planning period. The Alder Creek WTP detailed assessment and/or the Long-Term Water Supply Study could prompt an update to the WSMP and CIP depending on the findings and recommendations. As the City grows or more information is collected, it is prudent for the City to continue to regularly evaluate capital investment, prioritize needs for the water system, and document this long-term water service strategy in the WSMP.

6.7.2 Water Management and Conservation Plan

The City was required to submit a WMCP by April 2016, with an update required in 10 years. The next update of the WMCP is due to the state of Oregon Water Resources Department in November 2025, and it is anticipated that a future update within this WSMP's 20-year planning horizon will be required in 2024.

6.7.3 SCADA Upgrades

The water utility SCADA system equipment is out of date and reaching the end of its useful life. Furthermore, the communication systems consist of numerous aging and unreliable leased lines that are prone to failure. It is recommended that the City proceed with a SCADA Master Plan to identify the most effective approach to upgrade and replace aging equipment.

While the full scope and cost of a SCADA system upgrade will be defined by the SCADA Master Plan, a preliminary budget placeholder has been included in the CIP as Project M.5. This preliminary budget estimate should be refined and incorporated into the City's capital planning following completion of the SCADA Master Plan.

6.7.4 Water Meter Replacement

The City completed a water service meter replacement and AMI project between 2019 and 2021. Water meters typically have a service life of 15-20 years, at which point the meter accuracy may decrease and the battery operated meter registers that transmit data to the City's AMI system begin to fail. It is recommended that the City include a budget in the CIP for a meter replacement program. Based on the year of installation of most current meters in the system, the meter replacement program should be completed in the 11-to-20-year timeframe. The City has approximately 3,000 service meters, so it is assumed that the replacement program will be conducted over 5 years.

6.7.5 Replacement and Operations and Maintenance

A systematic, planned replacement program will provide the following benefits.

- Reduced impacts to customers and the environment from unplanned pipe failures
- Reduced repair and replacement costs by performing the work proactively rather than on an emergency basis
- Reduced water loss that results from main breaks and leaks

- Reduction in claims for property damage and loss of revenues from commercial and industrial customers

It is recommended that the City aim to implement an aggressive pipe replacement program to avoid having to replace a disproportionate amount of pipe in the future as the pipes age. For this reason, it is recommended that the City aim to replace 4,750 linear feet (LF) of pipe per year. This is a replacement rate of about one percent of pipe per year. Pipe replacement projects should be coordinated with other City programs such as the Pavement Management Program and other utility projects to save on cost and prevent redundant work and obstruction of roadways. Water mains were assumed to need replacement after 75 years. Total costs for the full time period were uniformly divided into annual costs for the respective timeframes. These costs represent a significant investment in the water system, and substantially more than the City's current annual water main replacement budget. However, continued investment in renewal and replacement of the water system is essential to ensuring reliable system operation and minimizing expensive emergency repairs associated with failing pipeline infrastructure.

The existing system contains 4-inch diameter mains as well as asbestos concrete (AC) and CI mains. The small pipes can cause flow restrictions, reducing system capacity. Replacement of AC and CI material pipes are recommended for health and safety and reducing risk of breaks or failures. There is approx. 64,000 LF of 4-inch diameter, AC, or CI mains in the existing system. These pipes are recommended to be the highest priority in the City's Replacement Program. At the recommended replacement length described above (4,750 LF), it would take approximately 13.5 years to replace all of these mains.

Annual maintenance for pipes, tanks, pump stations, valves, and other facilities is not considered in the CIP list. It is assumed these maintenance items are addressed in the operations budget.

6.8 Cost Estimating Assumptions

All cost estimates for CIP projects presented in this WSMP are planning level costs approximately equivalent to Association for the Advancement of Cost Engineering Class 5 estimates. Cost estimates of this type are classified as order-of-magnitude cost estimates, which assume a 0 to 2 percent level of project definition to reflect the significant number of unknowns in project scope and conditions. Correspondingly, Class 5 cost estimates have a wide accuracy range to reflect these uncertainties at the master planning stage; actual costs may vary from these by minus 50 percent to plus 100 percent:

- **Low End Accuracy Range:** -20 to -50 percent (i.e. the low end of the accuracy range for a \$1 million cost estimate is \$0.5 to \$0.8 million).
- **High End Accuracy Range:** +30- to +100 percent (i.e. the high end of the accuracy range for a \$1 million cost estimate is \$1.3 to \$2.0 million).

All costs are in 2022 dollars, and the Engineering News-Record's Seattle, WA Construction Cost Index for November 2022 was 15202.68. The estimates are subject to change as the project designs mature. The cost of labor, materials, and equipment may also vary in the future.

6.8.1 Pipeline Unit Cost Assumptions

Table 6-1 presents general assumptions for unit costs of different-sized pipelines that may be used in a CIP project.

Table 6-1 | Pipeline Unit Costs

Pipe Diameter (Inches)	Pipeline Cost, Arterial Road, Including Cost Factors (\$/Linear Foot)
8	\$509
10	\$598
12	\$686
18	\$931

Pipeline costs are for ductile iron pipe and include general markups for earthwork and construction, erosion and traffic control, fittings and valves, mobilization, contingencies, contractor overhead, engineering design, and legal/admin coordination. Pipeline construction costs do not include property acquisition costs or easement or right-of-way costs. Roadway resurfacing unit costs assume open trench construction with trench patches and do not include full street resurfacing. Where open trench construction may not be possible, individual project cost estimates were modified, as needed, to reflect costs for boring or other construction methods.

6.8.2 Direct Construction Cost Development

Direct construction costs were developed using historical project data, vendor quotes, and general market trends. Direct construction cost estimates focused on major facilities and equipment and include allowances for additional civil, mechanical, electrical, and instrumentation requirements.

6.8.3 Cost Factors

To estimate total project costs for inclusion in the CIP, cost factors were added to the direct construction cost estimates. **Table 6-2** summarizes the cost factors and provides an example of how they were applied to determine a CIP project’s cost.

Table 6-2 | Cost Factors

Cost Element	Cost Factor	Cost
Direct Construction Cost		\$1.00M
Bonds and Insurance	2%	\$0.02M
Mobilization	10%	\$0.10M
Construction Cost		\$1.12M
Project Contingency	30%	\$0.33M
Total Construction Cost		\$1.45M
Oregon Corporate Activity Tax	1%	\$0.02M
Engineering Allowance	20%	\$0.29M
Permitting, Inspections, and Administration	5%	\$0.07M
Construction Contract Administration	10%	\$0.14M
Total CIP Project Cost		\$1.97M

6.9 CIP Funding

The City may fund the water system CIP from a variety of sources including governmental grant and loan programs, publicly issued debt, and cash resources and revenue. The City's cash resources and revenue available for water system capital projects include water rate funding, cash reserves, and SDCs.

Generated through development and system growth, SDCs are typically used by utilities to support capital funding needs. The charge is intended to recover a fair share of the costs of existing and planned facilities that provide capacity to serve new growth. Projects intended to serve only new growth would have 100 percent of the cost allocated to growth. Other projects that are intended to improve reliability and efficiency or address asset renewal are assumed to benefit existing and new customers. For these projects, the percent allocated to growth is the percentage of future demand projected to be generated from new customers. The percentage of project costs allocated to growth are shown in **Table 6-3** as the Preliminary SDC Eligibility.

Subsequent to the final review and approval of this WSMP, the City will conduct a financial analysis to review the current water rates and SDC methodology to support the recommended CIP described in this section.

6.10 CIP Summary

The CIP is summarized in **Table 6-3** and **Figure 6-1** on the following pages.

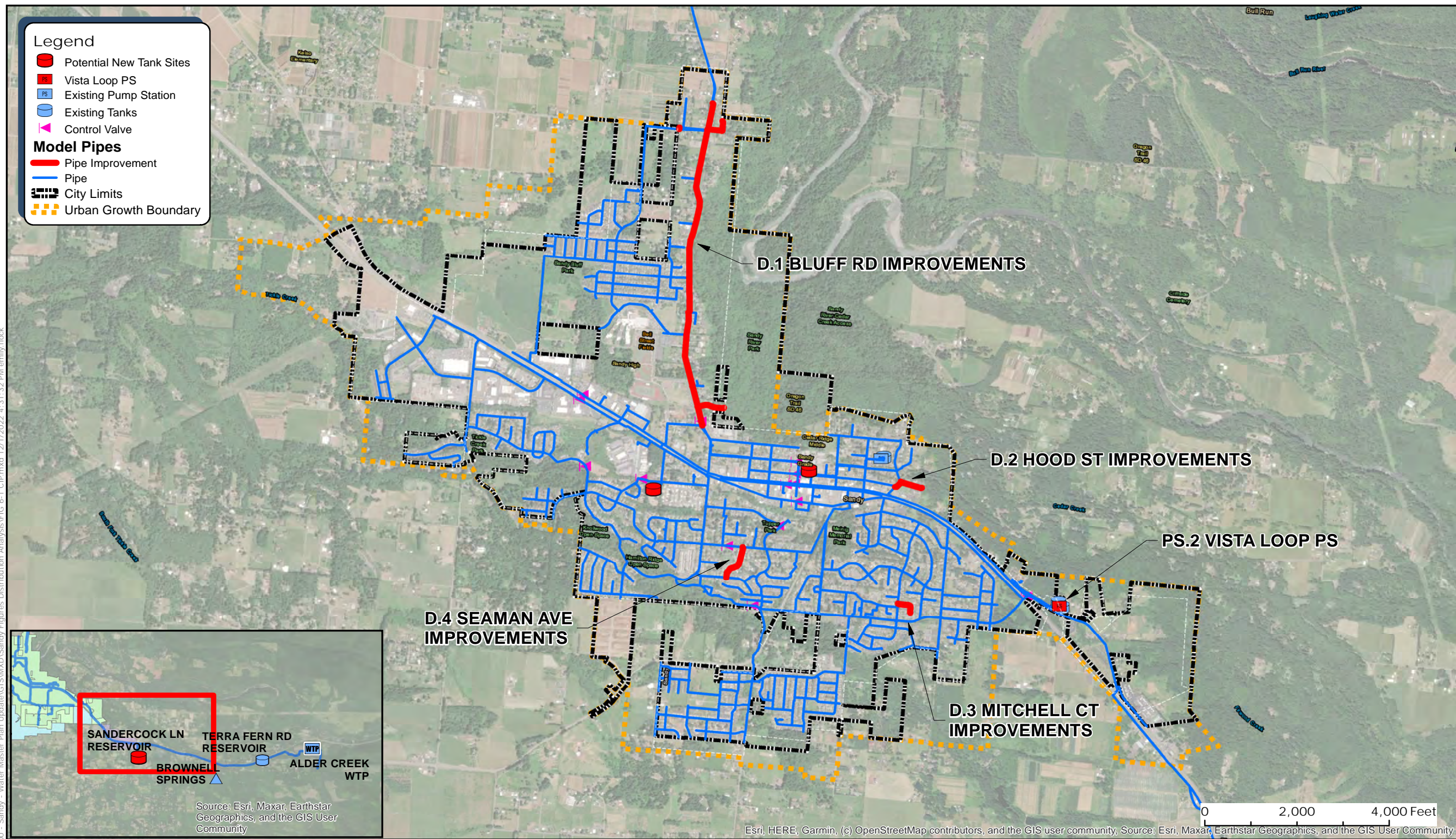
Table 6-3 | Capital Improvement Program

Project No.	Project Description	CIP Schedule and Project Cost Summary (2022 Dollars)				Preliminary SDC Eligibility
		1-5 Years (2023-2027)	6-10 Years (2028-2032)	11-20 Years (2033-2042)	TOTAL	
R.1	5.0 MG Additional Storage		\$17,290,000	\$17,290,000	\$34,580,000	49%
R.2	Storage Siting Study	\$180,000			\$180,000	49%
R.3	Reservoir Seismic and Condition Assessment		\$375,000		\$375,000	49%
Storage Subtotal		\$180,000	\$17,665,000	\$17,290,000	\$35,135,000	
PS.1	Terra Fern Pump Station Upgrades	\$780,000			\$780,000	45%
PS.2	Vista Loop Pump Station	\$1,420,000			\$1,420,000	45%
Pump Station Subtotal		\$2,200,000	\$-	\$-	\$2,200,000	
D.1	Bluff Rd Fire Flow Improvements		\$5,580,000		\$5,580,000	45%
D.2	Hood St Fire Flow Improvements		\$540,000		\$540,000	45%
D.3	Mitchell Ct Fire Flow Improvements		\$260,000		\$260,000	45%
D.4	Seaman Ave Fire Flow Improvements		\$550,000		\$550,000	45%
Distribution Subtotal		\$-	\$6,930,000	\$-	\$6,930,000	
S.1	Near-Term Alder Creek WTP Improvements	\$1,050,000			\$1,050,000	0%
S.2	Short-Term Alder Creek WTP Assessment	\$240,000			\$240,000	45%
S.3	Alder Creek WTP Improvements	\$42,080,000			\$42,080,000	45%
S.4	PWB Filtered Water Supply Connection	\$39,416,000			\$39,416,000	45%
S.5	Long-Term Supply Study		\$240,000		\$240,000	45%
Supply Subtotal		\$82,786,000	\$240,000	\$-	\$83,026,000	
M.1	Water System Master Plan Update		\$220,000		\$220,000	45%
M.2	Water Management and Conservation Plan	\$110,000			\$110,000	45%
M.3	Annual Replacement Budget	\$-	\$6,000,000	\$24,000,000	\$30,000,000	45%
M.4	Water Service Meter Replacement			\$7,920,000	\$7,920,000	0%
M.5	SCADA Master Plan	\$150,000			\$150,000	45%
M.6	SCADA Upgrades (Preliminary Budget Placeholder)		\$760,000		\$760,000	45%
Other Subtotal		\$260,000	\$6,980,000	\$31,920,000	\$39,160,000	
CIP Total		\$85,426,000	\$31,815,000	\$49,210,000	\$166,451,000	

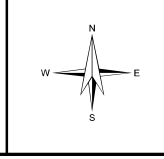
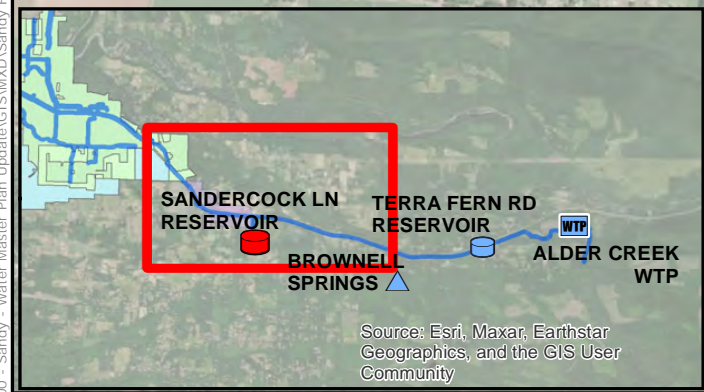
¹ All costs in 2022 dollars and include all soft costs including bonds and insurance, mobilization, contingency, engineering, permitting and admin, and construction contract admin

² Engineering News-Record's Seattle, WA Construction Cost Index for November 2022 was 15202.68 (for all costs)

³ Percentage based on MDD (or governing demand) from 2023 compared to MDD (governing demand) in 2043



- Legend**
- Potential New Tank Sites
 - Vista Loop PS
 - Existing Pump Station
 - Existing Tanks
 - ▲ Control Valve
- Model Pipes**
- Pipe Improvement
 - Pipe
 - City Limits
 - Urban Growth Boundary



City of Sandy
Water Master Plan Update

Figure 6-1
Capital Improvement Plan

December 2022

20-2800

APPENDIX A
GROUNDWATER SUPPLY
EVALUATION FOR CITY OF SANDY
WATER MASTER PLAN UPDATE,
GSI WATER SOLUTIONS, JULY 2022





TECHNICAL MEMORANDUM-FINAL

Groundwater Supply Evaluation for City of Sandy Water Master Plan Update

To: Brian Ginter, PE, - Murraysmith
Jeff Fuchs, PE - Murraysmith

From: Owen McMurtrey, GSI Water Solutions, Inc.
Andrew Wentworth, RG - GSI Water Solutions, Inc.
Walt Burt, RG - GSI Water Solutions, Inc.
Ronan Igloria, PE - GSI Water Solutions, Inc.

Date: July 7, 2022

1. Introduction and Summary of Findings

At the request of Murraysmith and the City of Sandy (City), GSI Water Solutions, Inc. (GSI) developed the following summary of information pertinent to whether and how the City could meet its water demands using water supplied under its own water rights. This memorandum discusses the limitations of the City's water rights for Brownell Springs, Alder Creek, and the Salmon River, as well as the hydrogeology of the area around the City and its suitability for development as a water supply source.

The City's most senior water right for Brownell Springs, combined with an estimated maximum reliable supply from Alder Creek of 3.7 cubic feet per second (cfs) or 2.4 million gallons per day (mgd), provide a reliable supply of 2.72 mgd (4.2 cfs).¹ The City's undeveloped water use permit from the Salmon River, with permitted use of 16.2 mgd (25.0 cfs), has limitations on the maximum rate of diversion allowed, and development of a point of diversion (POD) anywhere on the Salmon River or Sandy River faces significant regulatory obstacles. The key limitations and challenges to the Salmon River permit include:

- With POD upstream of Boulder Creek confluence (river mile [RM] 0.8):
 - No water may be diverted from August 16 through October 31
 - No water may be diverted from November 1 through February 29 when target flows are not met upstream of Boulder Creek confluence.
- With POD downstream of Boulder Creek confluence (RM 0.8):
 - The City must provide the Oregon Water Resources Department (OWRD) with an executed agreement between the City and Oregon Department of Fish and Wildlife (ODFW) setting out specific fish passage requirements.

¹ This reliable supply estimate may be high and operations data from the City's water treatment plant (WTP) indicate there are periods when streamflows may not support the City's entire 4.0 cfs water right. This is discussed further in Section 2.2 of this tech memo.

With a POD upstream of Boulder Creek, aquifer storage and recovery (ASR) could provide an option to meet the peak summer demands; however, the restrictions on diversion from November through February makes the Salmon River an unreliable source of supply for ASR injection during winter. Furthermore, available data suggests that the aquifer characteristics in the vicinity of the City are not conducive for ASR. As a result, the most feasible pathway for the development of the City’s Salmon River surface water permit as a reliable, year-round source of supply is through a surface water to groundwater transfer to a hydraulically connected well on the Sandy River downstream of the confluence with the Salmon River. Approval of the permit amendment needed to transfer the surface water diversion to groundwater would be contingent on demonstrating that the withdrawals do not impact Cedar Creek.

Based on a review of the hydrogeologic conditions in areas near the City where an infiltration gallery or collector well could be constructed, the composition of the aquifer appears to be too thin and not laterally extensive enough for a 5 mgd facility. However, a 1 mgd facility may be feasible under favorable circumstances.

2. Water Rights Review

The City holds three water right certificates for municipal use authorizing diversions from Brownell Springs. Certificate 5427 authorizes the use of up to 0.13 mgd (0.2 cfs), Certificate 26132 authorizes the use of up to 0.7 cfs (0.45 mgd), and Certificate 91156 authorizes the use of up to 0.19 mgd (0.3 cfs). In addition, the City holds Certificate 93884 for the use of up to 2.59 mgd (4.0 cfs) from Alder Creek and Permit S-48451 for the use of up to 16.16 mgd (25.0 cfs) from the Salmon River. Table 1 summarizes these water rights.

Table 1. City of Sandy Municipal Water Rights

Source	Application	Permit	Certificate	Priority Date	Type of Beneficial Use	Authorized Rate (cfs/mgd)	Authorized Date for Completion
Brownell Springs (tributary of Beaver Creek)	S-9669	S-6597	5427	7/11/1924	Municipal	0.2/0.13	N/A
	S-27810	S-21879	26132	11/10/1952	Municipal	0.7/0.45	N/A
	S-47254	S-35394	91156	7/23/1970	Municipal	0.3/0.19	N/A
Alder Creek (tributary of Sandy River)	S-48840	S-36601	93884	11/11/1971	Municipal	4.0/2.59	N/A
Salmon River	S-65051	S-48451	N/A	4/28/1983	Municipal	25.0/16.16	10/1/2069

Note

cfs = cubic feet per second
 mgd = million gallons per day
 N/A = not applicable

Historically, the City has used a combination of its sources from Brownell Springs and Alder Creek to meet demands. As presented in the City’s 2015 water management and conservation plan, the City has relied on the springs to meet approximately one-third of demand and Alder Creek to meet approximately two-thirds of demand.

2.1 Brownell Springs

The City holds three water right certificates authorizing a total of 1.2 cfs from Brownell Springs. The priority date of Certificate 5427 (0.2 cfs) pre-dates all other water rights within the Beavercreek and Cedar Creek system. The City's other two certificates, Certificates 26132 and 91156, are junior in priority to the ODFW's 25.0 cfs water right for fish propagation (i.e., a hatchery); ODFW's water right has a priority date of 1949. In at least one instance, occurring in 2015, these two certificates held by the City were regulated off in favor of ODFW's water right. The City's records indicate that Brownell Springs reliably produces approximately 0.77 cfs, but due to the potential for regulation in favor of ODFW's senior fish hatchery water right on Cedar Creek, the City only has 0.2 cfs of reliable supply from Brownell Springs.

2.2 Alder Creek

The City's Alder Creek water right certificate has a priority date of November 11, 1971. The City's water rights on Alder Creek are senior to instream water rights on Alder Creek and the Sandy River. There is no history of regulation by priority on Alder Creek. There are no long-term streamflow records available for Alder Creek, but as part of the City's water supply investigation for the Alder Creek Basin, the City measured fairly consistent streamflows of approximately 5.1 cfs on Alder Creek approximately 0.5 miles above the Mt. Hood Loop Highway in August and September of 1971 and 1973. According to the City's WTP operators, however, there are periods when streamflows may not support the City's entire 4.0 cfs water right. The water use records available through OWRD's water use reporting database show that the City's average daily diversion during peak demand months of July and August does not exceed approximately 2.0 cfs. Murraysmith has assumed Alder Creek produces a reliable supply of 2.4 mgd (3.7 cfs) in the Water Master Plan. For purposes of this memo, Alder Creek is assumed to provide a reliable supply of 3.7 cfs. The City could further evaluate the reliable supply available from the Alder Creek source during periods of low flow.

2.3 Salmon River

The City holds Permit S-48451 for use of up to 16.2 mgd (25.0 cfs) from the Salmon River, which is currently undeveloped and has an extension of time to October 1, 2069. In the *Agreement for Instream Conversion* executed October 24, 2002 as part of the *Settlement Agreement Concerning the Removal of the Bull Run Hydroelectric Project (FERC Project No. 447)* (Settlement Agreement), the City voluntarily agreed to reduce the maximum rate of diversion under Permit S-48451 from 25.0 cfs to 16.3 cfs when the flow available in the Sandy River near Marmot, Oregon is 600 cfs or less, but can still divert up to 25.0 cfs when the flow available is more than 600 cfs. Based on data from a stream gage on the Sandy River near Marmot (U.S. Geological Survey Gage 14137000), a flow of 600 cfs is typically not exceeded from July through October, and for longer periods of time during years with low snowpack (e.g., 2015, 2018), when flows drop below 600 cfs prior to the beginning of June.

2.3.1 Fish Persistence Conditions Imposed by Extension Final Order

In addition to the restriction imposed by the Settlement Agreement, the order approving the City's extension of time for Permit S-48451 (extension order) imposes several conditions on the City's use of water under the permit, depending on where water is diverted. The City's currently authorized POD from the Salmon River is located at approximately RM 7.5. For diversion from the Salmon River at a location **upstream** from the confluence with Boulder Creek (RM 0.8), the extension order includes the following conditions:

1. Prior to using water under the permit, the City must install a means of measuring streamflow at a location between the confluence with Cheeney Creek (RM 7) and the mouth of the Salmon River. The City must receive OWRD's written concurrence with the location of measurement.
2. Prior to using water under the permit, the City must provide OWRD with an executed agreement between the City and ODFW, setting out specific fish passage requirements that ensure adequate upstream and downstream passage for fish.

3. No water may be diverted from August 16 to October 31.
4. From November 1 through February 29, the target flow for maintaining the persistence of listed fish species in the Salmon River is 129 cfs, or the average flow for the previous October, whichever is less. When the target flow is not met, no water can be diverted.

Given the restriction on any diversion of water from August 16 to October 31 for a diversion located above the confluence with Boulder Creek, the City would need to provide water from an alternate source from August 16 through October 31. The City’s late August demands are likely similar to the maximum day demand. Alder Creek and Brownell Springs are not expected to be capable of meeting the City’s projected maximum day demand. Figure 1 shows the City’s projected demands compared to reliable supply under the City’s Brownell Springs and Alder Creek water rights.

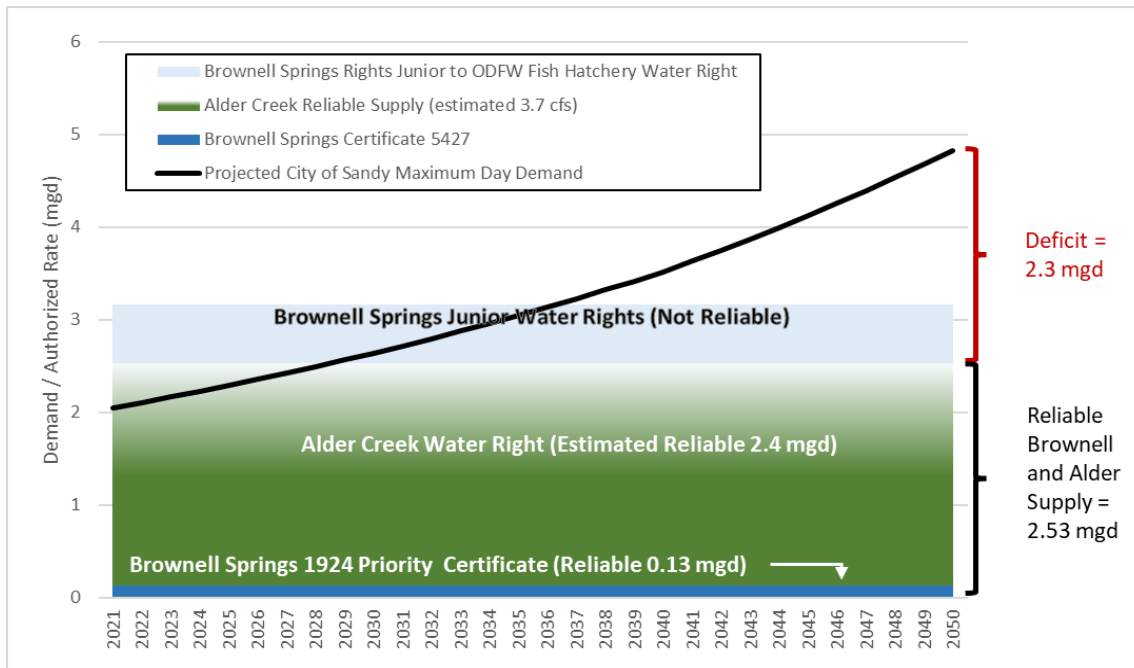


Figure 1. City of Sandy Projected Demand and Reliable Water Supply from Alder Creek and Brownell Springs

For diversion of water from a location **downstream** from the confluence with Boulder Creek at approximately RM 0.8, including a diversion from the Sandy River, the only condition included in the extension order, apart from repetition of conditions of the Settlement Agreement, is that prior to using water under the permit, the City must provide OWRD with an executed agreement between the City and ODFW setting out specific fish passage requirements that ensure adequate upstream and downstream passage for fish.

2.3.2 Surface Water to Groundwater Modification

The requirement for an agreement with ODFW regarding fish passage requirements, and the potential for additional federal conditions on any surface water diversion structure pose significant regulatory challenges to the development of a surface water diversion anywhere on the Salmon River or Sandy River. However, it may be possible for the City to minimize state and federal permitting associated with a new POD by

amending Permit S-48451 to change the surface water POD on the Salmon River to a hydraulically connected groundwater point of appropriation (POA) downstream on the Sandy River.

The City previously evaluated the potential to develop a groundwater source with a capacity of at least 5 mgd that meets OWRD requirements for transferring surface water rights to a hydraulically connected groundwater source (GSI, 2007). GSI's review and update of this evaluation is discussed in Section 4.

While there are no administrative rules governing permit amendments, OWRD reviews permit amendments using the same criteria as it does for water right transfers. OWRD would require the City's permit amendment application include a report prepared by a licensed geologist demonstrating that the use of the groundwater at the new POA downstream near the Sandy River would meet the following criteria:

1. The change would not result in injury or enlargement².
2. The new POD appropriates groundwater from an aquifer that is hydraulically connected to the authorized surface source.
3. The proposed change in POD will affect the surface water source similarly to the authorized POD specified in the water use subject to transfer.

OWRD considers "similarly" to mean that the use of groundwater at the new POA will affect the surface water source specified in the permit and would result in stream depletion of at least 50 percent of the rate of appropriation within 10 days of continuous pumping.

Although the surface water source identified in the City's permit is the Salmon River, recent OWRD practice indicates that OWRD likely would not preclude a surface water to groundwater change to a downstream surface water body.

One potential obstacle to completing a surface water to groundwater permit amendment to a well hydraulically connected to the Sandy River is the proximity of Cedar Creek to the Sandy River in areas most suitable for development of a hydraulically connected groundwater POD. Near Sandy, Cedar Creek flows parallel to the Sandy River at a distance of 0.75 to 0.25 miles from the Sandy River. It is theoretically possible, although unlikely, that a well hydraulically connected to the Sandy River could also influence flows in Cedar Creek. Depending on the pumping rate, recharge from the Sandy River would probably limit the extent of the cone of depression. Regardless, if OWRD determines that a well hydraulically connected to the Sandy River also influence flows in Cedar Creek, then OWRD may find that such a change would not meet the criteria that use of the well impact surface water "similarly." Furthermore, any impact to Cedar Creek flows would likely result in a finding that the change would cause injury. ODFW holds a surface water right for the use of water from Cedar Creek for its fish hatchery at a location near the confluence with the Sandy River. This water right has previously been the basis for regulation of one the City's junior Brownell Springs water rights in 2015, so any impact to Cedar Creek flows identified through modelling of the proposed hydraulically connected well would have the potential to result in OWRD finding injury.

Therefore, although a surface water to groundwater permit amendment to a well hydraulically connected to the Sandy River appears to present the most feasible opportunity of navigating the conditions imposed by the Settlement Agreement and the final order approving the City's extension of time for Permit S-48451, some uncertainty remains as to the possibility of receiving approval of the permit amendment.

² OWRD considers "injury" to mean a proposed water right action would result in another, existing water right not receiving previously available water to which it is legally entitled. OWRD considers "enlargement" to mean expansion of a water right and includes using a greater rate or duty of water per acre than currently allowed; increasing the acreage irrigated; failing to keep the original place of use from receiving water from the same source; or diverting more water at the new point of diversion or appropriation than is legally available to that right at the original point of diversion or appropriation.

It should be noted that the City has the option to include only a portion of its Salmon River permit in a downstream surface water to groundwater permit amendment. For example, the City’s projected groundwater supply need of 2.53 mgd (3.91 cfs), described in section 3, could be included in a surface water to groundwater modification to a downstream hydraulically connected well, while the remaining permitted rate remains associated with the currently authorized point of diversion on the Salmon River.

Furthermore, if the downstream surface water to groundwater permit amendment is approved, but for some reason, the City does not want to complete development of a hydraulically connected well, the City can return the rate moved to a downstream hydraulically connected well to the original point of diversion within five years of the approval of the permit amendment to move the point of diversion to a hydraulically connected well.

3. Groundwater Supply Needs

The City’s current water master planning effort projects demand through 2050. The water demand projection is predicated on assumption of steady, continual growth of Sandy over the next 30 years. Table 2 provides a summary of the results of the projection in the draft Water Master Plan at the time this tech memo was prepared.

Table 2. City of Sandy Projected Demands through 2050 (in million gallons per day)³

Year	Single-Family Residential	Multi-Family Residential	Commercial/Industrial	Other (Wholesale, Backwater, Bulk)	Total ADD ¹	EDUs	MDD
2021	0.65	0.11	0.21	0.05	1.20	6,613	2.05
2030	0.77	0.13	0.35	0.06	1.55	8,535	2.64
2040	0.89	0.15	0.64	0.07	2.07	11,362	3.52
2050	0.99	0.16	1.17	0.08	2.84	15,618	4.83

Notes

¹ Includes 18% water loss

ADD = average-day demand

EDU = Equivalent dwelling unit

MDD = maximum day demand

As described above, the City’s maximum reliable supply under its senior Brownell Springs water right and Alder Creek is 2.53 mgd. This is lower than the City’s projected maximum day demand of 4.83 mgd and average day demand of 2.84 mgd by 2050. If the City maintains its Brownell Springs and Alder Creek sources of supply, in order to meet the City’s maximum day demand using its own existing water rights, the City would need to develop a reliable supply of at least 2.3 mgd from a hydraulically connected well on the Sandy River downstream of the confluence with the Salmon River.

4. Future Groundwater Supply Alternatives

In 2007, GSI, under contract with Curran-McLeod, completed the *City of Sandy Groundwater/Riverbed Filtration Hydrogeologic Evaluation* (GSI, 2007). The objective of this evaluation was to determine if a groundwater source with a capacity of at least 5 mgd could be developed on the Sandy River that meets OWRD requirements for transferring surface water rights to a hydraulically connected groundwater source.

³ Data in this table is from Draft City of Sandy Water Master Plan (2022) being prepared by Murraysmith at the time this tech memo was prepared.

The information presented below is based on a review of those findings to confirm if other/newer data warrant updates or refinements to those findings and recommendations.

Figure 2 is a map of the City's authorized surface water POD and areas evaluated as part of the 2007 hydrogeologic evaluation.

4.1 Aquifer Storage and Recovery Feasibility near the City of Sandy

An ASR project would allow the City to inject water into the aquifer during the winter months for recovery during the high demand summer period. A successful ASR system requires an aquifer with several characteristics, including the ability to accept/yield water at a sufficient rate, sufficient storage volume, confined conditions that will not lose stored water to surface water bodies, and an acceptable depth from the surface (i.e., not so deep as to render drilling and operation of the well prohibitively expensive).

GSI evaluated the feasibility of ASR development for the following water-bearing formations in the vicinity of Sandy:

- **Columbia River Basalt Group (CRBG)** — The CRBG unit consists of a series of basalt sheetflows characterized by thin, often permeable, interflow zones separated by thick, low permeability flow interiors. Interflow zones include the top of one flow, the base of an overlying flow, and intervening sediments. Well yields are moderate to high, with most high-capacity wells open to multiple interflow zones. In the Sandy area, the CRBG is assumed to underlie the younger sedimentary units, but the depth to the top of the CRBG is uncertain, and likely greater than 1,000 feet below ground surface. A productive ASR well would likely need to extend at least several hundred feet into the basalt. Costs associated with drilling and operation of a high-capacity ASR well in the CRBG would be very high, and the presence and nature of suitable aquifer storage targets in the CRBG is not known in this area.
- **Rhododendron Formation** — The Rhododendron Formation consists of debris-flow breccias and andesite lava flows, with generally poor water-bearing characteristics (Swanson et al., 1993). Yields range from 10 to 60 gallons per minute (gpm), often with considerable drawdown (specific capacity 0.04 to 3 gpm per foot).⁴
- **Troutdale Formation** — The Troutdale Formation is an important aquifer for water supply in the area and consists of volcanic and quartzite-bearing conglomerate and vitric sandstone. The greater well yields in the Troutdale Formation near the City are 40 to 50 gpm, much less than the City's needs. The Troutdale Formation near Sandy is mostly unconfined and in hydraulic connection with surface water bodies. Both the unconfined condition and hydraulic connection with surface water are associated with considerable risk of losing stored water.
- **Boring Lava** — The Boring Lava consists of localized accumulations of basaltic lavas, vent plugs, and volcanic debris. The potential to encounter favorable conditions in the Boring Lava for an ASR system that can meet the City's needs is low because of the limited extent and locally variable nature of the unit.

The feasibility of developing ASR in the shallower water-bearing units is mostly limited by aquifer characteristics, whereas the development potential of a deeper aquifer is more affected by uncertainty regarding the presence of a suitable storage aquifer, and the drilling and construction depth that would be required to construct a high-capacity ASR well.

⁴ This information was obtained from the following reference well logs for the Rhododendron Formation near Sandy: CLAC 6699, CLAC 18898, CLAC 18519, CLAC 6688, and CLAC 51283/52951.

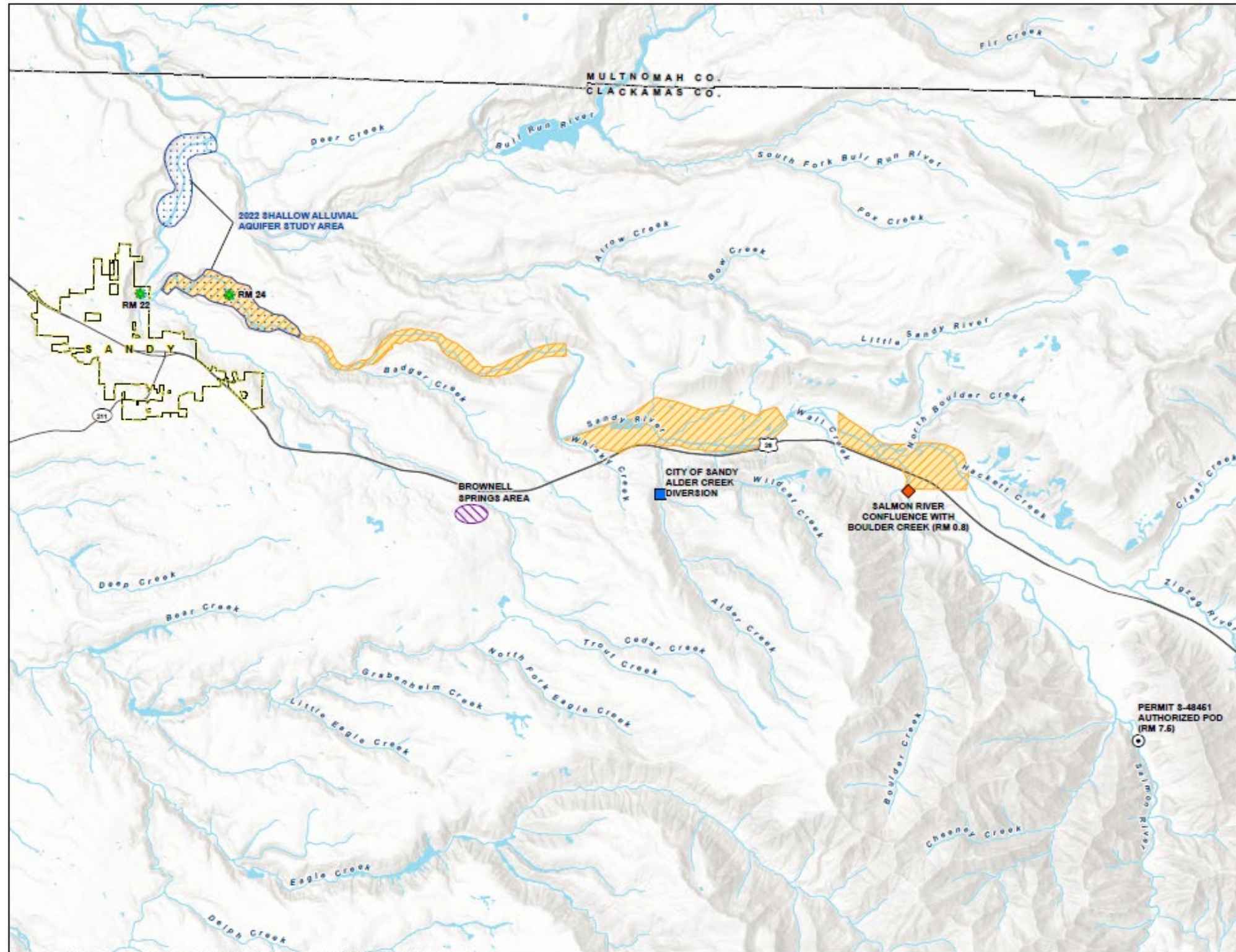


FIGURE 2
Authorized Water Right Points of Diversion and Groundwater Areas of Interest
City of Sandy

LEGEND

- Permit 8-48451 Authorized Point of Diversion (POD)
- ◆ Salmon River and Boulder Creek Confluence
- City of Sandy Alder Creek Diversion
- ★ River Mile of Interest
- ▭ 2022 Shallow Alluvial Aquifer Study Area
- ▨ City of Sandy 2007 Study Area
- ▧ Brownell Springs Area

All Other Features

- ▭ City Boundary
- ▭ County Boundary
- Major Road
- Watercourse
- Waterbody

PROJECT LOCATION

OREGON

PERMIT 8-48451 AUTHORIZED POD (RM 7.6)

0 1 2 Miles

Date: June 16, 2022
 Data Sources: BLM, ESRI, ODOT, USGS, OWRD

GSI
 Water Solutions, Inc.

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In addition, restrictions on diversion of water from an upstream POD during November through February may make the Salmon River an unreliable source of supply for ASR injection during winter. GSI reviewed Salmon River flow data from 1925 through 1952. While water was typically available from November through February, during dry years from the 1925 through 1952 period of record, data indicate that water would have been available for less than 90 days in 3 out of 25 years in the period of record. There is no Salmon River flow data available for the winter of 1976 to 1977, but Sandy River flow data from 1976 to 1977 suggest the possibility that no water would have been available from November through February in that year. The City would need to have sufficient excess water supply available from Alder Creek and Brownell Springs to provide water for ASR injection.

4.2 Shallow Alluvial Aquifer near the City of Sandy

GSI evaluated the favorability of groundwater development from the shallow alluvial aquifer on the south side of the Sandy River between RM 22 and RM 24 (GSI, 2007) and between RM 19 and RM 22. Both reaches of the Sandy River are downstream from the confluence with Boulder Creek and would likely meet the criteria for a downstream transfer of the Salmon River water right. Although the composition of the aquifer indicates potential for high-yielding shallow groundwater production, the shallow alluvial aquifer appears not to be laterally extensive, and the limited saturated thickness may constrain yield potential from either riverbank filtration (RBF) or a vertical well. According to nearby wells logs (CLAC 6688, CLAC 6723, CLAC 18462, CLAC 1327, CLAC 74908, and CLAC 11163) the saturated thickness of the aquifer is approximately 20 to 25 feet. Two well logs from geotechnical borings (CLAC 51394 and CLAC 51395) located near where Lusted Road meets Dodge Park (approximately RM 19) reported gravels and cobbles to a depth of 35 feet. However, the majority of logs between RM 19 and RM 22 reported depths of coarse alluvial deposits between 11 and 27 feet. GSI affirms the findings from the 2007 study that it is unlikely that an infiltration gallery or collector well system constructed in the shallow alluvial aquifer near the City could produce the desired 5 mgd.

A vertical well that is hydraulically connected to the Sandy River may be able to produce yields in excess of 100 gpm, but there are considerable uncertainties that might limit actual yields, including seasonal water level fluctuations and the depth of the productive zone(s). For example, if only the uppermost layer of the aquifer is in connection with the river, it might be highly productive during the wet season, but lose some or all hydraulic connection during periods of low water levels in the river. Similarly, pumping from the well might cause the water level to drawdown below the top of a shallow screen interval and cause water to cascade into the well. Cascading water should be avoided because it increases the risks of corrosion and biofouling. A horizontal gallery or lateral well may be capable of higher rates. Similar settings with suitable hydrogeologic characteristics may yield more than 1 mgd to a horizontal facility under the right conditions. Completion of a test well would be the best recommended approach to estimate actual sustainable production rates from the shallow alluvial aquifer.

In summary, the current review confirms that the saturated thickness of the shallow alluvial aquifer in this area is likely insufficient to provide a 5 mgd groundwater supply source, but may be capable of yielding 1 mgd to a horizontal well at a site under favorable circumstances.

5. Additional Data Needs

A comprehensive field characterization program would be necessary should the City decide to investigate the feasibility of developing a lower capacity source (i.e., 1 mgd) in the alluvial aquifer through a surface to groundwater transfer. The objectives of the field characterization program include:

1. Determine potential yield of a groundwater source under low stage/flow (summer) conditions on the river

2. Evaluate the feasibility of a surface to groundwater transfer based on hydraulic connection with the river during the summer season, assessing the likelihood of interference with streamflow in Cedar Creek.

The characterization program should include the following elements to develop a sufficient confidence in the capacity of a given location to before investing in infrastructure to develop the source:

1. Identify a site(s) adjacent to the flood plain and with space within 100 feet of the river. The City may consider identifying more than one site to explore in the event that characteristics at the first site are unsuitable and/or the City should desire to develop an additional increment of supply.
2. Complete a field exploration and monitoring program including the following activities:
 - Generate an accurate topographic map of the site using either survey or LiDAR data, depending on availability
 - Conduct a geophysical survey to map the extent and thickness of shallow deposits
 - Drill 2–4 small boreholes using sonic drilling technique to identify geologic materials and assess initial suitability
 - Construct a test well and two piezometers to serve as observation wells
 - Perform a constant-rate aquifer test during the low flow season in the Sandy River, and monitor water level responses and field water quality parameters.
 - Collect samples for water quality analysis and conduct microscopic particulate analysis (MPA) during the constant-rate aquifer test
 - Monitor water levels in the test well and observation wells over periods of high- and low-stages in the Sandy River
3. Evaluate source capacity and stream depletion from testing and monitoring data, water quality data and analytical modeling.
4. Develop preliminary design of horizontal well or infiltration gallery.

We estimate that planning level costs for this assessment per site are approximately \$225,000. Including a 25 percent contingency, the total per site assessment cost would be \$281,000.

6. References

- GSI. 2007. *City of Sandy Groundwater/Riverbed Filtration Hydrogeologic Evaluation*. Draft report prepared for Curran-McLeod, Inc. and City of Sandy. May 2007.
- GSI. 2015. City of Sandy Water Management and Conservation Plan.
- PGE. 2002. Settlement Agreement Concerning the Removal of the Bull Run Hydroelectric Project (FERC Project No. 447
- Swanson, R.D., McFarland, W.D., Gonthier, J.B., and Wilkinson, J.M. 1993. A description of hydrogeologic units in the Portland Basin, Oregon and Washington: U.S. Geological Survey Water-Resources Investigations Report 90–4196, 56 p., 10 sheets, scale 1:100,000.



APPENDIX B
PRESENTATION TO
SANDY CITY COUNCIL

Bull Run Water Supply Decision Re-Evaluation

June 6, 2022

Presented by:

Jennifer Coker
Public Works Director

Murraysmith



Presentation Overview

- Background, Drivers
- Existing Water Supply Sources
- Water Demand
- Changes to Portland Supply
- Water Supply Alternatives
- Schedule
- Recommendation & Next Steps
- Q&A

Existing Water Supply

Today, water is supplied from three sources

Portland Wholesale Supply

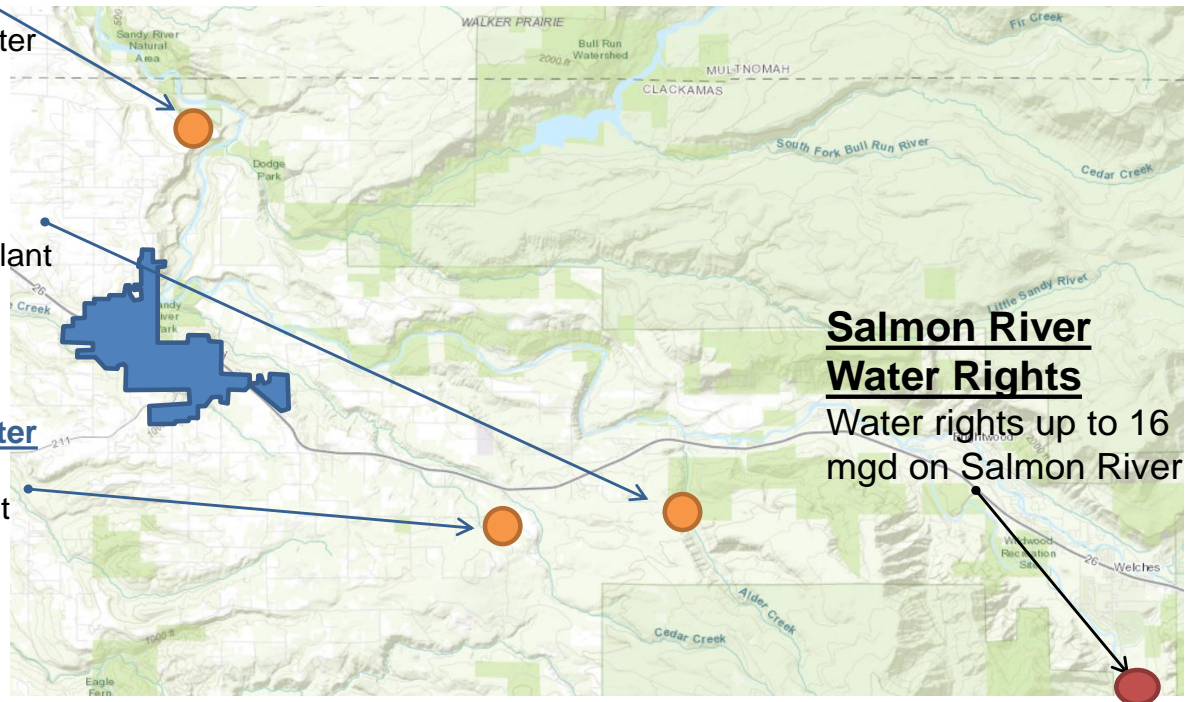
Purchase unfiltered treated water from Portland : 3 (mgd)

Alder Creek Surface Water Source

City owned Water Treatment Plant on Alder Creek: 0.9 mgd

Brownell Springs Groundwater Source

City owned groundwater well at Brownell Springs: 0.12 mgd



Salmon River Water Rights
Water rights up to 16 mgd on Salmon River

Groundwater

▪ **Water Rights Review**

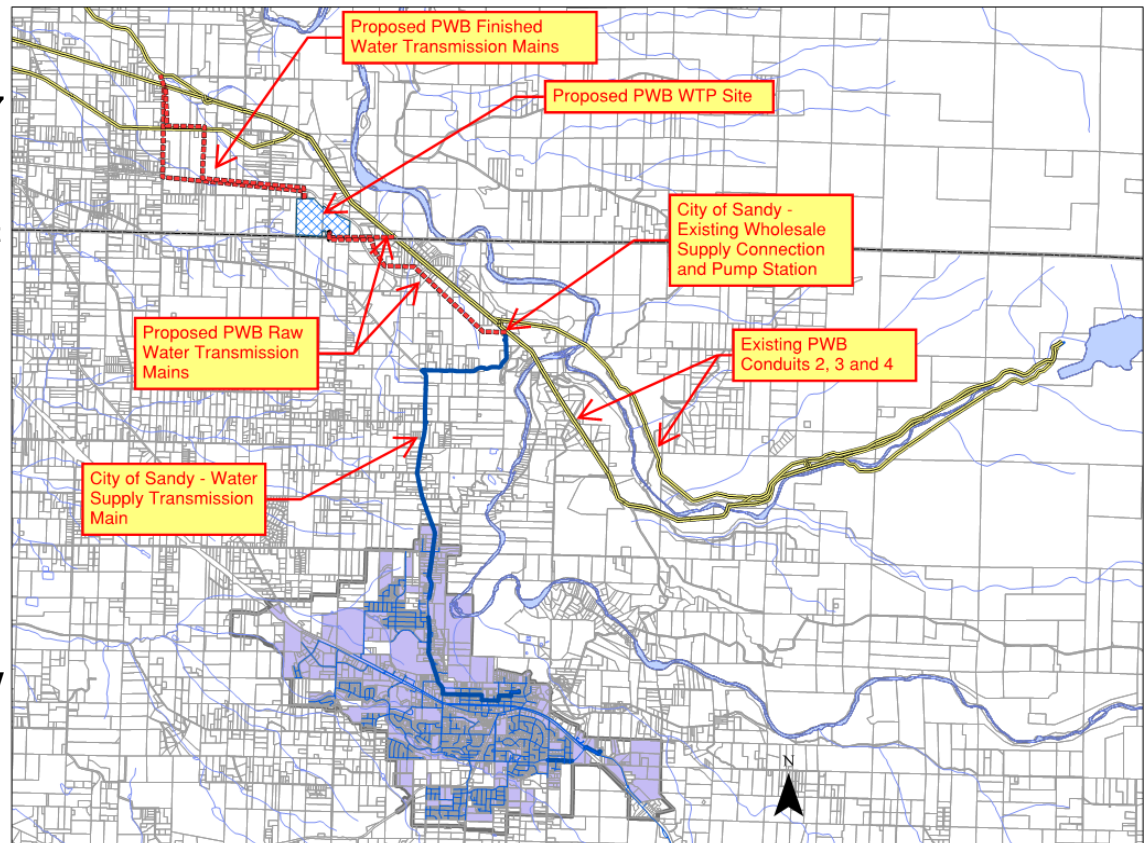
- Brownell Springs & Alder Creek @ 2.7 MGD water right priority
- Undeveloped Salmon River Permit – 16.2 MGD– significant regulatory hurdles.
 - Surface water to groundwater transfer of permit to a well on the Sandy River downstream of Salmon River confluence may be feasible.
 - Uncertain outcome, cannot happen by 2027

▪ **Groundwater Review**

- Unlikely a wellfield could produce 5 MGD

Changes to Portland Supply

- Portland is building a new filtration plant to meet Surface Water Treatment Rules
 - Must be in service by fall 2027
 - Treated water will not be available to Sandy when plant goes in service without constructing improvements
 - Sandy can buy untreated water from Portland and build a treatment plant
- or*
- Sandy can buy filtered water from Portland and build a new pipeline from Portland's WTP to existing connection at Lusted Road and Hudson Road



Sandy Water Supply History

2008 20-year Water Supply Agreement w/ PWB

2011 Sandy constructs infrastructure to connect to PWB

2018 Sandy Agreement w/OHA treat Bull Run Water for Cryptosporidium by **September 2027**

June 2021 Sandy chooses water treatment plant & purchase unfiltered water from PWB

May 2022 Revisit Decision based on updated costs

Compliance Status with OHA

Bilateral Compliance Agreement	Date Issued	Due Date	Closed Date
Submit Master Plan	Sept 2018	December 2020	OVERDUE
Begin Construction	Sept 2018	July 31, 2024	
Correct Water Quality Deficiencies	Sept 2018	September 30, 2027	

Decision Drivers

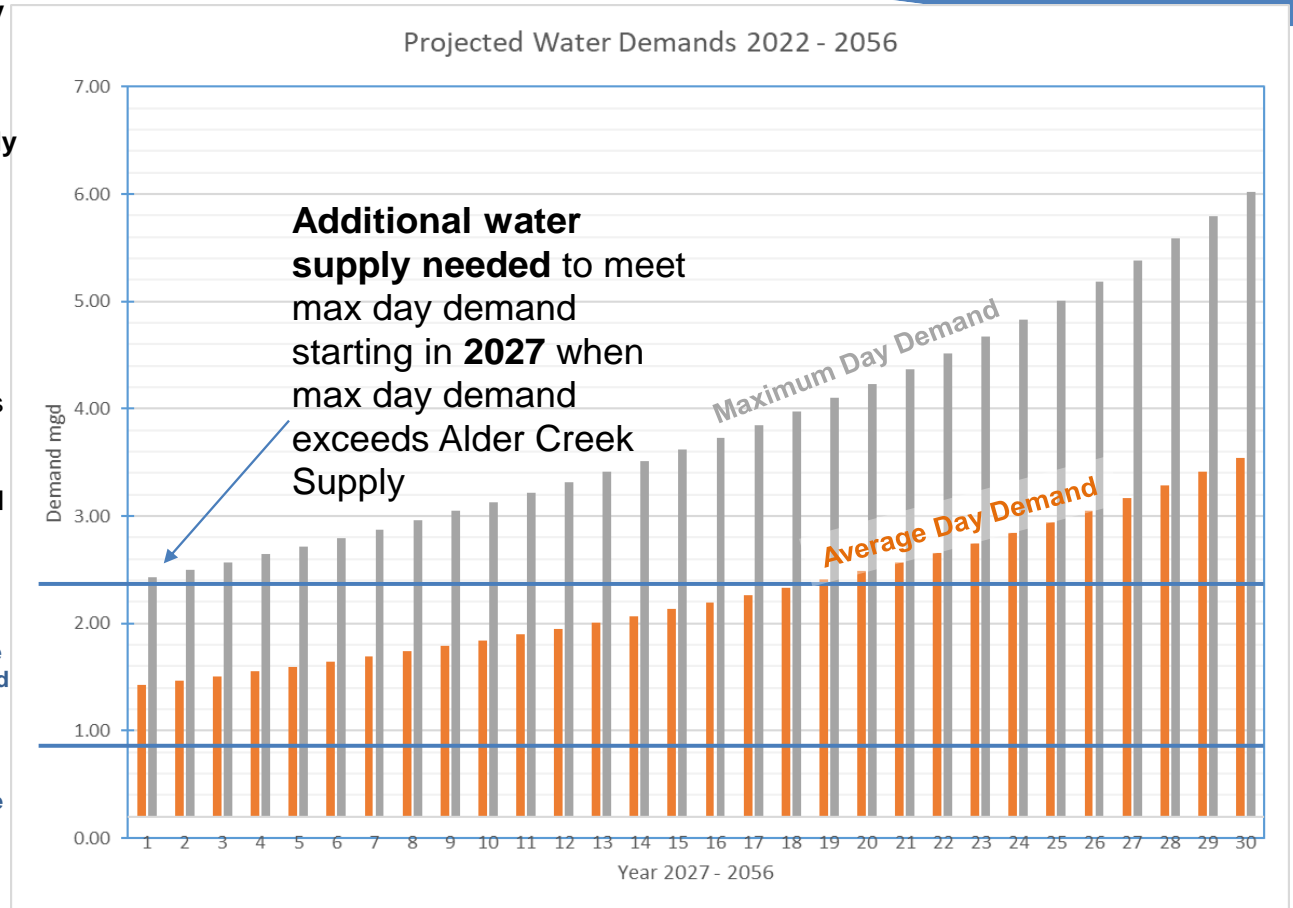


Water Demand

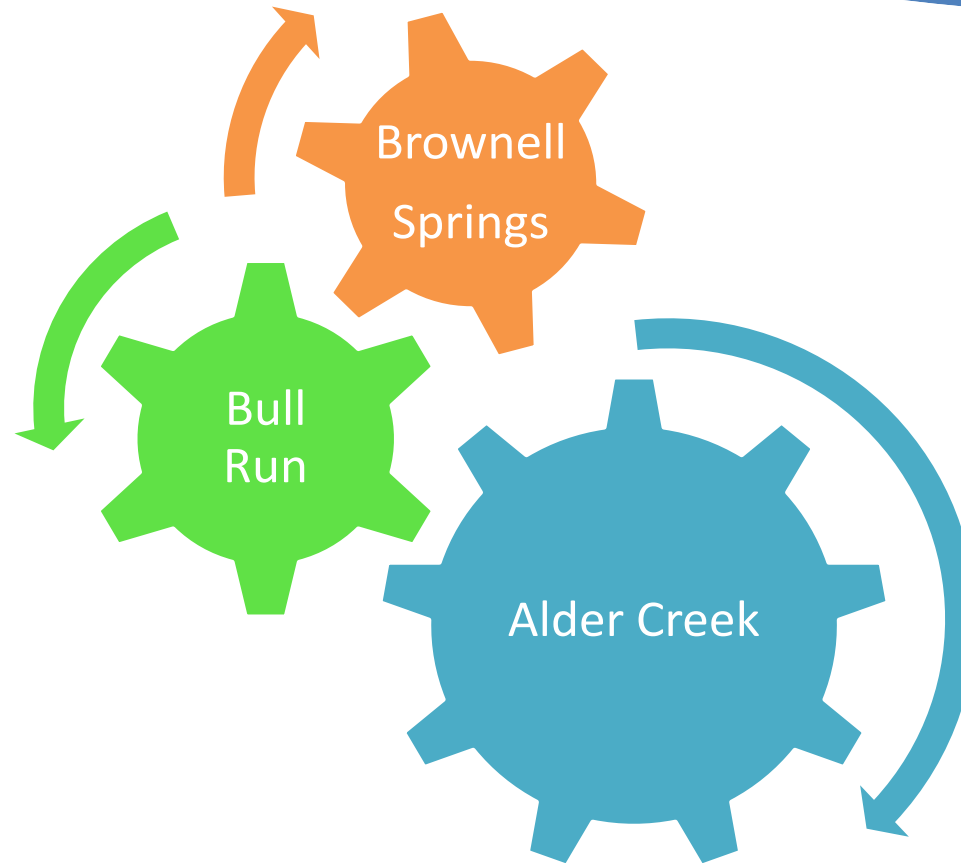
- **Additional water supply needed in 2027** to meet max day demand
- **Size of additional supply varies** depending on capacity of Alder Creek
- **Brownell Springs provides** additional 0.12 mgd in the winter
- **Max day demand** occurs in summer
- **Today max day demand** is 2.1 mgd (ADD is 1.2 mgd)

ALDER CREEK
Maximum future capacity 2.4 mgd

ALDER CREEK
Current reliable capacity 0.9 mgd



Water Supply Alternatives Screening



Water Supply Alternatives Screening

Upgrade existing supply at Alder Creek,

- Maintain existing capacity of 0.9 mgd with minor maintenance
- Improve supply to 1.4 mgd with major maintenance
- Maximize supply to 2.4 mgd with upgrades

PLUS:

A) Purchase raw water & build second treatment plant;

or

B) Purchase filtered water and build Pipeline

Pipeline Alignment for Finished Water

Potential PWB Backfeed Pipeline

Would need to be oversized to feed Sandy

Bluff Rd. Pipeline

New low-head pump station – 5 mgd

PWB obtaining easement

New pipeline
11,500 FT – 24" dia.

Exist.
Connection and
pumpstation

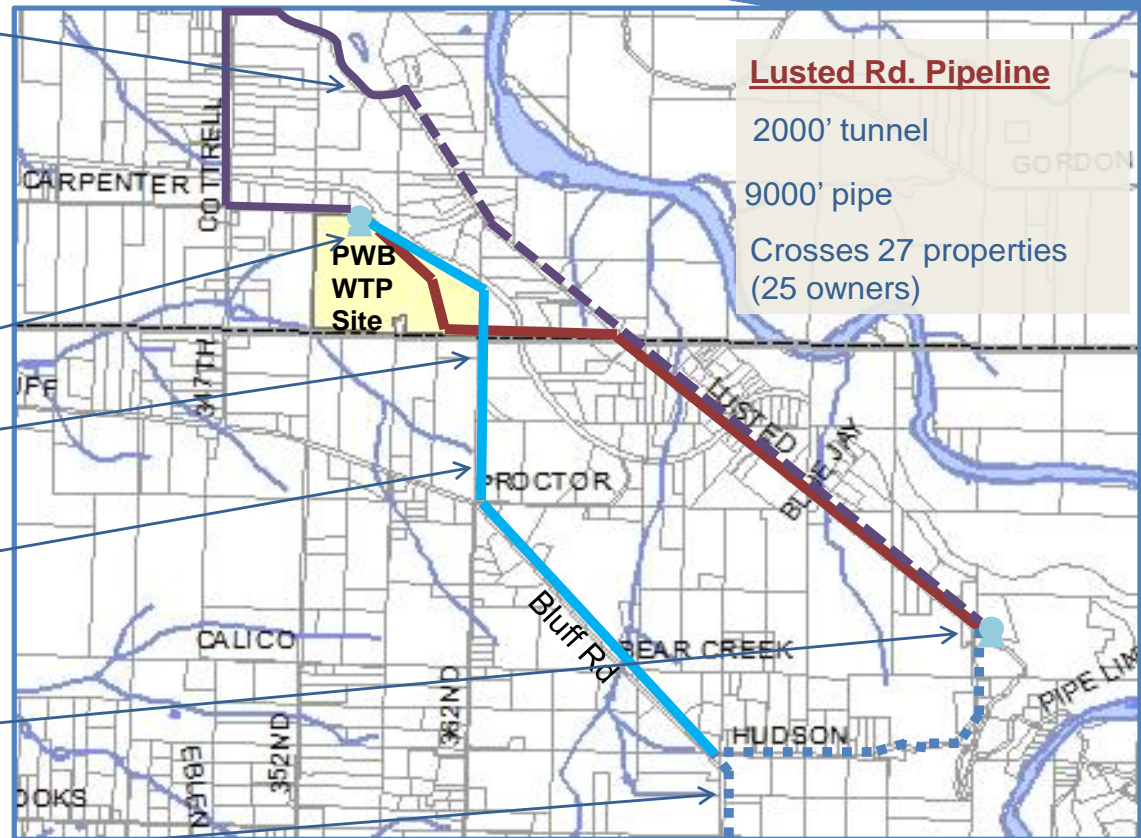
Exist. Sandy
supply pipeline

Lusted Rd. Pipeline

2000' tunnel

9000' pipe

Crosses 27 properties
(25 owners)



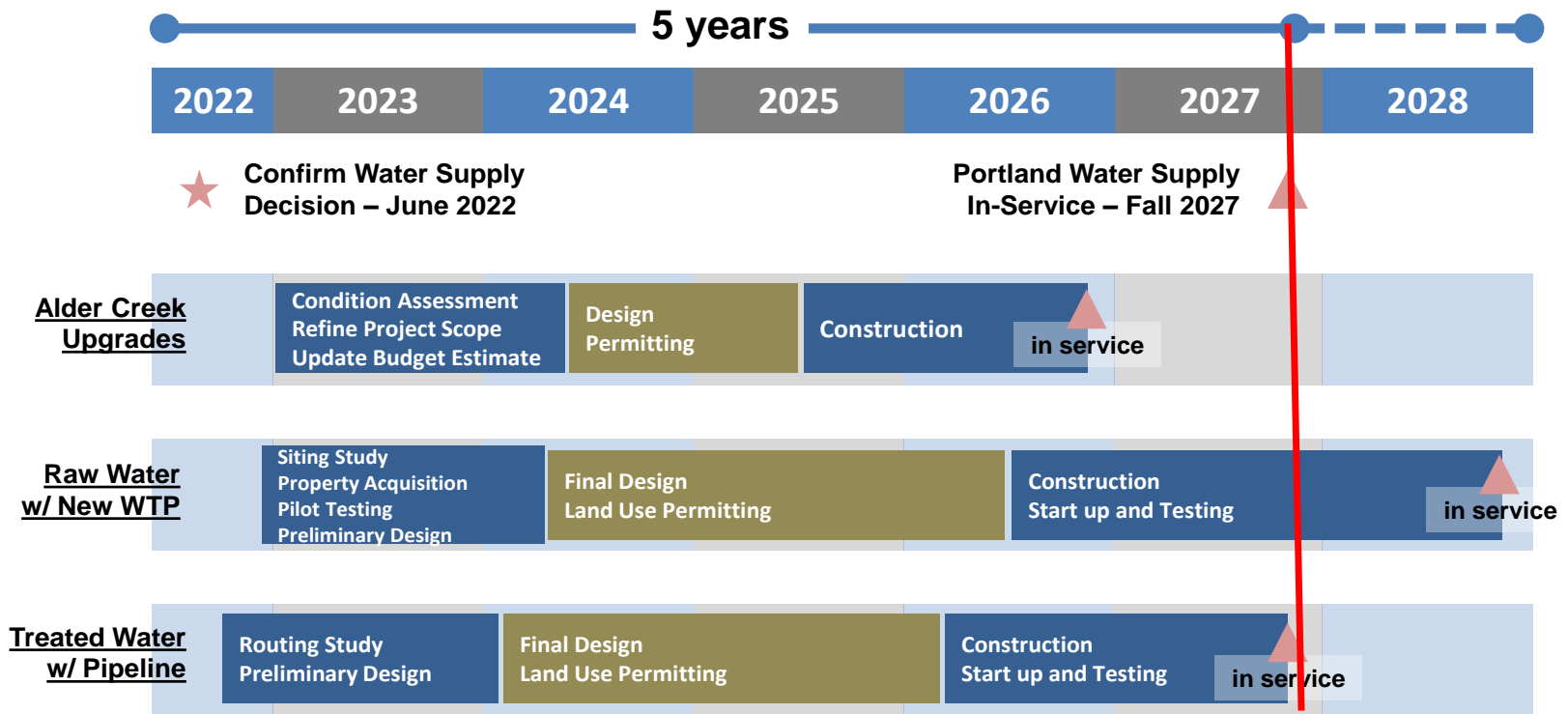
Supply Alternatives Filtered vs. Unfiltered Water Purchase

CRITERIA	PURCHASE FILTERED WATER FROM PDX BUILD BLUFF ROAD PIPELINE			PURCHASE RAW WATER FROM PDX BUILD WATER TREATMENT PLANT			
Water Supply Cost (30-yr cost in 2026 \$)	LifeCycle Cost:	\$85.6M	+	LifeCycle Cost:	\$143.4M	-	
	Total Investment:	\$47.2M		Total Investment:	\$ 58.4M		
Cost of Portland Water (in 2026 \$)	30-yr Cost:	\$10.7M	-	30-yr Cost:	\$ 6.1M	+	
Implementation Risk	<ul style="list-style-type: none"> * Entire pipeline must be built - <u>can't</u> be phased * Requires Carpenter Ln Easement * All construction is outside the City * Without pipeline, City can't meet summer demand in 2027 			-	<ul style="list-style-type: none"> * WTP can be built in phases * Requires one (1) 3-to-5-acre property near existing pipeline * Land use permitting provides some uncertainty 		+

Supply Alternatives including Alder Creek Upgrades

CRITERIA	PURCHASE FILTERED WATER FROM PDX BUILD BLUFF ROAD PIPELINE		PURCHASE RAW WATER FROM PDX BUILD WATER TREATMENT PLANT	
Water Filtration	<ul style="list-style-type: none"> * Water Treatment Plant (WTP) built by Portland * WTP cost shared by wholesale purchasers & Portland rate payers 	+	<ul style="list-style-type: none"> * City builds and owns new WTP * WTP paid for by City Rate Payers 	-
Operational Complexity	<ul style="list-style-type: none"> * Minimal O&M cost for pipeline * Need To evaluate disinfection approach * City operates only upgraded Alder Creek WTP and new pumpstation * PWB responsible for compliance 	+	<ul style="list-style-type: none"> * City operates two water treatment plants * Higher O&M cost * City responsible for compliance 	-
Resilience / Reliability	Portland groundwater supply provides redundancy	+	Portland groundwater supply not available for raw water option	-

Water Supply Program Schedule



Recommendation

- Upgrade Alder Creek & Install Bluff Road Water Transmission Pipe, **purchase filtered water**
- Capital Cost **\$47.2 Million**
- 30-year Lifecycle cost **\$85.6 Million**
- Lowest Capital and Lifecycle Costs, Faster Schedule, and Resiliency/Groundwater access

Next Steps

- **Council Formalize** purchase decision
- **Refine condition assessment** to maximize Alder Creek WTP and determine water system CIP
- **Complete Master Plan**
- **Evaluate land use and permitting** associated with building a pipeline
- **Develop funding** approach for program
- **Hire** program manager/design team

Questions



Portland Supply Alternatives

We also considered new pipeline in Lusted Road.

- Included a 2,000 ft tunnel and 200' deep bore shaft – high risk
- Required property acquisition from 25 property owners along Lusted Road – high risk
- Cost was higher than Bluff Road option

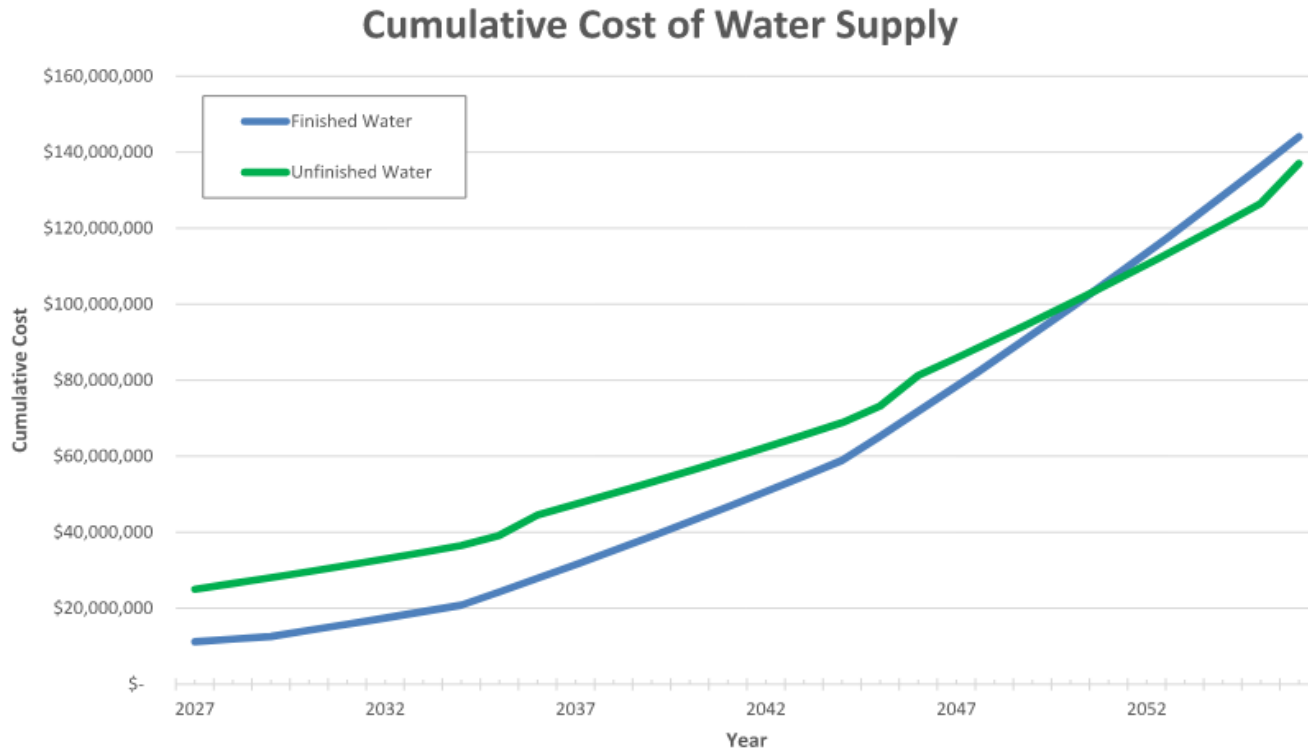
Screening: Raw Water Alternatives

Raw Water Alternatives	Initial Investment (2026 Dollars)	Lifecycle Cost (30 years)	Water Purchase	O & M
(R1) New Plant + Alder minor	\$43,947,000 \$ 1,033,000	\$176,607,000	\$37,756,000	\$27,300,000
TOTAL	\$44,900,000	<i>Build a new WTP and perform minor maintenance at Alder Creek. Alder Creek contributes today's amount 0.9 MGD</i>		
(R2) New Plant + Alder major maintenance	\$43,947,000 \$ 4,164,000	\$161,668,000	\$17,835,000	\$36,270,000
TOTAL	\$48,100,000	<i>Major maintenance at Alder Creek includes new filters, control repair/upgrades. Alder Creek contributes 1.4 MGD.</i>		
(R3) New Plant + Upgrade Alder Creek	\$43,947,000 \$ 14,407,000	\$143,356,000	\$6,057,000	\$32,240,000
TOTAL	\$58,400,000	<i>Partial replacement of Alder Creek includes new filters, new control, new process piping and upgraded pump station. Alder Creek contributes 2.4 MGD</i>		

Screening: Filtered Water Alternatives

Filtered Water Alternative	Initial Investment (2026 \$)	Lifecycle Cost (30 years)	Water Purchase	O & M
(FB1) New Bluff Rd Pipe Alder Creek minor maintenance	\$32,784,000	\$177,700,000	\$75,061,000	\$4,977,000
TOTAL	\$1,033,000 \$33,817,000	11,500 LF of 24" pipe including 5 mgd pump station. Alder Creek produces current rate for 10 years		
(FB2) New Bluff Rd Pipe Alder Creek major maintenance	\$32,784,000	\$119,289,000	\$31,146,000	\$14,208,000
TOTAL	\$4,164,000 \$36,948,000	11,500 LF of 24" pipe including 5 mgd pump station. Increase Alder Creek production to 1.4 MGD		
(FB3) New Bluff Rd Pipe Upgrade Alder Creek	\$32,784,000	\$85,618,000	\$10,682,000	\$10,177,000
TOTAL	\$14,407,000 \$47,190,000	11,500 LF of 24" pipe including 5 mgd pump station. Increase Alder Creek production to 2.4 MGD		

Previous Analysis



Future Water Supply Alternatives

Evaluating Alder Creek Alternatives

All options assume Alder Creek improvements are completed before 2027

Note: Maximum capacity from Alder Creek requires additional source to meet max day demand

Alternative	Capacity	Cost	Benefits/Risk
Minor Maintenance	0.9 mgd	\$ 1M	<ul style="list-style-type: none">• Requires most water from Portland• Alder Creek has approx. 10-year life expectancy without significant upgrades• Does not Maximize Alder Creek supply
Major Maintenance	1.4 mgd	\$ 4.2M	<ul style="list-style-type: none">• Reduces water needed from Portland• Restores reliable long-term water supply• Does not Maximize Alder Creek supply
Partial Replacement	2.4 mgd	\$ 14.4M	<ul style="list-style-type: none">• Maximizes Supply from Alder Creek• Requires least water from Portland• Restores reliable long-term water supply



APPENDIX C
CIP COST ESTIMATES

**Table 6-3
Sandy Capital Improvement Plan Summary**

Project No.	Project Description	CIP Schedule and Project Cost Summary (2022 Dollars)				Preliminary SDC Eligibility
		1-5 Years (2023-2027)	6-10 Years (2028-2032)	11-20 Years (2033-2042)	TOTAL	
R.1	5.0 MG Additional Storage		\$ 17,290,000	\$ 17,290,000	\$ 34,580,000	49%
R.2	Storage Siting Study	\$ 180,000			\$ 180,000	49%
R.3	Reservoir Seismic and Condition Assessment		\$ 375,000		\$ 375,000	49%
	<i>Storage Subtotal</i>	\$ 180,000	\$ 17,665,000	\$ 17,290,000	\$ 35,135,000	
PS.1	Terra Fern Pump Station Upgrades	\$ 780,000			\$ 780,000	45%
PS.2	Vista Loop Pump Station	\$ 1,420,000			\$ 1,420,000	45%
	<i>Pump Station Subtotal</i>	\$ 2,200,000	\$ -	\$ -	\$ 2,200,000	
D.1	Bluff Rd Fire Flow Improvements		\$ 5,580,000		\$ 5,580,000	45%
D.2	Hood St Fire Flow Improvements		\$ 540,000		\$ 540,000	45%
D.3	Mitchell Ct Fire Flow Improvements		\$ 260,000		\$ 260,000	45%
D.4	Seaman Ave Fire Flow Improvements		\$ 550,000		\$ 550,000	45%
	<i>Distribution Subtotal</i>	\$ -	\$ 6,930,000	\$ -	\$ 6,930,000	
S.1	Near-Term Alder Creek WTP Improvements	\$ 1,050,000			\$ 1,050,000	0%
S.2	Short-Term Alder Creek WTP Assessment	\$ 240,000			\$ 240,000	45%
S.3	Alder Creek WTP Improvements	\$ 42,080,000			\$ 42,080,000	45%
S.4	PWB Filtered Water Supply Connection	\$ 39,416,000			\$ 39,416,000	45%
S.5	Long-Term Supply Study		\$ 240,000		\$ 240,000	45%
	<i>Supply Subtotal</i>	\$ 82,786,000	\$ 240,000	\$ -	\$ 83,026,000	
M.1	Water System Master Plan Update		\$ 220,000		\$ 220,000	45%
M.2	Water Management and Conservation Plan	\$ 110,000			\$ 110,000	45%
M.3	Annual Replacement Budget	\$ -	\$ 6,000,000	\$ 24,000,000	\$ 30,000,000	45%
M.4	Water Service Meter Replacement			\$ 7,920,000	\$ 7,920,000	0%
M.5	SCADA Master Plan	\$ 150,000			\$ 150,000	45%
M.6	SCADA Upgrades (Preliminary Budget Placeholder)		\$ 760,000		\$ 760,000	45%
	<i>Other Subtotal</i>	\$ 260,000	\$ 6,980,000	\$ 31,920,000	\$ 39,160,000	
	CIP Total	\$ 85,426,000	\$ 31,815,000	\$ 49,210,000	\$ 166,451,000	



Probable Cost of Construction CIP R.1

Project: 5.0 MG Additional Storage

Location To be assessed

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	2.0 MG Reservoir	1	LS	\$4,000,000
A2	2.0 MG reservoir	1	LS	\$4,000,000
A3	1.0 MG Reservoirs	1	LS	\$3,000,000
A4	12-inch transmission piping	15,900	LF	\$370
A5	Control Valve Vault	3	EA	\$100,000
SubTotal:				\$17,190,000
Special				
C1	Property Acquisition	2	AC	\$660,000
SubTotal:				\$1,320,000
Material & Labor Total:				\$18,510,000
Bonds and Insurance 2%				\$370,200
Mobilization: 10%				\$1,851,000
Subtotal				\$20,740,000
Oregon Corporate Activity Tax 1.0%				\$207,400
Subtotal:				\$20,950,000
Contingency: 30%				\$6,290,000
Engineering 20%				\$4,190,000
Permitting and Admin 5%				\$1,050,000
Construction Contract Administration 10%				\$2,100,000
Total Estimated Project Cost:				\$34,580,000
Cost Range				
-30%				\$24,206,000
50%				\$51,870,000



Probable Cost of Construction CIP R.2

Project: Storage Siting Study

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Storage Siting Study	1	LS	\$150,000
SubTotal:				\$150,000
		Contingency:	20%	\$30,000
Total Estimated Project Cost:				\$180,000
Cost Range		-30%		\$126,000
		50%		\$270,000



**Probable Cost of Construction
CIP R.3**

Project: Reservoir Seismic and Condition Assessment

Location Reservoir Locations

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Reservoir Seismic and Condition Assessment	1	LS \$375,000	\$375,000
SubTotal:				\$375,000
Total Estimated Project Cost:				\$375,000
Cost Range		-30%		\$262,500
		50%		\$562,500



**Probable Cost of Construction
CIP PS.1**

Project: Terra Fern Pump Station Upgrades

Location Terra Fern Road

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Fire Flow Pump	1	LS \$400,000	\$400,000
SubTotal:				\$400,000
Material & Labor Total:				\$400,000
	Bonds and Insurance	2%		\$8,000
	Mobilization:	10%		\$40,000
Subtotal				\$450,000
	Oregon Corporate Activity Tax	1.0%		\$4,500
	Subtotal:			\$460,000
	Contingency:	30%		\$140,000
	Engineering	20%		\$100,000
	Permitting and Admin	5%		\$30,000
	Construction Contract Administration	10%		\$50,000
Total Estimated Project Cost:				\$780,000
Cost Range		-30%		\$546,000
		50%		\$1,170,000



Probable Cost of Construction CIP PS.2

Project: Vista Loop Pump Station

Location Vista Loop

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Pump Station	1	LS	\$750,000
SubTotal:				\$750,000
Material & Labor Total:				\$750,000
Bonds and Insurance				2% \$15,000
Mobilization:				10% \$75,000
Subtotal				\$840,000
Oregon Corporate Activity Tax				1.0% \$8,400
Subtotal:				\$850,000
Contingency:				30% \$260,000
Engineering				20% \$170,000
Permitting and Admin				5% \$50,000
Construction Contract Administration				10% \$90,000
Total Estimated Project Cost:				\$1,420,000
Cost Range		-30%	\$994,000	
		50%	\$2,130,000	



Probable Cost of Construction CIP D.1

Project: Bluff Rd Fire Flow Improvements

Location Bluff Rd, Burgs Ln, Kelso Rd, SE Baumbach Ave, Marcy St

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	8-inch diameter	1800	LF \$270	\$490,000
A2	12-inch diameter	6700	LF \$370	\$2,480,000
SubTotal:				\$2,970,000
Material & Labor Total:				\$2,970,000
Bonds and Insurance 2%				\$59,400
Mobilization: 10%				\$297,000
Subtotal				\$3,330,000
Oregon Corporate Activity Tax 1.0%				\$33,300
Subtotal:				\$3,370,000
Contingency: 30%				\$1,020,000
Engineering 20%				\$680,000
Permitting and Admin 5%				\$170,000
Construction Contract Administration 10%				\$340,000
Total Estimated Project Cost:				\$5,580,000
Cost Range		-30%		\$3,906,000
		50%		\$8,370,000



Probable Cost of Construction CIP D.2

Project: Hood St Fire Flow Improvements

Location Hood St and SE Ten Eyck Rd

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	12-inch diameter	680	LF	\$260,000
SubTotal:				\$260,000
Material & Labor Total:				\$260,000
Bonds and Insurance 2%				\$5,200
Mobilization: 10%				\$26,000
Subtotal				\$300,000
Oregon Corporate Activity Tax 1.0%				\$3,000
Subtotal:				\$310,000
Contingency: 30%				\$100,000
Engineering 20%				\$70,000
Permitting and Admin 5%				\$20,000
Construction Contract Administration 10%				\$40,000
Total Estimated Project Cost:				\$540,000
Cost Range		-30%	\$378,000	
		50%	\$810,000	



Probable Cost of Construction CIP D.3

Project: Mitchell Ct Fire Flow Improvements

Location Mitchell Court

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	8-inch diameter	430	LF	\$270
SubTotal:				\$120,000
Material & Labor Total:				\$120,000
Bonds and Insurance 2%				\$2,400
Mobilization: 10%				\$12,000
Subtotal				\$140,000
Oregon Corporate Activity Tax 1.0%				\$1,400
Subtotal:				\$150,000
Contingency: 30%				\$50,000
Engineering 20%				\$30,000
Permitting and Admin 5%				\$10,000
Construction Contract Administration 10%				\$20,000
Total Estimated Project Cost:				\$260,000
Cost Range		-30%	\$182,000	
		50%	\$390,000	



Probable Cost of Construction CIP D.4

Project: Seaman Ave Fire Flow Improvements

Location Seaman Ave

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	12-inch diameter	720	LF	\$370
SubTotal:				\$270,000
Material & Labor Total:				\$270,000
Bonds and Insurance 2%				\$5,400
Mobilization: 10%				\$27,000
Subtotal				\$310,000
Oregon Corporate Activity Tax 1.0%				\$3,100
Subtotal:				\$320,000
Contingency: 30%				\$100,000
Engineering 20%				\$70,000
Permitting and Admin 5%				\$20,000
Construction Contract Administration 10%				\$40,000
Total Estimated Project Cost:				\$550,000
Cost Range		-30%	\$385,000	
		50%	\$825,000	



Probable Cost of Construction CIP S.1

Project: Near-Term Alder Creek WTP Improvements

Location Alder Creek WTP

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Minor Maintenance at Alder Creek WTP	1	LS	\$550,000
SubTotal:				\$550,000
Material & Labor Total:				\$550,000
Bonds and Insurance 2%				\$11,000
Mobilization: 10%				\$55,000
Subtotal				\$620,000
Contingency: 30%				\$190,000
Engineering 20%				\$130,000
Permitting and Admin 5%				\$40,000
Construction Contract Administration 10%				\$70,000
Total Estimated Project Cost:				\$1,050,000
Cost Range		-30%	\$735,000	
		50%	\$1,575,000	



Probable Cost of Construction CIP S.2

Project: Short-Term Alder Creek WTP Assessment

Location Alder Creek WTP

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Detailed WTP Assessment (includes structure, mechanical, and electrical assessments; cost benefit analysis; improvement plan	1	LS \$200,000	\$200,000
SubTotal:				\$200,000
Contingency:		20%		\$40,000
Total Estimated Project Cost:				\$240,000
Cost Range		-30%		\$168,000
		50%		\$360,000



Probable Cost of Construction CIP S.3

Project: Alder Creek WTP Improvements

Location Alder Creek WTP

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Full Replacement of Alder Creek WTP and Associated Infrastructure (2.6 MGD Capacity)	1	LS	\$22,530,000
SubTotal:				\$22,530,000
Material & Labor Total:				\$22,530,000
Bonds and Insurance 2%				\$450,600
Mobilization: 10%				\$2,253,000
Subtotal				\$25,240,000
Oregon Corporate Activity Tax 1.0%				\$252,400
Subtotal:				\$25,500,000
Contingency: 30%				\$7,650,000
Engineering 20%				\$5,100,000
Permitting and Admin 5%				\$1,280,000
Construction Contract Administration 10%				\$2,550,000
Total Estimated Project Cost:				\$42,080,000
Cost Range		-30%		\$29,456,000
		50%		\$63,120,000



Probable Cost of Construction CIP S.4

Project: PWB Filtered Water Supply Connection

Location Hudson PS

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	5 MG Pump Station	1	LS	\$12,005,000
A2	24-inch diameter transmission line	11,500	LF	\$738
SubTotal:				\$20,495,000
Material & Labor Total:				\$20,495,000
Bonds and Insurance 2%				\$409,900
Mobilization: 10%				\$2,049,500
Subtotal				\$22,955,000
Oregon Corporate Activity Tax 1.0%				\$229,550
Subtotal:				\$23,185,000
Contingency: 35%				\$8,115,000
Engineering 20%				\$4,637,000
Permitting and Admin 5%				\$1,160,000
Construction Contract Administration 10%				\$2,319,000
Total Estimated Project Cost:				\$39,416,000
Cost Range		-30%		\$27,591,200
		50%		\$59,124,000



Probable Cost of Construction CIP S.5

Project: Long-Term Supply Study

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Long-Term Water Supply Study	1	LS	\$200,000
SubTotal:				\$200,000
		Contingency:	20%	\$40,000
Total Estimated Project Cost:				\$240,000
Cost Range		-30%		\$168,000
		50%		\$360,000



Probable Cost of Construction CIP M.1

Project: Water System Master Plan Update

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Water System Master Plan Update	1	LS	\$200,000
SubTotal:				\$200,000
		Contingency:	10%	\$20,000
Total Estimated Project Cost:				\$220,000
Cost Range		-30%		\$154,000
		50%		\$330,000



Probable Cost of Construction CIP M.2

Project: Water Management and Conservation Plan

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Water Conservation Management Plan	1	LS \$100,000	\$100,000
SubTotal:				\$100,000
		Contingency:	10%	\$10,000
Total Estimated Project Cost:				\$110,000
Cost Range		-30%		\$77,000
		50%		\$165,000



Probable Cost of Construction CIP M.3

Project: Annual Replacement Budget

Location Distribution System

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	8-inch diameter (average)	4740	LF	\$270
SubTotal:				\$1,280,000
Material & Labor Total:				\$1,280,000
Bonds and Insurance 2%				\$25,600
Mobilization: 10%				\$128,000
Subtotal				\$1,440,000
Oregon Corporate Activity Tax 1.0%				\$14,400
Subtotal:				\$1,454,400
Contingency: 30%				\$437,000
Engineering 20%				\$291,000
Permitting and Admin 5%				\$73,000
Construction Contract Administration 10%				\$146,000
Total Estimated Project Cost:				\$2,400,000
Cost Range		-30%		\$1,680,000
		50%		\$3,600,000



Probable Cost of Construction CIP M.4

Project: Water Service Meter Replacement

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	Water Service Meter Replacement	3000	EA \$2,400	\$7,200,000
SubTotal:				\$7,200,000
		Contingency:	10%	\$720,000
Total Estimated Project Cost:				\$7,920,000
Cost Range		-30%		\$5,544,000
		50%		\$11,880,000



Probable Cost of Construction CIP M.5

Project: SCADA Master Plan

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

15,202.68

For the purposes of future updating, all cost estimates are in November 2022 dollars

Item No.	Item	Quantity	Unit Costs	Total Cost
Facilities				
A1	SCADA Master Plan	1	LS	\$125,000
SubTotal:				\$125,000
		Contingency:	10%	\$20,000
Total Estimated Project Cost:				\$150,000
Cost Range		-30%		\$105,000
		50%		\$225,000



Probable Cost of Construction CIP M.6

Project: SCADA Upgrades (Preliminary Budget Placeholder)

Location n/a

Date: December 1, 2022

ENR, CCI - Seattle, WA:

For the purposes of future updating, all cost estimates are in November 2022 dollars

15,202.68

Item No.	Item	Quantity	Unit Costs	Total Cost												
Facilities																
A1	SCADA Upgrades (Preliminary Budget Placeholder)	1	LS	\$450,000												
SubTotal:				\$450,000												
<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; padding-right: 20px;">Contingency:</td> <td style="text-align: center; padding-right: 20px;">30%</td> <td style="text-align: right;">\$140,000</td> </tr> <tr> <td style="text-align: right; padding-right: 20px;">Engineering</td> <td style="text-align: center; padding-right: 20px;">20%</td> <td style="text-align: right;">\$90,000</td> </tr> <tr> <td style="text-align: right; padding-right: 20px;">Permitting and Admin</td> <td style="text-align: center; padding-right: 20px;">5%</td> <td style="text-align: right;">\$30,000</td> </tr> <tr> <td style="text-align: right; padding-right: 20px;">Construction Contract Administration</td> <td style="text-align: center; padding-right: 20px;">10%</td> <td style="text-align: right;">\$50,000</td> </tr> </table>					Contingency:	30%	\$140,000	Engineering	20%	\$90,000	Permitting and Admin	5%	\$30,000	Construction Contract Administration	10%	\$50,000
Contingency:	30%	\$140,000														
Engineering	20%	\$90,000														
Permitting and Admin	5%	\$30,000														
Construction Contract Administration	10%	\$50,000														
Total Estimated Project Cost:				\$760,000												
Cost Range			-30%	\$532,000												
			50%	\$1,140,000												

Final

Water Management and Conservation Plan

Prepared for
City of Sandy, Oregon

June 2016

Prepared by



1600 SW Western Blvd., Suite 240 Corvallis, OR 97333
P: 541.753.0745 F: 541.754.4211
info@gsiws.com www.gsiws.com

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Oregon

Kate Brown, Governor

Water Resources Department

North Mall Office Building

725 Summer St NE, Suite A

Salem, OR 97301

Phone (503) 986-0900

Fax (503) 986-0904

www.wrd.state.or.us

June 3, 2016

City of Sandy
Attn: Mike Walker, Public Works Director
39250 Pioneer Blvd.
Sandy, OR 97055

Subject: Water Management and Conservation Plan

Dear Mr. Walker:

Enclosed, please find the final order approving your water management and conservation plan, and specifying that no diversion of water is authorized at this time under Permit S-48451.

The attached final order specifies that the City of Sandy's plan shall remain in effect until **June 2, 2026**. Additionally, the City of Sandy is required to submit a progress report to the Department by **June 2, 2021**, detailing progress made toward the implementation of conservation benchmarks scheduled in the plan. Finally, the City of Sandy must submit an updated Water Management and Conservation Plan to the Department by **November 30, 2025**.

***NOTE:** The deadline established in the attached final order for submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of Sandy from any existing or future requirement(s) for submittal of a water management and conservation plan at an earlier date as established through other final orders of the Department.*

We appreciate your cooperation in this effort. Please do not hesitate to contact me at 503-986-0919 or Kerri.H.Cope@wrд.state.or.us if you have any questions.

Sincerely,

Kerri H. Cope
Water Management and Conservation Analyst
Water Right Services Division

Enclosure

cc: WMCP File
Application # S-65051 (Permit # S-48451)
Watermaster # 20 Amy Kim
GSI Water Solutions, Inc., Attn: Adam Sussman, 1600 Western Blvd., Suite 240, Corvallis, OR 97333



...the following information...

...the following information...

...the following information...

...the following information...

...the following information...

...the following information...

...the following information...

...the following information...

**BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON**

In the Matter of the Proposed Water) FINAL ORDER APPROVING A
Management and Conservation Plan for the) WATER MANAGEMENT AND
City of Sandy, Clackamas County) CONSERVATION PLAN

Authority

OAR Chapter 690, Division 086, establishes the process and criteria for approving water management and conservation plans required under the conditions of permits, permit extensions and other orders of the Department.

Findings of Fact

1. The City of Sandy submitted a Water Management and Conservation Plan (plan) to the Water Resources Department (Department) on January 28, 2016. The plan was submitted to comply with conditions set forth under the City's previously approved plan (Sp. Or. Vol. 73, Pg. 376 issued on September 27, 2007, and a condition set forth in the final order issued on November 16, 2012 approving an Extension of Time for Permit S-48451.
2. The Department published notice of receipt of the plan on February 2, 2016, as required under OAR Chapter 690, Division 086. No comments were received.
3. The Department provided written comments on the plan to the City on April 7, 2016. In response, the City submitted a revised plan on May 16, 2016.
4. The Department reviewed the revised plan and finds that it is consistent with the relevant requirements under OAR Chapter 690, Division 086.

Conclusion of Law

The Water Management and Conservation Plan submitted by the City of Sandy, is consistent with the criteria in OAR Chapter 690, Division 086.

Now, therefore, it is ORDERED:

Duration of Plan Approval:

1. The City of Sandy Water Management and Conservation Plan is approved and shall remain in effect until June 2, 2026, unless this approval is rescinded pursuant to OAR 690-086-0920.

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Development Limitation:

2. The limitation of the diversion of water under Permit S-48451 established in the Final Order approving an Extension of Time for Permit S-48451 (*issued on November 16, 2012*) remains unchanged. Subject to other limitations or conditions of the permit, therefore, the City of Sandy is not authorized to divert any water under Permit S-48451 at this time.

Plan Update Schedule:

3. The City of Sandy shall submit an updated plan meeting the requirements of OAR Chapter 690, Division 086 within ten years and no later than November 30, 2025.

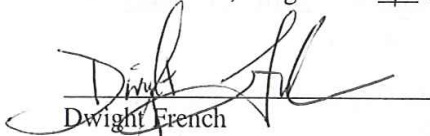
Progress Report Schedule:

4. The City of Sandy shall submit a progress report containing the information required under OAR 690-086-0120(4) by June 2, 2021.

Other Requirements for Plan Submittal:

5. The deadline established herein for the submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of Sandy from any existing or future requirement(s) for submittal of a Water Management and Conservation Plan at an earlier date as established through other final orders of the Department.

Dated at Salem, Oregon this 1 day of June, 2016.



Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

Mailing date: JUN 07 2016

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Executive Summary

The City of Sandy (City), the eastern-most city in Clackamas County, serves as a gateway to Mt. Hood. The City is surrounded by scenic rivers and wilderness areas appreciated by both residents and tourists. This proximity to precious natural resources continuously reminds the City of the importance of environmental sustainability. As a result, the City views management and conservation of its water resources as a key priority. With this in mind, the City has developed this updated Water Management and Conservation Plan (WMCP, or Plan), to guide development and implementation of water management and conservation programs promoting sustainable water use. This updated WMCP meets the requirements of three final orders issued by the Oregon Water Resources Department (OWRD). The final order approving the City's first WMCP (issued on September 27, 2007) included the requirement that the City submit an "updated" WMCP within 10 years and no later than January 31, 2016. The final order approving an extension of time for the City's water use Permit S-48451 for use of water from the Salmon River (issued on November 16, 2012) included the requirement that the City submit a WMCP by November 16, 2015. (This date was later extended by OWRD to January 29, 2016.)

This WMCP describes the City's water supply, water management and conservation programs, water curtailment plan, and water supply projections and plans.

Municipal Water Supplier Description

Currently, the City's water supply comes from three sources: Alder Creek (a tributary of the Sandy River), Brownell Springs, (a tributary of Beaver Creek), and the City of Portland's Portland Water Bureau (PWB), which provides the City water from its Bull Run surface water supply. The water rights that the City holds for these sources are as follows:

- **Brownell Springs:** Certificate 5427 for the use of up to 0.2 cubic feet per second cubic feet per second (cfs), Certificate 26132 for the use of up to 0.7 cfs, and Certificate 91156 for the use of up to 0.3 cfs from Brownell Springs.
- **Alder Creek:** Certificate, 91176, approved on January 28, 2016, for the use of up to 3.0 cfs.
- **Alder Creek:** Permit S-36601 for the use of up to 1.0 cfs (pending extension of time).
- **Salmon River:** Permit S-48451 for the use of up to 25.0 cfs from the Salmon River.

The City's 2014 estimated service population is 10,387, which includes the estimated population of 10,170 inside the City and the estimated population of 217 served through 81 connections outside city limits.

From 2006 through 2014, the City's annual demand averaged 395.8 million gallons (MG). Average day demand (ADD) averaged 1.08 million gallons per day (mgd) during the same period and the highest maximum day demand (MDD) was 1.24 mgd, which occurred in 2006. For this WMCP, demand refers to the quantity of water delivered to the City's water distribution system. This includes the Alder Creek water pumped to the Terra Fern Reservoir from the Alder Creek Water Treatment Plant (WTP), the water diverted from Brownell Springs that is chlorinated then blended with the Terra Fern Reservoir water, and

wholesale water from the PWB. Annual demand decreased by nearly 100 MG from 2006 to 2014, which the City attributes to reduced irrigation as a result of in-filling in the City's single-family and low-density zones, implementation of higher water rates, the City's water conservation efforts, and to a lesser degree, the economic downturn. The City's ADD also showed a decreasing trend during that time period and the City's MDD dropped markedly in 2013 and 2014, possibly reflecting milder summer weather during those years.

The City has four customer categories: single family residential, multi-family residential, commercial/industrial, and wholesale. The City's wholesale customers are Alder Creek Barlow Water District (District) and Skyview Acres Water Company (Skyview). In 2014, residential water use represented 65 percent of total consumption, while commercial/industrial water use represented 22 percent, multi-family residential water use represented 11 percent, and wholesale water use represented 2 percent.

Consumption refers to the portion of water use that is metered. The City's total annual consumption fluctuated between 287.1 MG and 322.6 MG during the period from 2006 through 2014. Metered consumption did not follow a decreasing trend similar to demand, which likely reflects improvements in customer meter accuracy. The City believes that customer meters were reading low, so that more of the water produced was actually recorded as consumed following meter replacement.

The City's unaccounted-for water was 11.5 percent in 2014 and averaged 22.3 from 2006 through 2014, both substantial reductions in unaccounted-for water compared to the period 1999 through 2005. For the purposes of this WMCP, unaccounted-for water is the difference between demand and metered water consumption. The City attributes its reduction of unaccounted-for water in recent years to a meter replacement efforts and installation of meters at previously unmetered connections, and water demand and consumption accounting improvements.

Section 2 provides more details about the City's water supply, water use, water rights, and water system.

Water Conservation

Highlights of the City's recent water management and conservation efforts include:

- The City implemented a fixed-based radio Automatic Meter Reading (AMR) metering system for all new service connections in December 2011.
- The City gives all new homeowners a welcome packet containing information on indoor and outdoor conservation measures.
- The City distributes indoor and outdoor water conservation kits at the City's Earth Day event, a rotating neighborhood-specific event in the fall, and at additional neighborhood fairs/block parties upon request.
- The City joined in the EPA "Water Sense" program in 2012 and participated in the WaterSense "Fix a Leak Week" in 2013.
- The City partnered with Iseli Nursery in August 2012 to implement a water reuse project at the nursery.

OWRD requires that all water suppliers establish five-year benchmarks for initiating or expanding water management and conservation measures associated with required conservation programs. **Exhibit ES-1** lists the five-year benchmarks associated with the required conservation programs.

Exhibit ES-1. Five-Year Water Conservation Benchmarks.

Conservation Program	Five-year Benchmarks
Annual Water Audit	<ul style="list-style-type: none"> • The City will continue to conduct an annual water audit. • In the next two years, the City will investigate its billing software for potential sources of accounting errors.
System-wide Metering	<ul style="list-style-type: none"> • The City will continue to install AMR meters on all new connections. • In the next five years, the City will complete a cost-benefit analysis of replacing all non-AMR meters with AMR meters and will decide how to proceed with meter replacement.
Meter Testing and Maintenance	<ul style="list-style-type: none"> • The City will continue its meter testing and maintenance program. In the next five years, the City will begin to track the number of meters that it replaces at existing connections. • In the next five years, the City will complete a cost-benefit analysis of replacing all non-AMR meters with AMR meters and will decide how to proceed with meter replacement.
Water Rate Structure and Billing Practices that Encourage Conservation	<ul style="list-style-type: none"> • The City will continue to bill customers based on the quantity of water metered at the service connection. • The City will continue to bill its customers monthly and to periodically include water conservation messages in utility bills.
Leak Detection	<ul style="list-style-type: none"> • The City will continue to conduct its leak detection and repair program.
Public Education	<ul style="list-style-type: none"> • The City will continue to be a member of the Regional Water Providers Consortium. • The City will continue to promote water conservation at the City’s Earth Day event and neighborhood events.

Exhibit ES-1. Five-Year Water Conservation Benchmarks Continued.

Conservation Program	Five-year Benchmarks
Technical and Financial Assistance	<ul style="list-style-type: none"> In the next five years, the City will explore ways to increase interest in the xeriscaping outreach program materials.
Supplier Financed Retrofit or Replacement of Inefficient Fixtures	<ul style="list-style-type: none"> The City will continue to make water conservation kits available at no charge to any customer requesting one.
Water Reuse, Recycling, and Non-potable Opportunities	<ul style="list-style-type: none"> The City will continue to make downspout rain barrels available to water customers to reduce demand for finished water for residential irrigation. The City will continue the water reuse project with Iseli Nursery. In the next five years, the City will explore additional water reuse, recycling, and non-potable water opportunities.

Section 3 contains more details about the City’s water management and conservation programs.

Water Curtailment

Water curtailment plans outline proactive measures that water suppliers may take during short-term water supply shortages. The City has adopted a four-stage water curtailment plan that it will implement in the event of a water supply shortage that requires water curtailment. The four stages of curtailment increase in severity and are intended to be implemented in progressive steps. The curtailment stages include both voluntary and mandatory limitations. The potential initiating conditions (i.e. triggers) for the City’s curtailment stages focus on supply capacity, but also include such conditions as drought, failure of a major system component, and source water contamination.

The curtailment plan identifies voluntary or mandatory actions under each stage of water curtailment, including:

- Stage 1: Water Supply Shortage Warning**

The City may request that its customers take the following voluntary actions:

- Limit landscape watering between the hours of 10:00 am and 6:00 pm.
- Comply with an alternate days system for landscape watering.
- Implement other conservation measures, such as those suggested by the RWPC website and the RWPC brochures, *H2O outdoor* and *H2O indoor*.

- Stage 2: Moderate Water Supply Shortage**

The City may impose such mandatory water restrictions as:

- Watering landscapes prohibited between 10:00 am and 6:00 pm.
- No water use to wash sidewalks, walkways, driveways, parking lots, tennis court, and other hard-surfaced outdoor areas.

- No water use for fountains or ponds for aesthetic or scenic purposes, except where necessary to support fish life.

- **Stage 3: Severe Water Supply Shortage**

The City may impose such additional mandatory water restrictions as:

- Prohibition on all outdoor watering (with a few exceptions)
- No water use from hydrants for construction purposes (except on a case-by-case basis), firefighting exercises, or any purpose other than firefighting.
- Implement limitations on commercial uses of water as determined appropriate by the city manager.

- **Stage 4: Critical Water Supply Shortage**

The City may impose the following additional mandatory water restrictions:

- Limit residential water use to essential uses only, such as drinking, cooking, basic sanitation, and maintaining human health.
- Prohibit all non-essential water uses by commercial/industrial customers

The City will issue a notice to customers describing the current water situation, the reason for the voluntary or mandatory conservation measures, and the RWPC website (www.conserveh2o.org), which contains conservation information and tips. The City may issue a similar notice through local media (newspaper, radio, or TV).

Section 4 further describes the initiating conditions and response actions for each curtailment stage.

Water Supply

WMCPs must provide 10-year and 20-year population and water demand projections. The City's projected population for its future water service area, which includes its current UGB and Urban Reserve Area, is 13,123 in 2025 and 16,769 in 2035. These population projections were prepared by Portland State University's Population Research Center (PRC) in October 2014 based on Metro's Buildable Land Inventory (BLI), household forecasts for areas called transportation analysis zones (TAZs) adopted by the Metro Council in 2012, data from the PRC, and data from the US Census Bureau.

To estimate the City's future water demands, the City's average annual water demand from 2006 through 2014 (395.8 MG) was apportioned among the City's customer categories based on the percentage of water that each customer category consumed in 2014. Average annual water demand for each customer category was divided by 365 days to calculate ADD per customer category.

The City then projected future Residential ADDs using an annual residential growth rate of 2.12 percent applied to the average Residential (single family + multi-family) ADD of 0.82 mgd, developed as described above. The projected future Commercial/Industrial ADD was estimated using the annual employment growth rate of 4.0 percent applied to the average Commercial/Industrial ADD of 0.24 mgd. Finally, the projected Wholesale ADD was developed assuming no growth (no additional wholesale customers and no increase from any population growth in the District and Skyview), resulting in the average Wholesale demand of 0.02 mgd continuing through 2035.

The City summed the projected Residential, Commercial/Industrial, and Wholesale ADDs for each year through 2035 then applied the maximum peaking factor (MDD:ADD) from 2006-2014 of 2.3 to obtain the projected MDD for each year through 2035.

Finally, the City determined the standard deviation of the MDDs from 2006 through 2014, which was 0.3 mgd (0.46 cfs), and added the 0.3 mgd “weather allowance” to the MDD projections to account for the potential effects of weather variations on MDD.

Exhibit ES-2 presents the City’s MDD projections with and without the weather allowance. The City’s projected MDDs with the weather allowance are 3.6 mgd (5.5 cfs) in 2025 and 4.5 mgd (7.0 cfs) in 2035.

Exhibit ES-2. Projected Maximum Day Demand (MDD) With and Without a Weather Allowance.

Year	MDD		MDD with Weather Allowance (mgd)	MDD with Weather Allowance (cfs)
	(mgd)	(cfs)		
2025	3.3	5.1	3.6	5.5
2035	4.2	6.6	4.5	7.0

The City presently relies principally on its Alder Creek and Brownell Springs water supply, and PWB water is a supplemental water supply. To meet its future demands, the City intends to fully utilize its Alder Creek and Brownell Springs water rights in order to minimize its reliance on the water it purchases from the PWB, which is particularly important in the event of a disruption in the PWB water supply.

The City’s analysis of the water supply reliability of its sources indicates that the City can reliably use 4.0 cfs from Alder Creek and 0.2 cfs from Brownell Springs plus 0.77 cfs from the PWB for a total reliable water supply of 4.97 cfs (3.21 mgd). The City’s projected MDD with a weather allowance shows that in less than 10 years (by 2021) the City will need the entire reliable supply of 4.97 cfs.

In the coming years, the City will evaluate the best approach to meet its projected water demands through at least 2035. The City is considering three options:

- 1) Begin to develop the City’s Salmon River water supply,
- 2) Purchase additional wholesale water from the PWB, or
- 3) Pursue a combination of options 1 and 2.

Section 5 describes the City’s future service area, population and demand projections, and water supply strategies in further detail.

SECTION 1

Municipal Water Supplier Plan

This section satisfies the requirements of OAR 690-086-0125.

This rule requires a list of affected local governments to whom the plan was made available, and a proposed date for submittal of an updated plan.

Introduction

The City of Sandy (City), once the site of a trading post on the Oregon Trail, is a growing community in the western foothills of Mt. Hood. The City recognizes the importance of properly managing the natural resources that its community members depend on, and as a result, has been implementing numerous water management and conservation measures.

The purpose of this Water Management and Conservation Plan (WMCP) is to guide development and implementation of water management and conservation programs that promote sustainable water use and to consider the City's future water needs. This WMCP is intended to be a working document that will aid future water planning.

Plan Requirement

This WMCP is an update of the City's first WMCP, which the Oregon Water Resources Department (OWRD) approved in a Final Order issued on September 27, 2007. The WMCP Final Order included the requirement that the City submit an "updated" WMCP within 10 years and no later than January 31, 2016. The Final Order also required a WMCP Progress Report by January 31, 2011, which was submitted and acknowledged by OWRD.

On November 16, 2012, OWRD issued a Final Order approving an extension of time on the City's water right Permit S-48451 for use of water from the Salmon River. The extension of time Final Order included the requirement that the City submit a WMCP by November 16, 2015. This date was later extended by OWRD to January 29, 2016.

The City is submitting this updated WMCP to meet the requirements of both of the Final Orders described above. This WMCP meets all of the requirements of the Oregon Administrative Rules (OAR) adopted by the Water Resources Commission in November 2002 (OAR Chapter 690, Division 86) regarding WMCPs.

Plan Organization

The WMCP is organized into the following sections, each addressing specific sections of OAR Chapter 690, Division 86. Section 2 is a self-evaluation of the City's water supply, water use, water rights, and water system. The information developed for Section 2 is the foundation for the sections that follow. The later sections use this information to consider how the City can improve its water conservation and water supply planning efforts. The WMCP also includes appendices with supporting information.

Section	Requirement
Section 1 – Water Supplier Plan	OAR 690-086-0125
Section 2 – Water Supplier Description	OAR 690-086-0140
Section 3 – Water Management and Conservation	OAR 690-086-0150
Section 4 – Water Curtailment Plan	OAR 690-086-0160
Section 5 – Water Supply	OAR 690-086-0170

The City has relied on information from the following sources in preparing this plan:

- City of Sandy 2007 WMCP [Approved September 27, 2007]
- City of Sandy Public Works staff
- Portland State University Population Research Center
- Oregon Water Resources Department (OWRD)

Affected Governments

OAR 690-086-0125(5)

The following local governments may be affected by this WMCP:

- City of Sandy
- Clackamas County

Thirty days before submitting this WMCP to OWRD, the City made the draft WMCP available for review by each affected local government listed above along with a request for comments relating to consistency with the local government’s comprehensive land use plan. The letters requesting comment are in **Appendix A**. No comments were received.

In addition, the City provided Alder Creek Barlow Water District and Skyview Acres Water Company with a copy of the plan as a courtesy.

Plan Update Schedule

OAR 690-086-0125(6)

The City anticipates submitting an update of this WMCP within 10 years of the final order approving this WMCP, or upon the approval of the pending permit extension application for Permit S-36601 As required by OAR Chapter 690, Division 86, and a progress report will be submitted within 5 years of the final order.

Time Extension

OAR 690-086-0125(7)

The City is not requesting additional time to implement metering or a previous benchmark.

SECTION 2

Water Supplier Description

This section satisfies the requirements of OAR 690-086-0140.

This rule requires descriptions of the City's water sources, water delivery area and population, water rights, and adequacy and reliability of the existing water supply. The rule also requires descriptions of the City's customers and their water use, the water system, interconnections with other water suppliers, and quantification of system leakage.

Water Sources

OAR 690-086-0140(1)

The City's water supply currently comes from three sources: Alder Creek (a tributary of the Sandy River), Brownell Springs, (a tributary of Beaver Creek), and the City of Portland's Portland Water Bureau (PWB), which provides the City water from its Bull Run surface water supply.

The Alder Creek diversion is approximately 7 miles east of the City. The City has a raw water intake located along the creek, approximately one mile upstream from its confluence with the Sandy River.

Brownell Springs consists of a group of eight natural springs approximately 6 miles southeast of the City, on the north slope of Lenhart Butte. Brownell Springs is located at the headwaters of Beaver Creek, a tributary of Cedar Creek, which flows into the Sandy River.

The City also purchases wholesale water from the PWB as a supplemental water supply and to provide water supply redundancy in the event of an emergency.

Finally, the City also holds a permit for use of water from the Salmon River, but does not currently use that water source.

Interconnections with Other Systems

OAR 690-086-0140(7)

The City has a new interconnection with the PWB, which was placed into service in April 2014. PWB water supplements the City's Brownell Springs and Alder Creek sources, reduces the City's reliance on the single transmission line along Hwy 26 for its entire water supply, and provides redundancy in case of emergencies. The City does not have the ability to convey water back to the PWB through this interconnection.

The City serves wholesale water to the Alder Creek Barlow Water District (District), which is Public Water System Identification (PWS ID) Number 4100630. The City is the District's only water supply source. The District has no ability to supply water to the City. The two systems are connected through a 4-inch main at one location.

In 2014, the City began serving wholesale water to Skyview Acres Water Company (Skyview), which is PWS ID Number 4100786. The City is Skyview's primary water supply source and the PWB is an emergency water supply source. Skyview has no ability to supply water to the City.

Intergovernmental Agreements

OAR 690-086-0140(1)

The City has a wholesale water supply agreement with the City of Portland. The term of the agreement is from November 2008 until June 30, 2028. The agreement allows the City to obtain a minimum of 0.5 million gallons per day (mgd) and up to a maximum of 3 mgd from the City of Portland's Bull Run source. The City is required to pay for at least 0.5 mgd regardless of the amount used. If the average of the 3 highest usage days in any calendar year exceeds the minimum purchase amount (0.5 mgd), then that 3-day average becomes the new minimum purchase amount for subsequent years. The City of Portland is responsible for maintaining and calibrating the master meter at the water system connection and includes the cost of maintenance in the established water rate. The agreement requires the City to submit a Water Conservation Plan to the City of Portland every 5 years that describes the City's water management and conservation programs. WMCPs approved by OWRD meet this agreement requirement. If the City of Portland declares a water shortage, the City is required to implement curtailment measures that meet the requirements of the mutually agreed-upon curtailment plan.

The City has had a water supply agreement with Alder Creek Barlow Water District since 1984. The agreement requires a 6-month notification period before a change to the agreement is implemented, and as of 2004, the agreement automatically renews every two years unless either party wishes to terminate the agreement. The agreement does not specify a maximum amount of water that the City will supply. The District is responsible for operating and maintaining its water system to minimize water "losses, leakage, and overuse" of water. The City agreed to test and calibrate the master meter biannually and the District agreed to pay the associated costs. The agreement also discusses how water will be curtailed in times of water shortage.

The City also has a water supply agreement with Skyview that became effective July 1, 2014 and will remain in effect until June 30, 2034. The agreement will then be renewed every 5-years unless either party terminates the agreement. The agreement states that the City will initially supply a maximum demand of 60,000 gallons per day and a maximum flow rate of 200 gallons per minute, and the City may revise the maximum day demand and maximum flow rate in the future. The City will pay costs associated with bi-annual testing and calibration of the master meter. Skyview and its water users are subject to the water use regulations, water conservation practices, and curtailment measures applicable to the City's other wholesale and retail customers under its WMCP, Section 13.0 4.220 of the Sandy Municipal Code, and/or its water purchase agreement with the City of Portland. Skyview is responsible for operating and maintaining its water distribution system in a manner that minimizes water "losses, leakage, and overuse" of water.

Service Area Description and Population

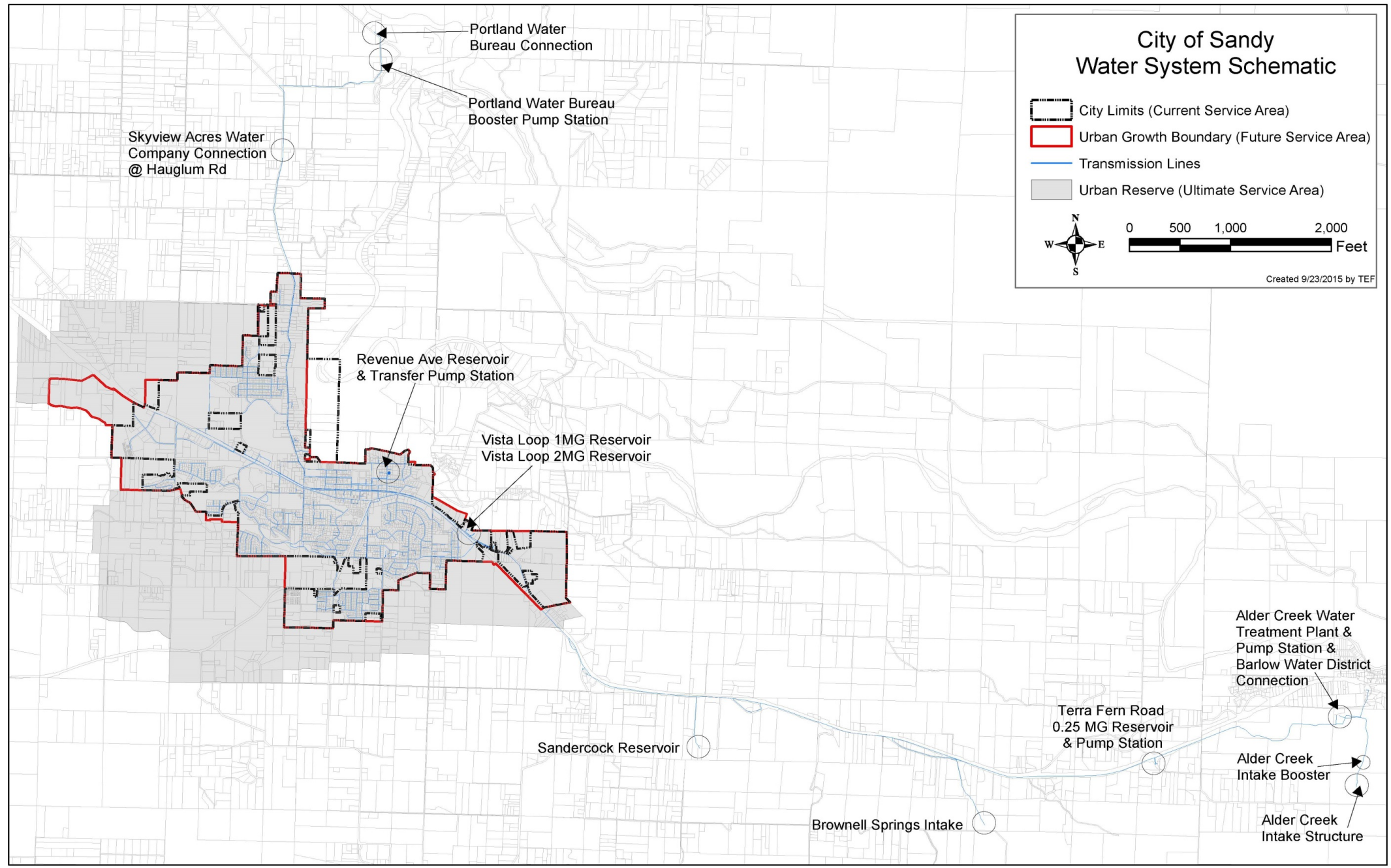
OAR 690-086-0140(2)

The City's 2014 estimated population is 10,387, which was calculated by adding the City's population (10,170) to the estimated number of people served outside the City limits (217). The City's 2014 estimated population was obtained from Portland State University's Population Research Center. The population served outside the City limits was estimated by multiplying the number of residential connections outside the city limits in 2014 (81), according to City records, by the City's estimated persons per household (2.68), according to the US Census 2010.

Exhibit 2-1 shows the City's current service area, which consists of the area within city limits plus the approximately 81 residential connections served outside of city limits, primarily east of the city limits along Highway 26.

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Exhibit 2-1. Service Area Map and System Schematic.



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Records of Water Use

OAR 690-086-0140(4) and (9)

Terminology

For this WMCP, demand refers to the quantity of finished water delivered to the City's water distribution system. This includes the Alder Creek water pumped to the Terra Fern Reservoir from the Alder Creek Water Treatment Plant (WTP), the water diverted from Brownell Springs that is chlorinated then blended with the Terra Fern Reservoir water, and wholesale water from the PWB. The finished water is used through metered consumption, unmetered uses, and water lost to leakage. For the purposes of this WMCP, the terms demand and production are synonymous. Consumption refers to the portion of water use that is metered.

Generally, demand and consumption in municipal systems are expressed in units of million gallons per day (mgd). They may also be expressed in cubic feet per second (cfs) or gallons per minute (gpm). One mgd is equivalent to 1.55 cfs or 694 gpm. For annual or monthly values, a quantity of water is typically reported in million gallons (MG).

This WMCP uses the following terms to describe specific values of system demands:

- Average day demand (ADD) equals the total annual system input (demand) divided by the number of days in the year (typically 365 days).
- Maximum day demand (MDD) equals the highest system demand that occurs on any single day during a calendar year.
- Maximum monthly demand (MMD) in MG equals the highest total monthly demand of the 12 months of a calendar year. MMD in mgd equals the average day demand of the month with the highest total demand within a calendar year.
- Peaking factors are the ratios of one demand value to another. The most common and important peaking factor is the ratio of the MDD to the ADD.

Historical Water Demands

Annual and Daily Demands

The City's water demands from 2006 through 2014 are summarized in **Exhibit 2-2**.

Exhibit 2-2. Historical Annual Water Demand, Average Day Demand (ADD), Maximum Day Demand (MDD), Peaking Factor, and Maximum Month Demand (MMD), 2006-2014.

Year	Annual Demand (MG)	ADD (mgd)	MDD (mgd)	MDD: ADD Peaking Factor	MMD (MG)	MMD (mgd)
2006	450.8	1.24	2.20	1.8	55.7	1.80
2007	428.1	1.17	2.36	2.0	50.7	1.63
2008	403.5	1.10	2.41	2.2	53.2	1.72
2009	383.5	1.05	2.46	2.3	53.6	1.73
2010	404.3	1.11	2.19	2.0	51.9	1.68
2011	378.4	1.04	2.17	2.1	47.4	1.53
2012	391.7	1.07	2.19	2.0	51.5	1.66
2013 ¹	365.7	1.00	1.69	1.7	47.9	1.54
2014	356.0	0.98	1.72	1.8	49.6	1.60
Average	395.8	1.08	2.15	2.0	51.3	1.65
Maximum	450.8	1.24	2.46	2.3	55.7	1.80

¹ Brownell Springs demand data was lost for June and July 2013. Average demands for June and July from 2006 through 2012 and 2014 were used to estimate demands during those months in 2013.

Annual demand decreased by nearly 100 MG from 2006 to 2014, as shown in **Exhibit 2-2** and **Exhibit 2-3**. The City attributes this decreasing trend to in-filling in the City's single-family and low-density zones, implementation of higher water rates, the City's water conservation efforts, and to a lesser degree, the economic downturn. **Exhibit 2-2** and **Exhibit 2-4** show that ADD also had a decreasing trend during that time period, decreasing from a high of 1.24 mgd in 2006 to 0.98 mgd in 2014. The City's MDD dropped markedly in 2013 and 2014, which could reflect milder summer weather during those years.

Exhibit 2-3. Annual Demand, 2006-2014.

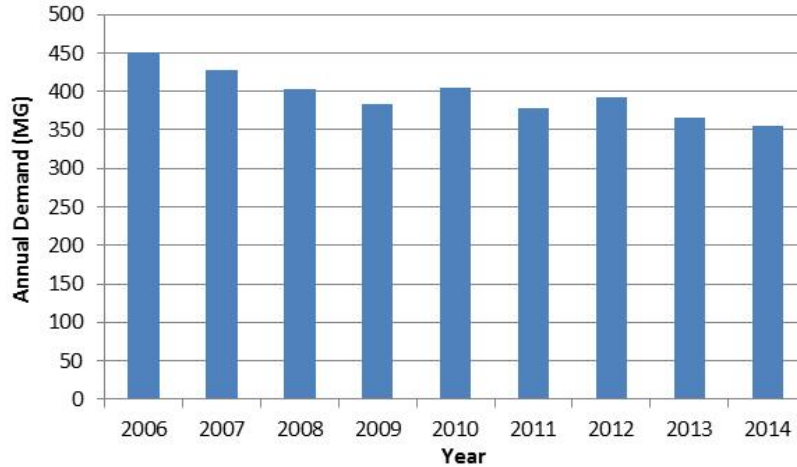
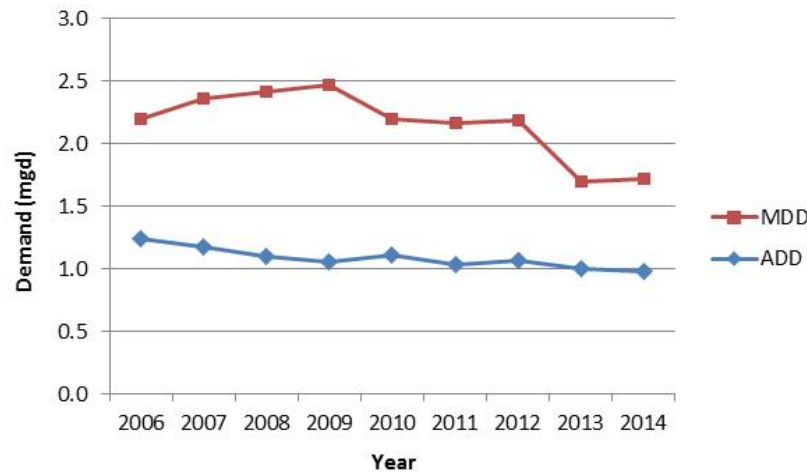


Exhibit 2-4. Average Day Demand (ADD) and Maximum Day Demand (MDD), 2006-2014.



For the purposes of this WMCP, MDD from 2006 through 2013 was calculated by adding the MDD at the Alder Creek WTP to the ADD at Brownell Springs for the month when the MDD at the Alder Creek WTP occurred (Demand at Brownell Springs is only recorded monthly due to the City’s relatively consistent daily water diversions). MDD in 2014 was calculated using the same methodology, but also adding the PWB demand on the same day as the MDD at the Alder Creek WTP.

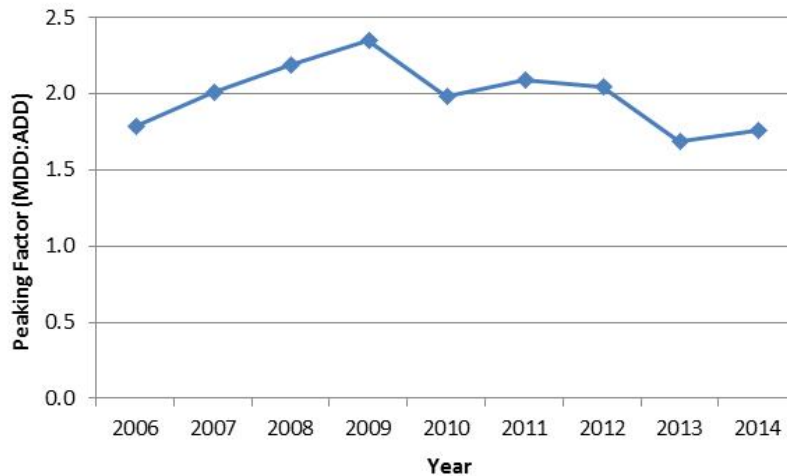
MDD is an important value for water system planning. Water rights and supply facilities (e.g. treatment plants, pipelines, and reservoirs) must be capable of meeting a city’s MDD. If the MDD exceeds the combined supply capacity on any given day, finished water storage levels will be reduced, and if the MDD exceeds combined supply capacity on several consecutive days, a water shortage may occur.

Weather patterns and the economy strongly influence MDD. Weather patterns that can cause fluctuations in MDD from year to year include: maximum temperatures, the number of consecutive days with high temperatures, when high temperatures occur in the summer, overall rainfall levels during the summer, and consecutive days without rainfall. Unusually hot and/or dry weather results in more outdoor irrigation, which increases the MDD. The economy can affect MDD by influencing: customer spending on irrigation, the number of new homes with landscapes needing intense irrigation for plant establishment, and the opening or closing of facilities that use water in their operations.

Peaking Factors

From 2006 through 2014, the City’s MDD to ADD peaking factor averaged 2.0. This peaking factor is within the range of other water utilities in the Portland area, such as the City of Lake Oswego (averaged 2.3 from 2001 to 2008; *City of Lake Oswego July 2010 WMCP*) and the City of Gresham and Rockwood Water People’s Utility District, which averaged 1.8 and 1.6 from 2000 to 2006, respectively (*Rockwood Water People’s Utility District and City of Gresham 2013 WMCP*). A peaking factor can be an important tool used in demand forecasting and in developing targeted water conservation measures.

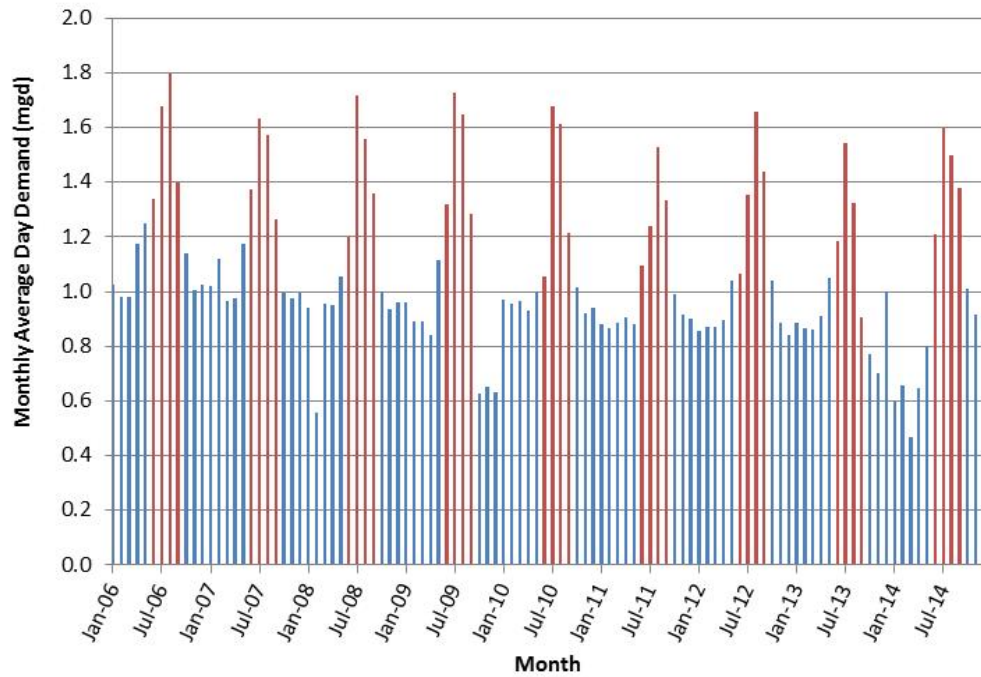
Exhibit 2-5. Peaking Factors (MDD: ADD), 2006-2014.



Monthly Demand

The City's average maximum month demand (MMD) volume from 2006 through 2014 was 51.3 MG. During those maximum-demand months, the City's ADD averaged 1.65 mgd. **Exhibit 2-6** shows monthly ADD, with the peak season months of June through September in red. The highest monthly ADD of 1.80 mgd occurred in July 2006, and the months with the greatest ADD were consistently July and August.

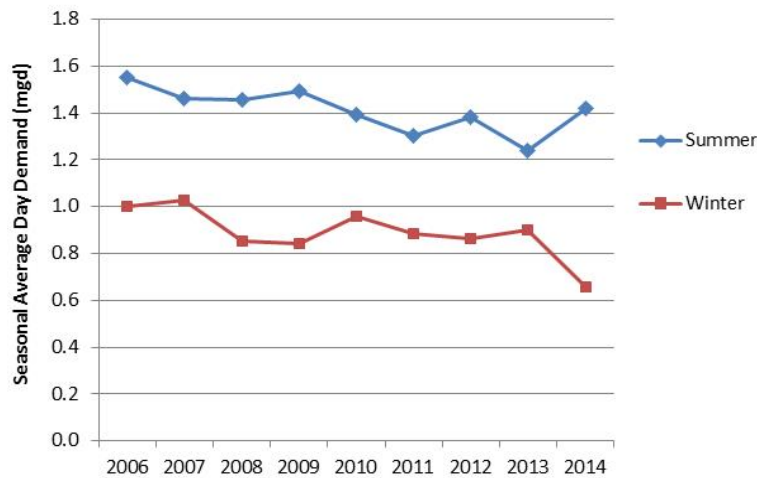
Exhibit 2-6. Monthly Average Day Demand, 2006-2014. Red indicates peak season months (June through September) while blue indicates non-peak season months.



Seasonal Demand

Exhibit 2-7 shows that from 2006 through 2014, Summer (June through September) ADD ranged from 1.30 mgd to 1.55 mgd (the data point of 1.24 mgd in 2013 has been disregarded for this analysis due to the missing Brownell Springs summertime data in this year) and Winter (December through March) ADD ranged from 0.66 mgd to 1.03 mgd. During this period, the average of the City’s ADD in the summer was 1.6 times greater than the average of the City’s ADD in winter. The difference between seasons is largely attributable to water demand for irrigation during the summer months.

Exhibit 2-7. Historical Seasonal Average Day Demand, 2014. Summer = June to September. Winter = December to March.



Authorized Consumption

Authorized consumption is equal to the metered and certain unmetered water uses within the system.

Customer Characteristics and Use Patterns

OAR 690-086-0140(6)

Customer Description

The City has four customer categories: single family residential, multi-family residential, commercial/industrial, and wholesale. As previously described, the City’s wholesale customers are Alder Creek Barlow Water District and Skyview. **Exhibit 2-8** presents the number of accounts by customer category from 2006 through 2014. The number of single-family residential accounts steadily increased during this period while the number of accounts for the other customer categories remained relatively stable. The commercial/industrial customer category is broken down by meter size to provide further details about these customers. Small commercial accounts use a 3/4-inch or smaller meter and would include businesses such as real estate offices, stores, and some restaurants. Large

commercial accounts use a meter larger than ¾-inch and would include laundries, manufacturers, and light industrial companies.

Exhibit 2-8. Number of Accounts by Customer Category, 2006-2014.

Year	Single Family Residential	Multi-Family Residential	Commercial/Industrial			Wholesale	Total
			Small (¾-inch meters)	Large (>¾-inch meters)	Total Commercial /Industrial		
2006	2,479	88	134	105	239	1	3,046
2007	2,744	81	133	113	246	1	3,318
2008	2,841	87	133	136	269	1	3,467
2009	2,916	87	131	114	245	1	3,494
2010	2,973	86	128	117	245	1	3,550
2011	2,998	87	125	118	243	1	3,572
2012	3,039	88	123	120	243	1	3,614
2013	3,067	88	123	123	246	1	3,648
2014	3,196	87	124	124	248	2	3,781

Annual Consumption

As shown in **Exhibit 2-9**, total annual consumption fluctuated from 2006 through 2014. The greatest consumption of 322.6 MG occurred in 2006 and the lowest consumption of 287.1 MG occurred in 2011. The average total annual consumption during this period was 306.0 MG. Metered consumption does not follow a decreasing trend similar to demand, which likely reflects improvements in customer meter accuracy. The City believes that customer meters were reading low, so that more of the water produced was actually recorded as consumed following meter replacement. This underreporting of customer consumption likely contributed substantially to the high unaccounted-for water recorded in 2006 and 2007.

Exhibit 2-9. Annual Consumption, 2006-2014.

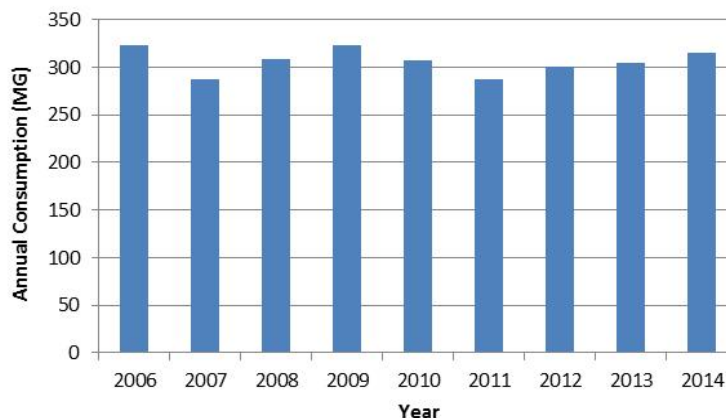


Exhibit 2-10 presents annual consumption by customer category from 2006 through 2014. Single-family residential consumption fluctuated during this period and peaked in 2014 with 203.8 MG. Multi-family residential and wholesale consumption experienced minor fluctuations from 2006 through 2014 while commercial/industrial consumption decreased from 2006 through 2011 and has since been rebounding.

Exhibit 2-10. Annual Consumption by Customer Category, 2006-2014.

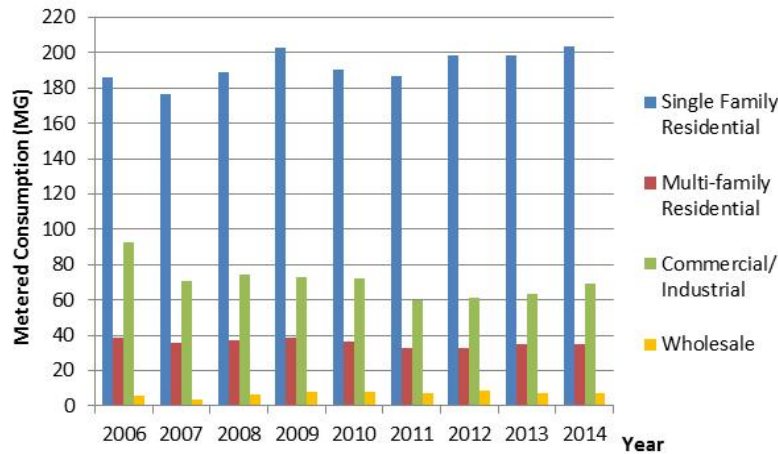
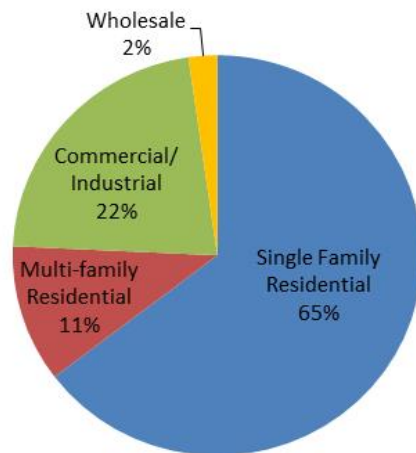


Exhibit 2-11 shows that single-family residential and the commercial/industrial customer categories represented 65 percent and 22 percent of total consumption in 2014, respectively. Water conservation efforts targeting all customer categories would be beneficial, but particularly targeting single family residential customers could be most cost-effective given that this customer category represented 65 percent of total water consumption in 2014.

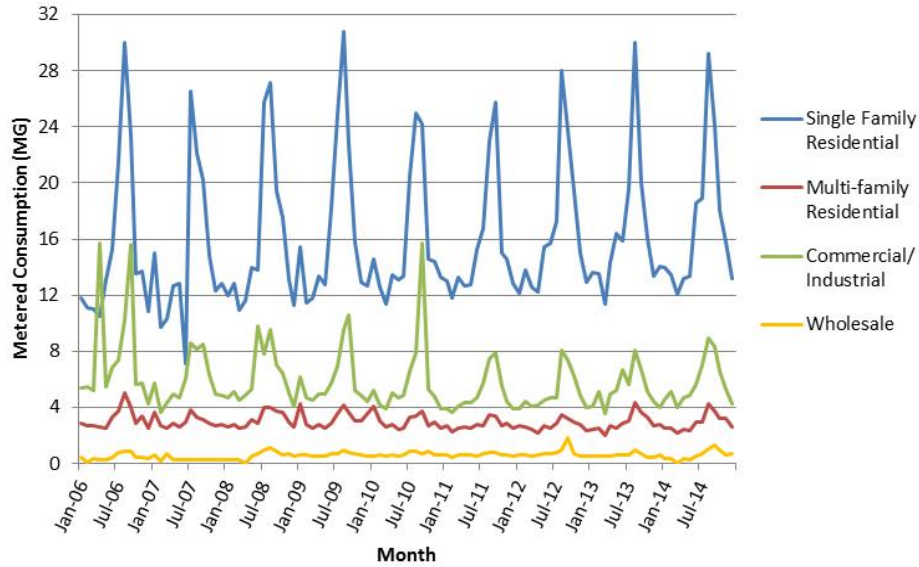
Exhibit 2-11. Percent of Annual Consumption by Customer Category, 2014.



Monthly Consumption

Exhibit 2-12 presents monthly consumption by customer category from 2006 through 2014. Consumption generally peaked during the summer months for each customer category. However, multi-family residential consumption also peaked on a few occasions in the winter. Wholesale consumption remained flat for much of 2007.

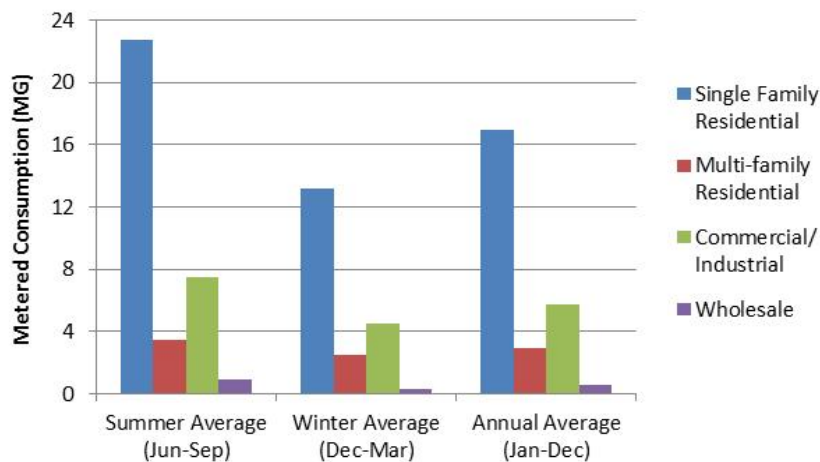
Exhibit 2-12. Monthly Consumption by Customer Category, 2006-2014.



Seasonal Consumption

Exhibit 2-13 shows average monthly consumption by season and customer category in 2014. Single-family residential average summer consumption was 22.69 MG compared to its average winter consumption of 13.15 MG, which makes average summer consumption approximately 1.7 times greater than average winter consumption. The differences in seasonal consumption were slightly less pronounced in the commercial/industrial and multi-family residential customer categories. Wholesale summer consumption was approximately 2.64 times greater than its total winter consumption, but wholesale represented only 2 percent of total consumption in 2014.

Exhibit 2-13. Seasonal Consumption by Customer Category, 2014.



Average Day Per Capita Demand and Residential Per Capita Consumption

The Regional Water Providers Consortium (RWPC) completed an analysis of water use trends for its member agencies in 2015 (See **Appendix B** for the full RWPC analysis). The RWPC is a coordinating organization created to improve the planning and management of municipal water supplies in the greater Portland, Oregon metropolitan. The RWPC currently is made up of 20 member agencies, including the City of Sandy, and the regional government Metro. The City of Sandy has been a member of the RWPC since 1997. The RWPC analysis found the following:

- During the summer months (June through September), the City's average day per capita demand (i.e. water demand per person) averaged from 2004 through 2013 was 145.9 gallons per capita per day (gpcd), which was in the lower end of the range among RWPC members. Gallons per capita per day is calculated by dividing demand for the specified time period by the total service area population during that period.

- On a peak day (day when maximum demand occurs), average day per capita demand averaged from 2004 through 2013 was 222.2 gpcd, which was in the mid-range among RWPC members.
- For the entire year, average day per capita demand averaged from 2004 through 2013 was 115.8 gpcd, which was in the lower end of the range among RWPC members.
- The City's per capita summer and annual demand showed significant declines from 2004 through 2013.

The RWPC suggests that the reduction in summer demand could be due to the mild summers that the region experienced during the study period.

The RWPC analysis also looked at per capita consumption by customer class. According to the study the City's average day per capita consumption from 2004 through 2013 averaged 64.9 gpcd for residential customers and 86.0 gpcd for all customer classes combined. The City had the second lowest average day per capita consumption for residential customers of the RWPC member agencies and the lowest average day per capita consumption for all customer classes. The City's average day per capita consumption had a significant decreasing trend during the study period.

Unaccounted-for Water

OAR 690-086-0140(9)

For the purposes of this WMCP, unaccounted-for water is the difference between demand and metered water consumption. Thus, unaccounted-for water represents system leakage and unmetered water usage. System leakage is water lost due to deteriorating pipe, compromised pipe joints, service connections, valves, etc. Unmetered water usage could include unmetered or unauthorized connections, unmetered water for operations and maintenance uses (street cleaning), and unmetered water for firefighting, reservoir overflows, and data collection / metering errors. With proper record keeping and metering of water, the percentage of unaccounted-for water should approach the net volume lost to actual leakage.

As shown in **Exhibit 2-14**, the City's unaccounted-for water was 11.5 percent in 2014 and averaged 22.3 from 2006 through 2014, both of which are a substantial improvement from the 1999 through 2005 annual average unaccounted-for water of 31 percent reported in the City's 2007 WMCP. The City attributes its reduction of unaccounted-for water in recent years to several factors. First, demand decreased due to in-filling in the City's single-family and low-density zones, implementation of higher water rates, the City's water conservation efforts, and the economic downturn. Meanwhile, consumption remained relatively steady instead of similarly decreasing due to installation of meters at some unmetered connections and meter accuracy improvements as older meters were replaced with more accurate meters. The City believes that customer meters were reading low, so that more of the water produced was actually recorded as consumed following meter replacement. Finally, the City made water demand and consumption accounting improvements, further reducing unaccounted-for water. Based on the relative newness of the City's customer meters and the

lack of substantial leaks detected in previous leak detection studies, the City believes that its unaccounted-for water in recent years is primarily the result of accounting errors.

Exhibit 2-14. Unaccounted-for Water, 2006-2014.

Year	Demand (MG)	Metered Consumption (MG)	Unaccounted-for Water (MG)	Unaccounted-for Water (%)
2006	450.8	322.6	128.2	28.4
2007	428.1	287.2	140.9	32.9
2008	403.5	308.0	95.5	23.7
2009	383.5	322.2	61.2	16.0
2010	404.3	306.6	97.7	24.2
2011	378.4	287.1	91.3	24.1
2012	391.7	300.9	90.7	23.2
2013	365.7	303.9	61.8	16.9
2014	356.0	315.3	40.8	11.5
Average				22.3

Water Rights

OAR 690-086-0140(5)

Exhibit 2-15 provides detailed information about the City’s municipal water rights. Following is a summary of those water rights.

The City holds three water right certificates for the use of water from Brownell Springs. Certificate 5427 is for the use of up to 0.2 cfs, Certificate 26132 is for the use of up to 0.7 cfs, and Certificate 91156 is for the use of up to 0.3 cfs from Brownell Springs for municipal purposes. .

The City holds Certificate 91176 for the use of up to 3.0 cfs from Alder Creek. The City also holds Permit S-36601 for the use of 1.0 cfs from Alder Creek (pending extension of time).

Finally, the City also holds Permit S-48451 for the use of up to 25.0 cfs from the Salmon River. On November 16, 2012, OWRD issued a Final Order approving an extension of time for Permit S-48451, which extended the time to apply water to full beneficial use to October 1, 2069.

Exhibit 2-16 provides information about the City’s non-municipal water right, Certificate 41492, which is for the use of up to 0.01 cfs of water from a spring for domestic use for one family. The City does not deliver water through its municipal distribution system for municipal customer supply under this water right.

Exhibit 2-15. City of Sandy Water Rights.

Source	Application	Permit	Certificate	Priority Date	Type of Beneficial Use	Authorized Rate (cfs) or Volume (AF)	Authorized Date for Completion	Maximum Rate or Volume of Withdrawal to Date		2014 Average Withdrawal		Five-Year (2010-2014) Average Withdrawal		Comments
								Instantaneous (cfs or annual volume (AF))	Annual (MG)	Monthly (MG)	Daily (mgd)	Monthly (MG)	Daily (mgd)	
Brownell Springs, tributary of Beaver Creek	S-9669	S-6597	5427	7/11/1924	Municipal	0.2	N/A	0.2	151.6	8.3	0.3	11.3	0.4	
	S-27810	S-21879	26132	11/10/1952	Municipal	0.7	N/A	0.7						
	S-47254	S-35394	91156	7/23/1970	Municipal	0.3	N/A	0.3						Certificate issued January 20, 2016.
Alder Creek, tributary of Sandy River	S-48840	S-36601	91176	11/11/1971	Municipal	3.0	N/A	3.0	306.2	12.1	0.4	18.4	0.6	Certificate issued January 28, 2016.
		S-36601	--			1.0	10/1/1996							Extension of time pending.
Salmon River	S-65051	S-48451	--	4/28/1983	Municipal	25.0	10/1/2069	0	0	0	0	0	0	Recently extended to 10/1/2069.

Exhibit 2-16. City of Sandy Non-Municipal Water Rights.

Source	Application	Permit	Certificate	Priority Date	Type of Beneficial Use	Authorized Rate (cfs)
A spring, tributary of Cedar Creek	S-47255	S-35395	41492	7/23/1970	Domestic use for one family	0.01

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Aquatic Resource Concerns

OAR 690-086-140(5) requires municipal water suppliers to identify the following for each of its water sources: 1) any listing of the source as water quality limited (and the water quality parameters for which the source was listed); 2) any streamflow-dependent species listed by a state or federal agency as sensitive threatened or endangered that are present in the source; and 3) any designation of the source as being in a critical groundwater area.

Water Quality

The City's sources of supply authorized by its water rights are Alder Creek, Brownell Springs, and the Salmon River. Alder Creek and Brownell Springs have been the City's sources of drinking water for decades.

Every two years, Oregon Department of Environmental Quality's (DEQ) is required to assess water quality and report to EPA on the condition of Oregon's waters. The Clean Water Act Section 303(d) requires the DEQ to identify waters that do not meet water quality standards and where a Total Maximum Daily Load (TMDL) pollutant load limit needs to be developed. Water quality parameters may be removed from the 303(d) list when TMDLs or other control measures have been established that are expected to improve water quality, when data show water quality has improved, and in some cases when water quality standards are revised.

Alder Creek and the Salmon River are listed as water quality limited streams according to DEQ due to certain parameters not meeting water quality criteria. The Brownell Springs points of diversion are located at the headwaters of Beaver Creek, a tributary of Cedar Creek, which flows into the Sandy River. Beaver Creek is also listed as a water quality limited stream according to DEQ.

The City's point of diversion (POD) on Alder Creek is at approximately River Mile (RM) 1. Alder Creek is listed as water quality limited between RM 0 and RM 2 for temperature from August 15 through June 15, and a Total Maximum Daily Load (TMDL) has been approved for that parameter. Alder Creek is also listed as water quality limited between RM 0 and RM 5.5 for flow modification, but TMDL's are not established to address flow modification.

The City's POD on the Salmon River is at approximately RM 7.5. The Salmon River, is water quality limited between RM 0 and RM 13.3 for temperature (August 15-June 15) and a TMDL has been approved for that parameter. The Salmon River is water quality limited between RM 0 and RM 33.9 for temperature (year around, non-spawning) and a TMDL has been approved for that parameter, as well. In that same stretch, the Salmon River is water quality limited for biological criteria (year around) and habitat modification. A TMDL has not been approved for the biological criteria parameter and is not required for the habitat modification parameter.

Beaver Creek is listed as water quality limited between RM 0 and RM 8.4 for biological criteria and temperature year around. Beaver Creek is listed as water quality limited between RM 0 to RM 8.3 for *E. coli* in the summer, and for flow modification. A TMDL is needed for the biological criteria parameter, TMDLs were approved for the temperature and *E. coli* parameters, and a TMDL is not needed for flow modification.

Water Supplier Description

The list of water quality limiting parameters for these water bodies can be found in DEQ's Water Quality Assessment – Oregon's 2010 Integrated Report Assessment Database at <http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp>

Listed Streamflow-Dependent Species

Exhibit 2-17 shows the fish species listed under the state and federal endangered species acts in the lower Columbia River, Sandy River, and Salmon River drainages (Hydrologic Unit Code 17080001 subbasin).

Exhibit 2-17. Listed Fish Species in the Lower Columbia River, Sandy River, and Salmon River Drainages¹.

Species	Common Name	Evolutionarily Significant Unit (ESU) (if applicable)	Federal Listing	State Listing
<i>Oncorhynchus tshawytscha</i>	Chinook	Lower Columbia River ESU (fall and spring runs)	Threatened	Sensitive "Critical"
<i>Oncorhynchus mykiss</i>	Steelhead	Lower Columbia River ESU, (winter run)	Threatened	Sensitive "Critical"
<i>Oncorhynchus keta</i>	Chum	Columbia River – Oregon ESU	Threatened	Sensitive "Critical"
<i>Oncorhynchus clarkii</i>	Coastal Cutthroat Trout	Southwestern Washington/Columbia River ESU	--	Sensitive "Vulnerable"
<i>Oncorhynchus kisutch</i>	Coho	Lower Columbia River ESU	Threatened	Endangered
<i>Lampetra richardsoni</i>	Western Brook Lamprey	--	--	Sensitive "Vulnerable"
<i>Lampetra tridentate</i>	Pacific Lamprey	--	Petitioned for listing	Sensitive "Vulnerable"
<i>Thaleichthys pacificus</i>	Pacific Eulachon	Southern DPS, including the Columbia River system	Threatened	--

¹ The fish species listed in this exhibit are from all of the sources combined, such that not all of the species listed are found in each source.

Sources:

- Federal ESA listed species (T&E), from NOAA Fisheries Office of Protected Resources:
<http://www.nmfs.noaa.gov/pr/species/esa/fish.htm>
 and http://www.westcoast.fisheries.noaa.gov/maps_data/species_population_boundaries.html
- Federal Sensitive species, from the Interagency Special Status/Sensitive Species Program for Oregon and Washington State:
<http://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/>
- Oregon State ESA listed species, from the Oregon Department of Fish & Wildlife:
http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp
- Oregon State Sensitive Species, from the Oregon Department of Fish & Wildlife:
http://www.dfw.state.or.us/wildlife/diversity/species/sensitive_species.asp
- Federal Species of Concern, from the U.S. Fish & Wildlife Service, Oregon Fish & Wildlife Office:
<http://www.fws.gov/oregonfwo/Species/Data/PacificLamprey/default.asp>
- ODFW's Division 315 Evaluation of Fish Persistence for Municipal Extension City of Sandy Application Number S-65051

Critical Groundwater Area

The City does not have a groundwater right that would require identification of whether its location is in a critical groundwater area. Nonetheless, the City is included in the Sandy/Boring Groundwater Limited Area.

Evaluation of Water Rights/Supply

OAR 690-086-0140(3)

As previously described, the City's sources of water supply are Alder Creek, Brownell Springs, and PWB wholesale water. Following is an analysis of the adequacy and reliability of these water sources.

Alder Creek and Brownell Springs

The City's Alder Creek water rights are for the use of up to 4.0 cfs and its Brownell Springs water rights are for the use of up to 1.2 cfs, for a total of 5.2 cfs (3.37 mgd). However, the City's ability to divert the full 5.2 cfs is limited by streamflows and water rights senior to those held by the City.

Source Reliability

There are no long-term streamflow records available for Alder Creek, but as part of the City's water supply investigation for the Alder Creek Basin, the City measured fairly consistent streamflows of approximately 5.1 cfs on Alder Creek approximately 0.5 miles above the Mt. Hood Loop Highway in August and September of 1971 and 1973. According to the City's WTP operators, however, there are periods when streamflows may not support the City's entire 4.0 cfs water right. Brownell Springs reliably produces only approximately 0.77 cfs (0.5 mgd), making the reliable supply from the two sources approximately 4.77 cfs (3.09 mgd).

Regulatory Reliability

The City's Alder Creek water rights (Certificate 91176 and Permit S-36601), which have a priority date of November 11, 1971, are junior in priority date to four surface water rights that name Alder Creek as the authorized source. Of the four water rights, two are small domestic use water rights (0.01 and 0.005 cfs, respectively). One water right is a non-consumptive power water right downstream of the City's POD. The fourth water right is a domestic use water right for 1.0 cfs that is in the name of Alder Creek Water Company but is now held by the Alder Creek Barlow Water District (District). The City has provided water to the District since 1984, and the District has not been using its water right on Alder Creek. There is no history of water use regulation on Alder Creek. The City's Certificate 91176 and Permit S-36601 (pending time extension) are senior to instream water right Certificate 72636, which have a 1991 priority date and protects flows in the reach from RM 2.0 to the mouth of Alder Creek. The City's permit is also senior to instream water rights Certificate 73015 and Certificate 75992 on the lower Sandy River, which have 1991 and 1992 priority dates, respectively. Based on this information, the City can only rely on 4.0 cfs from Alder Creek to meet maximum day demands.¹

¹ The City understands that water use limitations may be added to Permit S-36601 as a result of an approved extension of time. At this time, the potential conditions are unknown.

The City's three water rights on Brownell Springs have priority dates of 1924, 1952 and 1970. According to OWRD's web-based water rights database, there are no other water rights for use of Brownell Springs and no senior water rights for "a spring" that is a tributary to Beaver Creek. In addition, the City's 1924 priority water right for 0.2 cfs is the most senior right on the Beaver Creek and Cedar Creek system. The City's 1952 water right for 0.7 cfs is junior in priority to two small water rights on Beaver Creek (0.01 and 0.26 cfs respectively) and to two small water rights on Cedar Creek (0.03 cfs and 0.01 cfs respectively). However, the City's 1952 water right for 0.7 cfs and 1970 water right for 0.3 cfs are junior to the Oregon Department of Fish and Wildlife's (ODFW) 25.0 cfs water right for fish propagation (hatchery) with a priority date of 1949. In the past, most recently in 2015, the State of Oregon Watermaster has curtailed the City's use of Brownell Springs to its senior water right of 0.2 cfs in favor of ODFW's water right. The Brownell Springs water rights are senior to instream water right Certificate 72630, which protects instream flows in the reach from Cedar Creek's confluence with Beaver Creek to the mouth of Cedar Creek. The Brownell Springs water rights are also senior to instream water right Certificate 73015 and Certificate 75992 on the lower Sandy River. Based on this information, the City can only rely on 0.2 cfs from Brownell Springs to meet maximum day demands.

Salmon River

The City holds Permit S-48451 for use of up to 25.0 cfs from the Salmon River, which is currently undeveloped and has an extension of time to October 1, 2069. The Salmon River is designated as a federal Wild and Scenic River managed by the Bureau of Land Management and the U.S. Forest Service. Management standards for the wild and scenic river are detailed in the *Salmon National Wild and Scenic River Management Plan* (USFS, 1993). This water right is intended to provide a long-term water supply to accommodate the City's growth. In the *Agreement for Instream Conversion* (executed October 24, 2002) associated with Portland General Electric's decommissioning of Marmot Dam (Agreement), the City voluntarily agreed to reduce this permit from 25.0 cfs to 16.3 cfs when the flow available in the Sandy River near Marmot, OR is 600 cfs or less, but can still divert up to 25.0 cfs when the flow available is more than 600 cfs. No gage is currently operating near Marmot, OR to provide a picture of the flow regime in the Sandy River at that location, but the City understands that 600 cfs will be frequently not be met.

In addition, as part of the extension of time for Permit S-48451, there are two sets of conditions placed on the permit. "Condition A" pertains to any POD upstream from the confluence of the Salmon River and Boulder Creek. Under "Condition A," the City cannot divert water between August 16 and October 31; diversions between March 1 through August 15 are subject to the Agreement; and diversions from November 1 through February 29 will be reduced if the target flows of 129 cfs or the average flow for the previous October, whichever is less, is not met. Diversions from November 1 through February 29 are also subject to the Agreement. "Condition B" pertains to any POD downstream from the confluence with Boulder Creek. Under "Condition B," the City's diversions are only subject to the Agreement. Under "Condition A" and "Condition B," the City also must provide OWRD an executed agreement between the City and ODFW setting out specific fish passage requirements that ensure adequate upstream and downstream passage for fish

The Salmon River water right is junior to several very small domestic water rights ranging from 0.005 cfs to 0.1 cfs, but streamflow records from a U.S. Geological Survey gage in the

vicinity (14135500) with a period of record from 1936 to 1952 show that the lowest streamflows met or exceeded 50 percent of the time is 97 cfs. Permit S-48451 is senior to instream water right certificates 72636 and 72637, which have priority dates of 1991 and protect water instream in the reach of the Salmon River from RM 16.3 to the mouth. Permit S-48451 is also senior to the two instream water rights on the lower Sandy River. Based on existing data and considering other senior water rights it appears that the Salmon River source would be reliable for meeting the City's long-term supply needs to accommodate growth. However, until the City determines where it will locate the POD, the reliability of water under Permit S-48451 is unclear with respect to the required permit conditions.

PWB

The City uses its PWB water (currently 0.5 mgd, but the City is allowed to use up to 3 mgd) as a supplemental water supply, particularly when its use of Brownell Springs is regulated back or when needed to meet peak demands. The PWB water also provides water supply redundancy in the event that the City's water sources become unavailable. PWB's Bull Run water supply is generally reliable, but occasionally experiences high-turbidity events as a result of being unfiltered. A wildfire, earthquake, or volcanic event in the Bull Run watershed could also affect the PWB water supply. The reliability of the PWB water is described in detail in the City of Portland's WMCP. The contract with the City of Portland expires on June 30, 2028 and the City has the option to renew it.

System Description

OAR 690-086-140(8)

Exhibit 2-1 presents a schematic of the City's water sources, WTP, and water distribution facilities. The City's POD on Alder Creek is located approximately 7 miles east of the City and 1 mile upstream from its confluence with the Sandy River. The concrete intake structure has a fish screen to prevent fish entrapment and water quality monitoring equipment (for measurement of water temperature, turbidity, conductivity, and flow rates). Water diverted from Alder Creek is pumped by low-lift pumps to the Alder Creek WTP, which is located approximately 4,000 feet downstream of the POD. The Alder Creek WTP is a filtration treatment plant with a capacity of 2.6 mgd that was built in 1979 and upgraded in 2001. After filtration and chlorination at the WTP, the water is pumped to Terra Fern Road Reservoir (0.25 MG).

Water is diverted from Brownell Springs using open bottom concrete boxes that are built into the slope of the butte and water in these boxes is gravity-fed to a common holding tank. Water diverted from Brownell Springs is then chlorinated and blended with water pumped from the Terra Fern Road Reservoir. The blended water is conveyed to Sandercock Lane Reservoir (0.5 MG) and the two Vista Loop Road Reservoirs (2.0 MG and 1.0 MG), at which point it flows by gravity to the majority of the City's water distribution system.

The City connects to the PWB system at the Hudson Road Intertie site. About 1,000 feet southeast of the connection on Hudson Road, the City has a booster pump station that pumps the PWB water through approximately 27,000 feet of 18-inch and 24-inch diameter pipe to a 1.0 MG reservoir on Revenue Avenue in the City of Sandy. Another pump station then pumps water from the 1.0 MG reservoir up to the Vista Loop Reservoirs.

Exhibit 2-18 and **Exhibit 2-19** provide more details about the City’s five reservoirs and five pump stations, respectively. The City’s water system has approximately 78.3 miles of pipeline, as shown in **Exhibit 2-20**.

Exhibit 2-18. Summary of System Reservoirs.

Reservoir	Volume (MG)	Overflow Elevation (feet)	Material	Completion Date
Terra Fern Road	0.25	1,231.5	Steel	1978
Sandercock Lane	0.50	1,384.5	Steel	1966
Vista Loop Road	2.00	1,135.0	Concrete	2001
Vista Loop Road	1.00	1,135.0	Steel	1975
Revenue Avenue	1.00	995.0	Concrete	2014
Total	4.75			

Exhibit 2-19. Summary of System Pump Station.

Name	Location	Pumps (#)	Firm Capacity (gpm)
Intake Booster	Near the Alder Creek point of diversion	2	1,500 per pump
Alder Creek WTP	At the Alder Creek WTP	4	1,800 Total
Terra Fern	At Terra Fern Road Reservoir	5	1,750 Total
PWB Booster PS	Hudson Road	3	3,300 Total
PWB Transfer PS	At Revenue Ave. Reservoir	2	1,500 Total

Exhibit 2-20. Summary of System Pipelines.

Pipe Diameter (inches)	Total Length (feet)	Total Length (miles)	Percent of Total Pipeline (%)
2	332	0.1	0.1
4	6,677	1.3	1.6
6	163,983	31.1	39.7
8	83,191	15.8	20.1
10	6,908	1.3	1.7
12	71,409	13.5	17.3
16	51,891	9.8	12.6
18	15,729	3.0	3.8
24	13,254	2.5	3.2
	413,374	78.3	100.0

SECTION 3

Water Management and Conservation

This section addresses the requirements of OAR 690-086-0150(1) – (6).

This rule requires a description of specific required conservation measures and benchmarks, and additional conservation measures implemented by the City.

Current Conservation Measures

OAR 690-086-0150(1) and (3)

Progress Report

This is the City's second WMCP. OWRD approved the City's first WMCP on September 27, 2007. Since approval of its 2007 WMCP, the City has been striving to meet its conservation benchmarks. **Exhibit 3-1** shows the water conservation benchmarks established in the 2007 WMCP and the progress that the City has made to meet those benchmarks.

Other Conservation Measures

In addition to the accomplishments listed in the progress report of the City's conservation benchmarks in **Exhibit 3-1**, the City implemented the following water conservation measures within the past 10 years.

- The City has significantly increased water rates over the past few years to increase revenue for water system projects and to encourage water conservation.
- The City gives all new homeowners a welcome packet containing information on indoor and outdoor conservation measures.
- The City developed a display that was used at the City's Earth Day/Arbor Day events in 2010, 2011, and 2012 describing a xeriscaping project that the City's Planning Director completed at his personal residence in 2010.

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Exhibit 3-1. Water Conservation Progress Report.

Requirement	2007 Benchmarks	2015 Benchmark Status
Annual water audit	The City will continue to conduct annual water audits to measure unaccounted-for water and estimate leakage rates.	The City continues to track and analyze water production data against water sales data annually to determine unaccounted-for water totals.
System metering	The City will install meters on three unmetered connections along the Brownell Spring's transmission line by September 27, 2008.	These connections are now metered and all new connections are metered.
Meter testing and maintenance	The City will implement a program for routine testing of production meters at Alder Creek and Brownell Springs.	All production flowmeters are tested and calibrated annually. The production meter at Brownell Springs was replaced with an ultrasonic flowmeter in 2008.
	The City will routinely test large meters (ex. Meters serving the school district and Mt. Hood cleaners, and the meter at the interconnection with Alder Creek Water District) to evaluate flow rates and to determine if any meters should be replaced.	The City aims to test all meters 2-inches and larger on an annual basis, which has been achieved most years. Decisions on meter replacement and repair are made based on test results. The City tests both wholesale customer meters every other year.
	The City will develop a program to routinely repair, test, and calibrate hydrant meters for construction contractor use.	The City re-evaluated whether to develop this program and decided that the program would not be cost effective given that bulk water sales from hydrants are a small portion of overall sales (less than 0.2% in 2011).
	The City will track the performance of new meters installed and maintain records on meters removed from service.	The City tracks the performance of newly installed meters using the AMR metering system. Records on meters removed from service are maintained in the City's utility billing system software.
	The City will develop a sampling program for residential meters to assess their accuracy and age.	The City assesses accuracy of new residential meters using the AMR metering system. Given that most meters are relatively new, the City will track meter records of older meters to monitor for failure rather than develop a sampling plan for older meters.
	The City will conduct a meter repair and replacement program.	The City recently implemented a fixed-base radio AMR metering system for all new service connections. Over time, the City would like to outfit all residential meters with AMR and to use the AMR data to track meter performances. The City is investigating whether increased meter accuracy from replacement of all non-AMR meters (approximately 90% of installed meters) will increase revenue enough to cover the debt service for the meter replacement project. If the full-scale meter replacement project does not proceed, the City intends to replace 100 existing residential meters with AMR meters each biennium.
Rate structure based on the quantity of water metered and billing practices that encourage water conservation	The City will continue to use its current billing rate structure that bases customer bills on the amount of water that they use. Customers are billed monthly.	Customers continue to be billed based on the amount of water consumed. The City continues to bill its customers monthly to provide timely feedback about water consumption. Customers with AMR meters (about 360 currently) can be quickly notified of excessive or unusual water use instead of waiting for the next utility bill to discover excessive or unusual water use. Customers with AMR may also contact the City on any work day to find out their water consumption.
Leak detection and leak repair or line replacement	The City will conduct a baseline leak survey of the water system using the sampling plan described in the 2000 water audit (targeted assessment of certain high-value and/or old lines and random sampling of the remaining system).	The baseline leak survey has not yet been performed. Previous leak surveys were inconclusive or only turned up a few small leaks. Consequently, the City does not believe that the unaccounted-for water is attributable to leaks and has decided to invest resources in other water conservation efforts.
	The City will target the following for segments for leak detection: o The 6-inch transmission line between the Brownell Springs meter and its intersection with the Alder Creek 16-inch line o The 16-inch transmission line from Alder Creek and Sandercock Storage Tank o The 2-inch and 4-inch transmission lines supplying the Alder Creek and Special Water Service Districts	The 6-inch transmission main between the Brownell Springs meter and the 16-inch transmission main is located on very difficult to access and inaccessible terrain. With the exception of difficult to access portions of the transmission lines, the City performs a visual inspection of the pipelines every summer. In addition, this line is metered so excessive water loss would be simple to detect. The 16" transmission main between the Alder Creek WTP and Sandercock Reservoir is located in the shoulder of Hwy 26. Acoustic leak detection methods are not effective due to heavy traffic noise, so the City relies on visual inspection for this transition main. The 2-inch and 4-inch transmission lines supplying the Alder Creek Barlow Water Districts are both metered and all customer service connections are metered. Excessive water loss would be simple to detect and would be reported by the wholesale customer.
	The City will perform leak detection at 36 randomly selected pipe sections throughout the system to determine a statistically significant estimate of leakage rates.	This sampling has not yet been performed. Previous leak surveys were inconclusive or only turned up a few small leaks. Consequently, the City does not believe that the unaccounted-for water is attributable to leaks and has decided to invest resources in other water conservation efforts.
	The City will maintain records of repaired and reported leaks including the cause of leaks, the age and type of pipe, and other information.	All repaired and reported leaks have been recorded to include these factors.
	The City will annually survey approx. 10% of the water system for leaks in order to survey the entire system every 10 years.	The annual survey has not yet been performed. Previous leak surveys were inconclusive or only turned up a few small leaks. Consequently, the City does not believe that the unaccounted-for water is attributable to leaks and has decided to invest resources in other water conservation efforts.
	The City will strive to, within available resources, reduce the unaccounted-for water rate to 10 percent or less by 2010.	The City reduced its unaccounted-for water from 28 percent in 2005 to 11.5 percent in 2014. The City will continue to strive to reduce its unaccounted-for water.
	The City will conduct annual leak detection surveys and repairs.	See responses above.

Exhibit 3-1. Water Conservation Progress Report Continued.

Requirement	2007 Benchmark	2015 Benchmark Status
Public education program to encourage water conservation	The City will continue to be a member of Regional Water Providers Consortium (RWPC) and benefit from RWPC's services (public education).	The City remains a member of the RWPC and continues to benefit from the RWPC's outreach and public education programs.
	The City will continue to make conservation kits available.	The City makes indoor and outdoor conservation kits available to all customers and passes out these kits at the City's Earth Day event, a rotating neighborhood-specific event in the Fall, and at additional neighborhood fairs/block parties upon request.
	Additional public education activities will be employed as new conservation programs are implemented.	The City participates in the RWPC conservation and public education programs. The City joined in the EPA "Water Sense" program in 2012 and participated in the WaterSense "Fix a Leak Week" in 2013 (See Appendix C for "Fix a Leak Week" press releases.)
	The City will initiate an open-house workshop where all conservation measures should be promoted.	This function is performed annually at the City's Earth Day event and at least once each year at neighborhood fairs and block parties.
Technical and financial assistance programs to encourage water conservation	The City will conduct sample water audits for commercial/tourist facilities.	These audits have not been implemented to date. The City will need to hire a consultant to conduct these audits due to lack of staff availability. The City intends to have this activity funded within the next five years.
Supplier financed retrofitting or replacement of existing inefficient water using fixtures	The City will distribute low-flow showerheads in conservation kits or with a low-flow toilet rebate program.	The City has distributed approximately 500 indoor conservation kits with 2.5 gpm low flow showerheads and faucet aerators. The City continues to make water conservation kits available at no charge to any customer requesting one.
	The City will implement a low-flow toilet rebate program, mainly targeting residential customers, but also available to commercial and tourist-related facilities.	Due to the City having mostly new homes that contain low-flow toilets, the City has decided to direct funds to other water conservation programs instead.
Water reuse, recycling, and non-potable water opportunities; and	Not specified.	The City has distributed approximately 126 downspout rain barrels to utility customers.
Any other conservation measures identified by the water supplier that would improve water use efficiency.	Not specified.	The City finalized and implemented a xeriscaping outreach program in 2013, which provides technical advice and printed materials. The City has not received responses to its xeriscaping outreach thus far.

Use and Reporting Program

OAR 690-086-0150(2)

The City's water measurement and reporting program complies with the measurement and reporting standards in OAR Chapter 690, Division 85.

The City currently measures water demand using four ultrasonic master meters. These master meters are located at the Alder Creek WTP, Brownell Springs diversion, Hudson Road pump station, and Revenue Avenue pump station.

The City submits monthly water use measurements to OWRD on an annual basis. Reporting is for the previous water year (October 1 to September 30). The City's water use records can be found at http://apps.wrd.state.or.us/apps/wr/wateruse_report/

Required Conservation Programs

OAR 690-086-0150(4)

OAR 690-086-0150(4) requires that all water suppliers establish five-year benchmarks for implementing the following water management and conservation measures:

1. Annual water audit
2. System-wide metering
3. Meter testing and maintenance
4. Unit-based billing
5. Leak detection and repair (if system leakage exceeds 10 percent)
6. Public education

Five-Year Benchmarks for Required Conservation Measures

During the next five years, the City plans to initiate, continue, or expand the following conservation measures that are required of all municipal water suppliers when a condition of a water use permit, permit extension, or another order or rule requires a WMCP:

1. Annual Water Audit.

OWRD defines a water audit as an analysis of the water system that includes a thorough accounting of all water entering and leaving the system to identify leaks in the system, and authorized and unauthorized water uses, metered or estimated. The water audit also includes analysis of the water supplier's own water use.

The City conducts an annual water audit based on records of total demand (volume of finished water that enters the water distribution system), and total consumption (volume of water consumed through metered service connections). The City's unaccounted-for water was 11.5 percent in 2014.

Given the relative newness of the City's customer meters (installed in 2002 or more recently) and the lack of substantial leaks detected in previous leak detection studies, both of which are described later in Section 3, the City believes that its unaccounted-for water is primarily the result of accounting errors related to its billing software or its non-AMR meters.

Five-Year Benchmarks: The City will continue to conduct an annual water audit. In the next two years, the City will investigate its billing software for potential sources of accounting errors.

2. System-wide Metering.

The City’s water system is fully metered. The City installs meters on all new connections. Since January 2006, the City has installed over 800 new meters at new connections.

The City implemented a fixed-based radio Automatic Meter Reading (AMR) metering system for all new service connections in December 2011. Since then, the City has installed approximately 360 AMR meters, which represents approximately 10 percent of the City’s customer meters. **Exhibit 3-2** presents a breakdown of the City’s meters by age.

Exhibit 3-2. Number of New and Existing Meters Installed.

Year Installed	Number of Meters	Age (Years)
pre-1991	756	
1991	7	24
1992	18	23
1993	54	22
1994	66	21
1995	31	20
1996	80	19
1997	54	18
1998	82	17
1999	133	16
2000	171	15
2001	195	14
2002	213	13
2003	174	12
2004	159	11
2005	185	10
2006	269	9
2007	185	8
2008	160	7
2009	108	6
2010	77	5
2011	55	4
2012	77	3
2013	59	2
2014	122	1
2015	71	0
Unknown	53	
Total	3,614	

The City is investigating whether increased meter accuracy from replacement of all non-AMR meters (approximately 90 percent of installed meters) in the near future will increase revenue enough to cover the debt service for the meter replacement project. If the full-scale meter replacement project does not proceed, the City intends to replace 100 existing residential meters with AMR meters each biennium.

Five-Year Benchmarks: The City will continue to install AMR meters on all new connections. In the next five years, the City will complete a cost-benefit analysis of replacing all non-AMR meters with AMR meters and will decide how to proceed with meter replacement.

3. Meter Testing and Maintenance.

The City has a meter testing and maintenance program. All production meters are tested and calibrated annually. The City strives to test all meters two-inches and larger on an annual basis, and achieves that goal most years. The City replaces or repairs these meters based on test results. The City tests both wholesale customer meters every other year. The performance of AMR meters can be tracked by analyzing AMR meter records. For non-AMR meters, the City will track meter records for signs of failure and will replace the meters with AMR meters when deemed necessary. The City also tests meters in response to customer inquiries. The City maintains records of meters removed from service in its utility billing system software. The City has replaced up to approximately 20 meters per year at existing connections. The failed existing meters have been replaced with AMR meters since December 2011.

Five-Year Benchmarks: The City will continue its meter testing and maintenance program. In the next five years, the City will begin to track the number of meters that it replaces at existing connections. In the next five years, the City will complete a cost-benefit analysis of replacing all non-AMR meters with AMR meters and will decide how to proceed with meter replacement.

4. Water Rate Structure.

The City has a uniform rate structure consisting of a monthly base charge (to cover fixed costs, such as meter reading, billing, and debt service), a meter charge (the larger the meter, the greater the charge), and a volume charge that is based on the quantity of water metered at the connection. Tiered water rates are currently considered unnecessary given that high water rates already encourage water conservation and that most water customers have small lots and do not maintain green lawns in the summer. As shown in **Exhibit 3-3**, the City has significantly increased single-family residential water rates over the past few years to increase revenue for water system projects and to encourage water conservation. The rates for the other customer categories have similarly increased

Exhibit 3-3 shows the single-family residential customer charges from 2008 through 2014 inside and outside the City. **Appendix D** details water rates for multi-family residential customers, commercial and industrial customers, wholesale customers, and Skyview.

Exhibit 3-3. Single Family Residential Monthly Base, Monthly Meter, and Volume Charges, as of 2014.

Year	Monthly Base Charge Inside City	Monthly Base Charge Outside City	Monthly Meter Charge (5/8" x 3/4" meter) Inside City	Monthly Meter Charge (5/8" x 3/4" meter) Outside City	Volume Charge per CCF Inside City	Volume Charge per CCF Outside City
2008	\$4.80	\$7.20	\$0.17	\$0.26	\$1.91	\$2.86
2010	\$4.99	\$7.49	\$0.18	\$0.27	\$1.99	\$2.97
2011	\$5.29	\$7.94	\$0.19	\$0.28	\$2.11	\$3.15
2012	\$5.60	\$8.42	\$0.20	\$0.30	\$2.24	\$3.34
2013	\$5.94	\$8.93	\$0.21	\$0.32	\$2.37	\$3.54
2014 (current)	\$6.18	\$9.29	\$0.22	\$0.33	\$2.46	\$3.68

Five-Year Benchmarks: The City will continue to bill customers based on the quantity of water metered at the service connection.

5. Leak Detection and Repair.

The City has a leak detection and repair program to minimize system leakage. Leak detection studies that the City conducted in the past were inconclusive or only turned up a small number of minor leaks, which leads the City to believe that leaks are not a major contributor to unaccounted-for water. Consequently, the City currently monitors for leaks on a regular basis using visual inspections where possible. The City also maintains records of repaired and reported leaks on a continuous basis, including the cause of leaks, the age and type of pipe, and other information. Since 2006, the City has replaced 3,200 linear feet of existing pipeline since 2006.

Five-Year Benchmarks: The City will continue to conduct its leak detection and repair program.

6. Public Education.

The City provides public education about water conservation through a combination of internal efforts and membership in the Regional Water Providers Consortium (RWPC).

The City gives all new homeowners a welcome packet containing information on indoor and outdoor conservation measures, such as repairing leaky faucets, avoiding over-watering of outdoor plants, and limiting outdoor water use for cleaning sidewalks and driveways. The City also makes indoor and outdoor water conservation kits available to all existing customers, which it distributes at the City’s Earth Day event, a rotating neighborhood-specific event in the fall, and at additional neighborhood fairs/block parties upon request. The City staffs a booth at the Earth Day event to promote water conservation. In addition, the City occasionally includes water conservation messages in its monthly newsletter, which is on the back of the utility bill. **Appendix E** shows the water conservation message in the July 2015 newsletter.

The City is a member of the RWPC. (Membership currently costs the City \$5,502 per year.) The benefit of membership is that the RWPC has a variety of water conservation public outreach efforts that become available to the City and its water customers. For example, the RWPC provides workshops for developers and landscapers that focus on water-efficient landscape design and installation and using water-efficient irrigation equipment. The RWPC also develops conservation displays available to members for use at local events, and produces brochures containing conservation information. In addition, the RWPC sponsors a summer water conservation media campaign that includes TV and radio advertisements and news interviews on local stations, conducts outreach at large regional events (e.g. Yard, Garden, and Patio Show and the Salmon Festival), and maintains a Web site (www.conserveh2o.org) that has indoor and outdoor water conservation information and suggestions. The City and the RWPC also sponsored annual water conservation education presentations at local elementary schools in 2010, 2013, 2014, and 2015 (See Appendix F for the announcements of these presentations). Presentations did not occur in 2011 and 2012 due to lack of interest from local elementary schools.

The City joined in the EPA "Water Sense" program in 2012 and participated in the WaterSense "Fix a Leak Week" in 2013 (See Appendix C for "Fix a Leak Week" press releases.)

Five-Year Benchmarks: The City will continue to be a member of the RWPC. The City will continue to promote water conservation at the City's Earth Day event and neighborhood events.

Additional Conservation Measures

OAR 690-086-0150(6)

OAR 690-086-0150(6) requires municipal water suppliers that serve a population greater than 1,000 and propose to expand or initiate the diversion of water under an extended permit for which resource issues have been identified, or if the population served is greater than 7,500, to provide a description of the specific activities, along with a five-year schedule to implement several additional conservation measures. The City served a population of 10,387 in 2014, therefore, the City is required to address the following additional conservation measures.

1. Leak Repair or Line Replacement Program

Under this rule requirement, the City is required to implement a system-wide leak repair program or line replacement program to reduce system leakage to 15 percent, and if feasible to 10 percent. As previously described, the City's unaccounted-for water was 11.5 percent in 2014. The City has a leak detection and repair program to minimize system leakage. Leak detection studies that the City conducted in the past were inconclusive or only turned up a small number of minor leaks, such that the City believes that leaks are not a major contributor to unaccounted-for water. Consequently, the City currently monitors for leaks on a regular basis using visual inspections. The City maintains records of repaired and reported leaks on a

continuous basis, including the cause of leaks, the age and type of pipe, and other information.

Five-Year Benchmarks: The City will continue to conduct its leak detection and repair program.

2. Technical and Financial Assistance Programs

As mentioned under Public Education, the City makes indoor and outdoor water conservation kits available to all existing customers. The indoor water conservation kits include a shower timer and toilet tank dye tablets. The outdoor water conservation kits include the RWPC outdoor conservation brochure, Water Efficient Plants of the Willamette Valley booklets, and watering/irrigation gauge.

In 2013, the City funded an intern to implement activities associated with the EPA's National Fix a Leak Week, which included leak detection information on the City's website and Facebook page, as well as a question and answer session at City Hall with a local plumber to address customer questions about leak detection and repair (See Appendix C).

The City's Planning Director did a xeriscaping project at his personal residence in 2010 that both KATU News (<http://www.katu.com/about/green/126381243.html>) and the RWPC website featured in 2011. The Planning Director also had a display describing his project at the City's Earth Day/Arbor Day events in 2010, 2011, and 2012. In 2013, the City implemented a xeriscaping outreach program, which consists of technical advice and printed materials. The City has not received questions or requests for materials provided in response to the xeriscaping outreach program thus far.

Five-Year Benchmarks: In the next five years, the City will investigate ways to increase interest in the xeriscaping outreach program materials by reviewing how other cities are implementing xeriscaping programs, and will then implement changes to the program.

3. Supplier Financed Retrofit or Replacement of Inefficient Fixtures

As previously mentioned, the City makes indoor and outdoor water conservation kits available to all existing customers. The indoor water conservation kits include a low-flow showerhead and faucet aerators. To date, the City has distributed approximately 500 indoor conservation kits with low-flow (2.5 gpm) showerheads and faucet aerators.

Five-Year Benchmarks: The City will continue to make water conservation kits available at no charge to any customer requesting one.

4. Rate Structure and Billing Practices that Encourage Conservation

The City bills its customers monthly to provide timely feedback about water consumption. In addition, customers with AMR may contact the City on any work day to find out their water consumption, which the AMR system metering enables. The City periodically includes water conservation messages in utility bills, as well. **Appendix E** contains the most recent water conservation message in its monthly newsletter, which was on the back of the July 2015 utility bill.

Five-Year Benchmarks: The City will continue to bill its customers monthly and to periodically include water conservation messages in utility bills.

5. Water Reuse, Recycling, and Non-potable Water Opportunities

The City makes downspout rain barrels available to water customers to reduce demand for finished water for outdoor watering. Since April 2008, the City has distributed approximately 126 downspout rain barrels to utility customers.

The City partnered with Iseli Nursery in August 2012 to implement a water reuse project at the nursery. From May 1 to October 31, the City is providing up to 2.90 cfs of reclaimed water to Iseli Nursery for nursery uses and for irrigation of approximately 348 acres currently, and potentially up to 614 acres. Treated wastewater is delivered to Iseli Nursery through approximately 8,000 feet of 14-inch diameter pipe. Reclaimed water is blended with other water in storage ponds at the nursery.

Five-Year Benchmarks: The City will continue to make downspout rain barrels available to water customers to reduce demand for finished water for residential irrigation. The City will continue the water reuse project with Iseli Nursery. In the next five years, the City will contact at least two commercial/industrial customers to discuss the potential for water reuse, recycling, or non-potable water use opportunities.

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SECTION 4

Water Curtailment Plan

This section satisfies the requirements of OAR 690-086-0160.

This rule requires a description of past supply deficiencies and current capacity limitation. It also requires inclusion of stages of alert and the associated triggers and curtailment actions for each stage.

Introduction

Water curtailment plans outline proactive measures that water suppliers may take to reduce demand and to find alternative supply during short-term water supply shortages. The intent of water curtailment plans is to minimize the impacts of water supply shortages and to ensure water supply for public health and safety.

The curtailment plan presented in this section is based on the City's ordinance 13.04.220 Regulations Pertaining to Inadequate Supply or Shortages of Water contained in **Appendix G**, but has been updated to comply with Division 86 requirements. The City's existing ordinance outlines three stages of alert for dealing with potential water shortages. Stage 1 calls for voluntary reductions in water use, Stage 2 implements compulsory restrictions, and Stage 3 prohibits certain water uses. The ordinance also allows the city council to temporarily raise water rates, and describes enforcement provisions including fines and disconnection of service. While the city manager is authorized to trigger a Stage 1 alert level, under the city's existing ordinance, only the city council can declare higher curtailment stages. The existing ordinance does not describe the "pre-determined levels of severity of shortage or water service difficulties that will trigger the curtailment actions" as required by Division 86. In addition, the existing ordinance does not provide for a Stage 4 curtailment response to an interruption of water service because of some type of catastrophic event. The curtailment plan presented in this section modifies the City's current plan (ordinance) by adding a Stage 4, identifying objective measures that will trigger the curtailment stages, and increasing the level of response triggered at Stages 2 and 3.

History of System Curtailment Episodes

OAR-690-086-0160(1)

The City has only implemented water curtailment measures once during the past 10 years. The City activated Stage 1 voluntary curtailment on July 27, 2009 in response to the combination of record high air temperatures that increased water demands and record low stream flow levels in Alder Creek that affected the City's ability to divert water. The City changed its diversion dam and intake structure to enable the City to provide more water to the WTP at that time. The City lifted Stage 1 curtailment on July 31 in response to decreased temperatures.

Since then, the City has not activated any curtailment stages and has taken action to reduce the likelihood of the need for water curtailment in the future by securing a redundant water supply. In 2014, the City began utilizing a new interconnection with the PWB. This interconnection provides additional water supply from PWB's Bull Run water supply source to meet peak demands and provides the City with water supply redundancy in the

event that the City’s water sources (i.e. Alder Creek and Brownell Springs) are impacted by a long-term drought, contamination, or system failure that results in a water shortage. The addition of the PWB water source increased the City’s production capacity to approximately 5 mgd, which is more than double the City’s MDD. Consequently, the City expects to maintain water delivery during most long-term water shortages.

Currently, the City’s water system infrastructure is sufficient to meet water demands in the near future.

Curtailment Event Triggers and Stages

OAR-690-086-0160(2) and (3)

The City’s water curtailment plan as presented in this WMCP has four stages that increase in severity and are intended to be implemented in progressive steps. The curtailment stages include both voluntary and mandatory limitations and the type of limitations will depend on the cause, severity, and anticipated duration of the water shortage.

The City’s four curtailment stages and their potential initiating conditions (i.e. triggers) are presented in **Exhibit 4-1**. The City’s initiating conditions focus on supply capacity, but include other supply shortage initiating conditions, as well.

Exhibit 4-1. Curtailment Stages 1 through 4.

Curtailment Stages	Potential Initiating Conditions
Stage 1: Water Alert	General recognition of drought conditions in Clackamas County, or Demand reaches 80 percent of supply capacity for 3 or more consecutive days, or Water storage is approaching the minimum required for fire protection or other essential needs as determined by the City
Stage 2: Serious Shortage	Demand reaches 90 percent of supply capacity for 3 or more consecutive days.
Stage 3: Critical Shortage	Demand is 100 percent or more of supply capacity for 3 or more consecutive days.
Stage 4: Emergency	System failure, such as a main break or treatment plant interruption. Chemical spill, malevolent attack on the system or other event introduces a contaminant at some point in the system.

Curtailment Plan Implementation

OAR-690-086-0160(4)

Stage 1: Water Alert

Stage 1 will activate a program to inform customers of the potential for drought and/or water shortages, and reasons to voluntarily conserve water. Stage 1 will be activated by the city manager and will be triggered when any of the following conditions exist:

1. General recognition of drought conditions in Clackamas County.
2. Demand reaches 80 percent of water supply capacity as determined by the city manager for a period of 3 or more consecutive days.
3. Water storage approaches the minimum required for fire protection or other essential needs as determined by the city manager.

Under Stage 1, the City will issue a notice requesting voluntary reduction in water use by all customers. The notice will include a description of the current water situation, the reason for the requested conservation measures, and a warning that mandatory restrictions will be implemented if voluntary measures are not sufficient to achieve water use reduction goals. The notice also will direct customers to the RWPC website (www.conserveh2o.org) for conservation information and tips. A similar notice could be issued through local media (newspaper, radio, or TV) if a regional drought has not already triggered media coverage of water shortage concerns.

When Stage 1 is triggered, the City will ask customers to voluntarily take one or more of the following actions:

- Limit landscape watering between the hours of 10:00 am and 6:00 pm, the period of highest water loss due to evaporation.
- Comply with an alternate days system for landscape watering (i.e. even numbered addresses water on even numbered days and odd numbered addresses water on odd numbered days).
- Implement other conservation measures, such as those suggested by the RWPC website and the RWPC brochures, *H2O outdoor* and *H2O indoor*.

Stage 2: Serious Water Shortage

Stage 2 is similar to Stage 1 except that the voluntary measures regarding outdoor water use will be made compulsory by the city council, and additional non-essential water use will be prohibited. Stage 2 will be activated by the city council when demand on the water system reaches 90 percent of the supply capacity for 3 days or more.

Under Stage 2, the City will issue a notice describing the current water situation, the need for mandatory conservation measures, and the mandatory water conservation actions imposed. The notice also will direct customers to the RWPC website (www.conserveh2o.org) for conservation information and tips. A similar notice could be issued through local media (newspaper, radio, or TV).

When Stage 2 is triggered, the City will impose one or more of the following mandatory water restrictions:

1. Watering landscapes prohibited between 10:00 am and 6:00 pm.
2. Comply with the alternate day system for landscape watering (i.e. even numbered addresses water on even numbered days and odd numbered addresses on odd numbered days).
3. No water use for washing motorbikes, motor vehicles, boat trailers, or other vehicles except at a commercial washing facility that practices wash water recycling. (Exceptions include vehicles that must be cleaned to maintain public health and welfare such as food carriers and solid waste transfer vehicles.)
4. No water use to wash sidewalks, walkways, driveways, parking lots, tennis court, and other hard-surfaced outdoor areas.
5. No water use to wash buildings and structures, except as needed for painting or construction.
6. No water use for a fountain or pond for aesthetic or scenic purposes, except where necessary to support fish life.
7. Discourage serving water to customers in restaurants unless water is requested by the customer. (This action does not provide significant water savings, but is useful for generating awareness of the need to curtail use.)
8. Water only tees and greens and not other golf course areas.
9. No water use for dust control unless absolutely necessary, as determined by the City Council.
10. No water use for gutter cleaning.

Stage 3: Critical Water Shortage

Stage 3 will be activated by the city council when demand on the water system is 100 percent or more of available supply capacity for 3 days or more. The City will issue public service announcements to notify customers of the severity of the conditions.

Under Stage 3, the City will issue a notice describing the severity of the current water situation and the additional mandatory water conservation actions imposed. The notice also will direct customers to the RWPC website (www.conserveh2o.org) for conservation information and tips. A similar notice could be issued through local media (newspaper, radio, or TV).

When Stage 3 is triggered, the City will impose one or more of the following mandatory water restrictions (in addition to water restrictions that may have been imposed under Stage 1 or Stage 2):

1. Replace the restriction of alternate days system for landscape watering from Stage 2 with a prohibition on all outdoor watering (Exceptions include new lawn, grass or turf planted after March 1st of the calendar year in which restrictions are imposed, sod farms, high-use athletic fields, golf tees and greens, or park and recreation areas specifically designated by the city council.)

2. No water use to fill, refill, or add to any indoor or outdoor swimming pools or hot tubs, except if one of the following conditions is met: the pool is used for a neighborhood fire control supply, the pool has a recycling water system, the pool has an evaporative cover, or the pool's use is required by a medical doctor's prescription.
3. No water use from hydrants for construction purposes (except on a case-by case basis), fire drills, or any purpose other than firefighting.
4. Implement limitations on commercial uses of water as determined appropriate by the city manager.

Stage 4: Emergency Water Shortage

Stage 4 will be activated when failure of a system component or non-drought emergency conditions results in an immediate shortage of water. Examples include failure of the main transmission line from the Terra Fern Road Reservoir to the City, failure of the intake or water treatment plant, a chemical spill on Alder Creek upstream of the intake or in the PWB's Bull Run water supply upstream of the point of diversion, or a malevolent attack on the system that introduces a contaminant at some point in the system.

If water in the system is unsafe to drink or an emergency shortage exists from a failure in the water system, the city manager will direct staff to notify customers as quickly as possible to inform them about the emergency water shortage and the necessary mandatory water curtailment measures. (This scenario assumes that a decision to implement Stage 4 will need to happen immediately and that approval from the entire city council will not be expeditious enough.)

When Stage 4 is triggered, the City will impose one or more of the following mandatory water restrictions (in addition to water restrictions that may have been imposed under Stage 2 or Stage 3):

1. Limit residential water use to essential uses only, such as drinking, cooking, basic sanitation, and maintaining human health.
2. Prohibit all non-essential water uses by commercial/industrial customers.

In addition, the city manager will implement the following:

1. Contact the Oregon Drinking Water Program, Department of Human Services and request their assistance in responding to the problem.
2. Notify the local news media, if appropriate, to ask for their assistance in notifying customers.
3. Call an emergency city council meeting
4. Contact the Oregon State Police and Clackamas County Sheriff to obtain help in contacting customers.

The City will continue to investigate and develop specific back-up plans for a Stage 4 emergency. These plans may include renting a water hauling truck and purchasing water from neighboring communities, sending customers to a pre-designated water distribution location, and supplying bottled water.

Conservation Water Rate Schedule

In addition to the above measures, the City shall retain ordinance provisions regarding the adoption of temporary conservation water rate schedules and enforcement.

Enforcement

The city code includes the following enforcement provisions for violations of the regulations related to water curtailment. (13.04.220(E)):

1. The City shall personally deliver a notice of violation to the occupant of the premises. If the occupant is not present, the City may post a notice on the premises advising the user of the violation and warning the user of what specific sanctions may be imposed if the violations continue. The City shall also mail the notice of violation by regular mail to the occupant at the address of the subject premises where the violation has occurred.
2. The following penalties may be imposed if violations continue:
 - Second violation: \$100.00 Fine
 - Third violation: \$300.00 Fine
 - Fourth and subsequent violations: \$500.00 Fine

In the case of continuing violations, the City also has the authority to discontinue water service. (Ord. 12-92 §1, 1992; Ord. 10-73 § 23, 1973.)

SECTION 5

Water Supply

This section satisfies the requirements of OAR 690-086-0170.

This rule requires descriptions of the City's current and future water delivery areas and population projections, demand projections for 10 and 20 years, and the schedule for when the City expects to fully exercise its water rights. The rule also requires comparison of the City's projected water needs and the available sources of supply, an analysis of alternative sources of water, and a description of required mitigation actions.

Delineation of Service Areas

OAR 690-086-0170(1)

Exhibit 2-1 shows the City's urban growth boundary and its urban reserve area, which together represent the City's future service area.

Population Projections

OAR 690-086-0170(1)

The City's projected population for its future water service area, which includes its current UGB and Urban Reserve Area, is 13,123 in 2025 and 16,769 in 2035, as shown in **Exhibit 5-1**. These population projections were prepared by Portland State University's Population Research Center (PRC) in October 2014. The projections are based on household forecasts for areas called transportation analysis zones (TAZs) adopted by the Metro Council in 2012, Metro's Buildable Land Inventory (BLI), data from the US Census Bureau, and data from the PRC. **Appendix B** pages 5 and 6 are part of the report detailing the methods and the data sources used for the population projections. The population projections do not include areas served by the Alder Creek Barlow Water District or Skyview Acres Water Company.

Exhibit 5-1. Projected Water Service Area Population.

Year	Population ¹
2010 ²	10,863
2013	11,290
2014	11,447
2015	11,606
2016	11,761
2017	11,916
2018	12,073
2019	12,225
2020	12,384
2021	12,532
2022	12,680
2023	12,826
2024	12,976
2025	13,123
2026	13,470
2027	13,823
2028	14,178
2029	14,539
2030	14,909
2031	15,271
2032	15,638
2033	16,012
2034	16,390
2035	16,769

¹All population projections presented above are for the City water service area and do not include areas served by the Alder Creek Barlow Water District and Skyview Acres Water Company.

²April 1, 2010 census data used. All other years use July 1 (2013 estimates and 2014-2045 forecasts).

Demand Forecast

OAR 690-086-0170(3)

The City developed its demand forecasts using the following steps. First, the City's average annual water demand from 2006 through 2014 (395.8 MG) was apportioned among the City's customer categories based on the percentage of water that each customer category consumed in 2014, as shown in **Exhibit 5-2**. Average annual water demand was divided by 365 days for each customer category to calculate ADD by customer category. Average annual water demand from 2006 through 2014 was used instead of annual demand for 2014 to provide a historically representative annual water demand. (The City's 2014 annual water demand was the lowest during the period 2006 through 2014.) The year 2014 was used instead of an average from 2006 through 2014 for the percentage of water that each customer category consumed to represent the most current distribution of water usage by customer category.

Exhibit 5-2. Average Annual Water Demand and Average Day Demand (ADD) by Customer Category.

Customer Category	Percentage of Annual Consumption in 2014 (%)	Average Annual Water Demand from 2006-2014 (MG)	ADD Averaged from 2006-2014 (mgd)
Single Family Residential	65	257.2	0.70
Multi-family Residential	11	43.5	0.12
Commercial/ Industrial	22	87.1	0.24
Wholesale	2	7.9	0.02
Total	100%	395.8	1.08

To project demand through 2035, the City then took the following steps:

- **Projected Residential ADD** -- An annual residential growth rate of 2.12 percent, based on the PRC Population Projections for the years 2015 through 2035, was applied to Residential (single family + multi-family) ADD averaged from 2006 through 2014 of 0.82 mgd (0.70 mgd + 0.12 mgd = 0.82 mgd).
- **Projected Commercial/Industrial ADD** -- The annual employment growth rate of 4.0 percent, based on the Metro Transportation Plan for the years 2010 through 2014, was applied to the Commercial/Industrial ADD averaged from 2006 through 2014 of 0.24 mgd.
- **Projected Wholesale ADD** -- The annual wholesale growth rate was assumed to be 0 percent based on the assumptions that the City will have no additional wholesale customers and the District and Skyview will not have an increase in population over the next 20 years that would increase their demand, resulting in the Wholesale demand of 0.02 mgd continuing through 2035.

The City summed the projected Residential, Commercial/Industrial, and Wholesale ADDs for each year through 2035 then applied the maximum peaking factor (MDD:ADD) from 2006-2014 of 2.3 to obtain the projected MDD for each year through 2035.

Exhibit 5-3 presents the City’s MDD projections that were developed using the above described methodology. The demand projections estimate that the City’s MDD will reach 3.3 mgd (5.1 cfs) by 2025 and 4.2 mgd (6.6 cfs) by 2035. These initial MDD projections do not, however, consider the variability in demand based on climactic conditions (weather). To account for the effects of weather variations on MDD, the City determined the standard deviation of the MDDs from 2006 through 2014, which was 0.3 mgd (0.46 cfs). The City added the 0.3 mgd “weather allowance” to the MDD projections. **Exhibit 5-3** shows the City’s projected MDD with the weather allowance, which is estimated to be 3.6 mgd (5.5 cfs) in 2025 and 4.5 mgd (7.0 cfs) in 2035.

Exhibit 5-3. Projected Maximum Day Demand (MDD) With and Without a Weather Allowance.

Year	MDD		MDD with weather allowance (mgd)	MDD with weather allowance (cfs)
	(mgd)	(cfs)		
2014	2.5	3.9	2.8	4.3
2015	2.6	4.0	2.9	4.4
2016	2.6	4.1	2.9	4.5
2017	2.7	4.2	3.0	4.6
2018	2.8	4.3	3.1	4.7
2019	2.8	4.4	3.1	4.8
2020	2.9	4.5	3.2	4.9
2021	3.0	4.6	3.3	5.1
2022	3.0	4.7	3.3	5.2
2023	3.1	4.8	3.4	5.3
2024	3.2	5.0	3.5	5.4
2025	3.3	5.1	3.6	5.5
2026	3.4	5.2	3.7	5.7
2027	3.5	5.3	3.8	5.8
2028	3.5	5.5	3.8	5.9
2029	3.6	5.6	3.9	6.1
2030	3.7	5.8	4.0	6.2
2031	3.8	5.9	4.1	6.4
2032	3.9	6.1	4.2	6.5
2033	4.0	6.2	4.3	6.7
2034	4.1	6.4	4.4	6.9
2035	4.2	6.6	4.5	7.0

Schedule to Exercise Permits and Comparison of Projected Need to Available Sources

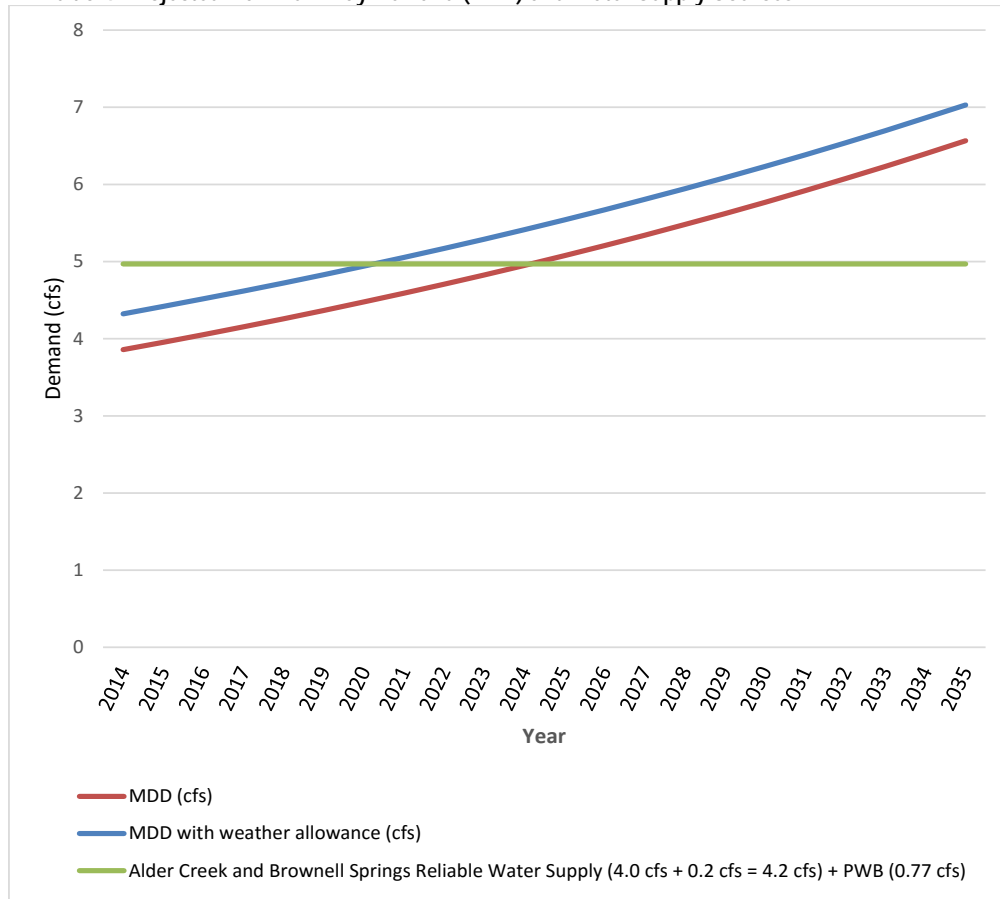
OAR 690-086-0170(2) and (4)

As described in Section 2, the City currently relies principally on its Alder Creek and Brownell Springs water rights to supply water to its customers, and PWB water is a supplemental water supply. The City currently is authorized to use up to 5.2cfs under its Alder Creek water rights and Brownell Springs water rights (4.0 cfs under Certificate 91176 and Permit S-36601 and 1.2 cfs under its Brownell Springs water rights). The water supply reliability of the City's Alder Creek water rights (4.0 cfs)² and Brownell Springs water rights (0.2 cfs) plus the PWB water (0.77 cfs) totals 4.97 cfs (3.21 mgd).

The City's projected MDD with a weather allowance shows that the City needs 4.97 cfs in less than 10 years (by 2021). (See **Exhibit 5-3** and **Exhibit 5-4**). The City intends to fully utilize its Alder Creek and Brownell Springs water rights to minimize its reliance on the water it purchases from the PWB, which is particularly important in the event of a disruption in the PWB Bull Run water supply.

² As previously described, City understands that water use limitations may be added to Permit S-36601 as a result of an approved extension of time. At this time, the potential conditions are unknown.

Exhibit 5-4. Projected Maximum Day Demand (MDD) and Water Supply Sources.



Over the next few years, the City will evaluate the best approach to meet its projected water demands through at least 2035. The City is considering three options: 1) begin to develop the City’s Salmon River water supply, 2) purchase additional wholesale water from the PWB (purchase of up to 3.0 mgd is allowed under the current contract, which is in effect until June 30, 2028), or 3) pursue a combination of options 1 and 2. The City will provide an update on its evaluation of the best approach to use to meet its projected water demands through 2035 in the 10-year update of this WMCP.

Alternative Sources

OAR 690-086-0170(5)

OAR 690-086-0170(5) requires an analysis of alternative sources of water if any expansion or initial diversion of water allocated under existing permits is necessary to meet future water demand. The City is not seeking expansion or initial diversion of water under its existing permits; therefore, this provision is not applicable.

Quantification of Projected Maximum Rate and Monthly Volume

OAR 690-086-0170(6)

OAR 690-086-0170(6) requires a quantification of the maximum rate of withdrawal and maximum monthly use if any expansion or initial diversion of water allocated under an existing permit is necessary to meet demands in the 20-year planning horizon. The City is not seeking expansion or initial diversion of water under its existing permits; therefore, this provision is not applicable.

Mitigation Actions under State and Federal Law

OAR 690-086-0170(7)

Under OAR 690-086-0170(7), for expanded or initial diversion of water under an existing permit, the water supplier is to describe mitigation actions it is taking to comply with legal requirements of the Endangered Species Act, Clean Water Act, and other applicable state or federal environmental regulations.

The City currently is not required to take any mitigation actions under state or federal law. The final order approving an extension of time for the City's Permit S-48451 (use of water from Salmon River) did, however, include "fish persistence" conditions. These conditions were included to maintain the persistence of fish species listed under the Endangered Species Act in portions of the river affected by the water user under the permit. The City is fully aware of these conditions, and upon initiating use of Permit S-48451, the City will monitor streamflows and use as needed to comply with its permit requirements. The City is also aware that fish persistence conditions may be added to Permit S-36601 upon approval of the pending permit extension.

New Water Rights

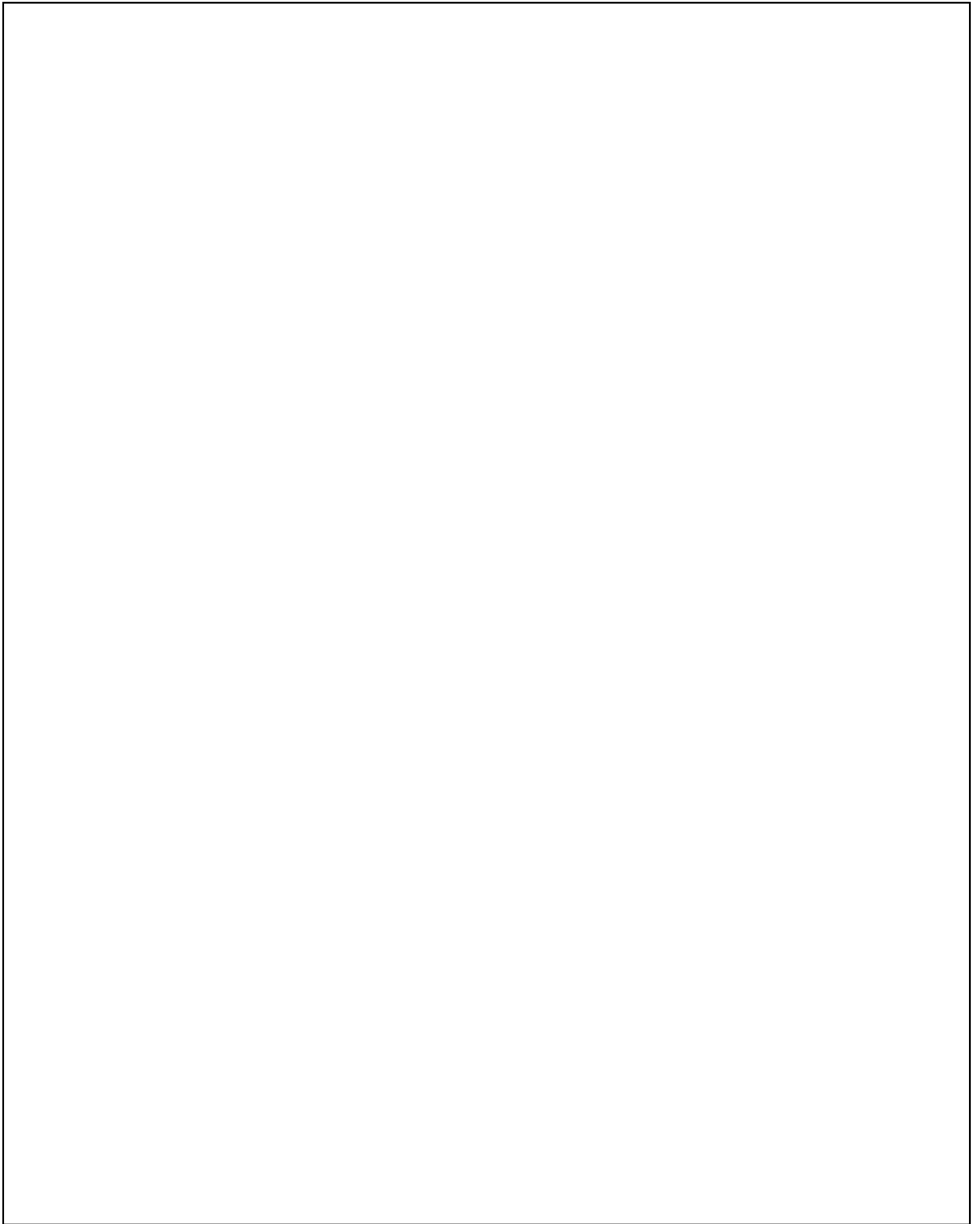
OAR 690-086-0170(8)

Under OAR 690-086-0170(8), if a municipal water supplier finds it necessary to acquire new water rights within the next 20 years in order to meet its projected demand, an analysis of alternative sources of the additional water is required. The analysis must consider availability, reliability, feasibility and likely environmental impacts and a schedule for development of the new sources of water. The City does not intend to acquire new water rights to meet demands within the next 20 years, so the provisions of this section are not applicable.

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Appendix A

Letters to Local Governments





December 21, 2015

Tracy Brown, Director
Planning and Development Department
City of Sandy
39250 Pioneer Blvd.
Sandy, OR 97055

Subject: Water Management and Conservation Plan for the City of Sandy

Dear Mr. Brown:

The City of Sandy has developed a draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans. Enclosed is a CD containing the City of Sandy's draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comment to me at the address on this letterhead or e-mail them to me directly at: asussman@gsiws.com.

If you have any questions, please feel free to contact me at 541-257-9001. Thank you for your interest.

Sincerely,
GSI Water Solutions Inc.

A handwritten signature in blue ink, appearing to read "Adam Sussman", is written over the typed name.

Adam Sussman
Principal Water Resources Consultant

Enclosure



December 21, 2015

Clackamas County - Planning and Zoning Division
Development Services Building
150 Beaver Creek Rd.
Oregon City, OR 97045

Subject: Water Management and Conservation Plan for the City of Sandy

Dear Sir or Madam:

The City of Sandy has developed a draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department.

Under these rules, the water supplier shall make its draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans. Enclosed is a CD containing the City of Sandy's draft WMCP for your review.

Please provide comments to me within 30 days from the date of this letter. If the plan appears consistent with your agency's Comprehensive Land Use Plan, a letter response to that effect would be appreciated. You may send your comment to me at the address on this letterhead or e-mail them to me directly at: asussman@gsiws.com.

If you have any questions, please feel free to contact me at 541-257-9001. Thank you for your interest.

Sincerely,
GSI Water Solutions Inc.

A handwritten signature in blue ink, appearing to read "Adam Sussman", is written over the typed name.

Adam Sussman
Principal Water Resources Consultant

Enclosure



December 21, 2015

Jeremy Tower
Alder Creek Barlow Water District
PO Box 542
Sandy, OR 97055

Subject: Water Management and Conservation Plan for the City of Sandy

Dear Mr. Tower:

The City of Sandy has developed a Draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department. Under these rules, the water supplier shall make its Draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans.

As a courtesy, the City of Sandy is providing you a copy of the Draft WMCP. If you have any questions, please feel free to contact me at 541-257-9001.

Sincerely,
GSI Water Solutions Inc.

A handwritten signature in blue ink, appearing to read "Adam Sussman", is written over the typed name.

Adam Sussman
Principal Water Resources Consultant

Enclosure



December 21, 2015

David Jacob
Skyview Acres Water Company
PO Box 2072
Sandy, OR 97055

Subject: Water Management and Conservation Plan for the City of Sandy

Dear Mr. Jacob:

The City of Sandy has developed a Draft Water Management and Conservation Plan (WMCP) to fulfill the requirements of Oregon Administrative Rule Chapter 690, Division 86 of the Oregon Water Resources Department. Under these rules, the water supplier shall make its Draft WMCP available for review by affected local governments and seek comments relating to consistency with the local governments' comprehensive land use plans.

As a courtesy, the City of Sandy is providing you a copy of the Draft WMCP. If you have any questions, please feel free to contact me at 541-257-9001.

Sincerely,
GSI Water Solutions Inc.

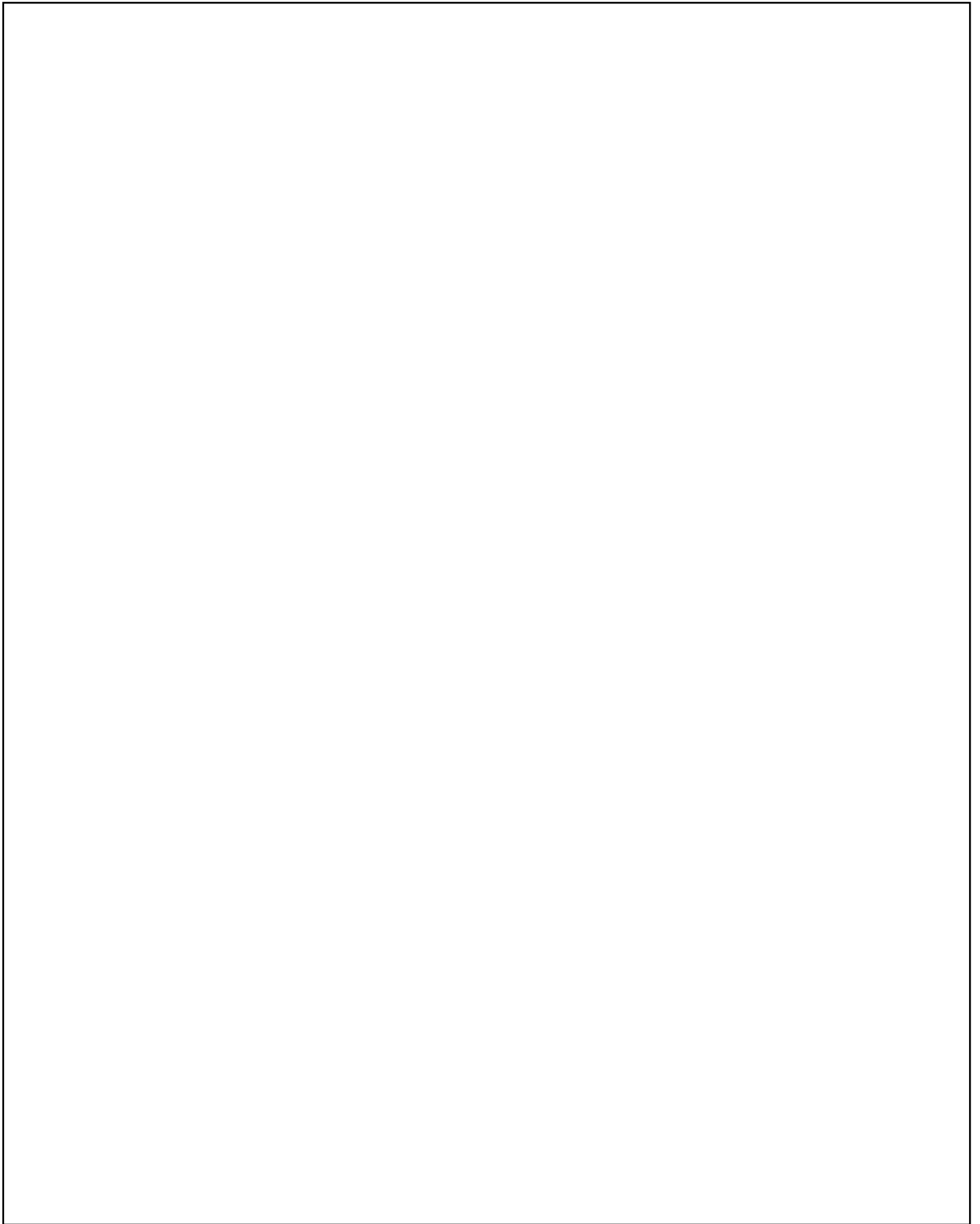
A handwritten signature in blue ink, appearing to read "Adam Sussman", is written over the typed name.

Adam Sussman
Principal Water Resources Consultant

Enclosure

Appendix B

Regional Water Providers Consortium Population, Housing Unit, and Household Forecasts 2014 to 2045



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**Regional Water Providers Consortium
Population, Housing Unit, and Household Forecasts
2014 to 2045**



JUNE 2014

DRAFT

**Regional Water Providers Consortium
Population, Housing Unit, and Household Forecasts
2014 to 2045**

**Prepared By
Population Research Center
Portland State University**

*Charles Rynerson, Research Associate, principal investigator
Kevin Rancik, Research Assistant*

JUNE, 2014

Background

Water providers have an ongoing need for estimates and forecasts of the total population and the number of housing units and households within their service areas. While some of the water providers within Clackamas, Multnomah, and Washington counties have obtained this information periodically on an individual basis, a complete and systematic set of estimates and forecasts for all members of the Regional Water Providers Consortium has not been prepared for nearly 10 years.

The Portland Water Bureau (PWB), on behalf of the Regional Water Providers Consortium, requested that the Portland State University Population Research Center (PRC) update service area boundaries and prepare population, housing unit, and household estimates and forecasts for the water service areas of the municipalities and water districts in the Consortium, as well as the wholesale customers of the PWB that are not Consortium members.

This report includes a brief description of the procedures, methodologies, and data sources used to prepare forecasts for each year from 2014 to 2045. The appendix contains summaries of population and household forecasts for each service area for 2035 and 2045 and a detailed one page profile for each service area that includes annual estimates of population, household population, housing units, households, persons per household, and vacancy rates. *[Note: the detailed profiles in draft form are available on the ftp site, in the "PRC" subfolder under each provider's folder. They will be added to the appendix when the forecasts are final.]* A report issued in February 2014 described the process of collecting and reviewing boundaries for each provider and preparing estimates for each year from 1990 to 2013.

Service Area Boundaries

Forecasts for all years have been prepared based on 2013 boundaries for every water provider included in the study. Boundaries for many of the providers may change in the future, and tentative plans are to update the forecasts in five years.

Several providers submitted shapefiles or maps that included future expanded service areas, in addition to their current boundaries. For these providers, PRC prepared forecasts for current service areas and also for future service areas. However, please note that PRC made no attempt to predict when the expansion would occur. The detailed forecast profiles simply tabulate 2010 census, 2013 estimates, and 2014 to 2045 forecasts for the larger areas. Also, because forecasts from 2014 to 2024 were

interpolated from 2013 and 2025 figures, the results may imply that residential development in new urban areas will begin sooner than is likely. For example, an area slated for development of 1,000 housing units by 2025 may in reality remain undeveloped until 2022, but the interpolation procedure will place housing in the area beginning in 2014. These forecasts are intended to depict likely long range future growth scenarios, not to precisely depict growth in the short run. Annual updates of the estimates will be prepared for 2014, 2015, and so on, incorporating actual residential development that has occurred by the date of the estimates.

Forecast Model and Data Sources Overview

In November 2012 the Metro Council adopted household (HH) forecasts by jurisdiction.¹ These forecasts were also produced for smaller areas called transportation analysis zones (TAZs). There are 1,482 TAZs in Clackamas, Multnomah, and Washington counties, making TAZs ideal for aggregating to larger geographic areas such as the 35 water service areas for which these forecasts are produced. However, the imprecise geographic fit between TAZs and water provider boundaries and the need for housing unit (HU) and population (POP) estimates in addition to HH estimates requires additional data and a relatively complex model.

Metro prepares forecasts for HHs, which are occupied HUs. We also needed to prepare HU forecasts for water providers, so we derived HU growth forecasts at the TAZ level by dividing HH growth forecasts by occupancy rates. POP forecasts were not generated at the TAZ level, but were produced for water service areas after HH forecasts were aggregated to service areas.

Most water service areas are composed of partial TAZs as well as whole TAZs. Therefore, the forecasts for TAZs that are split among more than one water provider must be allocated based on shares of expected growth within each TAZ/provider part. All of the data inputs were prepared for whole TAZs and TAZ/provider pieces, and provider shares of whole TAZs were calculated as a means to allocate TAZ level forecasts to providers. Six sets of shares were derived — four categories of net residential capacity from Metro’s Buildable Land Inventory (BLI) at the parcel level, an inventory of existing HUs on parcels not included in the BLI, and land area.

We used the shares to distribute HU and HH growth forecasts to TAZ/provider pieces in three increments: 2010 to 2025, 2010 to 2035, and 2010 to 2040. Most TAZs are entirely within a single

¹ Ordinance No. 12-1292A, Metro Council, November 29, 2012.

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water service area; the location and timing of development within a TAZ would not matter in those cases. For TAZs that are split between more than one provider, the amount of net residential capacity in each piece as well as the type of capacity makes a difference in the allocation of growth to each service area. We used the simple assumptions that growth within each TAZ would initially occur on vacant land, followed by underdeveloped land with net capacity (most of the region's net residential capacity is on these parcels), followed by infill on existing developed multiple family parcels (this category accounts for relatively little capacity), followed by the remainder of the TAZ not included in the BLI.

An additional piece of TAZ level information from Metro's MetroScope model is "2045 HH Capacity"² For TAZs in which the 2045 HH capacity exceeds the 2010 to 2040 HH growth, we allocated the excess capacity to TAZ/provider pieces based on land area.

Household Forecasts

HH growth for the three increments and the remaining capacity for 2040 to 2045 were aggregated from the TAZ/provider pieces to water service areas. Initial HH forecasts for 2025, 2035, and 2040 were calculated by adding the growth increments to the 2010 census base. To ensure that the HH forecasts are consistent with regional control totals and the 2013 base year estimates for each water service area, service area shares of the regional HH totals (based on the sum of these initial forecasts) were computed for the benchmark years 2013, 2025, 2035, and 2040. These shares were then interpolated for the intermediate forecast years, and the shares for each year from 2014 to 2040 were applied to regional control totals to produce final HH forecasts by water service area.³ The 2041 to 2045 HH forecasts were distributed from the regional control totals based on the service area's shares of regional excess capacity.

Housing Unit Forecasts

Once the TAZ/provider HU growth forecasts were generated, initial forecasts by water service area were prepared for 2025, 2035, and 2040 using the same method as the initial HH estimates. Growth increments for each service area were added to the 2010 base. The interpolation method differed, however. Rather than computing regional shares for the benchmark years, we computed occupancy rates (HH divided by HU) and interpolated those. Using the occupancy rates calculated for 2013, 2025,

² MetroScope Gamma 2035 TAZ Forecast, DRAFT 9/19/12.

³ For a description of the regional control totals, see the "Preliminary county forecasts by age group" item in the Data Sources and Uses section of this report.

2035, and 2040, interpolations for intermediate years and extrapolations for 2041 to 2045, we derived final HU forecasts by multiplying occupancy rates by the final HH forecasts.

Group Quarters Forecasts

All persons are reported by the Census Bureau as living in either HHs (occupied HUs), or group quarters (GQs) such as dorms, prisons, and nursing homes.⁴ The region’s GQ population (GQPOP) grew faster than HH population (HHPOP) between 2000 and 2010, but it is difficult to predict the future rate or location of GQPOP growth. GQPOP is currently less than two percent of current total population, and would be barely over two percent even if its growth rate continued to outpace the HHPOP growth rate in a manner similar to the 2000 to 2010 period. Considering the small impact of GQPOP and the uncertainty of future GQ sites or GQPOP change at existing sites, the safest assumption is that GQPOP will grow at the same rate as total POP, and that GQPOP in each service area will grow at the same rate as the region.

Household Population Forecasts

We estimated the future distribution of single family (SF) and multifamily (MF) growth for each service area using shares of net capacity by HU type aggregated from Metro’s BLI. We then multiplied the HH growth by persons per HH (PPH) — 2.75 for SF HHs and 1.97 for MF HHs, deriving initial estimates of annual HHPOP growth.⁵ These were added to the 2013 base year HHPOP to produce initial annual estimates of HHPOP, which were finally adjusted to match the regional control totals.

Total Population

Total population is the sum of household population and group quarters population. Because HHPOP and GQPOP forecasts for each service area are consistent with the regional control totals, no additional adjustments to POP are required.

$$\text{POP} = \text{HHPOP} + \text{GQPOP}$$

⁴ A more detailed definition of group quarters is included in the Glossary.

⁵ These PPHs are from the Census Bureau’s 2008-2012 American Community Survey 5 year estimates. Future PPHs are expected to decline significantly due to the aging of the population and declining fertility rates. Although the 2008-2012 PPHs are not adjusted in the model, the increasing share of multifamily homes and the regional HHPOP control result in declining future PPHs.

Data Sources and Uses

From Metro

Transportation Analysis Zone (TAZ) shapefile. Metro’s regional forecast is allocated to zones within the metro area, including 1,482 TAZs within Clackamas, Multnomah, and Washington counties. The forecast model relies on TAZ data, so all data inputs must be summarized at the TAZ level.

Buildable Land Inventory (BLI). Residential capacity by taxlot within Metro’s Urban Growth Boundary (UGB), shapefiles downloaded from Metro’s ftp site. “Capacity is calculated from current zoning or current comprehensive plan data (and sometimes concept plans when there isn’t any urban zoning or comp plan in place). The [BLI is] based on a 2008 vacant land survey data that was subsequently revised to represent 2010 capacity.”⁶

Household forecasts by TAZ. 2010 base year and 2025, 2035, and 2040 forecasts.⁷ Household forecasts were divided by occupancy rates for each TAZ to derive TAZ housing unit forecasts.

From U.S. Census Bureau

Census 2010, Summary File 1, Table H3. Housing unit and household counts were aggregated from census blocks to TAZs, in order to calculate initial occupancy rates for each TAZ. Some initial rates were adjusted to correct for extreme values in 2010, such as newly developing areas where homes were not yet occupied, or relatively unpopulated areas where a small number of existing homes were 100 percent occupied.

Census 2010, Summary File 1, Table H17. Householders by age were divided by age group population totals to derive age-specific headship rates. These rates are used to derive household forecasts, given population forecasts by age group.

From PSU Population Research Center

Regional water providers shapefile. PRC created a regional layer based on files submitted by individual water providers, finalized in January 2014, for use in the population, housing unit, and household estimates prepared in February 2014.⁸ This shapefile and the TAZ shapefile were used to aggregate data to unique TAZ/provider geographies.

Water providers 2013 estimates. The 2013 estimates of population, housing units, households, and household population prepared in February 2014 are the base year data for the 2014 to 2045 forecasts.

⁶ *Regional Forecast Distribution Methodology & Assumptions. Population and Employment 2010-40 TAZ Forecast Distribution “Gamma Scenario”.* Metro, Attachment 6 (Staff Report to Ordinance no. 12-1292A), November 2012.

⁷ Datasets and associated information are available at <http://www.oregonmetro.gov/regional-2035-forecast-distribution>.

⁸ A more detailed description may be found in *Regional Water Providers Consortium, Population, Housing Unit, and Household Estimates, 1990 to 2013.* Portland State University Population Research Center, February 2014.

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Housing unit inventory shapefile. PRC created a layer in GIS with a point representing each housing unit in Clackamas, Multnomah, and Washington counties. This layer, based on Metro’s RLIS taxlot and multifamily housing inventory, was initially developed for the estimates prepared in February. In the forecast model it is used to allocate TAZ housing unit forecasts to water providers in areas outside of the UGB not covered by Metro’s BLI, and within the UGB where the forecast exceeds net capacity.

Preliminary county forecasts by age group. PRC has recently initiated the Oregon Population Forecast Program (OPFP) and is currently refining county level forecasts.⁹ Preliminary forecasts for the tri-county area in five year increments were interpolated to create annual forecast series and were used in the model as regional population and household control totals. These OPFP population forecasts will be revised after extensive review, but the preliminary figures at the regional level were applicable due to their comparability to forecasts from the Oregon Office of Economic Analysis’ 2013 county forecast series as well as to Metro’s 2012 TAZ allocation.¹⁰

⁹ See OPFP description at <http://www.pdx.edu/prc/opfp>.

¹⁰ See OEA forecast at <http://www.oregon.gov/DAS/OEA/Pages/demographic.aspx> and Metro’s [City and county profiles](#).

Glossary

The following definitions are furnished by the U.S. Census Bureau.¹¹

Group Quarters	A group quarters is a place where people live or stay that is normally owned or managed by an entity or organization providing housing and/or services for the residents. These services may include custodial or medical care as well as other types of assistance, and residency is commonly restricted to those receiving these services. People living in group quarters are usually not related to each other. Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, workers' dormitories, and facilities for people experiencing homelessness.
Household	A person or group of people who occupy a housing unit as their usual place of residence. The number of households equals the number of occupied housing units in a census.
Housing unit	A single-family house, townhouse, mobile home or trailer, apartment, group of rooms, or single room that is occupied as a separate living quarters or, if vacant, is intended for occupancy as a separate living quarters (in which one or more occupants live separately from any other individual(s) in the building and have direct access to the living quarters without going through another living quarters, such as from outside the building or through a common hall. For vacant units, the criteria of separateness and direct access are applied to the intended occupants.)
Population	All people living in a geographic area.
Vacant Housing Unit	A housing unit in which no one is living on Census Day, unless its occupants are only temporarily absent. Units temporarily occupied at the time of enumeration by individuals who have a usual home elsewhere are classified as vacant. (Transient quarters, such as hotels, are housing units only if occupied. Thus, there are no vacant housing units at hotels and the like.) New units not yet occupied are classified as vacant housing units if construction has reached a point where all exterior windows and doors are installed and final usable floors are in place. Vacant units are excluded from the housing unit inventory if they are open to the elements, have a posted "condemned" sign, or are used entirely for nonresidential purposes (except storage of household furniture).

¹¹ U.S. Census Bureau, Decennial Management Division Glossary. Available at <http://www.census.gov/dmd/www/glossary.html>, last accessed on February 25, 2014.

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Population Forecast Summary

	2013 Population Estimate	2035 Population Forecast	2045 Population Forecast	'13 to '35 Numeric Pop. Chg.	'13 to '35 Percent Pop. Chg.
Cities (2013 Water Service Area)					
City of Beaverton Water Service Area	68,515	77,112	77,381	8,597	13%
City of Fairview Water Service Area	8,151	8,123	8,143	-28	0%
City of Forest Grove Water Service Area	22,518	27,409	29,523	4,891	22%
City of Gladstone Water Service Area	11,137	11,918	12,236	781	7%
City of Gresham Water Service Area	71,654	91,368	97,473	19,714	28%
City of Hillsboro Water Service Area	81,310	91,292	93,634	9,982	12%
Cherry Grove (City of Hillsboro) Water Service Area	1,456	1,637	1,650	181	12%
City of Lake Oswego Water Service Area	35,145	39,592	43,489	4,447	13%
City of Milwaukie Water Service Area	19,430	21,296	21,325	1,866	10%
Portland Water Bureau Service Area	575,365	767,341	827,080	191,976	33%
City of Sandy Water Service Area	10,337	15,161	18,713	4,824	47%
City of Sherwood Water Service Area	18,575	19,147	19,688	572	3%
City of Tigard Water Service Area	60,236	76,571	79,174	16,335	27%
City of Tualatin Water Service Area	26,510	26,172	26,604	-338	-1%
City of Wilsonville Water Service Area	21,550	26,468	27,177	4,918	23%
Districts (2013 Water Service Area)					
Clackamas River Water District*	44,271	59,892	65,825	15,621	35%
Clackamas River Water/Oregon City Overlap	10,396	13,925	13,971	3,529	34%
Oak Lodge Water District	27,417	29,546	29,591	2,129	8%
Raleigh Water District	4,142	4,260	4,385	118	3%
Rockwood Water PUD	61,514	71,893	76,008	10,379	17%
South Fork Water Board (Oregon City Part*)	23,944	28,352	30,046	4,408	18%
Clackamas River Water/Oregon City Overlap	10,396	13,925	13,971	3,529	34%
South Fork Water Board (West Linn Part)	25,529	27,901	29,450	2,372	9%
Sunrise Water Authority	46,228	67,003	74,310	20,775	45%
Tualatin Valley Water District (Total)	211,361	257,440	268,842	46,079	22%
TVWD (Metzger sub-area)	20,160	23,992	25,111	3,832	19%
TVWD (Wolf Creek sub-area)	191,201	233,448	243,731	42,247	22%
West Slope Water District	10,245	11,706	12,145	1,461	14%

*Does not include CRW/Oregon City overlap area

Population Research Center, Portland State University, May 2014

www.pdx.edu/prc

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Population Forecast Summary

PWB Wholesale Customers (2013 Water Service Area)	2013 Population Estimate	2035 Population Forecast	2045 Population Forecast	'13 to '35 Numeric Pop. Chg.	'13 to '35 Percent Pop. Chg.
Burlington Water District	280	333	332	53	19%
GNR Water Company	48	54	54	6	13%
Green Valley Water Company	7	9	9	2	29%
Hideaway Hills Water Company	52	57	56	5	10%
Lake Grove Water District	2,881	3,281	3,445	400	14%
Lorna Water Company	249	277	288	28	11%
Lusted Water District	1,069	1,085	6,000	16	1%
Palatine Hill Water District	1,531	1,874	1,925	343	22%
Pleasant Home Water District	1,462	1,417	3,815	-45	-3%
Skyview Acres Water Company	35	39	39	4	11%
Two Rivers Water Association	14	15	15	1	7%
Valley View Water District	900	1,099	1,110	199	22%

Future Water Service Areas*

City of Beaverton Water Service Area	68,617	80,499	82,930	11,882	17%
City of Hillsboro Water Service Area	81,481	106,676	111,887	25,195	31%
South Fork Water Board (Oregon City Part**)	24,206	29,340	31,113	5,134	21%
City of Sandy Water Service Area	11,290	16,769	20,878	5,479	49%
City of Sherwood Water Service Area	18,752	21,767	22,883	3,015	16%
Tualatin Valley Water District (Total)	211,556	262,276	274,458	50,720	24%
TVWD (Wolf Creek sub-area)	191,396	238,284	249,347	46,888	24%

**For water providers that provided current and future service areas, these estimates and forecasts include expanded service area boundaries, with no attempt to predict when expansion might occur.*

The City of Hillsboro includes South Hillsboro; South Fork - Oregon City includes areas within the UGB but not in the CRW overlap area; City of Sandy includes the Urban Reserve Area; TVWD includes North Bethany and Bonny Slope.

***Does not include CRW/Oregon City overlap area*

Population Research Center, Portland State University, May 2014

www.pdx.edu/prc

DRAFT For Review

Household Forecast Summary

	2013 Household Estimate	2035 Household Forecast	2045 Household Forecast	'13 to '35 Numeric HH Chg.	'13 to '35 Percent HH Chg.
Cities (2013 Water Service Area)					
City of Beaverton Water Service Area	27,793	33,913	34,481	6,120	22%
City of Fairview Water Service Area	3,282	3,512	3,571	230	7%
City of Forest Grove Water Service Area	7,821	10,448	11,491	2,627	34%
City of Gladstone Water Service Area	4,418	5,080	5,292	662	15%
City of Gresham Water Service Area	26,755	37,810	41,161	11,055	41%
City of Hillsboro Water Service Area	27,871	34,577	36,126	6,706	24%
Cherry Grove (City of Hillsboro) Water Service Area	526	631	644	105	20%
City of Lake Oswego Water Service Area	15,325	18,137	20,036	2,812	18%
City of Milwaukie Water Service Area	8,248	9,506	9,619	1,258	15%
Portland Water Bureau Service Area	245,837	360,194	395,290	114,357	47%
City of Sandy Water Service Area	3,830	6,081	7,642	2,251	59%
City of Sherwood Water Service Area	6,492	7,256	7,605	764	12%
City of Tigard Water Service Area	24,277	32,646	34,148	8,369	34%
City of Tualatin Water Service Area	10,212	10,753	11,071	541	5%
City of Wilsonville Water Service Area	8,657	11,210	11,584	2,553	29%
Districts (2013 Water Service Area)					
Clackamas River Water District*	17,607	25,297	28,132	7,690	44%
Clackamas River Water/Oregon City Overlap	3,596	5,272	5,355	1,676	47%
Oak Lodge Water District	11,335	12,850	13,004	1,515	13%
Raleigh Water District	2,038	2,189	2,262	151	7%
Rockwood Water PUD	21,162	28,211	30,730	7,049	33%
South Fork Water Board (Oregon City Part*)	9,231	11,917	12,861	2,686	29%
Clackamas River Water/Oregon City Overlap	3,596	5,272	5,355	1,676	47%
South Fork Water Board (West Linn Part)	9,728	11,300	12,064	1,572	16%
Sunrise Water Authority	16,292	26,588	30,184	10,296	63%
Tualatin Valley Water District (Total)	79,837	106,267	112,865	26,430	33%
TVWD (Metzger sub-area)	8,476	10,750	11,387	2,274	27%
TVWD (Wolf Creek sub-area)	71,361	95,517	101,478	24,156	34%
West Slope Water District	4,429	5,305	5,552	876	20%

*Does not include CRW/Oregon City overlap area

Population Research Center, Portland State University, May 2014

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DRAFT For Review

Household Forecast Summary

PWB Wholesale Customers (2013 Water Service Area)	2013 Household Estimate	2035 Household Forecast	2045 Household Forecast	'13 to '35 Numeric HH Chg.	'13 to '35 Percent HH Chg.
Burlington Water District	134	170	172	36	27%
GNR Water Company	19	23	23	4	21%
Green Valley Water Company	3	4	4	1	33%
Hideaway Hills Water Company	18	21	21	3	17%
Lake Grove Water District	1,257	1,496	1,582	239	19%
Lorna Water Company	99	122	130	23	23%
Lusted Water District	384	415	2,345	31	8%
Palatine Hill Water District	525	686	714	161	31%
Pleasant Home Water District	523	540	1,480	17	3%
Skyview Acres Water Company	15	18	18	3	20%
Two Rivers Water Association	7	8	8	1	14%
Valley View Water District	359	468	479	109	30%

Future Water Service Areas*

City of Beaverton Water Service Area	27,832	35,492	37,105	7,660	28%
City of Hillsboro Water Service Area	27,935	41,975	45,028	14,040	50%
South Fork Water Board (Oregon City Part**)	9,350	12,372	13,358	3,022	32%
City of Sandy Water Service Area	4,187	6,724	8,519	2,537	61%
City of Sherwood Water Service Area	6,555	8,329	8,932	1,774	27%
Tualatin Valley Water District (Total)	79,911	108,438	115,421	28,527	36%
TVWD (Wolf Creek sub-area)	71,435	97,688	104,034	26,253	37%

**For water providers that provided current and future service areas, these estimates and forecasts include expanded service area boundaries, with no attempt to predict when expansion might occur.*

The City of Hillsboro includes South Hillsboro; South Fork - Oregon City includes areas within the UGB but not in the CRW overlap area; City of Sandy includes the Urban Reserve Area; TVWD includes North Bethany and Bonny Slope.

***Does not include CRW/Oregon City overlap area*

Population Research Center, Portland State University, May 2014

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DRAFT For Review

Household Size Forecast Summary

	2013 Household Size Estimate	2035 Household Size Forecast	2045 Household Size Forecast	'13 to '35 Numeric PPHH Chg.	'13 to '35 Percent PPHH Chg.
Cities (2013 Water Service Area)					
City of Beaverton Water Service Area	2.44	2.24	2.21	-0.19	-8%
City of Fairview Water Service Area	2.48	2.31	2.28	-0.17	-7%
City of Forest Grove Water Service Area	2.71	2.46	2.41	-0.25	-9%
City of Gladstone Water Service Area	2.50	2.32	2.29	-0.18	-7%
City of Gresham Water Service Area	2.64	2.38	2.33	-0.26	-10%
City of Hillsboro Water Service Area	2.87	2.59	2.54	-0.28	-10%
Cherry Grove (City of Hillsboro) Water Service Area	2.75	2.58	2.55	-0.17	-6%
City of Lake Oswego Water Service Area	2.27	2.16	2.14	-0.11	-5%
City of Milwaukie Water Service Area	2.32	2.20	2.17	-0.12	-5%
Portland Water Bureau Service Area	2.27	2.07	2.03	-0.20	-9%
City of Sandy Water Service Area	2.69	2.49	2.44	-0.20	-8%
City of Sherwood Water Service Area	2.86	2.64	2.59	-0.22	-8%
City of Tigard Water Service Area	2.47	2.33	2.30	-0.14	-5%
City of Tualatin Water Service Area	2.59	2.42	2.39	-0.16	-6%
City of Wilsonville Water Service Area	2.29	2.16	2.14	-0.13	-6%
Districts (2013 Water Service Area)					
Clackamas River Water District*	2.49	2.35	2.32	-0.14	-6%
Clackamas River Water/Oregon City Overlap	2.84	2.60	2.56	-0.24	-9%
Oak Lodge Water District	2.38	2.26	2.23	-0.12	-5%
Raleigh Water District	2.01	1.92	1.91	-0.09	-5%
Rockwood Water PUD	2.86	2.50	2.43	-0.36	-12%
South Fork Water Board (Oregon City Part*)	2.54	2.33	2.28	-0.21	-8%
Clackamas River Water/Oregon City Overlap	2.84	2.60	2.56	-0.24	-9%
South Fork Water Board (West Linn Part)	2.61	2.46	2.43	-0.16	-6%
Sunrise Water Authority	2.83	2.52	2.46	-0.32	-11%
Tualatin Valley Water District (Total)					
TVWD (Metzger sub-area)	2.32	2.18	2.15	-0.15	-6%
TVWD (Wolf Creek sub-area)	2.66	2.43	2.38	-0.23	-9%
West Slope Water District	2.29	2.18	2.16	-0.11	-5%

*Does not include CRW/Oregon City overlap area

Population Research Center, Portland State University, May 2014

www.pdx.edu/prc

DRAFT For Review

Household Size Forecast Summary

PWB Wholesale Customers (2013 Water Service Area)	2013 Household Size Estimate	2035 Household Size Forecast	2045 Household Size Forecast	'13 to '35 Numeric PPHH Chg.	'13 to '35 Percent PPHH Chg.
Burlington Water District	2.09	1.96	1.93	-0.13	-6%
GNR Water Company	2.53	2.35	2.35	-0.18	-7%
Green Valley Water Company	2.33	2.25	2.25	-0.08	-4%
Hideaway Hills Water Company	2.89	2.71	2.67	-0.17	-6%
Lake Grove Water District	2.28	2.18	2.17	-0.10	-4%
Lorna Water Company	2.51	2.26	2.21	-0.24	-10%
Lusted Water District	2.76	2.59	2.55	-0.17	-6%
Palatine Hill Water District	2.92	2.73	2.70	-0.18	-6%
Pleasant Home Water District	2.78	2.60	2.57	-0.18	-6%
Skyview Acres Water Company	2.33	2.17	2.17	-0.17	-7%
Two Rivers Water Association	2.00	1.88	1.88	-0.13	-6%
Valley View Water District	2.50	2.35	2.32	-0.16	-6%
Future Water Service Areas*					
City of Beaverton Water Service Area	2.44	2.24	2.20	-0.20	-8%
City of Hillsboro Water Service Area	2.87	2.50	2.44	-0.37	-13%
South Fork Water Board (Oregon City Part**)	2.54	2.32	2.28	-0.22	-9%
City of Sandy Water Service Area	2.69	2.49	2.45	-0.20	-7%
City of Sherwood Water Service Area	2.86	2.61	2.56	-0.25	-9%
TVWD (Wolf Creek sub-area)	2.66	2.42	2.38	-0.24	-9%

**For water providers that provided current and future service areas, these estimates and forecasts include expanded service area boundaries, with no attempt to predict when expansion might occur.*

The City of Hillsboro includes South Hillsboro; South Fork - Oregon City includes areas within the UGB but not in the CRW overlap area; City of Sandy includes the Urban Reserve Area; TVWD includes North Bethany and Bonny Slope.

***Does not include CRW/Oregon City overlap area*

Population Research Center, Portland State University, May 2014

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DRAFT For Review

Vacancy Rate Forecast Summary

	2013 Vacancy Rate Estimate	2035 Vacancy Rate Forecast	2045 Vacancy Rate Forecast	'13 to '35 Numeric VAC Chg.	'13 to '35 Percent VAC Chg.
Cities (2013 Water Service Area)					
City of Beaverton Water Service Area	5.3%	5.4%	5.4%	0.2%	3%
City of Fairview Water Service Area	6.3%	6.2%	6.2%	0.0%	0%
City of Forest Grove Water Service Area	5.7%	5.9%	6.0%	0.2%	3%
City of Gladstone Water Service Area	5.1%	5.1%	5.2%	0.0%	1%
City of Gresham Water Service Area	5.4%	6.0%	6.0%	0.6%	11%
City of Hillsboro Water Service Area	5.0%	5.4%	5.4%	0.4%	7%
Cherry Grove (City of Hillsboro) Water Service Area	5.6%	5.8%	6.1%	0.3%	5%
City of Lake Oswego Water Service Area	6.5%	6.5%	6.7%	0.1%	1%
City of Milwaukie Water Service Area	5.0%	5.0%	5.0%	0.0%	1%
Portland Water Bureau Service Area	6.2%	6.9%	7.1%	0.7%	11%
City of Sandy Water Service Area	5.3%	5.5%	5.5%	0.2%	4%
City of Sherwood Water Service Area	3.8%	3.9%	3.8%	0.1%	3%
City of Tigard Water Service Area	4.5%	4.6%	4.7%	0.2%	3%
City of Tualatin Water Service Area	4.9%	5.0%	5.1%	0.1%	2%
City of Wilsonville Water Service Area	7.4%	8.2%	8.2%	0.8%	11%
Districts (2013 Water Service Area)					
Clackamas River Water District*	5.4%	5.1%	5.0%	-0.3%	-5%
Clackamas River Water/Oregon City Overlap	12.3%	9.3%	9.2%	-3.0%	-25%
Oak Lodge Water District	5.9%	5.9%	6.0%	0.0%	0%
Raleigh Water District	5.3%	5.7%	5.8%	0.4%	8%
Rockwood Water PUD	5.6%	5.9%	5.9%	0.3%	5%
South Fork Water Board (Oregon City Part*)	5.4%	5.8%	6.2%	0.5%	8%
Clackamas River Water/Oregon City Overlap	12.3%	9.3%	9.2%	-3.0%	-25%
South Fork Water Board (West Linn Part)	5.2%	5.3%	5.3%	0.1%	1%
Sunrise Water Authority	5.3%	5.2%	5.2%	-0.1%	-3%
Tualatin Valley Water District (Total)					
TVWD (Metzger sub-area)	5.2%	5.3%	5.3%	0.1%	2%
TVWD (Wolf Creek sub-area)	5.4%	5.4%	5.3%	0.0%	0%
West Slope Water District	5.3%	5.6%	5.7%	0.2%	5%

*Does not include CRW/Oregon City overlap area

Population Research Center, Portland State University, May 2014

www.pdx.edu/prc

DRAFT For Review

Vacancy Rate Forecast Summary

PWB Wholesale Customers (2013 Water Service Area)	2013 Vacancy Rate Estimate	2035 Vacancy Rate Forecast	2045 Vacancy Rate Forecast	'13 to '35 Numeric VAC Chg.	'13 to '35 Percent VAC Chg.
Burlington Water District	10.7%	10.5%	10.4%	-0.1%	-1%
GNR Water Company	5.0%	4.2%	4.2%	-0.8%	-17%
Green Valley Water Company	0.0%	0.0%	0.0%	0.0%	
Hideaway Hills Water Company	5.3%	4.5%	4.5%	-0.7%	-14%
Lake Grove Water District	5.3%	5.6%	5.7%	0.2%	4%
Lorna Water Company	5.7%	4.7%	5.8%	-1.0%	-18%
Lusted Water District	5.7%	5.9%	3.9%	0.2%	4%
Palatine Hill Water District	10.1%	10.4%	10.3%	0.3%	3%
Pleasant Home Water District	6.4%	6.6%	8.2%	0.1%	2%
Skyview Acres Water Company	11.8%	10.0%	10.0%	-1.8%	-15%
Two Rivers Water Association	0.0%	0.0%	0.0%	0.0%	
Valley View Water District	5.5%	5.3%	5.5%	-0.3%	-5%
Future Water Service Areas*					
City of Beaverton Water Service Area	5.3%	5.4%	5.3%	0.1%	1%
City of Hillsboro Water Service Area	5.0%	5.4%	5.4%	0.4%	7%
South Fork Water Board (Oregon City Part**)	5.4%	5.8%	6.2%	0.5%	8%
City of Sandy Water Service Area	5.2%	5.4%	5.4%	0.2%	4%
City of Sherwood Water Service Area	3.8%	3.8%	3.8%	0.1%	2%
TVWD (Wolf Creek sub-area)	5.4%	5.4%	5.3%	0.0%	0%

*For water providers that provided current and future service areas, these estimates and forecasts include expanded service area boundaries, with no attempt to predict when expansion might occur.

The City of Hillsboro includes South Hillsboro; South Fork - Oregon City includes areas within the UGB but not in the CRW overlap area; City of Sandy includes the Urban Reserve Area; TVWD includes North Bethany and Bonny Slope.

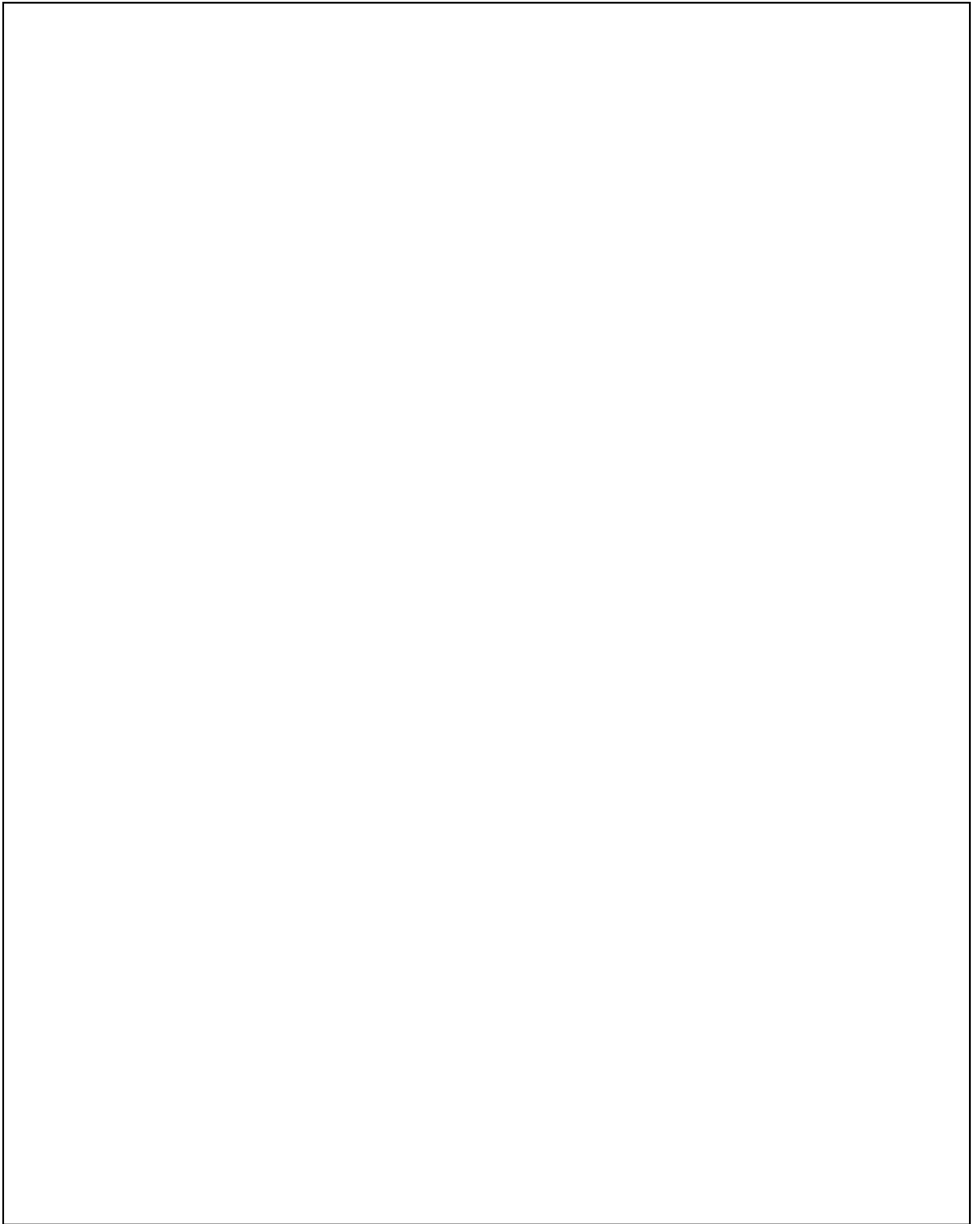
**Does not include CRW/Oregon City overlap area

Population Research Center, Portland State University, May 2014

www.pdx.edu/prc

Appendix C

WaterSense Fix a Leak Week Press Release



Newsroom News Releases - Partnerships and Stewardship

Stop the Drops! EPA's National "Fix-a-Leak Week" Kicks Off in Metro Portland

Release Date: 03/19/2013

Contact Information: Bevin Horn, EPA/Seattle, 206-553-1566, horn.bevin@epa.gov

(Portland, OR – March 18, 2013) Every year, more than 1 trillion gallons of water leak from U.S. homes nationwide. That's equivalent to the total annual water use of Los Angeles, Chicago, and Miami combined! Experts estimate that leaks in almost 10 percent of American homes drip away almost 90 gallons of water a day. The usual culprits: leaky toilets, faucets and showerheads.

The U.S Environmental Protection Agency's WaterSense program is again teaming up with local partners to promote the fifth annual **National Fix a Leak Week, March 18-24, 2013**.

In cities like Portland, that can mean up to \$200 per year in utility charges literally going down the drain. Finding and fixing leaks is easier than most people think. Most replacement parts can be installed by do-it-yourselfers and quickly pay for themselves. Don't waste money AND natural resources, fix your drips and leaks and make your wallet watertight!

Here are some ways people can get involved in the **Portland** Area:

Fix-a-Leak Week Photo/Video Contest - The [Regional Water Providers Consortium](#) is inviting customers to join "Drippy Drew" - the leak detection gnome - in celebrating [Fix A Leak Week](#) (March 18-24, 2013) by participating in their first-ever Fix a Leak Week Contest. Contestants are invited to submit photo or video entries (by Midnight, March 20th) that depict themselves or others finding & fixing leaks around their homes with the chance to win a \$500, \$300, or \$200 Lowe's gift card!! **Contact:** RWPCinfo@portlandoregon.gov

RWPC website: <http://www.conserveh2o.org/Fix-Leak-Week-Contest>


Follow the RWPC and Drippy Drew on Facebook at: <https://www.facebook.com/RegionalWaterProvidersConsortium>


"Everything You Ever Wanted to Know About Fixing Leaks...but Were Afraid to Ask! - City of Sandy, OR, is sponsoring a "Do It Yourself" Fix-a-Leak presentation and Q&A with a local plumber at 6 pm, March 20th in the council chambers at Sandy City Hall. There will be more information about the City's partnership with WaterSense program and tips, tricks & trade secrets will be offered for saving water and money by fixing even minor leaks. Also: Toilet leak dye tablets are available (attached to the WaterSense Dye Tablet Card) at the City Hall's Water Billing counter. **Contact:** Liz Storn, City of Sandy (503) 489-2161, lstorn@ci.sandy.or.us


For more about EPA's WaterSense Program: <http://www.epa.gov/watersense/>

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 [View selected historical press releases from 1970 to 1998 in the EPA History website.](#)

Recent additions

- 08/18/2015 [Hoboken Mayor Dawn Zimmer named to National EPA Advisory Committee](#)
- 08/13/2015 [Tell EPA About Your Green Infrastructure Project](#)
- 08/03/2015 [FACT SHEET: PRESIDENT OBAMA TO ANNOUNCE HISTORIC CARBON POLLUTION STANDARDS FOR POWER PLANTS](#)
- 07/30/2015 [Galveston Bay Foundation Receives Second Place Gulf Guardian Award in the Civic/Non Profit Category](#)
- 07/30/2015 [Coastal and Marine Operators Group Receives Second-Place Gulf Guardian Award in Business and Industry Category](#)

City of Sandy, Oregon – City Government

March 12, 2013 · 

WATERSENSE "FIX-A-LEAK" WEEK

Do you have a faucet that has an annoying drip? Do you have to jiggle the toilet handle or hear it run/fill when no one is in the bathroom? Chances are, you have a leak! (or 2, or 3...)

A leaky faucet that drips 30 times in one hour (that's 1 drip every other second) can really start to add up. That little drip can send over 1000 gallons down your drain over the space of a year. If your toilet is leaking, that can be up to 400 gallons in just one day!

March 18-24 is the WaterSense Fix a Leak Week, and Sandy is stepping up to help. WaterSense is a partnership program sponsored by the US Environmental Protection Agency, and seeks to protect the future of our nation's water supply by offering people a simple way to use less water with water-efficient products and services. On March 20th (6 – 7pm) at City Hall's Council Chambers, there will be a Q&A with a local plumber to help you DIY your leaks away. Keep an eye on the City's website and Facebook page for more details.



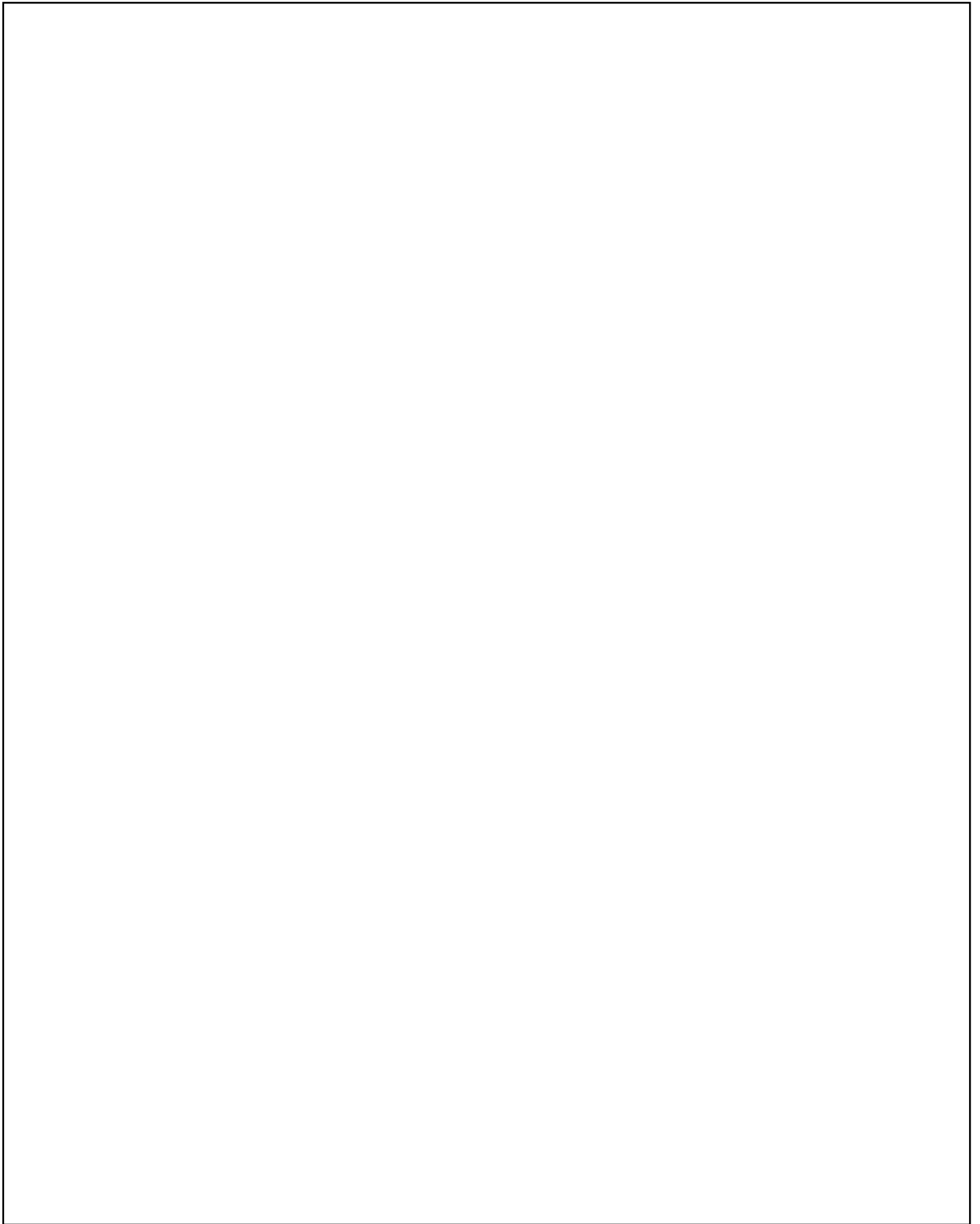
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Appendix D

Water Rates by Customer Category



Multi-Family Residential Customer Water Rates

Inside City Limits

Year	Monthly Base Fee MF	Monthly Meter Charge (5/8" x 3/4" meter)	Monthly Meter Charge (1" meter)	Monthly Meter Charge (1.5" meter)	Monthly Meter Charge (2" meter)	Volume Charge per CCF
2014 (current)	\$6.18	\$0.22	\$0.56	\$1.08	\$1.74	\$2.31
2013	\$5.94	\$0.21	\$0.54	\$1.04	\$1.67	\$2.22
2012	\$5.60	\$0.20	\$0.51	\$0.98	\$1.58	\$2.09
2011	\$5.29	\$0.19	\$0.48	\$0.93	\$1.49	\$1.97
2010	\$4.99	\$0.18	\$0.45	\$0.88	\$1.41	\$1.86
2008	\$4.80	\$0.17	\$0.43	\$0.85	\$1.36	\$1.79

Outside City Limits

Year	Monthly Base Fee MF	Monthly Meter Charge (5/8" x 3/4" meter)	Monthly Meter Charge (1" meter)	Monthly Meter Charge (1.5" meter)	Monthly Meter Charge (2" meter)	Volume Charge per CCF
2014 (current)	\$6.18	\$0.33	\$0.81	\$1.66	\$2.61	\$2.31
2013	\$5.94	\$0.32	\$0.84	\$1.60	\$2.51	\$2.22
2012	\$5.60	\$0.30	\$0.76	\$1.50	\$2.37	\$2.09
2011	\$5.29	\$0.28	\$0.72	\$1.41	\$2.24	\$1.97
2010	\$4.99	\$0.27	\$0.68	\$1.33	\$2.12	\$1.86
2008	\$4.80	\$0.26	\$0.65	\$1.28	\$2.04	\$1.79

Commercial-Industrial Customer Water Rates

Inside City Limits

Year	Monthly Base Fee Comm.-Ind.	Monthly Meter Charge (5/8" x 3/4" meter)	Monthly Meter Charge (1" meter)	Monthly Meter Charge (1.5" meter)	Monthly Meter Charge (2" meter)	Volume Charge per CCF Inside
2014 (current)	\$6.18	\$0.22	\$0.56	\$1.08	\$1.74	\$2.12
2013	\$5.94	\$0.21	\$0.54	\$1.04	\$1.67	\$2.04
2012	\$5.60	\$0.20	\$0.51	\$0.98	\$1.58	\$1.92
2011	\$5.29	\$0.19	\$0.48	\$0.93	\$1.49	\$1.81
2010	\$4.99	\$0.18	\$0.45	\$0.88	\$1.41	\$1.71
2008	\$4.80	\$0.17	\$0.43	\$0.85	\$1.36	\$1.64

Outside City Limits

Year	Monthly Base Fee Comm.-Ind.	Monthly Meter Charge (5/8" x 3/4" meter)	Monthly Meter Charge (1" meter)	Monthly Meter Charge (1.5" meter)	Monthly Meter Charge (2" meter)	Volume Charge per CCF
2014 (current)	\$6.18	\$0.33	\$0.81	\$1.66	\$2.61	\$3.29
2013	\$5.94	\$0.32	\$0.84	\$1.60	\$2.51	\$3.16
2012	\$5.60	\$0.30	\$0.76	\$1.50	\$2.37	\$2.98
2011	\$5.29	\$0.28	\$0.72	\$1.41	\$2.24	\$2.81
2010	\$4.99	\$0.27	\$0.68	\$1.33	\$2.12	\$2.65
2008	\$4.80	\$0.26	\$0.65	\$1.28	\$2.04	\$2.55

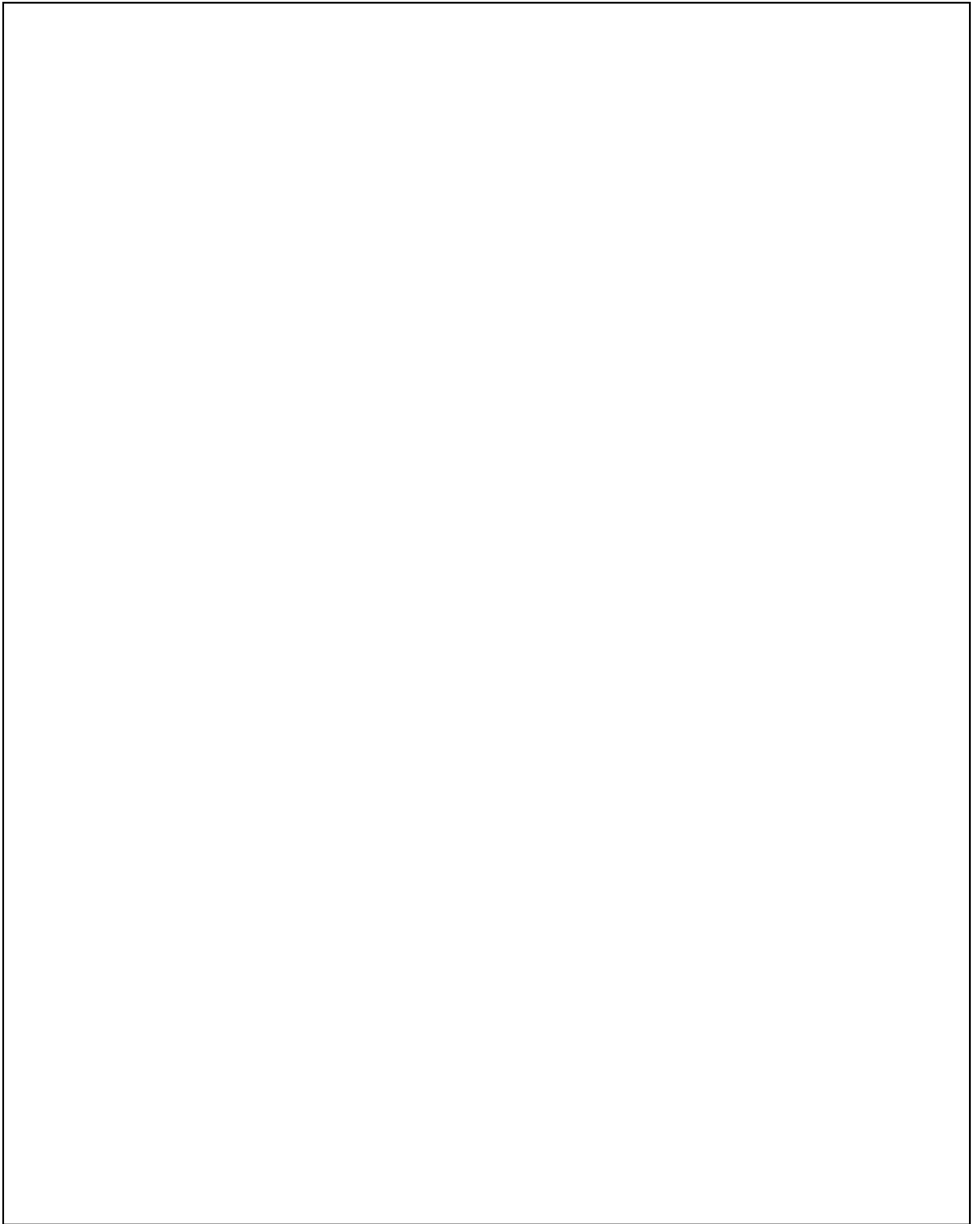
Wholesale Customer Water Rates

Year	Monthly Base Fee Wholesale	Monthly Meter Charge (4" meter)	Volume Charge per CCF
2014 (current)	\$7.40	\$8.21	\$2.59
2013	\$7.12	\$7.90	\$2.49
2012	\$6.72	\$7.45	\$2.35
2011	\$6.34	\$7.03	\$2.22
2010	\$5.98	\$6.64	\$2.10
2008	\$5.75	\$6.38	\$2.02

Skyview Water Rates

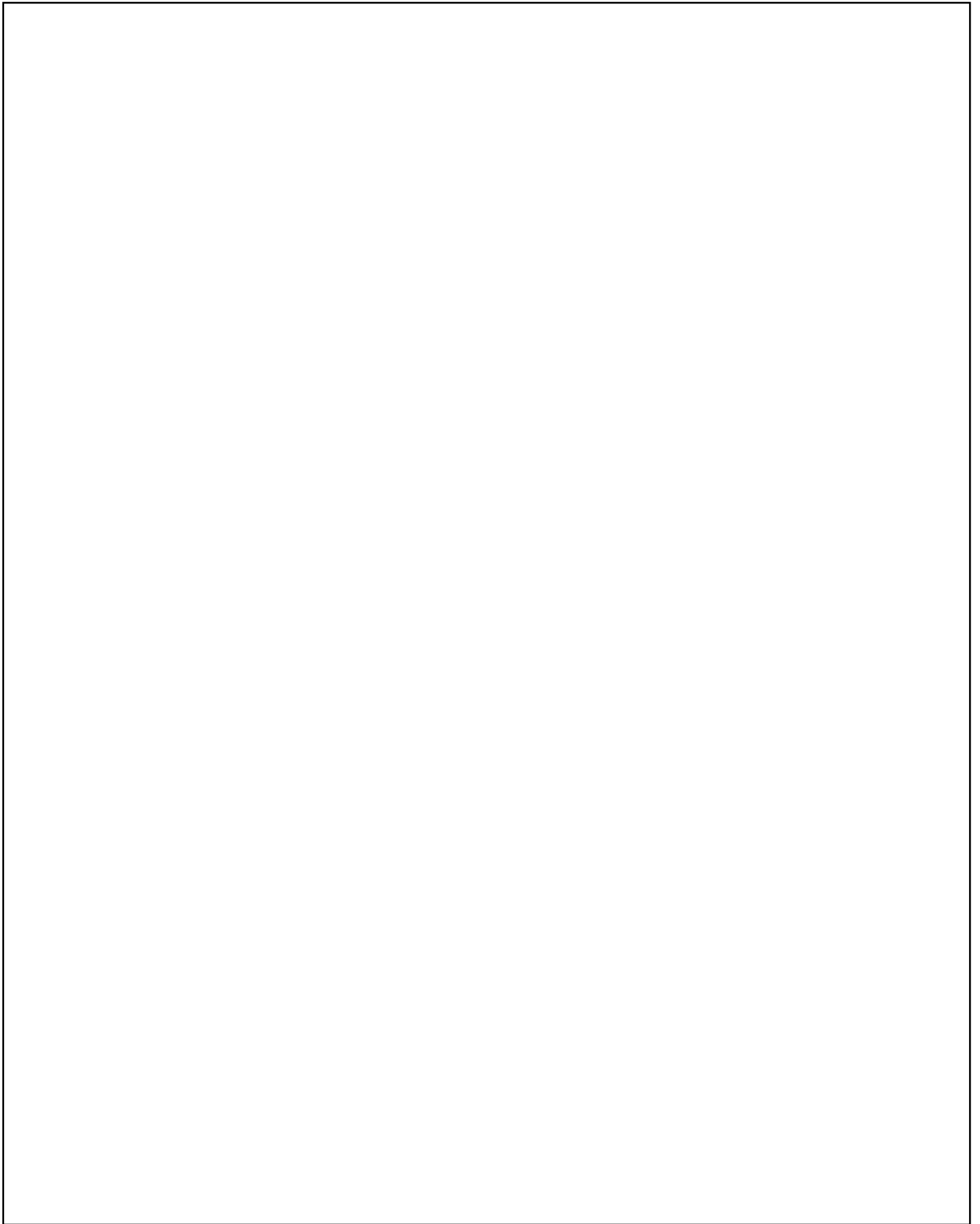
Year	Monthly Base Fee Wholesale	Monthly Meter Charge (4" meter)	Volume Charge per CCF
2015 (current)	\$7.90	\$8.21	\$0.597
2014	\$7.40	\$7.90	\$0.48

NOTE: By agreement, Skyview's rate is reviewed and adjusted on a different schedule than other customers



Appendix E

**“At Your Service” Monthly Newsletter –
Water Conservation Message, July 2015**



July 2015

City of Sandy At Your Service

A Monthly Bulletin of Community News



Water Supply

With the recent warm, dry weather and all the media coverage of drought in Oregon we wanted to inform customers on Sandy's water supply situation. While last winter's snowfall was well below average, rainfall was at or near normal in western Oregon. Our water sources are located in low-elevation watersheds where most runoff comes from rainfall, not snowmelt. The outlook for municipal supplies is generally good in the metro region.

That being said, we still don't have enough water to waste. Please visit <http://www.conserveh2o.org/> for tips on reducing indoor and outdoor water consumption and water conservation strategies.

If you live in a new home, make sure your irrigation timer is set properly. Builders often adjust the timer to keep new turf well watered in order to improve curb appeal, however they don't have to pay for it. You can sign up to receive an email with your weekly watering number at www.conserveh2o.org and adjust your irrigation timer to match weather conditions for Sandy.



2015 Sandy Summer Sounds & Starlight Cinema at Meinig Park

info online at www.cityofsandy.com or pick up a brochure at City Hall,

Community/Senior Center or the Library

Sundays, 7/19-8/9 **Acoustic Series** 6:30pm

Wednesdays, 7/29-8/26 **Main Stage Music** 6:30 pm

(Hops & Blues Festival, 7/29 5:30-9:30pm)

Movies at dusk (Note: 8/22 Movie originally Cinderella, now Into the Woods)

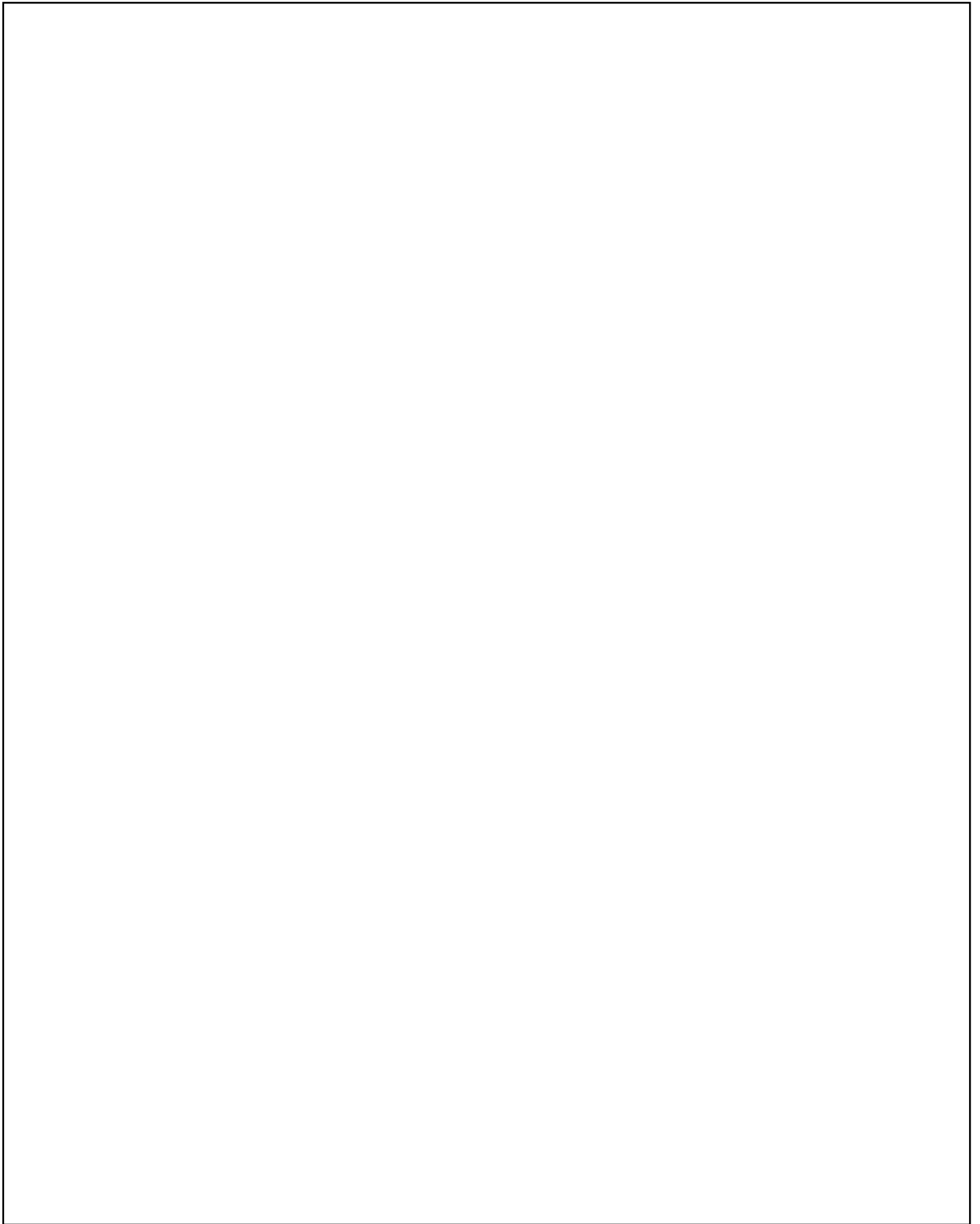
~Concessions available~



REMINDER

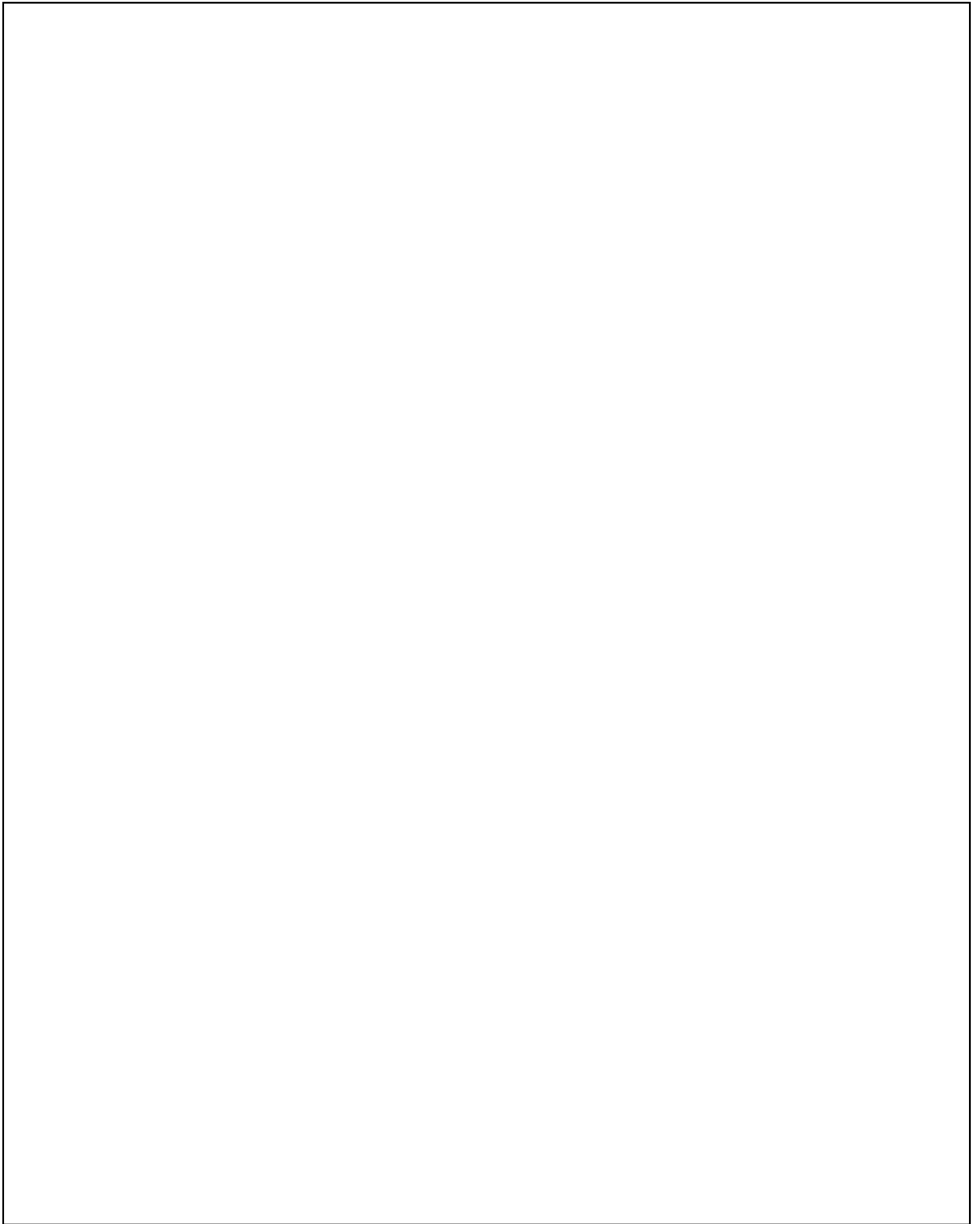
Please remember to register your dogs with

Clackamas County <http://www.clackamas.us/dogs/license.html>



Appendix F

Announcements for Annual Water Conservation Education Presentations at Local Elementary Schools



What Do You Know About H2O?



Sponsored by the City of Sandy
Presented by Mad Science of Portland & Vancouver



Customer Details:


Organization: Kelso Elementary **Phone:** 503-668-8020
Address: 34651 SE Kelso Road **Fax:** 503-668-0883
 Boring, OR 97009
Contact: Katie Schweitzer
Title: Principal **Email:** katie.schweitzer@ortrail.k12.or.us
Directions: Hwy 26 toward Sandy, after Swiss Village turn left onto Kelso Rd. On the left right after stop sign, set back from road.

Event Details:

Instructor: TBD **Number of Kids Attending:**
Special Instructions: 4 classes - 135 Students

Event/Booth Topics	Date	Start Time	End Time	Grades/# kids
What Do You Know About H2O?	3/31/2014	9:00 AM	9:30 AM	3-5/135

Things you need to know



- Your Mad Scientist will arrive approximately 45 minutes before the event to set up.
- They will need one (1) **banquet size table** to set-up their equipment and **access to electricity and water**.
- This show requires a fair amount of water. We will need access to a deep sink to fill gallon bottles.
- If you have a PA system, please set it up for our Mad Scientist.
- If you have any questions call Mad Science at (503) 230-8040.

Mad Science of Portland & Vancouver
1522 N. Ainsworth St., Portland, OR 97217

portland.madscience.org • www.conserveh2o.org

What Do You Know About H2O?



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Presented by Mad Science of Portland & Vancouver



Customer Details:

Organization: Sandy Elementary **Phone:** 503-668-8065
Address: 38965 Pleasant Ave. **Fax:** 503-668-6246
 Sandy, OR 97055
Contact: Rachael George
Title: Principal **Email:** rachael.george@ortrail.k12.or.us
Directions: I-84 east to Wood Village exit. Turn right and continue south. Turn left on Burnside, turns into Hwy 26. Continue into Sandy (about 10 miles). Turn left on Strauss. Right on Pleasant.

Event Details:

Instructor: TBD **Number of Kids Attending:** 90
Special Instructions: 3 Classrooms, 90 Students

Event/Booth Topics	Date	Start Time	End Time	Grades/# kids
What Do You Know About H2O?	4/2/2015	7:40 AM	8:10 AM	3-5/90

Things you need to know



- Your Mad Scientist will arrive approximately 45 minutes before the event to set up.
- They will need one (1) **banquet size table** to set-up their equipment and **access to electricity and water.**
- This show requires a fair amount of water. We will need access to a deep sink to fill gallon bottles.
- If you have a PA system, please set it up for our Mad Scientist.
- If you have any questions call Mad Science at (503) 230-8040.

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What Do You Know about H2O?



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Customer Details:

Organization: Firwood Elementary **Phone:** 503-668-8005 X:
Address: 42900 SE Trubel Road **Fax:** 503-668-3684
 Sandy, OR 97055
Contact: Susan Baysinger **Email:** baysings@ortrail.k12.or.us
Title: School Contact
Directions: Hwy 26 toward Mt. Hood. 2mi. East of the last stoplight in Sandy, turn right on Firwood Rd. (Landmark is 'Shorty's Corner'). Turn left on Firwood School Rd (This is actually Trubel Road, but the sign says "Firwood School Road").

Event Details:

Instructor: TBD **Number of Kids Attending:** 225
Special Instructions: Susan Baysinger booked the show. Instructor should check in at office then drive around back to unload at the Gym door. Susan will have a student available to fill jugs. 9 teachers

Event/Booth Topics	Date	Start Time	End Time	Grades/# kids
What Do You know about H2O?	11/18/2010	10:00 AM	10:30 AM	3-5/225

Things you need to know



- Your Mad Scientist will arrive approximately 45 minutes before the event to set up.
- They will need a **banquet size table** to set-up their equipment and **access to electricity and water**.
- There is a fair amount of water required. We will need **access to a deep sink** to fill gallon bottles.
- If you have a PA system, please set it up for our Mad Scientist.
- If you have any questions call Mad Science at 503-230-8040.

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What Do You Know about H2O?



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Presented by Mad Science of Portland & Vancouver



Customer Details:

Organization: Firwood Elementary **Phone:** 503-668-8005
Address: 42900 SE Trubel Road **Fax:** 503-668-3684
 Sandy, OR 97055
Contact: Deb Manley **Email:** deb.manley@ortrail.k12.or.us
Title: School Contact
Directions: Hwy 26 toward Mt. Hood. 2 miles east of the last stoplight in Sandy, turn right on Firwood Rd. (Landmark is 'Shorty's Corner'). Turn left on Firwood School Rd (This is actually Trubel Road, but the sign says "Firwood School Road").

Event Details:

Instructor: TBD **Number of Kids Attending:** 240
Special Instructions:

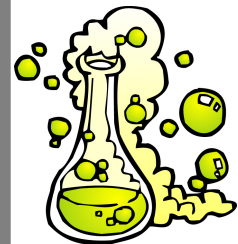
Event/Booth Topics	Date	Start Time	End Time	Grades/# kids
What Do You Know About H2O?	5/22/2013	1:30 PM	2:00 PM	3-5/240

Things you need to know



- Your Mad Scientist will arrive approximately 45 minutes before the event to set up.
- They will need a **banquet size table** to set-up their equipment and **access to electricity and water**.
- There is a fair amount of water required. We will need **access to a deep sink** to fill gallon bottles.
- If you have a PA system, please set it up for our Mad Scientist.
- If you have any questions call Mad Science at 503-230-8040.

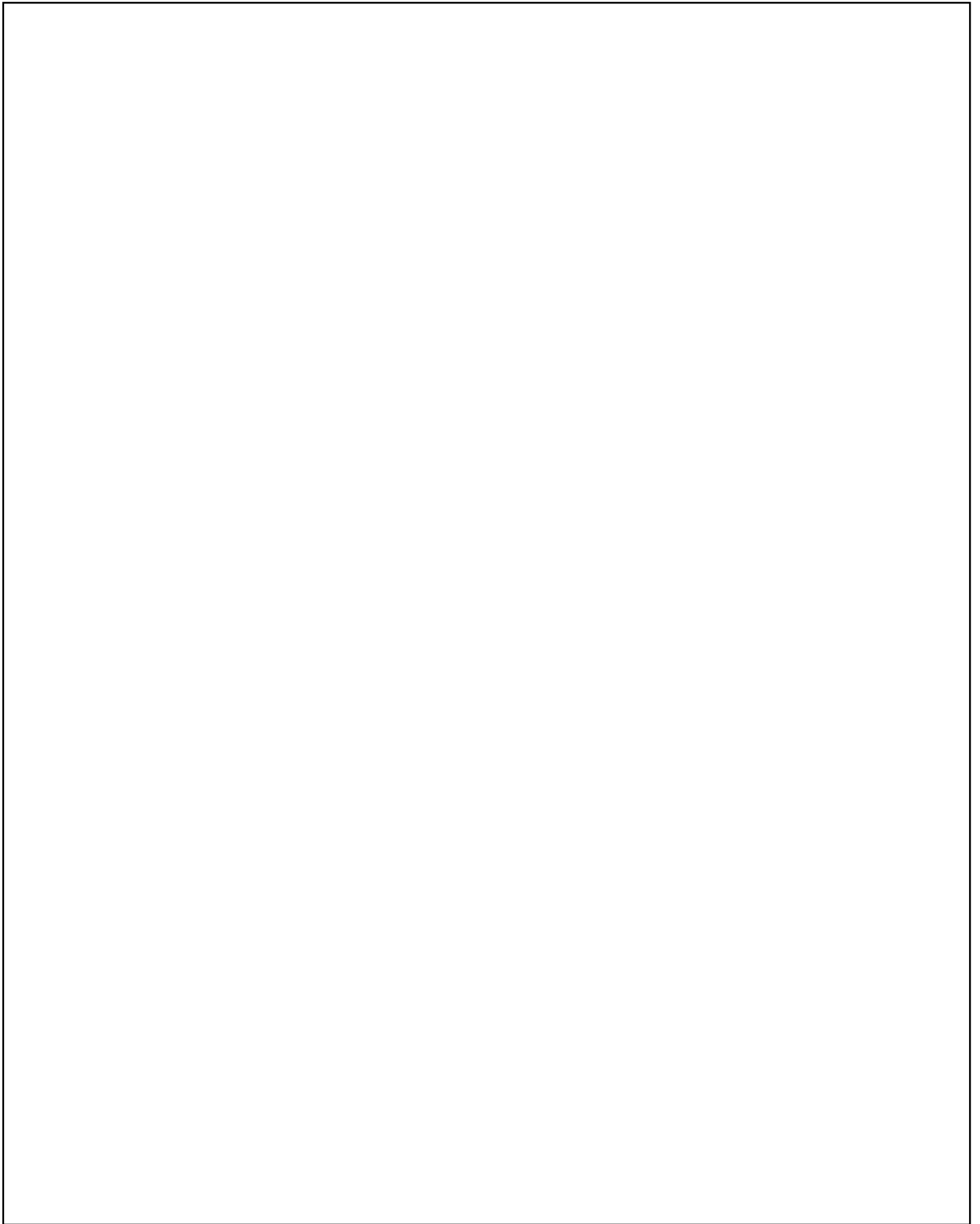
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Appendix G

Ordinance 13.04.220 - Regulations Pertaining to Inadequate Supply or Shortages of Water



13.04.220 Regulations pertaining to inadequate supply or shortages of water.

A. Upon determination that water consumption exceeds availability and/or water storage within the system is approaching the minimum required to meet fire protection and other essential requirements, as determined by the city manager, the city manager shall have authority to request voluntary reduction of water use by customers, including but not limited to the following specific actions:

1. Requesting patrons to limit landscape watering between the hours of 10:00 a.m. and 6:00 p.m.;
2. Requesting voluntary compliance with alternate day system for landscaping watering (i.e. even numbered addresses water on even numbered days, and odd numbered addresses on odd numbered days);
3. Requesting other voluntary measures on the part of city customers.

B. Upon determination of serious water shortages by the city council, the city council may declare an emergency restricting certain uses. Pursuant to such action the city council may impose the following measures:

1. Prohibiting landscape watering between the hours of 10:00 a.m. and 6:00 p.m.;
2. Requiring compliance with alternate day system for landscaping watering (i.e. even numbered addresses water on even numbered dates, and odd numbered addresses on odd numbered days.);
3. Restricting other outdoor uses as determined by the city council.

C. Upon determination of critical water shortages by the city council, the city council may declare an emergency prohibiting certain uses. Pursuant to such action by the city council it shall be expressly prohibited to:

1. Water, sprinkle or irrigate lawns, grass or turf unless:
 - a. It is new lawn, grass or turf that has been seeded or sodded after March 1st of the calendar year in which any restrictions are imposed, and in such cases it may be watered as necessary until established,
 - b. Lawn, grass or turf that is part of a commercial sod farm,
 - c. High use athletic fields that are used for organized play,
 - d. Golf tees and greens, and
 - e. Park and recreation areas deemed by the city council to be of a particular significance and value to the community that would allow exception to the prohibition;
2. Washing, wetting down, or sweeping with water, sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas unless:

a. In the opinion of the city council there is a demonstrable need in order to meet public health, safety requirements including but not limited to alleviation of immediate fire or sanitation hazards, or dust control to meet air quality requirements mandated by the Oregon Department of Environmental Quality,

b. Power washing of buildings, roofs and homes prior to painting, repair, remodeling or reconstruction and not solely for aesthetic purposes;

3. Washing cars, trucks, trailers, tractors, or other land vehicles or boats or other water borne vehicles except by commercial establishments or fleet washing facilities which recycle or reuse the water in their washing processes or by bucket and hose with a shut-off mechanism unless the city council finds that the public health, safety and welfare is contingent upon frequent vehicle cleaning such as cleaning of solid waste transfer vehicles, vehicles that transport food and other perishables or otherwise required by law.

D. Upon determination that the restrictions and/or prohibitions permitted pursuant to this section have not reduced water consumption to the level necessary to eliminate emergency water conditions, the city council may as an additional conservation measure adopt a temporary conservation water rate schedule. The city council may do so by the passage of a resolution.

E. Any violation of the restrictions or prohibitions permitted by this section shall be enforced by the city as follows:

1. The city shall personally deliver a notice of violation to the occupant of the premises. If the occupant is not present, the city may post the same on the premises advising the user of the violation and warning the user of what specific sanctions may be imposed if the violations continue. The city shall also mail the notice of violation by regular mail to the occupant at the address of the subject premises where the violation has occurred.

2. The following penalties may be imposed if violations continue:

Second violation \$100.00 Fine

Third violation \$300.00 Fine

Fourth and subsequent violations \$500.00 Fine

In the case of continuing violations, the city also has the authority to discontinue water service.

(Ord. 12-92 §1, 1992: Ord. 10-73 § 23, 1973.)

CHAPTER 13.04 WATER SYSTEM—RULES AND REGULATIONS

Sec. 13.04.010. Application for water use.

Application for the use of water shall be made on forms furnished by the city. Said application shall be made at the time a building or plumbing permit is applied for. The applicant or applicants shall agree to conform to the rules and regulations of the city, now or hereafter in effect, [including the 2022 Water System Master Plan and the 2016 Water Management and Conservation Plan](#), as a condition for the use of water.

(Ord. No. 10-73, § 2, 1973; Ord. No. 38-75, § 1, 1975; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.020. Reserved.

Ord. No. 2021-02 , § 1, adopted March 15, 2021, repealed § 13.04.020, which pertained to inspection of a premises with a pending application for use of water, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.030. Restriction on water use.

No person supplied with water from the city mains will be entitled to use it for any purpose other than that stated in his or her application. No user of water will be entitled to supply water in any way to other persons or users.

(Ord. No. 10-73, § 4, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.040. Connection.

The materials for the connection to the public water supply system, including the meter, shall be and remain the property of the city. All connections to public water mains shall be done under the direction of the public works director, or their designee. The meter shall be placed in the public right-of-way or in a dedicated utility easement. Water service laterals and connections are those pipes and connections which convey water from the public water main to the water meter. All public water mains, service laterals, connections and appurtenances shall be under the exclusive control and ownership of the city, and no person, other than the public works director or their designee, will be permitted to install any service laterals or connections or make any repairs or alterations or changes in any public water lines, service laterals, connections and meters.

(Ord. No. 10-73, § 5, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.045. Changes in service.

When new buildings are to be erected on the site of old ones or it is desired to increase the size or change the location of an existing service connection, or where a service connection to any premises is abandoned or no longer in use, a new service shall be required, as needed, upon application of the occupant and upon payment for a new connection including all applicable Systems Development Charges. Water service shall be considered abandoned if utility bills, including any unpaid balance remain unpaid for 12 consecutive billing cycles.

(Ord. No. 10-73, § 5A, 1973; Ord. No. 38-75, § 2, 1975; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.050. Placement of stop and waste cocks.

All private service pipes from the property line shall be properly installed and at all times maintained in good order by the owner with no leakage or wasting of water.

(Ord. No. 10-73, § 6, 1973; Ord. No. 2021-02, § 1(Exh. A), 3-15-2021)

Sec. 13.04.060. Reserved.

Ord. No. 2021-02, § 1, adopted March 15, 2021, repealed § 13.04.060, which pertained to leaks excavation by the public works superintendent, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.070. Separate service for each house—Exception.

A separate service and meter will be required for each parcel or legal lot of record that is to be supplied with water.

(Ord. No. 10-73, § 8, 1973; Ord. No. 2021-02, § 1(Exh. A), 3-15-2021)

Sec. 13.04.080. Conditions under which water will not be furnished.

Water will not be furnished where there are active or potential, unprotected cross-connections as defined in Chapter 13.06 [or as otherwise determined through evaluations in the 2022 Water System Master Plan.](#)

(Ord. No. 10-73, § 9, 1973; Ord. No. 2021-02, § 1(Exh. A), 3-15-2021)

Sec. 13.04.090. Plumber—Prohibited actions.

No plumber or other person will be allowed to make any alteration in any conduit, pipe or other fixture connecting with the city mains or to turn water off or on the premises at the meter without permission from the city.

(Ord. No. 10-73, § 10, 1973; Ord. No. 2021-02, § 1(Exh. A), 3-15-2021)

Sec. 13.04.100. Reserved.

Ord. No. 2021-02, § 1, adopted March 15, 2021, repealed § 13.04.100, which pertained to the required plumber report of work done, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.110. Interrupted service.

The water may at any time be shut off from the mains, without notice, for repairs or other necessary purposes, and the city will not be responsible for any consequent damages.

(Ord. No. 10-73, § 12, 1973; Ord. No. 2021-02, § 1(Exh. A), 3-15-2021)

Sec. 13.04.120. Reserved.

Ord. No. 2021-02 , § 1, adopted March 15, 2021, repealed § 13.04.120, which pertained to city-worker access to structures receiving water from the mains, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.130. Monthly reports by administrative office.

The administrative office shall prepare a monthly report indicating: the number of customers (by customer class); the amount of water produced and sold, together with such other data as the council may require.

(Ord. No. 10-73, § 14, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.140. Records.

Utility staff shall, as a part of their duties, record the address, parcel number, meter number of all premises where water is furnished by the city, and shall furnish a record of such to utility billing staff for purposes of accurate billing. Utility staff shall also keep and maintain accurate hard copies and digital records of all pipes, valves, fittings, hydrants, services and other appurtenances within the water system.

(Ord. No. 10-73, § 15, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.150. Use of fire hydrants.

It is unlawful for any person to operate, alter, change, remove, disconnect, connect with, or interfere in any manner with any fire hydrant owned by the city or connected to the public water system without first obtaining written permission from the city. The provisions of this section shall not apply to emergency or other uses by the Sandy Rural Fire Protection District No. 72. The city may require that accurate records or estimates of City water used for fire suppression, training or other uses by the Sandy Rural Fire Protection District No. 72 be submitted on a regular basis but not more frequently than monthly.

(Ord. No. 10-73, § 16, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.160. Fire protection service.

- A. When the owner of a building desires, or when the building code calls for a certain size pipe to supply water to a wet or dry sprinkler system without hose connections, such pipe or pipes may be covered by an approved proportional meter or a detector check. The owner or agent of such building shall agree in writing that water supplied through this service will not be used for any purpose except for extinguishing a fire. If at any time it is found that unapproved connections have been added to the system or that registration has been recorded on the meter or detector check, the immediate installation of a billing meter on the fire service line may be required by the city at the sole expense of the owner or agent.
- B. No charge shall be made for water used in the extinguishing of fires if the owner or agent reports such use to the city in writing within ten days of such usage. A minimum service charge for fire protection purposes established by Council resolution may be billed each month to the owner or agent of the property supplied.

(Ord. No. 10-73, § 17, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.170. Use of private water and city water.

Owners of buildings desiring to use both a city water supply and a supply of water other than that furnished by the city water system may obtain city water at meter rates upon the following conditions and not otherwise. Under no circumstances shall a physical connection, direct or indirect, exist or be made in any manner, even temporarily between the city water supply and that of a private water supply. Where such connection is found to exist, or where provision is made to connect the two systems by means of a spacer or otherwise, the city water supply shall be shut off from the premises without notice. In case of such discontinuance, service shall not be reestablished until satisfactory proof is furnished that the cross-connection has been completely and permanently severed.

(Ord. No. 10-73, § 18, 1973)

Sec. 13.04.180. Water for building purposes on meter basis.

If the owner or agent of any premises applies for water service and the meter has been installed, water shall be furnished for building purposes at meter rates, to be charged against the premises.

(Ord. No. 10-73, § 19, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.190. Ownership, damage and registration of meters.

All meters of the city water system are the property of the city, and any repairs to said meters shall be made by the city. If a meter is burned out by hot water or damaged by the carelessness or negligence of the owner or occupant of the premises, the city will repair or replace the meter, and the cost of such repairs or replacement shall be charged against the owner of the property and if not paid within 30 days, shall then become a lien against said property. When a meter fails to register accurately, the charge shall be either based on the average quantity of water used, as shown by the meter when in order, or if there is no such average consumption, then the quantity of water used during the same billing cycle in the prior year shall be used. If freezing or snowing weather shall make reading of the meters impracticable, an estimated reading shall be made by the city during the time such conditions exist. Estimated readings for other just conditions affecting reading of a meter shall be made only on approval of the city.

(Ord. No. 10-73, § 20, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.200. Services outside the city.

- A. Excess water of the city, as determined by the council, may be served to individual users, companies or water districts outside the city boundaries, under such rates, charges and rules as the council may from time to time prescribe, or as outlined under special contracts. All regulations now or hereafter that affect the users inside the city shall apply to users outside the city, except as provided by the council. Service to users outside the city shall at all times be subject to the prior superior right of the residents of the city to said water. The city shall have the right to refuse to sell water to consumers who do not comply with the requirement of this section.
- B. The city may require annexation prior to service extension if such annexation is practical and in the best interest of the city. If annexation is not required, the owner must enter into an agreement for future annexation to the city, upon the city's request in an agreement form, satisfactory to the city attorney. The water service extension will be installed to city standards. A person or persons requesting service extension will bear all costs of the extension of the service, including, but not limited to, the cost of public lines and any

(Supp. No. 2, Update 1)

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oversizing as specified by the public works director. A water service connection will be provided only for a permitted use as identified in the Clackamas County Development Code and the City Comprehensive Plan. The extension of water service facilities shall follow an approved shadow plat design for future extension of infrastructure for the site, which meets the satisfaction of the city. No service extension shall conflict with existent natural hazards and/or goals criteria.

(Ord. No. 10-73, § 21, 1973; Ord. No. 5-93, § 1, 1993; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.210. Reserved.

Ord. No. 2021-02 , § 1, adopted March 15, 2021, repealed § 13.04.210, which pertained to mandated reports for water-distributing entities besides the city, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.220. Regulations pertaining to inadequate supply or shortages of water.

- A. Upon determination that water consumption exceeds availability and/or water storage within the system is approaching the minimum required to meet fire protection and other essential requirements, as determined by the city manager, the city manager shall have authority to request voluntary reduction of water use by customers, including but not limited to the following specific actions:
1. Requesting patrons to limit landscape watering between the hours of 10:00 a.m. and 6:00 p.m.;
 2. Requesting voluntary compliance with alternate day system for landscaping watering (i.e. even numbered addresses water on even numbered days, and odd numbered addresses on odd numbered days);
 3. Requesting other voluntary measures on the part of city customers.
- B. Upon determination of serious water shortages by the city council, the city council may declare an emergency restricting certain uses. Pursuant to such action the city council may impose the following measures:
1. Prohibiting landscape watering between the hours of 10:00 a.m. and 6:00 p.m.;
 2. Requiring compliance with alternate day system for landscaping watering (i.e. even numbered addresses water on even numbered dates, and odd numbered addresses on odd numbered days.);
 3. Restricting other outdoor uses as determined by the city council.
- C. Upon determination of critical water shortages by the city council, the city council may declare an emergency prohibiting certain uses. Pursuant to such action by the city council it shall be expressly prohibited to:
1. Water, sprinkle or irrigate lawns, grass or turf unless:
 - a. It is new lawn, grass or turf that has been seeded or sodded after March 1 of the calendar year in which any restrictions are imposed, and in such cases it may be watered as necessary until established,
 - b. Lawn, grass or turf that is part of a commercial sod farm,
 - c. High use athletic fields that are used for organized play,
 - d. Golf tees and greens, and
 - e. Park and recreation areas deemed by the city council to be of a particular significance and value to the community that would allow exception to the prohibition;

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(Supp. No. 2, Update 1)

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2. Washing, wetting down, or sweeping with water, sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas unless:
 - a. In the opinion of the city council there is a demonstrable need in order to meet public health, safety requirements including but not limited to alleviation of immediate fire or sanitation hazards, or dust control to meet air quality requirements mandated by the Oregon Department of Environmental Quality,
 - b. Power washing of buildings, roofs and homes prior to painting, repair, remodeling or reconstruction and not solely for aesthetic purposes;
 3. Washing cars, trucks, trailers, tractors, or other land vehicles or boats or other water borne vehicles except by commercial establishments or fleet washing facilities which recycle or reuse the water in their washing processes or by bucket and hose with a shut-off mechanism unless the city council finds that the public health, safety and welfare is contingent upon frequent vehicle cleaning such as cleaning of solid waste transfer vehicles, vehicles that transport food and other perishables or otherwise required by law.
- D. Upon determination that the restrictions and/or prohibitions permitted pursuant to this section have not reduced water consumption to the level necessary to eliminate emergency water conditions, the city council may as an additional conservation measure adopt a temporary conservation water rate schedule. The city council may do so by the passage of a resolution.
- E. Any violation of the restrictions or prohibitions permitted by this section shall be enforced by the city as follows:
1. The city shall personally deliver a notice of violation to the occupant of the premises. If the occupant is not present, the city may post the same on the premises advising the user of the violation and warning the user of what specific sanctions may be imposed if the violations continue. The city shall also mail the notice of violation by regular mail to the occupant at the address of the subject premises where the violation has occurred.
 2. The following penalties may be imposed if violations continue:
Second violation: \$100.00 fine.
Third violation: \$300.00 fine.
Fourth and subsequent violations: \$500.00 fine.

In the case of continuing violations, the city also has the authority to discontinue water service.

(Ord. No. 10-73, § 23, 1973; Ord. No. 12-92, § 1, 1992)

Sec. 13.04.230. Reserved.

Ord. No. 2021-02 , § 1, adopted March 15, 2021, repealed § 13.04.230, which pertained to water for motor power, and derived from Ord. No. 10-73, adopted in 1973.

Sec. 13.04.240. Private pipe or main—Council permission required.

No person shall be permitted to lay any private pipes or mains in or upon any public right-of-way, street or road in the city without issuance of a revocable permit by the council.

(Ord. No. 10-73, § 26, 1973; Ord. No. 2021-02 , § 1(Exh. A), 3-15-2021)

Sec. 13.04.250. Violation—Penalty.

Any person who shall in any way interfere with, change, alter or damage any water main, pipe, conduit, shutoff or any other part of the water system belonging to the city, or who shall turn on the water to any premises without due authority, shall upon conviction in municipal court of said city be fined in the sum of not more than \$100.00 for each offense, or by imprisonment for a period of not more than ten days, or by both fine and imprisonment.

(Ord. No. 10-73, § 25, 1973)



Staff Report

Meeting Date: February 27, 2023

From Emily Meharg, Senior Planner

SUBJECT: 22-031 DR/VAR/TREE State Street Homes Mixed-Use Development

BACKGROUND / CONTEXT:

The applicant, State Street Homes, submitted an application on behalf of the owners, State Street Homes and Joycelyn Paola, to construct a four-story mixed-use building with associated parking and landscaping. The building will contain self-service storage on the ground floor and 42 multi-family residential units above. The recent adoption of Ordinance 2022-26 to restrict self-service storage does not apply to this application. The proposed development and the existing Paola's Pizza Barn will share an access from Highway 26 and the existing Paola's Pizza Barn parking lot will be reconfigured. The applicant is also requesting the following four (4) variances:

- A. Type III Special Variance to Section 17.74.40(B.2) to exceed the maximum 4-foot height of a wall/fence on a commercial property in the front yard.
- B. Type III Special Variance to Section 17.74.40(B.4) to exceed the maximum 8-foot height of a wall/fence on a commercial property in the rear yard.
- C. Type III Special Variance to Section 17.74.40(B.4) to exceed the maximum 8-foot height of a wall/fence on a commercial property in the side yard.
- D. Type III Tree Removal Variance in accordance with Section 17.102.70.

KEY CONSIDERATIONS / ANALYSIS:

See Staff Report

RECOMMENDATION:

Staff recommends the Planning Commission **approve** the proposed mixed-use development and parking lot reconfiguration request **with conditions as outlined in the staff report.**

Staff further recommends the Planning Commission **approve** the following requested variances:

- A. Type III Special Variance to Section 17.74.40(B.2) to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard (south side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall and make a determination as follows:

- If the wall is 5-feet-tall as specified in the Stairs Grading Detail, staff recommends the Planning Commission approve the requested variance with a maximum wall height of 5 feet and a maximum guardrail height of 3.5 feet, in which case the applicant shall update the Plan Set to detail the south (front) retaining wall and fence as a maximum 5-foot-tall retaining wall with a maximum 3-foot-6-inch-tall guardrail on top.
- If the wall is greater than 5 feet in height, staff recommends the Planning Commission review the applicant's updated information regarding wall height and make a determination on the maximum wall height they'd support in a commercial front yard.

In either case, the retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

B. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard (north side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial rear yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

C. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard (east side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial side yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

Staff recommends the Planning Commission determine whether they want to grant a variance to the tree retention standards in Section 17.102.50 based on the criteria in Section 17.102.70. Staff recommends the Planning Commission review the existing and proposed driveway location keeping in mind both ODOT's recommendation and the City's Development Code requirements, particularly Sections 17.90.00(C.2), 17.90.00(D.1), 17.90.120(F), and 17.92.10(C), in addition to the tree retention

requirements of Chapter 17.102. If the Planning Commission decides to grant a variance to the minimum tree retention standards, staff recommends the Planning Commission determine the minimum number of retention trees they will require be retained. In addition, if the Planning Commission grants a variance to allow the applicant to not retain the minimum number of trees, staff recommends the Planning Commission require that all new landscaping on the property be native species or water-efficient species acclimated to the Willamette Valley (see the Water-Efficient Plants for the Willamette Valley booklet), consistent with the conservation benchmarks in the City of Sandy 2016 Water Management and Conservation Plan. The applicant shall update the Preliminary Planting Plan to detail native species or water-efficient plants acclimated to the Willamette Valley.

In either case, the applicant will be required to update the Plan Set to detail a minimum 20-foot-deep landscape buffer that comprises at least 30 percent (51 feet minimum) of the combined Highway 26 frontage of the subject properties in compliance with Section 17.90.120(F). Staff recommends the Planning Commission require the applicant to either:

- A. Retain the existing 65-foot landscape buffer as is, including retaining all of the existing trees and shrubs for a minimum depth of 20 feet. This option would require keeping the current shared access driveway location at STA 759+40, or as otherwise approved by ODOT, terminating the shared access easement at STA 759+85, recording an updated shared access easement reflecting that location, and updating the driveway and sidewalk design in compliance with ODOT and ADA standards.
- B. Update the Plan Set to detail an alternative landscape buffer that meets the requirements of Section 17.90.120(F). If the applicant chooses to propose an alternative landscape buffer location, the applicant shall update the Preliminary Planting Plan to detail retention of all existing trees within the buffer area as well as planting a mix of both deciduous and evergreen trees (nine (9) trees minimum), shrubs, and groundcover at a quantity sufficient to provide a partial buffer within two (2) years from the date they are planted. The proposed plants shall be selected from the list in Section 17.90.120(F.3). However, due to concerns with Asian Long-horned Beetle, the maple species are not currently permitted; cascara, pacific dogwood, or an alternative native deciduous tree species reviewed and approved by staff shall be selected instead.

LIST OF ATTACHMENTS/EXHIBITS:

Staff Report

Exhibits

- A. Land Use Applications
- B. Project Narrative (dated September 16, 2022)
- C. Plan Set
 - o Sheet G0.01 - Cover Sheet

- Sheet 1 - Cover Sheet and Notes
 - Sheet 2 – Existing Conditions and Demo Plan
 - Sheet 3 – Composite Site Plan
 - Sheet 4 – Entry Utility Plan
 - Sheet 5 – Site Utility Plan
 - Sheet 6 – Stormwater Extension Plan
 - Sheet 7 –Grading and ESC Plan
 - Sheet 8 – Wall Cross Sections
 - Sheet 9 – Entry Grading Plan
 - Sheet 10 – Civic Area Grading Plan
 - Sheet 11 – ESC Notes and Details
 - Sheet 12 – Site Circulation Plan
 - Sheet L1.1 – Existing Tree Inventory
 - Sheet L2.1 – Preliminary Planting Plan
 - Sheet A1.01 – Site Plan
 - Sheet A1.02 – Enlarged Site Plan
 - Sheet A1.03 – Trash Enclosure
 - Sheet A1.04 – Bicycle Enclosure
 - Sheet A1.05 – Gazebo
 - Sheet A1.21 – Floor Plan – Level 01
 - Sheet A1.22 – Floor Plan – Levels 02-04
 - Sheet A1.23 – Floor Plan – Roof
 - Sheet A2.01 – Elevations (north and east)
 - Sheet A2.02 – Elevations (south and west)
- D. Lighting Plans
- Sheet E0.00 – Site Lighting Plan
 - Sheet E0.01 – Photometric Plan
- E. Lighting Cut-Sheets
- F. Preliminary Stormwater Report (dated September 12, 2022)
- G. Transportation Analysis Letter (dated August 29, 2022)
- H. Arborist Report (dated September 22, 2022)
- I. ODOT Memo (dated December 5, 2022)
- J. ODOT Indenture of Access (dated December 5, 2022)
- K. Reciprocal Access and Maintenance Agreement (Clackamas County Doc. 2022-037782)
- L. Storm Sewer Easement (Clackamas County Doc. 2022-037783)

Agency Comments:

- M. Parks and Recreation Director (dated January 3, 2023)
- N. Fire Marshal (dated January 10, 2023)
- O. ODOT (dated January 13, 2023)
- P. City Transportation Engineer (dated January 17, 2023)
- Q. Assistant Public Works Director (received January 17, 2023)
- R. Third-party Arborist Review (dated January 19, 2023)

Additional Documents Submitted by Staff:

S. ODOT comments from State Street Homes pre-application meeting (dated May 24, 2021)

T. ODOT email (dated December 21, 2022)

Additional documents Submitted by the Applicant:

U. Updated Sheets A1.01 and A1.02

Public Comments:

V. Dennis Petross (received February 14, 2023)

**PLANNING COMMISSION STAFF REPORT
TYPE III LAND USE PROPOSAL**

This proposal was reviewed concurrently as a Type III Design Review with four (4) Type III variances, and tree removal. The following exhibits and findings of fact explain the proposal and support the staff recommendation.

DATE: February 17, 2023

FILE NO.: 22-031 DR/VAR/TREE

PROJECT NAME: State Street Homes Mixed Use Development

APPLICANT: State Street Homes

OWNER: State Street Homes (Tax Lot 902); Joycelyn D Paola Trustee (Tax Lot 1000)

PHYSICAL ADDRESS: 38015 Highway 26 and adjacent parcel to the east (no situs)

LEGAL DESCRIPTION: T2SR4E14AD, Tax Lots 902 and 1000

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 - Sheet A1.23 – Floor Plan – Roof
 - Sheet A2.01 – Elevations (north and east)
 - Sheet A2.02 – Elevations (south and west)
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Public Comments:

- V. Dennis Petross (received February 14, 2023)

FINDINGS OF FACT

GENERAL FINDINGS

1. These findings are based on the applicant's submittal items received on August 2, 2022, with additional items received October 3, 2022, December 5, 2022, and December 22, 2022. The application was deemed complete on December 29, 2022. The 120-day deadline is April 28, 2023.
2. This report is based upon the exhibits listed in this document, including the applicant's submittals, agency comments, and public testimony.
3. This application is not subject to the moratorium on development adopted by City Council through Resolution 2022-24 because it was submitted prior to the effective date of the moratorium.
4. The proposal includes two lots (Tax Lots 902 and 1000) that total 2.46 acres. The existing Paola's Pizza Barn (Tax Lot 1000) is located at 38015 Highway 26 and the proposed mixed-use development is located on the flag lot to the east (Tax Lot 902; no situs address).
5. The parcel has a Comprehensive Plan Map designation of Commercial and a Zoning Map designation of General Commercial (C-2).
6. The applicant, State Street Homes, submitted an application on behalf of the owners, State Street Homes and Joycelyn Paola, to construct a four-story mixed-use building with associated parking and landscaping. The building will contain self-service storage on the ground floor and 42 multi-family residential units above. The recent adoption of Ordinance 2022-26 to restrict self-service storage does not apply to this application. The proposed development and the existing Paola's Pizza Barn will share an access from Highway 26 and the existing Paola's Pizza Barn parking lot will be reconfigured. The applicant is also requesting the following four (4) variances:
 - A. Type III Special Variance to Section 17.74.40(B.2) to exceed the maximum 4-foot height of a wall/fence on a commercial property in the front yard.
 - B. Type III Special Variance to Section 17.74.40(B.4) to exceed the maximum 8-foot height of a wall/fence on a commercial property in the rear yard.
 - C. Type III Special Variance to Section 17.74.40(B.4) to exceed the maximum 8-foot height of a wall/fence on a commercial property in the side yard.
 - D. Type III Tree Removal Variance in accordance with Section 17.102.70.
7. The City of Sandy completed the following notices:
 - A. A transmittal was sent to agencies asking for comment on December 29, 2022.
 - B. Notification of the proposed application was mailed to affected property owners within 500 feet of the subject property on February 2, 2023.
 - C. A legal notice was published in the Sandy Post on February 8, 2023.

8. At publication of this staff report, one written public comment was received. Dennis Petross (Exhibit V) expressed concerns related to the proposed retaining wall, stormwater management, nature path width, light pollution, and erosion control. Petross noted wall height contradictions and the lack of wall sections, details, construction methods, and maintenance access in the submitted items, and requested additional details and information on the proposed retaining wall and photometric plans prior to making final comments.
9. On February 9, 2023, the applicant submitted an updated Site Plan (Sheet A1.01) and Enlarged Site Plan (Sheet A1.02) (Exhibit U) in response to a request from staff for more information and clarification on a few items prior to the hearing. The updated plans detail the proposed building outside of the 15-foot sanitary sewer line easement along the south property line of the flag portion of Tax Lot 902. Staff did not have time to do an in-depth evaluation of the updated plans but note the following:
 - A. The majority of parking spaces on Tax Lot 902 are still detailed at 16 feet deep. At least 60 percent of the parking spaces on Tax Lot 902 will need to meet the standard parking space size requirement of 9 feet by 18 feet. All other parking related requirements (e.g., aisle width, landscaping buffer width, etc.) will still need to be met.
 - B. The reconfiguration removes the proposed open lawn area in the northwest corner of Tax Lot 902. The applicant will need to confirm that the shared outdoor recreation requirement is still being met. If the Planning Commission approves the requested variance to the minimum tree retention standards, the location of any required mitigation trees on Tax Lot 902 will need to be reevaluated.
 - C. The proposed reconfiguration of the parking area south of the Paola's Pizza Barn will need to be evaluated. The right-of-way dedication required along Highway 26 will also need to be considered. An analysis of the required and proposed parking for Tax Lot 1000 is still required.
 - D. The applicant will need to demonstrate that all other requirements of the Development Code will be met with the new layout.

DESIGN REVIEW – Chapter 17.90

10. The proposal is subject to all the requirements for Design Review as stated in Section 17.90.00. **As required by Section 17.90.00, the reviewing body shall refer to the following objectives in evaluating Design Review requests:**

- A. Protect and enhance the city's quality of life and community image.
- B. Encourage functional, safe, and aesthetically pleasing development, while maintaining compatibility with the surrounding built and natural environment.
- C. Implement the Sandy Style, as described by this chapter. The Sandy Style is based on the following guiding principles:
 - i. Celebrate Sandy as the Gateway to Mount Hood through contextually appropriate landscaping and building designs.
 - ii. Protect and enhance Sandy's tree canopy, particularly along the Highway 26 Landscape Management Corridor.
 - iii. Emphasize a "village" scale and character in new development. Village scale means development is compact and walkable, building entrances are oriented to the street sidewalk or a plaza, and large building masses are broken down through a combination of design elements such as articulation, combinations of complementary building materials and detailing.
 - iv. Express elements of or reflect Cascadian architecture by adapting appropriate elements of English Arts and Crafts Style (1900—1920) and Oregon Rustic Style (1915—1940), and/or similar elements, into new buildings and exterior remodels, except in locations where this Code allows or requires a different architectural style (e.g., C-1 Historic Roadside Commercial District).
 - v. Encourage green building practices in new construction, such as the use of renewable energy (e.g., solar and wind), use of recycled materials, integration of water quality facilities in landscapes, capture of rainwater for irrigation, and similar practices.
- D. The city considers the following elements to be incompatible with the Sandy Style. The reviewing body may deny, or require modifications to, a project with any of the following:
 - i. Excessive tree removal and/or grading that may harm existing vegetation within a designated landscape conservation area.
 - ii. Commercial development where buildings are setback from the street behind surface parking lots.
 - iii. Excessive surface parking lot paving and redundant driveways.
 - iv. Drive-up facilities adjacent to a street that interrupt pedestrian circulation patterns or create potential safety hazards.
 - v. Disjointed parking areas, confusing or unsafe circulation patterns.
 - vi. Box-like structures with large, blank, unarticulated wall surfaces.
 - vii. Building materials or colors that do not conform to this Code.
 - viii. Highly reflective surfaces or heavily tinted glass storefronts.
 - ix. Strongly thematic architectural styles, forms, colors, materials, and/or detailing, that do not conform to the Sandy Style, including some forms of franchise architectural styles associated with some chain commercial establishments.
 - x. Inadequate landscape buffers adjacent to parking lots, walkways, and streets.

- xi. Visible outdoor storage, loading, and equipment areas.

Staff finds the proposal is generally in compliance with the intent of the Sandy Style, but believes the project contains a few elements that are incompatible with Sandy Style as proposed, particularly D.i. and not adhering to C.ii. The two incompatibilities are discussed further in Section 17.90.120(F) of this document as part of the analysis of the applicant's request to remove substantial existing trees within the property's existing required landscape buffer along Highway 26.

11. Section 17.90.70 specifies that **design review approval shall be void after two (2) years from the date of the Final Order, unless the applicant has submitted plans for building permit approval.**
12. Section 17.90.120 contains design standards for the General Commercial (C-2) zone. Section 17.90.120(A) contains standards related to site layout and access. Section 17.90.120(A.1) requires all lots to abut or have cross access to a dedicated public street. The multi-family development lot (Tax Lot 902) and the existing Paola's Pizza Barn lot (Tax Lot 1000) are proposed to share an access to Highway 26.
13. Section 17.90.120(A.3) requires off-street parking to be located to the rear or side of buildings with no portion of the parking lot located within required setbacks or within ten feet of the public right-of-way. When access must be provided directly from a public right-of-way, driveways for ingress or egress shall be limited to one per 150 feet. For lots with frontage of less than 150 feet or less, shared access may be required. As detailed on the Site Plan (Exhibit C, Sheet 3), the proposed parking for the mixed-use lot is located behind the proposed building. The reconfigured parking area on the Paola's Pizza Barn lot is located behind the existing building; however, the existing parking in front of the building is proposed to remain.
14. Section 17.90.120(A.5) requires urban design details, such as raised or painted pedestrian crossings and similar devices incorporating changes in paving materials, textures or color, to be used to calm traffic and protect pedestrians in parking areas. Section 17.90.120(A.7) requires walkways from the public street sidewalk to the building entrance(s) and that crosswalks through parking lots and drive aisles shall be constructed of a material contrasting with the road surface or painted (e.g., colored concrete inlay in asphalt). The proposed mixed-use development is on a flag lot and the building and parking area are set back from Highway 26. The Site Plan (Exhibit C, Sheet 3) details a pedestrian walkway along the pole portion of the lot that connects the sidewalk on Highway 26 to the proposed mixed-use building entrance. The proposal also includes a reconfiguration of the existing parking areas on the Paola's Pizza Barn site (Tax Lot 1000). Currently, there are existing parking spaces for the Paola's Pizza Barn located in the flagpole portion of Tax Lot 902 with a striped walkway connecting the spaces to the Paola's Pizza Barn building. The proposed reconfiguration will remove these spaces and the striped walkway. The parking spaces located within the flagpole will be replaced with the relocated shared access driveway and pedestrian walkway connecting the sidewalk on Highway 26 to the mixed-use building. **The applicant shall update the Plan Set to detail a colored concrete inlay crosswalk connecting the pedestrian walkway located in the flagpole of Tax Lot 902 across the**

shared driveway aisle to the Paola's Pizza Barn entrance in compliance with the design standards of Section 17.90.120(A.5 and 7). The pedestrian crossing shall have a paved delineation in the form of a colored concrete inlay.

15. Section 17.90.120(B) contains provisions specifying building façade articulation, pedestrian shelters, construction materials, and colors. Section 17.90.120(B.1) requires that buildings visible from an abutting public street or pedestrian walkway are to be articulated, varied, and provide visual interest. The ground floor of the proposed mixed-use building is a commercial use and subject to the requirements of Section 17.90.120(B). The narrative (Exhibit B) states that the north elevation of the proposed building is visible from Bluff Road. The Enlarged Site Plan (Exhibit C, Sheet A1.02) details pedestrian walkways on all four sides of the proposed building, thus all four ground floor elevations are required to meet Section 17.90.120(B). The Elevations (Exhibit C, Sheets A2.01 and A2.02) detail the change in materials with different types of proposed siding and decking on the residential floors and ground floor as well as delineation between the ground floor and upper floors, but it is difficult to evaluate the depth of the articulation based on the elevations. The Floor Plan – Level 01 (Exhibit C, Sheet A1.21) does not include any articulation on any of the ground floor facades, with the exception of the gabled entries on the north, west, and east elevations. The gabled entries occur at a spacing in conformance with the requirements of Section 17.90.120(B) on the east and west elevations, but the north elevation appears to include wall planes greater than 40 feet in length. The ground floor of the south elevation does not appear to include any articulation and neither the north nor south ground floor elevations include contrasting materials. **The applicant shall update the Floor Plan – Level 01 and Elevations to detail articulated elevations on ground floor (level 01) of all four building facades meeting the wall plane requirements of Section 17.90.120(B) (i.e., distinct planes of no more than 40 linear feet with recessed or projecting sections that project or recede at least six inches from the adjacent plane, for a length of at least four feet).**
16. Section 17.90.120(B.2) requires that buildings incorporate pedestrian shelters over primary building entrances and pedestrian areas. The pedestrian shelters must extend at least 5 feet over the pedestrian area. Shelters designed with gables are preferred over flat shelters and must comply with the roof pitch standards in Section 17.90.120(C). Building entrances are located on the north, west, and east sides of the mixed-use building. As detailed on the Floor Plan – Level 01 (Exhibit C, Sheet A1.21), all entrances are proposed to have a minimum 5-foot-deep pedestrian shelter, with the primary entrance on the north elevation detailed to have a 12-foot-deep pedestrian shelter. As stated in the narrative (Exhibit B), the upper-level patios and exterior storage areas provide shelter over the walkway along the north façade.
17. Section 17.90.120(B.3.a) requires architecturally unified buildings. Architectural unity means buildings are related in architectural style and share some common elements, such as color scheme, materials, roof forms, and/or detailing. The applicant is proposing the primary mixed-use building as well as a garbage enclosure, bicycle parking enclosure, and covered gazebo. The mixed-use building elevations (Exhibit C, Sheets A2.01 and A2.02) detail a cultured stone base with a mix of lap siding and cedar shake siding, and a standing seam metal roof with gabled ends featuring heavy timbers. The trash enclosure (Exhibit C, Sheet A1.03), bicycle enclosure (Exhibit C, Sheet A1.04), and gazebo (Exhibit C, Sheet A1.05), all detail gabled roofs with wooden beams. Both the bicycle enclosure and gazebo also have a

stone base at the base of the supporting posts. Architectural unification of buildings on the site is satisfied.

18. Section 17.90.120(B.3.b) requires strong base materials on those sides of the building visible from an abutting public street. Per the submitted building elevations (Exhibit C, Sheets A2.01 and A2.02), all of the main mixed-use building elevations feature a 36-inch-tall cultured stone base in compliance with this standard.
19. Section 17.90.120(B.3.d) states that siding shall consist of wood, composite-wood (e.g., concrete fiberboard, panels or shingles), stone, brick, split-faced or rusticated concrete block, concrete form liner or a combination of these materials. The applicant is proposing to use a mix of lap siding, fiber cement shingles, and vertical board and batten siding as an accent. Section 17.90.120(B.3.d.ii) states: “Where board-and-batten siding is used, battens shall be a minimum of two-inches wide x one-inch deep and spaced 24 inches apart or closer; rough-sawn boards (specialty panel) are preferred over panels having a resin overlay.” The mixed-use building elevations (Exhibit C, Sheets A2.01 and A2.02) specify lap siding with alternating 4-inch and 8-inch exposure and lap siding with 8-inch exposure in compliance with the code. The elevations also specify fiber cement board and batten siding, but do not specify the depth or spacing. **Battens shall be a minimum of two-inches wide by one-inch deep and spaced 24 inches apart or closer.**
20. Section 17.90.120(B.3.e) requires building elevations facing a public street to incorporate at least three (3) Sandy Style features. The south elevation of the proposed mixed-use building faces Highway 26, though the building will be substantially set back from the highway on the flag portion of the flag lot and won’t be easily visible from the highway. The east elevation faces Bluff Road, with a parking lot owned by the Oregon Trail School District (OTSD) located between the building and the road. As detailed on the mixed-use building north and east elevations (Exhibit C, Sheet A2.01) and explained in the narrative (Exhibit B), all elevations feature exposed natural wood-colored beams, brackets and trim, metal canopies and roofing, and shingles as an accent material. The trash enclosure, bicycle parking enclosure, and gazebo all feature gabled roofs with wood beams, brackets, and a standing seam metal roof. Thus, all proposed structures are detailed in compliance with Section 17.90.120(B.3.e).
21. Section 17.90.120(B.4) requires exterior building colors to include warm earth tones that conform to the Color Palette in Chapter 17.90, Appendix C. As specified in the narrative (Exhibit B), all paint colors are earth tones from the City’s approved Miller Paint Historic Collection. As detailed on the elevations (Exhibit C, Sheets A2.01 and A2.02), the fiber cement lap siding with alternating 4-inch and 8-inch exposure will be painted “Palomino,” lap siding with 8-inch exposure “Gropius Gray,” cedar shake siding “Portobello,” board and batten siding “Jewett White,” and trim, heavy timber canopy, bracket, cedar fascia board, and decking will all be painted “Chocolate” in conformance with the color palette.
22. Section 17.90.120(C.1) requires gable roofs with a minimum roof pitch of 6:12 on new buildings with a span of 50 feet or less. The proposed building is approximately 190 feet by 69 feet; thus the roof span is greater than 50 feet. However, as stated in the narrative (Exhibit B) and detailed on the mixed-use building Floor Plan - Roof (Exhibit C, Sheet A1.23) and the

trash enclosure (Exhibit C, Sheet A1.03), bicycle enclosure (Exhibit C, Sheet A1.04), and gazebo (Exhibit C, Sheet A1.05), the applicant is proposing a 6:12 roof pitch for all proposed structures.

23. Section 17.90.120(C.4) requires pitched roofs visible from an abutting public street to provide a secondary roof form. The applicant did not submit a line-of-sight diagram but the narrative (Exhibit B) states that the north elevation of the building will be visible from Bluff Road. The north roof is approximately 190 feet, which requires four (4) secondary roof forms. As detailed on the north elevation (Exhibit C, Sheet A2.01), the applicant is proposing four (4) dormers along the north roof in compliance with the code.
24. Section 17.90.120(C.5) requires visible roof materials to be wood shingle or architectural grade composition shingle, slate, or concrete tile. Metal with standing or batten seam may also be used conforming to the Color Palette in Appendix D of the Development Code. The applicant is proposing to use standing seam metal in “Dark Brown,” which is an approved roof color in Appendix D.
25. Section 17.90.120(C.6) requires all roof and wall-mounted mechanical, electrical, communications, and service equipment, including satellite dishes and vent pipes, to be screened from view from all adjacent public rights-of-way and civic spaces by parapets, walls, or by other approved means. Per the narrative (Exhibit B), all rooftop penetrations (i.e., vent pipes) and wall penetrations (i.e., venting for exhaust fans) will have covers and/or be hooded and be a similar color to the adjacent building material so as to blend in with the building; there will be no other rooftop/wall-mounted mechanical, electrical, or communication systems.
26. Section 17.90.120(D) contains standards related to building orientation and entrances. The intent of providing adequate building orientation and entrances is to maintain and enhance streetscapes as public spaces, emphasizing pedestrian-scale and character. Section 17.90.120(D.1) requires buildings to be oriented to a public street or civic space. This standard is met when at least 50 percent of the subject site's street frontage is comprised of building(s) placed within 20 feet of a sidewalk, walkway, or civic space and not more than 20 percent of the off-street parking is located between a building's front façade and the adjacent street(s). The proposed mixed-use building is located on a flag lot and thus is set back greater than 20 feet from the street frontage; however, there is a proposed walkway within 20 feet of all four sides of the building as well as a proposed civic space within 20 feet of the west side of the building. In addition, the proposed building is set back 10 feet from the south property line on the flag portion of the lot and comprises approximately 71 percent of the flag's south property line. The proposal includes a direct pedestrian walkway connecting the primary building entrances to the sidewalk on Highway 26. No parking is proposed to be located between the building's front façade and the highway.
27. Section 17.90.120(D.3) states that ground floor spaces shall face a public street or civic space and shall be connected to it by a direct pedestrian route (i.e., avoid out-of-direction travel). The proposed mixed-use building is located on a flag lot and is set back substantially from Highway 26. The south elevation technically faces Highway 26 but is separated from the highway by the parcel to the south (Tax Lot 900). The pedestrian and vehicular access to the

building is along the flagpole portion of the lot and the pedestrian walkway directly connects the building's three pedestrian entrances (on the north, east, and west facades) to the Highway 26 sidewalk.

28. Section 17.90.120(D.5) requires structures greater than 40,000 gross square feet to have at least two clearly articulated public entrances on the structure; at least one such entrance shall be visible from a public street and connected to that street by a pedestrian sidewalk or walkway. The proposed building is 46,500 square feet and is therefore required to comply with Section 17.90.120(D.5). The building is located on the flag portion of a flag lot and thus is set back substantially from Highway 26. The applicant is proposing public entrances on the north, east, and west facades, all of which have a pedestrian walkway that connects the entrance to the Highway 26 sidewalk. The entrances on the north and west facades will be visible from the shared driveway access and pedestrian walkway where residents/customers will enter the site.
29. Section 17.90.120(D.7) requires buildings to provide at least one (1) elevation where the pedestrian environment is "activated." An elevation is "activated" when it meets the window transparency requirements in Subsection 17.90.120(E) and contains a public entrance with a pedestrian shelter extending at least five (5) feet over an adjacent sidewalk, walkway, or civic space. As stated in the narrative (Exhibit B), the applicant has identified the north building elevation as the "activated" elevation. The north elevation contains a primary building entrance with a pedestrian shelter extending greater than five feet over the walkway in front of the entrance. The window transparency requirements are discussed in Section 17.90.120(E) below.
30. Section 17.90.120(D.8) states that primary entrances shall be architecturally emphasized, visible from the public right-of-way, and where practical sheltered with a gabled canopy, overhang, or portico with a depth of at least five (5) feet. Detailing around the base of the building, such as stonework, benches, or art, should also be used to emphasize an entrance. As previously stated, the proposed mixed-use building is located on the flag portion of the flag lot and is not highly visible from either Highway 26 or Bluff Road. The proposed building has primary entrances on the north, west, and east elevations, all of which have a pedestrian shelter with a depth of at least 5 feet. As stated in the narrative (Exhibit B), all primary entrances are articulated by a separate roof structure from the building that provides at least 5 feet of shelter.
31. Section 17.90.120(E.2) contains standards for construction and placement of ground floor windows. A building greater than 30,000 square feet is required to provide 20 percent ground floor windows on the activated frontage. As noted in the narrative (Exhibit B), the applicant has designated the north elevation as the activated frontage. Per the narrative (Exhibit B), the ground floor wall area of the north elevation is 1,693 square feet, which requires 339 square feet of glazing. The narrative states that the glazed opening area, which includes 17 windows and three doors (two single doors and one double door) with windows above, is 349 square feet; however, the North Elevation (Exhibit C, Sheet A2.01) notes that the ground floor glazing is 339.5 square feet. Per the narrative, all ground floor glazing is made of clear glass, vertically oriented, and provided with trim surrounds with a depth of 3.5 inches. Based on measurements taken from the north elevation (Exhibit C, Sheet A2.01), it appears the wall

area calculated in the narrative was not based on a 12-foot ground floor. Chapter 17.10 of the Development Code defines ground floor elevation as: “The elevation of a building that is at or nearest the ground level measured from the ground to a point 12-feet above the ground. (This definition is used to measure the ground floor area subject to window requirements in Chapter 17.90).” In addition, it appears that the glazing calculations include the window trim. **The applicant shall update the elevations and floor plan to detail two (2) additional windows (detailed at 3-feet by 5-feet-6-inches per elevation note #16) on the ground floor of the north elevation. Staff recommends the two (2) additional windows be added to the north wall of the mini-storage office to the west of the main lobby entrance.**

32. Section 17.90.120(E.3) contains standards for upper floor windows. Per the narrative (Exhibit B), all upper floor windows are vertical in nature and are less than 5-feet by 7-feet. All windows will have internal grids and a 3.5-inch trim. As noted on the north elevation (Exhibit C, Sheet A2.01), the internal grids on all of the upper story windows will not exceed 1-foot in either direction. The upper floor windows are in compliance with Section 17.90.120(E.3).
33. Section 17.90.120(F) contains additional landscaping and streetscape design standards, including standards for parcels along Highway 26. Section 17.90.120(F.2) states that parcels abutting Highway 26 shall provide a landscape buffer comprising not less than 30 percent of the highway frontage, to a depth of not less than 20 feet. One of the many requirements within the buffer is that existing trees shall be preserved to the greatest extent practicable. The required landscape buffer is further detailed in the Chapter 17.10 definitions, which defines the landscape management corridor as: “The required yards abutting Highway 26 within the C-2, I-I and I-2 zoning districts where the Development Code requires native conifer and deciduous landscaping, creating the appearance of a forested corridor; openings or breaks in the landscape corridor are minimized, allowing for transportation access and framed views into development sites.” The subject properties (Tax Lots 902 and 1000) both have frontage on Highway 26. Both lots currently share an access located at Station (STA) 759+40 and are proposed to continue to share a relocated access located at STA 759+85. The combined frontage on Highway 26 is approximately 171 feet, requiring a 51-foot landscape buffer. The lots currently have a 65-foot-wide landscape buffer with existing trees and vegetation located along the entire south property line of the flagpole adjacent to Highway 26 and the eastern portion of the south property line of Tax Lot 1000 in compliance with Section 17.92.120(F). However, the applicant is proposing to remove the existing landscape buffer to accommodate relocation of the shared access driveway. Relocation of the driveway results in removal of approximately nine (9) trees and one (1) shrub within the 20-foot buffer plus an additional three (3) trees and four (4) shrubs further north outside of the designated buffer area. Per Section 17.90.00(C.2) protecting and enhancing Sandy's tree canopy, particularly along the Highway 26 Landscape Management Corridor, is one of the guiding principles of the Sandy Style that the reviewing body is required to refer to in reviewing all Design Review requests. In addition, “excessive tree removal and/or grading that may harm existing vegetation within a designated landscape conservation area” is one of the elements determined to be incompatible with the Sandy Style per Section 17.90.00(D.1) and the reviewing body may deny, or require modifications to, a project that includes excessive tree removal within a designated landscape area. Thus, removal of the existing landscape buffer along Highway 26 is not compatible with Sandy Style and may constitute a reason for denial

of a Design Review application. There is an additional landscaped area along the west side of the south frontage of Tax Lot 1000, but the applicant did not submit a tree inventory or any other details on the existing plants. Based on Google Earth imagery, it appears that the western landscaped area is sparsely planted and does not meet the requirements of Section 17.90.120(F). **The applicant shall update the Plan Set to detail a minimum 20-foot-deep landscape buffer that comprises at least 30 percent (51 feet minimum) of the combined Highway 26 frontage of the subject properties in compliance with Section 17.90.120(F). Staff recommends the Planning Commission require the applicant to either:**

- A. **Retain the existing 65-foot landscape buffer as is, including retaining all of the existing trees and shrubs for a minimum depth of 20 feet. This option would require keeping the current shared access driveway location at STA 759+40, or as otherwise approved by ODOT, terminating the shared access easement at STA 759+85, recording an updated shared access easement reflecting that location, and updating the driveway and sidewalk design in compliance with ODOT and ADA standards.**
- B. **Update the Plan Set to detail an alternative landscape buffer that meets the requirements of Section 17.90.120(F). If the applicant chooses to propose an alternative landscape buffer location, the applicant shall update the Preliminary Planting Plan to detail retention of all existing trees within the buffer area as well as planting a mix of both deciduous and evergreen trees (nine (9) trees minimum), shrubs, and groundcover at a quantity sufficient to provide a partial buffer within two (2) years from the date they are planted. The proposed plants shall be selected from the list in Section 17.90.120(F.3). However, due to concerns with Asian Long-horned Beetle, the maple species are not currently permitted; cascara, pacific dogwood, or an alternative native deciduous tree species reviewed and approved by staff shall be selected instead.** If the Planning Commission approves the applicant's request for a variance to the minimum tree retention standards, staff recommends all new landscaping on the subject properties be native species or water-efficient species acclimated to the Willamette Valley, consistent with the conservation benchmarks in the City of Sandy 2016 Water Management and Conservation Plan.

- 34. Section 17.90.120(G) contains requirements related to civic space. The intent of civic space is to connect buildings to the public realm and create comfortable and attractive gathering places and outdoor seating areas for customers and the public. As stated in the narrative (Exhibit B), the applicant proposes a 1,590 square foot outdoor public plaza located on the west side of the building, which is in compliance with the code requirement. The narrative further states that due to the property being on a flag lot, having a civic space directly abut a public right-of-way is not possible; however, the location was chosen for its pedestrian connectivity to Highway 26 via the new pedestrian walkway that connects the proposed mixed-use building and civic space to the highway. The civic space is proposed to contain various raised planters and public benches.
- 35. Section 17.90.120(H) contains standards related to lighting and states that walkways and parking lots should be illuminated at 1.5 to 2.0 foot-candles. The proposal includes parking

on Tax Lot 1000 and parking and pedestrian walkways on Tax Lot 902. The Photometric Plan (Exhibit D, Sheet E0.01) details lighting in both parking areas and along the pedestrian pathways north, west, and east of the building as well as the pedestrian walkway through the flagpole portion of Tax Lot 902 that connects to Highway 26; however, not all areas are detailed at 1.5 – 2.0 foot-candles. In addition, the Photometric Plan does not show any lighting along the pedestrian walkway south of the proposed mixed-use building. **The applicant shall update the Photometric Plan to detail all walkways and parking lots illuminated at 1.5 – 2.0 foot-candles. The applicant shall update the Photometric Plan to detail path lighting along the proposed pedestrian walkway on the south side of the mixed-use building at 1.5 – 2.0 foot-candles. To prevent impact within the critical root zones of existing trees on the adjacent property to the south (Tax Lot 900), staff recommends solar path lighting; however, if electrical conduit is installed, the applicant shall bore the conduit at a minimum depth of 18-inches under the critical root zone of the existing trees under supervision of an ISA-certified arborist.** Lighting is further reviewed in Chapter 15.30 of this document.

36. Section 17.90.120(I) contains standards related to safety and security and requires window placement that enables visibility between the building interior and exterior pedestrian and parking areas. As detailed on the mixed-use building elevations (Exhibit C, Sheets A2.01 and A2.02), all four sides of the building contain windows, which provides visibility between the interior of the building and the parking areas and pedestrian walkway areas.
37. Section 17.90.120(I.3) contains standards related to addressing and requires street address numbers measuring a minimum of six (6) inches high, which clearly locate buildings and their entries for patrons and emergency services. **The applicant shall provide street address numbers measuring a minimum of six (6) inches high, which clearly locate the mixed-use building and its entries for patrons and emergency services. The applicant shall verify the location(s) of the address with the Building Official and emergency service providers. Per the Fire Marshal (Exhibit N), the address identification shall be legible and placed in a position that is visible from the street or road fronting the property, including on a monument sign.**
38. The intent of Section 17.90.120(J) is to promote land use compatibility and aesthetics, particularly where development abuts public spaces. Section 17.90.120(J.1) states that exterior storage of merchandise and/or materials, except as specifically authorized as a permitted accessory use, is prohibited. The applicant is not proposing outdoor storage or display areas. The applicant is proposing a garbage and recycling area, which will be screened.
39. Section 17.90.120(J.3) states that mechanical, electrical, communications equipment including meters and transformers, and service and delivery entrances and garbage storage areas shall be screened from view from public rights-of-way and civic spaces. Garbage storage areas are addressed in staff's response to Section 17.90.120(J.4), below. The submitted narrative (Exhibit B) does not address Section 17.90.120(J.3) and the submitted elevations (Exhibit C, Sheets A2.01 and A2.02) do not detail mechanical, electrical, or communications equipment. The proposed building is set back on the flag lot and not likely to be highly visible from a public right-of-way; however, the west elevation will be highly

visible from the civic space area. **All mechanical, electrical, and communications equipment shall be screened from view from all public rights-of-way and civic spaces.** In addition to the civic space, the proposed layout includes primary building entrances with pedestrian walkways on the north and east elevations, with parking along the north elevation and additional pedestrian amenities (bicycle parking, gazebo, fire pit, dog area) along the east elevation. Thus, the north and east elevations will be highly visible from the interior of the site. **Staff recommends the Planning Commission require mechanical, electrical, and communications equipment to be screened from view from pedestrian amenity areas and parking areas in addition to being screened from public rights-of-way and civic spaces.**

40. Section 17.90.120(J.4) contains standards for trash collection and recycling areas. The applicant proposes a screened garbage and recycling area to the east of the proposed mixed-use building. The submitted Trash Enclosure Elevations (Exhibit C, Sheet A1.03) detail a covered structure with a gabled roof and a 6-foot-tall wall on all four sides designed to match the primary building in compliance with the code. The wall is proposed to be alternating 1-inch by 6-inch and 1-inch by 8-inch horizontal boards with a 1/2-inch gap between each and painted “Gropius Gray” to match the main building with 6-inch by 6-inch pressure treated wood posts. The front (west) and side (south) walls contain gates for access.
41. Section 17.90.160 includes additional design standards for multi-family developments. The proposal includes a mixed-use building with self-service storage on the ground floor and residential units above and thus is subject to the additional multi-family design standards.
42. Section 17.90.160(A) contains requirements for roofs. However, this building is located in the General Commercial (C-2) zoning district, and this code provision is superseded by the 6:12 roof slope provision. The proposed mixed-use building features a 6:12 roof pitch in compliance with Section 17.90.120(C).
43. Section 17.90.160(B) contains requirements for entries. As discussed in Section 17.90.120(B), all entrances are proposed to have a minimum 5-foot-deep pedestrian shelter, with the primary entrance on the north elevation detailed to have a 12-foot-deep pedestrian shelter. All entries face a pedestrian walkway with a direct connection to the sidewalk on Highway 26. Therefore, staff finds that the proposed entries are in compliance with Section 17.90.160(B).
44. Section 17.90.160(C) states that building facades shall be articulated with windows, entries, balconies and/or bays. Towers or other special vertical elements may be used in a limited fashion to focus views to the area from surrounding streets. As detailed on the Elevations (Exhibit C, Sheets A2.01 and A2.02), all facades of the mixed-use building feature windows and three of the facades (north, west, and east) contain an entry with a projecting gable end in compliance with this section. In addition, the north and south facades include balconies.
45. Section 17.90.160(D) states that along the vertical face of a structure, when facing a public street, pedestrian way, or an abutting residential use, offsets shall occur at a minimum of every 20 feet by providing recesses of a minimum depth of eight feet or extensions with a minimum depth of eight feet. If a partially enclosed covered porch is proposed, this can meet

one of the offset requirements provided the porch is eight feet deep and at least 125 square feet in area. All four sides of the proposed mixed-use building face a pedestrian walkway. Based on the Floor Plan – Levels 02-04 (Exhibit C, Sheet A1.22), it appears that the applicant is proposing alternating storage areas and outdoor patios on the north and south elevations; however, they are only extended or recessed 4 feet. In addition, some of the offsets occur greater than 20 feet apart. No offsets are detailed on the east and west elevations. **The applicant shall update the Floor Plan – Levels 02-04 to detail offsets at a minimum of every 20 feet by providing recesses or extensions with a minimum depth of eight feet on all four elevations of the proposed mixed-use building. If this cannot be accomplished, the applicant will need to apply for an adjustment or variance to Section 17.90.160(D).**

46. Section 17.90.160(E) contains requirements for private outdoor areas. A separate outdoor area of not less than 48 square feet in the form of balconies, terraces, or porches shall be provided for each dwelling unit located above the ground level. As detailed on the Floor Plan – Levels 02-04 (Exhibit C, Sheet A1.22), 18 of the 1-bedroom units include a 54 square foot outdoor patio and 12 of the 1-bedroom units include a 49 square foot patio, both in compliance with the code. All 2-bedroom units include a 51 square foot patio in compliance with the code.
47. Section 17.90.160(F) contains parking lot requirements. Parking lots in multi-family developments shall not occupy more than 50 percent of the frontage of any public street abutting the lot or building. The proposed parking and maneuvering area for the mixed-use development is located behind (north of) the proposed building on the flag portion of the flag lot in compliance with this section.
48. Section 17.90.160(G) contains requirements for individual storage areas. Enclosed storage areas shall be required and may be attached to the exterior of each dwelling unit to accommodate garden equipment, patio furniture, barbecues, bicycles, etc. Individual storage areas are required to be a minimum of 24 square feet and a minimum of 6 feet in height for 1-bedroom units, and a minimum of 36 square feet and 6 feet in height for 2-bedroom units. As detailed on the Floor Plan – Levels 02-04 (Exhibit C, Sheet A1.22), each 1-bedroom unit includes a 26 square foot individual storage area, and each 2-bedroom unit includes a 20 square foot and an 18-square foot storage area for a total of 38 square feet of storage area in compliance with the code.
49. Section 17.90.160(I) contains requirements for shared outdoor recreation areas. Multi-family residential development shall provide usable recreation areas for developments containing more than 5 dwelling units at the rate of 200 square feet per dwelling unit. The proposed 42-unit multi-family project requires 8,400 square feet of shared outdoor recreation area ($42 \times 200 = 8,400$). The Enlarged Site Plan (Exhibit C, Sheet A1.02) details 9,081 square feet of shared outdoor area as follows: 786 square foot off-leash dog area, 320 square foot covered gazebo (counted at 1.25 of the 256 square foot size), 285 square foot fire pit with outdoor seating, 1,785 square foot northern outdoor lawn area, 958 square foot eastern outdoor lawn area, 2,860 square foot landscaped nature path connecting the eastern open lawn area to the pedestrian walkway in the flag pole, and 2,087 square foot landscaped nature area located to the east of the pedestrian walkway in the flag pole.

50. Section 17.90.160(J) contains requirements for safety and security, which include providing an outdoor lighting system which facilitates police observation and resident observation through strategic location, orientation, and brightness without being obtrusive by shining into residential units or adjacent residential developments, and establishing a directory for apartment complexes of four or more units, which clearly orients visitors and emergency service providers as to the location of residential units. Where possible, this system should be evident from the primary vehicle entryway. The applicant submitted a Site Lighting Plan (Exhibit D, Sheet E0.00) that details proposed lighting. Lighting is discussed in further detail in Section 17.90.120(H) and Chapter 15.30 of this document. Neither the Site Plans (Exhibit C, Sheets 3, A1.01, and A1.020) nor the Floor Plans (Exhibit C, Sheets A1.21 and A1.22) detail the location of an apartment directory. The ground floor plan (floor plan – level 01) details a lobby at the main entrance, which is assumed to serve both the residential units and the mini-storage facility. **The applicant shall update the Floor Plan – Level 01 to detail an apartment directory in the lobby.**
51. Section 17.90.160(K) contains requirements for service, delivery, and screening. Per Section 17.90.160(K.2), pedestrian access from unit entries to postal delivery areas, garbage and recycling collection areas, shared activity areas, and parking areas is required to be provided. Elements such as, but not limited to, concrete paths, striped walkways or raised walkways through vehicular areas or gravel trails will meet this requirement. Per Section 17.90.160(K.4), garbage collection areas shall have a concrete floor surface and shall have a gate on the truck-loading side and a separate pedestrian access. Per Section 17.90.160(K.5), outdoor storage areas, garbage containers and recycling bins shall be screened from view with a solid sight obscuring wall or fence not less than six feet in height and constructed of durable materials compatible with the primary structure(s) or with evergreen plant materials which will retain their screening ability and will reach the height of six feet within three years from time of planting. As detailed on the Enlarged Site Plan (Exhibit C, Sheet A1.02), the garbage enclosure is located along the east property line with a pedestrian walkway directly connecting the garbage enclosure to the building's entrances. The Trash Enclosure (Exhibit C, Sheet A1.03) details the garbage area having a concrete floor and screened by a 6-foot-tall wall with both a gate on the truck-loading side (west) and a separate pedestrian gate on the south side. In the narrative response to Section 17.84.100, the applicant states that the mail delivery area is located in front of the development. However, the Site Plans (Exhibit C, Sheets 3, A1.01, and A1.02) do not clearly identify the location of the mail delivery area. **The applicant shall update the Plan Set to detail the location of the mail delivery area in a convenient location efficiently designed for residents and mail delivery personnel and in accordance with U.S. Postal Service requirements.**
52. Section 17.90.160(L) contains requirements for electrical and mechanical equipment. On-grade and above-grade electrical and mechanical equipment such as transformers, heat pumps, and central air conditioner units shall be screened with sight obscuring fences, walls, or landscaping. The submitted narrative (Exhibit B) does not address Section 17.90.160(L) and the submitted elevations (Exhibit C, Sheets A2.01 and A2.02) do not detail electrical and mechanical equipment. **On-grade and above-grade electrical and mechanical equipment such as transformers, heat pumps, and central air conditioner units shall be screened with sight obscuring fences, walls, or landscaping.**

FENCES/RETAINING WALLS – Chapter 17.74

53. Section 17.74.40 specifies, among other things, retaining wall and fence height in front, side, and rear yards. Retaining walls on property in commercial zones shall not exceed 4 feet in height in the front yard and 8 feet in height in the rear yard and side yards. The Grading and ESC Plan (Exhibit C, Sheet 7) and the Wall Cross Sections (Exhibit C, Sheet 8) detail retaining walls on the south, north, and east sides of the proposed mixed-use building lot. The narrative (Exhibit B) states that the walls will have a 3-foot-6-inch guardrail on top of them. The combined height of the retaining wall and fence on the south, north, and east sides exceed the maximum allowed fence height in a commercial zone per Section 17.74.40(B). The applicant has requested three (3) special variances to exceed the maximum allowed retaining wall and fence height for the south, north, and east sides of the mixed-use lot, which are discussed in more detail in Chapter 17.66 of this staff report.

VARIANCES – Chapter 17.66

54. The applicant requested the following four (4) variances:

- A. Type III Special Variance to Section 17.74.40(B.2) to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard (south side).
- B. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard (north side).
- C. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard (east side).
- D. Type III Tree Removal Variance

Variances A-C are processed through Chapter 17.66 and are reviewed in detail below. The Type II Tree Removal Variance is processed in accordance with Section 17.102.70 and is discussed in Chapter 17.102 of this document.

Variance A: Wall/Fence Height – Front Yard (South Side)

55. The applicant requested a Type III Special Variance to Section 17.74.40(B.2) to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard (south side).

56. To be granted a Type III Special Variance, the applicant must meet one of the following criteria in Section 17.66.80:

- A. The unique nature of the proposed development is such that:
 - 1. The intent and purpose of the regulations and of the provisions to be waived will not be violated; and
 - 2. Authorization of the special variance will not be materially detrimental to the public welfare and will not be injurious to other property in the area when compared with the effects of development otherwise permitted.
- B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
- C. When restoration or replacement of a nonconforming development is necessary due to damage by fire, flood, or other casual or natural disaster, the restoration or replacement will decrease the degree of the previous noncompliance to the greatest extent possible.

57. Staff believes the requested variance to Section 17.74.40(B.2) to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard meets Criterion A. As detailed on the Composite Site Plan (Exhibit C, Sheet 3) and the Grading and ESC Plan (Exhibit C, Sheet 7), the applicant is proposing an approximately 5-foot to 7-foot tall retaining wall on the south side (front) of Tax Lot 902 south of the proposed bicycle parking enclosure, stairs, and gazebo. The Site Plan includes a note (key note #17) that states the wall is +/- 7 feet. The Stairs Grading Detail on the Grading and ESC Plan labels the wall as 5-feet in height. The submittal items did not include an elevation profile of the entire wall so it is unclear what the maximum wall height is. The narrative (Exhibit B) states and the Enlarged

Site Plan (Exhibit C, Sheet A1.02) details that the wall will have a 3-foot-6-inch guardrail on top for a combined height of approximately 8.5 to 10.5 feet, depending on whether the wall is 5 feet as detailed on the Grading and ESC Plan or +/- 7 feet as detailed on the Site Plan. Neither the narrative or the Plan Set specify details on the type of retaining wall and type of guardrail that are proposed. Chapter 17.74 of the narrative states that the maximum 4-foot retaining wall/fence height in a front yard cannot be met due to the topography of the site. The narrative did not provide any additional information, nor did it address the variance criteria in Chapter 17.66. Because the subject parcel (Tax Lot 902) is a flag lot, the front lot line is not adjacent to the public right-of-way and appears more like a side yard or rear yard than a front yard. Per Section 17.74.40(B.4) a wall/fence in a commercial side yard or rear yard is permitted to be 8 feet in height. Thus, permitting a variance to allow the combined wall/fence height at 8 feet is in line with the intent of the height regulations and will not be detrimental to the adjacent property owner since the adjacent property owner would be outright permitted to have an 8-foot-tall wall/fence along the same property line since it is their rear yard. As proposed, the wall would only be visible from the subject property (Tax Lot 902). The property that abuts the subject property would only see the guardrail on top of the wall. In addition, there is an existing vegetative screen as indicated on the Existing Conditions and Demolition Plan (Exhibit C, Sheet 2) along the property line between the subject property (Tax Lot 902) and the property to the south (Tax Lot 700). It is also worth noting, that while there is an existing house to the south of the subject property, the existing zoning is General Commercial (C-2).

58. For the reasons discussed, **staff recommends the Planning Commission approve the requested variance to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard (south side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall and make a determination as follows:**

- A. **If the wall is 5-feet-tall as specified in the Stairs Grading Detail, staff recommends the Planning Commission approve the requested variance with a maximum wall height of 5 feet and a maximum guardrail height of 3.5 feet, in which case the applicant shall update the Plan Set to detail the south (front) retaining wall and fence as a maximum 5-foot-tall retaining wall with a maximum 3-foot-6-inch-tall guardrail on top.**
- B. **If the wall is greater than 5 feet in height, staff recommends the Planning Commission review the applicant's updated information regarding wall height and make a determination on the maximum wall height they'd support in a commercial front yard.**

In either case, the retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

Variance B: Wall/Fence Height – Rear Yard (North Side)

59. The applicant requested a Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard (north side).

60. To be granted a Type III Special Variance, the applicant must meet one of the following criteria in Section 17.66.80:

- A. The unique nature of the proposed development is such that:
 - 1. The intent and purpose of the regulations and of the provisions to be waived will not be violated; and
 - 2. Authorization of the special variance will not be materially detrimental to the public welfare and will not be injurious to other property in the area when compared with the effects of development otherwise permitted.
- B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
- C. When restoration or replacement of a nonconforming development is necessary due to damage by fire, flood, or other casual or natural disaster, the restoration or replacement will decrease the degree of the previous noncompliance to the greatest extent possible.

61. Staff believes the requested variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard meets Criterion A. As detailed on the Composite Site Plan (Exhibit C, Sheet 3), Grading and ESC Plan (Exhibit C, Sheet 7), and Wall Cross Sections (Exhibit C, Sheet 8), the applicant is proposing an approximately 12-foot to 14.9-foot tall retaining wall on the north side (rear) of Tax Lot 902. The Site Plan includes a note (key note #15) that states the wall is +/- 12 feet. The Wall Cross Sections detail one wall section at 14.9-feet in height (STA 1+00). The narrative (Exhibit B) states and the Enlarged Site Plan (Exhibit C, Sheet A1.02) details that the wall will have a 3-foot-6-inch guardrail on top for a combined height of approximately 15.5-feet to 18.4-feet, depending on whether the wall is +/- 12-feet as detailed on the Site Plan or 14.9-feet as detailed on the Wall Cross Section. The Wall Cross Sections specify the retaining wall is a modular wall but neither the narrative nor the Plan Set specify the type of modular retaining wall nor the type of guardrail that are proposed. Chapter 17.74 of the narrative states that the maximum 8-foot retaining wall/fence height in a rear yard cannot be met due to the topography of the site. The narrative did not provide any additional information, nor did it address the variance criteria in Chapter 17.66. Due to the conflicting information submitted by the applicant, staff finds it difficult to make a specific recommendation regarding maximum wall height; however, staff recognizes the topography of the site provides a design challenge and is generally supportive of a variance to exceed the 8-foot wall/fence height maximum in a commercial rear yard. It is also worth noting, that while there are existing houses to the north of the subject property, the existing zoning is General Commercial (C-2).

62. For the reasons discussed, **staff recommends the Planning Commission approve the requested variance to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard (north side). Staff recommends the Planning Commission**

require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial rear yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

Variance C: Wall/Fence Height – Side Yard (East Side)

63. The applicant requested a Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard (east side).
64. To be granted a Type III Special Variance, the applicant must meet one of the following criteria in Section 17.66.80:
- A. The unique nature of the proposed development is such that:
 - 1. The intent and purpose of the regulations and of the provisions to be waived will not be violated; and
 - 2. Authorization of the special variance will not be materially detrimental to the public welfare and will not be injurious to other property in the area when compared with the effects of development otherwise permitted.
 - B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
 - C. When restoration or replacement of a nonconforming development is necessary due to damage by fire, flood, or other casual or natural disaster, the restoration or replacement will decrease the degree of the previous noncompliance to the greatest extent possible.
65. Staff believes the requested variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard meets Criterion A. As detailed on the Composite Site Plan (Exhibit C, Sheet 3), Grading and ESC Plan (Exhibit C, Sheet 7), and Wall Cross Sections (Exhibit C, Sheet 8), the applicant is proposing an approximately 7.55-foot to 8-foot tall retaining wall on the east side (side yard) of Tax Lot 902. The wall is a continuation of the wall along the north property line. The Site Plan includes a note (key note #16) that states the wall is +/- 8-feet. The Wall Cross Sections detail the tallest wall section at 7.55-feet in height (STA 3+00) but the detail for the north wall section just before the wall turns the corner to the east is detailed at 11.75-feet (STA 2+50). The submittal items did not include an elevation profile of the entire wall, so it is unclear what the maximum wall height is for the portion of the wall on the east property line between stations 2+50 and 3+00. The narrative (Exhibit B) states and the Enlarged Site Plan (Exhibit C, Sheet A1.02) details that the wall will have a 3-foot-6-inch guardrail on top for a combined height of approximately 10.05-feet to 11.5-feet, or greater, depending on whether the wall is +/- 8 feet as detailed on the Site Plan or 7.55 feet as detailed on the Wall Cross Section at STA 3+00, or potentially taller north of STA 3+00. The Wall Cross Sections specify the retaining wall is a modular wall but neither the narrative nor the Plan Set specify the type of modular retaining wall nor the type of guardrail that are proposed. Chapter 17.74 of the narrative states that the

maximum 8-foot retaining wall/fence height in a side yard cannot be met due to the topography of the site. The narrative did not provide any additional information, nor did it address the variance criteria in Chapter 17.66. The wall and guardrail will be visible from the adjacent OTSD parking lot to the east and from Bluff Road. Due to the conflicting information submitted by the applicant, staff finds it difficult to make a specific recommendation regarding maximum wall height; however, staff recognizes the topography of the site provides a design challenge and is generally supportive of a variance to exceed the 8-foot wall/fence height maximum in a commercial side yard. It is also worth noting, that the properties to the east of the subject property are zoned as General Commercial (C-2) and owned by the Oregon Trail School District.

66. For the reasons discussed, **staff recommends the Planning Commission approve the requested variance to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard (east side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial side yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.**

ZONING and SETBACKS – Chapters 17.44 and 17.80

67. The applicant proposes constructing a four-story mixed-use building with associated parking and landscaping on Tax Lot 902. The building will contain self-service storage on the ground floor and 42 multi-family residential units above as permitted in the general commercial (C-2) zoning district per Sections 17.44.10(B.2.i) and 17.44.10(A.1), respectively. The applicant also proposes relocating the shared access driveway to span the common lot line between Tax Lots 902 and 1000, as well as reconfiguring the existing Paola's Pizza Barn parking lot, which is permitted as an accessory use per Section 17.44.10(C.3).
68. Section 17.44.30(A) contains the development requirements for the C-2 zoning district, which include a 20 percent minimum landscaping requirement. Per the submitted narrative (Exhibit B) and Enlarged Site Plan (Exhibit C, Sheet A1.02), the site contains 27.21 percent landscaping. It appears that this calculation is for the mixed-use development lot (Tax Lot 902) and does not include the Paola's Pizza Barn lot (Tax Lot 1000). The proposal includes removal of existing landscaping on Tax Lot 1000 to accommodate a relocated access driveway. **The applicant shall submit additional information on the percent landscaping on Tax Lot 1000 demonstrating that the 20 percent landscaping minimum is met.** Landscaping is discussed further in Chapter 17.92 of this staff report.
69. Per Section 17.44.30(A), the maximum structure height is 55-feet. The narrative (Exhibit B) and Elevations (Exhibit C, Sheet A2.01) detail the proposed mixed-use building height at 52-feet-2-inches to the mid-point of the highest gable, in compliance with the standard.
70. Section 17.44.30(A) requires a 10-foot minimum and 50-foot maximum front yard setback. Chapter 17.80 contains additional setback requirements on collector and arterial streets. Section 17.80.20 requires all structures to have a minimum setback of 20 feet to collector and arterial streets. Highway 26 is classified as an arterial street and, thus, all structures will need to be set back at least 20 feet from the applicable property line. The proposed mixed-use development is located on a flag lot, with the flag portion of the lot set back approximately 215 feet from Highway 26 and the proposed mixed-use building set back 10 feet from the south property line of the flag portion of the lot.

TRANSPORTATION AND IMPROVEMENTS – Chapter 17.84

71. Section 17.84.20 pertains to timing of required improvements. Section 17.84.20(A.2) states that where a land division is not proposed, the site shall have required public and franchise utility improvements installed or financially guaranteed in accordance with the provisions of Chapter 17 prior to temporary or final occupancy of structures. **The applicant shall install required public and franchise utility improvements prior to temporary or final occupancy of the proposed mixed-use building.**
72. Section 17.84.30 includes pedestrian and bicycle requirements. Section 17.84.30(A.2) requires all proposed sidewalks on arterial or collector streets to be six feet wide and separated from curbs by a tree planting area that is a minimum of five feet in width. As required by Section 17.84.30(B), safe and convenient pedestrian and bicyclist facilities that strive to minimize travel distance to the extent practicable shall be provided in conjunction with new development. The existing sidewalk along the subject properties and the adjacent properties to the east and west is curb-tight. As stated in the narrative (Exhibit B), the existing driveway will be relocated, and the sidewalk will be modified. The submitted Site Plans (Exhibit C, Sheets 3 and A1.01) do not detail sidewalk improvements. The narrative states the modified sidewalk will be a minimum of 5 feet in width, which is insufficient for an arterial street sidewalk. Based on Figure 6 of the 2011 Transportation System Plan, the required improvements for a 40-mph zone along Highway 26 include a 6-foot-wide bike lane, 6-inch curb, planter strip with street trees set back at least 6 feet from the curb, and 6-foot-wide sidewalk. Based on a total identified minimum width of 22 to 24 feet, the planter strip is required to be 9.5-11 feet in width. The recent Goodwill project west of the subject properties included an 11-foot-wide planter strip. It's unclear from the submittal items how much right-of-way remains behind the existing curb; however, as noted by ODOT (Exhibit O), the applicant will be required to dedicate right-of-way as necessary to accommodate the planned cross section and ADA improvements. Per the Assistant Public Works Director (Exhibit Q), **frontage improvements along Highway 26 shall be made in accordance with Figure 6 in the 2011 Transportation System Plan for a 40 MPH speed zone. ADA compliance and 6-foot sidewalks shall be maintained across the frontage. The applicant shall update the Plan Set to detail a minimum 6-foot-wide sidewalk, 9.5-foot to 11-foot-wide planter strip, 6-inch curb, and 6-foot-wide bike lane along the Highway 26 frontage of the subject properties. Street trees shall be planted 30 feet on center within the planter strip, with ODOT approval. The required width of the planter (minimum 9.5 feet up to 11 feet) shall be determined based on the relative location of the required street trees in relation to the overhead power lines such that the street trees are set back sufficiently so as not to grow into the power lines (minimum of 6 feet from curb). If an 11-foot-wide planting strip provides insufficient space to set back the street trees such that they won't grow into the power lines, the applicant shall plant short growth species to avoid conflict with overhead utilities.**
73. Section 17.84.50(B) outlines requirements for transportation impact studies for developments with dwellings. The applicant submitted a Transportation Analysis Letter (Exhibit G) from Lancaster Mobley, dated August 22, 2022. The City Transportation Engineer (Exhibit P) reviewed the letter and determined that a full traffic impact analysis is not triggered based on

a peak hour trip generation under the threshold for this development. This finding analyzes the Transportation Analysis Letter (TAL).

- A. According to the TAL, the proposed development would generate up to 16 site trips during the morning peak hour, 17 trips during the evening peak hour, and 196 average weekday trips.
- B. The City Transportation Engineer (Exhibit P) reviewed the TAL and provided the following comments in a letter dated January 17, 2023:
 - i. **The development shall contribute System Development Charges toward citywide impacts.**
 - ii. **Minimum sight distance requirements shall be met at all site driveways. Sight distances should be verified in the final engineering/construction stages of development.**
- C. ODOT (Exhibit O) reviewed the TAL and provided the following comments in a letter dated January 13, 2023:
 - i. The site of this proposed land use action proposes an access to US 26. ODOT has permitting authority for this facility and an interest in ensuring that this proposed land use is compatible with its safe and efficient operation. **The applicant shall contact the District Contact, Robbie Cox, at D2CAP@odot.oregon.gov to determine permit requirements and obtain application information.** Per the Assistant Public Works Director (Exhibit Q), **the applicant shall update the “Utility Notes” on Sheet 1 of the Plan Set to note that ODOT approval must be secured before constructing the new entrance on Highway 26.**
 - ii. **Right-of-way donated to ODOT as necessary to accommodate the planned cross section and ADA improvements shall be provided. The deed must be to the State of Oregon, Oregon Department of Transportation. The ODOT District contact will assist in coordinating the transfer. ODOT should provide verification to the local jurisdiction that this requirement has been fulfilled. The property owner must be the signatory for the deed and will be responsible for a certified environmental assessment of the site prior to transfer of property to the Department.** Note: It may take up to 3 months to transfer ownership of property to ODOT.
 - iii. **A State Highway Approach Road Permit from ODOT for access to the state highway for the proposed use is required and being completed. Truck turning templates shall be provided as needed to ensure vehicles can enter and exit the approach safely. Site access to the state highway is regulated by OAR 734.51. For application information go to <http://www.oregon.gov/ODOT/HWY/ACCESSMGT/Pages/Application-Forms.aspx>.** Note: It may take 2 to 3 months to process a State Highway Approach Road Permit.
 - iv. **The applicant shall record cross-over access easements to the adjacent properties with state highway frontage with the County Assessor to facilitate future shared access.** Shared access will improve highway safety by reducing potential conflicts between vehicles and between vehicles and pedestrians and

bicyclists at closely spaced driveways and will implement ODOT Access Management Program goals.

- v. **The applicant is advised that the subject property's highway frontage is access controlled. ODOT has acquired and owns access rights to the subject property. The subject property was granted a Reservation of Access, as recorded in the property deed. Based on the reviewed material, the proposal is relocating the access and an Indenture of Access is required and being processed. If ODOT approves an Indenture of Access, it changes the terms for using the access right and any modification must be recorded in a property deed. The owner is responsible for recording the deed and for any associated costs. Note: It may take 1 to 2 months to process an Indenture of Access.**
- vi. **An ODOT Miscellaneous Permit must be obtained for all work in the highway right-of-way.**

74. Sections 17.84.50(F and G) require public streets to be improved to City standards along the entire frontage of the property. Highway 26 is identified as an arterial street in the TSP and is therefore required to be improved to arterial street City standards. Per the Assistant Public Works Director (Exhibit Q), **frontage improvements along Highway 26 shall be made in accordance with Figure 6 in the 2011 Transportation System Plan for a 40 MPH speed zone. ADA compliance and 6-foot sidewalks shall be maintained across the frontage. The applicant shall update the Plan Set to detail a minimum 6-foot-wide sidewalk, 9.5-foot to 11-foot-wide planter strip, 6-inch curb, and 6-foot-wide bike lane along the Highway 26 frontage of the subject properties. Street trees shall be planted 30 feet on center within the planter strip, with ODOT approval. The required width of the planter (minimum 9.5 feet up to 11 feet) shall be determined based on the relative location of the required street trees in relation to the overhead power lines such that the street trees are set back sufficiently so as not to grow into the power lines (minimum of 6 feet from curb). If an 11-foot-wide planting strip provides insufficient space to set back the street trees such that they won't grow into the power lines, the applicant shall plant short growth species to avoid conflict with overhead utilities.**

PARKING, LOADING, AND ACCESS REQUIREMENTS – Chapter 17.98

75. Section 17.98.10(O) pertains to unassigned parking for residential developments. Multi-family developments with more than 10 required vehicle parking spaces shall provide unassigned parking. The unassigned parking shall consist of at least 15 percent of the total required parking spaces and be located to be available for use by all occupants and guests of the development. The applicant did not indicate whether they are planning to provide assigned parking or if all of the spaces will be unassigned. **If the applicant proposes assigned parking for the multi-family development, at least 15 percent of the total required parking spaces for the multi-family development shall be unassigned and available for use by all occupants and guests of the development.**
76. Section 17.98.20 contains off-street parking requirements. The proposed use is a mixed-use building with self-service storage on the ground floor and 42 multi-family residential units above. As stated in the narrative (Exhibit B), 30 of the residential units are 1-bedroom units and the remaining 12 residential units are 2-bedroom units. Per Section 17.98.20(A.8), a 1-bedroom unit requires a minimum of 1.5 parking spaces per unit and a 2-bedroom unit requires a minimum of 2 parking spaces per unit. In addition, one bicycle parking spaces is required for each residential unit. Therefore, the multi-family portion of the development requires 69 parking spaces $((30 \times 1.5) + (12 \times 2) = 69)$ and 42 bicycle parking spaces. Per Section 17.98.20(A.11), storage establishments require 1 parking space per employee on the largest shift and two (2) bicycle parking spaces. The submitted narrative (Exhibit B) states that a maximum of two (2) employees will be working at once. Therefore, the self-service storage portion of the development requires two (2) parking spaces and two (2) bicycle parking spaces. In total, the proposed mixed-use development requires 71 parking spaces and 44 bicycle parking spaces. The proposed mixed-use development includes 72 parking spaces in compliance with the required minimum as stated in the narrative (Exhibit B) and detailed on the site plans (Exhibit C, Sheets 3 and A1.02). The narrative also states there will be 20 bicycle parking stalls in a covered outdoor bicycle area and 8 bicycle racks on each residential floor for a total of 44 bicycle parking spaces in compliance with the required minimum.
77. In addition to the proposed mixed-use building and associated parking on Tax Lot 902, the applicant is proposing alterations to the existing parking lot for the Paola's Pizza Barn on Tax Lot 1000. The proposal includes removal of approximately 42 parking spaces located adjacent to the west property line of Tax Lot 1000, adjacent to the east property line of Tax Lot 1000, within the northern portion of the flagpole on Tax Lot 902, and just east of the existing Paola's Pizza Barn building to accommodate the proposed relocation of the shared access driveway, as well as a reconfiguration of the parking area to the rear (north) of the Paola's Pizza Barn building. One of the parking spaces proposed for removal is an ADA parking space. The proposed parking area north of the existing building includes 33 relocated parking spaces, none of which are detailed as ADA spaces. No changes are proposed to the parking area directly south of the Paola's Pizza Barn building, which contains 11 parking spaces. Per Section 17.98.20(A.10), eating or drinking establishments require 1 parking space per 250 square feet of gross floor area or 1 parking space per 4 fixed seats or stools, plus 1 per 2 employees. In addition, two (2) bicycle parking spaces or 5 percent of the minimum parking spaces (whichever is greater) are required. The submitted narrative (Exhibit B) does

not include any analysis of the existing and proposed changes to parking associated with the Paola's Pizza Barn. It is unclear if the site has any bicycle parking spaces, how many existing spaces there are, how many employees are present on the largest shift, the number of seats in the restaurant, or what the total square footage of the restaurant building(s) is. In addition, there are some issues related to the aisle width and vehicle maneuvering area related to the 11 existing spaces to the south of the existing building. **The applicant shall submit a parking analysis for the Paola's Pizza Barn on Tax Lot 1000, including an analysis of required parking spaces, existing parking spaces, proposed parking spaces, and ADA parking spaces, as well as a proposed reconfiguration of the parking area south of the building in compliance with Chapter 17.98. If the minimum parking requirements for parking spaces, ADA parking spaces, and/or bicycle parking spaces are not met, the applicant shall submit an updated parking plan for Tax Lot 1000 in conformance with Chapter 17.98 and ADA requirements.**

78. Section 17.98.160 contains requirements related to bicycle parking facilities. Per Section 17.98.160(B) each required bicycle parking space shall be at least two and one-half feet by six feet; vertical or upright bicycle storage structures are exempt from the parking space length. An access aisle of at least five feet wide shall be provided and maintained beside or between each row of bicycle parking. The submitted Bicycle Enclosure (Exhibit C, Sheet A1.04) details the proposed bicycle enclosure with 10 "Inverted U" bike racks separated into two rows with a 5-foot-wide access aisle between the two rows of bike racks. In addition, the Floor Plan – Levels 02-04 (Exhibit C, Sheet A1.22) details a bike storage room with eight (8) bike racks on each of the three residential floors. The covered bicycle area is located at the southwest side of the building and is not visible from the primary building entrance. However, the Plan Set details five (5) additional bike parking spaces near the primary entrance on the north side of the proposed mixed-use building, as labeled on the Preliminary Planting Plan (Exhibit C, Sheet L2.1).
79. Section 17.98.60 includes standards on parking lot design, size, and access. The Enlarged Site Plan (Exhibit C, Sheet A1.02) identifies 72 parking spaces on the mixed-use development lot (Tax Lot 902). The Enlarged Site Plan labels 28 of the spaces as "compact" and three (3) as ADA. The three (3) ADA parking spaces are all detailed at 9 feet by 18 feet, and one has a passenger side access aisle in compliance with the code and ORS 447.233. **Signage associated with the ADA parking spaces shall meet the head clearance distance requirement in the Building Code. All approved parking spaces shall be clearly delineated with painted lines and the entrance and exit driveways shall be signed or marked with paint.** The spaces that are labeled "compact" are detailed at 8 feet by 16 feet, with the exception of one (1) that is detailed at 9 feet wide with a depth of 18 feet on the west and 16 feet on the east. However, many of the other parking spaces that aren't labeled "compact" are also detailed at 16 feet in depth, which does not meet the minimum size requirement for a standard parking space. Only 13 of the proposed parking spaces on the mixed-use property meet the minimum 9-foot by 18-foot requirement for a standard parking space (including the three ADA parking spaces). Section 17.98.60(B.5) states that no more than 40 percent of the parking stalls shall be compact spaces. As detailed, 59 parking spaces (or 82 percent) are compact. **The applicant shall update the Plan Set to detail that a minimum of 43 (60 percent) of the parking spaces on Tax Lot 902 meet the minimum standard parking space size requirement (9 feet by 18 feet).**

80. The Enlarged Site Plan details 33 reconfigured parking spaces behind the existing Paola's Pizza Barn, and an additional 11 existing parking spaces in front of the Paola's Pizza Barn, including one ADA parking space with a passenger side aisle. All 33 parking spaces at the rear of the building are detailed at 9 feet by 18 feet with 25-foot-wide parking aisles. As previously stated, there are numerous issues with the existing parking area located to the south of the Paola's Pizza Barn Building. **The applicant shall submit a parking analysis for the Paola's Pizza Barn on Tax Lot 1000, including an analysis of required parking spaces, existing parking spaces, proposed parking spaces, and ADA parking spaces, as well as a proposed reconfiguration of the parking area south of the building in compliance with Chapter 17.98. If the minimum parking requirements for parking spaces, ADA parking spaces, and/or bicycle parking spaces are not met, the applicant shall submit an updated parking plan for Tax Lot 1000 in conformance with Chapter 17.98 and ADA requirements.**
81. Section 17.98.60(C) contains standards on parking lot aisle width. All parking lot aisles are proposed to meet or exceed the minimum aisle width standards for one-way and two-way parking lot aisles. The Enlarged Site Plan (Exhibit C, Sheet A1.02) details all parking lot aisles at 25 or 26 feet wide. The Composite Site Plan (Exhibit C, Sheet 3) details the northernmost parking aisle on Tax Lot 902 at 24.95 feet in width. The applicant is required to update the Plan Set to detail additional standard parking spaces, which may affect aisle width and/or landscaping. **The updated Plan Set shall demonstrate compliance with the aisle width standards in Section 17.98.60(C).**
82. Section 17.98.80(A) requires access from a lower functional order street. Both subject parcels (Tax Lots 902 and 1000) have frontage on Highway 26, with Tax Lot 902 being a flag lot. Neither parcel has access to any other streets. The parcels (Tax Lots 902 and 1000) are proposed to share an access from Highway 26. At the pre-application meeting for the subject application, ODOT provided pre-application meeting comments (Exhibit S) requiring the applicant to either work with the property owner of Tax Lot 900 to establish a crossover easement to one of the reservations located on the frontage of Tax Lot 9000, or to relinquish access rights to the engineering stations located on Tax Lot 900 in exchange for establishing access rights at the existing Paola's Pizza Barn access on Tax Lot 1000 (STA 759+40), with a crossover easement between Tax Lot 1000 and 902. At some point between the pre-application meeting and submittal of the land use application, ODOT revised their recommendation to require a shared access between Tax Lots 1000 and 902 but to relocate the access from the existing access at STA 759+40 further east to STA 759+85 such that the new access straddles the shared property line. Relocating the shared access and driveway further east, as proposed, requires removal of at least 13 mature trees, five (5) mature shrubs, and existing groundcover, and brings the proposal out of compliance with the landscape buffer requirement detailed in Sections 17.90.120(F) and 17.90.00(C.2). Staff reached out to ODOT staff for more information regarding the updated access location recommendation and received a response (Exhibit T). ODOT explained that they have been having issues with shared accesses where the access is strictly located on one parcel and the owners of the parcel with the access block the access for the other parcel. ODOT's updated recommendation to relocate the shared access such that the center line of the shared access is on the shared lot line between Tax Lots 1000 and 902 removes the likelihood of one owner blocking another

owner's right to access. Staff understands this concern but also recognizes that relocating the access will bring the subject properties out of compliance with Sections 17.90.120(F) and 17.90.00(C.2). Moreover, staff requires that a shared access easement be recorded regardless of whether the existing shared access is maintained or if the shared access is relocated. The location of the shared access and the requirement to comply with the landscape buffer requirement are discussed further in Section 17.90.120(F) of this document.

83. Section 17.98.120 contains landscaping and screening provisions for parking areas. Section 17.98.120(A) requires screening of parking areas containing 4 or more spaces. Section 17.92.80 requires buffering in conjunction with issuance of construction permits for parking areas containing four or more spaces, loading areas, and vehicle maneuvering areas. The proposal includes a parking area associated with the proposed mixed-use development on Tax Lot 902 and modifications to the Paola's Pizza Barn parking areas, driveway, and aisles on Tax Lot 1000. The Enlarged Site Plan (Exhibit C, Sheet A1.02) and Preliminary Planting Plan (Exhibit C, Sheet L2.1) detail boundary plantings between the parking areas and adjacent properties as well as plantings between parking bays and vehicle maneuvering areas.

The Enlarged Site Plan details the landscaping buffers at 5-feet in width for the most part; however, the middle landscape planter in the double row of parking spaces on Tax Lot 902 is detailed at 5 feet wide including the curb. **The applicant shall update the Plan Set to detail planter and boundary areas in the parking lot at a minimum diameter of five feet (two and one-half foot radius, inside dimensions).**

Neither the Enlarged Site Plan nor the Preliminary Planting Plan detail a landscaping buffer along the west side of the newly configured parking area behind the Paola's Pizza Barn on Tax Lot 1000. **The applicant shall update the Preliminary Planting Plan to detail a minimum 5-foot-wide (interior dimension) landscape planter with a mix of low-lying ground cover and shrubs, and vertical shrubs and trees between the proposed westernmost parking row on Tax Lot 1000 and the property to the west.**

In addition, the Enlarged Site Plan includes a note (Keynote 8) that indicates there will be a retaining wall with a guardrail on top located within the landscaping buffer along the north and east property lines of Tax Lot 902. It is unclear exactly where the retaining wall is proposed to be located. **The applicant shall submit section drawings that clearly detail the parking area, landscaping area, retaining wall, guardrail, and property lines for the areas between the parking area and the north and east property line; the landscape buffer shall have a minimum inside dimension of 5 feet.**

84. Section 17.98.120(B) requires parking in a commercial district that adjoins a residential district to include a site-obscuring screen that is at least 80 percent opaque when viewed horizontally from between 2 and 8 feet above the average ground level. Although there are residences to the north and south of the proposed mixed-use development, all adjacent properties are zoned General Commercial, C-2, so this standard is not applicable.
85. Section 17.98.120(C) requires parking facilities to include at least 10 percent landscaping. The Enlarged Site Plan (Exhibit C, Sheet A1.02) states that the overall landscaping for the mixed-use development site (Tax Lot 902) is 27.21 percent. Although the plan does not

include a landscaping analysis for the parking area specifically, a majority of the proposed landscaping consists of planter bays and buffers within the parking area. In addition, the applicant did not submit any information on the percent of landscaping on Tax Lot 1000. **The applicant shall submit additional information regarding landscaping in the parking areas on Tax Lot 1000 to ensure that the 10 percent minimum landscaping standard is met.**

86. Section 17.98.120(D) restricts parking bays to no more than 20 spaces and requires landscape planters at the ends of each parking bay that have a minimum width of five feet and a minimum length of 17 feet for a single depth bay and 34 feet for a double bay. Each planter shall contain one major structural tree and ground cover. The Preliminary Planting Plan (Exhibit C, Sheet L2.1) details planter bays at the ends of a majority of the parking bays that are at least five feet in width by 17 feet in length with one major structural tree and ground cover; however, there are multiple planter bays that do not meet the minimum 5-foot by 17-foot requirement and/or do not detail one major structural tree and groundcover. **The applicant shall update the Preliminary Planting Plan to detail a landscape planter at the end of each parking bay at a minimum width of 5-feet and a minimum length of 17-feet, exclusive of curb, with one major structural tree and ground cover.**
87. Section 17.98.120(E) states that parking area setbacks shall be landscaped with major trees, shrubs, and ground cover. Section 17.92.80 requires parking area buffers to contain a balance of low-lying ground cover and shrubs, and vertical shrubs and trees. The submitted Preliminary Planting Plan (Exhibit C, Sheet L2.1) details landscaping buffers between parking areas and adjacent properties; however, the buffers along the east and west property lines of Tax Lot 902 and the west property line of Tax Lot 1000 are detailed to only contain groundcover. **The applicant shall update the Preliminary Planting Plan to detail a mix of groundcover, shrubs, and trees in the required landscaping buffers between parking areas and adjacent properties.**
88. Section 17.98.120(F) requires wheel stops or other methods to protect landscaped areas and pedestrian walkways. The Preliminary Planting Plan (Exhibit C, Sheet L2.1) and the Enlarged Site Plan (Exhibit C, Sheet A1.02)) detail wheel stops in all of the reconfigured parking spaces on Tax Lot 1000, and in the middle rows and southern row of parking spaces on Tax Lot 902. Section 17.98.120(F) allows parking to project over an internal sidewalk provided a minimum clearance of five feet for pedestrian circulation is maintained. Section 17.92.10(D) states that where the curb or the edge of a required planter or boundary area is used as a tire stop for parking, the planter or boundary plantings shall be a minimum width of seven and one-half feet. The applicant will be required to update the parking plan to include standard sized parking spaces, which may affect the landscaping buffers. **The updated Plan Set shall either detail wheel stops in the parking spaces adjacent to landscaping and walkways (5-foot minimum, exclusive of curb) to protect landscaping and pedestrian walkways, or shall detail a minimum planting area of 7.5 feet, exclusive of curb, adjacent to all parking spaces that use the curb as a tire stop and a minimum clearance of 5 feet for pedestrian walkways that are adjacent to parking spaces that use the curb as a tire stop.**

89. Section 17.98.130 requires that all parking and vehicular maneuvering areas shall be paved with asphalt or concrete. As required by Section 17.98.130, **all parking, driveway, and maneuvering areas shall be constructed of asphalt, concrete, or other approved material.**
90. Section 17.98.140 requires parking areas, aisles, and turnarounds to provide adequate provisions for on-site collection of stormwater to eliminate sheet flow onto sidewalks, public rights-of-way, and abutting private property. **The applicant shall comply with the requirements of Section 13.18 of the Sandy Municipal Code.**
91. Section 17.98.150 requires lighting to be provided in all required off-street parking areas. The applicant submitted a lighting fixture schedule for new site lighting, and a photometric plan. These submittals are reviewed in Chapter 15.30 of this document.
92. Section 17.98.190 contains minimum standards for off-street loading facilities for commercial and industrial developments and states that all commercial and industrial uses that anticipate loading and unloading of products/materials shall provide an off-street area for loading/unloading of products/materials. The proposal includes self-service storage on the ground floor, which is expected to require loading and unloading of products/materials. The Enlarged Site Plan (Exhibit C, Sheet A1.02) details a loading area near the east entrance of the mixed-use building. **The required loading berth shall be not less than ten feet in width by 35 feet in length and shall have an unobstructed height clearance of 14 feet. The applicant shall update the Plan Set to detail a minimum 10-foot by 35-foot loading area with 14 feet of clearance. The loading area shall be delineated either by striping or use of a different material. The loading area shall be screened from public view from public streets and from adjacent properties.**

UTILITIES – Chapters 17.84 and 15.30

93. Section 17.84.60 outlines the requirements of public facility extensions. The applicant submitted an Entry Utility Plan (Exhibit C, Sheet 4) and a Site Utility Plan (Exhibit C, Sheet 5) that show the location of proposed water, sanitary sewer, and stormwater drainage facilities for Tax Los 902 and 1000.
94. The Assistant Public Works Director (Exhibit Q) reviewed the proposal and notes that the plans and overview show potential encroachment into the sanitary sewer line (and possibly easement) between the proposed mixed-use building and the south property line. Section 17.84.90(A.2) requires the easement to be a minimum of 15 feet wide. The space between the building and the property line appears to be only 10 feet wide. The building's second story is also cantilevered, which appears to encroach even further into the existing area that needs to be maintained for future access to the sewer line. Lastly, grades are difficult to determine since they do not show the depth of the sewer, but the building is six or seven feet below native ground adjacent to the sewer on the south side of the building. **The applicant shall update the Plan Set to detail a 15-foot-wide sanitary sewer easement where the existing sewer line runs along the south property line of the flag portion of Tax Lot 902. The applicant shall update the Plan Set to detail the proposed building, including the cantilever, outside of the 15-foot easement. Alternatively, the applicant may be able to abandon the existing public sanitary sewer line along the south property line of Tax Lot 902 and relocate the public sanitary sewer line such that it extends further north from the point the existing sewer line enters Tax Lot 902 and aligns with the proposed parking aisles on Tax Lot 902 and then connects to the private sewer lateral on Tax Lot 1000. In this case, the applicant shall record a 15-foot easement reflecting the updated location of the public sanitary sewer line on Tax Lot 902.**
95. Broadband vault/conduit infrastructure are required for all new developments. **The applicant shall provide SandyNet with a set of PGE utility and street/sidewalk lighting plans to design and return a SandyNet broadband deployment plan to overlay in the dry utility shared trench. SandyNet will provide requirements for layout and acceptable materials for the developer/contractor. SandyNet shall be contacted after installation of infrastructure and coordinated for onsite inspection before backfilling the common trench. Plans for SandyNet design shall be sent to Greg Brewster gbrewster@ci.sandy.or.us, 503-953-4604. The onsite contact for general questions and inspections will be Ron Yow, ryow@ci.sandy.or.us, 541-514-9771.**
96. Franchise utilities will be provided as required in Section 17.84.80. The location of these utilities shall be identified with building permit plans and installed or guaranteed prior to the mixed-use building site receiving a certificate of occupancy. **All franchise utilities shall be installed underground. The developer shall make all necessary arrangements with franchise utility providers.**
97. Eight-foot-wide public utility easements (PUE) are required along all property lines abutting a public right-of-way. Both properties (Tax Lots 902 and 1000) contain frontage on Highway 26. **The applicant shall record an eight-foot-wide public utility easement along the entirety of the Highway 26 right-of-way of Tax Lots 902 and 1000.**

98. Section 17.84.100 outlines the requirements for mail delivery facilities. **The location and type of mail delivery facilities shall be coordinated with the City Engineer and the Post Office as part of the construction plan process.**
99. The Fire Marshal (Exhibit N) reviewed the proposal and provided general comments as well as comments related to fire apparatus access and firefighting water supplies. **The applicant shall comply with all applicable Oregon Fire Code requirements.** When buildings are completely protected with an approved automatic fire sprinkler system, the requirements for fire apparatus access and water supply may be modified as approved by the fire code official. **The applicant shall adhere to all Fire Marshal requirements in Exhibit N, including but not limited to the following:**
- A. **Construction documents detailing compliance with fire apparatus access and fire protection water supply requirements shall be provided to Sandy Fire District for review and approval concurrently with building permit submittal. All construction activities shall comply with the applicable Oregon Fire Code and the Fire Code Application Guide.**
 - B. **The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction. The plan shall address the requirements found in OFC Chapter 33 and shall be made available for review by the fire code official upon request.**
 - C. **Where fire apparatus access roads or a water supply for fire protection are required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction except where approved alternative methods of protection are provided.**
 - D. **Buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property, including monument signs.**
 - E. **A key lock box for building will be required to provide access to common use areas, the fire alarm control panel(s), and the fire sprinkler riser room(s). The Fire District uses KNOX brand boxes. To order a KNOX box keyed for the Sandy Fire District, please visit Sandy Fire's website (<https://www.knoxbox.com/Products>) for ordering information.**
 - F. **Knox Box Contents. When more than one key is secured in the Knox Box, each key shall be legibly identified as to its use, utilizing a round key tag that is a minimum of 1-inch in diameter. Necessary keys provided by the building owner or business owner may include: a) Main entrance door, b) Fire Alarm Control Panel, c) Alarm codes, d) Manual pull stations, e) Fire Sprinkler Control padlock/s, f) Mechanical rooms, g) Elevator control, h) Attic or roof access, and i) Any other keys necessary to access building controls.**
 - G. **An emergency vehicle access and maintenance agreement shall be deeded and recorded as a condition of approval.**
 - H. **New buildings four or more stories above grade plane, except those with a roof slope greater than four units vertical in 12 units horizontal (33.3% slope), shall be provided with a stairway to the roof.**

- I. **Commercial buildings exceeding three stories or 30 feet in height shall have not fewer than two means of fire apparatus access for each building.**
 - J. **A minimum of one on-site fire hydrant shall be provided near the proposed mixed-use development for firefighting operations. If distances between fire hydrants exceeds 500 feet, additional on-site fire hydrants may be required along the fire apparatus access road.**
 - K. **Fire department connections (FDC) are required to be remote and shall be located within 100 feet of a public fire hydrant. All FDC's shall be permanently labeled with appropriate address in which it serves and shall be accessible and visible from the fire apparatus access road.**
 - L. **Each new fire hydrant installed shall be ordered in an OSHA safety red finish and have a 4-inch non-threaded metal faced hydrant connection with cap installed on the steamer port (4 ½-inch NST x 4-inch Storz Adaptor). If a new building, structure, or dwelling is already served by an existing hydrant, the existing hydrant shall also be OSHA safety red and have a 4-inch non-threaded metal faced hydrant connection with cap installed.**
100. **The applicant submitted a preliminary stormwater report (Exhibit F). All site runoff shall be detained such that post-development runoff does not exceed the predevelopment runoff rate for the 2, 5, 10 and 25 year storm events. Stormwater quality treatment shall be provided for all site drainage per the standards in the City of Portland Stormwater Management Manual (COP SWMM).**
101. **The proposal includes an offsite stormwater conveyance line as detailed on the Stormwater Extension Plan (Exhibit C, Sheet 6) that extends through three properties to the north before connecting to an existing storm line connection into a ditch inlet in Meeker Street. Per the Assistant Public Works Director (Exhibit Q), the applicant shall confirm that the storm system shown is private until it outfalls to the ditch inlet. New storm lines shall require an easement through each property. The applicant shall record all necessary easements for offsite utilities. Based on the proposed location of the stormwater conveyance line, it appears that a number of existing trees on the properties to the north may be negatively affected. The applicant shall submit additional information from the project arborist or third-party arborist regarding the proposed stormwater conveyance line extension that evaluates impacts on offsite trees and outlines strategies to minimize negative impacts to existing trees. The applicant shall retain the project arborist or third-party arborist on site during extension of the storm line within the critical root zone of 1-foot per 1-inch DBH of the offsite trees. If any of the offsite trees need to be removed, the applicant and subject property owner shall submit a tree removal application in accordance with Chapter 17.102.**
102. **Chapter 15.30 contains the City of Sandy's Dark Sky Ordinance. The applicant submitted a Site Lighting Plan (Exhibit D, Sheet E0.00), Photometric Plan (Exhibit D, Sheet E0.01), and a lighting fixture cut sheet (Exhibit E) for a D-Series Size 0 LED Area Luminaire by Lithonia Lighting. The Site Lighting Plan details four (4) single-headed lights and five (5) double-headed lights and specifies that the lights will be 3,000 Kelvins in compliance with the code. Downward facing, full cut-off lighting shall be required. Lights shall not exceed 4,125 Kelvins or 591 nanometers to minimize negative impacts on wildlife and human health.**

103. Section 15.30.060(D) states that all outdoor lighting systems shall be designed and operated so that the area ten feet beyond the property line of the premises receives no more than one-quarter of a foot-candle of light from the premises lighting system. The submitted Photometric Plan (Exhibit D, Sheet E0.01) details foot candles extending 10 feet beyond the property lines. Light trespass onto adjacent properties is detailed to exceed the 0.25 foot-candle maximum on the property east of the flagpole (Tax Lot 900) as well as the property east of the flag portion of Tax Lot 902 (Tax Lot 600). In addition, the applicant is required to provide lighting along the proposed path south of the mixed-use building, which will need to be analyzed for light trespass. **The applicant shall update the Photometric Plan such that the area ten feet beyond the property line of the subject properties receives no more than one-quarter of a foot-candle of light from the development's lighting system.**

URBAN FORESTRY – 17.102

104. In addition to the landscaping requirements of Chapter 17.92, Chapter 17.102 contains Urban Forestry regulations. An Arborist Report prepared by Caleb Lattimer of Teragan & Associates and dated September 22, 2022, is included as Exhibit H. The arborist inventoried all trees 2-inches and greater diameter at breast height (DBH) on the subject property as well as trees on the adjacent properties that may be impacted by development on the subject property. The inventory of existing trees is also included in the Plan Set (Existing Tree Inventory; Exhibit C, Sheet L1.01), though the one included in the Arborist Report is more accurate and comprehensive in terms of existing trees and species identification. However, the arborist report was based on an outdated version of the site plan. The arborist report also shows a number of trees in the southeast corner of Tax Lot 902 marked for removal (with an X) that are marked as being retained in the inventory and in the Plan Set. In addition, the only trees detailed in the arborist report on Tax Lot 1000 are those located within the existing landscape buffer in the southeast corner of Tax Lot 1000. It appears that there may be a couple additional trees on Tax Lot 1000 located in the southwest corner in front of the existing building. **The applicant shall update the Tree Retention Plan in the Arborist Report to reflect the updated site plan, the retention of the trees in the southeast corner of Tax Lot 902, and the location, condition, and species of any additional trees on Tax Lot 1000.**
105. The applicant's Arborist Report was reviewed by a third-party arborist reviewer. The third-party review was conducted by Todd Prager of Todd Prager & Associates, LLC and is dated January 19, 2023 (Exhibit R). The third-party review noted the outdated site plan used in the applicant's arborist report and states: "The main differences appear to be on the east side of the site adjacent to trees 28 through 30. The site plan changes should be reviewed by the project arborist to ensure the trees will be adequately protected. Particular attention should be paid to the location of the proposed retaining wall adjacent to trees 31 and 32 (see sheet 3 in Attachment 2) and the proposed grading that potentially conflicts with the root zones of trees 28 and 29 (see sheet 7 in Attachment 2)." **The project arborist shall review the site plan changes on the east side of Tax Lot 902 and shall ensure the trees marked for retention will be adequately protected. Particular attention shall be paid to the location of the proposed retaining wall adjacent to Trees #31 and 32 (see sheet 3 in Attachment 2 of the third-party arborist review (Exhibit R)) and the proposed grading that potentially conflicts with the root zones of Trees #28 and 29 (see sheet 7 in Attachment 2 of the third-party arborist review (Exhibit R)).**
106. Section 17.102.50(A) contains tree retention requirements and requires retention of at least three (3) trees per acre. Retention trees are required to be 11-inches DBH or greater, healthy, likely to live to maturity, and be located to minimize the potential for blow-down. Based on the acreage of the subject properties, a minimum of seven (7) retention trees are required. The applicant is proposing to retain one (1) tree on the subject properties. The tree proposed for retention is a 28-inch DBH bigleaf maple (Tree #28) determined to be in good condition and fair structure, with multiple stems at the base and deadwood in the crown. Tree #28 is located along the east property line at the southeast corner of Tax Lot 902. Because the proposal does not meet the minimum tree retention requirement, the applicant is requesting a variance to the tree retention requirement pursuant to Section 17.102.70.

107. Section 17.102.70 outlines the process for a variance to the minimum tree retention standard. Under a Type III review process, the Planning Commission may allow newly-planted trees to substitute for retained trees if the substitution is at a ratio of at least two-to-one (i.e., at least two native quality nursery grown trees will be planted for every protected tree that is removed) and the substitution more nearly meets the intent of this chapter due to the location of the existing and proposed new trees, or the physical condition of the existing trees or their compatibility with the existing soil and climate conditions, or an undue hardship is caused by the requirement for retention of existing trees, or tree removal is necessary to protect a scenic view corridor. Neither the applicant's arborist report (Exhibit H) nor the narrative (Exhibit B) addressed Section 17.102.70 or specified why the tree retention variance was being requested. The third-party arborist review (Exhibit R) reviewed the applicant's proposal as well as the code requirements and determined there are six (6) potential retention trees that meet the criteria of Section 17.102.50(A). The six (6) potential retention trees are:

- Tree #4 (a 12-inch DBH Colorado blue spruce in good condition)
- Tree #5 (an 11-inch DBH western redcedar in good condition)
- Tree #11 (a 15-inch DBH Norway spruce in good condition)
- Tree #28 (a 28-inch DBH bigleaf maple in good condition)
- Tree #33 (a 24-inch DBH Douglas fir in good condition)
- Tree #34 (a 24-inch DBH Douglas fir in good condition).

These six (6) retention tree candidates are highlighted in yellow on Attachment 1 and 2 of the third-party arborist review (Exhibit R). The third-party arborist report states: "Of these trees, tree 28 is proposed for retention while the remaining trees will be removed. Trees 33 and 34 do not appear practicable to retain based on their locations towards the center of the site within the proposed parking lot. However, trees 4, 5, and 11 may be possible to retain if the site access could be reconfigured. It should be clarified whether the driveway reconfiguration is an ODOT requirement, or a recommendation. Based on this clarification, a determination can be made as to whether up to four retention trees could be retained, or if only one retention tree can be retained. The balance of required retention trees could be mitigated if a variance is approved by the Planning Commission according to Sec. 17.102.70."

108. In addition to the six (6) trees that meet the retention standards of being 11-inches DBH or greater and in good condition, there are a few additional trees that are either in good condition but less than 11-inches DBH, or 11-inches DBH or greater but in fair condition. In the past, the Planning Commission has allowed trees slightly smaller than 11-inches DBH in good condition to count as retention trees and has allowed 11-inch or greater trees in fair condition to count as retention trees at a 2:1 ratio (two trees in fair condition count as one retention tree). There are a few existing trees on the subject properties that could be potential retention trees based on these criteria; these are:

- Tree #4.1 (a 10-inch DBH Colorado blue spruce in good condition)
- Tree #7 (a 10-inch DBH windmill palm in good condition)
- Tree #10 (a 16-inch sugar maple in fair condition)
- Tree #35 (a 12-inch DBH bigleaf maple in fair condition).

Three (3) of the four (4) trees (Trees #4.1, 7, and 10) are located near the southeast corner of the subject properties in the existing landscape buffer along Highway 26 and the fourth tree (Tree #35) is located towards the center of the site within the proposed parking lot. Retention of Tree #7 would depend on how much right-of-way needs to be dedicated to accommodate the required street frontage improvements.

109. The applicant is proposing to retain one (1) tree on the subject properties: Tree #28. The third-party arborist review evaluated whether Tree #28 can be adequately protected from construction impacts, taking into account the area of root zone impacts by the proposed construction, grading, and retaining wall in the root zone of the tree. As identified in the third-party arborist review (Exhibit R): “The currently proposed impacts include grading within four feet of the tree’s trunk and disturbance of approximately 40 percent of its root zone. This well exceeds the City’s typical minimum tree protection zone in Figure 1 and will likely not provide adequate protection for tree 28. The applicant should explore whether it is possible to construct a retaining wall as shown in the example markup on sheet L2.1 in Attachment 2 to limit root zone disturbance to less than 25 percent and limit grade changes and any construction to at least 14 feet from tree 28. If this is possible, the tree could be adequately protected.” Thus, based on the applicant’s proposal and the third-party arborist review, only one (1) retention tree is proposed (Tree #28); however, adequate protection of that tree would require additional protection measures to limit root zone disturbance such that the tree is likely to grow to maturity as required of a retention tree per Section 17.102.50(A.3).

In addition to the proposed retention tree (Tree # 28), there are five (5) other trees that meet the tree retention requirements (Trees #4, 5, 11, 33, and 34) as well as four (4) additional trees that are close to meeting the retention requirements and could be potential candidates (Trees #4.1, 7, 10, and 35). Of these nine (9) additional retention tree candidates, three (3) trees (Trees #33, 34, and 35) are located towards the center of the site within the proposed parking lot and do not make sense to retain based on their location. Staff finds that these three (3) trees (Trees #33, 34, and 35) meet variance criteria 17.102.70(B.1). The remaining six (6) trees (Trees #4, 4.1, 5, 7, 10, and 11) are all located in the existing required landscape buffer along Highway 26 in the southeast corner of the subject properties. The applicant is proposing to remove all of these existing trees (as well as others that don’t meet the retention standards) in order to accommodate relocation of the shared access driveway per ODOT’s request. Removal of these trees could potentially meet tree variance criteria B.1 (in Section 17.102.70) due to ODOT’s request to relocate the shared access driveway. Staff would prefer to see existing healthy trees retained rather than plant mitigation trees due to the low survival rate and continued code enforcement issues that mitigation trees have historically resulted in. Staff understands ODOT’s concerns and desire to relocate the shared access driveway, but staff is also required to uphold the requirements of the Development Code, including the following:

- The landscape buffer requirement outlined in Section 17.90.120(F)
- The Sandy Style guiding principle to protect the landscape buffer along Highway 26 in Section 17.90.00(C.2)

- Excessive tree removal and/or grading that may harm existing vegetation within a designated landscape conservation area is explicitly listed as an element incompatible with Sandy Style in Section 17.90.00(D.1)
- The minimum tree retention standards in Section 17.102.50(A)
- The tree protection standards in Section 17.92.10(C)

As discussed in Section 17.90.120(F) of this document, the applicant will be required to either:

- A. Retain the existing landscape buffer, including the existing trees and other vegetation, and keep the existing location of the shared access driveway (or another location approved by ODOT that does not impact the existing landscape buffer), -OR-
- B. Relocate the required landscape buffer to allow the shared access driveway to be located on the shared property line as requested by ODOT.

If the applicant chooses option A, five (5) to six (6) trees that either meet or are close to meeting the retention standards could likely be retained (Trees #4, 4.1, 5, 10, and 11 should be able to be retained and Tree #7 may also be able to be retained depending on how much right-of-way dedication is required) in addition to Tree #28. If the applicant chooses option B, Tree #28 is the only potential retention tree that could be retained. **Staff recommends the Planning Commission determine whether they want to grant a variance to the tree retention standards in Section 17.102.50 based on the criteria in Section 17.102.70. Staff recommends the Planning Commission review the existing and proposed driveway location keeping in mind both ODOT's recommendation and the City's Development Code requirements, particularly Sections 17.90.00(C.2), 17.90.00(D.1), 17.90.120(F), and 17.92.10(C), in addition to the tree retention requirements of Chapter 17.102. If the Planning Commission decides to grant a variance to the minimum tree retention standards, staff recommends the Planning Commission determine the minimum number of retention trees they will require be retained. In addition, if the Planning Commission grants a variance to allow the applicant to not retain the minimum number of trees, staff recommends the Planning Commission require that all new landscaping on the property be native species or water-efficient species acclimated to the Willamette Valley (see the Water-Efficient Plants for the Willamette Valley booklet). The applicant shall update the Preliminary Planting Plan to detail native species or water-efficient plants acclimated to the Willamette Valley, consistent with the conservation benchmarks in the City of Sandy 2016 Water Management and Conservation Plan.**

110. With regards to Tree #28, **the applicant shall explore whether it is possible to construct a retaining wall near Tree #28 to limit root zone disturbance to less than 25 percent and limit grade changes and any construction to at least 14 feet from Tree #28 (see the example markup on sheet L2.1 in Attachment 2 of the third-party arborist review). If this is possible, Tree #28 could be adequately protected and counted as a retention tree. If this is not possible, the applicant shall mitigate for Tree #28 by planting two (2) mitigation trees on the subject properties.** With regards to Trees #4, 4.1, 5, 7, 10, and 11, **the applicant shall either:**

- A. **Retain existing Trees #4, 4.1, 5, 7, 10, and 11 as retention trees.** This will require adequately protecting the trees throughout construction such that they remain healthy and likely to grow to maturity. Tree protection fencing will be required at the critical root zone of 1-foot per 1-inch DBH, with allowance for up to 25 percent impact to the critical root zone provided there is no encroachment into the minimum root protection zone of 0.5-feet per 1-inch DBH.
- B. **Mitigate for Trees #4, 4.1, 5, 7, 10, and 11 at a minimum 2:1 ratio.** This will require planting (or paying a fee in lieu of mitigation for) 12 mitigation trees. If the applicant chooses this option, the required landscape buffer along Highway 26 will need to be relocated and planted per Section 17.90.120(F). As discussed in Section 17.90.120(F) of this document, this will include planting nine (9) trees within the relocated landscape buffer.

111. This finding analyzes the potential need for mitigation trees. Based on whether or not Tree #28 can be adequately protected and retained and whether the applicant chooses option A or B, the applicant may need to mitigate for one or more required retention trees, which could result in up to 14 required mitigation trees. These mitigation trees will need to be planted on the subject properties and located such that they can grow to maturity. If there is insufficient space to plant the required number of mitigation trees, the City may require a fee-in-lieu of mitigation tree for one or more required mitigation trees at \$500 per tree.

As required by Section 17.102.70(A), mitigation trees are required to be native species, and are typically planted “like for like.” Five of the six retention tree candidates are evergreen conifers (2 Colorado blue spruce, 2 Doug firs, and a Norway spruce) and the sixth is a large native deciduous tree (a bigleaf maple). Of the four (4) potential retention candidates, one is an evergreen conifer, one is an evergreen palm, and two are large deciduous trees. Thus, a minimum of 10-12 of the mitigation trees would need to large native evergreen trees, such as Alaska yellow cedar, incense cedar, Douglas fir, or western hemlock, and the remaining 2-4 mitigation trees would need to be large native deciduous trees, such as bigleaf maple or red alder. Staff analyzed the proposed development on both subject properties and determined the following in relation to the location of potential mitigation trees.

- A. Based on an analysis of the proposed site and landscape plans for the mixed-use development site (Tax Lot 902), staff determined that if mitigation trees were to be planted on the flag lot (Tax Lot 902), they would need to be placed within the proposed 1,785 square foot open lawn area in the northwest corner of the flag lot in order to ensure sufficient soil volume and planting space, and to reduce potential future conflicts with built structures or other development. **If the applicant needs to plant mitigation trees on Tax Lot 902, the mitigation trees shall be planted in the 1,785 square foot open lawn area in the northwest corner of the lot.** The third-party arborist (Exhibit R) reviewed the proposed mixed-use development site and landscaping plans and noted there is one black gum (*Nyssa sylvatica*) proposed in that location, which has a 20- to 30-foot-wide mature crown spread. That leaves a remaining planting space of approximately 55 to 60 linear feet. Based on that analysis, the third-party arborist recommends no more than one to two large, native, evergreen trees to be planted in the 1,785 square foot open lawn area to avoid

excessive competition over time between trees growing in that location. In addition, there is a proposed stormwater conveyance line that bisects the proposed open lawn area. **The applicant shall plant no more than two (2) of the required mitigation trees within the 1,785 square foot open space area in the northwest corner of Tax Lot 902.**

- B. Any remaining required mitigation trees would either need to be planted on Tax Lot 1000 or the applicant would need to pay a fee-in-lieu of mitigation tree at \$500 per tree. The only non-developed area on Tax Lot 1000 that could accommodate mitigation trees is the northern portion of the site, north of the proposed parking lot. While there appears to be sufficient space to accommodate planting some mitigation trees, there is also a stormwater conveyance line that is proposed to enter the northern portion of Tax Lot 1000 from the east and then turn north, continuing through the northern portion of Tax Lot 1000 and exiting at the north property line. **If the applicant needs to plant additional mitigation trees on Tax Lot 1000, the trees shall be planted on the northern portion of Tax Lot 1000 and the applicant shall submit analysis from the project arborist or third-party arborist detailing that the northern portion has sufficient soil volume and planting space to accommodate the necessary number of mitigation trees (large native evergreens). If the applicant is unable to provide sufficient soil volume and planting space for the necessary number of mitigation trees, the applicant shall pay a fee-in-lieu of mitigation tree at \$500 per tree for the number of mitigation trees the site cannot support.**

All proposed mitigation trees will need to be kept alive and healthy. To help maximize the health and survival of the mitigation trees in the future, **the applicant shall adhere to the following conditions:**

- **The applicant shall aerate and amend the soil prior to planting the mitigation trees and shall submit documentation from the project landscaper stating that the soil has been amended and aerated prior to planting the mitigation trees.**
- **The applicant shall not anchor anything to the mitigation trees, compact the soil under the dripline, or otherwise harm or damage the mitigation trees.**
- **The mitigation trees shall be a minimum of 5 feet in height at time of planting and planted per the City of Sandy standard planting detail. All ties and burlap shall be removed from the root ball prior to planting. If the burlap cannot be completely removed from the root ball without compromising the integrity of the root ball, the burlap shall be removed from at least the top one third of the side of the root ball. If the mitigation trees are staked, the applicant shall use loosely tied twine to tie the trees to the stake and the twine shall be removed after the first growing season but no later than one year from being planted.**
- **The mitigation trees shall be adequately watered for at least the first three dry seasons (summers). To help ensure proper watering, the applicant shall install an irrigation system, such as drip-line irrigation.**

112. There are also multiple existing trees on the adjacent properties to the south (Tax Lot 900) and east (Tax Lots 500 and 600) of Tax Lot 902 that will be retained; however, due to their

proximity to the shared property line with Tax Lot 902, development of Tax Lot 902 will impact the root systems of these trees. Negative impacts to these existing trees on adjacent properties should be minimized to the greatest extent practicable. The third-party arborist report (Exhibit R) identifies 21 trees on adjacent properties that are proposed to be retained and protected with development (highlighted in green on Attachment 1 and 2 of the third-party review). The third-party arborist reviewed the impact of the proposed construction adjacent to these with the trees' critical root zones (1 foot per 1-inch DBH) and minimum root protection zones (0.5 feet per 1-inch DBH) as detailed in Figure 1 of the third-party review and determined that there are 12 trees on neighboring properties that will not be able to meet the minimum trees protection zone requirements as detailed in Figure 1. The third-party review outlines the following recommendations to protect the neighboring trees in addition to the protection measures outlined in the applicant's arborist report.

- **Trees 2.1, 2.3, and 13.2:** Consider shifting the pedestrian pathway so it is directly adjacent to the driveway alignment at the driveway entrance adjacent to trees 2.1 and 2.3. Also, consider shifting the entire driveway further from all three trees if allowed by ODOT. **If the applicant chooses to locate the driveway along the shared property line, the applicant shall update the Plan Set to detail the pedestrian walkway so it's directly adjacent to the driveway alignment at the driveway entrance adjacent to Trees #2.1 and 2.3.**
- **Tree 15:** Consider locating utilities under the sidewalk or driveway so they are further from the tree. **The applicant shall update the Utility Plan to locate utilities under the sidewalk or driveway so they are further from Tree #15.**
- **Trees 21, 23, 24, 25, and 26:** Trees 21, 24, 25, and 26 are nuisance species (sweet cherry, *Prunus avium*). Consider discussing removal with the tree owner rather than protecting this low value species.
- **Trees 29, 31, and 32:** These trees have the greatest potential to be impacted based on the sizes of the root zones and proximity of grading or retaining walls. Consider whether a retaining wall could be used to prevent grading within the typical minimum construction setback radius of tree 29. For trees 31 and 32, consider removing the parking space closest to the tree and shifting the retaining wall to the edge of the parking lot and driveway access to avoid the typical minimum construction setback radii of the trees. **The applicant shall consider whether a retaining wall could be used to prevent grading within the typical minimum construction setback radius of Tree #29. For Trees #31 and 32, the applicant shall consider removing the parking space closest to the tree and shifting the retaining wall to the edge of the parking lot and driveway access to avoid the typical minimum construction setback radii of the trees.**

113. The Arborist Report (Exhibit H) provides recommendations for protection of retained trees including identification of the recommended tree protection zone for these trees as detailed on page 9 of the report. However, as previously stated, the arborist report is based on an outdated site plan. The third-party arborist review (Exhibit R) reviewed the proposed tree

protection fencing plan and added the critical root zone and minimum root protection zones to the page 9 plan used in the applicant's arborist report as well as to the updated site plan in Attachment 2 of the third-party report. **The applicant shall update the proposed tree protection fencing plan on page 9 of the arborist report to reflect the updated site plan. The update tree protection shall address the third-party recommendation for a retaining wall to protect Tree #28 and shall detail the tree fencing such that no more than 25 percent of the critical root zone of Tree #28 is impacted with no encroachment into the minimum root zone, or, if this is not feasible and Tree #28 cannot be adequately protected, Tree #28 shall not count as a retention tree. The applicant shall install tree protection fencing as detailed on the updated tree protection fencing plan. Tree protection shall comply with the following requirements:**

- The tree fencing shall be installed prior to any development activity on the site, including earthwork, tree removal, and erosion control measures, in order to protect the trees and the soil around the trees from disturbance.
- Erosion control fencing shall be installed outside of the tree protection area fencing. If erosion control is required inside the tree protection zones, use straw wattles to minimize root zone disturbance of the trees to be retained.
- The applicant shall not relocate or remove the tree protection fencing prior to the certificate of occupancy.
- The tree protection fencing shall be 6-foot-tall chain link or no-jump horse fencing supported with metal posts placed no farther than 10 feet apart installed flush with the initial undisturbed grade.
- The applicant shall affix laminated signs (minimum 8.5 inches by 11 inches, placed every 75 feet or less) to the tree protection fencing with the following information as recommended by the project arborist:

TREE PROTECTION ZONE, DO NOT REMOVE OR ADJUST THE APPROVED LOCATION OF THIS TREE PROTECTION FENCING, Please contact the City's Planning Division and the project arborist if alterations to the approved location of the tree protection fencing are necessary. Planning Division – planning@cityofsandy.com. [Name], Project Arborist – [Phone Number/contact].

- No construction activity shall occur within the tree protection zone, including, but not limited to, grading, clearing, excavation, access, stockpiling, or dumping or storage of materials such as building supplies, soil, waste items, equipment, or parked vehicles.
- The applicant shall request an inspection of tree protection measures with City staff and the project arborist prior to any tree removal, grading, or other construction activity on the site.
- Up to 25 percent of the area between the minimum root protection zone of 0.5 feet per 1-inch DBH and the critical root zone of 1 foot per 1-inch DBH may be able to be impacted without compromising the tree, provided the work is monitored by a qualified arborist.

- **The applicant shall retain an arborist on site to monitor any construction activity within the critical root protection zones of the retention trees or trees on adjacent properties that have critical root protection zones that would be impacted by development activity on the subject property.**
- **Prior to receiving a certificate of occupancy, the applicant shall submit a post-construction arborist report prepared by the project arborist or other TRAQ certified arborist to assess whether any of the retention trees were damaged during construction. If retention trees were damaged and need to be replaced, the mitigation ratio shall be 4:1 achieved through planting mitigation trees and/or paying a fee in lieu of mitigation tree as determined by staff.**

114. Page 9 of the applicant's arborist report (Exhibit H) details trees proposed to be retained and trees proposed for removal. The plan details Trees #28 and #29 as being removed; however, the tree inventory on page 8 notes these two trees will be retained, which is also reflected in the Plan Set. **The applicant shall update the tree retention plan on page 9 of the arborist report to indicate retention of Trees # 28 and 29. The applicant shall not remove any trees that aren't marked for removal.**
115. The applicant did not provide specific information regarding how the trees proposed for removal with this application would be felled. **The applicant shall have the trees felled such that they do not negatively impact existing trees that will remain either on the subject properties or the adjacent properties. Tree removal shall be completed without the use of vehicles or heavy equipment in the tree protection zone. Removal of any trees from within the critical root zones of protected retention trees or existing trees on adjacent properties shall be completed under the supervision of the project arborist and the applicant shall fell the trees to be removed away from the trees to be retained so they do not contact or otherwise damage the trunks or branches of the trees to be retained.**
116. The applicant did not indicate if there are nests in the trees proposed for removal. **If the trees are removed during prime nesting season (February 1- July 31), the applicant shall check for nests prior to tree removal. If nests are discovered, the applicant shall delay tree removal until after the nesting season or shall hire a professional to relocate the nests to an appropriate nearby location, provided the species using the nest is not invasive.**
117. The applicant's submitted Arborist Report (Exhibit H) and the third-party arborist review (Exhibit R) include recommendations for additional protection measures related to tree removal as well as tree protection recommendations for the trees to be retained. **The applicant shall adhere to recommendations contained in the arborist report and third-party arborist review including the following:**
- The project arborist shall be onsite during excavation within the critical root zones of retained Trees # 13.2, 14, 15, 21, 23, 24, 25, 26, 28, 29, 31, and 32.
 - The project arborist shall evaluate and oversee the proper cutting of roots with sharp cutting tools. If many significant roots are encountered during excavation in the zones

highlighted in Appendix 5 of the arborist report, an alternative layout for areas requiring excavation should be considered to maintain the health and safety of retained trees. Alternate methods of construction may also be necessary for the preservation of significant roots of retained trees. Other construction methods include but are not limited to bridging over significant roots, constructing sidewalks on top of grade over landscape fabric without excavation, and using post and beam construction instead of conventional footing foundations within the critical root zone.

- The arborist report (with updates as required) and the third-party arborist review shall be shared in their entirety to the project team, including contractors performing demolition and concrete work.
- The applicant shall adhere to the tree protection specifications contained in Appendix 3 of the arborist report (pages 4-6) including requirements before construction begins, during construction, and after construction.

118. **To ensure protection of the required retention and mitigation trees, the applicant shall record a tree protection covenant specifying protection of the approved retention and mitigation trees on the subject properties and limiting removal without submittal of an Arborist's Report and City approval. The covenant shall detail the species and locations of the mitigation trees and retention trees as well as the critical root zones of each retention tree at 1 foot per 1-inch DBH. This covenant shall be finalized after the post-construction arborist report.**

LANDSCAPING AND SCREENING – Chapter 17.92

119. Section 17.92.10 contains general provisions for landscaping. As required by Section 17.92.10(C), trees over 25-inches circumference measured at a height of 4.5 feet above grade are considered significant and should be preserved to the greatest extent practicable and integrated into the design of a development. Trees to be retained shall be protected from damage during construction by a construction fence located five feet outside the dripline. A 25-inch circumference tree measured at 4.5 feet above grade has roughly an eight-inch diameter at breast height (DBH). The applicant is proposing to remove a majority of the trees on the site and the proposed development will likely negatively impact existing trees on adjacent properties. Tree retention and protection are discussed in more detail in the Urban Forestry, Chapter 17.102, section of this document.
120. **Per Section 17.92.10(D), planter and boundary areas used for required plantings shall have a minimum diameter of five feet (two and one-half foot radius, inside dimensions). Where the curb or the edge of these areas are used as a tire stop for parking, the planter or boundary plantings shall be a minimum width of seven and one-half feet.**
121. Per Section 17.92.10(L), **all landscaping shall be continually maintained, including necessary watering, weeding, pruning, and replacing.** Landscaping will be maintained or otherwise enforced by Code Enforcement.
122. Section 17.92.20 contains minimum landscaping area requirements. The subject property is zoned General Commercial, C-2. Section 17.92.20 requires that a minimum of 20 percent of the site be landscaped in the General Commercial (C-2) zoning district. The submitted Enlarged Site Plan (Exhibit C, Sheet A1.02) details a 27.21 percent landscaping area on the mixed-use development site (Tax Lot 902). As a condition of approval, the applicant is required to provide additional standard sized parking spaces, which may affect the landscaping area. **The applicant shall submit confirmation that the proposal meets the minimum landscaping requirement on Tax Lot 902 after all required updates are made to the Plan Set.** The applicant did not submit the percent landscaping for the Paola's Pizza Barn lot (Tax Lot 1000). The proposal includes removal of existing landscaping on Tax Lot 1000 to accommodate a relocated access driveway. **The applicant shall submit additional information on the percent landscaping on Tax Lot 1000 demonstrating that the 20 percent landscaping minimum is met.**
123. Section 17.92.30 states that planting of trees is required for all parking lots with four or more parking spaces, public street frontages, and along private drives more than 150 feet long. Parking lot trees are required at 1 medium tree per 8 parking spaces, or 1 large tree per 12 parking spaces. The mixed-use development (Tax Lot 902) contains 72 parking spaces, which requires a minimum of 9 medium trees. The Preliminary Planting Plan details 10 medium-large trees in the parking area, as well as three (3) small trees. Two additional trees will also need to be planted to meet the requirements of Section 17.98.120(D). Tax Lot 1000 contains approximately 44 parking spaces, which requires a minimum of 6 parking lot trees. The Preliminary Planting Plan (Exhibit C, Sheet L2.1) details planting 2 parking lot trees on Tax Lot 1000. However, as previously stated, in order to be in compliance with Section 17.98.120(D), **the applicant shall update the Preliminary Planting Plan to detail one**

major structural tree and ground cover in the landscape planters at each end of each parking bay. This will require a reconfiguration of the parking in front (south) of the existing Paola's Pizza Barn building.

124. The applicant is proposing to mass grade the area of the subject properties that will be developed as detailed on the Grading and ESC Plan (Exhibit C, Sheet 7). This will remove topsoil and will heavily compact the existing soil. To maximize the success of the landscaping required to be planted, **the applicant shall aerate and amend the soil within the planting areas on the buildable portion of the site to a depth of 3 feet prior to planting required landscaping. The applicant shall submit a letter from the project landscaper confirming that the soil has been aerated and amended prior to planting required landscaping.**
125. Section 17.92.40 requires that all landscaping shall be irrigated, either with a manual or automatic system. The Preliminary Planting Plan (Exhibit C, Sheet L2.1) states that the irrigation system will be an "automated underground system design build by the landscape contractor." **The applicant shall submit details on the proposed automatic irrigation system with building plans. Per Section 17.92.10(L), all landscaping shall be continually maintained, including necessary watering, weeding, pruning and replacing.**
126. Section 17.92.50 specifies the types and sizes of plant materials that are required when planting new landscaping. Trees are typically required to be a minimum caliper of 1.5-inches measured 6 inches from grade if deciduous, or 5 feet in height if coniferous. Shrubs are required to be a minimum of one gallon in size or two feet in height when measured immediately after planting. **All trees planted on the site shall be a minimum of 1.5-inches in caliper measured 6 inches above the ground (if deciduous) or 5 feet in height (if coniferous) and shall be planted per the City of Sandy standard planting detail. Trees shall be planted, staked, and bark mulch, vegetation, or other approved material installed prior to occupancy. Tree ties shall be loosely tied twine or other soft material and shall be removed after one growing season (or a maximum of 1 year). All shrubs shall be a minimum of one gallon in size or 2-feet in height when measured immediately after planting.**
127. Section 17.92.50(B) encourages the use of native plant materials or plants acclimatized to the Pacific Northwest where possible. The Preliminary Planting Plan (Exhibit C, Sheet L2.1) includes two native plants. The remaining proposed plants are not native to the Pacific Northwest but are also not nuisance species. **Staff recommends the applicant update the Preliminary Planting Plan to detail native species or water-efficient plants acclimated to the Willamette Valley. If the Planning Commission approves the applicant's request for a variance to the minimum tree retention standards, staff recommends the Planning Commission require the applicant to update the Planting Plan to detail all new landscaping as native species or water-efficient species acclimated to the Willamette Valley,** consistent with the conservation benchmarks in the City of Sandy 2016 Water Management and Conservation Plan.
128. Section 17.92.60 requires revegetation in all areas that are not landscaped or remain as natural areas. The applicant did not submit any plans for re-vegetation of areas damaged

through grading/construction. Most of the areas affected by grading on Tax Lot 902 will be improved; however, the plans show grading on the north section of Tax Lot 1000 to accommodate the storm sewer in a portion of the site that does not contain any proposed development. **Areas where natural vegetation has been removed or damaged through grading or construction activity in areas not affected by the landscaping requirements and that are not to be occupied by structures or other improvements shall be replanted.**

129. Section 17.92.80 requires boundary plantings in parking, loading, and vehicle maneuvering areas to buffer these uses from adjacent properties and the public right-of-way. Parking lot buffer landscaping is discussed in further detail in Section 17.98.120 of this document.
130. Section 17.92.130 contains standards for a performance bond. The applicant has the option to defer the installation of trees and other landscaping for weather-related reasons. Staff recommends the applicant utilize this option rather than planting trees and landscaping during the dry summer months. Consistent with the warranty period in Section 17.92.140, staff recommends a two-year maintenance and warranty period for trees and landscaping. **If the applicant chooses to postpone tree and/or landscaping installation, the applicant shall post a performance bond equal to 120 percent of the cost of the trees/landscaping, assuring planting within 6 months. The cost of the trees shall be based on the average of three estimates from three landscaping contractors; the estimates shall include as separate items all materials, labor, and other costs of the required action, including a two-year maintenance and warranty period.**

PARKLAND AND OPEN SPACE – Chapter 17.86

131. Section 17.86.10 includes minimum parkland dedication requirements and requires residential developments, including multi-family development, to provide parkland to serve the residents of the development. The proposed 42 multi-family units are required to provide 0.571 acres of parkland (42 units x 2 persons/units x 0.0068 per person parkland dedication factor). Per the submitted narrative (Exhibit B), the applicant proposes payment in lieu of land dedication. Section 17.86.10(C) and 17.86.40 pertain to fee in lieu of dedication. Sections 17.86.40(A-C) state that the City shall accept a fee in lieu of dedication if the land area proposed for dedication is not identified in the 2022 Parks and Trails Master Plan proposed park system or proposed trail system and if the level of service standard for mini parks described in the 2022 Parks and Trails Master Plan has been satisfied. The Parks and Recreation Director (Exhibit M) reviewed the application and code criteria and recommends a fee-in-lieu of parkland dedication. The current fee-in-lieu amount is \$869,242.00 per acre. A payment in lieu of land dedication is separate from Park Systems Development Charges (SDCs) and is not eligible for a credit of Park SDCs. **The applicant shall pay a fee in lieu of parkland dedication in the amount of \$496,337.18 (0.571 acres x \$869,242 per acre). The fee in lieu of dedication shall be paid at the time of building permit issuance for the mixed-use building.**

EROSION CONTROL – Chapters 15.44 and 8.04

132. A separate Grading and Erosion Control Permit will be required prior to any site grading. **The applicant shall submit a grading and erosion control permit and request an inspection of installed devices prior to any additional grading onsite.**
133. Section 15.44.50 contains requirements for maintenance of a site including re-vegetation of all graded areas. **All erosion control and grading shall comply with Section 15.44 of the Municipal Code. The proposed development is greater than one acre which typically requires approval of a DEQ 1200-C Permit.**
134. **All the work within the public right-of-way and within the paved area should comply with American Public Works Association (APWA) and City requirements as amended.**
135. Recent development has sparked unintended rodent issues in surrounding neighborhoods. Prior to development of the site, **the applicant shall have a licensed pest control agent evaluate the site to determine if rat eradication is needed. The result of the evaluation shall be submitted to staff.**
136. The Assistant Public Works Director (Exhibit Q) reviewed the proposal and noted that it appears that the construction entrance is called out with a wash station on Sheet 9 of the Plan Set. **The applicant shall confirm the location and dimensions of the construction entrance.**

RECOMMENDATION

Staff recommends the Planning Commission **approve** the proposed mixed-use development and parking lot reconfiguration request **with conditions as outlined in the staff report**.

Staff further recommends the Planning Commission **approve** the following requested variances:

- A. Type III Special Variance to Section 17.74.40(B.2) to exceed the 4-foot maximum height of a retaining wall and fence in a commercial front yard (south side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall and make a determination as follows:
- If the wall is 5-foot-tall as specified in the Stairs Grading Detail, staff recommends the Planning Commission approve the requested variance with a maximum wall height of 5 feet and a maximum guardrail height of 3.5 feet, in which case the applicant shall update the Plan Set to detail the south (front) retaining wall and fence as a maximum 5-foot-tall retaining wall with a maximum 3-foot-6-inch-tall guardrail on top.
 - If the wall is greater than 5 feet in height, staff recommends the Planning Commission review the applicant's updated information regarding wall height and make a determination on the maximum wall height they'd support in a commercial front yard.

In either case, the retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

- B. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial rear yard (north side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial rear yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.
- C. Type III Special Variance to Section 17.74.40(B.4) to exceed the 8-foot maximum height of a retaining wall and fence in a commercial side yard (east side). Staff recommends the Planning Commission require the applicant to submit clarification on the height of the wall, review public testimony, and make a determination on the maximum wall height they'd support in a commercial side yard (with a 3.5-foot guardrail on top). The retaining wall shall be a split face block wall or alternative wall reviewed and approved by the

Director and the guardrail shall be black steel or aluminum picket fence, or submit a similar alternative design to staff for review and approval. Where the fence pickets are required as a guard from falling, the space between pickets shall be less than 4 inches.

Staff recommends the Planning Commission determine whether they want to grant a variance to the tree retention standards in Section 17.102.50 based on the criteria in Section 17.102.70. Staff recommends the Planning Commission review the existing and proposed driveway location keeping in mind both ODOT's recommendation and the City's Development Code requirements, particularly Sections 17.90.00(C.2), 17.90.00(D.1), 17.90.120(F), and 17.92.10(C), in addition to the tree retention requirements of Chapter 17.102. If the Planning Commission decides to grant a variance to the minimum tree retention standards, staff recommends the Planning Commission determine the minimum number of retention trees they will require be retained. In addition, if the Planning Commission grants a variance to allow the applicant to not retain the minimum number of trees, staff recommends the Planning Commission require that all new landscaping on the property be native species or water-efficient species acclimated to the Willamette Valley (see the Water-Efficient Plants for the Willamette Valley booklet), consistent with the conservation benchmarks in the City of Sandy 2016 Water Management and Conservation Plan. The applicant shall update the Preliminary Planting Plan to detail native species or water-efficient plants acclimated to the Willamette Valley.

In either case, the applicant will be required to update the Plan Set to detail a minimum 20-foot-deep landscape buffer that comprises at least 30 percent (51 feet minimum) of the combined Highway 26 frontage of the subject properties in compliance with Section 17.90.120(F). Staff recommends the Planning Commission require the applicant to either:

- A. Retain the existing 65-foot landscape buffer as is, including retaining all of the existing trees and shrubs for a minimum depth of 20 feet. This option would require keeping the current shared access driveway location at STA 759+40, or as otherwise approved by ODOT, terminating the shared access easement at STA 759+85, recording an updated shared access easement reflecting that location, and updating the driveway and sidewalk design in compliance with ODOT and ADA standards.
- B. Update the Plan Set to detail an alternative landscape buffer that meets the requirements of Section 17.90.120(F). If the applicant chooses to propose an alternative landscape buffer location, the applicant shall update the Preliminary Planting Plan to detail retention of all existing trees within the buffer area as well as planting a mix of both deciduous and evergreen trees (nine (9) trees minimum), shrubs, and groundcover at a quantity sufficient to provide a partial buffer within two (2) years from the date they are planted. The proposed plants shall be selected from the list in Section 17.90.120(F.3). However, due to concerns with Asian Long-horned Beetle, the maple species are not currently permitted; cascara, pacific dogwood, or an alternative native deciduous tree species reviewed and approved by staff shall be selected instead.

Additional Staff Recommendations

1. Staff recommends the Planning Commission require mechanical, electrical, and communications equipment to be screened from view from pedestrian amenity areas and parking areas in addition to being screened from public rights-of-way and civic spaces.

RECOMMENDED CONDITIONS OF APPROVAL

A. Prior to submittal of trade permits and/or grading or other construction permits, the applicant shall update the plans submitted with the land use application to include the following items as specified below:

1. Update the Plan Set to detail the following:
 - a. A colored concrete inlay crosswalk connecting the pedestrian walkway located in the flagpole of Tax Lot 902 across the shared driveway aisle to the Paola's Pizza Barn entrance in compliance with the design standards of Section 17.90.120(A.5 and 7). The pedestrian crossing shall have a paved delineation in the form of a colored concrete inlay.
 - b. A minimum 20-foot-deep landscape buffer that comprises at least 30 percent (51 feet minimum) of the combined Highway 26 frontage of the subject properties in compliance with Section 17.90.120(F). The applicant shall either:
 - i. Retain the existing 65-foot landscape buffer as is, including retaining all of the existing trees and shrubs for a minimum depth of 20 feet. This option would require keeping the current shared access driveway location at STA 759+40, or as otherwise approved by ODOT, terminating the shared access easement at STA 759+85, recording an updated shared access easement reflecting that location, and updating the driveway and sidewalk design in compliance with ODOT and ADA standards.
 - ii. Update the Plan Set to detail an alternative landscape buffer that meets the requirements of Section 17.90.120(F). If the applicant chooses to propose an alternative landscape buffer location, the applicant shall update the Preliminary Planting Plan to detail retention of all existing trees within the buffer area as well as planting a mix of both deciduous and evergreen trees (nine (9) trees minimum), shrubs, and groundcover at a quantity sufficient to provide a partial buffer within two (2) years from the date they are planted. The proposed plants shall be selected from the list in Section 17.90.120(F.3). However, due to concerns with Asian Long-horned Beetle, the maple species are not currently permitted; cascara, pacific dogwood, or an alternative native deciduous tree species reviewed and approved by staff shall be selected instead.
 - c. The location of the mail delivery area in a convenient location efficiently designed for residents and mail delivery personnel and in accordance with U.S. Postal Service requirements. The location and type of mail delivery facilities shall be coordinated with the City Engineer and the Post Office as part of the construction plan process.
 - d. A minimum 6-foot-wide sidewalk, 9.5- to 11-foot-wide planter strip, 6-inch curb, and 6-foot-wide bike lane along the Highway 26 frontage of the subject properties. Street trees shall be planted 30 feet on center within the planter strip. The required width of

the planter (minimum 9.5 feet up to 11 feet) shall be determined based on the relative location of the required street trees in relation to the overhead power lines such that the street trees are set back sufficiently so as not to grow into the power lines (minimum of 6 feet from curb). If an 11-foot-wide planting strip provides insufficient space to set back the street trees such that they won't grow into the power lines, the applicant shall plant short growth species to avoid conflict with overhead utilities.

- e. Revise the "Utility Notes" on Sheet 1 of the Plan Set to note that ODOT approval must be secured before constructing the new entrance on Highway 26.
 - f. A minimum of 43 (60 percent) of the parking spaces on Tax Lot 902 meet the minimum standard parking space size requirement (9 feet by 18 feet).
 - g. Demonstrate compliance with the aisle width standards in Section 17.98.60(C).
 - h. Planter and boundary areas in the parking lot at a minimum diameter of five feet (two and one-half foot radius, inside dimensions).
 - i. Either detail wheel stops in the parking spaces adjacent to landscaping and walkways (5-foot minimum, exclusive of curb) to protect landscaping and pedestrian walkways, or detail a minimum planting area of 7.5 feet, exclusive of curb, adjacent to all parking spaces that use the curb as a tire stop and a minimum clearance of 5 feet for pedestrian walkways that are adjacent to parking spaces that use the curb as a tire stop.
 - j. A minimum 10-foot by 35-foot loading area with 14 feet of clearance. The loading area shall be delineated either by striping or use of a different material.
 - k. A 15-foot-wide sanitary sewer easement where the existing sanitary sewer line runs along the south property line of the flag portion of Tax Lot 902. Detail the proposed building, including the cantilever, outside of the 15-foot sanitary sewer easement. Alternatively, the applicant may be able to abandon the existing public sanitary sewer line along the south property line of Tax Lot 902 and relocate the public sanitary sewer line such that it extends further north from the point the existing sewer line enters Tax Lot 902 and aligns with the proposed parking aisles on Tax Lot 902 and then connects to the private sewer lateral on Tax Lot 1000. In this case, the applicant shall record a 15-foot easement reflecting the updated location of the public sanitary sewer line on Tax Lot 902.
 - l. If the applicant chooses to locate the driveway along the shared property line, the applicant shall update the Plan Set to detail the pedestrian walkway so it's directly adjacent to the driveway alignment at the driveway entrance adjacent to Trees #2.1 and 2.3.
2. Update the Floor Plans and Elevations to detail the following:
- a. Articulated elevations on all four ground floor (level 01) building facades meeting the

wall plane requirements of Section 17.90.120(B) (i.e., distinct planes of no more than 40 linear feet with recessed or projecting sections that project or recede at least six inches from the adjacent plane, for a length of at least four feet).

- b. Offsets at a minimum of every 20 feet by providing recesses or extensions with a minimum depth of eight feet on the upper floors (levels 02-04) of all four elevations of the proposed mixed-use building. If this cannot be accomplished, the applicant will need to apply for an adjustment or variance to Section 17.90.160(D).
 - c. Battens at a minimum of two-inches wide by one-inch deep and spaced 24 inches apart or closer.
 - d. Two (2) additional windows (detailed at 3-feet by 5-feet-6-inches per elevation note #16) on the ground floor of the north elevation. The two (2) additional windows shall be added to the north wall of the mini-storage office to the west of the main lobby entrance.
 - e. An apartment directory in the lobby.
3. Update the Photometric Plan to detail the following:
- a. The area ten feet beyond the property line of the premises receives no more than one-quarter of a foot-candle of light from the premises lighting system
 - b. Detail all walkways and parking lots illuminated at 1.5 – 2.0 foot-candles.
 - c. Detail path lighting along the proposed pedestrian walkway on the south side of the mixed-use building at 1.5 – 2.0 foot-candles. To prevent impact within the critical root zones of existing trees on the adjacent property to the south (Tax Lot 900), staff recommends solar path lighting; however, if electrical conduit is installed, the applicant shall bore the conduit at a minimum depth of 18-inches under the critical root zone of the existing trees under supervision of an ISA-certified arborist.
4. Update the Preliminary Planting Plan to detail the following:
- a. A minimum 5-foot-wide (interior dimension) landscape planter with a mix of low-lying ground cover and shrubs, and vertical shrubs and trees between the proposed westernmost parking row on Tax Lot 1000 and the property to the west.
 - b. A landscape planter at the end of each parking bay at a minimum width of 5-feet and a minimum length of 17-feet, exclusive of curb, with one major structural tree and ground cover.
 - c. A mix of groundcover, shrubs, and trees in the required landscaping buffers between parking areas and adjacent properties.
5. Update the Tree Retention Plan and Planting Plan based on the following required considerations:
- a. Consider discussing removal of Trees #21, 24, 25, and 26 (all of which are nuisance species (sweet cherries)) with the adjacent property owner rather than protecting this low value species.
 - b. The applicant shall consider whether a retaining wall could be used to prevent grading within the typical minimum construction setback radius of Tree #29. For

Trees #31 and 32, the applicant shall consider removing the parking space closest to the tree and shifting the retaining wall to the edge of the parking lot and driveway access to avoid the typical minimum construction setback radii of the trees.

- c. The applicant shall explore whether it is possible to construct a retaining wall near Tree #28 to limit root zone disturbance to less than 25 percent and limit grade changes and any construction to at least 14 feet from Tree #28 (see the example markup on sheet L2.1 in Attachment 2 of the third-party arborist review). If this is possible, Tree #28 could be adequately protected and counted as a retention tree. If this is not possible, the applicant shall mitigate for Tree #28 by planting two (2) mitigation trees on the subject properties.
- d. The project arborist shall review the site plan changes on the east side of Tax Lot 902 and shall ensure the trees marked for retention will be adequately protected. Particular attention shall be paid to the location of the proposed retaining wall adjacent to Trees #31 and 32 (see sheet 3 in Attachment 2 of the third-party arborist review (Exhibit R)) and the proposed grading that potentially conflicts with the root zones of Trees #28 and 29 (see sheet 7 in Attachment 2 of the third-party arborist review (Exhibit R)).
- e. With regards to Trees #4, 4.1, 5, 7, 10, and 11, the applicant shall either:
 - i. Retain existing Trees #4, 4.1, 5, 7, 10, and 11 as retention trees. This will require adequately protecting the trees throughout construction such that they remain healthy and likely to grow to maturity. Tree protection fencing will be required at the critical root zone of 1-foot per 1-inch DBH, with allowance for up to 25 percent impact to the critical root zone provided there is no encroachment into the minimum root protection zone of 0.5-feet per 1-inch DBH.
 - ii. Mitigate for Trees #4, 4.1, 5, 7, 10, and 11 at a minimum 2:1 ratio. This will require planting (or paying a fee in lieu of mitigation for) 12 mitigation trees. If the applicant chooses this option, the required landscape buffer along Highway 26 will need to be relocated and planted per Section 17.90.120(F). As discussed in Section 17.90.120(F) of this document, this will include planting nine (9) trees within the relocated landscape buffer.
- f. If the applicant needs to plant mitigation trees on Tax Lot 902, the mitigation trees shall be planted in the 1,785 square foot open lawn area in the northwest corner of the lot. The applicant shall plant no more than two (2) of the required mitigation trees within the 1,785 square foot open space area in the northwest corner of Tax Lot 902.
- g. If the applicant needs to plant additional mitigation trees on Tax Lot 1000, the trees shall be planted on the northern portion of Tax Lot 1000 and the applicant shall submit analysis from the project arborist or third-party arborist detailing that the northern portion has sufficient soil volume and planting space to accommodate the necessary number of mitigation trees (large native evergreens).

- h. If the applicant is unable to provide sufficient soil volume and planting space for the necessary number of mitigation trees, the applicant shall pay a fee-in-lieu of mitigation tree at \$500 per tree for the number of mitigation trees the site cannot support.
- 6. Update the Tree Retention Plan and Tree Protection Fencing Plan on page 9 of the Arborist Report to reflect the following:
 - a. Updated site plan.
 - b. Retention of the trees in the southeast corner of Tax Lot 902
 - c. Location, condition, and species of any additional trees on Tax Lot 1000.
 - d. Detail retention of Trees # 28 and 29.
 - e. The updated tree protection shall address the third-party recommendation for a retaining wall to protect Tree #28 and shall detail the tree fencing such that no more than 25 percent of the critical root zone of Tree #28 is impacted with no encroachment into the minimum root zone, or, if this is not feasible and Tree #28 cannot be adequately protected, Tree #28 shall not count as a retention tree.
- 7. Update the Utility Plan to locate utilities under the sidewalk or driveway so they are further from Tree #15.
- 8. Submit a parking analysis for the Paola's Pizza Barn on Tax Lot 1000, including an analysis of required parking spaces, existing parking spaces, proposed parking spaces, and ADA parking spaces, as well as a proposed reconfiguration of the parking area south of the building in compliance with Chapter 17.98. If the minimum parking requirements for parking spaces, ADA parking spaces, and/or bicycle parking spaces are not met, the applicant shall submit an updated parking plan for Tax Lot 1000 in conformance with Chapter 17.98 and ADA requirements.).
- 9. Submit the following information related to site landscaping:
 - a. Confirmation that the proposal meets the minimum landscaping requirement on Tax Lot 902 after all required updates are made to the Plan Set.
 - b. Additional information on the percent landscaping on Tax Lot 1000 demonstrating that the 20 percent landscaping minimum is met.
 - c. Additional information regarding landscaping in the parking areas on Tax Lot 1000 to ensure that the 10 percent minimum landscaping standard is met.
 - d. Section drawings that clearly detail the parking area, landscaping area, retaining wall, guardrail, and property lines for the areas between the parking area and the north and east property line; the landscape buffer shall have a minimum inside dimension of 5 feet.
- 10. Confirm that the storm system shown is private until it outfalls to the ditch inlet. New storm lines shall require a recorded easement through each property per Condition E.10.c.

11. Submit additional information from the project arborist or third-party arborist regarding the proposed stormwater conveyance line extension that evaluates impacts on offsite trees and outlines strategies to minimize negative impacts to existing trees. The applicant shall retain the project arborist or third-party arborist on site during extension of the storm line within the critical root zone of 1-foot per 1-inch DBH of the offsite trees. If any of the offsite trees need to be removed, the applicant and subject property owner shall submit a tree removal application in accordance with Chapter 17.102.
12. Confirm the location and dimensions of the construction entrance.
13. Submit a copy of the State Highway Approach Road Permit from ODOT for access to the state highway for the proposed use to City staff.

B. Prior to tree removal, the applicant shall complete the following and receive the necessary approvals as described:

1. Apply for a Grading and Erosion Control Permit and detail the location of the tree protection fencing on the submitted Grading and Erosion Control Plan Set.
2. Install tree protection fencing as detailed on the updated tree protection fencing plan. The tree fencing shall be installed prior to any development activity on the site, including earthwork, tree removal, and erosion control measures, in order to protect the trees and the soil around the trees from disturbance. The tree fencing shall adhere to the following:
 - a. Erosion control fencing shall be installed outside of the tree protection area fencing. If erosion control is required inside the tree protection zones, use straw wattles to minimize root zone disturbance of the trees to be retained.
 - b. The applicant shall not relocate or remove the tree protection fencing prior to the certificate of occupancy.
 - c. The tree protection fencing shall be 6-foot-tall chain link or no-jump horse fencing supported with metal posts placed no farther than 10 feet apart installed flush with the initial undisturbed grade.
 - d. The applicant shall affix a laminated sign (minimum 8.5 inches by 11 inches, placed every 75 feet or less) to the tree protection fencing with the following information: “TREE PROTECTION ZONE, DO NOT REMOVE OR ADJUST THE APPROVED LOCATION OF THIS TREE PROTECTION FENCING, Please contact the City’s Planning Division and the project arborist if alterations to the approved location of the tree protection fencing are necessary. Planning Division – planning@cityofsandy.com. [Name], Project Arborist – [Phone Number].”
3. Request an inspection of tree protection measures as specified in Section 17.102.50 C with Planning staff and the project arborist. The tree protection fencing inspection shall be completed prior to any tree removal, earthwork, grading, or other development/construction activity on the site.

4. Once the tree protection fencing is approved, the applicant shall adhere to the following conditions when performing tree removal or other development activity on the site:
 - a. No construction activity shall occur within the tree protection zone, including, but not limited to, grading, clearing, excavation, access, stockpiling, or dumping or storage of materials such as building supplies, soil, waste items, equipment, or parked vehicles.
 - b. Up to 25 percent of the area between the minimum root protection zone of 0.5 feet per 1-inch DBH and the critical root zone of 1 foot per 1-inch DBH may be able to be impacted without compromising the tree, provided the work is monitored by a qualified arborist.
 - c. Retain an arborist on site to monitor any construction activity within the critical root protection zones of the retention trees or trees on adjacent properties that have critical root protection zones that would be impacted by development activity on the subject property.
 - d. The applicant shall not remove any trees that aren't marked for removal.
 - e. Tree removal shall be completed without the use of vehicles or heavy equipment in the tree protection zone.
 - f. Removal of any trees from within the critical root zones of protected retention trees shall be completed under the supervision of the project arborist and the applicant shall fell the trees to be removed away from the trees to be retained so they do not contact or otherwise damage the trunks or branches of the trees to be retained.
 - g. If the trees are removed during prime nesting season (February 1- July 31), the applicant shall check for nests prior to tree removal. If nests are discovered, the applicant shall delay tree removal until after the nesting season or shall hire a professional to relocate the nests to an appropriate nearby location, provided the species using the nest is not invasive.
 - h. The project arborist shall be onsite during excavation within the critical root zones of retained Trees # 13.2, 14, 15, 21, 23, 24, 25, 26, 28, 29, 31, and 32.
 - i. The project arborist shall evaluate and oversee the proper cutting of roots with sharp cutting tools. If many significant roots are encountered during excavation in the zones highlighted in Appendix 5 of the arborist report, an alternative layout for areas requiring excavation should be considered to maintain the health and safety of retained trees. Alternate methods of construction may also be necessary for the preservation of significant roots of retained trees. Other construction methods include but are not limited to bridging over significant roots, constructing sidewalks on top of grade over landscape fabric without excavation, and using post and beam construction instead of conventional footing foundations within the critical root zone.
 - j. The arborist report (with updates as required) and the third-party arborist review shall be shared in their entirety to the project team, including contractors performing demolition and concrete work.
 - k. The applicant shall adhere to the tree protection specifications contained in Appendix 3 of the arborist report (pages 4-6) including requirements before construction begins, during construction, and after construction.

C. Prior to earthwork, grading, or excavation, the applicant shall complete the following and receive necessary approvals as described:

1. Apply and receive approval for a Grading and Erosion Control Permit and request an inspection of installed devices prior to any grading onsite. The grading and erosion control plan shall include a re-vegetation plan for all areas disturbed during construction. All erosion control and grading shall comply with Section 15.44 of the Municipal Code.
2. Install sediment fencing outside the tree protection zones. If erosion control is required inside the tree protection zones, the applicant shall use straw wattles to minimize root zone disturbance of the trees to be retained.
3. Submit proof of receipt of a Department of Environmental Quality 1200-C permit or submit confirmation from DEQ if a 1200-C Permit will not be required.
4. Request an inspection of erosion control measures. Inspections of erosion control measure by the Public Works Department shall be completed prior to any earthwork or grading being conducted onsite.
5. Prior to grading or any earthwork have a licensed pest control agent evaluate the site to determine if rat eradication is needed. The result of the evaluation shall be submitted to staff and if required the evaluation shall include eradication techniques.

D. Submit the following information with the Building Permit:

1. Details on the proposed automatic irrigation system.
2. Construction documents detailing compliance with fire apparatus access and fire protection water supply requirements shall be provided to the Sandy Fire District for review and approval concurrently with building permit submittal. All construction activities shall comply with the applicable Oregon Fire Code and the Fire Code Application Guide.
3. A detailed final stormwater report stamped by a licensed professional engineer for review. The calculations shall meet the water quality/quantity criteria as stated in the City of Sandy Development Code (SDC) Chapter 13.18 Standards and the City of Portland Stormwater Management Manual (SWMM) Standards that were adopted by reference into the Sandy Development Code.
4. Provide SandyNet with a set of PGE utility and street/sidewalk lighting plans to design and return a SandyNet broadband deployment plan to overlay in the dry utility shared trench. SandyNet will provide requirements for layout and acceptable materials for the developer/contractor. SandyNet shall be contacted after installation of infrastructure and coordinated for onsite inspection before backfilling the common trench. Plans for SandyNet design shall be sent to Greg Brewster gbrewster@ci.sandy.or.us, 503-953-4604. The onsite contact for general questions and inspections will be Ron Yow, ryow@ci.sandy.or.us, 541-514-9771.
5. Pay a fee in lieu of parkland dedication in the amount of \$496,337.18 (0.571 acres x \$869,242 per acre).

E. Prior to receiving a certificate of occupancy, the applicant shall complete all of the following improvements or provide financial assurance for their future completion:

1. Submit a copy of the right-of-way dedication to ODOT to City staff.
2. Install all required landscaping.
 - a. Aerate and amend the soil within the planting areas on the buildable portion of the site to a depth of 3 feet prior to planting the trees prior to planting mitigation trees and other landscaping. Submit a letter from the project landscaper confirming that the soil has been aerated and amended prior to planting the mitigation trees and required landscaping.
 - b. Plant required mitigation trees and/or pay a fee-in-lieu of \$500 per tree for mitigation trees as determined by condition A.5.
3. Install an irrigation system, such as drip-line irrigation, to water all landscaping, including trees. Submit documentation from the project landscaper detailing the type of irrigation system that was installed.
4. Install all required improvements.
 - a. Frontage improvements along Highway 26 shall be made in accordance with Figure 6 in the 2011 Transportation System Plan for a 40 MPH speed zone. ADA compliance and 6-foot sidewalks shall be maintained across the frontage.
5. Buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property, including on a monument sign. Provide street address numbers measuring a minimum of six (6) inches high, which clearly locate the mixed-use building and its entries for patrons and emergency services. The applicant shall verify the location(s) of the address with the Building Official and emergency service providers.
6. Submit a post-construction report prepared by the project arborist or other TRAQ qualified arborist to assess whether any of the retention trees were damaged during construction. If retention trees were damaged and need to be replaced, the applicant shall apply for a tree removal permit and the mitigation ratio shall be 4:1 achieved through planting mitigation trees and/or paying a fee in lieu of mitigation tree as determined by staff.
7. Record a tree protection covenant specifying protection of the approved retention and mitigation trees on the subject properties and limiting removal without submittal of an Arborist's Report and City approval and submit a copy to City staff. The covenant shall detail the species and locations of the mitigation trees and retention trees as well as the critical root zones of each retention tree at 1 foot per 1-inch DBH.
8. An emergency vehicle access and maintenance agreement shall be deeded and recorded and a copy provided to City staff.

9. Install all required fire hydrants. Each new fire hydrant installed shall be ordered in an OSHA safety red finish and have a 4-inch non-threaded metal faced hydrant connection with cap installed on the steamer port (4 ½-inch NST x 4-inch Storz Adaptor). If a new building, structure, or dwelling is already served by an existing hydrant, the existing hydrant shall also be OSHA safety red and have a 4-inch non-threaded metal faced hydrant connection with cap installed.
10. Record the following easements with the County Recorder and submit a copy to City staff:
 - a. Cross-over access easements to the adjacent properties with state highway frontage to facilitate future shared access.
 - b. An eight-foot-wide public utility easement along the entirety of the Highway 26 right-of-way of Tax Lots 902 and 1000.
 - c. All necessary easements for offsite utilities including an easement through each property for the new stormwater conveyance line.
 - d. A 15-foot-wide sanitary sewer easement where the existing sewer line runs along the south property line of the flag portion of Tax Lot 902 or submit documentation of the existing recorded easement.

G. General Conditions

1. Design review approval shall be void after two (2) years from the date of the Final Order, unless the applicant has submitted plans for building permit approval.
2. All mechanical, electrical, and communications equipment shall be screened from view from all public rights-of-way and civic spaces. On-grade and above-grade electrical and mechanical equipment such as transformers, heat pumps, and central air conditioner units shall be screened with sight obscuring fences, walls, or landscaping.
3. If the applicant proposes assigned parking for the multi-family development, at least 15 percent of the total required parking spaces for the multi-family development shall be unassigned and available for use by all occupants and guests of the development.
4. Signage associated with the ADA parking spaces shall meet the head clearance distance requirement in the Building Code.
5. All parking, driveway, and maneuvering areas shall be constructed of asphalt, concrete, or other approved material. All approved parking spaces shall be clearly delineated with painted lines and the entrance and exit driveways shall be signed or marked with paint.
6. The required loading berth shall be not less than ten feet in width by 35 feet in length and shall have an unobstructed height clearance of 14 feet. The loading area shall be screened from public view from public streets and from adjacent properties.

7. Landscaping shall comply with the following requirements:
 - a. Per Section 17.92.10(D), planter and boundary areas used for required plantings shall have a minimum diameter of five feet (two and one-half foot radius, inside dimensions). Where the curb or the edge of these areas are used as a tire stop for parking, the planter or boundary plantings shall be a minimum width of seven and one-half feet.
 - b. All trees planted on the site shall be a minimum of 1.5-inches in caliper measured 6 inches above the ground and shall be planted per the City of Sandy standard planting detail. Trees shall be planted, staked, and bark mulch, vegetation, or other approved material installed prior to occupancy. Tree ties shall be loosely tied twine or other soft material and shall be removed after one growing season (or a maximum of 1 year).
 - c. All shrubs shall be a minimum of one gallon in size or 2-feet in height when measured immediately after planting.
 - d. All landscaping shall be continually maintained, including necessary watering, weeding, pruning, and replacing.
 - e. Areas where natural vegetation has been removed or damaged through grading or construction activity in areas not affected by the landscaping requirements and that are not to be occupied by structures or other improvements shall be replanted.
 - f. If the applicant chooses to postpone tree and/or landscaping installation, the applicant shall post a performance bond equal to 120 percent of the cost of the trees/landscaping, assuring planting within 6 months. The cost of the trees shall be based on the average of three estimates from three landscaping contractors; the estimates shall include as separate items all materials, labor, and other costs of the required action, including a two-year maintenance and warranty period.
8. The applicant shall not anchor anything to the mitigation trees, compact the soil under the dripline, or otherwise harm or damage the mitigation trees. The mitigation trees shall be a minimum of 5 feet in height at time of planting and planted per the City of Sandy standard planting detail. All ties and burlap shall be removed from the root ball prior to planting. If the burlap cannot be completely removed from the root ball without compromising the integrity of the root ball, the burlap shall be removed from at least the top one third of the side of the root ball. If the mitigation trees are staked, the applicant shall use loosely tied twine to tie the trees to the stake and the twine shall be removed after the first growing season but no later than one year from being planted. The mitigation trees shall be adequately watered for at least the first three dry seasons (summers).
9. The applicant shall call the PGE Service Coordinators at 503-323-6700 when they are ready to start the project.
10. All franchise utilities shall be installed underground. The developer shall make all necessary arrangements with franchise utility providers.
11. An ODOT Miscellaneous Permit must be obtained for all work in the highway right-of-way.

12. Where fire apparatus access roads or a water supply for fire protection are required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction except where approved alternative methods of protection are provided.
13. The applicant shall comply with all applicable Oregon Fire Code requirements. The applicant shall adhere to all Fire Marshal requirements in Exhibit N, including but not limited to the following:
 - a. The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction. The plan shall address the requirements found in OFC Chapter 33 and shall be made available for review by the fire code official upon request.
 - b. A key lock box for building will be required to provide access to common use areas, the fire alarm control panel(s), and the fire sprinkler riser room(s). The Fire District uses KNOX brand boxes. To order a KNOX box keyed for the Sandy Fire District, please visit Sandy Fire's website (<https://www.knoxbox.com/Products>) for ordering information.
 - c. Knox Box Contents. When more than one key is secured in the Knox Box, each key shall be legibly identified as to its use, utilizing a round key tag that is a minimum of 1-inch in diameter. Necessary keys provided by the building owner or business owner may include: a) Main entrance door, b) Fire Alarm Control Panel, c) Alarm codes, d) Manual pull stations, e) Fire Sprinkler Control padlock/s, f) Mechanical rooms, g) Elevator control, h) Attic or roof access, and i) Any other keys necessary to access building controls.
 - d. New buildings four or more stories above grade plane, except those with a roof slope greater than four units vertical in 12 units horizontal (33.3% slope), shall be provided with a stairway to the roof.
 - e. Commercial buildings exceeding three stories or 30 feet in height shall have not fewer than two means of fire apparatus access for each building.
 - f. A minimum of one on-site fire hydrant shall be provided near the proposed mixed-use development for firefighting operations. If distances between fire hydrants exceeds 500 feet, additional on-site fire hydrants may be required along the fire apparatus access road.
 - g. Fire department connections (FDC) are required to be remote and shall be located within 100 feet of a public fire hydrant. All FDC's shall be permanently labeled with appropriate address in which it serves and shall be accessible and visible from the fire apparatus access road.

19. Downward facing, full cut-off lighting shall be required. Lights shall not exceed 4,125 Kelvins or 591 nanometers to minimize negative impacts on wildlife and human health.
20. All earthwork activities to include grading, foundation excavation, site and sub-grade preparation, cut and fill slopes shall be observed and documented by a geo-technical engineer to assure compliance with IBC standards as amended by the state of Oregon and referenced as "Oregon Structural Specialty Code" (OSSC). Site grading shall not in any way impede or impound or inundate the surface drainage flow from the adjoining properties without a proper collection system. The earthwork activities shall be observed and documented under the supervision of the geotechnical Engineer.
21. All site runoff shall be detained such that post-development runoff does not exceed the predevelopment runoff rate for the 2, 5, 10 and 25 year storm events. Stormwater quality treatment shall be provided for all site drainage per the standards in the City of Portland Stormwater Management Manual (COP SWMM).
22. Pay System Development Charges prior to issuance of the building permits.
23. Successors-in-interest of the applicant shall comply with site development requirements prior to the issuance of building permits.
24. Comply with all other conditions or regulations imposed by the Sandy Fire District, or state and federal agencies. Compliance is made a part of this approval and any violations of these conditions and/or regulations may result in the review of this approval and/or revocation of approval.

EXHIBIT A



General Land Use Application

1 page

Name of Project:	
Location or Address:	

Map & Tax Lot #	T:	R:	Section:	Tax Lot (s):
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Request:

I am the (check one) owner lessee of the property listed above, and the statements and information contained herein are in all respects true, complete and correct to the best of my knowledge and belief.

Applicant (if different than owner)	Owner
Address	Address
City/State/Zip	City/State/Zip
Email mark@statestreet-homes.com emily@statestreet-homes.com	Email
Phone	Phone
Signature	Signature <i>Brandon Gill</i>

Staff Use Only

File #: 22-031 DR	Date: 8/2/22	Fee: \$12,605	Planner:
Type of review:	Type I <input type="checkbox"/>	Type II <input checked="" type="checkbox"/>	Type III <input type="checkbox"/> Type IV <input type="checkbox"/>
Has applicant attended a pre-app?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If yes, date of pre-app meeting: May 2021	

Development Services Department, 39250 Pioneer Blvd, Sandy, OR 97055, 503.489.2160



General Land Use Application

1 page

Name of Project:	State Street Homes Sandy-Hwy 26 Project
Location or Address:	No Situs, Flag lot next to 38015 Hwy 26 Sandy, OR 97055

Map & Tax Lot #	T:	R:	Section:	Tax Lot (s): 24E14AD00902
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Request: Mixed use 4 story building on C-2 lot
• LEVEL 01, STORAGE/LEASING: 9,984 sf, • LEVEL 02-04, RESIDENTIAL: 10,695 sf, OVERALL = 42,069 sf
1 BED / 1 BATH - 30 UNITS, 2 BED / 2 BATH - 12 UNITS, TOTAL UNITS = 42 UNITS

I am the (check one) owner lessee of the property listed above, and the statements and information contained herein are in all respects true, complete and correct to the best of my knowledge and belief.

Applicant (if different than owner) State Street Homes	Owner Joycelyn Paola
Address 1233 NW Northrup St Ste 125	Address 15475 SE 262nd Ave
City/State/Zip Portland, OR 97209	City/State/Zip Boring, OR 97009
Email brandon@statestreet-homes.com	Email Mitchpaola@gmail.com
Phone 503-753-4492	Phone 503-358-3431
Signature	Signature <small>DocuSigned by: Joycel Paola 2BCCEC295B9B147B...</small>

Staff Use Only

File #:	Date:	Fee\$:	Planner:
Type of review:	Type I <input type="checkbox"/>	Type II <input checked="" type="checkbox"/>	Type III <input type="checkbox"/> Type IV <input type="checkbox"/>
Has applicant attended a pre-app? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, date of pre-app meeting:			

Development Services Department, 39250 Pioneer Blvd, Sandy, OR 97055, 503.489.2160

**Design Review - Narrative**

September 16th, 2022

New Mixed Use Development
38015 Hwy 26
Sandy, OR
Zoned C-2, General Commercial

The proposed project includes the development of one 46,500 sf mixed use building with approximately 11,280 sf of mini-storage provided on the ground floor and approximately 35,208 sf of residential above. The proposed development will be accessed off of HWY 26 through a shared access easement with Paola's Pizza Barn. The building will be 4 stories in height and composed of 42 units, thirty (30) 1 bd / 1 ba units and twelve (12) 2 bd / 2 ba units. Outlined below is how the proposed projects addresses all applicable Design Standards for Site plan and Design Review

Site Plan and Design Review criteria:

- The proposed project meets all of the applicable standards within the city of Sandy's Title 17 – Development Code, the following is a summary of all the applicable design standards for a Mixed-Use Development within a C-2 (General Commercial) zone and how the proposed project satisfies these requirements

17.44 – General Commercial, C-2

- **17.44.10 – Permitted uses**
 - *Multi-family dwellings above a commercial business is permitted outright per 17.44.10.A.1, as is self-service storage per 17.44.10.B.i*
- **17.44.30.A – Development Requirements**
 - *Front setback: 10'-0" min., 50'-0" maximum. The proposed development is on a flag lot, and by nature, the Front setback is taken parallel to the access aisle to the lot. Due to the access of this lot being share with the adjacent tax lot 1000, the front setback is taken from the West property line as indicated on the site plan. The building is set back roughly 31'-2" from the front setback line, meeting the min./max. front setback*
 - *Landscaping: 20% minimum. The proposed development meets this standard with 27.21% of landscaping*
 - *Maximum Structure Height: 55'-0." The proposed development meets this standard with a building height of 52'-2"*

17.74 – Accessory Development – Additional Provisions and Procedures

- **17.74.40.B – Fences and Windscreens, Commercial**
 - Fences in front yard: the height of a fence or retaining wall in a front yard shall not exceed four feet. Due to the topography, this standard cannot be met, retaining walls within the front set back are higher than 4'-0" in height and have a 3'-6" guardrail atop them, thus requiring a Type III Special Variance
 - Fences in side and rear yards: height of a fence or retaining wall adjacent to a side or rear yard or a side or rear property line shall not exceed eight feet. Due to the topography, this standard cannot be met. The retaining walls along the side and rear property lines have a 3'-6" guardrail atop them and are higher than 8'-0" in height, thus requiring a Type III Special Variance

17.84 – Improvements Required with Development

- **17.84.30.A – Pedestrian and Bicyclist Requirements: Sidewalks shall be required along both sides of all arterial, collector, and local streets.**
 - Highway 26 is classified as a Major Arterial street, thus requiring sidewalks along both sides of the street. The proposed development will be altering the existing sidewalk and drive apron for Paolo pizza to provide joint access per ODOT standards. The modified sidewalk will be a minimum 5'-0" in width and match the existing sidewalk.
- **17.84.30.B – Pedestrian and Bicyclist Requirements: Safe and convenient pedestrian and bicyclist facilities that strive to minimize travel distance to the extent practicable shall be provided in conjunction with new development.**
 - The proposed development provides direct access from the highway to the entrance of the building with a minimum of 5'-0" wide raised sidewalk, promoting a safe and convenient path for both pedestrians and bicyclists alike.
- **17.84.40 – Transit and School Bus Transit Requirements: Development sites located along existing or planned transit routes shall, where appropriate, incorporate bus pull-outs and/or shelters into the site design**
 - While located on a transit route, the proposed development is not near any existing transit stops thus providing a bus pull-out and/or transit stop shelters is not appropriate for the frontage of this site.
- **17.84.50.B – Street Requirements: Transportation Impact Study(Dwellings), for development applications that propose dwelling units, an applicant must submit a transportation impact study.**
 - A Transportation Impact Study was performed for the proposed development and has been included with this submittal.
- **17.84.50.F – Street Requirements: Development sites shall be provided with access from a public street improved to the city standards.**

- The proposed development is accessed off of Highway 26 and the shared access with Paola Pizza is designed per ODOT's standards.
- **17.84.60.A – Public Facilities: All development sites shall be provided with public water, sanitary sewer, broadband (fiber) and storm drainage.**
 - The proposed development will be provided with all of the above.
- **17.84.100 – Mail Delivery Facilities: In establishing placement of mail delivery facilities, location of sidewalks, bikeways, intersections, existing or future driveways, existing or future utilities, right-of-way and street width, and vehicle, bicycle and pedestrian movements shall be considered.**
 - The proposed mail delivery area has been placed with all of the above in mind. The location is set immediately in front of the development and provides adequate access for pedestrians and mail carriers alike.

17.86 – Parkland and Open Space: Multi-family developments are required to provide parkland to serve residents of those developments. The required parkland acreage to be dedicated shall be based on the following formula, required parkland dedication (acres) = (proposed dwelling units) x (persons/dwelling unit) x 0.0068 (per person park land dedication factor)

- The proposed development requires 0.57 acres of parkland (42 x 2 x 0.0068), in which the development will provide a payment in lieu of land dedication.

17.90.120 – Design Standards, General Commercial

- **17.90.120.A.1 – Site Layout and Access: All lots shall abut or have access to a dedicated public street.**
 - Lot 902 has direct access to Highway 26 via a shared access easement with Paola's Pizza Barn.
- **17.90.120.A.3 – Site Layout and Access: Off-street parking shall be located to the rear of side of buildings with no portion of the parking lot located within required setbacks or within 10'-0" of the public right-of-way.**
 - Off-street parking area for the proposed mixed-use building is located to the rear side of the building. Revised parking layout for the adjacent lot 1000 is now located primary to the rear of that existing building.
- **17.90.120.A.7 – Site Layout and Access: Walkways from the public street sidewalk to the building entrance(s) are required.**
 - A walkway from Highway 26 is provided for direct pedestrian access to the West, North, and East entrances of the new mixed-use building.
- **17.90.120.B.1.a – Articulation: All elevations visible from an abutting public street or pedestrian way shall be divided into distinct planes of no more than 40 lineal feet.**
 - The North Elevation, visible from Bluff Road, provides articulation in its façade in the form of recessed balconies. No wall plane is greater than 40 linear feet, and all recessed balconies are greater than 6" in depth from the adjacent wall plane. Each balcony is at least 13'-0" in width. Each wall change provides a change in material color to provide contrasting and complementary changes within the façade. The recessed balconies and popped out exterior storage areas, supported

by exposed wood bracketing, provide pedestrian shelter along the North perimeter of the building

- **17.90.120.B.2 – Pedestrian Shelters: Buildings must incorporate pedestrian shelters**
 - Pedestrian shelters are provided along the three primary entrances along the East, North, and West facades. The upper level patios and exterior storage areas provide shelter over the front sidewalk along the North façade of the building.
- **17.90.120.B.3 – Building materials: Exterior building materials shall convey an impression of strength and durability consistent with the Sandy Style.**
 - The proposed building is consistent with Sandy’s Style with natural stone as a base for both the building and all exterior columns. The primary siding is composed of fiber cement lapped siding, fiber cement shingles and board and batten siding as an accent.
- **17.90.120.B.3.e – Building materials: Building elevations facing a public street shall incorporate at least three (3) of the features listed under 17.90.120.B.3.e**
 - The proposed North elevation that faces Bluff Road incorporates exposed natural wood color beams, brackets and trim, metal canopies and roofing, and shingles as an accent material. These features are consistent around the entire façade of the building, not just the façade that faces Bluff Road.
- **17.90.120.B.4 – Colors: Building exteriors shall comply with the following standards: permitted color include warm earth tones conforming to Color Palette in Appendix C.**
 - All proposed colors are warm earth tones in nature and are taken from Miller Paint Company’s Historic Colour Collection
- **17.90.120.C.1 – Roof Pitch, Materials, and Parapets: Except as provided in subsections 17.90.120.C.8, below, pitched (gable or hipped) roofs are required on all new buildings with a span of 50’-0” of less.**
 - The proposed building length is ~190’-0” and the width is ~69’-0”, thus this requirement does not apply. However, a gable roof is provided.
- **17.90.120.C.4 – Roof Pitch, Materials, and Parapets: Pitched roof visible from an abutting public street shall provide a secondary roof form (e.g. dormer) in the quantity of 4 for 81’-0” and greater**
 - The North roof pitch is visible via Bluff Road and ~190’-0” in length, thus provides adequate secondary roof forms to break up the span of the roof
- **17.90.120.C.5 – Roof Pitch, Materials, and Parapets: Visible roof materials must be wood shingle or architectural grade composition shingle, slate, or concrete tile. Metal with standing or batten seam may also be used conforming to the Color Palette in Appendix D**
 - The proposed roofing material is a standing seam metal, in Dark Brown, which conforms to the Color Pallett in Appendix D
- **17.90.120.C.6 – Roof Pitch, Materials, and Parapets: All roof and wall-mounted mechanical, electrical, communications and service equipment, including satellite dishes and vent pipes, shall be screened from view from all adjacent public rights-of-way and civic spaces by parapets, walls or by other approved means.**
 - All rooftop penetrations (i.e. vent pipes) and wall penetrations (i.e. venting for exhaust fans) will be will have covers and/or be hooded and be a similar color to the adjacent building material so as to blend in with the building. There will be no other rooftop/wall-mounted mechanical, electrical, or communication systems then what is noted above.
- **17.90.120.D.1 – Building Orientation and Entrances: Buildings shall be orientated to a public street or civic space. This standard is met when at least 50% of the subject site’s**

street frontage is compromised of building(s) placed within 20'-0" of a sidewalk, walkway or civic space.

- The proposed site is a flag lot and thus the "frontage" of this site is compromised of the drive aisle and outdoor space.
- **17.90.120.D.3 – Building Orientation and Entrances: Ground floor spaces shall face a public street or civic space and shall be connected to it by a direct pedestrian route (i.e. avoid out-of-direction travel).**
 - Due to the proposed site being a flag lot, orientating the main entrance to Highway 22 is not possible. However, direct pedestrian access is granted from Highway 22 to the West and North ground floor entrances of the building.
- **17.90.120.D.5 – Building Orientation and Entrances: For Structures greater than 40,000 gross square feet, there shall be at least two (2) clearly articulated public entrances on the structure; at least one such entrance shall be visible from a public street and connected to that street by a pedestrian sidewalk or walkway**
 - The proposed building is roughly 46,500 sf structure, and thus requires a minimum of 2 articulated entrances. The proposed project proposes three (3) articulated entrances, one on the West, one on the North and one on the East facade of the building.
- **17.90.120.D.7 – Building Orientation and entrances: Buildings shall provide at least one (1) elevation where the pedestrian environment is "activated." An elevation is "activated" when it meets the window transparency requirements in subsection 17.90.120.E, below, and contain a public entrance with a pedestrian shelter extending at least five (5) feet over an adjacent sidewalk, walkway, or civic space.**
 - The proposed building provides an activated elevation along the North Façade of the building. The North façade provides an emphasized public entrance, 5'-0" of pedestrian shelter, and meets the window transparency requirements. See below how the proposed activated elevations meets subsection 17.90.120.E.2.
- **17.90.120.D.8 – Primary entrances must be architecturally emphasized and visible from the public right-of-way and shall be sheltered with a canopy, overhang, or portico with a depth of at least 5'-0"**
 - The proposed building provides three primary entrances, one on the West façade, one on the North façade and one on the East façade. Due the nature of the lot being a flag lot and not having frontage along a public right-of-way, no primary entrance is entirely visible from a public right-of-way. The East primary entrance may be visible from Highway 22, and the North primary entrance may be visible from Bluff Blvd. Regardless, all primary entrances are articulated from secondary entrances by a separate roof structure from the building that provides at least 5'-0" of shelter.
- **17.90.120.E.2 – Ground Floor Windows: the ground floor elevation of all new buildings shall contain ground floor display areas, windows, and doorways on the "activated" frontage.**
 - Buildings greater than 30,000 SF must provide a minimum of 20% glazing on the ground floor. The ground floor of the North façade is 1,693 SF, thus requiring a minimum of 339 SF of activated glazing. The proposed ground floor glazing for the North façade provides 349 SF of glazing, exceeding this standard. All ground floor glazing is made of clear glass, vertically orientated, and provided with trim surrounds with a depth of 3 ½"

- **17.90.120.E.3 – Upper Floor Windows:** *the reviewing authority may require buildings exceeding 20'-0" in height of provide upper-story windows along the "activated" frontage. Windows shall be square or vertically oriented. Individual window units shall not exceed five (5) feet by seven (7) feet. Any portion of a window unit with a dimension exceeding four (4) feet shall be divided into smaller panes. At least half of all the windows in upper floors shall be made up of glass panes with dimensions no greater than two (2) feet by three (3) feet, unless approved by variance or adjustment. Upper story windows that have one (1) foot by (1) foot grid inside double pain glass are appropriate and are encouraged. Window trim and moldings shall be compatible with those used on the ground floor*
 - The proposed windows on the upper floors meet the above requirements as all windows are vertical in nature, individual windows are less than 5'-0" in width and less than 7'-0" in height, all windows have internal grids to break up the window pane, and all windows are provided with a 3 ½" trim surround.
- **17.90.120.F.2 – Landscaping and Streetscape Design:** *parcels abutting Highway 26 shall provide a landscape buffer compromising not less than 30% of the highway frontage, to a depth of not less than 20'-0"*
 - The lot is a flag lot in nature and provides a 67'-8" of frontage through a shared easement along Highway 26. The proposed site plan provides 39'-0" of landscape frontage, for a total of 58%
- **17.90.120.G.1-6 – Civic Space:** *Not less than three (3) percent of the building area of every development shall be improved as a civic space. Civic space improvements may include plazas, private extensions of sidewalks, walkways, public art, pedestrian-scale lighting, bus waiting areas, tourist amenities or similar pedestrian amenities. Priority locations for civic spaces are those areas with the highest pedestrian activity. Civic spaces should about a public right-of-way or otherwise be connected to and visible from a public right-of-way by a sidewalk or approved pedestrian access way.*
 - The proposed building is 46,500 sf, thus requiring 1,395 sf of Civic Space. The project proposes a 1,590 sf outdoor public plaza as Civic space located towards the West side of the building. Due to the property being on a flag lot, having a civic space directly about a public right-of-way is not possible, however, the location was chosen for its pedestrian connectivity to highway 22 via the new sidewalk that connects our site to the highway. The Civic space is a public plaza with various raised planters and public benches.
- **17.90.120.H.1-3 – Lighting:** *To promote business vitality, public safety and aesthetics through effective outdoor lighting, consistent with the Sandy Style*
 - All walkways, parking lots, and building entrances will be illuminated at a minimum of 1-5 – 2.0 foot candles
- **17.90.120.J.1-4 – External Storage and Screening:** *To promote land use compatibility and aesthetics, particularly where development abuts public spaces*
 - Trash collection and recycling storage areas are not visible from any public rights-of-ways or civic spaces. While the proposed trash and recycling storage are is exterior to the building, it is both enclosed and covered in a manor that reflects the aesthetics of the primary building on-site.

17.90.160 – Additional Requirements, Multifamily Developments

- **17.90.160.A.1 – Roofs shall be gabled or hip type roofs (minimum 3:12) with at least a 30" overhang and using shingles or similar roofing materials. Alternatives may be approved**

where the developer can demonstrate that abutting structures or the majority of structures within 300 feet have roofs similar to what is proposed

- The roof meets this standard by taking on a gable roof form with a slope of 6:12. As the project is a mixed use building that falls in a C-2 zone, the roofing material is proposed to be standing seam metal roof to match that of other commercial buildings in the area.
- **17.90.160.B.1 – Entries shall be sheltered with an overhang, portico or recessed entry or otherwise be articulated with an architecturally detailed entry**
 - All three primary ground floor entrances are sheltered with a separate roof structure to articulate the importance of these entries. These shelters provide 8' – 12' of shelter.
- **17.90.160.E.2 – A separate outdoor area of not less than 48 square feet in the form of balconies, terraces or porches shall be provided for each dwelling unit located above the ground level**
 - Each upper story dwelling unit is accompanied by a balcony. The balcony SF range from 49.5 sf to 54.25 sf.
- **17.90.160.G – Enclosed storage areas shall be required and may be attached to the exterior of each dwelling unit to accommodate garden equipment, patio furniture, barbecues, bicycles, etc.**
 - Each unit is accompanied by an exterior storage closet off of its balcony. The one (1) bedrooms exterior storage closets range from 25.88 sf to 27 sf, while the two (2) bedroom units come equipped with a 39 sf exterior storage closet.
- **17.90.160.I – Multi-family residential development shall provide usable recreation areas for developments containing more than 5 dwelling units at a rate of 200 SF per dwelling unit. Such areas shall be counted as part of the required landscaping.**
 - The proposed projects has a total of 42 units on-site, requiring 8,400 sf of outdoor rec area. The proposed outdoor rec areas include a fenced in dog park (705 sf), an outdoor seating/fire pit area (285 sf), open lawn to the East and North of the building (2,468 sf), a covered gazebo (320 sf), landscaped nature path behind the building (2,860 sf) and a landscaped nature sidewalk path connecting the back nature path to the adjacent highway (2,087 sf), for a total of 8,725 sf of outdoor rec area.

17.92 – Landscape and Screening General Standards

- **17.92.20 – Minimum Improvements-Landscaping and screening: the minimum landscaping area for a C-2 zoned site is 20%**
 - The proposed development exceeds this minimum requirement by providing 27% landscaping
- **17.92.30 – Required Tree Plantings: Planting of trees is required for all parking lots with four or more parking spaces.**
 - The proposed development has 72 parking stalls dedicated to the residential development and 33 relocated parking stalls for Paolo Pizza. The development requires either 13 Medium trees or 9 large trees, or a combination of. The proposed development meets this standard with 10 large parking trees spread throughout the parking lot.

- **17.92.100 – Screening of service facilities: site-obscuring shrubbery or a berm, wall or fence shall be placed along a property line between residential and commercial and industrial zones and around unsightly areas such as a trash and recycling areas.**
 - The proposed development provides screening of exterior trash areas by the means of a wood slat wall, 6'-0" in height.

17.98 – Parking, Loading, and Access Requirements

- **17.98.20 – Off-Street Parking Requirements: In addition to 1.5 stalls per studio/1 bed and 2 stalls per units with 2 beds or greater, parking for employees shall be provided based on one space per two employees for the largest shift**
 - With thirty (3) 1 bed units, twelve (12) 2 bed units, and a max of two (2) employees working at once, the proposed development exceeds this standard with a total of 72 parking spaces. 1 bicycle parking stall is required per unit. The proposed development provides 20 bicycle parking stalls in a covered outdoor bicycle area and 8 bicycle racks on each residential floor for a total of 44 bicycle parking stalls for the development.
- **17.98.50 – Setbacks: Required parking shall not be located in a required front or side yard setback area.**
 - The proposed project meets this requirement
- **17.98.60 – Design, size and access: All off-street parking facilities, vehicular maneuvering areas, driveways, loading facilities, accessways, and private streets shall conform to the standards set forth in this section. A standard space shall be 9'-0" x 18'-0", and compact stalls shall be 8'-0" x 16'-0" with no more than 40% of the spaces being compact.**
 - The proposed development meets these standards
- **17.98.120 – Landscaping and Screening: Screening of all parking areas containing four or more spaces and all parking areas in conjunction with an off-street loading facility shall be required in accordance with zoning district requirements and chapter 17.98. Parking facilities shall include landscaping to cover not less than 10% of the area devoted to parking facilities, parking areas shall be divided into bays of not more than 20 spaces. Between, and at the end of each parking bay, there shall be planters that have a minimum width of 5'-0" and a minimum length of 17'-0." Wheel stops, bumper guards, or other methods to protect landscaped areas and pedestrian walkways shall be provided.**
 - The proposed development meets this standard.
- **17.98.130 – Paving: Parking areas, driveways, aisles and turnarounds shall be paved with concrete, asphalt or comparable surfacing.**
 - The proposed development meets this standard.
- **17.98.140 – Drainage: Parking areas, aisles and turnarounds shall have adequate provisions made for the on-site collection of drainage waters to eliminate sheet flow of such waters onto sidewalks, public right-of-way and abutting private properties.**
 - The proposed development meets this standard.

- **17.98.150 – Lighting: Artificial lighting shall be provided in all required off-street parking areas. Lighting shall be directed into the site and shall be arranged to not produce direct glare on adjacent properties**
 - The proposed development meets this standard.
- **17.98.160.A – Bicycle Parking Facilities, Locations: Bicycle parking shall be located on site, convenient to the primary building entrances, and have direct access to both the public right-of-way and to the main entrance of the primary structure**
 - The proposed bicycle storage rooms and bicycle enclosure on the site meets these requirements
- **17.98.160.B - Bicycle Parking Facilities, Bicycle Parking Space Dimensions: each required bicycle parking space shall be at least 2'-0" x 6'-0" with a minimum vertical clearance of 7'-0" and an access aisle of 5'-0"**
 - The proposed development meets these standards
- **17.98.160.C - Bicycle Parking Facilities, Security: Bicycle parking facilities shall offer security in the form of either a lockable enclosure in which the bicycle can be store in a stationary object (i.e a "rack") upon which the bicycle can be located, racks shall accommodate both cable and u-shaped locks, racks shall be securely anchored to the ground, and all outdoor bicycle parking facilities shall be provided with adequate shelter.**
 - Both the proposed indoor and outdoor bicycle parking meet this standards.

17.102 – Urban Forestry

- **17.102.20.A – Applicability, no person shall cut, harvest, or remove trees 11 inches DBH or greater without first obtaining a permit and demonstrating compliance with this chapter**
 - The proposed development proposes the removal of 6 trees with a DBH of 12-24." The applicant will obtain a permit for the removal of these trees.
- **17.120.30.A.1 – Procedures and application requirements: A person who desires to remove trees shall first apply for and receive one of the following tree cutting permits before tree removal occurs**
 - The proposed development is removing fewer than 50 trees, and thus requires a Type I Tree removal permit
- **17.102.50.A – Tree retention: The landowner is responsible for retention and protection of trees required to be retained as specified**
 - The proposed development is made up of 1.46 acres of land, requiring a minimum of 4.38 trees with 11" DBH or greater to be retained. This requirement is met through the retention of 7 trees on the property that are 11" DBH or greater.

We believe that through the findings above, the proposed project meets all applicable Site and Design approval criteria for a Type II Site and Design Plan Review.

Sincerely,

Mercedes Butchas

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SITE PLAN & DESIGN REVIEW

MIXED USE DEVELOPMENT

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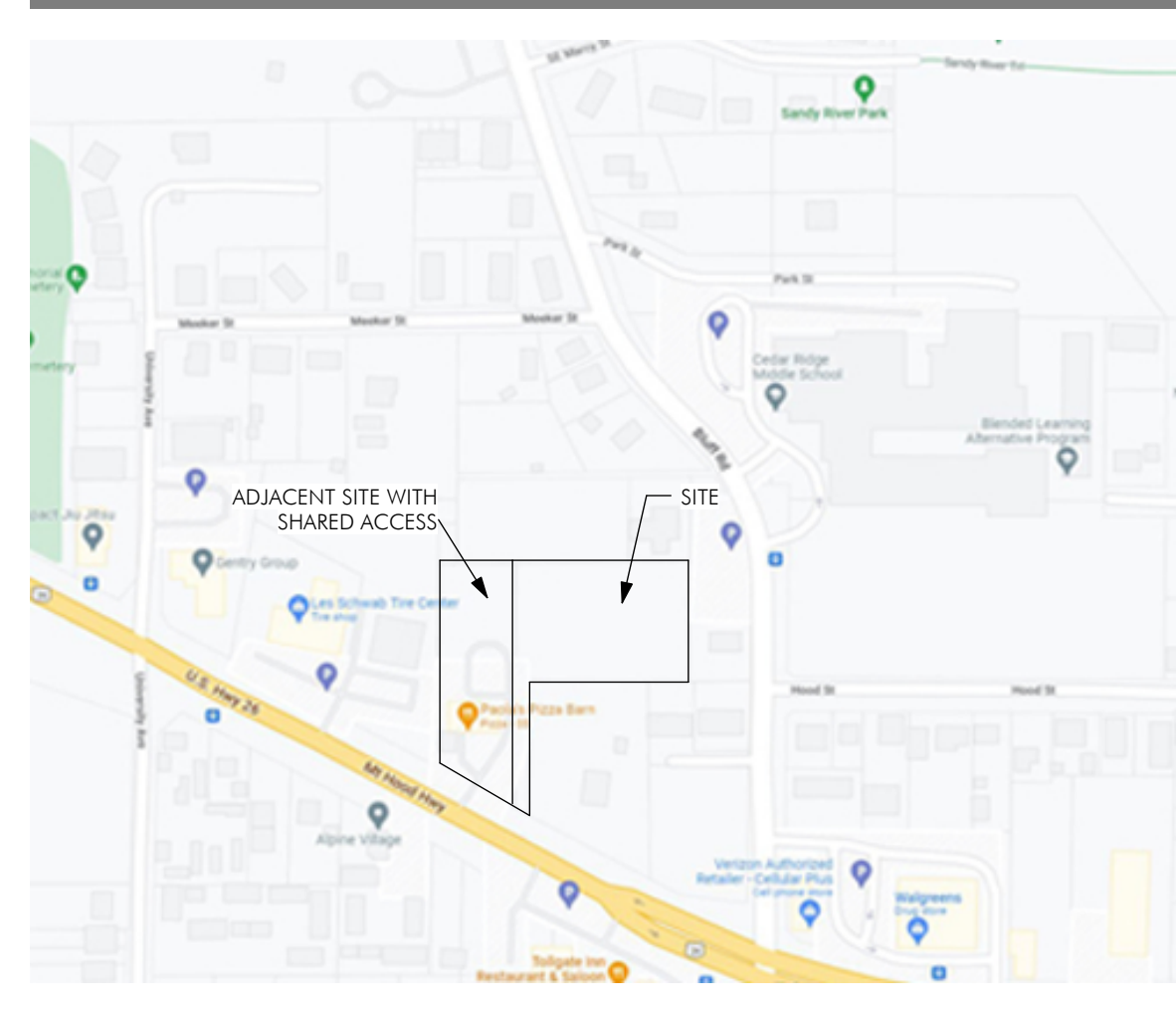


IN THE EVENT CONFLICTS ARE DISCOVERED BETWEEN THE ORIGINAL SIGNED AND SEALED DOCUMENTS PREPARED BY THE ARCHITECTS AND/OR THEIR CONSULTANTS, AND ANY COPY OF THE DOCUMENTS TRANSMITTED BY MAIL, FAX, ELECTRONICALLY OR OTHERWISE, THE ORIGINAL SIGNED AND SEALED DOCUMENTS SHALL GOVERN.

PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS

VICINITY MAP:



AERIAL PHOTO:



DRAWINGS LIST:

- GENERAL
- G0.01 COVER SHEET
- CIVIL
- C1 COVER SHEET AND NOTES
- C2 EXISTING CONDITIONS AND DEMO PLAN
- C3 COMPOSITE SITE PLAN
- C4 ENTRY UTILITY PLAN
- C5 SITE UTILITY PLAN
- C6 STORMWATER EXTENSION PLAN
- C7 GRADING AND ESC PLAN
- C8 WALL CROSS SECTIONS
- C9 ENTRY GRADING PLAN
- C10 CIVIC AREA GRADING PLAN
- C11 ESC NOTES AND DETAILS
- C12 SITE CIRCULATION PLAN
- LANDSCAPE
- L1.1 EXISTING TREE INVENTORY
- L2.1 PRELIMINARY PLANTING PLAN
- ARCHITECTURAL
- A1.01 SITE PLAN
- A1.02 ENLARGED SITE PLAN
- A1.03 TRASH ENCLOSURE
- A1.04 BICYCLE ENCLOSURE
- A1.05 GAZEBO
- A1.21 FLOOR PLAN - LEVEL 01
- A1.22 FLOOR PLAN - LEVELS 02-04
- A1.23 FLOOR PLAN - ROOF
- A2.01 ELEVATIONS
- A2.02 ELEVATIONS

PROJECT TEAM:

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SYMBOL LEGEND:

ELEVATION DATUM:
100.00 F.F.E. ELEVATION DATUM LOCATION

SECTION REFERENCE:
FILLED ARROW DENOTES BUILDING SECTION
OPEN ARROW DENOTES WALL SECTION/DETAIL
DETAIL NUMBER
SHEET NUMBER
SIDE NOTE IF REQUIRED

ELEVATION REFERENCE:
ELEVATION NUMBER OR DESIGNATION AS OCCURS
SHEET NUMBER

DETAIL REFERENCE:
DETAIL NUMBER
SHEET NUMBER
SIDE NOTE IF REQUIRED
DETAIL CUT LOCATION IF SHOWN

WINDOW TYPE:
REFER TO WINDOW ELEVATIONS SHOWN ON DRAWINGS AS.1X

DOOR NUMBER:
DOOR SIZE OR NUMBER

PLAN NOTE DESIGNATION:
PLAN OR SIDE NOTE NUMBER
MARK OR DIAGONAL NOTE NUMBER
REVISION NUMBER

ROOM TITLE + NUMBER:
XXXX ROOM NAME
XXXX ROOM NUMBER

WALL TYPE MARK:
WALL OR PARTITION CONSTRUCTION TYPE. SEE LEGEND.

NEW MULTI-FAMILY DEVELOPMENT

SANDY

38015 Hwy 26, Sandy, OR

SHEET:
G0.01
COVER SHEET

GENERAL NOTES:

- ALL WORK AND MATERIALS SHALL CONFORM TO THESE PLANS AND THE APPLICABLE PROVISIONS OF THE CITY OF SANDY PUBLIC WORKS STANDARDS. IMPROVEMENTS DEPICTED ON THESE PLANS ARE IN CONFORMANCE WITH THE CITY LAND USE ACTION CASEFILE NO. 12-031 SUB/MOD.
- IN ORDER TO PROTECT UNDERGROUND FACILITIES, EXCAVATORS PERFORMING THE WORK SET FORTH ON THESE PLANS MUST COMPLY WITH THE PROVISIONS OF ORS 757.541 TO 757.571 (REQUIRES CONTRACTOR TO NOTIFY UTILITIES AT LEAST 48 HOURS, BUT NOT MORE THAN 10 BUSINESS DAYS, PRIOR TO ANY EXCAVATION).
- THE LOCATION OF EXISTING UTILITIES SHOWN ON THE PLANS ARE APPROXIMATE ONLY AND SHOWN FOR INFORMATION PURPOSES ONLY. THE CONTRACTOR SHALL HAVE ALL UTILITIES LOCATED PRIOR TO COMMENCING CONSTRUCTION. NOTIFY ENGINEER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.
- VERTICAL DATUM: CITY OF SANDY BENCHMARK #10, ELEVATION=867.035, LOCATED AT THE SE CORNER OF BLUFF ROAD AND MARCY STREET
- TRENCHES WITHIN THE RIGHTS OF WAY SHALL BE BACKFILLED WITH AN APPROVED GRANULAR MATERIAL CONFORMING TO APWA CLASS B SPECIFICATIONS.
- TRENCHES OUTSIDE OF RIGHTS OF WAY MAY BE BACKFILLED IN ACCORDANCE WITH NATIVE MATERIAL AND COMPACTION SPECIFICATIONS FOR APWA CLASS A BACKFILL.
- VEGETATION AND TOPSOIL ARE TO BE STRIPPED TO MINERAL EARTH (AND INSPECTED BY THE PROJECT ENGINEER OR GEOTECHNICAL ENGINEER) PRIOR TO PLACEMENT OF FILL OR BASE MATERIALS.
- IN ADDITION TO ANY REQUIRED COMPACTION TESTING, THE CITY MAY REQUIRE A PROOF ROLL WITH A FULLY LOADED 10-YARD DUMP TRUCK TO CHECK SUBGRADE COMPACTION PRIOR TO PLACEMENT OF ROCK SUBBASE AND AGAIN AT THE COMPLETION OF THE PLACEMENT OF THE BASE ROCK PRIOR TO PAVING THE FIRST LIFT OF ASPHALT.
- ASPHALTIC CONCRETE MIX IS TO BE BATCHED FROM A MIX FORMULA APPROVED BY OSD FOR MATERIAL USED. PAVING CONTRACTOR SHALL PROVIDE A CERTIFICATE OF COMPLIANCE FROM ASPHALT PAVEMENT PLANT.
- SUBSEQUENT SETTLEMENT OR CRACKING OF FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A FAILURE OF THE SUBGRADE AND REPAIRED AT NO COST TO THE CITY AND IN A MANNER ACCEPTABLE TO THE CITY. A PERFORMANCE BOND IS REQUIRED TO GUARANTEE REPAIRS UNDER THE WARRANTY PERIOD.
- THE CONTRACTOR SHALL CONTROL TRAFFIC THROUGH THE PROJECT SITE IN CONFORMANCE WITH THE LATEST EDITION OF "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "OREGON SUPPLEMENTS". THE CONTRACTOR SHALL AT ALL TIMES MAINTAIN LOCAL ACCESS FOR HOMEOWNERS ALONG THE PROJECT SITE.
- THE CONTRACTOR AND/OR SUB-CONTRACTOR SHALL HAVE A MINIMUM OF ONE (1) SET OF APPROVED CONSTRUCTION PLANS ON THE JOB SITE AT ALL TIMES DURING THE CONSTRUCTION PHASES.
- CONTRACTOR SHALL REMOVE AND DISPOSE OF TREES, STUMPS, BRUSH, ROOTS, TOPSOIL AND OTHER MATERIAL ENCOUNTERED DURING THE CONSTRUCTION OF THE ROADWAY AND WHERE INDICATED ON THE PLANS. MATERIAL SHALL BE DISPOSED OF IN ACCORDANCE WITH LOCAL, REGIONAL AND STATE REGULATIONS AT FACILITIES AUTHORIZED TO ACCEPT SUCH MATERIAL.
- CONTRACTOR SHALL CAREFULLY MAINTAIN BENCHMARKS, PROPERTY CORNERS, MONUMENTS AND OTHER REFERENCE POINTS. IF SUCH POINTS ARE DISTURBED OR DESTROYED BY CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND PAY FOR THEIR REPLACEMENT BY EMPLOYING A PROFESSIONAL LAND SURVEYOR TO RESET PROPERTY CORNERS AND OTHER SUCH MONUMENTS.
- EXCESS EXCAVATED MATERIAL SHALL BE HAULED AND DISPOSED OF AT SITES PROVIDED BY THE OWNER AND APPROVED PURSUANT TO AN APPROPRIATE GRADING PERMIT. FILL SITES SHALL BE LEVELED AND GRADED TO DRAIN. THE CONTRACTOR SHALL CORRECT ANY FILL RELATED CONDITIONS.
- FINAL CLEANUP - PRIOR TO FINAL ACCEPTANCE AND PAYMENT, THE CONTRACTOR SHALL CLEAN THE WORK SITE AND ADJACENT AREAS OF ANY DEBRIS, DISCARDED ASPHALTIC CONCRETE MATERIAL OR OTHER ITEMS DEPOSITED BY THE CONTRACTORS PERSONNEL DURING THE PERFORMANCE OF THIS CONTRACT.
- A PERMIT IS REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY, CONTACT THE CITY OF SANDY PUBLIC WORKS DEPARTMENT OR VISIT www.ci.sandy.or.us FOR PERMIT APPLICATION FORMS.
- ALL WORK MUST COMPLY WITH CITY OF SANDY GRADING AND EROSION CONTROL PERMIT #xxxx GR/EC ISSUED XX/XX/XX AND THE NPDES 1200C PERMIT ISSUED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY ON YY/YY/YY. ALL WORK MUST COMPLY WITH THE MOST STRINGENT REQUIREMENTS IN BOTH PERMITS.
- ALL WORK MUST COMPLY WITH THE CITY OF SANDY'S EROSION CONTROL STANDARDS. CONTRACTOR TO SCHEDULE INSPECTIONS 48 NORMAL BUSINESS HOURS IN ADVANCE.
- PRIOR TO DEMOLITION OF ANY OF THE EXISTING STRUCTURES ON-SITE, A DEMOLITION PERMIT IS REQUIRED FROM THE CITY OF SANDY.
- ANY EXISTING DOMESTIC OR IRRIGATION WELLS SHALL BE ABANDONED IN CONFORMANCE WITH OAR 690-220-0030. SUBMIT COPY OF WRD ABANDONMENT FORM TO THE CITY. ANY EXISTING ON-SITE SEWAGE DISPOSAL SYSTEM SHALL BE ABANDONED IN CONFORMANCE WITH CLACKAMAS COUNTY WES REGULATIONS. THE CONTRACTOR SHOULD SUBMIT COPY OF THE CERTIFICATES FOR WELL ABANDONMENT AND SEPTIC TANK REMOVAL TO THE CITY.
- IF, AT ANYTIME DURING THE ON-SITE CONSTRUCTION, THE CONTRACTOR OBSERVES AN ENVIRONMENTAL IMPACT ON-SITE SUCH AS OIL TANKS, CONTAMINATION RESIDUE OR HAZARDOUS MATERIALS, SPILLAGE, ETC., IT MUST BE REPORTED, INSPECTED, AND TREATED IN CONFORMANCE WITH THE APPROPRIATE AGENCY'S REQUIREMENTS.

MIXED USE SITE DEVELOPMENT

38015 HWY 26, SANDY, OR 97055

SANITARY SEWER NOTES:

- SEWER PIPE AND FITTINGS TO BE GREEN PVC GRAVITY SEWER PIPE CONFORMING TO ASTM D-3034, SDR 35 FOR 8" AND 6", SDR26 FOR 15", WITH RUBBER RING TYPE JOINTS CONFORMING WITH ASTM D-3212. SUBMIT CERTIFICATE OF COMPLETION OF 95% MANDREL TEST ON ALL PIPES AFTER COMPACTION.
- PIPE BEDDING, PIPE ZONE MATERIALS SHALL BE 3/4" MINUS CRUSHED ROCK. BACKFILL WITHIN THE RIGHT-OF-WAY SHALL BE 3/4" MINUS CRUSHED ROCK COMPACTED TO 95% OF AASHTO T-180 (ASTM D-1557).
- SEWER MAINS TO BE AIR TESTED AS PER APWA PART 00445.72. 95% MANDREL TESTED AS PER APWA PART 00445.73. AND VIDEO INSPECTED AS PER APWA PART 00445.74 FOLLOWING TRENCH BACKFILL AND COMPACTION.
- LATERALS SHALL BE 6" 3034 PVC PIPE, GREEN IN COLOR, AND SHALL BE INSTALLED AT 2% MINIMUM SLOPE UNLESS OTHERWISE NOTED.
- MANHOLE TESTING SHALL BE AS PER APWA PART 00470.71.
- SETTLEMENT OF THE FINISHED SURFACE WITHIN THE WARRANTY PERIOD SHALL BE CONSIDERED TO BE A RESULT OF IMPROPER COMPACTION AND SHALL BE PROMPTLY REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.
- ALL AC SAWCUT LINES SHALL BE STRAIGHT. ALL EDGES SHALL BE SEALED AND SANDED UPON COMPLETION.
- ALL SERVICE LATERALS SHALL EXTEND 5 FT. BEYOND THE PROPERTY LINE. THE END SHALL BE MARKED WITH A SINGLE 2X4 WHICH EXTEND 2 FT. ABOVE FINISH GRADE. THE EXPOSED PORTIONS OF THE 2X4 SHALL BE PAINTED WHITE. DEPTH OF LATERAL SHALL BE PAINTED ON THE 2X4. CLEANOUTS SHALL BE INSTALLED FOR EACH STRUCTURE
- SANITARY LATERAL LOCATIONS SHALL BE STAMPED WITH AN "S" ON THE CURB FACE FOR FUTURE LOCATION.
- SEWER AND WATERLINE CROSSINGS MUST MEET THE REQUIREMENTS OF OAR 333-061-0050(9)
- PRIOR TO CONSTRUCTION, OBTAIN APPROVAL FOR THE SANITARY SEWER SYSTEM FROM THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) AS PER OAR 340-052 AND SUBMIT A COPY OF THE APPROVAL TO THE CITY (ENGINEER TO APPLY FOR APPROVAL).
- CONTRACTOR TO SUBMIT A BYPASS PUMPING PLAN FOR TRUNK LINE RELOCATION, PLAN SHALL INCLUDE DETAILS ON PUMP SIZING FOR PEAK FLOWS, STANDBY, BACKUP PUMP(S), PUMP ATTENDANT AND / OR DIAL-OUT SYSTEM FOR PUMP FAILURE OR MALFUNCTION

STREET AND STORM DRAINAGE NOTES:

- STREET AND STORM DRAIN IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF SANDY STANDARDS AND REQUIREMENTS.
- ALL TRENCH EXCAVATION SHALL CONFORM TO STANDARD STORM SEWER SPECIFICATIONS AND SHALL BE UNCLASSIFIED.
- PIPE BEDDING AND PIPE ZONE SHALL CONFORM TO THE EXCAVATION AND BACKFILL DETAILS, AND SHALL BE 3/4"-0" CRUSHED ROCK.
- THE CITY REQUIRES COMPACTION WITHIN THE RIGHT-OF-WAY TO BE 95% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-180. CONTRACTOR TO DETERMINE TYPE OF EQUIPMENT AND METHOD USED TO ACHIEVE REQUIRED COMPACTION.
- TRENCH BACKFILL OUTSIDE OF RIGHTS OF WAY OR PAVED AREAS MAY BE EXCAVATED TRENCH MATERIAL. TRENCH BACKFILL IN PAVED AREAS SHALL BE AN APPROVED GRANULAR MATERIAL.
- MATERIAL IN SOFT SPOTS WITHIN THE ROADWAY SHALL BE REMOVED TO THE DEPTH REQUIRED TO PROVIDE A FIRM FOUNDATION AND SHALL BE REPLACED WITH 1-1/2"-0" CRUSHED ROCK. THE ENTIRE SUBGRADE SHALL BE THOROUGHLY COMPACTED TO 95% AASHTO T-180.
- CONTRACTOR SHALL NOTIFY THE ENGINEER AND CITY OF SANDY WHEN SUBGRADE IS COMPLETE AND 24 HOURS PRIOR TO PLACEMENT OF ROCK BASE MATERIAL AND 24 HOURS PRIOR TO FINAL PAVING FOR AN INSPECTION OF THE WORK. FAILURE TO DO SO WILL MAKE ANY SUBGRADE FAILURE PROBLEMS THE RESPONSIBILITY OF THE CONTRACTOR. A PROOF ROLL WITH A FULLY LOADED 10-YARD DUMP TRUCK MAY BE REQUIRED TO CHECK SUBGRADE COMPACTION PRIOR TO PLACEMENT OF ROCK SUBBASE AND AGAIN AT THE COMPLETION OF THE PLACEMENT OF THE BASE ROCK PRIOR TO PAVING THE FIRST LIFT OF ASPHALT.
- ALL SAWCUT JOINTS SHALL BE STRAIGHT, TACKED AND SAND SEALED UPON PAVING.
- THE CITY REQUIRES A SUCCESSFUL MANDREL PULL ON ONE SECTION OF EACH DIAMETER OF STORM PIPE USED.
- ASPHALT COMPACTION SHALL BE PERFORMED USING NUCLEAR GAUGE. THE RICE DENSITY TESTS SHALL EET 91% FOR THE BASE LIFT AND 92% FOR THE TOP LIFT IN ACCORDANCE WITH ODOT TM305 OR AASHTO T-209. SUBMIT TESTING REPORTS TO THE CITY.
- STORM DRAIN LATERALS SHALL BE 4" 3034 PVC AND WHITE IN COLOR. PLACE 2X4 WOODEN PIPE MARKER AT END OF EACH LATERAL.

GRADING NOTES:

- FILLS SHALL BE COMPACTED TO 95 PERCENT OF MAXIMUM DENSITY IN THE BUILDING ENVELOPE AND 92 PERCENT OF MAXIMUM DENSITY ON THE REMAINDER OF THE LOT AS DETERMINED BY ASTM TEST SD 1557-91, METHOD A, OR AN EQUIVALENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING THE NECESSARY ARRANGEMENTS FOR SUCH TESTING AND FOR SUPPLYING THE RESULTS TO THE CITY OF SANDY.
- ALL CUTS SHALL BE MADE CONSISTENT WITH THE DETAILS NOTED IN THE PLANS. NO CUT SHALL EXCEED A GRADE OF 2 HORIZONTAL TO 1 VERTICAL UNLESS APPROVED BEFOREHAND BY THE ENGINEER AND THE CITY OF SANDY.
- APPROPRIATE BENCHING OF FILLS IS REQUIRED FOR FILLS OVER 5 FEET IN HEIGHT ON SLOPES IN EXCESS OF 5 HORIZONTAL TO 1 VERTICAL. BENCHING MUST BE DONE AS PER THE APPROVED PLANS. THE CITY OF SANDY SHALL INSPECT BENCHES PRIOR TO FILL PLACEMENT.
- CUT AND FILL SLOPES SHALL BE PROTECTED FROM EROSION. SUCH CONTROL MAY CONSIST OF APPROPRIATE REVEGETATION OR OTHER ACCEPTABLE MEANS AND METHODS. EROSION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EARTHWORK OR SITE STRIPPING.
- THE CONTRACTOR SHALL COORDINATE WITH CITY PERSONNEL BY CALLING (503) 668-6941 OR (503) 668-5533 ANYTIME FOR REQUIRED INSPECTIONS AT THE FOLLOWING STAGES OF CONSTRUCTION:

UTILITY NOTES:

- THE CONTRACTOR IS REQUIRED TO OBTAIN ALL NECESSARY PERMITS FROM THE CITY OF SANDY PRIOR TO BEGINNING CONSTRUCTION.

NOTIFICATION:

GENERAL - THE CONTRACTOR SHALL, AS A MINIMUM, COORDINATE THE PROPOSED CONSTRUCTION ACTIVITIES WITH THE OWNER AND LOCAL PUBLIC AGENCIES, UTILITIES AND COMPANIES DURING CONSTRUCTION TO AVOID DAMAGE AND TO PREVENT THE INTERRUPTION OF SERVICES AND UTILITIES TO RESIDENTS AND BUSINESSES:

OREGON UTILITY NOTIFICATION CENTER
1-503-246-6699

CLACKAMAS COUNTY
(503) 353-4400

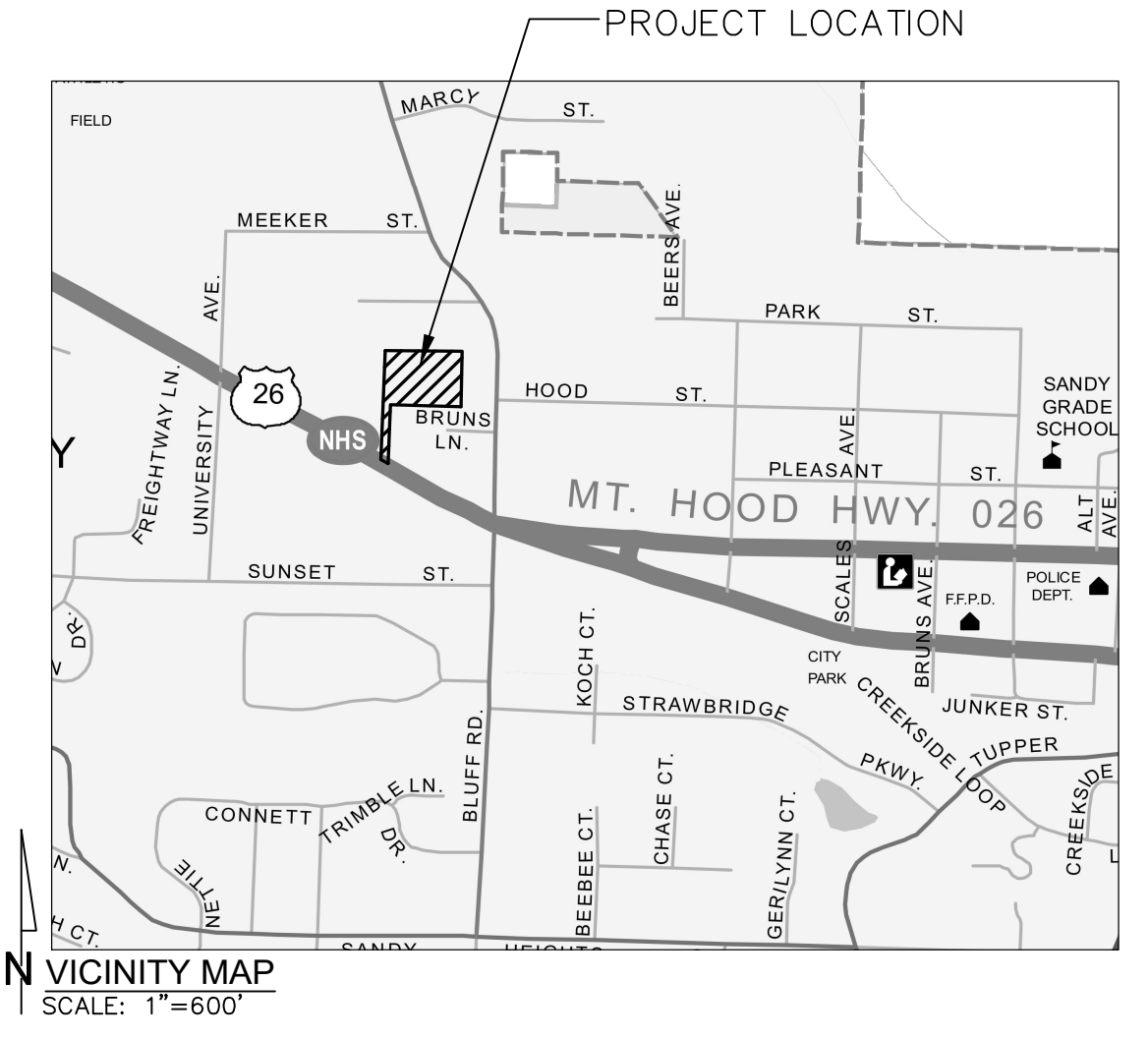
CITY OF SANDY ENGINEERING DEPT. (503) 668-5533
BUILDING DIVISION INSPECTIONS (503) 668-6941

PORTLAND GENERAL ELECTRIC
(503) 226-8111

VERIZON NORTHWEST (TELEPHONE)
1-800-483-4100

NORTHWEST NATURAL GAS
(503) 226-4211

CHARTER COMMUNICATIONS (CABLE TV)
1-866-731-5420



WATERLINE NOTES

- STENCIL "W" ON CURBS AT WATER METER LOCATION.
- ALL PUBLIC WATERLINE PIPE SHALL BE PRESSURE CLASS 350 DUCTILE IRON. DUCTILE IRON PIPE SHALL BE CEMENT-MORTAR LINED AND SHALL CONFORM TO AWWA STANDARD C151 AND C104 AND SHALL BE U.S. TYTON JOINT PIPE OR APPROVED EQUAL. RUBBER RING GASKETS SHALL CONFORM TO ANSI A-21.10 AND ANSI A-21.4. MORTAR LINING SHALL BE SAME THICKNESS AS FOR PIPE.
- NO PUBLIC WATER VALVES SHALL BE OPENED OR CLOSED (OPERATED) BY ANYONE BUT THE CITY OF SANDY.
- ALL PUBLIC WATERLINES PIPE SHALL HAVE A MINIMUM OF 36" OF COVER IN STREET RIGHT OF WAYS TO FINISH GRADE UNLESS OTHERWISE SHOWN.
- ALL WATERLINES SHALL BE THOROUGHLY FLUSHED AND CHLORINATED AND PORTABLE WATER TEST SHALL BE APPROVED BY THE OREGON STATE HEALTH DEPARTMENT AND THE CITY OF SANDY PRIOR TO ANY METER SERVICE HOOK-UP OR CONNECTION TO EXISTING SYSTEM. DISINFECTION TESTING OF ALL WATERLINES TO BE PER AWWA C-651
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROPER SEPARATION BETWEEN SANITARY SEWER LINES AND WATERLINES AS REQUIRED BY THE DEPARTMENT OF ENVIRONMENTAL QUALITY AND SATE DEPARTMENT OF HEALTH.
- ALL FILLING, FLUSHING, AND TESTING OF NEW WATERLINE FACILITIES SHALL BE DONE THROUGH A 6" DOUBLE-CHECK DEVICE AND TEMPORARY BLOW-OFFS.
- MECHANICAL RESTRAINT IS REQUIRED AT ALL FITTINGS AS OPPOSED TO THRUST BLOCKING
- PRIOR TO CONSTRUCTION, OBTAIN APPROVAL FOR THE WATER SYSTEM FROM THE OREGON DEPARTMENT OF HUMAN SERVICES, DRINKING WATER PROGRAM AS PER OAR 333-061 AND SUBMIT A COPY OF THE APPROVAL TO THE CITY (ENGINEER TO APPLY FOR APPROVAL)
- ALL WATERLINES TO BE HYDROSTATIC TESTED PER AWWA C-600

WATER SERVICES

- WATER SERVICE PIPE SHALL BE COPPER TUBING CONFORMING TO ASTM B88, TYPE K, ANNEALED, THE TUBING SHALL BE COUPLED USING FLARE TYPE COMPRESSION FITTINGS CONFORMING TO THE REQUIREMENTS OF AWWA C800 WITH MINIMUM 150 PSI WORKING PRESSURE.
- SADDLES SHALL BE STAINLESS STEEL, DOUBLE STRAPS OR BAND TYPE WITH STANDARD TAPPING TO MATCH SERVICE REQUIREMENTS.
- CORPORATION STOPS SHALL CONFORM TO AWWA C800 AND SHALL BE OF LEAD-FREE BRONZE ALLOY WITH COLD-FLARE CUTS OR COMPRESSION OUTLET. DIRECT TAP CONNECTIONS SHALL BE AWWA TAPERED THREAD INLET. SADDLE CONNECTIONS SHALL BE IP INLET. REFER TO STANDARD DRAWING #408 FOR APPROVED MANUFACTURERS AND MODEL NUMBERS
- METER STOPS SHALL BE ANGLE PATTERN WITH LOCK WINGS, REFER TO STANDARD DETAIL NO. 408 FOR APPROVED MANUFACTURERS AND MODEL NUMBERS.



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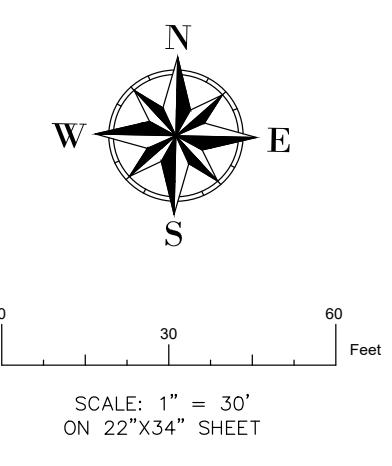
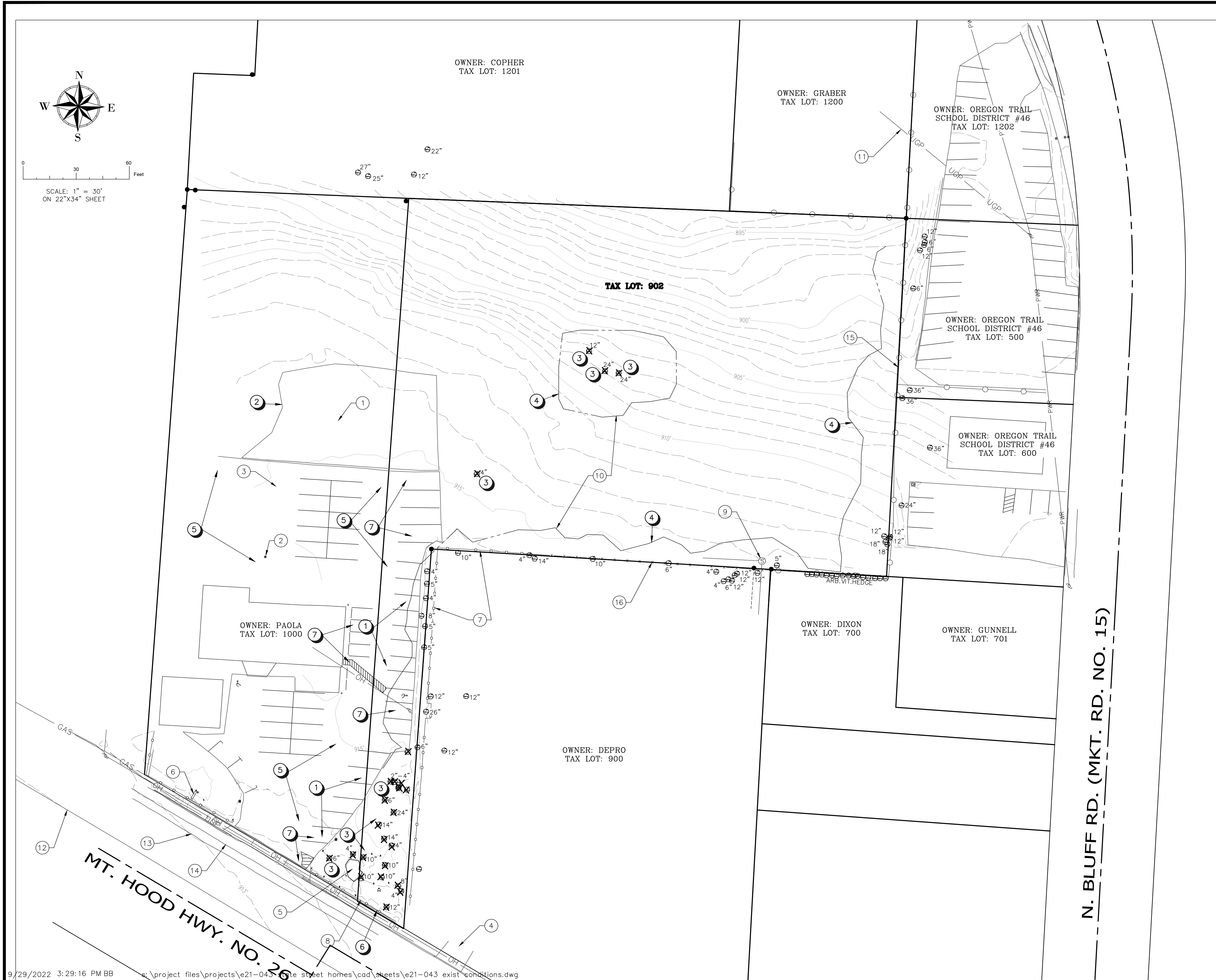


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(503) 668-3737

STATE STREET HOMES
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COVER SHEET AND NOTES
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

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AS-BUILT NOTES

- ① GRAVEL PARKING AREA USED FOR DELIVERY SEMIS WITH 35' TRAILER TURNING AND LARGE VEHICLE PARKING.
- ② STORM DRAIN IN PAVED PARKING LOT.
- ③ PAVED PARKING AREA WITH VERY FADED PARKING LINES.
- ④ NEAREST DRIVEWAY APPROACH
- ⑤ EXISTING POND LANDSCAPE FEATURE WITH STONE BORDER AND SMALL PATH. SEVERAL ELECTRICAL OUTLETS IN THE AREA TO THE EAST.
- ⑥ EXISTING PAOLA'S PIZZA SIGN.
- ⑦ NEWER 6-FOOT WOOD FENCE BELONGING TO DEPRO.
- ⑧ OLD 2-FOOT WOOD DECORATIVE FENCE RUNS ALONG FRONTAGE ON BOTH SIDES OF APPROACH.
- ⑨ EXISTING SANITARY SEWER MANHOLE LID.
- ⑩ TREE DRIP LINE.
- ⑪ UNDERGROUND POWER TO GRABER RESIDENCE. LOCATION NOT VERIFIED. INFORMED OF ITS EXISTENCE VIA GRABER AND TOLD IT IS 9' UNDERGROUND.
- ⑫ NORTHERN MOST LINE OF CENTER TURN LANE.
- ⑬ FOG LINE.
- ⑭ BIKE LANE.
- ⑮ 6-FOOT CHAINLINK FENCE.
- ⑯ 3-FOOT WELDED WIRE FENCE WITH GATE JUST WEST OF MANHOLE LID.

CONTOURS: 1' MINOR AND 5' MAJOR

FIELD WORK CONDUCTED ON JULY 14 AND 15, 2021. WATER AND SEWER LOCATES WERE NOT MARKED AT THE TIME OF SURVEY. SEE CITY MAP.

THIS DOES NOT CONSTITUTE A FORMAL BOUNDARY SURVEY. THIS BOUNDARY IS BASED ON A BEST FIT OF S11941 TO FOUND MONUMENTS. RIGHTS-OF-WAYS HAVE NOT BEEN RESOLVED AND MAY NOT BE ACCURATE.

LEGEND

- FOUND MONUMENT OF RECORD
- WOOD FENCE
- CHAINLINK FENCE
- BARBWIRE/WOVEN WIRE/FARM FENCE
- ⊙ EXISTING TREE WITH DIAMETER
- ⊞ ELECTRICAL OUTLET
- UGP UNDERGROUND ELECTRIC
- PWR OVERHEAD WIRE
- ⊞ UTILITY POLE
- GAS UNDERGROUND GAS LINE
- ⊞ IRRIGATION CONTROL BOX
- ⊞ 5' LAMP POST
- ⊞ FLOOD LIGHT
- ⊞ SANITARY SEWER MANHOLE
- SS SANITARY SEWER LINE
- ⊞ STORM SEWER MANHOLE
- ⊞ STORM CATCH BASIN
- ⊞ SPRINKLER HEAD
- CS SURVEY NUMBER, CLACKAMAS COUNTY SURVEY RECORDS
- DOC. NO. DOCUMENT NUMBER, CLACKAMAS COUNTY DEED RECORDS

DEMO KEY NOTES

- ① SAWCUT AND REMOVE PORTION OF EXIST ASPHALT AS NECESSARY TO CONSTRUCT NEW ASPHALT MATCHLINE AND 6" EXPOSURE CURB AND 5' SIDEWALK, SEE SHEET 3
- ② EXIST GRAVEL AREA TO BE REMOVED
- ③ REMOVE EXIST TREE (24 TOTAL), TYPICAL
- ④ REMOVE EXIST BRUSH
- ⑤ PROTECT EXIST ASPHALT
- ⑥ REMOVE EXIST FENCE
- ⑦ REMOVE EXIST STRIPING

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
MAY 26, 2015
SAMANTHA KAY TANNER
90079
RENEWS 6/30/2022

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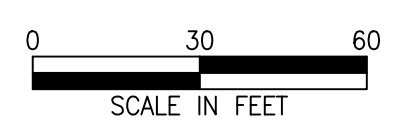
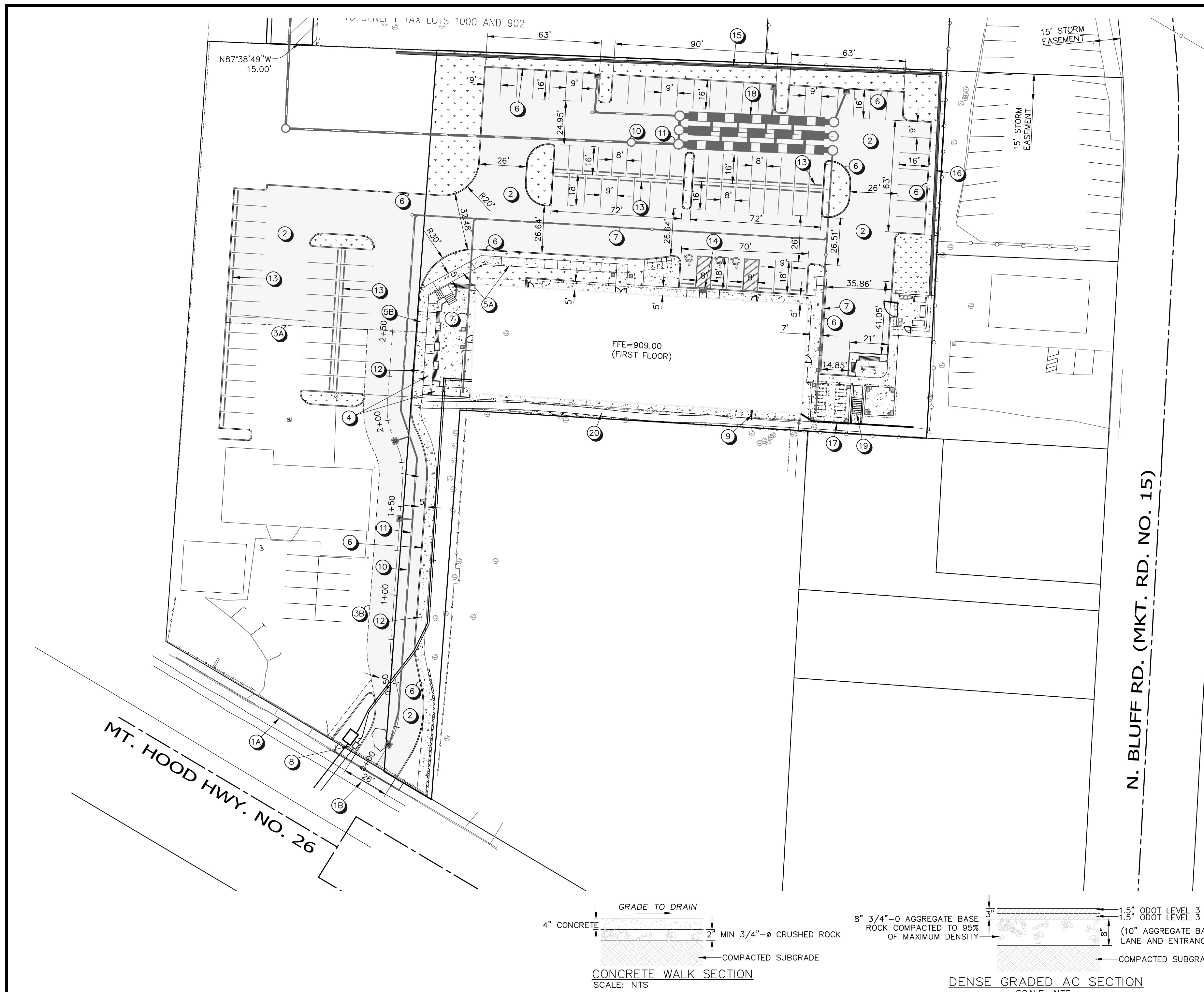
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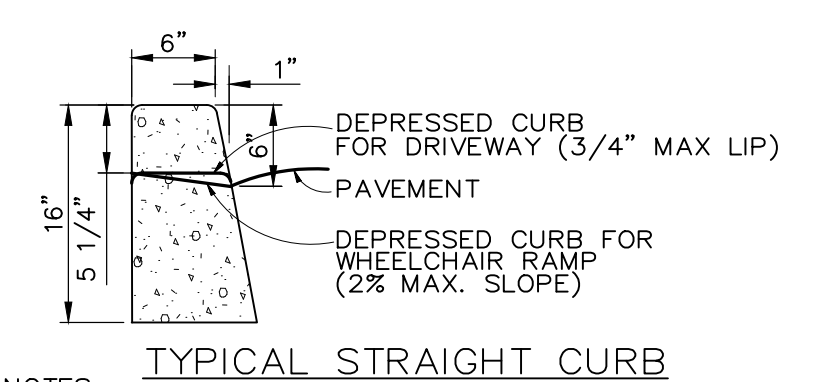
EXISTING CONDITIONS AND DEMO PLAN
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38015 HWY 26, SANDY, OR 97055

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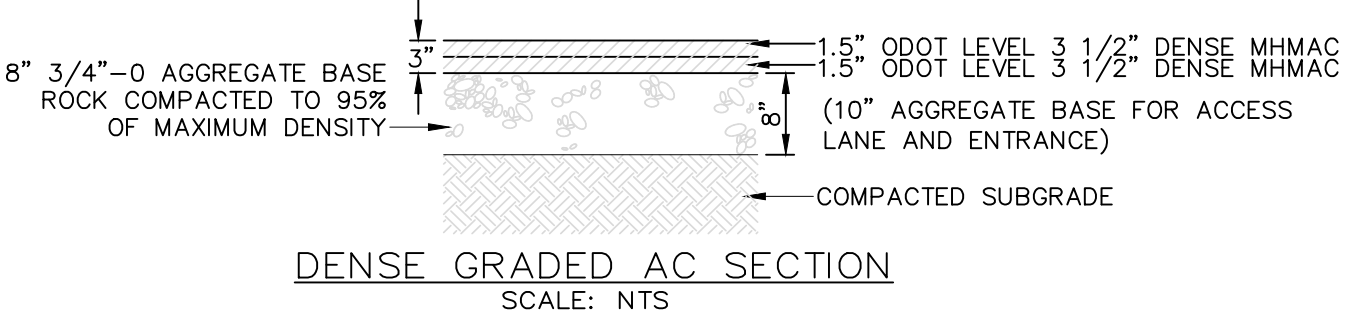
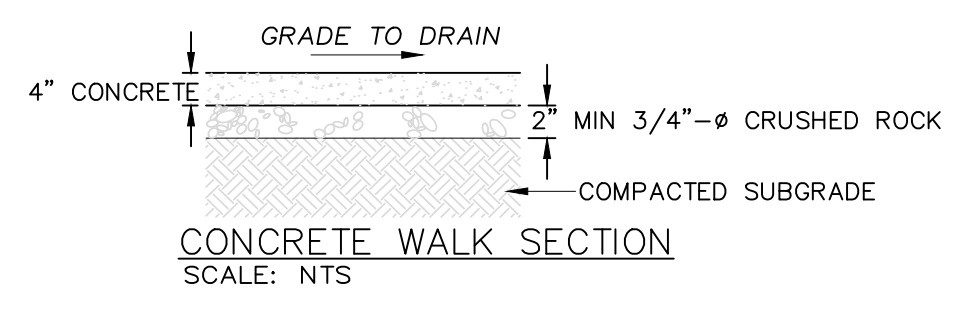


KEY NOTES

- 1A EXIST 35'± WIDE COMMERCIAL DRIVEWAY APPROACH
- 1B PROPOSED 26' WIDE DRIVEWAY ACCESS AND SIDEWALK
- 2 NEW ASPHALT DRIVELANE AND PARKING AREA, SEE TYPICAL SECTION DETAIL THIS SHEET, SEE SITE CIRCULATION PLAN ON SHEET 12 FOR EMERGENCY VEHICLE ACCESS PLAN
- 3A SAWCUT MIN 1" FROM EDGE OF EXIST EDGE OF ASPHALT, TYPICAL
- 3B SAWCUT EXIST ASPHALT FOR MATCH LINE TO EXIST AC PARKING, TYPICAL
- 4 CONCRETE SIDEWALK RAMP TO CIVIC AREA ACCESS WITH HAND RAILS, SEE ARCHITECTURAL PLANS FOR HAND RAILING DETAILS
- 5A DOWNWARD RAMP AND LANDING PATHWAY WITH HANDRAILS TO MAIN FLOOR, SEE ARCHITECTURAL PLANS FOR HANDRAIL DETAILS
- 5B RAMP DOWN PORTION OF SIDEWALK WITH HAND RAILS, SEE ARCHITECTURAL PLANS FOR HANDRAIL DETAILS
- 6 CURB WITH 6" EXPOSURE UNLESS OTHERWISE NOTED (TYPICAL), SEE TYPICAL SECTION THIS SHEET
- 7 DOWNSPOUT CONVEYANCE LINES TO STORM SYSTEM
- 8 DOUBLE DETECTOR CHECK VALVE AND VAULT AND WATER SERVICE METER AND VAULT FOR SPRINKLER AND POTABLE WATER SERVICE
- 9 CONNECT TO EXIST SEWER MAIN FOR SEWER SERVICE, CONTRACTOR TO VERIFY DEPTH PRIOR TO CONSTRUCTION
- 10 WATER QUALITY MANHOLE, SEE SHEET 5
- 11 FLOW CONTROL MANHOLE, SEE SHEET 5
- 12 PROPOSED 5' WIDE CONCRETE WALKWAY, MAX 2% CROSS SLOPE (1.5% TYPICAL) AND MAXIMUM 5% LONGITUDINAL SLOPE, SEE TYPICAL SECTION DETAIL THIS SHEET
- 13 CONCRETE WHEEL STOPS WITH STORMWATER UNDERDRAIN (TYPICAL)
- 14 ADA COMPLIANT SIDEWALK RAMP
- 15 12'± RETAINING WALL
- 16 8'± RETAINING WALL
- 17 7'± RETAINING WALL
- 18 60" DETENTION SYSTEM, SEE SHEET 5
- 19 10 STAIRS WITH LANDINGS TO TOP OF WALL, SEE SHEET 4 FOR SPOT GRADING PLAN
- 20 TRAIL



- NOTES:**
1. ALL RADII SHALL BE 3/4" EXCEPT AS OTHERWISE SHOWN.
 2. ISOLATION JOINTS SHALL BE PLACED ONLY AS SPECIFIED.
 3. CONTRACTION JOINTS SHALL BE PLACED AT 15' INTERVALS AND SHALL EXTEND AT LEAST 50% THROUGH THE CURB OR CURB AND GUTTER.
 4. A CONTRACTION JOINT SHALL BE PLACED ALONG AND OVER WEEP HOLE THROUGH THE CURB AND THROUGH THE SIDEWALK.
 5. WHEN SIDEWALKS ARE CONSTRUCTED, EXTEND 3" PIPE TO BACK OF SIDEWALK AND INSTALL COUPLING.



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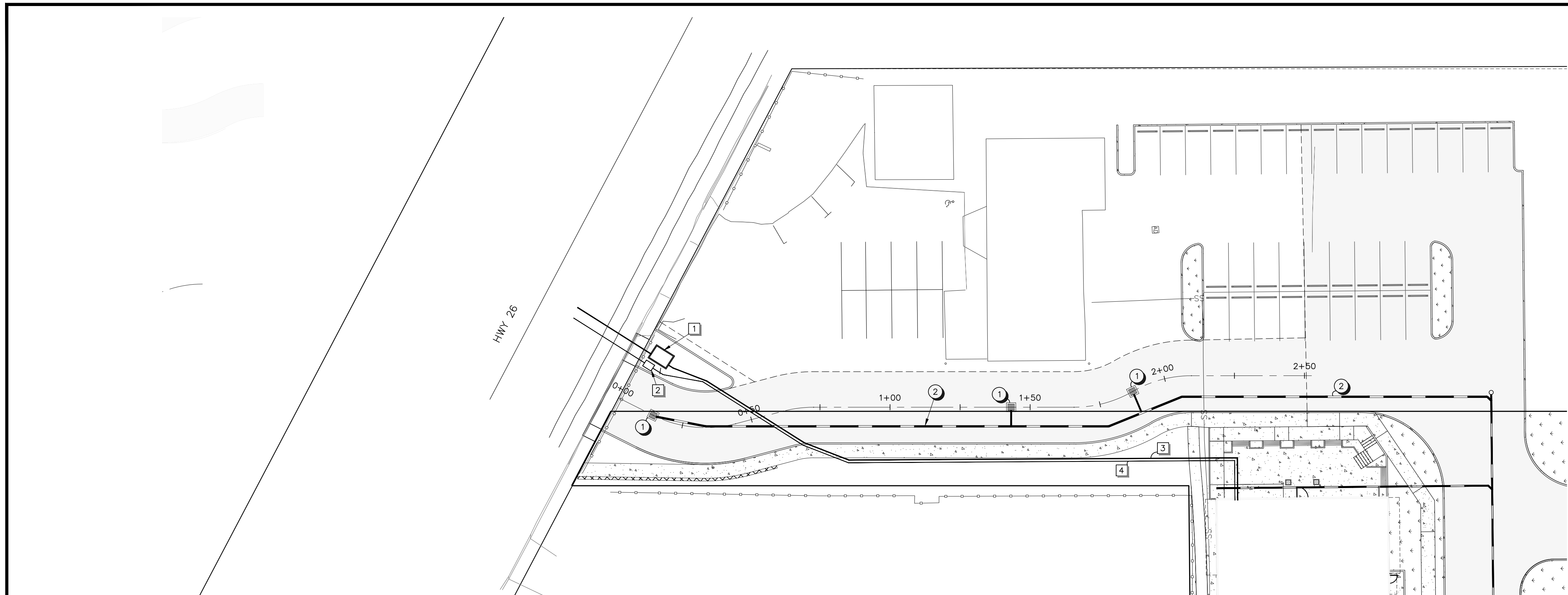
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COMPOSITE SITE PLAN
MIXED USE SITE DEVELOPMENT
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- KEY NOTES**
- ① LYNCH TYPE TRAP CATCH BASIN
 - ② STORM CONVEYANCE LINE TO DETENTION SYSTEM

- WATERLINE KEY NOTES**
- ① PROPOSED DOUBLE DETECTOR CHECK VALVE AND VAULT BY FIRE SUPPRESSION DESIGNER
 - ② PROPOSED WATER METER SIZED BY WATER SYSTEM DESIGNER
 - ③ NEW FIRE SUPPRESSION LINE, SIZE PROVIDED BY WATER SYSTEM DESIGNER
 - ④ NEW POTABLE WATER SERVICE LINE, SIZE PROVIDED BY WATER SYSTEM DESIGNER



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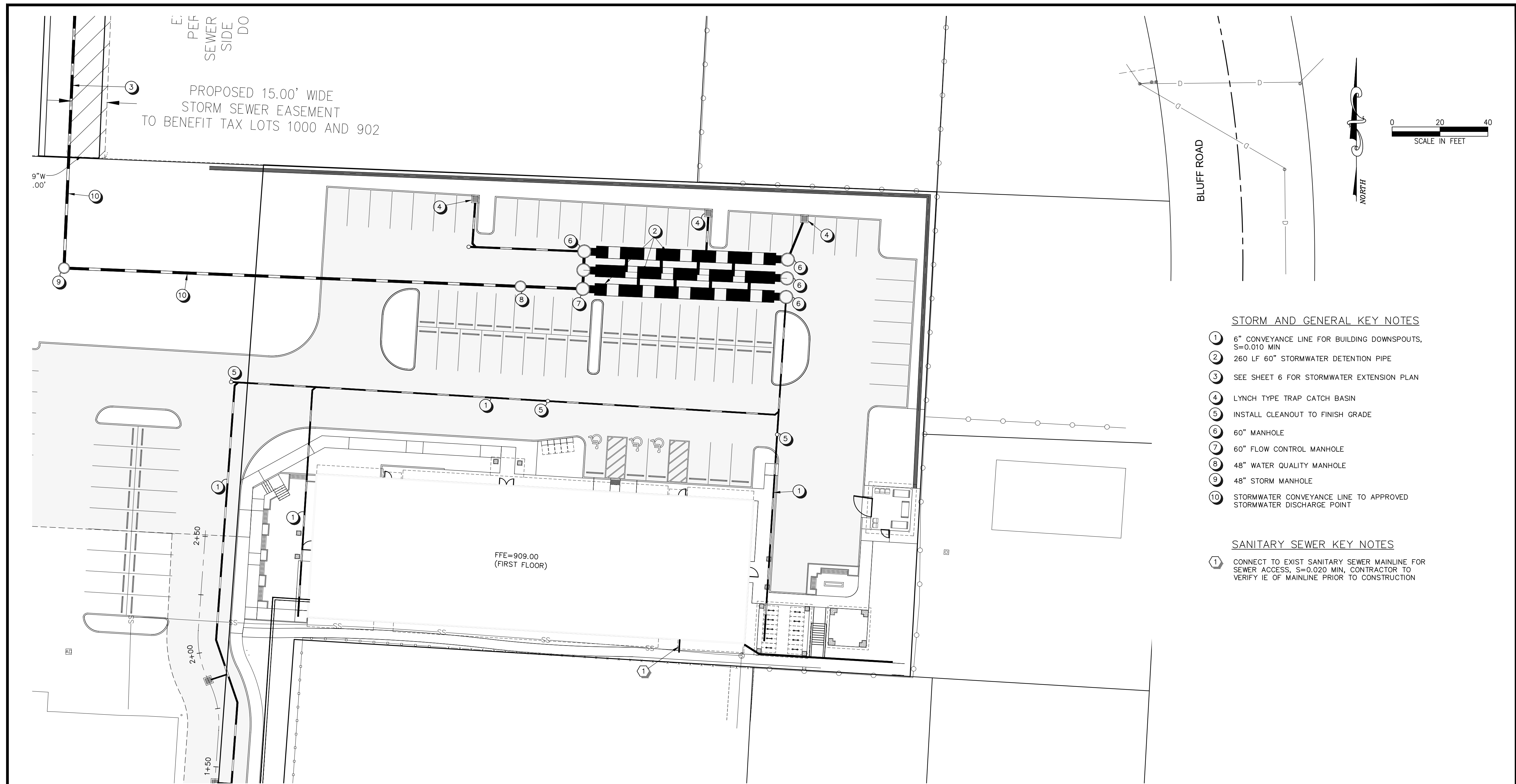
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ENTRY UTILITY PLAN
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STORM AND GENERAL KEY NOTES

- ① 6" CONVEYANCE LINE FOR BUILDING DOWNSPOUTS, S=0.010 MIN
- ② 260 LF 60" STORMWATER DETENTION PIPE
- ③ SEE SHEET 6 FOR STORMWATER EXTENSION PLAN
- ④ LYNCH TYPE TRAP CATCH BASIN
- ⑤ INSTALL CLEANOUT TO FINISH GRADE
- ⑥ 60" MANHOLE
- ⑦ 60" FLOW CONTROL MANHOLE
- ⑧ 48" WATER QUALITY MANHOLE
- ⑨ 48" STORM MANHOLE
- ⑩ STORMWATER CONVEYANCE LINE TO APPROVED STORMWATER DISCHARGE POINT

SANITARY SEWER KEY NOTES

- ① CONNECT TO EXIST SANITARY SEWER MAINLINE FOR SEWER ACCESS, S=0.020 MIN, CONTRACTOR TO VERIFY IE OF MAINLINE PRIOR TO CONSTRUCTION



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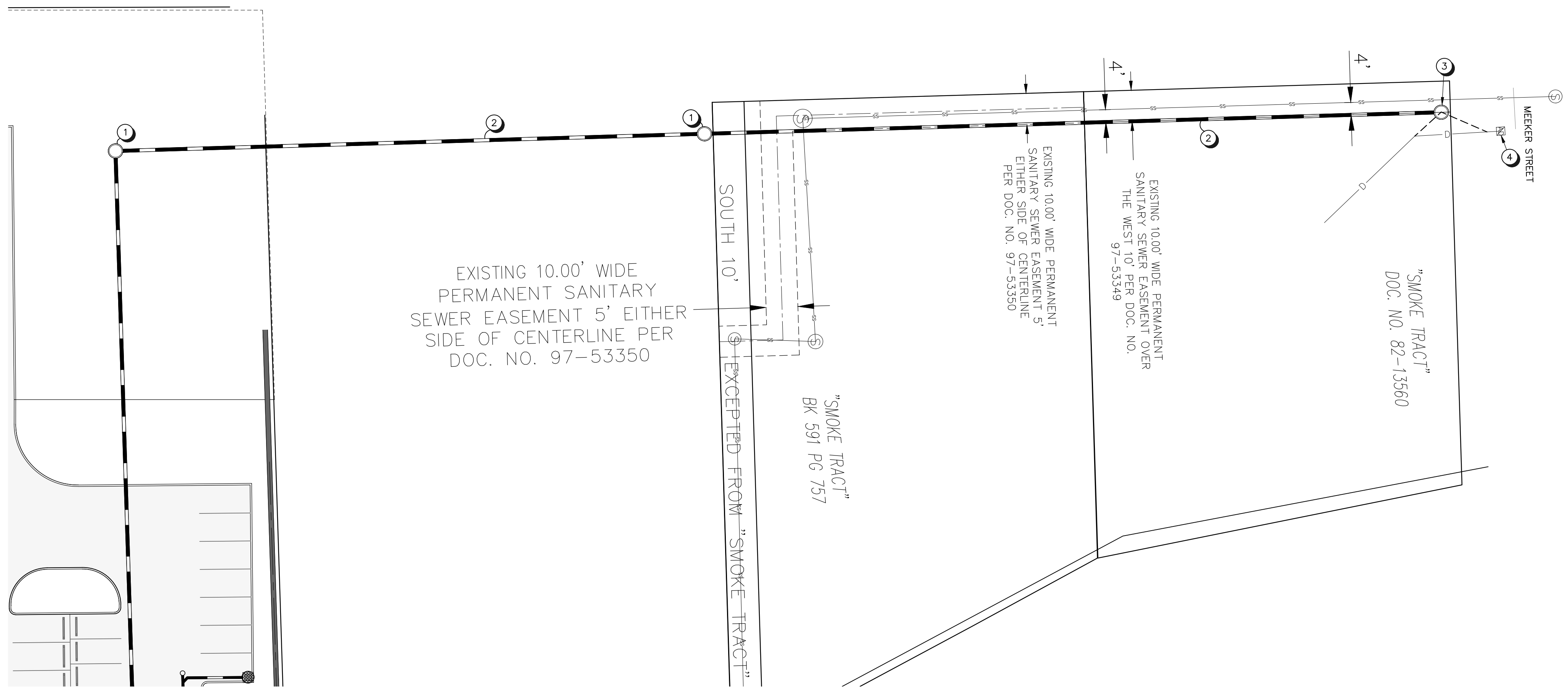
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SITE UTILITY PLAN
MIXED USE SITE DEVELOPMENT
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KEY NOTES

- ① 48" STORM MANHOLE
- ② STORMWATER CONVEYANCE LINE TO APPROVED STORMWATER DISCHARGE POINT
- ③ REALIGN EXIST STORMLINE AND CONNECT INTO PROPOSED 48" MANHOLE
- ④ STORMWATER TO CONNECT INTO EXIST DITCH INLET, UTILIZE EXIST STORM LINE CONNECTION INTO DITCH INLET



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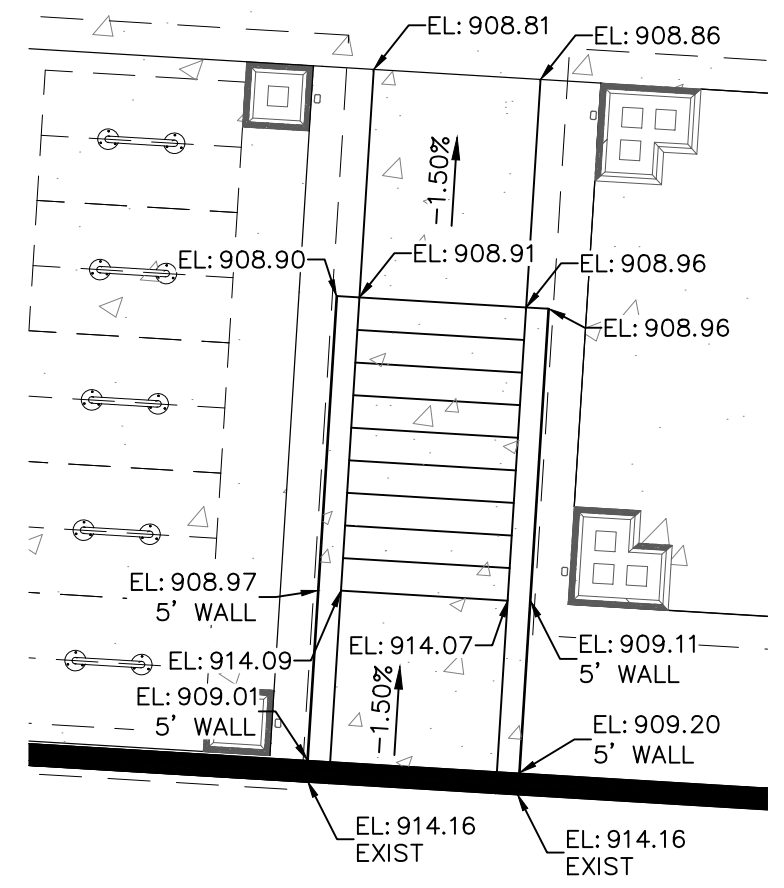
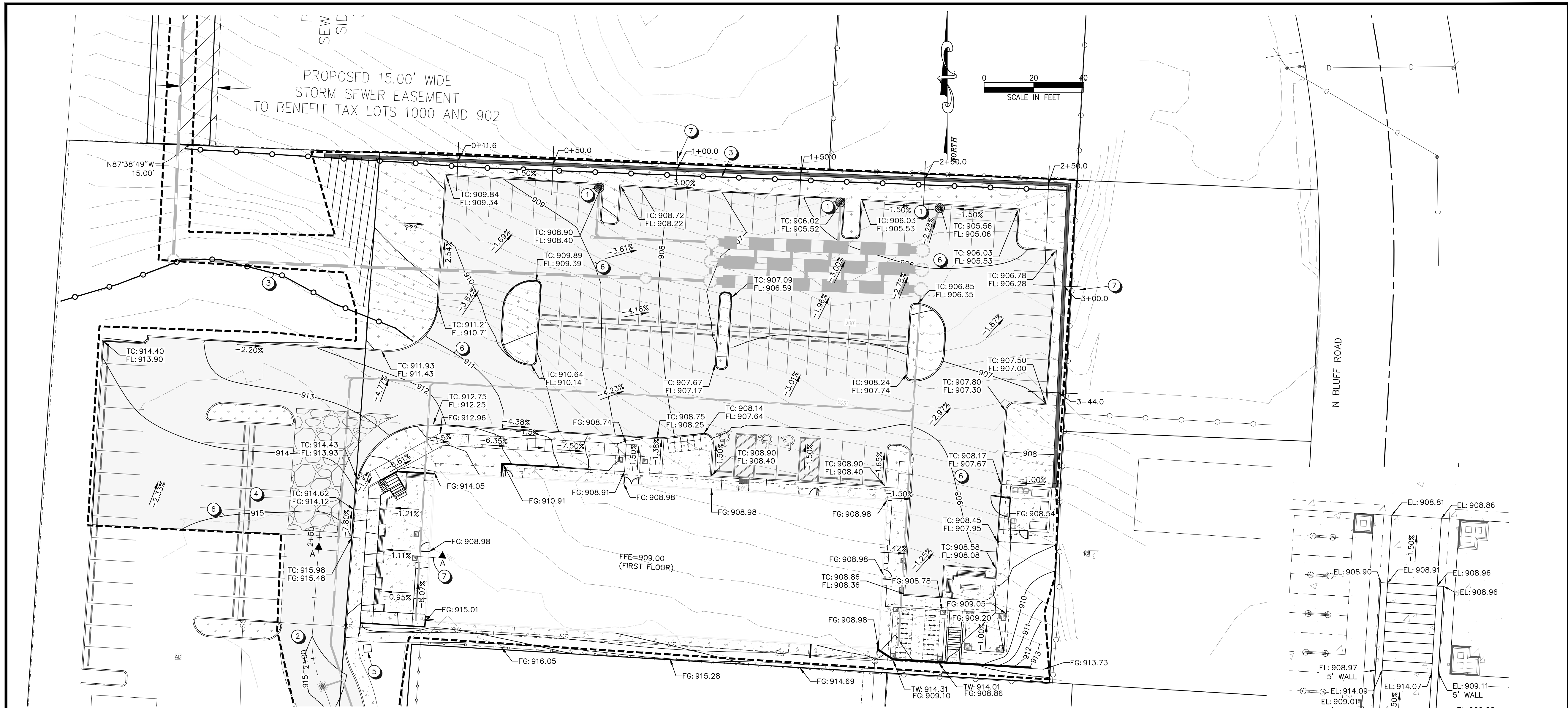


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STORMWATER EXTENSION PLAN
MIXED USE SITE DEVELOPMENT
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- KEY NOTES**
- 1 CB INSERT INLET PROTECTION FOR AREA DRAIN TYPE CATCH BASIN. SEE DETAILS ON SHEET 11 (TYPICAL)
 - 2 PROVIDE TEMPORARY INLET PROTECTION ON ALL STORMWATER INLETS WITHIN 250 LF DOWNSTREAM OF THE PROJECT SITE
 - 3 TEMPORARY SILT FENCING. SEE DETAIL ON SHEET 11. ADJUST SILT FENCING AS NECESSARY DURING CONSTRUCTION
 - 4 CONSTRUCTION ENTRANCE. SEE DETAIL THIS ON SHEET 11
 - 5 CONSTRUCT TEMPORARY 3' X 3' X 2' DEEP SUMP AREA TO BE USED AS WASH AREA FOR CONCRETE TRUCKS, AFTER CURBS AND SIDEWALKS ARE INSTALLED AND BEFORE ROADS ARE PAVED, FILL AND COMPACT SUMP AREA PER STRUCTURAL REQUIREMENTS, DO NOT OVERFILL SUMP AREA, CONTRACTOR TO INCREASE SUMP WIDTH AS NECESSARY TO PROVIDE ADEQUATE VOLUME AS (IF) NEEDED
 - 6 PROPOSED FINISH GRADE CONTOURS (TYPICAL)
 - 7 SEE SHEET 8 FOR WALL CROSS SECTIONS, TYPICAL

ESTIMATED INPLACE QUANTITIES:

SITE SCRAPING OF ORGANICS AND HARD SURFACES (ASSUMED 4" AVERAGE, TO BE HAUL OFF): 790 CY
 ASPHALT DATUM TO SITE SCRAPING: 610 CY CUT, 4190 CY FILL
 SIDEWALK/LANDSCAPE DATUM TO SITE SCRAPING: 361 CY CUT, 940 CY FILL
 UNDER BUILDING (ASSUME SLAB CONSTRUCTION): 2030 CY CUT, 0 CY FILL

TOTAL CUT: 3,791 CY
 TOTAL FILL: 5,130 CY

QUANTITY IS AN ESTIMATE FOR INPLACE QUANTITIES AND DOES NOT INCLUDE TRENCH SPOILS, CONTRACTOR RESPONSIBLE FOR DOING OWN QUANTITY ESTIMATE FOR CONSTRUCTION COST

STAIRS GRADING DETAIL
 SCALE: SEE SCALE BAR

LEGEND

- TEMPORARY SEDIMENT FENCE
- BIO-BAG AND INLET INSERT PROTECTION
- LIMITS OF DISTURBANCE (1.9 ACRES)

SCALE IN FEET: 0 5 10

REGISTERED PROFESSIONAL ENGINEER
 67149PE
PRELIMINARY
 OREGON
 KELLY A. GROVER
 EXPIRES: 06/30/23
 SIGNATURE DATE:

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PROJECT NO. E21-043		

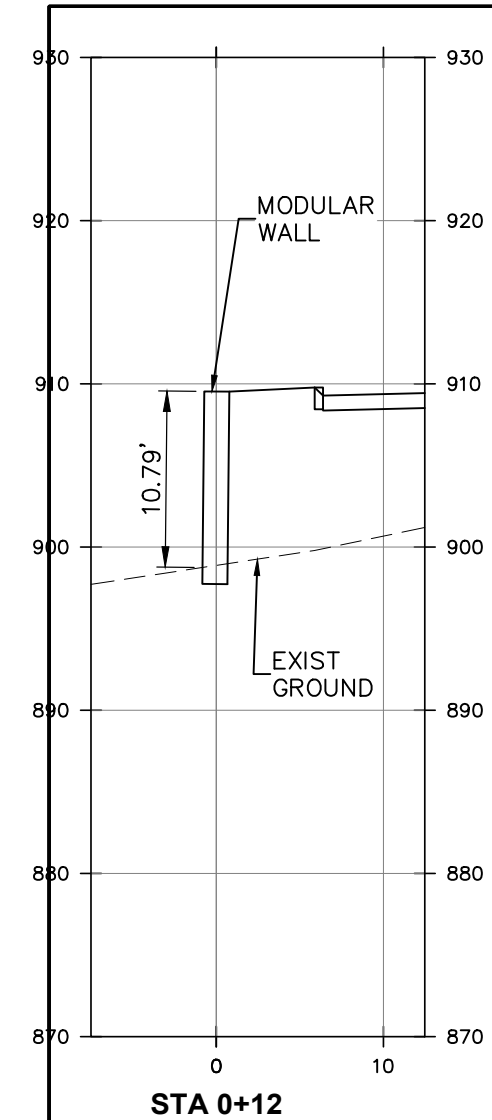
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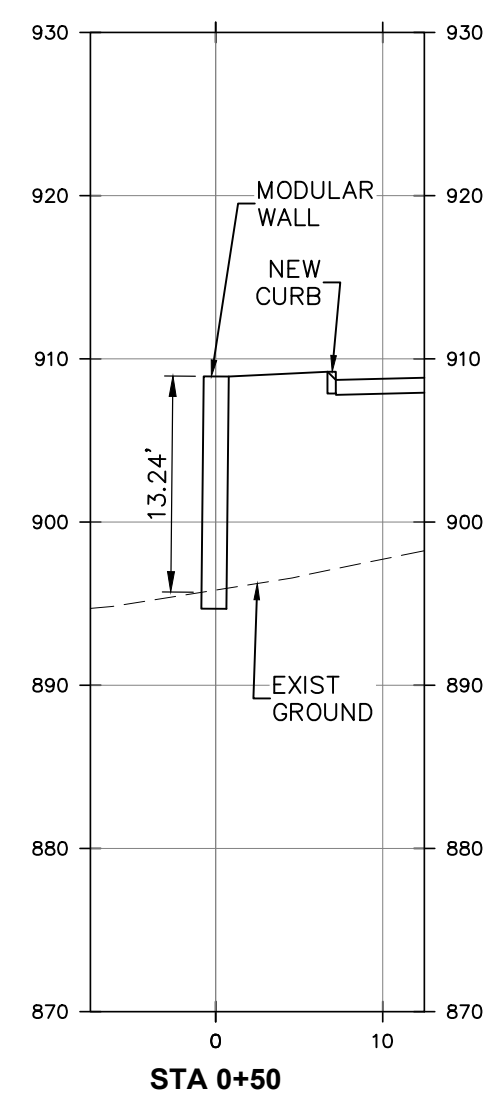
STATE STREET HOMES
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 PORTLAND, OR 97209

GRADING AND ESC PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

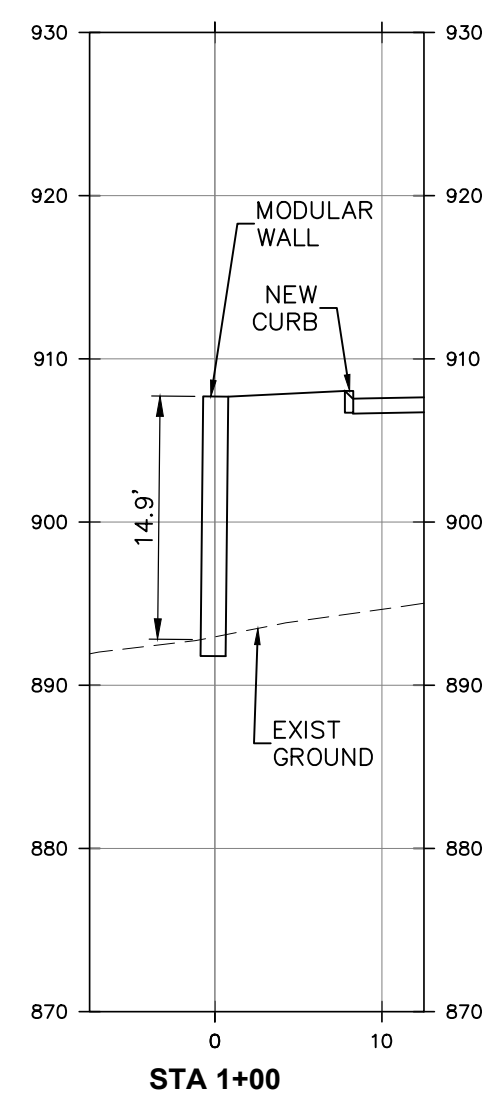
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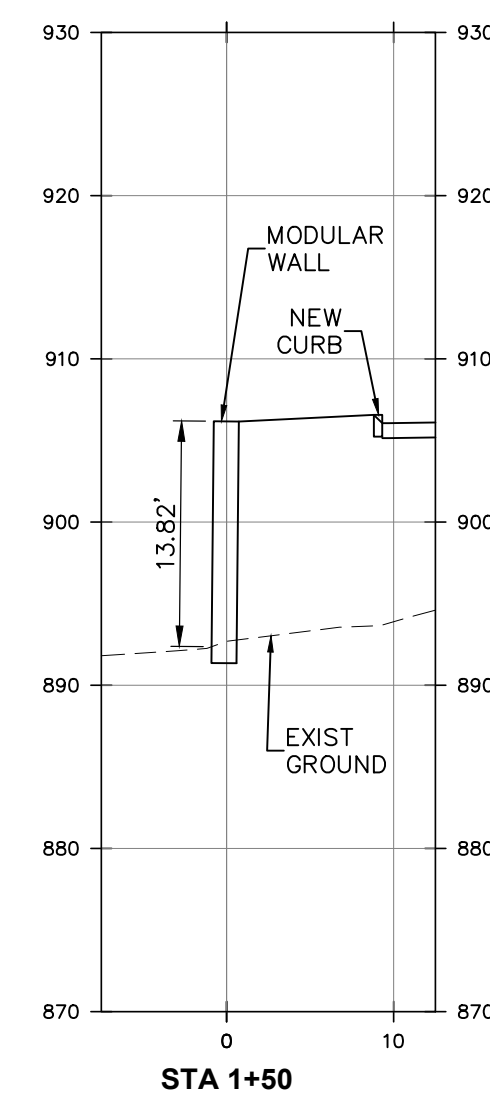
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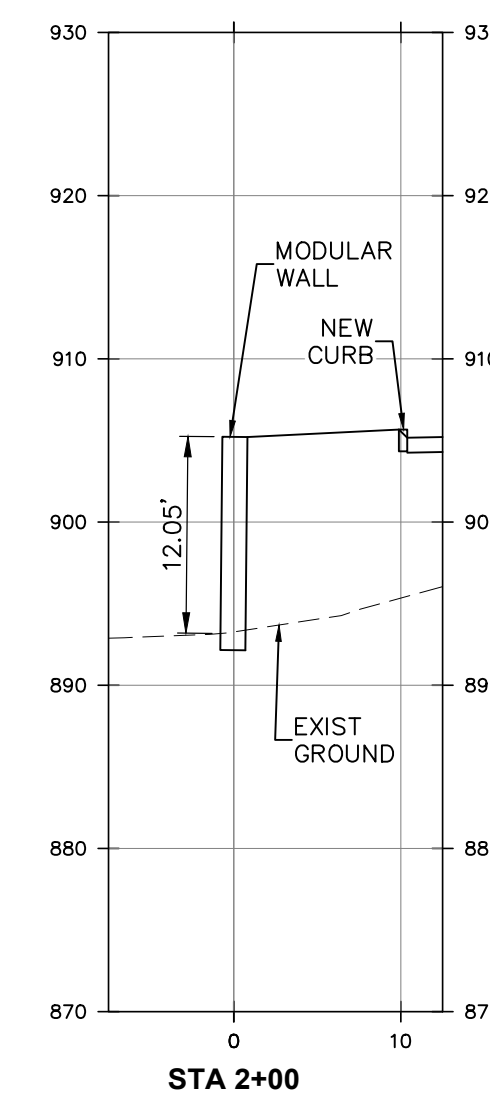
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STA 1+00

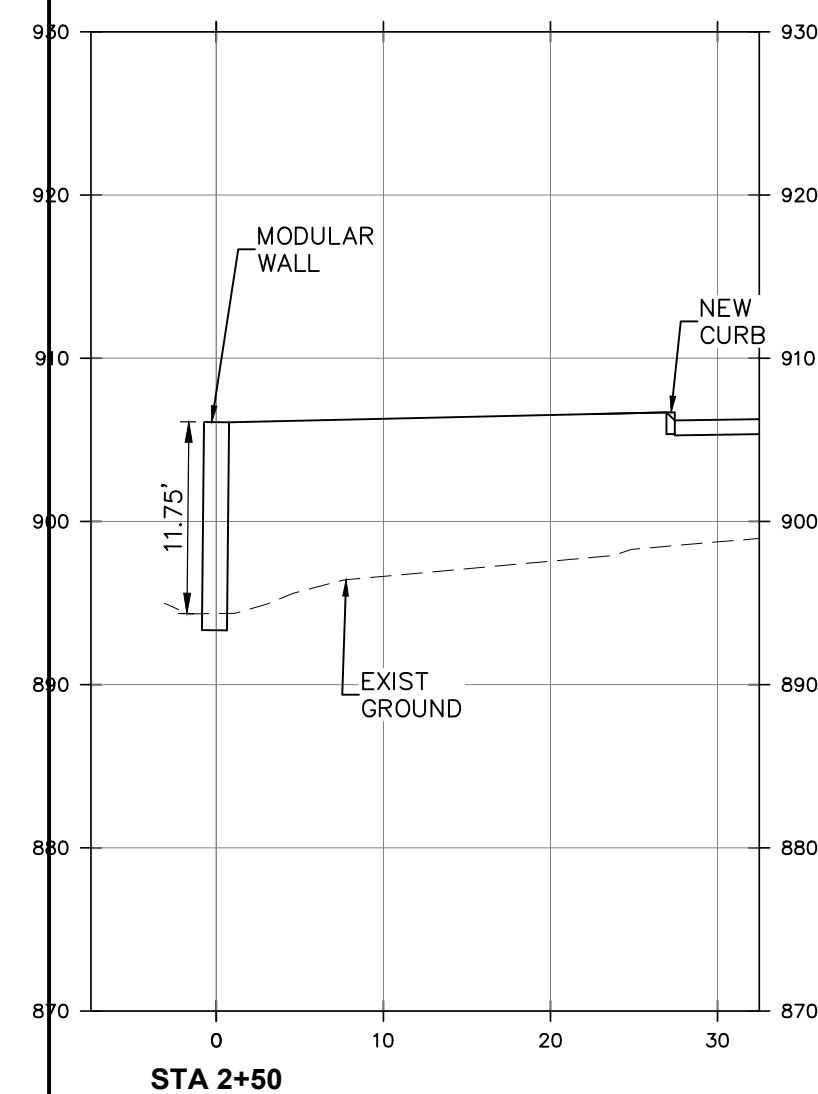


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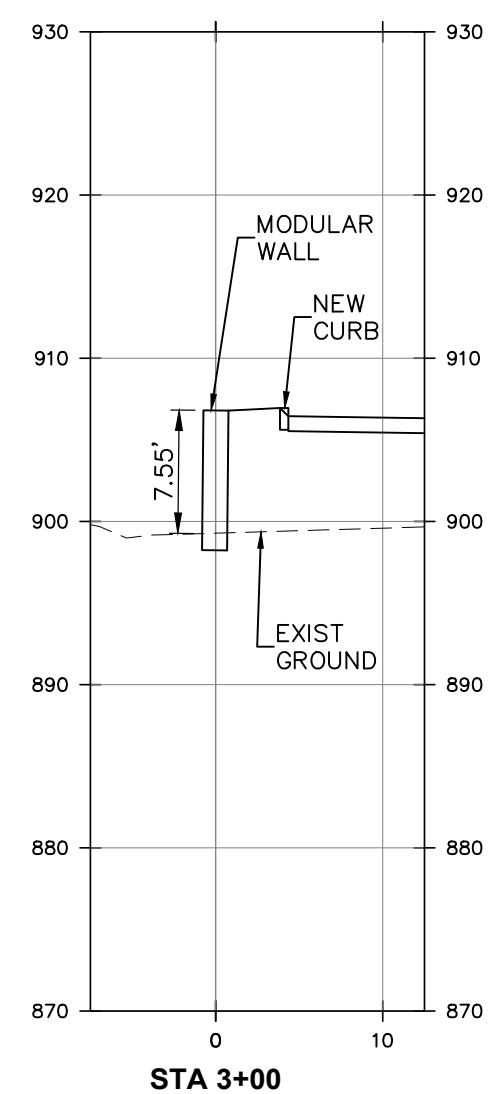


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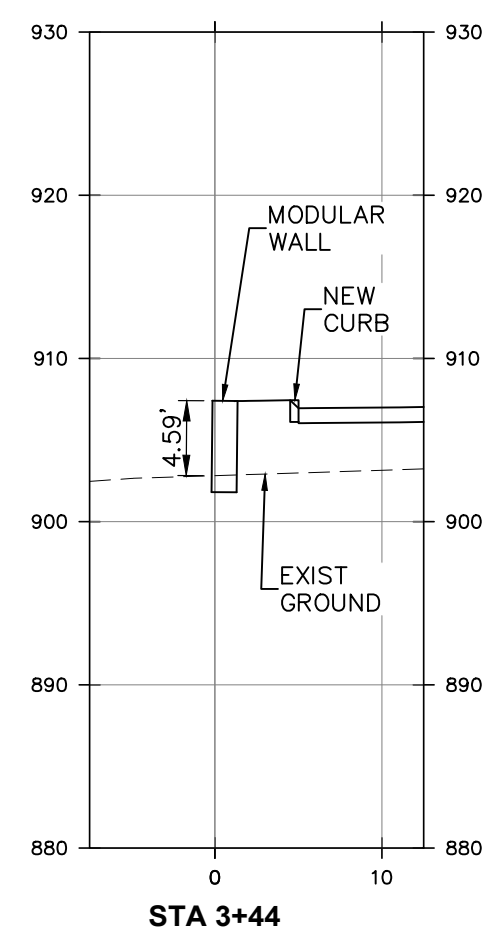
WALL CROSS SECTIONS
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



STA 2+50

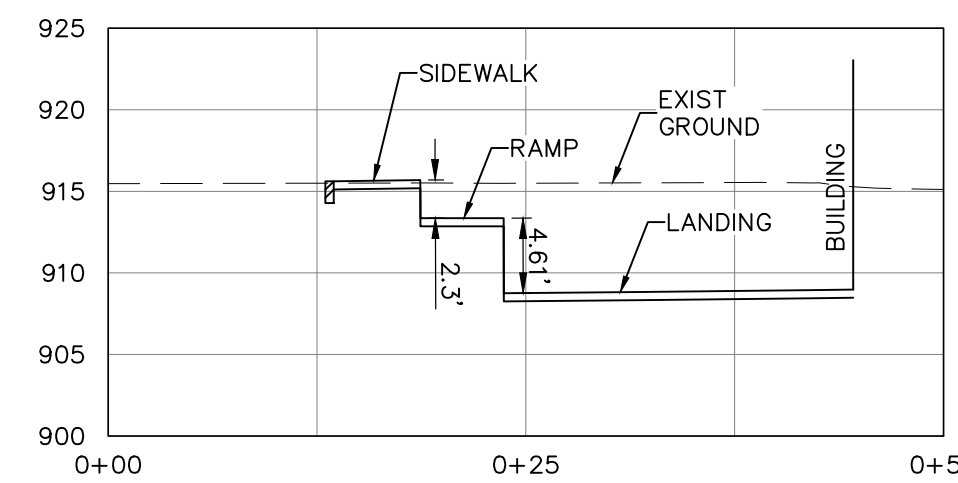


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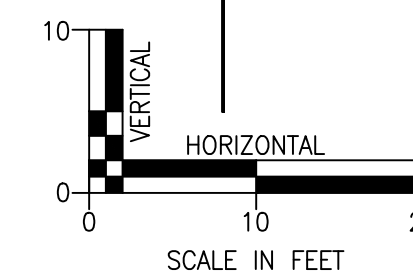


STA 3+44

WALL CROSS SECTIONS
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



WALL CROSS "A-A"
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



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PROJECT NO. E21-043		

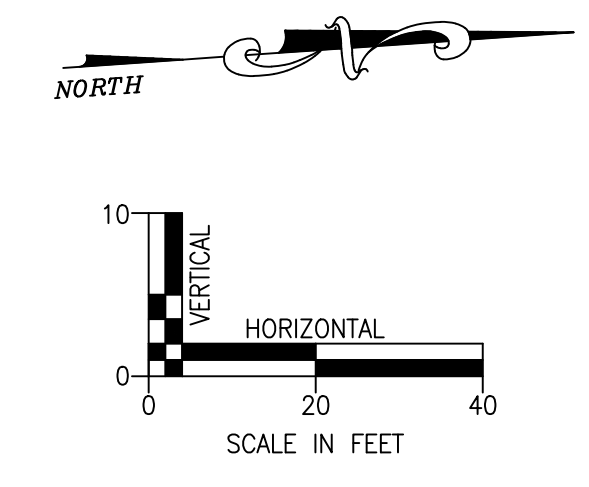
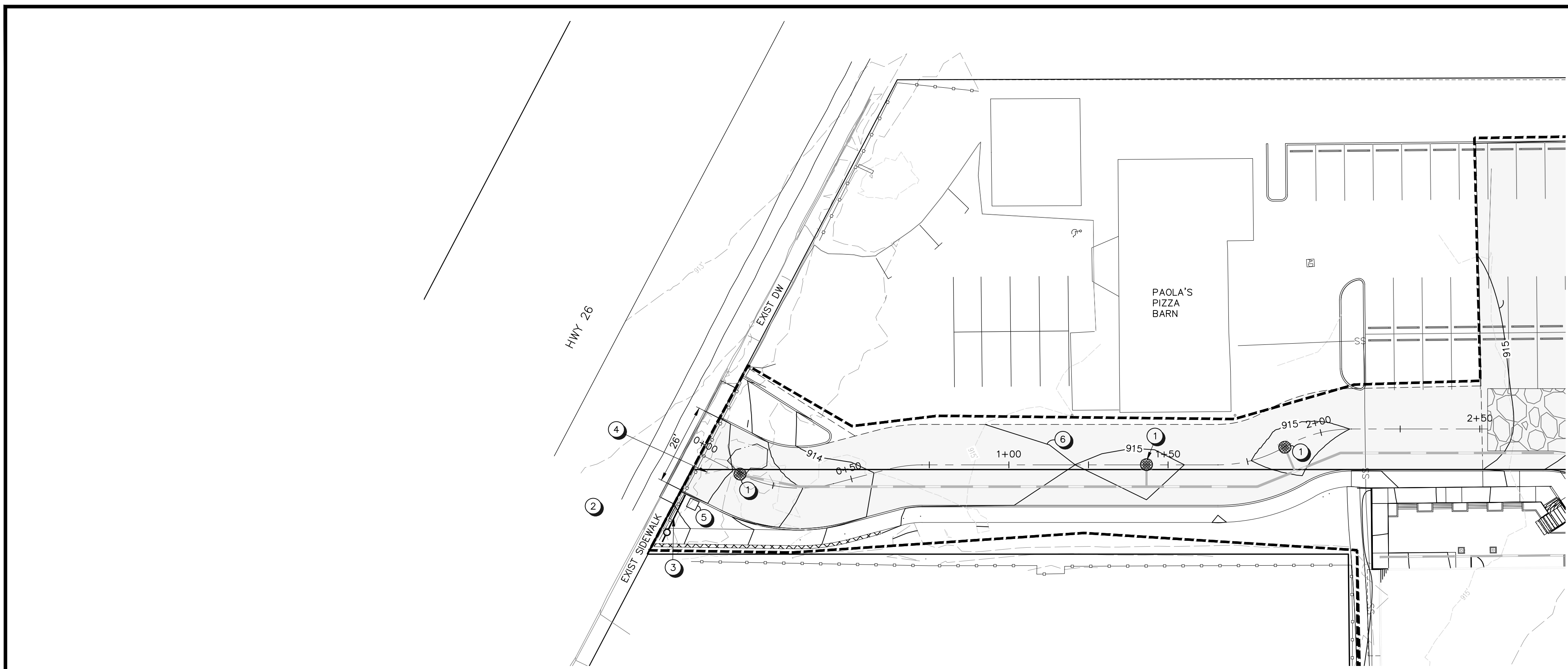


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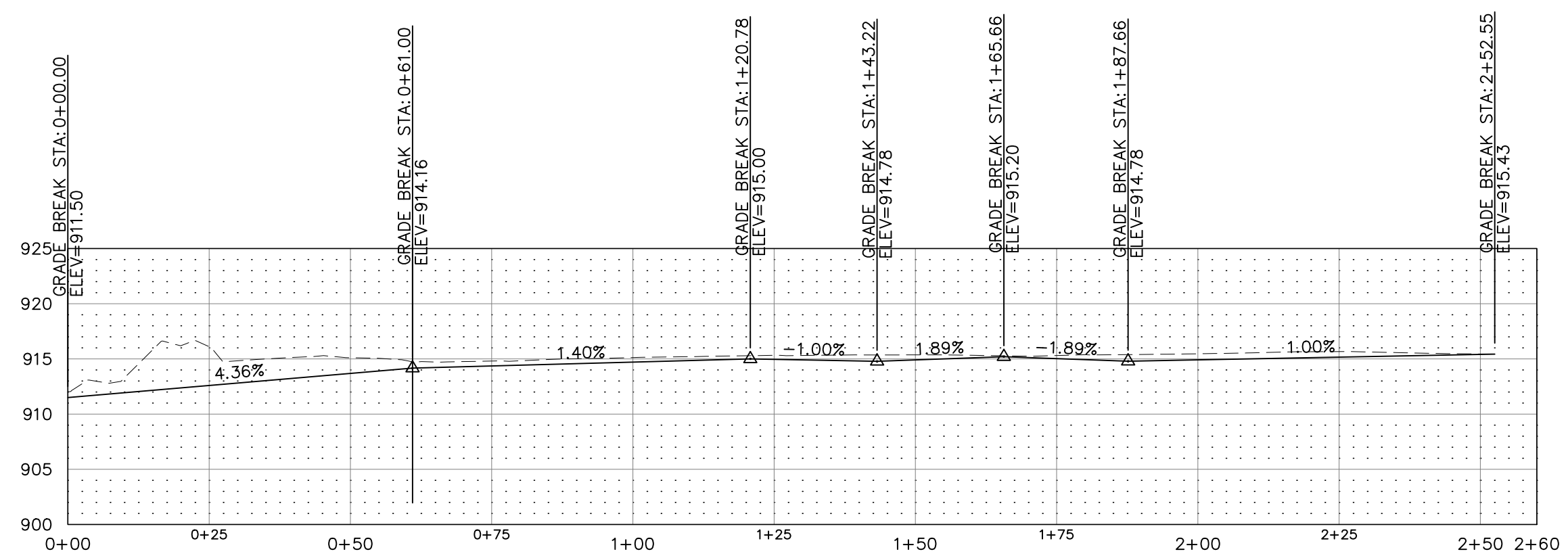
WALL CROSS SECTIONS
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12



KEY NOTES

- ① CB INSERT INLET PROTECTION FOR AREA DRAIN TYPE CATCH BASIN, SEE DETAILS ON SHEET 11 (TYPICAL)
- ② PROVIDE TEMPORARY INLET PROTECTION ON ALL STORMWATER INLETS WITHIN 250 LF DOWNSTREAM OF THE PROJECT SITE
- ③ TEMPORARY SILT FENCING, SEE DETAIL ON SHEET 11, ADJUST SILT FENCING AS NECESSARY DURING CONSTRUCTION
- ④ CONSTRUCTION ENTRANCE, SEE DETAIL THIS ON SHEET 11
- ⑤ CONSTRUCT TEMPORARY 3' X 3' X 2' DEEP SUMP AREA TO BE USED AS WASH AREA FOR CONCRETE TRUCKS, AFTER CURBS AND SIDEWALKS ARE INSTALLED AND BEFORE ROADS ARE PAVED, FILL AND COMPACT SUMP AREA PER STRUCTURAL REQUIREMENTS, DO NOT OVERFILL SUMP AREA, CONTRACTOR TO INCREASE SUMP WIDTH AS NECESSARY TO PROVIDE ADEQUATE VOLUME AS (IF) NEEDED
- ⑥ PROPOSED FINISH GRADE CONTOURS (TYPICAL)



ENTRY ROAD CENTERLINE PROFILE
1"=20' HORIZ

- LEGEND**
- TEMPORARY SEDIMENT FENCE
 - ⊙ BIO-BAG AND INLET INSERT PROTECTION
 - LIMITS OF DISTURBANCE (1.9 ACRES)



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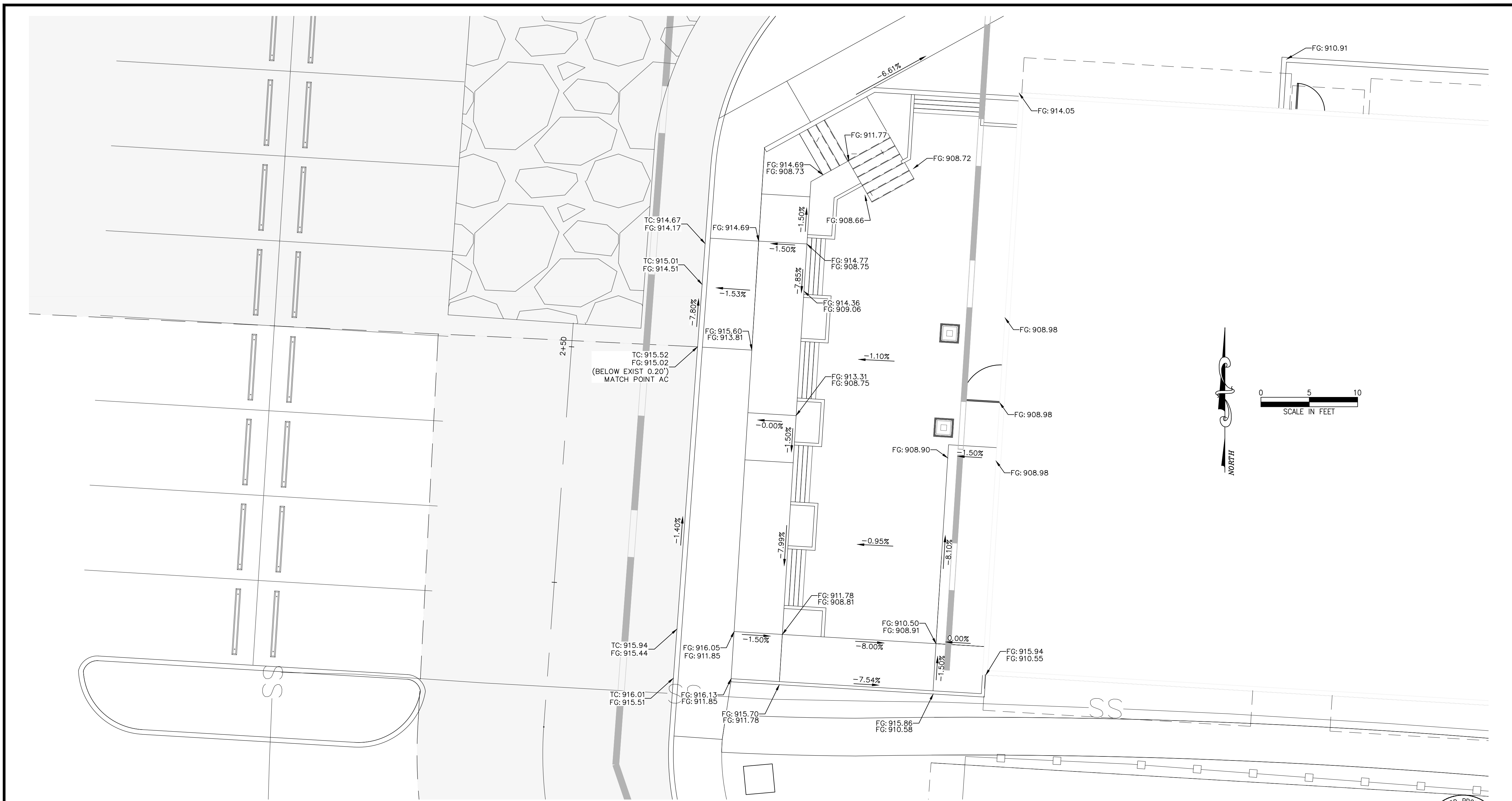
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PROJECT NO. E21-043		

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ENTRY GRADING PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055



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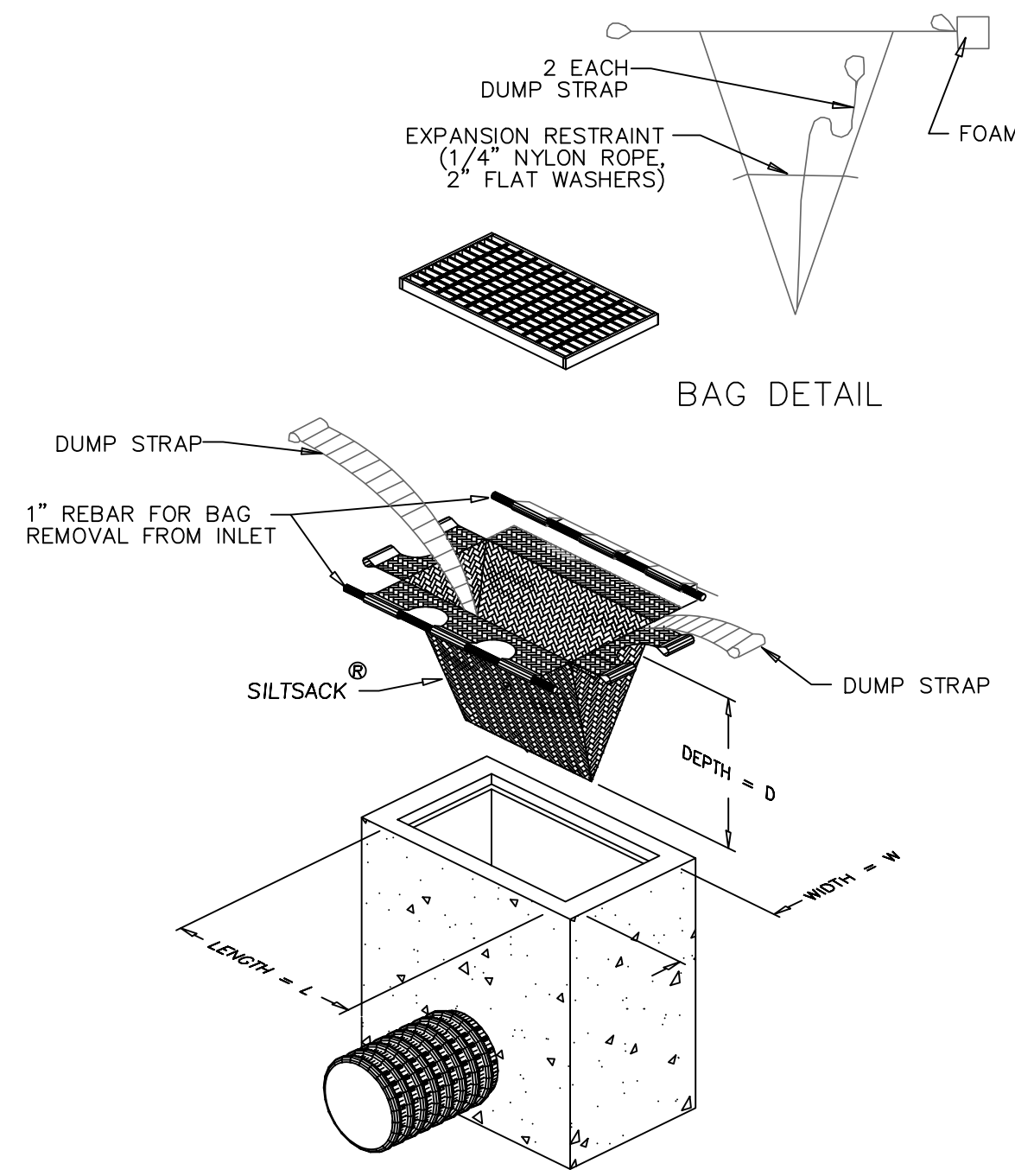
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SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

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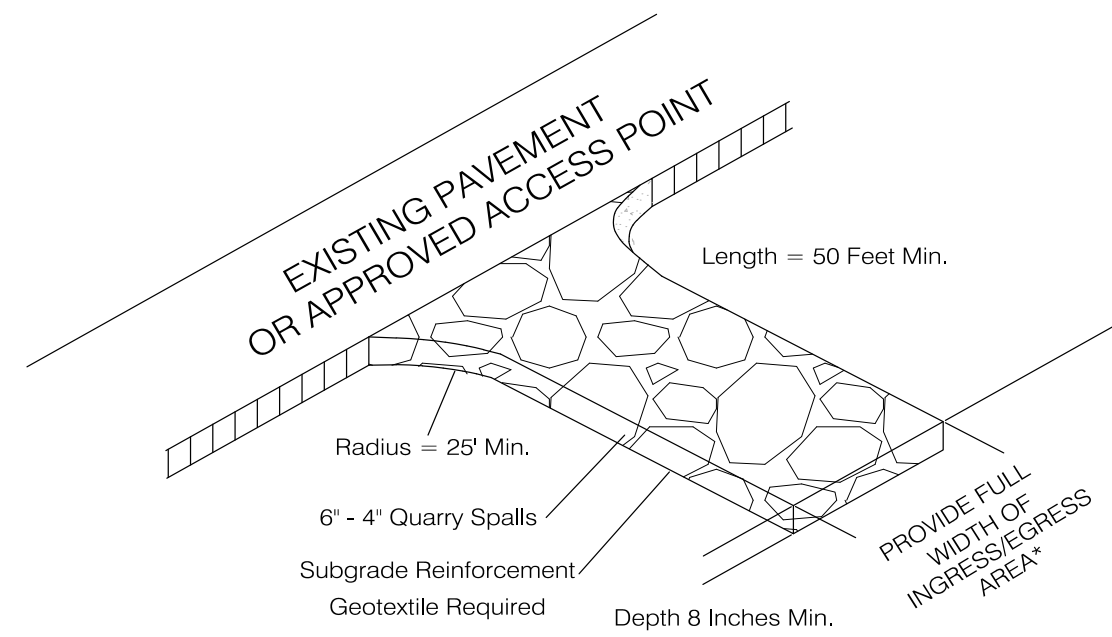
CIVIC AREA GRADING PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

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12



REGULAR FLOW ONLY DO NOT USE HIGH FLOW INSERT BAGS.

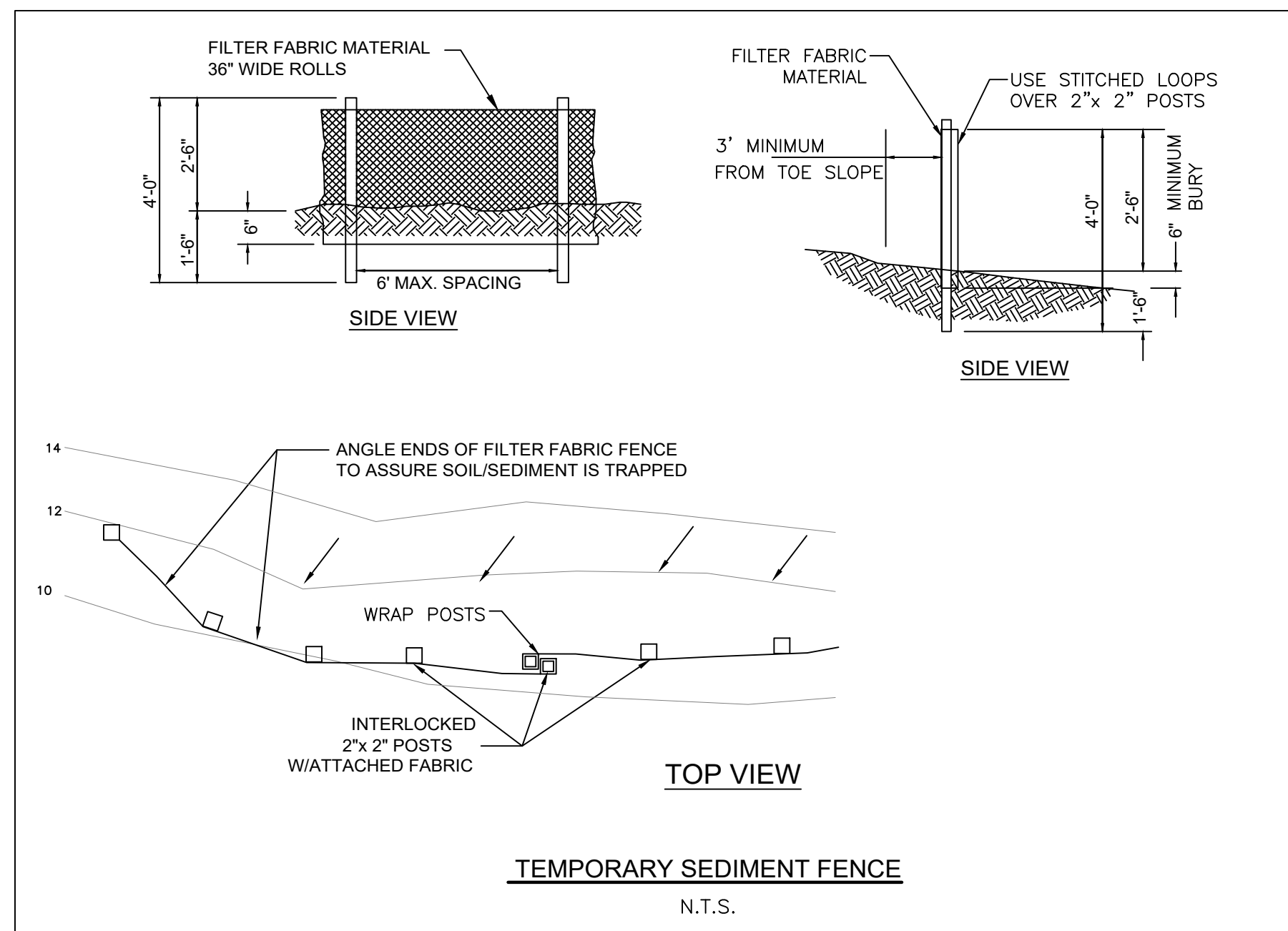
INLET PROTECTION



*20' MIN. FOR SINGLE FAMILY AND DUPLEX RESIDENTIAL

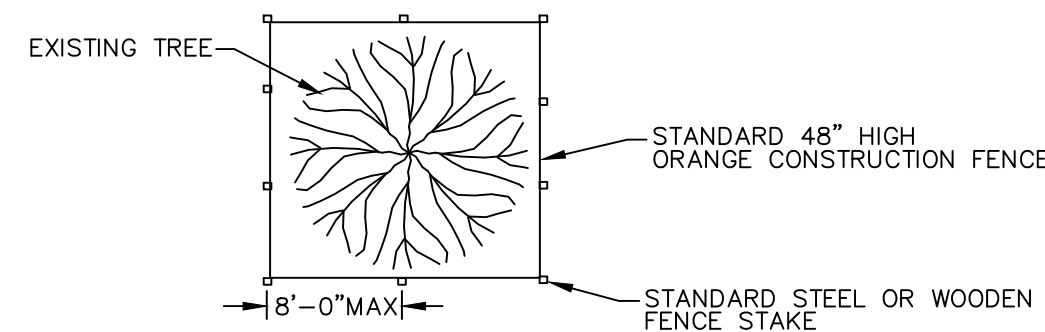
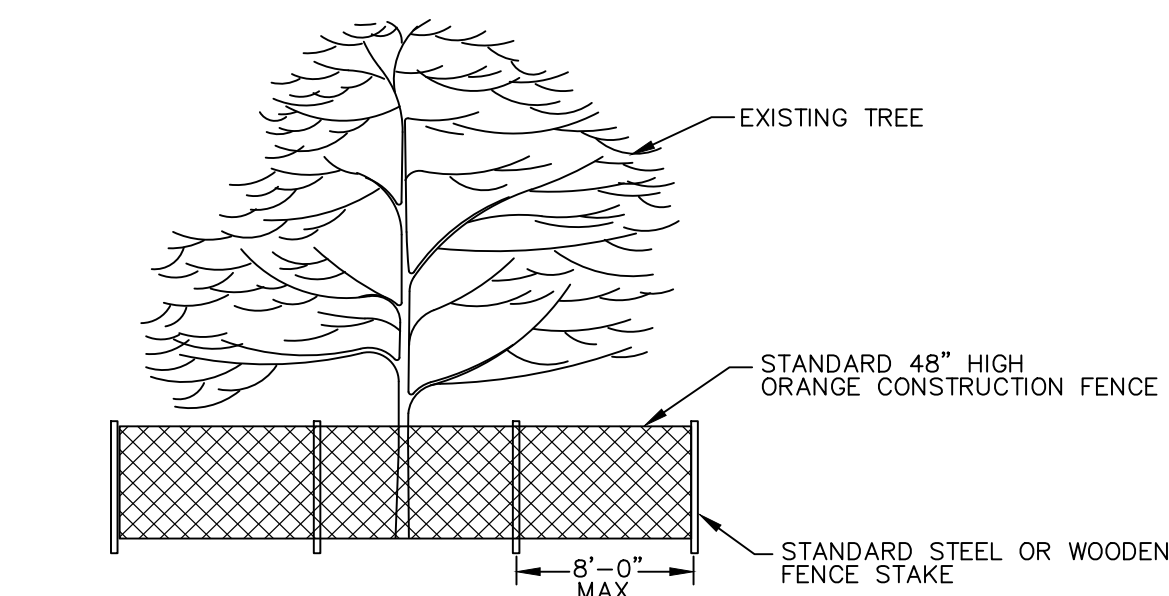
GRAVEL CONSTRUCTION ENTRANCES :

1. STABILIZED CONSTRUCTION ENTRANCE(S) SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
2. ALL VEHICLES LEAVING THE SITE SHALL LEAVE BY DRIVING ACROSS THE GRAVEL CONSTRUCTION ENTRANCE(S) IF GRAVEL ENTRANCE BECOME FILLED WITH MUD AND IS NO LONGER FUNCTIONAL. ADDITIONAL GRAVEL SHALL BE PLACED. VEHICLE TIRES SHALL BE FREE FROM DIRT BEFORE LEAVING THE SITE.
3. IF ACCESS IS NEEDED FROM A PAVED SURFACE OVER A CURB TO A GRAVEL SITE ENTRANCE. A WOODEN RAMP SHALL BE BUILT FROM THREE OR MORE PLANKS OF INCREASING SIZE WOOD, OFFSET TO ALLOW FOR DRAINAGE. NO GRAVEL OR ROAD BASE RAMPS ALLOWED.



SEDIMENT CONTROL FENCES :

1. AT NO TIME SHALL SEDIMENT BE ALLOWED TO ACCUMULATE BEHIND A SEDIMENT FENCE MORE THAN ONE-THIRD OF THE FENCE HEIGHT ABOVE GROUND. SEDIMENT SHOULD BE REMOVED OR REGRADED ONTO SLOPES, AND THE SEDIMENT FENCES REPAIRED AND REESTABLISHED AS NEEDED.
2. FENCE SHALL BE REMOVED ONLY WHEN UPSLOPE AREAS ARE PERMANENTLY STABILIZED.



NOTE:
TREE PROTECTION FENCE SHALL BE LOCATED AT THE OUTER PERIMETER OF THE DRIP LINE OR AS NOTED ON THE PLAN. INSTALL FENCING AS PER MANUFACTURER'S SPECIFICATIONS.
FENCE MAY BE LOCATED AROUND THE DRIP LINE OF TREE GROUPINGS RATHER THAN INDIVIDUAL TREES.

TREE PROTECTION DETAIL

EROSION AND SEDIMENT CONTROL NOTES

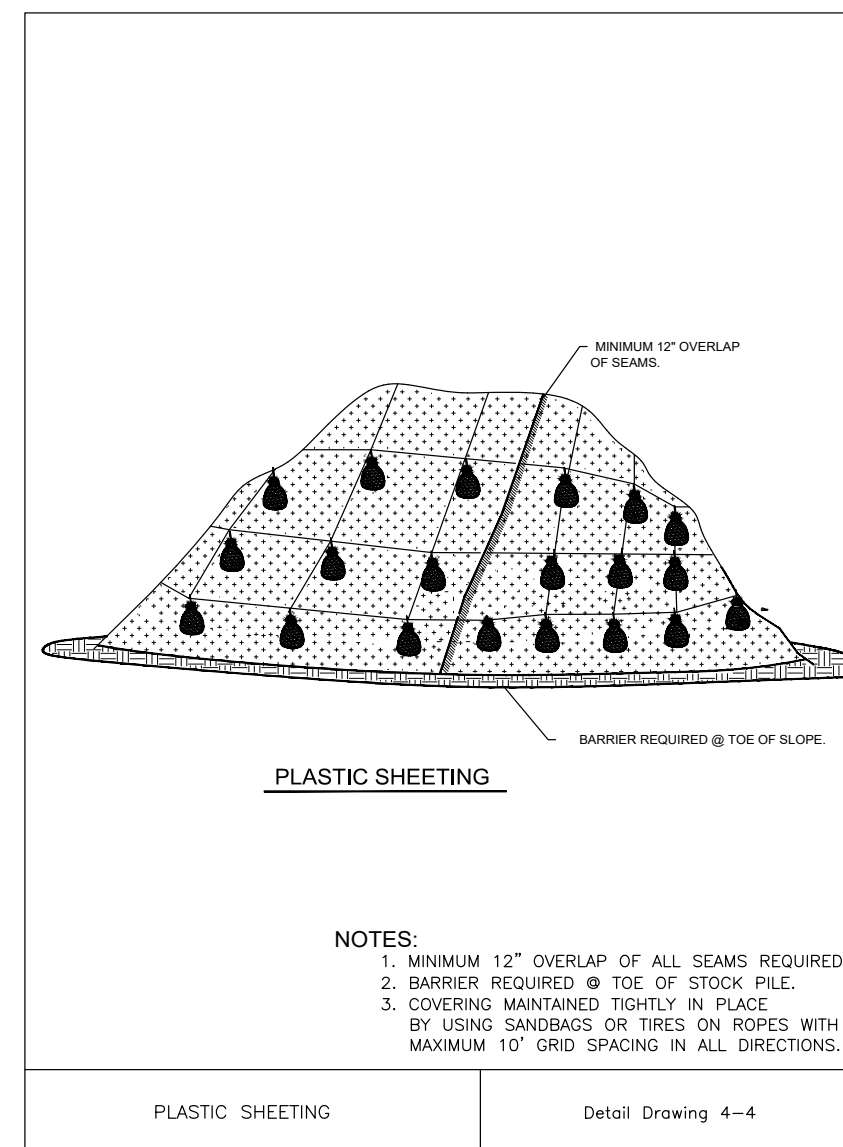
GENERAL :

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IN ACCORDANCE WITH THE CURRENT CITY OF SANDY ORDINANCES & REFERENCED DOCUMENTS & CITY OF PORTLAND EROSION CONTROL MANUAL.
2. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
3. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENT FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR EXPECTED STORM EVENTS AND TO ENSURE THE SEDIMENT LADEN WATER DOES NOT LEAVE THE SITE.
4. NO VISIBLE AND MEASURABLE SEDIMENT OR POLLUTANT SHALL EXIT THE SITE, ENTER THE PUBLIC RIGHT-OF-WAY, OR BE DEPOSITED INTO ANY WATER BODY OR STORM DRAINAGE SYSTEM.
5. ANY SOIL THAT ENTERS THE PUBLIC RIGHT-OF-WAY SHALL BE REMOVED WITHIN 24 HOURS.
6. CONTRACTOR SHALL PROVIDE ANY ADDITIONAL EROSION CONTROL MEASURES AS MAY BE REQUIRED TO MEET DEQ AND CITY OF SANDY STANDARDS AS NECESSARY TO PREVENT SEDIMENT DISCHARGE FROM THE SITE.
7. ESC FACILITIES SHALL BE INSPECTED EVERY 24 HOURS DURING STORM OR RAIN EVENTS TO ENSURE THE MEASURES ARE FUNCTIONING PROPERLY.
8. PERMANENT OR TEMPORARY SOIL STABILIZATION MEASURES SHALL BE APPLIED TO DENUDED DEVELOPMENT SITES IN CONFORMANCE WITH THE FOLLOWING SCHEDULE:
 - a. BETWEEN OCTOBER 1 AND APRIL 30, ALL DENUDED SITES SHALL IMMEDIATELY BE PROVIDED WITH EITHER TEMPORARY OR PERMANENT SOIL STABILIZATION.
 - b. BETWEEN MAY 1 AND SEPTEMBER 30, TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES TO REDUCE DUST AND SEDIMENT TRANSPORT SHALL BE APPLIED AS SOON AS PRACTICABLE, BUT IN NO CASE MORE THAN SEVEN DAYS AFTER GROUND DISTURBING ACTIVITY OCCURS.
 - c. GROUND COVER SHALL BE INSTALLED ON ANY PORTION OF A SITE THAT IS DENUDED FOR MORE THAN 6 MONTHS.
 - d. TEMPORARY MEASURES SHALL BE MAINTAINED UNTIL PERMANENT MEASURES ARE ESTABLISHED.
 - e. STOCKPILES SHALL BE SECURED OR PROTECTED THROUGHOUT THE PROJECT WITH TEMPORARY OR PERMANENT SOIL STABILIZATION MEASURES.
 - f. REPLACEMENT GROUND COVER VEGETABLE SHALL NOT INCLUDE PLANTS LISTED AS NUISANCE OR PROHIBITED PLANTS ON THE CITY OF PORTLAND PLANT LIST.
 - g. EROSION CONTROL MEASURES SHALL BE MAINTAINED DURING CONSTRUCTION.
9. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
10. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE EVERY TWO WEEKS, OR WITHIN 24 HOURS FOLLOWING A STORM EVENT. DAILY INSPECTIONS SHALL BE PERFORMED DURING PROLONGED RAINFALL. LOG OF INSPECTIONS TO BE KEPT AVAILABLE AT THE SITE.

RESEEDING/ESTABLISHMENT OF VEGETATIVE COVER :

1. RECOMMENDED EROSION CONTROL GRASS SEED MIXES ARE AS SPECIFIED AS BELOW. SIMILAR MIXES DESIGNED TO ACHIEVE EROSION CONTROL MAY BE SUBSTITUTED WITH APPROVAL. IN GENERAL, USE OF QUICK GROWING, STERILE GRASSES AND GRAINS IN MIXTURE WITH PERMANENT VEGETATIVE COVER IS RECOMMENDED TO ACHIEVE QUICK COVER OF EXPOSED SOILS.
 - a. DWARF GRASS MIX (LOW HEIGHT, LOW MAINTENANCE), 100 POUNDS PER ACRE SEED RATE

(MINIMUM):
1. DWARF PERENNIAL RYEGRASS, 80% BY SEED COUNT.
2. CREEPING RED FESCUE, 20% BY SEED COUNT.
2. IT IS RECOMMENDED THAT TOP SOIL ON SLOPES BE PREPARED BY ROUGHENING THE SLOPES BEFORE SEEDING.
3. AREAS THAT FAIL TO ESTABLISH GRASS COVER ADEQUATE TO PREVENT EROSION SHALL BE RESEED AS SOON AS SUCH AREAS ARE IDENTIFIED, AND ALL APPROPRIATE MEASURES TAKEN TO ESTABLISH COVER.
4. EROSION CONTROL MEASURES SHALL BE MAINTAINED BY CONTRACTOR UNTIL GRASS COVER IS ESTABLISHED AND UP TO ONE YEAR AFTER COMPLETION OF CONSTRUCTION, WHICHEVER IS SOONER.
5. MULCH SHALL BE SPREAD UNIFORMLY IMMEDIATELY FOLLOWING SEEDING.



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PROJECT NO. E21-043		



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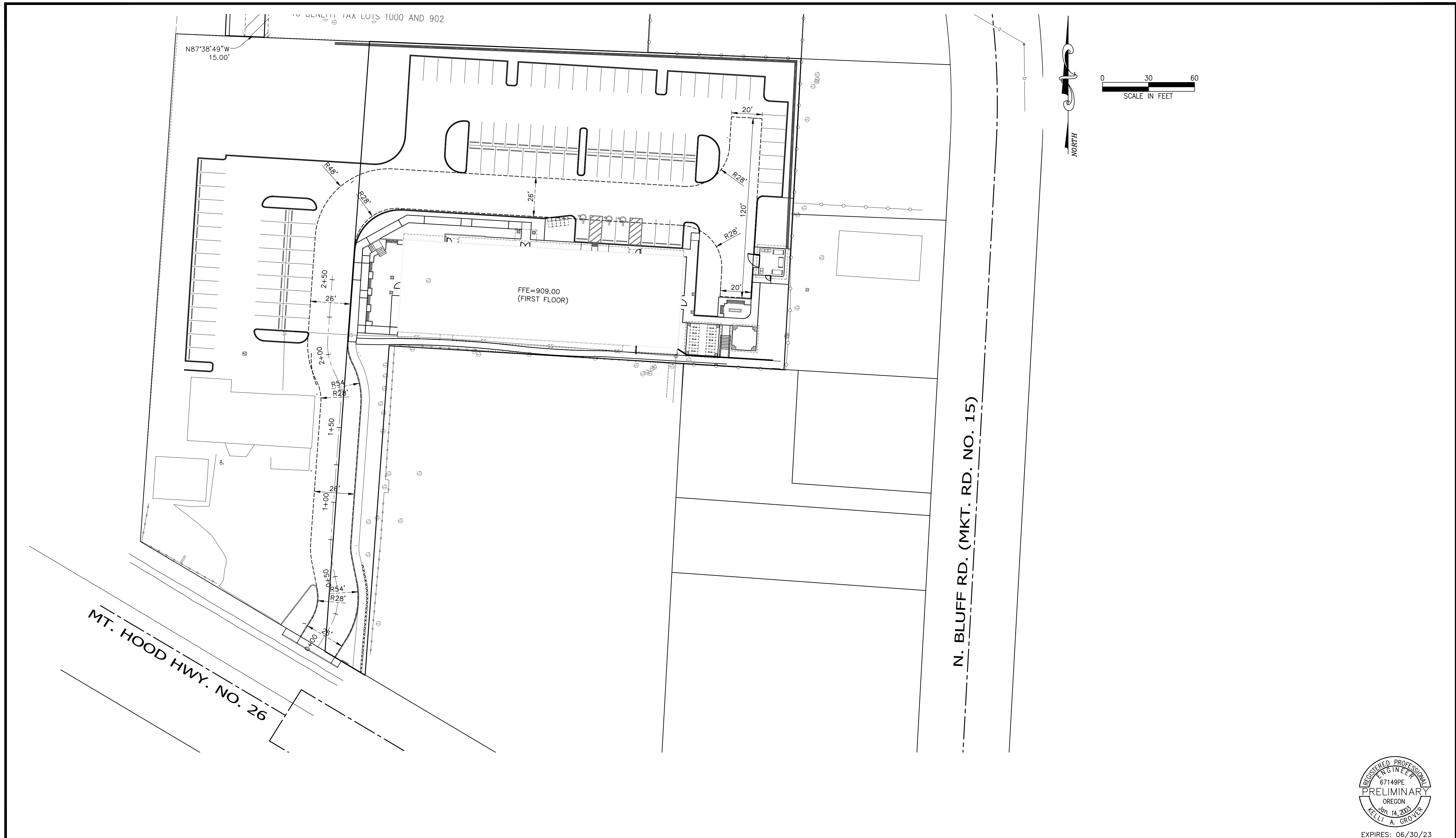
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ESC NOTES AND DETAILS
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055



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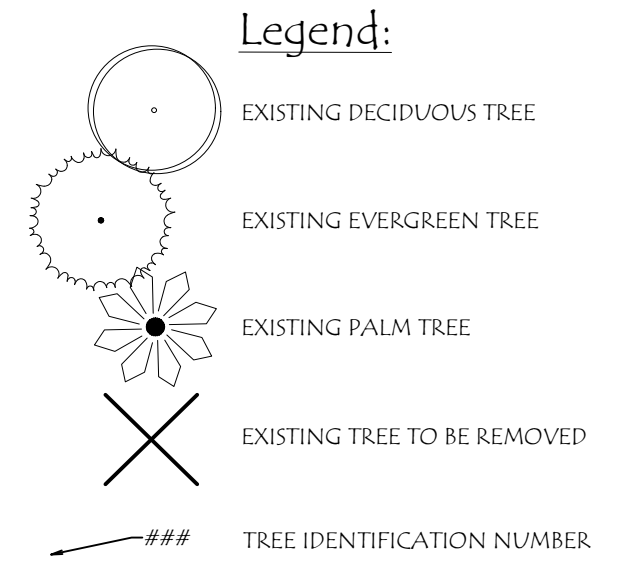
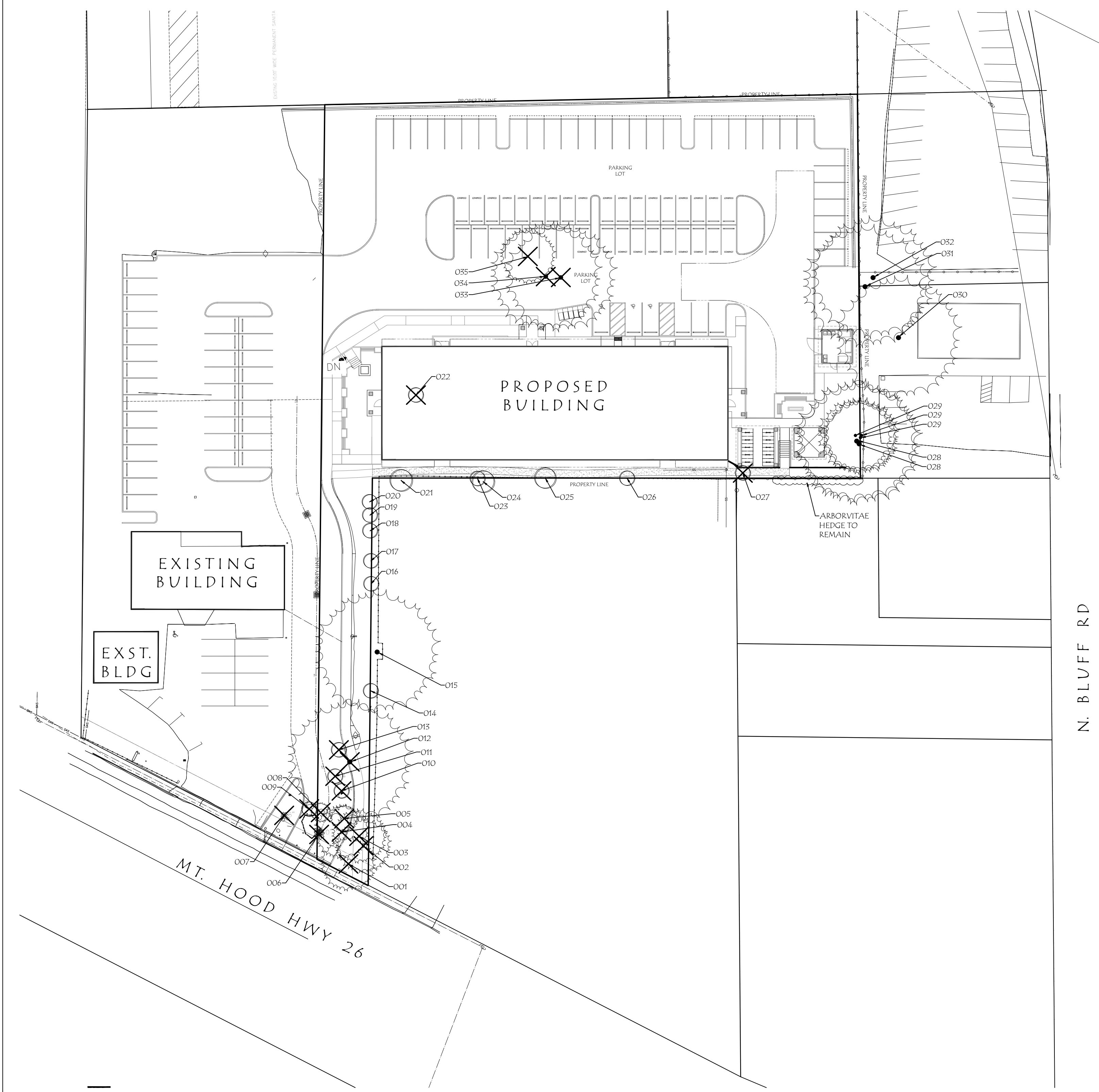
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SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

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 PORTLAND, OR 97209

SITE CIRCULATION PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

12 / 12



General Notes:

1. TREE LOCATIONS BASED ON SITE SURVEY.
2. SEE ARCHITECTURAL PLANS FOR SITE INFORMATION.
3. TREE INVENTORY TABLE SEE THIS SHEET.

Existing Tree Inventory

TREE ID	TREE SPECIES	SIZE (DBH)	NOTES	REMAIN/REMOVE
001	Blue Spruce	12"		Remove, Development Impacts
002	Western Red Cedar	4"		Remove, Development Impacts
003	Western Red Cedar	8"		Remove, Development Impacts
004	Blue Spruce	10"		Remove, Development Impacts
005	Western Red Cedar	8"		Remove, Development Impacts
006	Windmill Palm	10"		Remove, Development Impacts
007	Windmill Palm	6"		Remove, Development Impacts
008	Conifer (Unknown)	10"	Dead	Remove, Development Impacts
009	Holly	4"		Remove, Development Impacts
010	Sugar Maple	14"		Remove, Development Impacts
011	Cherry	14"		Remove, Development Impacts
012	Douglas Fir	24"		Remove, Development Impacts
013	Cherry	6"		Remove, Development Impacts
014	Filbert	14"		Remain
015	Douglas Fir	26"		Remain
016	Redbud	5"	Located on Property Line	Remain
017	Holly	5"	Located on Property Line	Remain
018	Thundercloud Plum	4"	Located on Property Line	Remain
019	Redbud	5"	Located on Property Line	Remain
020	Thundercloud Plum	4"	Located on Property Line	Remain
021	Red Maple	10"	Located on Adjacent Property	Remain
022	Filbert	6"		Remove, Development Impacts
023	Cherry	4"	Located on Property Line	Remain
024	Red Maple	6"	Located on Adjacent Property	Remain
025	Cherry	10"	Located on Property Line	Remain
026	Cherry	6"	Located on Property Line	Remain
027	Redbud	5"		Remove, Development Impacts
028	Douglas Fir	18", 18"	Located on Property Line	Remain
029	Douglas Fir	12", 12", 12"	Located on Property Line	Remain
030	Douglas Fir	36"	Located on Adjacent Property	Remain
031	Douglas Fir	36"	Located on Adjacent Property	Remain
032	Douglas Fir	36"	Located on Adjacent Property	Remain
033	Douglas Fir	24"		Remove, Development Impacts
034	Douglas Fir	24"		Remove, Development Impacts
035	Douglas Fir	12"		Remove, Development Impacts

Laurus Designs, LLC

1012 Pine Street
Silverton, Oregon
503.784.6494

Multi-Family
Sandy

38015 Highway 26
Sandy, Oregon

REGISTERED
643
PRELIMINARY
LAURA A. ANTONSON
OREGON
11/16/2007
LANDSCAPE ARCHITECT

EXISTING TREE INVENTORY

SCALE: 1"=30'-0"
0' 15' 30' 60'
SCALE

September 15th, 2022

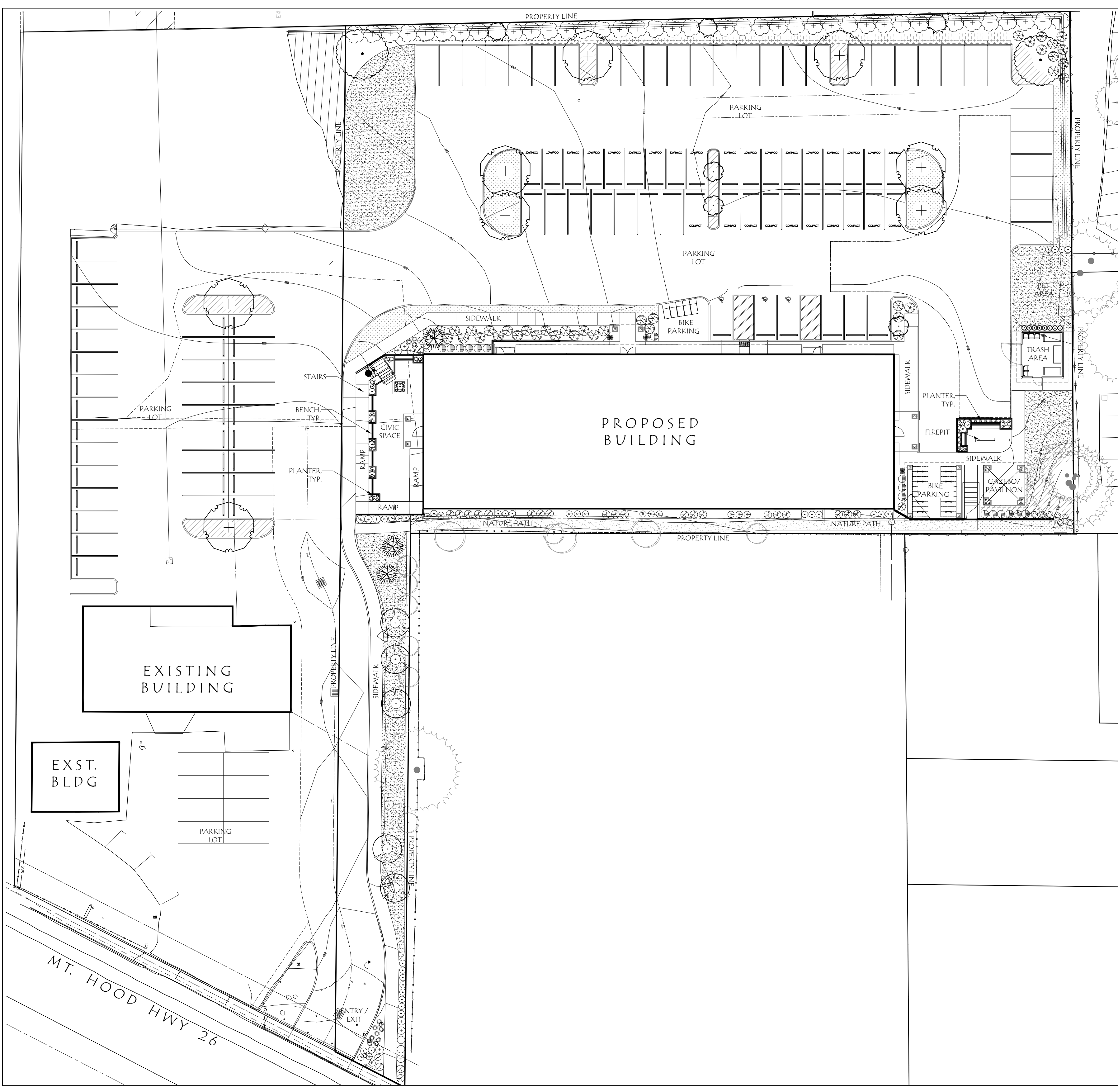
REVISIONS

#	DATE	NOTES	INITIALS

L1.1

SHEET 1 OF 2

PROJECT #: 1409R



Legend:
 EXISTING DECIDUOUS TREE TO REMAIN
 EXISTING EVERGREEN TREE TO REMAIN

General Notes:
 1. PLANTING PLAN FOR PRELIMINARY USE ONLY, NOT FOR BIDDING OR CONSTRUCTION.
 2. TREE INVENTORY FOR EXISTING TREES TO REMAIN AND REMOVE SEE SHEET L1.1.
 3. SEE ARCHITECTURAL DRAWINGS FOR SITE PLAN.
 4. SEE CIVIL DRAWINGS FOR GRADING AND UTILITIES.
 5. PLANT SIZES MEET MINIMUM CITY OF SANDY PLANT REQUIREMENTS OR GREATER.
 6. IRRIGATION TO BE AN AUTOMATIC UNDERGROUND SYSTEM DESIGN BUILT BY THE LANDSCAPE CONTRACTOR.

Landscape Requirements
 Total Site Area (sf): 63,711 sf (1.46 acres)
 Landscape Area: 15,894 sf
 Civic Space: 1,614 sf
 Outdoor Recreation Areas: 9,901 sf
 Parking Lot: 1 Large Tree Per 12 Spaces
 Screen/buffer: Evergreen plants to screen within 2 years

Preliminary Plant Legend

TREES	QTY	BOTANICAL / COMMON NAME	SIZE	NOTES
	3	Chamaecyparis nootkatensis 'Glauca Pendula' / Weeping Nootka False Cypress	5' Ht. Min., B&B	
	3	Chamaecyparis obtusa 'Gracilis' / Slender Hinoki False Cypress	5' Ht. Min., B&B	
	3	Lagerstroemia indica 'Whit II' TM / Dynamite Cape Myrtle	1 1/2" Cal., B&B	
	2	Nyssa sylvatica 'Wildfire' / Black Gum	1 1/2" Cal., B&B	Large Parking Lot Tree
	5	Prunus serrulata 'Amanoyawa' / Japanese Flowering Cherry	1 1/2" Cal., B&B	
	8	Zelkova serrata 'Green Vase' / Sawleaf Zelkova	1 1/2" Cal., B&B	Large Parking Lot Tree
SHRUBS	QTY	BOTANICAL / COMMON NAME	SIZE	
	36	Abelia x grandiflora 'Kaleidoscope' / Kaleidoscope Abelia	2 Gal.	
	8	Euonymus japonicus 'Greenspire' / Greenspire Upright Euonymus	5 Gal.	
	7	Ilex crenata 'Sky Pencil' / Sky Pencil Japanese Holly	24"-30" Ht.	
	38	Ligustrum japonicum 'Texanum' / Texas Japanese Privet	5 Gal.	
	20	Nandina domestica 'Atropurpurea Nana' / Dwarf Nandina	1 Gal.	
	38	Prunus laurocerasus 'Mount Vernon' / Mount Vernon Laurel	1 Gal.	
	12	Rosa KnockOut 'Radrazz' / Radrazz KnockOut Rose	2 Gal.	
	16	Sarcococca confusa / Fragrant Sarcococca	2 Gal.	
	27	Spiraea x bumalda 'Magic Carpet' / Magic Carpet Spiraea	2 Gal.	
	7	Symphoricarpos albus / Common White Snowberry	1 Gal.	
GRASSES / PERENNIALS	QTY	BOTANICAL / COMMON NAME	SIZE	
	23	Calamagrostis x acutiflora 'Karl Foerster' / Karl Foerster Feather Reed Grass	1 Gal.	
	3	Hakonechloa macra 'Aureola' / Golden Variegated Forest Grass	1 Gal.	
	30	Iberis sempervirens 'Absolutely Amethyst' / Absolutely Amethyst Candytuft	1 Gal.	
	16	Pennisetum alopecuroides 'Burgundy Bunny' / Burgundy Bunny Dwarf Fountain Grass	1 Gal.	
GROUND COVERS	QTY	BOTANICAL / COMMON NAME	SIZE	SPACING
	195	Arctostaphylos uva-ursi / Kinnikinnick	1 Gal.	30" o.c.
	275	Fragaria chiloensis / Beach Strawberry	4" Pot	18" o.c.
	293	Rubus pentalobus 'Emerald Carpet' / Bramble	1 Gal.	30" o.c.
	3,795 sf	ProTime 301 Water Smarter Fescue or Equal	Seed @ Rate of 10 lbs per 1000 sf	

Laurus Designs, LLC

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 Silverton, Oregon
 503.784.6494

Multi-Family
 Sandy
 38015 Highway 26
 Sandy, Oregon

REGISTERED
 643
PRELIMINARY
 LAURA A. ANTONSON
 OREGON
 11/16/2007
 LANDSCAPE ARCHITECT

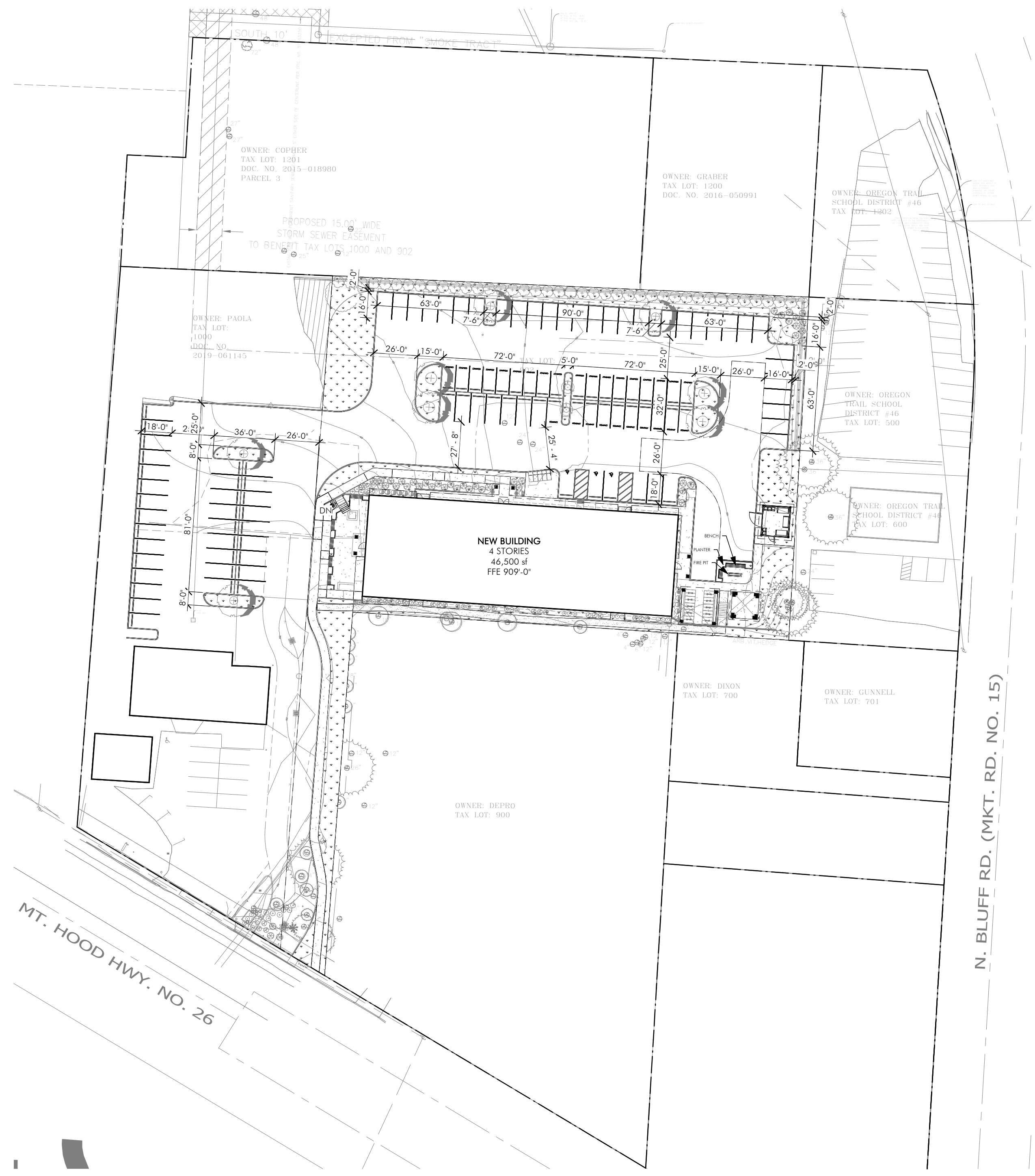
PRELIMINARY PLANTING PLAN

 SCALE: 1"=20'-0"
 0' 10' 20' 40'
 SCALE
 September 15th, 2022

REVISIONS

#	DATE	NOTES	INITIALS

L2.1
 SHEET 2 OF 2
 PROJECT #: 1409R



SITE PLAN GENERAL NOTES:

- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVES. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
- REFER TO CIVIL DRAWINGS FOR GRADING. SITE IS REQUIRED TO MEET THE LAWS OF FHA AND ADA. ACCESSIBLE ROUTES SHALL NOT EXCEED 5% (1 IN 20) OR CROSS SLOPES SHALL NOT EXCEED 2% (1 IN 50). ALL AT GRADE SIDEWALKS ARE ACCESSIBLE ROUTES.
- JOINTS IN CONCRETE WALKS NOTED AS E.J. ARE TO BE CONSTRUCTED AS EXPANSION JOINTS. ALL OTHER JOINTS SHOWN, TO BE TOOLED CONTROL JOINTS. SEE CIVIL.
- PROVIDE CONSTRUCTION FENCING AS REQUIRED TO SECURE SITE AND BUILDING DURING CONSTRUCTION.
- SEE LANDSCAPE DRAWINGS FOR LANDSCAPE AND IRRIGATION ELEMENTS.
- EXTREME CARE SHOULD BE TAKEN TO PRESERVE EXISTING ROOTS OF TREES TO REMAIN.
- SEE ELECTRICAL DRAWINGS FOR SITE LIGHTING.



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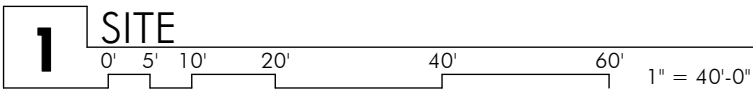
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PROJECT # 2021-1146
DATE: 07/29/2022

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
38015 Hwy 26, Sandy, OR

SHEET:
A1.01
SITE PLAN



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- SEE ELECTRICAL DRAWINGS FOR SITE LIGHTING.

SITE DEVELOPMENT CODE REVIEW:

SITE AREA: 63,711 sf = 1.46 ac
 ZONING: C-2 General Commercial
 SETBACKS: FRONT YARD - 10'-0" SIDE/REAR YARD - NONE
 BUILDING HEIGHT: 55 FT.
 BUILDING AREAS:
 • LEVEL 01, STORAGE/LEASING: 11,280 sf
 • LEVEL 02-04, RESIDENTIAL: 11,736 sf
OVERALL = 46,500 sf

CIVIC SPACE REQMT: 3% BUILDING AREA = 1,395 sf
PROVIDED = 1,590 sf

OUTDOOR REC AREA: 200 sf PER UNIT = 8,400 sf
 OUTDOOR DOG PARK = 786 SF
 COVERED GAZEBO (256 sf x 1.25) = 320 SF
 OUTDOOR SEATING/FIRE PIT = 285 SF
 NORTHERN OPEN LAWN = 1,785 SF
 EASTERN OPEN LAWN = 958 SF
 LANDSCAPED NATURE PATH = 2,860 SF
 LANDSCAPED NATURE SIDEWALK = 2,087 SF
PROVIDED = 9,081 SF

UNIT MIX:
 1 BED / 1 BATH - 30 UNITS
 2 BED / 2 BATH - 12 UNITS
TOTAL UNITS = 42 UNITS

PARKING:
 • STORAGE: 1 SPACE PER 2 EMPLOYEES 1.5 SPACES PER 1 BD 2 SPACES PER 2 BD
 • MULTIFAMILY: = 71 SPACES RQ'D
PROVIDED = 72 SPACES 38% COMPACT

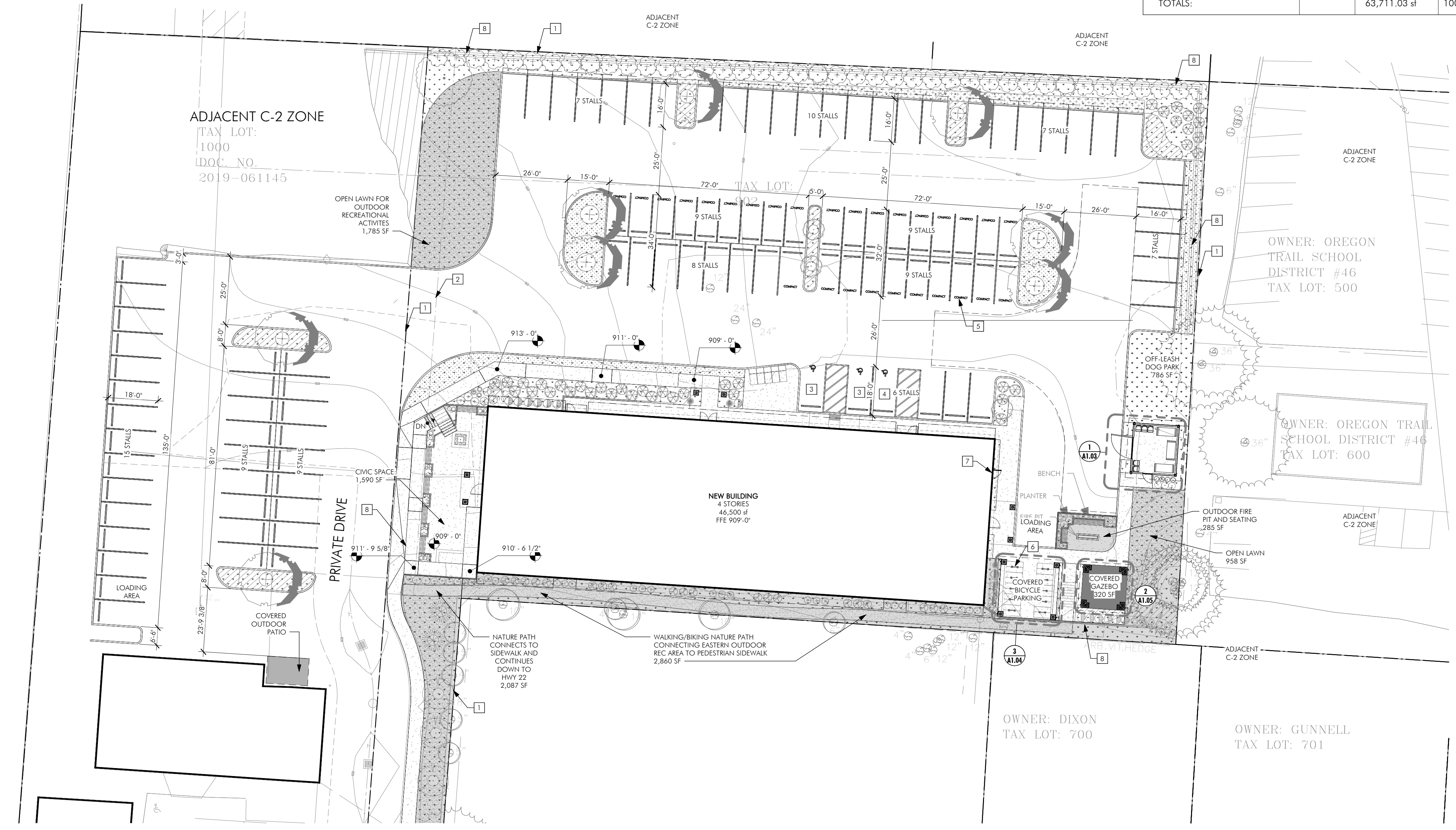
BIKE PARKING:
 • MULTIFAMILY: 1 PER DWELLING UNIT = 42 SPACES

SITE PLAN KEYNOTES:

- PROPERTY LINE
- FRONT SETBACK
- ACCESSIBLE PARKING STALL
- VAN ACCESSIBLE PARKING STALL
- COMPACT PARKING SPACE, PROVIDE PAINTED LETTERING AT EACH STALL AS INDICATED
- SHORT-TERM BIKE PARKING WITH GROUND MOUNTED U-RACKS
- PROVIDE SIGNAGE AT DOOR INDICATING FIRE RISER ROOM
- PROVIDE 3'-6" HIGH GUARDRAIL ATOP RETAINING WALL/ADJACENT TO RAMP/STAIR WHEN GREATER THAN 30" IN HEIGHT

SITE CALCULATIONS AND LEGEND:

SITE ELEMENT DESCRIPTION:	LEGEND:	AREA: (sf)	PERCENTAGE: (%)
BUILDINGS:	[Symbol]	11,279.98 sf	17.70 %
BUILDINGS OVERHANG ABOVE:	[Symbol]		
LANDSCAPING:	[Symbol]	17,328.37 sf	27.21 %
ASPHALT PAVING:	[Symbol]	28,224.39 sf	44.30 %
ACCESSORY STRUCTURES:	[Symbol]	942.48 sf	1.48 %
CONCRETE SIDEWALKS:	[Symbol]	3,322.09 sf	5.21 %
CONCRETE PAVING & CURBS:	[Symbol]	2,613.72 sf	4.10 %
TOTALS:		63,711.03 sf	100.0 %



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FOR PLAN REVIEW ONLY

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PROJECT # 2021-146
 DATE: 12/21/2022
 REVISIONS

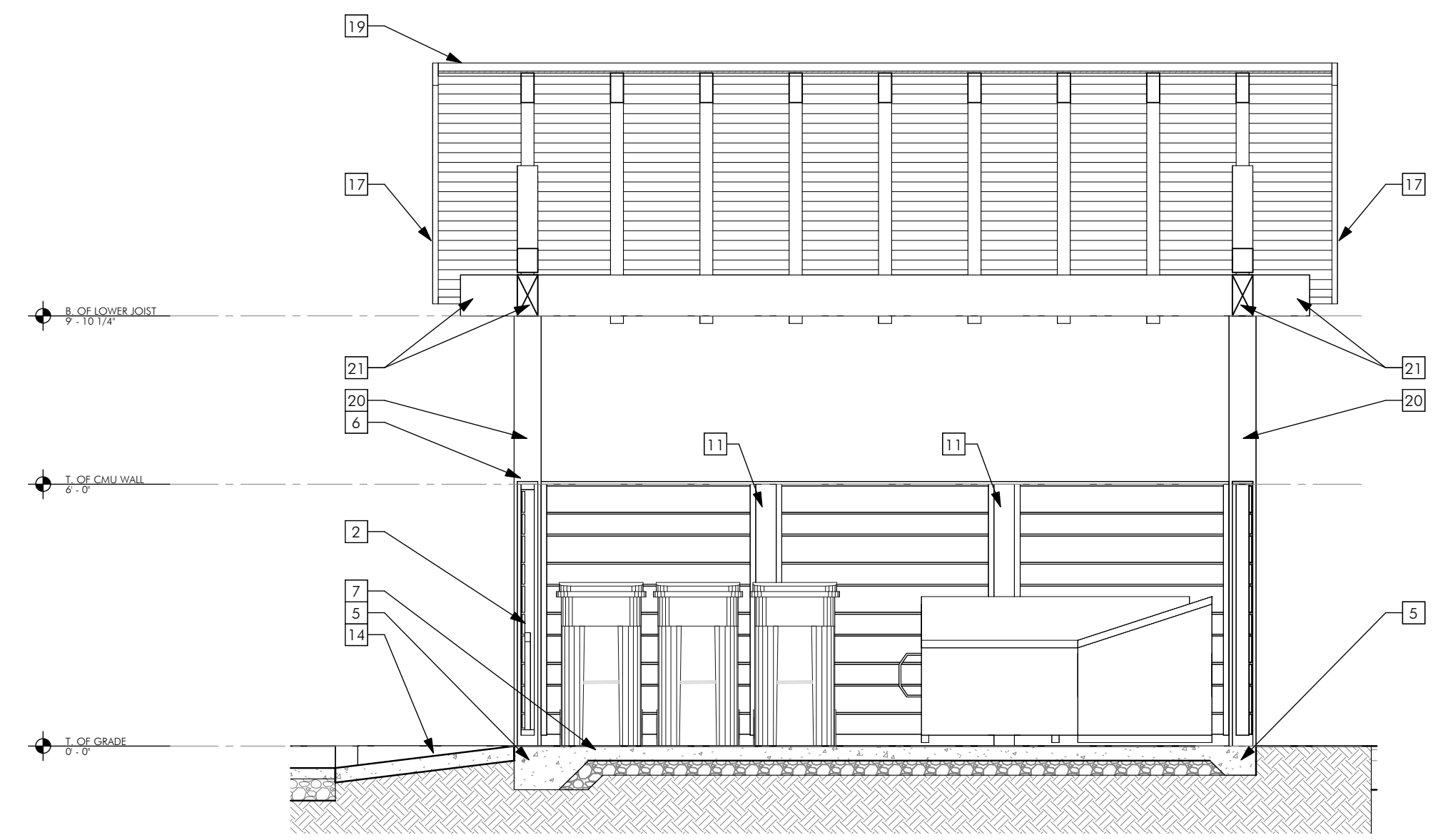
NEW MULTI-FAMILY DEVELOPMENT
SANDY
 38015 Hwy 26, Sandy, OR

SHEET:
A1.02
 ENLARGED SITE PLAN

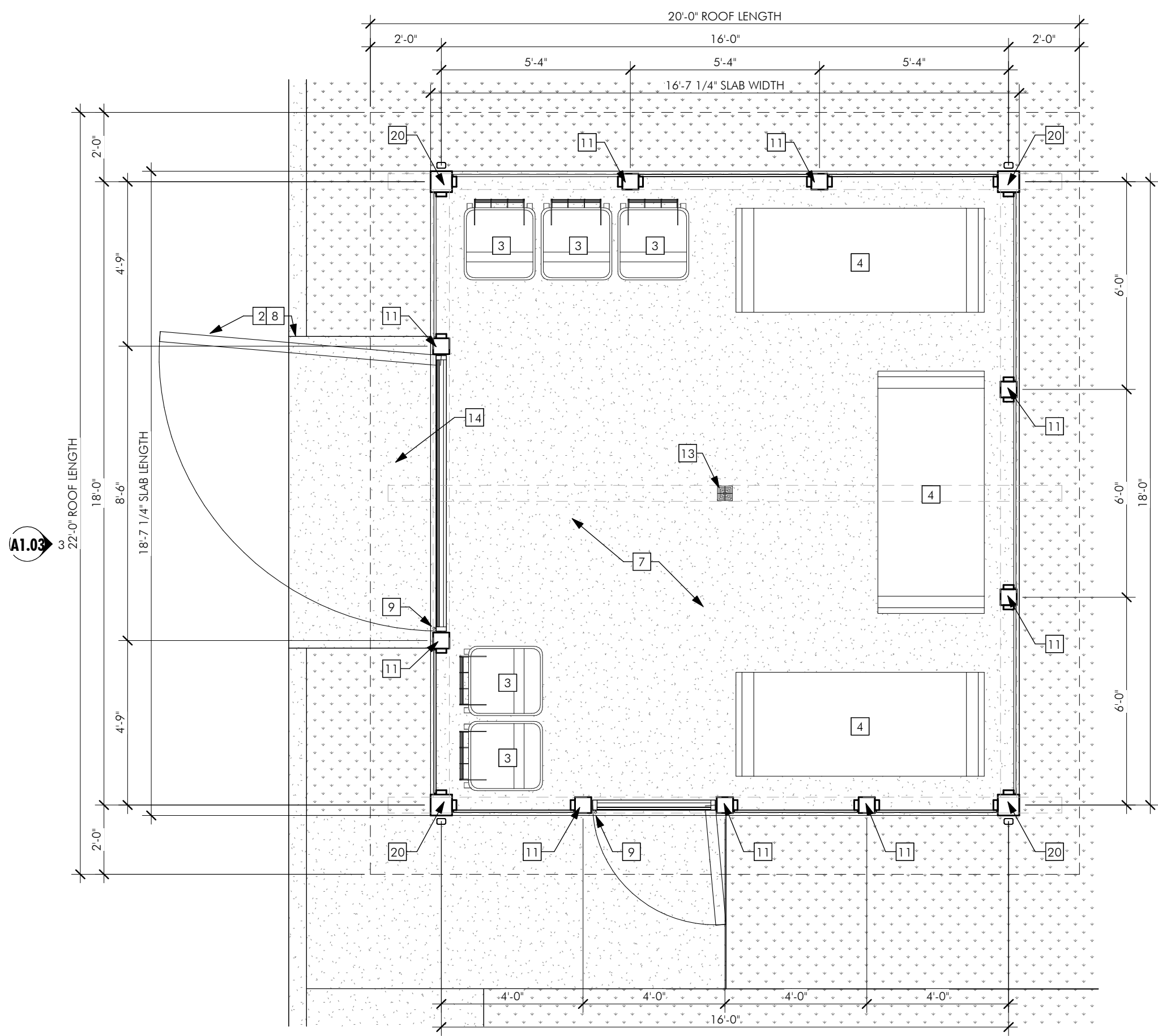


1 SITE - ENLARGED
 0 5 10 20 40 60 1" = 20'-0"

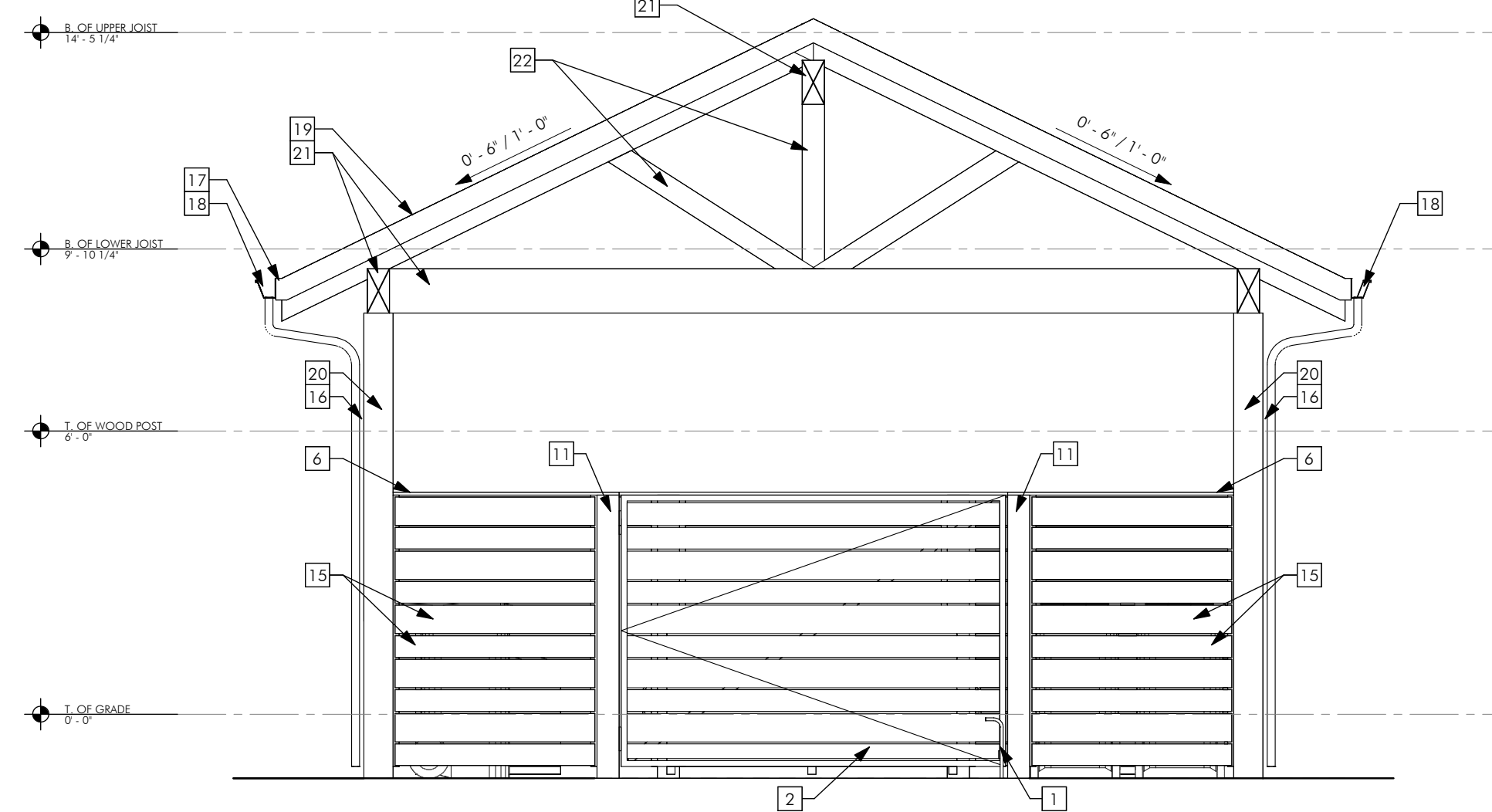
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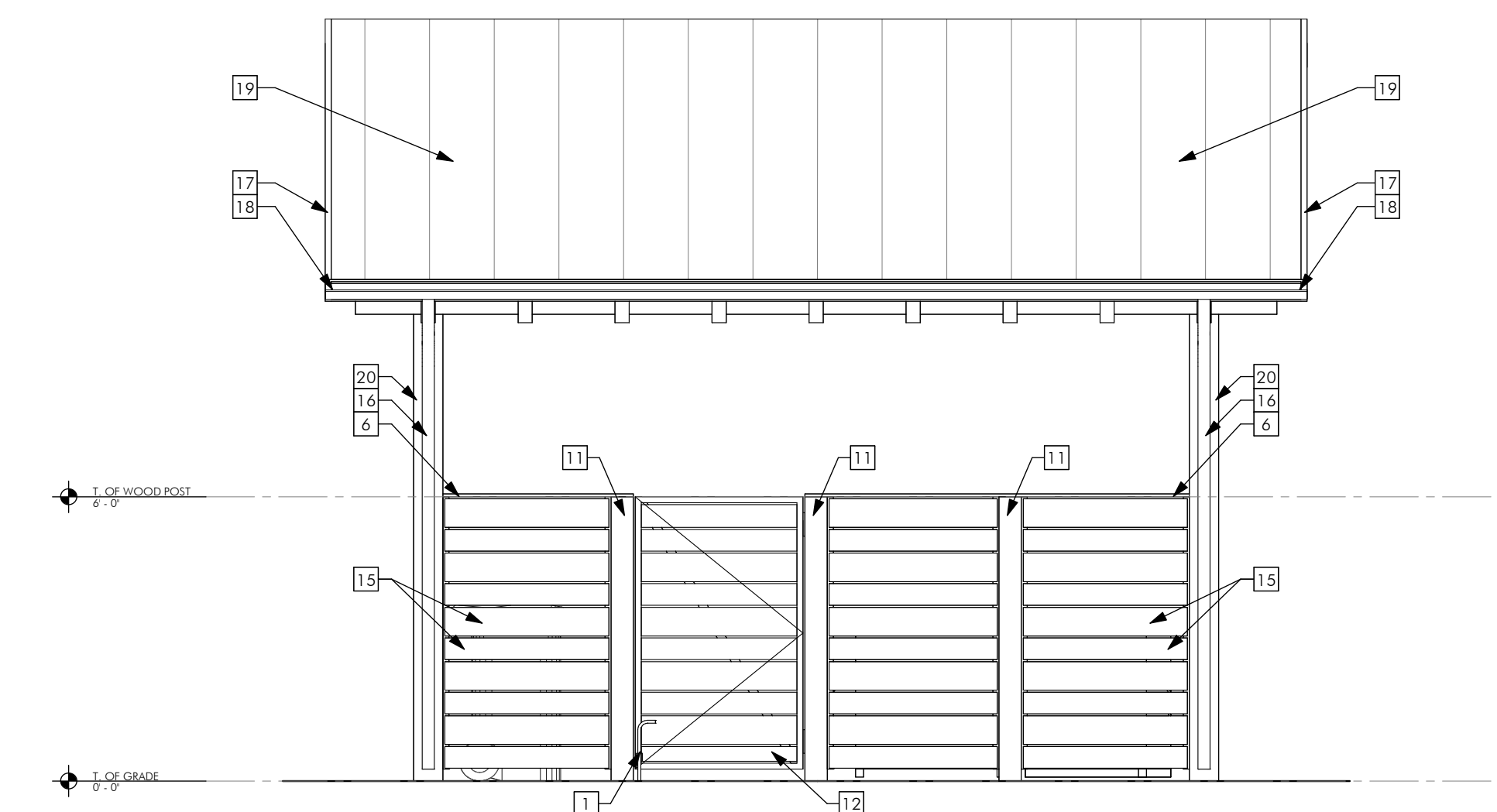
2 TRASH ENCLOSURE - SECTION



1 TRASH ENCLOSURE



3 TRASH ENCLOSURE - FRONT



4 TRASH ENCLOSURE - SIDE

TRASH ENC.NOTES:

- 1 GALVANIZED STEEL LOCKABLE CANE BOLTS FOR GATE
- 2 8'-0" WIDE GATE WITH HEAVY DUTY GALVANIZED STRAP HINGES AND CANE BOLT WITH SLEEVE IN CONCRETE PAD
- 3 90 GALLON RECYCLING BIN
- 4 2 CUBIC YARD TRASH BIN
- 5 CONCRETE FOOTING / THICKENED SLAB EDGE, SEE STRUCTURAL
- 6 1x6 TOP RAIL
- 7 CONCRETE SLAB, SEE STRUCTURAL. SLOPE FLOOR OF TRASH ENCLOSURE TO INTERIOR DRAIN
- 8 PROVIDE GATE STOP AND HOOK TO RESTRAIN GATE IN OPEN POSITION WHEN IN USE
- 9 GALVANIZED STEEL SLEEVE SET IN CONCRETE (OPEN TO DRAIN BELOW CONCRETE SLAB), TO RECEIVE GATE CANE BOLT
- 10 H.D. WELDABLE HINGES
- 11 6'-0" HIGH, 6x6" PRESSURE TREATED WOOD POST
- 12 3'-6" WIDE PEDESTRIAN DOOR WITH HEAVY DUTY GALVANIZED STRAP HINGES
- 13 4' X 4' SQUARE FLOOR DRAIN
- 14 SLOPE CONCRETE DOWN TO ASPHALT
- 15 ALTERNATE 1x6" AND 1x8" BOARDS HORIZONTALLY WITH A 1/2" GAP BETWEEN EACH. PAINT TO MATCH ADJACENT BUILDING. MILLER PAINT, GROPIUS GRAY
- 16 PRE-FINISHED ALUMINUM DOWNSPOUT
- 17 2"x6" WOOD FASCIA
- 18 PRE-FINISHED ALUMINUM GUTTER
- 19 2" STANDING SEAM METAL ROOF, OVER PLYWOOD SHEATHING, OVER 4x8" WOOD JOISTS SPACED 24" O.C. 1" T&G PANELING ATTACHED TO UNDERSIDE OF SHEATHING BETWEEN ROOF JOISTS. METAL ROOF COLOR TO MATCH ADJACENT BUILDING
- 20 8"x8" PRESSURE TREATED WOOD POST
- 21 6x12" WOOD BEAM
- 22 6x6" WOOD SUPPORTS



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PROJECT # 2021-1146
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REVISIONS

NEW MULTI-FAMILY DEVELOPMENT

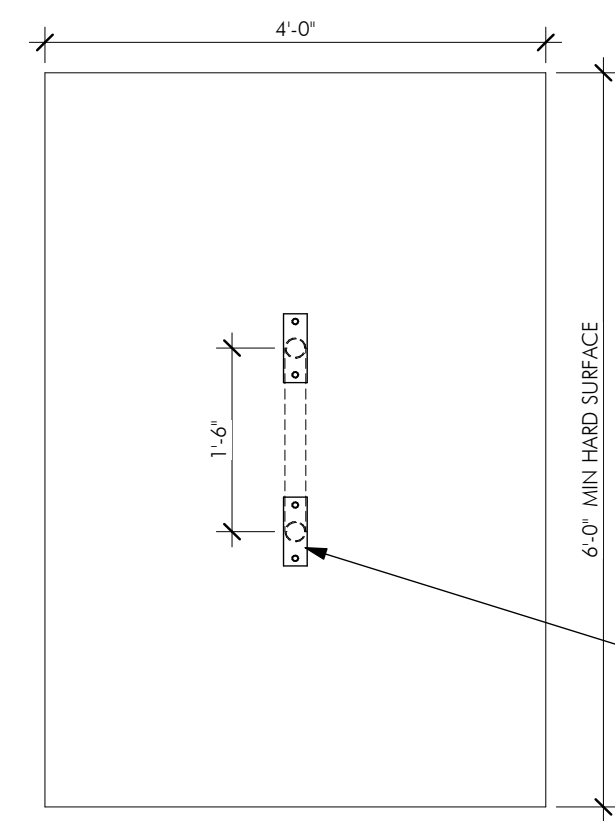
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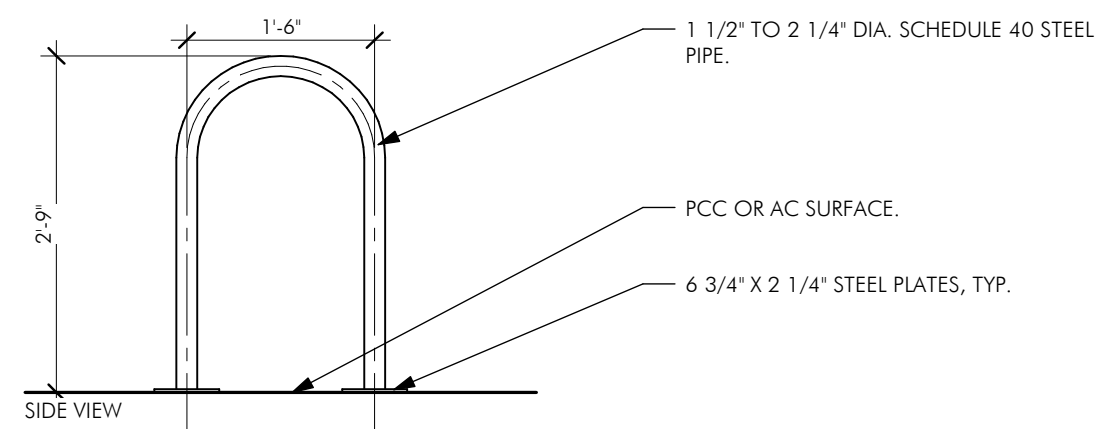
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A1.03

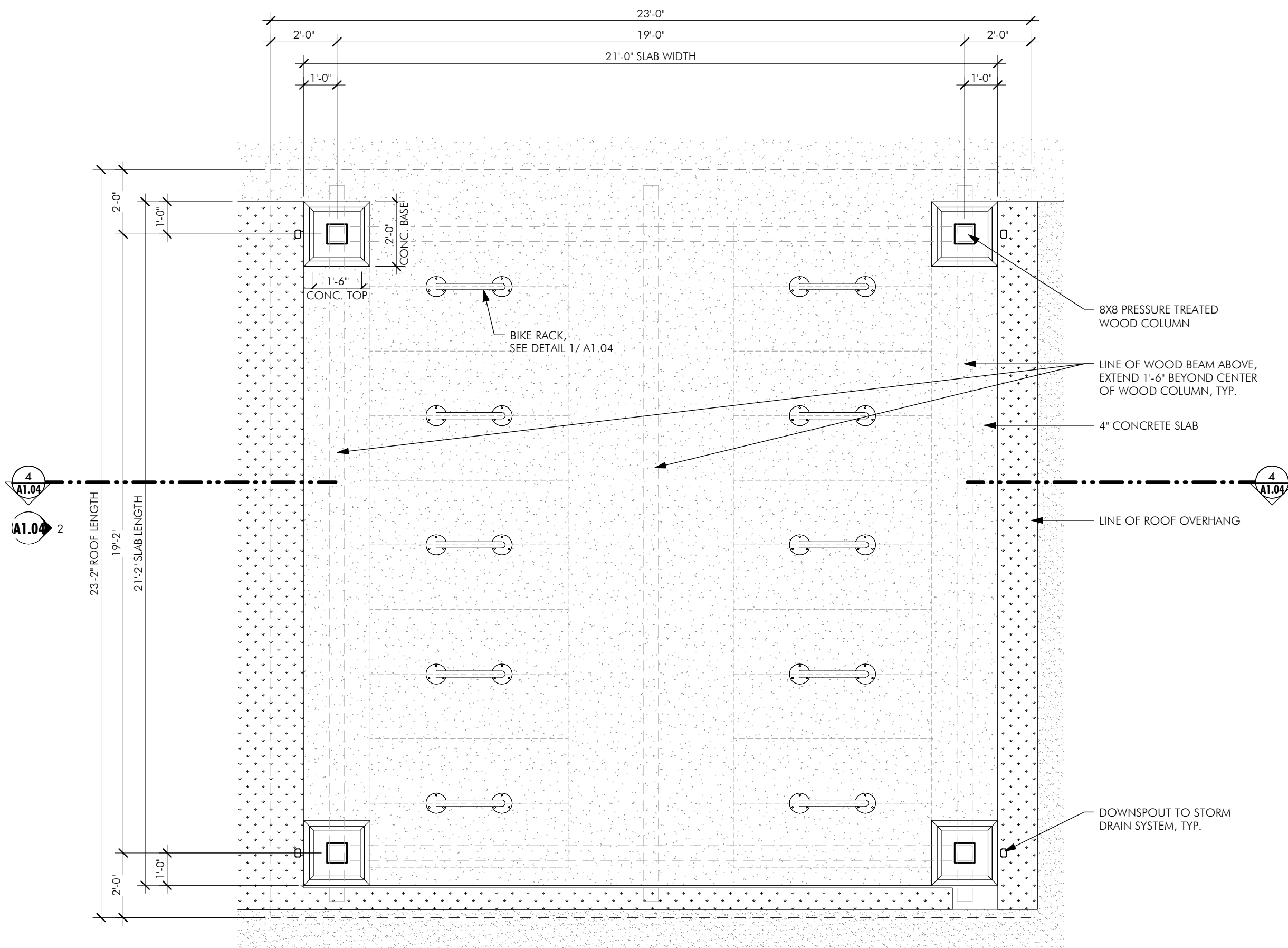
TRASH ENCLOSURE



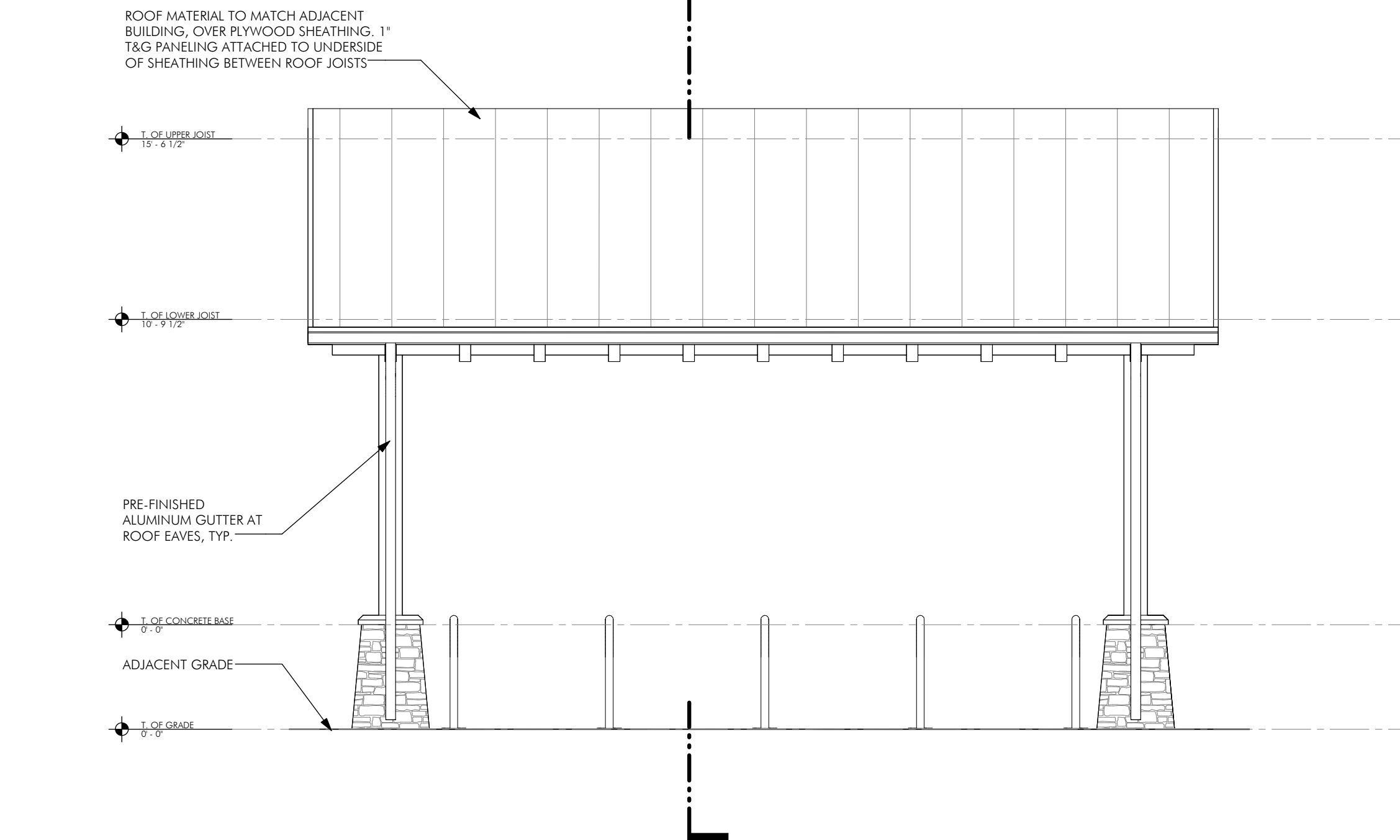
- NOTES:
- BIKE RACKS SHALL HAVE A GLOSS BLACK POLYESTER POWDER COAT FINISH.
 - MOUNTING RAILS SHALL BE FURNISHED WITH MOUNTING HOLES AND VANDAL RESISTANT CONCRETE ANCHOR MOUNTING HARDWARE.
 - EACH "U" SHALL BE WELDED OR MOUNTED TO RAILS OR PLATES WITH VANDAL RESISTANT OR HIDDEN FASTENERS. FOR SINGLE "U" INSTALLATION, EACH MOUNTING PLATE WILL BE EQUIPPED WITH TWO ANCHOR BOLT HOLES.



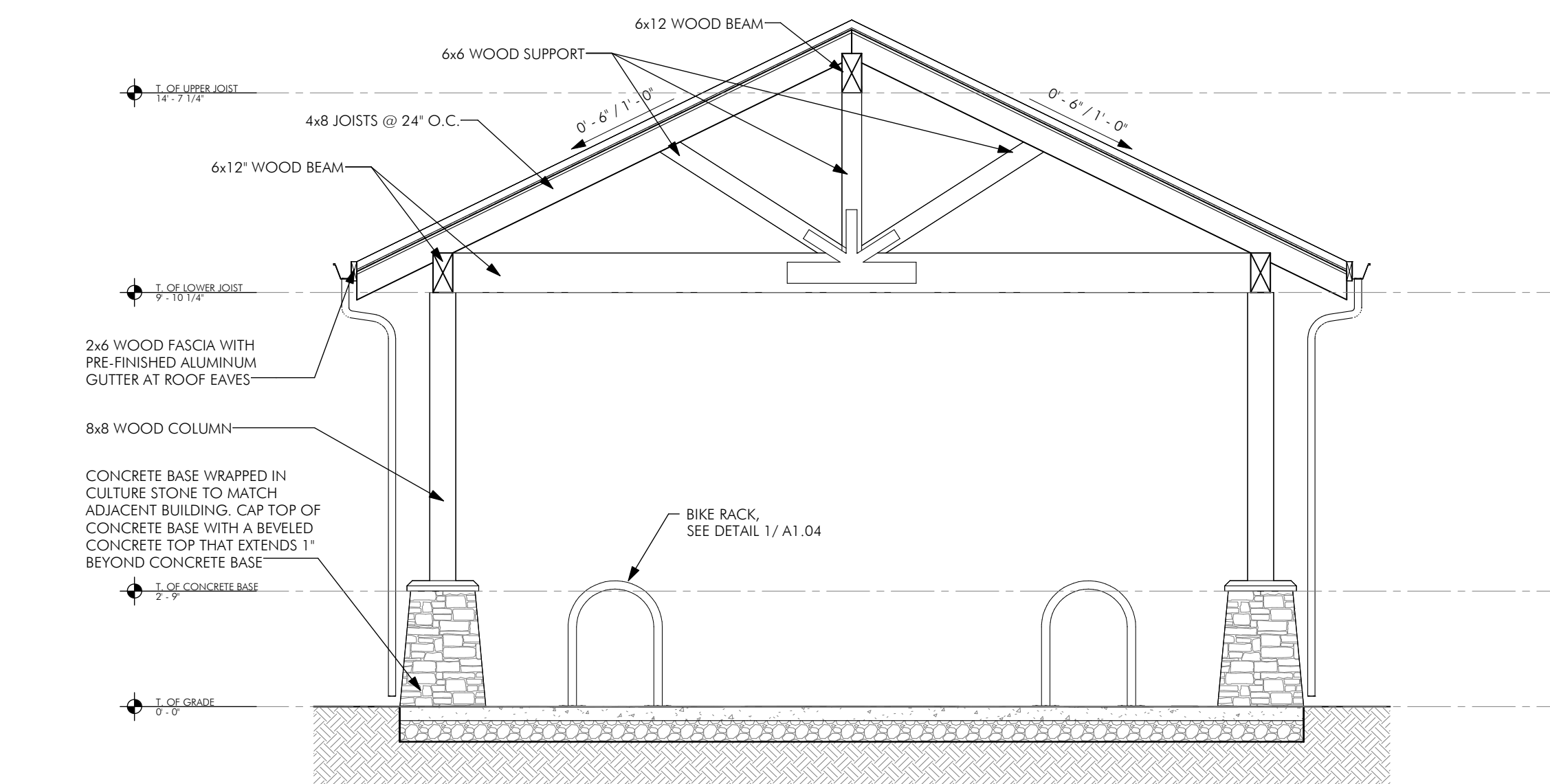
1 "INVERTED U" BIKE RACK DETAIL
3/4" = 1'-0"



3 BICYCLE ENCLOSURE
3/8" = 1'-0"



2 BICYCLE ENCLOSURE - ELEVATION, SIDE
3/8" = 1'-0"



4 BIKE ENCLOSURE - SECTION
3/8" = 1'-0"



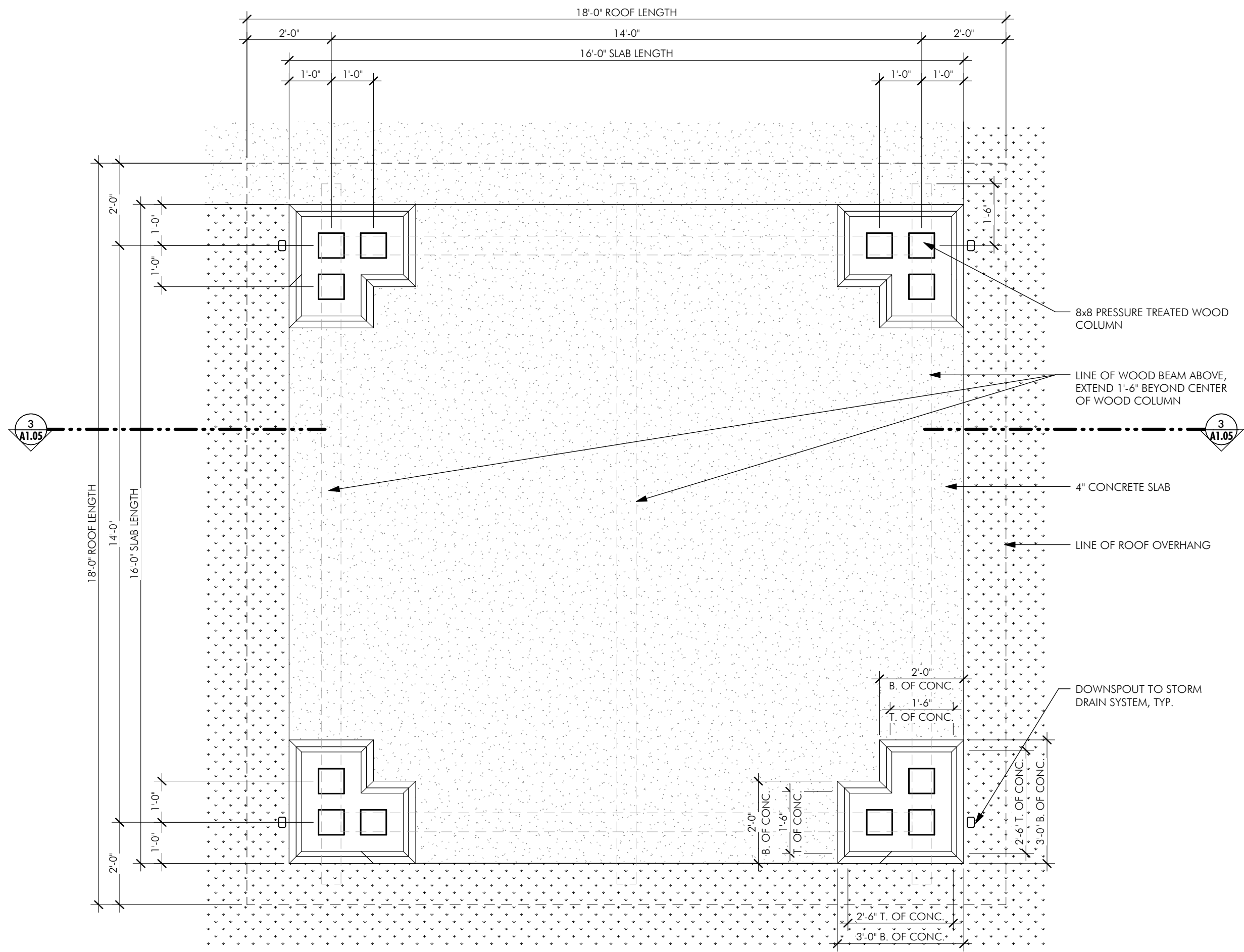
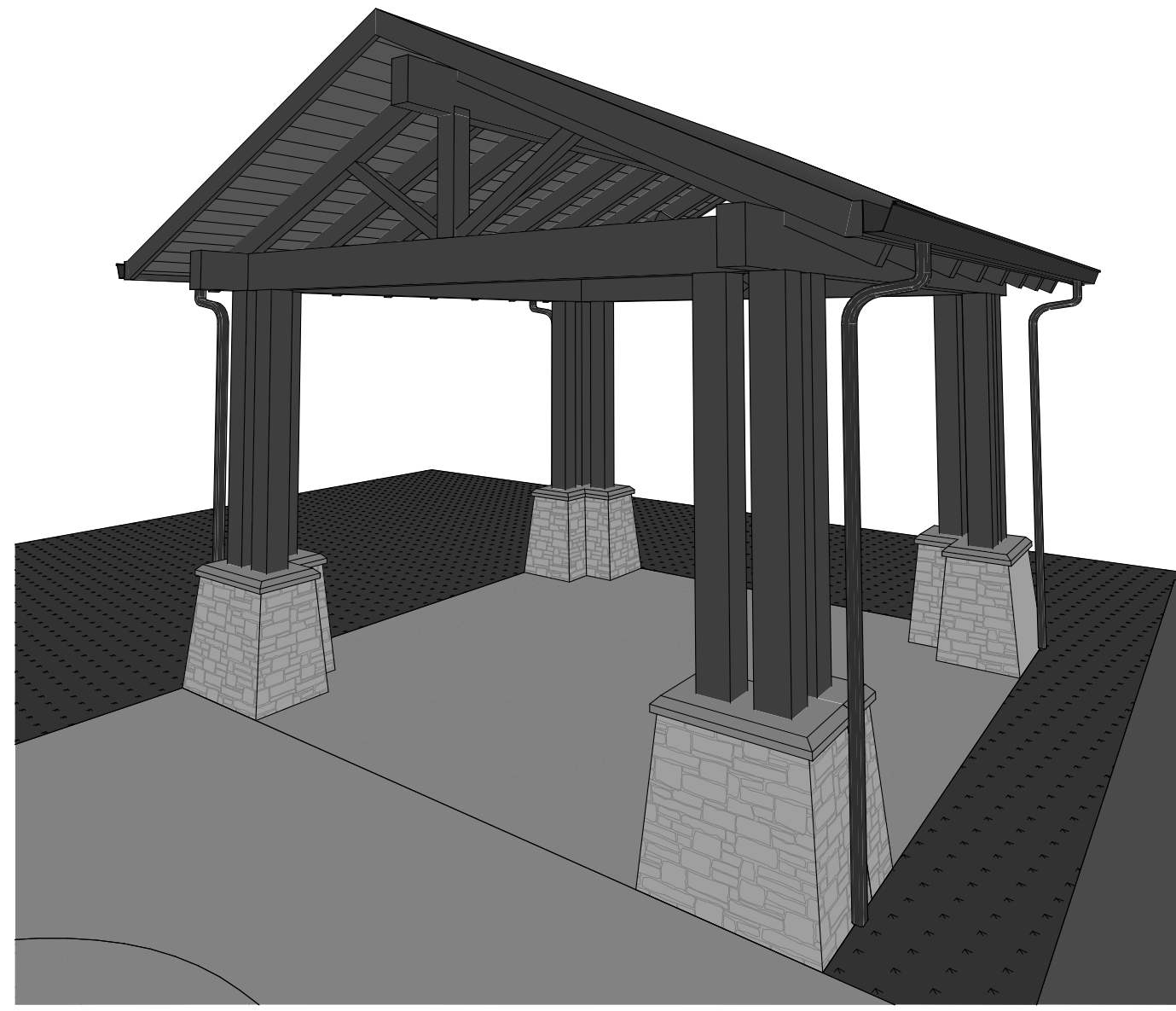
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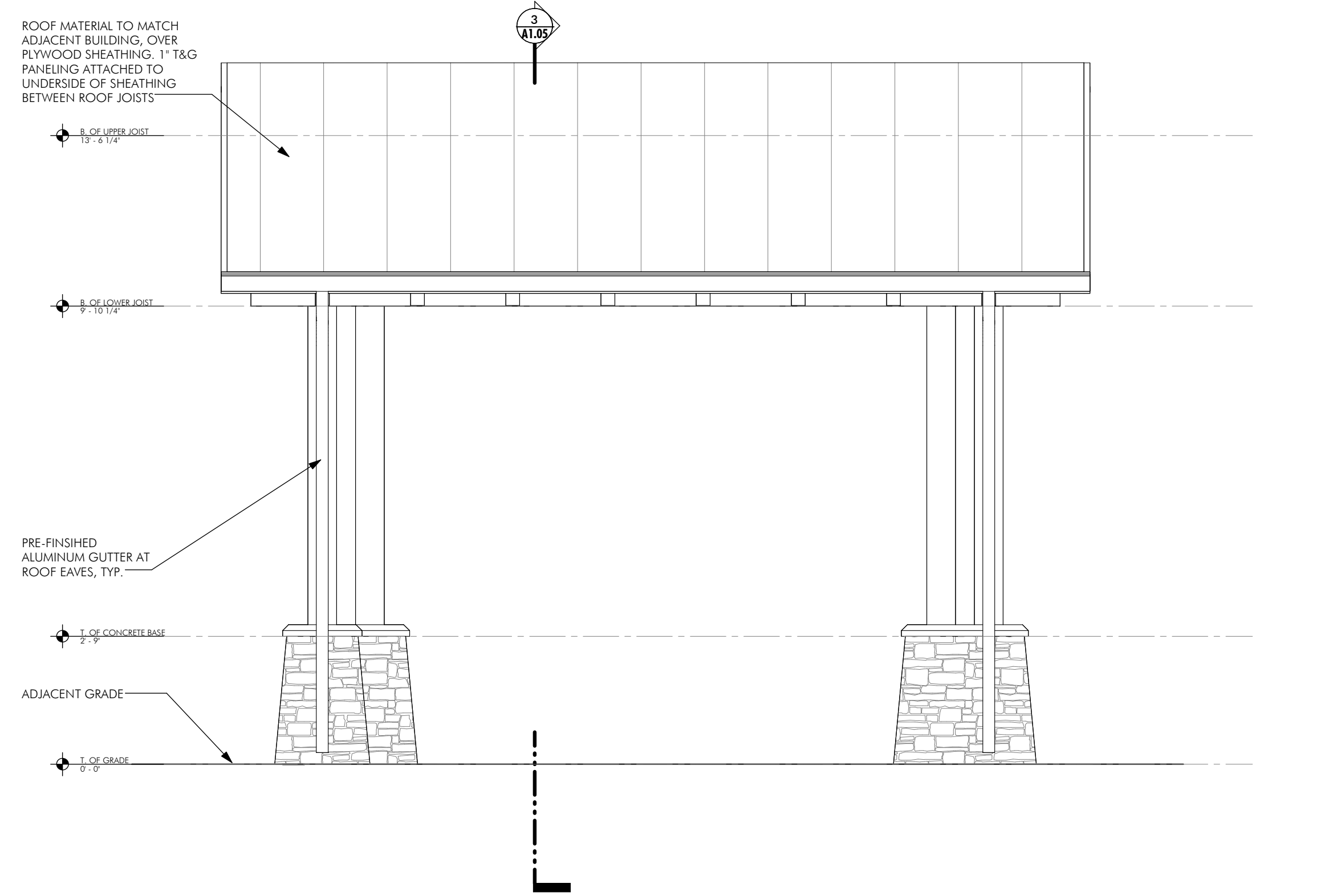
REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
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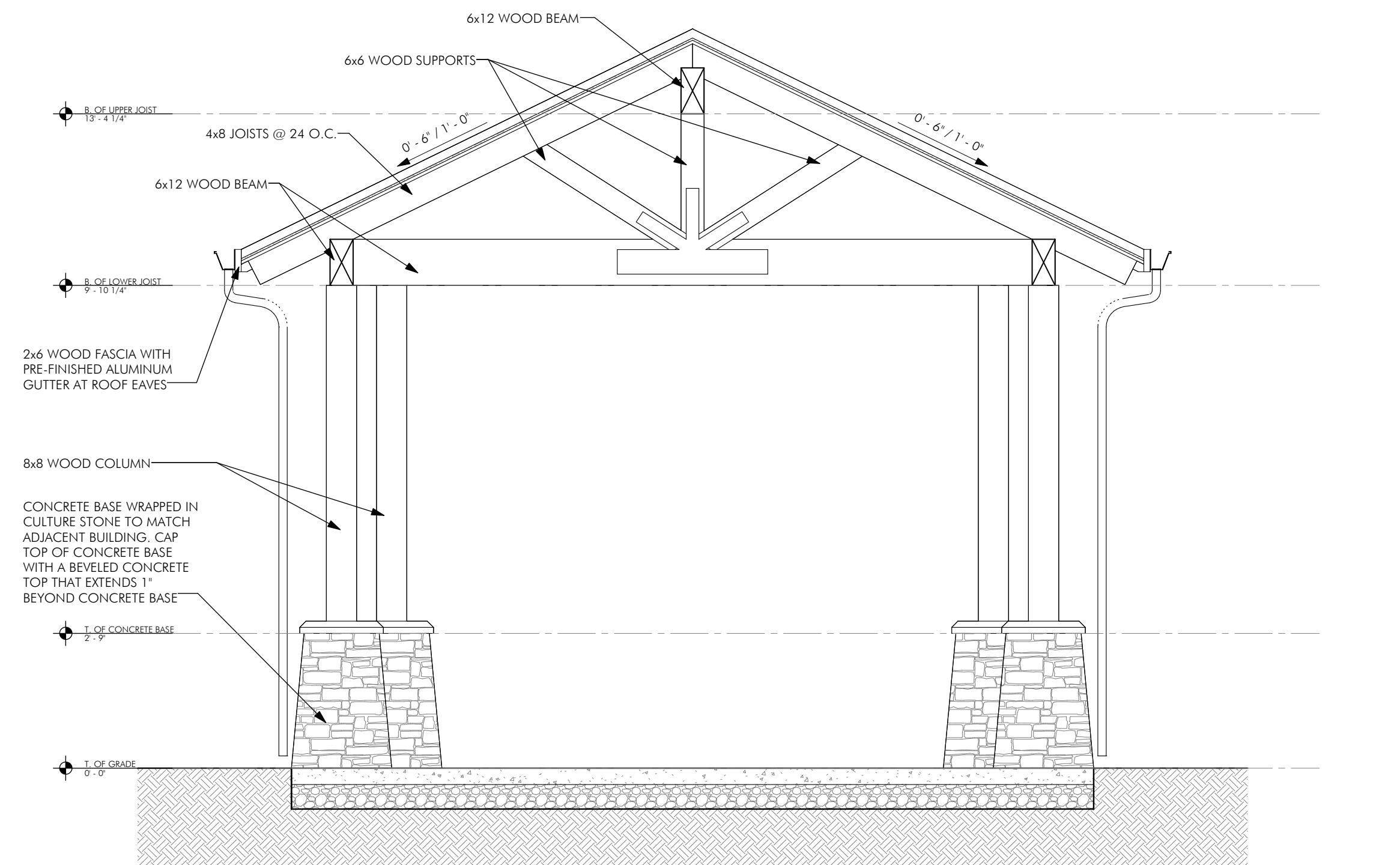




2 GAZEBO
0 1 2 4 6 1/2" = 1'-0"



1 GAZEBO - ELEVATION, SIDE
0 1 2 4 6 1/2" = 1'-0"



3 GAZEBO - SECTION
0 1 2 4 6 1/2" = 1'-0"



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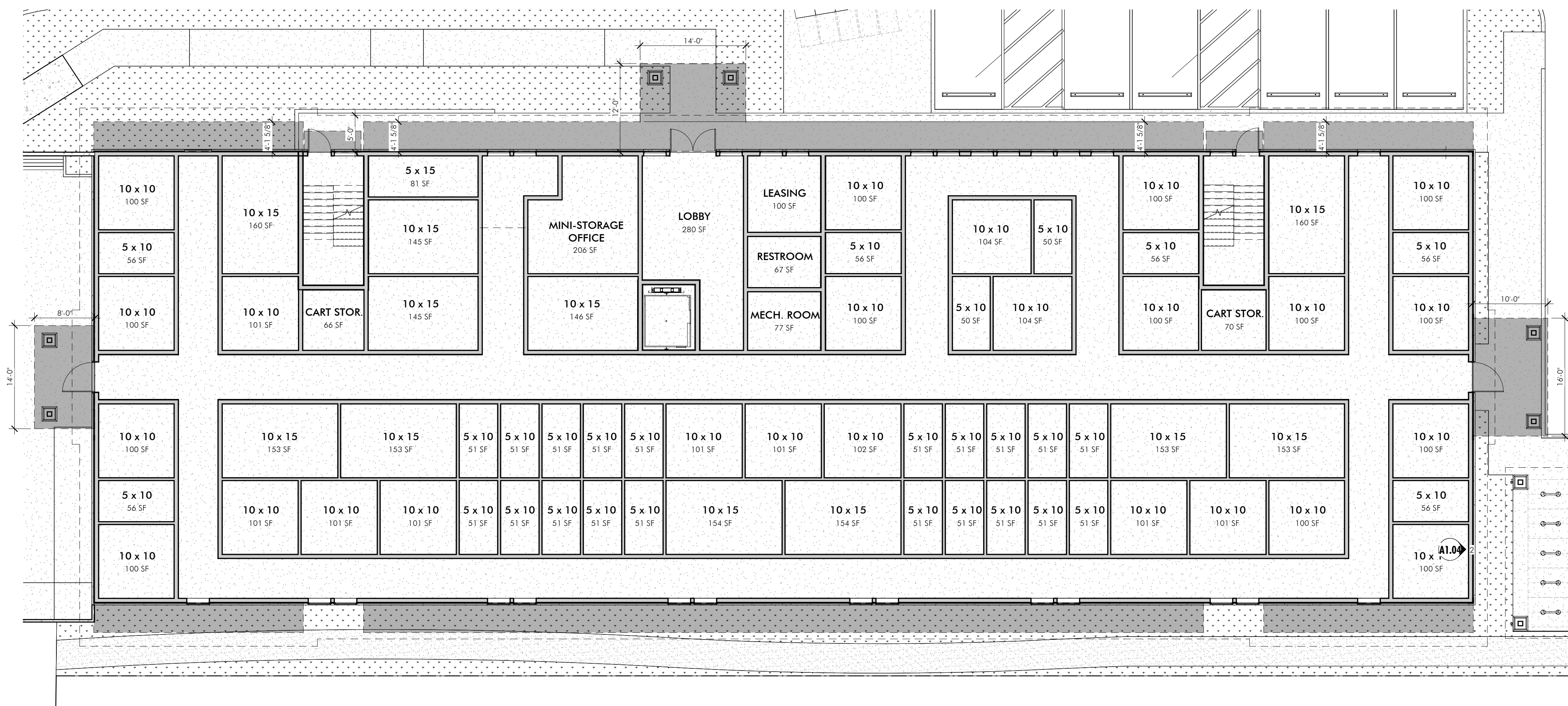
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REVISIONS

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- WHERE THE INTENT OF THE DRAWINGS IS IN DOUBT, OR WHERE THERE APPEARS TO BE AN ERROR ON THE DRAWINGS, OR WHERE THERE IS A DISCREPANCY BETWEEN THE DRAWINGS AND THE FIELD, THE ARCHITECT (AND ENGINEER WHERE APPLICABLE) SHALL BE NOTIFIED AS SOON AS REASONABLY POSSIBLE FOR THE PROCEDURE TO FOLLOW. DO NOT SCALE THE DRAWINGS.
- ALL REVISIONS MUST BE APPROVED IN WRITING BY BOTH THE OWNER AND THE ARCHITECT PRIOR TO THE CONSTRUCTION OF ANY DEVIATION IN THE SCOPE OF WORK.
- DIMENSIONS ARE TO FACE OF FRAMING, OR FACE OF CONCRETE, U.N.O. DIMENSIONS STATED AS CLEAR ARE FROM FACE OF FINISH TO FACE OF FINISH. DIMENSIONING OF DEMISING WALLS ARE TO CENTER OF DEMISING WALL.
- ALL DOORS ARE TO BE 3" FROM FACE OF FRAMING TO ROUGH OPENING, OR CENTERED IN THE WALL, U.N.O. ALL OPENINGS ARE DIMENSIONED FROM FACE OF FRAMING TO CENTER OF OPENING.
- SEE STRUCTURAL DRAWINGS FOR SHEAR WALL LOCATIONS. WHERE NON-SHEAR WALLS ARE IN THE SAME PLANE, CONTINUE SHEATHING LAYER TO NEAREST CORNER TO ENSURE CONTINUITY.
- WALL MATERIAL MAY CHANGE AT WALL INTERSECTIONS, REVIEW SECTIONS AND ELEVATIONS FOR ADDED INFORMATION.
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- AT ALL BATH AND TOILET ROOMS, AS WELL AS ALL WET WALLS IN KITCHENS, PROVIDE WATER RESISTANT GYPSUM BOARDS AS FACE LAYER ON ALL ADJACENT GYPSUM BOARD WALL AND CEILING ASSEMBLIES.
- REFER TO CODE REVIEW SHEETS FOR FIRE RATING. REFER TO WALL TYPE SHEETS FOR CONSTRUCTION OF WALLS AND FLOORS IN RATED CONDITIONS.
- PROVIDE UL APPROVED THROUGH PENETRATION AND MEMBRANE PENETRATION FIRESTOP SYSTEMS AS REQUIRED BY CODE AT ALL ELECT., PLUM., AND MECH. PENETRATIONS IN FIRE RATED ASSEMBLIES.
- SEE ENLARGED FLOOR PLANS FOR DIMENSIONS AND WALL TAGS NOT SHOWN.

A2.01



A2.02 2

A2.01

1 LEVEL 01
0 2 4 8 16 24
1/8" = 1'-0"

A2.02



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NEW MULTI-FAMILY DEVELOPMENT

SANDY

38015 Hwy 26, Sandy, OR

SHEET:

A1.21
FLOOR PLAN - LEVEL
01



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SHEET:

A1.22

FLOOR PLAN - LEVELS 02-04

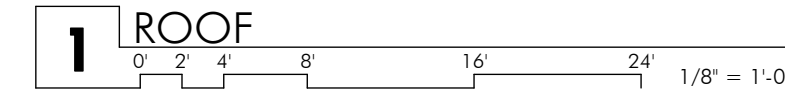
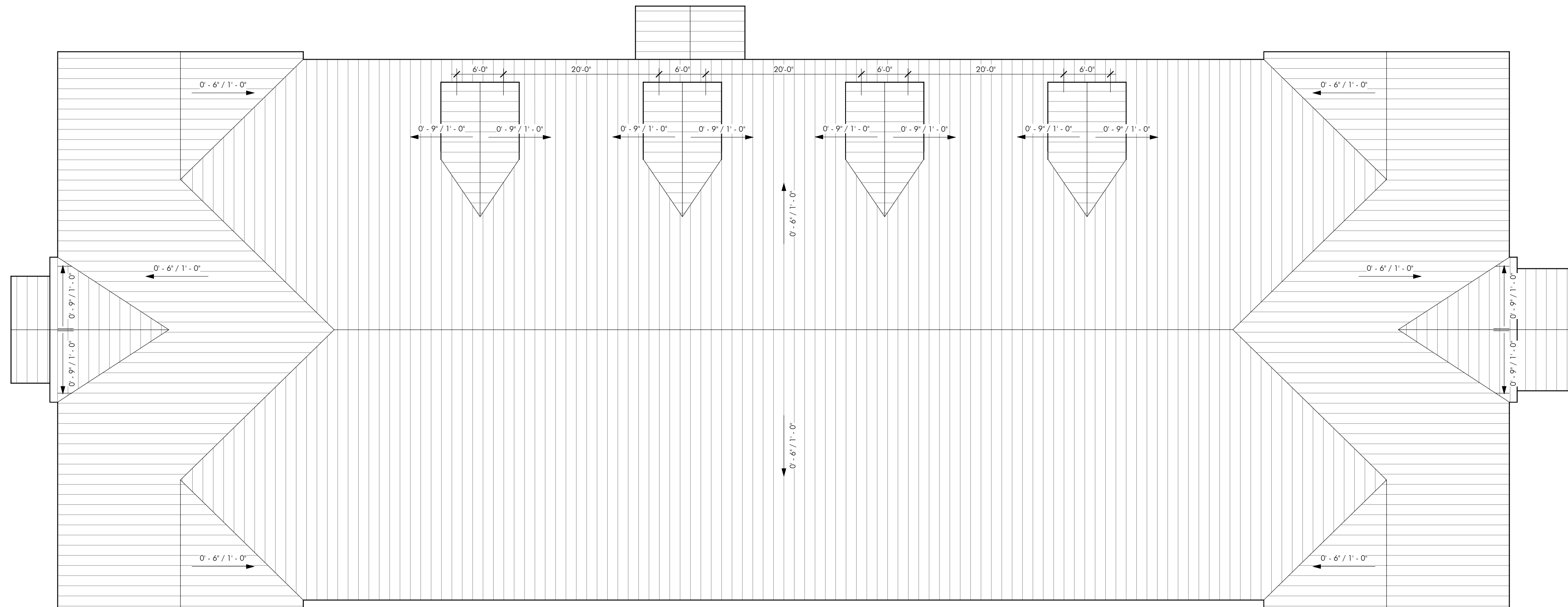


1 LEVELS 02 - 04
0 2 4 8 16 24
1/8" = 1'-0"



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- WALL MATERIAL MAY CHANGE AT WALL INTERSECTIONS, REVIEW SECTIONS AND ELEVATIONS FOR ADDED INFORMATION.
- PROVIDE FIRE BLOCKING IN CONCEALED SPACES OF WALLS, PARTITIONS AND FURRED SPACES AT 10'-0" O.C. IN ALL DIRECTIONS AND AT ALL INTERCONNECTIONS BETWEEN CONCEALED VERTICAL AND HORIZONTAL SPACES.
- INSTALL WALL BACKING FOR ALL WALL MOUNTED ITEMS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING: DOOR STOPS, FIXTURES, WALL CABINETS, SHELVING, COUNTERS, TOILET ACCESSORIES, HAND RAILS AND WINDOW COVERING TRACKS.
- ALL MATERIALS AND WORKMANSHIP SHALL CONFORM WITH ALL STATE AND LOCAL JURISDICTIONS AND REGULATIONS.
- WHERE WALLS WITH DIFFERING LAYERS OF GYP ARE IN THE SAME PLANE, ADD ADDITIONAL LAYERS OF GYP TO ENSURE A CONTINUOUS FINISH SURFACE. CONTINUE ADDITIONAL LAYERS TO NEAREST CORNER.
- AT ALL BATH AND TOILET ROOMS, AS WELL AS ALL WET WALLS IN KITCHENS, PROVIDE WATER RESISTANT GYPSUM BOARDS AS FACE LAYER ON ALL ADJACENT GYPSUM BOARD WALL AND CEILING ASSEMBLIES.
- REFER TO CODE REVIEW SHEETS FOR FIRE RATING. REFER TO WALL TYPE SHEETS FOR CONSTRUCTION OF WALLS AND FLOORS IN RATED CONDITIONS.
- PROVIDE UL APPROVED THROUGH PENETRATION AND MEMBRANE PENETRATION FIRESTOP SYSTEMS AS REQUIRED BY CODE AT ALL ELECT., PLUM., AND MECH. PENETRATIONS IN FIRE RATED ASSEMBLIES.
- SEE ENLARGED FLOOR PLANS FOR DIMENSIONS AND WALL TAGS NOT SHOWN.



275 COURT ST. NE
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PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
38015 Hwy 26, Sandy, OR



SHEET:
A1.23
FLOOR PLAN - ROOF



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PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT

SANDY

38015 Hwy 26, Sandy, OR

SHEET:

A2.01

ELEVATIONS

GROUND FLOOR WALL AREA: 1,693 SF
WINDOWS RGD: 339 SF (20%)
PROVIDED:
DOOR GLAZING: 51 SF
TRANSOM GLAZING: 14 SF
WINDOW GLAZING: 274.5 SF
TOTAL: 339.5 SF (20%)



1 North Building Elevation
0 2 4 8 16 24
1/8" = 1'-0"

ELEVATION NOTES:

- 1 FIBER CEMENT LAP SIDING W/ ALTERNATING 4" AND 8" EXPOSURE. COLOR: MILLER PAINT-PALOMINO.
- 2 FIBER CEMENT LAP SIDING W/ 8" EXPOSURE. COLOR: MILLER PAINT-GROPIUS GRAY
- 3 FIBER CEMENT TRIM. COLOR: MILLER PAINT-CHOCOLATE.
- 4 CULTURED STONE BASE.
- 5 CEDAR SHAKE SIDING. COLOR: MILLER PAINT-PORTOBELLA
- 6 STANDING SEAM METAL ROOF.
- 7 VINYL WINDOW. COLOR: WHITE. FIBER CEMENT TRIM SURROUND. PAINT: CHOCOLATE
- 8 INSULATED HOLLOW METAL DOOR. PAINT WHITE TO MATCH WINDOWS.
- 9 HEAVY TIMBER CANOPY. COLOR: MILLER PAINT-CHOCOLATE
- 10 FIBERGLASS DOOR. COLOR: WHITE.
- 11 CEDAR FACIA BOARD. COLOR: CHOCOLATE
- 12 HEAVY TIMBER BRACKET. COLOR: MILLER PAINT-CHOCOLATE
- 13 FIBER CEMENT BOARD & BATTEN SIDING. COLOR: MILLER PAINT-JWETT WHITE.
- 14 X2 DECKING OVER WOOD FRAMING WITH VERTICAL METAL RAILING AND X2 WOOD TOP RAIL. PAINT ALL EXPOSED WOOD AND STEEL MILLER PAINT-CHOCOLATE.
- 15 LIGHT WELL FOR LEVEL 01 WINDOW
- 16 3 0 x 5 6 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 16.5 SF
- 17 3 0 x 5 6 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 18 3 0 x 7 0 DOOR WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION. GLAZED AREA: 12.75 SF
- 19 3 0 x 3 6 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 10.5 SF
- 20 3 0 x 1 2 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 3.5 SF
- 21 6 0 x 1 2 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 7 SF
- 22 3 0 x 2 0 FIXED WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 23 4 0 x 7 0 DOOR WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 24 2 0 x 5 6 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 25 3 0 x 4 0 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 26 4 0 x 4 0 SLIDER WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.



2 East Building Elevation
0 2 4 8 16 24
1/8" = 1'-0"

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PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS



1 South Building Elevation
0 2 4 8 16 24 1/8" = 1'-0"

ELEVATION NOTES:

- 1 FIBER CEMENT LAP SIDING W/ ALTERNATING 4" AND 8" EXPOSURE. COLOR: MILLER PAINT-PALOMINO.
- 2 FIBER CEMENT LAP SIDING W/ 8" EXPOSURE. COLOR: MILLER PAINT-GROPIUS GRAY
- 3 FIBER CEMENT TRIM. COLOR: MILLER PAINT-CHOCOLATE.
- 4 CULTURED STONE BASE.
- 5 CEDAR SHAKE SIDING. COLOR: MILLER PAINT-PORTOBELLA
- 6 STANDING SEAM METAL ROOF.
- 7 VINYL WINDOW. COLOR: WHITE. FIBER CEMENT TRIM SURROUND. PAINT-CHOCOLATE
- 8 INSULATED HOLLOW METAL DOOR. PAINT WHITE TO MATCH WINDOWS.
- 9 HEAVY TIMBER CANOPY. COLOR: MILLER PAINT-CHOCOLATE
- 10 FIBERGLASS DOOR. COLOR: WHITE.
- 11 CEDAR FACIA BOARD. COLOR: CHOCOLATE
- 12 HEAVY TIMBER BRACKET. COLOR: MILLER PAINT-CHOCOLATE
- 13 FIBER CEMENT BOARD & BATTEN SIDING. COLOR: MILLER PAINT-JWETT WHITE.
- 14 X2 DECKING OVER WOOD FRAMING WITH VERTICAL METAL RAILING AND X2 WOOD TOP RAIL. PAINT ALL EXPOSED WOOD AND STEEL MILLER PAINT-CHOCOLATE.
- 15 LIGHT WELL FOR LEVEL 01 WINDOW
- 16 3 0 x 5 6 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 16.5 SF
- 17 3 0 x 5 6 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 18 3 0 x 7 0 DOOR WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION. GLAZED AREA: 12.75 SF
- 19 3 0 x 3 6 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 10.5 SF
- 20 3 0 x 1 2 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 3.5 SF
- 21 6 0 x 1 2 FIXED WINDOW WITH INTERIOR GRID. GLAZED AREA: 7 SF
- 22 3 0 x 2 0 FIXED WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 23 4 0 x 7 0 DOOR WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 24 2 0 x 5 6 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 25 3 0 x 4 0 SINGLE HUNG WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.
- 26 4 0 x 4 0 SLIDER WINDOW WITH INTERIOR GRIDS NOT TO EXCEED 1'-0" IN EITHER DIRECTION.



2 West Building Elevation
0 2 4 8 16 24 1/8" = 1'-0"

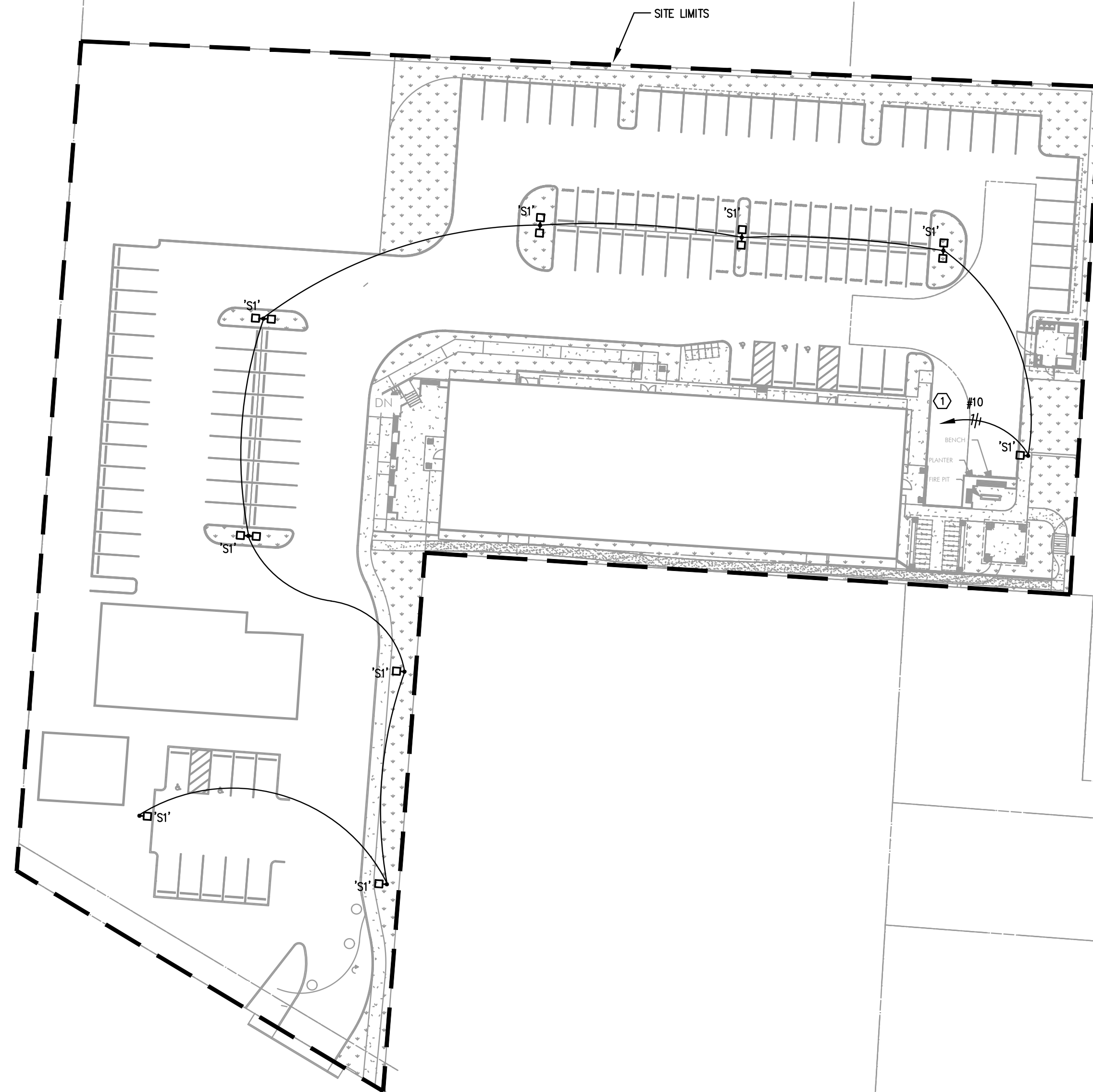
NEW MULTI-FAMILY DEVELOPMENT

SANDY

38015 Hwy 26, Sandy, OR

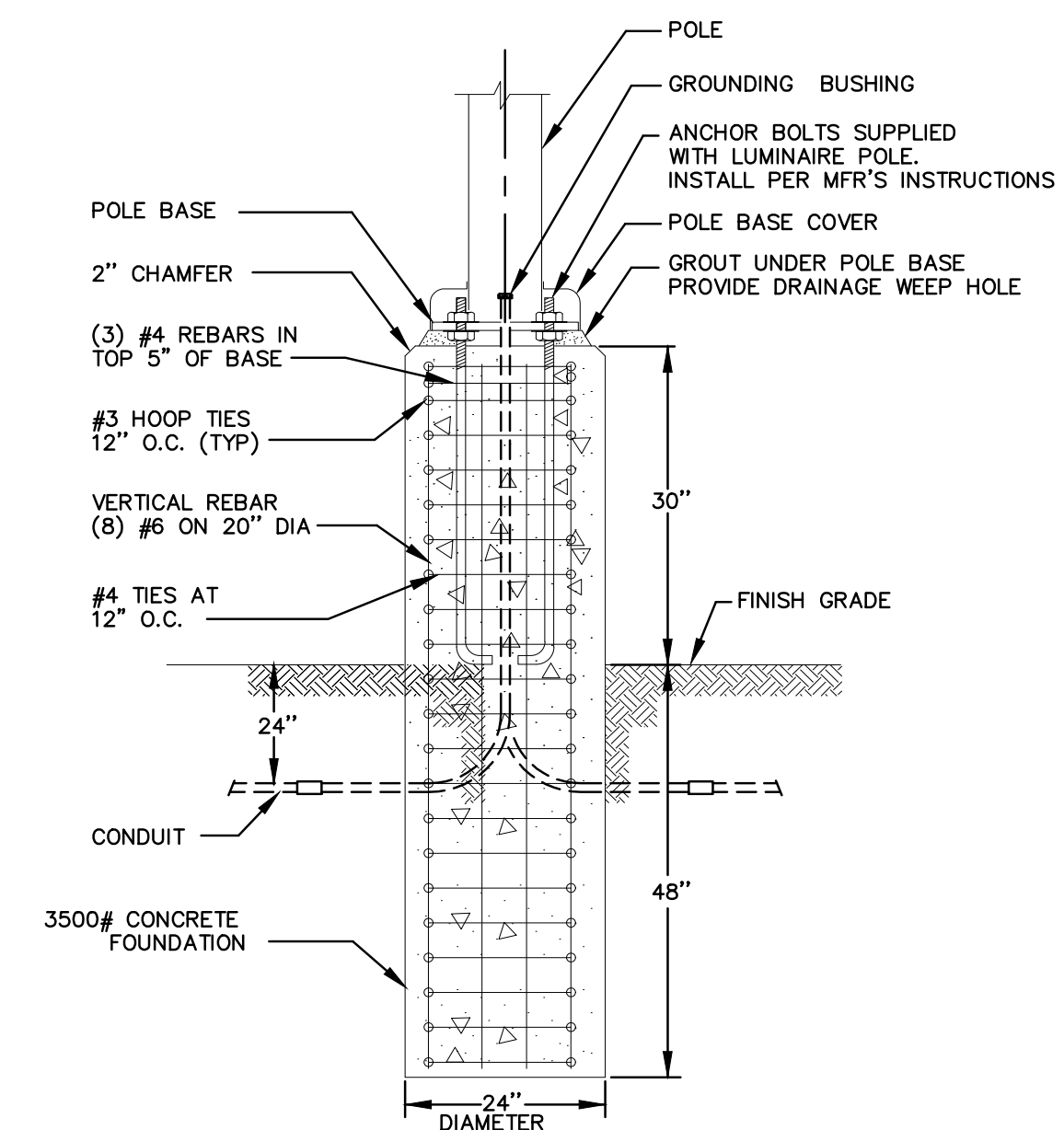
SHEET:
A2.02
ELEVATIONS

EXHIBIT D



1 SITE LIGHTING PLAN
E0.00 1/32" = 1'-0"

LIGHTING FIXTURE LIST					
TYPE	LAMP	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	OPTIONS
S1	LED 3000K 5500LM	LITHONIA LIGHTING (OR APPROVED OTHER)	DSXO P2 SERIES	TYPE :AREA LIGHT (SINGLE/TWIN HEAD) MOUNTING :POLE MOUNT (+20'-0") HOUSING : LENS/REFL : VOLTAGE :MVOLT BALLAST :LED DRIVER	TFTM DISTRIBUTION INTEGRAL PHOTOCCELL PARKING AREA
49W					



2 POLE BASE DETAIL
E0.00 N.T.S.

NOTES:

- ① ROUTE HOME RUN VIA LIGHTING CONTROL PANEL FOR CONTROLS. CONNECT TO SPARE 20A/1P CIRCUIT BREAKER IN 'HOUSE' PANEL

Date: 07-29-2022
 Proj No: 10423
 Drawn By: REM
 Chkd By: REM
 DSGN By: REM
 Acad File: E000

NEW MULTI-FAMILY DEVELOPMENT
 SANDY
 38015 HWY 26
 OR
 SITE LIGHTING PLAN



Consulting Engineers
 2007 S.E. Ash St.
 Portland, OR 97214
 PHN: (503) 234-0548
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 WWW.MFA-ENG.COM

SHEET
E0.00

OF 0000

EXHIBIT E



D-Series Size 0 LED Area Luminaire



Buy American

Catalog Number
Notes
Type

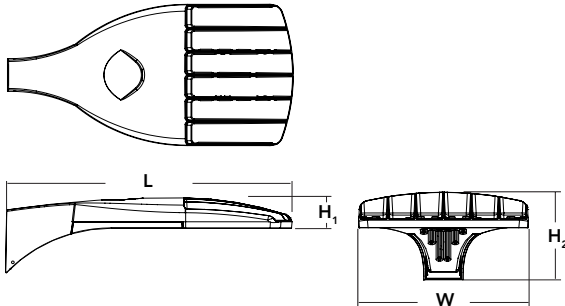
Hit the Tab key or mouse over the page to see all interactive elements.

Introduction

The modern styling of the D-Series is striking yet unobtrusive - making a bold, progressive statement even as it blends seamlessly with its environment. The D-Series distills the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire. The outstanding photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. It is ideal for replacing up to 400W metal halide with typical energy savings of 70% and expected service life of over 100,000 hours.

Specifications

- EPA: 0.95 ft² (.09 m²)
- Length: 26" (66.0 cm)
- Width: 13" (33.0 cm)
- Height₁: 3" (7.62 cm)
- Height₂: 7" (17.8 cm)
- Weight (max): 16 lbs (7.25 kg)



Ordering Information

EXAMPLE: DSX0 LED P6 40K T3M MVOLT SPA NLTAIR2 PIRHN DDBXD

DSX0 LED		Color temperature		Distribution		Voltage		Mounting	
Series	LEDs								
DSX0 LED	Forward optics P1 P5 P2 P6 P3 P7 ¹ P4 ¹ Rotated optics P10 ² P12 ² P11 ² P13 ^{1,2}	30K 3000 K 40K 4000 K 50K 5000 K		T1S Type I short (Automotive) T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4M Type IV medium TFTM Forward throw medium TSVS Type V very short ³	T5S Type V short ³ T5M Type V medium ³ TSW Type V wide ³ BLC Backlight control ⁴ LCCO Left corner cutoff ⁴ RCCO Right corner cutoff ⁴	MVOLT (120V-277V) ^{5,6} XVOLT (277V-480V) ^{7,8,9} 120 ⁶ 208 ⁶ 240 ⁶ 277 ⁶ 347 ⁶ 480 ⁶		Shipped included SPA Square pole mounting RPA Round pole mounting ¹⁰ WBA Wall bracket ³ SPUMBA Square pole universal mounting adaptor ¹¹ RPUMBA Round pole universal mounting adaptor ¹¹ Shipped separately KMA8 DDBXD U Mast arm mounting bracket adaptor (specify finish) ¹²	

Control options		Other options		Finish (required)	
Shipped installed NLTAIR2 nLight AIR generation 2 enabled ^{13,14} PIRHN Network, high/low motion/ambient sensor ¹⁵ PER NEMA twist-lock receptacle only (control ordered separate) ¹⁶ PER5 Five-pin receptacle only (control ordered separate) ^{16,17} PER7 Seven-pin receptacle only (leads exit fixture) (control ordered separate) ^{16,17} DMG 0-10V dimming extend out back of housing for external control (control ordered separate) ¹⁸	PIR High/low, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 5fc ^{19,20} PIRH High/low, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 5fc ^{19,20} PIR1FC3V High/low, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc ^{19,20} PIRH1FC3V High/low, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc ^{19,20} FAO Field adjustable output ²¹	Shipped installed HS House-side shield ²² SF Single fuse (120, 277, 347V) ⁶ DF Double fuse (208, 240, 480V) ⁶ L90 Left rotated optics ² R90 Right rotated optics ² DDL Diffused drop lens ²² HA 50°C ambient operations ¹ BAA Buy America(n) Act Compliant Shipped separately BS Bird spikes ²³ EGS External glare shield	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Textured dark bronze DBLTXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white		



COMMERCIAL OUTDOOR

One Lithonia Way • Conyers, Georgia 30012 • Phone: 1-800-705-SERV (7378) • www.lithonia.com
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DSX0-LED
Rev. 07/19/21
Page 1 of 8

Ordering Information

Accessories

Ordered and shipped separately.

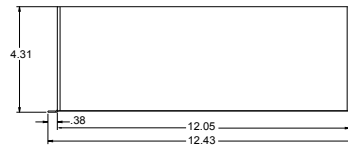
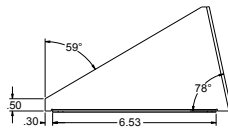
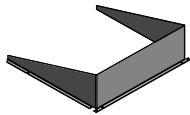
DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V) ²⁴
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V) ²⁴
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V) ²⁴
DSHORT SBK U	Shorting cap ²⁴
DSXOHS 20C U	House-side shield for P1,P2,P3 and P4 ²²
DSXOHS 30C U	House-side shield for P10,P11,P12 and P13 ²²
DSXOHS 40C U	House-side shield for P5,P6 and P7 ²²
DSXODDL U	Diffused drop lens (polycarbonate) ²²
PUMBA DDBXD U*	Square and round pole universal mounting bracket adaptor (specify finish) ²³
KMA8 DDBXD U	Mast arm mounting bracket adaptor (specify finish) ²³
DSXOEGS (FINISH) U	External glare shield

For more control options, visit [DTL](#) and [ROAM](#) online. Link to [nLight Air 2](#)

NOTES

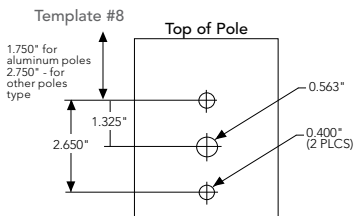
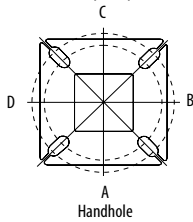
- 1 HA not available with P4, P7, and P13.
- 2 P10, P11, P12 and P13 and rotated options (L90 or R90) only available together.
- 3 Any Type 5 distribution with photocell, is not available with WBA.
- 4 Not available with HS or DDL.
- 5 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
- 6 Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V. XVOLT not available with fusing (SF or DF).
- 7 XVOLT only suitable for use with P4, P7 and P13.
- 8 XVOLT operates with any voltage between 277V and 480V.
- 9 XVOLT not available with fusing (SF or DF) and not available with PIR, PIRH, PIR1FC3V, PIRH1FC3V.
- 10 Suitable for mounting to round poles between 3.5" and 12" diameter.
- 11 Universal mounting brackets intended for retrofit on existing pre-drilled poles only. 1.5 G vibration load rating per ANCI C136.31. Only usable when pole's drill pattern is NOT Lithonia template #8.
- 12 Must order fixture with SPA mounting. Must be ordered as a separate accessory; see Accessories information. For use with 2-3/8" diameter mast arm (not included).
- 13 Must be ordered with PIRHN.
- 14 Sensor cover available only in dark bronze, black, white and natural aluminum colors.
- 15 Must be ordered with NLTAIR2. For more information on nLight Air 2 visit [this link](#).
- 16 Photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Shorting Cap included.
- 17 If ROAM[®] node required, it must be ordered and shipped as a separate line item from Acuity Brands Controls. Shorting Cap included.
- 18 DMG not available with PIRHN, PER5, PER7, PIR, PIRH, PIR1FC3V or PIRH1FC3V, FAO.
- 19 Reference Controls Options table on page 4.
- 20 Reference Motion Sensor Default Table on page 4 to see functionality.
- 21 Not available with other dimming controls options.
- 22 Not available with BLC, LCCO and RCCO distribution.
- 23 Must be ordered with fixture for factory pre-drilling.
- 24 Requires luminaire to be specified with PER, PER5 or PER7 option. See Controls Table on page 4.
- 25 For retrofit use only. Only usable when pole's drill pattern is NOT Lithonia template #8

EGS – External Glare Shield



Drilling

HANDHOLE ORIENTATION (from top of pole)



Tenon Mounting Slipfitter

Tenon O.D.	Mounting	Single Unit	2 @ 180	2 @ 90	3 @ 90	3 @ 120	4 @ 90
2-3/8"	RPA	AS3-5 190	AS3-5 280	AS3-5 290	AS3-5 390	AS3-5 320	AS3-5 490
2-7/8"	RPA	AST25-190	AST25-280	AST25-290	AST25-390	AST25-320	AST25-490
4"	RPA	AST35-190	AST35-280	AST35-290	AST35-390	AST35-320	AST35-490

Mounting Option	Drilling Template	Single	2 @ 180	2 @ 90	3 @ 90	3 @ 120	4 @ 90
Head Location		Side B	Side B & D	Side B & C	Side B, C & D	Round Pole Only	Side A, B, C & D
Drill Nomenclature	#8	DM19AS	DM28AS	DM29AS	DM39AS	DM32AS	DM49AS
Minimum Acceptable Outside Pole Dimension							
SPA	#8	2-7/8"	2-7/8"	3.5"	3.5"		3.5"
RPA	#8	2-7/8"	2-7/8"	3.5"	3.5"	3"	3.5"
SPUMBA	#5	2-7/8"	3"	4"	4"		4"
RPUMBA	#5	2-7/8"	3.5"	5"	5"	3.5"	5"

DSX0 Area Luminaire - EPA

*Includes luminaire and integral mounting arm. Other tenons, arms, brackets or other accessories are not included in this EPA data.

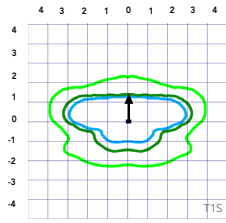
Fixture Quantity & Mounting Configuration	Single DM19	2 @ 180 DM28	2 @ 90 DM29	3 @ 90 DM39	3 @ 120 DM32	4 @ 90 DM49
Mounting Type						
DSX0 LED	0.950	1.900	1.830	2.850	2.850	3.544

Photometric Diagrams

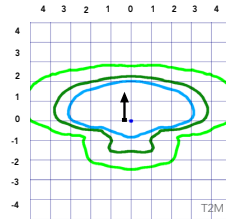
To see complete photometric reports or download .ies files for this product, visit [Lithonia Lighting's D-Series Area Size 0 homepage](#).

Isofootcandle plots for the DSX0 LED 40C 1000 40K. Distances are in units of mounting height (20').

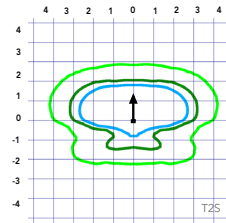
- LEGEND**
- 0.1 fc
 - 0.5 fc
 - 1.0 fc



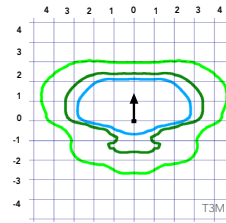
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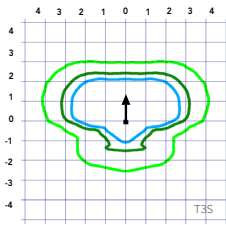
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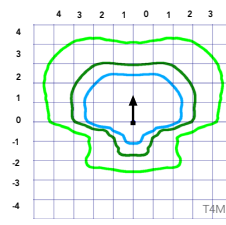
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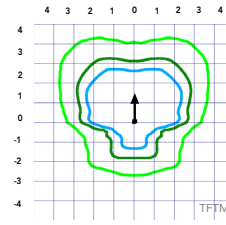
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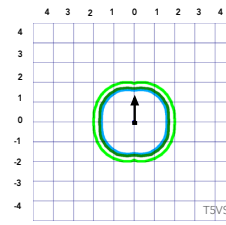
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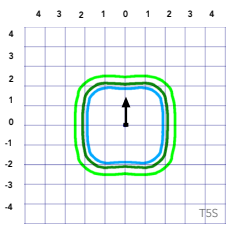
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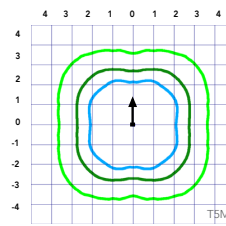
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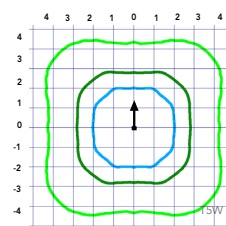
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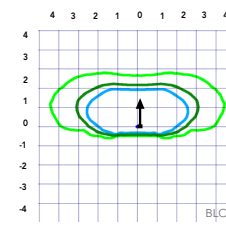
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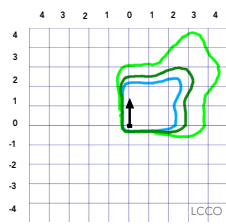
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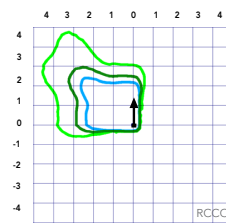
Test No. LTL23457P25 tested in accordance with IESNA LM-79-08.



Test No.



Test No.



Test No.

Performance Data

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.04
5°C	41°F	1.04
10°C	50°F	1.03
15°C	59°F	1.02
20°C	68°F	1.01
25°C	77°C	1.00
30°C	86°F	0.99
35°C	95°F	0.98
40°C	104°F	0.97

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the platforms noted in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	Lumen Maintenance Factor
25,000	0.96
50,000	0.92
100,000	0.85

Motion Sensor Default Settings						
Option	Dimmed State	High Level (when triggered)	Photocell Operation	Dwell Time	Ramp-up Time	Ramp-down Time
PIR or PIRH	3V (37%) Output	10V (100%) Output	Enabled @ 5FC	5 min	3 sec	5 min
*PIR1FC3V or PIRH1FC3V	3V (37%) Output	10V (100%) Output	Enabled @ 1FC	5 min	3 sec	5 min

*for use when motion sensor is used as dusk to dawn control.

Electrical Load

	Performance Package	LED Count	Drive Current	Wattage	Current (A)					
					120	208	240	277	347	480
Forward Optics (Non-Rotated)	P1	20	530	38	0.32	0.18	0.15	0.15	0.10	0.08
	P2	20	700	49	0.41	0.23	0.20	0.19	0.14	0.11
	P3	20	1050	71	0.60	0.37	0.32	0.27	0.21	0.15
	P4	20	1400	92	0.77	0.45	0.39	0.35	0.28	0.20
	P5	40	700	89	0.74	0.43	0.38	0.34	0.26	0.20
	P6	40	1050	134	1.13	0.65	0.55	0.48	0.39	0.29
	P7	40	1300	166	1.38	0.80	0.69	0.60	0.50	0.37
Rotated Optics (Requires L90 or R90)	P10	30	530	53	0.45	0.26	0.23	0.21	0.16	0.12
	P11	30	700	72	0.60	0.35	0.30	0.27	0.20	0.16
	P12	30	1050	104	0.88	0.50	0.44	0.39	0.31	0.23
	P13	30	1300	128	1.08	0.62	0.54	0.48	0.37	0.27

Controls Options

Nomenclature	Description	Functionality	Primary control device	Notes
FAO	Field adjustable output device installed inside the luminaire; wired to the driver dimming leads.	Allows the luminaire to be manually dimmed, effectively trimming the light output.	FAO device	Cannot be used with other controls options that need the 0-10V leads
DS	Drivers wired independently for 50/50 luminaire operation	The luminaire is wired to two separate circuits, allowing for 50/50 operation.	Independently wired drivers	Requires two separately switched circuits. Consider nLight AIR as a more cost effective alternative.
PER5 or PER7	Twist-lock photocell receptacle	Compatible with standard twist-lock photocells for dusk to dawn operation, or advanced control nodes that provide 0-10V dimming signals.	Twist-lock photocells such as DLL Elite or advanced control nodes such as ROAM.	Pins 4 & 5 to dimming leads on driver, Pins 6 & 7 are capped inside luminaire
PIR or PIRH	Motion sensors with integral photocell. PIR for 8-15' mounting; PIRH for 15-30' mounting	Luminaires dim when no occupancy is detected.	Acuity Controls SBGR	Also available with PIRH1FC3V when the sensor photocell is used for dusk-to-dawn operation.
NLTAIR2 PIRHN	nLight AIR enabled luminaire for motion sensing, photocell and wireless communication.	Motion and ambient light sensing with group response. Scheduled dimming with motion sensor over-ride when wirelessly connected to the nLight Eclipse.	nLight Air rSDGR	nLight AIR sensors can be programmed and commissioned from the ground using the CIAIRity Pro app.

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Forward Optics																			
Power Package	LED Count	Drive Current	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
P1	20	530	38W	T1S	4,369	1	0	1	115	4,706	1	0	1	124	4,766	1	0	1	125
				T2S	4,364	1	0	1	115	4,701	1	0	1	124	4,761	1	0	1	125
				T2M	4,387	1	0	1	115	4,726	1	0	1	124	4,785	1	0	1	126
				T3S	4,248	1	0	1	112	4,577	1	0	1	120	4,634	1	0	1	122
				T3M	4,376	1	0	1	115	4,714	1	0	1	124	4,774	1	0	1	126
				T4M	4,281	1	0	1	113	4,612	1	0	2	121	4,670	1	0	2	123
				TF1M	4,373	1	0	1	115	4,711	1	0	2	124	4,771	1	0	2	126
				TSVS	4,548	2	0	0	120	4,900	2	0	0	129	4,962	2	0	0	131
				T5S	4,552	2	0	0	120	4,904	2	0	0	129	4,966	2	0	0	131
				T5M	4,541	3	0	1	120	4,891	3	0	1	129	4,953	3	0	1	130
				TSW	4,576	3	0	2	120	4,929	3	0	2	130	4,992	3	0	2	131
				BLC	3,586	1	0	1	94	3,863	1	0	1	102	3,912	1	0	1	103
				LCCO	2,668	1	0	1	70	2,874	1	0	2	76	2,911	1	0	2	77
				RCCO	2,668	1	0	1	70	2,874	1	0	2	76	2,911	1	0	2	77
				P2	20	700	49W	T1S	5,570	1	0	1	114	6,001	1	0	1	122	6,077
T2S	5,564	1	0					2	114	5,994	1	0	2	122	6,070	2	0	2	124
T2M	5,593	1	0					1	114	6,025	1	0	1	123	6,102	1	0	1	125
T3S	5,417	1	0					2	111	5,835	1	0	2	119	5,909	2	0	2	121
T3M	5,580	1	0					2	114	6,011	1	0	2	123	6,087	1	0	2	124
T4M	5,458	1	0					2	111	5,880	1	0	2	120	5,955	1	0	2	122
TF1M	5,576	1	0					2	114	6,007	1	0	2	123	6,083	1	0	2	124
TSVS	5,799	2	0					0	118	6,247	2	0	0	127	6,327	2	0	0	129
T5S	5,804	2	0					0	118	6,252	2	0	0	128	6,332	2	0	1	129
T5M	5,789	3	0					1	118	6,237	3	0	1	127	6,316	3	0	1	129
TSW	5,834	3	0					2	119	6,285	3	0	2	128	6,364	3	0	2	130
BLC	4,572	1	0					1	93	4,925	1	0	1	101	4,987	1	0	1	102
LCCO	3,402	1	0					2	69	3,665	1	0	2	75	3,711	1	0	2	76
RCCO	3,402	1	0					2	69	3,665	1	0	2	75	3,711	1	0	2	76
P3	20	1050	71W					T1S	7,833	2	0	2	110	8,438	2	0	2	119	8,545
				T2S	7,825	2	0	2	110	8,429	2	0	2	119	8,536	2	0	2	120
				T2M	7,865	2	0	2	111	8,473	2	0	2	119	8,580	2	0	2	121
				T3S	7,617	2	0	2	107	8,205	2	0	2	116	8,309	2	0	2	117
				T3M	7,846	2	0	2	111	8,452	2	0	2	119	8,559	2	0	2	121
				T4M	7,675	2	0	2	108	8,269	2	0	2	116	8,373	2	0	2	118
				TF1M	7,841	2	0	2	110	8,447	2	0	2	119	8,554	2	0	2	120
				TSVS	8,155	3	0	0	115	8,785	3	0	0	124	8,896	3	0	0	125
				T5S	8,162	3	0	1	115	8,792	3	0	1	124	8,904	3	0	1	125
				T5M	8,141	3	0	2	115	8,770	3	0	2	124	8,881	3	0	2	125
				TSW	8,204	3	0	2	116	8,838	4	0	2	124	8,950	4	0	2	126
				BLC	6,429	1	0	2	91	6,926	1	0	2	98	7,013	1	0	2	99
				LCCO	4,784	1	0	2	67	5,153	1	0	2	73	5,218	1	0	2	73
				RCCO	4,784	1	0	2	67	5,153	1	0	2	73	5,218	1	0	2	73
				P4	20	1400	92W	T1S	9,791	2	0	2	106	10,547	2	0	2	115	10,681
T2S	9,780	2	0					2	106	10,536	2	0	2	115	10,669	2	0	2	116
T2M	9,831	2	0					2	107	10,590	2	0	2	115	10,724	2	0	2	117
T3S	9,521	2	0					2	103	10,256	2	0	2	111	10,386	2	0	2	113
T3M	9,807	2	0					2	107	10,565	2	0	2	115	10,698	2	0	2	116
T4M	9,594	2	0					2	104	10,335	2	0	3	112	10,466	2	0	3	114
TF1M	9,801	2	0					2	107	10,558	2	0	2	115	10,692	2	0	2	116
TSVS	10,193	3	0					1	111	10,981	3	0	1	119	11,120	3	0	1	121
T5S	10,201	3	0					1	111	10,990	3	0	1	119	11,129	3	0	1	121
T5M	10,176	4	0					2	111	10,962	4	0	2	119	11,101	4	0	2	121
TSW	10,254	4	0					3	111	11,047	4	0	3	120	11,186	4	0	3	122
BLC	8,036	1	0					2	87	8,656	1	0	2	94	8,766	1	0	2	95
LCCO	5,979	1	0					2	65	6,441	1	0	2	70	6,523	1	0	3	71
RCCO	5,979	1	0					2	65	6,441	1	0	2	70	6,523	1	0	3	71

Performance Data

Lumen Output

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Forward Optics																							
Power Package	LED Count	Drive Current	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)								
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW				
P5	40	700	89W	T1S	10,831	2	0	2	122	11,668	2	0	2	131	11,816	2	0	2	133				
				T2S	10,820	2	0	2	122	11,656	2	0	2	131	11,803	2	0	2	133				
				T2M	10,876	2	0	2	122	11,716	2	0	2	132	11,864	2	0	2	133				
				T3S	10,532	2	0	2	118	11,346	2	0	2	127	11,490	2	0	2	129				
				T3M	10,849	2	0	2	122	11,687	2	0	2	131	11,835	2	0	2	133				
				T4M	10,613	2	0	3	119	11,434	2	0	3	128	11,578	2	0	3	130				
				TFTM	10,842	2	0	2	122	11,680	2	0	2	131	11,828	2	0	2	133				
				TSVS	11,276	3	0	1	127	12,148	3	0	1	136	12,302	3	0	1	138				
				T5S	11,286	3	0	1	127	12,158	3	0	1	137	12,312	3	0	1	138				
				T5M	11,257	4	0	2	126	12,127	4	0	2	136	12,280	4	0	2	138				
				TSW	11,344	4	0	3	127	12,221	4	0	3	137	12,375	4	0	3	139				
				BLC	8,890	1	0	2	100	9,576	1	0	2	108	9,698	1	0	2	109				
				LCCO	6,615	1	0	3	74	7,126	1	0	3	80	7,216	1	0	3	81				
				RCCO	6,615	1	0	3	74	7,126	1	0	3	80	7,216	1	0	3	81				
				P6	40	1050	134W	T1S	14,805	3	0	3	110	15,949	3	0	3	119	16,151	3	0	3	121
								T2S	14,789	3	0	3	110	15,932	3	0	3	119	16,134	3	0	3	120
								T2M	14,865	3	0	3	111	16,014	3	0	3	120	16,217	3	0	3	121
T3S	14,396	3	0					3	107	15,509	3	0	3	116	15,705	3	0	3	117				
T3M	14,829	2	0					3	111	15,975	3	0	3	119	16,177	3	0	3	121				
T4M	14,507	2	0					3	108	15,628	3	0	3	117	15,826	3	0	3	118				
TFTM	14,820	2	0					3	111	15,965	3	0	3	119	16,167	3	0	3	121				
TSVS	15,413	4	0					1	115	16,604	4	0	1	124	16,815	4	0	1	125				
T5S	15,426	3	0					1	115	16,618	4	0	1	124	16,828	4	0	1	126				
T5M	15,387	4	0					2	115	16,576	4	0	2	124	16,786	4	0	2	125				
TSW	15,506	4	0					3	116	16,704	4	0	3	125	16,915	4	0	3	126				
BLC	12,151	1	0					2	91	13,090	1	0	2	98	13,255	1	0	2	99				
LCCO	9,041	1	0					3	67	9,740	1	0	3	73	9,863	1	0	3	74				
RCCO	9,041	1	0					3	67	9,740	1	0	3	73	9,863	1	0	3	74				
P7	40	1300	166W					T1S	17,023	3	0	3	103	18,338	3	0	3	110	18,570	3	0	3	112
								T2S	17,005	3	0	3	102	18,319	3	0	3	110	18,551	3	0	3	112
								T2M	17,092	3	0	3	103	18,413	3	0	3	111	18,646	3	0	3	112
				T3S	16,553	3	0	3	100	17,832	3	0	3	107	18,058	3	0	3	109				
				T3M	17,051	3	0	3	103	18,369	3	0	3	111	18,601	3	0	3	112				
				T4M	16,681	3	0	3	100	17,969	3	0	3	108	18,197	3	0	3	110				
				TFTM	17,040	3	0	3	103	18,357	3	0	4	111	18,590	3	0	4	112				
				TSVS	17,723	4	0	1	107	19,092	4	0	1	115	19,334	4	0	1	116				
				T5S	17,737	4	0	2	107	19,108	4	0	2	115	19,349	4	0	2	117				
				T5M	17,692	4	0	2	107	19,059	4	0	2	115	19,301	4	0	2	116				
				TSW	17,829	5	0	3	107	19,207	5	0	3	116	19,450	5	0	3	117				
				BLC	13,971	2	0	2	84	15,051	2	0	2	91	15,241	2	0	2	92				
				LCCO	10,396	1	0	3	63	11,199	1	0	3	67	11,341	1	0	3	68				
				RCCO	10,396	1	0	3	63	11,199	1	0	3	67	11,341	1	0	3	68				

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

Rotated Optics																							
Power Package	LED Count	Drive Current	System Watts	Dist. Type	30K (3000 K, 70 CRI)					40K (4000 K, 70 CRI)					50K (5000 K, 70 CRI)								
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW				
P10	30	530	53W	T1S	6,727	2	0	2	127	7,247	3	0	3	137	7,339	3	0	3	138				
				T2S	6,689	3	0	3	126	7,205	3	0	3	136	7,297	3	0	3	138				
				T2M	6,809	3	0	3	128	7,336	3	0	3	138	7,428	3	0	3	140				
				T3S	6,585	3	0	3	124	7,094	3	0	3	134	7,183	3	0	3	136				
				T3M	6,805	3	0	3	128	7,331	3	0	3	138	7,424	3	0	3	140				
				T4M	6,677	3	0	3	126	7,193	3	0	3	136	7,284	3	0	3	137				
				TF1M	6,850	3	0	3	129	7,379	3	0	3	139	7,472	3	0	3	141				
				TSVS	6,898	3	0	0	130	7,431	3	0	0	140	7,525	3	0	0	142				
				T5S	6,840	2	0	1	129	7,368	2	0	1	139	7,461	2	0	1	141				
				T5M	6,838	3	0	1	129	7,366	3	0	2	139	7,460	3	0	2	141				
				TSW	6,777	3	0	2	128	7,300	3	0	2	138	7,393	3	0	2	139				
				BLC	5,626	2	0	2	106	6,060	2	0	2	114	6,137	2	0	2	116				
				LCCO	4,018	1	0	2	76	4,328	1	0	2	82	4,383	1	0	2	83				
				RCCO	4,013	3	0	3	76	4,323	3	0	3	82	4,377	3	0	3	83				
				P11	30	700	72W	T1S	8,594	3	0	3	119	9,258	3	0	3	129	9,376	3	0	3	130
								T2S	8,545	3	0	3	119	9,205	3	0	3	128	9,322	3	0	3	129
T2M	8,699	3	0					3	121	9,371	3	0	3	130	9,490	3	0	3	132				
T3S	8,412	3	0					3	117	9,062	3	0	3	126	9,177	3	0	3	127				
T3M	8,694	3	0					3	121	9,366	3	0	3	130	9,484	3	0	3	132				
T4M	8,530	3	0					3	118	9,189	3	0	3	128	9,305	3	0	3	129				
TF1M	8,750	3	0					3	122	9,427	3	0	3	131	9,546	3	0	3	133				
TSVS	8,812	3	0					0	122	9,493	3	0	0	132	9,613	3	0	0	134				
T5S	8,738	3	0					1	121	9,413	3	0	1	131	9,532	3	0	1	132				
T5M	8,736	3	0					2	121	9,411	3	0	2	131	9,530	3	0	2	132				
TSW	8,657	4	0					2	120	9,326	4	0	2	130	9,444	4	0	2	131				
BLC	7,187	3	0					3	100	7,742	3	0	3	108	7,840	3	0	3	109				
LCCO	5,133	1	0					2	71	5,529	1	0	2	77	5,599	1	0	2	78				
RCCO	5,126	3	0					3	71	5,522	3	0	3	77	5,592	3	0	3	78				
P12	30	1050	104W					T1S	12,149	3	0	3	117	13,088	3	0	3	126	13,253	3	0	3	127
								T2S	12,079	4	0	4	116	13,012	4	0	4	125	13,177	4	0	4	127
				T2M	12,297	3	0	3	118	13,247	3	0	3	127	13,415	3	0	3	129				
				T3S	11,891	4	0	4	114	12,810	4	0	4	123	12,972	4	0	4	125				
				T3M	12,290	3	0	3	118	13,239	4	0	4	127	13,407	4	0	4	129				
				T4M	12,058	4	0	4	116	12,990	4	0	4	125	13,154	4	0	4	126				
				TF1M	12,369	4	0	4	119	13,325	4	0	4	128	13,494	4	0	4	130				
				TSVS	12,456	3	0	1	120	13,419	3	0	1	129	13,589	4	0	1	131				
				T5S	12,351	3	0	1	119	13,306	3	0	1	128	13,474	3	0	1	130				
				T5M	12,349	4	0	2	119	13,303	4	0	2	128	13,471	4	0	2	130				
				TSW	12,238	4	0	3	118	13,183	4	0	3	127	13,350	4	0	3	128				
				BLC	10,159	3	0	3	98	10,944	3	0	3	105	11,083	3	0	3	107				
				LCCO	7,256	1	0	3	70	7,816	1	0	3	75	7,915	1	0	3	76				
				RCCO	7,246	3	0	3	70	7,806	4	0	4	75	7,905	4	0	4	76				
				P13	30	1300	128W	T1S	14,438	3	0	3	113	15,554	3	0	3	122	15,751	3	0	3	123
								T2S	14,355	4	0	4	112	15,465	4	0	4	121	15,660	4	0	4	122
T2M	14,614	3	0					3	114	15,744	4	0	4	123	15,943	4	0	4	125				
T3S	14,132	4	0					4	110	15,224	4	0	4	119	15,417	4	0	4	120				
T3M	14,606	4	0					4	114	15,735	4	0	4	123	15,934	4	0	4	124				
T4M	14,330	4	0					4	112	15,438	4	0	4	121	15,633	4	0	4	122				
TF1M	14,701	4	0					4	115	15,836	4	0	4	124	16,037	4	0	4	125				
TSVS	14,804	4	0					1	116	15,948	4	0	1	125	16,150	4	0	1	126				
T5S	14,679	3	0					1	115	15,814	3	0	1	124	16,014	3	0	1	125				
T5M	14,676	4	0					2	115	15,810	4	0	2	124	16,010	4	0	2	125				
TSW	14,544	4	0					3	114	15,668	4	0	3	122	15,866	4	0	3	124				
BLC	7919	3	0					3	62	8531	3	0	3	67	8639	3	0	3	67				
LCCO	5145	1	0					2	40	5543	1	0	2	43	5613	1	0	2	44				
RCCO	5139	3	0					3	40	5536	3	0	3	43	5606	3	0	3	44				



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DSX0-LED
 Rev. 07/19/21
 Page 7 of 8

FEATURES & SPECIFICATIONS

INTENDED USE

The sleek design of the D-Series Size 0 reflects the embedded high performance LED technology. It is ideal for many commercial and municipal applications, such as parking lots, plazas, campuses, and pedestrian areas.

CONSTRUCTION

Single-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance and future light engine upgrades. The LED driver is mounted in direct contact with the casting to promote low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65). Low EPA (0.95 ft²) for optimized pole wind loading.

FINISH

Exterior parts are protected by a zinc-infused Super Durable TGIC thermostat powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in both textured and non-textured finishes.

OPTICS

Precision-molded proprietary acrylic lenses are engineered for superior area lighting distribution, uniformity, and pole spacing. Light engines are available in 3000 K, 4000 K or 5000 K (70 CRI) configurations. The D-Series Size 0 has zero uplight and qualifies as a Nighttime Friendly™ product, meaning it is consistent with the LEED® and Green Globes™ criteria for eliminating wasteful uplight.

ELECTRICAL

Light engine(s) configurations consist of high-efficacy LEDs mounted to metal-core circuit boards to maximize heat dissipation and promote long life (up to L85/100,000 hours at 25°C). Class 1 electronic drivers are designed to have a power factor >90%, THD <20%, and an expected life of 100,000 hours with <1% failure rate. Easily serviceable 10kV surge protection device meets a minimum Category C Low operation (per ANSI/IEEE C62.41.2).

STANDARD CONTROLS

The DSX0 LED area luminaire has a number of control options. DSX Size 0, comes standard with 0-10V dimming driver. Dusk to dawn controls can be utilized via optional NEMA twist-lock photocell receptacles. Integrated motion sensors with on-board photocells feature field-adjustable programming and are suitable for mounting heights up to 30 feet.

nLIGHT AIR CONTROLS

The DSX0 LED area luminaire is also available with nLight® AIR for the ultimate in wireless control. This powerful controls platform provides out-of-the-box basic motion sensing and photocontrol functionality and is suitable for mounting heights up to 40 feet. Once commissioned using a smartphone and the easy-to-use CLAIRITY app, nLight AIR equipped luminaires can be grouped, resulting in motion sensor and photocell group response without the need for additional equipment. Scheduled dimming with motion sensor over-ride can be achieved when used with the nLight Eclipse. Additional information about nLight Air can be found [here](#).

INSTALLATION

Included mounting block and integral arm facilitate quick and easy installation. Stainless steel bolts fasten the mounting block securely to poles and walls, enabling the D-Series Size 0 to withstand up to a 3.0 G vibration load rating per ANSI C136.31. The D-Series Size 0 utilizes the AERIS™ series pole drilling pattern (template #8). Optional terminal block and NEMA photocontrol receptacle are also available.

LISTINGS

UL listed to meet U.S. and Canadian standards. UL Listed for wet locations. Light engines are IP66 rated; luminaire is IP65 rated. Rated for -40°C to 50°C ambient with HA option. U.S. Patent No. D672,492 S. International patent pending.

DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

International Dark-Sky Association (IDA) Fixture Seal of Approval (FSA) is available for all products on this page utilizing 3000K color temperature only.

BUY AMERICAN

Product with the BAA option is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/buy-american for additional information.

WARRANTY

5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/support/customer-support/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.



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Rev. 07/19/21
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STORMWATER REPORT
Preliminary

MIXED USE SITE DEVELOPMENT
38015 HYW 26
Sandy, OR 97055
FDG # E21-043

September 12, 2022

Prepared By:



359 E. Historic Columbia River Highway
Sandy, OR 97060
503.668.3737- fax 503.668.3788

Sandy Multi-Family

TABLE OF CONTENTS

- I. OBJECTIVE
- II. METHODOLOGY
- III. REFERENCES
- IV. SITE DESCRIPTION
- V. STORMWATER MANAGEMENT

APPENDICES

Time of Concentration Pathway Exhibit

Storm Basin Area Exhibit

HyrdoCAD output

NRCS Soils Report

STORM DRAINAGE CALCULATIONS

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I. OBJECTIVE

The objective is to provide stormwater treatment and detention for the new impervious parking, sidewalk, and building areas.

Stormwater discharge from the above referenced impervious areas will be discharged into a 60" detention system and routed into a water quality manhole and into the public stormwater system in Meeker Street north of the site improvements.

II. METHODOLOGY

As per the City of Sandy code, the 2016 City of Portland stormwater manual (performance method for all facilities) was applied in developing the proposed stormwater management for the impervious surface areas. Water quality and quantity is managed via underground detention facilities and a water quality manhole. The City of Portland Hierarchy for the new impervious area categories 1-3 (See Section V) are not feasible due to site constraints including soil types and fill condition of the site development. HydroCAD is used to apply the Santa Barbara unit hydrograph for the respective storm intensities for the 2yr, 5yr, 10yr, and 25yr 24hour design storms.

III. REFERENCES:

USGS Soil Maps for Clackamas County, Oregon
City of Portland, Stormwater Management Manual

IV. SITE DESCRIPTION:

The site is a parcel located in the City of Sandy at 38015 HYW 26 and is approximately 2.0 acres in size with a topography that has slopes ranging from 0 to 12%. The site slopes from South to North towards Meeker Street. The site is currently an empty field area just north of Highway 26. The proposed on-site improvements include 41,740 sf of new asphalt driveway and parking area, 5,490 sf new concrete / sidewalk area, and 11,320 sf of new building roof area.

The Soils per the USDA Soils maps are predominately classified as Cazadero silty clay loam, with 0 to 12 percent slopes. The Soils have a hydrologic soil group - Hydrologic Group C. Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

V. STORMWATER MANAGEMENT:

Stormwater Hierarchy

The following management hierarchy is the order of preferred management approaches per the City of Portland manual:

Category 1. Requires total on-site infiltration in vegetation infiltration facilities.

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Category 2. Requires total on-site infiltration in vegetation infiltration facilities that overflow to subsurface infiltration facilities or standalone subsurface infiltration facilities.

Category 3. Requires onsite detention with vegetated facilities that overflow to drainageway, stream, river, or storm pipe only.

Categories 1 and 2 are not feasible due to the low infiltration rate of the soils (0.5 inches per hour), see USDA NRCS soils report included in this report. Stormwater Hierarchy Categories 1-3 are not feasible due to site constraints such as site fill and the lack of adequate room for vegetated areas.

The design storms and detention requirements, as required by the City of Sandy design and construction standards, are as follows:

Recurrence Interval [~] (years)	Total Precipitation Depth (In)
WQ	0.20 intensity per rational method
2	3.5
5	4.5
10	4.8
25	5.5

1. The post construction 24-hour 2-year recurrence interval storm event runoff will not exceed the 2-year predevelopment 2-year 24-hour runoff
2. The post construction 24-hour 5-year recurrence interval storm event runoff will not exceed the 5-year predevelopment 5-year 24-hour runoff
3. The post construction 24-hour 10-year recurrence interval storm event runoff will not exceed the 10-year predevelopment 10-year 24-hour runoff
4. The post construction 24-hour 25-year recurrence interval storm event runoff will not exceed the predevelopment 25-year runoff.

Water Quantity Analysis for Impervious Areas

Stormwater detention is achieved by directing stormwater into the proposed underground detention pipes located at the northerly side of the parking area. The Santa Barbara Urban Hydrograph (HydroCAD) was used to create the basin hydrographs (see appendix for data and calculations) and to estimate the peak flows for the design storms. A curve number (CN) value of 98 was assigned to the impervious surfaces. The time of concentration for impervious area is 6 minutes as a minimum value.

A 250 lf 60" underground stormwater detention system for the impervious area will be required to detain stormwater per the City of Sandy standards. The City of Sandy standards for detention are used as outlined above for the calculations.

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Stormwater Flows

Design Storm	Pre-Development (Existing) Peak Flow (cfs)	Post-Construction Peak Flow (cfs)	Allowed Post Construction Runoff	Actual Post Construction Runoff
2 year	0.46	1.09	0.46	0.45
5 year	0.74	1.41	0.74	0.74
10 year	0.83	1.51	0.83	0.83
25 year	1.05	1.73	1.05	0.99

Stage and Storage

Post construction event	Peak Stage Elevation (ft)	Peak Storage (cf)
2 year	2.33	1,927
5 year	2.90	2,644
10 year	3.05	2,829
25 year	3.43	3,293

Water Quality Analysis for Impervious Area

The water quality flow as required by the City of Sandy is the 0.20 inches / hour storm; Applying the rational method, CIA = (0.90) (0.20) (1.34) = 0.24 cfs is the water quality flow rate for all of the impervious area for the Mixed Use Site Development Improvements. Storm water treatment is proposed to be achieved by utilizing the CDS Hydrodynamic Separator Model PMSU20_15_4 water quality manhole; The treatment capacity of the PMSU20_15_4 water quality manhole is 0.70 cfs.

Treatment specification for the PMSU20_15_4 Stormwater Treatment Device (SWTD) meets the follows standards:

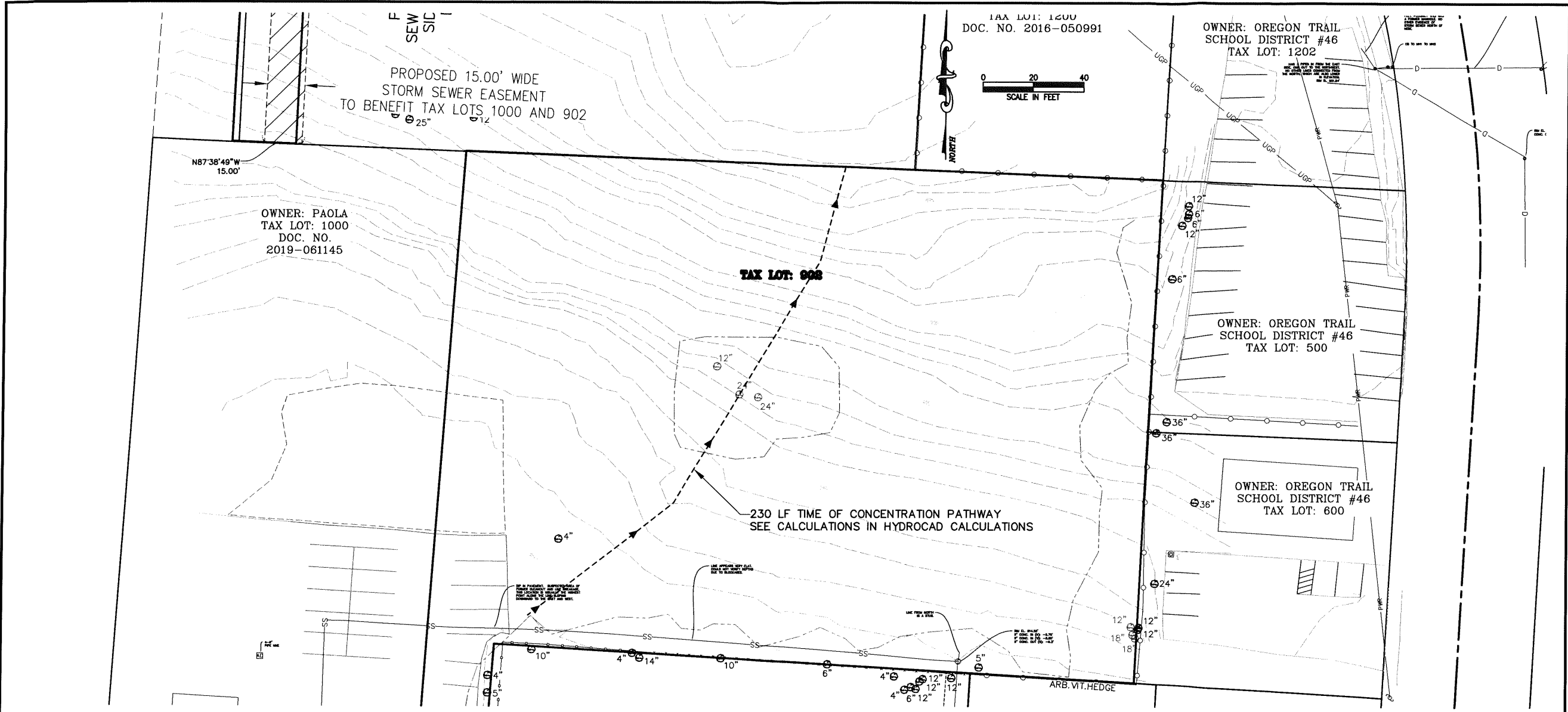
1. The SWTD is capable of achieving an 80 percent average annual reduction for a particle distribution having a mean particle size (d50) of 125 microns
2. The SWTD is capable of capturing and retaining 100 percent of pollutants greater than or equal to 3/16 of an inch regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD is designed to retain all previously captured pollutants addressed by this subsection under all flow conditions.
3. The SWTD is capable of capturing and retaining total petroleum hydrocarbons. The SWTD is capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies is based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD is

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greater than 99 percent effective in controlling dry-weather accidental oil spills.

Conclusion

Post development stormwater runoff will be detained, treated, and discharged into the existing City of Sandy Storm system located in Meeker Street at pre-existing flow rates for the design storms in conformance with the City of Sandy municipal code standards via a underground piped detention system and a water quality treatment CDS manhole.



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EXPIRES: 06/30/23
SIGNATURE DATE:

DATE	NO.	REVISION

DRAWN:	DESIGNED:	CHECKED:
SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

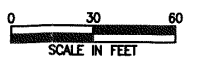
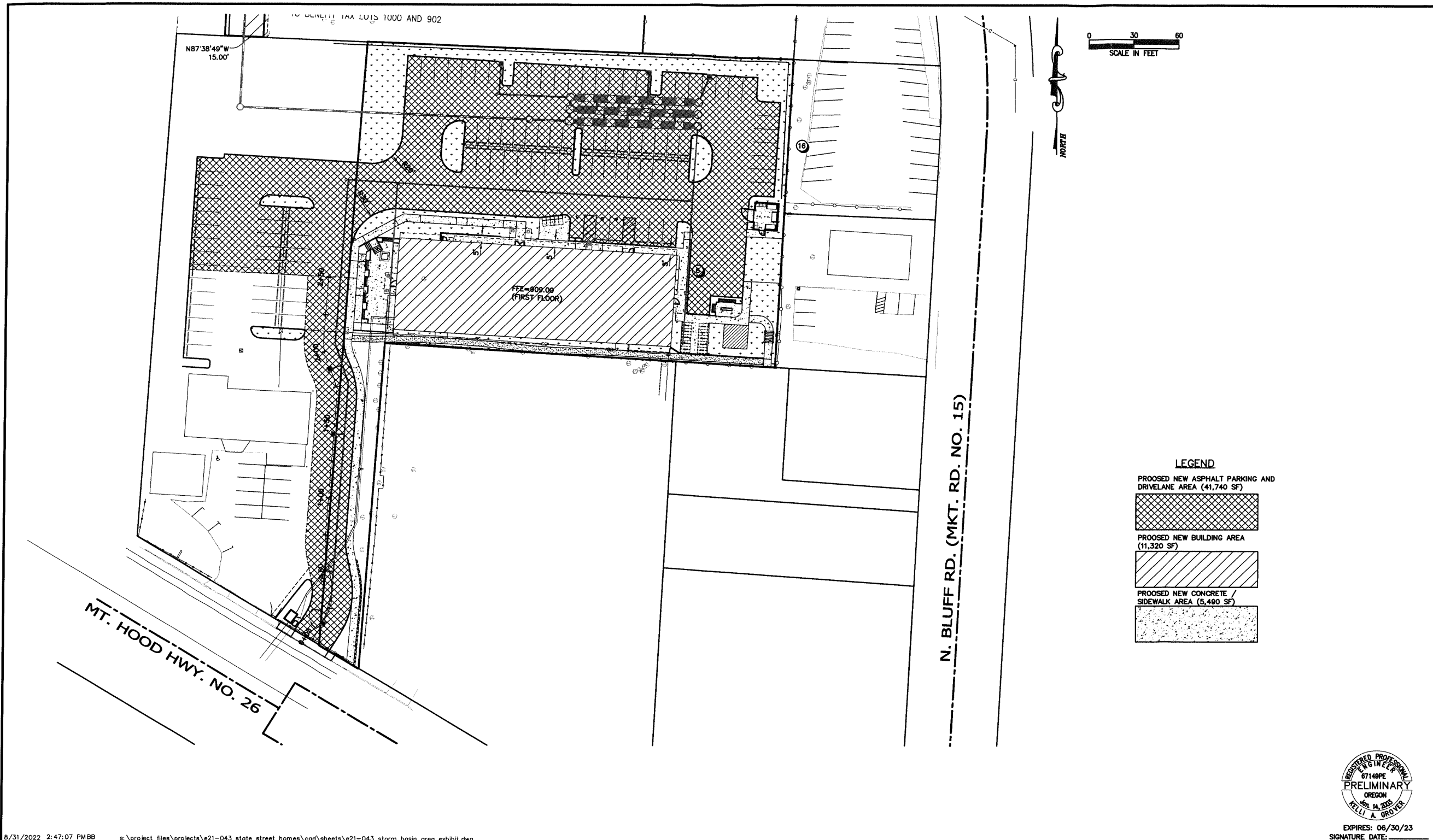


359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

STATE STREET HOMES
1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

TIME OF CONCENTRATION PATHWAY
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

1/1



- LEGEND**
- PROPOSED NEW ASPHALT PARKING AND DRIVEWAY AREA (41,740 SF)
 - PROPOSED NEW BUILDING AREA (11,320 SF)
 - PROPOSED NEW CONCRETE / SIDEWALK AREA (5,490 SF)



EXPIRES: 06/30/23
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PROJECT NO. E21-043		

FIRWOOD DESIGN GROUP
 Reliable Engineering Solutions
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 TROUTDALE, OREGON 97060
 (503) 668-3737

STATE STREET HOMES
 1233 NW NORTHROP ST. #125
 PORTLAND, OR 97209

STORM BASIN AREA EXHIBIT
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

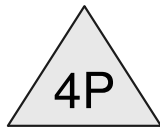
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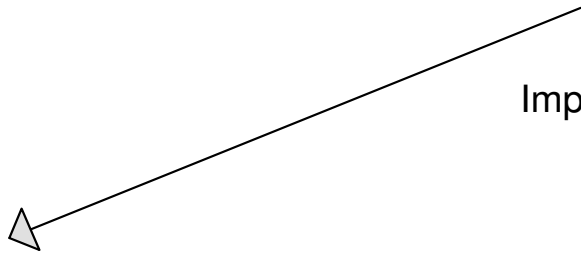
Pre Construction Runoff
for Total Impervious
Area



Impervious basin



48" Detention Basin



Routing Diagram for REVISED PRELIMINARY E21-043 Storm
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2yr	Type IA 24-hr		Default	24.00	1	3.50	2
2	5yr	Type IA 24-hr		Default	24.00	1	4.50	2
3	10yr	Type IA 24-hr		Default	24.00	1	4.80	2
4	25yr	Type IA 24-hr		Default	24.00	1	5.50	2

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Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
41,740	98	Asphalt (3S)
11,320	98	Roof Area (3S)
5,490	98	Sidewalk (3S)
58,550	79	Woods/grass comb., Poor, HSG C (6S)
117,100	89	TOTAL AREA

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Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
58,550	HSG C	6S
0	HSG D	
58,550	Other	3S
117,100		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	0	0	41,740	41,740	Asphalt
0	0	0	0	11,320	11,320	Roof Area
0	0	0	0	5,490	5,490	Sidewalk
0	0	58,550	0	0	58,550	Woods/grass comb., Poor
0	0	58,550	0	58,550	117,100	TOTAL AREA

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Type IA 24-hr 2yr Rainfall=3.50"

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Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 3S: Impervious basin Runoff Area=58,550 sf 100.00% Impervious Runoff Depth=3.27"
Tc=6.0 min CN=0/98 Runoff=1.09 cfs 15,938 cf

Subcatchment 6S: Pre Construction Runoff Runoff Area=58,550 sf 0.00% Impervious Runoff Depth=1.57"
Flow Length=230' Tc=7.4 min CN=79/0 Runoff=0.46 cfs 7,641 cf

Pond 4P: 48" Detention Basin Peak Elev=2.33' Storage=1,927 cf Inflow=1.09 cfs 15,938 cf
Outflow=0.45 cfs 15,938 cf

Total Runoff Area = 117,100 sf Runoff Volume = 23,578 cf Average Runoff Depth = 2.42"
50.00% Pervious = 58,550 sf 50.00% Impervious = 58,550 sf

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Type IA 24-hr 2yr Rainfall=3.50"

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Summary for Subcatchment 3S: Impervious basin

Runoff = 1.09 cfs @ 7.92 hrs, Volume= 15,938 cf, Depth= 3.27"
 Routed to Pond 4P : 48" Detention Basin

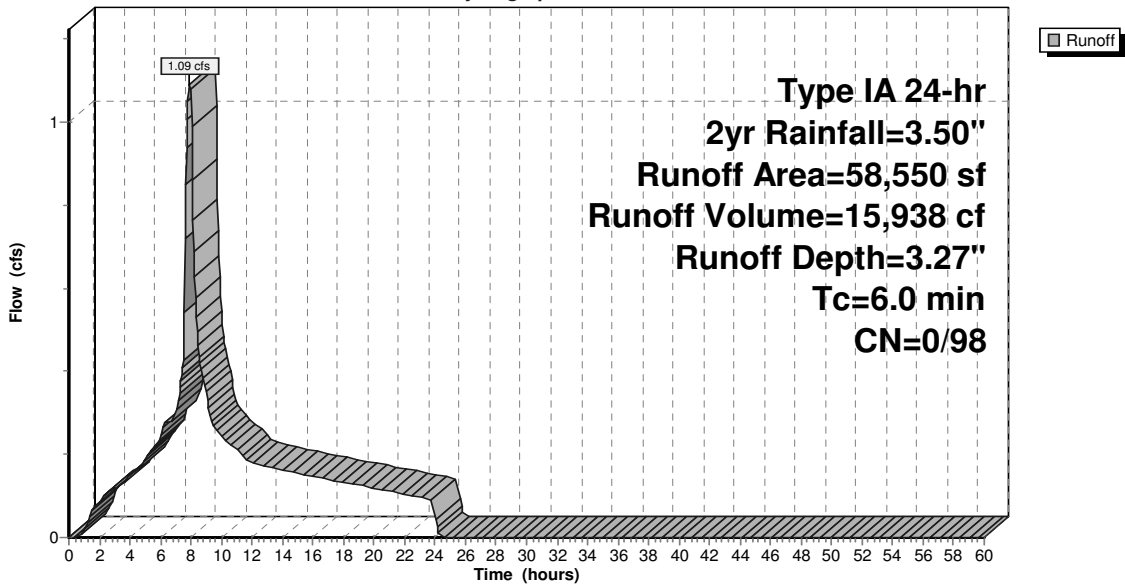
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 2yr Rainfall=3.50"

	Area (sf)	CN	Description
*	41,740	98	Asphalt
*	11,320	98	Roof Area
*	5,490	98	Sidewalk
	58,550	98	Weighted Average
	58,550		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Post Construction

Subcatchment 3S: Impervious basin

Hydrograph



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Type IA 24-hr 2yr Rainfall=3.50"

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Summary for Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Runoff = 0.46 cfs @ 7.99 hrs, Volume= 7,641 cf, Depth= 1.57"

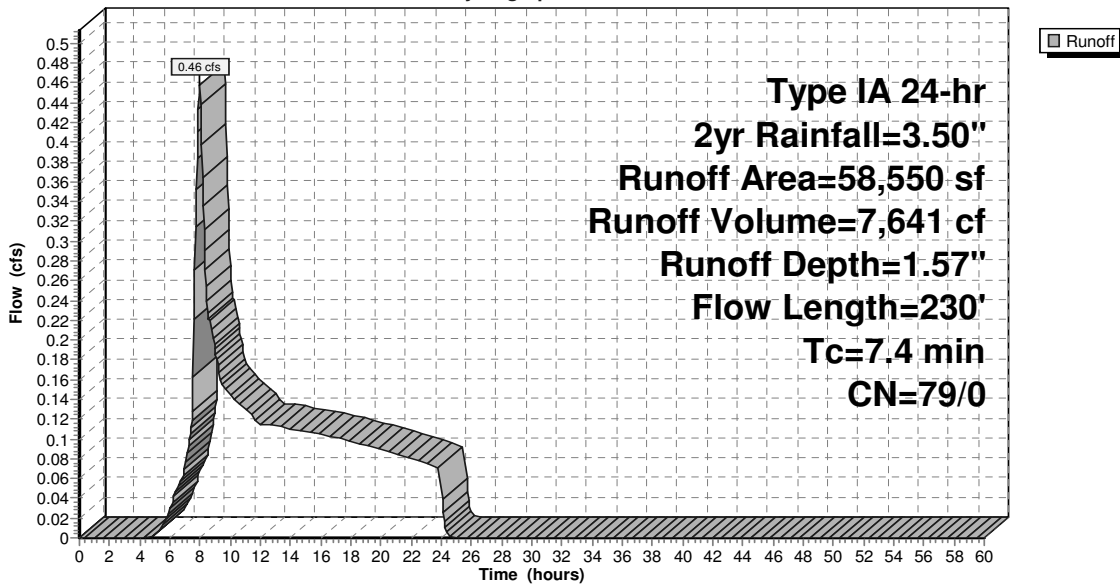
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2yr Rainfall=3.50"

Area (sf)	CN	Description
58,550	79	Woods/grass comb., Poor, HSG C
58,550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	100	0.0500	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	130	0.1200	2.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
7.4	230	Total			

Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Hydrograph



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Type IA 24-hr 2yr Rainfall=3.50"

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Summary for Pond 4P: 48" Detention Basin

Inflow Area = 58,550 sf, 100.00% Impervious, Inflow Depth = 3.27" for 2yr event
 Inflow = 1.09 cfs @ 7.92 hrs, Volume= 15,938 cf
 Outflow = 0.45 cfs @ 8.47 hrs, Volume= 15,938 cf, Atten= 59%, Lag= 33.4 min
 Primary = 0.45 cfs @ 8.47 hrs, Volume= 15,938 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Peak Elev= 2.33' @ 8.47 hrs Surf.Area= 1,230 sf Storage= 1,927 cf

Plug-Flow detention time= 26.7 min calculated for 15,938 cf (100% of inflow)
 Center-of-Mass det. time= 26.7 min (691.7 - 665.0)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4,909 cf	60.0" Round Pipe Storage L= 250.0' S= 0.0020 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	3.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	2.50'	4.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

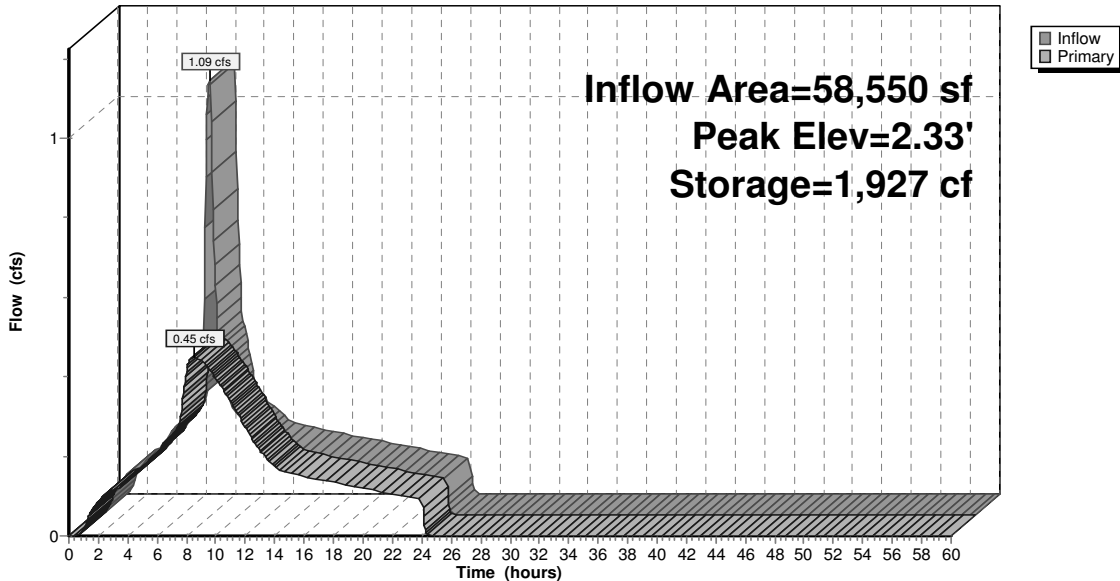
Primary OutFlow Max=0.45 cfs @ 8.47 hrs HW=2.32' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.45 cfs @ 7.11 fps)

2=Orifice/Grate (Controls 0.00 cfs)

Pond 4P: 48" Detention Basin

Hydrograph



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Type IA 24-hr 5yr Rainfall=4.50"

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Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 3S: Impervious basin Runoff Area=58,550 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=0/98 Runoff=1.41 cfs 20,805 cf

Subcatchment 6S: Pre Construction Runoff Runoff Area=58,550 sf 0.00% Impervious Runoff Depth=2.38"
Flow Length=230' Tc=7.4 min CN=79/0 Runoff=0.74 cfs 11,595 cf

Pond 4P: 48" Detention Basin Peak Elev=2.90' Storage=2,644 cf Inflow=1.41 cfs 20,805 cf
Outflow=0.74 cfs 20,805 cf

Total Runoff Area = 117,100 sf Runoff Volume = 32,400 cf Average Runoff Depth = 3.32"
50.00% Pervious = 58,550 sf 50.00% Impervious = 58,550 sf

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Type IA 24-hr 5yr Rainfall=4.50"

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Summary for Subcatchment 3S: Impervious basin

Runoff = 1.41 cfs @ 7.92 hrs, Volume= 20,805 cf, Depth= 4.26"
 Routed to Pond 4P : 48" Detention Basin

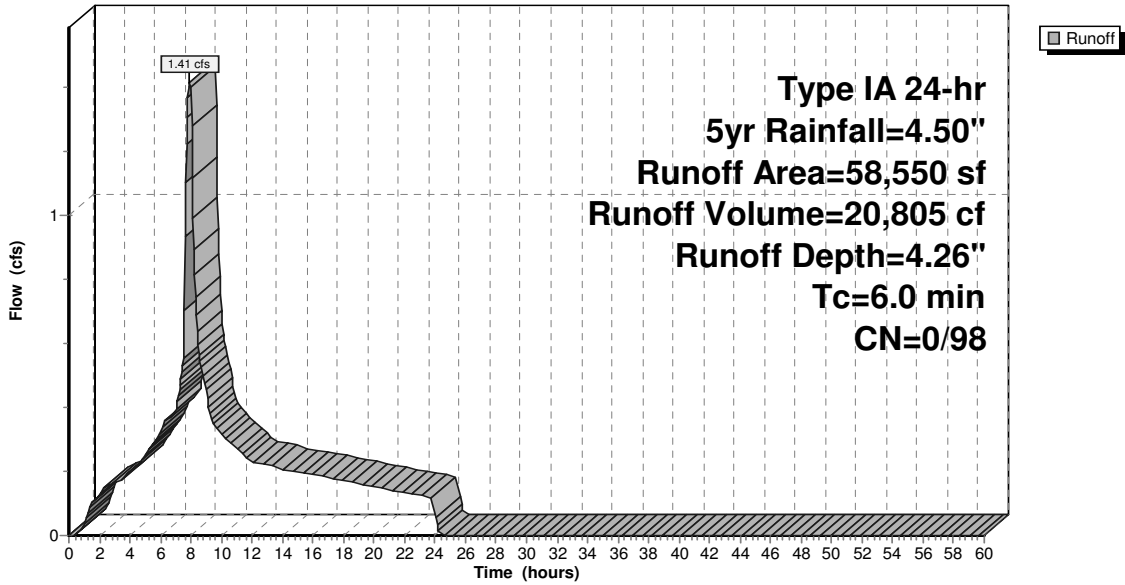
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 5yr Rainfall=4.50"

	Area (sf)	CN	Description
*	41,740	98	Asphalt
*	11,320	98	Roof Area
*	5,490	98	Sidewalk
	58,550	98	Weighted Average
	58,550		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Post Construction

Subcatchment 3S: Impervious basin

Hydrograph



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Type IA 24-hr 5yr Rainfall=4.50"

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Summary for Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Runoff = 0.74 cfs @ 7.99 hrs, Volume= 11,595 cf, Depth= 2.38"

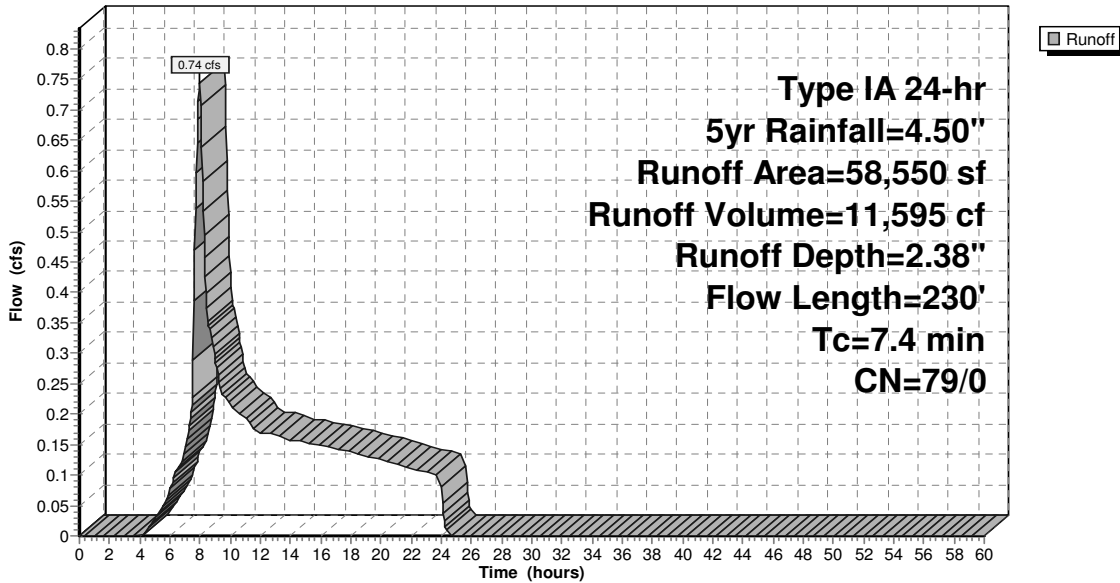
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type IA 24-hr 5yr Rainfall=4.50"

Area (sf)	CN	Description
58,550	79	Woods/grass comb., Poor, HSG C
58,550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	100	0.0500	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	130	0.1200	2.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
7.4	230	Total			

Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Hydrograph



REVISED PRELIMINARY E21-043 Storm

Type IA 24-hr 5yr Rainfall=4.50"

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Summary for Pond 4P: 48" Detention Basin

Inflow Area = 58,550 sf, 100.00% Impervious, Inflow Depth = 4.26" for 5yr event
 Inflow = 1.41 cfs @ 7.92 hrs, Volume= 20,805 cf
 Outflow = 0.74 cfs @ 8.31 hrs, Volume= 20,805 cf, Atten= 48%, Lag= 23.4 min
 Primary = 0.74 cfs @ 8.31 hrs, Volume= 20,805 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Peak Elev= 2.90' @ 8.31 hrs Surf.Area= 1,246 sf Storage= 2,644 cf

Plug-Flow detention time= 34.5 min calculated for 20,805 cf (100% of inflow)
 Center-of-Mass det. time= 34.5 min (693.6 - 659.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4,909 cf	60.0" Round Pipe Storage L= 250.0' S= 0.0020 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	3.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	2.50'	4.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

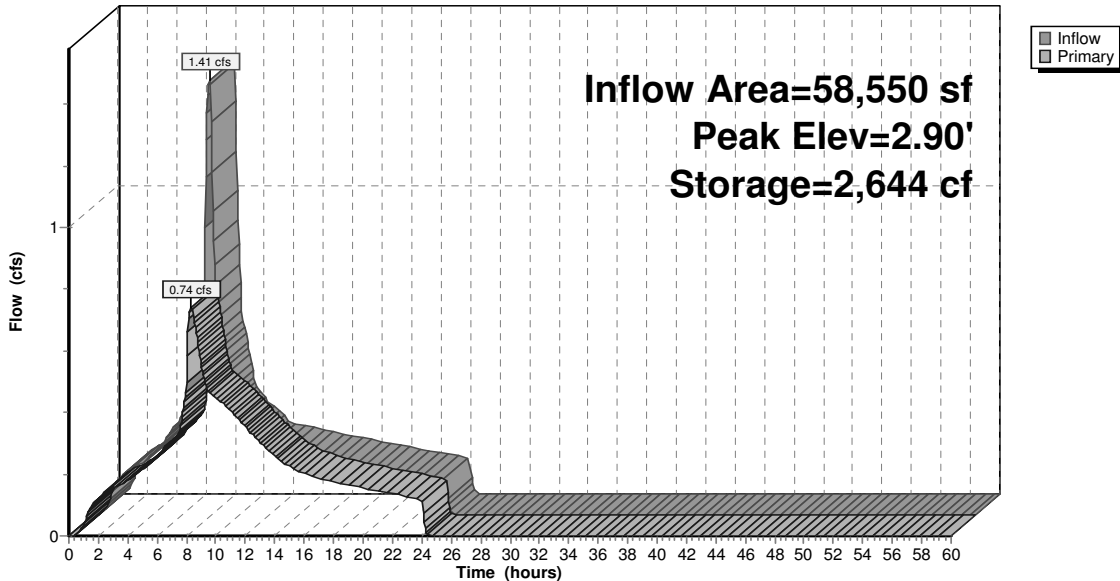
Primary OutFlow Max=0.74 cfs @ 8.31 hrs HW=2.90' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.50 cfs @ 8.00 fps)

2=Orifice/Grate (Orifice Controls 0.24 cfs @ 2.25 fps)

Pond 4P: 48" Detention Basin

Hydrograph



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Type IA 24-hr 10yr Rainfall=4.80"

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Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 3S: Impervious basin Runoff Area=58,550 sf 100.00% Impervious Runoff Depth=4.56"
Tc=6.0 min CN=0/98 Runoff=1.51 cfs 22,266 cf

Subcatchment 6S: Pre Construction Runoff Runoff Area=58,550 sf 0.00% Impervious Runoff Depth=2.63"
Flow Length=230' Tc=7.4 min CN=79/0 Runoff=0.83 cfs 12,834 cf

Pond 4P: 48" Detention Basin Peak Elev=3.05' Storage=2,829 cf Inflow=1.51 cfs 22,266 cf
Outflow=0.83 cfs 22,266 cf

Total Runoff Area = 117,100 sf Runoff Volume = 35,100 cf Average Runoff Depth = 3.60"
50.00% Pervious = 58,550 sf 50.00% Impervious = 58,550 sf

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Type IA 24-hr 10yr Rainfall=4.80"

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Summary for Subcatchment 3S: Impervious basin

Runoff = 1.51 cfs @ 7.91 hrs, Volume= 22,266 cf, Depth= 4.56"
 Routed to Pond 4P : 48" Detention Basin

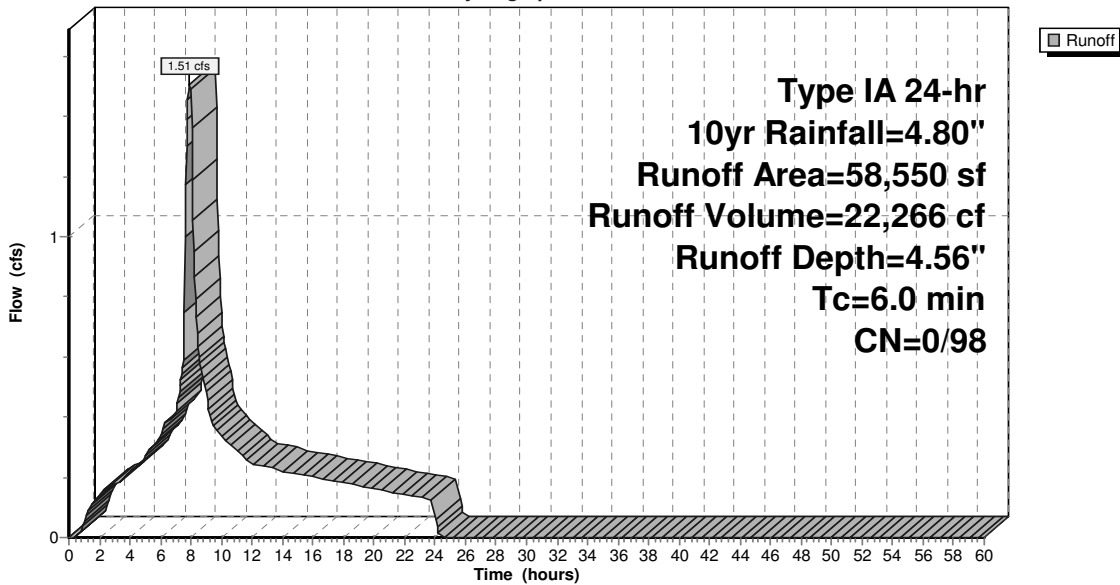
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 10yr Rainfall=4.80"

	Area (sf)	CN	Description
*	41,740	98	Asphalt
*	11,320	98	Roof Area
*	5,490	98	Sidewalk
	58,550	98	Weighted Average
	58,550		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Post Construction

Subcatchment 3S: Impervious basin

Hydrograph



REVISED PRELIMINARY E21-043 Storm

Type IA 24-hr 10yr Rainfall=4.80"

Prepared by Firwood Design Storm

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Summary for Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Runoff = 0.83 cfs @ 7.98 hrs, Volume= 12,834 cf, Depth= 2.63"

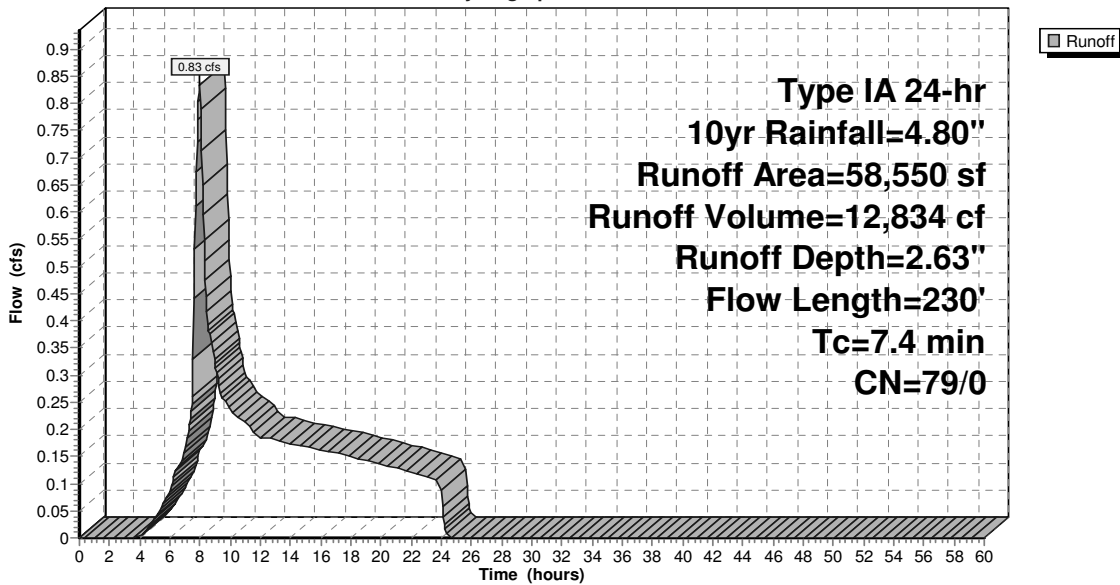
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10yr Rainfall=4.80"

Area (sf)	CN	Description
58,550	79	Woods/grass comb., Poor, HSG C
58,550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	100	0.0500	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	130	0.1200	2.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
7.4	230	Total			

Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

Hydrograph



REVISED PRELIMINARY E21-043 Storm

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Type IA 24-hr 10yr Rainfall=4.80"

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Summary for Pond 4P: 48" Detention Basin

Inflow Area = 58,550 sf, 100.00% Impervious, Inflow Depth = 4.56" for 10yr event
 Inflow = 1.51 cfs @ 7.91 hrs, Volume= 22,266 cf
 Outflow = 0.83 cfs @ 8.28 hrs, Volume= 22,266 cf, Atten= 45%, Lag= 21.9 min
 Primary = 0.83 cfs @ 8.28 hrs, Volume= 22,266 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Peak Elev= 3.05' @ 8.28 hrs Surf.Area= 1,239 sf Storage= 2,829 cf

Plug-Flow detention time= 36.0 min calculated for 22,248 cf (100% of inflow)
 Center-of-Mass det. time= 36.0 min (693.7 - 657.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4,909 cf	60.0" Round Pipe Storage L= 250.0' S= 0.0020 '/'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	3.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	2.50'	4.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

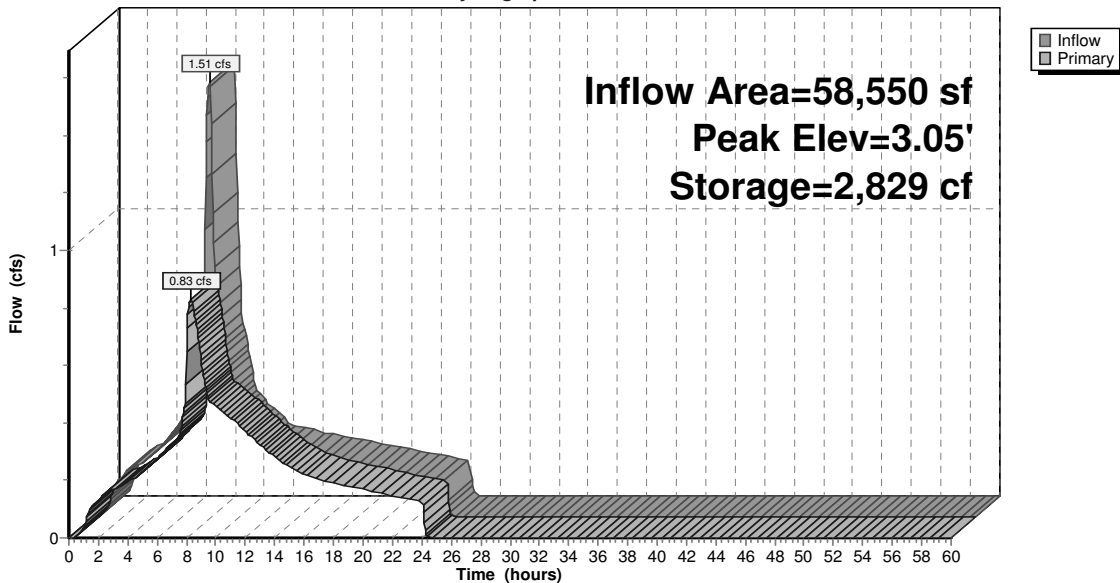
Primary OutFlow Max=0.83 cfs @ 8.28 hrs HW=3.05' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.52 cfs @ 8.21 fps)

2=Orifice/Grate (Orifice Controls 0.31 cfs @ 2.91 fps)

Pond 4P: 48" Detention Basin

Hydrograph



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Type IA 24-hr 25yr Rainfall=5.50"

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Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment 3S: Impervious basin Runoff Area=58,550 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=0/98 Runoff=1.73 cfs 25,676 cf

Subcatchment 6S: Pre Construction Runoff Runoff Area=58,550 sf 0.00% Impervious Runoff Depth=3.24"
Flow Length=230' Tc=7.4 min CN=79/0 Runoff=1.05 cfs 15,792 cf

Pond 4P: 48" Detention Basin Peak Elev=3.43' Storage=3,293 cf Inflow=1.73 cfs 25,676 cf
Outflow=0.99 cfs 25,676 cf

Total Runoff Area = 117,100 sf Runoff Volume = 41,469 cf Average Runoff Depth = 4.25"
50.00% Pervious = 58,550 sf 50.00% Impervious = 58,550 sf

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Type IA 24-hr 25yr Rainfall=5.50"

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Summary for Subcatchment 3S: Impervious basin

Runoff = 1.73 cfs @ 7.91 hrs, Volume= 25,676 cf, Depth= 5.26"
 Routed to Pond 4P : 48" Detention Basin

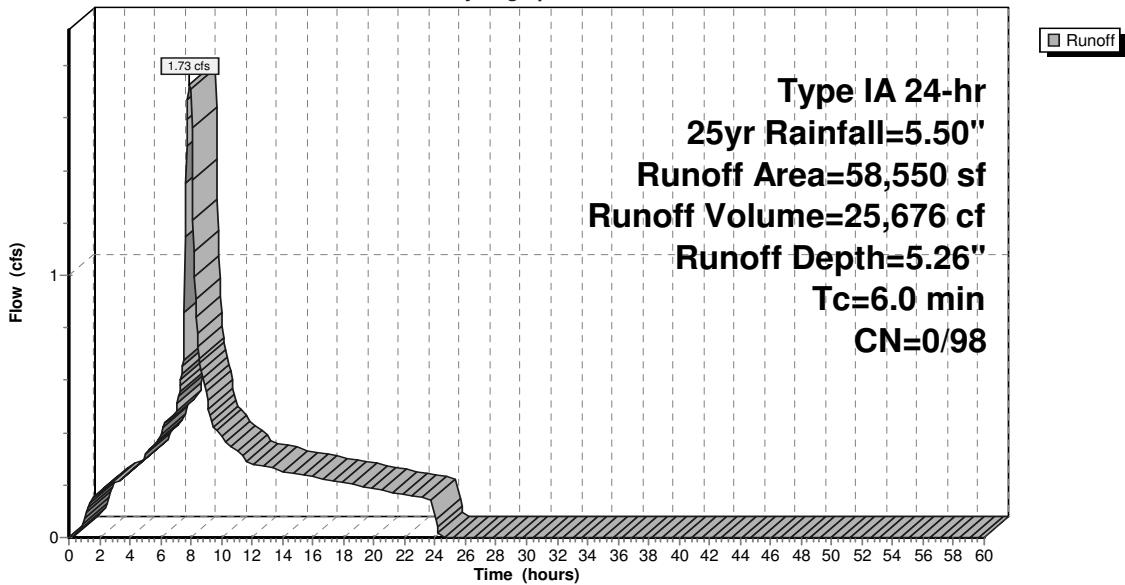
Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 25yr Rainfall=5.50"

	Area (sf)	CN	Description
*	41,740	98	Asphalt
*	11,320	98	Roof Area
*	5,490	98	Sidewalk
	58,550	98	Weighted Average
	58,550		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Post Construction

Subcatchment 3S: Impervious basin

Hydrograph



REVISED PRELIMINARY E21-043 Storm

Type IA 24-hr 25yr Rainfall=5.50"

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Summary for Subcatchment 6S: Pre Construction Runoff for Total Impervious Area

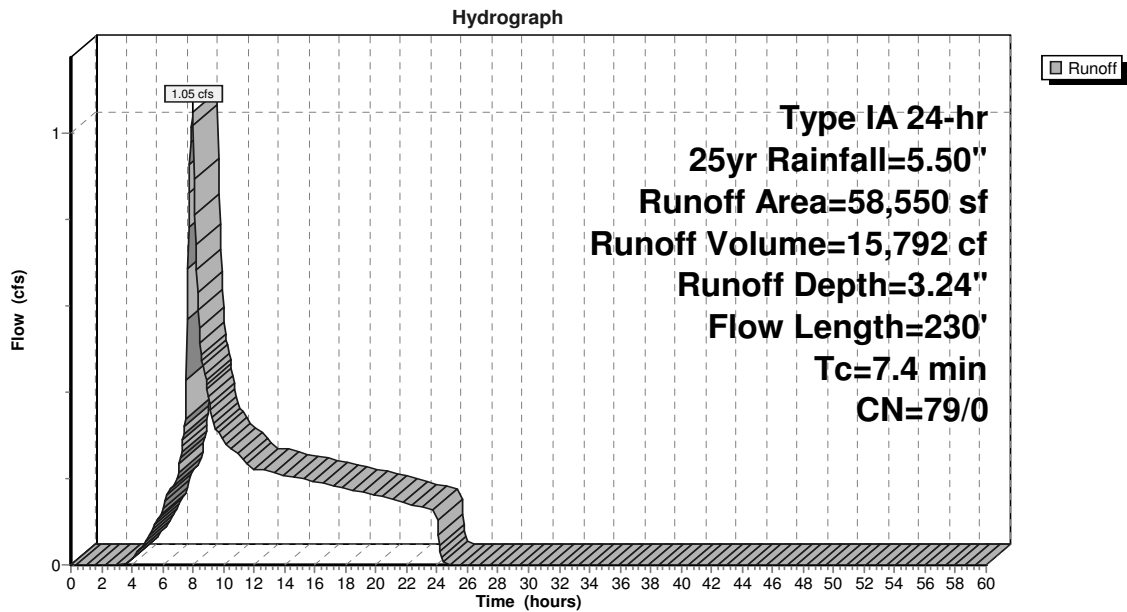
Runoff = 1.05 cfs @ 7.98 hrs, Volume= 15,792 cf, Depth= 3.24"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25yr Rainfall=5.50"

Area (sf)	CN	Description
58,550	79	Woods/grass comb., Poor, HSG C
58,550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	100	0.0500	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.50"
0.9	130	0.1200	2.42		Shallow Concentrated Flow, Shallow Short Grass Pasture Kv= 7.0 fps
7.4	230	Total			

Subcatchment 6S: Pre Construction Runoff for Total Impervious Area



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Type IA 24-hr 25yr Rainfall=5.50"

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Summary for Pond 4P: 48" Detention Basin

Inflow Area = 58,550 sf, 100.00% Impervious, Inflow Depth = 5.26" for 25yr event
 Inflow = 1.73 cfs @ 7.91 hrs, Volume= 25,676 cf
 Outflow = 0.99 cfs @ 8.26 hrs, Volume= 25,676 cf, Atten= 43%, Lag= 20.5 min
 Primary = 0.99 cfs @ 8.26 hrs, Volume= 25,676 cf

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
 Peak Elev= 3.43' @ 8.26 hrs Surf.Area= 1,200 sf Storage= 3,293 cf

Plug-Flow detention time= 39.7 min calculated for 25,676 cf (100% of inflow)
 Center-of-Mass det. time= 39.7 min (694.8 - 655.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	4,909 cf	60.0" Round Pipe Storage L= 250.0' S= 0.0020 '/'

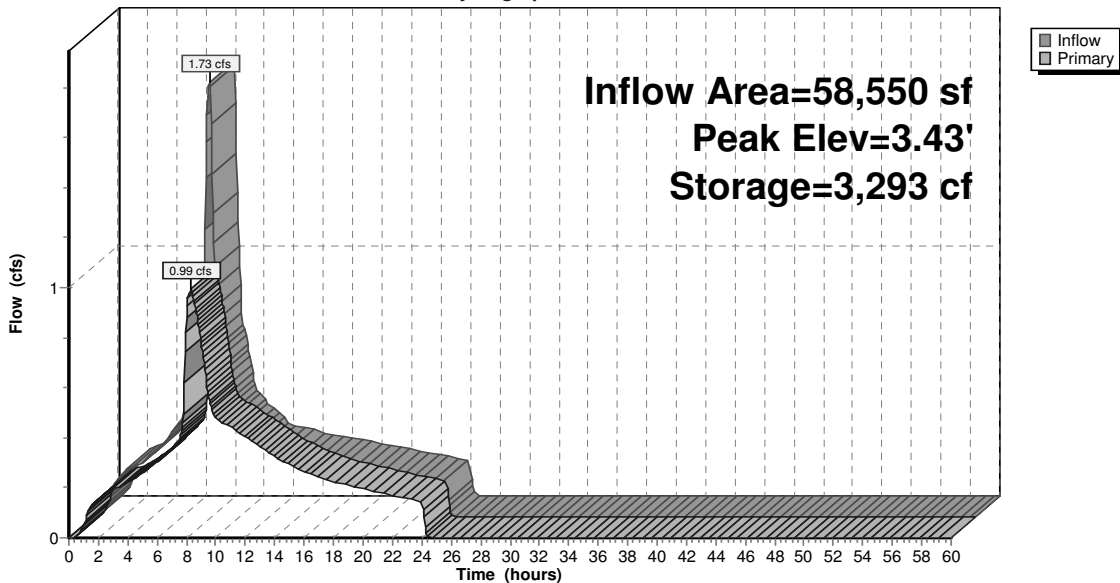
Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	3.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Primary	2.50'	4.4" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.99 cfs @ 8.26 hrs HW=3.43' (Free Discharge)

- 1=Orifice/Grate (Orifice Controls 0.55 cfs @ 8.73 fps)
- 2=Orifice/Grate (Orifice Controls 0.44 cfs @ 4.16 fps)

Pond 4P: 48" Detention Basin

Hydrograph





United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Clackamas County Area, Oregon



January 28, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map





































The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)		 Spoil Area	
 Area of Interest (AOI)		 Stony Spot	
Soils		 Very Stony Spot	
 Soil Map Unit Polygons		 Wet Spot	
 Soil Map Unit Lines		 Other	
 Soil Map Unit Points		 Special Line Features	
Special Point Features		Water Features	
 Blowout		 Streams and Canals	
 Borrow Pit		Transportation	
 Clay Spot		 Rails	
 Closed Depression		 Interstate Highways	
 Gravel Pit		 US Routes	
 Gravelly Spot		 Major Roads	
 Landfill		 Local Roads	
 Lava Flow		Background	
 Marsh or swamp		 Aerial Photography	
 Mine or Quarry			
 Miscellaneous Water			
 Perennial Water			
 Rock Outcrop			
 Saline Spot			
 Sandy Spot			
 Severely Eroded Spot			
 Sinkhole			
 Slide or Slip			
 Sodic Spot			

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
 Survey Area Data: Version 18, Oct 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15B	Cazadero silty clay loam, 0 to 7 percent slopes	5.1	74.2%
15C	Cazadero silty clay loam, 7 to 12 percent slopes	1.8	25.4%
24B	Cottrell silty clay loam, 2 to 8 percent slopes	0.0	0.3%
Totals for Area of Interest		6.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

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landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clackamas County Area, Oregon

15B—Cazadero silty clay loam, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 223c
Elevation: 300 to 900 feet
Mean annual precipitation: 48 to 85 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cazadero and similar soils: 85 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cazadero

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old mixed alluvium

Typical profile

H1 - 0 to 21 inches: silty clay loam
H2 - 21 to 75 inches: clay

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F003XC003OR - Glaciated Western Cascades Mesic Udic Forest Group
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

Minor Components

Borges

Percent of map unit: 2 percent
Landform: Hillslopes, depressions on terraces

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Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

15C—Cazadero silty clay loam, 7 to 12 percent slopes

Map Unit Setting

National map unit symbol: 223d
Elevation: 600 to 900 feet
Mean annual precipitation: 60 to 85 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cazadero and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cazadero

Setting

Landform: Terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old mixed alluvium

Typical profile

H1 - 0 to 21 inches: silty clay loam
H2 - 21 to 75 inches: clay

Properties and qualities

Slope: 7 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F003XC003OR - Glaciated Western Cascades Mesic Udic Forest Group

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Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Other vegetative classification: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

24B—Cottrell silty clay loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 223v
Elevation: 300 to 900 feet
Mean annual precipitation: 45 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 140 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cottrell and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cottrell

Setting

Landform: Hillslopes, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve, base slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium

Typical profile

H1 - 0 to 24 inches: silty clay loam
H2 - 24 to 55 inches: silty clay
H3 - 55 to 86 inches: silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: F002XB006OR - Foothill Group
Forage suitability group: Moderately Well Drained < 15% Slopes (G002XY004OR)

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Other vegetative classification: Moderately Well Drained < 15% Slopes
(G002XY004OR)
Hydric soil rating: No

Minor Components

Borges

Percent of map unit: 4 percent
Landform: Hillslopes, depressions on terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Aquults

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

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EXHIBIT G

321 SW 4th Ave., Suite 400
 Portland, OR 97204
 503.248.0313
 lancastermoble.com

Memorandum

To: **Emily Moran**
State Street Homes

From: **Myla Cross**

Date: **August 29, 2022**

Subject: **State Street Homes**
Transportation Analysis Letter



EXPIRES 12/31/2022

This Transportation Analysis Letter (TAL) evaluates the transportation impacts of the proposed State Street Homes development, consisting of 42 apartment units and 35 self-storage units, located at 38015 Highway 26 in Sandy, Oregon. Based on feedback from City of Sandy staff, a full traffic impact study is not required; however, this TAL is provided to address potential transportation-related concerns.

The purpose of this TAL is to determine whether the transportation system within the vicinity of the site is capable of safely and efficiently supporting the existing and proposed uses, as well as to determine any mitigation that may be necessary to do so. Detailed information on trip generation calculations and safety analyses are included as an attachment to this letter.

Location Description

The proposed State Street Homes is located north of Highway 26, and west Bluff Road. The adjacent land uses are predominately residential and commercial properties. The project site is currently undeveloped. Access will be provided via a shared driveway between the project site (tax lot 902) and the property to the west (tax lot 1000).

Vicinity Roadways

The proposed development is expected to mainly impact Highway 26, as this roadway provides access to the site. Table 1 provides a description of Highway 26.

Table 1: Vicinity Roadway Descriptions

Street Name	Jurisdiction	Functional Classification	Cross-Section	Speed (MPH)	Curbs & Sidewalks	On-Street Parking	Bicycle Facilities
Highway 26	ODOT	Major Arterial/ Statewide Hwy	5 lanes	40	Both Sides	Not Permitted	Both Sides

Figure 1 presents an aerial image of the nearby vicinity with the project site outlined in yellow.



Figure 1: Aerial Photo of Site Vicinity (Image from Google Maps)

Trip Generation

The State Street Homes development will include the construction of a four-story apartment building, consisting of 42 apartment units and 35 self-storage units on the ground floor. To estimate the number of trips that will be generated by the proposed use, trip rates from the *Trip Generation Manual*¹ were used. Specifically, data from the following land use codes were used:

- 151, *Mini-Warehouse*, based on the number of storage units.
- 221, *Multifamily Housing (Mid-Rise)*, was used based on the number of dwelling units.

The trip generation calculations show that the proposed project is projected to generate 16 morning peak hour trips, 17 evening peak hour trips, and 196 average weekday trips. The trip generation estimates are summarized in Table 2. Detailed trip generation calculations are included as an attachment to this memorandum.

Table 2: Trip Generation Summary

Land Use	ITE Code	Size	Morning Peak Hour			Evening Peak Hour			Weekday Total
			In	Out	Total	In	Out	Total	
Mini-Warehouse	151	35 storage units	0	0	0	1	0	1	6
Multifamily Housing (Mid-Rise)	221	42 dwelling units	4	12	16	10	6	16	190
Total:			4	12	16	11	6	17	196

¹ Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 11th Edition, 2021.



Trip Distribution

A preliminary directional distribution of site trips to and from the proposed development was estimated based on locations of likely destinations and locations of major transportation facilities in the site vicinity. The following trip distribution was used for analysis:

- Approximately 40 percent of site trips will travel to/from the east along Highway 26;
- Approximately 40 percent of site trips will travel to/from the west along Highway 26; and
- Approximately 20 percent of site trips will travel to/from the north along Bluff Road.

Crash History

Using data obtained from ODOT's Crash Data System, a review of approximately five years of the most recent available crash history (January 2016 through December 2020) was performed along the site frontage on Highway 26. The crash data was evaluated based on the number of crashes, the type of collisions, and the severity of the collisions. Specific to the site access intersection (i.e. the existing access which currently serves Paola's Pizza Barn to the west of the site), a crash rate was calculated for the intersection by utilizing annual average daily traffic (AADT) volumes from ODOT's TransGIS website.

Crash severity is based on injuries sustained by people involved in the crash, and includes five categories:

- *PDO* – Property Damage Only;
- *Injury C* – Possible Injury;
- *Injury B* – Suspected Minor Injury;
- *Injury A* – Suspected Serious Injury; and
- *Fatality*

Crash rates provide the ability to compare safety risks at different intersections by accounting for both the number of crashes that have occurred during the study period and the number of vehicles that typically travel through the intersection. Crash rates in excess of 1.00 crashes per million entering vehicles (CMEV) may be indicative of design deficiencies and therefore require a need for further investigation and possible mitigation. According to *Exhibit 4-1: Intersection Crash Rates per MEV by Land Type and Traffic Control* of ODOT's Analysis Procedures Manual² (APM), intersections which experience crash rates in excess of their respective 90th percentile crash rates should be "flagged for further analysis". For stop-controlled, three-legged intersections in urban settings, the average and 90th percentile rates of 0.131 CMEV and 0.293 CMEV are applicable to the study intersection.

Based on the crash data, there was one reported crash located at the site access along Highway 26. The crash occurred when the driver of a southbound vehicle turning right from the site access failed to yield right-of-way to a westbound vehicle on Highway 26. The crash was classified as *PDO* – Property Damage Only. Given the

² [Oregon Department of Transportation: Analysis Procedures Manual](#)



AADT of Highway 26 at a location just west of Bluff Road is approximately 29,000 vehicles, the crash rate at the intersection was calculated to be 0.019 CMEV.

There were six other crashes reported on Highway 26 within the vicinity of the site access that were rear-end collisions involving vehicles traveling eastbound or westbound on the highway, none of which appear to be related to the existing site access intersection or any other driveways along this segment of Highway 26. Crash reports for the study area are included as an attachment to this memorandum.

Based on the review of the available crash data, no significant trends or crash patterns were identified at the site access intersection that were indicative of safety concerns. In addition, the study intersection does not exhibit crash rates near or above the ODOT's 90th percentile rate. Accordingly, no safety mitigation is recommended per the crash data analysis.

Sight Distance Evaluation

Sight Distance Definitions & Methodologies

Sight Distances were measured at the proposed site access along Highway 26 in accordance with standards established in *A Policy on Geometric Design of Highways and Streets*³.

Intersection sight distance is an operational measure, intended to provide sufficient line of sight along the major-street so that a driver can enter the roadway without impeding the flow of through traffic. For intersection sight distance, the driver's eye is assumed to be 14.5 feet from the near edge of the travel lane of the intersecting street and at a height of 3.5 feet above the approach street pavement.

Stopping sight distance is considered the minimum requirement to ensure safe operation of the driveway. This distance allows the driver of a vehicle traveling on the major-street to react to a turning vehicle or other object in the roadway and come to a complete stop to avoid a collision.

Sight Distance Measurements

A field investigation was conducted on Wednesday, August 17th, 2022, to measure sight distance at the proposed site access location along Highway 26. Based on the posted speed of 40 mph on Highway 26, the minimum recommended intersection sight distance for vehicles at a stopped position is 500 feet for left turning vehicles (viewing to the west of the site access), and 385 feet for right-turning vehicles (viewing to the east of the access). The minimum required stopping sight distance standard is 305 feet for both left and right-turning vehicles.

Due to existing fence and landscaping, sight distance measurements were taken from 11 feet behind the near edge of the travel lane rather than the standard 15 feet behind. However, there are no existing horizontal curves in the road near this location and no other obstructions were noted either on-site or along the roadway which would reduce sight distances to less than those measured in the field if measurements had been conducted at the standard 15-foot distance.

To the east, sight distance was measured back to the intersection of Highway 26 & Bluff Road approximately 425 feet away, therefore, exceeding the 385-foot minimum recommended intersection sight distance standard.

³ American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 7th Edition, 2018.



To the west, sight distance was measured to exceed 600 feet, exceeding the 500-foot minimum recommended intersection sight distance standard.

Provided any obstructing on-site foliage, fences, or landscaping near the proposed access are removed/ properly maintained following development of the site, adequate sight distances to the east and west of the access intersection can be made available to ensure safe and efficient operation along Highway 26. No other sight distance related mitigation is necessary or recommended at the proposed access intersection.

City of Sandy and ODOT Standards

Private Access Driveway Width Standards

Section 17.98.100(A) of the City of Sandy Development Code requires a minimum driveway width of 20 feet for two-way driveways. The proposed driveway access is approximately 26 feet wide. This standard is met and no mitigation is required.

Minimum ODOT Street Intersection Spacing Standards

According to Table 14 in Appendix C of the Oregon Highway Plan⁴ (OHP), for a Statewide Highway with a posted speed of 40 mph and an Annual Average Daily Traffic (AADT) of approximately 29,000 vehicles the minimum access spacing standard is 800 feet in urban areas and 990 feet in rural areas. Per Table 4 of the City's Transportation System Plan (TSP) indicates the minimum access spacing standards along Highway 26 are 990 feet for urban settings. Regardless of which standard is observed, neither spacing standard will be met at the proposed access location given the nearest accesses to the east and west of the site are located less than 100 feet and less than 150 feet away, respectively.

Although these spacing standards will not be met, approval of the proposed access is recommended for the following reasons:

- The project site's only frontage to an adjacent street is Highway 26. To gain access to Bluff Road, the nearest roadway to the site, the applicant would need to purchase additional property to the east of the site, creating an undue financial hardship on the applicant.
- The proposed site access will be consolidated/shared with an existing access which currently serves Paola's Pizza Barn to the west of the site. Accordingly, no additional access driveways will be constructed along Highway 26.
- Per the crash data analysis in this TAL, 1 crash was reported at the existing access intersection over the most recent five-year analysis period with a crash rate of 0.019 CMEV. Based on these findings it is expected that the access intersection will operate relatively safely following buildout of the proposed development.
- Adequate intersection sight distances to the east and west of the access intersection can be made available to ensure safe and efficient operation along Highway 26.
- There are currently multiple examples of driveways along the segment of Highway 26, between University Avenue and Bluff Road, where access spacing standards are not met. Therefore, it's

⁴ [Microsoft Word - 1999 OHP-Amend Final 05-15 Update 20151223 clean.docx \(oregon.gov\)](#)



reasonable to assume motor vehicle operators along this segment of roadway will be aware of and expect other vehicles to turn to/from these minor-street approaches.

Based on the above reasoning, City of Sandy and ODOT staff may approve site access at the proposed location along Highway 26.

TSP Frontage Improvements

Section 17.84.50 of the City of Sandy Development Code states that *"Where a development site abuts an existing public street not improved to City standards, the abutting street shall be improved to City standards along the full frontage of the property concurrent with development."* Based on a review of the City of Sandy's TSP, any portions of site frontage along Highway 26 not designed to appropriate standards will be updated in a manner consistent with Figures 6 through 8. If meeting these design standards is impractical when considering existing infrastructure along the highway and adjacent to the site frontage, the applicant may seek a variance or modification to these standards.

Conclusions

Findings from this TAL include:

- The trip generation calculations show that the proposed development is projected to generate 16 morning peak hour trips, 17 evening peak hour trips, and 196 average weekday trips.
- Based on a review of crash data, no significant existing crash hazards are evident in the site vicinity. No specific safety mitigations are necessary or recommended in conjunction with the proposed development.
- Intersection sight distance recommendations are met to the east and west of the site access.
- Although ODOT's access spacing standards are not met at the proposed site access location, the City of Sandy and ODOT may approve site access at the proposed location along Highway 26 when considering the following:
 - The project site's only frontage to an adjacent street is Highway 26.
 - The proposed site access will be consolidated/shared with an existing access which currently serves Paola's Pizza Barn to the west of the site.
 - Based on a review of crash history at the existing access, it is expected that the access intersection will operate relatively safely following buildout of the proposed development.
 - Adequate sight distances to the east and west of the access intersection can be made available to ensure safe and efficient operation along Highway 26.
 - There are currently multiple examples of driveways along the segment of Highway 26, between University Avenue and Bluff Road, where access spacing standards are not met. Therefore, it's reasonable to assume motor vehicle operators along this segment of roadway will be aware of and expect other vehicles to turn to/from these minor-street approaches.
- All other City of Sandy standards have been reviewed and deemed met, therefore, no additional mitigation is necessary or recommended.

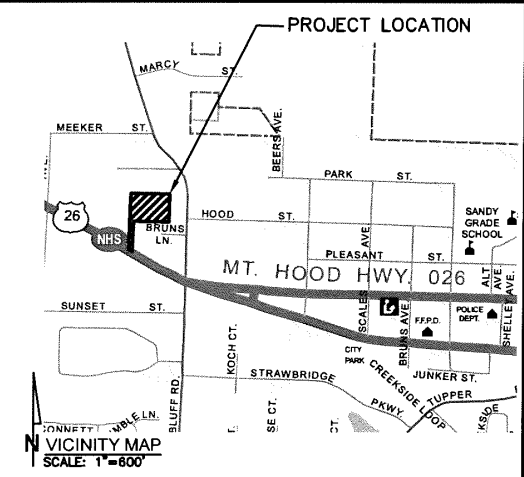
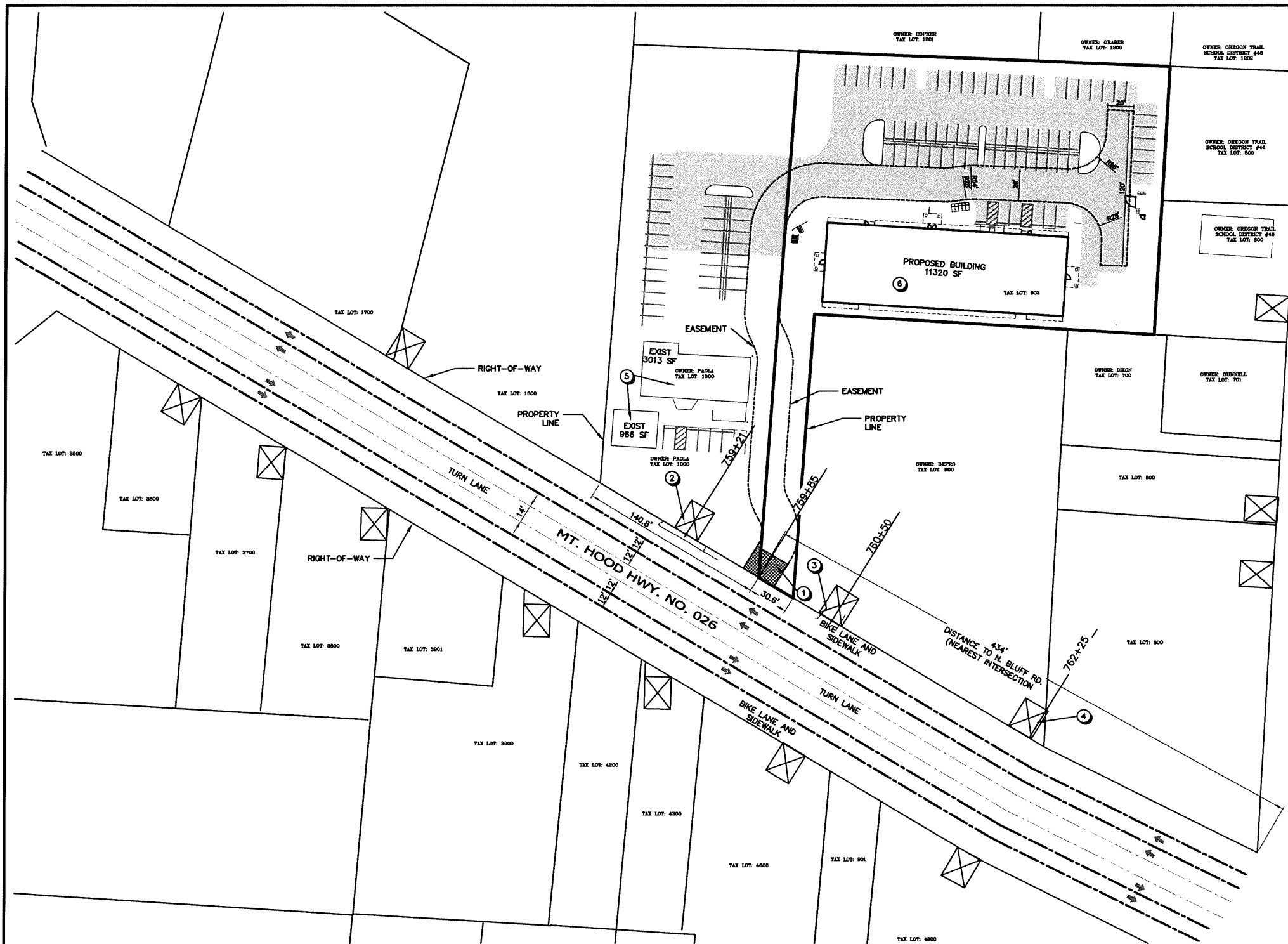


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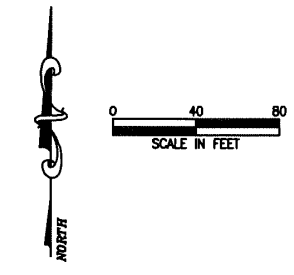
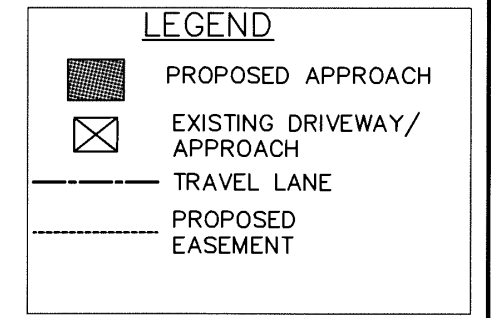
Attachments



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- KEY NOTES**
- ① PROPOSED 27.2' WIDE COMMERCIAL DRIVEWAY APPROACH TO BE UTILIZED FOR SITE ACCESS. HWY STA 759+85
 - ② APPROACH ACCESS FOR BENEFIT OF TAX LOT 902 TO BE CANCELED. HWY STA 759+21
 - ③ APPROACH ACCESS FOR BENEFIT OF TAX LOT 902 TO BE CANCELED. HWY STA 760+50
 - ④ APPROACH ACCESS FOR BENEFIT OF TAX LOT 902 TO BE CANCELED. HWY STA 762+25
 - ⑤ EXISTING PIZZA PARLOR. NO CHANGE IN USE.
 - ⑥ PROPOSED NEW BUILDING TO BE USED AS STORAGE AND APARTMENTS.



6/2/2022 2:29:26 PM BB s:\project files\projects\21-043 state street homes\cod\sheets\for odot\21-043 odot sheet-new entrance.dwg

DATE:	NO.	REVISION

DRAWN:	DESIGNED:	CHECKED:
SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		



359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 888-3737

STATE STREET HOMES
1233 NW NORTHROP ST. #125
PORTLAND, OR 97209

ODOT ACCESS PERMIT SHEET
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

1/1



TRIP GENERATION CALCULATIONS
Source: Trip Generation Manual, 11th Edition

Land Use: Mini-Warehouse
Land Use Code: 151
Land Use Subcategory: All Sites
Setting/Location: General Urban/Suburban
Variable: Storage Units (100s)
Trip Type: Vehicle
Variable Quantity: **0.35**

WARNING: Variable Quantity is less than Minimum Survey Size for Peak Hours

AM PEAK HOUR

Trip Rate: 1.21

	Enter	Exit	Total
Directional Split	51%	49%	
Trip Ends	0	0	0

PM PEAK HOUR

Trip Rate: 1.68

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	1	0	1

WEEKDAY

Trip Rate: 17.96

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	3	3	6

SATURDAY

Trip Rate: 16.29

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	3	3	6



TRIP GENERATION CALCULATIONS
Source: Trip Generation Manual, 11th Edition

Land Use: Multifamily Housing (Mid-Rise)
Land Use Code: 221
Land Use Subcategory: Not Close to Rail Transit
Setting/Location: General Urban/Suburban
Variable: Dwelling Units
Trip Type: Vehicle
Variable Quantity: 42

AM PEAK HOUR

Trip Rate: 0.37

	Enter	Exit	Total
Directional Split	23%	77%	
Trip Ends	4	12	16

PM PEAK HOUR

Trip Rate: 0.39

	Enter	Exit	Total
Directional Split	61%	39%	
Trip Ends	10	6	16

WEEKDAY

Trip Rate: 4.54

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	95	95	190

SATURDAY

Trip Rate: 4.57

	Enter	Exit	Total
Directional Split	50%	50%	
Trip Ends	96	96	192



9/22/2022

Emily Moran
State Street Homes
123 NW Northrup St #125
Portland, OR 97209

Re: Tree Protection Plan for 38015 HWY 26, Sandy, Oregon

Summary

The property at 38015 Hwy 26 in Sandy, Oregon is planned for development and the construction of a 48,811 square foot, four-story building. Also planned is a parking lot with seventy-six spaces, and a shared access road on the west side of the property.

Assignment

Prepare a Tree Protection Plan to meet the requirements outlined in the City of Sandy Code 17.102.

Observations

A tree inventory of the undeveloped site was completed on 9/20/2022. All trees on the property were included in the inventory, as well as trees on adjacent properties which may be impacted by the planned construction. Twenty-four (24) trees will be impacted by site disturbance and are recommended for removal. Twenty-two (22) trees bordering the property are recommended to be retained and protected due to their location on neighboring properties and/or their health and structure.

Discussion

The proposed changes to the site will be within the critical root zones of existing trees. Existing asphalt will be removed and replaced, and new sidewalk will be excavated and poured. Twenty-four (24) trees are recommended for removal to accommodate the new construction. It is not possible to retain these trees with the proposed development. Twenty-two (22) trees around the outside of the of the planned construction shall be protected as outlined in the tree protection plan (Appendix 5). The trees to be retained and protected are near the property lines and in some cases on adjacent properties. Tree protection zones shall be fenced during the duration of the project and no changes to the native soil in these areas is planned.

As outlined in Appendix 5, the project arborist shall be onsite during excavation within the critical root zones of retained trees 13.2, 14, 15, 21, 23, 24, 25, 26, 28, 29, 31, and 32. The project consulting arborist shall evaluate and oversee the proper cutting of roots with sharp cutting tools. If many significant roots are encountered during excavation in the zones highlighted in Appendix 5, an alternative layout for areas requiring excavation should be considered to maintain the health and safety of retained trees. Alternate methods of construction may also be necessary for the preservation of significant roots of retained trees. Other construction methods include but are not limited to: bridging over significant roots, constructing sidewalks on top of grade over landscape fabric without excavation, and using post and beam construction instead of conventional footing foundations within the critical root zone.

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

Recommendations

Based on the proposed development, my observations, and requirements of the proposed development at 38015 Hwy 26, I recommend the following actions:

1. **Tree protection fencing.** Tree protection fencing that is a minimum of six-feet tall and chain link shall be installed per the tree protection plan (Appendix 5).
 - a. Tree protection fencing is to be installed before any ground disturbing activities and remain in place for the duration of the project, or a planning official approves removal.
 - b. Tree protection is not to be moved without written consent from the project arborist.
2. **Tree removal.** Remove twenty-four (24) trees negatively impacted by site improvements.
3. **Report sharing.** Share this report in its entirety to the project team, including contractors performing demolition and concrete work.

Additional tree protection recommendations for the trees to be retained are included in Appendix 3, Tree Protection Specifications.

Conclusion

The proposed renovation to the north of the north parking lot will require the removal of twenty-four (24) trees. Tree protection fencing shall be installed for the twenty-two (22) trees near or over the property line on adjacent properties that may be impacted by site disturbance. The project arborist shall be present during excavation within the critical root zones outlined in Appendix 5. This report meets the requirements outlined in the City of Sandy Code 17.102.

Please contact me if you have questions, concerns, or need any additional information.

Sincerely,

Caleb Lattimer

Caleb Lattimer
ISA Certified Arborist®, PN-8644A
ISA Tree Risk Assessment Qualified
caleb@teragan.com

Enclosures:

- | | |
|-------------|-------------------------------------|
| Appendix 1: | Certification of Performance |
| Appendix 2: | Assumptions and Limiting Conditions |
| Appendix 3: | Tree Protection Specifications |
| Appendix 4: | Tree Inventory |
| Appendix 5: | Tree Protection Plan |

Teragan & Associates, Inc.
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Appendix 1: Certification of Performance

I, Caleb Lattimer, certify:

- That a representative of Teragan & Associates, Inc., has inspected the tree(s) and/or the property referred to in this report. The extent of the evaluation is stated in the attached report.
- That Teragan & Associates, Inc. has no current or prospective interest in the vegetation of the property that is the subject of this report, and Teragan & Associates, Inc. has no personal interest or bias with respect to the parties involved.
- That Teragan & Associates, Inc.'s compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party, or upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.
- That the analysis, opinions, and conclusions that were developed as part of this report have been prepared according to commonly accepted arboricultural practices.
- That a Board-Certified Master Arborist has overseen the gathering of data.

Appendix 2: Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Teragan and Associates, Inc. checked the species identification and tree diameters in the field.
2. It is assumed that this property is not in violation of any codes, statutes, ordinances, or other governmental regulations.
3. The consultant is not responsible for information gathered from others involved in various activities pertaining to this project. Care has been taken to obtain information from reliable sources.
4. Loss or alteration of any part of this delivered report invalidates the entire report.
5. Drawings and information contained in this report may not be to scale and are intended to be used as display points of reference only.
6. The consultants' role is only to make recommendations. Inaction on the part of those receiving the report is not the responsibility of the consultant.
7. This report is to certify the trees that are on site, their size and condition and create a tree plan. Tree plan to include the measures necessary to protect trees that are to be retained during the construction process.

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Appendix 3: Tree Protection Specifications

It is critical that the following steps be taken to ensure that trees slated for retention are protected.

Before Construction Begins

- 1. Tree removals** within the tree protection area.
 - a. Prior to construction, allow tree removal within the tree protection area to occur.
 - i. The project arborist shall oversee the removal of any trees within the tree protection zone.
 - b. Installing tree protection fencing immediately following the removal of trees within the tree protection area (see 3 below). Tree protecting shall be installed after removals to ensure:
 - i. Tree removals are performed safely.
 - ii. Tree protection fencing is not accidentally or intentionally moved.
- 2. Notify all contractors of the tree protection procedures.** For successful tree protection on a construction site, all contractors must know and understand the goals of tree protection. It can only take one mistake with a misplaced trench or other action to destroy the future of a tree.
 - a. Hold a Tree Protection meeting with all contractors to fully explain goals of tree protection.
 - b. Have all sub-contractors sign memoranda of understanding regarding the goals of tree protection. Memoranda to include penalty for violating tree protection plan. Penalty to equal appraised value of tree(s) within the violated tree protection zone per the current Trunk Formula Method as outline by the Council of Tree & Landscape Appraisers current edition of the *Guide for Plant Appraisal*. Penalty is to be paid to owner of the property.
- 3. Fencing.**
 - a. Establish fencing around each tree or grove of trees to be retained.
 - b. The fencing is to be put in place before the ground is cleared in order to protect the trees and the soil around the trees from any disturbance at all.
 - c. Fencing is to be placed at the edge of the root protection zone. Root protection zones are to be established by the project arborist based on the needs of the site and the tree to be protected.
 - d. Fencing is to consist of 6-foot high chainlink fence secured to the ground with metal posts every ten feet to prevent it from being moved by contractors, sagging or falling down OR as required by municipal code.
 - e. Fencing is to remain in the position that is established by the project arborist and not to be moved without written permission from the project arborist until the end of the project.
- 4. Signage**
 - a. All tree protection fencing should have signage as follows so that all contractors understand the purpose of the fencing:

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

VEGETATION/TREE PROTECTION ZONE

DO NOT REMOVE OR ADJUST THIS FENCING.

The fence locations are approved to protect vegetation & trees.

NOTE: Moving these fences is a civil violation.

Please contact the Code Enforcement Specialist and project arborist if alterations to the approved location of the protection fencing is requested.

Project Arborist: TERAGAN & ASSOCIATES, INC 503-697-1975

- b. Signage should be placed as to be visible from all sides of a tree protection area and spaced every 75 feet.

During Construction

1. Protection guidelines Within the Root Protection Zone

- a. No traffic shall be allowed within the root protection zone. No vehicle, heavy equipment, or even repeated foot traffic.
 - b. No storage of materials including but not limiting to soil, construction material, or waste from the site.
 - i. Waste includes but is not limited to concrete wash out, gasoline, diesel, paint, cleaner, thinners, etc.
 - c. Construction trailers are not to be parked / placed within the root protection zone without written clearance from project arborist.
 - d. No vehicles shall be allowed to park within the root protection areas.
 - e. No activity shall be allowed that will cause soil compaction within the root protection zone.
- 2. Tree pruning.** The trees shall be protected from any cutting, skinning or breaking of branches, trunks or roots.
- 3. Root pruning.** Any roots that are to be cut from existing trees that are to be retained, the project consulting arborist shall be notified to evaluate and oversee the proper cutting of roots with sharp cutting tools. Cut roots are to be immediately covered with soil or mulch to prevent them from drying out.
- 4. Grade changes.** No grade change should be allowed within the root protection zone.
- 5. Root protection zone changes.** Any necessary deviation of the root protection zone shall be cleared by the project consulting arborist or project owner.
- 6. Watering.** Provide water to trees during the summer months. Tree(s) that will have had root system(s) cut back will need supplemental water to overcome the loss of ability to absorb necessary moisture during the summer months.
- 7. Utilities.** Any necessary passage of utilities through the root protection zone shall be by means of tunneling under roots by hand digging or boring.

After Construction

- 1. Landscaping.** Carefully landscape in the area of the tree. Do not allow trenching within the root protection zone. Carefully plant new plants within the root protection zone. Avoid cutting the roots of the existing trees.

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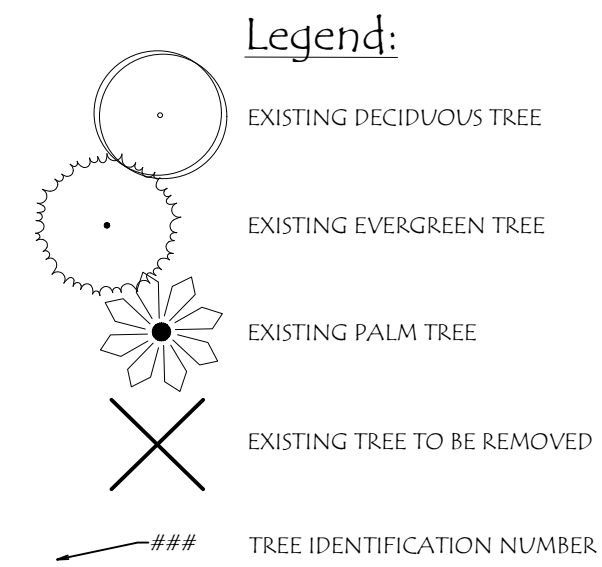
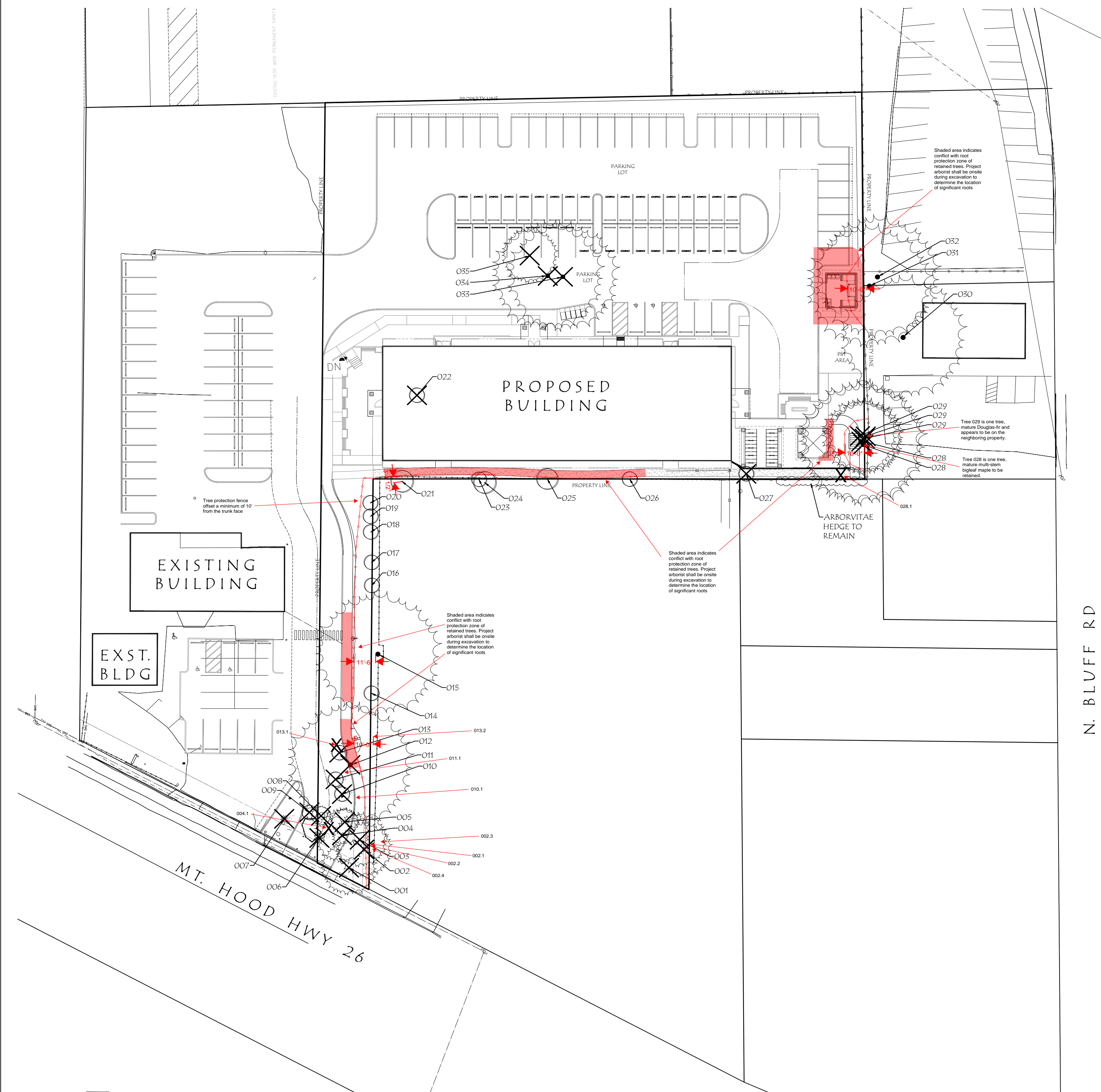
2. **Irrigation.** Do not plan for irrigation within the root protection zone of existing trees unless it is drip irrigation for a specific planting or cleared by the project arborist.
3. **Drainage.** Provide for adequate drainage of the location around the retained trees.
4. **Tree pruning.** Pruning of the trees should be completed as one of the last steps of the landscaping process before the final placement of trees, shrubs, ground covers, mulch, or turf.
5. **Pest and disease inspection.** Provide for inspection and treatment of insect and disease populations that can damage the retained trees and plants.
6. **Fertilization.** Trees that are retained may need to be fertilized as called for by project arborist after final inspection.

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Survey Number	Common Name	Scientific Name	DBH	Condition	Health	Condition	Structure	Field Notes/ Comments	Remove	Retain
001	Colorado blue spruce	<i>Picea pungens</i>	14	Poor		Poor			X	
002	western red cedar	<i>Thuja plicata</i>	6	Fair		Good			X	
002.1	Douglas-fir	<i>Pseudotsuga menziesii</i>	8	Good		Good		Tree may be on property to east		X
002.2	Douglas-fir	<i>Pseudotsuga menziesii</i>	6	Good		Good		Tree may be on property to east		X
002.3	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	Good		Good		Tree on property to east. Obvious large surface roots at 8' from base of tree.		X
002.4	English holly	<i>Ilex aquifolium</i>	4	Good		Good		Tree may be on property to east		X
003	western red cedar	<i>Thuja plicata</i>	8	Fair		Good			X	
004	Colorado blue spruce	<i>Picea pungens</i>	12	Good		Good			X	
004.1	Colorado blue spruce	<i>Picea pungens</i>	10	Good		Good			X	
005	western red cedar	<i>Thuja plicata</i>	11	Good		Good			X	
006	windmill palm	<i>Trachycarpus fortunei</i>	6	Good		Good			X	
006.1	Japanese maple	<i>Acer japonica</i>	2							X
007	windmill palm	<i>Trachycarpus fortunei</i>	10	Good		Good		Tree on property to west	X	
008	western red cedar	<i>Thuja plicata</i>	10	Poor		Fair		Tree on property to west	X	
009	English holly	<i>Ilex aquifolium</i>	4	Good		Good		Tree on property to west	X	
010	sugar maple	<i>Acer saccharum</i>	16	Fair		Fair			X	
010.1	rhododendron	<i>Rhododendron</i>	4	Good		Good			X	
011	Norway spruce	<i>Picea abies</i>	15	Good		Good			X	
011.1	Japanese andromeda	<i>Pieris japonica</i>	3	Fair		Fair			X	
012	golden chain tree	<i>Laburnum anagyroides</i>	7	Fair		Fair		Sweeping trunk at base, codominant stems at 3'	X	
013	photinia	<i>Photinia serratifolia</i>	6	Good		Good			X	
013.1	photinia	<i>Photinia serratifolia</i>	6	Fair		Fair			X	
013.2	bigleaf maple	<i>Acer macrophyllum</i>	23	Poor		Poor		Tree may be on property to east. Thin crown		X
014	photinia	<i>Photinia serratifolia</i>	12	Good		Fair		Decay at base, tree may be on property line.		X
015	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good		Good		Tree on neighboring property to east		X
016	golden chain tree	<i>Laburnum anagyroides</i>	8	Poor		Poor		Tree on property to east. Significant decay in stem.		X
017	thundercloud plum	<i>Prunus cerasifera</i>	6	Fair		Fair		Tree on property to east		X
018	golden chain tree	<i>Laburnum anagyroides</i>	9	Fair		Fair		Tree on property to east		X

Survey Number	Common Name	Scientific Name	DBH	Condition Health	Condition Structure	Field Notes/ Comments	Remove	Retain
019	golden chain tree	<i>Laburnum anagyroides</i>	8	Fair	Fair	Tree on property to east. Significant decay in stem		X
020	thundercloud plum	<i>Prunus cerasifera</i>	4	Fair	Fair	Tree on property to east		X
021	sweet cherry	<i>Prunus avium</i>	10	Poor	Poor	Tree on property to south. Thin crown with ivy in crown		X
022	sweet cherry	<i>Prunus avium</i>	6	Good	Good		X	
023	cascara	<i>Frangula pershiana</i>	6	Good	Good	Tree on property to south		X
024	sweet cherry	<i>Prunus avium</i>	12	Fair	Fair	Tree on property to south		X
025	sweet cherry	<i>Prunus avium</i>	10	Poor	Fair	Tree on property to south		X
026	sweet cherry	<i>Prunus avium</i>	6	Poor	Poor	Tree on property to south. Stem originates on neighboring property		X
027	sweet cherry	<i>Prunus avium</i>	6	Poor	Poor	Tree appears to be on property to be developed	X	
028	bigleaf maple	<i>Acer macrophyllum</i>	28	Good	Fair	Multiple stems at base. Deadwood in crown		X
028.1	English holly	<i>Ilex aquifolium</i>	4	Fair	Fair	Tree appears to be on property to be developed	X	
029	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Retain. Tree on property to east		X
030	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Tree on property to east		X
031	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	Good	Good	Tree on property to east		X
032	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Tree on property to east		X
033	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good	Fair	Tree base inaccessible. Branches at ground level	X	
034	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good	Fair	Tree base inaccessible. Branches at ground level	X	
035	bigleaf maple	<i>Acer macrophyllum</i>	12	Fair	Fair	Tree inaccessible. Suppressed crown	X	



- General Notes:**
- TREE LOCATIONS BASED ON SITE SURVEY.
 - SEE ARCHITECTURAL PLANS FOR SITE INFORMATION.
 - TREE INVENTORY TABLE SEE THIS SHEET.

Existing Tree Inventory

TREE ID	TREE SPECIES	SIZE (DBH)	NOTES	REMAIN/REMOVE
001	Blue Spruce	12"		Remove, Development Impacts
002	Western Red Cedar	4"		Remove, Development Impacts
003	Western Red Cedar	8"		Remove, Development Impacts
004	Blue Spruce	10"		Remove, Development Impacts
005	Western Red Cedar	8"		Remove, Development Impacts
006	Windmill Palm	10"		Remove, Development Impacts
007	Windmill Palm	6"		Remove, Development Impacts
008	Conifer (Unknown)	10"	Dead	Remove, Development Impacts
009	Holly	4"		Remove, Development Impacts
010	Sugar Maple	14"		Remove, Development Impacts
011	Cherry	14"		Remove, Development Impacts
012	Douglas Fir	24"		Remove, Development Impacts
013	Cherry	6"		Remove, Development Impacts
014	Filbert	14"		Remain
015	Douglas Fir	26"		Remain
016	Redbud	5"	Located on Property Line	Remain
017	Holly	5"	Located on Property Line	Remain
018	Thundercloud Plum	4"	Located on Property Line	Remain
019	Redbud	5"	Located on Property Line	Remain
020	Thundercloud Plum	4"	Located on Property Line	Remain
021	Red Maple	10"	Located on Adjacent Property	Remain
022	Filbert	6"		Remove, Development Impacts
023	Cherry	4"	Located on Property Line	Remain
024	Red Maple	6"	Located on Adjacent Property	Remain
025	Cherry	10"	Located on Property Line	Remain
026	Cherry	6"	Located on Property Line	Remain
027	Redbud	5"		Remove, Development Impacts
028	Douglas Fir	18", 18"	Located on Property Line	Remove, Development Impacts
029	Douglas Fir	12", 12", 12"	Located on Property Line	Remove, Development Impacts
030	Douglas Fir	36"	Located on Adjacent Property	Remain
031	Douglas Fir	36"	Located on Adjacent Property	Remain
032	Douglas Fir	36"	Located on Adjacent Property	Remain
033	Douglas Fir	24"		Remove, Development Impacts
034	Douglas Fir	24"		Remove, Development Impacts
035	Douglas Fir	12"		Remove, Development Impacts

08/22/22
Laurus Designs, LLC

 1012 Pine Street
 Silverton, Oregon
 503.784.6494

Multi-Family
Sandy
 38015 Highway 26
 Sandy, Oregon

REGISTERED
 643
PRELIMINARY
 LAURA A. ANTONSON
 OREGON
 11/16/2007
 LANDSCAPE ARCHITECT

EXISTING TREE INVENTORY

 SCALE: 1"=30'-0"
 0' 15' 30' 60'
 SCALE
 July 11th, 2022

REVISIONS

#	DATE	NOTES	INITIALS

L1.1
 SHEET 1 OF 2
 PROJECT #: 1409R

EXHIBIT I



Oregon

Kate Brown, Governor

Department of Transportation

Right of Way Section

4040 Fairview Industrial Drive SE – MS2

Salem, OR 97302

503-986-3600

Fax 503-986-3625

www.oregon.gov/odot/hwy/row

December 5, 2022

State Street Homes, Inc.
1233 NW Northrup St, STE 125
Portland, OR 97209

Files: 34604, 37134
Section: Duncan Road – Sandy
Highway: Mt. Hood
County: Clackamas

Enclosed is an Indenture of Access form which you should sign in the presence of a notary public. By signing this document you are relinquishing any interest in the access rights at Engineer's Stations 760+50 and 762+25 and the State is granting new access rights at Engineer's Station 759+85 in a width of 35 feet on the north side of the Mt. Hood Highway to serve tax lot 902 in Township 2 South, Range 4 East, Section 14AD. This reservation will be shared with tax lot 1000 to the west.

Please have the document signed and notarized. Return the original signed document to this office and I will obtain the signature of the State Right of Way Manager. Please return the signed and notarized document to the following address:

Oregon Department of Transportation
Right of Way Section – Access Research MS-2
4040 Fairview Industrial Drive SE
Salem, OR 97302-1142

After the Indenture of Access has been signed by all parties, the original document will be recorded in Clackamas County and a photocopy of the recorded document will be forwarded to you for your permanent records.

Thank you.

Damon Eliuk
Access Research Coordinator
(971) 375-8109

Files 34604, 37134
Drawing 8B-24-15

INDENTURE OF ACCESS

THIS INDENTURE, for no monetary consideration, dated this 5th day of December, 2022, by and between the **STATE OF OREGON, by and through its DEPARTMENT OF TRANSPORTATION**, hereinafter called "State", and **STATE STREET HOMES, INC., an Oregon corporation**, hereinafter called "Owner".

WHEREAS, State, by Warranty Deed recorded November 12, 1964, in Book 649, Page 126, Clackamas County Book of Deeds, acquired certain property; which Warranty Deed, in part, reserved access rights, for the service of the grantor's remaining property, to and from the North side of the Mt. Hood Highway opposite Engineer's Stations 760+50 and 762+25, both in a width of 35 feet; and

WHEREAS, Owner, by Statutory Warranty Deed recorded June 29, 2022, Instrument No. 2022-037666, Clackamas County Official Records, acquired fee title to the property affected by the access changes herein made; and

WHEREAS, by Reciprocal Access Easement and Maintenance Agreement recorded June 30, 2022, Instrument No. 2022-037782, Clackamas County Official Records, Owner acquired a property interest at Engineer's Station 759+85; and

WHEREAS, Owner has requested that Owner's access rights at Engineer's Stations 760+50 and 762+25 set out above be terminated, and that access rights be substituted, therefore, to and from the North side of the Mt. Hood Highway opposite Engineer's Station 759+85, in a width of 35 feet (New Access Rights); and

WHEREAS, State is agreeable to the granting of Owner's request.

AFTER RECORDING RETURN TO:
OREGON DEPARTMENT OF TRANSPORTATION
PROPERTY MANAGEMENT / ACCESS RESEARCH
4040 FAIRVIEW INDUSTRIAL DRIVE SE, MS#2
SALEM, OR 97302-1142

12/5/2022
Page 1 of 3 - loA
dje

Files 34604, 37134
Drawing 8B-24-15

NOW THEREFORE, THIS INDENTURE WITNESSETH, that for and in consideration of the grant herein made by State, OWNER does convey unto State, its successors and assigns, Owner's existing access rights at Engineer's Stations 760+50 and 762+25, and STATE, in consideration of the relinquishment and warranties herein made, does grant New Access Rights as set forth above unto Owner and Owner's heirs, successors and assigns.

It is understood that the New Access Rights are to be used and enjoyed in common with the property abutting to the west, described as tax lot 1000, T02S-R04E-S14AD.

It is understood that the access rights at Engineer's Stations 760+50 and 762+25, North side, will continue to serve the property abutting to the east, described as tax lot 900, T02S-R04E-S14AD.

The other remaining provisions in the above-mentioned Warranty Deed to State shall remain in full force and effect, and the access rights herein granted shall be subject to all the provisions of said Warranty Deed, as fully as if set forth herein.

The New Access Rights granted herein are subject to, and may only be exercised in accordance with, the statutes and administrative rules applicable to access control and road approaches. Such access is contingent upon issuance of an approach road permit, and no access rights may be exercised or construction of an approach road begun unless, and until, a standard Approach Road Permit application is submitted and a permit issued by the Oregon Department of Transportation. The approach road may only be constructed or maintained upon issuance of such permit and in accordance with such permit. If the State constructs the approach road during a highway project, Grantor is required to sign a standard Approach Road Permit to ensure proper operation and maintenance of the approach road.

In construing this document, where the context so requires, the singular includes the plural and all grammatical changes shall be made so that this document shall apply equally to corporations and to individuals.

IN WITNESS WHEREOF, the parties hereto have executed these presents the day and year first written above.

Files 34604, 37134
Drawing 8B-24-15

SIGNATURE PAGE 3 OF 3 AS ATTACHED TO ABOVE INDENTURE OF ACCESS DATED DECEMBER 5, 2022

**STATE OF OREGON, by and through its
DEPARTMENT OF TRANSPORTATION**

By: _____
Georgine Gleason, State Right of Way Manager

STATE OF OREGON, County of Marion

Dated _____, 20_____. Personally appeared Georgine Gleason, who being sworn, stated that she is the State Right of Way Manager for the State of Oregon, Department of Transportation, and that this document was voluntarily signed on behalf of the State of Oregon by authority delegated to her. Before me:

Notary Public for Oregon
My Commission expires _____

**STATE STREET HOMES, INC.,
an Oregon corporation**

By: _____
Brandon Tyler Gill, President

By: _____
Mark Wilde, Secretary

STATE OF OREGON, County of _____

Dated _____, 20_____. Personally appeared Brandon Tyler Gill and Mark Wilde, who, being sworn, stated that they are the President and Secretary of State Street Homes, Inc., an Oregon corporation, and that this instrument was voluntarily signed on behalf of the corporation by authority of its Board of Directors. Before me:

Notary Public for Oregon
My Commission expires _____

FIRST AMERICAN 3718844-G.R.

After Recording Return to:
State Street Homes, Inc
1233 NW Northrup St.
Suite 125
Portland, OR 97209

Until a Change is requested, all
Tax statements shall be sent to:
No Change in Tax Statements

Clackamas County Official Records		2022-037782
Sherry Hall, County Clerk		06/30/2022 09:41:02 AM
D-E	Cnt=2 Str=73 LESLIE	\$148.00
\$35.00	\$5.00 \$16.00 \$10.00 \$20.00 \$62.00	

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

WHEREAS, Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust u/a/d August 21, 2019, is the owner of that tract described in Deed Document No. 2019-061145; and

WHEREAS, State Street Homes Inc, an Oregon Domestic Business Corporation, is the owner of that tract described in Deed Document No. 2022-037666; and

WHEREAS, Paola and State Street Homes both wish to provide a mutual private access easement between Paola and State Street Homes' adjacent tracts; and

WHEREAS, Paola and State Street Homes intend that the present and future owner(s) of each tract (collectively "the tracts") shall jointly and equally share in all decisions regarding the private access, as well as the maintenance, snowplowing, and repair costs thereof.

NOW, THEREFORE, the following permanent reciprocal easement and restrictions are hereby imposed upon the tracts and lands involved:

1. A permanent, variable-width access easement is hereby created for the benefit of the tracts as described and depicted in Exhibit 'A'.
2. The easement use granted herein will be appurtenant to, and for the benefit of, both tracts. All owners of the tracts will be subject to this easement and this easement will run with the land and be a covenant binding on all future owners of the tracts and their heirs or successors (collectively the owners).
3. The easement shall be used for private road, access, and utility purposes only. This easement agreement provides an effective and convenient mechanism for the owners to jointly maintain the easement area in a reasonably safe condition, suitable for safe and efficient travel for firefighting, emergency and other public vehicles and personnel

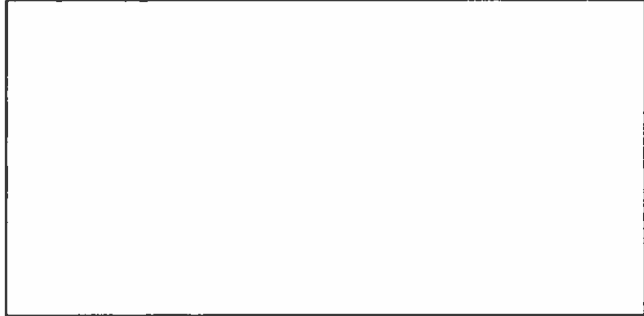
RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

First American Title Accommodation
Recording Assumes No Liability

FIRST AMERICAN 371 8844-G.R.

After Recording Return to:
State Street Homes, Inc
1233 NW Northrup St.
Suite 125
Portland, OR 97209

Until a Change is requested, all
Tax statements shall be sent to:
No Change in Tax Statements



RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

WHEREAS, Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust u/a/d August 21, 2019, is the owner of that tract described in Deed Document No. 2019-061145; and

WHEREAS, State Street Homes Inc, an Oregon Domestic Business Corporation, is the owner of that tract described in Deed Document No. 2022-037666; and

WHEREAS, Paola and State Street Homes both wish to provide a mutual private access easement between Paola and State Street Homes' adjacent tracts; and

WHEREAS, Paola and State Street Homes intend that the present and future owner(s) of each tract (collectively "the tracts") shall jointly and equally share in all decisions regarding the private access, as well as the maintenance, snowplowing, and repair costs thereof.

NOW, THEREFORE, the following permanent reciprocal easement and restrictions are hereby imposed upon the tracts and lands involved:

1. A permanent, variable-width access easement is hereby created for the benefit of the tracts as described and depicted in Exhibit 'A'.
2. The easement use granted herein will be appurtenant to, and for the benefit of, both tracts. All owners of the tracts will be subject to this easement and this easement will run with the land and be a covenant binding on all future owners of the tracts and their heirs or successors (collectively the owners).
3. The easement shall be used for private road, access, and utility purposes only. This easement agreement provides an effective and convenient mechanism for the owners to jointly maintain the easement area in a reasonably safe condition, suitable for safe and efficient travel for firefighting, emergency and other public vehicles and personnel

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

First American Title Accommodation
Recording Assumes No Liability

for public services, and delivery and business vehicles. It is intended that the easement shall permit year-round access for vehicles and foot traffic to and from Mt. Hood Hwy No. 26 (i.e. the public road) for the tracts.

4. The owners covenant and agree that the tracts shall have unobstructed right of ingress and egress over the easement area. The owners will not prohibit, restrict, limit or in any manner, interfere with the normal ingress and egress and use by way of the owner. Normal ingress and egress and use shall include use by guests, invitees, vendors, tradesmen, delivery persons, emergency service providers, or others bound to or returning from any part of either tract and having a need to use the easement area.
5. The easement shall be jointly maintained by the then-owners of the tracts, with the owner of each tract paying an equal fractional share of the reasonable costs of repairing and maintaining the private road located within the easement. No maintenance, repair, or upgrading of the private road work shall be done, however, until the owners of a majority of the tracts jointly agree on the contractor or contractors to do the work as well as what work will be done. If the owners of the tracts by majority vote cannot agree on the maintenance, alteration, repair, or upgrading work for the private road to be done or cannot agree upon the costs thereof, the owners of the tracts shall together choose one (1) arbitrator whose decision(s) regarding such item(s) shall be final and shall bind the parties. Notwithstanding anything contained in this agreement, the owner of each tract shall maintain and repair the private road access easement so as to always comply with the requirements of all applicable City of Sandy ordinances and in such a manner as to assure that the private easement is safe for travel at all times.
6. Any owner(s) or their guests, contractors, or invitees causing damage to the easement area beyond ordinary wear for commercial use (including any damage caused by construction or other equipment), will be solely responsible for the entire cost of repairs to the satisfaction of the other owners within thirty (30) calendar days of the damage.
7. No vehicle shall be parked on or within the easement, nor shall any impediment be placed, stored, or maintained on or within the easement. It is the intent of this document that the easement shall remain free and clear to allow the owners of each tract (and its invitees) to have full, unimpeded access to their respective tracts which branch off of the easement. No person shall in any way prohibit, restrict, limit, or in any matter interfere with normal ingress and egress and use of the easement (or the private road therein) by any of the other tract owners benefitted by the easement or their invitees.
8. Invalidation of any provisions of this easement by judgment or court order shall in no way effect any of the other provisions of this easement, which shall remain in full force and effect. This easement may not be amended or terminated except upon recordation

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

in the deed records of Clackamas County, Oregon, of an express written amendment, amendments or termination, as applicable, approved, signed, and acknowledged by all owners of all parcels referencing this agreement.

The true consideration for this conveyance is \$1.00, the receipt of which is hereby acknowledged.

THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

In witness whereof, the parties hereto have hereunder set their hand and seals on the day and year as set forth in their respective acknowledgments. And this easement, covenant, and restriction will be binding upon the undersigned heirs, successors, and assigns.

GRANTORS
Dated this 28th day of June 2022.

Joycelyn D. Paola
Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

Dated this 28 day of June 2022.

Brandon Gill
Brandon Gill, President of State Street Homes Inc.

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

in the deed records of Clackamas County, Oregon, of an express written amendment, amendments or termination, as applicable, approved, signed, and acknowledged by all owners of all parcels referencing this agreement.

The true consideration for this conveyance is \$1.00, the receipt of which is hereby acknowledged.

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In witness whereof, the parties hereto have hereunder set their hand and seals on the day and year as set forth in their respective acknowledgments. And this easement, covenant, and restriction will be binding upon the undersigned heirs, successors, and assigns.

GRANTORS

Dated this _____ day of _____ 20_____.

Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

Dated this 08 day of June 2022.



Brandon Gill, President of State Street Homes Inc.

=====

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

APPROVALS AND ACCEPTANCE

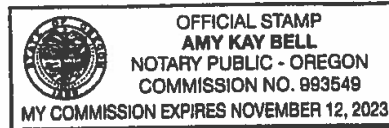
Dated this 20th day of June 2022.

Joycelyn D. Paola
Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

Dated this 28 day of June 2022.

Brandon Gill
Brandon Gill, President of State Street Homes Inc.

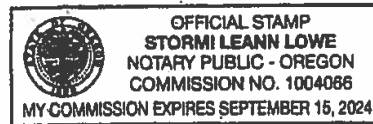
ACKNOWLEDGEMENTS



STATE OF OREGON)
COUNTY OF Clackamas ss.

This instrument was acknowledged before me on this 20th day of June, 2022 by Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust.

Amy K Bell
Notary Public for Oregon
My commission expires: 11/12/23



STATE OF OREGON)
COUNTY OF Multnomah) ss.

This foregoing instrument was acknowledged before me this 28 day of June, 2022, by Brandon Gill, President of State Street Homes Inc.

Stormi Leann Lowe
Notary Public for Oregon
My commission expires: 9-15-24

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

APPROVALS AND ACCEPTANCE

Dated this _____ day of _____ 20____.

Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

Dated this 28 day of June 2022.



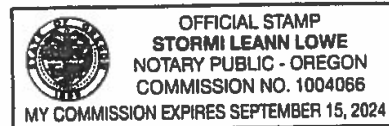
Brandon Gill, President of State Street Homes Inc.

ACKNOWLEDGEMENTS

STATE OF OREGON)
) ss.
COUNTY OF _____)

This instrument was acknowledged before me on this _____, day of _____, 20____ by Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust.

Notary Public for Oregon
My commission expires: _____



STATE OF OREGON)
) ss.
COUNTY OF Multnomah)

This foregoing instrument was acknowledged before me this 28, day of June, 2022, by Brandon Gill, President of State Street Homes Inc.

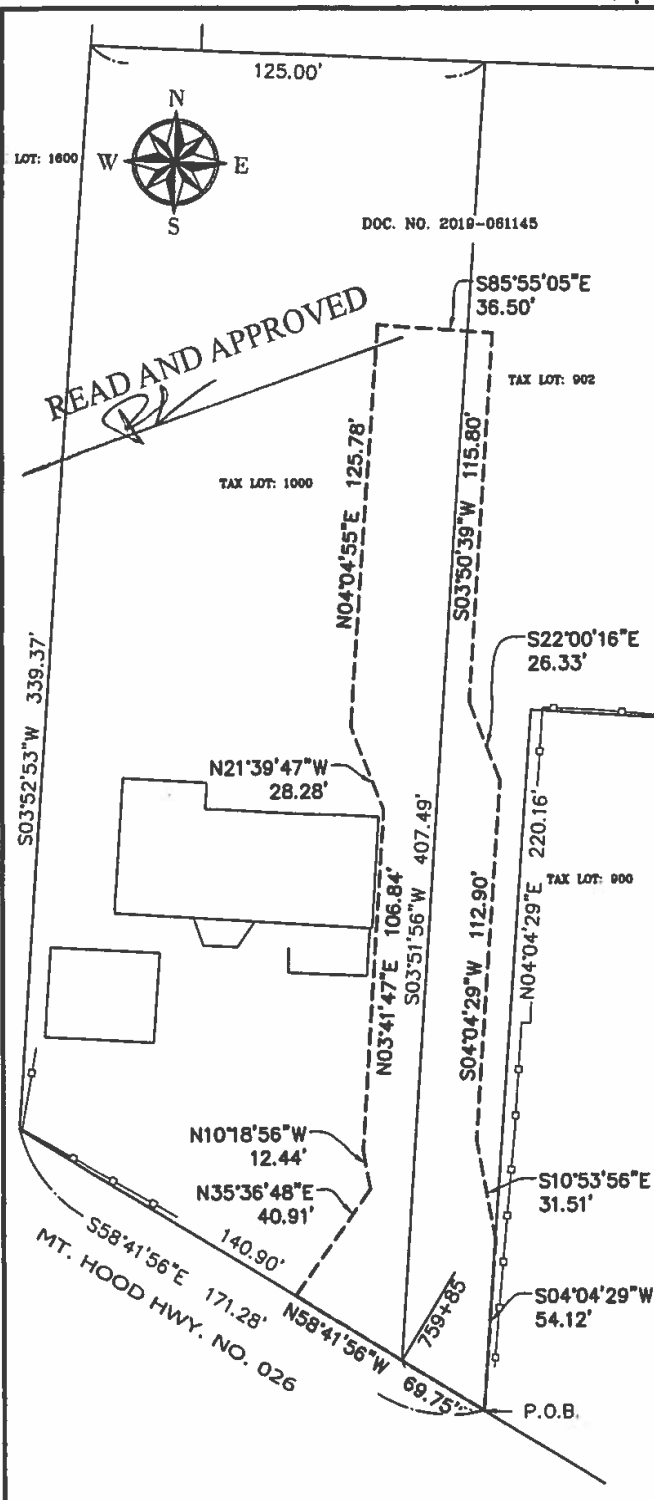


Notary Public for Oregon
My commission expires: 9-15-24

=====

RECIPROCAL ACCESS EASMENT AND MAINTENANCE AGREEMENT

EXHIBIT "A"



LEGAL DESCRIPTION

A VARIABLE WIDTH TRACT OF LAND, BEING A PART OF DOCUMENT NO. 2019-061145, CLACKAMAS COUNTY DEED RECORDS, LOCATED IN THE NE 1/4 OF SECTION 14, TOWNSHIP 2 SOUTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, CITY OF SANDY, CLACKAMAS COUNTY, OREGON, AND AS SHOWN ON THE ADJACENT MAP, AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF THAT TRACT DESCRIBED IN DEED NO. 2019-061145 (P.O.B.),
 THENCE NORTH 58°41'56" WEST 69.75 FEET ALONG THE NORTH RIGHT-OF-WAY OF MT. HOOD HWY. NO. 26;
 THENCE NORTH 35°36'48" EAST 40.91 FEET;
 THENCE NORTH 10°18'56" WEST 12.44 FEET;
 THENCE NORTH 03°41'47" EAST 106.84 FEET;
 THENCE NORTH 21°39'47" WEST 28.28 FEET;
 THENCE NORTH 04°04'55" EAST 125.78 FEET;
 THENCE SOUTH 85°55'05" EAST 36.50 FEET;
 THENCE SOUTH 03°50'39" WEST 115.80 FEET;
 THENCE SOUTH 22°00'16" EAST 26.33 FEET;
 THENCE SOUTH 04°04'29" WEST 112.90 FEET;
 THENCE SOUTH 10°53'56" EAST 31.51 FEET TO A POINT ON THE EAST PROPERTY LINE OF SAID DEED;
 THENCE ALONG SAID EAST PROPERTY LINE SOUTH 04°04'29" WEST 54.12 FEET; TO SAID POINT OF BEGINNING.

CONTAINING 12,727 SQUARE FEET/ 0.29 AC. MORE OR LESS

BASIS OF BEARING IS PER GPS OBSERVATION ON CONTROL POINTS (OR NORTH 2011)

REGISTERED
 PROFESSIONAL
 LAND SURVEYOR

Samantha Kay Tanner

OREGON
 MAY 26, 2015
 SAMANTHA KAY TANNER
 90079PLS

RENEWS 6/30/2024

SCALE: 1" = 50' ON 8.5"x11" SHEET
 PLOT DATE: 6/22/2022
 FILE NAME: 21013 EASEMENTS2.DWG

45th PARALLEL GEOMATICS, LLC
 P.O. BOX 1863, HOOD RIVER, OREGON 97031
 STANNER@45THPARALLELGEOMATICS.COM

RECIPROCAL ACCESS AND
 UTILITY EASEMENT
 EXHIBIT 'A'
 LOCATED IN THE NE 1/4 SECTION 14, TOWNSHIP 2
 SOUTH, RANGE 4 EAST, WILLAMETTE MERIDIAN

STATE STREET HOMES
 1233 NW NORTHROP STREET
 PORTLAND, OREGON 97209

1
 1

FIRST AMERICAN 371 8844-GK

After Recording Return to:
State Street Homes, Inc
1233 NW Northrup St.
Suite 125
Portland, OR 97209

Until a Change is requested, all
Tax statements shall be sent to:
No Change in Tax Statements

Clackamas County Official Records		2022-037783
Sherry Hall, County Clerk		06/30/2022 09:41:02 AM
D-E	Cnt=1 Sin=73 LESLIE	\$113.00
\$25.00	\$16.00	\$10.00
	\$62.00	

STORM SEWER EASEMENT

Grantor: Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust u/a/d August 21, 2019, owner of that tract described in Deed Document No. 2019-061145

Grantee: State Street Homes Inc, an Oregon Domestic Business Corporation, owner of that tract described in Deed Document No. 2022-037666

First American Title Accommodation
Recording Assumes No Liability

- Grant of Easement.** The above-named hereby grants and conveys an easement to the Grantee, its agents, successors and assigns, on, over and across the property legally described and depicted in attached Exhibit 'A' ("Easement Area") for the purposes set forth herein.
- Purpose of Easement.** Grantee, its agents, contractors and permittees, may use the Easement Area for the following purposes:

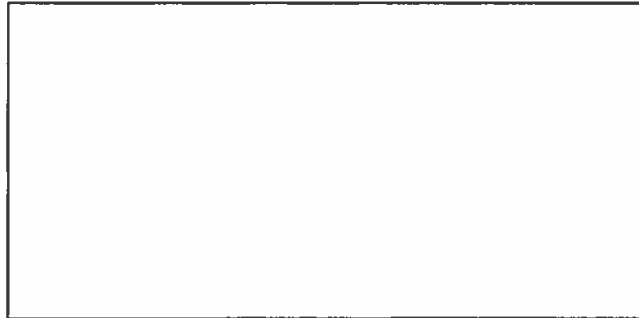
Storm Sewer: To install, construct, reconstruct, alter, improve, remove, access, repair, maintain, replace and operate a private storm sewer subject to all applicable municipal codes and regulations, together with all necessary connections and appurtenances thereto including without limitation sewer piping, manholes, access roadway, sumps, pump stations, vaults, catch basins, and inlets (collectively the "Facilities").

- Access.** Grantee shall have the right of ingress to and egress from the Easement Area over and across the Property for the purpose of installing, constructing, reconstructing, altering, improving, removing, repairing, maintaining, replacing, and operating the Facilities within the Easement Area.
- Restoration.** Promptly Following initial installation and construction of, and thereafter following any work in the Easement Area, Grantee shall, to the extent reasonably practicable, restore landscaping and surfaces and portions of the Property, including the

FIRST AMERICAN 371 8844-GK

After Recording Return to:
State Street Homes, Inc
1233 NW Northrup St.
Suite 125
Portland, OR 97209

Until a Change is requested, all
Tax statements shall be sent to:
No Change in Tax Statements



STORM SEWER EASEMENT

Grantor: Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust u/a/d August 21, 2019, owner of that tract described in Deed Document No. 2019-061145

Grantee: State Street Homes Inc, an Oregon Domestic Business Corporation, owner of that tract described in Deed Document No. 2022-0376666

First American Title Accommodation
Recording Assumes No Liability

1. **Grant of Easement.** The above-named hereby grants and conveys an easement to the Grantee, its agents, successors and assigns, on, over and across the property legally described and depicted in attached Exhibit 'A' ("Easement Area") for the purposes set forth herein.
2. **Purpose of Easement.** Grantee, its agents, contractors and permittees, may use the Easement Area for the following purposes:

Storm Sewer: To install, construct, reconstruct, alter, improve, remove, access, repair, maintain, replace and operate a private storm sewer subject to all applicable municipal codes and regulations, together with all necessary connections and appurtenances thereto including without limitation sewer piping, manholes, access roadway, sumps, pump stations, vaults, catch basins, and inlets (collectively the "Facilities").

3. **Access.** Grantee shall have the right of ingress to and egress from the Easement Area over and across the Property for the purpose of installing, constructing, reconstructing, altering, improving, removing, repairing, maintaining, replacing, and operating the Facilities within the Easement Area.
4. **Restoration.** Promptly Following initial installation and construction of, and thereafter following any work in the Easement Area, Grantee shall, to the extent reasonably practicable, restore landscaping and surfaces and portions of the Property, including the

Easement Area, affected by Grantee's work to the condition existing immediately prior to such work. All such restoration shall be performed in a workmanlike manner, in accordance with all applicable laws, ordinances and codes. All such work shall be performed as soon as reasonably possible after the completion of Grantee's work shall be coordinated with Grantor so as to cause the minimum amount of disruption to Grantor's use of the Property. Grantee shall at all times while this Easement is in effect defend, indemnify and hold Grantor, its agents and employees harmless from any work conducted in the Easement Area or Grantor's use of the Easement Area.

5. **Consideration for Easement.** The consideration for this easement is \$ 1.00, together other good and valuable consideration, the receipt of which is hereby acknowledged.
6. **Easement to Bind Successors / Amendment of Easement.** This Easement shall run with the land, shall be binding upon the Grantor's and Grantee's successors and assigns in perpetuity, and may only be modified by the Grantee and Grantor by execution of a recordable document.
7. **Interference With Easement.** Grantor may utilize the Easement area provided said use is not inconsistent or does not interfere with the Grantee's use and of the purposes of this easement. No building construction, material storage, grade reduction, or tree planting shall be permitted within the Easement without prior written approval of Grantee's Public Works Director. No other utilities, facilities, or easements shall be located within the boundaries of the Easement without prior written approval of Grantee's Public Works Director.
8. **Warranty of Title.** Grantor warrants to Grantee that Grantor has full legal and equitable title to the real property upon which this easement is granted.

THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.


GRANTOR

Dated this _____ day of _____ 20____.

Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

APPROVAL AND ACCEPTANCE

Dated this _____ day of _____ 20____.



Brandon Gill, President of State Street Homes Inc.

ACKNOWLEDGEMENTS

STATE OF OREGON)
) ss.
COUNTY OF _____)


This instrument was acknowledged before me on this _____, day of _____, 20____ by Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust.

Notary Public for Oregon
My commission expires: _____



STATE OF OREGON)
) ss.
COUNTY OF Multnomah)

This foregoing instrument was acknowledged before me this 28th day of June, 2022, by Brandon Gill, President of State Street Homes Inc.



Notary Public for Oregon
My commission expires: 9-15-24

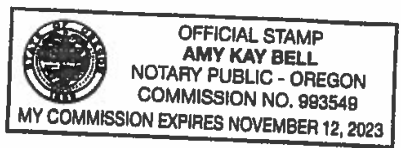
GRANTOR
Dated this 28th day of June, 2022.
Joycelyn D. Paola
Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust

APPROVAL AND ACCEPTANCE

Dated this _____ day of _____, 20____.
[Signature]
Brandon Gill, President of State Street Homes Inc.

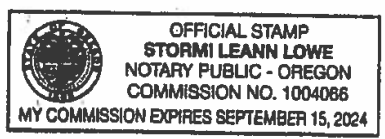
ACKNOWLEDGEMENTS

STATE OF OREGON)
COUNTY OF Clackamas ss.



This instrument was acknowledged before me on this 28th day of June, 2022 by Joycelyn D. Paola, Trustee of the J.D. Paola Revocable Living Trust.

Amy K Bell
Notary Public for Oregon
My commission expires: 11/12/23



STATE OF OREGON)
COUNTY OF Multnomah) ss.

This foregoing instrument was acknowledged before me this 28th day of June, 2022, by Brandon Gill, President of State Street Homes Inc.

Stormi Lowe
Notary Public for Oregon
My commission expires: 9-15-24

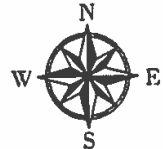
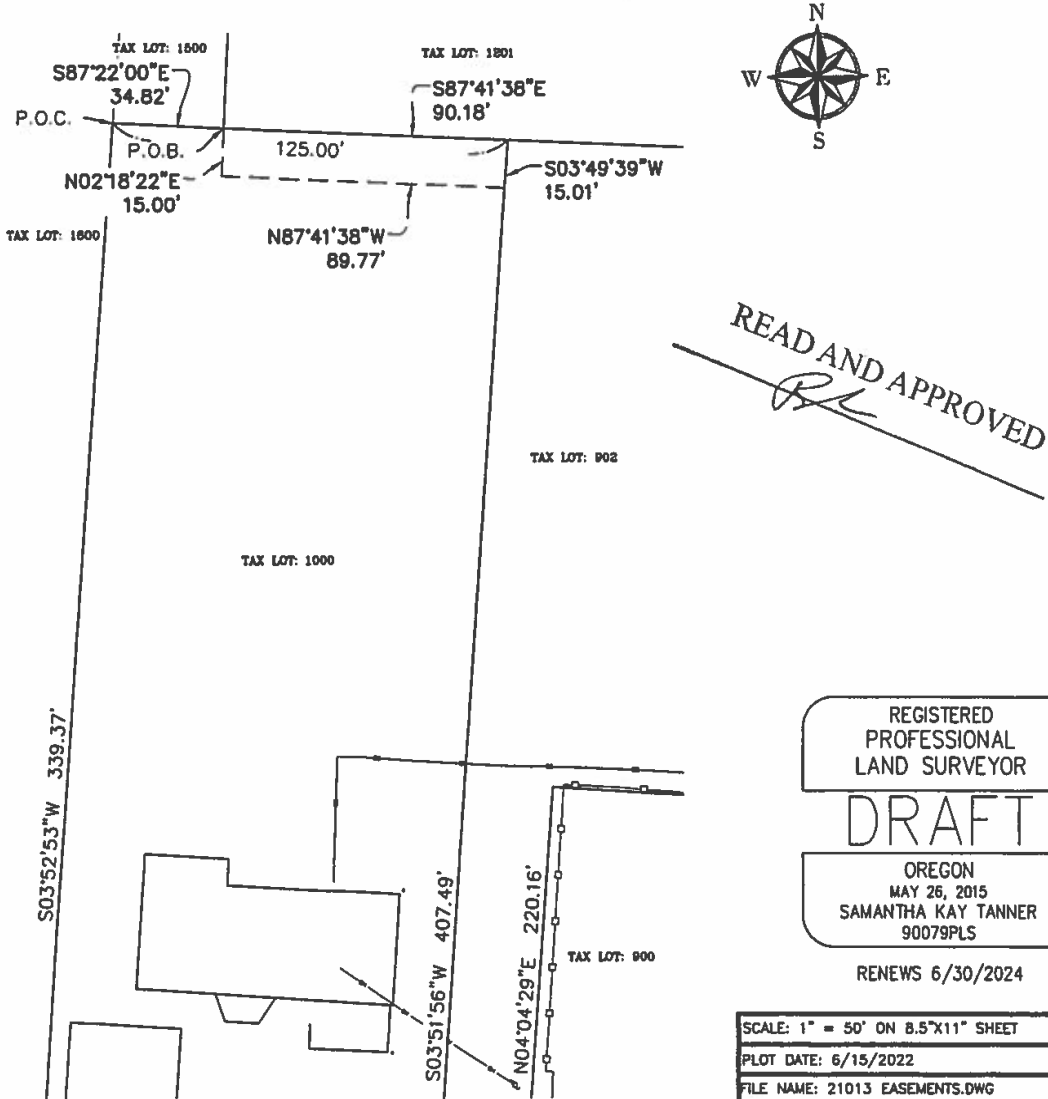
EXHIBIT "A"

LEGAL DESCRIPTION

A 15-FOOT WIDE TRACT OF LAND, BEING A PART OF DOCUMENT NO. 2019-061145, CLACKAMAS COUNTY DEED RECORDS, LOCATED IN THE NE 1/4 OF SECTION 14, TOWNSHIP 2 SOUTH, RANGE 4 EAST, WILLAMETTE MERIDIAN, CITY OF SANDY, CLACKAMAS COUNTY, OREGON, AND AS SHOWN ON THE ADJACENT MAP, AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHWEST CORNER OF THAT TRACT DESCRIBED IN DEED NO. 2019-061145 (P.O.C.), THENCE SOUTH 87°22'00" EAST 34.82 FEET ALONG THE SOUTH LINE OF THAT TRACT OF LAND DESCRIBED IN DOC. NO. 2021-076221, CLACKAMAS COUNTY DEED RECORDS TO THE SOUTHEAST CORNER THEREOF, BEING THE POINT OF BEGINNING; THENCE ALONG THE SOUTH LINE OF THAT TRACT DESCRIBED AS PARCEL 3 IN DOC. NO. 2015-018980, CLACKAMAS COUNTY DEED RECORDS SOUTH 87°41'38" EAST 90.18 FEET TO THE NORTHEAST CORNER OF THAT TRACT DESCRIBED IN BOOK 607 PAGE 739, CLACKAMAS COUNTY DEED RECORDS; THENCE SOUTH 03°49'39" WEST 15.01 FEET ALONG THE EAST LINE THEREOF; THENCE NORTH 87°41'38" WEST 89.77 FEET 15.00 FEET SOUTH OF AND PARALLEL TO SAID NORTH LINE; THENCE NORTH 02°18'22" EAST 15.00 FEET TO SAID POINT OF BEGINNING. CONTAINING 1,350 SQUARE FEET MORE OR LESS.

BASIS OF BEARING IS PER GPS OBSERVATION ON CONTROL POINTS.



READ AND APPROVED
[Signature]

REGISTERED
PROFESSIONAL
LAND SURVEYOR

DRAFT

OREGON
MAY 26, 2015
SAMANTHA KAY TANNER
90079PLS

RENEWS 6/30/2024

SCALE: 1" = 50' ON 8.5"x11" SHEET
PLOT DATE: 6/15/2022
FILE NAME: 21013 EASEMENTS.DWG

45th PARALLEL GEOMATICS, LLC <small>P.O. BOX 1863, HOOD RIVER, OREGON 97031 STANNER@45THPARALLELGEOMATICS.COM</small>	15-FOOT WIDE STORM SEWER EASEMENT EXHIBIT 'A' <small>LOCATED IN THE NE 1/4 SECTION 14, TOWNSHIP 2 SOUTH, RANGE 4 EAST, WILLAMETTE MERIDIAN</small>	STATE STREET HOMES <small>1233 NW NORTHRUP STREET PORTLAND, OREGON 97209</small>
--	--	--

EXHIBIT M



38348 Pioneer Blvd.,
Sandy, OR 97055
503-668-5569

To: Planning Commission

Date: Jan. 3, 2023

From: Rochelle Anderholm-Parsch, Parks and Recreation Director

Subject: State Street Homes

Attachments: None

I am sending this communication on behalf of the Parks and Recreation Department

City staff has reviewed the State Street Home application dated 12/29/22 and recommend a fee-in-lieu of parkland for the proposed development.

Thank you for your consideration of this matter.

Staff Contact:

Rochelle Anderholm-Parsch
Parks and Recreation Director
503-489-2157
randholmparsch@ci.sandy.or.us



SANDY FIRE DISTRICT NO. 72 Fire Prevention Division

E-mail Memorandum

To: planning@ci.sandy.or.us

From: Gary Boyles

Date: January 10, 2023

Re: File No. 22-031 DR/VAR/TREE ~ 38105 Hwy 26

This review is not intended to be a comprehensive analysis of all applicable code sections, nor shall this review nullify code requirements that are determined necessary during building permit review. Review and comments are based upon the current version of the Oregon Fire Code (OFC) as adopted by the Oregon Office of State Fire Marshal. The scope of this review is typically limited to fire apparatus access and water supply, although the applicant shall comply with all applicable OFC requirements. When buildings are completely protected with an approved automatic fire sprinkler system, the requirements for fire apparatus access and water supply may be modified as approved by the fire code official. References, unless otherwise specified, include provisions found in the Metro Code Committee's Fire Code Applications Guide, OFC Chapter 5 and Appendices B, C and D.

COMMENTS:

General

1. Construction documents detailing compliance with fire apparatus access and fire protection water supply requirements shall be provided to Sandy Fire District for review and approval concurrently with building permit submittal. All construction activities shall comply with the applicable Oregon Fire Code and the [Fire Code Application Guide](#).
2. The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction. The plan shall address the requirements found in OFC Chapter 33 and shall be made available for review by the fire code official upon request.
3. Where fire apparatus access roads or a water supply for fire protection are required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction except where approved alternative methods of protection are provided.

4. Buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property, including monument signs.
5. A key lock box for building will be required to provide access to common use areas, the fire alarm control panel(s), and the fire sprinkler riser room(s). The Fire District uses KNOX brand boxes. To order a KNOX box keyed for the Sandy Fire District, please visit Sandy Fire's website (<https://www.knoxbox.com/Products>) for ordering information.
6. Knox Box Contents. When more than one key is secured in the Knox Box, each key shall be legibly identified as to its use, utilizing a round key tag that is a minimum of 1-inch in diameter. Necessary keys provided by the building owner or business owner may include:
 - a. Main entrance door
 - b. Fire Alarm Control Panel
 - c. Alarm codes
 - d. Manual pull stations
 - e. Fire Sprinkler Control padlock/s
 - f. Mechanical rooms
 - g. Elevator control
 - h. Attic or roof access
 - i. Any other keys necessary to access building controls
7. An emergency vehicle access and maintenance agreement shall be deeded and recorded as a condition of approval
8. New buildings four or more stories above grade plane, except those with a roof slope greater than four units vertical in 12 units horizontal (33.3% slope), shall be provided with a stairway to the roof.

Fire Apparatus Access

FIRE APPARATUS ACCESS ROAD (as defined by the OFC). A road that provides fire apparatus access from a fire station to a facility, building or portion thereof. This is a general term inclusive of all other terms such as *fire lane*, public street, private street, parking lot lane and access roadway.

1. All public roads, bridges or entrances from public roads shall be subject to the applicable roadway standards for either Clackamas County or the City of Sandy.
2. Fire apparatus access roads shall be within 150 feet of all portions of the exterior walls of the first story of any building as measured by an approved route around the exterior of the building. An approved turnaround that meets the Oregon Fire Code requirements will be required if the remaining distance to an approved intersecting roadway, as measured along the fire apparatus access road, is greater than 150 feet.

3. Commercial buildings having a gross building area of more than 62,000 square feet (124,000 square feet if equipped throughout with an approved automatic sprinkler systems) shall be provided with two separated and approved fire apparatus access roads.
4. **Commercial buildings exceeding three stories or 30 feet in height shall have not fewer than two means of fire apparatus access for each building.**
5. Where two access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses.
6. Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet and an unobstructed vertical clearance of 13 feet 6 inches is to be maintained.
7. When the vertical distance between the grade plane and a building's highest roof surface exceeds 30 feet, approved aerial fire apparatus access roads shall be provided. For purposes of this requirement, the highest roof surface shall be determined by measurements to the eave of a pitched roof, the intersection of the roof to the exterior wall, or the top of parapet walls, whichever is greater. If buildings are more than 30 feet in height, as measured above, the following requirements apply:
 - a. Aerial fire apparatus access roads shall be provided and have a minimum unobstructed width of 26 feet, exclusive of shoulders or parking, in the immediate vicinity of the building or portion thereof that will accommodate aerial operations.
 - b. The aerial fire apparatus access road shall be located not less than 15 feet nor greater than 30 feet from the building and shall be positioned parallel to one entire side of the building.
 - c. The side of the building on which the aerial fire apparatus access road is positioned shall be approved by the fire code official.
 - d. Overhead utility and power lines shall not be located within the aerial fire apparatus access road or between the aerial fire apparatus access road and the building.
8. Facilities, buildings, or portions of buildings hereafter constructed shall be accessible to fire department apparatus by way of an approved fire apparatus access road with an asphalt, concrete, or other approved driving surface capable of supporting the imposed load of fire apparatus weighing up to 75,000 pounds (gross vehicle weight).
9. The inside turning radius and outside turning radius for fire apparatus access roads shall be not less than 28 feet and 48 feet respectively, measured from the same center point.
10. Where fire apparatus roadways are not of sufficient width to accommodate parked vehicles and 20 feet of unobstructed driving surface, "NO PARKING-FIRE LANE" signs shall be placed on one or both sides of the roadway and in turnarounds as needed.

Firefighting Water Supplies

1. The minimum available fire-flow and flow duration for commercial and industrial buildings shall be as specified in OFC Appendix B. In no case shall the resulting fire-flow be less than 1,500 gpm at 20 psi residual.
2. Fire flow testing will be required to determine available fire flow. Testing will be the responsibility of the applicant. Applicant to contact the City of Sandy Public Works for testing information and requirements and notify the Fire Marshal prior to fire flow testing.
3. **A minimum of one on-site fire hydrant** shall be provided near the proposed mixed-use development for firefighting operations. If distances between fire hydrants exceeds 500 feet, additional on-site fire hydrants may be required along the fire apparatus access road.
4. **Fire department connections (FDC) are required to be remote and shall be located within 100 feet of a public fire hydrant.** All FDC's shall be permanently labeled with appropriate address in which it serves and shall be accessible and visible from the fire apparatus access road.
5. The minimum number and distribution of fire hydrants shall be in accordance with City of Sandy requirements and OFC Appendix C.
6. Fire hydrants installed within the Sandy Fire District shall comply with the following requirements:
 - a. Flow requirements and location of fire hydrants will be reviewed and approved by Sandy Fire upon building permit submittal.
 - b. Each new fire hydrant installed shall be ordered in an OSHA safety red finish and have a 4-inch non-threaded metal faced hydrant connection with cap installed on the steamer port (4 ½-inch NST x 4-inch Storz Adaptor). If a new building, structure, or dwelling is already served by an existing hydrant, the existing hydrant shall also be OSHA safety red and have a 4-inch non-threaded metal faced hydrant connection with cap installed.**

NOTE:

Sandy Fire District comments may not be all inclusive based on information provided. A more detailed review may be needed for future development to proceed.

Please do not hesitate to contact Fire Marshal Gary Boyles at 503-891-7042 or fmboyles.sandyfire@gmail.com should you have any questions or concerns.



Oregon

Tina Kotek, Governor

EXHIBIT O

Department of Transportation

Transportation Region 1

123 NW Flanders St.

Portland, OR 97209-4012

(503) 731-8200

Fax: (503) 731-8259

1/13/23:

ODOT #12104

ODOT Response

Project Name: State Street Homes	Applicant: State Street Homes
Jurisdiction: City of Sandy	State Highway: US 26
Site Address: 38015 Hwy 26, Sandy, OR	

The site of this proposed land use action proposes to access US 26. ODOT has permitting authority for this facility and an interest in ensuring that this proposed land use is compatible with its safe and efficient operation. **Please direct the applicant to the District Contact indicated below to determine permit requirements and obtain application information.**

COMMENTS/FINDINGS

The applicant proposes to construct a four-story mixed-use building with 42 multifamily Residential units. The proposed development and the existing Paola’s Pizza Barn proposes to share an access from Highway 26 and the existing Pizza Barn parking lot will be reconfigured. The developer is currently working with the District 2C Office to process all documents relating to the highway access.

All alterations within the State highway right of way are subject to the ODOT Highway Design Manual (HDM) standards. Alterations along the State highway but outside of ODOT right-of-way may also be subject to ODOT review pending its potential impact to safe operation of the highway. If proposed alterations deviate from ODOT standards a Design Exception Request must be prepared by a licensed engineer for review by ODOT Technical Services. Preparation of a Design Exception request does not guarantee its ultimate approval. Until more detailed plans have been reviewed, ODOT cannot make a determination whether design elements will require a Design Exception.

Note: Design Exception Requests may take up to 3 months to process.

All ODOT permits and approvals must reach 100% plans before the District Contact will sign-off on a local jurisdiction building permit, or other necessary requirement prior to construction.

ODOT RECOMMENDED LOCAL CONDITIONS OF APPROVAL

Right of Way

- Right of way donated to ODOT as necessary to accommodate the planned cross section and ADA improvements shall be provided. The deed must be to the State of Oregon, Oregon Department of Transportation. The ODOT District contact will assist in coordinating the transfer. ODOT should provide verification to the local jurisdiction that this requirement has been fulfilled. The property owner must be the signatory for the deed and will be responsible for a certified environmental assessment of the site prior to transfer of property to the Department.

Note: It may take up to **3 months** to transfer ownership of property to ODOT.

Access to the State Highway

- A State Highway Approach Road Permit from ODOT for access to the state highway for the proposed use is required and being completed. Truck turning templates shall be provided as needed to ensure vehicles can enter and exit the approach safely. Site access to the state highway is regulated by OAR 734.51. For application information go to <http://www.oregon.gov/ODOT/HWY/ACCESSMGT/Pages/Application-Forms.aspx>.

Note: It may take **2 to 3 months** to process a State Highway Approach Road Permit.

- The applicant shall record cross-over access easements to the adjacent properties with state highway frontage with the County Assessor to facilitate future shared access. Shared access will improve highway safety by reducing potential conflicts between vehicles and between vehicles and pedestrians and bicyclists at closely spaced driveways and will implement ODOT Access Management Program goals.

Access Control

- The applicant is advised that the subject property's highway frontage is access controlled. ODOT has acquired and owns access rights to the subject property. The subject property was granted a Reservation of Access, as recorded in the property deed. Based on the reviewed material, the proposal is relocating the access and an Indenture of Access is required and being processed. If ODOT approves an Indenture of Access, it changes the terms for using the access right and any modification must be recorded in a property deed. The owner is responsible for recording the deed and for any associated costs.

Note: It may take **1 to 2 months** to process a Indenture of Access.

Permits and Agreements to Work in State Right of Way

- An ODOT Miscellaneous Permit must be obtained for all work in the highway right of way.

Please send a copy of the Notice of Decision including conditions of approval to:

ODOT Region 1 Planning
Development Review
123 NW Flanders St
Portland, OR 97209

ODOT_R1_DevRev@odot.oregon.gov

Development Review Planner: Marah Danielson	503.731.8258, marah.b.danielson@odot.oregon.gov
Traffic Contact: Avi Tayar, P.E.	503.731.8221 Abraham.tayar@odot.oregon.gov
District Contact: Robby Cox	D2CAP@odot.oregon.gov



DATE: January 17, 2023

REQUEST: State Street Homes, Transportation Review

FILE NO: 22-031/38015 Hwy 26

REVIEWER: Dock Rosenthal, PE, DKS Associates

DKS Associates has reviewed the traffic analysis letter¹ and site plan for the State Street Homes and self-storage. The proposed development application would construct 42 apartment units and 35 self-storage units at 38015 Highway 26 in Sandy, Oregon. The project site is located just north of Pioneer Boulevard (US 26) and will connect to the transportation system with direct access on US 26.

A full traffic impact analysis is not triggered based on a peak hour trip generation under the threshold for this development. The general comments and listing of recommended conditions of approval are based on a review of the traffic analysis letter and site plan.

DEVELOPMENT TRANSPORTATION IMPACT REVIEW

Key comments and issues related to the proposed development’s transportation impact analysis include:

Existing

- Traffic analysis was not included in the and is not required for a traffic analysis letter.
- Crash data from January 2016 to December 2020 was analyzed, no systemic safety issues were identified. One crash from the site access driveway was recorded over the five year period.

Future With Project Condition

- ITE Trip Generation Code 151 Mini-Warehouse and 221 Multifamily Housing (Mid-rise) were used for the trip generation estimate.
- The proposed project would result in additional vehicle trips: 16 (4 in/12 out) AM peak hour vehicle trips, 17 (11 in/6 out) PM peak hour vehicle trips and 196 weekday trips.

¹ State Street Homes, Lancaster Mobley, August 29, 2022.

- Intersection and Stopping site distance were evaluated for the site access. Intersection site distance was measured from 11 feet behind the near edge of the travel lane rather than 15 feet due to existing fence and landscaping. Intersection and stopping site distance are met.
- Access spacing standards were evaluated based on the Oregon Highway Plan and City of Sandy Transportation System Plan. Access spacing standards are not met for the site access driveway. No mitigation is recommended to meet the access spacing standard for the following reasons:
 - The site access is the only available access point for the parcel. Additional access would require the purchase of an additional parcel.
 - The site access will consolidate an existing driveway and not construct a new access point.
 - Intersection and stopping site distances are met, helping to ensure safe operation of the site access.
 - Many site access driveways along US 26 do not meet the access spacing standard, drivers along the highway are likely aware of turning vehicles from these access points.

Mitigation

- No mitigation is proposed.

RECOMMENDED CONDITIONS OF APPROVAL

The following conditions of approval are recommended based on a review of the traffic impact study and site plan:

1. The development shall contribute Transportation System Development Charges toward citywide impacts.
2. Minimum sight distance requirements shall be met at all site driveways. Sight distances should be verified in the final engineering/construction stages of development.

Memorandum

To: Emily Meharg, Associate Planner
From: AJ Thorne, Assistant Public Works Director
Re: State Street Homes 22-031

Public Works Comments

Review for this development has been completed by the City's Public Works Department and Curran McLeod Engineering. The comments are as follows:

Transportation

Under 'Utility Notes' on page 1, it should be noted that ODOT approval must be secured before constructing the new entrance on HWY 26.

It appears that the construction entrance is called out with a wash station on sheet 9. Please confirm the location and dimensions of the construction entrance.

Frontage improvements shall be made to figure 6 in the TSP for a 40 MPH speed zone. Street trees planted in the buffer should be short growth species to avoid conflict with overhead utilities. ADA compliance and 6 foot sidewalks shall be maintained across the frontage.

Sanitary Sewer

The plans and overview show potential encroachment into the sanitary sewer easement between the buildings and the property line.. The code in 17.84.90.A.2 requires the easement to be a minimum of 15 feet wide. The space between the building and the property line appears to be only 10 feet wide, although it's difficult to find a dimension. The building second story is also cantilevered, which appears to encroach even further into the existing easement. Lastly, grades are difficult to determine they do not show the depth of the sewer but the building is six or 7 feet below native ground adjacent to the sewer on the south side of the building.

Storm Sewer

Please confirm that the storm system shown is private until it outfalls to the ditch inlet. New storm lines will require an easement through each property.

Sincerely,

AJ Thorne, PE
Assistant Public Works Director
City of Sandy
503-489-2162





Todd Prager & Associates LLC

MEMORANDUM

DATE: January 19, 2023
TO: Emily Meharg (City of Sandy)
FROM: Todd Prager, RCA #597, ISA Board Certified Master Arborist
RE: Tree Preservation and Removal Review for 38105 Highway 26

This memorandum is a summary of my review of the tree preservation and removal plan for the mixed-use development proposal at 38105 Highway 26 in Sandy, Oregon.

The City of Sandy requested a third-party review of the tree preservation and removal plan for the 38105 Highway 26 mixed-use project to address the following items:

- Review the arborist report for mixed-use development proposal on the vacant flag lot east of 38015 Highway 26 (Tax Lot 902);
Provide recommendations on how to minimize the negative impact to the trees on adjacent parcels;
Provide an assessment of whether tree # 28 can be adequately protected; and
Provide a recommendation for mitigation trees in the northwest corner of the site.

My review is based on the arborist report dated September 22, 2022, by Teragan & Associates, Inc. in Attachment 1 as well as the excerpted plan set dated July 29, 2022, in Attachment 2. Note that I added the following markups on pages 7 through 9 of the arborist report in Attachment 1 and sheets 2, 3, L1.1, and L2.1 in the plan set in Attachment 2 to aid in my review:

- Potential retention tree (11-inch+ DBH and good condition)
Neighboring tree to be retained
Typical root protection zone radius of one foot per inch of DBH
Typical minimum construction setback radius of 0.5 feet per inch of DBH

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Phone: 971.295.4835 · Email: todd@toddprager.com · Website: toddprager.com

Arborist Report Review

The arborist report in Attachment 1 includes the required elements: an inventory and assessment of existing trees; tree removal and preservation recommendations based on the proposed construction impacts; and protection recommendations for the trees to be retained. However, there are a few outstanding issues that should be addressed:

1. **Sec. 17.102.50.A Tree Retention:** This code standard requires at least three trees that are at least 11-inches in trunk diameter (DBH) per acre of contiguous development to be retained. City staff has determined that based on this code standard, seven trees are required to be retained. The City of Sandy's administrative practice is to require retention trees to be in good health condition. In reviewing pages 7 and 8 of the arborist report, there are six potential retention trees at the site (trees 4, 5, 11, 28, 33, and 34, which I highlighted in yellow). Of these trees, tree 28 is proposed for retention while the remaining trees will be removed. Trees 33 and 34 do not appear practicable to retain based on their locations towards the center of the site within the proposed parking lot. However, trees 4, 5, and 11 may be possible to retain if the site access could be reconfigured. It should be clarified whether the driveway reconfiguration is an ODOT requirement, or a recommendation. Based on this clarification, a determination can be made as to whether up to four retention trees could be retained, or if only one retention tree can be retained. The balance of required retention trees could be mitigated if a variance is approved by the Planning Commission according to Sec. 17.102.70.
2. **Differing Site Plans:** The site plan included on page 9 of the arborist report is different from the site plans provided in the plan set in Attachment 2. The main differences appear to be on the east side of the site adjacent to trees 28 through 30. The site plan changes should be reviewed by the project arborist to ensure the trees will be adequately protected. Particular attention should be paid to the location of the proposed retaining wall adjacent to trees 31 and 32 (see sheet 3 in Attachment 2) and the proposed grading that potentially conflicts with the root zones of trees 28 and 29 (see sheet 7 in Attachment 2).

Protection of Trees on Adjacent Properties

I identified 21 trees on adjacent properties that are proposed to be retained and protected with development. These trees are highlighted in green on pages 7 through 9 of the arborist report and on sheets 2, 3, and L1.1 in the plan set in Attachment 2. The City of Sandy requested my recommendations on how to minimize the negative impact to these trees on adjacent properties.

The City of Sandy's administrative practice is to limit construction disturbances to no closer than a radius from a tree of 0.5 feet per inch of trunk diameter (DBH) if no more than 25 percent of the root protection zone area (estimated at one

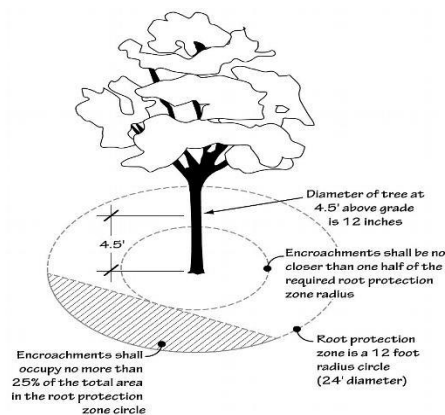


Figure 1: Typical minimum protection zone

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foot radius per inch of DBH) is impacted. Figure 1 illustrates this concept.

I included the typical root protection zone radii and typical minimum construction setback radii for the trees on neighboring properties to be retained on page 9 of Attachment 1 and sheets 2, 3, and L1.1 in the plan set in Attachment 2. In reviewing the proposed construction in relation to the typical minimum protection zones in Figure 1, there are 12 neighboring trees that do not meet the Figure 1 minimum tree protection zone (trees 2.1, 2.3, 13.2, 15, 21, 23, 24, 25, 26, 29, 31, and 32).

The following protection measures should be considered for protecting trees on the neighboring property in addition to the protection measures described in the project arborist report:

Trees 2.1, 2.3, and 13.2: Consider shifting the pedestrian pathway so it is directly adjacent to the driveway alignment at the driveway entrance adjacent to trees 2.1 and 2.3. Also, consider shifting the entire driveway further from all three trees if allowed by ODOT.

Tree 15: Consider locating utilities under the sidewalk or driveway so they are further from the tree.

Trees 21, 23, 24, 25, and 26: Trees 21, 24, 25, and 26 are nuisance species (sweet cherry, *Prunus avium*). Consider discussing removal with the tree owner rather than protecting this low value species. If the owner does not want to remove these trees, determine whether the sidewalk can be constructed without disturbing the existing grade as recommended by the project arborist. Alternative sidewalk materials should be considered if they would be less impactful to the trees' root zones. The sidewalk may also be meandered further from these trees, and potentially avoid the typical minimum construction setback radius of tree 23.

Trees 29, 31, and 32: These trees have the greatest potential to be impacted based on the sizes of the root zones and proximity of grading or retaining walls. Consider whether a retaining wall could be used to prevent grading within the typical minimum construction setback radius of tree 29. For trees 31 and 32, consider removing the parking space closest to the tree and shifting the retaining wall to the edge of the parking lot and driveway access to avoid the typical minimum construction setback radii of the trees.

Protection of Tree 28

The City of Sandy requested my opinion as to whether tree 28 can be adequately protected from construction impacts and to include a measurement of the percent of root zone that is impacted by the proposed development.

On sheet L2.1 in Attachment 2, I provided a markup of the typical root protection zone radius and typical minimum construction setback radius for tree 28. I also provided a measurement of the area of root zone impacts by the proposed construction, grading, and retaining wall in the root zone of the tree. The currently proposed impacts include grading within four feet of the tree's trunk and disturbance

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of approximately 40 percent of its root zone. This well exceeds the City's typical minimum tree protection zone in Figure 1 and will likely not provide adequate protection for tree 28.

The applicant should explore whether it is possible to construct a retaining wall as shown in the example markup on sheet L2.1 in Attachment 2 to limit root zone disturbance to less than 25 percent and limit grade changes and any construction to at least 14 feet from tree 28. If this is possible, the tree could be adequately protected.

Mitigation Tree Recommendations

If a tree retention variance is approved per Sec. 17.102.70, the applicant will be required to plant mitigation trees at a ratio of at least 2:1. If the only retention tree retained is tree 28, then mitigation would be required for six retention trees and at least 12 mitigation trees would be required to be planted. The City may require a fee-in-lieu of mitigation tree planting and/or planting trees on the 38015 Hwy 26 lot. The City noted that if trees were to be planted on the flag lot, they would likely be placed in the 1,785 square foot open lawn area in the NW corner of the flag lot. The City asked for my opinion as to how many mitigation trees (large, native, evergreen) I would recommend for that area.

As shown on sheet L2.1 in Attachment 2, there is one black gum (*Nyssa sylvatica*) proposed in that location, which has a 20- to 30-foot-wide mature crown spread. That leaves a remaining planting space of approximately 55 to 60 linear feet. I recommend no more than one to two large, native, evergreen trees to be planted in the 1,785 square foot open lawn area to avoid excessive competition over time between trees growing in that location.

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Conclusion

Based on my review of the tree preservation and removal plan for the mixed-use development proposal at 38105 Highway 26, I recommend the following:

- Consider whether site plan and/or construction modifications are possible to retain additional retention trees, and increase protections for certain offsite trees and onsite tree 28;
- Have the design team work with their project arborist to ensure any site plan modifications will provide adequate tree protection; and
- Plant no more than one to two mitigation trees in the open lawn area in the northwest corner of the site.

Please contact me if you have questions, concerns, or need any additional information.

Sincerely,



Todd Prager

*ASCA Registered Consulting Arborist
ISA Board Certified Master Arborist, WE-6723B
ISA Qualified Tree Risk Assessor
AICP, American Planning Association*

Attachment 1 – Project Arborist Report with Redlines

Attachment 2 – Excerpted Plan Set with Redlines

*Todd Prager & Associates, LLC
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Third Party Review for 38015 Hwy 26
Emily Meharg, City of Sandy

January 19, 2023
Page 5 of 28



9/22/2022

Emily Moran
State Street Homes
123 NW Northrup St #125
Portland, OR 97209

Re: Tree Protection Plan for 38015 HWY 26, Sandy, Oregon

Summary

The property at 38015 Hwy 26 in Sandy, Oregon is planned for development and the construction of a 48,811 square foot, four-story building. Also planned is a parking lot with seventy-six spaces, and a shared access road on the west side of the property.

Assignment

Prepare a Tree Protection Plan to meet the requirements outlined in the City of Sandy Code 17.102.

Observations

A tree inventory of the undeveloped site was completed on 9/20/2022. All trees on the property were included in the inventory, as well as trees on adjacent properties which may be impacted by the planned construction. Twenty-four (24) trees will be impacted by site disturbance and are recommended for removal. Twenty-two (22) trees bordering the property are recommended to be retained and protected due to their location on neighboring properties and/or their health and structure.

Discussion

The proposed changes to the site will be within the critical root zones of existing trees. Existing asphalt will be removed and replaced, and new sidewalk will be excavated and poured. Twenty-four (24) trees are recommended for removal to accommodate the new construction. It is not possible to retain these trees with the proposed development. Twenty-two (22) trees around the outside of the of the planned construction shall be protected as outlined in the tree protection plan (Appendix 5). The trees to be retained and protected are near the property lines and in some cases on adjacent properties. Tree protection zones shall be fenced during the duration of the project and no changes to the native soil in these areas is planned.

As outlined in Appendix 5, the project arborist shall be onsite during excavation within the critical root zones of retained trees 13.2, 14, 15, 21, 23, 24, 25, 26, 28, 29, 31, and 32. The project consulting arborist shall evaluate and oversee the proper cutting of roots with sharp cutting tools. If many significant roots are encountered during excavation in the zones highlighted in Appendix 5, an alternative layout for areas requiring excavation should be considered to maintain the health and safety of retained trees. Alternate methods of construction may also be necessary for the preservation of significant roots of retained trees. Other construction methods include but are not limited to: bridging over significant roots, constructing sidewalks on top of grade over landscape fabric without excavation, and using post and beam construction instead of conventional footing foundations within the critical root zone.

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

Recommendations

Based on the proposed development, my observations, and requirements of the proposed development at 38015 Hwy 26, I recommend the following actions:

1. **Tree protection fencing.** Tree protection fencing that is a minimum of six-feet tall and chain link shall be installed per the tree protection plan (Appendix 5).
 - a. Tree protection fencing is to be installed before any ground disturbing activities and remain in place for the duration of the project, or a planning official approves removal.
 - b. Tree protection is not to be moved without written consent from the project arborist.
2. **Tree removal.** Remove twenty-four (24) trees negatively impacted by site improvements.
3. **Report sharing.** Share this report in its entirety to the project team, including contractors performing demolition and concrete work.

Additional tree protection recommendations for the trees to be retained are included in Appendix 3, Tree Protection Specifications.

Conclusion

The proposed renovation to the north of the north parking lot will require the removal of twenty-four (24) trees. Tree protection fencing shall be installed for the twenty-two (22) trees near or over the property line on adjacent properties that may be impacted by site disturbance. The project arborist shall be present during excavation within the critical root zones outlined in Appendix 5. This report meets the requirements outlined in the City of Sandy Code 17.102.

Please contact me if you have questions, concerns, or need any additional information.

Sincerely,

Caleb Lattimer

Caleb Lattimer
ISA Certified Arborist®, PN-8644A
ISA Tree Risk Assessment Qualified
caleb@teragan.com

Enclosures:

- Appendix 1: Certification of Performance
- Appendix 2: Assumptions and Limiting Conditions
- Appendix 3: Tree Protection Specifications
- Appendix 4: Tree Inventory
- Appendix 5: Tree Protection Plan

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

Appendix 1: Certification of Performance

I, Caleb Lattimer, certify:

- That a representative of Teragan & Associates, Inc., has inspected the tree(s) and/or the property referred to in this report. The extent of the evaluation is stated in the attached report.
- That Teragan & Associates, Inc. has no current or prospective interest in the vegetation of the property that is the subject of this report, and Teragan & Associates, Inc. has no personal interest or bias with respect to the parties involved.
- That Teragan & Associates, Inc.'s compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party, or upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.
- That the analysis, opinions, and conclusions that were developed as part of this report have been prepared according to commonly accepted arboricultural practices.
- That a Board-Certified Master Arborist has overseen the gathering of data.

Appendix 2: Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Teragan and Associates, Inc. checked the species identification and tree diameters in the field.
2. It is assumed that this property is not in violation of any codes, statutes, ordinances, or other governmental regulations.
3. The consultant is not responsible for information gathered from others involved in various activities pertaining to this project. Care has been taken to obtain information from reliable sources.
4. Loss or alteration of any part of this delivered report invalidates the entire report.
5. Drawings and information contained in this report may not be to scale and are intended to be used as display points of reference only.
6. The consultants' role is only to make recommendations. Inaction on the part of those receiving the report is not the responsibility of the consultant.
7. This report is to certify the trees that are on site, their size and condition and create a tree plan. Tree plan to include the measures necessary to protect trees that are to be retained during the construction process.

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

Third Party Review for 38015 Hwy 26
Emily Meharg, City of Sandy

January 19, 2023
Page 8 of 28

Appendix 3: Tree Protection Specifications

It is critical that the following steps be taken to ensure that trees slated for retention are protected.

Before Construction Begins

- 1. Tree removals** within the tree protection area.
 - a. Prior to construction, allow tree removal within the tree protection area to occur.
 - i. The project arborist shall oversee the removal of any trees within the tree protection zone.
 - b. Installing tree protection fencing immediately following the removal of trees within the tree protection area (see 3 below). Tree protecting shall be installed after removals to ensure:
 - i. Tree removals are performed safely.
 - ii. Tree protection fencing is not accidentally or intentionally moved.
- 2. Notify all contractors of the tree protection procedures.** For successful tree protection on a construction site, all contractors must know and understand the goals of tree protection. It can only take one mistake with a misplaced trench or other action to destroy the future of a tree.
 - a. Hold a Tree Protection meeting with all contractors to fully explain goals of tree protection.
 - b. Have all sub-contractors sign memoranda of understanding regarding the goals of tree protection. Memoranda to include penalty for violating tree protection plan. Penalty to equal appraised value of tree(s) within the violated tree protection zone per the current Trunk Formula Method as outline by the Council of Tree & Landscape Appraisers current edition of the *Guide for Plant Appraisal*. Penalty is to be paid to owner of the property.
- 3. Fencing.**
 - a. Establish fencing around each tree or grove of trees to be retained.
 - b. The fencing is to be put in place before the ground is cleared in order to protect the trees and the soil around the trees from any disturbance at all.
 - c. Fencing is to be placed at the edge of the root protection zone. Root protection zones are to be established by the project arborist based on the needs of the site and the tree to be protected.
 - d. Fencing is to consist of 6-foot high chainlink fence secured to the ground with metal posts every ten feet to prevent it from being moved by contractors, sagging or falling down OR as required by municipal code.
 - e. Fencing is to remain in the position that is established by the project arborist and not to be moved without written permission from the project arborist until the end of the project.
- 4. Signage**
 - a. All tree protection fencing should have signage as follows so that all contractors understand the purpose of the fencing:

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
E: info@teragan.com | O: 503.697.1975

VEGETATION/TREE PROTECTION ZONE

DO NOT REMOVE OR ADJUST THIS FENCING.

The fence locations are approved to protect vegetation & trees.

NOTE: Moving these fences is a civil violation.

Please contact the Code Enforcement Specialist and project arborist if alterations to the approved location of the protection fencing is requested.

Project Arborist: TERAGAN & ASSOCIATES, INC 503-697-1975

- b. Signage should be placed as to be visible from all sides of a tree protection area and spaced every 75 feet.

During Construction

1. Protection guidelines Within the Root Protection Zone

- a. No traffic shall be allowed within the root protection zone. No vehicle, heavy equipment, or even repeated foot traffic.
 - b. No storage of materials including but not limiting to soil, construction material, or waste from the site.
 - i. Waste includes but is not limited to concrete wash out, gasoline, diesel, paint, cleaner, thinners, etc.
 - c. Construction trailers are not to be parked / placed within the root protection zone without written clearance from project arborist.
 - d. No vehicles shall be allowed to park within the root protection areas.
 - e. No activity shall be allowed that will cause soil compaction within the root protection zone.
- 2. Tree pruning.** The trees shall be protected from any cutting, skinning or breaking of branches, trunks or roots.
- 3. Root pruning.** Any roots that are to be cut from existing trees that are to be retained, the project consulting arborist shall be notified to evaluate and oversee the proper cutting of roots with sharp cutting tools. Cut roots are to be immediately covered with soil or mulch to prevent them from drying out.
- 4. Grade changes.** No grade change should be allowed within the root protection zone.
- 5. Root protection zone changes.** Any necessary deviation of the root protection zone shall be cleared by the project consulting arborist or project owner.
- 6. Watering.** Provide water to trees during the summer months. Tree(s) that will have had root system(s) cut back will need supplemental water to overcome the loss of ability to absorb necessary moisture during the summer months.
- 7. Utilities.** Any necessary passage of utilities through the root protection zone shall be by means of tunneling under roots by hand digging or boring.

After Construction

- 1. Landscaping.** Carefully landscape in the area of the tree. Do not allow trenching within the root protection zone. Carefully plant new plants within the root protection zone. Avoid cutting the roots of the existing trees.

Teragan & Associates, Inc.
3145 Westview Circle, Lake Oswego, OR 97034
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Attachment 1

2. **Irrigation.** Do not plan for irrigation within the root protection zone of existing trees unless it is drip irrigation for a specific planting or cleared by the project arborist.
3. **Drainage.** Provide for adequate drainage of the location around the retained trees.
4. **Tree pruning.** Pruning of the trees should be completed as one of the last steps of the landscaping process before the final placement of trees, shrubs, ground covers, mulch, or turf.
5. **Pest and disease inspection.** Provide for inspection and treatment of insect and disease populations that can damage the retained trees and plants.
6. **Fertilization.** Trees that are retained may need to be fertilized as called for by project arborist after final inspection.

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Third Party Review for 38015 Hwy 26
Emily Meharg, City of Sandy

January 19, 2023
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Survey Number	Common Name	Scientific Name	DBH	Condition Health	Condition Structure	Field Notes/ Comments	Remove	Retain
001	Colorado blue spruce	<i>Picea pungens</i>	14	Poor	Poor		X	
002	western red cedar	<i>Thuja plicata</i>	6	Fair	Good		X	
002.1	Douglas-fir	<i>Pseudotsuga menziesii</i>	8	Good	Good	Tree may be on property to east		X
002.2	Douglas-fir	<i>Pseudotsuga menziesii</i>	6	Good	Good	Tree may be on property to east		X
002.3	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	Good	Good	Tree on property to east. Obvious large surface roots at 8' from base of tree.		X
002.4	English holly	<i>Ilex aquifolium</i>	4	Good	Good	Tree may be on property to east		X
003	western red cedar	<i>Thuja plicata</i>	8	Fair	Good		X	
004	Colorado blue spruce	<i>Picea pungens</i>	12	Good	Good		X	
004.1	Colorado blue spruce	<i>Picea pungens</i>	10	Good	Good		X	
005	western red cedar	<i>Thuja plicata</i>	11	Good	Good		X	
006	windmill palm	<i>Trachycarpus fortunei</i>	6	Good	Good		X	
006.1	Japanese maple	<i>Acer japonica</i>	2				X	
007	windmill palm	<i>Trachycarpus fortunei</i>	10	Good	Good	Tree on property to west	X	
008	western red cedar	<i>Thuja plicata</i>	10	Poor	Fair	Tree on property to west	X	
009	English holly	<i>Ilex aquifolium</i>	4	Good	Good	Tree on property to west	X	
010	sugar maple	<i>Acer saccharum</i>	16	Fair	Fair		X	
010.1	rhododendron	<i>Rhododendron</i>	4	Good	Good		X	
011	Norway spruce	<i>Picea abies</i>	15	Good	Good		X	
011.1	Japanese andromeda	<i>Pieris japonica</i>	3	Fair	Fair		X	
012	golden chain tree	<i>Laburnum anagyroides</i>	7	Fair	Fair	Sweeping trunk at base, codominant stems at 3'	X	
013	photinia	<i>Photinia serratifolia</i>	6	Good	Good		X	
013.1	photinia	<i>Photinia serratifolia</i>	6	Fair	Fair		X	
013.2	bigleaf maple	<i>Acer macrophyllum</i>	23	Poor	Poor	Tree may be on property to east. Thin crown		X
014	photinia	<i>Photinia serratifolia</i>	12	Good	Fair	Decay at base, tree may be on property line.		X
015	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good	Good	Tree on neighboring property to east		X
016	golden chain tree	<i>Laburnum anagyroides</i>	8	Poor	Poor	Tree on property to east. Significant decay in stem.		X
017	thundercloud plum	<i>Prunus cerasifera</i>	6	Fair	Fair	Tree on property to east		X
018	golden chain tree	<i>Laburnum anagyroides</i>	9	Fair	Fair	Tree on property to east		X

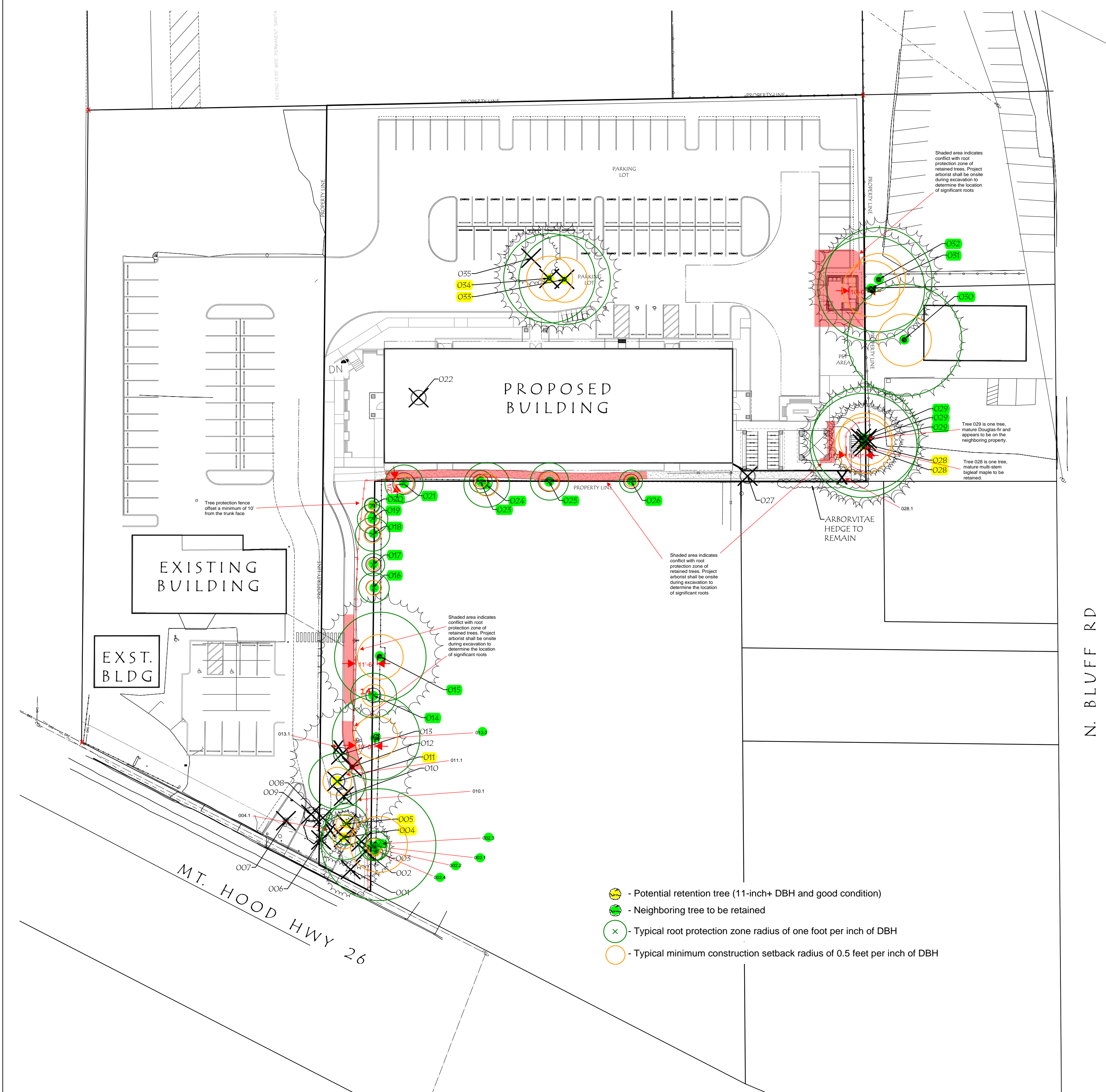
● - Potential retention tree (11-inch DBH and good condition)

● - Neighboring tree to be retained

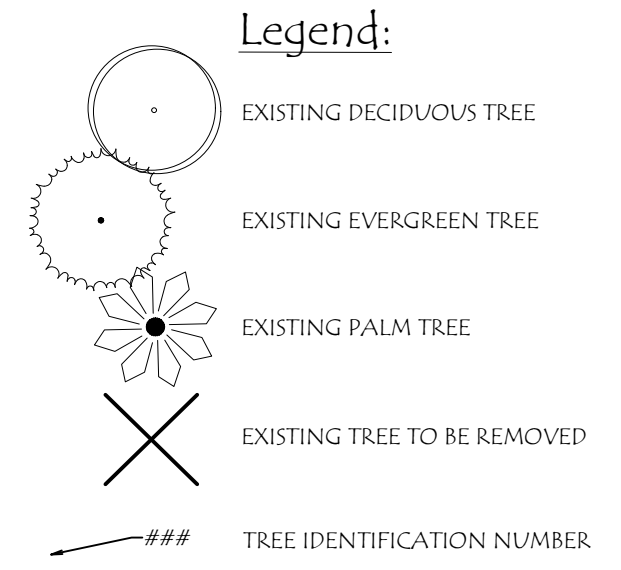
Survey Number	Common Name	Scientific Name	DBH	Condition Health	Condition Structure	Field Notes/ Comments	Remove	Retain
019	golden chain tree	<i>Laburnum anagyroides</i>	8	Fair	Fair	Tree on property to east. Significant decay in stem		X
020	thundercloud plum	<i>Prunus cerasifera</i>	4	Fair	Fair	Tree on property to east		X
021	sweet cherry	<i>Prunus avium</i>	10	Poor	Poor	Tree on property to south. Thin crown with ivy in crown		X
022	sweet cherry	<i>Prunus avium</i>	6	Good	Good		X	
023	cascara	<i>Frangula pershiana</i>	6	Good	Good	Tree on property to south		X
024	sweet cherry	<i>Prunus avium</i>	12	Fair	Fair	Tree on property to south		X
025	sweet cherry	<i>Prunus avium</i>	10	Poor	Fair	Tree on property to south.		X
026	sweet cherry	<i>Prunus avium</i>	6	Poor	Poor	Stem originates on neighboring property		X
027	sweet cherry	<i>Prunus avium</i>	6	Poor	Poor	Tree appears to be on property to be developed	X	
028	bigleaf maple	<i>Acer macrophyllum</i>	28	Good	Fair	Multiple stems at base. Deadwood in crown		X
028.1	English holly	<i>Ilex aquifolium</i>	4	Fair	Fair	Tree appears to be on property to be developed	X	
029	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Retain. Tree on property to east		X
030	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Tree on property to east		X
031	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	Good	Good	Tree on property to east		X
032	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	Good	Good	Tree on property to east		X
033	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good	Fair	Tree base inaccessible. Branches at ground level	X	
034	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	Good	Fair	Tree base inaccessible. Branches at ground level	X	
035	bigleaf maple	<i>Acer macrophyllum</i>	12	Fair	Fair	Tree inaccessible. Suppressed crown	X	

● - Potential retention tree (11-inch+ DBH and good condition)

● - Neighboring tree to be retained



- Potential retention tree (11-inch+ DBH and good condition)
- Neighboring tree to be retained
- Typical root protection zone radius of one foot per inch of DBH
- Typical minimum construction setback radius of 0.5 feet per inch of DBH



General Notes:

- TREE LOCATIONS BASED ON SITE SURVEY.
- SEE ARCHITECTURAL PLANS FOR SITE INFORMATION.
- TREE INVENTORY TABLE SEE THIS SHEET.

Attachment 1

Existing Tree Inventory

TREE ID	TREE SPECIES	SIZE (DBH)	NOTES	REMAIN/REMOVE
001	Blue Spruce	12"		Remove, Development Impacts
002	Western Red Cedar	4"		Remove, Development Impacts
003	Western Red Cedar	8"		Remove, Development Impacts
004	Blue Spruce	10"		Remove, Development Impacts
005	Western Red Cedar	8"		Remove, Development Impacts
006	Windmill Palm	10"		Remove, Development Impacts
007	Windmill Palm	6"		Remove, Development Impacts
008	Conifer (Unknown)	10"	Dead	Remove, Development Impacts
009	Holly	4"		Remove, Development Impacts
010	Sugar Maple	14"		Remove, Development Impacts
011	Cherry	14"		Remove, Development Impacts
012	Douglas Fir	24"		Remove, Development Impacts
013	Cherry	6"		Remove, Development Impacts
014	Filbert	14"		Remain
015	Douglas Fir	26"		Remain
016	Redbud	5"	Located on Property Line	Remain
017	Holly	5"	Located on Property Line	Remain
018	Thundercloud Plum	4"	Located on Property Line	Remain
019	Redbud	5"	Located on Property Line	Remain
020	Thundercloud Plum	4"	Located on Property Line	Remain
021	Red Maple	10"	Located on Adjacent Property	Remain
022	Filbert	6"		Remove, Development Impacts
023	Cherry	4"	Located on Property Line	Remain
024	Red Maple	6"	Located on Adjacent Property	Remain
025	Cherry	10"	Located on Property Line	Remain
026	Cherry	6"	Located on Property Line	Remain
027	Redbud	5"		Remove, Development Impacts
028	Douglas Fir	18", 18"	Located on Property Line	Remove, Development Impacts
029	Douglas Fir	12", 12", 12"	Located on Property Line	Remove, Development Impacts
030	Douglas Fir	36"	Located on Adjacent Property	Remain
031	Douglas Fir	36"	Located on Adjacent Property	Remain
032	Douglas Fir	36"	Located on Adjacent Property	Remain
033	Douglas Fir	24"		Remove, Development Impacts
034	Douglas Fir	24"		Remove, Development Impacts
035	Douglas Fir	12"		Remove, Development Impacts

08/22/22
Laurus Designs, LLC

 1012 Pine Street
 Silverton, Oregon
 503.784.6494

Multi-Family Sandy
 38015 Highway 26
 Sandy, Oregon

REGISTERED
 643
PRELIMINARY
 LAURA A. ANTONSON
 OREGON
 11/16/2007
 LANDSCAPE ARCHITECT

EXISTING TREE INVENTORY

 SCALE: 1"=30'-0"
 0' 15' 30' 60'
 SCALE
 July 11th, 2022

REVISIONS

#	DATE	NOTES	INITIALS

L1.1
 SHEET 1 OF 2
 PROJECT # 1402R
 January 19, 2023
 Page 14 of 28

SITE PLAN & DESIGN REVIEW

MIXED USE DEVELOPMENT

Attachment 2

38105 Hwy 26, Sandy OR

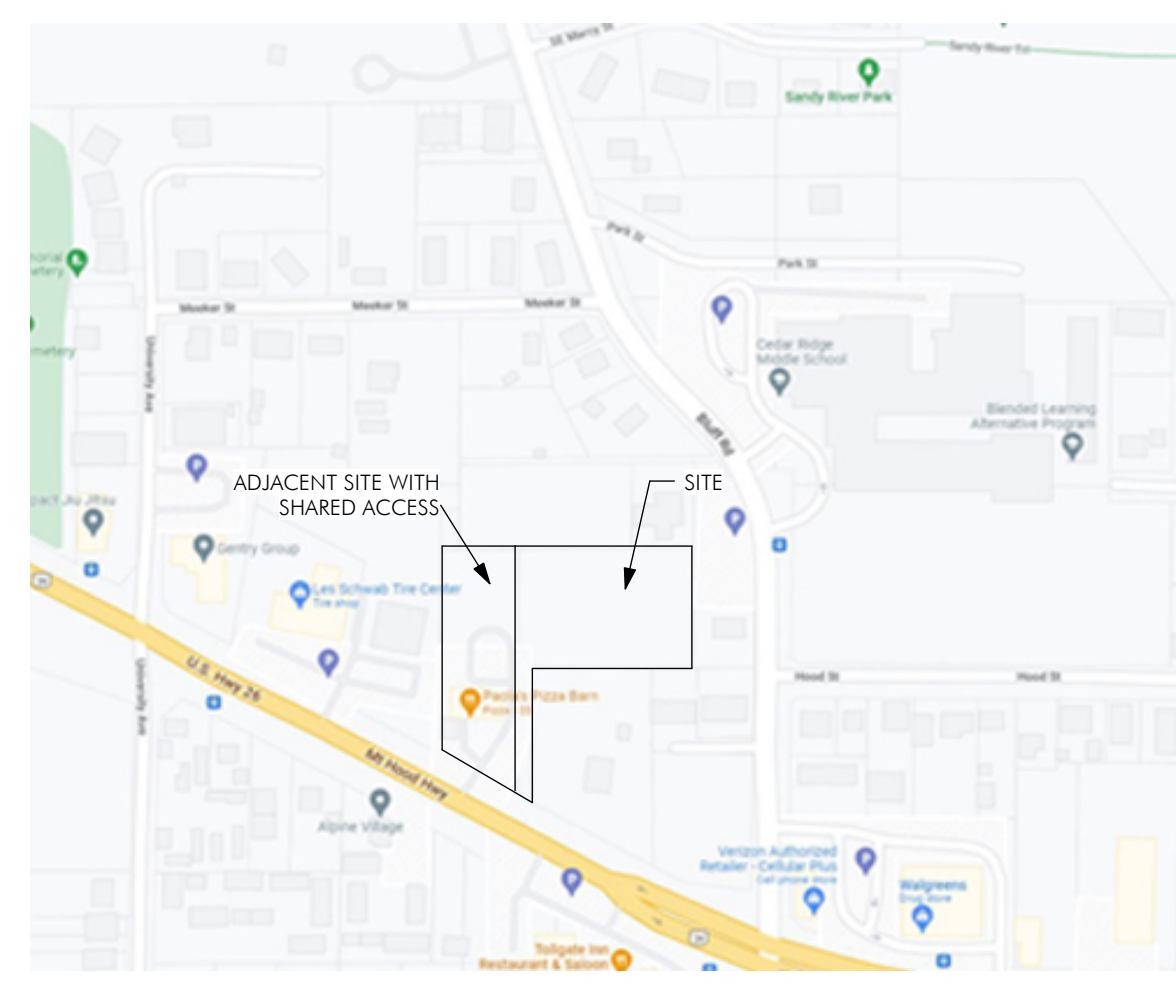


IN THE EVENT CONFLICTS ARE DISCOVERED BETWEEN THE ORIGINAL SIGNED AND SEALED DOCUMENTS PREPARED BY THE ARCHITECTS AND/OR THEIR CONSULTANTS, AND ANY COPY OF THE DOCUMENTS TRANSMITTED BY MAIL, FAX, ELECTRONICALLY OR OTHERWISE, THE ORIGINAL SIGNED AND SEALED DOCUMENTS SHALL GOVERN.

PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS

VICINITY MAP:



AERIAL PHOTO:



DRAWINGS LIST:

- GENERAL
- G0.01 COVER SHEET
- CIVIL
- C1 COVER SHEET AND NOTES
- C2 EXISTING CONDITIONS AND DEMO PLAN
- C3 COMPOSITE SITE PLAN
- C4 ENTRY UTILITY PLAN
- C5 SITE UTILITY PLAN
- C6 STORMWATER EXTENSION PLAN
- C7 GRADING AND ESC PLAN
- C8 WALL CROSS SECTIONS
- C9 ENTRY GRADING PLAN
- C10 CIVIC AREA GRADING PLAN
- C11 ESC NOTES AND DETAILS
- C12 SITE CIRCULATION PLAN
- LANDSCAPE
- L1.1 EXISTING TREE INVENTORY
- L2.1 PRELIMINARY PLANTING PLAN
- ARCHITECTURAL
- A1.01 SITE PLAN
- A1.02 ENLARGED SITE PLAN
- A1.03 TRASH ENCLOSURE
- A1.04 BICYCLE ENCLOSURE
- A1.05 GAZEBO
- A1.21 FLOOR PLAN - LEVEL 01
- A1.22 FLOOR PLAN - LEVELS 02-04
- A1.23 FLOOR PLAN - ROOF
- A2.01 ELEVATIONS
- A2.02 ELEVATIONS

PROJECT TEAM:

- OWNER:**
State Street Homes, Inc.
Brandon Gill
1233 NW Northrup St. #135
Portland, OR 97209
P: 503.954.8545
E: Brandon@statestreet-homes.com
- ARCHITECT:**
STUDIO 3 ARCHITECTURE, Inc.
Gene Bolante
275 Court Street St. NE
Salem OR 97301
P: 503.390.6500
E: Gene@studio3architecture.com
- LANDSCAPE:**
Laurus Designs, LLC
Lauara Antonson
1012 Pine St.
Silverton, OR 97381
P: 503.784.6494
E: laura@laurusdesigns.com
- CIVIL ENGINEER:**
Firwood Design Group
Kelli Grover
359 E. Historic Columbia River HW
Troutdale, OR 97060
P: 503.668.3737
E: kg@firwooddesign.com

SYMBOL LEGEND:

- ELEVATION DATUM:**
- 100.00 F.F.E. ELEVATION
 - ELEVATION DATUM LOCATION:
- SECTION REFERENCE:**
- FILLED ARROW DENOTES BUILDING SECTION
 - OPEN ARROW DENOTES WALL SECTION/DETAIL
 - DETAIL NUMBER
 - SHEET NUMBER
 - SIDE NOTE IF REQUIRED
- ELEVATION REFERENCE:**
- ELEVATION NUMBER OR DESIGNATION AS OCCURS
 - SHEET NUMBER
- DETAIL REFERENCE:**
- DETAIL NUMBER
 - SHEET NUMBER
 - SIDE NOTE IF REQUIRED
 - DETAIL CUT LOCATION IF SHOWN
- WINDOW TYPE:**
- REFER TO WINDOW ELEVATIONS SHOWN ON DRAWINGS AS.1X
- DOOR NUMBER:**
- DOOR SIZE OR NUMBER
- PLAN NOTE DESIGNATION:**
- PLAN OR SIDE NOTE NUMBER
 - MARK OR DIAGONAL NOTE NUMBER
 - REVISION NUMBER
- ROOM TITLE + NUMBER:**
- ROOM NAME
 - ROOM NUMBER
- WALL TYPE MARK:**
- WALL OR PARTITION CONSTRUCTION TYPE. SEE LEGEND.

NEW MULTI-FAMILY DEVELOPMENT

SANDY

38015 Hwy 26, Sandy, OR

SHEET:
G0.01
COVER SHEET

Attachment 2

AS-BUILT NOTES

- 1 GRAVEL PARKING AREA USED FOR DELIVERY SEMIS WITH 35' TRAILER TURNING AND LARGE VEHICLE PARKING.
- 2 STORM DRAIN IN PAVED PARKING LOT.
- 3 PAVED PARKING AREA WITH VERY FADED PARKING LINES.
- 4 NEAREST DRIVEWAY APPROACH
- 5 EXISTING POND LANDSCAPE FEATURE WITH STONE BORDER AND SMALL PATH. SEVERAL ELECTRICAL OUTLETS IN THE AREA TO THE EAST.
- 6 EXISTING PAOLA'S PIZZA SIGN.
- 7 NEWER 6-FOOT WOOD FENCE BELONGING TO DEPRO.
- 8 OLD 2-FOOT WOOD DECORATIVE FENCE RUNS ALONG FRONTAGE ON BOTH SIDES OF APPROACH.
- 9 EXISTING SANITARY SEWER MANHOLE LID.
- 10 TREE DRIP LINE.
- 11 UNDERGROUND POWER TO GRABER RESIDENCE. LOCATION NOT VERIFIED. INFORMED OF ITS EXISTENCE VIA GRABER AND TOLD IT IS 9' UNDERGROUND.
- 12 NORTHERN MOST LINE OF CENTER TURN LANE.
- 13 FOG LINE.
- 14 BIKE LANE.
- 15 6-FOOT CHAINLINK FENCE.
- 16 3-FOOT WELDED WIRE FENCE WITH GATE JUST WEST OF MANHOLE LID.

CONTOURS: 1' MINOR AND 5' MAJOR

FIELD WORK CONDUCTED ON JULY 14 AND 15, 2021. WATER AND SEWER LOCATES WERE NOT MARKED AT THE TIME OF SURVEY. SEE CITY MAP.

THIS DOES NOT CONSTITUTE A FORMAL BOUNDARY SURVEY. THIS BOUNDARY IS BASED ON A BEST FIT OF S11941 TO FOUND MONUMENTS. RIGHTS-OF-WAYS HAVE NOT BEEN RESOLVED AND MAY NOT BE ACCURATE.

LEGEND

- FOUND MONUMENT OF RECORD
- WOOD FENCE
- CHAINLINK FENCE
- BARBWIRE/WOVEN WIRE/FARM FENCE
- ⊙ EXISTING TREE WITH DIAMETER
- ⊙ ELECTRICAL OUTLET
- UGP — UNDERGROUND ELECTRIC
- PWR — OVERHEAD WIRE
- ⊙ UTILITY POLE
- GAS — UNDERGROUND GAS LINE
- ⊙ IRRIGATION CONTROL BOX
- ⊙ 5' LAMP POST
- ⊙ FLOOD LIGHT
- ⊙ SANITARY SEWER MANHOLE
- SS — SANITARY SEWER LINE
- ⊙ STORM SEWER MANHOLE
- ⊙ STORM CATCH BASIN
- ⊙ SPRINKLER HEAD
- CS SURVEY NUMBER, CLACKAMAS COUNTY SURVEY RECORDS
- DOC. NO. DOCUMENT NUMBER, CLACKAMAS COUNTY DEED RECORDS

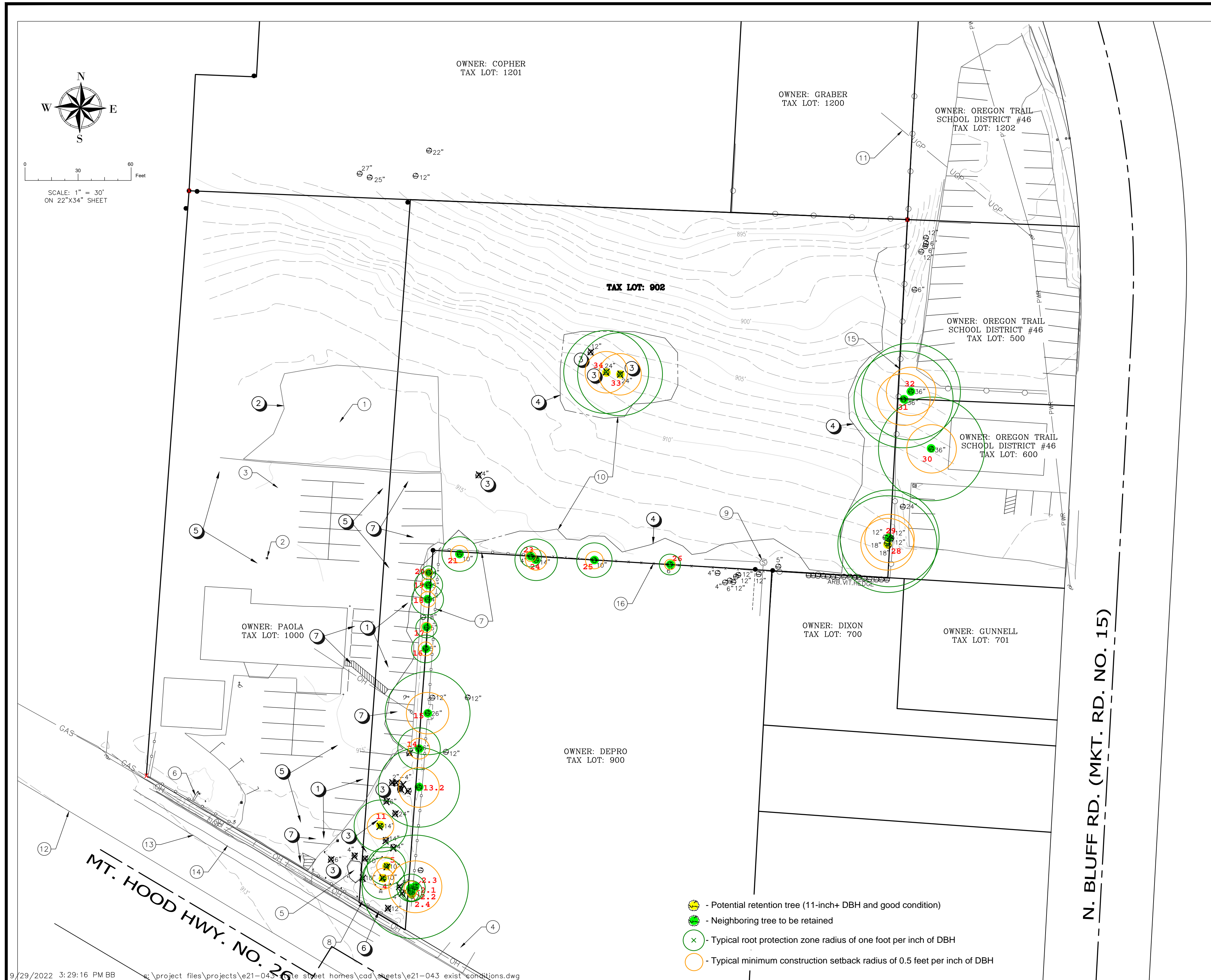
DEMO KEY NOTES

- 1 SAWCUT AND REMOVE PORTION OF EXIST ASPHALT AS NECESSARY TO CONSTRUCT NEW ASPHALT MATCHLINE AND 6" EXPOSURE CURB AND 5' SIDEWALK, SEE SHEET 3
- 2 EXIST GRAVEL AREA TO BE REMOVED
- 3 REMOVE EXIST TREE (24 TOTAL), TYPICAL
- 4 REMOVE EXIST BRUSH
- 5 PROTECT EXIST ASPHALT
- 6 REMOVE EXIST FENCE
- 7 REMOVE EXIST STRIPING

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
MAY 26, 2015
SAMANTHA KAY TANNER
90079

RENEWS 6/30/2022



- - Potential retention tree (11-inch+ DBH and good condition)
- - Neighboring tree to be retained
- ⊙ - Typical root protection zone radius of one foot per inch of DBH
- - Typical minimum construction setback radius of 0.5 feet per inch of DBH

9/29/2022 3:29:16 PM BB ...project_files\projects\21-043...state_street_homes\cad\sheet\21-043_existing_conditions.dwg

DATE:	NO.	REVISION

DRAWN:	DESIGNED:	CHECKED:
SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

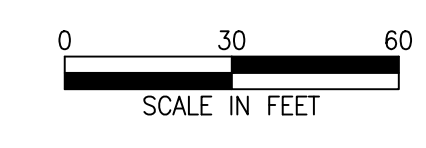
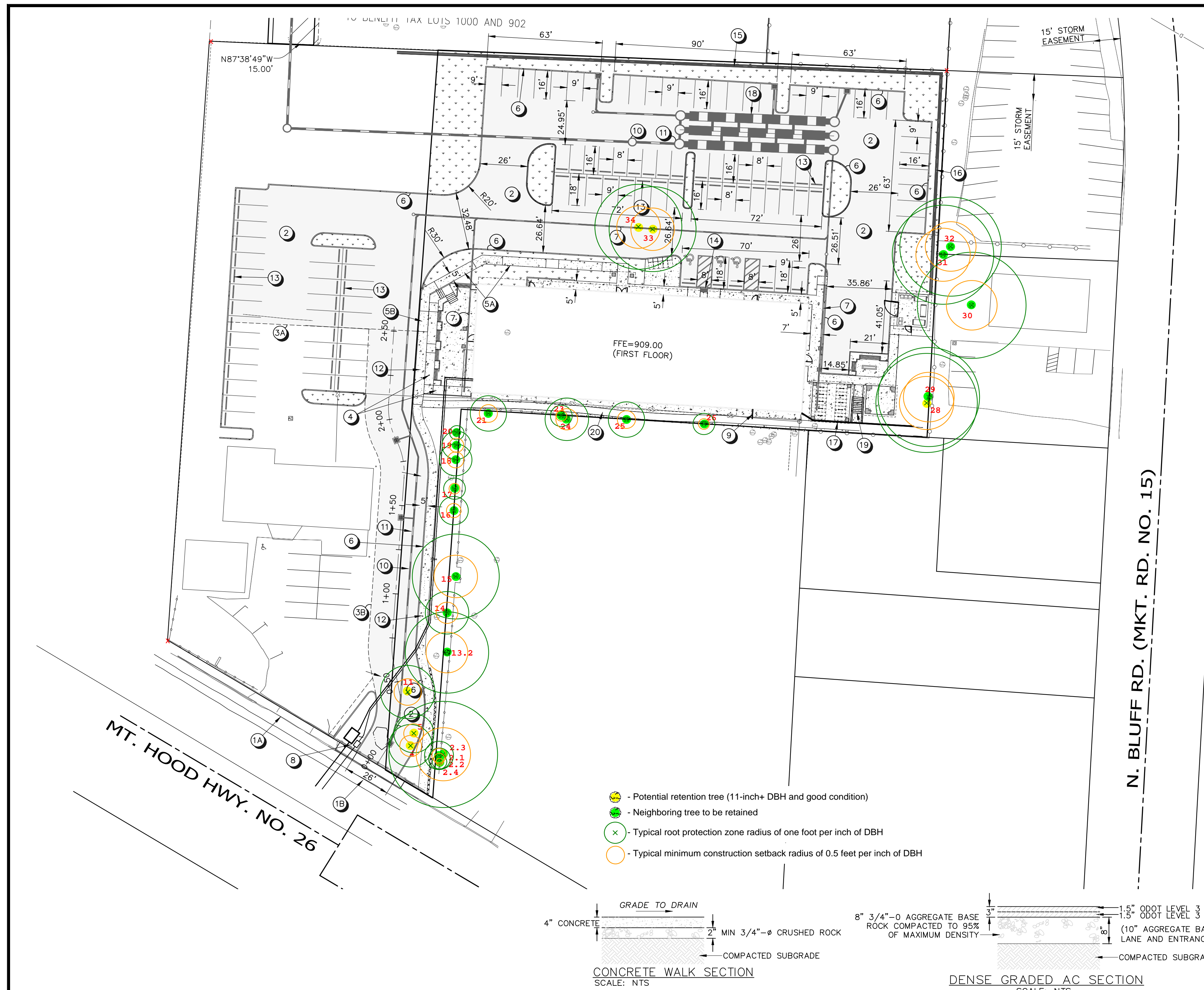
FIRWOOD DESIGN GROUP
Reliable Engineering Solutions

359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TROUTDALE, OREGON 97060
(503) 668-3737

STATE STREET HOMES
1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

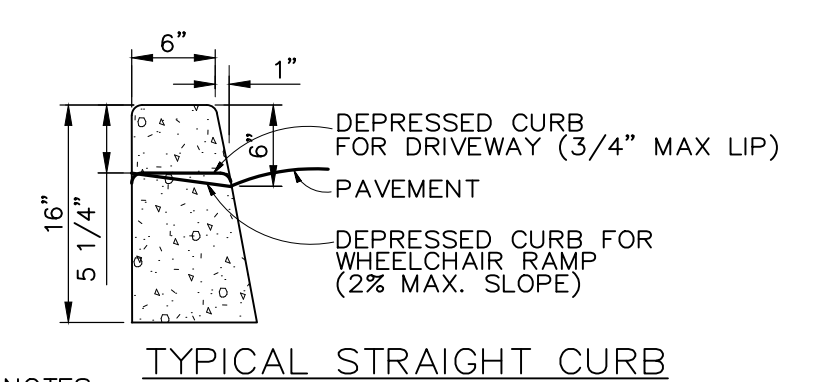
EXISTING CONDITIONS AND DEMO PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

2
12



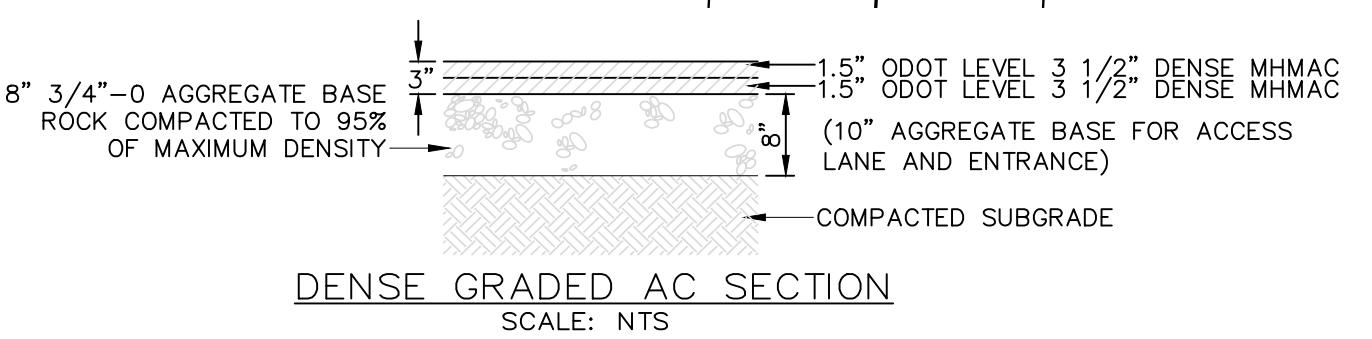
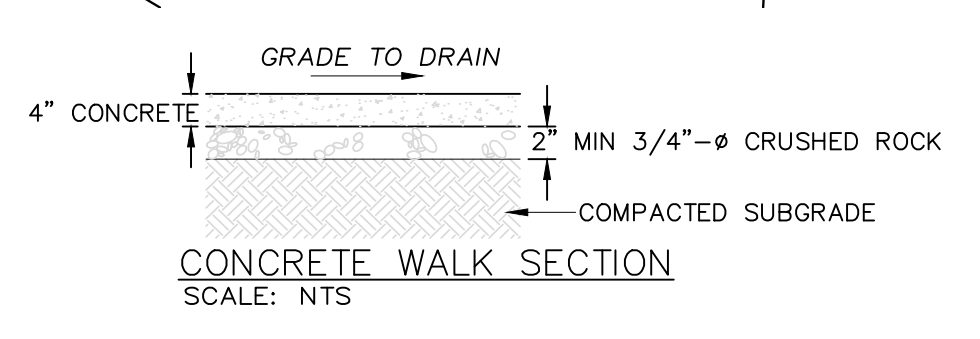
KEY NOTES

- 1A EXIST 35'± WIDE COMMERCIAL DRIVEWAY APPROACH
- 1B PROPOSED 26' WIDE DRIVEWAY ACCESS AND SIDEWALK
- 2 NEW ASPHALT DRIVEWAY AND PARKING AREA, SEE TYPICAL SECTION DETAIL THIS SHEET, SEE SITE CIRCULATION PLAN ON SHEET 12 FOR EMERGENCY VEHICLE ACCESS PLAN
- 3A SAWCUT MIN 1" FROM EDGE OF EXIST EDGE OF ASPHALT, TYPICAL
- 3B SAWCUT EXIST ASPHALT FOR MATCH LINE TO EXIST AC PARKING, TYPICAL
- 4 CONCRETE SIDEWALK RAMP TO CIVIC AREA ACCESS WITH HAND RAILS, SEE ARCHITECTURAL PLANS FOR HAND RAILING DETAILS
- 5A DOWNWARD RAMP AND LANDING PATHWAY WITH HANDRAILS TO MAIN FLOOR, SEE ARCHITECTURAL PLANS FOR HANDRAIL DETAILS
- 5B RAMP DOWN PORTION OF SIDEWALK WITH HAND RAILS, SEE ARCHITECTURAL PLANS FOR HANDRAIL DETAILS
- 6 CURB WITH 6" EXPOSURE UNLESS OTHERWISE NOTED (TYPICAL), SEE TYPICAL SECTION THIS SHEET
- 7 DOWNSPOUT CONVEYANCE LINES TO STORM SYSTEM
- 8 DOUBLE DETECTOR CHECK VALVE AND VAULT AND WATER SERVICE METER AND VAULT FOR SPRINKLER AND POTABLE WATER SERVICE
- 9 CONNECT TO EXIST SEWER MAIN FOR SEWER SERVICE, CONTRACTOR TO VERIFY DEPTH PRIOR TO CONSTRUCTION
- 10 WATER QUALITY MANHOLE, SEE SHEET 5
- 11 FLOW CONTROL MANHOLE, SEE SHEET 5
- 12 PROPOSED 5' WIDE CONCRETE WALKWAY, MAX 2% CROSS SLOPE (1.5% TYPICAL) AND MAXIMUM 5% LONGITUDINAL SLOPE, SEE TYPICAL SECTION DETAIL THIS SHEET
- 13 CONCRETE WHEEL STOPS WITH STORMWATER UNDERDRAIN (TYPICAL)
- 14 ADA COMPLIANT SIDEWALK RAMP
- 15 12'± RETAINING WALL
- 16 8'± RETAINING WALL
- 17 7'± RETAINING WALL
- 18 60" DETENTION SYSTEM, SEE SHEET 5
- 19 10 STAIRS WITH LANDINGS TO TOP OF WALL, SEE SHEET 4 FOR SPOT GRADING PLAN
- 20 TRAIL



- NOTES:
1. ALL RADII SHALL BE 3/4" EXCEPT AS OTHERWISE SHOWN.
 2. ISOLATION JOINTS SHALL BE PLACED ONLY AS SPECIFIED.
 3. CONTRACTION JOINTS SHALL BE PLACED AT 15' INTERVALS AND SHALL EXTEND AT LEAST 50% THROUGH THE CURB OR CURB AND GUTTER.
 4. A CONTRACTION JOINT SHALL BE PLACED ALONG AND OVER WEEP HOLE THROUGH THE CURB AND THROUGH THE SIDEWALK.
 5. WHEN SIDEWALKS ARE CONSTRUCTED, EXTEND 3" PIPE TO BACK OF SIDEWALK AND INSTALL COUPLING.

- - Potential retention tree (11-inch+ DBH and good condition)
- - Neighboring tree to be retained
- - Typical root protection zone radius of one foot per inch of DBH
- - Typical minimum construction setback radius of 0.5 feet per inch of DBH



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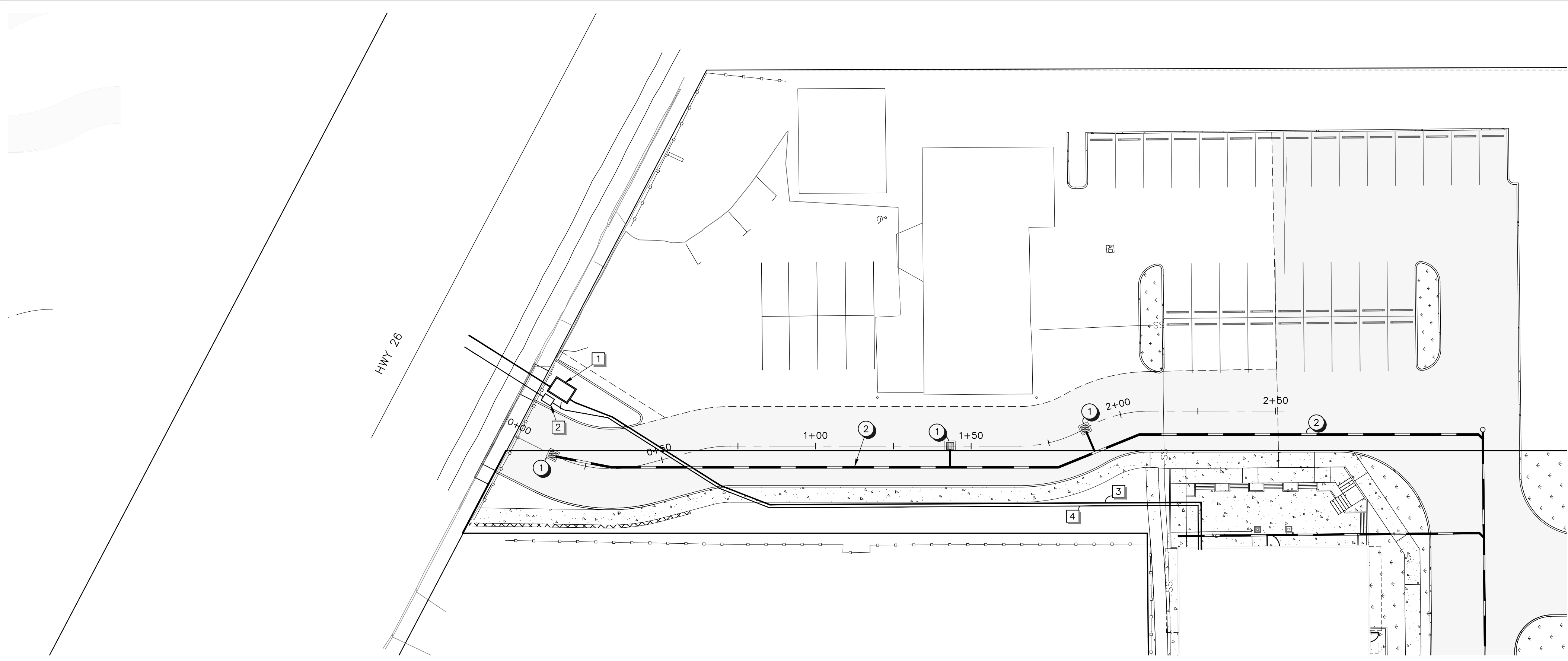
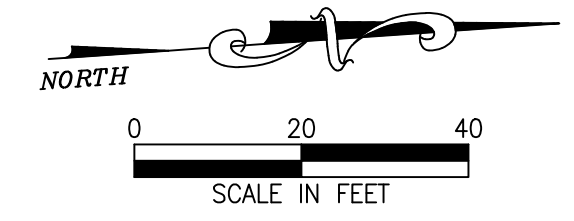
DATE:	NO.	REVISION

FIRWOOD DESIGN GROUP
 Reliable Engineering Solutions
 359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
 TROUTDALE, OREGON 97060
 (503) 668-3737

STATE STREET HOMES
 1233 NW NORTHRUP ST. #125
 PORTLAND, OR 97209

COMPOSITE SITE PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

3
12



- KEY NOTES**
- ① LYNCH TYPE TRAP CATCH BASIN
 - ② STORM CONVEYANCE LINE TO DETENTION SYSTEM

- WATERLINE KEY NOTES**
- ① PROPOSED DOUBLE DETECTOR CHECK VALVE AND VAULT BY FIRE SUPPRESSION DESIGNER
 - ② PROPOSED WATER METER SIZED BY WATER SYSTEM DESIGNER
 - ③ NEW FIRE SUPPRESSION LINE, SIZE PROVIDED BY WATER SYSTEM DESIGNER
 - ④ NEW POTABLE WATER SERVICE LINE, SIZE PROVIDED BY WATER SYSTEM DESIGNER



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SIGNATURE DATE: _____

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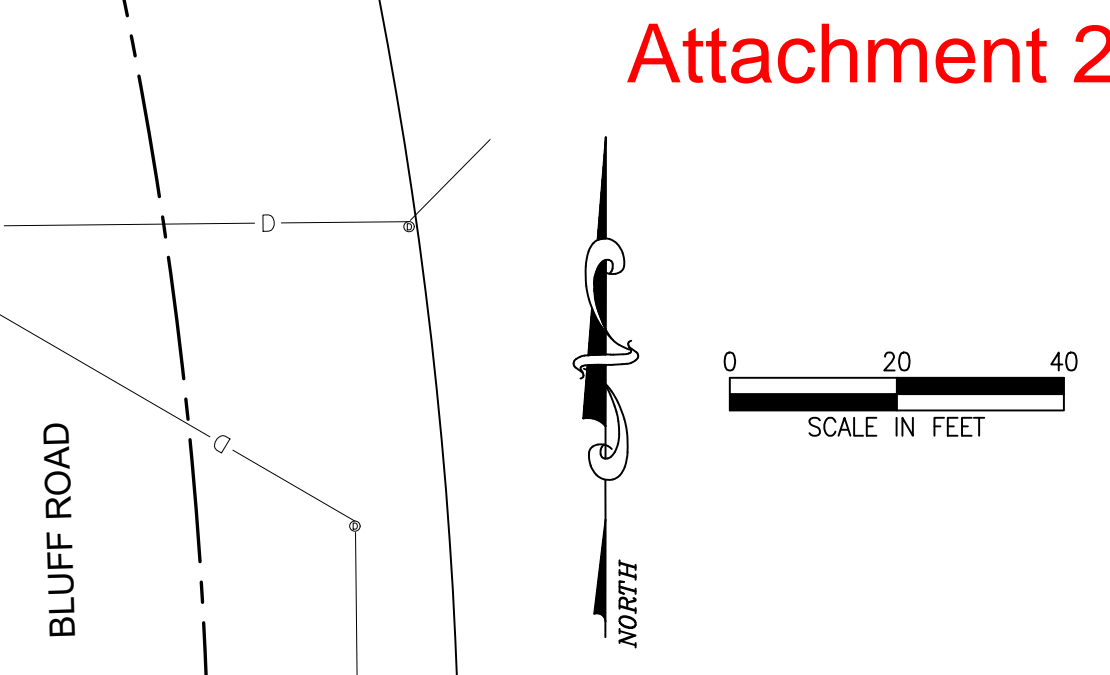
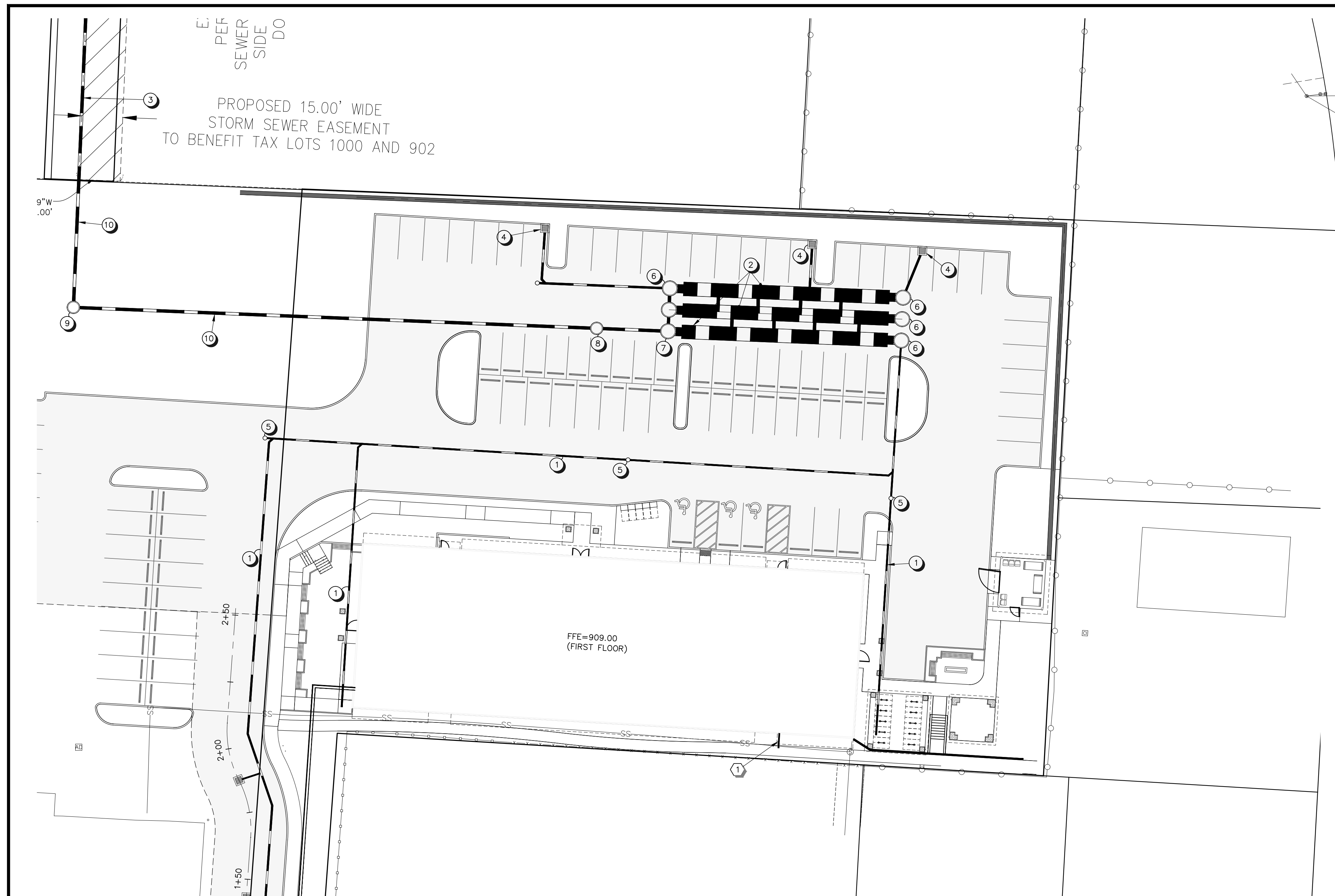
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SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

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ENTRY UTILITY PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

4
12



STORM AND GENERAL KEY NOTES

- ① 6" CONVEYANCE LINE FOR BUILDING DOWNSPOUTS, S=0.010 MIN
- ② 260 LF 60" STORMWATER DETENTION PIPE
- ③ SEE SHEET 6 FOR STORMWATER EXTENSION PLAN
- ④ LYNCH TYPE TRAP CATCH BASIN
- ⑤ INSTALL CLEANOUT TO FINISH GRADE
- ⑥ 60" MANHOLE
- ⑦ 60" FLOW CONTROL MANHOLE
- ⑧ 48" WATER QUALITY MANHOLE
- ⑨ 48" STORM MANHOLE
- ⑩ STORMWATER CONVEYANCE LINE TO APPROVED STORMWATER DISCHARGE POINT

SANITARY SEWER KEY NOTES

- ① CONNECT TO EXIST SANITARY SEWER MAINLINE FOR SEWER ACCESS, S=0.020 MIN, CONTRACTOR TO VERIFY IE OF MAINLINE PRIOR TO CONSTRUCTION



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PROJECT NO. E21-043		

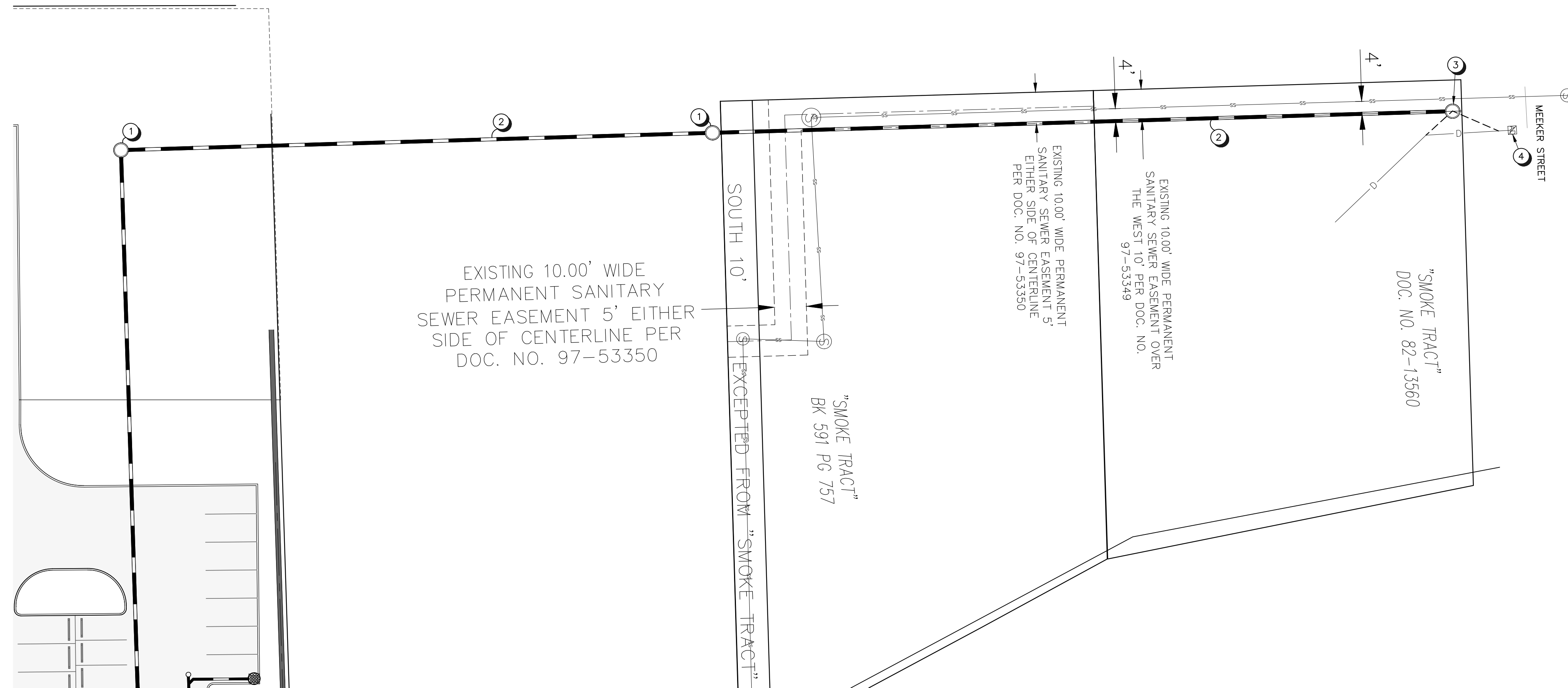
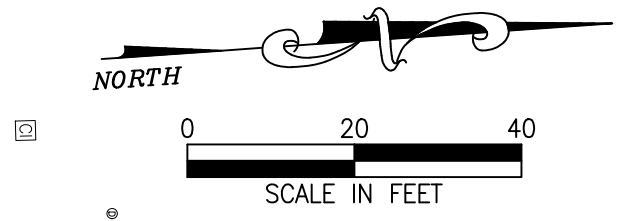
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Reliable Engineering Solutions

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(503) 668-3737

STATE STREET HOMES
1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

SITE UTILITY PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

5
12



KEY NOTES

- ① 48" STORM MANHOLE
- ② STORMWATER CONVEYANCE LINE TO APPROVED STORMWATER DISCHARGE POINT
- ③ REALIGN EXIST STORMLINE AND CONNECT INTO PROPOSED 48" MANHOLE
- ④ STORMWATER TO CONNECT INTO EXIST DITCH INLET, UTILIZE EXIST STORM LINE CONNECTION INTO DITCH INLET



EXPIRES: 06/30/23
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DRAWN:	DESIGNED:	CHECKED:
SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

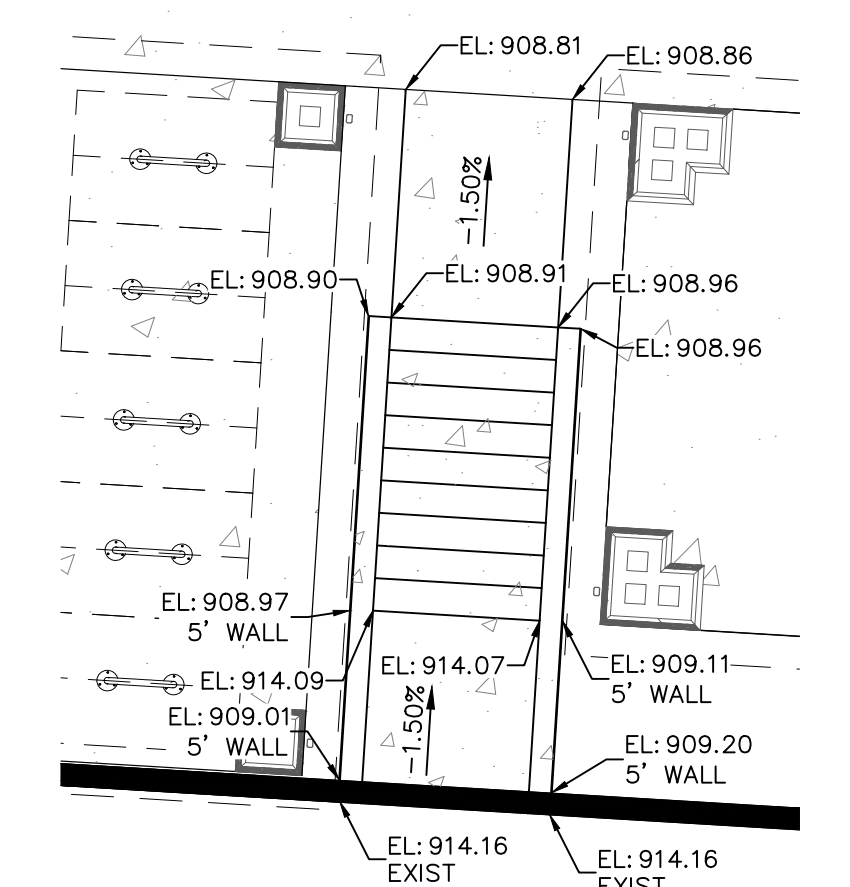
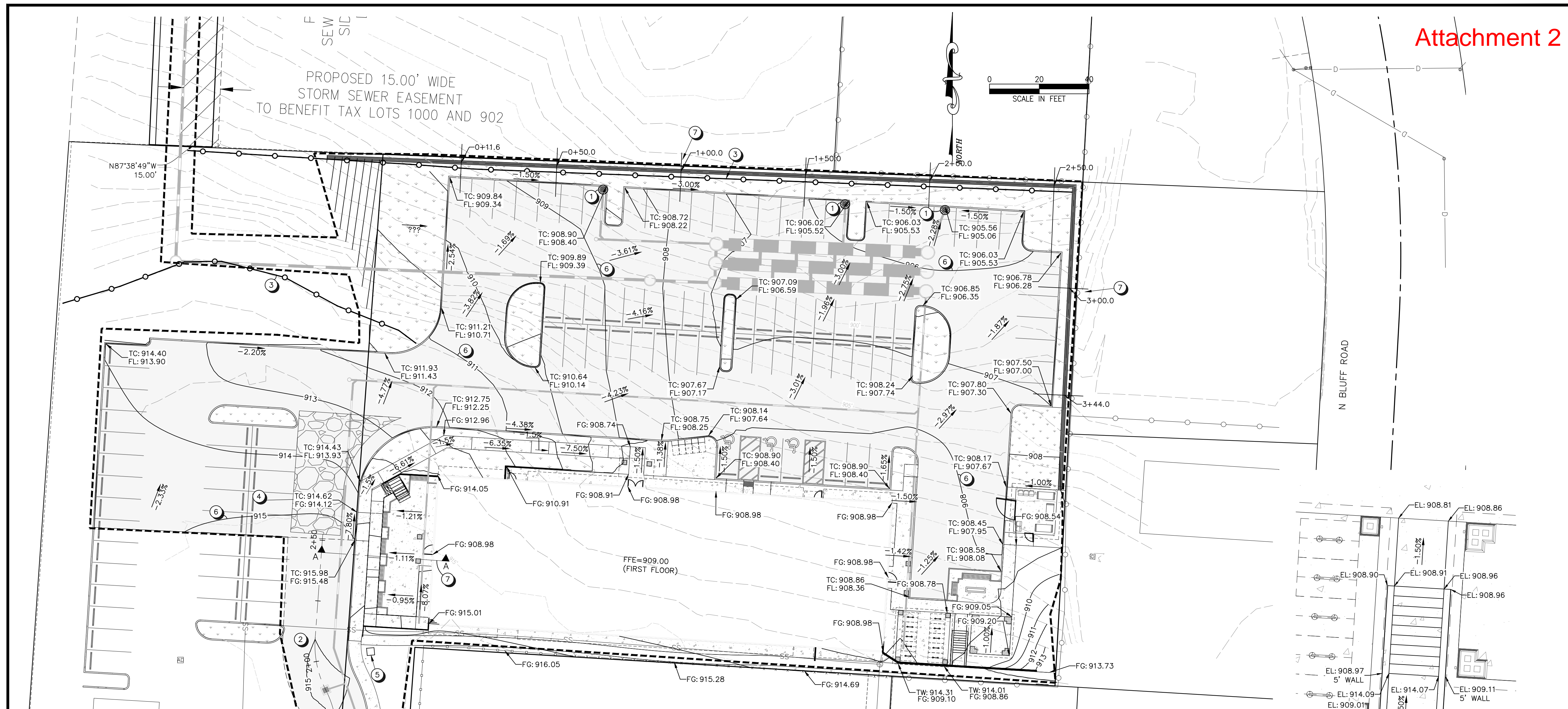


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TROUTDALE, OREGON 97060
(503) 668-3737

STATE STREET HOMES
1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

STORMWATER EXTENSION PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

6
12



- KEY NOTES**
- 1 CB INSERT INLET PROTECTION FOR AREA DRAIN TYPE CATCH BASIN. SEE DETAILS ON SHEET 11 (TYPICAL)
 - 2 PROVIDE TEMPORARY INLET PROTECTION ON ALL STORMWATER INLETS WITHIN 250 LF DOWNSTREAM OF THE PROJECT SITE
 - 3 TEMPORARY SILT FENCING, SEE DETAIL ON SHEET 11. ADJUST SILT FENCING AS NECESSARY DURING CONSTRUCTION
 - 4 CONSTRUCTION ENTRANCE, SEE DETAIL THIS ON SHEET 11
 - 5 CONSTRUCT TEMPORARY 3' X 3' X 2' DEEP SUMP AREA TO BE USED AS WASH AREA FOR CONCRETE TRUCKS, AFTER CURBS AND SIDEWALKS ARE INSTALLED AND BEFORE ROADS ARE PAVED, FILL AND COMPACT SUMP AREA PER STRUCTURAL REQUIREMENTS, DO NOT OVERFILL SUMP AREA, CONTRACTOR TO INCREASE SUMP WIDTH AS NECESSARY TO PROVIDE ADEQUATE VOLUME AS (IF) NEEDED
 - 6 PROPOSED FINISH GRADE CONTOURS (TYPICAL)
 - 7 SEE SHEET 8 FOR WALL CROSS SECTIONS, TYPICAL

ESTIMATED INPLACE QUANTITIES:

SITE SCRAPING OF ORGANICS AND HARD SURFACES (ASSUMED 4" AVERAGE, TO BE HAUL OFF): 790 CY
 ASPHALT DATUM TO SITE SCRAPING: 610 CY CUT, 4190 CY FILL
 SIDEWALK/LANDSCAPE DATUM TO SITE SCRAPING: 361 CY CUT, 940 CY FILL
 UNDER BUILDING (ASSUME SLAB CONSTRUCTION): 2030 CY CUT, 0 CY FILL

TOTAL CUT: 3,791 CY
 TOTAL FILL: 5,130 CY

QUANTITY IS AN ESTIMATE FOR INPLACE QUANTITIES AND DOES NOT INCLUDE TRENCH SPOILS, CONTRACTOR RESPONSIBLE FOR DOING OWN QUANTITY ESTIMATE FOR CONSTRUCTION COST

STAIRS GRADING DETAIL
 SCALE: SEE SCALE BAR

LEGEND

- TEMPORARY SEDIMENT FENCE
- BIO-BAG AND INLET INSERT PROTECTION
- LIMITS OF DISTURBANCE (1.9 ACRES)

SCALE IN FEET: 0 5 10

REGISTERED PROFESSIONAL ENGINEER
 67149PE
PRELIMINARY
 OREGON
 KELLY A. GROVER
 Expires: 06/30/23
 Signature Date: _____

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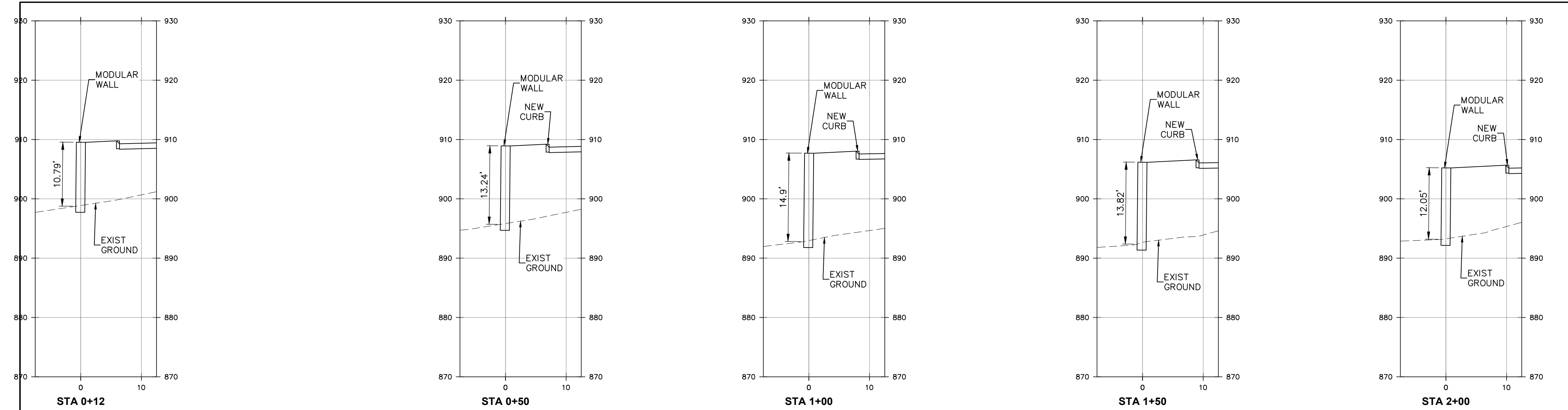
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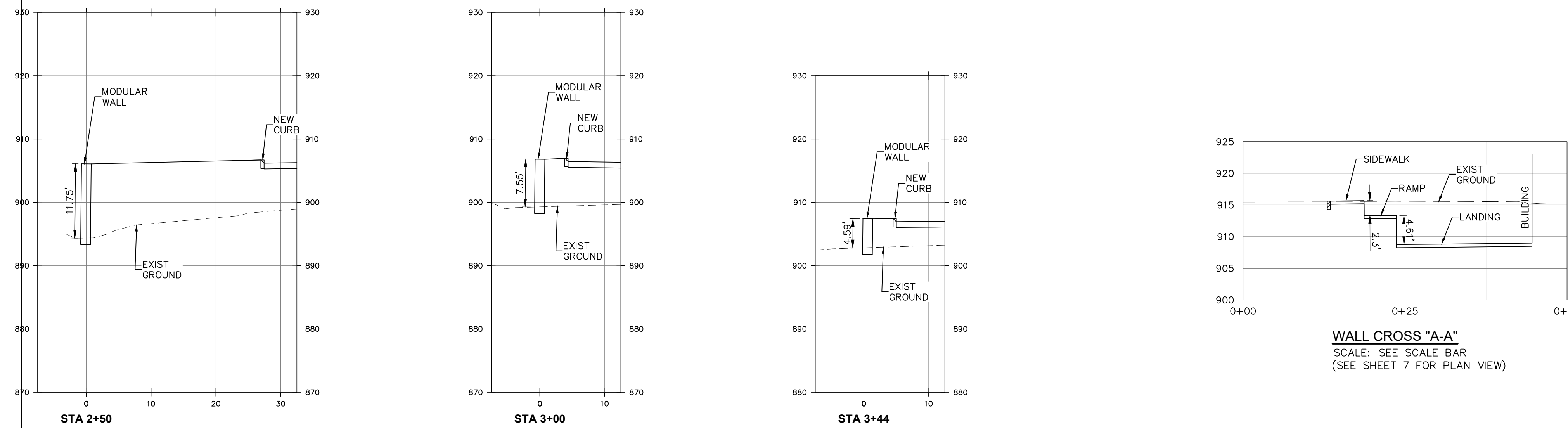
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 PORTLAND, OR 97209

GRADING AND ESC PLAN
 MIXED USE SITE DEVELOPMENT
 38015 HWY 26, SANDY, OR 97055

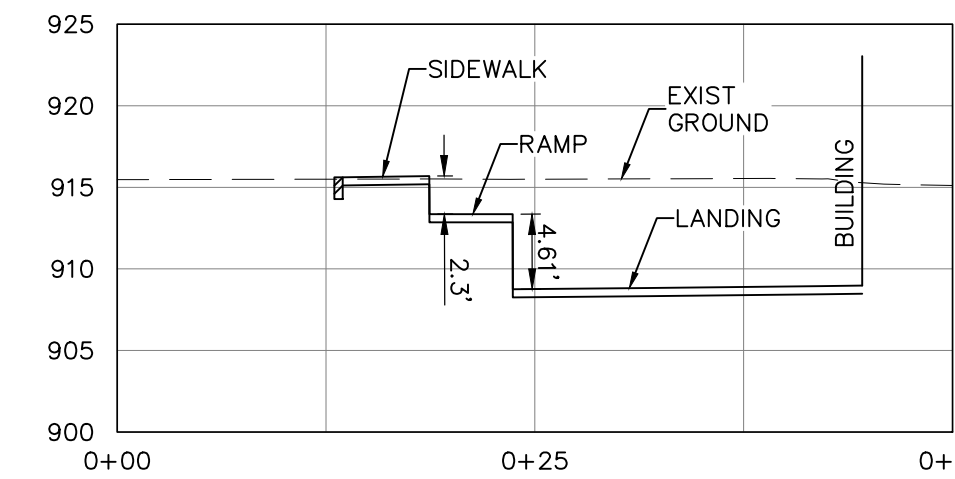
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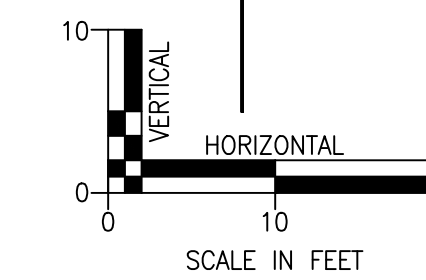
WALL CROSS SECTIONS
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



WALL CROSS SECTIONS
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



WALL CROSS "A-A"
SCALE: SEE SCALE BAR
(SEE SHEET 7 FOR PLAN VIEW)



EXPIRES: 06/30/23
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SCALE: AS SHOWN	DATE: DECEMBER 2021	
PROJECT NO. E21-043		

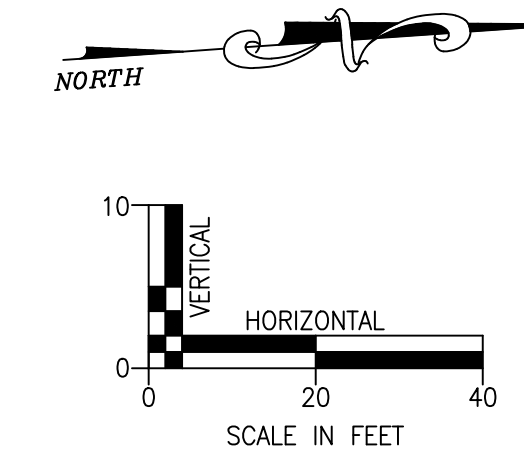
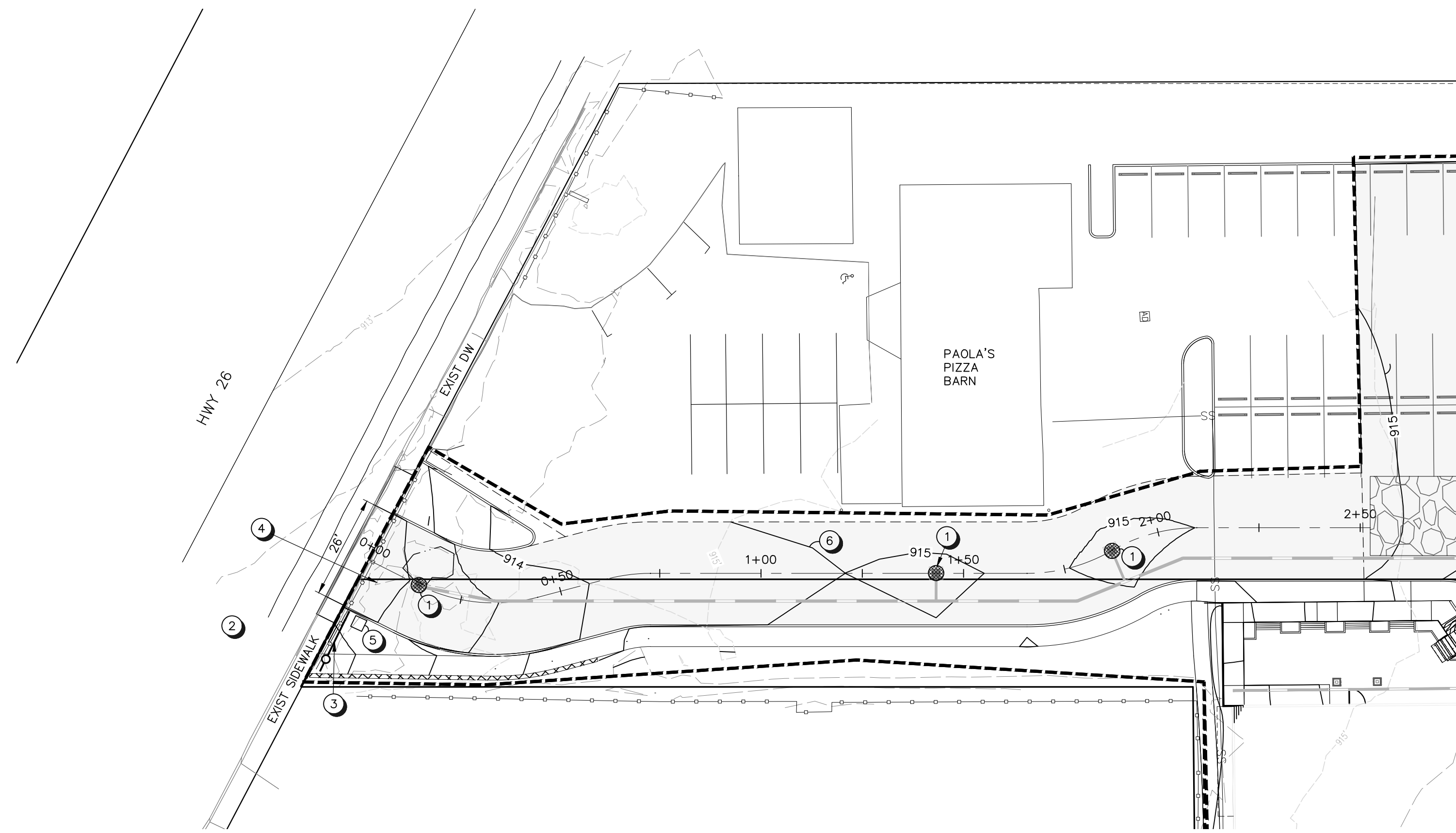


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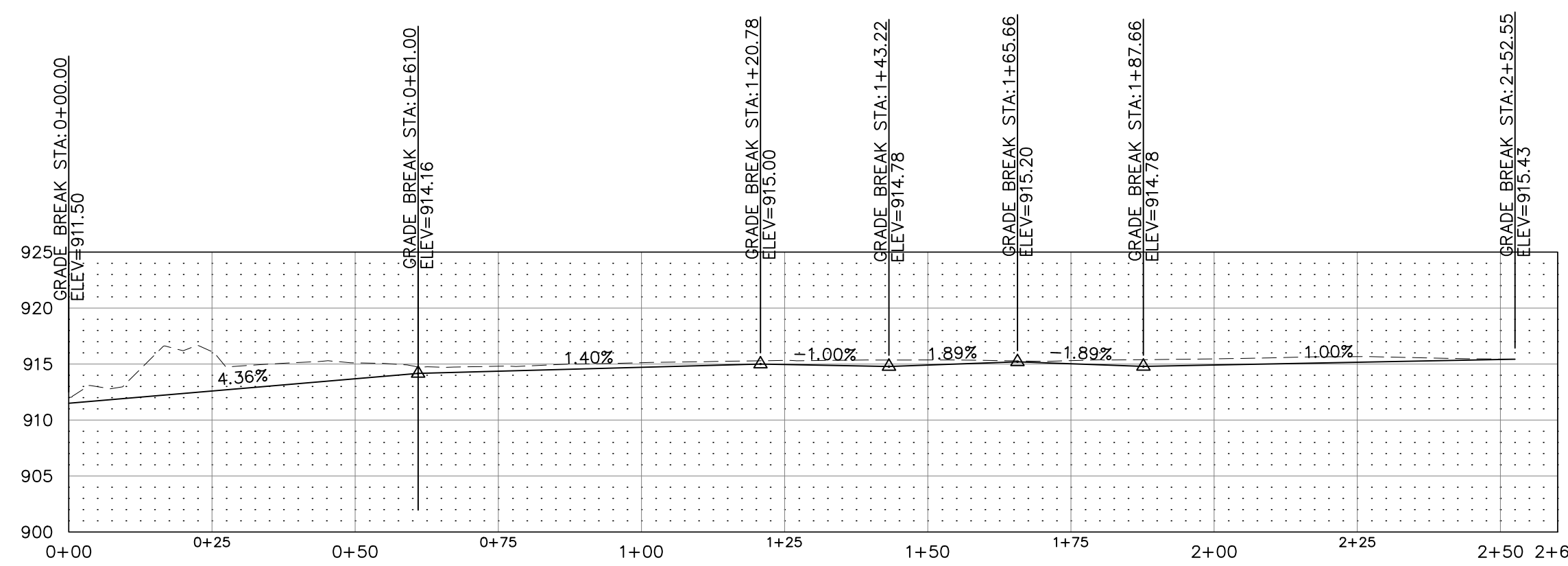
WALL CROSS SECTIONS
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

8
12



KEY NOTES

- 1 CB INSERT INLET PROTECTION FOR AREA DRAIN TYPE CATCH BASIN, SEE DETAILS ON SHEET 11 (TYPICAL)
- 2 PROVIDE TEMPORARY INLET PROTECTION ON ALL STORMWATER INLETS WITHIN 250 LF DOWNSTREAM OF THE PROJECT SITE
- 3 TEMPORARY SILT FENCING, SEE DETAIL ON SHEET 11, ADJUST SILT FENCING AS NECESSARY DURING CONSTRUCTION
- 4 CONSTRUCTION ENTRANCE, SEE DETAIL THIS ON SHEET 11
- 5 CONSTRUCT TEMPORARY 3' X 3' X 2' DEEP SUMP AREA TO BE USED AS WASH AREA FOR CONCRETE TRUCKS, AFTER CURBS AND SIDEWALKS ARE INSTALLED AND BEFORE ROADS ARE PAVED, FILL AND COMPACT SUMP AREA PER STRUCTURAL REQUIREMENTS, DO NOT OVERFILL SUMP AREA, CONTRACTOR TO INCREASE SUMP WIDTH AS NECESSARY TO PROVIDE ADEQUATE VOLUME AS (IF) NEEDED
- 6 PROPOSED FINISH GRADE CONTOURS (TYPICAL)



ENTRY ROAD CENTERLINE PROFILE
1"=20' HORIZ

- LEGEND
- TEMPORARY SEDIMENT FENCE
 - BIO-BAG AND INLET INSERT PROTECTION
 - LIMITS OF DISTURBANCE (1.9 ACRES)



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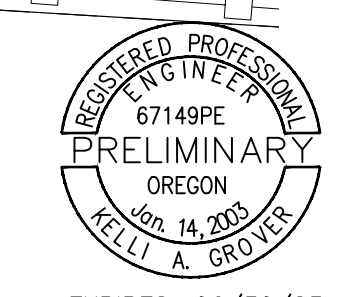
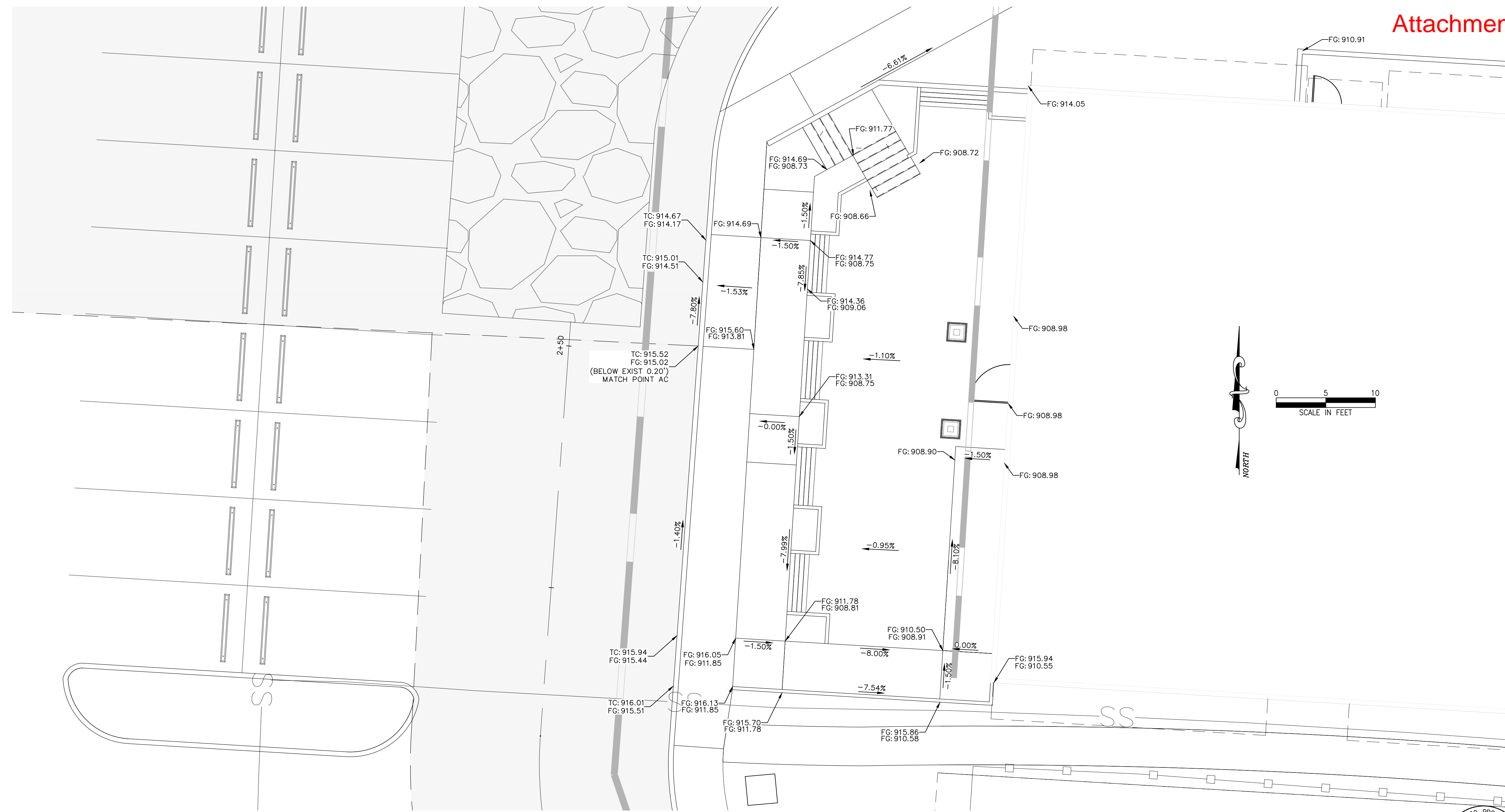
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Reliable Engineering Solutions
359 EAST HISTORIC COLUMBIA RIVER HIGHWAY
TRUXTONDALE, OREGON 97060
(503) 668-3737

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1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

ENTRY GRADING PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

9
12

Third Party Review for 38015 Hwy 26
Emily Meharg, City of Sandy



EXPIRES: 06/30/23
SIGNATURE DATE:

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PROJECT NO. E21-043		

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Reliable Engineering Solutions
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TROUTDALE, OREGON 97060
(503) 668-3737

STATE STREET HOMES
1233 NW NORTHRUP ST. #125
PORTLAND, OR 97209

CIVIC AREA GRADING PLAN
MIXED USE SITE DEVELOPMENT
38015 HWY 26, SANDY, OR 97055

10
12



- Legend:**
- EXISTING DECIDUOUS TREE
 - EXISTING EVERGREEN TREE
 - EXISTING PALM TREE
 - EXISTING TREE TO BE REMOVED
 - TREE IDENTIFICATION NUMBER

- General Notes:**
1. TREE LOCATIONS BASED ON SITE SURVEY.
 2. SEE ARCHITECTURAL PLANS FOR SITE INFORMATION.
 3. TREE INVENTORY TABLE SEE THIS SHEET.

Attachment 2

Existing Tree Inventory

TREE ID	TREE SPECIES	SIZE (DBH)	NOTES	REMAIN/REMOVE
001	Blue Spruce	12"		Remove, Development Impacts
002	Western Red Cedar	4"		Remove, Development Impacts
003	Western Red Cedar	8"		Remove, Development Impacts
004	Blue Spruce	10"		Remove, Development Impacts
005	Western Red Cedar	8"		Remove, Development Impacts
006	Windmill Palm	10"		Remove, Development Impacts
007	Windmill Palm	6"		Remove, Development Impacts
008	Conifer (Unknown)	10"	Dead	Remove, Development Impacts
009	Holly	4"		Remove, Development Impacts
010	Sugar Maple	14"		Remove, Development Impacts
011	Cherry	14"		Remove, Development Impacts
012	Douglas Fir	24"		Remove, Development Impacts
013	Cherry	6"		Remove, Development Impacts
014	Filbert	14"		Remain
015	Douglas Fir	26"		Remain
016	Redbud	5"	Located on Property Line	Remain
017	Holly	5"	Located on Property Line	Remain
018	Thundercloud Plum	4"	Located on Property Line	Remain
019	Redbud	5"	Located on Property Line	Remain
020	Thundercloud Plum	4"	Located on Property Line	Remain
021	Red Maple	10"	Located on Adjacent Property	Remain
022	Filbert	6"		Remove, Development Impacts
023	Cherry	4"	Located on Property Line	Remain
024	Red Maple	6"	Located on Adjacent Property	Remain
025	Cherry	10"	Located on Property Line	Remain
026	Cherry	6"	Located on Property Line	Remain
027	Redbud	5"		Remove, Development Impacts
028	Douglas Fir	18", 18"	Located on Property Line	Remain
029	Douglas Fir	12", 12", 12"	Located on Property Line	Remain
030	Douglas Fir	36"	Located on Adjacent Property	Remain
031	Douglas Fir	36"	Located on Adjacent Property	Remain
032	Douglas Fir	36"	Located on Adjacent Property	Remain
033	Douglas Fir	24"		Remove, Development Impacts
034	Douglas Fir	24"		Remove, Development Impacts
035	Douglas Fir	12"		Remove, Development Impacts

- Potential retention tree (11-inch+ DBH and good condition)
- Neighboring tree to be retained
- Typical root protection zone radius of one foot per inch of DBH
- Typical minimum construction setback radius of 0.5 feet per inch of DBH

Laurus Designs, LLC



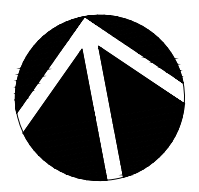
1012 Pine Street
Silverton, Oregon
503.784.6494

Multi-Family
Sandy

38015 Highway 26
Sandy, Oregon

REGISTERED
643
PRELIMINARY
LAURA A. ANTONSON
OREGON
11/16/2007
LANDSCAPE ARCHITECT

EXISTING TREE INVENTORY



SCALE: 1"=30'-0"
0' 15' 30' 60'
SCALE

September 15th, 2022

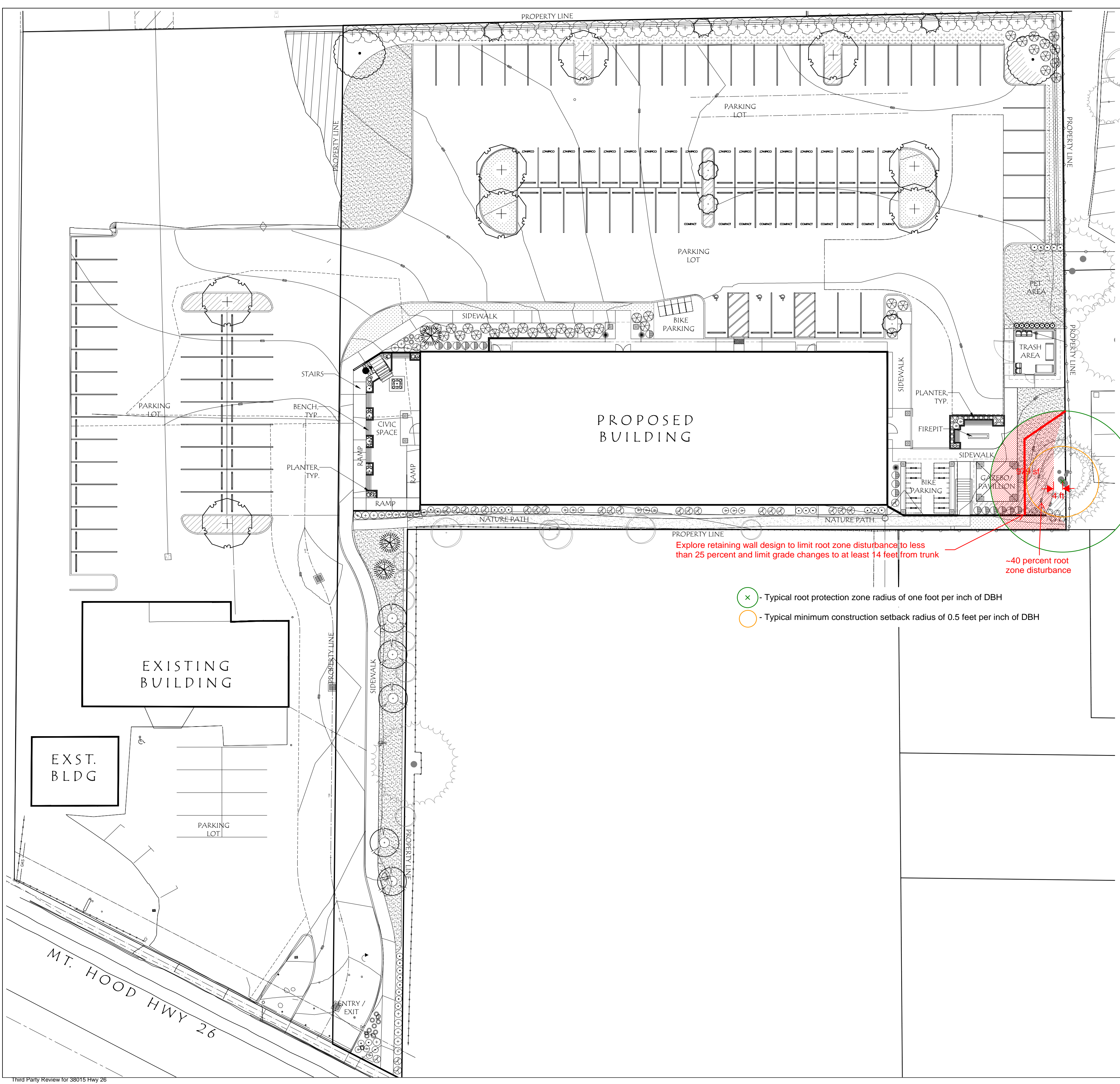
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#	DATE	NOTES	INITIALS

L1.1

SHEET 1 OF 2

PROJECT #: 1409R
JANUARY 19, 2023
Page 25 of 28



- Legend:**
- EXISTING DECIDUOUS TREE TO REMAIN
 - EXISTING EVERGREEN TREE TO REMAIN

Attachment 2

- General Notes:**
- PLANTING PLAN FOR PRELIMINARY USE ONLY. NOT FOR BIDDING OR CONSTRUCTION.
 - TREE INVENTORY FOR EXISTING TREES TO REMAIN AND REMOVE SEE SHEET L1.1.
 - SEE ARCHITECTURAL DRAWINGS FOR SITE PLAN.
 - SEE CIVIL DRAWINGS FOR GRADING AND UTILITIES.
 - PLANT SIZES MEET MINIMUM CITY OF SANDY PLANT REQUIREMENTS OR GREATER.
 - IRRIGATION TO BE AN AUTOMATIC UNDERGROUND SYSTEM DESIGN BUILT BY THE LANDSCAPE CONTRACTOR.

Landscape Requirements
 Total Site Area (sf): 63,711 sf (1.46 acres)
 Landscape Area: 15,894 sf
 Civic Space: 1,614 sf
 Outdoor Recreation Areas: 9,901 sf
 Parking Lot: 1 Large Tree Per 12 Spaces
 Screen/buffer: Evergreen plants to screen within 2 years

Preliminary Plant Legend

TREES	QTY	BOTANICAL / COMMON NAME	SIZE	NOTES
	3	Chamaecyparis nootkatensis 'Glauca Pendula' / Weeping Nootka False Cypress	5' Ht. Min., B&B	
	3	Chamaecyparis obtusa 'Gracilis' / Slender Hinoki False Cypress	5' Ht. Min., B&B	
	3	Lagerstroemia indica 'Whit II' TM / Dynamite Cape Myrtle	1 1/2" Cal., B&B	
	2	Nyssa sylvatica 'Wildfire' / Black Gum	1 1/2" Cal., B&B	Large Parking Lot Tree
	5	Prunus serrulata 'Amanoyawa' / Japanese Flowering Cherry	1 1/2" Cal., B&B	
	8	Zelkova serrata 'Green Vase' / Sawleaf Zelkova	1 1/2" Cal., B&B	Large Parking Lot Tree

SHRUBS	QTY	BOTANICAL / COMMON NAME	SIZE
	36	Abelia x grandiflora 'Kaleidoscope' / Kaleidoscope Abelia	2 Gal.
	8	Euonymus japonicus 'Greenspire' / Greenspire Upright Euonymus	5 Gal.
	7	Ilex crenata 'Sky Pencil' / Sky Pencil Japanese Holly	24"-30" Ht.
	38	Ligustrum japonicum 'Texanum' / Texas Japanese Privet	5 Gal.
	20	Nandina domestica 'Atropurpurea Nana' / Dwarf Nandina	1 Gal.
	38	Prunus laurocerasus 'Mount Vernon' / Mount Vernon Laurel	1 Gal.
	12	Rosa KnockOut 'Radrazz' / Radrazz KnockOut Rose	2 Gal.
	16	Sarcococca confusa / Fragrant Sarcococca	2 Gal.
	27	Spiraea x bumalda 'Magic Carpet' / Magic Carpet Spiraea	2 Gal.
	7	Symphoricarpos albus / Common White Snowberry	1 Gal.

GRASSES / PERENNIALS	QTY	BOTANICAL / COMMON NAME	SIZE
	23	Calamagrostis x acutiflora 'Karl Foerster' / Karl Foerster Feather Reed Grass	1 Gal.
	3	Hakonechloa macra 'Aureola' / Golden Variegated Forest Grass	1 Gal.
	30	Iberis sempervirens 'Absolutely Amethyst' / Absolutely Amethyst Candytuft	1 Gal.
	16	Pennisetum alopecuroides 'Bungundy Bunny' / Bungundy Bunny Dwarf Fountain Grass	1 Gal.

GROUND COVERS	QTY	BOTANICAL / COMMON NAME	SIZE	SPACING
	195	Arctostaphylos uva-ursi / Kinnikinnick	1 Gal.	30" o.c.
	275	Fragaria chiloensis / Beach Strawberry	4" Pot	18" o.c.
	293	Rubus pentalobus 'Emerald Carpet' / Bramble	1 Gal.	30" o.c.
	3,795 sf	ProTime 301 Water Smarter Fescue or Equal	Seed @ Rate of 10 lbs per 1000 sf	

Explore retaining wall design to limit root zone disturbance to less than 25 percent and limit grade changes to at least 14 feet from trunk

- Typical root protection zone radius of one foot per inch of DBH
- Typical minimum construction setback radius of 0.5 feet per inch of DBH

Laurus Designs, LLC

 1012 Pine Street
 Silverton, Oregon
 503.784.6494

Multi-Family
 Sandy
 38015 Highway 26
 Sandy, Oregon

REGISTERED
 643
PRELIMINARY
 LAURA A. ANTONSON
 OREGON
 11/16/2007
 LANDSCAPE ARCHITECT

PRELIMINARY PLANTING PLAN

 SCALE: 1"=20'-0"
 0' 10' 20' 40'
 SCALE
 September 15th, 2022

REVISIONS

#	DATE	NOTES	INITIALS

L2.1
 SHEET 2 OF 2
 PROJECT #: 1409R
 JANUARY 15, 2023
 Page 26 of 28

Third Party Review for 38015 Hwy 26
 Emily Meharg, City of Sandy

SITE PLAN GENERAL NOTES:

- THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVES. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
- REFER TO CIVIL DRAWINGS FOR GRADING. SITE IS REQUIRED TO MEET THE LAWS OF FHA AND ADA. ACCESSIBLE ROUTES SHALL NOT EXCEED 5% (1 IN 20) OR CROSS SLOPES SHALL NOT EXCEED 2% (1 IN 50), ALL AT GRADE SIDEWALKS ARE ACCESSIBLE ROUTES.
- JOINTS IN CONCRETE WALKS NOTED AS E.J. ARE TO BE CONSTRUCTED AS EXPANSION JOINTS. ALL OTHER JOINTS SHOWN, TO BE TOOLED CONTROL JOINTS, SEE CIVIL.
- PROVIDE CONSTRUCTION FENCING AS REQUIRED TO SECURE SITE AND BUILDING DURING CONSTRUCTION.
- EXTREME CARE SHOULD BE TAKEN TO PRESERVE EXISTING ROOTS OF TREES TO REMAIN.
- SEE LANDSCAPE DRAWINGS FOR LANDSCAPE AND IRRIGATION ELEMENTS.
- SEE ELECTRICAL DRAWINGS FOR SITE LIGHTING.

SITE DEVELOPMENT CODE REVIEW:

SITE AREA: 63,711 sf = 1.46 ac
 ZONING: C-2 General Commercial
 SETBACKS: FRONT YARD - 10'-0" SIDE/REAR YARD - NONE
 BUILDING HEIGHT: 55 FT.
 PROPOSED: 3 LEVELS OF RES. OVER 1 LEVEL OF STORAGE
 BUILDING AREAS:
 • LEVEL 01, STORAGE/LEASING: 11,280 sf
 • LEVEL 02-04, RESIDENTIAL: 11,736 sf
 OVERALL = 46,500 sf

CIVIC SPACE REQMT: 3% BUILDING AREA = 1,395 sf
 PROVIDED = 1,590 sf

OUTDOOR REC AREA: 200 sf PER UNIT = 8,400 sf
 OUTDOOR DOG PARK = 786 SF
 COVERED GAZEBO (256 sf x 1.25) = 320 SF
 OUTDOOR SEATING/FIRE PIT = 285 SF
 NORTHERN OPEN LAWN = 1,785 SF
 EASTERN OPEN LAWN = 958 SF
 LANDSCAPED NATURE PATH = 2,860 SF
 LANDSCAPED NATURE SIDEWALK PROVIDED = 9,081 SF

UNIT MIX:
 1 BED / 1 BATH - 30 UNITS
 2 BED / 2 BATH - 12 UNITS
 TOTAL UNITS = 42 UNITS

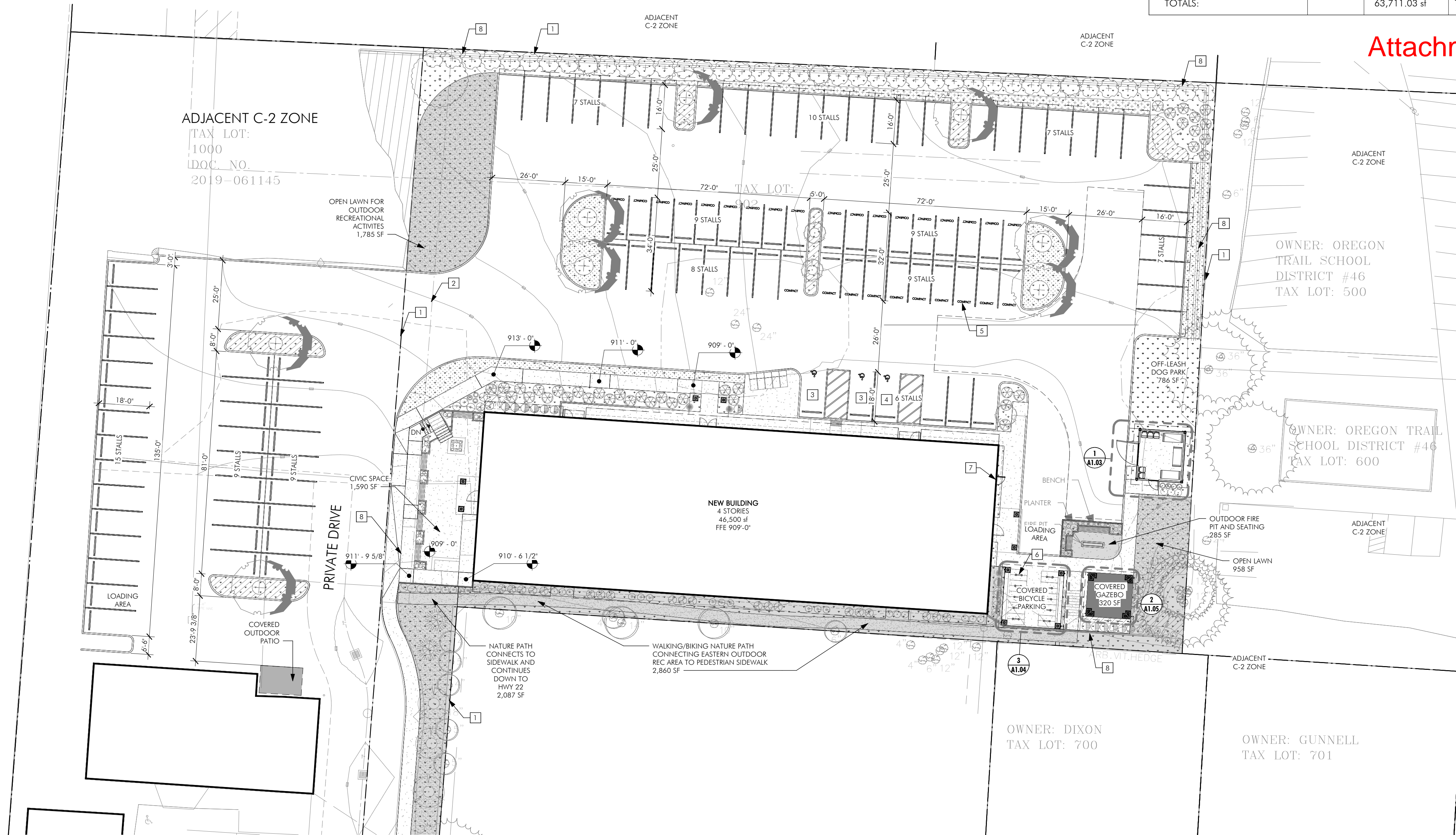
PARKING:
 • STORAGE: 1 SPACE PER 2 EMPLOYEES 1.5 SPACES PER 1 BD 2 SPACES PER 2 BD = 71 SPACES RQ'D PROVIDED = 72 SPACES 38% COMPACT
 • MULTIFAMILY:
 BIKE PARKING:
 • MULTIFAMILY: 1 PER DWELLING UNIT = 42 SPACES

SITE PLAN KEYNOTES:

- PROPERTY LINE
- FRONT SETBACK
- ACCESSIBLE PARKING STALL
- VAN ACCESSIBLE PARKING STALL
- COMPACT PARKING SPACE, PROVIDE PAINTED LETTERING AT EACH STALL AS INDICATED
- SHORT-TERM BIKE PARKING WITH GROUND MOUNTED U-RACKS
- PROVIDE SIGNAGE AT DOOR INDICATING FIRE RISER ROOM
- PROVIDE 3'-6" HIGH GUARDRAIL TOP RETAINING WALL ADJACENT TO RAMP/STAIR WHEN GREATER THAN 30" IN HEIGHT

SITE CALCULATIONS AND LEGEND:

SITE ELEMENT DESCRIPTION:	LEGEND:	AREA: (sf)	PERCENTAGE: (%)
BUILDINGS:	[Symbol]	11,279.98 sf	17.70 %
BUILDINGS OVERHANG ABOVE:	[Symbol]		
LANDSCAPING:	[Symbol]	17,328.37 sf	27.21 %
ASPHALT PAVING:	[Symbol]	28,224.39 sf	44.30 %
ACCESSORY STRUCTURES:	[Symbol]	942.48 sf	1.48 %
CONCRETE SIDEWALKS:	[Symbol]	3,322.09 sf	5.21 %
CONCRETE PAVING & CURBS:	[Symbol]	2,613.72 sf	4.10 %
TOTALS:		63,711.03 sf	100.0 %



Attachment 2



275 COURT ST NE
 SALEM, OR 97301-3442
 P: 503.390.6500
 www.studio3architecture.com

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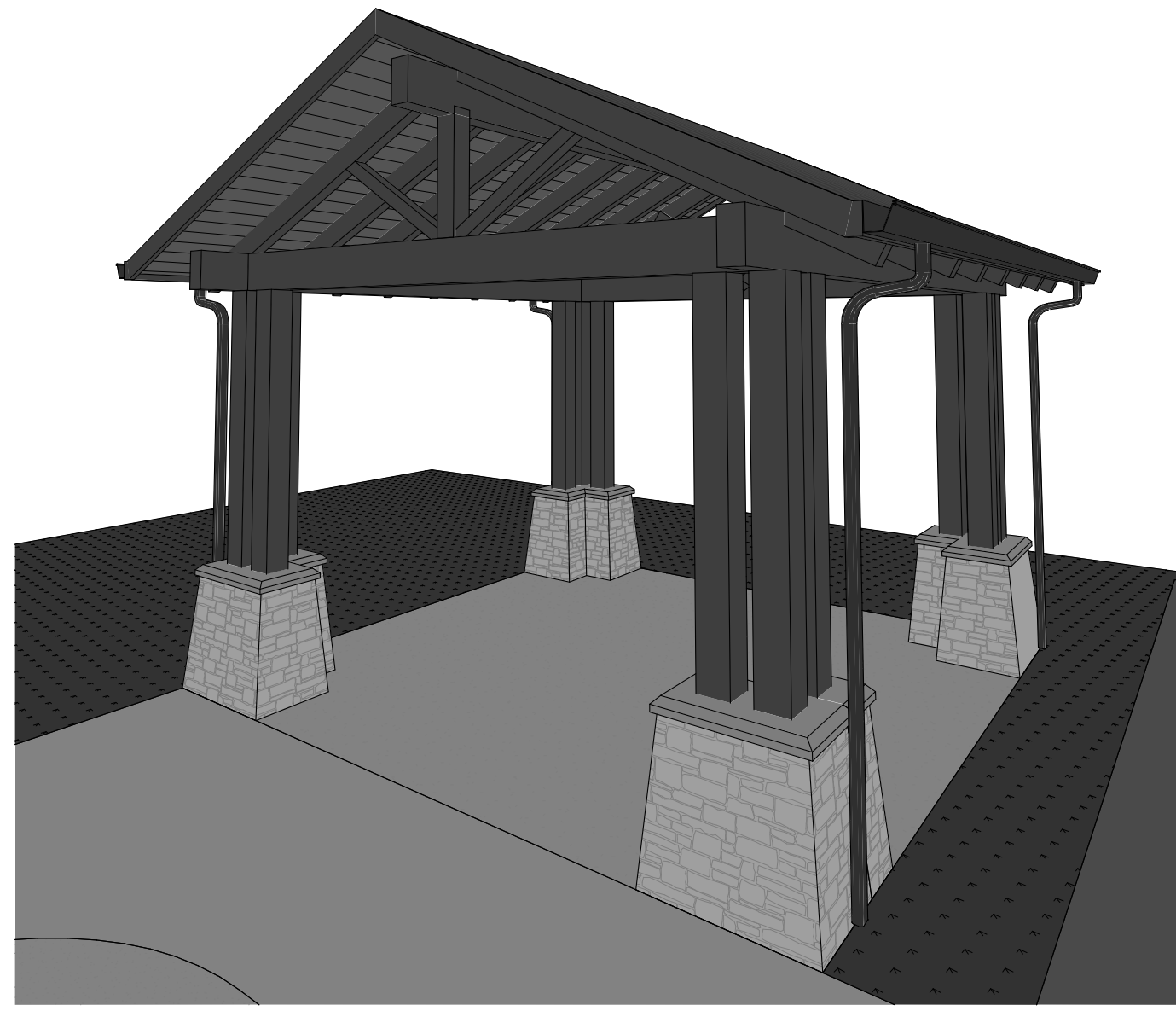
PROJECT # 2021-146
 DATE: 12/21/2022

REVISIONS

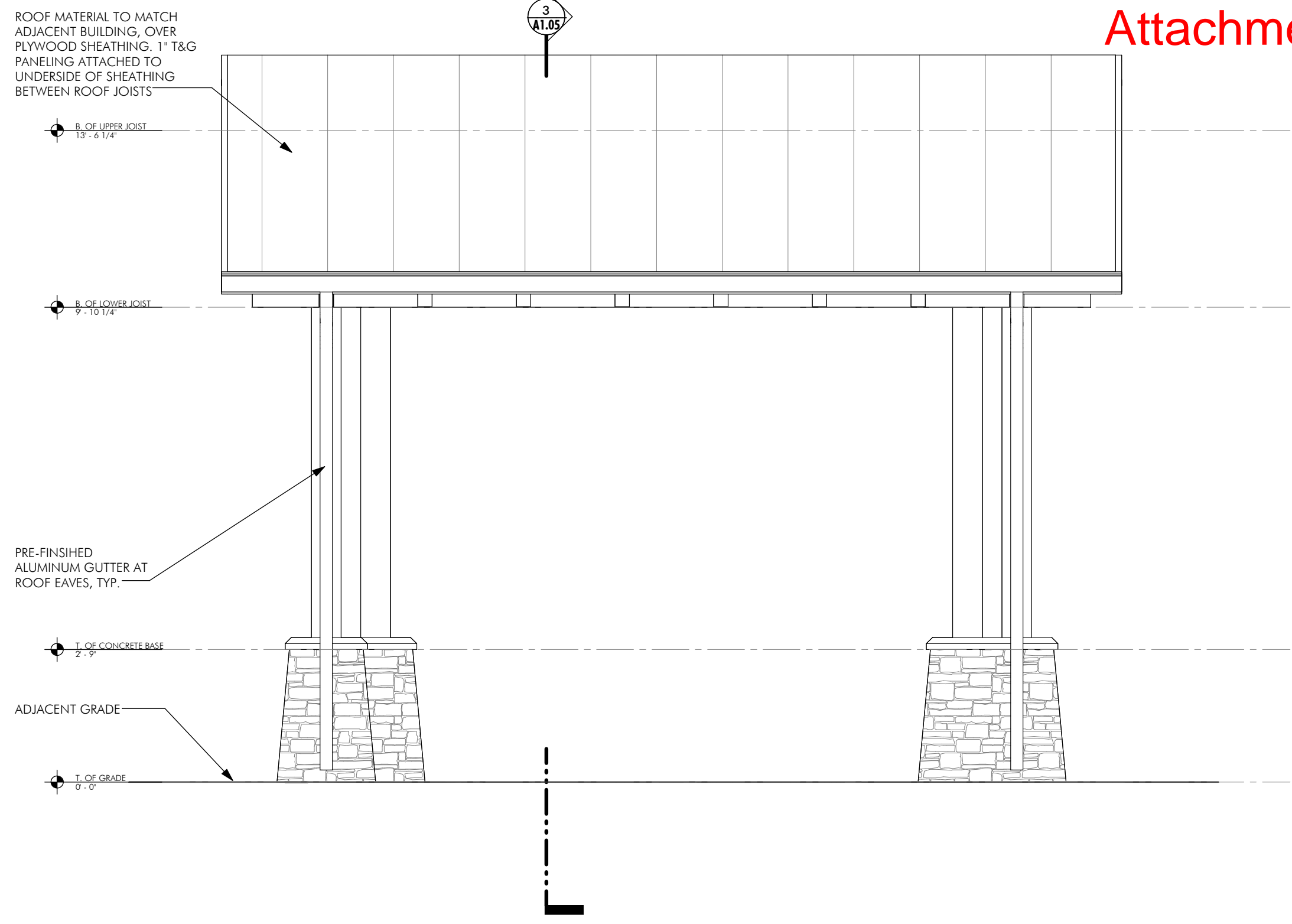
NEW MULTI-FAMILY DEVELOPMENT
SANDY
 38015 Hwy 26, Sandy, OR

SHEET:
A1.02
 ENLARGED SITE PLAN

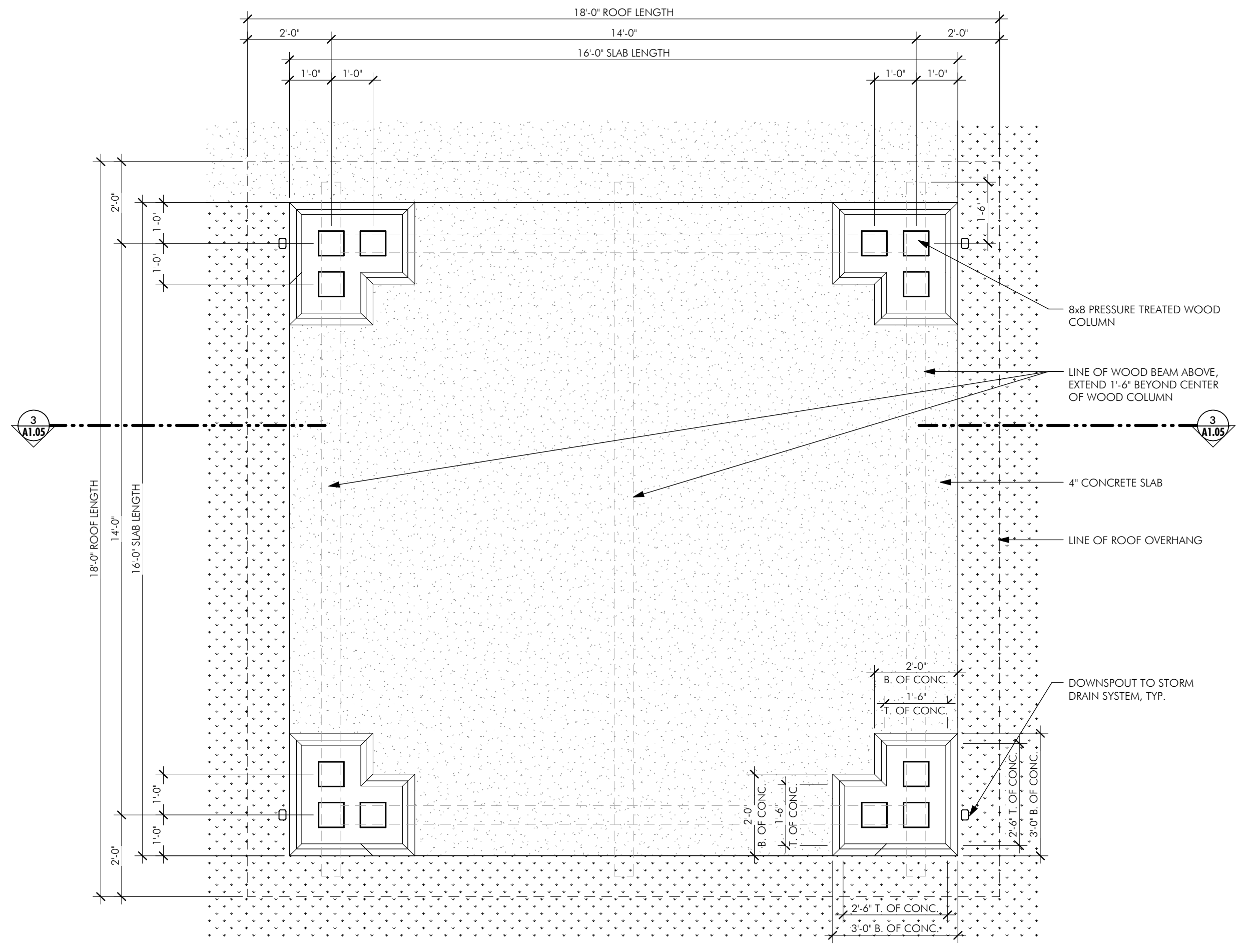




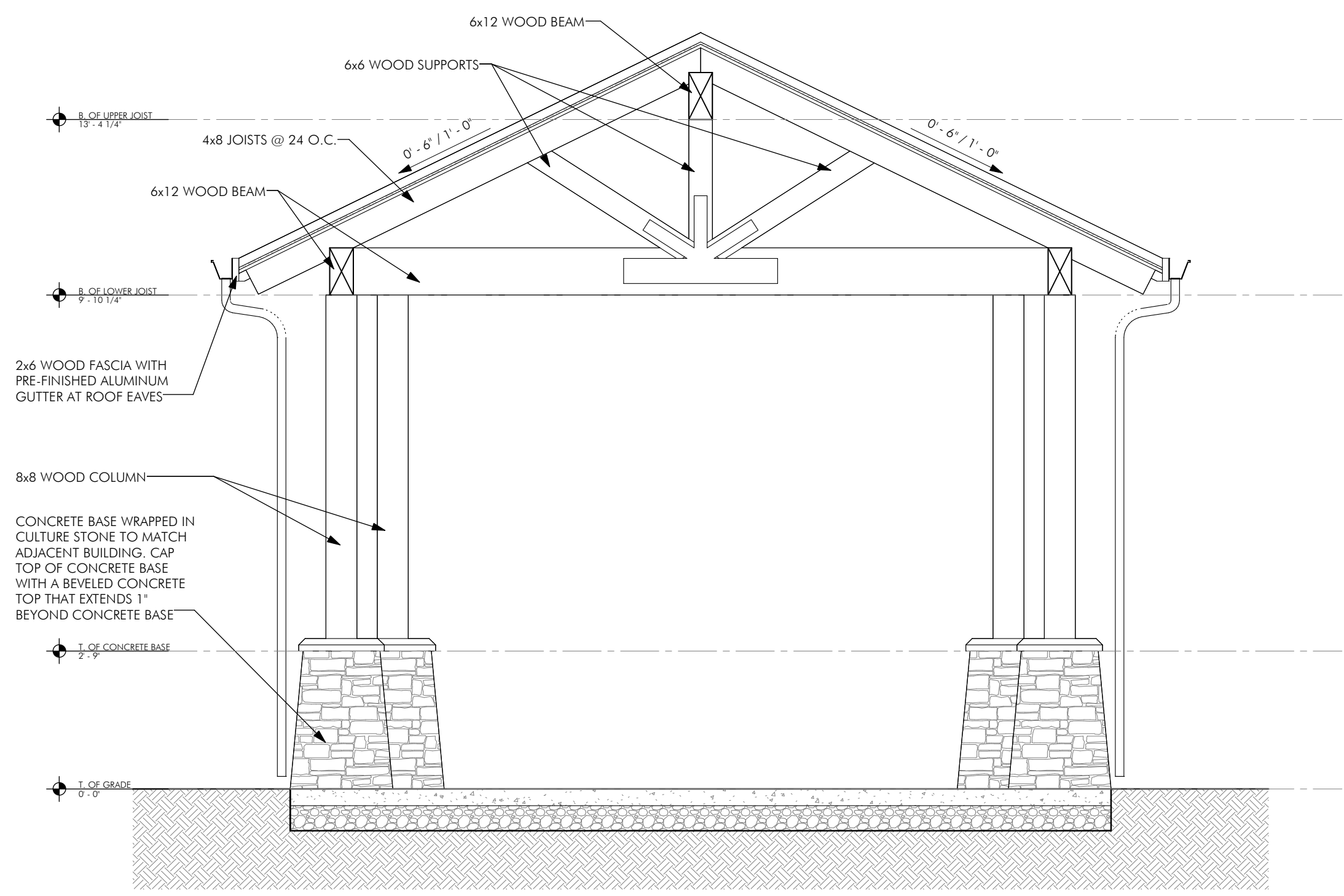
Attachment 2



1 GAZEBO - ELEVATION, SIDE



2 GAZEBO



3 GAZEBO - SECTION

STUDIO
3
ARCHITECTURE
INCORPORATED

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PROJECT # 2021-146
DATE: 07/29/2022

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
38015 Hwy 26, Sandy, OR

SHEET:
A1.05
GAZEBO



Oregon

Kate Brown, Governor

EXHIBIT S

Department of Transportation

Region 1 Headquarters
123 NW Flanders Street
Portland, Oregon 97209
(503) 731.8200
FAX (503) 731.8259

May 24th, 2021

ODOT #12104

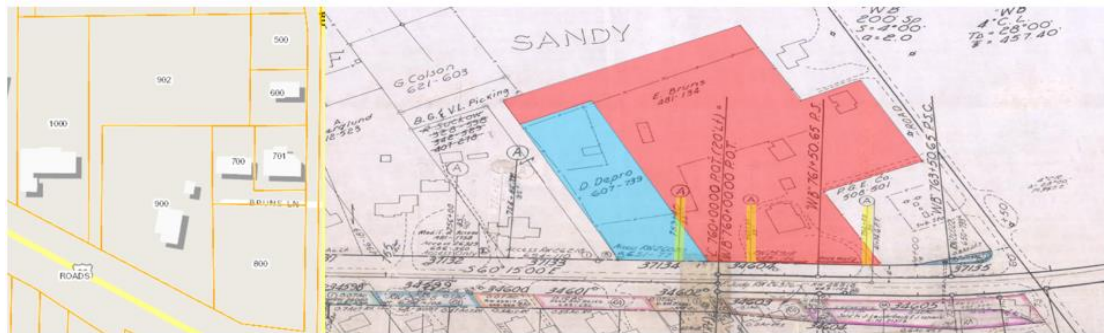
ODOT Response

Project Name: State Street Homes	Applicant: State Street Homes
Jurisdiction: City of Sandy	Jurisdiction Case #: BKM_PrimJuriCase
Site Location: 2S4E14AD TL902 adjacent to 38015 Hwy 26, Sandy, OR	State Highway: US 26

ODOT Facilities and Access Control Research

ODOT has permitting authority for US 26 and an interest in ensuring that this proposed land use is compatible with its safe and efficient operation. The applicant is proposing 42 multifamily units with ground floor storage located on the bottom level. The site of this proposed land use action is for TL 902 which is flag lot that is adjacent to US 26.

This section of US26 is access controlled, meaning ODOT has acquired highway access rights along the frontage of TL 1000, TL 902 and TL 900. At the time ODOT acquired access rights TL 902 and TL 900 were part of the same property or had the same owner. Properties only have the right to apply for access to the highway at specific locations identified at specific engineering stations which are called reservations of access. The right of way map below shows reservation locations in yellow. The blue property (TL 1000) has a single reservation of access to serve that tax lot and the property shown in red (TL 902 and TL 900) has two. Based on this research, TL 902 only has the right to apply for access to the highway at reservations of access located on TL 900.



2S-4E-14AD-TL 902 (portion of red area) Access is controlled along US26 (the Mt. Hood Highway) with reservations of access at sta. 760+50 and 762+25.

2S-4E-14AD-TL 1000 (blue) Access is controlled along US26 with a reservation of access at sta. 759+40. For ODOT to review a highway approach that serves TL 902, the property owner needs (1) access rights to the state highway (2) a highway approach permit application.

Access Options

Option 1

Work with property of TL 900 to establish a cross over easements to one of reservations located on the frontage of TL 902 (762+25, 35' or 760+50,35').

Option 2

For ODOT to consider an approach application for a shared access between TL 1000 and TL 902 at the reservation located at engineering station 759+40, the applicant will be required to do the following:

1. Relinquish their interest to access rights at engineering stations 760+50 and 762+25 located on TL 900, in exchange for establishing access rights at 759+40 to benefit TL 902.

To facilitate the exchange of access rights, a Reciprocal Conveyance of Access Rights will be required an Indenture of Access application, checklist and associated fee will be needed:

https://www.oregon.gov/odot/Engineering/Docs_AccessMngt/734-3792.pdf

2. Establish cross over access easements between TL 1000 and TL 902
3. Submit a State Highway Approach Road Application for highway access at engineering station 759+40. Site access to the state highway is regulated by [OAR 734.51. Application for a Permit to Construct a State Highway Approach.](#)

The recommended conditions of approval below are made under the assumption that the applicant will choose to move forward with Option 2.

ODOT RECOMMENDED LOCAL CONDITIONS OF APPROVAL

Access to the State Highway

- A State Highway Approach Road Permit from ODOT for access to the state highway documenting that the existing approach is legal for the proposed use is required. Truck turning templates shall be provided as needed to ensure vehicles can enter and exit the approach safely. Site access to the state highway is regulated by [OAR 734.51. Application for a Permit to Construct a State Highway Approach](#) link.

Note: It may take **2 to 3 months** to process a State Highway Approach Road Permit.

- The applicant shall record a cross-over access easement to TL 1000 with the County Assessor to facilitate shared access. Shared access will improve highway safety by reducing potential conflicts between vehicles and between vehicles and pedestrians and bicyclists at closely spaced driveways and will implement ODOT Access Management Program goals.

Access Control

- The applicant shall relinquish their interest to access rights at engineering stations 760+50 and 762+25 located on TL 900, in exchange for establishing access rights at 759+40 to benefit TL 902.

To facilitate the exchange of access rights, a Reciprocal Conveyance of Access Rights will be required through an Indenture of Access. An application, checklist and associated fee will be required. [Indenture of Access Application Link.](#)

Permits and Agreements to Work in State Right of Way

- An ODOT Miscellaneous Permit is required for connection to state highway drainage facilities. Connection will only be considered if the site's drainage naturally enters ODOT right of way. The applicant must provide ODOT District with a preliminary drainage plan showing impacts to the highway right of way.

A drainage study prepared by an Oregon Registered Professional Engineer is usually required by ODOT if:

1. Total peak runoff entering the highway right of way is greater than 1.77 cubic feet per second; or
2. The improvements create an increase of the impervious surface area greater than 10,758 square feet.

[Application for ODOT Permit to Occupy or Perform Operations Upon a State Highway Link.](#)

Please direct the applicant to the District Contact indicated below to determine permit requirements and obtain application information.

Send the Land Use Notice to:

ODOT Region 1 Planning
Development Review
123 NW Flanders St
Portland, OR 97209

ODOT_R1_DevRev@odot.state.or.us

Development Review Planner: Marah Danielson	503.731.8258, marah.b.danielson@odot.state.or.us
Traffic Contact: Avi Tayar, P.E.	503.731.8221 Abraham.tayar@odot.state.or.us
District Contact: Loretta Kieffer	503.667.7441 Loretta.l.kieffer@odot.state.or.us



EXHIBIT T

Emily Meharg <emeharg@ci.sandy.or.us>

State Street Homes project in Sandy (38015 Highway 26)

RIKLI Anthony <Anthony.RIKLI@odot.oregon.gov>
To: Emily Meharg <emeharg@ci.sandy.or.us>, "Kelly O'Neill Jr." <koneill@ci.sandy.or.us>
Cc: COX Robert W <Robert.W.COX@odot.oregon.gov>

Wed, Dec 21, 2022 at 1:52 PM

Hi Emily and Kelly,

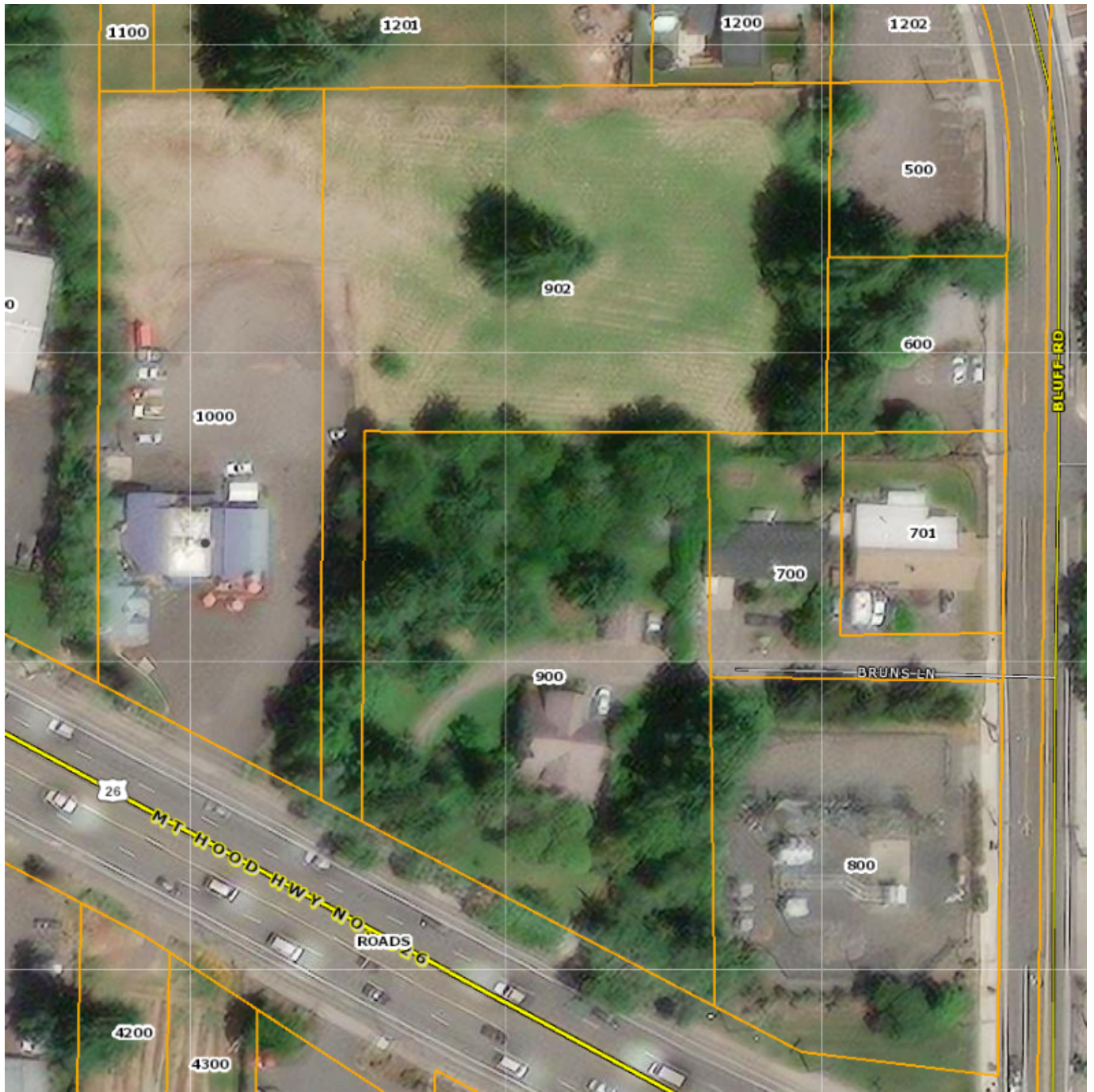
Recently, and I'm sure before my time, with shared accesses we have seen issues where if the access is strictly located on one parcel or another, folks within that parcel have been known to block the access and prevent folks who are legally allowed to use the access entrance onto our facilities. This usually becomes an issue and through some form or another we are fighting an uphill battle to keep the shared access and have to allow another access to our facility. This then creates the potential for more conflict points on our facility, decreasing safety and, more often than not, does not fit within our spacing standard set in Division 51.

That said, the new location for this access will have a center line on the shared tax lot line of TL 902 and TL 1000 therefore removing that likelihood of one owner blocking another's right to access our roadway. A snapshot below shows the general location referenced.

Hope that helps!

Tony

Tony Rikli, PE
Region Access Management Engineer
ODOT Region 1 Garrett Building
(503) 731-8563 (office)
(503) 312-3407 (cell)
Anthony.RIKLI@odot.oregon.gov



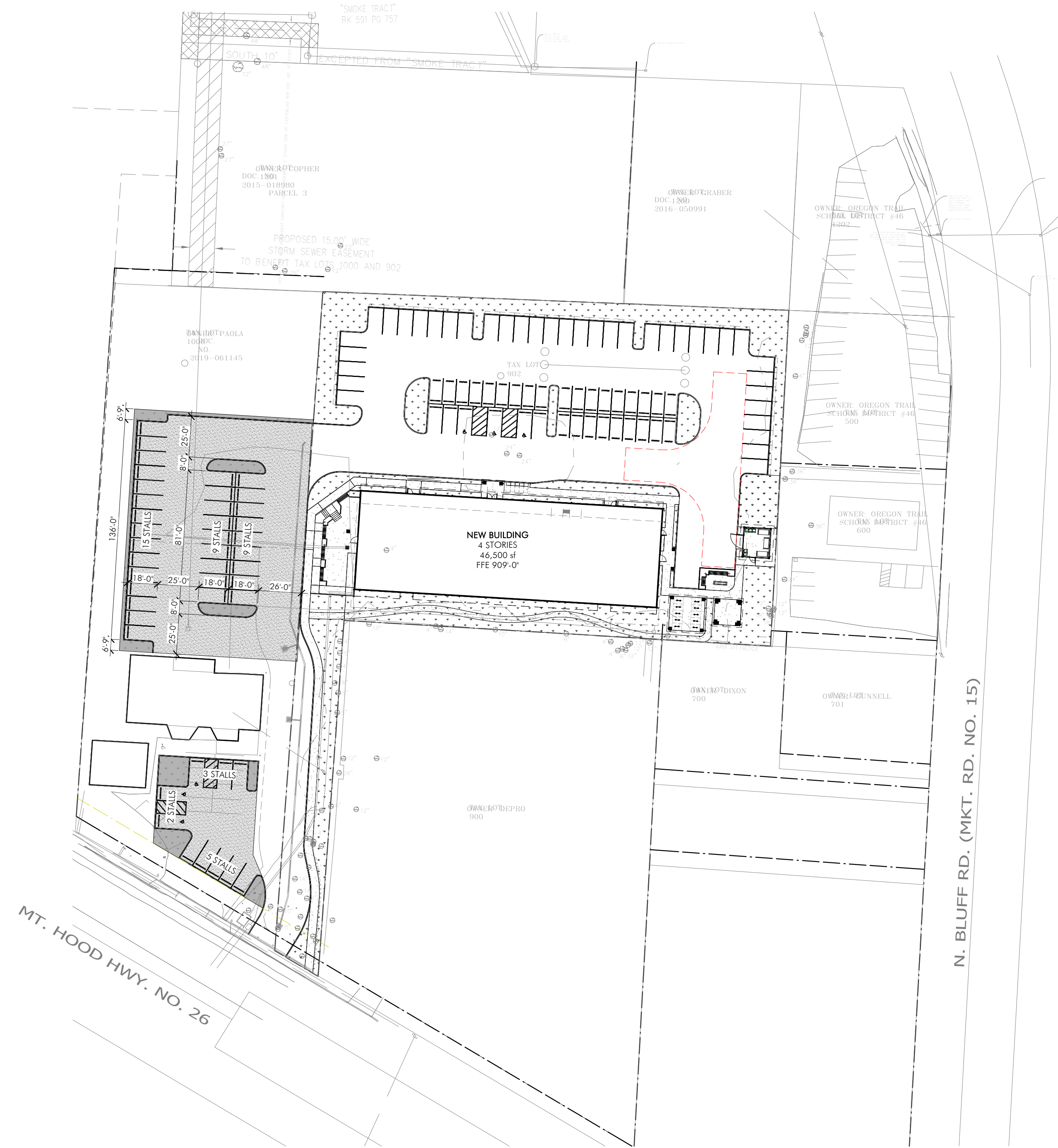
[Quoted text hidden]

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- SEE ELECTRICAL DRAWINGS FOR SITE LIGHTING.

SITE DEVELOPMENT CODE REVIEW:

- PARKING:
- EATING ESTABLISHMENT: 1 SPACE PER 250 SF (4,421 SF) = 17 SPACES
1 SPACE PER 2 EMPLOYEES (10) = 23 SPACES RQD
 - EXISTING PARKING: 44 SPACES
PROVIDED = 43 SPACES
0.00% COMPACT
- BIKE PARKING:
- EATING ESTABLISHMENT: 5% OF RQD PARKING, OR 2 SPACES = 2 SPACES
- REQUIRED PARKING LANDSCAPE: 10% OF PARKING LOT
- LOWER PARKING (3,445 SF) = 345 SF
 - UPPER PARKING (15,221 SF) = 1,522 SF
 - **PROVIDED = 1,967 SF**
 - MINIMUM 5'-0" PLANTERS AT ENDS OF EACH BAY



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www.studio3architecture.com

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PROJECT # 2021-146
DATE: 02/08/2023

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
38015 Hwy 26, Sandy, OR

SHEET:
A1.01
SITE PLAN

SITE PLAN GENERAL NOTES:

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 SIDE/REAR YARD - NONE
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 • LEVEL 02-04, RESIDENTIAL: 11,736 sf
OVERALL = 46,500 sf

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PROVIDED = 1,544 sf
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 OUTDOOR DOG PARK = 786 SF
 COVERED GAZEBO (25.6' x 1.25') = 320 SF
 OUTDOOR SEATING/FIRE PIT = 285 SF
 NORTHERN OPEN LAWN = 1,785 SF
 EASTERN OPEN LAWN = 958 SF
 LANDSCAPED NATURE PATH = 2,860 SF
 LANDSCAPED NATURE SIDEWALK = 2,087 SF
PROVIDED = 9,081 SF

UNIT MIX:
 1 BED / 1 BATH - 32 UNITS
 2 BED / 2 BATH - 10 UNITS
TOTAL UNITS = 42 UNITS

PARKING:
 • STORAGE: 1 SPACE PER 2 EMPLOYEES
 1.5 SPACES PER 1 BD
 2 SPACES PER 2 BD
 = 70 SPACES RQD
PROVIDED = 70 SPACES
38.6% COMPACT
 REQUIRED PARKING LANDSCAPE:
 10% OF PARKING LOT = 2,662 SF
PROVIDED = 2,858 SF
 • MINIMUM 5'-0" PLANTERS AT ENDS OF EACH BAY

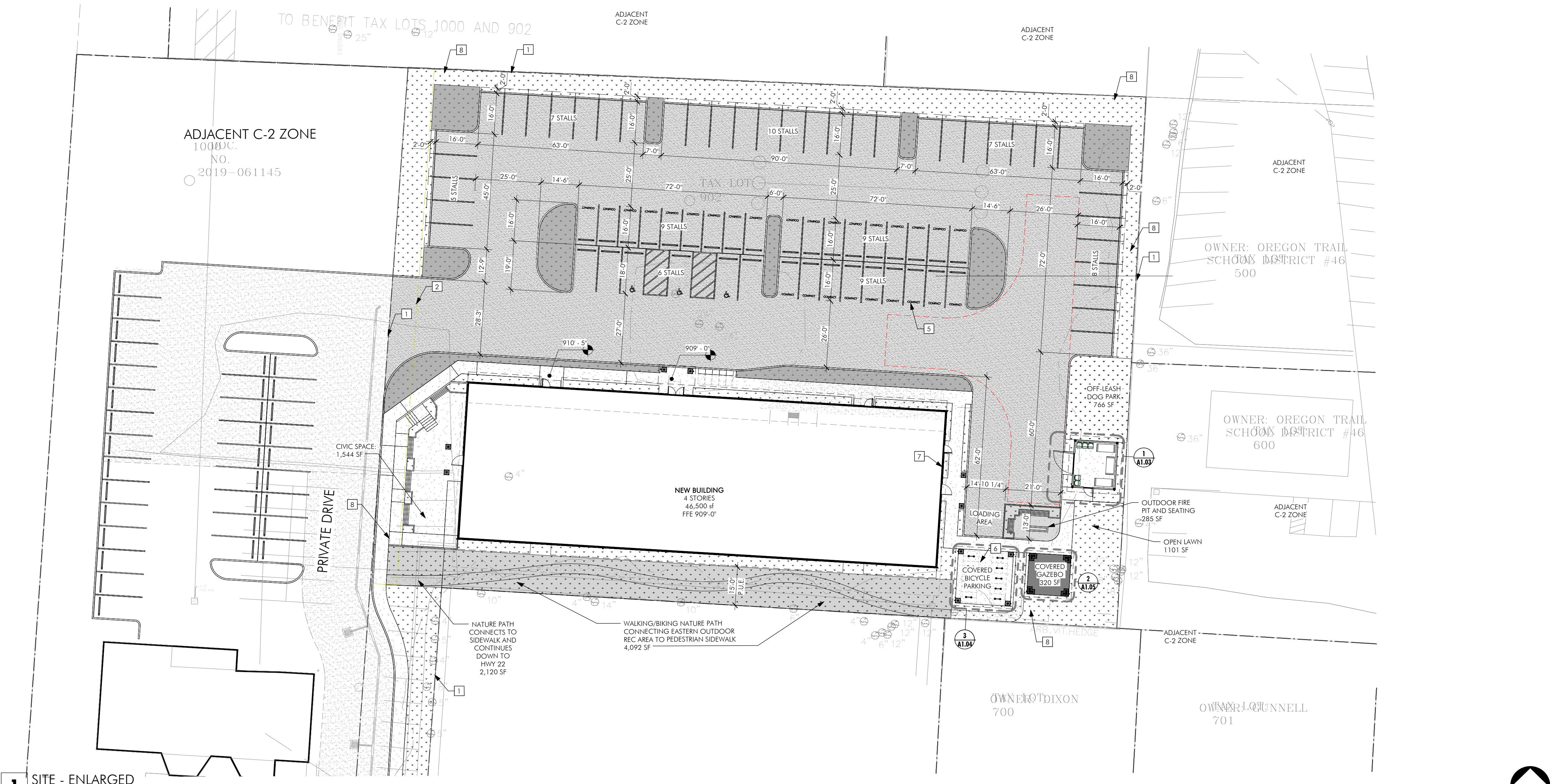
BIKE PARKING:
 • MULTIFAMILY: 1 PER DWELLING UNIT = 42 SPACES

SITE PLAN KEYNOTES:

- PROPERTY LINE
- FRONT SETBACK
- ACCESSIBLE PARKING STALL
- VAN ACCESSIBLE PARKING STALL
- COMPACT PARKING SPACE, PROVIDE PAINTED LETTERING AT EACH STALL AS INDICATED
- SHORT-TERM BIKE PARKING WITH GROUND MOUNTED U-RACKS
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CONCRETE PAVING & CURBS:	[Symbol]	2,613.72 sf	4.10 %
TOTALS:		63,711.03 sf	100.0 %



1 SITE - ENLARGED
 0 5 10 20 40 60 1" = 20'-0"



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PROJECT # 2021-146
 DATE: 02/08/2023

REVISIONS

NEW MULTI-FAMILY DEVELOPMENT
SANDY
 38015 Hwy 26, Sandy, OR

SHEET:
A1.02
 ENLARGED SITE PLAN



EXHIBIT V

The submitted plans are not near enough to determine or effectively predict the future damages to adjacent properties. One cannot determine the proposed wall heights given the height contradictions, and there are no sections or details in the plan set to review and provide comments. The construction of features of work and the methods that might be used are indeterminate given the lack of detail. The methods used may cause damage to my property and I ask for consideration of these factors in your findings.

In accordance with 17.60.00 the potential for flood damage to adjacent properties from improper drainage of the retaining walls and run off from the proposed impermeable surfaces is likely. The proposed drainage is not supported by the appropriate calculations. In addition, the maintenance access is not shown in the plans.

17.66 The variances applied here are only more convenient and they are not more efficient. Many other permutations for property use exist. They are listed in section 17.44 (C-2). A 4-story apartment building is not required to be built here and may not even be an efficient use of the property, certainly not relative to other commercial use ideas that provide more jobs for the area and improve Sandy economics. A multi-use commercial space that includes restaurants, fitness space, office and retail space would most certainly be a more efficient use of the property. Further the retaining wall does not promote innovation or allow for flexibility that would promote innovation. The location of the walls and the size of the wall don't conserve energy. None of the listed adjustments in 17.66 are relevant to a retaining wall in this situation.

In 17.66.70 the circumstances necessitating the variance are in fact the making of the applicant. In D of that same section the construction of this wall on the north side has the potential to cause harm to my property. There is effectively no gap between the proposed wall and my existing fence on my property line. Traditionally a retaining wall has a 'heel' and a 'toe'. The footing and the toe extend to the non-retaining side of the wall and its length is greater than the available space shown on sheet 7/11 "Grading and ESC Plan". This 'toe' side would then extend onto my property and there is no easement currently agreed upon. In addition, the construction of the wall would require construction workers to be on both the north and south side of the wall to install/remove snap ties/formwork and currently the available space shown does not provide for that. How does the designer propose the wall will be built without damaging my property (fence) or needing to be on my property to construct it?

I currently do not experience flooding or water conveyance issues from the adjacent property in review. When the wall is constructed, it will likely require weep holes to be installed to relieve the hydrostatic pressure on the wall. And while there is stormwater management onsite and an impermeable surface on top, water will make its way through to the soil below through joints, cracks, and seams, and it will need to be planned for. This water will make its way to the wall and potentially through the weep holes in the wall. This water will likely make its way on to my property and by code should not be burdened with managing this water. I would like to request more details and information concerning the proposed wall before making final comments.

Bicycles are not allowed on sidewalks for the safety of pedestrians. The proposed 'nature path' is narrow and does not provide safe clearance for pedestrians and cyclists. In addition, it encourages cyclists to break the law to cross onto this path by riding on the sidewalk.

15.30 I am concerned about the potential light pollution from the parking area lights and the exterior lighting on the building. The current property does not provide light pollution to the area and the proposed project may not meet the dark sky code. There isn't enough information to tell if the exterior illumination will be overwhelming or not. There is no mention of reflectors or shields to prevent light

spilling over into the adjacent properties. I would request that we receive more information and time to review the plans and specifications concerning 15.30.

15.44.40 I would like to add my own emphasis on this section to plead that if this project is to be constructed that the erosion control will be tightly monitored. There will be 1000's of yards of nonnative soil imported to this site and the runoff concerns and mobilization of sediment is real. I am a downhill recipient of this potential material, and I would like it to stay on their side of the fence.

In speaking with the resident where the storm water would be sent an easement has not yet been agreed upon.