# City of Sandy 



Agenda<br>Planning Commission Meeting<br>Meeting Location: Zoom<br>Meeting Date: Monday, November<br>23, 2020

Meeting Time: 7:00 PM

## Page

## 1. MEETING FORMAT NOTICE

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2. ROLL CALL

## 3. APPROVAL OF MINUTES

3.1. Draft Planning Commission Minutes for October 26, 2020

Planning Commission - 26 Oct 2020 - Minutes - Pdf

## 4. 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.


## 5. DIRECTOR'S REPORT

6. COMMISSIONER'S DISCUSSION

## 7. NEW BUSINESS

7.1. $20-028$ The Views SUB TREE FSH PD

20-028 The Views PD - Staff Report \& Exhibits A-G
20-028 The Views PD - Exhibit H - KK
The Views PD - additional exhibits from the public
The Views PD - additional exhibits from the applicant
The Views PD - Requested Modifications from applicant Nov. 22
The Views PD - Fair Housing Council of Oregon Nov. 23
8. ADJOURN

MINUTES
Planning Commission Meeting
Monday, October 26, 2020 Zoom 6:00 PM

## COMMISSIONERS PRESENT:

## COMMISSIONERS ABSENT:

STAFF PRESENT:

## MEDIA PRESENT:

Don Carlton, Commissioner, Ron Lesowski, Commissioner, Hollis MacLean-Wenzel, Commissioner, John Logan, Commissioner, Chris Mayton, Commissioner, and Todd Mobley, Commissioner

Jerry Crosby, Commissioner

Kelly O'Neill, Development Services Director, Emily Meharg, Senior Planner, Shelley Denison, Associate Planner, and David Doughman, City Attorney

None

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2. WORK SESSION - 6:00 PM
2.1. Vice Chairman Carlton called the work session to order at 6:01 p.m.

Kelly O'Neill Jr. introduced Ethan Stuckmayer, the Senior Planner of Housing Programs with DLCD, and Jennifer Donnelly, the Local Planning Representative with DLCD. Mr. Stuckmayer provided an overview of House Bill 2001 and how it impacts housing in middle-sized cities, such as Sandy. He reiterated that Sandy shall adopt a compliant code by the end of June 2021, or the city will be forced to use the model code drafted by DLCD.

Senior Planner Emily Meharg summarized the staff report and provided an indepth presentation related to the proposal. Meharg summarized the proposed code change schedule with a Planning Commission hearing in January and a City Council hearing in March.

Kelly O'Neill Jr. explained that House Bill 2001 (HB 2001) makes ADUs and Duplex units like one another. Commissioner Mayton asked DLCD if any of the assumptions that staff is making are incorrect. Mr. Stuckmayer stated that staff's assumptions in the staff report are correct. Commissioners Lesowski and Carlton asked clarifying questions that were answered by DLCD staff and City staff. Commissioner Mayton asked questions regarding permitting for duplex units and tandem parking. Commissioner Lesowski asked Stuckmayer and Donnelly about potential pitfalls with adopting code standards. Mr. Stuckmayer said the model code should help cities, but that the model code has not existed long enough to know if there are pitfalls. Meharg explained that some of the requirements in the model code were incorporated into the Sandy code modifications. Commissioner Lesowski asked for other examples around the country. Mr. Stuckmayer said that Minneapolis and New Orleans have middle housing requirements, but that Oregon is the only state to adopt such standards. Ms. Donnelly suggested that staff look at Hood River for an example of parking for single family homes.

Commissioner Maclean-Wenzel asked, does DLCD have any input regarding people working from home and how that might modify the need for families to have multiple vehicles? Ms. Donnelly said that more families will likely have less vehicles over time because of more people working from home. Mr. Stuckmayer stated that as vehicle ownership patterns change the state will reexamine rules. Commissioner Maclean-Wenzel stated that overtime she believes the necessity for multiple vehicles will decrease. Commissioners Carlton and Lesowski made some additional comments. Commissioner Mayton asked a question about having a triplex and quadplex on the same lot. Mr. Stuckmayer provided some clarity on Mr. Mayton's question. Kelly O'Neill Jr. repeated some questions from the staff report, and the Planning Commission provided some feedback. The work session ended at 6:59 p.m.

## 3. REGULAR MEETING-7:00 PM

## 4. ROLL CALL

Vice Chairman Carlton called the regular meeting to order at 7:05 p.m.

## 5. APPROVAL OF MINUTES

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### 5.1. APPROVAL OF MINUTES - September 28, 2020

Motion: Approve the Planning Commission minutes for September 28, 2020.
Moved By: Commissioner Lesowski
Seconded By: Commissioner Maclean-Wenzel
Yes votes: All Ayes
No votes: None
Abstentions: None
The motion passed.
6. REQUESTS FROM THE FLOOR - CITIZEN COMMUNICATION ON NON-AGENDA ITEMS

Kathleen Walker
15920 Bluff Road
Sandy, OR 97055
Mrs. Walker commented on HB 2001 and the parking issues that already exist in the city of Sandy. Mrs. Walker asked if ADUs and Duplex units will still be required to have additional off-street parking.
7. DIRECTOR'S REPORT

Kelly O'Neill Jr. summarized the director's report and provided information on HB 2001 in response to Mrs. Walker's public comments.
8. COMMISSIONER'S DISCUSSION

Commissioner Mayton stated that he appreciated the work session and encourages residents to listen to the House Bill 2001 discussion once it is posted to YouTube. Commissioner Carlton agreed with Commissioner Mayton. Commissioner Lesowski stated that the Planning Commission does not see all of the applications and that the Commission is more of a review commission for exceptions that are being requested. Commissioner Logan announced that he will not be seeking Planning Commissioner reappointment. Commissioner Maclean-Wenzel asked if we are going to extend the deadline for submitting applications for commissioner seats. O'Neill stated that he thinks extending the deadline for submitting applications is a good idea, but that he also wants to make sure some of the open seats are filled to make sure we do not run into quorum issues. Commissioner Mayton asked other people in the public to apply for the Planning Commission. Commissioner Carlton provided some additional input.
9. OLD BUSINESS

### 9.1. Bull Run Terrace (19-050 CPA/ZC/SAP/SUB/TREE):

Vice Chairman Carlton opened the continuance of the public hearing on File No. 19-050 CPA/ZC/SAP/SUB/TREE at 7:31 p.m. Carlton 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 Shelley Denison summarized the staff report and provided an in-depth presentation related to the request. O'Neill presented a few additional items.

## Applicant Testimony:

Tracy Brown
17075 Fir Drive
Sandy, OR 97055
Mr. Brown stated that most of the modifications to the proposal are reflective of the input that was received from the public and the Planning Commission in August. He then presented a slideshow that highlighted the modifications to the proposal.

Ray Moore
All County Surveyors and Planners, Inc.
PO 955
Sandy, OR 97055
Mr. Moore thanked staff and the public. He stated that the input from the
August meeting was great and modifications were made to the proposal in response to concerns that were raised. Mr. Moore also explained the logic behind adding a second stormwater pond facility.

Mike Ard
Ard Engineering
17790 SW Dodson Drive
Sherwood, OR 97410
Mr. Ard explained the modifications to the traffic analysis and explained some of the concerns that were raised by ODOT. A trip cap is being proposed with the application. 340 PM Peak Hour Trips is the proposed trip cap.

Commissioner Mobley asked if a grant of access is needed for Dubarko Road. Mr. Ard said that a grant of access or another mechanism will be applied for.

Mike Robinson
Schwabe, Williamson, and Wyatt
1211 SW 5th Avenue, Suite 1900

Portland, OR 97204
Mr. Robinson explained that he believes only an indenture of access is needed.

Mr. Brown provided a brief recap and thanked the Planning Commission. Commissioner Maclean-Wenzel thanked the applicant for the additional landscape screening and tree retention.

Commissioner Carlton then explained the testimony process.

## Proponent Testimony:

Vadim Verbelchuk
18382 Meadow Avenue
Sandy, OR 97055
Mr. Verbelchuk thanked the applicant for the additional screening along the common property line.

## Opponent Testimony:

Steven Hook
18078 Meadow Avenue
Sandy, OR 97055
Mr. Hook thanked the developers for the concessions that were made to help the existing neighborhood to the west. Mr. Hook said he has some concerns with permitting higher density and the parking issues it may create.

Brenda Hoyt
40485 Buck Street
Sandy, OR 97055
Ms. Hoyt expressed concerns with parking and the issues with availability in the Deer Pointe subdivision. She also has concerns with 5th-Wheelers that are always parked on the streets.

Ann Ruhl
18368 Meadow Avenue
Sandy, OR 97055
Ms. Ruhl likes the new proposal better than the last proposal, but still doesn't think the proposal meets the municipal code criteria. Ms. Ruhl then read a letter that summarized her thoughts related to comprehensive plan changes, density increases, multi-family housing, etc. She finished her testimony by asking for a continuance to the public hearing.

Zoanna McKenzie

18428 Meadow Avenue
Ms. McKenzie expressed concerns about not knowing how the buildings in the proposed subdivision will be designed.

## Neutral Testimony:

Kathleen Walker
15920 Bluff Road
Sandy, OR 97055
Mrs. Walker said she is speaking on behalf of the Parks and Trails Advisory Board. She said there is nothing in the staff report regarding the Parks and Trails Advisory Board input.

Bill Knapp
PO Box 880
Sandy, OR 97055
Mr. Knapp stated he doesn't see a rationale for the increase in density and wants more information. He then elaborated on the traffic impacts at Dubarko Road.

## Staff Recap:

Denison explained the parking regulations for multi-family housing, the future design review requirements related to Lots 5-7, housing needs and affordability, and the comprehensive plan modifications. O'Neill elaborated on a few additional points related to the Parks and Trails Advisory Board and information in the recommendations section related to the rationale for supporting an increase in density.

## Applicant Rebuttal:

Mike Robinson
Schwabe, Williamson, and Wyatt
1211 SW 5th Avenue, Suite 1900
Portland, OR 97204
Mr. Robinson elaborated on the continuance request and explained that most of the record before the Commission is from August. He then elaborated on approval criteria, state goals, modifications since the August proposal, the correct land use mix to pay for the transportation improvements, and other pertinent state laws.

Mike Ard
Ard Engineering
17790 SW Dodson Drive

October 26, 2020

## Sherwood, OR 97410

Mr. Ard addressed a few of the public comments, including the comments regarding the intersection of Langensand Road and Highway 26. He then elaborated on the intersection improvements at Dubarko Road and Highway 26.

Tracy Brown
17075 Fir Drive
Sandy, OR 97055
Mr. Brown provided some information on the Parks and Trails Advisory Board meetings and asked staff to include the Parks and Trails Advisory Board minutes in the exhibits list. He also explained that the applicant would like to assist in construction of Deer Pointe Park.

## Discussion:

Commissioner Mayton stated he is conflicted as he likes some of the proposal and doesn't like some of the proposal mainly because the community attitude is against multi-family housing. Commissioner Carlton stated that having a developer that is ready to develop multi-family housing is not a bad thing. David Doughman stated the review criteria for Comprehensive Plan amendments are the criteria in Section 17.24.70, and that the attitudes of the public are not approval criteria. Commissioner Mobley stated that the latest proposal is subject to a trip cap and will not generate more trips than the existing zoning. O'Neill stated that if the trip cap is not in the existing staff report it should be added as a condition.

Commissioner Carlton asked a question related to a traffic signal at Dubarko Road and Highway 26. Commissioner Mobley stated that the need for a traffic signal will be warranted eventually, but the threshold to warrant the signal has to be met first.

Commissioner Lesowski thanked the applicant for the modifications to the proposal and for listening to all of the concerns in August. He then elaborated on the relationship between 'development pays for itself' and the desire to have new parks and roads. Mr. Lesowski stated that the city could have helped pay for the transportation costs.

Commissioner Logan concurred with Mr. Lesowski. He elaborated on supply and demand with rental homes, and that people typically don't want high density in their backyard.

Commissioner Maclean-Wenzel stated that as all other commissioners have
stated it seems the proposal meets the requirements. She stated that the connection of Dubarko Road to Highway 26 is long overdue and needs to occur. Commissioner Mobley said that higher density development helps pay for transportation improvement costs.

Chairman Carlton stated the original zoning had R-2 so there likely was going to multi-family housing regardless of the zone change. He then elaborated on the proposal and explained that he feels that Dubarko Road and the park expansion are very important.

O'Neill explained the difference between a typical process that we typically do not evaluate costs, such as a design review, and this proposal that evaluates costs related to public benefits, such as transportation improvements and park improvements.

Commissioner Mayton asked if the modifications to R-3 zoning satisfy density and alternative housing options or create a public benefit. Both Commissioner Carlton and O'Neill explained their thoughts elaborating that they find the zoning modifications will do both.

Commissioner Lesowski said one of the main reasons we are hearing the comprehensive plan map change is because the applicant needs help to make the project pencil.

Motion: Motion to close the public hearing at 9:52 p.m.
Moved By: Commissioner Logan
Seconded By: Commissioner Mayton
Yes votes: Carlton, Lesowski, Maclean-Wenzel, Logan, Mobley and Mayton No votes: None
Abstentions: None
The motion passed at 9:52 p.m.

Motion: Motion to recommend to the City Council approval of the application per the staff report, with an additional condition of approval to implement a trip cap per the transportation analysis.
Moved By: Commissioner Mobley
Seconded By: Commissioner Maclean-Wenzel
Yes votes: Carlton, Lesowski, Maclean-Wenzel, Logan, Mobley and Mayton
No votes: None
Abstentions: None
The motion passed at 9:54 p.m.

O'Neill reminded the Commission of the November 23, 2020 Planning Commission hearing.
10. ADJOURNMENT


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## Staff Report

Meeting Date: November 23, 2020
From Kelly O'Neill, Development Services Director
SUBJECT: Director's Report for November 23, 2020

## BACKGROUND:

The following list highlights some of the main projects of interest in the Planning Division.

- 20-032 DCA code changes associated with House Bill 2001 related to duplexes and ADUs: Planning staff held a PC work session regarding HB 2001 on October 26 and the first evidentiary hearing is scheduled for the January Planning Commission meeting.
- Hood Street Daycare (20-039 DCA/ADJ): Completeness check has been completed. This request to construct a new day care facility at 38422 Hood Street is currently under review.
- Sandy Woods II (20-034 ZC): This zoning map update with FSH overlay for Sandy Woods II has been withdrawn by the applicant. The applicant stated that a subdivision application for Sandy Woods II will be submitted in the near future.
- Rogue Fabrication zone change (20-041 ZC): This request to change the zoning designation from I-1 to I-2 for Rogue Fabrication's new facility at the corner of Champion Way and Industrial Way has been deemed incomplete. Staff sent an incompleteness letter to the applicant and are awaiting a few additional materials. This will be heard by the Planning Commission most likely in early 2021.
- Bull Run Terrace (19-050 CPA/ZC/SUB): This project will be heard at a special City Council meeting on November 30.
- OAOR Annexation (20-025 ANN): Staff asked for a continuance for this project at a recent meeting due to a couple of code violations with Clackamas County. Staff met with the applicant in mid-October and it was determined that the applicant needs to correct these County code violations prior to moving forward. This project will be brought back before the Planning Commission once the outstanding issues have been corrected.
- Sandy High School Field House (20-040 DR/VAR): This proposal to construct new indoor batting cages at 36525 Industrial Way was deemed complete on November 12. The proposal will include variations that necessitate a Planning Commission hearing.
- $\mathbf{1 6 3 2 0}$ Bluff Road (20-037 DR): The final order for this request to construct a new single family residence on Bluff Road was issued on October 23.


## Staff Report

Meeting Date: November 23, 2020
From Shelley Denison, Associate Planner
SUBJECT: 20-028 The Views PD

## BACKGROUND:

The applicant, Even Better Homes, Inc., is proposing to subdivide and develop a Planned Development on the subject properties adjacent to Vista Loop Drive, just east of Highway 26. These properties total 32.87 acres. Both parcels are zoned SFR, Single Family Residential. The applicant proposes constructing 120 single family dwellings (32 attached dwellings and 88 detached dwellings) and 48 multi family dwellings on two lots.

A Planned Development is a specific kind of development which allows for integrating different kinds of land uses. In this case, the applicant is proposing using mixed housing types with recreational amenities. Additionally, in a Planned Development application, the applicant can request that certain code requirements be waived in order to provide outstanding design elements while still meeting the intent of the code.

A section of the subject site falls within the Flood and Slope Hazard (FSH) area, which has specific code requirements prohibiting development. The City hopes to avoid adverse impacts from flooding, erosion, landslides, and degradation of water within the FSH area. As part of the development, the applicant is also requesting tree removal. According to calculations based on the site acreage, the applicant is required to retain a minimum of 99 trees at 11 inches DBH or greater. The applicant is proposing to retain 212 trees. No trees are proposed to be removed within the FSH area.

## SUGGESTED MOTION:

Staff recommends the Planning Commission approve the Type IV Planned Development with tree removal and FSH overlay associated with the proposed development subject to the conditions of approval.

## LIST OF ATTACHMENTS/EXHIBITS:

Attachment 1: Staff Report
Attachment 2: Exhibits

## PLANNING COMMISSION STAFF REPORT TYPE IV RECOMMENDATION TO THE CITY COUNCIL

DATE: November 16, 2020

FILE NO.: 20-028 SUB/VAR/TREE/FSH/PD/ZC

PROJECT NAME: The Views PD
APPLICANT: Mac Even, Even Better Homes

OWNERS: Brad Picking, John Knapp
LEGAL DESCRIPTION: 25E 19, Tax Lots 200 and 500

The above-referenced proposal was reviewed concurrently as a Type IV planned development, subdivision, zoning map amendment, special variance, Flood and Slope Hazard (FSH) overlay review, and tree removal permit.

NOTE: The following exhibits, findings of fact and conditions (bold text) are to explain the proposal and assist the Planning Commission in forwarding a recommendation of approval, approval with conditions, or denial to the City Council.

## EXHIBITS:

## Applicant's Submittals:

A. Land Use Application
B. Project Narrative
C. Supplemental Narrative for Special Variance
D. Civil Plan Set

- Sheet 1 - Cover Sheet and Preliminary Plat Map
- Sheet 2 - Preliminary Plat Map: The Lower Views
- Sheet 3 - Preliminary Plat Map: The Upper Views
- Sheet 4 - Topographic Survey
- Sheet 5 - Topographic Survey: The Upper Views
- Sheet 6 - Tree Retention and Protection Plan
- Sheet 7 - Tree Inventory List
- Sheet 8 - Building Setbacks: The Lower Views
- Sheet 9 - Building Setbacks: The Upper Views
- Sheet 10 - Parking Analysis and Future Street Plan
- Sheet 11 - Block and Street Dimensions
- Sheet 12 - Street and Utility Plan: The Lower Views
- Sheet 13 - Street and Utility Plan: The Upper Views
- Sheet 14 - Grading and Erosion Control Plan: The Lower Views
- Sheet 15 - Grading and Erosion Control Plan: The Upper Views
- Sheet 16 - Sanitary Sewer Plan and Profile of Site
- Sheet 17 - Sanitary Sewer Plan and Profile of Site: The Lower Views
- Sheet 18 - Sanitary Sewer Plan and Profile of Site: The Upper Views
E. Preliminary Storm Drainage Report
F. Traffic Impact Study
G. Arborist Report
H. Wetland Determination Report
I. Geotechnical Report
J. Architectural Plans Booklet
K. The Views Proposed Homes
L. The Views Concept Plan
M. Lower Views Concept Plan
N. Upper Views Concept Plan
O. Plant Key
P. Plant Palette
Q. DSL Wetland Concurrence
R. Sound Wall Plans


## Agency Comments:

S. John Replinger, Traffic Engineer (September 14, 2020)
T. Hassan Ibrahim, City Engineer (September 14, 2020)
U. Sandy Fire Marshall (September 15, 2020)
V. SandyNet (September 16, 2020)
W. ODOT (September 17, 2020)
X. Sandy Area Metro (September 21, 2020)
Y. Public Works Director (November 6, 2020)

## Additional Documents from Staff:

Z. Pre-application Notes from May 29, 2019

## Additional Submission Items from the Applicant:

AA. Email from Michael Robinson (September 23, 2020)

## Public Comments:

BB. Bonnie Eichel (October 2, 2020)
CC. Jerry Carlson (October 29, 2020)

DD. John and Linda Bartmettler (October 29, 2020)
EE. Dustin and Bonnie Bettencourt (November 3, 2020)
FF. Georgia Sutherland (November 3, 2020)
GG. Gerald and Judith Dittbenner (November 5, 2020)
HH. Tony and Kim Turin (November 6, 2020)
II. John and Christine Andrade (November 7, 2020)

JJ. Todd Springer (November 8, 2020)
KK. John Eskridge (November 9, 2020)

## FINDINGS OF FACT

## General

1. These findings are based on the applicant's submittals received on June 26, 2020, July 29, 2020, and October 28, 2020. Staff deemed the application incomplete on July 24, 2020. The applicant submitted additional materials on July 29, 2020. The application was deemed complete on August 5, 2020 and initially a 120-day deadline of December 3, 2020 was established. However, it was later determined this application included a comprehensive plan map amendment and therefore the 120-day deadline was determined to not apply. As explained in Exhibit AA the applicant extended the 120-day deadline by 56 days (the time between September 28 and November 23). With the new applicant submissions received on October 28, 2020 it was determined a comprehensive plan map amendment is no longer needed. The revised 120-day deadline for this application is January 28, 2021.
2. In accordance with Section 17.64.70, "When a Planned Development project has been approved, the official Zoning Map shall be amended by ordinance to denote the new 'PD' Planned Development overlay designation. Such an amendment is a ministerial act, and Chapter 17.26, Zoning District Amendments, shall not apply when the map is amended to denote a PD overlay."
3. The public hearing for The Views PD was originally scheduled for September 28, 2020. On September 23, 2020 the applicant's attorney, Michael Robinson with Schwabe Williamson and Wyatt, requested The Views PD agenda item to be removed from the September 28 Planning Commission meeting and instead included on the November 23 Planning Commission meeting agenda. The request was largely made so the applicant could revise some of their proposal as reflected in the exhibits.
4. This report is based upon the exhibits listed in this document, as well as agency comments and public testimony. This code analysis is based on the code that was in effect at the time of the application submission on June 26, 2020 and therefore the code modifications with File No. 20-023 DCA do not apply.
5. The subject site is approximately 32.87 acres. The site is located east and west of the eastern end of Vista Loop Drive, east of Highway 26.
6. The parcel has a Comprehensive Plan Map designation of Low Density Residential and a Zoning Map designation of SFR, Single Family Residential.
7. The applicant, Even Better Homes, requests a Type IV combined planned development review to include both conceptual and development plan reviews. A planned development is a specific kind of development which allows for integrating different kinds of land uses. In this case, the applicant is proposing using mixed housing types along with recreational amenities. Additionally, in a planned development application, the applicant can request that certain code requirements be waived in order to provide outstanding design elements while still meeting the intent of the code. The site is divided into two sections: the "Lower Views" on the east side of the site and the "Upper Views" on the west side of the site.
8. The applicant is proposing a 122 lot development with 120 single family home lots and 2 multi-family home lots to accommodate a total of 48 multi-family units. Additionally, the applicant is proposing open space and stormwater detention tracts. The detailed acreage with associated tract letters is as follows:

| Tract Letter |  |  |
| :--- | :--- | :--- |
| Purpose |  | Acres |
| Lower Views | Private active open space | 1.10 |
| A | Private active open space | 0.25 |
| B | Private active open space | 0.23 |
| C | Private open space | 0.13 |
| D | Private active open space | 0.28 |
| E | Private drive | 0.06 |
| F | Private drive | 0.04 |
| G | Private drive | 0.04 |
| H | Private open space | 1.66 |
| I | Public stormwater detention pond | 0.32 |
| J | Private open space | 5.56 |
| K | Private open space | 1.03 |
| L | Private open space | 0.03 |
| P |  |  |
| Upper Views | Private active open space | 0.92 |
| M | Private active open space | 0.75 |
| N | Public stormwater detention pond | 0.39 |
| O |  |  |

9. Notification of the proposed application was originally mailed to affected agencies on September 8, 2020 and to affected property owners within 500 feet of the subject property on September 8, 2020 for the originally scheduled public hearing on September 28, 2020. A legal notice was submitted to the Sandy Post on September 8, 2020 to be published on September 16, 2020 informing residents of the public hearings.
10. On September 24, 2020 staff mailed a notice to affected property owners within 500 of the subject property stating that the public hearing scheduled for September 28, 2020 was postponed to November 23, 2020.
11. On October 21, 2020 staff mailed a notice to affected property owners within 500 of the subject sites reminding people of the November 23, 2020 public hearing. On November 2, 2020 staff submitted a legal notice to the Sandy Post to be published on November 11, 2020 informing residents of the Planning Commission public hearing.
12. On November 2, 2020 staff provided DLCD with a revised Plan Amendment (PAPA) notice.
13. Agency comments were received from the City Transportation Engineer, City Engineer, Public Works, SandyNet, Public Works, and Sandy Area Metro.
14. At publication of this staff report ten written comments from the public were received.

### 17.26 - Zoning District Amendments

15. This chapter outlines the requirements for zoning district amendments. In accordance with Section 17.64.70, "When a Planned Development project has been approved, the official Zoning Map shall be amended by ordinance to denote the new 'PD' Planned Development overlay designation. Such an amendment is a ministerial act, and Chapter 17.26, Zoning District Amendments, shall not apply when the map is amended to denote a PD overlay."

### 17.30 - Zoning Districts

16. The subject site is zoned SFR, single family residential.
17. The total gross acreage for the entire property is 32.87 acres. After removal of the right-ofway and proposed stormwater tracts, the net site area (NSA) for the subject property is reduced to 27.475 net acres. Additionally, the site also contains a restricted development area of 279,768 square feet. When this is subtracted from the net site area, the resulting unrestricted site area (USA) is 21.03 acres.
18. The underlying zoning district allows a minimum of 3 and a maximum of 5.8 dwelling units per net acre of unrestricted site area. Minimum density $=21.03 \times 3=63.03$, rounded down to 63 units. Maximum density is the lesser of the two following formulas: NSA x 5.8 or USA x $5.8 \times 1.5$ (maximum allowable density transfer based on Chapter 17.60).
I. $27.475 \times 5.8=159.11$, rounded to 159 units
II. $21.03 \times 5.8 \times 1.5=182.787$, rounded to 183 units
19. As a result of these calculations, the density range for the subject property is a minimum of 63 units and a maximum of 159 units.
20. The applicant is requesting a density bonus in conformance with Chapter 17.64, Planned Developments. The request is for 168 dwelling units. That request is discussed in Chapter 17.64 of this document.

### 17.34- Single Family Residential (SFR)

21. Section 17.34 .30 contains the development standards for this zone. The applicant is requesting multiple modifications to these development standards as part of the PD process. These modifications are outlined in the review of Chapter 17.64 below.
22. Section $17.34 .40(\mathrm{~A})$ requires that water service be connected to all dwellings in the proposed subdivision. Section 17.34 .40 (B) requires that all proposed dwelling units be connected to sanitary sewer service. Section 17.34 .40 (C) requires that the location of any real improvements to the property must provide for a future street network to be developed. Section 17.34.40(D) requires that all dwelling units must have frontage or approved access to public streets. The applicant proposes to meet all of these requirements. Each new residence constructed in the subdivision will gain access from a public street. However, six lots are proposed to gain access from three separate private drives connected to a public street.
23. Section 17.34 .50 (B) requires that lots with 40 feet or less of street frontage shall be accessed by a rear alley or shared private driveway. All of the attached single family homes have less than 40 feet of street frontage but are accessed by a rear alley. Many of the detached single family home lots do not have 40 feet of street frontage, but this is a modification being requested by the applicant as part of the PD process as reviewed in Chapter 17.64 below.

### 17.56 - Hillside Development

24. The applicant submitted a Geotechnical Report (Exhibit I) showing that the subject site contains a small area of slope in the Lower Views exceeding 25 percent. All recommendations in the conclusions and recommendations section of the Geotechnical Report (Exhibit I) shall be conditions for development.

### 17.60 - Flood and Slope Hazard (FSH) Overlay District

25. Section 17.60 .00 specifies the intent of the Flood and Slope Hazard (FSH) Overlay District, which is to promote the public health, safety and general welfare by minimizing public and private adverse impacts from flooding, erosion, landslides or degradation of water quality consistent with Statewide Planning Goal 6 (Air, Land and Water Resources Quality) and Goal 7 (Areas Subject to Natural Disasters and Hazards) and the Sandy Comprehensive Plan (SCP). A violation of the provisions set forth in Chapter 17.60, FSH, (e.g. tree removal without permit authorization or native vegetation removal) may result in a fine as specified in Section 17.06.80.
26. Section 17.60.20 contains permitted uses in the FSH overlay district and Section 17.60.40 contains the FSH review procedures. The applicant is not proposing any development within the FSH overlay district. Any future development within the FSH overlay district shall require separate permit review. The applicant shall install tree protection fencing at the outer edge of the FSH overlay district prior to grading to ensure no development occurs within the FSH overlay area. The submitted Tree Plan (Exhibit D, Sheet C6) states: "All dead or dying trees or vegetation that is hazardous to the public may be removed in accordance with Section 17.60.20." However, the applicant did not provide any additional information regarding the potential location of dead or dying trees or vegetation that is hazardous to the public. Staff does not find how any vegetation would be hazardous to the public considering the area is not open to the public. The applicant shall not remove any living or dead trees or vegetation that is hazardous to the public from the FSH area without applying for an FSH review for their removal. The grading plan does not indicate any grading will take place in the FSH overlay area, so staff assumes the applicant is not proposing to grade within the FSH. The applicant shall not perform any grading activities or cut or fill in the FSH overlay area without applying for an FSH review for the grading/cut and fill. The code does not allow removal of native vegetation from the FSH overlay nor does it allow planting non-native vegetation in the FSH overlay. The applicant shall not remove any native vegetation from the FSH overlay area. The applicant shall not plant any non-native vegetation in the FSH overlay area.
27. Section 17.60 .30 outlines required setbacks for development around FSH areas. According to the topographic survey submitted with the application dated June 24, 2020 (Exhibit D, Sheets C4 and C5), no development is proposed within any of the required setback areas.
28. Section 17.60 .50 contains requirements for special reports, including a hydrology and soils report, a grading plan, and a native vegetation report. The applicant submitted a Grading Plan (Exhibit D, Sheets C14 and C15) and a Wetland Delineation Report by Schott and Associates, LLC dated February 17, 2020 (Exhibit H) as well as DSL concurrence for the wetland report (Exhibit Q). The applicant did not submit a native vegetation report. The Director may exempt Type II permit applications from one of more of these reports where impacts are minimal, and the exemption is consistent with the purpose of the FSH overlay zone as stated in Section 17.60.00.
29. Section 17.60.60 contains approval standards and conditions for development in the restricted development areas of the FSH overlay district. The applicant's narrative (Exhibit B) did not address any of the criteria in Section 17.60.60.
30. Section 17.60.60(A.1) pertains to cumulative impacts and states "Limited development within the FSH overlay district, including planned vegetation removal, grading, construction, utilities, roads and the proposed use(s) of the site will not measurably decrease water quantity or quality in affected streams or wetlands below conditions existing at the time the development application was submitted." The applicant submitted a wetland delineation report along with concurrence from DSL (Exhibits H and Q) for tax lot 200. The wetland report identifies two wetlands and two streams on tax lot 200; one wetland and one stream are located in proposed Tract K and one wetland and one stream are located in proposed Tract L.
31. Section 17.60.60(A.2) pertains to impervious surface area and states, "Impervious surface area within restricted development areas shall be the minimum necessary to achieve development objectives consistent with the purposes of this chapter." No impervious surfaces shall be located within the restricted development area.
32. Section 17.60.60(A.3) pertains to construction materials and methods and states, "Construction materials and methods shall be consistent with the recommendations of special reports, or third-party review of special reports." Future construction or development within the FSH overlay district shall require separate FSH review.
33. Section 17.60.60(A.4) pertains to cuts and fills and states "Cuts and fills shall be the minimum necessary to ensure slope stability, consistent with the recommendations of special reports, or third-party review of special reports." The grading plan does not show any proposed grading within the FSH overlay area. Future grading or other development activity within the FSH overlay district shall require separate FSH review.
34. Section 17.60.60(A.5) pertains to minimizing wetland and stream impacts and states "Development on the site shall maintain the quantity and quality of surface and groundwater flows to locally significant wetlands or streams regulated by the FSH Overlay District." The applicant is proposing to add additional stormwater to the outflow in Tract L. The applicant shall update the Geotech Report or submit an addendum to the Geotech Report that provides analysis of the new stormwater discharge.
35. Section 17.60 .60 (A.6) pertains to minimizing loss of native vegetation and states "Development on the site shall minimize the loss of native vegetation. Where such vegetation is lost as a result of development within restricted development areas, it shall be replaced onsite on a $2: 1$ basis according to type and area. Two native trees of at least 1.5 -inch caliper shall replace each tree removed. Disturbed understory and groundcover shall be replaced by native understory and groundcover species that effectively covers the disturbed area." The applicant is not proposing to remove any trees from the FSH overlay area nor is the applicant proposing to remove any native vegetation from the FSH overlay area. To better protect the vegetation within the FSH overlay area, the applicant shall install tree protection fencing at the outer edge of the FSH overlay district. The applicant shall not damage or remove any native vegetation within the FSH overlay district. The applicant shall replace any disturbed understory or groundcover with native understory or groundcover species that effectively cover the disturbed area. The applicant shall retain a qualified arborist on-site for any work done within the critical root zone ( 1 foot per 1 inch DBH) of retention trees including those within the FSH area to ensure minimum impact to trees and native vegetation.
36. Section 17.60 .90 discusses water quality treatment facilities. The proposed detention ponds (Tracts J and O ) are not located within the mapped FSH overlay area.
37. Section 17.60 .100 contains density transfer provisions. Due to the density calculation from Chapter 17.30, this site does not qualify for density transfer under Chapter 17.60.

### 17.64 - Planned Developments

38. Chapter 17.64 contains regulations related to Planned Developments.
39. Section 17.64.10 allows for combined review of a Conceptual Development Plan and a Detailed Development Plan. This section requires city approval of both conceptual and detailed development plans and allows for "combined review" of both types of plans. This application is for both conceptual and detailed development plan approval as provided in Section 17.64.10(A). The applicant has met all application requirements for concept and detailed development plan review, as evidenced by the finding that the application was deemed complete on August 5, 2020.
40. The Sandy Development Code does not contain specific language identifying the process for completing a combined review, but rather details the specifics of individual conceptual and detailed reviews.
41. Section 17.64.30(A) states that dimensional and/or quantitative standards of the Sandy Development Code may be varied through the PD review process. The Development Services Director advised the applicant to prepare a detailed list of "modifications" to SDC standards. The applicant believes that the unique nature of the site and amenities offered as part of the PD application warrant this flexibility. The applicant is requesting the following modifications to the development code:
a. Section 17.34.10 lists permitted uses in the Single Family Residential zoning district. The applicant is proposing rowhouses and multifamily dwellings which are not listed as permitted outright uses.
b. Section 17.34 .30 requires lot sizes in the Single Family Residential zoning district to be at least 7,500 square feet. The applicant is proposing a variety of lot sizes: Of the single family detached lots, the applicant is proposing 50 lots between 3,400 and 4,999 square feet; 13 lots between 5,000 and 5,999 square feet; 12 lots between 6,000 and 7,499 square feet, and 13 lots greater than 7,500 square feet. Of the lots greater than 7,500 square feet, one is greater than 15,000 square feet, which is the maximum lot size allowed under Section 17.100 .220 (B) without needing to arrange lots to allow further subdivision. The single family attached lots range in size from 2,160 to 2,695 square feet.
c. Section 17.34 .30 requires a minimum average lot width to be 60 ft . The applicant is requesting a waiver to this requirement. Given that many lots do not meet the 7,500 square foot requirement, the applicant argues that this requirement is not possible to meet.
d. Section 17.34 .30 requires interior yard setbacks of 7.5 feet. The applicant is requesting that this be reduced to five (5) feet on all lots.
e. Section 17.34 .30 requires that rear yard setbacks be 20 feet. The applicant is requesting that this be reduced to 10 feet for lots $47-56$ in the Lower Views and 15 feet for lots 84-86 and 88-102 in the Upper Views.
f. Section 17.100 .120 requires a 400 foot maximum block length. The applicant is requesting three variances to this: a 691 foot block length on The Views Drive from Vista Loop Drive to Bonnie Street; a 665 foot block length on the north side of Bonnie Street; and an 805 foot block length on Knapp Street from Vista Loop Drive to Ortiz Street. According to the applicant, these block lengths are necessary to accommodate for the site layout.
42. Section 17.64.30(B) allows for a planned development to be established on any parcel of land, or on more than one parcel of land if those parcels are abutting. The subject property contains two abutting parcels.
43. Section 17.64 .40 states that: "The maximum number of allowable dwelling units shall be the sum of densities allowed by the underlying zone(s) unless an increase is authorized as otherwise allowed in this chapter." The applicant has requested an increase in density. Subsection A, related to "residential zones," calculates allowable density in planned developments based on "useable site area, exclusive of streets." According to density calculations earlier in this document the allowable density for this planned development (without a density increase) ranges from 63 to 159 units. Subsection C states: "An increase in density of up to $25 \%$ of the number of dwelling units may be permitted upon a finding that the Planned Development is outstanding in planned land use and design, and provides exceptional advantages in living conditions and amenities not found in similar developments
constructed under regular zoning." The applicant proposes to increase the total number of units to 168 , which is a six (6) percent density increase. The applicant states that this density increase is justified given the nature of the development. The narrative (Exhibit B) states: "As detailed on submitted plans, 19.5 percent ( 6.42 acres) of the 32.87 acre property is contained within restricted development areas and the Planned Development proposal includes the designation of 36.3 percent ( 11.92 acres) of the site as open space. In addition, no part of any lot will be platted within the FSH or a restricted development area. Other features of the proposal include a mix of housing types and densities; a request to vary development standards to promote flexibility in site planning; an innovative townhouse design exceeding the residential design standards including a two car rear-loaded detached garage and open courtyard; and constructing an array of recreational amenities for the use and enjoyment of the residents of the Planned Development. As a package the applicant believes there is sufficient justification to find that the Planned Development is outstanding in planned land use and design and provides exceptional advantages in living conditions and amenities not found in similar developments constructed in the SFR zone in order to justify this request." Staff finds the following elements provide advantages in living conditions not found in similar developments constructed under regular zoning:

- No lots are platted within the FSH overlay.
- There is a mix of housing types and densities which encourages inclusionary zoning.
- The proposed private recreation areas (Tracts $A, B, M$, and $N$ ) integrated within the planned development (though staff notes that a recreation area adjacent to the highway as proposed with Tract M is not the best location for a recreation area with play equipment that might attract small children).
- The proposed allée of trees along a majority of street frontages, with trees planted both in the planter strips and on the private property side of the sidewalks (or on either sides of the walkways where the walkways are proposed to be in private open space tracts).
- The proposed sound wall along Highway 26 which provides additional privacy and noise protection for future residents.
- The use of native pollinator-friendly plant species to promote native biodiversity in tracts A, B, M, and N (see conditions in Chapter 17.92 of this document).
- Open space and active recreation areas totaling 11.92 acres which is 3.67 acres more than is required in a PD.


## Staff recommends that the Planning Commission recommend approval of the applicant's request to exceed the maximum density for the base zone by 6 percent as proposed.

44. Section 17.64.50, Open Space, requires that a minimum of 25 percent of the site be dedicated as open space. The site is 32.87 acres; thus, the minimum open space dedication is 25 percent of 32.87 acres, or 8.25 acres. The applicant proposes 11.92 acres of total open space, including 8.25 acres of natural area open space and 3.68 acres of active recreation area. Rather than dedicating the open space to the City, the applicant proposes establishing a homeowner's association to own and maintain the open space areas as permitted by Section 17.86.50. All private open space tracts shall have a note on the plat that states these
tracts cannot be developed. The natural area open space tracts (Tracts $I, K$, and $L$ ) shall also be protected by a conservation easement or similar method.
45. Section 17.64.60 describes allowed uses through the PD process. These uses include singlefamily detached and single-family attached dwellings as well as multi-family dwellings, as proposed by the applicant.
46. Sections 17.64.70-90 are procedural in nature. Approval of The Views PD will result in an amendment to the Sandy Zoning Map, indicating that a PD has been approved on this SFR site. The applicant and City have complied with all procedural requirements for conceptual PD approval, as discussed under Section 17.64.10, above.
47. The proposed public utility layout is provided solely to comply with the planned development submission requirements in Section 17.64.90(B)2. of the Sandy Municipal Code (SMC). Approval of the land use application does not connote approval of the public improvement plans (which may be submitted and reviewed later) and shall not be considered as such.
48. Section 17.64.100 sets forth Planned Development approval criteria. There are two relevant criteria: (a) consistency with the intent of the PD Chapter, as found in Section 17.64.00; and (b) compliance with the general provisions, development standards and application provisions of Chapter 17.64, Planned Developments.

The "Intent" of the PD chapter is described in nine purpose statements. Staff does not interpret each of these statements as individual standards that must be met; rather, staff views these statements as goals that should be achieved through the PD review process. The purpose statements are as follows:
I. Refine and implement village development patterns designated "V" on the Comprehensive Plan Map.
II. Allow the relocation of zones within designated villages, provided that the overall intent of the village designation is maintained.
III. Allow a mixture of densities between base zones within the planned development.
IV. Promote flexibility in site planning and architectural design, placement, and clustering of structures.
V. Provide for efficient use of public facilities and energy.
VI. Encourage the conservation of natural features.
VII. Provide usable and suitable recreation facilities and public or common facilities.
VIII. Allow coordination of architectural styles, building forms and relationships.
IX. Promote attractive and functional business environments in non-residential zones, which are compatible with surrounding development.

The proposal includes a mix of densities in the form of single family detached residences, townhomes, and multifamily housing. In addition, the proposal includes three open space natural areas in the lower views, as well as multiple recreational areas in the form of private park-like spaces and wider pedestrian areas. As indicated by the proposed homes (Exhibit K),
the project includes two different townhome designs and 10 different single family home designs.
49. Sections $17.64 .110-120(A)$ specifies graphic and narrative requirements and procedures for review of detailed development plans. All graphic requirements are met in the maps, figures, tables, and appendices provided with this application. Staff found the application complete on August 5, 2020. The applicant has elected to submit a combined conceptual and detailed planned development application, thus providing the public, Planning Commission, and the City Council with a complete understanding of exactly what is proposed in this application.
50. Section 17.64.120(B) specifies additional items that must be addressed in the detailed development plan. In addition to the narrative requirements specified for a Conceptual Development Plan, the Detailed Development Plan narrative shall also include:

Proposals for setbacks or building envelopes, lot areas where land division is anticipated, and number of parking spaces to be provided (in ratio to gross floor area or number of units).
g. All of the items required by this section are included with the application package as shown on the Preliminary Plats and Building Setbacks and Parking Analysis sheets (Exhibit D).

Detailed statement outlining timing, responsibilities, and assurances for all public and nonpublic improvements such as irrigation, private roads and drives, landscape, and maintenance.
h. All open space and landscape areas will be commonly owned and maintained by a Homeowner's Association. Individual homeowners will be responsible for the lot area abutting adjacent public streets.

Statement addressing compatibility of proposed development to adjacent land uses relating to such items as architectural character, building type, and height of proposed structures.
i. The Lower Views shares a common boundary with a commercial business (Johnson RV), a large lot residential property in the city limits, and vacant properties outside the UGB. The Upper Views shares a common boundary with large lot residential and vacant properties and a multi-family development all within the city limits.

Statement describing project phasing, if proposed. Phases shall be:

- Substantially and functionally self-contained and self-sustaining with regard to access, parking, utilities, open spaces, and similar physical features; capable of substantial occupancy, operation, and maintenance upon completion of construction and development.
- Properly related to other services of the community as a whole and to those facilities and services yet to be provided.
- Provided with such temporary or permanent transitional features, buffers, or protective areas as may be required to prevent damage or detriment to any completed phases and to adjoining properties not in the Planned Development.
j. The applicant is proposing two phases. The Lower Views would be phase one and the Upper Views would be phase two. Each development site is generally independent of the other. The proposed phasing of The Views PD is discussed in further detail in Chapter 17.100 of this document.


### 17.66 - Adjustments \& Variances

51. The applicant is requesting the following two Type III Special Variances:

- Special Variance to Section $17.84 .30(\mathrm{~A})$ to not provide a sidewalk on multiple street frontages.
- Special Variance to Section 17.82.20(A and B) to not have the front doors of the proposed lots adjacent to Highway 26 face Highway 26 with direct pedestrian connection from the front doors to the Highway 26 sidewalk.

64. To be granted a Type III Special Variance, the applicant must meet one of the flowing criteria in Section 17.66.80:
A. The unique nature of the proposed development is such that:
65. The intent and purpose of the regulations and of the provisions to be waived will not be violated; and
66. 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. SIDEWALK ELIMINATION

Chapter 17.84 requires sidewalk and planter strips to be included with development. The applicant is requesting that this requirement be eliminated on the south side of The Views Drive from Vista Loop Drive to the alley and on the majority of the Highway 26 frontage. In addition, the applicant is proposing pedestrian walkways within private open space tracts rather than a traditional sidewalk in the public right-of-way along the south side of Vista Loop Drive, the north side of The Views Drive, and the south side of Bonnie Street.

## South side of The Views Drive

Section $17.84 .30(\mathrm{~A})$ requires sidewalks to be provided on both sides of the street. On a local street, such as The Views Drive, the sidewalk is required to be a minimum of 5 feet in width separated from the curb by a minimum 5 foot wide planter strip. The requested variance to not provide a sidewalk on the south side of The View Drive does not meet the intent and purpose of this regulation. However, the applicant is proposing a wider pedestrian zone along
the north side of The Views Drive, which includes a meandering walkway within an approximately 19 -foot wide private open space tract (Tract E). This allows for trees to be planted on both sides of the path, creating an allée-like feel and enhancing the pedestrian environment and contributing to a more outstanding design than would be included in a typical subdivision. Thus, staff recommends the Planning Commission recommend approval of the Special Variance request to not provide a sidewalk on the south side of The Views Drive with the condition that Tract $E$ be designed as proposed (i.e. approximately 19 feet wide with sufficient planting space of at least 5 feet on either side of the meandering walkway to accommodate street trees on both sides of the walkway) and add a note to the plat indicating that Tract E cannot be developed.

Walkways in private tracts along The Views Drive, Vista Loop Drive, and Bonnie Street The applicant is proposing to include pedestrian amenities in the form of a meandering walkway located within a private open space tract rather than the traditional sidewalk in a public right-of-way on the following street frontages: the south side of Vista Loop Drive, the north side of The Views Drive, and the south side of Bonnie Street. The meandering walkways meet the intent of having a sidewalk and planter strip, provided sufficient space is provided for planting and the walkways are covered by a pedestrian easement. Staff recommends the Planning Commission recommend the City Council approve the requested special variance to provide meandering walkways within private open space tracts rather than a traditional sidewalk/planter strip in the public right-of-way with the condition that the tracts maintain a minimum width of 15 feet to accommodate a 5 foot wide walkway with an average of 5 foot wide planter strips on either side as well as a minimum width of 16 feet on Vista Loop Drive for a 6 foot sidewalk and 5 foot planter strips as Vista Loop Drive is a collector. The applicant shall include a pedestrian easement and a note on the final plat indicating that the meandering walkway tracts are not developable. Staff also recommends a condition that the meandering walkways in the open space tracts remain the responsibility of the homeowner's association. Consistent with sidewalks along street frontages, staff recommends a plat note or restrictive covenant be recorded that if the homeowner's association dissolves the responsibility to maintain and repair the meandering walkways and associated landscaping including street trees and groundcover shall shift to the adjacent property owners.
66. FRONT DOORS NOT FACING AND CONNECTED TO A TRANSIT STREET

The requirement of building entrances oriented to transit streets, such as Highway 26, is to provide a pleasant and enjoyable pedestrian experience by connecting activities within a structure to the adjacent sidewalk where transit amenities are located. The applicant requests a special variance to Chapter 17.82.20 to allow the front door of the future homes constructed on Lots 99 and 103-121 to face the internal local street network instead of Highway 26, a designated transit street. The applicant is also proposing a sound wall along Highway 26. This variance request is essentially asking that the front lot line be along the internal street network rather than Highway 26 and that the proposed sound wall can be 6 feet in height, which would be allowed if the Highway 26 lot line is the rear lot line. Though the section of Highway 26 along the subject property is currently in a 65 mph speed zone, it will eventually become urbanized and the speed limit will be reduced. Staff recognizes that proposed Lots 99 and 103-121 will not be allowed to take access from the highway and thus, that all garages
and street parking will be located in the internal local street network. While the applicant could design the houses to have two front doors, staff recognizes that the front doors facing Highway 26 would essentially be false front doors, which is not the intent of the code. Thus, staff recommends that the Planning Commission recommend that the City Council approve the applicant's requested variance to not provide front doors facing Highway 26 with direct pedestrian connection from the front door to Highway 26 as required by Chapter 17.82. If approved, this variance request would establish Knapp Street as the front lot line for Lots 103-121 and Ortiz Street as the front lot line for Lot 99. If the Planning Commission (and ultimately Council) agree with this recommendation, staff recommends the Planning Commission condition additional architectural, landscaping, and/or design features to enhance the appearance of the proposed sound wall from the Highway 26 right-of-way.
67. Approval of a variance shall be effective for a 2 -year period from the date of approval, unless substantial construction has taken place. The Planning Commission (Type III) may grant a 1year extension if the applicant requests such an extension prior to expiration of the initial time limit. The variance approvals shall be consistent with the approved timelines for the subdivision phases.

### 17.74-Accessory Development

68. Section 17.74 .40 specifies, among other things, fence and wall height in front, side and rear yards. Walls in residential zones shall not exceed 4 feet in height in the front yard, 8 feet in height in rear and side yards abutting other lots, and 6 feet in height in side and rear yards abutting a street. The proposal includes a sound wall along Highway 26, a retaining wall along the south side of The Views Drive, and a retaining wall along the north side of Lot 72. The sound wall along Highway 26 is proposed to be a 6 foot tall wall. The applicant is requesting a Special Variance to allow the front lot line for Lots 103-121 to be on Knapp Street and the front lot line for Lot 99 to be on Ortiz Street rather than Highway 26, which is reviewed in Chapter 17.66 of this document. If approved, the property line along Highway 26 would be the rear property line for Lots 103-121 and the side property line for Lot 99, both of which would permit a 6 foot tall wall.
69. The applicant proposes using a Verti-Crete wall system for the sound wall along Highway 26 in the Upper Views (Exhibit R). The wall panels have a ledge stone finish on both sides and the posts are Ashlar finished. The applicant proposes installing a six-foot tall wall. The posts are 20 inches by 20 inches. The posts and panels come to the site in a concrete gray color and are stained in the field after the wall is installed. The applicant proposes staining the wall "Nutmeg," which is a warm-toned brown. Staff recommends that additional vegetation is planted between the sound wall and the sidewalk to make it more pedestrian friendly and to soften the large concrete wall.

### 17.80 - Additional Setbacks on Collector and Arterial Streets

70. Chapter 17.80 requires all residential structures to be setback at least 20 feet on collector and arterial streets. This applies to front, rear, and side yards. Vista Loop Drive is identified in the City's Transportation System Plan as a collector street. Highway 26 is a major arterial. As shown on the Block and Street Dimensions plan (Exhibit D, Sheets C8 and C9), it appears that all setbacks on lots adjacent to Vista Loop Drive and Highway 26 meet this requirement.

### 17.82 - Special Setbacks on Transit Streets

71. Section $17.82 .20(A)$ requires that all residential dwellings shall have their primary entrances oriented toward a transit street rather than a parking area, or if not adjacent to a transit street, toward a public right-of-way or private walkway which leads to a transit street. A transit street is defined as a street designated as a collector or arterial. The Upper Views is located adjacent to Highway 26, a major arterial, and Vista Loop Drive, a collector. The lot for the multi-family structure in the Upper Views is proposed to be located adjacent to Vista Loop Drive. Adherence to this code section for the future multi-family units will be determined in a future design review process.
72. Twenty (20) single family homes (lots 99 and 103-121) are proposed adjacent to Highway 26. Because a substantial grade separation exists between the subject property and Highway 26 over a majority of the property, the applicant does not propose orienting these structures toward the highway but rather orienting these homes toward the internal street. The applicant is requesting a special variance to not have the front doors of the proposed houses along Highway 26 face Highway 26 with a direct pedestrian connection to the highway. The variance request is reviewed in Chapter 17.66 of this document.
73. Section 17.82 .20 (B) requires that dwellings shall have a primary entrance connecting directly between the transit street and building interior and outlines requirements for the pedestrian route. The applicant is requesting a special variance to not have the front doors of the proposed houses along Highway 26 face Highway 26 with a direct pedestrian connection to the highway. The variance request is reviewed in Chapter 17.66 of this document.
Adherence to this code section for the future multi-family units will be determined in a future design review process.
74. Section $17.82 .20(\mathrm{C})$ requires that primary dwelling entrances shall be architecturally emphasized and visible from the transit street and shall include a covered porch at least 5 feet in depth. The adherence to this code section for the future multi-family units will be determined in a future design review process.

### 17.84 - Improvements Required with Development

75. Section17.84.20(A)(1) requires that all improvements shall be installed concurrently with development or be financially guaranteed. All lots in the proposed subdivision will be required to install public and franchise utility improvements or financially guarantee these improvements prior to final plat approval. All ADA ramps shall be designed and inspected by the design engineer and constructed by the applicant to meet the most current PROWAG requirements.
76. Section $17.84 .30(\mathrm{~A})(1)$ requires that all proposed sidewalks on the local streets will be five feet wide as required by the development code and separated from curbs by a tree planting area that is a minimum of five feet in width. All sidewalks on the internal streets in the Upper Views are proposed to be five feet wide separated from curbs by a landscape strip as required. All sidewalks in the Lower Views are also proposed to be five feet wide with the exception of a six-foot sidewalk proposed on the north side of The Views Drive entrance road from Vista Loop Drive to the proposed alley. The sidewalk is designed to connect to a
six-foot meandering sidewalk constructed in front of the proposed row homes. A planned development modification as discussed in Section 17.64 .30 has been proposed to modify the typical street section by shifting the road alignment to the southern edge of the right-of-way in order to allow for the construction of a meandering six-foot walkway in this location. The applicant is requesting a special variance to not provide sidewalks on some local street frontages. The special variance request is discussed in Chapter 17.66 of this document. Staff recommends a condition that the meandering walkways in the open space tracts remain the responsibility of the homeowner's association. Consistent with sidewalks along street frontages, staff recommends a plat note or restrictive covenant be recorded that if the homeowner's association dissolves the responsibility to maintain and repair the meandering walkways and associated landscaping including street trees and groundcover shall shift to the adjacent property owners.
77. As required by Section $17.84 .30(\mathrm{~A})(2)$, six-foot sidewalks are proposed to be constructed along arterial and collector streets. As shown on the submitted plans (Exhibit D) all sidewalks adjacent to Vista Loop Drive, a collector street, are proposed to be six-feet wide. Unlike a typical street section, the sidewalk/walkway along Vista Loop Drive is proposed to meander along the road rather than be parallel to this road. Rather than provide sidewalks in the public right-of-way, the applicant is proposing six-foot-wide walkways in Tracts M and N adjacent to Vista Loop Drive. The applicant's request to not provide sidewalks on the Vista Loop Drive frontage is a special variance. The special variance request is discussed in Chapter 17.66 of this document.
78. The applicant proposes a six foot wide sidewalk along the Highway 26 frontage of the site. The proposed sidewalk will be located adjacent to the proposed sound wall at the top of the slope.
79. In relation to Sections 17.84.30(B), 17.84.30(C), 17.84.30(D), and 17.84.30(E), the applicant is proposing sidewalk alternatives in multiple locations in the form of meandering pathways in private tracts.
80. Per the Public Works Director, the applicant shall improve all public street frontages (including the Highway 26 right-of-way, and the street frontage of all tracts) in conformance with the requirements of $\mathbf{1 7 . 8 4 . 3 0}$ and $\mathbf{1 7 . 8 4 . 5 0}$. Street frontage improvements include, but are not limited to: street widening, curbs, sidewalks, storm drainage, street lighting and street trees. One of the reasons for providing an urban street section (curbs, sidewalks, lighting, etc.) inside the city limits is to provide motorists with a visual cue that they are entering an urbanized area and to adjust their speed and alertness to match the visual cues. The area on both sides of Highway 26 is within the UBG and Urban Reserve so it will eventually become urbanized. An urbanized right-of-way makes drivers aware that they are entering a city and hopefully lead to adjusted speeds to match the conditions. As the city grows and these areas become urbanized the posted speed limit will likely be lowered to match the conditions. This is the case at the west end of Sandy where Highway 26 is an arterial street instead of a rural highway. This is also the case east of the couplet where the speed limit drops from basic rule to 40 mph and then to 25 mph as one travels west.
81. Section 17.84.40(A) requires that the developer construct adequate public transit facilities. Per Exhibit $X$, the proposed development will require a concrete bus shelter pad and a green bench (Fairweather model PL-3, powder-coated RAL6028). The required pad size is $7^{\prime} \times 9.5$ ' and should be located at the northernmost corner of The View Drive and Vista Loop Drive. Engineering specifications are available from the Transit Department.
82. Section 17.84 .50 outlines the requirements for providing a traffic study. The applicant included a Traffic Impact Study (TIS) with the application (Exhibit F). The study did not identify any required mitigation. According to the traffic study, the proposed development would produce 109 peak AM trips, 136 peak PM trips, and 1,564 total daily trips. The findings from the City Transportation Engineer (Exhibit T) are expressly incorporated by reference into this document.
83. According to the TIS, the study intersections currently operate acceptably and are projected to continue to operate acceptably under year 2022 traffic conditions either with or without the addition of site trips from the proposed development. No queuing-related mitigations are necessary or recommended in conjunction with the proposed development. Based on the crash data, the study intersections are currently operating acceptably with respect to safety. Based on the warrant analysis, no new traffic signals or turn lanes are recommended. ODOT states (Exhibit W) that the applicant shall provide additional space on Highway 26 to accommodate westbound right turning movements from Highway 26 onto Vista Loop Drive. Ard Engineering explains in the letter from October 27, 2020 the following:
"In addition to the lack of a clear standard used to justify a request for improvements on Highway 26, it should be noted that a recent improvement has already been undertaken at the request of the Oregon Department of Transportation in anticipation of supporting residential development within the subject property. The prior configuration of the intersection of Highway 26 at Vista Loop Drive included a westbound slip lane which allowed vehicles to turn onto Vista Loop Drive at high speeds. At the request of ODOT, this slip lane was removed and the then-existing shoulder was widened by 6.75 feet immediately east of Vista Loop Drive.

This improvement project was required as part of a lot partition and residential development. The condition of approval carried onto both the approval for the Timber Valley Subdivision, and the Johnson RV expansion that occurred on another piece of the partitioned property. Since the condition was applied to both the residential development and the Johnson RV property, the first one to develop ultimately had to make the improvements. When Johnson RV constructed their parking lot expansion, they were required to bond for the street improvements and were required to complete the improvements by October 31, 2018. As a result, the conditioned improvements for Highway 26 at Vista Loop Drive were completed approximately 2 years ago. Notably, the Timber Valley Subdivision was approved on property that is now The Views. Accordingly, the completed mitigation was specifically intended to support residential development on the subject property.

Since warrants are not met for intersection improvements at Highway 26 and Vista Loop Drive in conjunction with the proposed development and recent improvements at the intersection were specifically intended to support both development of the Johnson RV parking lot expansion and the residential development within what is now The Views property, it does not appear to be either appropriate or proportional to request a second round of intersection improvements in association with the current residential development proposal. Accordingly, we request that there be no condition of approval requiring further widening or improvements on Highway 26 at Vista Loop Drive."

Staff agrees with this analysis completed by Ard Engineering and are not recommending a condition associated with the right turning movement as requested by ODOT.
84. Intersection sight distance was evaluated for the proposed points of access along SE Vista Loop Drive. Based on the analysis it is projected that adequate site distance can be achieved for all access locations with clearing of vegetation from the roadside. No other sight distance mitigations are necessary or recommended.
85. The proposed development does not include any long straight street segments and is thus not required to follow the standards in Sections 17.84.50(C)(1) or (2).
86. Section $17.84 .50(\mathrm{C})(3)$ requires that cul-de-sacs should generally not exceed 400 feet in length nor serve more than 20 dwelling units. Two cul-de-sacs are proposed in the Lower Views and a single cul-de-sac is proposed in the Upper Views. All three proposed cul-desacs are less than 400 feet in length. Additionally, none of the cul-de-sacs will serve more than 12 lots.
87. Section $17.84 .50(\mathrm{D})$ requires that development sites shall be provided with access from a public street improved to City standards. All homes will gain access from a public street or a public alley improved to city standards or a private drive accessed from a public street. No off-site improvements have been identified or are warranted with the construction of this subdivision.
88. Section $17.84 .50(\mathrm{E})$ requires that public streets installed concurrent with development of a site shall be extended through the site to the edge of the adjacent property. Temporary deadends created by this requirement to extend street improvements to the edge of the adjacent properties may be installed without turn-arounds, subject to the approval of the Fire Marshal. The proposed street layout results in one temporary dead-end street at the East end of the Lower Views. This street end includes sufficient room to accommodate fire equipment to turn around. The only existing street to be extended is Ortiz Street in the Upper Views, which is proposed to be located directly across Vista Loop Drive from the existing street. The applicant submitted a future street plan (Exhibit D, Sheet C10); however, it details the area north of Ortiz Street as future apartments and does not consider this area to lend itself to a traditional subdivision. The Planning Commission needs to determine if an additional street stub or pedestrian access shall be extended north (i.e. in the location of Lots 91 and 92).
89. Section $17.84 .50(\mathrm{~F})$ requires that no street names shall be used that will duplicate or be confused with names of existing streets. The application includes proposed street names as shown on submitted plans (Exhibit D ). The applicant shall clarify if the street is intended to be named "The View Drive" or "The Views Drive" as both of these names are used on the application materials. All street names are subject to change prior to recording of the plat.
90. Proposed streets meet the requirements of $17.84 .50(\mathrm{H})$. The future street plan (Exhibit D , Sheet 1) shows that the proposed development will facilitate and not preclude development on adjacent properties, except with the possibility of the property north of Ortiz Street (i.e. Tax Map 25E18DC, Tax Lots 1000 and 1100). This is discussed in more detail in the subdivision approval criteria in Chapter 17.100 of this document. All proposed streets comply with the grade standards, centerline radii standards, and TSP-based right-of-way improvement widths with the exception of the portion of The Views Drive from the intersection with Vista Loop Drive to approximately the public alley which is proposed to be 31 feet wide. The applicant is requesting a reduction of the right-of-way in this location in order to shift the road to the south to construct a wider sidewalk on the north side of this street within a private landscaped tract. All proposed streets are designed to intersect at right angles with the intersecting street and comply with the requirements of Section 17.94.50.(H)(5). No private streets, with the exception of private drives, are proposed in the development.
91. The applicant has submitted a turning diagram demonstrating that there should be sufficient room for a 22 foot long vehicle to back out of a driveway (with an adjacent parked car in the driveway) and into the public alley with cars parked on the opposite side of the alley in a single motion without any conflict. The garage face setback from the alley shall meet or exceed that shown in the turning diagram.
92. The various streets and public alleys shall include a minimum four-foot wide utility and sign easement on both sides to provide enough room for street name, traffic control and regulatory signage and utility pedestals, fire hydrants, water meters, etc.
93. The plans detail all street intersections provide at least 50 foot tangents as required per $17.84 .50(\mathrm{H})(5)(\mathrm{C})$. The vertical design grade for landing at all the Tee intersections where controlled with "Stop" signs shall be no greater than 8 percent for a minimum of 50 feet or two car lengths.
94. Section 17.84 .60 outlines the requirements of public facility extensions. The applicant submitted a utility plan (Exhibit D, Sheets 12 and 13) which shows the location of proposed public water, sanitary sewer, and stormwater drainage facilities. Broadband fiber service will be detailed with construction plans. No private utilities are proposed. All public sanitary sewer and waterline mains are to be a minimum of 8 inches in diameter and storm drains are to be a minimum of $\mathbf{1 2}$ inches in diameter. These shall be extended to the plat boundaries where practical to provide future connections to adjoining properties. All utilities are extended to the plat boundary for future connections.
95. Franchise utilities will be provided to all lots within the proposed subdivision as required in Section 17.84.80. The location of these utilities will be identified on construction plans and installed or guaranteed prior to final plat approval. The applicant does not anticipate extending franchise utilities beyond the site. All franchise utilities other than streetlights will be installed underground. The developer will make all necessary arrangements with franchise utility providers. The developer will install underground conduit for street lighting.
96. Section 17.84.90 outlines requirements for land for public purposes. The only public easements anticipated with this development are public pedestrian access easements located over sidewalks not located within a public right-of-way, trails within the private open space tracts, and the recreation area tracts. Eight-foot wide public utility easements will be provided along all lots adjacent to street rights-of-way for future franchise utility installations. All easements and dedications shall be identified on the final plat as required.
97. 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 Public Works Director and the Post Office as part of the construction plan process.
98. SandyNet shall receive a set of PGE utility plans to design and return a SandyNet broadband deployment plan.
99. There are two private storm drain lines crossing the proposed right-of-way of The Views Drive. These storm lines serve private developments to the south of the site. Private utility facilities serving single sites are not permitted in public rights-of-way. When the land use application for the private development south of the site was processed the City identified that the location of these lines would present a conflict if a public right-of-way was ever dedicated across these private lines. Staff believes there are three options available: 1) relocate these lines outside the public right-of-way; 2) Replace the existing lines with materials conforming to City standards or demonstrate that the pipeline materials comply with and were installed in conformance with City standards and dedicate these improvements as public; or, 3) Have the owner of the adjacent site served by these lines apply for a revocable permit to place private drainage facilities in a public right-of-way. Since the exact location relative to proposed improvements in the right-of-way is unknown at this time the City will determine the most suitable option during construction plan review.
100. The proposed public sidewalks outside of the street right-of-way will require pedestrian scale bollard lighting conforming to the City's standards. Use of full-cutoff, Type II roadway distribution streetlights will not provide sufficient illumination for pedestrians where the sidewalk is set back so far from the street and obscured by trees.
101. An ODOT Permit to Occupy or Perform Operations Upon a State Highway shall be obtained for all work in the State highway right-of-way. When the total value of improvements within the ODOT right-of-way is estimated to be $\$ 100,000$ or more, an agreement with ODOT is required to address the ownership, maintenance, and operations of any improvements or alterations made in highway right-of-way. An Intergovernmental Agreement (IGA) is required for agreements involving local governments and a Cooperative

Improvement Agreement (CIA) is required for private sector agreements. The agreement shall address the project standards that must be followed, compliance with ORS 276.071, which includes State of Oregon prevailing wage requirements, and any other ODOT requirements for project construction, including costs for ODOT staff time for project approvals, inspection, and completion.

### 17.86 - Parkland and Open Space

102. The applicant intends to pay a fee in lieu of parkland dedication as outlined in the requirements of Chapter 17.86. Section 17.86.10(2) contains the calculation requirements for parkland dedication. The formula is acres $=$ proposed units $\times$ (persons/unit) x 0.0043 . For the four single family homes, acres $=120 \times 3 \times 0.0043=1.548$ acres. For the maximum development of 48 multifamily units, acres $=48 \times 2 \times 0.0043=0.4128$ acres. Combined, this totals 1.96 acres.
103. The applicant proposes paying a fee in lieu of parkland dedication. Based on 1.96 acres the parks fee in-lieu shall be $\$ 472,360$ based on the City's current fee schedule if this payment is not deferred and paid prior to final plat approval, and $\$ 519,400$ if half of the payment is deferred. If deferred, one-half of this amount $(\$ 259,700)$ is required to be paid prior to final plat approval with the other half $(\$ 259,700)$ evenly split and paid with each building permit. Because two of the lots are proposed to contain multi-family dwellings at a later date, the applicant requests the parks fee for these units be paid with the building permit for these units rather than at the time of final plat approval. If this proposal is accepted the amount of cash-in-lieu to be paid with the final plat would be based on the area of parkland required for the single family units which is 1.55 acres. This results in the following amounts 1.55 x $\$ 241,000=\$ 373,550$ if paid prior to Final plat approval and $1.55 \times \$ 265,000=\$ 410,750$ if one-half of the payment is deferred. The fee associated with the multi-family units 0.41 x $\$ 265,000=\$ 108,650$ would be paid with the building permit for these units if that is the ultimate decision of the City Council.
104. As explained in the findings for Chapter 17.64, maintenance for the dedicated open space areas will be the responsibility of a Homeowners Association. The applicant shall submit a draft agreement between the City and the HOA detailing the minimum maintenance requirements and responsibilities including a means for the City to remedy any failure to meet the agreed-upon standards. The agreement shall be finalized and recorded prior to plat approval and referenced on the face of the plat. Staff recommends a condition that the meandering walkways in the open space tracts remain the responsibility of the homeowner's association. Consistent with sidewalks along street frontages, staff recommends a plat note or restrictive covenant be recorded that if the homeowner's association dissolves the responsibility to maintain and repair the meandering walkways and associated landscaping including street trees and groundcover shall shift to the adjacent property owners.
105. Per Section $17.86 .50(5)$, in the event that any private owner of open space fails to maintain it according to the standards of the Sandy Municipal Code, the City of Sandy, following reasonable notice, may demand that the deficiency of maintenance be corrected, and may enter the open space for maintenance purposes. All costs thereby incurred by the City
shall be charged to those persons having the primary responsibility for maintenance of the open space.

### 17.90 - Design Standards

106. Chapter 17.90 contains design standards for development based on type and zone. All future buildings shall adhere to the design standards in Chapter 17.90. Single family residences and townhomes will be reviewed at building permit and multi-family buildings will be reviewed with a future design review application.

### 17.92 - Landscaping and Screening

107. Section 17.92.10 contains general provisions for landscaping. As previously determined by the Planning Commission, the City's tree protection standards in this section do not apply to residential subdivisions. Per Section $17.92 .10(\mathrm{~L})$, all landscaping shall be continually maintained, including necessary watering, weeding, pruning, and replacing.
108. Section 17.92 .30 specifies that street trees shall be chosen from the City-approved list. As required by Section 17.92.30, the development of the subdivision requires medium trees spaced 30 feet on center along street frontages. The applicant did not submit a separate street tree plan but the conceptual plan (Exhibit L) details street trees along all of the proposed streets, except Highway 26. The applicant shall update the street tree plan to detail street trees along Highway 26. A majority of the streets include both street trees and trees in the front yards of the private property, which creates an allée of trees and adds an element of exceptional design above and beyond a typical subdivision as required for the PD density bonus. The Landscape/Conceptual Plan (Exhibits L, M, and N) identifies tree species, size, and quantities of trees. The landscape/conceptual plan does not show much variety in tree species; for example, both sides of the entire length of Bonnie Street are proposed to have Japanese styrax. Staff would like to see more diversity in street tree species in general and within each block. The applicant shall update the plan set to detail a minimum of two (2) different tree species per block face for staff review and approval. In addition, the applicant is proposing red maples along The Views Drive, public alleys, and cul-de-sacs. Due to concerns with Asian Longhorn Beetle and Emerald Ash Borer, staff are not recommending maples or ashes at this time. The applicant shall update the plant palette to detail an alternate species for the red maple that is not a maple or an ash.
109. The applicant is proposing to mass grade the buildable portion of the site. This will remove top soil and heavily compact the soil. In order to maximize the success of the required street trees, the applicant shall aerate the planter strips and other areas proposed to contain trees to a depth of $\mathbf{3}$ feet prior to planting street trees. The applicant shall either aerate the planter strip soil at the subdivision stage and install fencing around the planter strips to protect the soil from compaction or shall aerate the soil at the individual home construction phase.
110. If the plan set changes in a way that affects the number of street trees (e.g., driveway locations), the applicant shall submit an updated street tree plan for staff review and approval. Street trees are required to be a minimum caliper of 1.5 -inches measured 6 inches from grade and shall be planted per the City of Sandy standard planting detail.

Trees shall be planted, staked, and the planter strip shall be graded and backfilled as necessary, and bark mulch, vegetation, or other approved material installed prior to occupancy. Tree ties shall be loosely tied twine and shall be removed after one growing season (or a maximum of 1 year).
111. Section 17.92 .40 specifies that landscaping shall be irrigated, either with a manual or automatic system, to sustain viable plant life. The proposal includes numerous private tracts with landscaping. The applicant did not submit an irrigation plan nor did the applicant address Section 17.92.40 in the narrative. The applicant shall submit an irrigation plan.
112. Section 17.92.50 contains standards related to types and sizes of plant materials. The applicant submitted a plant key (Exhibit O) and landscape plans (Exhibits L, M, and N) that detail plant sizes in compliance with this section. Section 17.92.50(B) encourages the use of native plants or plants acclimatized to the PNW. The applicant is proposing two species of Prunus that are nuisance species: Prunus laurocerasus 'Otto Luyken' and Prunus lusitanica. The applicant shall update the plant palette to include two alternate species to replace the nuisance Prunus species. Chapter 17.60 requires that any plants planted in the FSH overlay area are native. The Landscape Plan shall detail native plants for all vegetation planted in the FSH overlay area and native or PNW acclimatized pollinator friendly species for all vegetation planted in the recreation tracts and private walkway tracts. Staff recommends the following native or PNW acclimatized pollinator species:

- Trees: Rhamnus purshiana, Prunus virginiana, Amelanchier alnifolia, Malus floribunda
- Shrubs: Ceanothus spp., Berberis aquifolium, Perovskia atriplicifolia, Solidago canadensis, Helenium autumnale, Agastache foeniculum
- Groundcover: Eschscholzia californica, Madia elegans, Symphyotrichum subspicatum

113. The applicant submitted a conceptual plan that details extensive landscaping in the proposed private open space tracts and stormwater tracts. The inclusion of the recreation area tracts and the wider, more pedestrian friendly walkways with an allée of trees are two elements that set this planned development apart from a typical subdivision. On the streets where the meandering walkways with allées of trees are not proposed, the applicant is detailing additional trees planted in the front yards of houses to continue the allée feel. In addition, the proposal details trees in the rear yards of Lots 103-121, which will help buffer the noise from the highway, and trees in the public alley and private drives. The applicant shall install landscaping in the private open space tracts, front yards, rear yards, public alleys, and private drives as detailed on the submitted conceptual plan and in accordance with the requirements for the updated landscape plan. The applicant is proposing three natural area open space tracts, one of which will have a trail, which is a permitted use in otherwise undeveloped open space. The applicant is also proposing four recreation area tracts, which are proposed to contain sports courts and/or playground equipment. The applicant shall install the proposed sports courts and playground equipment per the conceptual plan and prior to recording the plat of the associated
phase. The applicant shall submit details on the sports courts and playground equipment to staff for review and approval.
114. Section 17.92 .130 contains standards for a performance bond. The applicant has the option to defer the installation of street trees and/or landscaping for weather-related reasons. Staff recommends the applicant utilize this option rather than install 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 street trees based on the standard establishment period of a tree. If the applicant chooses to postpone street tree and/or landscaping installation, the applicant shall post a performance bond equal to $\mathbf{1 2 0}$ percent of the cost of the street trees/landscaping, assuring installation within 6 months. The cost of the street 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.
115. Landscaping requirements for the multi-family units will be addressed with a subsequent design review application.

### 17.98 - Parking, Loading, and Access Requirements

116. Section 17.98.10(M) requires that the developer provide a Residential Parking Analysis Plan. This plan identifying the location of parking is included in Exhibit D, Sheet 10.
117. Section 17.98 .20 (A) requires that each single family dwelling unit is required to provide at least two off-street parking spaces. Compliance with this requirement will be evaluated during building plan review. Parking for the proposed multi-family units will be evaluated as part of a future design review application. Section 17.98 .60 has specifications for parking lot design and size of parking spaces. No lots are proposed to gain access from an arterial or collector street (Section 17.98.80).
118. Section 17.98 .100 has specifications for driveways. The minimum driveway width for a single-family dwelling shall be 10 feet and the maximum driveway approach within the public right-of-way shall be 24 feet wide measured at the bottom of the curb transition. Shared driveway approaches may be required for adjacent lots in cul-de-sacs in order to maximize room for street trees and minimize conflicts with utility facilities (power and telecom pedestals, fire hydrants, streetlights, meter boxes, etc.). The applicant shall update the driveway plan to detail shared driveways for the following pairs of Lots: 43 and 44, 45 and 46, 59 and 60 , and 63 and 64. Additionally, all driveways will meet vertical clearance, slope, and vision clearance requirements. All driveways appear to meet these criteria, but this will be verified at time of building permit submission and prior to excavation for the footings. Per Section 17.98.100(G), the sum of the width of all driveway approaches within the bulb of a cul-de-sac as measured in Section 17.98.100(B) shall not exceed fifty percent of the circumference of the cul-de-sac bulb. Per Section 17.98.100(I), driveways shall taper to match the driveway approach width to prevent stormwater sheet flow from traversing sidewalks.
119. Section 17.98.110 outlines the requirements for vision clearance. The requirements of this section will be considered in placing landscaping in these areas with construction of homes and will be evaluated with a future design review application for the multifamily units.
120. 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.
121. Section 17.98.200 contains requirements for providing on-street parking spaces for new residential development. Per Section 17.98.200, one on-street parking space at least 22 feet in length has been identified within 300 feet of each lot as required. Exhibit D, Sheet 10 shows that a minimum of 120 on-street parking spaces have been identified in compliance with this standard. No parking courts are proposed by the applicant.

### 17.100 - Land Division

122. Submittal of preliminary utility plans is solely to satisfy the requirements of Section 17.100.60. Preliminary plat approval does not connote utility or public improvement plan approval which will be reviewed and approved separately upon submittal of public improvement construction plans.
123. A pre-application conference was held with the City on May 29, 2019 per Section 17.100.60(A). The pre-app notes are attached as Exhibit Z.
124. As required by Section $17.100 .60(\mathrm{E})$, the proposed subdivision is designed to be consistent with the density, setback, design standards, and dimensional standards in the SFR zoning district with the exception of the requests as part of the Planned Development (PD). Dimensional and/or quantitative variations to development standards are permitted as part of the PD process per Section 17.64.30(A). See findings for Chapter 17.64 in this document.
125. Section 17.100.60(E)(2) requires subdivisions to be consistent with the design standards set forth in the chapter. Consistency with design standards in this chapter are discussed under each subsection below. Conditions of approval can be adopted where necessary to bring the proposal into compliance with applicable standards.
126. Section $17.100 .60(\mathrm{E})(3)$ requires the proposed street pattern to be connected and consistent with the Comprehensive Plan or official street plan for the City of Sandy. Given the requirements in Section 17.100 .100 (E), the site specific conditions of the subject property, particularly the location of the FSH overlay area, limits construction of an interconnected street system. The only existing street to be extended is Ortiz Street in the Upper Views, which is proposed to be located directly across Vista Loop Drive from the existing street. The applicant submitted a future street plan (Exhibit D, Sheet C10); however, it details the area north of Ortiz Street as future apartments and does not consider this area to lend itself to a traditional subdivision. The Planning Commission needs to determine if an additional street stub or pedestrian access shall be extended north (i.e. in the location of Lots 91 and 92).
127. Section $17.100 .60(\mathrm{E})(4)$ requires that adequate public facilities are available or can be provided to serve the proposed subdivision. All public utilities including water, sanitary sewer and stormwater are available or will be constructed by the applicant to serve the subdivision. As detailed on the submitted plans and because of the depth of the existing sewer line in Vista Loop, eleven lots in the Lower Views (Lots 39-46 and 61-63) and five lots (Lots 96-100) in the Upper Views will require installation of individual grinder sump systems to pump sanitary waste from these dwellings to a gravity sewer line.
128. Section $17.100 .60(\mathrm{E})(5)$ requires all proposed improvements to meet City standards through the completion of conditions as listed within this document and as detailed within these findings. The detailed review of proposed improvements is contained in this document.
129. Section $17.100 .60(\mathrm{E})(6)$ strives to ensure that a phasing plan, if requested, can be carried out in a manner that meets the objectives of the above criteria and provides necessary public improvements for each phase as it develops. The applicant proposes building The Lower Views as Phase 1 and The Upper Views as Phase 2. Staff supports a phased approach as proposed by the applicant but finds that the Planning Commission shall set forth recommendations to the City Council on items such as Parks fee in-lieu and expiration dates related to plat recording. This is explained in further detail in the recommendations section of this document.
130. Section 17.100.80 provides standards for denial of a development application due to physical land constraints. A significant portion of the Lower Views is affected by the FSH overlay identified by the City of Sandy. The applicant does not propose any development within this area. A Geotechnical Evaluation (Exhibit I) for the property is included with the application package. Except for the areas designated as open space, all areas of the Lower Views and all of the Upper Views property are suitable for development and do not pose any issues due to flooding.
131. The subject property abuts Highway 26 and notification of the proposal was sent to ODOT as required by Section 17.100.90. ODOT's comments are included as Exhibit W. One of ODOT's comments reads as follows: "The proposed land use notice is to construct 128 single family residential units and 48 multi-family units within the vicinity of the US 26/Vista Loop Drive intersection. The "Upper Views" site is located adjacent to the highway. ODOT has review the Traffic Impact Study prepared by Ard Engineering for the development. The development will increase the number of vehicles turning right onto Vista Loop Drive from the highway. The posted speed on the highway is 55 mph and vehicles making this turning movement must to slow down significantly to safely make the turn. Due to the high speed of through traffic, increasing the number of vehicles turning from the through lane onto Vista Loop Drive is a safety concern. In order to separate the right turning vehicles from the through movement, ODOT recommends that the city require the applicant to provide space for right turning vehicles to utilize while turning right onto Vista Loop Drive." After additional discussion with the City Transportation Engineer, prior to conditioning additional asphalt area for turning movements, he recommends the applicant's transportation engineer provides further analysis to be reviewed by ODOT and the City of

Sandy. This analysis by Ard Engineering is contained in Exhibit F and explained in further detail in Chapter 17.84 of this document.
132. As required by Section $17.100 .100(\mathrm{~A})$, a traffic impact study prepared in compliance with the City standards was submitted with the application (Exhibit F). This study does not identify any issues requiring mitigation by the applicant. The findings from the City Transportation Engineer (Exhibit S) are expressly incorporated by reference into this document. None of the special traffic generators listed in Section 17.100.100(B) are located near the subject site.
133. While Section $17.100 .100(\mathrm{C})$ calls for a rectangular grid pattern, due to topographic constraints in the Lower Views and existing infrastructure in the Upper Views (Highway 26 and Vista Loop Drive) the site does not lend itself to creating a rectangular gridded street pattern.
134. Section 17.100.100(E) requires applicants to provide a future street plan within a 400 foot radius of the subject property(ies). Given the requirements in Section 17.100.100(E), the site specific conditions of the subject property, particularly the location of the FSH overlay area, limits construction of an interconnected street system. The only existing street to be extended is Ortiz Street in the Upper Views, which is proposed to be located directly across Vista Loop Drive from the existing street. The applicant submitted a future street plan (Exhibit D, Sheet C10); however, it details the area north of Ortiz Street as future apartments and does not consider this area to lend itself to a traditional subdivision. The Planning Commission needs to determine if an additional street stub or pedestrian access shall be extended north (i.e. in the location of Lots 91 and 92).
135. Section 17.100.120(A) requires blocks to have sufficient width to provide for two tiers of lots at appropriate depths. However, exceptions to the block width shall be allowed for blocks that are adjacent to arterial streets or natural features. All blocks within the proposed subdivision have sufficient width to provide for two tiers of lots as required in Section 17.100.120(A), with the exception of blocks along Highway 26 and blocks adjacent to the FSH overlay district. The unique character of the site does not lend itself to creating blocks with two tiers due to the existing location of Highway 26 and the FSH overlay area.
136. Section 17.100.120(B) requires that blocks fronting local streets shall not exceed 400 feet in length, although blocks may exceed 400 feet if approved as part of a Planned Development. Due to site specific and topographic conditions, all streets do not comply with the 400 foot block length standard. The applicant is requesting an exception to this standard as part of the Planned Development request as identified in Chapter 17.64 of this document.
137. Section 17.100 .120 (D) requires that in any block over 600 feet in length, a pedestrian and bicycle accessway with a minimum improved surface of 10 feet within a 15 -foot right-ofway or tract shall be provided through the middle of the block. The applicant proposes establishing a ten foot wide sidewalk within a 15 -foot wide pedestrian access easement in the middle of Knapp Street to provide a sidewalk connection from this street to Vista Loop Drive. In order to provide sufficient room for landscaping, the walkway shall be shifted to
one side of the 15 foot wide pedestrian access easement to accommodate a landscaping strip that is at least 5 feet in width with trees.
138. As required by Section 17.100 .130 , eight-foot wide public utility easements will be included along all property lines abutting a public right-of-way. Eight foot wide public utility easements shall be included along all property lines abutting a public right-of-way. Only public pedestrian access easements will be needed to allow public access along some of the sidewalks located within private tracts. Staff does not believe that any other easements for public utility purposes are required but will verify this during construction plan review.
Preliminary plat approval does not connote utility or public improvement plan approval including easement locations which will be reviewed and approved separately upon submittal of public improvement construction plans.
139. Section 17.100.140 requires that public alleys shall have a minimum width of 20 feet. A 28foot wide paved alley within a 29 -foot public right-of-way is proposed in the Lower Views. This alley is designed to provide access to the 32 single family detached dwellings abutting this right-of-way. The proposed alley width is designed to accommodate public parking on the south side of the alley. The proposed alley widths include Type C vertical curb with 7 inch exposure per the street sections diagram.
140. Section 17.100.150 outlines requirements for residential shared private drives. A shared private drive is intended to provide access to a maximum of two dwelling units. One of the following two criteria must be met: Direct access to a local street is not possible due to physical aspects of the site including size, shape, or natural features; or the construction of a local street is determined to be unnecessary. As shown on submitted plans the Lower Views includes three private drives serving two lots each. These private drives are proposed due to the topographic constraints with the subject property. The design of the lots should be such that a shared access easement and maintenance agreement shall be established between the two units served by a shared private drive, public utility easements shall be provided where necessary in accordance with Section 17.100.130, and shared private drives shall be fully improved with an all weather surface (e.g. concrete, asphalt, permeable pavers) in conformance with city standards. The pavement width shall be 20 feet, and parking shall not be permitted along shared private drives at any time and shall be signed and identified accordingly. The proposed three private drives in the Lower Views are designed to serve only two lots each as permitted. A shared access easement and maintenance agreement shall be established for each private drive as part of the Final Plat. Public utility easements will be accommodated along these private drives as necessary to serve these lots. As shown on submitted plans each private drive is proposed to include a 20 -foot wide all weather surface within a 21 -foot wide tract and shall be posted "no parking."
141. Section 17.100.170 outlines requirements for flag lots. Lots 103 and 104 are proposed as flag lots. Both lots contain a minimum 15 feet of street frontage as required.
142. Section 17.100.180(A) requires that intersections are designed with right angles. All streets in the proposed subdivision have been designed to intersect at right angles to the opposing street as required.
143. All streets in the proposed subdivision have a minimum curve radius as required by Section 17.100.180(B).
144. A lighting plan shall be coordinated with PGE and the City as part of the construction plan process and prior to installation of any fixtures as required by Section 17.100.210.
145. All lots in the proposed subdivision have been designed so that no foreseeable difficulties due to topography or other conditions will exist in securing building permits on these lots as required by Section 17.100.220(A).
146. Section 17.100.220(B) requires that the lot dimensions shall comply with the minimum standards of the Development Code. When lots are more than double the minimum lot size required for the zoning district, the applicant may be required to arrange such lots to allow further subdivision and the opening of future streets to serve such potential lots. As allowed by Chapter 17.64 for Planned Developments, the applicant has proposed modifications to the minimum lot size and dimension standards specified in the Single Family Residential zone. Only Lot 62 ( 16,694 square feet) is proposed to contain more than double the minimum lot size ( 7,500 square feet) in the SFR zone. Due to its location and topographic constraints no further division of this lot is possible and therefore staff supports the proposed square footage of Lot 62.
147. Section 17.100.220 states that all new lots shall have at least 20 feet of street frontage. All lots in the proposed subdivision contain at least 20 feet of frontage along a public street with the exception of one flag lot and the six lots that are proposed to be accessed by three private drives.
148. Only Lots 99 and 103-121 are designed to have frontage on both an internal local street (Knapp Street) and Highway 26. This configuration is unavoidable because of the location of Highway 26 and limitations for access to this roadway and is thus allowed as required by Section 17.100.220(D).
149. The applicant shall install all water lines and fire hydrants in compliance with the applicable standards in Section 17.100.230, which lists requirements for water facilities.
150. The applicant intends to install sanitary sewer lines in compliance with applicable standards in Section 17.100.240. As noted above, because of the depth of the existing sanitary sewer in Vista Loop, 11 lots in the Lower Views (Lots 39-46 and 61-63) and five lots (Lots 96100) in the Upper Views will require installation of a grinder sump system installed at each of these dwellings to pump sanitary sewer waste from these dwellings to a gravity sanitary sewer line in the development.
151. Section 17.100.250(A) details requirements for stormwater detention and treatment. A stormwater water quality and detention facility is proposed to be located in the eastern portion of the Lower Views and the western area of the Upper Views as shown on submitted plans. These facilities have been sized and located to accommodate public stormwater generated by the subdivision. A stormwater report (Exhibit E) is included with this application as required. Stormwater calculations are found to meet the water quality/quantity
criteria as stated in the City of Sandy Development Code 13.18 Standards and the 2016 City of Portland Stormwater Management Manual Standards that were adopted by reference into the Sandy Development Code. However, a detailed final report stamped by a licensed professional shall be submitted for review with the final construction plans.
152. The detention ponds shall be constructed to meet the requirements of the 2016 City of Portland Stormwater Management Manual for landscaping Section 2.4.1 and escape route Section 2.30. The access to the detention ponds shall be paved of an all-weather surface to a minimum of $\mathbf{1 2}$-foot in width per the $\mathbf{2 0 1 6}$ City of Portland Stormwater Management Manual.
153. Section 17.100 .260 states that all subdivisions shall be required to install underground utilities. The applicant shall install utilities underground with individual service to each lot.
154. Section 17.100 .270 requires that sidewalks shall be installed on both sides of a public street and in any special pedestrian way within the subdivision. Sidewalks will be installed on both sides of all streets with the exception that a sidewalk is proposed to be constructed on only the north side of The View Drive from its intersection with Vista Loop Drive to the proposed public alley. The applicant is proposing this design to allow the road surface to be shifted to the south side of the public right-of-way to construct a six-foot sidewalk within a widened landscaped buffer. The applicant believes this design will provide a more aesthetically pleasing and desirable environment for pedestrians walking between the upper and lower parts of the development. The roadway width in this location will be 28 feet wide in compliance with city standards.
155. Planter strips will be provided along all frontages as required in Section 17.100.290. Street trees in accordance with City standards will be provided in these areas. The applicant shall provide a revised street tree plan with alternative species as explained in Chapter 17.92 of this document.
156. Grass seeding shall be completed as required by Section 17.100.300. Grass seeding will be completed as required by this section. The submitted erosion control plan (Exhibit D) provides additional details to address erosion control concerns. A separate Grading and Erosion Control Permit will be required prior to any site grading.

## $\mathbf{1 7 . 1 0 2}$ - Urban Forestry

157. Section 17.102.20 contains information on the applicability of Urban Forestry regulations. An Arborist Report by Todd Prager of Teragan \& Associates (ASCA Registered Consulting Arborist \#597, ISA Board Certified Master Arborist, WE-6723B, ISA Qualified Tree Risk Assessor) is included as Exhibit G. The arborist inventoried approximately 530 trees. The inventory is included in Exhibit D, Sheet 6 and the proposed retention trees are shown in Exhibit D, Sheet 7.
158. The property contains 32.87 acres requiring retention of 99 trees 11 inches and greater DBH ( $32.87 \times 3=98.61$ ). The submitted Tree Retention Plan (Exhibit D Sheets C6 and C7) identifies 219 trees that will be retained. Of the 219 trees proposed for retention, 105 are 11
inches DBH or greater and in good condition as required. Five (5) of the proposed retention trees are nuisance species: Tree \#149 is an English holly and Trees \#223, 224, 225, and 227 are sweet cherries. In addition, 76 of the 105 trees ( 72 percent) are conifer species as preferred by Section 17.102.50(4). The applicant submitted a supplemental Tree Protection Plan and Table prepared by the project arborist that details an additional seven (7) retention trees within the FSH overlay district that weren't previously inventoried that meet retention tree standards and aren't nuisance species. With these additional seven retention trees, the applicant is proposing to retain 101 trees that meet the retention standards and aren't nuisance species.
159. No trees are proposed to be removed within the FSH overlay area. The applicant shall not remove any trees from the FSH overlay area.
160. The Arborist Report (Exhibit G) provides recommendations for protection of retained trees including identification of the recommended tree protection zone for these trees. The requirements of Section 17.102.50(B) will be complied with prior to any grading or tree removal on the site. Per the Pacific Northwest International Society of Arboriculture (ISA), the ISA defines the critical root zone (CRZ) as "an area equal to a 1 -foot radius from the base of the tree's trunk for each 1 inch of the tree's diameter at 4.5 feet above grade (referred to as diameter at breast height)." Often the drip-line is used to estimate a tree's CRZ; however, it should be noted that a tree's roots typically extend well beyond its dripline. In addition, trees continue to grow, and roots continue to extend. Thus, a proactive approach to tree protection would take into consideration the fact that the tree and its root zone will continue to grow. The submitted arborist report details a root protection zone radius of 1 foot per 1 inch DBH and a minimum construction setback radius of 0.5 feet per 1 inch DBH. The applicant shall install tree protection fencing at the critical root zone of 1 foot per 1 inch DBH to protect the 101 retention trees on the subject property as well as all trees on adjacent properties. The tree protection fencing shall be $\mathbf{6}$ foot tall chain link or no-jump horse fencing and the applicant shall affix a laminated sign (minimum 8.5 inches by 11 inches) to the tree protection fencing indicating that the area behind the fence is a tree retention area and that the fence shall not be removed or relocated. No construction activity shall occur within the tree protection zone, including, but not limited to, 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 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. The applicant shall submit a post-construction report prepared by the project arborist or other TRAQ qualified arborist to ensure none of the retention trees were damaged during construction.

To ensure protection of the required retention trees, the applicant shall record a tree protection covenant specifying protection of all retention trees, including trees in the

FSH Overlay per the recommendations of the applicant's arborist report of 1 foot per 1 inch DBH. The tree protection covenant shall specify limiting removal of the retention trees without submittal of an Arborist's Report and City approval. This document shall include a sketch identifying the required retention trees and a $\mathbf{1}$ foot per 1 inch DBH radius critical root zone around each tree consistent with the applicant's arborist report. All trees marked for retention shall be retained and protected during construction regardless of desired or proposed building plans; plans for future houses on the proposed lots within the subdivision shall be modified to not encroach on retention trees and associated tree protection fencing.
161. The arborist report contains additional recommendations related to tree protection, directional felling, stump removal, tree crown protection, monitoring of new grove edges, and sediment fencing. The applicant shall follow the recommendations outlined in the arborist report related to tree protection, directional felling, stump removal, tree crown protection, monitoring of new grove edges, and sediment fencing.

### 15.30 - Dark Sky

162. Chapter 15.30 contains the City of Sandy’s Dark Sky Ordinance. The applicant will need to install street lights along all street frontages wherever street lighting is determined necessary. The locations of these fixtures shall be reviewed in detail with construction plans. Full cut-off lighting shall be required. Lights shall not exceed 4,125 Kelvins or 591 nanometers in order to minimize negative impacts on wildlife and human health.

### 15.44 - Erosion Control

163. The applicant submitted a Geotechnical Report (Exhibit I) prepared by Redmond Geotechnical Services dated May 15, 2020. The applicant shall retain appropriate professional geotechnical services for observation of construction of earthwork and grading activities. The grading setbacks, drainage, and terracing shall comply with the Oregon Structural Specialty Code (OSSC) requirements and the geotechnical report recommendations and conclusions as indicated in the report. When the grading is completed, the applicant shall submit a final report by the Geotechnical Engineer to the City stating that adequate inspections and testing have been performed on the lots and all of the work is in compliance with the above noted report and the OSSC. Site grading should not in any way impede, impound or inundate the adjoining properties.
164. 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. The applicant shall submit a grading and erosion control permit and request an inspection of installed devices prior to any additional grading onsite. The grading and erosion control plan shall include a re-vegetation plan for all areas disturbed during construction of the subdivision. All erosion control and grading shall comply with Section 15.44 of the Municipal Code. The proposed subdivision is greater than one acre which typically requires approval of a DEQ 1200-C Permit. The applicant shall submit confirmation from DEQ if a 1200-C Permit will not be required.
165. Section 15.44 .50 contains requirements for maintenance of a site including re-vegetation of all graded areas. The applicant's Erosion Control Plan shall be designed in accordance with the standards of Section 15.44.50.
166. Development at both the Zion Meadows subdivision and the remodel of the Pioneer Building (former Sandy High School) have sparked unintended rodent issues in the surrounding neighborhoods. Prior to development of the site, the applicant shall have a licensed pest control agent evaluate the site to determine if pest eradication is needed.

## RECOMMENDATION TO FORWARD TO COUNCIL:

If the ultimate decision is to approve this land use application with conditions, all of the conditions (with the exception of standard conditions) are listed in this document in the findings with the use of bold. Instead of creating a conditions list as is typically done in a Planning Commission staff report, staff believes the main objective for the Planning Commission in this application is to answer the requests related to the application and forward a recommendation of approval, approval with conditions, or denial to the City Council.

Staff is generally supportive of the applicant's request and thinks the applicant has done a commendable job of creating a development proposal that meets the spirit of the Development Code while also incorporating some creative solutions to increase density and deviate from some of the code requirements. Staff has been working closely with the developer and his consultants, but with the public comments received to date and the indeterminate language in Chapter 17.64 staff finds it important to define if the Planning Commission finds that this proposed PD meets the intent of the development code. Some of the indeterminate language in Chapter 17.64 includes things such as, 'outstanding in planned land use and design, and provides exceptional advantages in living conditions and amenities not found in similar developments constructed under regular zoning' and 'development standards of the base zone, overlay zone or planned development overlay apply unless they are superseded by the standards of this chapter, or are modified during a Planned Development review'. While staff understands concerns as expressed by the surrounding neighborhood the proposal incorporates a variety of housing price points and supports inclusionary zoning practices.

Staff recommends the Planning Commission provide the City Council a clear recommendation by answering the following questions:
A. Does the Planning Commission recommend exceeding the maximum density for the base zone by six (6) percent? To allow this density increase the Planning Commission, and ultimately the City Council, needs to find that the Planned Development is outstanding in planned land use and design, and provides exceptional advantages in living conditions and amenities not found in similar developments constructed under regular zoning.
B. Does the Planning Commission recommend permitting rowhouses in the SFR zoning district?
C. Does the Planning Commission recommend permitting multifamily housing in the SFR zoning district?
D. Does the Planning Commission recommend allowing lot sizes less than 7,500 square feet?
E. Does the Planning Commission recommend allowing a minimum average lot width less than 60 feet?
F. Does the Planning Commission recommend allowing interior side yard setbacks at 5 feet, when the typical standard is 7.5 feet?
G. Does the Planning Commission recommend reducing the rear yard setbacks from 20 feet to 10 feet for lots 47-56 in the Lower Views and 20 feet to 15 feet for lots 84-86 and 88102 in the Upper Views?
H. Does the Planning Commission recommend allowing block lengths at 691 feet on The Views Drive from Vista Loop Drive to Bonnie Street; at 665 feet on the north side of Bonnie Street; and at 805 feet on Knapp Street from Vista Loop Drive to Ortiz Street?
I. Does the Planning Commission recommend approval of the request to provide meandering walkways within private open space tracts rather than a traditional sidewalk/planter strip in the public right-of-way with the condition that the tracts maintain a minimum width of 15 feet to accommodate a 5 foot wide walkway with an average of 5 foot wide planter strips on either side?
J. Does the Planning Commission recommend approval of the request to not provide a sidewalk on the south side of The Views Drive with the condition that Tract E on the north side of The Views Drive be designed as proposed (i.e. approximately 19 feet wide with 5 feet wide of planting space on either side of the meandering walkway to accommodate street trees on both sides of the walkway)?
K. Does the Planning Commission recommend approval of the request to not provide front doors facing Highway 26 and instead allow the lot line abutting Highway 26 to be considered the rear yard so the sound wall can be 6 feet in height?
L. Does the Planning Commission recommend phasing this development in two distinct phases as proposed by the applicant? If so, what policies should be recommended for the two following requirements?
a. Parks fee in-lieu?

Staff recommends the parks fee in-lieu are paid prior to each phase being recorded. The parks fee in-lieu for Phase one, the Lower Views would be the calculation for Lots 1-72. The parks fee in-lieu for Phase two, the Upper Views would be the calculation for Lot $73-122$.
b. Expiration dates?

Staff recommends each phase is allowed two years to complete plating requirements, with the two-year clock starting for the second phase at the recording date of phase one, the Lower Views.
M. Does the Planning Commission recommend to not require a right turn lane at the intersection of Vista Loop Drive and Highway 26, consistent with staff's recommendation -or- does the Planning Commission recommend a condition to require a right turn lane at this intersection, consistent with ODOT's recommendation?
N. Does the Planning Commission recommend the proposed future street layout north of Ortiz Street as proposed by the applicant -or- does the Planning Commission recommend a street stub and/or pedestrian connection to the north in the vicinity of where Knapp Street intersects with Ortiz Street?
O. Does the Planning Commission recommend that additional vegetation is planted between the sound wall and the sidewalk along Highway 26 to make it more pedestrian friendly and to soften the large concrete wall?
P. Does the Planning Commission have any additional recommendations related to maintenance of the open space owned by a proposed Homeowner's Association (HOA)?
Q. Does the Planning Commission have any other recommendations related to modifying other findings or conditions?
R. Does the Planning Commission recommend approval of The Views PD?

## EXHIBIT A



| Name of Project: | THE VIEWS PLANNED DEVELOPMENT |
| :--- | :--- |
| Location or Address: | VISTA LOOP DRIVE |


| Map \& Tax Lot \# | T: 2S | R: 5 E | Section: 19 | Tax Lot (s): <br> 200 \& 500 |
| :--- | :--- | :--- | :--- | :--- |

Request: 122 LOT PLANNED DEVELOPMENT

I am the (check one) $\square$ owner $\square$ 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.



| Name of Project: | THE VIEWS PLANNED DEVELOPMENT |
| :--- | :--- |
| Location or Address: | VISTA LOOP DRIVE |


| Map \& Tax Lot \# | T: 2S | R: 5 E | Section: 19 | Tax Lot (s): <br> 200 \& 500 |
| :--- | :--- | :--- | :--- | :--- |

Request: 122 LOT PLANNED DEVELOPMENT

I am the (check one) $\square$ owner $\square$ 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.


## EXHIBIT B

## Project Narrative

For

## The Views Planned Development SE Vista Loop Drive Sandy, Oregon 97055



Prepared by Tracy Brown Planning Consultants, LLC
J une 2020
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## Project Details


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## I. General Project Description

The project site consists of two parcels located at Township 2 South, Range 5 East, Section 19, tax lots 200 and 500 . The property contains a total area 32.87 acres and contains an existing single family home and accessory structures.

Both parcels are zoned SFR, Single Family Residential. The applicant proposes constructing a 122 lot planned development in order to build 120 single family dwellings and 48 multi-family dwellings on two separate lots. The following dwelling unit types are proposed: 32 single family attached dwellings (Lots $1-32$ ), 88 single family detached dwellings (Lots 33-71 and 73-121), and 48 multifamily dwellings ( 24 units each on Lots 72 and 122).

The two parcels proposed for this project are abutting each other and separated only by Vista Loop Drive. Tax lot 200 referred to in this application as the "Lower Views" shares a common property line with the existing J ohnson RV recreational vehicle business. This property contains about 23.32 acres and is proposed to gain access by construction of a local street ("The Views Drive") intersecting Vista Loop Drive. Two existing home and a barn currently located on this property will be removed following land use approval. The portion of the property proposed as buildable contains gentle to moderate slopes. A considerable portion of the rest of the property falls within the FSH Overlay with slopes greater than 25 percent. The Lower Views is proposed to contain three housing types: 32 units single family attached dwellings, 39 single family detached dwellings, and one lot to contain 24 multi-family dwelling units. The Lower Views is also proposed to include a wide variety of amenities including play structures, a half-court basketball court, a viewpoint plaza, and trails within the private open spaces.

Tax lot 500 referred to as the "Upper Views" is located directly across Vista Loop Drive from the Lower Views. This property contains about 9.55 acres and is bordered on one side by Vista Loop Drive and the other by Highway 26. The property is gently sloping with about 40 feet of elevation difference between the South and north property lines. The Upper Views is proposed to contain two housing types: 49 detached single family dwelling units and one lot to contain 24 multi-family dwelling units. Additional features proposed in the Upper Views include a half-court basketball court, play structure, tot lot, dog park, and sidewalk system.

A pre-application conference was held with the City to review the project on May 29, 2019. Based on input received at this meeting modifications were made to the project layout.

## II. Application Approval Requests

The applicant requests the following approvals with this application:

- Type IV Combined Planned Development Review to include both Conceptual and Development Plan reviews;


## III. Items Submitted With This Application

Exhibit A - Land Use Application
Exhibit B - Notification List and Mailing Labels
Exhibit C - Pre-application Notes
Exhibit D - Project Narrative
Exhibit E - Architectural Plans Booklet
Exhibit F - Storm Drainage Report
Exhibit G - Traffic Impact Analysis
Exhibit H - Arborist Report
Exhibit I - Geotechnical Report
Exhibit J - DSL Wetland Delineation Concurrence
Exhibit K - Civil Plans (under separate cover)

- Sheet C1 - Cover Sheet
- Sheet C2 - Preliminary Plat - The Lower Views
- Sheet C3 - Preliminary Plat - The Upper Views
- Sheet C4 - Topographic Survey - The Lower Views
- Sheet C5 - Topographic Survey - The Upper Views
- Sheet C6-Tree Retention and Protection Plan
- Sheet C7-Tree Inventory List
- Sheet C8 - Building Setbacks - The Lower Views
- Sheet C9 - Building Setbacks - The Upper Views
- Sheet C10-Parking Analysis and Future Street Plan
- Sheet C11-Block and Street Dimensions
- Sheet C12 - Street and Utility Plan - The Lower Views
- Sheet C13 - Street and Utility Plan - The Upper Views
- Sheet C14-Grading and Erosion Control Plan - The Lower Views
- Sheet C15-Grading and Erosion Control Plan - The Upper Views
- Sheet C16-Sanitary Sewer Plan and Profile - Offsite
- Sheet C17 - Sanitary Sewer Plan and Profile - The Lower Views
- Sheet C18 - Sanitary Sewer Plan and Profile - The Upper Views

Exhibit L - Landscape Concept Plans (under separate cover)

- Sheet L1-Overall Concept Plan
- Sheet L2 - Lower Views Concept Plan
- Sheet L3-Upper Views Concept Plan

Exhibit M - Architectural Plans Display Sheet (under separate cover)

## IV. Review of Applicable Approval Criteria

Development applications are required to meet development standards set forth in the City of Sandy Development Code. This section addresses all applicable review criteria. Pertinent code provisions are cited below in regular text followed by a
response describing how the proposal complies with this standard in italics. The following code chapters have been reviewed in this narrative:

## Chapter Title

17.30-Zoning District
17.34-Single Family Residential (SFR)
17.56 - Hillside Development
17.60 - Flood and Slope Hazard Overlay
17.64 - Planned Development
17.80 - Additional Setbacks on Collector and Arterial Streets
17.82-Special Setbacks on Transit Streets
17.84-Improvements Required with Development
17.86 - Parkland and Open Space
17.90 - Design Standards
17.92-Landscaping and Screening
17.98 - Parking, Loading, and Access Requirements
17.100 - Land Division
17.102 - Urban Forestry
15.30-Dark Sky Ordinance

## CHAPTER 17.30-ZONING DISTRICTS

### 17.30.20 - RESIDENTIAL DENSITY CALCULATION PROCEDURE

The number of dwelling units permitted on a parcel of land is calculated after the determination of the net site area and the acreage of any restricted development areas (as defined by Chapter 17.60). Limited density transfers are permitted from restricted development areas to unrestricted areas consistent with the provisions of the Flood and Slope Hazard Area Overlay District, Chapter 17.60.
Response: The applicant proposes developing a 122 lot Planned Development and subdivision to include 120 lots to accommodate single-family dwellings and two lots to accommodate 48 multi-family units for a total of 168 dwelling units. In addition, the proposal includes three private drives (Tracts F, G, and H), two public stormwater detention and water quality facilities (Tracts J and 0 ), eight private open space tracts to be maintained by a Homeowner's Associations (Tracts A - E, I, K, L) in the Lower Views and two private open space tracts (Tracts M,N) in the Upper Views. The table to the right provides a list of all proposed tracts and the proposed purpose and area of each.

| Tract Number | Purpose | Area (sq.ft) | Acres |
| :---: | :---: | :---: | :---: |
| Lower Views |  |  |  |
| A | Private Active Open Space | 49,686 | 1.14 |
| B | Private Active Open Space | 10,782 | 0,25 |
| c | Private Active Open Space | 9,895 | 0.23 |
| D | Private Open Space | 5,791 | 0.13 |
| E | Private Active Open Space | 11,985 | 0.28 |
| F | Private Drive | 2,820 | 0.06 |
| G | Private Drive | 1,883 | 0,04 |
| H | Private Drive | 1.716 | 0.04 |
| 1 | Private Open Space | 72,119 | 1.66 |
| $J$ | Public Stormwater Detention Pond | 13,954 | 0.32 |
| K | Private Open Space | 240,970 | 5.53 |
| 1 | Private Open Space | 45,051 | 1.03 |
| Upper Views |  |  |  |
| M | Private Active Open Space | 39,940 | 0.92 |
| N | Private Active Open Space | 32,655 | 0.75 |
| 0 | Pubilc Stormwater Detention Pond | 16.839 | 0,39 |

The subject property contains a gross site area of 32.87 acres. After deducting public rights-of-way (4.73 acres) and
stormwater tracts ( 0.707 acres) proposed to be dedicated to the City, the net site area (NSA) is 27.433 acres. Because the subject property contains restricted development areas (RDA) as defined by Chapter 17.60 these areas are also deducted from the net site area to determine the unrestricted site area (USA). The formula used in this calculation is: NSA - RDA = USA.

The subject property contains 279,768 square feet ( 6.423 acres) of restricted devel opment area (RDA). Subtracting this area from the net site area (NSA) results in an unrestricted site area (USA) containing 21.010 acres.

The SFR zone allows a minimum of 3 and a maximum of 5.8 units per net acre. The minimum density is calculated by multiplying the USA $x$ the required minimum density ( 21.010 acres $\times 3=63.03$ units round down to $\underline{63 \text { units) }}$

The maximum density is determined by using the lesser number of units in the following two formulas.
a. NSA (in acres) x Maximum Density of Zoning District (units/ acre).
(27.433 acres $\times 5.8$ units/ acre $=159.11$ (rounded to 159 units))
or,
b. USA (in acres) x Maximum Density of Zoning District (units/ acre) $\times 1.5$ (maximum allowable density transfer based on Chapter 17.60)
(21.01 x acres $\times 5.8$ units/ acre $\times 1.5$ density transfer $=182.787$ (rounded to 183 units)

As a result of these calculations the density range for the subject property is a minimum of 63 units and a maximum of 159 dwelling units.

As discussed in more detail below, Chapter 17.64, Planned Developments, Section 17.64.40(C), allows the density to be increased by up to $25 \%$ of the number of dwelling units upon a finding that the Planned Development is outstanding in planned Iand use and design, and provides exceptional advantages in living conditions and amenities not found in similar developments constructed under regular zoning.

Multiplying the maximum density above by $25 \%$ results in 39.75 (rounded to 40 dwellings units) additional dwelling units. With this provision, the maximum density for the subject property can be increased to 199 dwelling units (159 maximum allowed $x .25=40 . \quad 159+40$ units $=199$ maximum as allowed by Chapter 17.64). The applicant proposes constructing 168 dwelling units, nine units more than allowed by Chapter $\mathbf{1 7 . 3 0}$ and 31 units fewer than allowed by Chapter 17.64. This represents an increase in the number of units by six percent over the maximum allowed by Chapter 17.30. The details of this request is discussed in Chapter 17.64 below.

## CHAPTER 17.34-SINGLE-FAMILY RESIDENTIAL (SFR)

### 17.34.00-INTENT

The district is intended to implement the Low Density Residential Comprehensive Plan designation by providing for low-density residential development in specific areas of the city. The purpose of this district is to allow limited development of property while not precluding more dense future development, as urban services become available. Density shall not be less than 3 or more than 5.8 units per net acre.
Response: As discussed in Chapter 17.30 above, the proposal to construct 168 units exceeds the density range allowed in the SFR zone but is less than the maximum number of units (199 units) permitted by Chapter 17.64 as discussed below. The proposed planned development represents an overall density of 6.12 units per net acre.

### 17.34.10 - PERMITTED USES

## A. Primary Uses Permitted Outright:

1. Single detached dwelling subject to design standards in Chapter 17.90; Response: The applicant proposes constructing 32 single family attached dwellings, 88 single family detached dwellings, 48 multi-family dwelling units. All of the proposed housing types are allowed as part of a Planned Development application per Section 17.64.60(A)(2) below.

### 17.34.30 - DEVELOPMENT STANDARDS

Response: As shown on the plan set, a number lots in the proposal do not contain at least 7,500 square feet, are at least 60 feet wide, and provide minimum setbacks required by this section. As discussed in Section 17.64.30(A) below, the proposal includes a request to vary these development standards that are dimensional and/ or quantitative as allowed by this section. Required offstreet parking is shown in the plan set and is reviewed in Chapter 17.98 below.

### 17.34.40 - MINIMUM REQUIREMENTS

A. Must connect to municipal water.

Response: The applicant proposes extending water service to serve all dwellings in the development.
B. Must connect to municipal sewer if service is currently within 200 feet of the site. Sites more than 200 feet from municipal sewer, may be approved to connect to an alternative disposal system provided all of the following are satisfied:

1. A county septic permit is secured and a copy is provided to the city;
2. The property owner executes a waiver of remonstrance to a local improvement district and/ or signs a deed restriction agreeing to complete improvements, including but not limited, to curbs, sidewalks, sanitary sewer, water, storm sewer or other improvements which directly benefit the property;
3. The minimum size of the property is one acre or is a pre-existing buildable lot, as determined by the city;
4. Site consists of a buildable parcel(s) created through dividing property in the city, which is less than five acres in size.
Response: The existing dwelling is currently served by a septic system. This system will be decommissioned in accordance with applicable regulations and the applicant will provide proof of the decommissioned system with construction documents.
C. The location of any real improvements to the property must provide for a future street network to be developed.
Response: A new street network will be constructed to serve each dwelling as required.
D. Must have frontage or approved access to public streets.

Response: Each new residence constructed in the subdivision will gain access from a public street however six lots will gain access from three separate private drives connected to a public street.

### 17.34.50-ADDITIONAL REQUIREMENTS

A. Design review as specified in Chapter 17.90 is required for all uses. Response: The Residential Design Standard of Section 17.90.150, are applicable to residential development. The applicant is not proposing to submit for design review of the proposed multi-family structures on Lots 72 and 122 at this time.
B. Lots with 40 feet or less of street frontage shall be accessed by a rear alley or a shared private driveway.
Response: All proposed lots contain greater than 40 feet of street frontage except six lots proposed to be accessed by private drives (Lots 41, 42, 57, 58,61 and 62), two flag lots (Lots 103,104), and all attached dwelling units (Lots 1-32) which will be accessed by a rear alley.

## CHAPTER 17.56-HILLSIDE DEVELOPMENT

### 17.56.00-INTENT

The intent of this chapter is to comply with Statewide Planning Goal 7 (Natural Hazards) by minimizing seismic and landslide hazards, and soil erosion associated with development on steep or unstable slopes. Development may be permitted on potentially hazardous areas, provided that the recommendations of approved studies are implemented as conditions of building permit or land use approval.

### 17.56.10-APPLICABILITY

These regulations shall apply to any parcel with slopes greater than twenty-five percent $(25 \%)$ as shown on the Hillside Development Overlay District Map or with slope hazards mapped by the Department of Geology and Mineral Industries
(DOGAMI). This chapter shall apply only to activities and uses that require a building, grading, tree removal and/ or land use permit.
Response: As shown on the figure to the right from the City's Hillside Overlay District Map and as shown on the Existing Conditions Plan submitted with this application, a small area of the Lower Views contains slopes greater than 25 percent.

A. General. No person shall develop property in areas designated by SDC
17.56. 10, without first demonstrating compliance with this chapter.

1. As a condition of permit issuance or land use approval, the applicant shall agree to implement the recommendations of approved studies and to allow all inspections to be conducted.
2. Where a bond, letter of credit or other guarantee is required, the permit shall not be issued until the bond or guarantee has been obtained and approved.
Response: A Geotechnical Report has been included with this application.
B. Exemptions:
3. An activity or use that avoids slopes of $25 \%$ or greater, DOGAMI slope hazard areas, natural drainageways and potentially hazardous analysis areas as defined in Section 17.56.30.A.
Response: As shown on the submitted plans only limited development is proposed on slopes 25 percent or greater. No development is proposed on DOGAMI slope hazard areas, natural drainageways, or hazardous analysis areas.

## CHAPTER 17.60 - FLOOD AND SLOPE HAZARD (FSH) OVERLAY 17.60.10 - INTERPRETATION AND MAPPING

The Director has the ultimate responsibility for maintaining the FSH Overlay District on the City of Sandy Zoning Map, determining on-site measuring methods, and otherwise interpreting the provisions of this chapter. Technical terms used in this chapter are defined in Chapter 17.10, Definitions. This chapter does not regulate development on lots or parcels entirely outside the FSH Overlay District.
A. FSH Overlay District. The only areas subject to the restrictions and prohibitions of the FSH overlay district are those indicated on the City of Sandy Zoning Map on file in the Planning Department. This chapter does not regulate lots or parcels entirely outside the FSH Overlay District.
Response: As shown on the city's Zoning Map and submitted plans, a portion of the Lower Views is encumbered by the FSH Overlay District. No development is proposed to occur within any part of this overlay.
B. Development Approval Required. No development shall occur within the FSH overlay district without first obtaining City approval under the provisions of this chapter. The Director shall notify the Oregon Division of State Lands whenever any inventoried wetland is proposed for development, in accordance with ORS 227.350. In riverine situations, the Director shall notify adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notification to the administrator.
Response: As shown on submitted plans, no portion of any lot is proposed to be platted within the FSH overlay district.
C. Applicant Responsibilities. The applicant for alteration or development within the FSH overlay district shall be responsible for preparing a survey of the entire site, based on site specific field surveys or Corps of Engineers data that precisely maps and delineates the following areas:

1. The name, location and dimensions of affected streams or rivers, and the tops of their respective banks.
Response: No rivers or streams are located on the subject property. As noted in the section above, no development is proposed within the FSH overlay district on the subject property.
2. 100-year floodplain and floodway boundaries and elevations as determined by the J une 17, 2008 FIS for Clackamas County and Incorporated Areas.
Response: The Lower Views contains a small wetland/ drainage as shown on submitted plans.
3. The City of Sandy FSH overlay district boundary as depicted on the City of Sandy FSH Map.
4. The water quality and slope setback area(s) as defined in Section 17.60.30.
5. The size and location of locally significant wetlands shall be determined based on the City of Sandy Locally Significant Wetland Inventory (2002) unless modified by a wetland delineation approved by the Oregon Division of State Lands and submitted to the City. Wetland delineations that have formal concurrence from the Division of State Lands shall be valid for the period specified in that agency's administrative rules.
6. Steep slope areas where the slope of the land is $25 \%$ or greater within the FSH overlay district boundary.
7. The area enclosed by a continuous line, measured 25 feet horizontally, parallel to and upland from the top of a steep slope area, where the top of the steep slope is within the FSH overlay district boundary.
8. Existing public rights-of-way, structures, roads and utilities.
9. Natural vegetation, including trees or tree clusters and understory within the FSH Overlay District boundary.
10. Existing and proposed contours at 2 -foot intervals.

Response: All of this information is included on submitted plans. A portion of the Lower Views is encumbered by the FSH Overlay and a wetland has been delineated on this property as well. An existing storm drainage pipe and outfall is located within the delineated wetland area that will remain. No development is proposed in the FSH Overlay as shown on submitted plans.

### 17.60.20 - PERMITTED USES AND ACTIVITIES

A. Restricted Development Areas. Restricted development areas within the FSH overlay district as shown on the City of Sandy Zoning Map include:

1. Slopes of $25 \%$ or greater that (a) encompass at least 1,000 square feet and (b) have an elevation differential of at least 10 feet.
2. Protected water features, including locally significant wetlands, wetland mitigation areas approved by the Division of State Lands, and perennial streams.
3. Required setback areas as defined in section 17.60.30.

Response: As shown on submitted plans portion of the Lower Views is located within a restricted development area.
B. Permitted Uses. Permitted uses within restricted development areas are limited to the following:
Response: The only uses proposed within any restricted development area are permitted uses: trail construction, removal of non-native plants, and planting native plants.
C. Platting of New Lots. No new lot shall be platted or approved for development that is exclusively in restricted development areas as defined in subsection 17.60.20. A.

Response: No portion of any lot is proposed to be platted within the FSH overlay or restricted development area.

### 17.60.30 - REQUIRED SETBACK AREAS

A. Required Setbacks. The required special setback(s) shall be:

1. 70 feet from the top of bank of Tickle Creek;
2. 25 feet around the edge of any mapped locally significant wetland; and
3. 25 feet from the top of any $25 \%$ slope break where the slope break occurs within the FSH overlay district as mapped by the city.
Response: The Topographic Survey submitted with the application includes this information as applicable. No development is proposed within any of these areas.
B. Minimize Impacts. Natural vegetation shall be preserved and enhanced and excavation minimized within required water quality setback areas.
Response: No disturbance or development is proposed within water quality setback areas on the subject property.

### 17.60.40-REVIEW PROCEDURES

Review of development requests within the FSH Overlay District shall occur subject to the following procedures. Unless otherwise indicated below, the Director may approve Type I permits over the counter or following a field check. Type II and III development applications shall be reviewed to ensure consistency with Section 17.60.60-70. Section 17.60.50 special reports shall also be required, unless specifically exempted by the Director.
Response: As noted above, no development is proposed within the FSH Overlay District and no special reports have been identified by the Director.

### 17.60.80 - NOTIFICATION TO OTHER ENTITIES AND RECORD KEEPING

A. Whenever a watercourse is to be altered or relocated, notification shall be sent to Clackamas County and DLCD prior to such alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administrator through appropriate notification means (i.e. submittal of a Letter of Map Revision (LOMR)), and assure that the flood carrying capacity of the altered or relocated portion of said watercourse is maintained.
B. Base Flood Elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, the Director shall notify the Federal Insurance Administrator of the changes by submitting technical or scientific data in accordance with Volume 44 Code of Federal Regulations Section 65.3. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and floodplain management requirements will be based upon current data.
C. Notify the Federal Insurance Administrator in writing of acquisition by means of annexation, incorporation or otherwise, of additional areas of jurisdiction.
D. Obtain and maintain the following for public inspection and make available as needed:

1. Obtain and record the actual elevation (in relation to the mean sea level) of the lowest floor (including basements) of all new or substantially improved structures, and whether or not the structure contains a basement.
2. For all new or substantially improved floodproofed structures:
a. Verify and record the actual elevation (in relation to mean sea level), and
b. Maintain the floodproofing certifications required in Section 17.60.70(F).
3. Obtain and maintain certification for flood openings when certification is required under Section 17.60.70(E)(5).
Response: As noted above, no development is proposed within the FSH Overlay District

### 17.60.90 - WATER QUALITY TREATMENT FACILITIES

Tickle Creek, the Sandy River and associated natural drainage ways are vital to Sandy's recreationally based economy and to the quality of life of Sandy residents. Placement of water quality facilities shall be limited as follows:
A. The water quality facility shall not be constructed in restricted development areas, except where necessary to serve approved development within restricted development areas (e.g., a road) and where no reasonable alternative exists in buildable areas of the site.
B. Where the approval authority determines that a more efficient and effective regional site exists within the sub-basin, the water quality facility may be constructed off-site.
Response: The proposed water quality facilities on Tract J and O are located outside the FSH overlay.

### 17.60.100 - DENSITY TRANSFER PROVISIONS

Residential density transfer may be approved subject to the following:
A. Required Setback Areas. Density may be transferred from restricted development areas (i.e., steep slopes, protected water features and required setbacks) to buildable portions of the site.
Response: As detailed in Chapter 17.30 above, the density for the site does not allow a density transfer per Chapter 17.60.
B. Density Maximum. The maximum gross density for the buildable area of the site shall not exceed $150 \%$ of the maximum density allowed by the underlying zoning district for that buildable area.
Response: As detailed in Chapter 17.30 above, the maximum density is based on the lesser of the two methods of calculating density. As a result, the maximum density permitted is 159 . The applicant proposes increasing the density by nine units to 168 units as discussed in Chapter 17.64.
C. Housing Types Not Permitted in Underlying Zoning District. Housing types not permitted in the underlying zoning district may only be approved through the PD (planned development) or SAP (specific area plan) process.
Response: The applicant proposes constructing 32 single-family attached dwellings and two multi-family buildings to include 24 units each. Both of these dwelling types are not otherwise allowed in the SFR zoning district however they are through the PD approval process as discussed in Chapter 17.64 below.
D. Transfer Area. Transfer of density may only occur within the same property and/ or to properties contiguous to the primary property. The terms "primary property" identify the legal lot from which density is to be transferred to "secondary property(s)". Further development or land use action on the primary or secondary properties shall be reviewed together in the same application.
Response: As noted above the proposal is not permitted to transfer density per the provisions of Chapter 17.30.

## CHAPTER 17.64 - PLANNED DEVELOPMENT

### 17.64.00-INTENT

The Planned Development regulations are intended to:
A. Refine and implement village development patterns designated "V" on the Comprehensive Plan Map.
B. Allow the relocation of zones within designated villages, provided that the overall intent of the village designation is maintained.
C. Allow a mixture of densities between base zones within the planned development.
D. Promote flexibility in site planning and architectural design, placement, and clustering of structures.
E. Provide for efficient use of public facilities and energy.
F. Encourage the conservation of natural features.
G. Provide usable and suitable recreation facilities and public or common facilities.
H. Allow coordination of architectural styles, building forms and relationships.
I. Promote attractive and functional business environments in non-residential zones, which are compatibility with surrounding development.
Response: The proposed Planned Development is intended to further the intent of this chapter. The proposal includes a mixture of housing types and densities; a request for variations to setbacks to promote flexibility in site planning; conservation of natural features by not platting any lots within the FSH or restricted development areas and restricting development within restricted development areas to only permitted uses (trail construction, removal and planting native plants); an array of recreational amenities for the use and enjoyment of residents of The Views; and interesting and functional building designs intended to create a high quality and diverse residential neighborhood.

### 17.64.10 - GENERAL PROVISIONS

A. Combined Review. The procedures of this chapter require review of both a Conceptual Development Plan and a Detailed Development Plan. Requests may be made sequentially or for a combined review. In the event of a combined review, the Planning Commission shall forward a recommendation regarding the plans to the City Council, and the City Council shall make a final decision approving, approving with conditions or denying the application.
Response: The submitted application requests a combined review of both Conceptual and Detailed Development Plans.
B. Development Permit Issuance. Development permits are only issued following approval of a Detailed Development Plan.
Response: The applicant is aware of this requirement.

### 17.64.20 - AREAS OF APPLICATION

Planned developments are allowed in all zones.

Response: The subject property is zoned Single Family Residential Zone and a Planning Development is proposed as permitted in all zones.

### 17.64.30 - DEVELOPMENT STANDARDS

A. Variation from Development Code Standards Generally. The development standards of the base zone, overlay zone or planned development overlay apply unless they are superseded by the standards of this chapter, or are modified during a Planned Development review. The Planned Development and Specific Area Plan review processes allow modification of development code standards that are dimensional and/ or quantitative, however a base zone's minimum density is not eligible for modification under any circumstances, including a modification under Chapter 17.66.
Response: Due to the unique physical characteristics of the site including extensive restricted development areas, the applicant is requesting several variations to Development Standards with the application. The majority of these items have been proposed in order to provide additional flexibility in designing and placing homes on the lots. The applicant believes the requested variations are the minimum necessary for a successful project.

1. Minimum Lot Size - The SFR zone requires lots for single family dwellings to contain a minimum of $7,500 \mathrm{sq}$. ft . Because of the unique physical aspects of the subject property including large areas in the Lower restricted by the FSH Overlay and the location of existing transportation facilities (Vista Loop Drive and Highway 26) impacting the Upper Views, compliance with the minimum lot size standard is challenging and still allow the project to be financially successful. For this reason the proposal includes a variety of lots sizes. The proposed Planned Development includes four lot categories for the 88 single-family detached lots: 50 lots (3,400-4,999 sq. ft.), 13 lots ( $5,000-5,999$ sq. ft.), 12 lots (6,000-7,499 sq. ft.) and 13 lots ( $7,500 \mathrm{sq}$. ft. and greater). The proposed single family attached lots range in size from 2,160 sq. ft. - 2,695 sq. ft. Each category of lot is intended to provide an opportunity to construct a different housing product type.
2. Minimum Average Lot Width ( 60 ft .) - Lower Views Lots - 1-39, 65, and 68-70. Upper Views Lots - all except Lots 73, 83, 87, 99, 100, and 121. This variation is requested to provide flexibility in the design and placement of homes. The applicant believes the unique nature of the site and amenities offered as part of the PD application warrant an extra degree of flexibility in site design and home design selection this request provides.
3. Interior Side Yard Setbacks - The applicant proposes reducing the interior side yard setback on all lots to five feet. This variation is requested to provide greater flexibility in building design and placement. The applicant believes the unique nature of the site and amenities offered as part of the

PD warrant an extra degree of flexibility in placing homes on these lots and selecting home designs.
4. Rear yard setbacks - All lots will provide a 20 foot rear yard setback with the exception a 10 foot setback is proposed for Lots 47-56 abutting the public open space in the Lower Views and a 15 foot rear setbacks is proposed for Lot 84-86 and Lots 88-102 in the Upper Views. This variation is requested to provide greater flexibility in building design and placement. The applicant believes the unique nature of the site and amenities offered as part of the PD warrant an extra degree of flexibility in placing homes on these lots and selecting home designs.
5. Maximum Block Length - Due to the unique physical characteristics of the Lower Views (steep slope, restricted development areas) and the Upper Views (Vista Loop Drive and Highway 26) compliance with the 400 foot maximum block length standard in Section 17.100.120 is not possible. For this reason the applicant is requesting a variation to this standard as part of the PD process. The specific streets segments requested included: The Views Drive from Vista Loop Drive to Bonnie Street, north side of Bonnie Street, and Knapp Street from Ortiz Street to Vista Loop. The Lower Views is contained by steep slopes and restricted development making street connectivity and block lengths impossible. Because of the location of Highway 26 and Vista Loop Drive the Upper Views street design is logical given these constraints.
6. Eliminate sidewalk/ planter - The applicant also requests approval to eliminate the requirement to construct a sidewalk and planter along the following street frontages: south side of The Views Drive from Vista Loop Drive to the alley and the majority of the Highway 26 frontage. The details and reasons for this request is explained in Chapter 17.84 below.
B. Minimum Site Area. A planned development may be established on any parcel of land, or on more than one parcel of land if those parcels are abutting.
Response: The subject property contains two abutting parcels totaling 32.87 acres in compliance with this section.

### 17.64.40 - DENSITY CALCULATION

The maximum number of allowable dwelling units shall be the sum of densities allowed by the underlying zone(s) unless an increase is authorized as otherwise allowed in this chapter.
A. Residential Zones. The calculation is based on a determination of gross site area and the acreage of any restricted development areas (as defined by Chapter 17.60). A specific determination of density shall be made pursuant to Chapter 17.30. When a PD is located in more than one " $R$ " zone, the total
allowed number of units is the sum of the number of units allowed by each zone. The dwelling units may be placed without regard to zone boundaries.
Response: The subject property contains only property zoned Single Family Residential. As reviewed in Chapter 17.30 above, the density range for the property is a minimum of 63 units and a maximum of 159 units. The applicant to increase the maximum density by nine units to 168 units.
C. Increase in Density. An increase in density of up to $25 \%$ of the number of dwelling units may be permitted upon a finding that the Planned Development is outstanding in planned land use and design, and provides exceptional advantages in living conditions and amenities not found in similar developments constructed under regular zoning.
Response: As noted above the maximum density allowed by the SFR and Chapter 17.30 is 159 units and the applicant proposes 168 units. The applicant proposes increasing density as permitted by this section by nine units, an increase of six percent. The applicant believes the proposed density increase is justified given the unique nature of the property and the amenities offered with this proposal. As detailed on submitted plans, 19.5 percent ( 6.42 acres) of the 32.87 acre property is contained within restricted development areas and the Planned Development proposal includes the designation of 36.3 percent ( 11.92 acres) of the site as open space. In addition, no part of any lot will be platted within the FSH or a restricted development area. Other features of the proposal include a mix of housing types and densities; a request to vary development standards to promote flexibility in site planning; an innovative townhouse design exceeding the residential design standards including a two car rear-loaded detached garage and open courtyard; and constructing an array of recreational amenities for the use and enjoyment of the residents of the Planned Development. As a package the applicant believes there is sufficient justification to find that the Planned Development is outstanding in planned land use and design and provides exceptional advantages in living conditions and amenities not found in similar developments constructed in the SFR zone in order to justify this request.
D. Density Transfer. A transfer of density may be allowed by the Planning Commission when consistent with the review criteria of Chapter 17.64.100 C. Density may be transferred across zone district boundaries.
Response: The subject property is located in the SFR zoning district only and a density transfer is not requested.

### 17.64.50 - OPEN SPACE AND PARKLAND

All Planned Developments shall provide a minimum percentage of the total area in open space as specified below. In addition to required open space, all Planned Developments that include residential housing shall also provide a required parkland dedication as specified in Chapter 17.86.
A. Residential Zones. A minimum of $25 \%$ of the total site area.

Response: This section requires the Planned Development proposal to provide 25 percent of the total site area in open space. The subject property contains 32.87 acres requiring 8.22 acres of open space. As shown on submitted plans, the proposal includes 11.92 acres of open space with 10.25 acres in the Lower Views ( 8.22 acres within FSH Overlay restricted development areas, 1.9 acres of active open space, and 0.13 acres of additional open space) and 1.67 acres in the Upper Views. The proposed 11.92 acres of open space represents 36 percent of the total site area in compliance with this section.
B. Commercial or Industrial Zones. A minimum of $15 \%$ of the total tract area. Response: This section is not applicable.
C. Payment in Lieu of Dedication. At the city's discretion only, the city may accept payment of a fee in lieu of land dedication. The amount of the fee in lieu of land dedication (in dollars per acre) shall set by City Council Resolution or determined by a current land appraisal. The City may also allow open space land donation requirements to be fulfilled on another parcel.
Response: The applicant does not propose dedicating any open spaces areas to the city, instead these areas will be held as private open space to be owned and maintained by a homeowner's association.
D. The following factors shall be used in the choice of whether to accept land or cash in lieu:
a. The topography, geology, access to, parcel size, and location of land to be dedicated;
b. Potential adverse/ beneficial effects on environmentally sensitive areas;
c. Compatibility with the Parks Master Plan, Public Facilities element of the Comprehensive Plan, and the City of Sandy Capital Improvements Program in effect at the time of dedication;
d. Availability of previously acquired property; and
e. The feasibility of dedication.

Response: At noted above, the applicant does not propose dedicating any park or open spaces areas to the city.
E. The types of open space that may be provided are as follows:
a. Natural Areas: areas of undisturbed vegetation, steep slopes, stream corridors, wetlands, wildlife habitat areas or areas replanted with native vegetation after construction.
b. Greenways: linear green belts linking residential areas with other open space areas. These greenways may contain bicycle paths or footpaths. Connecting greenways between residences and recreational areas are encouraged.
Response: As shown on submitted plans, the proposed 11.92 acres of open space includes 8.22 acres within FSH Overlay restricted development areas.
F. Dedication Procedures. Open space as part of Planned Development application shall be dedicated according to the requirements of Section 17.86.50.
Response: The applicant does not propose dedicating any open space to the City of Sandy. Instead the applicant proposes establishing a homeowner's association to own and maintain these areas as permitted by Section 17.86.50.

### 17.64.60 - ALLOWED USES

A. Residential Districts:

1. Uses permitted in the underlying district
2. Housing types may include, but are not limited to, single family dwellings, duplexes, row houses, clustered dwelling units, multiple family dwellings, or manufactured dwellings.
3. Related commercial uses as part of the development
4. Related community service uses as part of the development
5. Accessory buildings and uses

Response: The proposed PD includes 88 lots to accommodate single-family detached dwellings, 32 lots for single-family attached dwellings, and two lots to allow construction of up to 48 multi-family dwellings in the future. A variety dwelling types have been proposed to provide diverse housing choices to accommodate a range of income levels.

### 17.64.70-OFFICIAL ZONING MAP

When a Planned Development proj ect has been approved, the official Zoning Map shall be amended by ordinance to denote the new "PD" Planned Development overlay designation. Such an amendment is a ministerial act, and Chapter 17.26, Zoning District Amendments, shall not apply when the map is amended to denote a PD overlay.
Response: The applicant understands the City will complete a zone change as a ministerial act to denote a "PD", Planned Development Overlay designation on the property during the approval process. Since no parkland is proposed to be dedicated to the city a Zoning District Amendment is not required with this application.

### 17.64.80 - CONCEPTUAL DEVELOPMENT PLAN PROCEDURE

A. The Planning Commission shall review the Conceptual Development Plan at a public hearing and forward a recommendation for approval, approval with modifications, or denial of the application to the City Council for consideration. Response: The applicant is aware of the review process for this application.
B. The City Council shall review the recommendation at a public hearing and take action based on the Planning Commission recommendation. The City Council may approve, approve with modifications, or deny the application. Approval of the Conceptual Development Plan shall be limited to the tentative acceptability of the land uses proposed and their interrelationships and shall
not be construed to endorse precise locations of uses nor engineering feasibility.
Response: The applicant requests the proposal be approved as presented.
C. If an affirmative decision is made, the City Council shall adopt findings that specify how the application has or has not complied with this chapter's standards, as well as any other relevant standards, and approve the request by an ordinance that amends the Zoning Map.
Response: The applicant is aware the Council will need to adopt findings stating how the proposal complies with relevant code standards and approving the proposal.
D. Within 12 months of approval of the Conceptual Development Plan, the applicant shall file a Detailed Development Plan. The Detailed Development Plan shall incorporate any modification or condition required by approval of the Conceptual Development Plan.
Response: The applicant has submitted an application for a combined review of both Conceptual and Detailed Development Plans.

### 17.64.90 - CONCEPTUAL DEVELOPMENT PLAN APPLICATION

A Conceptual Development Plan is intended as a general guide to land use, transportation and utility placement within a planned development. A Conceptual Development Plan application requires significantly less detail than a Detailed Development Plan.
A. Application Requirements. An application for Conceptual Development Plan review shall be made on forms provided by the Director. The person filing the application must be the owner or a person having an interest in the land to be included in the Planned Development. If the Planned Development is to include land in more than one ownership, the application must be submitted jointly by all of the owners or persons having an interest in each of the separately owned properties to be included.
The application shall be accompanied by the following:

- 20 copies of the required narrative.
- 20 sets of full-scaled black line drawings of the conceptual development plan graphic(s) drawn at a typical engineering scale.
- One set of plans reduced to $81 / 2^{\prime \prime}$ by $11^{\prime \prime}$ sheets of paper. Graphics and related names/ numbers must be legible on this sheet size.
- List and mailing labels of all affected property owners within 300 feet.
- List of all proposed deviations from City development standards.

Response: All of the items required by this section are included with the application package.
B. Additional Submittals. A Conceptual Development Plan shall include the following information where applicable:

1. Existing land use map (typically a topographic map that extends at least 300 feet beyond the site). The map shall include building footprints and make a distinction between single-family, multi-family, commercial and industrial uses, as well as other significant features such as roads, drainage ways, parks and schools.
Response: The proposal includes a future street plan containing the items in this section.
2. Site plan(s) and other graphics drawn to scale. The site plan(s) shall contain the following:
a) Title sheet, date, north arrow, and legend
b) Existing site conditions including contours at 10 -foot intervals, watercourses, floodplains and natural features.
c) Boundary of the proposed Planned Development and any interior boundaries related to proposed development phases or land divisions.
d) General location of existing and proposed land uses, including residential densities and non-residential building types. An indication of approximate building envelopes may be required where necessary to evaluate building relationships.
e) General location and size of areas to be conveyed, dedicated, or reserved as common open spaces, public parks, recreational areas, school sites, and similar public and semi-public uses.
f) Existing and proposed general circulation system including collector and arterial streets and major points of access to public rights-of-way and adjacent property. Notations of proposed ownership (public or private) should be included where appropriate.
g) General pedestrian and bicycle circulation system, including its interrelationship with the motor vehicular system and indicating proposed treatments at existing or potential points of conflict.
h) Existing and proposed utility systems including sanitary sewer, water, storm sewer, and drainage ways.
i) Sufficient information on land areas within at least 300 ft . of the subject property to indicate their relationships with the proposed development including land uses, lot lines, circulation systems (including potential for connectivity of streets and pedestrian ways), public facilities, and unique natural features of the landscape.

The Director may waive any of the above requirements or require additional information when deemed necessary to properly evaluate the proposed Planned Development.
Response: All of the items in this section have been submitted as detailed in the pre-application conference for this project.
C. Narrative Requirements for a Conceptual Development Plan. A written statement shall be provided, including the following information:

1. Statement of objectives to be achieved by the Planned Development. This statement should indicate:

- A description of the character of the proposed development.
- The rationale behind the design assumptions and choices made.
- The rationale behind any design change to an existing Village and reasons why the proposal is superior.
- A discussion indicating how the application meets the review criteria in 17.64. 100 below.

Response: The submitted narrative describes the character of the proposed development, the rationale for the proposed design, and discusses how the proposal complies with the review criteria in Section 17.64.100 below. The subject property is not located within a Village designation.
2. Statement of intentions with regard to future sale or lease of all or portions of the Planned Development.
Response: Single family dwellings will be constructed on all lots by the applicant and offered for sale with the exception that two lots are proposed to contain multi-family structures to offer units for rent.
3. Quantitative data for the following, where appropriate:

- Total number and type of dwelling units
- Parcel size(s)
- Proposed lot coverage of buildings and structures where known
- Gross densities per acre
- Total amount of open space (lands not designated for buildings or vehicle parking and maneuvering areas)
- Total amount of nonresidential construction

Response: The details of this section are shown in table below.

| Total number and type of dwelling units | $88-$ single family detached <br> $32-$ single family attached <br> $48-$ multi-family on two lots |
| :--- | :--- |
| Parcel size(s) | Tax Lot $200-23.318$ acres <br> Tax Lot $500-9.552$ acres <br> Total Site -32.87 acres (1, 431, $813 ~ s q . ~ f t) ~$. |
| Proposed lot coverage of buildings and structures <br> where known <br> Gross densities per acre | Unrestricred site area =21.01 acres |

4. General statement of intentions concerning timing, responsibilities, and assurances for all public and non-public improvements, such as parks, open space improvements, pedestrian connections, irrigation, private roads and drives, landscape, and maintenance.
Response: The applicant intends to complete necessary improvements following land use approval. The applicant hopes to begin constructing public improvements in the Spring/ Summer 2021 and complete improvement in the Fall 2021.
5. Description of how the Planned Development contributes to the completion and connectivity of the pedestrian and vehicular circulation system.
Response: The location of the Planned Development does not provide a significant contribution towards the completion and connectivity of a pedestrian and vehicular circulation system. Primary contributing features include new sidewalks along a portion of Vista Loop Drive and sidewalks along the local street in the Upper Views to connect to a future sidewalk along Highway 26 and trails within proceed open space areas.

### 17.64.100 - CONCEPTUAL DEVELOPMENT PLAN REVIEW PROCESS

A. Acceptance of Application. The Director shall review the application in accordance with Chapter 17.18 - Processing Applications.
Response: The Director will need to process the application in conformance with the requirements of Chapter 17.18.
B. Staff Evaluation. The Director shall prepare a report that evaluates whether the Conceptual Development Plan complies with the review criteria below. The report shall also include a recommendation for approval or denial and, if needed, a list of conditions for the Planning Commission to consider if an approval is granted.
Response: The Director will prepare a staff report for the Planning Commission and Council to consider.
C. Review Criteria for Conceptual Development Plan. Requests for approval of a Conceptual Development Plan shall be reviewed to:

1. Assure consistency with the Intent of this chapter;

Response: The intent statements in Chapter 17.64 relevant to the proposed PD include:
D. Allow a mixture of densities between base zones within the planned development.
E. Promote flexibility in site planning and architectural design, placement, and clustering of structures.
F. Provide for efficient use of public facilities and energy.
G. Encourage the conservation of natural features.
H. Provide usable and suitable recreation facilities and public or common facilities.
I. Allow coordination of architectural styles, building forms and relationships.
The proposal includes lots proposed to contain three housing types: 88 single-family detached, 32 single-family attached dwellings, and two lots to contain 48 multi-family structures. As shown on the submitted architectural renderings, the proposal includes a range of building designs as well. The proposed townhouse design in unique to the city in that all of these homes includes a rear-loaded detached two-car garage and a courtyard between the garage and the back of the home.

The proposed PD encourages the conservation of natural features by exceeding the 25 percent open space requirement. The proposal includes 36 percent ( 11.92 acres) of the total site area as open space, including 8.22 of within the FSH Overlay. All of these areas will be held in perpetuity and maintained by a homeowners association.

The proposal also includes 1,490 linear feet of trails located within these natural open space areas. Additional amenities tot lots, play structures, dog park, two half-court basketball courts, and a Mt. Hood viewing plaza.
2. Assure compliance with the General Provisions, Development Standards and Application provisions of this chapter; and
Response: As reviewed in this document the proposal generally complies with all provisions and development standards. As detailed in this document the applicant proposes several variations to these standards as permitted by Section 17.64.30(A). The proposed variations are justified given the unique physical characteristics of the site and the amenities provided.
3. When located in a Village, assure consistency with the appropriate Comprehensive Plan policies for Village designations.
Response: The proposal is not located within a designated Village.

### 17.64.110 - DETAILED DEVELOPMENT PLAN PROCEDURE

A. If the Detailed Development Plan will involve the subdivision of land, the applicant shall prepare and submit a tentative subdivision plat along with the Detailed Development Plan to be considered at the same time.
Response: The proposed Detailed Development Plan also involves a subdivision application. All materials required for this application have been submitted.
B. The Planning Commission shall review the Detailed Development Plan at a public hearing and may approve, approve with modifications or deny the application.
Response: The applicant understands the proposal will be reviewed by both the Planning Commission and City Council because the application a Combined
review application of both the Conceptual and Detailed Development Plans has been requested.

### 17.64.120 - DETAILED DEVELOPMENT PLAN APPLICATION

A Detailed Development Plan is intended as a master plan for land use, transportation and utility placement within a planned development. A Detailed Development Plan application follows an approved Conceptual Development Plan or both applications may be submitted simultaneously. Where Iand divisions are proposed, the Detailed Development Plan shall be combined with a Tentative Subdivision Plat application according the requirements of Chapter 17.100. An application for a Detailed Development Plan shall be reviewed in accordance with the following procedures:
Response: The proposal includes sufficient detail to address the requirements of this section.
A. Application Requirements. An application filed for a Detailed Development Plan shall follow the requirements specified for a Conceptual Development Plan as listed above and shall also include the following:

1. Graphic Requirements
a) Topographic contours at two-foot intervals for slopes under 15 percent and at five-foot intervals for slopes at or greater than 15 percent. A grading plan is required to show how runoff or surface water from the subject property will be managed, including ultimate disposal of surface waters.
Response: Two foot contour intervals are provided over the entire site as required as shown on submitted plans.
b) Location and floor area of existing and proposed structures and other improvements, including maximum heights, building types, gross density per acre (for residential developments).
Response: The plan set shows proposed building setbacks for all lots. The other information required by this section is included in this narrative and as shown in the architectural plan booklet submitted with the application package.
c) Detailed utility plan indicating how sanitary sewer, water, storm sewer, and drainage systems will function.
Response: A detailed utility plan is included for both the Lower and Upper Views areas.
d) Location of existing utilities, including existing fire hydrants, overhead utility lines in the abutting right of way, easements and walkways. Response: All existing utilities are shown as required.
e) Typical elevations of buildings and structures (which may be submitted on additional sheets) sufficient to indicate the architectural intent and character of the proposed development.
Response: Architectural renderings are provided on both a full sheet and in a booklet format. These drawings show the general design elements for a number of homes proposed for the site including details of the proposed townhome units.
f) Landscape plan drawn to scale showing location of existing trees and vegetation proposed to be removed from or to be retained on the site, location and design of proposed landscaped areas, quantities, varieties, quantities, and sizes of trees and plant materials to be planted, other landscape features including walks and fences, and irrigation systems required to maintain plant materials.
Response: A Landscape Plan has been provided showing concept planning for all proposed site amenities and plantings.
g) Circulation plan showing street, driveway, parking area, service area, loading area, pedestrian way and bikeway improvements, their dimensions and connectivity to surrounding parcels, existing and proposed streets.
Response: The submitted Preliminary Plat sheets and the Future Street Plan include this information.
h) Location and dimensions of all areas to be conveyed, dedicated, or reserved as common open spaces, public parks, recreational areas, school sites, and similar public and semipublic areas.
Response: The only areas proposed to be conveyed to the city are two public stormwater facilities and all public rights-of-way. All open space areas are proposed to be conveyed to and maintained by a homeowner's association established for the project as shown on submitted plans.
i) Exterior lighting plan indicating the location, size, height, typical design, material, and method and direction of illumination.
Response: The project will include street lighting. The requirements of this section will be provided with construction plans.
j) Concurrent Design Review graphic elements.

Response: The application package includes architectural renderings and Iandscape design graphics detailing amenities proposed with this development.
B. Narrative Requirements for a Detailed Development Plan. In addition to the narrative requirements specified for a Conceptual Development Plan, the Detailed Development Plan narrative shall also include:

1. Proposals for setbacks or building envelopes, lot areas where land division is anticipated, and number of parking spaces to be provided (in ratio to gross floor area or number of units)
Response: All of the items required by this section are included with the application package as shown on the Preliminary Plats and Building Setbacks and Parking Analysis sheets.
2. Detailed statement outlining timing, responsibilities, and assurances for all public and non-public improvements such as irrigation, private roads and drives, Iandscape, and maintenance.
Response: All open space and landscape areas will be commonly owned and maintain by a Homeowner's Association. Individual homeowners will be responsible for the lot area abutting adjacent public streets.
3. Statement addressing compatibility of proposed development to adjacent land uses relating to such items as architectural character, building type, and height of proposed structures.
Response: The Lower Views shares a common boundary with a commercial business (J ohnson RV), a large lot residential property in the city limits, and vacant properties outside the UGB. The Upper Views shares a common boundary with large lot residential and vacant properties and a multifamily development all within the city limits. The proposal is generally compatible with these uses in terms of architectural character, building type, and height of proposed structures.
4. Statement describing project phasing, if proposed. Phases shall be:
a) Substantially and functionally self-contained and self-sustaining with regard to access, parking, utilities, open spaces, and similar physical features; capable of substantial occupancy, operation, and maintenance upon completion of construction and development.
Response: The applicant has not determined if the Lower Views and Upper Views will be constructed in a single phase or two separate phases. The applicant prefers having the flexibility of developing and platting the Upper and Lower Views as separate phases if it is deemed necessary based on construction timing and economic factors. Each development site is generally independent of the other and should have no problem being developed and platted separately.
b) Properly related to other services of the community as a whole and to those facilities and services yet to be provided.
Response: The location and configuration of the Lower and Upper Views require the extension of sanitary sewer and water service independent of the other phase.
c) Provided with such temporary or permanent transitional features, buffers, or protective areas as may be required to prevent damage or
detriment to any completed phases and to adjoining properties not in the Planned Development.
Response: The location of the Lower and Upper Views properties are separate and independent of each other and can be developed without any transitional features, buffer, or protective areas to prevent damage to the other phase.
5. Statement of "substantial compliance" with the Conceptual Development Plan. Response: The applicant has requested a Combined Review of both the Conceptual and Detailed Development Plans.

### 17.64.140 - EFFECTIVE PERIOD OF APPROVAL

A. Conceptual Development Plan. Approval of a Conceptual Development Plan shall be valid for a 12 -month period from the date of approval, with possible six-month extension(s) when requested in writing and granted by the Director for good cause.
Response: The applicant is aware of the timeline stated in this section. The proposal includes a combined review of both the Conceptual and Detailed Development Plans.
B. Detailed Development Plan.

1. Approval of a Detailed Development Plan shall be valid for a 24 -month period from the date of approval, with possible six-month extension(s) when requested in writing and granted by the Director for good cause.
Response: The applicant is aware of the timeline stated in this section.
2. When a Detailed Development Plan is submitted and approved for a single phase, 24-month periods are allowed for submission of each subsequent phase. If the applicant has not begun construction within this time frame, all approvals shall expire.
Response: The applicant is aware of the timeline stated in this section.
3. When shown that conditions have not changed, the Commission may extend the approval for two additional years at its discretion and without a public hearing.
Response: The applicant is aware of this section.
4. Total elapsed time for submission of Detailed Plans for all phases of a Planned Development shall not exceed ten years from the date of Conceptual Development Plan approval (or the initial Detailed Development Plan approval in the case of a concurrent application), including extensions.
Response: The applicant is aware of the timeline stated in this section.

## CHAPTER 17.80-ADDITIONAL SETBACKS ON COLLECTOR AND ARTERIAL STREETS

### 17.80.00-INTENT

The requirement of additional special setbacks for development on arterial or collector is intended to provide better light, air and vision on more heavily traveled streets. The additional setback, on substandard streets, will protect collector and arterial streets and permit the eventual widening of streets.
Response: Vista Loop Drive is identified in the City's Transportation System Plan as a collector street. Highway 26 is a major arterial.

### 17.80.10 - APPLICABLITY

These regulations apply to all collector and arterial streets as identified in the latest adopted Sandy Transportation System Plan (TSP). The Central Business District ( $\mathrm{C}-1$ ) is exempt from Chapter 17.80 regulations.
Response: Vista Loop Drive is identified in the City's Transportation System Plan as a collector street. Highway 26 is a major arterial.

### 17.80.20-SPECIFIC SETBACKS

Any structure located on streets listed above or identified in the Transportation System Plan as arterials or collectors shall have a minimum setback of 20 feet measured from the property line. This applies to applicable front, rear and side yards.
Response: All structures adjacent to Vista Loop Drive and Highway 26 will be setback at least 20 feet from the property line abutting these streets.

## CHAPTER 17.82-SPECIAL SETBACKS ON TRANSIT STREETS

17.82.00-INTENT

The intent is to provide for convenient, direct, and accessible pedestrian access to and from public sidewalks and transit facilities; provide a safe, pleasant and enjoyable pedestrian experience by connecting activities within a structure to the adjacent sidewalk and/ or transit street; and, promote the use of pedestrian, bicycle, and transit modes of transportation.

### 17.82.10-APPLICABILITY

This chapter applies to all residential development located adjacent to a transit street. A transit street is defined as any street designated as a collector or arterial, unless otherwise designated in the Transit System Plan.
Response: The Upper Views is located adjacent to Highway 26, a major arterial and Vista Loop Drive is designation a collector in the City's Transportation System Plan.

### 17.82.20 - BUILDING ORIENTATION

A. All residential dwellings shall have their primary entrances oriented toward a transit street rather than a parking area, or if not adjacent to a transit street, toward a public right-of-way or private walkway which leads to a transit street.

Response: The lot for the multi-family structure in the Upper Views is proposed to be located adjacent to Vista Loop Drive and 20 single family residences are proposed adjacent to Highway 26. Although the details of the apartment design has not been submitted with this application, the applicant anticipates providing entrances oriented to Vista Loop Drive on this structure. Because a substantial grade separation exists between the subject property and Highway 26 over a majority of the property, the applicant does not propose orienting these structures towards the highway but rather orienting these homes towards the internal street. The applicant proposes constructing a decorative sound reducing wall along the back of these homes to soften the noise impact from this facility as shown on the Landscape Concept Plan.
B. Dwellings shall have a primary entrance connecting directly between the street and building interior. A clearly marked, convenient, safe and lighted pedestrian route shall be provided to the entrance, from the transit street. The pedestrian route shall consist of materials such as concrete, asphalt, stone, brick, permeable pavers, or other materials as approved by the Director. The pedestrian path shall be permanently affixed to the ground with gravel subsurface or a comparable subsurface as approved by the Director.
Response: As noted in Subsection A above, only the proposed future apartment building will be located along and oriented towards Vista Loop Drive. The details of this design will be reviewed during a subsequent design review application.
C. Primary dwelling entrances shall be architecturally emphasized and visible from the street and shall include a covered porch at least 5 feet in depth.
Response: The details of the design for the proposed apartment building will be determined during a subsequent design review application for this structure.
D. If the site has frontage on more than one transit street, the dwelling shall provide one main entrance oriented to a transit street or to a corner where two transit streets intersect.
Response: The Upper Views portion of the property technically contains frontage on two transit streets (Vista Loop Drive and Highway 26). Due to the grade separation between the property and Highway 26 and speeds along this road, only the proposed apartment building adjacent to Vista Loop Drive will be oriented to this street. The details of this design will be included with a future design review application.

## CHAPTER 17.84-IMPROVEMENTS REQUIRED WITH DEVELOPMENT 17.84.20 - TIMING OF IMPROVEMENTS

A. All improvements required by the standards in this chapter shall be installed concurrently with development, as follows:

1. Where a land division is proposed, each proposed lot shall have required public and franchise utility improvements installed or financially guaranteed in accordance with the provisions of Chapter 17 prior to approval of the final plat.
Response: All lots in the proposed development will install public and franchise utility improvements or financially guaranteed these improvements prior to final plat approval.
2. 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.
Response: This section is not applicable because a land division is proposed.
B. Where specific approval for a phasing plan has been granted for a planned development and/ or subdivision, improvements may similarly be phased in accordance with that plan.
Response: The applicant requests the flexibility to construct the Lower Views and Upper Views as two separate phases if it deemed necessary or desirable.

### 17.84.30 - PEDESTRIAN AND BICYCLIST REQUIREMENTS

A. Sidewalks shall be required along both sides of all arterial, collector, and local streets, as follows:

1. Sidewalks shall be a minimum of 5 ft . wide on local streets. The sidewalks shall be separated from curbs by a tree planting area that provides separation between sidewalk and curb, unless modified in accordance with Subsection 3 below.
Response: All sidewalks on the internal streets in the Upper Views are proposed to be five feet wide separated from curbs by a landscape strip as required. All sidewalks in the Lower Views are also proposed to be five feet wide with the exception a six-foot sidewalk is proposed on the North side of The Views entrance road from Vista Loop Drive to the proposed alley. This sidewalk is designed to connect to a six-foot meandering sidewalk constructed in front of the proposed row homes. A Planned Development variation as discussed in Section 17.64.30 has been proposed to modify the typical street section by shifting the road alignment to southern edge of the right-of-way in order to allow for the construction of a meandering six foot walkway in this location. The applicant is proposing this design because he believes it will create a more aesthetically pleasing pedestrian experience for residents of The Views to walk between the upper and lower parts of the development. This design is also increases the area on the north side of this road to plant additional landscape materials, further enhancing this design. The applicant has also proposed the Homeowner's Association established for the development be responsible for maintaining this area because as the entrance to the Lower

Views he is concerned maintenance of a planter strip along the south side of this road would not receive the same level of care he prefers.
2. Sidewalks along arterial and collector streets shall be separated from curbs with a planting area, except as necessary to continue an existing curb-tight sidewalk. The planting area shall be landscaped with trees and plant materials approved by the City. The sidewalks shall be a minimum of 6 ft . wide.
Response: As shown on submitted plans all sidewalks adjacent to Vista Loop Drive are proposed to be six-feet wide. This sidewalk is proposed to meander along the road rather than be parallel to this road as is typical. The applicant does not propose constructing a six foot sidewalk along the majority of the Highway 26 frontage because an internal street with sidewalks is proposed to be constructed parallel the highway and he feels a facility along the highway would be redundant. In addition, the applicant believes a sidewalk in this location is unnecessary given the location of the subject property and a sidewalk along the highway is unsafe and would be unpleasant for pedestrians to use. Instead, the applicant proposes constructing a sidewalk connection off the end of the cul-de-sac to the highway right-of-way to facilitate a connection to a sidewalk constructed on the property west if the city chooses to require this facility with development of this property in the future. The applicant believes this proposal is superior to requiring construction of a sidewalk either at the highway grade or at the top of the bank and along the back of the lots abutting Highway 26.
3. Sidewalk improvements shall be made according to city standards, unless the city determines that the public benefit in the particular case does not warrant imposing a severe adverse impact to a natural or other significant feature such as requiring removal of a mature tree, requiring undue grading, or requiring modification to an existing building. Any exceptions to the standards shall generally be in the following order.
a) Narrow landscape strips
b) Narrow sidewalk or portion of sidewalk to no less than 4 feet in width
c) Eliminate landscape strips
d) Narrow on-street improvements by eliminating on-street parking
e) Eliminate sidewalks

Response: As discussed above, the applicant proposes constructing a sidewalk and planter strip on the North side of The View Drive only. The right-of-way in this area is proposed to be narrowed and shifted to the southern edge of the right-of-way to allow for the construction of a sixfoot meandering sidewalk on the North side only. This facility will be contained within a widened private tract maintained by the homeowners association. The purpose of this facility is to create a more appealing and pleasant pedestrian experience for residents and visitors of The Views to travel between the Upper and Lower Views.

In addition as noted above, the applicant does not propose constructing a sidewalk along Highway 26 but instead this facility is proposed to be located on the internal street constructed in the Upper Views parallel to the highway.
4. The timing of the installation of sidewalks shall be as follows:
a) Sidewalks and planted areas along arterial and collector streets shall be installed with street improvements, or with development of the site if street improvements are deferred.
b) Sidewalks along local streets shall be installed in conjunction with development of the site, generally with building permits, except as noted in (c) below.
c) Where sidewalks on local streets abut common areas, drainageways, or other publicly owned or semi-publicly owned areas, the sidewalks and planted areas shall be installed with street improvements.
Response: The applicant intends constructing all sidewalk improvements as required by this section. The applicant is open to the city deciding which of these improvements will need to be completed prior to final plat approval. Sidewalks along the local streets will be constructed at the time of home construction.
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 within and between new subdivisions, planned developments, commercial developments, industrial areas, residential areas, public transit stops, school transit stops, and neighborhood activity centers such as schools and parks, as follows:

1. For the purposes of this section, "safe and convenient" means pedestrian and bicyclist facilities that: are reasonably free from hazards which would interfere with or discourage travel for short trips; provide a direct route of travel between destinations; and meet the travel needs of pedestrians and bicyclists considering destination and length of trip.
Response: The majority of bicycle and pedestrian facilities are located along streets. The Upper Views also includes a widened mid-block sidewalk providing a connection between the sidewalk along Vista Loop and Knapp Street. All facilities are intended to be "safe and convenient" to encourage pedestrian use.
2. To meet the intent of "B" above, right-of-ways connecting cul-de-sacs or passing through unusually long or oddly shaped blocks shall be a minimum of 15 ft . wide with 8 feet of pavement.
Response: The proposed facility specified above will require a minimum 15 foot wide easement and construction of an eight-foot wide paved sidewalk or as required by the city.
3. 12 feet wide pathways shall be provided in areas with high bicycle volumes or multiple use by bicyclists, pedestrians, and joggers.
Response: There are no high volume pathways in this development.
4. Pathways and sidewalks shall be encouraged in new developments by clustering buildings or constructing convenient pedestrian ways. Pedestrian walkways shall be provided in accordance with the following standards:
a) The pedestrian circulation system shall be at least five feet in width and shall connect the sidewalk on each abutting street to the main entrance of the primary structure on the site to minimize out of direction pedestrian travel.
b) Walkways at least five feet in width shall be provided to connect the pedestrian circulation system with existing or planned pedestrian facilities which abut the site but are not adjacent to the streets abutting the site.
c) Walkways shall be as direct as possible and avoid unnecessary meandering.
Response: The requirements of this section have been satisfied with the applicant's proposal.
d) Walkway/ driveway crossings shall be minimized. Internal parking lot design shall maintain ease of access for pedestrians from abutting streets, pedestrian facilities, and transit stops.
e) With the exception of walkway/ driveway crossings, walkways shall be separated from vehicle parking or vehicle maneuvering areas by grade, different paving material, painted crosshatching or landscaping. They shall be constructed in accordance with the sidewalk standards adopted by the City. (This provision does not require a separated walkway system to collect drivers and passengers from cars that have parked on site unless an unusual parking lot hazard exists).
f) Pedestrians amenities such as covered walk-ways, awnings, visual corridors and benches will be encouraged. For every two benches provided, the minimum parking requirements will be reduced by one, up to a maximum of four benches per site. Benches shall have direct access to the circulation system.
Response: The majority of the requirements of these sections are not applicable to the proposed subdivision. A street crossing feature on Bonnie Street is proposed to connect the viewpoint plaza with the sidewalk on the West side of this street.
C. Where a development site is traversed by or adjacent to a future trail linkage identified within the Transportation System Plan, improvement of the trail linkage shall occur concurrent with development. Dedication of the trail to the City shall be provided in accordance with 17.84.80.
Response: No trails are identified in the City's Transportation System Plan are located on the subject property.
D. To provide for orderly development of an effective pedestrian network, pedestrian facilities installed concurrent with development of a site shall be extended through the site to the edge of adjacent property(ies).
Response: All sidewalks will be extended to the edge of the subject property as required.
E. To ensure improved access between a development site and an existing developed facility such as a commercial center, school, park, or trail system, the Planning Commission or Director may require off-site pedestrian facility improvements concurrent with development.
Response: No off-site pedestrian improvements have been identified.

### 17.84.40 - TRANSIT AND SCHOOL BUS TRANSIT REQUIREMENTS

A. Development sites located along existing or planned transit routes shall, where appropriate, incorporate bus pull-outs and/ or shelters into the site design. These improvements shall be installed in accordance with the guidelines and standards of the transit agency. School bus pull-outs and/ or shelters may also be required, where appropriate, as a condition of approval for a residential development of greater than 50 dwelling units where a school bus pick-up point is anticipated to serve a large number of children.
Response: The proposal includes greater than 50 dwelling units. During the pre-application conference the city Transit Manager requested a transit amenity be constructed along Vista Loop Drive. This facility will be shown with construction plans.
B. New developments at or near existing or planned transit or school bus transit stops shall design development sites to provide safe, convenient access to the transit system, as follows:

1. Commercial and civic use developments shall provide a prominent entrance oriented towards arterial and collector streets, with front setbacks reduced as much as possible to provide access for pedestrians, bicycles, and transit.
2. All developments shall provide safe, convenient pedestrian walkways between the buildings and the transit stop, in accordance with the provisions of 17.84.30 B.
Response: The proposed residential subdivision complies with the requirements of this section.

### 17.84.50-STREET REQUIREMENTS

A. Traffic evaluations may be required of all development proposals in accordance with the following:

1. A proposal establishing the scope of the traffic evaluation shall be submitted for review to the City Engineer. The evaluation requirements shall reflect the magnitude of the project in accordance with accepted
traffic engineering practices. Large projects should assess all nearby key intersections. Once the scope of the traffic evaluation has been approved, the applicant shall present the results with and an overall site development proposal. If required by the City Engineer, such evaluations shall be signed by a Licensed Professional Civil Engineer or Licensed Professional Traffic Engineer licensed in the State of Oregon.
2. If the traffic evaluation identifies level-of-service conditions less than the minimum standard established in the Transportation System Plan, improvements and funding strategies mitigating the problem shall be considered concurrent with a development proposal.
Response: A Traffic Impact Study is included with this application as requested by the City. This study does not identify any required mitigation.
B. Location of new arterial streets shall conform to the Transportation System Plan in accordance with the following:
3. Arterial streets should generally be spaced in one-mile intervals.
4. Traffic signals should generally not be spaced closer than 1500 ft . for reasonable traffic progression.
Response: No new arterial streets are required as part of this project.
C. Local streets shall be designed to discourage through traffic. NOTE: for the purposes of this section, "through traffic" means the traffic traveling through an area that does not have a local origination or destination. To discourage through traffic and excessive vehicle speeds the following street design characteristics shall be considered, as well as other designs intended to discourage traffic:
5. Straight segments of local streets should be kept to less than a quarter mile in length. As practical, local streets should include traffic calming features, and design features such as curves and " T " intersections while maintaining pedestrian connectivity.
6. Local streets should typically intersect in " $T$ " configurations rather than 4way intersections to minimize conflicts and discourage through traffic. Adjacent "T" intersections shall maintain a minimum of 150 ft . between the nearest edges of the 2 rights-of-way.
Response: The proposed street design is dependent on the location of Vista Loop Drive and Highway 26 in the Upper Views and topographic considerations in the Lower Views. No street segments greater than a quarter mile in length are proposed and all intersections are a minimum of 150 feet apart. The proposal complies with the requirements of this section.
7. Cul-de-sacs should generally not exceed 400 ft . in length nor serve more than 20 dwelling units, except in cases where existing topography, wetlands, or drainage systems or other existing features necessitate a

Ionger cul-de-sac in order to provide adequate access to an area. Cul-desacs longer than 400 feet or developments with only one access point may be required to provide an alternative access for emergency vehicle use only, install fire prevention sprinklers, or provide other mitigating measures, determined by the City.
Response: Due to topographic constraints, two cul-de-sacs are proposed in the Lower Views and because of the location of Highway 26, a single cul-de-sac is proposed in the Upper Views. All of these cul-de-sacs are less than 400 feet in length. In the Lower Views, five lots are proposed to have frontage on the Mt. Hood Court cul-de-sac and two lots will be accessed from a private drive at the end of this cul-de-sac for a total of seven lots served by this cul-de-sac. The other cul-de-sac in the Lower Views will provide direct access to eight lots and four additional lots served by two private drives for a total of 12 lots served. The single cul-de-sac in the Upper Views is proposed to serve 11 lots. The proposal complies with this section.
D. Development sites shall be provided with access from a public street improved to City standards in accordance with the following:

1. 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.
Response: All homes will gain access from a public street or a public alley improved to city standards in compliance with this section or a private drive accessed from a public street.
2. Half-street improvements are considered the minimum required improvement. Three quarter-street or full-street improvements shall be required where traffic volumes generated by the development are such that a half-street improvement would cause safety and/ or capacity problems. Such a determination shall be made by the City Engineer.
Response: All new streets are proposed as full street improvements with the exception of Vista Loop Drive abutting the Upper Views.
3. To ensure improved access to a development site consistent with policies on orderly urbanization and extension of public facilities the Planning Commission or Director may require off-site improvements concurrent with development. Off-site improvement requirements upon the site developer shall be reasonably related to the anticipated impacts of the development. Response: No off-site improvements have been identified or are warranted with construction of this subdivision.
4. Reimbursement agreements for $3 / 4$ street improvements (i.e., curb face to curb face) may be requested by the developer per Chapter 12 of the SMC.
Response: Except for the section of The Views Drive from the intersection of Vista Loop Drive to the alley no $3 / 4$ streets are proposed.
5. A $1 / 2$ street improvement includes curb and pavement 2 feet beyond the center line of the right-of-way. A $3 / 4$ street improvement includes curbs on both sides of the side and full pavement between curb faces.
Response: As noted above only the frontage adjacent to Vista Loop Drive will require $1 / 2$ street improvements and the sidewalk/ planter is proposed to be eliminated on the South side of The Views Drive.
E. As necessary to provide for orderly development of adjacent properties, public streets installed concurrent with development of a site shall be extended through the site to the edge of the adjacent property(ies) in accordance with the following:
6. Temporary dead-ends created by this requirement to extend street improvements to the edge of adjacent properties may be installed without turn-arounds, subject to the approval of the Fire Marshal.
7. In order to assure the eventual continuation or completion of the street, reserve strips may be required.
Response: The proposed street layout results in one temporary dead-end street at the East end of the Lower Views. This street end includes sufficient room to accommodate fire equipment to turn around. A secondary fire access to the Lower Views is provided by an easement through the J ohnson RV site. If this easement is deemed by the Fire Marshall to be insufficient or an alternative secondary access cannot be obtained, some of the homes in the Lower Views may require installation of fire sprinklers.
F. Where required by the Planning Commission or Director, public street improvements may be required through a development site to provide for the logical extension of an existing street network or to connect a site with a nearby neighborhood activity center, such as a school or park. Where this creates a land division incidental to the development, a land partition shall be completed concurrent with the development.
Response: The applicant does not anticipate any public street improvements will be required beyond the site boundaries. No such improvements were identified at the pre-application conference.
G. Except for extensions of existing streets, no street names shall be used that will duplicate or be confused with names of existing streets. Street names and numbers shall conform to the established pattern in the surrounding area and be subject to approval of the Director.
Response: The application includes proposed street names as shown on submitted plans.
H. Location, grades, alignment, and widths for all public streets shall be considered in relation to existing and planned streets, topographical conditions, public convenience and safety, and proposed land use. Where topographical conditions present special circumstances, exceptions to these
standards may be granted by the City Engineer provided the safety and capacity of the street network is not adversely affected. The following standards shall apply:
8. Location of streets in a development shall not preclude development of adjacent properties. Streets shall conform to planned street extensions identified in the Transportation Plan and/ or provide for continuation of the existing street network in the surrounding area.
Response: A future street plan is included with this application. This plan shows that the proposal will facilitate and not preclude development on adjacent properties. No roads identified on the TSP are shown on the subject property.
9. Grades shall not exceed 6 percent on arterial streets, 10 percent on collector streets, and 15 percent on local streets.
Response: As shown on submitted plans all streets in the proposed development are local streets and all street grades are less than the maximum allowed by this section. The steepest grade is 11 percent for the Mt. Hood Court cul-de-sac. No other street grade is greater than eight percent (east end of Bonnie Street) with most other streets at about two percent grade.
10. As far as practical, arterial streets and collector streets shall be extended in alignment with existing streets by continuation of the street centerline. When staggered street alignments resulting in " T " intersections are unavoidable, they shall leave a minimum of 150 ft . between the nearest edges of the two rights-of-way.
Response: No arterial or collector streets are required to be extended with this application.
11. Centerline radii of curves shall not be less than 500 ft . on arterial streets, 300 ft . on collector streets, and 100 ft . on local streets.
Response: All proposed streets in the subdivision are designed in compliance with this standard.
12. Streets shall be designed to intersect at angles as near as practicable to right angles and shall comply with the following:
a) The intersection of an arterial or collector street with another arterial or collector street shall have a minimum of 100 ft . of straight (tangent) alignment perpendicular to the intersection.
b) The intersection of a local street with another street shall have a minimum of 50 ft . of straight (tangent) alignment perpendicular to the intersection.
c) Where right angle intersections are not possible, exceptions can be granted by the City Engineer provided that intersections not at right angles have a minimum corner radius of 20 ft . along the right-of-way lines of the acute angle.
d) Intersections with arterial streets shall have a minimum curb corner radius of 20 ft . All other intersections shall have a minimum curb corner radius of 10 ft .
Response: All proposed streets are designed to insect at a right angle with the intersecting street and comply with the requirements of this section.
13. Right-of-way and improvement widths shall be as specified by the Transportation System Plan. Exceptions to those specifications may be approved by the City Engineer to deal with specific unique physical constraints of the site.
Response: All right-of-way widths are proposed to be 50 feet wide with the exception of the portion of The View Drive from the intersection with Vista Loop Drive to about the public alley which is proposed to be 31 feet wide. The applicant is requesting a reduction of the right-of-way in this location in order to shift the road to the South to construct a wider sidewalk on the North side of this street within a private landscaped tract.
J. Private streets may be considered within a development site provided all the following conditions are met:
Response: No private streets are proposed.

### 17.84.60 - PUBLIC FACILITY EXTENSIONS

A. All development sites shall be provided with public water, sanitary sewer, broadband (fiber), and storm drainage.
Response: The submitted Utility Plan shows the location of proposed public water, sanitary sewer, and stormwater drainage facilities. Broadband fiber service will be detailed in construction plans.
B. Where necessary to serve property as specified in "A" above, required public facility installations shall be constructed concurrent with development.
Response: All of the utilities identified above will be constructed concurrent with each phase of the development.
C. Off-site public facility extensions necessary to fully serve a development site and adjacent properties shall be constructed concurrent with development.
Response: The applicant will extend all utilities as necessary to serve the development as required by this section.
D. As necessary to provide for orderly development of adjacent properties, public facilities installed concurrent with development of a site shall be extended through the site to the edge of adjacent property(ies).
Response: As shown on submitted Utility Plans, all public facilities are proposed to be extended through the site to edge of adjacent properties.
E. Private on-site sanitary sewer and storm drainage facilities may be considered provided all the following conditions exist:
Response: No private utilities are proposed.

### 17.84.70 - PUBLIC IMPROVEMENT PROCEDURES

Response: The applicant is aware of and intends to comply with the requirements of this section.

### 17.84.80 - FRANCHISE UTILITY INSTALLATIONS

These standards are intended to supplement, not replace or supersede, requirements contained within individual franchise agreements the City has with providers of electrical power, telephone, cable television, and natural gas services (hereinafter referred to as "franchise utilities").
A. Where a land division is proposed, the developer shall provide franchise utilities to the development site. Each lot created within a subdivision shall have an individual service available or financially guaranteed prior to approval of the final plat.
Response: Franchise utilities will be provided to all lots within the proposed development as required. The location of these utilities will be identified on construction plans and installed or guaranteed prior to final plat approval.
B. Where necessary, in the judgment of the Director, to provide for orderly development of adjacent properties, franchise utilities shall be extended through the site to the edge of adjacent property(ies), whether or not the development involves a land division.
Response: The applicant does not anticipate extending franchise utilities beyond the site.
C. The developer shall have the option of choosing whether or not to provide natural gas or cable television service to the development site, providing all of the following conditions exist:

1. Extension of franchise utilities through the site is not necessary for the future orderly development of adjacent property(ies);
2. The development site remains in one ownership and land division does not occur (with the exception of Iand divisions that may occur under the provisions of 17.84 .50 F above); and
3. The development is non-residential.

Response: The applicant anticipates installing natural gas and cable television service as required.
D. Where a land division is not proposed, the site shall have franchise utilities required by this section provided in accordance with the provisions of 17.84.70 prior to occupancy of structures.
Response: A land division is proposed and this section is not applicable.
E. All franchise utility distribution facilities installed to serve new development shall be placed underground except as provided below. The following facilities may be installed aboveground:

1. Poles for street lights and traffic signals, pedestals for police and fire system communications and alarms, pad mounted transformers, pedestals, pedestal mounted terminal boxes and meter cabinets, concealed ducts, substations, or facilities used to carry voltage higher than 35,000 volts;
2. Overhead utility distribution lines may be permitted upon approval of the City Engineer when unusual terrain, soil, or other conditions make underground installation impracticable. Location of such overhead utilities shall follow rear or side lot lines wherever feasible.
Response: All franchise utilities will be installed underground with the exception of street lights as allowed by this section.
F. The developer shall be responsible for making necessary arrangements with franchise utility providers for provision of plans, timing of installation, and payment for services installed. Plans for franchise utility installations shall be submitted concurrent with plan submittal for public improvements to facilitate review by the City Engineer.
Response: The developer will make all the necessary arrangements with franchise utility providers as required by this section.
G. The developer shall be responsible for installation of underground conduit for street lighting along all public streets improved in conjunction with the development in accordance with the following:
3. The developer shall coordinate with the City Engineer to determine the location of future street light poles. The street light plan shall be designed to provide illumination meeting standards set by the City Engineer.
4. The developer shall make arrangements with the serving electric utility for trenching prior to installation of underground conduit for street lighting.
Response: The developer will install underground conduit for street lighting in accordance with the requirements of this section.

### 17.84.90 - LAND FOR PUBLIC PURPOSES

A. Easements for public sanitary sewer, water, storm drain, pedestrian and bicycle facilities shall be provided whenever these facilities are located outside a public right-of-way in accordance with the following:

1. When located between adjacent lots, easements shall be provided on one side of a lot line.
2. The minimum easement width for a single utility is 15 ft . The minimum easement width for two adjacent utilities is 20 ft . The easement width shall be centered on the utility to the greatest extent practicable. Wider easements may be required for unusually deep facilities.

Response: The only public easements anticipated with this development are public pedestrian access asements located over sidewalks not located within a pubic right-of-way.
B. Public utility easements with a minimum width of 5 feet shall be provided adjacent to all street rights-of-way for franchise utility installations.
Response: Despite the language in this section, eight foot wide public utility easements will be provided along all lots adjacent to street rights-of-way for future franchise utility installations.
C. Where a development site is traversed by a drainageway or water course, a drainage way dedication shall be provided to the City.
Response: No public dedication for the purposes in this section are anticipated.
D. Where a development is traversed by, or adjacent to, a future trail linkage identified within the Transportation System Plan, dedications of suitable width to accommodate the trail linkage shall be provided. This width shall be determined by the City Engineer, considering the type of trail facility involved. Response: No future trails are identified in the TSP or other adopted plans on the subject property.
E. Where existing rights-of-way and/ or easements within or adjacent to development sites are nonexistent or of insufficient width, dedications may be required. The need for and widths of those dedications shall be determined by the City Engineer.
Response: The only existing right-of-ways adjacent to the development are Vista Loop Drive and Highway 26. No additional dedication is required for these roads.
F. Where easement or dedications are required in conjunction with land divisions, they shall be recorded on the plat. Where a development does not include a land division, easements and/ or dedications shall be recorded on standard document forms provided by the City Engineer.
Response: All easements and dedications will be identified on the plat as required.

### 17.84.100 - MAIL DELIVERY FACILITIES

Response: The location and type of mail delivery facilities will be coordinated with the City Engineer and the Post Office as part of the construction plan process.

## CHAPTER 17.86-PARKLAND and OPEN SPACE

### 17.86.00-INTENT

The availability of parkland and open space is a critical element in maintaining and improving the quality of life in Sandy. Land that features trees, grass and vegetation provides not only an aesthetically pleasing landscape but also buffers incompatible uses, and preserves sensitive environmental features and important resources. Parks and open space, together with support facilities, also help to meet the active and passive recreational needs of the population of Sandy. This chapter implements policies of Goal 8 of the Comprehensive Plan and the Parks Master Plan by outlining provisions for parks and open space in the City of Sandy.
Response: The City's adopted Parks Master Plan does not show any parks or trails on the subject property.

### 17.86.10 - MINIMUM PARKLAND DEDICATION REQUIREMENTS

Parkland Dedication: New residential subdivisions, planned developments, multifamily or manufactured home park developments shall be required to provide parkland to serve existing and future residents of those developments.
Response: The proposed residential subdivision is subject to the provisions of this chapter.

1. The required parkland shall be dedicated as a condition of approval for the following:
a. Tentative plat for a subdivision or partition;
b. Planned Development conceptual or detailed development plan;
c. Design review for a multi-family development or manufactured home park; and
d. Replat or amendment of any site plan for multi-family development or manufactured home park where dedication has not previously been made or where the density of the development involved will be increased.
Response: No public parkland has been identified on the tentative plat.
2. Calculation of Required Dedication: The required parkland acreage to be dedicated is based on a calculation of the following formula rounded to the nearest $1 / 100(0.00)$ of an acre:
Required parkland dedication (acres) $=($ proposed units) $\times$ (persons/ unit) $\times$ 0.0043 (per person park land dedication factor)

Response: The proposed 120 single family units and 48 multi-family units results in the following formal: 120 (proposed s.f. units) $\times 3$ (persons/ unit) $x$ 0.0043 (per person park land dedication factor) $=1.548$ rounded to 1.55 acres plus 48 (proposed m.f. units) $\times 2$ (persons/ unit) $\times 0.0043$ (per person park land dedication factor) $=0.4128$ rounded to 0.41 acres. The total required parkland is then $1.55+0.41=\mathbf{1 . 9 6}$ acres.

### 17.86.20 - MINIMUM PARKLAND STANDARDS

Land required or proposed for parkland dedication shall be contained within a continuous unit and must be suitable for active use as a neighborhood or minipark, based on the following criteria:
Response: The applicant does not propose dedicating any parkland with this development.

### 17.86.40 - CASH IN LIEU OF DEDICATION

At the city's discretion only, the city may accept payment of a fee in lieu of land dedication. The city may require payment in lieu of land when the park land to be dedicated is less than 3 acres. A payment in lieu of land dedication is separate from Park Systems Development Charges, and is not eligible for a credit of Park Systems Development Charges. The amount of the fee in lieu of land dedication (in dollars per acre) shall be set by City Council Resolution, and it shall be based on the typical market value of developed property (finished lots) in Sandy net of related development costs.
Response: The applicant proposes paying a fee in lieu of parkland dedication. The amount of this fee will be $\$ 472,360$ based on the City's current fee schedule if this payment is not deferred and paid prior to final plat approval and \$519,400 if it is deferred based on 1.96 acres of parkland as calculated in Section 17.86.10(2) above. If deferred one-half of this amount $(\$ 259,700)$ is required to be paid prior to final plat approval with the other half $(\$ 259,700)$ evenly split and paid with each building permit. Because two of the lots are proposed to contain multi-family dwellings at a later date, the applicant requests the parks fee for these units be paid with the building permit for these units rather than at the time of final plat approval. If this proposal is accepted the amount of cash-inlieu to be paid with the final plat would be based on the area of parkland required for the single family units which is 1.55 acres. This results in the following amounts $1.55 \times \$ 241,000=\$ 373,550$ if paid prior to Final plat approval and $1.55 \times \$ 265,000=\$ 410,750$ is one-half is deferred. The fee associated with the multi-family units $0.41 \times \$ 241,000=\$ 98,810$ would be paid with the building permit for these units.

### 17.86.50 - MINIMUM STANDARDS FOR OPEN SPACE DEDICATION

The applicant through a subdivision or design review process may propose the designation and protection of open space areas as part of that process. This open space will not, however, be counted toward the parkland dedication requirement of Sections 17.86. 10 through 17.86.40.

1. The types of open space that may be provided are as follows:
a. Natural Areas: areas of undisturbed vegetation, steep slopes, stream corridors, wetlands, wildlife habitat areas or areas replanted with native vegetation after construction.
b. Greenways: linear green belts linking residential areas with other open space areas. These greenways may contain bicycle paths or footpaths. Connecting greenways between residences and recreational areas are encouraged.

Response: The proposal includes the designation of 11.92 acres of private open space to be owned and maintained by a Homeowner's Association. This includes 8.22 acres of natural areas, 3.57 acres of active open space, and 0.13 acres of additional open space.
2. A subdivision or design review application proposing designation of open space shall include the following information as part of this application:
a. Designate the boundaries of all open space areas; and
b. Specify the manner in which the open space shall be perpetuated, maintained, and administered; and
c. Provide for public access to trails included in the Park Master Plan, including but not limited to the Tickle Creek Path.
Response: All of this information is provided. The applicant proposes maintaining all open space areas by forming a homeowner's association.
3. Dedication of open space may occur concurrently with development of the project. At the discretion of the city, for development that will be phased, the open space may be set aside in totality and/ or dedicated in conjunction with the first phase of the development or incrementally set aside and dedicated in proportion to the development occurring in each phase.
Response: The applicant intends that all open space areas will be owned and maintained by a homeowner's association.
4. Open space areas shall be maintained so that the use and enjoyment thereof is not diminished or destroyed. Open space areas may be owned, preserved, and maintained by any of the following mechanisms or combinations thereof:
a. Dedication to the City of Sandy or an appropriate public agency approved by the City, if there is a public agency willing to accept the dedication. Prior to acceptance of proposed open space, the City may require the developer to submit a Phase I Environmental Site Assessment completed by a qualified professional according to American Society of Testing and Materials (ASTM) standards (ASTM E 1527). The results of this study shall indicate a clean environmental record.
b. Common ownership by a homeowner's association that assumes full responsibility for its maintenance;
c. Dedication of development rights to an appropriate public agency with ownership remaining with the developer or homeowner's association. Maintenance responsibility will remain with the property owner; and/ or
d. Deed-restricted private ownership preventing development and/ or subsequent subdivision and providing for maintenance responsibilities.

Response: As noted above, all open space areas will be owned and maintained by a homeowner's association as permitted by this section. The applicant feels this is the best ownership entity to ensure maintenance of these areas in perpetuity.
5. In the event that any private owner of open space fails to maintain it according to the standards of this Code, the City of Sandy, following reasonable notice, may demand that the deficiency of maintenance be corrected, and may enter the open space for maintenance purposes. All costs thereby incurred by the City shall be charged to those persons having the primary responsibility for maintenance of the open space.
Response: The applicant does not anticipate this section being applicable.

## CHAPTER 17.92-LANDSCAPING AND SCREENING GENERAL STANDARDS ALL ZONES

Response: This chapter has limited applicability to subdivisions so only those applicable sections are reviewed in this submittal.

### 17.92.10-GENERAL PROVISIONS

A. Where Iandscaping is required by this Code, detailed planting plans shall be submitted for review with development applications. No development may commence until the Director or Planning Commission has determined the plans comply with the purposes clause and specific standards in this chapter. All required landscaping and related improvements shall be completed or financially guaranteed prior to the issuance of a Certificate of Occupancy.
B. Appropriate care and maintenance of landscaping onsite and landscaping in the adjacent public right-of-way is the right and responsibility of the property owner, unless City ordinances specify otherwise for general public and safety reasons. If street trees or other plant materials do not survive or are removed, materials shall be replaced in kind within 6 months.
C. Significant plant and tree specimens should be preserved to the greatest extent practicable and integrated into the design of a development. Trees of 25 -inches or greater circumference measured at a height of $4-1 / 2 \mathrm{ft}$. above grade are considered significant. Plants to be saved and methods of protection shall be indicated on the detailed planting plan submitted for approval. Existing trees may be considered preserved if no cutting, filling, or compaction of the soil takes place between the trunk of the tree and the area $5-\mathrm{ft}$. outside the tree's drip line. Trees to be retained shall be protected from damage during construction by a construction fence located 5 ft . outside the dripline.
Response: As previously determined by the Planning Commission, the City's tree protection standards in this section do not apply to residential subdivisions. The regulations of Chapter 17.102, Urban Forestry relevant to this proposal are reviewed below.

### 17.92.20 - MINIMUM IMPROVEMENTS - LANDSCAPING AND SCREENING

Response: The Single Family Residential zone is not listed in this section requiring compliance with minimum landscaping requirements. Landscaping requirements for the multi-family units will be addressed with a subsequent design review application.

## CHAPTER 17.98-PARKING, LOADING, AND ACCESS REQUIREMENTS 17.98.10-GENERAL PROVISIONS

M. Residential Parking Analysis Plan. A Residential Parking Analysis Plan shall be required for all new residential planned developments, subdivisions, and partitions to include a site plan depicting all of the following:
a. Location and dimension of required parking spaces as specified in Section 17.98.200.
b. Location of areas where parking is not permitted as specified in Sections 17.98.200(A)(3) and (5).
c. Location and design of parking courts (if applicable).

Response: A Residential Parking Analysis Plan as required by this section is included in the plan set.

### 17.98.80 - ACCESS TO ARTERIAL AND COLLECTOR STREETS

Response: No lots are proposed to gain access from an arterial or collector street.

### 17.98.90 - ACCESS TO UNIMPROVED STREETS

Response: All streets proposed in the subdivision will be improved to city standards.

### 17.98.100 - DRIVEWAYS

A. A driveway to an off-street parking area shall be improved from the public roadway to the parking area a minimum width of 20 feet for a two-way drive or 12 feet for a one-way drive but in either case not less than the full width of the standard approach for the first 20 feet of the driveway.
Response: All lots will have a standard 24 foot wide curb cut and driveway approach.
B. A driveway for a single-family dwelling shall have a minimum width of 10 feet. Response: All lots single family detached lots will have a standard 24 foot wide curb cut and driveway approach. All single family attached lots will have an approximately 18 foot wide curb cut.
C. A driveway for a two-family dwelling shall have a minimum width of 20 feet. A driveway approach must be constructed in accordance with applicable city standards and the entire driveway must be paved with asphalt or concrete. Response: All of the proposed lots will be constructed with a single family dwellings or multi-family dwelling. This section is not applicable.
D. Driveways, aisles, turnaround areas and ramps shall have a minimum vertical clearance of twelve feet for their entire length and width but such clearance may be reduced in parking structures.
Response: All driveways will be designed in compliance with this standard.
E. No driveway shall traverse a slope in excess of 15 percent at any point along the driveway length.
Response: All driveways will be designed in compliance with this standard.
F. The location and design of the driveway shall provide for unobstructed sight per the vision clearance requirements. Requests for exceptions to these requirements will be evaluated by the City Engineer considering the physical limitations of the lot and safety impacts to vehicular, bicycle, and pedestrian traffic.
Response: All driveways will be designed in compliance with this standard.

### 17.98.110-VISION CLEARANCE

A. Except within the Central Business District, vision clearance areas shall be provided at intersections of all streets and at intersections of driveways and alleys with streets to promote pedestrian, bicycle, and vehicular safety. The extent of vision clearance to be provided shall be determined from standards in Chapter 17.74 and taking into account functional classification of the streets involved, type of traffic control present at the intersection, and designated speed for the streets.
Response: The subject property is located in the SFR zone requiring compliance with this section. The requirements of this section will be considered in placing landscaping in these areas with construction of homes.
B. Traffic control devices, streetlights, and utility installations meeting approval by the City Engineer are permitted within vision clearance areas.
Response: The exceptions contained in this section will be considered in the design and placement of these structures.

### 17.98.200 - RESIDENTIAL ON-STREET PARKING REQUIREMENTS

A. Residential On-Street Parking Requirements. Residential on-street parking shall conform to the following standards:

1. In addition to required off-street parking, all new residential planned developments, subdivisions and partitions shall provide one (1) on-street parking space within 200 feet of each dwelling except as provided in Section 17.98.200(A)(6) below.
2. The location of residential on-street parking shall be reviewed for compliance with this section through submittal of a Residential Parking Analysis Plan as required in Section 17.98.10(M).
3. Residential on-street parking shall not obstruct required clear vision areas and shall not violate any local or state laws.
4. Parallel residential on-street parking spaces shall be 22 feet minimum in length.
5. Residential on-street parking shall be measured along the curb from the outside edge of a driveway wing or curb cut. Parking spaces must be set back a minimum of 15 feet from an intersection and may not be located within 10 feet of a fire hydrant.

Response: A Residential On-Street Parking Analysis designed in compliance with the requirements of this section is included with the application package. The proposed 71 single family dwellings in the Lower Views require 71 on-street parking spaces. One on-street parking space at least 22 feet in length has been identified within 300 feet of each of the 71 lots. An additional 66 on-street parking spaces have also been identified in the Lower Views as shown on the Parking Plan. The 49 lots in the Upper Views require 49 on-street parking spaces. As shown on submitted plans, 50 onstreet parking spaces can be provided. The proposed plan complies with this standard.
6. Portions of residential on-street parking required by this section may be provided in parking courts that are interspersed throughout a development when the following standards are met:
Response: No parking courts are proposed.

## CHAPTER 17.100 - LAND DIVISION

17.100.20 - LAND DIVISION CLASSIFICATION - TYPE I, II OR III PROCEDURES
C. Type II Land Division (Maj or Partition or Subdivision). A major partition or subdivision shall be a Type II procedure when a street is extended, satisfactory street conditions exist and the resulting parcels/ lots comply with the standards of the zoning district and this chapter. Satisfactory street conditions exist when the Director determines one of the following:

1. Existing streets are stubbed to the property boundaries and are linked by the land division.
2. An existing street or a new proposed street need not continue beyond the land division in order to complete an appropriate street system or to provide access to adjacent property.
3. The proposed street layout is consistent with a street pattern adopted as part of the Comprehensive Plan or an officially adopted City street plan.
Response: The proposal will be processed as a Planned Development. This process allows a degree of flexibility and variation of design standards. All of the proposed variations are discussed in more detail in Chapter 17.64 above. The Planned Development requires the application to be processed as a Type IV quasi-judicial review.

### 17.100.60-SUBDIVISIONS

Approval of a subdivision is required for a land division of 4 or more parcels in a calendar year. A two-step procedure is required for subdivision approval: (1) tentative plat review and approval; and (2) final plat review and approval.
Response: The proposal is a 122 lot Planned Development and subdivision.
A. Preapplication Conference. The applicant for a subdivision shall participate in a preapplication conference with city staff to discuss procedures for approval, applicable state and local requirements, objectives and policies of the Sandy Comprehensive Plan, and the availability of services.
Response: A pre-application conference was held with the city on May 29, 2019.
B. Application Requirements for a Tentative Plat. Subdivision applications shall be made on forms provided by the planning department and shall be accompanied by:
Response: All of the items required by this section are included with the submittal.
E. Approval Criteria. The Director or Planning Commission shall review the tentative plat for the subdivision based on the classification procedure (Type II or III) set forth in Section 17.12 and the following approval criteria:

1. The proposed subdivision is consistent with the density, setback and dimensional standards of the base zoning district, unless modified by a Planned Development approval.
Response: As reviewed in the narrative above, variations to development standards as permitted as part of the Planned Development process. The proposed 168 dwelling units count is consistent with the increase in density provisions approved through the PD process. As detailed in Chapter 17.64, the applicant has proposed several variations to development standards as permitted by this chapter.
2. The proposed subdivision is consistent with the design standards set forth in this chapter.
Response: Except as noted in Chapter 17.64 as approved through the Planned Development process, the proposal generally complies with the design standards in this chapter.
3. The proposed street pattern is connected and consistent with the Comprehensive Plan or official street plan for the City of Sandy.
Response: As illustrated on the submitted Future Street Plan, the proposed street system is consistent with the City's Transportation System Plan and Comprehensive Plan. Due to topographic constraints on the Lower Views and the location of Vista Loop Drive and Highway 26 on the Upper Views, street connectivity around the entire development is not possible.
4. Adequate public facilities are available or can be provided to serve the proposed subdivision.
Response: The City of Sandy has indicated that all public facilities have capacity to serve the proposed subdivision. As detailed on submitted plans, because of the depth of the existing sewer line in Vista Loop, eleven lots in the Lower Views (Lots 39-46 and 61-63) and five lots (Lots 96-100) in the Upper Views will require installation of individual grinder sump systems to pump sanitary waste from these dwellings to a gravity sewer line.
5. All proposed improvements meet City standards.

Response: With the exception of variations as identified in Chapter 17.64, Planned Developments above, all improvements in the proposed development are designed in compliance with City standards.
6. The phasing plan, if requested, can be carried out in a manner that meets the objectives of the above criteria and provides necessary public improvements for each phase as it develops.
Response: The applicant requests flexibility in developing the Lower and Upper Views as two separate phases as necessary.

### 17.100.80 - CHARACTER OF THE LAND

Land which the Director or the Planning Commission finds to be unsuitable for development due to flooding, improper drainage, steep slopes, rock formations, adverse earth formations or topography, utility easements, or other features which will reasonably be harmful to the safety, health, and general welfare of the present or future inhabitants of the partition or subdivision and the surrounding areas, shall not be developed unless adequate methods are formulated by the subdivider and approved by the Director or the Planning Commission to solve the problems created by the unsuitable land conditions.
Response: A significant portion of the Lower Views is affected by the FSH overlay identified by the City of Sandy. The applicant does not propose any development within this area. A Geotechnical Evaluation for the property is included with the application package. Except for the areas designated as open space, all areas of the Lower Views and all of the Upper Views property are suitable for development and do not pose any issues due to flooding, etc as stated in this section.

### 17.100.90 - ACCESS CONTROL GUIDELINES AND COORDINATION

A. Notice and coordination with ODOT required. The city will coordinate and notify ODOT regarding all proposals for new or modified public and private accesses on to Highways 26 and 211.
Response: The project Transportation Engineer coordinated the scope of the submitted Traffic Study regarding Highway 26 with ODOT. No direct access to Highway 26 is proposed and a VNAR is likely to be required along this roadway.

### 17.100.100-STREETS GENERALLY

A. Transportation Impact Studies. Transportation impact studies may be required by the city engineer to assist the city to evaluate the impact of development proposals, determine reasonable and prudent transportation facility improvements and justify modifications to the design standards. Such studies will be prepared in accordance with the following:

1. A proposal established with the scope of the transportation impact study shall be coordinated with, and agreed to, by the city engineer. The study requirements shall reflect the magnitude of the project in accordance with accepted transportation planning and engineering practices. A professional civil or traffic engineer registered in the State of Oregon shall prepare such studies.
2. If the study identifies level-of-service conditions less than the minimum standards established in the Sandy Transportation System Plan, improvements and funding strategies mitigating the problem shall be considered as part of the land use decision for the proposal.
Response: A traffic impact study prepared in compliance with city and ODOT standards by a Transportation Engineer is included with the application package. This study does not identify any issues requiring mitigation by the applicant.
B. Topography and Arrangement. All streets shall be properly related to special traffic generators such as industries, business districts, schools, and shopping centers and to the pattern of existing and proposed land uses.
Response: None of special traffic generators listed in this section are located near the subject property. All existing and proposed residential uses have been considered in development of the proposed street pattern. A future street plan included with this application shows how streets could be extended beyond the subject property in the future.
C. Street Spacing. Street layout shall generally use a rectangular grid pattern with modifications as appropriate to adapt to topography or natural conditions.
Response: Due to topographic constraints in the Lower Views and existing infrastructure in the Upper Views (Highway 26 and Vista Loop Drive) the site does not lend itself to creating a rectangular gridded street pattern.
D. Future Street Plan. Future street plans are conceptual plans, street extensions and connections on acreage adjacent to land divisions. They assure access for future development and promote a logical, connected pattern of streets. It is in the interest of the city to promote a logical, connected pattern of streets. All applications for land divisions shall provide a future street plan that shows the pattern of existing and proposed future streets within the boundaries of the proposed land divisions, proposed connections to abutting properties, and extension of streets to adjacent parcels within a 400 foot radius of the study area where development may practically occur.

Response: A future street plan designed in compliance with the requirements of this section is included as part of the application package. This plan provides assurances that access for future development promotes a logical and connected pattern of streets.
E. Connections. Except as permitted under Exemptions, all streets, alleys and pedestrian walkways shall connect to other streets within the development and to existing and planned streets outside the development and to undeveloped properties which have no future street plan. Streets shall terminate at other streets or at parks, schools or other public land within a neighborhood.

Where practicable, local roads shall align and connect with other roads when crossing collectors and arterials.

Proposed streets or street extensions shall be located to provide direct access to existing or planned transit stops, and existing or planned neighborhood activity centers, such as schools, shopping areas and parks.
Response: The site specific conditions of the subject property limits construction of an interconnected street system. The only existing street to be extended is Ortiz Street in the Upper Views which proposed to be located directly across Vista Loop Drive from this existing street.

### 17.100.120 - BLOCKS AND ACCESSWAYS

A. Blocks. Blocks shall have sufficient width to provide for two tiers of lots at appropriate depths. However, exceptions to the block width shall be allowed for blocks that are adjacent to arterial streets or natural features.
Response: The unique character of the site does not lend itself to creating blocks with two tiers.
B. Residential Blocks. Blocks fronting local streets shall not exceed 400 feet in length, unless topographic, natural resource, or other similar physical conditions justify longer blocks. Blocks may exceed 400 feet if approved as part of a Planned Development, Specific Area Plan, adj ustment or variance. Response: As reviewed in Chapter 17.64 above, due to site specific and topographic conditions, all streets do not comply with the 400 foot block length standard. The applicant has requested a variation to this dimensional standard as permitted by Section 17.64.0(A).
D. Pedestrian and Bicycle Access Way Requirements. In any block in a residential or commercial district over 600 feet in length, a pedestrian and bicycle accessway with a minimum improved surface of 10 feet within a 15 -foot right-of-way or tract shall be provided through the middle of the block. To enhance public convenience and mobility, such accessways may be required to connect to cul-de-sacs, or between streets and other public or semipublic lands or through greenway systems.

Response: The applicant proposes establishing a ten foot wide sidewalk with a 15 -foot wide pedestrian access easement in the middle of Knapp Street to provide a sidewalk connection from this street to Vista Loop Drive.

### 17.100.130-EASEMENTS

A minimum eight (8) foot public utility easement shall be required along property lines abutting a right-of-way for all lots within a partition or subdivision. Where a partition or subdivision is traversed by a watercourse, drainage way, channel or stream, the land division shall provide a stormwater easement or drainage right-of-way conforming substantially with the lines of such watercourse, and such further width as determined needed for water quality and quantity protection. Response: Eight foot wide public utility easements will be included along all property lines abutting a public right-of-way. Only public pedestrian access easements will be needed to allow public access along some of the sidewalks located within private tracts. No other easements for public utility purposes are required.

### 17.100.140 - PUBLIC ALLEYS

Response: A 28 -foot wide paved alley within a 29 -foot public right-of-way is proposed in the Lower Views. This alley is designed to provide access to the 32 single family detached dwellings abutting this right-of-way. The proposed alley width is designed to accommodate public parking on the South side of this facility.

### 17.100.150 - RESIDENTIAL SHARED PRIVATE DRIVES

A shared private drive is intended to provide access to a maximum of two (2) dwelling units.
A. Criteria for Approval

Shared private drives may be approved by the Director when one or more of the following conditions exist:

1. Direct access to a local street is not possible due to physical aspects of the site including size, shape, or natural features.
2. The construction of a local street is determined to be unnecessary.

Response: As shown on submitted plans the Lower Views includes three private drives serving two lots each. These private drives are proposed due to the topographic constraints with the subject property.
B. Design

1. A shared private drive constructed to city standards shall not serve more than two (2) dwelling units.
2. A shared access easement and maintenance agreement shall be established between the two units served by a shared private drive. The language of the easement and maintenance agreement shall be subject to approval by the Director.
3. Public utility easements shall be provided where necessary in accordance with Section 17.100.130.
4. Shared private drives shall be fully improved with an all weather surface (e.g. concrete, asphalt, permeable pavers) in conformance with city standards. The pavement width shall be 20 feet.
5. Parking shall not be permitted along shared private drives at any time and shall be signed and identified accordingly.
Response: The proposed three private drives in the Lower Views are designed to serve only two lots each as permitted. A shared access easement and maintenance agreement will be established for each private drive as part of the Final Plat. Public utility easements will be accommodated along these private drives as necessary to serve these lots. As shown on submitted plans each private drive is proposed to include a 20 -foot wide all weather surface within a 21 -foot wide tract and will be posted "no parking". The proposal complies with this standard.

### 17.100.160 - PUBLIC ACCESS LANES

Response: No public access lanes are proposed in this development

### 17.100.170 - FLAG LOTS

Flag lots can be created where it can be shown that no other street access is possible to achieve the requested land division. The flag lot shall have a minimum street frontage of 15 feet for its accessway. The following dimensional requirements shall apply to flag lots:
A. Setbacks applicable to the underlying zoning district shall apply to the flag lot.
B. The access strip (pole) may not be counted toward the lot size requirements.

Response: Lots 103 and 104 are proposed as flag lots. Both lots contain a minimum 15 -feet of street frontage as required.

### 17.100.180 - INTERSECTIONS

A. Intersections. Streets shall be laid out so as to intersect as nearly as possible at right angles. A proposed intersection of two new streets at an angle of less than 75 degrees shall not be acceptable. No more than two streets shall intersect at any one point unless specifically approved by the City Engineer. The city engineer may require left turn lanes, signals, special crosswalks, curb extensions and other intersection elements justified by a traffic study or necessary to comply with the Development Code.
Response: All streets in the proposed subdivision have been designed to intersect at right angles to the opposing street as required.
B. Curve Radius. All local and neighborhood collector streets shall have a minimum curve radius (at intersections of rights-of-way) of 20 feet, unless otherwise approved by the City Engineer. When a local or neighborhood collector enters on to a collector or arterial street, the curve radius shall be a minimum of 30 feet, unless otherwise approved by the City Engineer.

Response: All streets in the proposed subdivision have a minimum curve radius as required by this section.

### 17.100.190 - STREET SIGNS

The subdivider shall pay the cost of street signs prior to the issuance of a Certificate of Substantial Completion. The City shall install all street signs and upon completion will bill the developer for costs associated with installation. In addition, the subdivider may be required to pay for any traffic safety devices related to the development. The City Engineer shall specify the type and location of the street signs and/ or traffic safety devices.
Response: The applicant understands it will be his responsibility to pay the cost of street signs and the city will install these signs.

### 17.100.200 - STREET SURFACING

Public streets, including alleys, within the development shall be improved in accordance with the requirements of the City or the standards of the Oregon State Highway Department. An overlay of asphalt concrete, or material approved by the City Engineer, shall be placed on all streets within the development. Where required, speed humps shall be constructed in conformance with the City's standards and specifications.
Response: All streets in the proposed subdivision will be improved in accordance with City standards.

### 17.100.210 - STREET LIGHTING

A complete lighting system (including, but not limited to: conduits, wiring, bases, poles, arms, and fixtures) shall be the financial responsibility of the subdivider on all cul-de-sacs, local streets, and neighborhood collector streets. The subdivider will be responsible for providing the arterial street lighting system in those cases where the subdivider is required to improve an arterial street. Standards and specifications for street lighting shall be coordinated with the utility and any lighting district, as appropriate.
Response: The applicant is aware of the requirements of this section. A lighting plan will be coordinated with PGE and the city prior to installation of these fixtures.

### 17.100.220 - LOT DESIGN

A. The lot arrangement shall be such that there will be no foreseeable difficulties, for reason of topography or other conditions, in securing building permits to build on all lots in compliance with the Development Code.
Response: All of the lots in the proposed subdivision have been designed so that no foreseeable difficulties due to topography or other conditions will exist in securing building permits on these lots. A Geotechnical Evaluation report is included with this application.
B. The lot dimensions shall comply with the minimum standards of the Development Code. When lots are more than double the minimum lot size required for the zoning district, the subdivider may be required to arrange such lots to allow further subdivision and the opening of future streets to serve such potential lots.
Response: As allowed by Chapter 17.64 for Planned Developments, the applicant has proposed modifications to the minimum lot size and dimension standards specified in the Single Family Residential zone. Only Lot 62 ( 16,694 square feet) is proposed to contain more than double the minimum lot size ( 7,500 square feet) in the SFR zone. Due to its location and topographic constraints no further division of this lot is possible.
C. The lot or parcel width at the front building line shall meet the requirements of the Development Code and shall abut a public street other than an alley for a width of at least 20 feet. A street frontage of not less than 15 feet is acceptable in the case of a flag lot division resulting from the division of an unusually deep land parcel which is of a size to warrant division into not more than two parcels.
Response: All lots in the proposed subdivision contain at least 20 feet of frontage along a public street with the exception of one flag lot and the six lots are proposed to be accessed by three private drives.
D. Double frontage lots shall be avoided except where necessary to provide separation of residential developments from arterial streets or to overcome specific disadvantages of topography or orientation.
Response: Only Lots 103-121 are designed to have frontage on both an internal local street (Knapp Street) and Highway 26. This configuration is unavoidable because of the location of Highway 26 and limitations for access to this roadway.
E. Lots shall avoid deriving access from major or minor arterials. When driveway access from major or minor arterials may be necessary for several adjoining lots, the Director or the Planning Commission may require that such lots be served by a common access drive in order to limit possible traffic hazards on such streets. Where possible, driveways should be designed and arranged to avoid requiring vehicles to back into traffic on minor or major arterials.
Response: No lots are proposed to gain access from an arterial street.

### 17.100.230 - WATER FACILITIES

Water lines and fire hydrants serving the subdivision or partition, and connecting the development to City mains, shall be installed to provide adequate water pressure to serve present and future consumer demand. The materials, sizes, and locations of water mains, valves, service laterals, meter boxes and other required appurtenances shall be in accordance with the standards of the Fire District, the City, and the State.

If the city requires the subdivider to install water lines in excess of eight inches, the city may participate in the oversizing costs. Any oversizing agreements shall be approved by the city manager based upon council policy and dependent on budget constraints. If required water mains will directly serve property outside the subdivision, the city may enter into an agreement with the subdivider setting forth methods for reimbursement for the proportionate share of the cost.
Response: The applicant intends to install all water lines and fire hydrants in compliance with applicable standards.

### 17.100.240 - SANITARY SEWERS

Sanitary sewers shall be installed to serve the subdivision and to connect the subdivision to existing mains. Design of sanitary sewers shall take into account the capacity and grade to allow for desirable extension beyond the subdivision.

If required sewer facilities will directly serve property outside the subdivision, the city may enter into an agreement with the subdivider setting forth methods for reimbursement by nonparticipating landowners for the proportionate share of the cost of construction.
Response: The applicant intends to install sanitary sewer lines in compliance with applicable standards. As noted above, because of the depth of the existing sewer in Vista Loop, 11 lots in the Lower Views (Lots 39-46 and 61-63) and five lots (Lots $96-100)$ in the Upper Views will require installation of a grinder sump system installed at each of these dwellings to pump sanitary waste from these dwellings to a gravity sewer line in the development.

### 17.100.250 - SURFACE DRAINAGE AND STORM SEWER SYSTEM

A. Drainage facilities shall be provided within the subdivision and to connect with off-site drainage ways or storm sewers. Capacity, grade and materials shall be by a design approved by the city engineer. Design of drainage within the subdivision shall take into account the location, capacity and grade necessary to maintain unrestricted flow from areas draining through the subdivision and to allow extension of the system to serve such areas.
Response: A stormwater water quality and detention facility is proposed to be located in the eastern portion of the Lower Views and the western area of the Upper Views as shown on submitted plans. These facility's have been sized and located to accommodate public stormwater generated by the subdivision. A stormwater report is included with this application as required.
B. In addition to normal drainage design and construction, provisions shall be taken to handle any drainage from preexisting subsurface drain tile. It shall be the design engineer's duty to investigate the location of drain tile and its relation to public improvements and building construction.
Response: No subsurface drain tiles are known to exist on the site.
C. The roof and site drainage from each lot shall be discharged to either curb face outlets (if minor quantity), to a public storm drain or to a natural acceptable drainage way if adjacent to the lot.
Response: All roof and site drainage will be discharged to curb face outlets or another approved system as required.

### 17.100.260 - UNDERGROUND UTILITIES

All subdivisions or major partitions shall be required to install underground utilities (including, but not limited to, electrical and telephone wiring). The utilities shall be installed pursuant to the requirements of the utility company.
Response: The applicant intends to install all utilities underground as required.

### 17.100.270 - SIDEWALKS

Sidewalks shall be installed on both sides of a public street and in any special pedestrian way within the subdivision.
Response: Sidewalks will be installed of both sides of all streets with the exception as detailed above a sidewalk is proposed to be constructed on only the North side of The View Drive from its intersection with Vista Loop Drive to the proposed public alley. The applicant is proposing this design to allow the road surface to be shifted to the South side of the public right-of-way to construct a six-foot sidewalk within a widened landscaped buffer. The applicant believes this design will provide a more aesthetically pleasing and desirable environment for pedestrians walking between the upper and lower parts of the development. The roadway width in this location will be 28 feet in compliance with city standards.

### 17.100.280 - BICYCLE ROUTES

If appropriate to the extension of a system of bicycle routes, existing or planned, the Director or the Planning Commission may require the installation of bicycle lanes within streets. Separate bicycle access ways may be required to reduce walking or cycling distance when no feasible street connection is available.
Response: No bicycle routes are existing, planned, or proposed on the subject property. The applicant is aware that street improvements on Vista Loop Drive may require completion of a bicycle lane along this frontage.

### 17.100.290 - STREET TREES

Where planting strips are provided in the public right-of-way, a master street tree plan shall be submitted and approved by the Director. The street tree plan shall provide street trees approximately every $30^{\prime}$ on center for all lots.
Response: Planter strips will be provided along all frontages as required. Street trees in accordance with City standards will be provided in these areas.

### 17.100.300-EROSION CONTROL

Grass seed planting shall take place prior to September 30th on all lots upon which a dwelling has not been started but the ground cover has been disturbed. The seeds shall be of an annual rye grass variety and shall be sown at not less than four pounds to each 1000 square feet of land area.

Response: Grass seeding will be completed as required by this section. The submitted erosion control plan provides additional details to address erosion control concerns.

### 17.100.310-REQUIRED IMPROVEMENTS

The following improvements shall be installed at no expense to the city, consistent with the design standards of Chapter 17.84, except as otherwise provided in relation to oversizing.
A. Drainage facilities
B. Lot, street and perimeter monumentation
C. Mailbox delivery units
D. Sanitary sewers
E. Sidewalks
F. Street lights
G. Street name signs
H. Street trees
I. Streets
J. Traffic signs
K. Underground communication lines, including broadband (fiber), telephone, and cable. Franchise agreements will dictate whether telephone and cable lines are required.
L. Underground power lines
M. Water distribution lines and fire hydrants

Response: All improvements specified in this section will be installed by the developer at no expense to the City of Sandy consistent with the design standards of Chapter 17.84 and applicable standards.

## CHAPTER 17.102-URBAN FORESTRY

### 17.102.20-APPLICABILITY

This chapter applies only to properties within the Sandy Urban Growth Boundary that are greater than one acre including contiguous parcels under the same ownership.
A. General: No person shall cut, harvest, or remove trees 11 inches DBH or greater without first obtaining a permit and demonstrating compliance with this chapter.

1. As a condition of permit issuance, the applicant shall agree to implement required provisions of this chapter and to allow all inspections to be conducted.
2. Tree removal is subject to the provisions of Chapter 15.44, Erosion Control, Chapter 17.56, Hillside Development, and Chapter 17.60 Flood and Slope Hazard.
Response: The subject property contains 32.87 and the standards of this chapter are applicable to the proposed Planned Development. The applicant intends removing some of the trees on the property to accommodate development of a residential subdivision. The proposed tree
removal and protection plan has been designed in accordance with the standards of this chapter and the provisions in Chapters 15.44, 17.56, and 17.60 as applicable.

### 17.102.50 - TREE RETENTION AND PROTECTION REQUIREMENTS

A. Tree Retention: The landowner is responsible for retention and protection of trees required to be retained as specified below:

1. At least three trees 11 inches DBH or greater are to be retained for every one-acre of contiguous ownership.
2. Retained trees can be located anywhere on the site at the landowner's discretion before the harvest begins. Clusters of trees are encouraged.
3. Trees proposed for retention shall be healthy and likely to grow to maturity, and be located to minimize the potential for blow-down following the harvest.
4. If possible, at least two of the required trees per acre must be of conifer species.
5. Trees within the required protected setback areas may be counted towards the tree retention standard if they meet these requirements. Response: As shown on the submitted plan set, the majority of trees on the subject property are located within the FSH Overlay portion of the Lower Views. The subject property contains 32.87 acres requiring retention of 99 trees, 11 inches and greater DBH ( $32.87 \times 3=98.61$ rounded up to 99 trees) and in good condition. The submitted plan indicates that 212 trees are proposed to be retained, at least 99 of these are over 11-inches DBH and in good condition as required. In addition as detailed in the Arborist report 69 of the 99 these trees ( $70 \%$ ) are conifer species as preferred by subsection 4 above. No trees are proposed to be removed within the FSH Overlay area.
B. Tree Protection Area: Except as otherwise determined by the Planning Director, all tree protection measures set forth in this section shall be instituted prior to any development activities and removed only after completion of all construction activity. Tree protection measures are required for land disturbing activities including but not limited to tree removal, clearing, grading, excavation, or demolition work.
6. Trees identified for retention shall be marked with yellow flagging tape and protected by protective barrier fencing placed no less than 10 horizontal feet from the outside edge of the trunk.
7. Required fencing shall be a minimum of six feet tall supported with metal posts placed no farther than ten feet apart installed flush with the initial undisturbed grade.
8. No construction activity shall occur within the tree protection zone, including, but not limited to dumping or storage of materials such as building supplies, soil, waste items, equipment, or parked vehicles.

Response: As shown on the submitted Tree Retention and Protection plan the majority of retained trees are not proposed to be retained on any lot or within any area proposed for development. The submitted Arborist report contains additional recommendations for tree protection.

### 17.102.60 - TREE REPLANTING REQUIREMENTS

1. All areas with exposed soils resulting from tree removal shall be replanted with a ground cover of native species within 30 days of harvest during the active growing season, or by J une 1st of the following spring.
2. All areas with exposed soils resulting from tree removal occurring between October 1 and March 31 shall also be covered with straw to minimize erosion.
3. Removal of hazard trees as defined shall be replanted with two native trees of quality nursery stock for every tree removed.
4. Tree Removal allowed within the FSH Overlay District shall be replanted with two native trees of quality nursery stock for every tree removed.
5. Tree Removal not associated with a development plan must be replanted following the provisions of OAR Chapter 629, Division 610, Section 020-060
Response: The requirements of this section as applicable will be completed with construction of subdivision improvements.

### 17.102.70 - VARIANCES

Response: The submitted plan is designed in compliance with the standards in this chapter and a variance to these standards is not requested or required.

## CHAPTER 15.30 - DARK SKY ORDINANCE

 15.30.000-PURPOSEThe purpose of the Sandy Dark Sky Ordinance is to regulate outdoor lighting in order to reduce or prevent light pollution. This means to the extent reasonably possible the reduction or prevention of glare and light trespass, the conservation of energy, and promotion of safety and security. (Ord. 2002-11)

### 15.30.030 - EXEMPTIONS AND EXCEPTIONS

D. Full cutoff street lighting, which is part of a federal, state, or municipal installation.

### 15.30.060 - GENERAL STANDARDS

D. All outdoor lighting systems shall be designed and operated so that the area 10 feet beyond the property line of the premises receives no more than .25 (one quarter) of a foot-candle of light from the premises lighting system.
Response: The applicant understands the requirements of this chapter. A detailed lighting plan will be submitted with construction plans following land use approval.

## V. Conclusion

The applicant proposes constructing a 122 Iot Planned Development to include 120 lots intended for single family dwellings with 32 lots of these for single family attached dwellings and 88 lots for single family detached dwellings. Lot sizes vary from large view lots to smaller lots to accommodate more moderate homes. In addition, two lots are proposed to construct 48 multi-family units at a later date. The project is divided into the "Lower Views" east of Vista Loop Drive and the "the Upper Views" located across Vista Loop Drive to the West. The two parts of the development with be connected by a sidewalk system and will share all project amenities. Thirty-six percent ( 11.92 acres) of the total lot area of the Planned Development is proposed to be designated private open space with 8.22 acres of this open space within FSH Overlay restricted development areas.

The project has been designed to provide residents The Views with a wide array of amenities including tot lots and play structures, half-court basketball courts, and a dog park. In addition, a trail system is proposed to be constructed within natural areas of the Lower Views and a Mt. Hood viewpoint plaza is also proposed to be constructed in a central location for all to enjoy. All of these amenities are intended for the use and pleasure of the resident's of the Planned Development and will be owned and maintained by a Homeowner's Association formed for this purpose. The Concept Plan for the development prepared by a Landscape Architect illustrates these amenities in addition to other notable features including a decorative sound wall to be constructed along Highway 26, a development entry sign, meandering sidewalks and footpaths, and extensive landscaping. Also as shown on this plan, a "Welcome to Sandy" monument sign is proposed to be constructed by the applicant along Highway 26 at the East end of the Upper Views .

As reviewed in this narrative and shown on submitted plans and studies including the submitted Traffic Impact Analysis, Geotechnical Report, Arborist Report, The Views Planned Development complies with all applicable standards with the exception of code variations as discussed in Section 17.64.30 above. Given these facts the applicant respectfully requests this application be approved as submitted.

## EXHIBIT C

## The Views Planned Development File No. 20-028 Special Variance Request and Narrative

Request: The applicant requests two special variances with this application as detailed below.

1. Special Variance to Section 17.84.30(A) to not construct sidewalk improvements adjacent to a single street frontage and to construct a meandering sidewalk design along three street segments;
2. Special Variance to Section $17.82 .20(A)$ and (B) to not orient the front doors of homes constructed on lots adjacent to Highway 26 towards the internal street rather than the highway.

## CHAPTER 17.66-ADJ USTMENTS AND VARIANCES 17.66.80 TYPE III SPECIAL VARIANCES

The Planning Commission may grant a special variance waiving a specified provision under the Type III procedure if it finds that the provision is unreasonable and unwarranted due to the specific nature of the proposed development. In submitting an application for a Type III Special Variance, the proposed development explanation shall provide facts and evidence sufficient to enable the Planning Commission to make findings in compliance with the criteria set forth in this section while avoiding conflict with the Comprehensive Plan.

## Special Variance No. 1

The applicant requests a Special Variance to Section 17.84.30(A) to not construct a sidewalk along the South side of The Views Drive from Vista Loop Drive to the alley and to construct meandering sidewalks within a private tract along the north side of The Views Drive and the west side of Bonnie Street in The Lower Views and along Vista Loop Drive in The Upper Views.

One of the following sets of criteria shall be applied as appropriate.
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
Response: Section 17.84.30(A) requires sidewalks to be constructed along both sides of all arterial, collector, and local streets according to city standards. As noted above, the applicant proposes constructing a sidewalk only on the north side of The Views Drive from Vista Loop Drive to the alley. City standards require a five foot wide sidewalk along both sides of a local street. The applicant proposes constructing a six-foot wide meandering sidewalk within a privately landscaped on the north side of this street only.

This facility will be located within Tract E, a private tract owned and maintained by the Homeowner's Association. The intent of this proposal is to create an enhanced pedestrian environment for residents and visitors walking between the Upper and Lower Views portions of the development. A similar meandering sidewalk configuration is proposed along Vista Loop Drive in The Upper Views and the West side of Bonnie Street in The Lower Views. The applicant believes these facilities will provide a more pleasant and unique pedestrian experience for the residents and visitors of the Planned Development. The proposed amenities are more than adequate to serve pedestrian volumes anticipated to use these facilities and the needs of this neighborhood. Approval of this request will not violate the intent and purpose of these regulations as an enhanced sidewalk will be constructed in these locations. The proposal complies with this criteria.
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.
Response: The proposed variance to eliminate a sidewalk along the south side of The Views Drive and to construct meandering sidewalks along three street segments will not be detrimental to the public welfare or will they be injurious to other property in the area. On the contrary, the applicant believes these facilities will enhance the pedestrian experience for residents and visitors of the development and will have no affect on adjoining properties. The proposal complies with this criteria.
B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
Response: The requested Special Variance is the minimum needed to facilitate creation of the intended character and design of the proposed Planned Development. The proposal complies with this criteria.
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.
Response: The proposal does not involve nonconforming development.

## Special Variance No. 2

The applicant requests a special Variance to Sections 17.82.20(A) and (B) to orient the front doors of homes constructed on the lots adjacent to Highway 26 towards the internal street rather than to Highway 26.
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

Response: Section 17.82.20(A) specifies that all residential dwellings shall have their primary entrances oriented toward a transit street or toward a public right-of-way or private walkway which leads to a transit street. Section 17.82.20(B) requires that "dwellings shall have a primary entrance connecting directly between the street and building interior." A transit street is defined as any collector or arterial street. The site has frontage on both Highway 26, an arterial and Vista Loop Drive, a collector street. The applicant proposes orienting the front door of homes abutting Highway 26 (Lots 99 and 103-121) towards the internal street rather than highway. The reason for this request is because there is a signification grade separating the elevation of these lots and the highway. In addition, because of concerns of increased sound levels from the highway traffic adversely affecting homes constructed adjacent to this road, a six-foot tall sound wall will be constructed at the back of these lots. This facility will essentially block access to the transit street and the sidewalk proposed to be constructed at the top of this bank. As contained in Chapter 17.82, this chapter "is to provide for convenient, direct, and accessible pedestrian access to and from public sidewalks and transit facilities". Given vehicle speeds along Highway 26 and site specific constraints it is highly unlikely a transit stop or boarding will ever be allowed along this portion of the Highway 26. As such, orienting homes towards this road and requiring constructing of a sidewalk connection is not warranted and should not be required. Given these factors, compliance with these standards is not practical. The unique site conditions described in this review warrants approval of a. Special Variance as the proposal does not violate the intent and purpose of these regulations.
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.
Response: The requested variance to this standard will have no effect on the public welfare or other properties in the area. The proposal includes front doors of homes constructed on these lots facing the internal street and a sidewalk connecting to a sidewalk along this facility. The proposal complies with this criteria.
B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
Response: The requested variance is the minimum variance needed to permit practical compliance with this 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.
Response: The proposal does not involve nonconforming development.

## THE VIEWS

A SANDY OREGON PLANNED DEVELOPMENT
(122 MIXED RESIDENTIAL LOTS)
JUNE 2020
UPDATED OCTOBER 2020






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# EXHIBIT E <br> Preliminary Storm Drainage Report For: The Views PD 



June 24, 2020

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| Basin 3 Analysis, Data, and Detention Pond Design | Appendix F |
| Standard Formulas, Coefficients, and Values | Appendix G |
| Water Quality Manhole Details |  |

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## Project Summary

## Purpose

The purpose of this analysis is to

1. Describe existing and proposed site conditions.
2. Provide detention calculations for the 2-yr, 5-yr, 10-yr, and $25-\mathrm{yr}$ storm events.
3. Provide water quality calculations.

## Project Location and Description

The Views PD is split into two sections, The Upper Views and The Lower Views. The Upper views site is the Knapp property located between Highway 26 and Vista Loop Road. It is Tax Lot 500 and is approximately 9.5 acres. This site is currently be used as a Christmas tree farm with grass ground cover. There are no structures on the site. The land is generally sloped to the north and west with an average slope of about $7 \%$.

The Lower Views is the Picking property located behind Johnson RV. It is Tax Lot 200 and is approximately 23.3 acres. This site has a home and outbuildings. The land slopes to the North and East. There are steep slopes, $25 \%$ and greater, on the Eastern and Northern portions of the site with a FSH overlay. The site is heavily forested on the steep unbuildable ground. The area of the proposed development is currently a grass hay field and has been that way for over 30 years. See the Existing Conditions Map in Appendix A.

## Proposed Improvements

The proposed 122 lot planned development will consist of 120 single-family residential lots ranging from 2,100 sf to $17,000 \mathrm{sf}$. The project will also include two multi-family lots ranging in size from 43,003 sf to $53,185 \mathrm{sf}$. The site improvements will include streets, curbs, sidewalks, utilities, trails and private park areas. New storm sewer pipes, manholes, and catch basins will be installed to convey storm water to a public detention systems. Due to the site topography, three separate detention systems will be required

Detention System \#1 will serve the Westerly half of the Lower Views. System \#1 will detain all of the area shown on the Developed Conditions Map in Appendix B. The detention will be provided in a tank under the new public road. Due to grade limitations the apartment site on Lot 72 will provide its own detention and water quality system at time of development. Lots 61 and 62 are also too low to drain to the detention tank. These two lots will provide lot-level detention and water quality systems at the time of building construction.

Detention System \#2 will serve the Easterly half of the Lower Views. System \#2 will detain all of the area shown on the Developed Conditions Map in Appendix B. The detention will be provided in an open pond located in Tract J along the Easterly side of the site.

Detention System \#3 will serve all of the lots on the Upper Views including the future apartment site. The detention will be provided in an open pond located in Tract O at the Northwest corner of the site. The discharge from the pond will be into an existing storm system in the ODOT right-of-way. Upstream and downstream analyses will be performed as needed at the time of final engineering.

The following calculations will demonstrate that the total post-developed release rates from all of the design storm events will not exceed the pre-developed rates as required by the code.

## Hydrograph Parameters

## Rainfall

The rainfall distribution numbers were taken from the City of Sandy Stormwater Website (http://www.ci.sandy.or.us/Stormwater/)

| Storm Recurrence Interval | Rainfall (inches) |
| :--- | :--- |
| 2 year | 3.50 |
| 5 year | 4.50 |
| 10 year | 4.80 |
| 25 year | 5.50 |

## Soils

The soil data for this site is from Soil Survey of Clackamas County, Oregon published by the United Stated Department of Agriculture (USDA). The post-development soil is assumed to be the same as pre-development.

Soil Type: 15B, Cazadero silty clay loam. Hydrologic Group "C"

## Areas

Pre-developed area calculations are based on Existing Conditions Map in Appendix A. Postdeveloped area calculations are based on proposed designs of streets, curbs, and walkways and the proposed homes as shown on Developed Conditions Map in Appendix B.

| Basin 1 |  | Basin 2 |  | Basin 3 |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Pre-Developed |  | Pre-Developed |  | Pre-Developed |  |
| Total Area | 5.497 ac | Total Area | 4.928 ac | Total Area | 10.456 ac |
| Impervious Area | 0.025 ac | Impervious Area | 0.337 ac | Impervious Area | 0.317 ac |
| Pervious Area | 5.472 ac | Pervious Area | 4.591 ac | Pervious Area | 10.139 ac |
| Post-Developed |  | Post-Developed |  | Post-Developed |  |
| Total Area | 5.497 ac | Total Area | 4.928 ac | Total Area | 10.456 ac |
| Impervious Area | 3.756 ac | Impervious Area | 2.946 ac | Impervious Area | 5.546 ac |
| Pervious Area | 1.741 ac | Pervious Area | 1.982 ac | Pervious Area | 4.910 ac |

## Curve Numbers

Curve Numbers are taken from the 2016 City of Portland Stormwater Management Manual.

| Description | CN | Land Use Description |
| :--- | :--- | :--- |
| Pre-Developed | 76 | Woods-grass combination (orchard or tree <br> farm) "Fair Condition" |
| Post-Developed <br> Pervious Areas | 74 | Lawns "Good Condition" |
| Impervious Areas | 98 | Buildings, AC, Sidewalks, etc. |

## Time of Concentration

The times of concentrations $\left(T_{c}\right)$, were calculated using the equations and spreadsheets in the attached Appendices.

| Basin 1 <br> (See Appendix C) |  |
| :--- | :--- |
| Pre-Developed | 28.2 minutes |
| Post-Developed | 5 minutes (assumed) |


| Basin 2 <br> (See Appendix D) |  |
| :--- | :--- |
| Pre-Developed | 25.2 minutes |
| Post-Developed | 5 minutes (assumed) |


| Basin 3 <br> (See Appendix E) |  |
| :--- | :--- |
| Pre-Developed | 34.4 minutes |
| Post-Developed | 5 minutes (assumed) |

## Detention Sizing Results

Hydrographs for the drainage basins were determined using a spreadsheet based on the King County, Washington Hydrograph Program, version 4.21B, which uses the Santa Barbara Urban Hydrograph (SBUH) method. The Post-Development flows were routed through the detention facilities and flow control structures were designed to release the water at the Pre-Developed rates for the 2 -year, 5 -year, 10-year, and 25-year storm events per the City of Sandy public Works Design Standards.

## Detention System 1 (Sizing Results)

The detention facility for Basin 1 is proposed to be a 6-foot diameter tank 474.6 feet long with a capacity of 13,419 cubic feet. The orifices in the flow control manhole were designed to release the Post-Development Peak-Q's at or below the Pre-Developed Peak-Q's.

See Appendix C for more information and the detailed analysis.

| Basin 1, Detention Tank 1 |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Recurrence <br> Interval <br> (years) | Pre- <br> Developed <br> Outflow (cfs) | Developed <br> Outflow (cfs) | Proposed <br> Release Rates <br> (cfs) | Reduction in outflow <br> from Pre-Developed <br> to Proposed |
| 25 | 2.84 | 6.67 | 2.84 | $0 \%$ |
| 10 | 2.20 | 5.67 | 1.96 | $11 \%$ |
| 5 | 1.93 | 5.25 | 1.61 | $16 \%$ |
| 2 | 1.10 | 3.87 | 1.10 | $0 \%$ |


| Orifice Table |  |  |
| :---: | :---: | :---: |
| Detention Tank 1 (Basin 1) |  |  |
| Orifice | Dia. (inches) | Height (feet) |
| Bottom | 4.29 | 0 |
| Top | 6.36 | 4.30 |

A Weir could be used for the top orifice in the flow control structure. See Rectangular, Sharp Crested Weir Calculations in the detailed analysis.

## Detention System 2 (Sizing Results)

The detention facility for Basin 2 is proposed to be a 4-deep detention pond. The required storage volume is 9,029 -cubic feet. This can be contained in a 4 -foot deep pond with a bottom area of 1,225 square feet. The orifices in the flow control manhole were designed to release the Post-Development Peak-Q's at or below the Pre-Developed Peak-Q's.

See Appendix D for more information and the detailed analysis.

| Basin 2, Detention Pond 2 |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Recurrence <br> Interval <br> (years) | Pre- <br> Developed <br> Outflow (cfs) | Developed <br> Outflow (cfs) | Proposed <br> Release Rates <br> (cfs) | Reduction in outflow <br> from Pre-Developed <br> to Proposed |
| 25 | 2.83 | 5.66 | 2.83 | $0 \%$ |
| 10 | 2.22 | 4.78 | 2.22 | $0 \%$ |
| 5 | 1.97 | 4.41 | 1.82 | $8 \%$ |
| 2 | 1.18 | 3.19 | 1.18 | $0 \%$ |


| Orifice Table |  |  |
| :---: | :---: | :---: |
| Detention Pond 2 (Basin 2) |  |  |
| Orifice | Dia. (inches) | Height (feet) |
| Bottom | 4.88 | 0 |
| Top | 7.64 | 3.24 |

A Weir could be used for the top orifice in the flow control structure. See Rectangular, Sharp Crested Weir Calculations in the detailed analysis.

## Detention System 3 (Sizing Results)

The detention facility for Basin 2 is proposed to be a 4-deep detention pond. The required storage volume is 19,983 -cubic feet. This can be contained in a 4-foot deep pond with a bottom area of 4,173 square feet. The orifices in the flow control manhole were designed to release the Post-Development Peak-Q's at or below the Pre-Developed Peak-Q's.

See Appendix E for more information and the detailed analysis.

| Basin 3, Detention Pond 3 |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Recurrence <br> Interval <br> (years) | Pre- <br> Developed <br> Outflow (cfs) | Developed <br> Outflow (cfs) | Proposed <br> Release Rates <br> (cfs) | Reduction in outflow <br> from Pre-Developed <br> to Proposed |
| 25 | 5.06 | 11.49 | 5.06 | $0 \%$ |
| 10 | 3.93 | 9.62 | 3.93 | $0 \%$ |
| 5 | 3.46 | 8.84 | 3.23 | $7 \%$ |
| 2 | 2.02 | 6.31 | 2.02 | $0 \%$ |


| Orifice Table |  |  |
| :---: | :---: | :---: |
| Detention Pond 3 (Basin 3) |  |  |
| Orifice | Dia. (inches) | Height (feet) |
| Bottom | 6.12 | 0 |
| Top | 9.60 | 2.94 |

A Weir could be used for the top orifice in the flow control structure. See Rectangular, Sharp Crested Weir Calculations in the detailed analysis.

## Water Quality Design

## CDS Storm Water Treatment Device

Three CDS manholes by Contech Stormwater Solutions were designed for water quality for this site, one for each drainage basin, see details in Appendix F). The developed impervious area includes AC pavement, sidewalks, and roofs.

The flow $(Q)$ from this runoff was calculated using the rational method $(Q=C I A)$ where:
$\mathrm{Q}=$ flow (cfs)
$\mathrm{C}=$ runoff coefficient $=0.90$ for Pavement and Roofs
I = Intensity = 0.2 inches per hour (City of Sandy Water Quality Storm for an "on-line facility")
A = Impervious Area
Basin 1
$\mathrm{Q}=(0.90) \times(0.2) \times(3.756)=0.68 \mathrm{cfs}$
Basin 2
$\mathrm{Q}=(0.90) \times(0.2) \times(2.946)=0.53 \mathrm{cfs}$
Basin 3
$Q=(0.90) \times(0.2) \times(5.546)=1.00 \mathrm{cfs}$

The Contech Stormwater Solutions Treatment Device Model CDS2015-4-C has a treatment capacity of 0.7 cfs. Therefore, this manhole will work for Basins 1 and 2. A CDS2015-5-C will be needed to treat Basin 3.

## Conclusion

In accordance with the City of Sandy requirements, on-site detention has been designed to maintain existing downstream storm water runoff characteristics and a water quality system has been designed to provide adequate treatment. These calculations demonstrate that the detention and water quality systems are more than adequately sized for the proposed development. Detailed calculations will be completed with the final engineering plans as needed.
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# Appendix A <br> Existing Conditions Map 

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## Appendix B Developed Conditions Map

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## THE VIEWS

## DEVELOPED CONDITIONS MAP



# Appendix C Basin 1 Analysis, Data, and Detention Pond Design 

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## PRE-DEVELOPED - TIME OF CONCENTRATION CALCULATIONS

| Job \# | 19-071 |
| :--- | :--- |
| Date: | $6 / 24 / 2020$ |

$28.2=$ Total Tc (min)
Overland Flow (max 300' total)
total

| Tc = | 26.6 |  |  |  | 26.6 | = travel time for less than 300' (min) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Ns = | 0.24 |  |  |  |  | = Manning's coefficient (sheet flow) |
| L = | 300 |  |  |  | 300 | = flow length (ft) |
| P2 = | 2.7 |  |  |  |  | = 2-year, 24 hour rainfall (in) |
| So = | 4.70\% |  |  |  |  | = slope of the land (\%) |





| Flow in | total |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Tc = | 0.0 |  |  |  | 0.0 | $=$ travel time in pipe (min) |
| $\mathrm{V}=$ | 10.15 |  |  |  |  | = calculated velocity pipe full (ft/sec) |
| Q = | 7.96 |  |  |  |  | = quantity of flow (ft^3/sec) |
| $\mathrm{n}=$ | 0.013 |  |  |  |  | = Manning's coefficient (pipe) |
| D = | 12 |  |  |  |  | = pipe diameter (in) |
| S = | 5.00\% |  |  |  |  | = slope of pipe (\%) |
| L = | 0.0 |  |  |  |  | $=$ length of pipe (ft) |

Project Name: The Views - Basin 1 Tank Hydrograph Analysis Summary

| Job \# | 19-071 |
| :--- | :--- |
| Date: | $6 / 24 / 2020$ |



| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | => | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 |
| Volume | cf => | 27,335 | 42,577 | 47,398 | 58,984 |  |
| Tpeak | min => | 480 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph | e=> | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | 0.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 60 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 70 | 1.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 80 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 90 | 1.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 1.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 110 | 1.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 120 | 2.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 130 | 2.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 140 | 2.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 150 | 2.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 160 | 2.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 170 | 2.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 180 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 190 | 3.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 200 | 3.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 210 | 3.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 220 | 3.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 230 | 3.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 240 | 4.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| 250 | 4.17 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| 260 | 4.33 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| 270 | 4.50 | 0.00 | 0.00 | 0.01 | 0.04 | 0.00 |
| 280 | 4.67 | 0.00 | 0.01 | 0.02 | 0.07 | 0.00 |
| 290 | 4.83 | 0.00 | 0.01 | 0.03 | 0.09 | 0.00 |
| 300 | 5.00 | 0.00 | 0.03 | 0.05 | 0.12 | 0.00 |
| 310 | 5.17 | 0.00 | 0.04 | 0.07 | 0.16 | 0.00 |
| 320 | 5.33 | 0.00 | 0.06 | 0.10 | 0.19 | 0.00 |
| 330 | 5.50 | 0.01 | 0.09 | 0.12 | 0.22 | 0.00 |
| 340 | 5.67 | 0.01 | 0.11 | 0.15 | 0.25 | 0.00 |
| 350 | 5.83 | 0.02 | 0.13 | 0.18 | 0.30 | 0.00 |
| 360 | 6.00 | 0.03 | 0.17 | 0.22 | 0.34 | 0.00 |
| 370 | 6.17 | 0.05 | 0.20 | 0.25 | 0.39 | 0.00 |
| 380 | 6.33 | 0.07 | 0.23 | 0.28 | 0.43 | 0.00 |
| 390 | 6.50 | 0.09 | 0.26 | 0.32 | 0.47 | 0.00 |
| 400 | 6.67 | 0.10 | 0.28 | 0.35 | 0.50 | 0.00 |
| 410 | 6.83 | 0.13 | 0.34 | 0.40 | 0.58 | 0.00 |
| 420 | 7.00 | 0.17 | 0.41 | 0.48 | 0.68 | 0.00 |
| 430 | 7.17 | 0.21 | 0.47 | 0.55 | 0.77 | 0.00 |
| 440 | 7.33 | 0.27 | 0.56 | 0.66 | 0.90 | 0.00 |
| 450 | 7.50 | 0.34 | 0.68 | 0.80 | 1.08 | 0.00 |
| 460 | 7.67 | 0.49 | 0.94 | 1.09 | 1.44 | 0.00 |
| 470 | 7.83 | 0.84 | 1.53 | 1.75 | 2.28 | 0.00 |
| 480 | 8.00 | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 |
| 490 | 8.17 | 1.08 | 1.87 | 2.12 | 2.72 | 0.00 |
| 500 | 8.33 | 0.99 | 1.68 | 1.90 | 2.43 | 0.00 |
| 510 | 8.50 | 0.90 | 1.50 | 1.70 | 2.16 | 0.00 |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 5 | 10 | 25 | 100 |
| 3.87 | 5.25 | 5.67 | 6.67 | 0.00 |
| 52,353 | 70,577 | 76,133 | 89,219 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| 2 | 5 | 10 | 25 | 100 |
| Hyd (cfs) | Hyd | Hyd | Hyd | Hyd |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.01 | 0.01 | 0.03 | 0.00 |
| 0.01 | 0.05 | 0.06 | 0.10 | 0.00 |
| 0.04 | 0.10 | 0.12 | 0.17 | 0.00 |
| 0.07 | 0.14 | 0.16 | 0.22 | 0.00 |
| 0.10 | 0.18 | 0.20 | 0.26 | 0.00 |
| 0.12 | 0.20 | 0.23 | 0.29 | 0.00 |
| 0.14 | 0.23 | 0.25 | 0.32 | 0.00 |
| 0.16 | 0.25 | 0.27 | 0.34 | 0.00 |
| 0.20 | 0.30 | 0.33 | 0.40 | 0.00 |
| 0.24 | 0.35 | 0.39 | 0.47 | 0.00 |
| 0.25 | 0.37 | 0.41 | 0.49 | 0.00 |
| 0.27 | 0.38 | 0.42 | 0.50 | 0.00 |
| 0.28 | 0.40 | 0.43 | 0.52 | 0.00 |
| 0.29 | 0.41 | 0.44 | 0.53 | 0.00 |
| 0.33 | 0.46 | 0.50 | 0.59 | 0.00 |
| 0.37 | 0.51 | 0.56 | 0.66 | 0.00 |
| 0.38 | 0.52 | 0.57 | 0.67 | 0.00 |
| 0.39 | 0.53 | 0.57 | 0.68 | 0.00 |
| 0.40 | 0.54 | 0.58 | 0.68 | 0.00 |
| 0.40 | 0.55 | 0.59 | 0.69 | 0.00 |
| 0.44 | 0.60 | 0.64 | 0.75 | 0.00 |
| 0.48 | 0.65 | 0.70 | 0.82 | 0.00 |
| 0.49 | 0.66 | 0.71 | 0.82 | 0.00 |
| 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 0.50 | 0.66 | 0.71 | 0.84 | 0.00 |
| 0.50 | 0.67 | 0.72 | 0.85 | 0.00 |
| 0.55 | 0.73 | 0.79 | 0.94 | 0.00 |
| 0.60 | 0.79 | 0.86 | 1.02 | 0.00 |
| 0.60 | 0.80 | 0.87 | 1.04 | 0.00 |
| 0.61 | 0.81 | 0.88 | 1.05 | 0.00 |
| 0.61 | 0.83 | 0.90 | 1.06 | 0.00 |
| 0.61 | 0.84 | 0.91 | 1.07 | 0.00 |
| 0.66 | 0.91 | 0.99 | 1.17 | 0.00 |
| 0.72 | 0.99 | 1.07 | 1.27 | 0.00 |
| 0.73 | 1.00 | 1.09 | 1.29 | 0.00 |
| 0.74 | 1.01 | 1.10 | 1.30 | 0.00 |
| 0.75 | 1.02 | 1.11 | 1.31 | 0.00 |
| 0.75 | 1.03 | 1.12 | 1.32 | 0.00 |
| 0.92 | 1.25 | 1.36 | 1.60 | 0.00 |
| 1.08 | 1.48 | 1.60 | 1.89 | 0.00 |
| 1.09 | 1.49 | 1.62 | 1.91 | 0.00 |
| 1.30 | 1.78 | 1.92 | 2.27 | 0.00 |
| 1.52 | 2.07 | 2.24 | 2.64 | 0.00 |
| 2.24 | 3.04 | 3.29 | 3.87 | 0.00 |
| 3.87 | 5.25 | 5.67 | 6.67 | 0.00 |
| 3.63 | 4.91 | 5.30 | 6.23 | 0.00 |
| 2.05 | 2.77 | 2.99 | 3.51 | 0.00 |
| 1.45 | 1.95 | 2.11 | 2.47 | 0.00 |
| 1.24 | 1.68 | 1.81 | 2.12 | 0.00 |

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Hydrograph Summary Page 1

| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | > | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 | 3.87 | 5.25 | 5.67 | 6.67 | 0.00 |
| Volume | cf => | 27,335 | 42,577 | 47,398 | 58,984 |  | 52,353 | 70,577 | 76,133 | 89,219 | - |
| Tpeak | min => | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | $\mathrm{hr}=>$ | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph | e=> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) |
| 520 | 8.67 | 0.84 | 1.39 | 1.56 | 1.98 | 0.00 | 1.25 | 1.68 | 1.82 | 2.13 | 0.00 |
| 530 | 8.83 | 0.76 | 1.25 | 1.41 | 1.78 | 0.00 | 1.04 | 1.40 | 1.51 | 1.77 | 0.00 |
| 540 | 9.00 | 0.68 | 1.10 | 1.24 | 1.56 | 0.00 | 0.83 | 1.11 | 1.20 | 1.41 | 0.00 |
| 550 | 9.17 | 0.62 | 1.00 | 1.12 | 1.41 | 0.00 | 0.83 | 1.12 | 1.20 | 1.41 | 0.00 |
| 560 | 9.33 | 0.58 | 0.93 | 1.04 | 1.31 | 0.00 | 0.83 | 1.12 | 1.21 | 1.41 | 0.00 |
| 570 | 9.50 | 0.56 | 0.89 | 0.99 | 1.24 | 0.00 | 0.84 | 1.12 | 1.21 | 1.42 | 0.00 |
| 580 | 9.67 | 0.54 | 0.86 | 0.96 | 1.19 | 0.00 | 0.84 | 1.13 | 1.21 | 1.42 | 0.00 |
| 590 | 9.83 | 0.53 | 0.84 | 0.94 | 1.16 | 0.00 | 0.84 | 1.13 | 1.22 | 1.42 | 0.00 |
| 600 | 10.00 | 0.53 | 0.83 | 0.92 | 1.15 | 0.00 | 0.84 | 1.13 | 1.22 | 1.43 | 0.00 |
| 610 | 10.17 | 0.53 | 0.83 | 0.92 | 1.14 | 0.00 | 0.85 | 1.13 | 1.22 | 1.43 | 0.00 |
| 620 | 10.33 | 0.53 | 0.83 | 0.92 | 1.13 | 0.00 | 0.85 | 1.14 | 1.23 | 1.43 | 0.00 |
| 630 | 10.50 | 0.54 | 0.83 | 0.92 | 1.13 | 0.00 | 0.85 | 1.14 | 1.23 | 1.43 | 0.00 |
| 640 | 10.67 | 0.54 | 0.83 | 0.92 | 1.13 | 0.00 | 0.85 | 1.14 | 1.23 | 1.44 | 0.00 |
| 650 | 10.83 | 0.53 | 0.81 | 0.90 | 1.11 | 0.00 | 0.78 | 1.04 | 1.12 | 1.31 | 0.00 |
| 660 | 11.00 | 0.51 | 0.78 | 0.86 | 1.06 | 0.00 | 0.70 | 0.94 | 1.01 | 1.18 | 0.00 |
| 670 | 11.17 | 0.49 | 0.75 | 0.83 | 1.02 | 0.00 | 0.70 | 0.94 | 1.01 | 1.18 | 0.00 |
| 680 | 11.33 | 0.49 | 0.74 | 0.82 | 1.00 | 0.00 | 0.70 | 0.94 | 1.01 | 1.18 | 0.00 |
| 690 | 11.50 | 0.48 | 0.73 | 0.81 | 0.99 | 0.00 | 0.71 | 0.94 | 1.02 | 1.19 | 0.00 |
| 700 | 11.67 | 0.48 | 0.73 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 710 | 11.83 | 0.48 | 0.72 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 720 | 12.00 | 0.48 | 0.72 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 730 | 12.17 | 0.48 | 0.72 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 740 | 12.33 | 0.48 | 0.73 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 750 | 12.50 | 0.49 | 0.73 | 0.80 | 0.98 | 0.00 | 0.71 | 0.95 | 1.02 | 1.19 | 0.00 |
| 760 | 12.67 | 0.49 | 0.73 | 0.81 | 0.98 | 0.00 | 0.71 | 0.95 | 1.03 | 1.20 | 0.00 |
| 770 | 12.83 | 0.48 | 0.71 | 0.78 | 0.95 | 0.00 | 0.64 | 0.86 | 0.92 | 1.07 | 0.00 |
| 780 | 13.00 | 0.45 | 0.68 | 0.74 | 0.90 | 0.00 | 0.57 | 0.76 | 0.81 | 0.95 | 0.00 |
| 790 | 13.17 | 0.44 | 0.65 | 0.72 | 0.87 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 800 | 13.33 | 0.43 | 0.63 | 0.70 | 0.85 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 810 | 13.50 | 0.42 | 0.62 | 0.69 | 0.83 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 820 | 13.67 | 0.42 | 0.62 | 0.68 | 0.82 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 830 | 13.83 | 0.41 | 0.61 | 0.67 | 0.82 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 840 | 14.00 | 0.41 | 0.61 | 0.67 | 0.81 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 850 | 14.17 | 0.41 | 0.61 | 0.67 | 0.81 | 0.00 | 0.57 | 0.76 | 0.82 | 0.95 | 0.00 |
| 860 | 14.33 | 0.41 | 0.61 | 0.67 | 0.81 | 0.00 | 0.57 | 0.76 | 0.82 | 0.96 | 0.00 |
| 870 | 14.50 | 0.41 | 0.61 | 0.67 | 0.81 | 0.00 | 0.57 | 0.76 | 0.82 | 0.96 | 0.00 |
| 880 | 14.67 | 0.42 | 0.61 | 0.67 | 0.81 | 0.00 | 0.57 | 0.76 | 0.82 | 0.96 | 0.00 |
| 890 | 14.83 | 0.41 | 0.60 | 0.66 | 0.80 | 0.00 | 0.54 | 0.72 | 0.77 | 0.90 | 0.00 |
| 900 | 15.00 | 0.40 | 0.58 | 0.64 | 0.77 | 0.00 | 0.50 | 0.67 | 0.72 | 0.84 | 0.00 |
| 910 | 15.17 | 0.39 | 0.57 | 0.63 | 0.76 | 0.00 | 0.51 | 0.67 | 0.72 | 0.84 | 0.00 |
| 920 | 15.33 | 0.38 | 0.56 | 0.62 | 0.74 | 0.00 | 0.51 | 0.67 | 0.72 | 0.84 | 0.00 |
| 930 | 15.50 | 0.38 | 0.56 | 0.61 | 0.74 | 0.00 | 0.51 | 0.67 | 0.72 | 0.84 | 0.00 |
| 940 | 15.67 | 0.38 | 0.55 | 0.61 | 0.73 | 0.00 | 0.51 | 0.67 | 0.72 | 0.84 | 0.00 |
| 950 | 15.83 | 0.38 | 0.55 | 0.61 | 0.73 | 0.00 | 0.51 | 0.67 | 0.73 | 0.84 | 0.00 |
| 960 | 16.00 | 0.38 | 0.55 | 0.60 | 0.73 | 0.00 | 0.51 | 0.68 | 0.73 | 0.84 | 0.00 |
| 970 | 16.17 | 0.38 | 0.55 | 0.60 | 0.73 | 0.00 | 0.51 | 0.68 | 0.73 | 0.84 | 0.00 |
| 980 | 16.33 | 0.38 | 0.55 | 0.60 | 0.73 | 0.00 | 0.51 | 0.68 | 0.73 | 0.85 | 0.00 |
| 990 | 16.50 | 0.38 | 0.55 | 0.61 | 0.73 | 0.00 | 0.51 | 0.68 | 0.73 | 0.85 | 0.00 |
| 1000 | 16.67 | 0.38 | 0.55 | 0.61 | 0.73 | 0.00 | 0.51 | 0.68 | 0.73 | 0.85 | 0.00 |
| 1010 | 16.83 | 0.37 | 0.54 | 0.59 | 0.71 | 0.00 | 0.46 | 0.61 | 0.66 | 0.76 | 0.00 |
| 1020 | 17.00 | 0.35 | 0.51 | 0.56 | 0.67 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1030 | 17.17 | 0.34 | 0.49 | 0.54 | 0.65 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1040 | 17.33 | 0.33 | 0.48 | 0.52 | 0.63 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1050 | 17.50 | 0.32 | 0.47 | 0.51 | 0.62 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1060 | 17.67 | 0.32 | 0.46 | 0.51 | 0.61 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1070 | 17.83 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.54 | 0.58 | 0.68 | 0.00 |
| 1080 | 18.00 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.54 | 0.59 | 0.68 | 0.00 |
| 1090 | 18.17 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.54 | 0.59 | 0.68 | 0.00 |
| 1100 | 18.33 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1110 | 18.50 | 0.32 | 0.45 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1120 | 18.67 | 0.32 | 0.45 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1130 | 18.83 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1140 | 19.00 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1150 | 19.17 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1160 | 19.33 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1170 | 19.50 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1180 | 19.67 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1190 | 19.83 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1200 | 20.00 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1210 | 20.17 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |

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Hydrograph Summary Page 2

| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | ====> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 | 3.87 | 5.25 | 5.67 | 6.67 | 0.00 |
| Volume | cf => | 27,335 | 42,577 | 47,398 | 58,984 | - | 52,353 | 70,577 | 76,133 | 89,219 | - |
| Tpeak | min $=>$ | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph | Name=> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) |
| 1220 | 20.33 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1230 | 20.50 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1240 | 20.67 | 0.32 | 0.46 | 0.50 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1250 | 20.83 | 0.32 | 0.46 | 0.51 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1260 | 21.00 | 0.32 | 0.46 | 0.51 | 0.60 | 0.00 | 0.41 | 0.55 | 0.59 | 0.68 | 0.00 |
| 1270 | 21.17 | 0.33 | 0.46 | 0.51 | 0.61 | 0.00 | 0.41 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1280 | 21.33 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1290 | 21.50 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1300 | 21.67 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1310 | 21.83 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1320 | 22.00 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1330 | 22.17 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1340 | 22.33 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1350 | 22.50 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1360 | 22.67 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1370 | 22.83 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1380 | 23.00 | 0.33 | 0.47 | 0.51 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1390 | 23.17 | 0.33 | 0.47 | 0.52 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1400 | 23.33 | 0.33 | 0.47 | 0.52 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1410 | 23.50 | 0.33 | 0.47 | 0.52 | 0.61 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1420 | 23.67 | 0.34 | 0.47 | 0.52 | 0.62 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1430 | 23.83 | 0.34 | 0.48 | 0.52 | 0.62 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1440 | 24.00 | 0.34 | 0.48 | 0.52 | 0.62 | 0.00 | 0.42 | 0.55 | 0.59 | 0.69 | 0.00 |
| 1450 | 24.17 | 0.29 | 0.40 | 0.44 | 0.52 | 0.00 | 0.21 | 0.28 | 0.30 | 0.34 | 0.00 |
| 1460 | 24.33 | 0.20 | 0.28 | 0.31 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1470 | 24.50 | 0.14 | 0.20 | 0.22 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1480 | 24.67 | 0.10 | 0.14 | 0.15 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1490 | 24.67 | 0.07 | 0.10 | 0.11 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1500 | 24.67 | 0.05 | 0.07 | 0.07 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |


| Pre-Developed Hydrographs |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year =======> | 2 | 5 | 10 | 25 | 100 |
| Qpeak cfs => | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 |
| Volume cf => | 27,335 | 42,577 | 47,398 | 58,984 | - |
| Tpeak min => | 480 | 480 | 480 | 480 | 10 |
| Tpeak hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph Name=> | 2 | 5 | 10 | 25 | 100 |
| Time Time <br> $(\mathrm{min})$ $(\mathrm{hr})$ | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) |


| Developed Hydrographs |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{3 . 8 7}$ | $\mathbf{5 . 2 5}$ | $\mathbf{5 . 6 7}$ | $\mathbf{6 . 6 7}$ | $\mathbf{0 . 0 0}$ |
| 52,353 | 70,577 | 76,133 | 89,219 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| $\mathbf{2}$ | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |





5 - Year pre and post Hydrographs


| Pre-Developed Hydrographs |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Year =======> | 2 | 5 | 10 | 25 | 100 |
| Qpeak cfs => | 1.10 | 1.93 | 2.20 | 2.84 | 0.00 |
| Volume cf => | 27,335 | 42,577 | 47,398 | 58,984 | - |
| Tpeak min => | 480 | 480 | 480 | 480 | 10 |
| Tpeak hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph Name=> | 2 | 5 | 10 | 25 | 100 |
| Time Time <br> $(\mathrm{min})$ $(\mathrm{hr})$ | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) |


| Developed Hydrographs |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{3 . 8 7}$ | $\mathbf{5 . 2 5}$ | $\mathbf{5 . 6 7}$ | $\mathbf{6 . 6 7}$ | $\mathbf{0 . 0 0}$ |
| 52,353 | 70,577 | 76,133 | 89,219 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| 2 | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |



Project Name: Detention System Summary
Job\#
Date:

Date: 6/24/2020

1) Detention Facility Design Input:
2) Type of facility:
3) Pond side slopes:
4) Tank Diameter:
5) Vertical permeability
6) Number of orifices:
7) Riser dia. =>
8) Orifice coefficient
9) IE - bottom orifice: 10) Max Q Bottom Orif. \#1
10) Top Orif \#2 Height =
11) Max Q Mid Orif. \#3
12) Mid Orif \#3 Height =

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6/24/2020

The Views - Basin 1 Tank

Note: The detention system design is based on the King
County Model "Facility Design Routine".
DETENTION TANK
3 NA
6 ft
$0 \mathrm{~min} / \mathrm{in}$
2
12 in
0.62 (typically 0.62 )
-2 ft (distance below bottom of pond - Negative \#)
1.41 cfs
4.295 ft
$0.00 \mathrm{cfs} \quad$ Orifice not being used
$0.00 \mathrm{ft} \quad$ Orifice not being used

Detention Facility Design Results:

| Performance <br> year | Developed <br> Inflow <br> cfs | Pre-Developed <br> Outflow <br> cfs | Actual <br> Outflow <br> cfs | Peak <br> Stage <br> ft | Storage |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 100 | 0 | 0 | $\mathbf{0}$ | 0 | cf |
| 25 | 6.67 | 2.84 | $\mathbf{2 . 8 5}$ | 6.00 | 13,419 |
| 10 | 5.67 | 2.20 | $\mathbf{1 . 9 6}$ | 4.67 | 11,199 |
| 5 | 5.25 | 1.93 | $\mathbf{1 . 6 1}$ | 4.40 | 10,542 |
| 2 | 3.87 | 1.10 | $\mathbf{1 . 1 0}$ | $\mathbf{2 . 8 8}$ | 6,354 |
|  |  |  | Required Storage $====$ | 13,419 |  |


|  | Bottom Orif. | Middle Orif. | Top Orif. | Optional Weir Design |
| :--- | :---: | :---: | :---: | :---: |
| Total $\mathrm{Q}=$ | 1.41 | 0.00 | 1.44 | (for top orifice) |
| Head $(\mathrm{ft})=$ | 8.00 | 0.00 | 1.71 | $0.87 \mathrm{La}(\mathrm{ft})$ |
| Dist. from bottom of pond $(\mathrm{ft})=$ | -2.00 | NA | 4.30 | $100.02<\mathrm{deg}$. |
| Orif. Dia. $(\mathrm{in})=$ | 4.29 | 0.00 | 6.36 | Weir is an option |

FLOW CONTROL STRUCTURE SCHEMATIC


12 (in) Riser dia.
(in) Dia. Orif \#2 (cfs) Max Q top Orif \#2
(in) Dia. Orif \#3 (cfs) Max Q Mid Orif \#3
4.29 (in) Dia. Orif \#1 1.41 (cfs) Max Q Bot. Orif \#1

| Project Name: | The Views - Basin 1 Tank |
| :--- | :--- |
| Detention Facility Type <br> Job\# <br> Date: | 19-071 <br> $6 / 24 / 2020$ |

Detention Facility Type:

| DETENTION TANK |  |
| :--- | ---: |
| $L=$ | NA ft |
| $\mathrm{W}=$ | NA ft |
| $\mathrm{D}=$ | 6.0 ft |
| Tank Vol. $=$ | $13,419 \mathrm{cf}$ |








Project Name: The Views - Basin 1 Tank

## Stage Storage Summary




| Stage ft | Storage cf | Discharge cfs |
| :---: | :---: | :---: |
| 3.25 | 2,025.38 | 0.90 |
| 3.30 | 2,141.86 | 0.91 |
| 3.35 | 2,259.98 | 0.91 |
| 3.40 | 2,379.66 | 0.92 |
| 3.45 | 2,500.84 | 0.93 |
| 3.50 | 2,623.45 | 0.93 |
| 3.55 | 2,747.43 | 0.94 |
| 3.60 | 2,872.72 | 0.95 |
| 3.65 | 2,999.27 | 0.95 |
| 3.70 | 3,127.01 | 0.96 |
| 3.75 | 3,255.89 | 0.97 |
| 3.80 | 3,385.85 | 0.97 |
| 3.85 | 3,516.86 | 0.98 |
| 3.90 | 3,648.85 | 0.98 |
| 3.95 | 3,781.77 | 0.99 |
| 4.00 | 3,915.58 | 1.00 |
| 4.05 | 4,050.23 | 1.00 |
| 4.10 | 4,185.67 | 1.01 |
| 4.15 | 4,321.86 | 1.02 |
| 4.20 | 4,458.75 | 1.02 |
| 4.25 | 4,596.30 | 1.03 |
| 4.30 | 4,734.46 | 1.03 |
| 4.35 | 4,873.19 | 1.04 |
| 4.40 | 5,012.44 | 1.05 |
| 4.45 | 5,152.18 | 1.05 |
| 4.50 | 5,292.36 | 1.06 |
| 4.55 | 5,432.95 | 1.06 |
| 4.60 | 5,573.89 | 1.07 |
| 4.65 | 5,715.15 | 1.07 |
| 4.70 | 5,856.70 | 1.08 |
| 4.75 | 5,998.48 | 1.09 |
| 4.80 | 6,140.45 | 1.09 |
| 4.85 | 6,282.59 | 1.10 |
| 4.90 | 6,424.85 | 1.10 |
| 4.95 | 6,567.18 | 1.11 |
| 5.00 | 6,709.56 | 1.11 |
| 5.05 | 6,851.93 | 1.12 |
| 5.10 | 6,994.27 | 1.13 |
| 5.15 | 7,136.52 | 1.13 |
| 5.20 | 7,278.66 | 1.14 |
| 5.25 | 7,420.64 | 1.14 |
| 5.30 | 7,562.42 | 1.15 |
| 5.35 | 7,703.96 | 1.15 |
| 5.40 | 7,845.22 | 1.16 |
| 5.45 | 7,986.17 | 1.16 |
| 5.50 | 8,126.75 | 1.17 |
| 5.55 | 8,266.93 | 1.17 |
| 5.60 | 8,406.67 | 1.18 |
| 5.65 | 8,545.93 | 1.18 |
| 5.70 | 8,684.66 | 1.19 |
| 5.75 | 8,822.81 | 1.20 |
| 5.80 | 8,960.36 | 1.20 |
| 5.85 | 9,097.25 | 1.21 |
| 5.90 | 9,233.44 | 1.21 |
| 5.95 | 9,368.88 | 1.22 |
| 6.00 | 9,503.53 | 1.22 |

## Project Name: The Views - Basin 1 Tank <br> Rectangular, Sharp Crested Weir Calculations <br> Job \# 19-071 <br> Date: 6/24/2020

Weir Equation: $\mathrm{Q}=\mathrm{C}(\mathrm{L}-0.2 \mathrm{H}) \mathrm{H}^{3 / 2}$

| Q | $=$ Flow over weir (cfs) |
| :--- | :--- |
| C | $=3.27+0.40 \mathrm{H} / \mathrm{P}(\mathrm{ft})$ |
| L | $=$ Adjusted length of weir (La $-0.1 \mathrm{H} \times 2)$ this is to account for side constraints |
| La | = Actual length of weir along pipes interior circumference (ft) |
| H | = Distance from bottom of weir to maximum head (ft) |
| P | = Distance from bottom of weir to outfall invert elevation ( ft ) |
| D | = Inside riser pipe diameter (in) |
| < | = Angle of opening for weir (maximum 180 degrees) |

## Given:

| Q | 1.44 | cfs |
| ---: | ---: | :--- |
| H | 1.71 | ft |
| P | 6.30 | ft |
| D | 12 | in |

Find:

| C | 3.38 | ft |
| :---: | ---: | :--- |
| L | 0.53 | ft |
| La | $\mathbf{0 . 8 7}$ | ft |
| $<$ | $\mathbf{1 0 0}$ | degrees |



# Appendix D Basin 2 Analysis, Data, and Detention Pond Design 

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| Over | x | ' total) | total |  |  | = travel time for less than 300' (min) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Tc = | 24.1 |  |  |  | 24.1 |  |
| Ns = | 0.24 |  |  |  |  | = Manning's coefficient (sheet flow) |
| L = | 300 |  |  |  | 300 | = flow length (ft) |
| P2 = | 2.7 |  |  |  |  | = 2-year, 24 hour rainfall (in) |
| So = | 6.00\% |  |  |  |  | = slope of the land (\%) |







| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year |  | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 |
| Volume | cf => | 26,694 | 40,632 | 45,022 | 55,549 | - |
| Tpeak | $\min =>$ | 480 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph | => | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 40 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | 0.83 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| 60 | 1.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 |
| 70 | 1.17 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 |
| 80 | 1.33 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 |
| 90 | 1.50 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 |
| 100 | 1.67 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 |
| 110 | 1.83 | 0.01 | 0.02 | 0.02 | 0.03 | 0.00 |
| 120 | 2.00 | 0.02 | 0.02 | 0.03 | 0.03 | 0.00 |
| 130 | 2.17 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 |
| 140 | 2.33 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 |
| 150 | 2.50 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 |
| 160 | 2.67 | 0.02 | 0.03 | 0.04 | 0.04 | 0.00 |
| 170 | 2.83 | 0.03 | 0.04 | 0.04 | 0.05 | 0.00 |
| 180 | 3.00 | 0.03 | 0.04 | 0.04 | 0.05 | 0.00 |
| 190 | 3.17 | 0.03 | 0.04 | 0.05 | 0.05 | 0.00 |
| 200 | 3.33 | 0.03 | 0.04 | 0.05 | 0.06 | 0.00 |
| 210 | 3.50 | 0.03 | 0.05 | 0.05 | 0.06 | 0.00 |
| 220 | 3.67 | 0.03 | 0.05 | 0.05 | 0.06 | 0.00 |
| 230 | 3.83 | 0.04 | 0.05 | 0.05 | 0.06 | 0.00 |
| 240 | 4.00 | 0.04 | 0.05 | 0.06 | 0.07 | 0.00 |
| 250 | 4.17 | 0.04 | 0.05 | 0.06 | 0.08 | 0.00 |
| 260 | 4.33 | 0.04 | 0.06 | 0.06 | 0.09 | 0.00 |
| 270 | 4.50 | 0.04 | 0.06 | 0.06 | 0.11 | 0.00 |
| 280 | 4.67 | 0.04 | 0.06 | 0.07 | 0.13 | 0.00 |
| 290 | 4.83 | 0.05 | 0.07 | 0.09 | 0.15 | 0.00 |
| 300 | 5.00 | 0.05 | 0.08 | 0.11 | 0.19 | 0.00 |
| 310 | 5.17 | 0.05 | 0.10 | 0.13 | 0.22 | 0.00 |
| 320 | 5.33 | 0.05 | 0.12 | 0.16 | 0.25 | 0.00 |
| 330 | 5.50 | 0.05 | 0.14 | 0.18 | 0.28 | 0.00 |
| 340 | 5.67 | 0.06 | 0.16 | 0.20 | 0.30 | 0.00 |
| 350 | 5.83 | 0.07 | 0.19 | 0.23 | 0.34 | 0.00 |
| 360 | 6.00 | 0.09 | 0.22 | 0.27 | 0.39 | 0.00 |
| 370 | 6.17 | 0.10 | 0.25 | 0.30 | 0.43 | 0.00 |
| 380 | 6.33 | 0.12 | 0.27 | 0.33 | 0.46 | 0.00 |
| 390 | 6.50 | 0.13 | 0.30 | 0.36 | 0.50 | 0.00 |
| 400 | 6.67 | 0.15 | 0.32 | 0.38 | 0.53 | 0.00 |
| 410 | 6.83 | 0.18 | 0.37 | 0.44 | 0.60 | 0.00 |
| 420 | 7.00 | 0.22 | 0.45 | 0.52 | 0.70 | 0.00 |
| 430 | 7.17 | 0.26 | 0.51 | 0.59 | 0.79 | 0.00 |
| 440 | 7.33 | 0.32 | 0.60 | 0.69 | 0.92 | 0.00 |
| 450 | 7.50 | 0.39 | 0.72 | 0.82 | 1.09 | 0.00 |
| 460 | 7.67 | 0.55 | 0.98 | 1.12 | 1.45 | 0.00 |
| 470 | 7.83 | 0.93 | 1.58 | 1.79 | 2.30 | 0.00 |
| 480 | 8.00 | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 |
| 490 | 8.17 | 1.13 | 1.86 | 2.09 | 2.65 | 0.00 |
| 500 | 8.33 | 1.00 | 1.63 | 1.83 | 2.32 | 0.00 |
| 510 | 8.50 | 0.89 | 1.43 | 1.61 | 2.02 | 0.00 |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 5 | 10 | 25 | 100 |
| 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| 43,836 | 59,768 | 64,648 | 76,172 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| 2 | 5 | 10 | 25 | 100 |
| Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.01 | 0.01 | 0.02 | 0.00 |
| 0.01 | 0.04 | 0.05 | 0.08 | 0.00 |
| 0.03 | 0.08 | 0.09 | 0.13 | 0.00 |
| 0.06 | 0.11 | 0.13 | 0.17 | 0.00 |
| 0.08 | 0.14 | 0.16 | 0.20 | 0.00 |
| 0.10 | 0.16 | 0.18 | 0.23 | 0.00 |
| 0.11 | 0.18 | 0.20 | 0.25 | 0.00 |
| 0.13 | 0.19 | 0.22 | 0.27 | 0.00 |
| 0.15 | 0.23 | 0.26 | 0.32 | 0.00 |
| 0.19 | 0.28 | 0.30 | 0.37 | 0.00 |
| 0.20 | 0.29 | 0.32 | 0.38 | 0.00 |
| 0.21 | 0.30 | 0.33 | 0.40 | 0.00 |
| 0.22 | 0.31 | 0.34 | 0.41 | 0.00 |
| 0.23 | 0.32 | 0.35 | 0.41 | 0.00 |
| 0.26 | 0.36 | 0.39 | 0.46 | 0.00 |
| 0.29 | 0.40 | 0.44 | 0.52 | 0.00 |
| 0.30 | 0.41 | 0.44 | 0.52 | 0.00 |
| 0.30 | 0.42 | 0.45 | 0.53 | 0.00 |
| 0.31 | 0.42 | 0.46 | 0.54 | 0.00 |
| 0.32 | 0.43 | 0.46 | 0.54 | 0.00 |
| 0.35 | 0.47 | 0.51 | 0.59 | 0.00 |
| 0.38 | 0.51 | 0.55 | 0.64 | 0.00 |
| 0.38 | 0.51 | 0.55 | 0.64 | 0.00 |
| 0.39 | 0.52 | 0.56 | 0.65 | 0.00 |
| 0.39 | 0.52 | 0.56 | 0.66 | 0.00 |
| 0.39 | 0.52 | 0.56 | 0.67 | 0.00 |
| 0.43 | 0.57 | 0.62 | 0.74 | 0.00 |
| 0.47 | 0.62 | 0.68 | 0.82 | 0.00 |
| 0.47 | 0.63 | 0.69 | 0.83 | 0.00 |
| 0.48 | 0.64 | 0.70 | 0.85 | 0.00 |
| 0.48 | 0.66 | 0.72 | 0.86 | 0.00 |
| 0.48 | 0.67 | 0.73 | 0.87 | 0.00 |
| 0.52 | 0.73 | 0.80 | 0.95 | 0.00 |
| 0.57 | 0.80 | 0.87 | 1.04 | 0.00 |
| 0.58 | 0.81 | 0.88 | 1.05 | 0.00 |
| 0.58 | 0.82 | 0.89 | 1.07 | 0.00 |
| 0.59 | 0.83 | 0.90 | 1.08 | 0.00 |
| 0.60 | 0.84 | 0.92 | 1.09 | 0.00 |
| 0.73 | 1.02 | 1.11 | 1.33 | 0.00 |
| 0.87 | 1.21 | 1.32 | 1.57 | 0.00 |
| 0.88 | 1.23 | 1.34 | 1.59 | 0.00 |
| 1.06 | 1.47 | 1.60 | 1.90 | 0.00 |
| 1.24 | 1.72 | 1.86 | 2.22 | 0.00 |
| 1.83 | 2.53 | 2.75 | 3.27 | 0.00 |
| 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| 3.01 | 4.14 | 4.49 | 5.31 | 0.00 |
| 1.71 | 2.35 | 2.55 | 3.01 | 0.00 |
| 1.21 | 1.66 | 1.79 | 2.12 | 0.00 |
| 1.04 | 1.43 | 1.54 | 1.82 | 0.00 |

19-071 - Detention-2-pond.xls
Hydrograph Summary Page 1

| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year == | > | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 | 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| Volume | cf => | 26,694 | 40,632 | 45,022 | 55,549 | - | 43,836 | 59,768 | 64,648 | 76,172 | - |
| Tpeak | min => | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph | => | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) |
| 520 | 8.67 | 0.82 | 1.31 | 1.46 | 1.83 | 0.00 | 1.05 | 1.43 | 1.55 | 1.83 | 0.00 |
| 530 | 8.83 | 0.74 | 1.17 | 1.30 | 1.63 | 0.00 | 0.87 | 1.19 | 1.29 | 1.52 | 0.00 |
| 540 | 9.00 | 0.64 | 1.02 | 1.13 | 1.41 | 0.00 | 0.70 | 0.95 | 1.03 | 1.21 | 0.00 |
| 550 | 9.17 | 0.59 | 0.92 | 1.02 | 1.27 | 0.00 | 0.70 | 0.96 | 1.03 | 1.22 | 0.00 |
| 560 | 9.33 | 0.55 | 0.85 | 0.95 | 1.18 | 0.00 | 0.70 | 0.96 | 1.04 | 1.22 | 0.00 |
| 570 | 9.50 | 0.53 | 0.81 | 0.90 | 1.12 | 0.00 | 0.71 | 0.96 | 1.04 | 1.22 | 0.00 |
| 580 | 9.67 | 0.51 | 0.79 | 0.88 | 1.08 | 0.00 | 0.71 | 0.97 | 1.04 | 1.23 | 0.00 |
| 590 | 9.83 | 0.51 | 0.77 | 0.86 | 1.06 | 0.00 | 0.71 | 0.97 | 1.05 | 1.23 | 0.00 |
| 600 | 10.00 | 0.50 | 0.77 | 0.85 | 1.05 | 0.00 | 0.71 | 0.97 | 1.05 | 1.24 | 0.00 |
| 610 | 10.17 | 0.50 | 0.77 | 0.85 | 1.04 | 0.00 | 0.72 | 0.98 | 1.05 | 1.24 | 0.00 |
| 620 | 10.33 | 0.50 | 0.77 | 0.85 | 1.04 | 0.00 | 0.72 | 0.98 | 1.06 | 1.24 | 0.00 |
| 630 | 10.50 | 0.51 | 0.77 | 0.85 | 1.04 | 0.00 | 0.72 | 0.98 | 1.06 | 1.25 | 0.00 |
| 640 | 10.67 | 0.51 | 0.77 | 0.85 | 1.04 | 0.00 | 0.72 | 0.98 | 1.06 | 1.25 | 0.00 |
| 650 | 10.83 | 0.50 | 0.75 | 0.83 | 1.01 | 0.00 | 0.66 | 0.90 | 0.97 | 1.14 | 0.00 |
| 660 | 11.00 | 0.48 | 0.72 | 0.79 | 0.97 | 0.00 | 0.60 | 0.81 | 0.87 | 1.03 | 0.00 |
| 670 | 11.17 | 0.46 | 0.69 | 0.77 | 0.93 | 0.00 | 0.60 | 0.81 | 0.88 | 1.03 | 0.00 |
| 680 | 11.33 | 0.46 | 0.68 | 0.75 | 0.91 | 0.00 | 0.60 | 0.81 | 0.88 | 1.03 | 0.00 |
| 690 | 11.50 | 0.45 | 0.67 | 0.74 | 0.90 | 0.00 | 0.60 | 0.81 | 0.88 | 1.03 | 0.00 |
| 700 | 11.67 | 0.45 | 0.67 | 0.74 | 0.90 | 0.00 | 0.60 | 0.82 | 0.88 | 1.03 | 0.00 |
| 710 | 11.83 | 0.45 | 0.67 | 0.73 | 0.89 | 0.00 | 0.60 | 0.82 | 0.88 | 1.04 | 0.00 |
| 720 | 12.00 | 0.45 | 0.67 | 0.73 | 0.89 | 0.00 | 0.61 | 0.82 | 0.88 | 1.04 | 0.00 |
| 730 | 12.17 | 0.45 | 0.67 | 0.74 | 0.89 | 0.00 | 0.61 | 0.82 | 0.89 | 1.04 | 0.00 |
| 740 | 12.33 | 0.45 | 0.67 | 0.74 | 0.89 | 0.00 | 0.61 | 0.82 | 0.89 | 1.04 | 0.00 |
| 750 | 12.50 | 0.46 | 0.67 | 0.74 | 0.90 | 0.00 | 0.61 | 0.82 | 0.89 | 1.04 | 0.00 |
| 760 | 12.67 | 0.46 | 0.68 | 0.74 | 0.90 | 0.00 | 0.61 | 0.83 | 0.89 | 1.04 | 0.00 |
| 770 | 12.83 | 0.45 | 0.66 | 0.72 | 0.87 | 0.00 | 0.55 | 0.74 | 0.80 | 0.94 | 0.00 |
| 780 | 13.00 | 0.42 | 0.62 | 0.68 | 0.82 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 790 | 13.17 | 0.41 | 0.59 | 0.65 | 0.79 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 800 | 13.33 | 0.40 | 0.58 | 0.64 | 0.77 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 810 | 13.50 | 0.39 | 0.57 | 0.62 | 0.75 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 820 | 13.67 | 0.39 | 0.56 | 0.62 | 0.75 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 830 | 13.83 | 0.38 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 840 | 14.00 | 0.38 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.66 | 0.71 | 0.83 | 0.00 |
| 850 | 14.17 | 0.38 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.66 | 0.71 | 0.84 | 0.00 |
| 860 | 14.33 | 0.38 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.66 | 0.72 | 0.84 | 0.00 |
| 870 | 14.50 | 0.39 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.66 | 0.72 | 0.84 | 0.00 |
| 880 | 14.67 | 0.39 | 0.56 | 0.61 | 0.74 | 0.00 | 0.49 | 0.67 | 0.72 | 0.84 | 0.00 |
| 890 | 14.83 | 0.38 | 0.55 | 0.60 | 0.72 | 0.00 | 0.46 | 0.63 | 0.67 | 0.79 | 0.00 |
| 900 | 15.00 | 0.37 | 0.53 | 0.58 | 0.70 | 0.00 | 0.43 | 0.58 | 0.63 | 0.74 | 0.00 |
| 910 | 15.17 | 0.36 | 0.52 | 0.57 | 0.69 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 920 | 15.33 | 0.36 | 0.51 | 0.56 | 0.68 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 930 | 15.50 | 0.35 | 0.51 | 0.56 | 0.67 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 940 | 15.67 | 0.35 | 0.51 | 0.55 | 0.67 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 950 | 15.83 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 960 | 16.00 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 970 | 16.17 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.63 | 0.74 | 0.00 |
| 980 | 16.33 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.64 | 0.74 | 0.00 |
| 990 | 16.50 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.64 | 0.74 | 0.00 |
| 1000 | 16.67 | 0.35 | 0.51 | 0.55 | 0.66 | 0.00 | 0.44 | 0.59 | 0.64 | 0.74 | 0.00 |
| 1010 | 16.83 | 0.34 | 0.49 | 0.54 | 0.64 | 0.00 | 0.40 | 0.53 | 0.57 | 0.67 | 0.00 |
| 1020 | 17.00 | 0.32 | 0.46 | 0.51 | 0.61 | 0.00 | 0.35 | 0.47 | 0.51 | 0.60 | 0.00 |
| 1030 | 17.17 | 0.31 | 0.45 | 0.49 | 0.58 | 0.00 | 0.35 | 0.47 | 0.51 | 0.60 | 0.00 |
| 1040 | 17.33 | 0.30 | 0.43 | 0.47 | 0.57 | 0.00 | 0.35 | 0.47 | 0.51 | 0.60 | 0.00 |
| 1050 | 17.50 | 0.30 | 0.43 | 0.47 | 0.56 | 0.00 | 0.35 | 0.47 | 0.51 | 0.60 | 0.00 |
| 1060 | 17.67 | 0.29 | 0.42 | 0.46 | 0.55 | 0.00 | 0.35 | 0.47 | 0.51 | 0.60 | 0.00 |
| 1070 | 17.83 | 0.29 | 0.42 | 0.46 | 0.55 | 0.00 | 0.35 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1080 | 18.00 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.35 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1090 | 18.17 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.35 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1100 | 18.33 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1110 | 18.50 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1120 | 18.67 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1130 | 18.83 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1140 | 19.00 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1150 | 19.17 | 0.29 | 0.42 | 0.45 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1160 | 19.33 | 0.29 | 0.42 | 0.46 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1170 | 19.50 | 0.29 | 0.42 | 0.46 | 0.54 | 0.00 | 0.36 | 0.48 | 0.51 | 0.60 | 0.00 |
| 1180 | 19.67 | 0.29 | 0.42 | 0.46 | 0.54 | 0.00 | 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 1190 | 19.83 | 0.30 | 0.42 | 0.46 | 0.54 | 0.00 | 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 1200 | 20.00 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 | 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 1210 | 20.17 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 | 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |

[^0]Hydrograph Summary Page 2

| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year == |  | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 |
| Volume | cf => | 26,694 | 40,632 | 45,022 | 55,549 | - |
| Tpeak | min => | 480 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph |  | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) |
| 1220 | 20.33 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1230 | 20.50 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1240 | 20.67 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1250 | 20.83 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1260 | 21.00 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1270 | 21.17 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1280 | 21.33 | 0.30 | 0.42 | 0.46 | 0.55 | 0.00 |
| 1290 | 21.50 | 0.30 | 0.43 | 0.46 | 0.55 | 0.00 |
| 1300 | 21.67 | 0.30 | 0.43 | 0.46 | 0.55 | 0.00 |
| 1310 | 21.83 | 0.30 | 0.43 | 0.46 | 0.55 | 0.00 |
| 1320 | 22.00 | 0.30 | 0.43 | 0.46 | 0.55 | 0.00 |
| 1330 | 22.17 | 0.30 | 0.43 | 0.47 | 0.55 | 0.00 |
| 1340 | 22.33 | 0.30 | 0.43 | 0.47 | 0.55 | 0.00 |
| 1350 | 22.50 | 0.30 | 0.43 | 0.47 | 0.55 | 0.00 |
| 1360 | 22.67 | 0.30 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1370 | 22.83 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1380 | 23.00 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1390 | 23.17 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1400 | 23.33 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1410 | 23.50 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1420 | 23.67 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1430 | 23.83 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1440 | 24.00 | 0.31 | 0.43 | 0.47 | 0.56 | 0.00 |
| 1450 | 24.17 | 0.26 | 0.36 | 0.39 | 0.47 | 0.00 |
| 1460 | 24.33 | 0.17 | 0.24 | 0.26 | 0.31 | 0.00 |
| 1470 | 24.50 | 0.12 | 0.16 | 0.18 | 0.21 | 0.00 |
| 1480 | 24.67 | 0.08 | 0.11 | 0.12 | 0.14 | 0.00 |
| 1490 | 24.67 | 0.05 | 0.07 | 0.08 | 0.09 | 0.00 |
| 1500 | 24.67 | 0.03 | 0.05 | 0.05 | 0.06 | 0.00 |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :--- | :---: |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{3 . 1 9}$ | $\mathbf{4 . 4 1}$ | $\mathbf{4 . 7 8}$ | $\mathbf{5 . 6 6}$ | $\mathbf{0 . 0 0}$ |
| 43,836 | 59,768 | 64,648 | 76,172 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| $\mathbf{2}$ | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.60 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.48 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.49 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.49 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.49 | 0.52 | 0.61 | 0.00 |
| 0.36 | 0.49 | 0.52 | 0.61 | 0.00 |
| 0.18 | 0.24 | 0.26 | 0.30 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
|  |  |  |  |  |


| Pre-Developed Hydrographs |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year =======> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 | 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| Volume cf => | 26,694 | 40,632 | 45,022 | 55,549 | - | 43,836 | 59,768 | 64,648 | 76,172 | - |
| Tpeak min => | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak $\quad \mathrm{hr}=>$ | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph Name=> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time Time <br> $(\mathrm{min})$ $(\mathrm{hr})$ | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) |



Developed Hydrograph Plot


| Pre-Developed Hydrographs |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year =======> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 | 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| Volume cf => | 26,694 | 40,632 | 45,022 | 55,549 | - | 43,836 | 59,768 | 64,648 | 76,172 | - |
| Tpeak min => | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak $\quad \mathrm{hr}=>$ | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph Name=> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time Time <br> $(\mathrm{min})$ $(\mathrm{hr})$ | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) |



| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | $=====>$ | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 1.18 | 1.97 | 2.22 | 2.83 | 0.00 | 3.19 | 4.41 | 4.78 | 5.66 | 0.00 |
| Volume | cf => | 26,694 | 40,632 | 45,022 | 55,549 |  | 43,836 | 59,768 | 64,648 | 76,172 | - |
| Tpeak | min => | 480 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | hr => | 8.00 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrogra | ph Name=> | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) |



19-071 - Detention-2-pond.xls
Hydrograph Summary Page 6

Project Name: Detention System Summary
Job\#
Date:

Date:

1) Detention Facility Design Input:
2) Type of facility:
3) Pond side slopes:
4) Pond storage depth:
5) Vertical permeability
6) Number of orifices:
7) Riser dia. =>
8) Orifice coefficient
9) IE - bottom orifice: 10) Max Q Bottom Orif. \#1
10) Top Orif \#2 Height =
11) Max Q Mid Orif. \#3
12) Mid Orif \#3 Height =

19-071
6/24/2020

The Views - Basin 2 Pond

Note: The detention system design is based on the King
County Model "Facility Design Routine".

## DETENTION POND

3 to 1
4 ft (from bottom of pond to overflow)
$0 \mathrm{~min} / \mathrm{in}$
2
12 in
0.62 (typically 0.62 )
-1 ft (distance below bottom of pond - Negative \#)
1.45 cfs
3.24 ft
0.00 cfs
0.00 ft

Orifice not being used
Orifice not being used

Detention Facility Design Results:

| Performance year | $\qquad$ | Pre-Developed Outflow cfs | Actual Outflow cfs | Peak Stage ft | Storage cf |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 100 | 0 | 0 | 0 | 0 | - |
| 25 | 5.66 | 2.83 | 2.83 | 4.00 | 9,029 |
| 10 | 4.78 | 2.22 | 2.22 | 3.52 | 7,449 |
| 5 | 4.41 | 1.97 | 1.82 | 3.33 | 6,851 |
| 2 | 3.19 | 1.18 | 1.18 | 2.32 | 4,127 |
|  |  |  | Required Storage ====: |  | 9,029 |
|  | Bottom Orif. | Middle Orif. | Top Orif. | Optional Weir Design (for top orifice) |  |
| Total $\mathrm{Q}=$ | 1.45 | $0.00$ | $1.38$ |  |  |
| Head (ft) = | 5.00 | 0.00 | 0.76 | 0.93 |  |
| Dist. from bottom of pond (ft) = | -1.00 | NA | 3.24 | 106.37 | deg. |
| Orif. Dia. (in) = | 4.88 | 0.00 | 7.64 | Weir is an o |  |

FLOW CONTROL STRUCTURE SCHEMATIC


12 (in) Riser dia
(in) Dia. Orif \#2 (cfs) Max Q top Orif \#2
(in) Dia. Orif \#3 (cfs) Max Q Mid Orif \#3

| Project Name: | The Views - Basin 2 Pond |
| :--- | :--- |
| Detention Facility Type |  |
| Job\# | $19-071$ |
| Date: | $6 / 24 / 2020$ |

Detention Facility Type:

| DETENTION POND |  |
| :--- | ---: |
| L = | 35.0 ft |
| W = | 35.0 ft |
| D $=$ | 4.0 ft |
| Pond Area $=$ | $1,225 \mathrm{sf}$ |








Project Name: The Views - Basin 2 Pond

## Stage Storage Summary




| Stage <br> ft | Storage <br> cf |  |
| :---: | :---: | :---: |
| 3.25 | $3,956.44$ | Discharge <br> cfs |
| 3.30 | $4,074.79$ | 1.17 |
| 3.35 | $4,194.61$ | 1.18 |
| 3.40 | $4,315.90$ | 1.19 |
| 3.45 | $4,438.67$ | 1.19 |
| 3.50 | $4,562.93$ | 1.20 |
| 3.55 | $4,688.69$ | 1.21 |
| 3.60 | $4,815.96$ | 1.22 |
| 3.65 | $4,944.75$ | 1.23 |
| 3.70 | $5,075.07$ | 1.24 |
| 3.75 | $5,206.92$ | 1.25 |
| 3.80 | $5,340.32$ | 1.25 |
| 3.85 | $5,475.27$ | 1.27 |
| 3.90 | $5,611.78$ | 1.28 |
| 3.95 | $5,749.87$ | 1.29 |
| 4.00 | $5,889.54$ | 1.30 |
| 4.05 | $6,030.79$ | 1.30 |
| 4.10 | $6,173.65$ | 1.31 |
| 4.15 | $6,318.11$ | 1.32 |
| 4.20 | $6,464.19$ | 1.33 |
| 4.25 | $6,611.90$ | 1.49 |
| 4.30 | $6,761.24$ | 1.73 |
| 4.35 | $6,912.23$ | 1.88 |
| 4.40 | $7,064.87$ | 1.99 |
| 4.45 | $7,219.17$ | 2.09 |
| 4.50 | $7,375.15$ | 2.18 |
| 4.55 | $7,532.80$ | 2.26 |
| 4.60 | $7,692.14$ | 2.34 |
| 4.65 | $7,853.18$ | 2.41 |
| 4.70 | $8,015.93$ | 2.48 |
| 4.75 | $8,180.39$ | 2.54 |
| 4.80 | $8,346.58$ | 2.61 |
| 4.85 | $8,514.50$ | 2.66 |
| 4.90 | $8,684.17$ | 2.72 |
| 4.95 | $8,855.58$ | 2.78 |
| 5.00 | $9,028.76$ | 2.83 |

# Project Name: The Views - Basin 2 Pond Rectangular, Sharp Crested Weir Calculations Job \# 19-071 <br> Date: 6/24/2020 

Weir Equation: $\mathrm{Q}=\mathrm{C}(\mathrm{L}-0.2 \mathrm{H}) \mathrm{H}^{3 / 2}$

| Q | = Flow over weir (cfs) |
| :---: | :---: |
| C | $=3.27+0.40 \mathrm{H} / \mathrm{P}$ (ft) |
| L | = Adjusted length of weir (La-0.1H $\times 2$ ) this is to account for side constraints |
| La | = Actual length of weir along pipes interior circumference (ft) |
| H | = Distance from bottom of weir to maximum head (ft) |
| P | = Distance from bottom of weir to outfall invert elevation (ft) |
| D | = Inside riser pipe diameter (in) |
| < | = Angle of opening for weir (maximum 180 degrees) |

Given:

| Q | 1.38 ffs |
| :--- | ---: |
| H | 0.76 ft |
| P | 4.24 ft |
| D | 12 in |

Find:

| C | 3.34 | ft |
| :---: | :---: | :---: |
| L | 0.78 | ft |
| La | $\mathbf{0 . 9 3} \mathrm{ft}$ |  |
| $<$ | 106 | degrees |



# Appendix E Basin 3 Analysis, Data, and Detention Pond Design 

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| Project Name: |  |  |  |
| :---: | :---: | :---: | :---: |
| PRE-DEVELOPED - TIME OF CONCENTRATION CALCULATIONS |  |  |  |
| $\begin{aligned} & \text { Job \# } \\ & \text { Date: } \end{aligned}$ | 19-071 |  |  |
|  | 6/24/202 |  |  |
|  |  | 34.4 | $=$ Total Tc (min) |


Shallow Concentrated Flow (after initial 300')

|  | total |  |  |  |  |
| :---: | ---: | ---: | ---: | ---: | :--- |
| $\mathrm{T}=$ | 2.6 |  |  | $\mathbf{2 . 6}$ | $=$ travel time for sheet flow (min) |
| $\mathrm{L}=$ | 376 |  |  |  | 376 |
|  | = flow length $(\mathrm{ft})$ |  |  |  |  |
| $\mathrm{So}=$ | $4.80 \%$ |  |  |  |  |
| $\mathrm{k}=$ | 11 |  |  |  |  |





Project Name: The Views - Basin 3 Pond Hydrograph Analysis Summary

| Job \# | 19-071 |
| :--- | :--- |
| Date: | $6 / 24 / 2020$ |


| Rainfall | Rainfall | Pre-Developed | Developed | Note: The hydrographs shown are based on the |
| :---: | :---: | :---: | :---: | :---: |
| (year) | (inches) | Pervious | Pervious |  |
| 2 | 3.50 | Area $=10.139$ acres | Area $=\quad 4.91$ acres | S.C.S. Type - 1A, 24 hour |
| 5 | 4.50 | $\mathrm{CN}=\quad 76 \mathrm{na}$ | $\mathrm{CN}=\quad 74 \mathrm{na}$ | storm using the SBUH |
| 10 | 4.80 | Impervious | Impervious | method based on the King |
| 25 | 5.50 | Area $=0.317$ acres | Area $=5.546$ acres | County Model. |
| 100 | 0.00 | $\mathrm{CN}=\quad 98 \mathrm{na}$ | $\mathrm{CN}=\quad 98 \mathrm{na}$ |  |
|  |  | $\mathrm{Tc}=\quad 34.4 \mathrm{~min}$ | $\mathrm{Tc}=\quad 5 \mathrm{~min}$ |  |
|  |  | Total $\mathrm{A}=10.456$ acres | Total $\mathrm{A}=10.456$ acres |  |


| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year |  | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 | 6.31 | 8.84 | 9.62 | 11.49 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - | 87,826 | 120,952 | 131,137 | 155,242 | - |
| Tpeak | min => | 490 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | $\mathrm{hr}=>$ | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph |  | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) |
| 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 20 | 0.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 30 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.05 | 0.00 |
| 40 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.07 | 0.09 | 0.15 | 0.00 |
| 50 | 0.83 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.06 | 0.15 | 0.18 | 0.25 | 0.00 |
| 60 | 1.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.11 | 0.21 | 0.24 | 0.32 | 0.00 |
| 70 | 1.17 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.15 | 0.26 | 0.30 | 0.38 | 0.00 |
| 80 | 1.33 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 | 0.18 | 0.30 | 0.34 | 0.43 | 0.00 |
| 90 | 1.50 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 | 0.21 | 0.34 | 0.38 | 0.47 | 0.00 |
| 100 | 1.67 | 0.01 | 0.01 | 0.02 | 0.02 | 0.00 | 0.24 | 0.37 | 0.41 | 0.50 | 0.00 |
| 110 | 1.83 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 | 0.29 | 0.44 | 0.49 | 0.60 | 0.00 |
| 120 | 2.00 | 0.01 | 0.02 | 0.02 | 0.03 | 0.00 | 0.35 | 0.52 | 0.57 | 0.69 | 0.00 |
| 130 | 2.17 | 0.02 | 0.02 | 0.03 | 0.03 | 0.00 | 0.37 | 0.55 | 0.60 | 0.72 | 0.00 |
| 140 | 2.33 | 0.02 | 0.03 | 0.03 | 0.03 | 0.00 | 0.39 | 0.57 | 0.62 | 0.74 | 0.00 |
| 150 | 2.50 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 | 0.41 | 0.59 | 0.64 | 0.76 | 0.00 |
| 160 | 2.67 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 | 0.43 | 0.60 | 0.66 | 0.78 | 0.00 |
| 170 | 2.83 | 0.02 | 0.03 | 0.03 | 0.04 | 0.00 | 0.49 | 0.68 | 0.74 | 0.88 | 0.00 |
| 180 | 3.00 | 0.02 | 0.03 | 0.04 | 0.05 | 0.00 | 0.54 | 0.76 | 0.82 | 0.97 | 0.00 |
| 190 | 3.17 | 0.03 | 0.04 | 0.04 | 0.05 | 0.00 | 0.56 | 0.77 | 0.84 | 0.98 | 0.00 |
| 200 | 3.33 | 0.03 | 0.04 | 0.04 | 0.05 | 0.00 | 0.57 | 0.79 | 0.85 | 1.00 | 0.00 |
| 210 | 3.50 | 0.03 | 0.04 | 0.04 | 0.05 | 0.00 | 0.58 | 0.80 | 0.86 | 1.01 | 0.00 |
| 220 | 3.67 | 0.03 | 0.04 | 0.05 | 0.05 | 0.00 | 0.59 | 0.81 | 0.87 | 1.02 | 0.00 |
| 230 | 3.83 | 0.03 | 0.04 | 0.05 | 0.06 | 0.00 | 0.65 | 0.88 | 0.95 | 1.11 | 0.00 |
| 240 | 4.00 | 0.03 | 0.05 | 0.05 | 0.06 | 0.00 | 0.71 | 0.96 | 1.03 | 1.20 | 0.00 |
| 250 | 4.17 | 0.04 | 0.05 | 0.05 | 0.07 | 0.00 | 0.72 | 0.97 | 1.04 | 1.21 | 0.00 |
| 260 | 4.33 | 0.04 | 0.05 | 0.06 | 0.10 | 0.00 | 0.73 | 0.98 | 1.05 | 1.22 | 0.00 |
| 270 | 4.50 | 0.04 | 0.05 | 0.06 | 0.13 | 0.00 | 0.74 | 0.98 | 1.06 | 1.25 | 0.00 |
| 280 | 4.67 | 0.04 | 0.06 | 0.08 | 0.16 | 0.00 | 0.74 | 0.99 | 1.06 | 1.28 | 0.00 |
| 290 | 4.83 | 0.04 | 0.07 | 0.10 | 0.21 | 0.00 | 0.81 | 1.08 | 1.17 | 1.42 | 0.00 |
| 300 | 5.00 | 0.04 | 0.09 | 0.14 | 0.27 | 0.00 | 0.88 | 1.18 | 1.29 | 1.56 | 0.00 |
| 310 | 5.17 | 0.05 | 0.12 | 0.18 | 0.33 | 0.00 | 0.89 | 1.20 | 1.32 | 1.60 | 0.00 |
| 320 | 5.33 | 0.05 | 0.16 | 0.22 | 0.39 | 0.00 | 0.89 | 1.22 | 1.34 | 1.63 | 0.00 |
| 330 | 5.50 | 0.05 | 0.20 | 0.27 | 0.45 | 0.00 | 0.90 | 1.25 | 1.37 | 1.66 | 0.00 |
| 340 | 5.67 | 0.06 | 0.24 | 0.31 | 0.51 | 0.00 | 0.90 | 1.27 | 1.40 | 1.69 | 0.00 |
| 350 | 5.83 | 0.08 | 0.29 | 0.37 | 0.58 | 0.00 | 0.98 | 1.40 | 1.54 | 1.86 | 0.00 |
| 360 | 6.00 | 0.10 | 0.34 | 0.43 | 0.67 | 0.00 | 1.07 | 1.53 | 1.68 | 2.03 | 0.00 |
| 370 | 6.17 | 0.13 | 0.40 | 0.50 | 0.75 | 0.00 | 1.09 | 1.56 | 1.71 | 2.07 | 0.00 |
| 380 | 6.33 | 0.16 | 0.45 | 0.56 | 0.83 | 0.00 | 1.11 | 1.59 | 1.74 | 2.10 | 0.00 |
| 390 | 6.50 | 0.19 | 0.51 | 0.62 | 0.90 | 0.00 | 1.13 | 1.62 | 1.77 | 2.13 | 0.00 |
| 400 | 6.67 | 0.23 | 0.56 | 0.68 | 0.97 | 0.00 | 1.15 | 1.64 | 1.80 | 2.16 | 0.00 |
| 410 | 6.83 | 0.28 | 0.65 | 0.78 | 1.10 | 0.00 | 1.41 | 2.01 | 2.19 | 2.64 | 0.00 |
| 420 | 7.00 | 0.35 | 0.78 | 0.92 | 1.28 | 0.00 | 1.67 | 2.38 | 2.60 | 3.13 | 0.00 |
| 430 | 7.17 | 0.42 | 0.89 | 1.05 | 1.45 | 0.00 | 1.71 | 2.42 | 2.65 | 3.18 | 0.00 |
| 440 | 7.33 | 0.52 | 1.06 | 1.24 | 1.69 | 0.00 | 2.06 | 2.91 | 3.17 | 3.81 | 0.00 |
| 450 | 7.50 | 0.65 | 1.28 | 1.49 | 1.99 | 0.00 | 2.41 | 3.41 | 3.71 | 4.45 | 0.00 |
| 460 | 7.67 | 0.92 | 1.72 | 1.99 | 2.63 | 0.00 | 3.59 | 5.06 | 5.51 | 6.59 | 0.00 |
| 470 | 7.83 | 1.53 | 2.72 | 3.11 | 4.05 | 0.00 | 6.31 | 8.84 | 9.62 | 11.49 | 0.00 |
| 480 | 8.00 | 2.00 | 3.46 | 3.93 | 5.06 | 0.00 | 5.97 | 8.34 | 9.07 | 10.81 | 0.00 |
| 490 | 8.17 | 2.02 | 3.43 | 3.89 | 4.98 | 0.00 | 3.42 | 4.76 | 5.17 | 6.14 | 0.00 |
| 500 | 8.33 | 1.89 | 3.18 | 3.59 | 4.58 | 0.00 | 2.42 | 3.36 | 3.65 | 4.34 | 0.00 |
| 510 | 8.50 | 1.75 | 2.91 | 3.28 | 4.17 | 0.00 | 2.09 | 2.90 | 3.15 | 3.73 | 0.00 |

[^1]Hydrograph Summary Page 1

| Pre-Developed Hydrographs |  |  |  |  |  |  | Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year |  | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 | 6.31 | 8.84 | 9.62 | 11.49 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - | 87,826 | 120,952 | 131,137 | 155,242 | - |
| Tpeak | min => | 490 | 480 | 480 | 480 | 10 | 470 | 470 | 470 | 470 | 10 |
| Tpeak | hr => | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 | 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| Hydrograph |  | 2 | 5 | 10 | 25 | 100 | 2 | 5 | 10 | 25 | 100 |
| Time (min) |  | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) |
| 520 | 8.67 | 1.65 | 2.72 | 3.06 | 3.87 | 0.00 | 2.11 | 2.92 | 3.17 | 3.76 | 0.00 |
| 530 | 8.83 | 1.53 | 2.49 | 2.80 | 3.53 | 0.00 | 1.76 | 2.43 | 2.64 | 3.13 | 0.00 |
| 540 | 9.00 | 1.38 | 2.23 | 2.50 | 3.15 | 0.00 | 1.40 | 1.94 | 2.11 | 2.49 | 0.00 |
| 550 | 9.17 | 1.27 | 2.04 | 2.29 | 2.87 | 0.00 | 1.41 | 1.95 | 2.11 | 2.50 | 0.00 |
| 560 | 9.33 | 1.19 | 1.90 | 2.13 | 2.66 | 0.00 | 1.42 | 1.96 | 2.12 | 2.51 | 0.00 |
| 570 | 9.50 | 1.14 | 1.81 | 2.01 | 2.51 | 0.00 | 1.43 | 1.97 | 2.13 | 2.52 | 0.00 |
| 580 | 9.67 | 1.10 | 1.74 | 1.93 | 2.41 | 0.00 | 1.43 | 1.97 | 2.14 | 2.53 | 0.00 |
| 590 | 9.83 | 1.08 | 1.69 | 1.88 | 2.33 | 0.00 | 1.44 | 1.98 | 2.15 | 2.54 | 0.00 |
| 600 | 10.00 | 1.06 | 1.66 | 1.84 | 2.28 | 0.00 | 1.45 | 1.99 | 2.16 | 2.55 | 0.00 |
| 610 | 10.17 | 1.05 | 1.64 | 1.82 | 2.25 | 0.00 | 1.45 | 2.00 | 2.16 | 2.56 | 0.00 |
| 620 | 10.33 | 1.05 | 1.62 | 1.80 | 2.22 | 0.00 | 1.46 | 2.01 | 2.17 | 2.57 | 0.00 |
| 630 | 10.50 | 1.05 | 1.62 | 1.79 | 2.21 | 0.00 | 1.47 | 2.01 | 2.18 | 2.57 | 0.00 |
| 640 | 10.67 | 1.06 | 1.62 | 1.79 | 2.21 | 0.00 | 1.47 | 2.02 | 2.19 | 2.58 | 0.00 |
| 650 | 10.83 | 1.04 | 1.58 | 1.75 | 2.15 | 0.00 | 1.34 | 1.84 | 1.99 | 2.35 | 0.00 |
| 660 | 11.00 | 1.00 | 1.52 | 1.68 | 2.07 | 0.00 | 1.21 | 1.66 | 1.80 | 2.12 | 0.00 |
| 670 | 11.17 | 0.97 | 1.48 | 1.64 | 2.01 | 0.00 | 1.22 | 1.67 | 1.80 | 2.13 | 0.00 |
| 680 | 11.33 | 0.96 | 1.45 | 1.60 | 1.96 | 0.00 | 1.22 | 1.67 | 1.81 | 2.13 | 0.00 |
| 690 | 11.50 | 0.95 | 1.43 | 1.58 | 1.93 | 0.00 | 1.22 | 1.68 | 1.81 | 2.14 | 0.00 |
| 700 | 11.67 | 0.94 | 1.42 | 1.56 | 1.91 | 0.00 | 1.23 | 1.68 | 1.82 | 2.14 | 0.00 |
| 710 | 11.83 | 0.94 | 1.41 | 1.55 | 1.90 | 0.00 | 1.23 | 1.68 | 1.82 | 2.15 | 0.00 |
| 720 | 12.00 | 0.94 | 1.40 | 1.55 | 1.89 | 0.00 | 1.24 | 1.69 | 1.83 | 2.15 | 0.00 |
| 730 | 12.17 | 0.94 | 1.40 | 1.55 | 1.88 | 0.00 | 1.24 | 1.69 | 1.83 | 2.16 | 0.00 |
| 740 | 12.33 | 0.94 | 1.40 | 1.55 | 1.88 | 0.00 | 1.24 | 1.70 | 1.84 | 2.16 | 0.00 |
| 750 | 12.50 | 0.94 | 1.41 | 1.55 | 1.88 | 0.00 | 1.25 | 1.70 | 1.84 | 2.16 | 0.00 |
| 760 | 12.67 | 0.95 | 1.41 | 1.55 | 1.89 | 0.00 | 1.25 | 1.70 | 1.84 | 2.17 | 0.00 |
| 770 | 12.83 | 0.93 | 1.38 | 1.52 | 1.84 | 0.00 | 1.12 | 1.53 | 1.65 | 1.95 | 0.00 |
| 780 | 13.00 | 0.89 | 1.32 | 1.45 | 1.76 | 0.00 | 0.99 | 1.35 | 1.46 | 1.72 | 0.00 |
| 790 | 13.17 | 0.86 | 1.27 | 1.40 | 1.70 | 0.00 | 1.00 | 1.36 | 1.47 | 1.72 | 0.00 |
| 800 | 13.33 | 0.84 | 1.24 | 1.36 | 1.65 | 0.00 | 1.00 | 1.36 | 1.47 | 1.73 | 0.00 |
| 810 | 13.50 | 0.82 | 1.22 | 1.34 | 1.62 | 0.00 | 1.00 | 1.36 | 1.47 | 1.73 | 0.00 |
| 820 | 13.67 | 0.81 | 1.20 | 1.32 | 1.60 | 0.00 | 1.00 | 1.36 | 1.47 | 1.73 | 0.00 |
| 830 | 13.83 | 0.81 | 1.19 | 1.31 | 1.58 | 0.00 | 1.00 | 1.37 | 1.48 | 1.73 | 0.00 |
| 840 | 14.00 | 0.80 | 1.18 | 1.30 | 1.57 | 0.00 | 1.01 | 1.37 | 1.48 | 1.74 | 0.00 |
| 850 | 14.17 | 0.80 | 1.18 | 1.29 | 1.56 | 0.00 | 1.01 | 1.37 | 1.48 | 1.74 | 0.00 |
| 860 | 14.33 | 0.80 | 1.18 | 1.29 | 1.56 | 0.00 | 1.01 | 1.37 | 1.48 | 1.74 | 0.00 |
| 870 | 14.50 | 0.80 | 1.18 | 1.29 | 1.56 | 0.00 | 1.01 | 1.37 | 1.48 | 1.74 | 0.00 |
| 880 | 14.67 | 0.80 | 1.18 | 1.29 | 1.56 | 0.00 | 1.01 | 1.38 | 1.49 | 1.74 | 0.00 |
| 890 | 14.83 | 0.79 | 1.16 | 1.27 | 1.53 | 0.00 | 0.95 | 1.29 | 1.40 | 1.64 | 0.00 |
| 900 | 15.00 | 0.77 | 1.13 | 1.24 | 1.49 | 0.00 | 0.89 | 1.21 | 1.31 | 1.53 | 0.00 |
| 910 | 15.17 | 0.76 | 1.11 | 1.21 | 1.46 | 0.00 | 0.89 | 1.21 | 1.31 | 1.54 | 0.00 |
| 920 | 15.33 | 0.75 | 1.09 | 1.20 | 1.44 | 0.00 | 0.89 | 1.21 | 1.31 | 1.54 | 0.00 |
| 930 | 15.50 | 0.74 | 1.08 | 1.18 | 1.42 | 0.00 | 0.90 | 1.22 | 1.31 | 1.54 | 0.00 |
| 940 | 15.67 | 0.74 | 1.07 | 1.17 | 1.41 | 0.00 | 0.90 | 1.22 | 1.31 | 1.54 | 0.00 |
| 950 | 15.83 | 0.73 | 1.07 | 1.17 | 1.41 | 0.00 | 0.90 | 1.22 | 1.32 | 1.54 | 0.00 |
| 960 | 16.00 | 0.73 | 1.06 | 1.17 | 1.40 | 0.00 | 0.90 | 1.22 | 1.32 | 1.54 | 0.00 |
| 970 | 16.17 | 0.73 | 1.06 | 1.16 | 1.40 | 0.00 | 0.90 | 1.22 | 1.32 | 1.54 | 0.00 |
| 980 | 16.33 | 0.73 | 1.06 | 1.16 | 1.40 | 0.00 | 0.90 | 1.22 | 1.32 | 1.55 | 0.00 |
| 990 | 16.50 | 0.73 | 1.06 | 1.16 | 1.40 | 0.00 | 0.90 | 1.22 | 1.32 | 1.55 | 0.00 |
| 1000 | 16.67 | 0.73 | 1.06 | 1.16 | 1.40 | 0.00 | 0.91 | 1.23 | 1.32 | 1.55 | 0.00 |
| 1010 | 16.83 | 0.72 | 1.04 | 1.14 | 1.36 | 0.00 | 0.82 | 1.10 | 1.19 | 1.40 | 0.00 |
| 1020 | 17.00 | 0.69 | 0.99 | 1.08 | 1.30 | 0.00 | 0.73 | 0.98 | 1.06 | 1.24 | 0.00 |
| 1030 | 17.17 | 0.66 | 0.96 | 1.05 | 1.26 | 0.00 | 0.73 | 0.98 | 1.06 | 1.24 | 0.00 |
| 1040 | 17.33 | 0.65 | 0.93 | 1.02 | 1.22 | 0.00 | 0.73 | 0.98 | 1.06 | 1.24 | 0.00 |
| 1050 | 17.50 | 0.63 | 0.91 | 1.00 | 1.20 | 0.00 | 0.73 | 0.99 | 1.06 | 1.24 | 0.00 |
| 1060 | 17.67 | 0.63 | 0.90 | 0.99 | 1.18 | 0.00 | 0.73 | 0.99 | 1.06 | 1.25 | 0.00 |
| 1070 | 17.83 | 0.62 | 0.89 | 0.98 | 1.17 | 0.00 | 0.73 | 0.99 | 1.06 | 1.25 | 0.00 |
| 1080 | 18.00 | 0.62 | 0.89 | 0.97 | 1.16 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1090 | 18.17 | 0.61 | 0.88 | 0.96 | 1.15 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1100 | 18.33 | 0.61 | 0.88 | 0.96 | 1.15 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1110 | 18.50 | 0.61 | 0.88 | 0.96 | 1.15 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1120 | 18.67 | 0.61 | 0.88 | 0.96 | 1.14 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1130 | 18.83 | 0.61 | 0.87 | 0.96 | 1.14 | 0.00 | 0.73 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1140 | 19.00 | 0.61 | 0.88 | 0.96 | 1.14 | 0.00 | 0.74 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1150 | 19.17 | 0.61 | 0.88 | 0.96 | 1.14 | 0.00 | 0.74 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1160 | 19.33 | 0.61 | 0.88 | 0.96 | 1.14 | 0.00 | 0.74 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1170 | 19.50 | 0.61 | 0.88 | 0.96 | 1.14 | 0.00 | 0.74 | 0.99 | 1.07 | 1.25 | 0.00 |
| 1180 | 19.67 | 0.61 | 0.88 | 0.96 | 1.15 | 0.00 | 0.74 | 1.00 | 1.07 | 1.25 | 0.00 |
| 1190 | 19.83 | 0.61 | 0.88 | 0.96 | 1.15 | 0.00 | 0.74 | 1.00 | 1.07 | 1.26 | 0.00 |
| 1200 | 20.00 | 0.62 | 0.88 | 0.96 | 1.15 | 0.00 | 0.74 | 1.00 | 1.07 | 1.26 | 0.00 |
| 1210 | 20.17 | 0.62 | 0.88 | 0.96 | 1.15 | 0.00 | 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |

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Hydrograph Summary Page 2

| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | ====> | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - |
| Tpeak | min $=>$ | 490 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograph | Name=> | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd <br> (cfs) |
| 1220 | 20.33 | 0.62 | 0.88 | 0.96 | 1.15 | 0.00 |
| 1230 | 20.50 | 0.62 | 0.88 | 0.96 | 1.15 | 0.00 |
| 1240 | 20.67 | 0.62 | 0.89 | 0.97 | 1.15 | 0.00 |
| 1250 | 20.83 | 0.62 | 0.89 | 0.97 | 1.15 | 0.00 |
| 1260 | 21.00 | 0.62 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1270 | 21.17 | 0.62 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1280 | 21.33 | 0.63 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1290 | 21.50 | 0.63 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1300 | 21.67 | 0.63 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1310 | 21.83 | 0.63 | 0.89 | 0.97 | 1.16 | 0.00 |
| 1320 | 22.00 | 0.63 | 0.90 | 0.98 | 1.16 | 0.00 |
| 1330 | 22.17 | 0.63 | 0.90 | 0.98 | 1.16 | 0.00 |
| 1340 | 22.33 | 0.63 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1350 | 22.50 | 0.63 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1360 | 22.67 | 0.64 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1370 | 22.83 | 0.64 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1380 | 23.00 | 0.64 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1390 | 23.17 | 0.64 | 0.90 | 0.98 | 1.17 | 0.00 |
| 1400 | 23.33 | 0.64 | 0.91 | 0.99 | 1.17 | 0.00 |
| 1410 | 23.50 | 0.64 | 0.91 | 0.99 | 1.17 | 0.00 |
| 1420 | 23.67 | 0.64 | 0.91 | 0.99 | 1.18 | 0.00 |
| 1430 | 23.83 | 0.64 | 0.91 | 0.99 | 1.18 | 0.00 |
| 1440 | 24.00 | 0.65 | 0.91 | 0.99 | 1.18 | 0.00 |
| 1450 | 24.17 | 0.56 | 0.80 | 0.87 | 1.03 | 0.00 |
| 1460 | 24.33 | 0.42 | 0.59 | 0.65 | 0.77 | 0.00 |
| 1470 | 24.50 | 0.31 | 0.44 | 0.48 | 0.57 | 0.00 |
| 1480 | 24.67 | 0.23 | 0.33 | 0.36 | 0.43 | 0.00 |
| 1490 | 24.67 | 0.17 | 0.25 | 0.27 | 0.32 | 0.00 |
| 1500 | 24.67 | 0.13 | 0.18 | 0.20 | 0.24 | 0.00 |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| 2 | 5 | 10 | 25 | 100 |
| 6.31 | 8.84 | 9.62 | 11.49 | 0.00 |
| 87,826 | 120,952 | 131,137 | 155,242 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| 2 | 5 | 10 | 25 | 100 |
| Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.74 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.75 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.75 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.75 | 1.00 | 1.08 | 1.26 | 0.00 |
| 0.75 | 1.01 | 1.08 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.08 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.08 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.75 | 1.01 | 1.09 | 1.27 | 0.00 |
| 0.38 | 0.51 | 0.55 | 0.64 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |


| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | $=====>$ | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - |
| Tpeak | min => | 490 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrograp | h Name=> | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd <br> (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) | Hyd (cfs) |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{6 . 3 1}$ | $\mathbf{8 . 8 4}$ | $\mathbf{9 . 6 2}$ | $\mathbf{1 1 . 4 9}$ | $\mathbf{0 . 0 0}$ |
| 87,826 | 120,952 | 131,137 | 155,242 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| $\mathbf{2}$ | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |



Developed Hydrograph Plot


| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | ======> | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - |
| Tpeak | min => | 490 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrogra | ph Name=> | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{6 . 3 1}$ | $\mathbf{8 . 8 4}$ | $\mathbf{9 . 6 2}$ | $\mathbf{1 1 . 4 9}$ | $\mathbf{0 . 0 0}$ |
| 87,826 | 120,952 | 131,137 | 155,242 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| $\mathbf{2}$ | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |



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Hydrograph Summary Page 5

| Pre-Developed Hydrographs |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Year | =======> | 2 | 5 | 10 | 25 | 100 |
| Qpeak | cfs => | 2.02 | 3.46 | 3.93 | 5.06 | 0.00 |
| Volume | cf => | 53,749 | 82,927 | 92,142 | 114,265 | - |
| Tpeak | min $=>$ | 490 | 480 | 480 | 480 | 10 |
| Tpeak | hr => | 8.17 | 8.00 | 8.00 | 8.00 | 0.17 |
| Hydrogra | ph Name=> | 2 | 5 | 10 | 25 | 100 |
| Time (min) | Time (hr) | Hyd <br> (cfs) | Hyd (cfs) | Hyd <br> (cfs) | Hyd (cfs) | Hyd (cfs) |


| Developed Hydrographs |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| $\mathbf{2}$ | $\mathbf{5}$ | $\mathbf{1 0}$ | $\mathbf{2 5}$ | $\mathbf{1 0 0}$ |
| $\mathbf{6 . 3 1}$ | $\mathbf{8 . 8 4}$ | $\mathbf{9 . 6 2}$ | $\mathbf{1 1 . 4 9}$ | $\mathbf{0 . 0 0}$ |
| 87,826 | 120,952 | 131,137 | 155,242 | - |
| 470 | 470 | 470 | 470 | 10 |
| 7.83 | 7.83 | 7.83 | 7.83 | 0.17 |
| 2 | 5 | 10 | 25 | 100 |
| Hyd | Hyd | Hyd | Hyd | Hyd |
| (cfs) | (cfs) | (cfs) | (cfs) | (cfs) |



Project Name: Detention System Summary
Job\#
Date:

Date:

1) Detention Facility Design Input:
2) Type of facility:
3) Pond side slopes:
4) Pond storage depth:
5) Vertical permeability
6) Number of orifices:
7) Riser dia. =>
8) Orifice coefficient
9) IE - bottom orifice: 10) Max Q Bottom Orif. \#1
10) Top Orif \#2 Height =
11) Max Q Mid Orif. \#3
12) Mid Orif \#3 Height =

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The Views - Basin 3 Pond

Note: The detention system design is based on the King County Model "Facility Design Routine".

## DETENTION POND

3 to 1
4 ft (from bottom of pond to overflow)
$0 \mathrm{~min} / \mathrm{in}$
2
12 in
0.62 (typically 0.62 )
-2 ft (distance below bottom of pond - Negative \#) 2.49 cfs
2.94 ft
0.00 cfs
0.00 ft

Orifice not being used
Orifice not being used

Detention Facility Design Results:

|  | Performance <br> year | Developed <br> Inflow <br> cfs | Pre-Developed <br> Outflow <br> cfs | Actual <br> Outflow <br> cfs | Peak <br> Stage <br> ft |
| :--- | :---: | :---: | :---: | :---: | :---: |

FLOW CONTROL STRUCTURE SCHEMATIC


12 (in) Riser dia.
(in) Dia. Orif \#2 (cfs) Max Q top Orif \#2
(in) Dia. Orif \#3 (cfs) Max Q Mid Orif \#3

| Project Name: | The Views - Basin 3 Pond |
| :--- | :--- |
| Detention Facility Type |  |
| Job\# | $19-071$ <br> Date: |
| $6 / 24 / 2020$ |  |

Detention Facility Type:

| DETENTION POND |  |
| :--- | ---: |
| $\mathrm{L}=$ | 64.6 ft |
| $\mathrm{W}=$ | 64.6 ft |
| $\mathrm{D}=$ | 4.0 ft |
| Pond Area $=$ | $4,173 \mathrm{sf}$ |







Project Name: The Views - Basin 3 Pond Stage Storage Summary


| $\begin{aligned} & \text { Stage } \\ & \mathrm{ft} \end{aligned}$ | Storage cf | Discharge cfs |
| :---: | :---: | :---: |
| 3.25 | 5,524.48 | 1.83 |
| 3.30 | 5,758.56 | 1.85 |
| 3.35 | 5,993.66 | 1.86 |
| 3.40 | 6,229.79 | 1.87 |
| 3.45 | 6,466.95 | 1.89 |
| 3.50 | 6,705.15 | 1.90 |
| 3.55 | 6,944.38 | 1.92 |
| 3.60 | 7,184.65 | 1.93 |
| 3.65 | 7,425.96 | 1.94 |
| 3.70 | 7,668.32 | 1.96 |
| 3.75 | 7,911.72 | 1.97 |
| 3.80 | 8,156.17 | 1.98 |
| 3.85 | 8,401.67 | 1.99 |
| 3.90 | 8,648.22 | 2.01 |
| 3.95 | 8,895.82 | 2.02 |
| 4.00 | 9,144.48 | 2.03 |
| 4.05 | 9,394.20 | 2.05 |
| 4.10 | 9,644.99 | 2.06 |
| 4.15 | 9,896.83 | 2.07 |
| 4.20 | 10,149.74 | 2.08 |
| 4.25 | 10,403.72 | 2.10 |
| 4.30 | 10,658.77 | 2.11 |
| 4.35 | 10,914.89 | 2.12 |
| 4.40 | 11,172.09 | 2.13 |
| 4.45 | 11,430.36 | 2.14 |
| 4.50 | 11,689.71 | 2.16 |
| 4.55 | 11,950.15 | 2.17 |
| 4.60 | 12,211.67 | 2.18 |
| 4.65 | 12,474.27 | 2.19 |
| 4.70 | 12,737.96 | 2.20 |
| 4.75 | 13,002.74 | 2.22 |
| 4.80 | 13,268.62 | 2.23 |
| 4.85 | 13,535.59 | 2.24 |
| 4.90 | 13,803.65 | 2.25 |
| 4.95 | 14,072.82 | 2.51 |
| 5.00 | 14,343.09 | 2.89 |
| 5.05 | 14,614.46 | 3.11 |
| 5.10 | 14,886.94 | 3.30 |
| 5.15 | 15,160.53 | 3.45 |
| 5.20 | 15,435.22 | 3.59 |
| 5.25 | 15,711.03 | 3.72 |
| 5.30 | 15,987.96 | 3.84 |
| 5.35 | 16,266.00 | 3.95 |
| 5.40 | 16,545.17 | 4.06 |
| 5.45 | 16,825.45 | 4.16 |
| 5.50 | 17,106.86 | 4.25 |
| 5.55 | 17,389.39 | 4.35 |
| 5.60 | 17,673.06 | 4.44 |
| 5.65 | 17,957.85 | 4.52 |
| 5.70 | 18,243.78 | 4.61 |
| 5.75 | 18,530.85 | 4.69 |
| 5.80 | 18,819.05 | 4.77 |
| 5.85 | 19,108.39 | 4.84 |
| 5.90 | 19,398.87 | 4.92 |
| 5.95 | 19,690.50 | 4.99 |
| 6.00 | 19,983.27 | 5.06 |

## Project Name: The Views - Basin 3 Pond Rectangular, Sharp Crested Weir Calculations Job \# 19-071 <br> Date: 6/24/2020

Weir Equation: $\mathrm{Q}=\mathrm{C}(\mathrm{L}-0.2 \mathrm{H}) \mathrm{H}^{3 / 2}$

| Q | = Flow over weir (cfs) |
| :---: | :---: |
| C | $=3.27+0.40 \mathrm{H} / \mathrm{P}$ (ft) |
| L | = Adjusted length of weir (La-0.1H $\times 2$ ) this is to account for side constraints |
| La | = Actual length of weir along pipes interior circumference (ft) |
| H | = Distance from bottom of weir to maximum head (ft) |
| P | = Distance from bottom of weir to outfall invert elevation (ft) |
| D | = Inside riser pipe diameter (in) |
| < | = Angle of opening for weir (maximum 180 degrees) |

## Given:

| Q | 2.57 ffs |
| ---: | ---: |
| H | 1.06 ft |
| P | 4.94 ft |
| D | 12 in |

Find:

| C | 3.36 ft |
| :---: | :---: |
| L | 0.91 ft |
| La | 1.13 ft |
| $<$ | 129 | degrees B



## Appendix F

## Standard Formulas, Coefficients, and Values

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## COEFFICIENTS

```
Ns = = Manning's coefficient (sheet flow)
            n}\mathrm{ values are for sheet flow only
Design Value
    0.011 Concrete or asphalt
    0.010 Bare soil
    0.020 Graveled surface
    0.020 Bare clay - loam (eroded)
    0.150 Grass (short prairie)
    0.240 Grass (dense lawn)
    0.410 Grass (bermuda)
    0.400 Woods (light underbrush)
    0.800 Woods (dense underbrush)
```

$\mathrm{k}=$ = time of concentration velocity factor ( $\mathrm{ft} / \mathrm{s}$ )
Design Value
3 Forest with heavy ground cover and meadows ( $n=0.10$ )
$5 \quad$ Brushy ground with some trees ( $n=0.060$ )
8 Fallow or cultivation ( $n=0.040$ )
9 High grass ( $\mathrm{n}=0.035$ )
11 Short grass, pasture or lawns ( $n=0.030$ )
13 Nearly bare ground ( $n=0.025$ )
$27 \quad$ Paved and gravel areas $(n=0.012)$
$\mathrm{n}=$ = Manning's coefficient (channel)
Design Value
CONSTRUCTED CHANNELS
A. Earth, straight and uniform
0.018 Earth (straight and uniform)
0.025 Gravel (straight and uniform)
0.027 Grass (with weeds)
B. Earth, winding and sluggish
0.025 Earth (no vegetation)
0.030 Grass (some weeds)
0.035 Dense weeds (deep channel)
0.030 Earth (rubble bottom and sides)
0.035 Stony bottom and weedy banks
0.040 Cobble bottom with clean sides
C. Rock lined
0.035 Smooth and uniform
0.040 Jagged and irregular
D. Channels not maintained (weeds and brush uncut)
0.050 Dense weeds (high as flow depth)
0.050 Clean bottom (brush on sides)
0.100 Dense brush (high stage)
0.200 Water quality swales (mowed regulary)
NATURAL STREAMS
0.029 Clean (straight no pools)
0.035 Clean (straight no pools with weeds and stones)
0.039 Clean (winding pools )
0.042 Clean (winding pools weeds and stones)
0.052 Clean (winding pools weeds and large stones)
0.065 Weedy (sluggish with deep pools)
0.112 Very weedy (sluggish with deep pools)

## Standard formulas used for the Time of Concentration Calculations

Overland Flow (max 300' total)

$$
\begin{aligned}
& \frac{(0.42)[(N s)(L)]^{0.8}}{\left(P_{2}\right)^{0.5}\left(S_{0}\right)^{0.4}} \\
& \hline
\end{aligned}
$$

| Tc |
| :---: |
| Ns |
| L |
| P 2 |
| So |

= time of concentration for less than 300' of travel (minutes)
= sheet flow Manning's effective roughness coefficient
= flow length (ft)
= 2-year, 24 hour rainfall (in)
$=$ slope of hydraulic grade line (land slope, $\mathrm{ft} / \mathrm{ft}$ )
Shallow Concentrated Flow (after initial 300')
$\mathrm{T}=\frac{L}{(60)\left(k \sqrt{S_{0}}\right)}$

| T | $=$ travel time for sheet flow (min) |
| :---: | :--- |
| L | $=$ flow length (ft) |
| So | = slope of hydraulic grade line (land slope, $\mathrm{ft} / \mathrm{ft}$ ) |
| k | $=$ time of concentration velocity factor (ft/s) |

Flow in Swales
$Q=(1.486 / n) \times A \times R^{\wedge} 2 / 3 \times S^{\wedge} 1 / 2$ (Manning's Equation)

| Tc | = time of concentration for gutter flow (minutes) |
| :---: | :---: |
| A | = area of flow (sf) |
| R | = hydraulic radius (ft) |
| Ls | = side slope |
| Q | = quantity of flow ( $\mathrm{ft}^{\wedge} 3 / \mathrm{sec}$ ) |
| V | = average velocity of flow (ft/sec) |
| L | = length of flow |
| Ve | = vertical length of side slope |
| Ho | = horizontal length of side slope |
| Bw | $=$ base width (in) |
| D | $=$ depth (in) |
| S | = slope (ft/ft) |
| n | = Manning's n |

## Flow in gutters

$\mathrm{V}=\frac{1.12}{n}(S)^{\wedge} 0.5(S x)^{\wedge} .67(T)^{\wedge} 0.67$

| Tc | $r$ gutter flow (minutes) |
| :---: | :---: |
| V | = average velocity of flow (ft/sec) |
| Q | = quantity of flow (ft^3/sec) |
| S | = street longitudinal slope (ft/ft) |
| Sx | = street cross slope (ft/ft) |
| T | = total width of flow in the gutter (ft) |
| n | = sheet flow Manning's (pavement $=0.018$ ) |
| L | Length of flow (ft) |

Flow in pipes
Mannings Equation

| Tc | pipe (minutes) |
| :---: | :---: |
| V | = calculated velocity pipe full (ft/sec) |
| Q | = quantity of flow ( $\mathrm{ft}^{\wedge} 3 / \mathrm{sec}$ ) |
| n | = Manning's n |
| D | = pipe Diameter (in) |
| S | = slope (ft/ft) |
| L | = length of pipe |

## Appendix G Water Quality Manhole Details

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## EXHIBIT F



# The Views <br> Traffic Impact Study 

## SANDY, OREGON



## Prepared For:

Mac Even

## Prepared By:

Michael Ard, PE
Ard Engineering

## DATE:

June 15, 2020

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## Executive Summary

1. A residential development is proposed on the northeast side of US Highway 26 at SE Vista Loop Drive in Sandy, Oregon. The proposed development will include 48 apartment dwelling units, 32 four-plex dwelling units and 88 single-family homes. The site will take access via three new driveways on SE Vista Loop Road, with two serving development on the west side of SE Vista Loop Road and one serving the property on the east side of SE Vista Loop Road.
2. Upon completion of proposed development, the subject property is projected to generate 109 new site trips during the morning peak hour, 136 trips during the evening peak hour, and 1,564 new daily site trips.
3. Based on the operational analysis, the study intersections currently operate acceptably and are projected to continue to operate acceptably under year 2022 traffic conditions either with or without the addition of site trips from the proposed development.
4. Based on the queuing analysis, there is sufficient distance along SE Vista Loop Drive between the Highway 26 and the proposed site access location for the Picking Property to allow the intersections to operate without interference from queues. No queuing-related mitigations are necessary or recommended in conjunction with the proposed development.
5. Based on the crash data, the study intersections are currently operating acceptably with respect to safety.
6. Based on the warrant analysis, no new traffic signals or turn lanes are recommended.
7. Intersection sight distance was evaluated for the proposed points of access along SE Vista Loop Drive. Based on the analysis, it is projected that adequate sight distance can be achieved for all access locations with clearing of vegetation from the roadside. No other sight distance mitigations are necessary or recommended.

## Project Description \& Location

## Introduction

The proposed residential development comprises two properties. The 9.6 -acre Knapp property is located between SE Vista Loop Road and US Highway 26. The 23.3-acre Picking property is located on the east side of SE Vista Loop Road near its southern intersection with Highway 26.

The proposed development will consist of 168 total dwelling units on 122 lots. It will take access via three new driveways intersecting SE Vista Loop Road, with one serving the 72 lots on the east side of SE Vista Loop Road and two serving the remaining 50 lots on the west side.

This report addresses the impacts of the proposed development on the surrounding street system. Based on discussions with the City of Sandy and ODOT staff, an operational and safety analysis was conducted for the proposed site access intersections on SE Vista Loop Drive as well as the intersections of Highway 26 at SE Vista Loop Road (west) and Highway 26 at SE Vista Loop Road (east).

The purpose of this analysis is to determine whether the surrounding transportation system is capable of safely and efficiently supporting the proposed use and to identify any necessary improvements and mitigations.

## Site Location and Study area Description

The proposed development has a total area of approximately 33 acres and is currently undeveloped. The subject properties are surrounded primarily by a mixture of existing low-density residential development, agricultural uses, and undeveloped forested land. Immediately southeast of the Picking property is the Johnson RV sales facility.

US Highway 26 (Mt. Hood Highway) is classified by the Oregon Department of Transportation as a Statewide Highway and a Freight Route. It has two through lanes in each direction and added turn lanes at intersections. It has a posted speed limit of 55 mph within the study area. The speed limit is reduced to 40 mph northwest of the subject property approximately halfway between SE Vista Loop Drive (west) and SE Langensand Road.

SE Vista Loop Drive is a narrow street without centerline striping and with a posted residential speed limit of 25 mph . It is classified by the City of Sandy as a collector roadway.


## Existing Conditions

The intersection of US Highway 26 at SE Vista Loop Drive (west) is currently a T- intersection controlled by a stop sign on the southwest-bound Vista Loop Drive approach. Through traffic traveling along Highway 26 does not stop. The southwest-bound approach has a single, shared lane for all turning movements. The southeast-bound approach has a left-turn lane and two through lanes. The northwest-bound approach has a dedicated through lane and a shared through/right lane.

The intersection of US Highway 26 at SE Vista Loop Drive (east) is also a T-intersection controlled by a stop sign on the southwest-bound Vista Loop Drive approach. Through traffic traveling along Highway 26 does not stop. The southwest-bound approach has a single, shared lane for all turning movements. The southeast-bound approach has a left-turn lane and two through lanes. The northwest-bound approach has a dedicated through lane and a shared through/right lane.

A vicinity map displaying the project site, vicinity streets, and the study intersections including lane configurations is provided in Figure 1 on page 6.



## Traffic Count Data

Traffic counts were conducted at the intersection of Highway 26 at SE Vista Loop Drive (west) on Tuesday March 19 ${ }^{\text {th }}$, 2019 from 4:00 to 6:00 PM and on Wednesday March 20 ${ }^{\text {th }}, 2019$ from 7:00 to 9:00 AM. Traffic counts were conducted at the intersection of Highway 26 at SE Vista Loop Drive (east) on Thursday July $18^{\text {th }}$ from 7:00 AM to 9:00 AM and 4:00 to 6:00 PM. Data was used from the highest-volume hour for each intersection during each analysis period.

The observed traffic volumes were adjusted to account for seasonal traffic variations in order to represent the $30^{\text {th }}$-highest hour design volumes. Since the July count data was collected closer to the August seasonal peak, this data was used to determine the through traffic volumes on Highway 26, and seasonal-peak through traffic volumes at the intersection of Highway 26 at SE Vista Loop Drive (west) were determined by balancing the turning movement volumes with the $30^{\text {th }}$-highest hour volumes calculated for Highway 26 at SE Vista Loop Drive (east).

US Highway 26 serves local and commuter traffic as well as trips to and from Mt. Hood and beyond. These trip types would be expected to exhibit very different seasonal variations in travel demands over the course of the year, since local and commuter traffic volumes are relatively stable regardless of season, while travel volumes to and from Mt. Hood vary significantly based on the season.

In order to determine the portion of traffic attributable to each of the two primary travel types, data from ODOT's 2017 Highway Volume Tables was utilized. Specifically, the data used was collected at ODOT's Automatic Count Data station 03-006, located 0.30 miles east of Camp Creek Road in Rhododendron, Oregon. This site is located on Highway 26 approximately 21 miles east of SE Vista Loop Drive. Although the distance to the ATR station means the data cannot be used directly, the ATR data provides useful information regarding the variation in traffic volumes traveling to Mt. Hood and beyond during the time of the count data collection as well as during the peak season of the year. Accordingly, this data allows determination of the likely portion of highway traffic that falls into each of the two seasonal variation categories ("commuter" and "recreational summer/winter"), as well as providing information regarding the most appropriate seasonal adjustment factor for the recreational summer/winter traffic.

Based on the data, 11,291 vehicles per day (approximately 1,129 per hour during the peak hour) travel along Highway 26 to and from Mt. Hood at the Rhododendron permanent count station location during the month of July. This volume represents 60.8 percent of the through traffic volumes measured on Highway 26 east of SE Vista Loop Drive on July 18, 2019. Accordingly, it is expected that no more than 60.8 percent of the trips traveling along Highway 26 in the project vicinity are traveling to and from destinations beyond the Rhododendron count station. Since the remaining 39.2 percent of through traffic volumes on the Highway 26 at the study intersections never reach Mt. Hood, it was assumed that these traffic volumes represent more typical commuter and local trips.

The ODOT data also showed that 11,738 vehicles were measured per day (approximately 1174 per hour during the peak hour) during the peak-season month of August at the ATR station near Rhododendron. This indicates that the seasonal recreational traffic volumes along the Highway 26 corridor increased by no more than 447 vehicles per day ( 11,738 vehicles per day in August - 11,291

vehicles per day in July). This equates to roughly 45 additional vehicles per hour during the peak hour of the peak recreational season.

In order to seasonally adjust the local and commuter traffic volumes, the through traffic volumes were reduced by the amount of the assumed seasonal traffic ( 1,129 vehicles per hour during the evening peak hour, and a seasonal adjustment of 1.014 was applied to the remaining local and commuter traffic volumes. Following this adjustment, the 1,129 July recreational trips and the 45 peak-season through trips were added to determine the total peak-season traffic volumes. These calculated through traffic volumes represent the anticipated traffic levels for the intersections along Highway 26 during the $30^{\text {th }}$-highest hour in August. The morning peak hour traffic volumes along the highway were then increased by the same overall percentage as the evening peak hour volumes (2.96 percent).

Figure 2 on page 9 shows the existing $201930^{\text {th }}$-highest hour traffic volumes for the morning and evening peak hours at the study intersections.



## OPERATIONAL ANALYSIS

An operational analysis was conducted for the study intersections using Synchro 10 software, with outputs calculated based on the HIGHWAY CAPACITY MANUAL, $\sigma^{\text {th }}$ Edition. The analysis was conducted for the weekday morning and evening peak hours.

The purpose of the existing conditions analysis is to establish how the study area intersections operate currently and allow for calibration of the operational analysis if required.

The results of the operational analysis are reported based on delay, Level of Service (LOS), and volume-to-capacity ratio ( $\mathrm{v} / \mathrm{c}$ ). Delays are reported in seconds. Level of service is reported as a letter grade and can range from A to F , with level of service A representing nearly free-flow conditions and level of service F representing high delays and severe congestion. A report of level of service D generally indicates moderately high but tolerable delays, and typically occurs prior to reaching intersection capacity. For unsignalized intersections, the $\mathrm{v} / \mathrm{c}$ represents the portion of the available intersection capacity that is being utilized on the worst intersection approach. A v/c ratio of 1.0 would indicate that the approach is operating at capacity.

The Oregon Department of Transportation requires that the intersections of Highway 26 at each end of SE Vista Loop Drive operate with a v/c ratio of 0.80 or less on the major-street approaches and a $\mathrm{v} / \mathrm{c}$ ratio of 0.90 or less on the minor-street approaches.

A summary of the existing conditions operational analysis is provided in Table 1 below. The reported delays and levels-of-service represent the approach lane which experiences the highest delays. The reported $\mathrm{v} / \mathrm{c}$ ratios represent the highest ratio for the major-street and minor-street movements.

Based on the analysis, the study intersections are currently operating acceptably. Detailed capacity analysis worksheets are provided in the technical appendix.

Table 1 - Operational Analysis Summary: 2019 Existing 30th-Highest Hour Conditions

| Intersection | AM Peak Hour |  |  | PM Peak Hour |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Delay | LOS | $\mathrm{v} / \mathrm{c}^{*}$ | Delay | LOS | $\mathrm{v} / \mathrm{c}^{*}$ |
| Highway 26 at Vista Loop Drive (west) | 10.5 | B | $0.19 / 0.05$ | 11.6 | B | $0.34 / 0.03$ |
| Vista Loop Drive at Ortiz Street | 8.5 | A | 0.01 | 8.4 | A | 0.01 |
| Highway 26 at Vista Loop Drive (east) | 10.4 | B | $0.20 / 0.01$ | 36.6 | E | $0.35 / 0.04$ |

*(major street $\mathrm{v} / \mathrm{c}$ ) / (minor-street $\mathrm{v} / \mathrm{c}$ )

## Site Trips

## Proposed Development

The proposed new development will consist of 88 single-family homes, 32 four-plex dwelling units and 48 apartment units. To estimate the number of trips that will be generated by the proposed development, trip rates from the TRIP GENERATION MANUAL, $10^{\text {th }}$ EDITION were used. Data from land-use codes 210, Single-Family Detached Housing, and 220, Multi-Family Housing, were used. The trip estimates are based on the number of dwelling units.

A summary of the trip generation calculations is provided in Table 2 below. Detailed trip generation worksheets are also included in the technical appendix.

Table 2 - Proposed Development Trip Generation Summary

|  | AM Peak Hour |  |  | PM Peak Hour |  |  | Daily |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In | Out | Total | In | Out | Total | Total |
| 80 Multi-Family Dwelling Units | 9 | 28 | 37 | 28 | 16 | 44 | 586 |
| 88 Single-Family Homes | 18 | 54 | 72 | 58 | 34 | 92 | 978 |
| Total Site Trips | 27 | 82 | 109 | 86 | 50 | 136 | 1,564 |

## Density Bonus Analysis

In addition to evaluation of the increase in site trips expected upon completion of the proposed residential development, trip generation calculations were prepared to examine the maximum permitted trip generation without the benefit of bonus density allowed per code section 17.64.40.C for planned developments. This allowed traffic level was compared to the proposed development traffic in order to determine whether the proposed use will result in a meaningful increase over traffic volumes that would otherwise be projected based on the underlying zoning.

The subject property is zoned SFR and has a total area of 32.929 acres and a net site area of 26.170 acres. The City of Sandy allows development of up to 5.8 dwelling units per acre within the SFR zone. Accordingly, the maximum development scenario for the underlying zoning absent a Planned Development would consist of 152 single-family homes.

A summary of the trip generation calculations for this density bonus comparison is provided in Table 3 on the following page. Detailed trip generation calculations are also included in the technical appendix.


Table 3 - Planned Development Trip Generation Calculations

|  | AM Peak Hour |  |  | PM Peak Hour |  |  | Daily |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In | Out | Total | In | Out | Total | Total |
| SFR Zoning (152 homes) | 28 | 85 | 113 | 96 | 56 | 152 | 1528 |
| Proposed Development | 27 | 82 | 109 | 86 | 50 | 136 | 1564 |
| Net Change In Site Trips | $\mathbf{- 1}$ | $\mathbf{- 3}$ | $\mathbf{- 4}$ | $\mathbf{- 1 0}$ | $\mathbf{- 6}$ | $\mathbf{- 1 6}$ | $\mathbf{3 6}$ |

Based on the analysis, the proposed Planned Development will not result in an increase in peak-hour traffic as compared to the maximum development permitted absent a Planned Development based on allowed development within the SFD zoning.

## TRIP DISTRIbUTION

The directional distribution of site trips to and from the project site was estimated based the existing travel patterns in the site vicinity, as well as the locations of likely trip destinations and major transportation routes. Overall, 85 percent of the anticipated site trips are projected to travel to and from the northwest on Highway 26 and 15 percent are projected to travel to and from the southeast on Highway 26.

It should be noted that a future development on the west side of Highway 26 may include an extension of Dubarko Road to intersect Highway 26 opposite the Highway 26 at Vista Loop Drive (west) intersection. Upon completion of this future street connection, it would be anticipated that approximately the trip distribution will consist of approximately 70 percent of site trips traveling to and from the north on Highway 26, 15 percent of site trips traveling to and from the west on Dubarko Road, and 15 percent of site trips traveling to and from the south on Highway 26.

The trip distribution percentages and trip assignment for the proposed development are shown in Figure 3 on page 13.


Future Conditions Analysis

## Background Volumes

In order to determine the expected impact of site trips on the study area intersections, it is necessary to compare traffic conditions both with and without the addition of the projected traffic from the proposed development. Since the proposed use cannot be constructed and occupied immediately, the comparison is made for future traffic conditions at the time of project completion. It is anticipated that the proposed use will be completed and occupied by 2022. Accordingly, the analysis was conducted for year 2022 traffic conditions.

Prior to adding the projected site trips to the study intersections, the existing traffic volumes were adjusted to account for background traffic growth over time. Background growth is expected to occur regardless of whether or not the proposed mixed-use development is constructed, and accounts for other developments outside the immediate project area.

Based on data from ODOT's Future Volume Tables, the growth rate for traffic volumes on Highway 26 in the site vicinity was calculated to be 1.93 percent per year (linear). This growth rate was applied to the through traffic volumes on the highway. All other turning movements had a growth factor of 2 percent per year (exponential) applied.

Figure 4 on page 15 shows the projected year 2022 background traffic volumes at the study intersections during the morning and evening peak hours

## BaCKGround Volumes plus Site Trips

Peak hour trips calculated to be generated by the proposed development were added to the projected year 2022 background traffic volumes to obtain the year 2022 total traffic volumes following completion of the proposed residential development. The resulting total traffic volumes are shown in figure 5 on page 16 .



## OPERATIONAL ANALYSIS

The operational analysis for future traffic conditions was again conducted using Synchro analysis software, with outputs based on the analysis methodologies contained in the HIGHWAY CAPACITY MANUAL, $\sigma^{\text {th }}$ Edition. The analysis was prepared for the intersections' morning and evening peak hours.

The results of the operational analysis are summarized in Table 4 below. Detailed analysis worksheets are also included in the technical appendix.

Table 4-Operational Analysis Summary: Year 2021 Future Conditions

| Intersection | AM Peak Hour |  |  | PM Peak Hour |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Delay | LOS | v/c* | Delay | LOS | $\mathrm{v} / \mathrm{c}^{*}$ |
| Highway 26 at Vista Loop Drive (west) |  |  |  |  |  |  |
| 2022 Background Conditions | 10.7 | B | $0.20 / 0.06$ | 11.9 | B | $0.36 / 0.05$ |
| 2022 Background plus Site | 11.2 | B | $0.22 / 0.11$ | 12.3 | B | $0.37 / 0.11$ |
| Vista Loop Drive at Ortiz Street |  |  |  |  |  |  |
| 2022 Background Conditions | 8.5 | A | 0.01 | 8.4 | A | 0.01 |
| 2022 Background Plus Site | 8.8 | A | 0.03 | 9.2 | A | 0.03 |
| Vista Loop Drive at S Knapp Access |  |  |  |  |  |  |
| 2022 Background Plus Site | 8.6 | A | 0.02 | 8.7 | A | 0.01 |
| Vista Loop Drive at Picking Site Access |  |  |  |  |  |  |
| 2022 Background Plus Site | 8.9 | A | 0.06 | 8.9 | A | 0.04 |
| Highway 26 at Vista Loop Drive (east) |  |  |  |  |  |  |
| 2022 Background Conditions | 10.5 | B | $0.21 / 0.01$ | 41.5 | E | $0.37 / 0.04$ |
| 2022 Background plus Site | 14.3 | B | $0.21 / 0.13$ | 28.0 | D | $0.37 / 0.18$ |

*(major street $\mathrm{v} / \mathrm{c}$ ) / (minor-street $\mathrm{v} / \mathrm{c}$ )
Based on the results of the operational analysis, the study intersections on Highway 26 are projected to operate acceptably per ODOT standards either with or without the addition of site trips from the proposed development. The intersections along Vista Loop Drive are also projected to operate acceptably per the requirements of the City of Sandy. No operational mitigations are necessary or recommended in conjunction with the proposed development.

## Queuing Analysis

In addition to the operational analysis, a queuing analysis was conducted to determine whether the closely spaced intersections of Highway 26 at SE Vista Loop Drive and the proposed Picking property site access on SE Vista Loop Drive can operate without queuing conflicts. The analysis was conducted for the morning and evening peak hours. Since the access will not exist without development of the subject property, the queuing analysis was conducted only for year 2022 background plus site trips conditions.

Based on the analysis, the projected $95^{\text {th }}$ percentile queue lengths for the southwest-bound approach on SE Vista Loop Drive to Highway 26 were 60 feet during the morning peak hour and 63 feet during the evening peak hour (approximately two to three vehicles). Since the projected queue lengths are far shorter than the distance along SE Vista Loop Drive between Highway 26 and the nearest proposed site access, no operational concerns are anticipated in conjunction with the close intersection spacing and no queuing-related mitigations are recommended.

## Safety Analysis

## Crash Data analysis

Using data obtained from the Oregon Department of Transportation, a review of the five most recent years of available crash history (from January 2013 through December 2017) was performed for the study intersections. None of the study intersections had any reported crashes during the five-year analysis period. Based on the crash data, no safety mitigations are recommended.

## Warrant analysis

Traffic signal and turn-lane warrants were examined for the study intersections.
Based on the projected traffic volumes, traffic signal warrants are not projected to be met at any of the unsignalized study intersections for any of the analysis scenarios. No new traffic signals are recommended in conjunction with the proposed development.

Turn lane warrants were also examined for the major-street approaches to the unsignalized study intersections. Left-turn lane warrants are intended to evaluate whether a meaningful safety benefit may be expected if the turning vehicles are provided with turn lane within the street, allowing leftturning drivers to move out of the through travel lane so that following vehicles may pass without conflicts.

Southeast-bound left-turn lanes are already in place on Highway 26 at both ends of SE Vista Loop Drive. However, northwest-bound right-turn lanes are not provided. Based on the projected turning movement volumes, right-turn lane warrants are not projected to be met. Since the design hour traffic volumes in the outside (westbound) travel lane are well below 700 vehicles per hour, the need for a shoulder improvement per the ODOT Right Turn Lane Criterion is also not triggered.

By inspection, traffic volumes at the site access intersections along SE Vista Loop Drive are too low to warrant either traffic signals or dedicated turn lanes. No new signals or turn lanes are recommended for these intersections.

## Intersection Sight Distance

Based on the posted speed limit of 25 mph , a minimum of 280 feet of intersection sight distance is required in each direction for each proposed point of access along SE Vista Loop Drive. With clearing of vegetation from the site frontage it is projected that this minimum can be met for the two new intersections that will serve development within the Knapp property.

For the new site access serving the Picking property, 280 feet of intersection sight distance can be provided to the north with clearing of vegetation along the east side of the roadway north of the proposed access. However, sight distance to the south will be limited by the proximity of the proposed access to Highway 26 since the access is spaced approximately 230 feet from Highway 26.


Notably, sight lined from the proposed access are projected to be continuous to Highway 26, and vehicles turning from the site access onto SE Vista Loop Drive are not required to yield to vehicles that have not yet turned onto Vista Loop Drive. Accordingly, it is appropriate to evaluate whether adequate stopping sight distance is available for vehicles turning from Highway 26 onto Vista Loop Drive to stop if necessary to avoid a collision.

Vehicles turning from Highway 26 would be expected to turn at speeds of up to approximately 25 mph . The minimum required stopping sight distance for this approach speed was calculated to be 155 feet. Since the proposed access is spaced more than 155 feet from Highway 26, the access can operate safely.

Based on the sight distance analysis, adequate sight lines can be attained for safe operation of all proposed points of access for the proposed development.

## Conclusions

Based on the operational analysis, the study intersections currently operate acceptably and are projected to continue to operate acceptably under year 2022 traffic conditions either with or without the addition of site trips from the proposed development.

Based on the queuing analysis, there is sufficient distance along SE Vista Loop Drive between the Highway 26 and the proposed site access location for the Picking Property to allow the intersections to operate without interference of queues. No queuing-related mitigations are necessary or recommended in conjunction with the proposed development.

Based on the crash data, the study intersections are currently operating acceptably with respect to safety.

Based on the warrant analysis, no new traffic signals or turn lanes are recommended.
Intersection sight distance was evaluated for the proposed points of access along SE Vista Loop Drive. Based on the analysis, it is projected that adequate sight distance can be achieved for all access locations with clearing of vegetation from the roadside. No other sight distance mitigations are necessary or recommended.

APPENDIX
Total Vehicle Summary

SE Vista Loop Dr \& Hwy 26
Wednesday, March 20, 2019 7:00 AM to 9:00 AM

## 5-Minute Interval Summary <br> 7:00 AM to 9:00 AM



| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

15-Minute Interval Summary
7:00 AM to 9:00 AM

| Interval Start Time | NorthboundSE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  |
| 7:00 AM |  | 0 | 0 | 12 | 0 | 2 | 74 | 0 | 202 | 0 | 0 | 290 |
| 7:15 AM |  | 0 | 0 | 8 | 0 | 5 | 114 | 0 | 196 | 0 | 0 | 323 |
| 7:30 AM |  | 0 | 0 | 9 | 0 | 5 | 143 | 0 | 156 | 1 | 0 | 314 |
| 7:45 AM |  | 0 | 0 | 6 | 0 | 4 | 165 | 0 | 137 | 0 | 0 | 312 |
| 8:00 AM |  | 0 | 1 | 6 | 0 | 4 | 138 | 0 | 121 | 0 | 0 | 270 |
| 8:15 AM |  | 0 | 0 | 1 | 0 | 6 | 123 | 0 | 120 | 0 | 0 | 250 |
| 8:30 AM |  | 0 | 1 | 4 | 0 | 0 | 181 | 0 | 138 | 0 | 0 | 324 |
| 8:45 AM |  | 0 | 0 | 3 | 0 | 4 | 183 | 0 | 147 | 0 | 0 | 337 |
| Total Survey |  | 0 | 2 | 49 | 0 | 30 | 1,121 | 0 | 1,217 | 1 | 0 | 2,420 |


| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

Peak Hour Summary


| By <br> Movement | Northbound SE Vista Loop Dr |  |  |  | Southbound SE Vista Loop Dr |  |  |  | Eastbound Hwy 26 |  |  |  | Westbound Hwy 26 |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | L |  | R | Total | L | T |  | Total |  | T | R | Total |  |
| Volume |  |  |  | 0 | 0 |  | 35 | 35 | 16 | 496 |  | 512 |  | 691 | 1 | 692 | 1,239 |
| \%HV | NA | NA | NA | 0.0\% | 0.0\% | NA | 8.6\% | 8.6\% | 6.3\% | 12.7\% | NA | 12.5\% | NA | 6.4\% | 0.0\% | 6.4\% | 9.0\% |
| PHF |  |  |  | 0.00 | 0.00 |  | 0.73 | 0.73 | 0.80 | 0.75 |  | 0.76 |  | 0.81 | 0.25 | 0.81 | 0.93 |

Rolling Hour Summary 7:00 AM to 9:00 AM

| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \end{gathered}$ | NorthboundSE Vista Loop Dr |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total | Pedestrians Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  | North | South | East | West |
| 7:00 AM |  | 0 | 0 | 35 | 0 | 16 | 496 | 0 | 691 | 1 | 0 | 1,239 | 0 | 0 | 0 | 0 |
| 7:15 AM |  | 0 | 1 | 29 | 0 | 18 | 560 | 0 | 610 | 1 | 0 | 1,219 | 0 | 0 | 0 | 0 |
| 7:30 AM |  | 0 | 1 | 22 | 0 | 19 | 569 | 0 | 534 | 1 | 0 | 1,146 | 0 | 0 | 0 | 0 |
| 7:45 AM |  | 0 | 2 | 17 | 0 | 14 | 607 | 0 | 516 | 0 | 0 | 1,156 | 0 | 0 | 0 | 0 |
| 8:00 AM |  | 0 | 2 | 14 | 0 | 14 | 625 | 0 | 526 | 0 | 0 | 1,181 | 0 | 0 | 0 | 0 |

## Heavy Vehicle Summary



Out 47
In 64

SE Vista Loop Dr \& Hwy 26
Wednesday, March 20, 2019
7:00 AM to 9:00 AM


Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM


Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

| Interval Start Time | NorthboundSE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 7:00 AM |  | 0 | 0 | 1 | 1 | 0 | 12 | 12 | 12 | 0 | 12 | 25 |
| 7:15 AM |  | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 6 | 0 | 6 | 21 |
| 7:30 AM |  | 0 | 0 | 2 | 2 | 1 | 21 | 22 | 14 | 0 | 14 | 38 |
| 7:45 AM |  | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 12 | 0 | 12 | 27 |
| 8:00 AM |  | 0 | 0 | 2 | 2 | 2 | 21 | 23 | 14 | 0 | 14 | 39 |
| 8:15 AM |  | 0 | 0 | 0 | 0 | 2 | 13 | 15 | 8 | 0 | 8 | 23 |
| 8:30 AM |  | 0 | 1 | 0 | 1 | 0 | 23 | 23 | 15 | 0 | 15 | 39 |
| 8:45 AM |  | 0 | 0 | 0 | 0 | 1 | 14 | 15 | 13 | 0 | 13 | 28 |
| Total Survey |  | 0 | 1 | 5 | 6 | 6 | 134 | 140 | 94 | 0 | 94 | 240 |

Heavy Vehicle Peak Hour Summary


| By <br> Movement | $\begin{aligned} & \text { Northb } \\ & \text { SE Vistal } \end{aligned}$ |  | SouthboundSE Vista Loop Dr |  |  | $\begin{aligned} & \text { Eastbound } \\ & \text { Hwy } 26 \end{aligned}$ |  |  | Westbound Hwy 26 |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| Volume |  | 0 | 0 | 3 | 3 | 1 | 63 | 64 | 44 | 0 | 44 | 111 |
| PHF |  | 0.00 | 0.00 | 0.38 | 0.38 | 0.25 | 0.75 | 0.73 | 0.79 | 0.00 | 0.79 | 0.73 |

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

| Interval Start | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 7:00 AM |  | 0 | 0 | 3 | 3 | , | 63 | 64 | 44 | 0 | 44 | 111 |
| 7:15 AM |  | 0 | 0 | 4 | 4 | 3 | 72 | 75 | 46 | 0 | 46 | 125 |
| 7:30 AM |  | 0 | 0 | 4 | 4 | 5 | 70 | 75 | 48 | 0 | 48 | 127 |
| 7:45 AM |  | 0 | 1 | 2 | 3 | 4 | 72 | 76 | 49 | 0 | 49 | 128 |
| 8:00 AM |  | 0 | 1 | 2 | 3 | 5 | 71 | 76 | 50 | 0 | 50 | 129 |


Total Vehicle Summary

SE Vista Loop Dr \& Hwy 26
Tuesday, March 19, 2019
4:00 PM to 6:00 PM
5-Minute Interval Summary
4:00 PM to 6:00 PM


| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 |

15-Minute Interval Summary 4:00 PM to 6:00 PM

| Interval Start Time | NorthboundSE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total | Pedestrians Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  | North | South | East | West |
| 4:00 PM |  | 0 | 1 | 5 | 0 | 8 | 179 | 0 | 177 | 0 | 0 | 370 | 0 | 0 | 0 | 0 |
| 4:15 PM |  | 0 | 0 | 6 | 0 | 10 | 204 | 0 | 165 | 0 | 0 | 385 | 0 | 0 | 0 | 0 |
| 4:30 PM |  | 0 | 0 | 3 | 0 | 9 | 196 | 2 | 185 | 0 | 0 | 393 | 1 | 0 | 0 | 0 |
| 4:45 PM |  | 0 | 0 | 2 | 1 | 7 | 193 | 0 | 176 | 0 | 0 | 378 | 0 | 0 | 0 | 0 |
| 5:00 PM |  | 0 | 0 | 4 | 0 | 10 | 194 | 0 | 181 | 0 | 0 | 389 | 0 | 0 | 0 | 0 |
| 5:15 PM |  | 0 | 0 | 4 | 0 | 3 | 191 | 0 | 124 | 0 | 0 | 322 | 0 | 0 | 0 | 0 |
| 5:30 PM |  | 0 | 0 | 5 | 0 | 5 | 194 | 0 | 107 | 0 | 0 | 311 | 0 | 0 | 0 | 0 |
| 5:45 PM |  | 0 | 0 | 3 | 0 | 4 | 209 | 0 | 133 | 0 | 0 | 349 | 0 | 0 | 0 | 0 |
| Total Survey |  | 0 | 1 | 32 | 1 | 56 | 1,560 | 2 | 1,248 | 0 | 0 | 2,897 | 1 | 0 | 0 | 0 |

Peak Hour Summary


| By | Northbound SE Vista Loop Dr |  |  |  | Southbound SE Vista Loop Dr |  |  |  | Eastbound Hwy 26 |  |  |  | Westbound Hwy 26 |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | L |  | R | Total | L | T |  | Total |  | T | R | Total |  |
| Volume |  |  |  | 0 | 0 |  | 15 | 15 | 36 | 787 |  | 823 |  | 707 | 0 | 707 | 1,545 |
| \%HV | NA | NA | NA | 0.0\% | 0.0\% | NA | 13.3\% | 13.3\% | 0.0\% | 3.3\% | NA | 3.2\% | NA | 6.6\% | 0.0\% | 6.6\% | 4.9\% |
| PHF |  |  |  | 0.00 | 0.00 |  | 0.54 | 0.54 | 0.90 | 0.93 |  | 0.94 |  | 0.95 | 0.00 | 0.95 | 0.97 |

## Rolling Hour Summary

 4:00 PM to 6:00 PM| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \end{gathered}$ | NorthboundSE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total | Pedestrians Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  | North | South | East | West |
| 4:00 PM |  | 0 | 1 | 16 | 1 | 34 | 772 | 2 | 703 | 0 | 0 | 1,526 | 1 | 0 | 0 | 0 |
| 4:15 PM |  | 0 | 0 | 15 | 1 | 36 | 787 | 2 | 707 | 0 | 0 | 1,545 | 1 | 0 | 0 | 0 |
| 4:30 PM |  | 0 | 0 | 13 | 1 | 29 | 774 | 2 | 666 | 0 | 0 | 1,482 | 1 | 0 | 0 | 0 |
| 4:45 PM |  | 0 | 0 | 15 | 1 | 25 | 772 | 0 | 588 | 0 | 0 | 1,400 | 0 | 0 | 0 | 0 |
| 5:00 PM |  | 0 | 0 | 16 | 0 | 22 | 788 | 0 | 545 | 0 | 0 | 1,371 | 0 | 0 | 0 | 0 |


Tuesday, March 19, 2019
4:00 PM to 6:00 PM

## 26

Heavy Vehicle 5-Minute Interval Summary 4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \\ \hline \end{gathered}$ | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 4:00 PM |  | 0 | 1 | 2 | 3 | 2 | 10 | 12 | 19 | 0 | 19 | 34 |
| 4:15 PM |  | 0 | 0 | 2 | 2 | 0 | 12 | 12 | 10 | 0 | 10 | 24 |
| 4:30 PM |  | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 9 | 0 | 9 | 13 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 12 | 0 | 12 | 16 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 16 | 0 | 16 | 22 |
| 5:15 PM |  | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 7 | 0 | 7 | 9 |
| 5:30 PM |  | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 8 | 0 | 8 | 12 |
| 5:45 PM |  | 0 | 0 |  | 0 | 0 | 4 | 4 | 6 | 0 | 6 | 10 |
| Total Survey |  | 0 | 1 | 4 | 5 | 2 | 46 | 48 | 87 | 0 | 87 | 140 |

Heavy Vehicle Peak Hour Summary


| By <br> Movement | $\begin{aligned} & \text { Northb } \\ & \text { SE Vistal } \end{aligned}$ |  | SouthboundSE Vista Loop Dr |  |  | $\begin{aligned} & \text { Eastbound } \\ & \text { Hwy } 26 \end{aligned}$ |  |  | Westbound Hwy 26 |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| Volume |  | 0 | 0 | 2 | 2 | 0 | 26 | 26 | 47 | 0 | 47 | 75 |
| PHF |  | 0.00 | 0.00 | 0.25 | 0.25 | 0.00 | 0.54 | 0.54 | 0.73 | 0.00 | 0.73 | 0.78 |

Heavy Vehicle Rolling Hour Summary 4:00 PM to 6:00 PM

| Interval Start Time | Northbound SE Vista Loop Dr |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | WestboundHwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 4:00 PM |  | 0 | 1 | 4 | 5 | 2 | 30 | 32 | 50 | 0 | 50 | 87 |
| 4:15 PM |  | 0 | 0 | 2 | 2 | 0 | 26 | 26 | 47 | 0 | 47 | 75 |
| 4:30 PM |  | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 44 | 0 | 44 | 60 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 43 | 0 | 43 | 59 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 0 | 16 | 16 | 37 | 0 | 37 | 53 |



Total Vehicle Summary

Out 554
In 548
SE Vista Loop Dr \& Hwy 26
Thursday, July 18, 2019
7:00 AM to 9:00 AM
5-Minute Interval Summary
7:00 AM to 9:00 AM

| Interval Start | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  |
| 7:00 AM |  | 0 | 0 | 1 | 0 | 0 | 23 | 0 | 41 | 0 | 0 | 65 |
| 7:05 AM |  | 0 | 0 | 0 | 0 | 0 | 23 | 0 | 55 | 0 | 0 | 78 |
| 7:10 AM |  | 0 | 0 | 1 | 0 | 1 | 31 | 0 | 47 | 0 | 0 | 80 |
| 7:15 AM |  | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 53 | 0 | 0 | 88 |
| 7:20 AM |  | 0 | 1 | 0 | 0 | 0 | 30 | 0 | 56 | 0 | 0 | 87 |
| 7:25 AM |  | 0 | 0 | 0 | 0 | 0 | 38 | 1 | 43 | 0 | 0 | 81 |
| 7:30 AM |  | 0 | 1 | 1 | 0 | 0 | 34 | 0 | 52 | 0 | 0 | 88 |
| 7:35 AM |  | 0 | 0 | 0 | 0 | 0 | 45 | 0 | 47 | 0 | 0 | 92 |
| 7:40 AM |  | 0 | 0 | 0 | 0 | 0 | 36 | 0 | 41 | 0 | 0 | 77 |
| 7:45 AM |  | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 52 | 0 | 0 | 86 |
| 7:50 AM |  | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 35 | 0 | 0 | 78 |
| 7:55 AM |  | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 44 | 1 | 0 | 71 |
| 8:00 AM |  | 0 | 0 | 0 | 0 | 1 | 60 | 0 | 42 | 0 | 0 | 103 |
| 8:05 AM |  | 0 | 0 | 0 | 0 | 1 | 45 | 0 | 31 | 0 | 0 | 77 |
| 8:10 AM |  | 0 | 0 | 2 | 0 | 1 | 28 | 0 | 40 | 0 | 0 | 71 |
| 8:15 AM |  | 0 | 0 | 0 | 0 | 0 | 40 | 0 | 45 | 0 | 0 | 85 |
| 8:20 AM |  | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 51 | 0 | 0 | 86 |
| 8:25 AM |  | 0 | 0 | 0 | 0 | 0 | 53 | 0 | 36 | 0 | 0 | 89 |
| 8:30 AM |  | 0 | 0 | 0 | 0 | 1 | 36 | 0 | 50 | 0 | 0 | 87 |
| 8:35 AM |  | 0 | 0 | 0 | 0 | 0 | 44 | 0 | 50 | 0 | 0 | 94 |
| 8:40 AM |  | 0 | 0 | 0 | 0 | 0 | 50 | 0 | 56 | 0 | 0 | 106 |
| 8:45 AM |  | 0 | 0 | 0 | 0 | 0 | 62 | 0 | 50 | 0 | 0 | 112 |
| 8:50 AM |  | 0 | 0 | 1 | 0 | 0 | 40 | 0 | 46 | 1 | 0 | 88 |
| 8:55 AM |  | 0 | 0 | 0 | 0 | 0 | 51 | 0 | 54 | 0 | 0 | 105 |
| Total Survey |  | 0 | 2 | 6 | 0 | 5 | 942 | 1 | 1,117 | 2 | 0 | 2,074 |


| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

15-Minute Interval Summary
7:00 AM to 9:00 AM

| Interval Start Time | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  |
| 7:00 AM |  | 0 | O | 2 | 0 | 1 | 77 | 0 | 143 | 0 | 0 | 223 |
| 7:15 AM |  | 0 | 1 | 0 | 0 | 0 | 103 | 1 | 152 | 0 | 0 | 256 |
| 7:30 AM |  | 0 | 1 | 1 | 0 | 0 | 115 | 0 | 140 | 0 | 0 | 257 |
| 7:45 AM |  | 0 | 0 | 0 | 0 | 0 | 103 | 0 | 131 | 1 | 0 | 235 |
| 8:00 AM |  | 0 | 0 | 2 | 0 | 3 | 133 | 0 | 113 | 0 | 0 | 251 |
| 8:15 AM |  | 0 | 0 | 0 | 0 | 0 | 128 | 0 | 132 | 0 | 0 | 260 |
| 8:30 AM |  | 0 | 0 | 0 | 0 | 1 | 130 | 0 | 156 | 0 | 0 | 287 |
| 8:45 AM |  | 0 | 0 | 1 | 0 | 0 | 153 | 0 | 150 | 1 | 0 | 305 |
| Total Survey |  | 0 | 2 | 6 | 0 | 5 | 942 | 1 | 1,117 | 2 | 0 | 2,074 |


| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

Peak Hour Summary


| By <br> Movement | Northbound SE Vista Loop Dr |  |  |  | Southbound SE Vista Loop Dr |  |  |  | Eastbound Hwy 26 |  |  |  | Westbound Hwy 26 |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | L |  | R | Total | L | T |  | Total |  | T | R | Total |  |
| Volume |  |  |  | 0 | 0 |  | 3 | 3 | 4 | 544 |  | 548 |  | 551 | 1 | 552 | 1,103 |
| \%HV | NA | NA | NA | 0.0\% | 0.0\% | NA | 0.0\% | 0.0\% | 75.0\% | 11.9\% | NA | 12.4\% | NA | 8.7\% | 0.0\% | 8.7\% | 10.5\% |
| PHF |  |  |  | 0.00 | 0.00 |  | 0.38 | 0.38 | 0.33 | 0.87 |  | 0.88 |  | 0.88 | 0.25 | 0.88 | 0.88 |

## Rolling Hour Summary

7:00 AM to 9:00 AM

| Interval Start Time | Northbound SE Vista Loop Dr |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total | Pedestrians Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  | North | South | East | West |
| 7:00 AM |  | 0 | 2 | 3 | 0 | 1 | 398 | 1 | 566 | 1 | 0 | 971 | 0 | 0 | 0 | 0 |
| 7:15 AM |  | 0 | 2 | 3 | 0 | 3 | 454 | 1 | 536 | 1 | 0 | 999 | 0 | 0 | 0 | 0 |
| 7:30 AM |  | 0 | 1 | 3 | 0 | 3 | 479 | 0 | 516 | 1 | 0 | 1,003 | 0 | 0 | 0 | 0 |
| 7:45 AM |  | 0 | 0 | 2 | 0 | 4 | 494 | 0 | 532 | 1 | 0 | 1,033 | 0 | 0 | 0 | 0 |
| 8:00 AM |  | 0 | 0 | 3 | 0 | 4 | 544 | 0 | 551 | 1 | 0 | 1,103 | 0 | 0 | 0 | 0 |

## Heavy Vehicle Summary



SE Vista Loop Dr \& Hwy 26
Thursday, July 18, 2019
7:00 AM to 9:00 AM


Heavy Vehicle 5-Minute Interval Summary
7:00 AM to 9:00 AM


Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \\ \hline \end{gathered}$ | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 7:00 AM |  | 0 | 0 | O | 0 | 0 | 11 | 11 | 11 | 0 | 11 | 22 |
| 7:15 AM |  | 0 | 0 | 0 | 0 | 0 | 14 | 14 | 7 | 0 | 7 | 21 |
| 7:30 AM |  | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 5 | 0 | 5 | 20 |
| 7:45 AM |  | 0 | 0 | 0 | 0 | 0 | 10 | 10 | 10 | 1 | 11 | 21 |
| 8:00 AM |  | 0 | 0 | 0 | 0 | 2 | 26 | 28 | 6 | 0 | 6 | 34 |
| 8:15 AM |  | 0 | 0 | 0 | 0 | 0 | 13 | 13 | 14 | 0 | 14 | 27 |
| 8:30 AM |  | 0 | 0 | 0 | 0 | 1 | 11 | 12 | 18 | 0 | 18 | 30 |
| 8:45 AM |  | 0 | 0 | 0 | 0 | 0 | 15 | 15 | 10 | 0 | 10 | 25 |
| Total Survey |  | 0 | 0 | 0 | 0 | 3 | 115 | 118 | 81 | 1 | 82 | 200 |

Heavy Vehicle Peak Hour Summary
8:00 AM to 9:00 AM

| By <br> Approach | NorthboundSE Vista Loop Dr |  |  | $\begin{aligned} & \text { Southbound } \\ & \text { SE Vista Loop Dr } \end{aligned}$ |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | In | Out | Total | In | Out | Total | In | Out | Total | In | Out | Total |  |
| Volume | 0 | 0 | 0 | 0 | 3 | 3 | 68 | 48 | 116 | 48 | 65 | 113 | 116 |
| PHF | 0.00 |  |  | 0.00 |  |  | 0.61 |  |  | 0.63 |  |  | 0.81 |


| By <br> Movement | Northbound SE Vista Loop Dr |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| Volume |  | 0 | 0 | 0 | 0 | 3 | 65 | 68 | 48 | 0 | 48 | 116 |
| PHF |  | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.63 | 0.61 | 0.63 | 0.00 | 0.63 | 0.81 |

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

| Interval Start | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 7:00 AM |  | 0 | 0 | 0 | 0 | 0 | 50 | 50 | 33 | 1 | 34 | 84 |
| 7:15 AM |  | 0 | 0 | 0 | 0 | 2 | 65 | 67 | 28 | 1 | 29 | 96 |
| 7:30 AM |  | 0 | 0 | 0 | 0 | 2 | 64 | 66 | 35 | 1 | 36 | 102 |
| 7:45 AM |  | 0 | 0 | 0 | 0 | 3 | 60 | 63 | 48 | 1 | 49 | 112 |
| 8:00 AM |  | 0 | 0 | 0 | 0 | 3 | 65 | 68 | 48 | 0 | 48 | 116 |


Total Vehicle Summary


Thursday, July 18, 2019
4:00 PM to 6:00 PM
5-Minute Interval Summary
4:00 PM to 6:00 PM

| Interval Start | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Time |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  |
| 4:00 PM |  | 0 | 0 | 1 | 0 | 0 | 75 | 0 | 82 | 0 | 0 | 158 |
| 4:05 PM |  | 0 | 0 | 0 | 0 | 0 | 91 | 0 | 68 | 0 | 0 | 159 |
| 4:10 PM |  | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 82 | 0 | 0 | 142 |
| 4:15 PM |  | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 62 | 0 | 0 | 151 |
| 4:20 PM |  | 0 | 0 | 0 | 0 | 0 | 95 | 0 | 70 | 0 | 0 | 165 |
| 4:25 PM |  | 0 | 0 | 1 | 0 | 2 | 69 | 0 | 63 | 0 | 0 | 135 |
| 4:30 PM |  | 0 | 0 | 1 | 0 | 0 | 72 | 0 | 61 | 0 | 0 | 134 |
| 4:35 PM |  | 0 | 0 | 0 | 0 | 0 | 88 | 0 | 67 | 0 | 0 | 155 |
| 4:40 PM |  | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 66 | 0 | 0 | 126 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 0 | 76 | 0 | 58 | 0 | 0 | 134 |
| 4:50 PM |  | 0 | 0 | 0 | 0 | 1 | 81 | 0 | 76 | 0 | 0 | 158 |
| 4:55 PM |  | 0 | 0 | 0 | 0 | 0 | 89 | 0 | 68 | 0 | 0 | 157 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 1 | 79 | 0 | 99 | 0 | 0 | 179 |
| 5:05 PM |  | 0 | 0 | 0 | 0 | 0 | 76 | 0 | 59 | 0 | 0 | 135 |
| 5:10 PM |  | 0 | 0 | 0 | 0 | 1 | 95 | 0 | 60 | 0 | 1 | 156 |
| 5:15 PM |  | 0 | 0 | 0 | 0 | 0 | 92 | 0 | 79 | 1 | 0 | 172 |
| 5:20 PM |  | 0 | 0 | 0 | 0 | 0 | 78 | 0 | 56 | 0 | 0 | 134 |
| 5:25 PM |  | 0 | 0 | 0 | 0 | 0 | 92 | 0 | 76 | 0 | 0 | 168 |
| 5:30 PM |  | 0 | 2 | 0 | 0 | 0 | 82 | 0 | 69 | 0 | 0 | 153 |
| 5:35 PM |  | 0 | 0 | 0 | 0 | 0 | 93 | 0 | 61 | 0 | 0 | 154 |
| 5:40 PM |  | 0 | 2 | 0 | 0 | 0 | 76 | 0 | 67 | 2 | 0 | 147 |
| 5:45 PM |  | 0 | 0 | 0 | 0 | 0 | 90 | 1 | 56 | 0 | 0 | 146 |
| 5:50 PM |  | 0 | 0 | 1 | 0 | 0 | 78 | 0 | 59 | 0 | 0 | 138 |
| 5:55 PM |  | 0 | 0 | 0 | 0 | 1 | 72 | 0 | 50 | 0 | 0 | 123 |
| Total Survey |  | 0 | 4 | 4 | 0 | 6 | 1,948 | 1 | 1,614 | 3 | 1 | 3,579 |


| Pedestrians <br> Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: |
| North | South | East | West |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

15-Minute Interval Summary
4:00 PM to 6:00 PM

| Interval Start Time | NorthboundSE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | WestboundHwy 26 |  |  | Interval Total | Pedestrians Crosswalk |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  | North | South | East | West |
| 4:00 PM |  | 0 | 0 | 1 | 0 | 0 | 226 | 0 | 232 | 0 | 0 | 459 | 0 | 0 | 0 | 0 |
| 4:15 PM |  | 0 | 0 | 1 | 0 | 2 | 253 | 0 | 195 | 0 | 0 | 451 | 0 | 0 | 0 | 0 |
| 4:30 PM |  | 0 | 0 | 1 | 0 | 0 | 220 | 0 | 194 | 0 | 0 | 415 | 0 | 0 | 0 | 0 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 1 | 246 | 0 | 202 | 0 | 0 | 449 | 0 | 0 | 0 | 0 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 2 | 250 | 0 | 218 | 0 | 1 | 470 | 0 | 0 | 0 | 0 |
| 5:15 PM |  | 0 | 0 | 0 | 0 | 0 | 262 | 0 | 211 | 1 | 0 | 474 | 0 | 0 | 0 | 0 |
| 5:30 PM |  | 0 | 4 | 0 | 0 | 0 | 251 | 0 | 197 | 2 | 0 | 454 | 0 | 0 | 0 | 0 |
| 5:45 PM |  | 0 | 0 | 1 | 0 | 1 | 240 | 1 | 165 | 0 | 0 | 407 | 0 | 0 | 0 | 0 |
| Total Survey |  | 0 | 4 | 4 | 0 | 6 | 1,948 | 1 | 1,614 | 3 | 1 | 3,579 | 0 | 0 | 0 | 0 |

Peak Hour Summary


| By <br> Movement | Northbound SE Vista Loop Dr |  |  |  | Southbound SE Vista Loop Dr |  |  |  | Eastbound Hwy 26 |  |  |  | Westbound Hwy 26 |  |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Total | L |  | R | Total | L | T |  | Total |  | T | R | Total |  |
| Volume |  |  |  | 0 | 4 |  | 0 | 4 | 3 | 1,023 |  | 1,026 |  | 826 | 3 | 829 | 1,859 |
| \%HV | NA | NA | NA | 0.0\% | 0.0\% | NA | 0.0\% | 0.0\% | 0.0\% | 2.7\% | NA | 2.7\% | NA | 5.0\% | 0.0\% | 4.9\% | 3.7\% |
| PHF |  |  |  | 0.00 | 0.25 |  | 0.00 | 0.25 | 0.38 | 0.96 |  | 0.96 |  | 0.85 | 0.38 | 0.85 | 0.94 |

## Rolling Hour Summary

| Interval Start Time | Northbound SE Vista Loop Dr |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Bikes | L | R | Bikes | L | T | Bikes | T | R | Bikes |  |
| 4:00 PM |  | 0 | 0 | 3 | 0 | 3 | 945 | 0 | 823 | 0 | 0 | 1,774 |
| 4:15 PM |  | 0 | 0 | 2 | 0 | 5 | 969 | 0 | 809 | 0 | 1 | 1,785 |
| 4:30 PM |  | 0 | 0 | 1 | 0 | 3 | 978 | 0 | 825 | 1 | 1 | 1,808 |
| 4:45 PM |  | 0 | 4 | 0 | 0 | 3 | 1,009 | 0 | 828 | 3 | 1 | 1,847 |
| 5:00 PM |  | 0 | 4 | 1 | 0 | 3 | 1,003 | 1 | 791 | 3 | 1 | 1,805 |


| Pedestrians   <br> Corsswalk   <br> North   |  |  |  |
| :---: | :---: | :---: | :---: |
| South | East | West |  |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 |

## Heavy Vehicle Summary



SE Vista Loop Dr \& Hwy 26
Thursday, July 18, 2019
4:00 PM to 6:00 PM


Heavy Vehicle 5-Minute Interval Summary 4:00 PM to 6:00 PM


Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \\ \hline \end{gathered}$ | $\begin{gathered} \text { Northbound } \\ \text { SE Vista Loop Dr } \end{gathered}$ |  | SouthboundSE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | Westbound Hwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 4:00 PM |  | 0 | 0 | O | 0 | 0 | 10 | 10 | 17 | 0 | 17 | 27 |
| 4:15 PM |  | 0 | 0 | 0 | 0 | 0 | 9 | 9 | 8 | 0 | 8 | 17 |
| 4:30 PM |  | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 13 | 0 | 13 | 19 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 9 | 0 | 9 | 15 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 0 | 13 | 13 | 5 | 0 | 5 | 18 |
| 5:15 PM |  | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 14 | 0 | 14 | 19 |
| 5:30 PM |  | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 14 | 0 | 14 | 18 |
| 5:45 PM |  | 0 | 0 | - | 0 | 0 | 4 |  | 9 | 0 | 9 | 13 |
| Total Survey |  | 0 | 0 | 0 | 0 | 0 | 57 | 57 | 89 | 0 | 89 | 146 |

Heavy Vehicle Peak Hour Summary


| By <br> Movement | $\begin{aligned} & \text { Northb } \\ & \text { SE Vistal } \end{aligned}$ |  | SouthboundSE Vista Loop Dr |  |  | $\begin{aligned} & \text { Eastbound } \\ & \text { Hwy } 26 \end{aligned}$ |  |  | Westbound Hwy 26 |  |  | Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| Volume |  | 0 | 0 | 0 | 0 | 0 | 28 | 28 | 41 | 0 | 41 | 69 |
| PHF |  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | 0.54 | 0.64 | 0.00 | 0.64 | 0.86 |

Heavy Vehicle Rolling Hour Summary 4:00 PM to 6:00 PM

| $\begin{gathered} \hline \text { Interval } \\ \text { Start } \\ \text { Time } \end{gathered}$ | Northbound SE Vista Loop Dr |  | Southbound SE Vista Loop Dr |  |  | Eastbound Hwy 26 |  |  | WestboundHwy 26 |  |  | Interval Total |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total | L | R | Total | L | T | Total | T | R | Total |  |
| 4:00 PM |  | 0 | 0 | 0 | 0 | 0 | 31 | 31 | 47 | 0 | 47 | 78 |
| 4:15 PM |  | 0 | 0 | 0 | 0 | 0 | 34 | 34 | 35 | 0 | 35 | 69 |
| 4:30 PM |  | 0 | 0 | 0 | 0 | 0 | 30 | 30 | 41 | 0 | 41 | 71 |
| 4:45 PM |  | 0 | 0 | 0 | 0 | 0 | 28 | 28 | 42 | 0 | 42 | 70 |
| 5:00 PM |  | 0 | 0 | 0 | 0 | 0 | 26 | 26 | 42 | 0 | 42 | 68 |



| Location: | US26; MP 46.38; MT. HOOD HIGHWAY NO. 26; 0.30 mile east of Camp Creek Rd <br> (USFS 28) | Site Name: | Rhododendron (03-006) |
| :--- | :--- | ---: | ---: |
|  | Installed: | August, 1995 |  |

HISTORICAL TRAFFIC DATA

|  |  | Percent of AADT |  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | :---: |
| Year | AADT | Max <br> Day | Max <br> Hour | 10TH <br> Hour | 20TH <br> Hour | 30TH <br> Hour |  |
| 2008 | 8162 | 233 | 22.9 | 20.1 | 19.1 | 18.2 |  |
| 2009 | 8737 | 197 | 22.3 | 19.6 | 18.4 | 17.8 |  |
| 2010 | 8714 | 207 | 21.6 | 19.8 | 18.9 | 18.5 |  |
| 2011 | 8330 | 214 | 24.7 | 20.0 | 18.6 | 18.1 |  |
| 2012 | 8480 | 227 | 24.0 | 21.0 | 20.2 | 19.4 |  |
| 2013 | 8527 | 213 | 23.4 | 21.1 | 20.3 | 19.1 |  |
| 2014 | 8652 | 216 | 23.2 | 21.1 | 20.3 | 19.2 |  |
| 2015 | 8861 | 242 | 21.4 | 20.3 | 19.4 | 18.7 |  |
| 2016 | 10071 | 208 | 22.9 | 19.6 | 18.8 | 17.9 |  |
| 2017 | 10223 | 200 | 19.9 | 19.1 | 18.1 | 17.5 |  |



2017 TRAFFIC DATA

|  | Average <br> Weekday <br> Traffic | Percent <br> of AADT | Average <br> Daily <br> Traffic | Percent <br> of AADT |
| :--- | ---: | ---: | ---: | ---: |
| January | 6744 | 66 | 9080 | 89 |
| February | 6533 | 64 | 9496 | 93 |
| March | 6763 | 66 | 9337 | 91 |
| April | 6166 | 60 | 8675 | 85 |
| May | 7675 | 75 | 9598 | 94 |
| June | 8568 | 84 | 10695 | 105 |
| July | 11291 | 110 | 13874 | 136 |
| August | 11738 | 115 | 13623 | 133 |
| September | 11300 | 111 | 12734 | 125 |
| October | 6589 | 64 | 8087 | 79 |
| November | 5493 | 54 | 7313 | 72 |
| December | 8753 | 86 | 10161 | 99 |


| For Vehicle Classification data near <br> your project, please go to the <br> following web page: |
| :---: |
| $\frac{\text { https://www.oregon.gov/ODOT/Data }}{\frac{/ D o c u m e n t s / T V T ~ 2017 . x l s x ~}{2}}$ |


| Location: | OR35; MP 57.79; MT. HOOD HIGHWAY NO. 26; 0.02 mile east of Warm Springs <br> Highway No. 53 (US26) | Site Name: | Mt. Hood Meadows (03-007) |
| :--- | :--- | ---: | ---: |
|  | Installed: | September, 1995 |  |

HISTORICAL TRAFFIC DATA

|  |  | Percent of AADT |  |  |  |  |  |
| :---: | ---: | ---: | ---: | ---: | ---: | ---: | :---: |
| Year | AADT | Max <br> Day | Max <br> Hour | 10TH <br> Hour | 20TH <br> Hour | 30TH <br> Hour |  |
| 2008 | 1854 | 398 | 56.8 | 44.2 | 39.9 | 36.1 |  |
| 2009 | 2130 | $* * *$ | $* * *$ | $* * *$ | $* * *$ | $* * *$ |  |
| 2010 | 2145 | 374 | 49.2 | 39.5 | 34.8 | 33.2 |  |
| 2011 | 1976 | 476 | 79.2 | 49.1 | 45.0 | 39.1 |  |
| 2012 | 2023 | 452 | 65.4 | 43.4 | 40.3 | 37.7 |  |
| 2013 | 1868 | 427 | 68.1 | 48.7 | 42.0 | 37.1 |  |
| 2014 | 1908 | 400 | 60.0 | 41.9 | 37.4 | 33.6 |  |
| 2015 | 1931 | 393 | 50.4 | 38.6 | 34.4 | 32.6 |  |
| 2016 | 2455 | 366 | 55.9 | 38.3 | 33.1 | 31.2 |  |
| 2017 | 2565 | 340 | 52.1 | 37.7 | 32.5 | 31.3 |  |



2017 TRAFFIC DATA

|  | Average <br> Weekday <br> Traffic | Percent <br> of AADT | Average <br> Daily <br> Traffic | Percent <br> of AADT |
| :--- | ---: | ---: | ---: | ---: |
| January | 2449 | 95 | 3616 | 141 |
| February | 1978 | 77 | 3362 | 131 |
| March | 1781 | 69 | 2833 | 110 |
| April | 1116 | 44 | 2050 | 80 |
| May | 1202 | 47 | 1609 | 63 |
| June | 1794 | 70 | 2070 | 81 |
| July | 2405 | 94 | 2837 | 111 |
| August | 2302 | 90 | 2614 | 102 |
| September | 3956 | 154 | 3993 | 156 |
| October | 1387 | 54 | 1614 | 63 |
| November | 768 | 30 | 1156 | 45 |
| December | 2499 | 97 | 2966 | 116 |


| For Vehicle Classification data near <br> your project, please go to the <br> following web page: |
| :---: |
| $\frac{\text { https://www.oregon.gov/ODOT/Data }}{\text { /Documents/TVT 2017.xlsx }}$ |



[^2]
## Seasonal Adjustment Calculations

| Rhododendron ATR |  |
| :---: | :---: |
| 11738 August Average Weekday Traffic |  |
| 11291 July Average Weekday Traffic |  |
| 447 ADT Delta |  |
| 45 PM Peak Hour Delta |  |
| July 18 PM Peak Hour Volume: | 1856 vehicles |
| July Seasonal PM Traffic | 1129 vehicles |
| July 18 Commuter Volume: | 727 vehicles |
| Commuter Adjustment: |  |
| July 18 Commuter Volume: | 727 vehicles |
| Times Adjustment Factor (1.014) | 737 vehicles |
| July 18 PM Peak-Hour Volume: | 1856 vehicles |
| Recreational Traffic Adjustment: | 45 vehicles |
| Commuter Traffic Adjustment: | 10 vehicles |
| August PM Peak Hour Traffic: | 1911 vehicles |
| Equivalent Adjustment Factor: | 1.0296 |

HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)



HCM 6th TWSC
2: Vista Loop Drive \& Ortiz Street


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 10 | 0 | - | 0 | 18 | 10 |
| Stage 1 | - | - | - | - | 10 | - |
| Stage 2 | - | - | - | - | 8 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1610 | - | - | - | 1000 | 1071 |
| Stage 1 | - | - | - | - | 1013 | - |
| Stage 2 | - | - | - | - | 1015 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 1610 | - | - | - | 999 | 1071 |
| Mov Cap-2 Maneuver | - | - | - | - | 999 | - |
| Stage 1 | - | - | - | - | 1012 | - |
| Stage 2 | - | - | - | - | 1015 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 2.4 |  | 0 |  | 8.5 |  |
| HCM LOS |  | A |  |  |  |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL | SETSWLn1 |  |
| Capacity (veh/h) |  | - | - | 1610 | - | 1046 |
| HCM Lane V/C Ratio |  | - | - | 0.001 | - | 0.006 |
| HCM Control Delay (s) |  | - | - | 7.2 | 0 | 8.5 |
| HCM Lane LOS |  | - | - | A | A | A |
| HCM 95th \%tile Q(veh) |  | - | - | 0 | - | 0 |

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HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)



The Views 08/13/2019 Existing 2019 AM Peak Hour
Synchro 10 Light Report MTA

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HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 878 | 0 | - | 0 | 1498 | 441 |
| Stage 1 | - | - | - | - | 878 | - |
| Stage 2 | - | - | - | - | 620 | - |
| Critical Hdwy | 4.16 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.23 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 759 | - | - | - | 113 | 564 |
| Stage 1 | - | - | - | - | 367 | - |
| Stage 2 | - | - | - | - | 499 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 758 | - | - | - | 107 | 563 |
| Mov Cap-2 Maneuver | - | - | - | - | 107 | - |
| Stage 1 | - | - | - | - | 349 | - |
| Stage 2 | - | - | - | - | 499 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 0.3 |  | 0 |  | 11.6 |  |
| HCM LOS |  |  |  |  | B |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL | SETSWLn1 |  |
| Capacity (veh/h) |  | - | - | 758 | - | 563 |
| HCM Lane V/C Ratio |  | - | - | 0.049 | - | 0.027 |
| HCM Control Delay (s) |  | - | - | 10 | - | 11.6 |
| HCM Lane LOS |  | - | - | A | - | B |
| HCM 95th \%tile Q(veh) |  | - | - | 0.2 | - | 0.1 |

HCM 6th TWSC
2: Vista Loop Drive \& Ortiz Street


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 12 | 0 | - | 0 | 27 | 11 |
| Stage 1 | - | - | - | - | 11 | - |
| Stage 2 | - | - | - | - | 16 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1607 | - | - | - | 988 | 1070 |
| Stage 1 | - | - | - | - | 1012 | - |
| Stage 2 | - | - | - | - | 1007 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 1607 | - | - | - | 985 | 1070 |
| Mov Cap-2 Maneuver | - | - | - | - | 985 | - |
| Stage 1 | - | - | - | - | 1009 | - |
| Stage 2 | - | - | - | - | 1007 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 2.4 |  | 0 |  | 8.4 |  |
| HCM LOS |  |  |  |  | A |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL | SETSWLn1 |  |
| Capacity (veh/h) |  | - | - | - 1607 | - 1070 |  |
| HCM Lane V/C Ratio |  | - | - | - 0.002 | - | 0.004 |
| HCM Control Delay (s) |  | - | - | 7.2 | 0 | 8.4 |
| HCM Lane LOS |  |  | - | A | A | A |
| HCM 95th \%tile Q(veh) |  | - | - | 0 | - | 0 |

The Views 08/13/2019 Existing 2019 PM Peak Hour
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HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)


The Views 08/13/2019 Existing 2019 PM Peak Hour
Synchro 10 Light Report MTA

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## Trip Generation Calculation Worksheet

Land Use Description: Single-Family Detached Housing<br>ITE Land Use Code: 210<br>Independent Variable: Dwelling Units<br>Quantity: 39 Dwelling Units

## Summary of ITE Trip Generation Data

## AM Peak Hour of Adjacent Street Traffic

Trip Equation: $T=0.71(X)+4.80$
Directional Distribution: 25\% Entering 75\% Exiting

## PM Peak Hour of Adjacent Street Traffic

Trip Equation: $\operatorname{Ln}(T)=0.96 \operatorname{Ln}(X)+0.20$
Directional Distribution: 63\% Entering 37\% Exiting

Total Weekday Traffic
Trip Equation: $\operatorname{Ln}(\mathrm{T})=0.92 \operatorname{Ln}(\mathrm{X})+2.71$
Directional Distribution: 50\% Entering 50\% Exiting

## Site Trip Generation Calculations

39 Dwelling Units

|  | Entering | Exiting | Total |
| :--- | :---: | :---: | :---: |
| AM Peak Hour | 8 | 24 | 32 |
| PM Peak Hour | 26 | 15 | 41 |
| Weekday | 219 | 219 | 438 |

## Trip Generation Calculation Worksheet

Land Use Description: Multi-Family Housing (Low-Rise)<br>ITE Land Use Code: 220<br>Independent Variable: Dwelling Units<br>Quantity: 56 Dwelling Units

## Summary of ITE Trip Generation Data

## AM Peak Hour of Adjacent Street Traffic

| Trip Rate: 0.46 trips per dwelling unit |  |
| :--- | :---: | :--- |
| Directional Distribution: | $23 \%$ Entering |

PM Peak Hour of Adjacent Street Traffic
$\begin{array}{lcl}\text { Trip Rate: } & 0.56 \text { trips per dwelling unit } \\ \text { Directional Distribution: } & 63 \% \text { Entering } & \\ & 37 \% \text { Exiting }\end{array}$

Total Weekday Traffic
Trip Rate: $\quad 7.32$ trips per dwelling unit
Directional Distribution: 50\% Entering 50\% Exiting

## Site Trip Generation Calculations

56 Dwelling Units

|  | Entering | Exiting | Total |
| :--- | :---: | :---: | :---: |
| AM Peak Hour | 6 | 20 | 26 |
| PM Peak Hour | 20 | 11 | 31 |
| Weekday | 205 | 205 | 410 |

## Trip Generation Calculation Worksheet

Land Use Description: Single-Family Detached Housing<br>ITE Land Use Code: 210<br>Independent Variable: Dwelling Units<br>Quantity: 49 Dwelling Units

## Summary of ITE Trip Generation Data

## AM Peak Hour of Adjacent Street Traffic

Trip Equation: $T=0.71(X)+4.80$
Directional Distribution: 25\% Entering 75\% Exiting

## PM Peak Hour of Adjacent Street Traffic

Trip Equation: $\operatorname{Ln}(T)=0.96 \operatorname{Ln}(X)+0.20$
Directional Distribution: 63\% Entering 37\% Exiting

Total Weekday Traffic
Trip Equation: $\operatorname{Ln}(\mathrm{T})=0.92 \operatorname{Ln}(\mathrm{X})+2.71$
Directional Distribution: 50\% Entering 50\% Exiting

## Site Trip Generation Calculations

49 Dwelling Units

|  | Entering | Exiting | Total |
| :--- | :---: | :---: | :---: |
| AM Peak Hour | 10 | 30 | 40 |
| PM Peak Hour | 32 | 19 | 51 |
| Weekday | 270 | 270 | 540 |

## Trip Generation Calculation Worksheet

Land Use Description: Multi-Family Housing (Low-Rise)<br>ITE Land Use Code: 220<br>Independent Variable: Dwelling Units<br>Quantity: 24 Dwelling Units

## Summary of ITE Trip Generation Data

## AM Peak Hour of Adjacent Street Traffic

| Trip Rate: 0.46 trips per dwelling unit |  |
| :--- | :---: | :--- |
| Directional Distribution: | $23 \%$ Entering |

PM Peak Hour of Adjacent Street Traffic
$\begin{array}{lcl}\text { Trip Rate: } & 0.56 \text { trips per dwelling unit } \\ \text { Directional Distribution: } & 63 \% \text { Entering } & \\ & 37 \% \text { Exiting }\end{array}$

Total Weekday Traffic
Trip Rate: $\quad 7.32$ trips per dwelling unit
Directional Distribution: 50\% Entering 50\% Exiting

## Site Trip Generation Calculations

24 Dwelling Units

|  | Entering | Exiting | Total |
| :--- | :---: | :---: | :---: |
| AM Peak Hour | 3 | 8 | 11 |
| PM Peak Hour | 8 | 5 | 13 |
| Weekday | 88 | 88 | 176 |

## Trip Generation Calculation Worksheet

Land Use Description: Single-Family Detached Housing<br>ITE Land Use Code: 210<br>Independent Variable: Dwelling Units<br>Quantity: 152 Dwelling Units

## Summary of ITE Trip Generation Data

## AM Peak Hour of Adjacent Street Traffic

Trip Equation: $T=0.71(X)+4.80$
Directional Distribution: 25\% Entering 75\% Exiting

## PM Peak Hour of Adjacent Street Traffic

Trip Equation: $\operatorname{Ln}(T)=0.96 \operatorname{Ln}(X)+0.20$
Directional Distribution: 63\% Entering 37\% Exiting

Total Weekday Traffic
Trip Equation: $\operatorname{Ln}(T)=0.92 \operatorname{Ln}(X)+2.71$
Directional Distribution: 50\% Entering 50\% Exiting

## Site Trip Generation Calculations

152 Dwelling Units

|  | Entering | Exiting | Total |
| :--- | :---: | :---: | :---: |
| AM Peak Hour | 28 | 85 | 113 |
| PM Peak Hour | 96 | 56 | 152 |
| Weekday | 764 | 764 | 1528 |


| HWY | MP | DIR | HS | Location | 2014 | 2015 | 2016 | 2036 | RSQ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 026 | 22.72 | 1 |  | 0.02 mile northwest of S.E. 362nd Drive, west city limits of Sandy |  | 29500 |  | 41400 | MODEL |
| 026 | 23.85 | 1 |  | 0.02 mile west of Bluff Road |  | 30100 |  | 42600 | MODEL |
| 026 | 23.89 | 1 |  | 0.02 mile east of Bluff Road |  | 15100 |  | 21600 | MODEL |
| 026 | 24.02 | 1 |  | 0.02 mile west of Beers Avenue |  | 15100 |  | 21600 | MODEL |
| 026 | 24.35 | 1 |  | 0.05 mile west of Eagle Creek-Sandy Highway (OR211) |  | 14800 |  | 21600 | MODEL |
| 026 | 24.42 | 1 |  | 0.02 mile east of Eagle Creek-Sandy Highway (OR211) |  | 12000 |  | 17100 | MODEL |
| 026 | 24.59 | 1 |  | 0.02 mile west of Ten Eyck Road |  | 11200 |  | 16000 | MODEL |
| 026 | 23.89 | 2 | W | 0.02 mile east of Bluff Road |  | 15200 |  | 21300 | MODEL |
| 026 | 24.04 | 2 | W | 0.02 mile west of Beers Avenue |  | 15200 |  | 21300 | MODEL |
| 026 | 24.36 | 2 | W | 0.05 mile west of Eagle Creek-Sandy Highway (OR211) |  | 14500 |  | 20700 | MODEL |
| 026 | 24.40 | 2 | W | 0.02 mile east of Eagle Creek-Sandy Highway (OR211) |  | 12100 |  | 16900 | MODEL |
| 026 | 24.61 | 2 | W | 0.02 mile west of Ten Eyck Road |  | 11700 |  | 16400 | MODEL |
| 026 | 25.10 | 1 |  | 0.02 mile west of Langensand Road |  | 18000 |  | 25400 | MODEL |
| 026 | 25.66 | 1 |  | 0.10 mile east of Vista Loop Drive |  | 19700 |  | 27600 | MODEL |

HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)



HCM 6th TWSC
2: Vista Loop Drive \& Ortiz Street



HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 679 | 0 | - | 0 | 1026 | 340 |
| Stage 1 | - | - | - | - | 679 | - |
| Stage 2 | - | - | - | - | 347 | - |
| Critical Hdwy | 4.34 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.32 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 845 | - | - | - | 231 | 656 |
| Stage 1 | - | - | - | - | 465 | - |
| Stage 2 | - | - | - | - | 687 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 845 | - | - | - | 230 | 656 |
| Mov Cap-2 Maneuver | - | - | - | - | 230 | - |
| Stage 1 | - | - | - | - | 462 | - |
| Stage 2 | - | - | - | - | 687 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 0.1 |  | 0 |  | 10.5 |  |
| HCM LOS |  |  |  |  | B |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL | SETSWLn1 |  |
| Capacity (veh/h) |  | - | - | 845 | - | 656 |
| HCM Lane V/C Ratio |  | - | - | 0.005 | - | 0.005 |
| HCM Control Delay (s) |  | - | - | 9.3 | - | 10.5 |
| HCM Lane LOS |  | - | - | A | - | B |
| HCM 95th \%tile Q(veh) |  | - | - | 0 | - | 0 |

HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)


| Major/Minor | Major1 | Major2 |  | Minor2 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 929 | 0 | - | 0 | 1584 | 466 |
| Stage 1 | - | - | - | - | 929 | - |
| Stage 2 | - | - | - | - | 655 | - |
| Critical Hdwy | 4.16 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.23 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 726 | - | - | - | 99 | 543 |
| Stage 1 | - | - | - | - | 345 | - |
| Stage 2 | - | - | - | - | 479 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 725 | - | - | - | 93 | 542 |
| Mov Cap-2 Maneuver | - | - | - | - | 93 | - |
| Stage 1 | - | - | - | - | 326 | - |
| Stage 2 | - | - | - | - | 479 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  |  |  | SW |  |
| HCM Control Delay, s | 0.3 |  | 0 |  | 11.9 |  |
| HCM LOS |  |  |  |  | B |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvm |  |  |  | SEL | SETS | NLn1 |
| Capacity (veh/h) |  | - | - | 725 | - | 542 |
| HCM Lane V/C Ratio |  | - | - | 0.054 | - | 0.03 |
| HCM Control Delay (s) |  | - | - | 10.2 | - | 11.9 |
| HCM Lane LOS |  | - | - | B | - | B |
| HCM 95th \%tile Q(veh) |  | - | - | 0.2 | - | 0.1 |

HCM 6th TWSC
2: Vista Loop Drive \& Ortiz Street


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 12 | 0 | - | 0 | 27 | 11 |
| Stage 1 | - | - | - | - | 11 | - |
| Stage 2 | - | - | - | - | 16 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1607 | - | - | - | 988 | 1070 |
| Stage 1 | - | - | - | - | 1012 | - |
| Stage 2 | - | - | - | - | 1007 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 1607 | - | - | - | 985 | 1070 |
| Mov Cap-2 Maneuver | - | - | - | - | 985 | - |
| Stage 1 | - | - | - | - | 1009 | - |
| Stage 2 | - | - | - | - | 1007 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 2.4 |  | 0 |  | 8.4 |  |
| HCM LOS |  | A |  |  |  |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL SETSWLn1 |  |  |
| Capacity (veh/h) |  | - | - | 1607 | - | 1070 |
| HCM Lane V/C Ratio |  | - | - | 0.002 | - | 0.004 |
| HCM Control Delay (s) |  | - | - | 7.2 | 0 | 8.4 |
| HCM Lane LOS |  | - | - | A | A | A |
| HCM 95th \%tile Q(veh) |  | - | - | 0 | - | 0 |

HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)


| Major/Minor | Major1 |  | Major2 |  | Minor2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Conflicting Flow All | 960 | 0 | - | 0 | 1558 | 480 |
| Stage 1 | - | - | - | - | 959 | - |
| Stage 2 | - | - | - | - | 599 | - |
| Critical Hdwy | 4.16 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.23 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 706 | - | - | - | 103 | 532 |
| Stage 1 | - | - | - | - | 333 | - |
| Stage 2 | - | - | - | - | 511 | - |
| Platoon blocked, \% |  | - | - | - |  |  |
| Mov Cap-1 Maneuver | 706 | - | - | - | 103 | 532 |
| Mov Cap-2 Maneuver | - | - | - | - | 103 | - |
| Stage 1 | - | - | - | - | 332 | - |
| Stage 2 | - | - | - | - | 511 | - |
|  |  |  |  |  |  |  |
| Approach | SE |  | NW |  | SW |  |
| HCM Control Delay, s | 0 |  | 0 |  | 41.5 |  |
| HCM LOS |  |  |  |  | E |  |
|  |  |  |  |  |  |  |
| Minor Lane/Major Mvmt |  | NWT NWR |  | SEL | SETSWLn1 |  |
| Capacity (veh/h) |  | - | - | 706 | - | 103 |
| HCM Lane V/C Ratio |  | - | - | 0.005 | - | 0.041 |
| HCM Control Delay (s) |  | - | - | 10.1 | - | 41.5 |
| HCM Lane LOS |  | - | - | B | - | E |
| HCM 95th \%tile Q(veh) |  | - | - | 0 | - | 0.1 |

HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)



HCM 6th TWSC
2: Knapp N Site Access/Ortiz Street \& Vista Loop Drive



HCM 6th TWSC
3: Vista Loop Drive \& Knapp S Site Access


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Synchro 10 Light Report MTA

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HCM 6th TWSC
4: Vista Loop Drive \& Picking Site Access


The Views 08/13/2019 2021 Background plus Site Trips AM Peak Hour
Synchro 10 Light Report MTA

HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)


The Views 08/13/2019 2021 Background plus Site Trips AM Peak Hour
Synchro 10 Light Report MTA

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HCM 6th TWSC
1: Highway 26 \& Vista Loop Drive (W)



HCM 6th TWSC
2: Knapp N Site Access/Ortiz Street \& Vista Loop Drive



HCM 6th TWSC
3: Vista Loop Drive \& Knapp S Site Access


The Views 08/13/2019 2021 Background plus Site Trips PM Peak Hour
Synchro 10 Light Report MTA

HCM 6th TWSC
4: Vista Loop Drive \& Picking Site Access


The Views 08/13/2019 2021 Background plus Site Trips PM Peak Hour
Synchro 10 Light Report MTA

HCM 6th TWSC
5: Highway 26 \& Vista Loop Drive (E)



The Views 08/13/2019 2021 Background plus Site Trips PM Peak Hour
Synchro 10 Light Report MTA

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Queuing and Blocking Report 2021 Background plus Site Trips AM Peak Hour
Intersection: 1: Highway 26 \& Vista Loop Drive (W)

| Movement | SE | SW |
| :--- | ---: | ---: |
| Directions Served | L | LR |
| Maximum Queue (ft) | 59 | 64 |
| Average Queue (ft) | 13 | 33 |
| 95th Queue (ft) | 42 | 54 |
| Link Distance (ft) |  | 32 |
| Upstream Blk Time (\%) |  | 9 |
| Queuing Penalty (veh) |  | 4 |
| Storage Bay Dist (ft) | 155 |  |
| Storage Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |

Intersection: 2: Knapp N Site Access/Ortiz Street \& Vista Loop Drive

| Movement | NE | SW |
| :--- | ---: | ---: |
| Directions Served | LTR | LTR |
| Maximum Queue (ft) | 43 | 31 |
| Average Queue (ft) | 18 | 4 |
| 95th Queue (ft) | 46 | 21 |
| Link Distance (ft) | 240 | 281 |
| Upstream Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |
| Storage Bay Dist (ft) |  |  |
| Storage Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |

Intersection: 3: Vista Loop Drive \& Knapp S Site Access

| Movement | EB |
| :--- | :---: |
| Directions Served | LR |
| Maximum Queue (ft) | 38 |
| Average Queue (ft) | 14 |
| 95th Queue (ft) | 41 |
| Link Distance (ft) | 142 |
| Upstream Blk Time (\%) |  |
| Queuing Penalty (veh) |  |
| Storage Bay Dist (ft) |  |
| Storage Blk Time (\%) |  |
| Queuing Penalty (veh) |  |

Queuing and Blocking Report
2021 Background plus Site Trips AM Peak Hour
Intersection: 4: Vista Loop Drive \& Picking Site Access

| Movement | WB |
| :--- | :---: |
| Directions Served | LR |
| Maximum Queue (ft) | 52 |
| Average Queue (ft) | 23 |
| 95th Queue (ft) | 50 |
| Link Distance (ft) | 312 |
| Upstream Blk Time (\%) |  |
| Queuing Penalty (veh) |  |
| Storage Bay Dist (ft) |  |
| Storage Blk Time (\%) |  |
| Queuing Penalty (veh) |  |

Intersection: 5: Highway 26 \& Vista Loop Drive (E)

| Movement | SE | SW |
| :--- | ---: | ---: |
| Directions Served | L | LR |
| Maximum Queue (ft) | 32 | 67 |
| Average Queue (ft) | 7 | 29 |
| 95th Queue (ft) | 28 | 60 |
| Link Distance (ft) |  | 35 |
| Upstream Blk Time (\%) |  | 8 |
| Queuing Penalty (veh) |  | 4 |
| Storage Bay Dist (ft) | 140 |  |
| Storage Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |

Network Summary
Network wide Queuing Penalty: 8

Queuing and Blocking Report 2021 Background plus Site Trips PM Peak Hour
Intersection: 1: Highway 26 \& Vista Loop Drive (W)

| Movement | SE | SE | SE | NW | NW | SW | B13 |
| :--- | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| Directions Served | L | T | T | T | TR | LR | T |
| Maximum Queue (ft) | 76 | 24 | 14 | 25 | 26 | 76 | 4 |
| Average Queue (ft) | 31 | 1 | 0 | 1 | 1 | 26 | 0 |
| 95th Queue (ft) | 61 | 11 | 8 | 10 | 12 | 55 | 3 |
| Link Distance (ft) |  | 1362 | 1362 | 2803 | 2803 | 32 | 1364 |
| Upstream Blk Time (\%) |  |  |  |  |  | 7 |  |
| Queuing Penalty (veh) |  |  |  |  |  | 2 |  |
| Storage Bay Dist (ft) | 155 |  |  |  |  |  |  |
| Storage Blk Time (\%) |  |  |  |  |  |  |  |

Intersection: 2: Knapp N Site Access/Ortiz Street \& Vista Loop Drive

| Movement | NE | SW |
| :--- | ---: | ---: |
| Directions Served | LTR | LTR |
| Maximum Queue (ft) | 48 | 20 |
| Average Queue (ft) | 12 | 1 |
| 95th Queue (ft) | 40 | 9 |
| Link Distance (ft) | 240 | 281 |
| Upstream Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |
| Storage Bay Dist (ft) |  |  |
| Storage Blk Time (\%) |  |  |
| Queuing Penalty (veh) |  |  |

Intersection: 3: Vista Loop Drive \& Knapp S Site Access

| Movement | EB |
| :--- | ---: |
| Directions Served | LR |
| Maximum Queue (ft) | 34 |
| Average Queue (ft) | 7 |
| 95th Queue (ft) | 30 |
| Link Distance (ft) | 142 |
| Upstream Blk Time (\%) |  |
| Queuing Penalty (veh) |  |
| Storage Bay Dist (ft) |  |
| Storage Blk Time (\%) |  |
| Queuing Penalty (veh) |  |

Queuing and Blocking Report
2021 Background plus Site Trips PM Peak Hour
Intersection: 4: Vista Loop Drive \& Picking Site Access

| Movement | WB |
| :--- | :---: |
| Directions Served | LR |
| Maximum Queue (ft) | 33 |
| Average Queue (ft) | 18 |
| 95th Queue (ft) | 44 |
| Link Distance (ft) | 312 |
| Upstream Blk Time (\%) |  |
| Queuing Penalty (veh) |  |
| Storage Bay Dist (ft) |  |
| Storage Blk Time (\%) |  |
| Queuing Penalty (veh) |  |

Intersection: 5: Highway 26 \& Vista Loop Drive (E)

| Movement | SE | SW | B8 |
| :--- | ---: | ---: | ---: |
| Directions Served | L | LR | T |
| Maximum Queue (ft) | 56 | 72 | 23 |
| Average Queue (ft) | 17 | 28 | 2 |
| 95th Queue (ft) | 45 | 63 | 20 |
| Link Distance (ft) |  | 35 | 108 |
| Upstream Blk Time (\%) |  | 13 | 0 |
| Queuing Penalty (veh) |  | 4 | 0 |
| Storage Bay Dist (ft) | 140 |  |  |
| Storage Blk Time (\%) |  |  |  |

Network Summary
Network wide Queuing Penalty: 6



## Preliminary Traffic Signal Warrant Analysis

Project Name: The Views
Intersection: Highway 26 at SE Vista Loop Road (West)
Scenario: 2021 Background Plus Site Trips

Number of Minor Street Lanes 1 PM Peak Hour Volume $\qquad$ (sum of both approaches) (highest-volume approach) $^{\text {a }}$
Posted or 85 th percentile speed $>40 \mathrm{mph}$ : $\qquad$ Isolated Population Less than 10,000:

## Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume

| Number of lanes for moving <br> traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  | Vehicles per hour on minor street <br> (total of both approaches) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Major Street | Minor Street | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ |
| 1 | 1 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |

Condition B - Interruption of Continuous Traffic

| Number of lanes for moving <br> traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  | Vehicles per hour on minor street <br> (total of both approaches) |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Major Street | Minor Street | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |



## Preliminary Traffic Signal Warrant Analysis

Project Name: The Views
Intersection: Highway 26 at SE Vista Loop Road (East)
Scenario: 2021 Background Plus Site Trips

| Number of Major Street Lanes: | 2 |  | PM Peak Hour Volume 2072 |
| :--- | :--- | :--- | :--- |
| Number of Minor Street Lanes | 1 |  | PM Peak Hour Volume |
| N um both approaches) | 11 | (highest-volume approach) |  |

Number
PM Peak Hour Volume $\qquad$ (highest-volume approach) ${ }^{\text {a }}$
Posted or 85 th percentile speed $>40 \mathrm{mph}$ Isolated Population Less than 10,000: $\qquad$

## Warrant 1, Eight-Hour Vehicular Volume

Condition A - Minimum Vehicular Volume

| Number of lanes for moving <br> traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  |  | Vehicles per hour on minor street <br> (total of both approaches) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Major Street | Minor Street | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ |
| 1 | 1 | 500 | 400 | 350 | 280 | 150 | 120 | 105 | 84 |
| 2 or more | 1 | 600 | 480 | 420 | 336 | 150 | 120 | 105 | 84 |
| 2 or more | 2 or more | 600 | 480 | 420 | 336 | 200 | 160 | 140 | 112 |
| 1 | 2 or more | 500 | 400 | 350 | 280 | 200 | 160 | 140 | 112 |

Condition B - Interruption of Continuous Traffic

| Number of lanes for moving <br> traffic on each approach | Vehicles per hour on major street <br> (total of both approaches) |  |  |  | Vehicles per hour on minor street <br> (total of both approaches) |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Major Street | Minor Street | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ | $100 \%$ | $80 \%$ | $70 \%$ | $56 \%$ |
| 1 | 1 | 750 | 600 | 525 | 420 | 75 | 60 | 53 | 42 |
| 2 or more | 1 | 900 | 720 | 630 | 504 | 75 | 60 | 53 | 42 |
| 2 or more | 2 or more | 900 | 720 | 630 | 504 | 100 | 80 | 70 | 56 |
| 1 | 2 or more | 750 | 600 | 525 | 420 | 100 | 80 | 70 | 56 |



## Right-Turn Lane Warrant Analysis (ODOT Methodology)

Project Name: The Views
Approach: $\quad$ Northwest-Bound Highway 26 at SE Vista Loop Drive (West)
Scenario: $\quad 2021$ Background Plus Site Trips

Major-Street Design Speed: 60 mph

|  | AM Volume | PM Volume |
| :--- | :---: | :---: |
| Number of Right Turns per Hour: | 1 | 0 |
| Approaching DVH in Outside Lane: | 320 | 461 |
| Calculated Turn Volume Threshold: | 34 | 23 |
| Right Turn Volume Exceeds Threshold? | NO | NO |

## Criterion 1: Vehicular Volume

The vehicular volume criterion is intended for application where the volume of intersecting traffic is the principal reason for considering installation of a right turn lane. The vehicular volume criteria are determined using the curve in Exhibit 7-2

Exhibit 7-2 Right Turn Lane Criterion


Note: If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.

Right-Turn Lane Warrant Analysis (ODOT Methodology)
Project Name: The Views
Approach: $\quad$ Northwest-Bound Highway 26 at SE Vista Loop Drive (East)
Scenario: $\quad 2021$ Background Plus Site Trips

Major-Street Design Speed: 60 mph

|  | AM Volume | PM Volume |
| :--- | :---: | :---: |
| Number of Right Turns per Hour: | 5 | 16 |
| Approaching DVH in Outside Lane: | 304 | 466 |
| Calculated Turn Volume Threshold: | 36 | 23 |
| Right Turn Volume Exceeds Threshold? | NO | NO |

## Criterion 1: Vehicular Volume

The vehicular volume criterion is intended for application where the volume of intersecting traffic is the principal reason for considering installation of a right turn lane. The vehicular volume criteria are determined using the curve in Exhibit 7-2

Exhibit 7-2 Right Turn Lane Criterion


Note: If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.

## EXHIBIT G



## MEMORANDUM

DATE: June 15, 2020
TO: Mac Even (Even Better Homes)
FROM: Todd Prager, RCA \#597, ISA Board Certified Master Arborist
RE: $\quad$ Tree Plan for The Views Subdivision

## Summary

This report includes tree removal, preservation, and protection recommendations for the proposed Views Subdivision in Sandy, Oregon.

## Background

Even Better Homes is proposing to construct a 122 lot subdivision with new streets, sidewalks, utilities, and open space at 41717 Highway 26 in Sandy, Oregon. The proposed site plan with the proposed tree removal and retention is provided in Attachment 1.

The assignment requested of our firm for this project was to:

- Assess the trees within and adjacent to the portion of the site to be developed;
- Identify the trees to be removed and retained; and
- Provide tree protection recommendations for the trees to be retained.


## Tree Assessment

In March, May, and June 2020 I completed the inventory of existing trees at the site.
The complete inventory data for each tree is provided in Attachment 2 and includes the tree number, common name, scientific name, trunk diameter (DBH), crown radius, health condition, structural condition, pertinent comments, whether it is an onsite 11-inch DBH or greater tree in good condition ${ }^{1}$, and whether the tree will be retained or removed.

All County Surveyors and Planners added color coded labels to the inventory to denote onsite trees within the restricted development area (green), onsite trees

Section 17.102 .50 of the City of Sandy Code requires three onsite trees over 11-inch DBH that are in good condition to be retained.
Tree Plan for The Views June 15, 2020
outside the restricted development area (light salmon), offsite trees (gray), trees that are 11-inch DBH or greater and in good condition (yellow), trees that are not 11-inch DBH or greater and/or not in good condition (red), and trees to be removed (dark salmon).

The tree numbers in the inventory in Attachment 2 correspond to the tree numbers on the plans in Attachment 1. The trees were also tagged with their corresponding numbers in the field.

## Tree Removal and Retention

This section of the report includes tree removal and retention recommendations based on the proposed site plan.

## Tree Removal

The standard tree protection requirements in the City of Sandy Code range from at least 10 feet from the trunks of retained trees (SDC 17.102.50.B.1) to five feet beyond the driplines (SDC 17.92.10.D) unless otherwise approved by the Planning Director.

A typical alternative minimum protection zone allows encroachments no closer than a radius from a tree of .5 feet per inch of DBH as long as no more than 25 percent of the critical root protection zone area (estimated at one foot radius per inch of DBH) is impacted. Figure 1 illustrates this concept.


Figure 1: Alterative minimum protection zone

Using the criteria described above, while considering the tree conditions and their locations relative to grading, paving, construction, and other site improvements, 190 of the assessed trees at the site are proposed for removal.

## Tree Retention

A total of 212 onsite trees are proposed to be retained. Of these 212 trees, 99 trees are in good condition and over 11 -inch DBH. Section 17.102.50.A of the City of Sandy Code includes five criteria for tree retention with development. The five criteria followed by my findings in italics are listed below:

1. At least three trees 11 inches DBH or greater are to be retained for every one-acre of contiguous ownership.

Finding: The site is 32.87 acres in size so 98.61 trees over 11-inch DBH in good condition are required to be retained. The proposed preservation includes 99 trees over 11-inch DBH in good condition. This criterion is met.
2. Retained trees can be located anywhere on the site at the landowner's discretion before the harvest begins. Clusters of trees are encouraged.

[^3]Finding: The retained trees are clustered primarily within the restricted development areas of the site as shown in Attachment 1. This criterion is met.
3. Trees proposed for retention shall be healthy and likely to grow to maturity, and be located to minimize the potential for blow-down following the harvest.

Finding: All of the trees subject to this standard are in good health condition and likely to grow to maturity. The proposed clustering of retained trees in the restricted development will help to minimize blow down hazards. Therefore, this criterion is met.
4. If possible, at least two of the required trees per acre must be of conifer species.

Finding: Sixty-nine (69) of the 99 trees over 11-inch DBH and in good condition to be retained are conifer species. This criterion is met.
5. Trees within the required protected setback areas may be counted towards the tree retention standard if they meet these requirements.

Finding: There is no protected setback area at the site. This criterion is not applicable.

## Tree Protection Recommendations

The standard tree protection requirements in the City of Sandy Code range from at least 10 feet from the trunks of retained trees (SDC 17.102.50.B.1) to five feet beyond the driplines (SDC 17.92.10.D) unless otherwise approved by the Planning Director.

A typical alternative minimum protection zone allows encroachments no closer than a radius from a tree of .5 feet per inch of DBH as long as no more than 25 percent of the critical root protection zone area (estimated at one foot radius per inch of DBH) is impacted. Figure 1 illustrates this concept.

The reason for using this alternative is because it allows the tree protection zone to better relate to the size of the tree and its root zone. For example, a 10 foot tree protection setback would not be adequate for a 48 -inch DBH tree which should have a minimum setback of at least 24 feet. Also, driplines can be highly variable based on species growth habits and onsite conditions such as the presence of adjacent trees or past pruning.

The trees to be retained can be adequately protected by placing tree protection fencing as shown in Attachment 1. The tree protection fencing will protect at least 75 percent of their critical roots zones and avoid any encroachments closer than a radius of .5 feet per inch of DBH to a tree to be retained. No grading, stockpiling, storage,

[^4]disposal, or any other construction related activity shall occur in the tree protection zones unless specifically reviewed and approved by the project arborist.

The following additional protection measures shall apply to the trees at the site:

- Tree Protection Fencing: Establish tree protection fencing in the locations shown in Attachment 1. Required fencing shall be a minimum of six feet tall supported with metal posts placed no farther than ten feet apart installed flush with the initial undisturbed grade. Fence installation may be delayed until immediately after tree removal is complete.
- Directional Felling: 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. No vehicles or heavy equipment shall be permitted within the tree protection zones during tree removal operations.
- Stump Removal: The stumps of the trees to be removed from within the tree protection zones shall either be retained in place or stump ground to protect the root systems of the trees to be retained.
- Protect Tree Crowns: Care will need to be taken to not contact or otherwise damage the crowns of the trees that may extend into the construction area.
- Monitoring of New Grove Edges: It will be important to reassess and monitor the trees along the newly exposed tree grove edges following site clearing and periodically during construction and after high wind events to ensure they do not pose a high risk. This monitoring should occur for the next two to three storm seasons following site clearing.
- Sediment Fencing: Shift sediment fencing to outside the tree protection zones. If erosion control is required inside the tree protection zones, use straw wattles to minimize root zone disturbance of the trees to be retained.

Additional tree protection recommendations for the trees to be retained are provided in Attachment 3.

[^5]
## Conclusion

Ninety-nine (99) trees over 11 -inch DBH in good condition are proposed to be retained at The Views Subdivision site. The required tree retention for the 32.87 acre site is 98.61 trees.

The trees to be retained will be adequately protected by adhering to the recommendations in this report.

Please contact me if you have questions, concerns, or need any additional information.

Sincerely,


Todd Prager
ASCA Registered Consulting Arborist \#597
ISA Board Certified Master Arborist, WE-6723B
ISA Qualified Tree Risk Assessor
AICP, American Planning Association
Attachments: Attachment 1 - Site Plan w/ Tree Removal, Retention and Protection
Attachment 2 - Tree Inventory
Attachment 3 - Tree Protection Recommendations
Attachment 4-Assumptions and Limiting Conditions



HICHWAY 26 $\qquad$


## Attachment 3

## Additional Tree Protection Recommendations

The following recommendations meet or exceed City of Sandy Code requirements:

## Before Construction Begins

1. Notify all contractors of tree protection procedures. For successful tree protection on a construction site, all contractors must know and understand the goals of tree protection.
a. Hold a tree protection meeting with all contractors to explain the goals of tree protection.
c. Have all contractors sign memoranda of understanding regarding the goals of tree protection. The memoranda should include a penalty for violating the tree protection plan. The penalty should equal the resulting fines issued by the local jurisdiction plus the appraised value of the tree(s) within the violated tree protection zone per the current Trunk Formula Method as outline in the current edition of the Guide for Plant Appraisal by the Council of Tree \& Landscape Appraisers. The penalty should be paid to the owner of the property.
2. Fencing
a. Trees to remain in the grove should be protected by installation of tree protection fencing as shown in Attachment 1.
b. The fencing should be put in place before the ground is cleared in order to protect the trees and the soil around the trees from disturbances.
c. Fencing should be established by the project arborist based on the needs of the trees to be protected and to facilitate construction.
d. Fencing should consist of 6-foot high steel fencing on concrete blocks or 6foot metal fencing secured to the ground with 8 -foot metal posts placed no farther than ten feet apart to prevent it from being moved by contractors, sagging, or falling down.
e. Fencing should remain in the position that is established by the project arborist and not be moved without approval from the project arborist until final project approval.
3. Signage
a. All tree protection fencing should have signage as follows so that all contractors understand the purpose of the fencing:

TREE PROTECTION ZONE
DO NOT REMOVE OR ADJUST THE APPROVED LOCATION OF THIS TREE PROTECTION FENCING.

Please contact the project arborist if alterations to the approved location of the tree protection fencing are necessary.

Todd Prager, Project Arborist - 971-295-4835
b. Signage should be placed every 75 -feet or less.

[^6]
## During Construction

1. Protection Guidelines Within the Tree Protection Zones:
a. No new buildings; grade change or cut and fill, during or after construction; new impervious surfaces; or utility or drainage field placement should be allowed within the tree protection zones.
b. No traffic should be allowed within the tree protection zones. This includes but is not limited to vehicle, heavy equipment, or even repeated foot traffic.
c. No storage of materials including but not limiting to soil, construction material, or waste from the site should be permitted within the tree protection zones. Waste includes but is not limited to concrete wash out, gasoline, diesel, paint, cleaner, thinners, etc.
d. Construction trailers should not to be parked/placed within the tree protection zones.
e. No vehicles should be allowed to park within the tree protection zones.
f. No other activities should be allowed that will cause soil compaction within the tree protection zones.
2. The trees should be protected from any cutting, skinning or breaking of branches, trunks or woody roots.
3. The project arborist should be notified prior to the cutting of woody roots from trees that are to be retained to evaluate and oversee the proper cutting of roots with sharp cutting tools. Cut roots should be immediately covered with soil or mulch to prevent them from drying out.
4. Trees that have roots cut should be provided supplemental water during the summer months.
5. Any necessary passage of utilities through the tree protection zones should be by means of tunneling under woody roots by hand digging or boring with oversight by the project arborist.
6. Any deviation from the recommendations in this section should receive prior approval from the project arborist.

## After Construction

1. Carefully landscape the areas within the tree protection zones. Do not allow trenching for irrigation or other utilities within the tree protection zones.
2. Carefully plant new plants within the tree protection zones. Avoid cutting the woody roots of trees that are retained.
3. Do not install permanent irrigation within the tree protection zones unless it is drip irrigation to support a specific planting or the irrigation is approved by the project arborist.
4. Provide adequate drainage within the tree protection zones and do not alter soil hydrology significantly from existing conditions for the trees to be retained.
5. Provide for the ongoing inspection and treatment of insect and disease populations that are capable of damaging the retained trees and plants.
6. The retained trees may need to be fertilized if recommended by the project arborist.
7. Any deviation from the recommendations in this section should receive prior approval from the project arborist.
[^7]
## Attachment 4

## Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. The site plans and other information provided by Even Better Homes and their consultants was the basis of the information provided in this report.
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 consultant's role is only to make recommendations. Inaction on the part of those receiving the report is not the responsibility of the consultant.
7. The purpose of this report is to:

- Assess the within and adjacent to the portion of the site to be developed;
- Identify the trees to be removed and retained; and
- Provide tree protection recommendations for the trees to be retained.


## SCHOTT \& ASSOCIATES

## EXHIBIT H

## JURISDICTIONAL WETLAND DELINEATION REPORT <br> FOR

The Views

T2S, R5E, S19, TL 200
Sandy, Oregon

## Prepared for

Even Better Homes, Inc
Mac Even
P.O. Box 2021

Gresham, OR 97030
Prepared by
Kim Biafora
of
Schott \& Associates, Inc.

## Date:

February 2020

Project \#: 2748

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## (A) Landscape Setting and Land Use

Schott \& Associates (S\&A) was contracted to conduct wetland delineation verification on a 23.24-acre study site located at 41717 Highway 26 in Sandy, Clackamas County, Oregon (T2S, R5EW, S19, TL 200). This site was originally delineated by S\&A in 2014 and wetland boundaries were concurred with by the Oregon Department of State Lands (DSL) in a letter issued March 10, 2015 (WD2014-0465). WD2014-0465 will expire on March 10, 2020 and the applicant wishes to renew the delineation in anticipation of future development. This report complies with all standards and requirements set forth in Oregon Administrative Rules (OAR) 141-090-0035 (1-17) for wetland delineation reports and jurisdictional determinations for the purpose of regulating fill and removal within waters of the state. This report will be used to fulfill federal and state regulatory requirements for project permitting.

The study site encompassed the entirety of tax lot 200 . The site featured rural residential development including home and outbuildings along the western boundary but was otherwise undeveloped. An open stormwater pipe extended from a recreational vehicle (RV) sales lot to the south of the site into the northwestern portion of the site within a storm sewer easement. Site topography was undulating and dissected by several steepsided ravines along the northern portion of the site which sloped to the north and east; two of the ravines contained the upper reaches of first-order streams. The site in this area was vegetated by mixed coniferous-deciduous forest with dense Himalayan blackberry (Rubus armeniacus) thickets at the forest margins. Blackberry was recently cleared to facilitate site access and verification of the wetland and stream boundaries. The remainder of the site consisted of a semi-regularly mown field vegetated by mixed pasture grasses and weedy forbs with areas of stockpiled fill material.

The site was surrounded by the RV sales lot and other commercial development to the southwest, woodland to the north and east, and low-density residential development to the south. At the time of delineation, the site was zoned for single-family residential (SFR) and the forested portion of the site featured a Flood and Slope Hazard (FSH) overlay designation according to City of Sandy zoning maps

## (B) Site Alterations

Aerial photographs for the time period between 1995 and 2018, available from Google Earth, were reviewed to assess site history. The site is believed to have been in agricultural use for decades, predominantly hay and pasture. In the earliest available aerial photograph (1995; Figure 5c), the site is in much the same condition as it is currently, though the adjacent RV lot is smaller. In 2003 (Figure 5b), the RV lot was expanded, and vehicle tracks are visible throughout the unforested portion of the study site. During a 2004 wetland delineation conducted by S\&A, a dirt bike track was observed throughout the site resulting in significant soil and vegetation disturbance, and the storm drain discharging onto the northeastern portion of the property had recently been installed. The RV lot to the south began expanding again in the mid-2000s and the existing footprint was in place by the mid-2010s.

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## (C) Precipitation Data and Analysis

Precipitation data for the date of fieldwork and the time period preceding it were reviewed to evaluate observed wetland hydrology conditions relative to actual and statistically normal precipitation. Precipitation that deviates from normal ranges can affect site conditions and impact observed wetland hydrology indicators. Precipitation data was acquired from the Natural Resources Conservation Service (NRCS) Agricultural Applied Climate Information System (AgACIS) for the Headworks Portland Wtr B station near Sandy to provide context for observed hydrological conditions of the study area at the time of the site visit (AgACIS 2019-2020). Table 1 provides the precipitation data, comparison to the normal water year average, as well as normal monthly ranges of precipitation representing 70\% probability as reported for the Headworks Portland Wtr B NRCS WETS station (NRCS 1981-2010).

Table 1. Precipitation Summary for the Date of Fieldwork and Preceding Water Year (October 1, 2019 - January 23, 2020)

|  | Observed Precipitation* |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Date of Field <br> Visit | Date of <br> Visit (in.) | 2 weeks to- <br> Date (in.) | Water Year <br> to-Date (in.) | Normal <br> Water Year <br> to-Date (in.) | \% of Normal <br> Water Year-to <br> Date |
| January 23, <br> 2020 | 1.24 | 7.85 | 25.89 | 36.71 | $71 \%$ |

*Data provided by NRCS AgACIS data from the Headworks Portland Wtr B Station, OR, 2018-2019
Table 2. Precipitation Summary for Three Months Preceding Fieldwork and Comparison to WETS Average and Normal Range

| Month | Total <br> Precipitation <br> (inches) | WETS <br> Average <br> (inches) | WETS Normal <br> Range <br> (inches)** | $\%$ of <br> Normal |
| :---: | :---: | :---: | :---: | :---: |
| December | 6.87 | 11.15 | $8.38-12.81$ | $17 \%$ |
| November | 2.89 | 11.19 | $8.25-13.13$ | $25 \%$ |
| October | 4.85 | 6.53 | $3.97-7.91$ | $60 \%$ |

*Data provided by NRCS AgACIS data from the Headworks Portland Wtr B Station, OR, 2018-2019
**Data provided by NRCS WETS station for the Headworks Portland Wtr B Station, OR, 1981-2010

Fieldwork took place on January 23, 2020 when 1.24 inches of precipitation was observed. In the two weeks preceding fieldwork, 7.85 inches of precipitation was observed ( $168 \%$ of normal precipitation at 4.67 inches). Precipitation observed in December and November was below the WETS average and normal range. Precipitation observed in the month of October was below the WETS average, but within the normal range. Precipitation for the water year (October 1, 2019-Janaury 23, 2020) was observed at $71 \%$ of normal ( 36.71 inches). Despite a very dry start to the water year, precipitation levels increased considerably during the first few weeks of January. Because of the heavy rain observed on the day of and in the weeks leading to fieldwork, and the open stormwater pipe discharging into the site from the adjacent RV lot, it is assumed that
that surface and groundwater levels observed during fieldwork were likely temporarily higher than normal.

## (D) Site Specific Methods

Prior to visiting the site, the following existing data and information was reviewed:

- Clackamas County tax map (https://cmap.clackamas.us/maps/cmap /; Figure 2)
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) and Local Wetland Inventory (LWI) for Sandy (Appendix D; SRI/SHAPIRO/AGCD, Inc., 1997)
- U.S. Department of Agriculture (USDA) National Resource Conservation Service (NRCS) gridded Soil Survey Geographic (gSSURGO) database for Clackamas County (Figure 4)
- Recent and historical aerial photographs provided by Google Earth (Figures 5a5c)
- USGS National Elevation Data (NED), 1/9 arc-second, 2013 (Figure 6)
- Wetland delineation report \#WD2014-0465

Two soil series were mapped within the study site boundary according to the USDA NRCS soil survey for Clackamas County: Cazadero silty clay loam at slopes ranging from $0-20 \%$ was mapped over all but the northeastern corner of the site and Klickitat stony loam at slopes of $30-69 \%$ was mapped in the northeastern corner. The Cazadero series is rated predominantly nonhydric ( $2 \%$ hydric inclusions) at slopes of $0-7 \%$ (occurring over the central and northwestern portions of the site) and nonhydric at slopes greater than $7 \%$. Klickitat stony loam is rated nonhydric. Neither soil series are subject to flooding or ponding.

WD2014-0465 identified two wetlands totaling 0.24 acres and two streams located in ravines in the northeastern and northwestern portions of the site, which extended offsite. The wetlands had formed at the heads of the drainages.

Schott \& Associates visited the site on January 23, 2019 to verify the boundaries of wetlands and waters delineated in 2014. The 2014 wetland boundaries and sample plots were flagged in the field by the surveying company that had surveyed the 2014 wetland delineation (All County Surveyors and Planners, Inc). New data were collected at previously established sample plot locations according to methods described in the 1987 Manual and the Regional Supplement to the Corps of Engineers Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0) and new sample plots were established as needed. For each sample plot, data on vegetation, hydrology, and soils was collected, recorded in the field and later transferred to data forms (Appendix B). Plant indicator status was determined using the 2016 National Wetland Plant List (Lichvar et al. 2016). Onsite streams were delineated via the ordinary high-water mark (OHWM) as indicated by top of bank, wrack or scour lines, change in vegetation communities, or gage elevation where applicable.

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All identified wetlands are classified according to the USFWS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) and the Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites (DSL 2001).

Representative ground level photographs were recorded to document site conditions (Appendix C; Figure 6).

## (E) Description of All Wetlands and Other Non-Wetland Waters

The boundaries of the two wetlands and two streams were verified within the site, though the wetland in the northeast was found to be larger in size than it was in 2014. Onsite wetland area totaled 0.47 acre and onsite stream area totaled 0.04 acre. Wetland, stream, and sample plot locations are shown in Figure 6.

Wetland 1: Wetland 1 was located in the northwestern portion of the site at the head of a steep-sided ravine and sloped north-northeast. The wetland received direct discharge from an open storm water pipe associated with the RV lot to the south. During the time of fieldwork, this pipe was observed to be overflowing and flooding areas of upland near the pipe. Surface water flows eventually coalesced into a defined channel (Stream 1) downslope of the wetland, which continued offsite to the north. The wetland was assessed as a slope HGM class with a Cowardin class of seasonally flooded palustrine scrub-shrub (PSSC). The vegetation community consisted predominantly of Himalayan blackberry with patches of soft rush (Juncus effusus: FACW), as well as creeping bentgrass (Agrostis stolonifera; FAC) and velvetgrass (Holcus lanatus; FAC).

Soil samples met the Corps hydric indicator of redox dark surface (F6) indicating that iron in the soil has been removed and translocated under saturated, anoxic conditions within dark-colored soils. Soil layers were generally very dark grayish brown (10 YR $3 / 2$ ) in matrix color and featured common yellow-red redoximorphic concentrations occurring as soft masses. These dark soils were underlain by depleted matrix color (10 YR 4/1) at about 10 inches of depth in some cases. Soil samples on the south end of the wetland exhibited mixed matrices, presumably due to disturbance from the installation of the stormwater pipe. Soil texture was silt loam to silty clay loam to silty clay. Wetland hydrological indicators observed included surface water (A1), high water table (A2), and soil saturation (A3).

Wetland 1 was bound by the ravine sideslopes. These areas were generally vegetated by Himalayan blackberry along with pasture grasses such as orchardgrass (Dactylis glomerata; FACU), tall fescue (Schedonorus arundinaceus; FAC), bentgrass, and velvetgrass. Soil samples frequently exhibited mixed matrices of 10 YR $3 / 2$ with dark brown ( 10 YR 3/3) and brown (7.5 YR 4/3) colors, likely due to past disturbance. No redoximorphic features were present. Hydrology indicators were present in some cases, attributed to recent heavy rains and the presence of an overflowing open stormwater pipe.

Wetland 2: Wetland 2 was located in the northeastern portion of the site, also at the head of a ravine, and sloped east. The wetland was apparently sustained by one or more seeps

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on the face of the ravine. Flows eventually drained into Stream 2 and continued offsite to the east. The wetland was assessed as a slope HGM class with a Cowardin class of seasonally flooded palustrine forested (PFOC). The vegetation community consisted an overstory of western redcedar (Thuja plicata; FAC) with an understory of vine maple (Acer circinatum; FAC), salmonberry (Rubus spectabilis; FAC), piggyback plant (Tolmiea menziesii; FAC), and skunk cabbage (Symplocarpus foetidus; OBL).

Soils met the Corps hydric indicator of depleted below dark surface (A11). Dark soil surface layers were very dark grayish brown in matrix color, depleted layers were dark grayish brown (10 YR 4/2) to grayish brown (10 YR 5/2) in matrix color and featured many yellow-red redoximorphic concentrations occurring as soft masses. Soil texture was cobbley, gravelly loamy sand. Wetland hydrological indicators observed included surface water, high water table, and soil saturation.
The wetland was bound by the ravine sideslopes vegetated by mixed forest including bigleaf maple (Acer macrophyllum; FACU), Douglas-fir (Pseudotsuga menziesii; FACU), and western red cedar with an understory of vine maple, hazelnut (Corylus cornuta; FACU), western swordfern (Polystichum munitum; FACU), trailing blackberry (Rubus ursinus; FACU), and wood sorrel (Oxalis oregana; FACU). Soils were brown to dark brown silt loam with no redoximorphic features. No hydrological indicators were present at sample plots.

Stream 1: Stream 1 flowed northeast from Wetland 1. The channel within the study site was approximately 2-3 feet wide and 1-2 feet deep with a silty substrate and featured a few inches of flowing water at the time of fieldwork. Based on the intermittently defined bed and banks and relatively low flow despite wet conditions, it is assumed that this headwater reach of Stream 1 is intermittent in flow period. The feature was assessed as a seasonally flooded intermittent riverine stream bed (R4SBC) Cowardin class. Riparian vegetation consisted of a red alder (Alnus rubra; FAC) with an understory dominated by Himalayan blackberry and some English ivy (Hedera helix; FACU).

Stream 2: Stream 2 flowed east from Wetland 2. The channel within the study site was approximately 3-4 feet wide and less than 1 foot deep with a sandy-gravelly substrate and featured a few inches of flowing water at the time of fieldwork. The stream had intermittently defined bed and banks and low flow, so is assumed intermittent in flow period. The feature was assessed as a R4SBC Cowardin class. Riparian vegetation consisted of western redcedar forest with an understory of vine maple, western swordfern, and wood sorrel.

## (F) Deviation from LWI or NWI

The NWI depicts the upper end of a seasonally flooded intermittent riverine stream bed (R4SBC) aquatic habitat mapped in the general location of Stream 2. This feature is associated with an ODF mapped intermittent stream (Figure 3). The Sandy LWI depicts wetlands in the general locations of Wetland/Stream 1 and Wetland/Stream 2, referred to as CC3 and CC4, respectively (Appendix D). The results of this study confirm and refine the LWI and augments the NWI, identifying PSSC and PFOC wetlands at the heads of two R4SBC streams as shown in Figures 6a and 6b.

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## (G) Mapping Method

The mapped wetland areas were based on soils, vegetation, and hydrology data. The wetland and OHWM boundaries and sample plot locations were recorded with a handheld Trimble GPS unit capable of sub-meter accuracy following differential correction with Pathfinder Office desktop software. These data were converted to ESRI shapefile and mapped using ArcMap 10.6 desktop software.

## (H) Additional Information

None.

## (I) Summary and Conclusions

Based on vegetation, soils, and hydrology data, two wetlands (totaling 0.47 acre) and two streams (totaling 0.04 acre) were identified within the study site. Wetland 1 occurred at the bottom of a ravine at the head of Stream 1 and was classified as a slope HGM class and PSSC Cowardin class. Wetland 2 occurred at the bottom of a ravine at the head of Stream 2 and was classified as a slope HGM class and PFOC Cowardin class. Both streams were assessed as R4SBC Cowardin classes and continue beyond the study site boundaries.

## (J) Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State lands in accordance with OAR 141-090-0005 through 141-0900055.

## APPENDIX A: FIGURES

FIGURE 1: LOCATION MAP


Date: 1/27/2020
Figure 1. Location Map


FIGURE 2: TAX MAP


Date: 1/27/2020
Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019

Figure 2. Clackamas County Tax Map 2S5E19

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FIGURE 3: WETLAND INVENTORY MAP


Date: $1 / 31 / 2020$
Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019

Figure 3. Wetland Inventory Map

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FIGURE 4: USDA/NRCS SOIL SURVEY MAP


Date: 1/27/2020
Figure 4. USDA/NRCS Soil Survey Map of Clackamas County

Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; Soil Survey Staff, USDA, NRCS, 12/2/2019

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FIGURE 5A: RECENT AERIAL IMAGE - SEPTEMBER 3, 2018


Date: 1/27/2020
Figure 5a. Recent Aerial Image -
Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019 September 3, 2018

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FIGURE 5B: HISTORICAL AERIAL IMAGE - JUNE 15, 2003


Date: 1/27/2020
Figure 5b. Recent Aerial Image June 15, 2003

Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019

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FIGURE 5C: HISTORICAL AERIAL IMAGE - JUNE 30, 1995


Date: $1 / 27 / 2020$
Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019

Figure 5c. Recent Aerial Image June 30, 1995

The Views Project Site: S\&A \#2748


FIGURE 6A: WETLAND DELINEATION MAP - OVERVIEW


FIGURE 6B: WETLAND DELINEATION MAP - DETAIL
Mapping Method and Precision Statement: The mapped areas were based on indicators of OHWM as well as vegetation, soils, and hydrology data gathered in the field by Schott \& Associates. The sample plots and feature boundaries were recorded utilizing aTrimble Geo XT hand-held unit and post-processed to a $+/-3$ foot accuracy. The GPS data were then imported into ArcGIS software to produce maps.

Legend

| $\square$ | Study Site Tax Lot <br> Boundary: 23.24 acres |  |
| ---: | ---: | :--- |
| Contours: 5-ft. Interva |  |  |
| Wetlands: 0.47 acre | Photo Points |  |
| Stream OHWM: 0.04 | $\otimes$ | Sample Plots |
| acre | $\rightarrow$ | Feature Continues <br> Offsite |

- Stormwater Pipe

Date: 1/28/2020
1 inch = 125 feet
Data Source: ESRI, 2020; Clackamas GIS
Dept., 2019; USGS, NED, 2011

Figure 6b. Wetland Delineation
Map - Detail

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## APPENDIX B: DATA FORMS

## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? | Yes X No |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes $X$ No | within a Wetland? | Yes | X | No |
| Wetland Hydrology Present? | Yes X No |  |  |  |  |
| Remarks: Himalayan blackberry recently cleared along margins of wetland to faciliate access. |  |  |  |  |  |

## VEGETATION



Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
Secondary Indicators (2 or more required)

Saturation (A3)
_ Water Marks (B1)
_ Sediment Deposits (B2)
_ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8)
$\qquad$ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A and 4B)
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks)
$\qquad$ Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


## VEGETATION



Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


Remarks: Soil profile appears disturbed, likely due to installation of nearby stormwater pipe.

## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required) MLRA 1, 2, 4A and 4B)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

Saturation (A3)
MLRA 1, 2, 4A
Salt Crust (B11)
__ Water Marks (B1)
__ Aquatic Invertebrates (B13)

- 4A and 4B)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)

Sediment Deposits (B2)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Dry-Season Water Table (C2)
— Drift Deposits (B3)
-_ Presence of Reduced Iron (C4)

- Saturation Visible on Aerial Imagery (C9)
___ Algal Mat or Crust (B4)
__ Recent Iron Reduction in Plowed Soils (C6)
$\ldots \quad \begin{aligned} & \text { Iron Deposits (B5) } \\ & \text { Surface Soil Cracks (B6) }\end{aligned}$
__ Stunted or Stressed Plants (D1) (LRR A)
$\qquad$ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
-_ Raised Ant Mounds (D6) (LRR A)
__ Inundation Visible on Aerial Imagery (B7)
) Sparsely Vegetated Concave Surface (B8) Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)

Field Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


## VEGETATION



Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


Remarks: Soil profile appears disturbed, likely due to installation of nearby stormwater pipe.

## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required) MLRA 1, 2, 4A and 4B)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

Saturation (A3)
MLRA 1, 2, 4A
Salt Crust (B11)
__ Water Marks (B1)
__ Aquatic Invertebrates (B13)

- 4A and 4B)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
Sediment Deposits (B2)
-_ Oxidized Rhizospheres along Living Roots (C3)
__ Dry-Season Water Table (C2)
_ Drift Deposits (B3)
___ Oxidized Rhizospheres along Living Roots (C3)
Presence of Reduced Iron (C4)
Recent Iron Reduction in Plowed Soils (C6)
__ Algal Mat or Crust
___ Surface Soil Cracks (B6)
__ Stunted or Stressed Plants (D1) (LRR A)
- 

__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
——_Raised Ant Mounds (D6) (LRR A)
__ Inundation Visible on Aerial Imagery (B7)
) Sparsely Vegetated Concave Surface (B8) Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)
Field Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? | Yes $X{ }^{\text {X }}$ No |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes $X{ }^{\text {No}}$ | within a Wetland? | Yes | X | No |
| Wetland Hydrology Present? | Yes X No |  |  |  |  |
| Remarks: Himalayan blackberry recently cleared along margins of wetland to faciliate access. |  |  |  |  |  |

VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

Saturation (A3)
-

## MLRA 1, 2, 4A and 4B)

Salt Crust (B11)
___ Water Marks (B1)
__ Aquatic Invertebrates (B13)
13)

- 4A and 4B)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
Sediment Deposits (B2)
-_O Oxidized Rhizospheres along Living Roots (C3)
__ Dry-Season Water Table (C2)
$\begin{array}{ll}\text { ___ } & \text { Drift Deposits (B3) } \\ \text { Algal Mat or Crust (B4) }\end{array}$
__ Presence of Reduced Iron (C4)
_ Saturation Visible on Aerial Imagery (C9)
___ Recent Iron Reduction in Plowed Soils (C6)
— Iron Deposits (B5)
__ Stunted or Stressed Plants (D1) (LRR A)
$\qquad$ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
——_ Raised Ant Mounds (D6) (LRR A)
_ Surface Soil Cracks (B6)
__ Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)
Inundation Visible on Aerial Imagery (B7)
)



## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? | Yes $X{ }^{\text {X }}$ No |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes $X{ }^{\text {No}}$ | within a Wetland? | Yes | X | No |
| Wetland Hydrology Present? | Yes X No |  |  |  |  |
| Remarks: Himalayan blackberry recently cleared along margins of wetland to faciliate access. |  |  |  |  |  |

VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required)

Saturation (A3)
_ Water Marks (B1)
_ Sediment Deposits (B2)
——Drift Deposits (B3)
_ Algal Mat or Crust (B4)
_Iron Deposits (B5)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8)

## MLRA 1, 2, 4A and 4B)

__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks) $\qquad$
$\qquad$
$\qquad$
$\qquad$
Field Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
__ Water-Stained Leaves (B9) (except
Secondary Indicators (2 or more required)
MLRA 1, 2, 4A and 4B) _ Water-Stained Leaves (B9) (MLRA 1, 2,
High Water Table (A2)
___ $\quad$ Salt Crust (B11)
Aquatic Invertebrates (B13)
__ Saturation (A3)

- 4A and 4B)
__ Water Marks (B1)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
_ Dry-Season Water Table (C2)
Sediment Deposits (B2)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Saturation Visible on Aerial Imagery (C9)
_Drift Deposits (B3)

__ Iron Deposits (B5)
__ $\quad \begin{aligned} & \text { Recent Iron Reduction in Plowed Soils (C6) } \\ & \text { Stunted or Stressed Plants (D1) (LRR A) }\end{aligned}$
$\qquad$ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) (LRR A)
_ Surface Soil Cracks (B6)
__O Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)
- Inundation Visible on Aerial Imagery (B7)
)



## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
__ Water-Stained Leaves (B9) (except
Secondary Indicators (2 or more required)

- MLRA 1, 2, 4A and 4B) Water-Stained Leaves (B9) (MLRA 1, 2,
High Water Table (A2)
__ $\quad \begin{aligned} & \text { Salt Crust (B11) } \\ & \text { Aquatic Invertebrates (B13) }\end{aligned}$
__ Saturation (A3)
- 4A and 4B)
_ Water Marks (B1)
-_ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
_- Oxidized Rhizospheres along Living Roots (C3)
Sediment Deposits (B2)
__ Presence of Reduced Iron (C4)
- 

Saturation Visible on Aerial Imagery (C9)
__ Drift Deposits (B3)
__ Recent Iron Reduction in Plowed Soils (C6)
___ Iron Deposits (B5)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) (LRR A)
__ Inundation Visible on Aerial Imagery (B7)
-_Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7) Sparsely Vegetated Concave Surface (B8)


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? |  | No | X |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes | No | X | within a Wetland? | Yes | No | X |
| Wetland Hydrology Present? | Yes | No | X |  |  |  |  |
| Remarks: |  |  |  |  |  |  |  |

VEGETATION

| Tree Stratum (Use scientific names.) | Absolute <br> \% Cover | Dominant Species? | Indicator Status? | Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Acer macrophyllum | 50 | Y | FACU |  | 1 | (A) |
| 2. |  |  |  | Total Number of Dominant |  |  |
| 3. |  |  |  | Species Across All Strata: |  | (B) |
| 4. |  |  |  | Percent of Dominant Species |  |  |
| Total Cover: | 50 |  |  | That Are OBL, FACW, or FAC: | 33\% | (A/B) |
| Shrub Stratum |  |  |  | Prevalence Index Worksheet: |  |  |
| 1. Thuja plicata | 20 | Y | FAC | Total \% Cover of: | Multiply by |  |
| 2. |  |  |  | OBL species $\quad \times 1=$ | 0 |  |
| 3. |  |  |  | FACW species | 0 |  |
| 4. |  |  |  | FAC species $\mathbf{2 0}$ | 60 |  |
| 5. |  |  |  | FACU species $\quad 90$ | 360 |  |
| Total Cover: | 20 |  |  | UPL species | 0 |  |
| Herb Stratum |  |  |  | Column Totals: 110 (A) | 420 |  |
| 1. Polystichum munitum | 40 | Y | FACU | Prevalence Index = $\mathrm{B} / \mathrm{A}=$ |  |  |
| 2. $\square$ |  |  |  |  |  |  |
| 3. |  |  |  |  |  | Hydrophytic Vegetation Indicators: |  |  |
| 4. |  |  |  | $\qquad$ 1 - Rapid Test for Hydrophytic Vegetation$\qquad$ 2 - Dominance Test is $>50 \%$ |  |  |
| 5. |  |  |  |  |  |  |
| 6. |  |  |  | 3 - Prevalence Index is $\leq 3.0^{1}$ |  |  |
| 7. |  |  |  | $\qquad$ 4 - Morphological Adaptation1 (Provide supporting$\qquad$ data in Remarks or on a separate sheet) |  |  |
| 8. |  |  |  |  |  |  |
| 9. |  |  |  | $\qquad$ 5 - Wetland Non-Vascular Plants ${ }^{1}$ |  |  |
| 10. |  |  |  | Problematic Hydrophytic Vegetation ${ }^{1}$ (Explain) |  |  |
| 11. |  |  |  | ${ }^{1}$ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. |  |  |
| Woody Vine Stratum Total Cover: | - 40 |  |  |  |  |  |
| 1. Woody Vine Stratum |  |  |  |  |  |  |
| 2. |  |  |  | Hydrophytic <br> Vegetation <br> Present? <br> Yes | No | X |
| Total Cover: | 0 |  |  |  |  |  |
| \% Bare Ground in Herb Stratum _ 60 \% | Cover of B | otic Crust | 0 |  |  |  |
| Remarks: |  |  |  |  |  |  |

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
__ Water-Stained Leaves (B9) (except
Secondary Indicators (2 or more required)

- MLRA 1, 2, 4A and 4B) _ Water-Stained Leaves (B9) (MLRA 1, 2,
High Water Table (A2)

__ Saturation (A3)
- 4A and 4B)
_ Water Marks (B1)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
-_ Oxidized Rhizospheres along Living Roots (C3)
Drift Deposits (B3)
_—_ Oxidized Rhizospheres along Living Roots (C3)
Presence of Reduced Iron (C4)
Recent Iron Reduction in Plowed Soils (C6)
___ Iron Deposits (B5)
__ $\quad$ Stunted or Stressed Plants (D1) (LRR A)
__ Dry-Season Water Table (C2)
__ Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (LRR A)
__ Inundation Visible on Aerial Imagery (B7)
-_ Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7) Sparsely Vegetated Concave Surface (B8)



## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required) MLRA 1, 2, 4A and 4B)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

Saturation (A3)
MLRA 1, 2, 4A
Salt Crust (B11)
__ Water Marks (B1)
__ Aquatic Invertebrates (B13)

- 4A and 4B)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)

Sediment Deposits (B2)
-_ Oxidized Rhizospheres along Living Roots (C3)
__ Dry-Season Water Table (C2)

Drift Deposits (B3)
___ Oxidized Rhizospheres along Living Roots (C3)
Presence of Reduced Iron (C4)
Recent Iron Reduction in Plowed Soils (C6)
___ Iron Deposits (B5)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
-_ Raised Ant Mounds (D6) (LRR A)
___ Surface Soil Cracks (B6)
-_ Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)
Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8) $\qquad$
Field Observations:

| Surface Water Present? | Yes |  | No | X | Depth (inches): |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Water table Present? | Yes | X | No |  | Depth (inches): | 0 |
| Saturation Present? | Yes | X | No |  | Depth (inches): | 0 |

$\qquad$ (includes capillary fringe)
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks:

## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
Secondary Indicators (2 or more required)

Saturation (A3)
_ Water Marks (B1)
_ Sediment Deposits (B2)
_ Drift Deposits (B3)
_ Algal Mat or Crust (B4)
_Iron Deposits (B5)
___ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8)
$\qquad$ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A and 4B)
__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
__ Stunted or Stressed Plants (D1) (LRR A)
-_Other (Explain in Remarks)
$\qquad$ Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? |  | No | X |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes | No | X | within a Wetland? | Yes | No | X |
| Wetland Hydrology Present? | Yes | No | X |  |  |  |  |
| Remarks: |  |  |  |  |  |  |  |

VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except
___ Saturation (A3)
_ Water Marks (B1)

- Sediment Deposits (B2)
_—_Drift Deposits (B3)
___ Algal Mat or Crust (B4)
Iron Deposits (B5)
__ Surface Soil Cracks (B6)
Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8)

MLRA 1, 2, 4A and 4B)
$\ldots \quad \begin{aligned} & \text { Salt Crust (B11) } \\ & \text { Aquatic Invertebrates (B13) }\end{aligned}$
___ Hydrogen Sulfide Odor (C1)
-_Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)

- Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks) )

Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2,

## 4A and 4B)

__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)

- Saturation Visible on Aerial Imagery (C9)
-_ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
__ Raised Ant Mounds (D6) (LRR A)
__ Frost-Heave Hummocks (D7)



## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? |  | No | X |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes | No | X | within a Wetland? | Yes | No | X |
| Wetland Hydrology Present? | Yes | No | X |  |  |  |  |
| Remarks: |  |  |  |  |  |  |  |

VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except
_ Saturation (A3)
__ Water Marks (B1)
Sediment Deposits (B2)
Drift Deposits (B3)
___ Algal Mat or Crust (B4)
Iron Deposits (B5)
__ Surface Soil Cracks (B6)
Inundation Visible on Aerial Imagery (B7) Sparsely Vegetated Concave Surface (B8)

MLRA 1, 2, 4A and 4B)
___ $\begin{aligned} & \text { Salt Crust (B11) } \\ & \text { Aquatic Invertebrates (B13) }\end{aligned}$
___ Hydrogen Sulfide Odor (C1)
-_Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)

- Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks)
$\qquad$

Id Observations:


## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
Secondary Indicators (2 or more required)

Saturation (A3)
_ Water Marks (B1)
_ Sediment Deposits (B2)
_ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
_Iron Deposits (B5)
___ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8)
$\qquad$ Water-Stained Leaves (B9) (except

## MLRA 1, 2, 4A and 4B)

__ Salt Crust (B11)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

## - 4A and 4B)

__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)

- Saturation Visible on Aerial Imagery (C9)
__ Geomorphic Position (D2)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
___ Raised Ant Mounds (D6) (LRR A)
__ Frost-Heave Hummocks (D7)
Field Observations:



## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.


VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
Surface Water (A1)

X High Water Table (A2)
$\qquad$ Water-Stained Leaves (B9) (except

Secondary Indicators (2 or more required) MLRA 1, 2, 4A and 4B)
$\qquad$ Water-Stained Leaves (B9) (MLRA 1, 2,

Saturation (A3)
___ $\begin{aligned} & \text { Salt Crust (B11) } \\ & \text { Aquatic Invertebrates (B13) }\end{aligned}$
___ Water Marks (B1)
_ 4A and 4B)
__ Hydrogen Sulfide Odor (C1)
__ Drainage Patterns (B10)
Sediment Deposits (B2)
_— Oxidized Rhizospheres along Living Roots (C3)
__ Dry-Season Water Table (C2)

Drift Deposits (B3)

___ Iron Deposits (B5)
__ $\quad \begin{aligned} & \text { Recent Iron Reduction in Plowed Soils (C6) } \\ & \text { Stunted or Stressed Plants (D1) (LRR A) }\end{aligned}$
-_ Geomorphic Position (D2)
Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)
——_Raised Ant Mounds (D6) (LRR A)
Surface Soil Cracks (B6)
-_ Other (Explain in Remarks)
__ Frost-Heave Hummocks (D7)
_ Inundation Visible on Aerial Imagery (B7)
Sparsely Vegetated Concave Surface (B8) $\qquad$
Field Observations:

| Surface Water Present? | Yes |  | No | X | Depth (inches): |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Water table Present? | Yes | X | No |  | Depth (inches): | 0 |
| Saturation Present? | Yes | X | No |  | Depth (inches): | 0 |

$\qquad$ (includes capillary fringe)
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
Remarks:

## WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region



SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

| Hydrophytic Vegetation Present? |  | No | X |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Hydric Soil Present? | Yes | No | X | within a Wetland? | Yes | No | X |
| Wetland Hydrology Present? | Yes | No | X |  |  |  |  |
| Remarks: |  |  |  |  |  |  |  |

VEGETATION


Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)


## HYDROLOGY

Wetland Hydrology Indicators:
Primary Indicators (any one indicator is sufficient)
__ Surface Water (A1)
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__ Presence of Reduced Iron (C4)
_ Recent Iron Reduction in Plowed Soils (C6)
__ Stunted or Stressed Plants (D1) (LRR A)
__ Other (Explain in Remarks)
$\qquad$

Id Observations:



Photo Point 1. From the side slope of the ravine in the northwestern portion of the site facing southwest.


Photo Point 1. From the side slope of the ravine in the northwestern portion of the site facing southeast toward Stream 1.


Photo Point 2. From Stream 1, facing northeast downstream.


Photo Point 2. From Stream 1, facing southwest upstream.


Photo Point 3. From the top of Wetland 1, facing northeast toward wetland area.


Photo Point 3. From the top of Wetland 1 facing east toward the western ravine side slope.


Photo Point 3. From the top of Wetland 1 facing south toward the face of the ravine and stormwater pipe


Photo Point 4. From the top of the western ravine side slope facing north toward Stream 1.


Photo Point 4. From the top of the western ravine side slope facing west toward Wetland 1.


Photo Point 4. From the top of the western ravine side slope facing east toward upland field.

APPENDIX C: GROUND LEVEL PHOTOGRAPHS
The Views Project Site
S\&A\#2748


Photo Point 5. From Wetland 2 facing east toward wetland area.


Photo Point 5. From Wetland 2 facing south toward wetland area.


Photo Point 5. From Wetland 2 facing north toward adjacent upland forest.


Photo Point 6. From the start of Stream 2 facing northeast, downstream.


Photo Point 6. From the start of Stream 2 facing northwest toward wetland.


Photo Point 7. From near the top of Wetland 2 facing east toward wetland area.

APPENDIX C: GROUND LEVEL PHOTOGRAPHS
The Views Project Site
S\&A\#2748


Photo Point 7. From near the top of Wetland 2 facing north toward wetland area.


Photo Point 7. From near the top of Wetland 2 facing west toward seep area.


Photo Point 7. From near the top of Wetland 2 facing southeast toward adjacent upland forest.


Photo Point 8. From the upland field in the central portion of the site facing east toward ravine containing Wetland 2 and Stream 2.

APPENDIX C: GROUND LEVEL PHOTOGRAPHS
The Views Project Site
S\&A\#2748


Photo Point 8. From the upland field in the central portion of the site facing south toward onsite rural residential development.


Photo Point 8. From the upland field in the central portion of the site facing west toward ravine containing Wetland 1 and Stream 1.

APPENDIX C: GROUND LEVEL PHOTOGRAPHS
The Views Project Site
S\&A\#2748

Schott \& Associates
P.O. Box 589

Aurora, OR. 97002
503.678.6007


Photo Point 8. From the upland field in the central portion of the site facing north toward upland forest.


## APPENDIX E: LITERATURE CITATIONS

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## EXHIBIT I

Geotechnical Investigation and Consultation Services
Proposed The Views Planned Development Site
Tax Lot No's. 200 and 500

41717 Highway 26
Sandy (Clackamas County), Oregon
for

Even Better Homes, Inc.

Project No. 1666.002.G
May 15, 2020

## R REDMOND GEOTECHNICAL SERVICES

May 15, 2020

Mr. Mac Even<br>Even Better Homes, Inc.<br>P.O. Box 2021<br>Gresham, Oregon 97030

Dear Mr. Even:

Re: Geotechnical Investigation and Consultation Services, Proposed The Views Planned Development Site, Tax Lot No's. 200 and 500, 41717 Highway 26, Sandy (Clackamas County), Oregon

Submitted herewith is our report entitled "Geotechnical Investigation and Consultation Services, Proposed The Views Planned Development Site, Tax Lot No's. 200 and 500, 41717 Highway 26, Sandy (Clackamas County), Oregon". The scope of our services was outlined in our formal proposal to Mr. Mac Even of Even Better Homes, Inc. dated November 20, 2019. Authorization of our services was provided by Mr. Mac Even on December 19, 2019.

During the course of our investigation, we have kept you and/or others advised of our schedule and preliminary findings. We appreciate the opportunity to assist you with this phase of the project. Should you have any questions regarding this report, please do not hesitate to call.


Daniel M. Redmond, P.E., G.E.
President/Principal Engineer

Cc: Mr. Ray Moore
All County Surveyors \& Planners, Inc.

$6 \times 4 \cdot(2-3)-20$

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## ATTACHMENTS

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Redmond Geotechnical Services

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# GEOTECHNICAL INVESTIGATION AND CONSULTATION SERVICES PROPOSED THE VIEWS PLANNED DEVELOPMENT SITE <br> TAX LOT NO'S. 200 AND 500 <br> 41717 HIGHWAY 26 SANDY (CLACKAMAS COUNTY) OREGON 

## INTRODUCTION

Redmond Geotechnical Services, LLC is please to submit to you the results of our Geotechnical Investigation and Consultation Services at the site of the proposed new The Views planned development project located to the east of Highway 26 and to the east and/or west of the intersection of SE Vista Loop Drive in Sandy (Clackamas County), Oregon. The general location of the subject site is shown on the Site Vicinity Map, Figure No. 1. The purpose of our geotechnical investigation and consultation services at this time was to explore the existing subsurface soils and/or groundwater conditions across the subject site and to evaluate any potential concerns with regard to development at the site as well as to develop and/or provide appropriate geotechnical design and construction recommendations for the proposed new The Views planned development project.

## PROJECT DESCRIPTION

Based on a review of the proposed site development plans, we understand that present plans will consist of the construction of a new planned development. Reportedly, the project will consist of the development and/or construction of approximately one hundred and twenty-two (122) new mixed use structures and/or lots ranging in size from about 2,000 to 11,000 square feet. We understand that the lots will primarily be developed with new single-family, one- and/or two-story wood-frame residential structures. However, construction of new two- and/or three-story woodframe multi-family (apartment) buildings is also planned.

Support of the new single- and/or multi-family residential structures is anticipated to consist primarily of conventional shallow strip (continuous) footings although some individual (column) footings will also be required. Additionally, we envision that the proposed new single-and/or multifamily residential structures will be constructed with raised wooden post and beams floors and/or concrete slab-on-grade floors, respectively. Further, due to the sloping site grades, we anticipate that some of the proposed new residential homes and/or structures may be constructed with partial and/or below level. As such, construction of some below grade retaining walls is also anticipated form the project. Structural loading information, although unavailable at this time, is anticipated to be fairly typical for this type of single- and/or four-story wood-frame structures and is expected to result in maximum dead plus live continuous (strip) and individual (column) footing loads on the order of about 1.5 to 4.0 kips per lineal foot (klf) and 10 to 35 kips, respectively.

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Other associated site improvements for the project will include construction of new paved public streets and/or private access drives and parking areas. Additionally, the project will include the construction of new underground utility services as well as new concrete curbs and sidewalks. Further, we understand that development of the site will also include the collection of storm water from hard and/or impervious surfaces (i.e., roofs and pavements) for on-site treatment and disposal within various storm water detention facilities designed by the Civil Engineer.

Earthwork and grading operations for the project to bring the subject property to finish design grades and/or elevations will reportedly result in both cuts and/or fills. A review of the proposed site grading plans for the project indicate that cuts and/or fills of between ten (10) to fifteen (15) feet are generally anticipated across the site.

## SCOPE OF WORK

The purpose of our geotechnical studies was to evaluate the overall subsurface soil and/or groundwater conditions underlying the subject site with regard to the proposed new residential development and construction at the site and any associated impacts or concerns with respect to development at the site as well as provide appropriate geotechnical design and construction recommendations for the project. Specifically, our geotechnical investigation included the following scope of work items:

1. Review of available and relevant geologic and/or geotechnical investigation reports for the subject site and/or area including a Preliminary Report of Engineering Geology and Geotechnical Engineering Services for the proposed Timber Valley Development prepared by GeoDesign, Inc. dated August 24, 2007.
2. A detailed field reconnaissance and subsurface exploration program of the soil and ground water conditions underlying the site by means of eleven (11) exploratory test pit excavations. The exploratory test pits were excavated to depths ranging from about five (5) to eight (8) feet beneath existing site grades at the approximate locations as shown on the Site Exploration Plan, Figure No. 2. Additionally, field infiltration testing was also performed within various test pits excavated across the subject site.
3. Laboratory testing to evaluate and identify pertinent physical and engineering properties of the subsurface soils encountered relative to the planned site development and construction at the site. The laboratory testing program included tests to help evaluate the natural (field) moisture content and dry density, maximum dry density and optimum moisture content, gradational characteristics, Atterberg Limits and (remolded) direct shear strength tests as well as direct shear strength and " R "-value tests.
4. A literature review and engineering evaluation and assessment of the regional seismicity to evaluate the potential ground motion hazard(s) at the subject site. The evaluation and assessment included a review of the regional earthquake history and sources such as potential seismic sources, maximum credible earthquakes, and reoccurrence intervals as well as a discussion of the possible ground response to the selected design earthquake(s), fault rupture, landsliding, liquefaction, and tsunami and seiche flooding.
5. Engineering analyses utilizing the field and laboratory data as a basis for furnishing recommendations for foundation support of the proposed new residential structures. Recommendations include maximum design allowable contact bearing pressure(s), depth of footing embedment, estimates of foundation settlement, lateral soil resistance, and foundation subgrade preparation. Additionally, construction and/or permanent subsurface water drainage considerations have also been prepared. Further, our report includes recommendations regarding site preparation, placement and compaction of structural fill materials, suitability of the on-site soils for use as structural fill, criteria for import fill materials, and preparation of foundation, pavement and/or floor slab subgrades.
6. Flexible pavement design and construction recommendations for the proposed new public streets and private access drives and parking area improvements.

## SITE CONDITIONS

## Regional and Site Geology

The subject site and/or area is located on the eastern margin of the Portland Basin near where the basin meets the western edge of the Cascade Mountains physiographic province (Orr and Orr, 1999). Bedrock in this region consists of volcanic rocks emplaced tens of millions of years ago, associated with the Columbia River Basalt Group and with volcanics from the Western Cascades province (Gannet and Caldwell, 1998).

The volcanic basement is overlain by silts, sands and gravels of Miocene to Pleistocene age which form the majority of the basin fill in the area. The basin fill sediments generally are mapped as Sandy River Mudstone towards the lower portion of the assemblage inturn overlain by the Troutdale Formation, a series of gravels, sands and silts deposited by the ancestral Columbia River and smaller rivers flowing from the Cascade Mountains (Schlicker and Finlayson, 1979). In the vicinity of Sandy, the Troutdale Formation is overlain by the Springwater Formation, a conglomerate with some volcaniclastic sands, silts, and debris flows derived from the Cascade Range. The conglomerate consists of gravels, cobbles, and boulders of volcanic composition that are strongly and deeply weathered to completely decomposed residual soils often producing a red, fine-grained soil up to 75 feet deep.

## Surface Conditions

The proposed new The Views planned development property consists of two (2) generally irregular shaped tax lots (TL's 200 and 500) which encompass a total plan area of approximately 35.32 acres. The proposed The Views planned development property is roughly located to the east of Highway 26 and to the east and west of the intersection with SE Vista Loop Drive. The easterly portion of the subject property (Tax Lot No. 500) is presently unimproved and consists of an existing tree farm while the westerly portion of the subject property (Tax Lot No. 20) is presently improved and contains an existing single-family residential home as well as various detached wooden outbuildings along the westerly site boundary. Surface vegetation across the easterly portion of the site generally consists of a light to moderate growth of grass and weeds as well as brush and numerous small to large sized trees across the easterly portion of the site. Additionally, the easterly portion of the subject property (Tax Lot No. 200) contains three (3) existing seasonal drainage basins.

Topographically, the westerly portion of the subject site (Tax Lot No. 500) is characterized as gently sloping terrain (i.e., less than 5 percent) descending downward towards the west with overall topographic relief estimated at about fifty (50) feet and ranges from a low about Elevation 1128 feet near the northwesterly corner of the subject site to a high of about Elevation 1178 near the southwesterly corner of the site. However, the easterly portion of the subject property (Tax Lot No. 200) is characterized as gently sloping to moderately steep terrain (i.e., 10 to 35 percent) descending downwards from the center of the site towards the north, south and east. Overall topographic relief across the easterly portion of the subject property is estimated at about two hundred feet (200) and ranges from a low of about Elevation 990 feet near the bottom of the existing easterly seasonal drainage basin to a high of about Elevation 1190 feet near the existing westerly residential home site.

## Subsurface Soil Conditions

Our understanding of the subsurface soil conditions underlying the site was developed by means of eleven (11) exploratory test pits excavated to depths ranging from about five (5) to eight (8) feet beneath existing site grades on April 15, 2020 with a John Deere 200C track-mounted excavator. The location of the exploratory test pits were located in the field by marking off distances from existing and/or known site features and are shown in relation to the existing site features and/or site improvements on the Site Exploration Plan, Figure No's. 2A and 2B. Detailed logs of the test pit explorations, presenting conditions encountered at each location explored, are presented in the Appendix, Figure No's. A-4 through A-9.

The exploratory test pit excavations were observed by staff from Redmond Geotechnical Services, LLC who logged each of the test pit explorations and obtained representative samples of the subsurface soils encountered across the site. Additionally, the elevation of the exploratory test pit excavations were referenced from a site topographic survey and should be considered as approximate. All subsurface soils encountered at the site and/or within the exploratory test pit excavations were logged and classified in general conformance with the Unified Soil Classification System (USCS) which is outlined on Figure No. A-3.

The test pit explorations revealed that the subject site is underlain by native soil deposits comprised of residual soils and/or highly weathered bedrock deposits composed of a surficial layer of dark brown, wet, soft , organic, sandy, clayey silt topsoil materials to depths of about 12 to 14 inches. These surficial topsoil materials were inturn underlain by medium to reddish-brown, very moist, medium stiff to stiff, sandy, clayey silt to the maximum depth explored of about eight (8) feet beneath the existing site and/or surface grades. These sandy, clayey silt subgrade soils and/or residual soils (highly weathered bedrock deposits) are best characterized by relatively moderate strength and low to moderate compressibility.

## Groundwater

Groundwater was not encountered within any of the exploratory test pit explorations (TH-\#1 through TH-\#11) at the time of excavation to depths of at least 8.0 feet beneath existing surface grades except. However, the northerly, easterly and southerly portions of the subject property contain existing seasonal drainage basins.

In this regard, groundwater elevations at the site may fluctuate seasonally in accordance with rainfall conditions and/or associated with runoff across the site as well as changes in site utilization. As such, we are generally of the opinion that the static water levels and/or surface water ponding observed and/or not observed during our recent field exploration work generally reflect the seasonal groundwater level(s) at and/or beneath the site.

## INFILTRATION TESTING

We performed two (2) field infiltration tests at the site on April 15, 2020. The infiltration tests were performed in test holes TH-\#4 and TH-\#11 at depths of between five (5) and six (6) feet beneath the existing site and/or surface grades. The subgrade soils encountered in the infiltration test hole consisted of sandy, clayey silt. The infiltration testing was performed in general conformance with current EPA and/or the City of Sandy/Clackamas County Encased Falling Head test method which consisted of advancing a 6-inch diameter PVC pipe approximately 6 inches into the exposed soil horizon at each test location. Using a steady water flow, water was discharged into the pipe and allowed to penetrate and saturate the subgrade soils. The water level was adjusted over a two (2) hour period and allowed to achieve a saturated subgrade soil condition consistent with the bottom elevation of the surrounding test pit excavation. Following the required saturating period, water was again added into the PVC pipe and the time and/or rate at which the water level dropped was monitored and recorded. Each measurable drop in the water level was recorded until a consistent infiltration rate was observed and/or repeated.

Based on the results of the field infiltration testing at the site, we have found that the native sandy, clayey silt subgrade soil deposits posses an ultimate infiltration rate on the order of about 0.1 to 0.2 inches per hour (in/hr).



## LABORATORY TESTING

Representative samples of the on-site subsurface soils were collected at selected depths and intervals from various test pit excavations and returned to our laboratory for further examination and testing and/or to aid in the classification of the subsurface soils as well as to help evaluate and identify their engineering strength and compressibility characteristics. The laboratory testing consisted of visual and textural sample inspection, moisture content and dry density determinations, maximum dry density and optimum moisture content, gradation analyses and Atterberg Limits as well as direct shear strength and " $R$ "-value tests. Results of the various laboratory tests are presented in the Appendix, Figure No's. A-10 through A-15.

## SEISMICITY AND EARTHOUAKE SOURCES

The seismicity of the southwest Washington and northwest Oregon area, and hence the potential for ground shaking, is controlled by three separate fault mechanisms. These include the Cascadia Subduction Zone (CSZ), the mid-depth intraplate zone, and the relatively shallow crustal zone. Descriptions of these potential earthquake sources are presented below.

The CSZ is located offshore and extends from northern California to British Columbia. Within this zone, the oceanic Juan de Fuca Plate is being subducted beneath the continental North American Plate to the east. The interface between these two plates is located at a depth of approximately 15 to 20 kilometers (km). The seismicity of the CSZ is subject to several uncertainties, including the maximum earthquake magnitude and the recurrence intervals associated with various magnitude earthquakes. Anecdotal evidence of previous CSZ earthquakes has been observed within coastal marshes along the Washington and Oregon coastlines. Sequences of interlayered peat and sands have been interpreted to be the result of large Subduction zone earthquakes occurring at intervals on the order of 300 to 500 years, with the most recent event taking place approximately 300 years ago. A study by Geomatrix (1995) and/or USGS (2008) suggests that the maximum earthquake associated with the CSZ is moment magnitude ( $M w$ ) 8 to 9 . This is based on an empirical expression relating moment magnitude to the area of fault rupture derived from earthquakes that have occurred within Subduction zones in other parts of the world. An Mw 9 earthquake would involve a rupture of the entire CSZ. As discussed by Geomatrix (1995) this has not occurred in other subduction zones that have exhibited much higher levels of historical seismicity than the CSZ. However, the 2008 USGS report has assigned a probability of 0.67 for a Mw 9 earthquake and a probability of 0.33 for a Mw 8.3 earthquake. For the purpose of this study an earthquake of Mw 9.0 was assumed to occur within the CSZ.

The intraplate zone encompasses the portion of the subducting Juan de Fuca Plate located at a depth of approximately 30 to 50 km below western Washington and western Oregon. Very low levels of seismicity have been observed within the intraplate zone in western Oregon and western Washington. However, much higher levels of seismicity within this zone have been recorded in Washington and California. Several reasons for this seismic quiescence were suggested in the Geomatrix (1995) study and include changes in the direction of Subduction between Oregon, Washington, and British Columbia as well as the effects of volcanic activity along the Cascade Range.

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Historical activity associated with the intraplate zone includes the 1949 Olympia magnitude 7.1 and the 1965 Puget Sound magnitude 6.5 earthquakes. Based on the data presented within the Geomatrix (1995) report, an earthquake of magnitude 7.25 has been chosen to represent the seismic potential of the intraplate zone.

The third source of seismicity that can result in ground shaking within the Vancouver and southwest Washington area is near-surface crustal earthquakes occurring within the North American Plate. The historical seismicity of crustal earthquakes in this area is higher than the seismicity associated with the CSZ and the intraplate zone. The 1993 Scotts Mills (magnitude 5.6) and Klamath Falls (magnitude 6.0 ), Oregon earthquakes were crustal earthquakes.

## Liquefaction

Seismic induced soil liquefaction is a phenomenon in which lose, granular soils and some silty soils, located below the water table, develop high pore water pressures and lose strength due to ground vibrations induced by earthquakes. Soil liquefaction can result in lateral flow of material into river channels, ground settlements and increased lateral and uplift pressures on underground structures. Buildings supported on soils that have liquefied often settle and tilt and may displace laterally. Soils located above the ground water table cannot liquefy, but granular soils located above the water table may settle during the earthquake shaking.

Our review of the subsurface soil test pit logs from our exploratory field explorations (TH-\#1 through TH-\#11) and laboratory test results indicate that the site is generally underlain by medium stiff to stiff, sandy, clayey silt residual soils and/or highly weathered bedrock deposits to depths of at least 8.0 feet beneath existing site grades. Additionally, groundwater was generally not encountered within any of the exploratory test pit excavations (TH-\#1 through TH-\#11) at the site during our field exploration work.

As such, due to the medium stiff to stiff and/or cohesive nature of the sandy, clayey silt subgrade soils and/or highly weathered bedrock deposits beneath the site, it is our opinion that the native clayey, sandy silt subgrade soil and/or highly weathered bedrock deposits located beneath the subject site have a very low potential for liquefaction during the design earthquake motions previously described.

## Landslides

No ancient and/or active landslides were observed or are known to be present on the subject site. Additionally, the subject property does not contain any steep slopes (i.e., greater than 40 percent). As such, development of the subject site into the planned residential development does not appear to present a potential geologic and/or landslide hazard provided that the site grading and development activities conform with the recommendations presented within this report.

## Surface Rupture

Although the site is generally located within a region of the country known for seismic activity, no known faults exist on and/or immediately adjacent to the subject site. As such, the risk of surface rupture due to faulting is considered negligible.

## Tsunami and Seiche

A tsunami, or seismic sea wave, is produced when a major fault under the ocean floor moves vertically and shifts the water column above it. A seiche is a periodic oscillation of a body of water resulting in changing water levels, sometimes caused by an earthquake. Tsunami and seiche are not considered a potential hazard at this site because the site is not near to the coast and/or there are no adjacent significant bodies of water.

## Flooding and Erosion

Stream flooding is a potential hazard that should be considered in lowland areas of Clackamas County and Sandy. The FEMA (Federal Emergency Management Agency) flood maps should be reviewed as part of the design for the proposed new residential structures and site improvements. Elevations of structures on the site should be designed based upon consultants reports, FEMA (Federal Emergency Management Agency), and Clackamas County requirements for the 100-year flood levels of any nearby creeks, streams and/or drainage basins.

## SLOPE STABILITY ANALYSIS

For the purpose of evaluating slope stability at the subject site, we performed quantitative slope stability modeling and analyses based upon the existing site conditions and/or the proposed site development plan.

Quantitative slope stability modeling and analyses were performed to evaluate slope stability on the site under the existing and/or post construction in-situ conditions using Slide 7.0 computer program developed by Rocscience, Inc. of Toronto, Ontario, Canada. This numerical analysis program utilizes a two-dimensional limiting equilibrium method to calculate the factor of safety of a potential slip surface, and incorporates search routines to identify the most critical potential failure surfaces for the case(s) analyzed. Factors of safety were calculated using Bishop and Janbu method of slices.

Proposed residential development at the subject site is anticipated to be constructed at and/or above the existing in-situ soil conditions of the existing easterly descending slope at the site and were modeled as a two (2) layer system with the upper layer as sandy, clayey silt structural fill soil and the lower layer as the existing (native) very moist, medium stiff to stiff, sandy, clayey silt residual soils encountered in test holes TH-\#1 through TH-\#11. Site and slope topography, subsurface geometry, and other site conditions modeled in the analyses are based on a topographic map provided by the client and/or our field measurements. In our analysis, we considered potential groundwater levels to be located greater than 50 feet beneath the site.

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For stability calculations, the potential failure model was considered primarily as circular sliding along a basal shear surface. Shear strength parameters used in the model were selected based on soil conditions encountered in the test pits, SPT N-value correlations, and our local experience with similar soil types and geologic conditions. The results of our slope stability analyses for the proposed single-family residential structures constructed above the in-situ subgrade soil conditions on structural fill soils are summarized in Table 2 . The slope stability analyses cross-section is presented as an attachment to this report in Appendix B. The location of the cross-section used is indicated on the Site Exploration Plan, Figure No. 2B.

Table 1 - Summary of Estimated In-Situ/Fill Soil Strength Parameters

| Geologic Unit | Wet Unit <br> Weight <br> (pcf) | Friction <br> Angle | Cohesion <br> (psf) |
| :---: | :---: | :---: | :---: |
| STRUCTURAL FILL: sandy, clayey SILT (ML) | 100 | 26 | 450 |
| Medium stiff, sandy, clayey SILT (ML) | 100 | 24 | 400 |

Table 2 - Summary of Slope Stability Analyses for In-Situ/Fill Soil Conditions with Proposed Development

| Pre-Construction | Factor of <br> Safety <br> (Static) | Factor of <br> Safety <br> (Seismic) |
| :---: | :---: | :---: |
| Cross-Section A-A' | 2.882 | 1.567 |

The results of the quantitative slope stability modeling and analysis performed using Slide 7.0 computer program indicated an existing in-situ and/or post construction slope stability factor of safety (FS) under static and seismic loading greater than 1.5 and 1.2 (see Slope Stability Results in Appendix B). In our opinion, the calculated factor of safety is adequate for the proposed residential construction and development of the subject site as we understand it.

## CONCLUSIONS AND RECOMMENDATIONS

## General

Based on the results of our field explorations, laboratory testing, and engineering analyses, it is our opinion that the site is presently stable and suitable for the proposed new The Views planned development and its associated site improvements provided that the recommendations contained within this report are properly incorporated into the design and construction of The Views planned development project.

The primary features of concern at the site are 1) the presence of highly moisture sensitive clayey and silty subgrade soils across the site, 2) the presence of gently to moderately steep sloping site conditions across the site and 3) the relatively low infiltration rates anticipated within the near surface clayey and silty subgrade soils.

With regard to the moisture sensitive clayey and silty subgrade soils, we are generally of the opinion that all site grading and earthwork activities be scheduled for the drier summer months which is typically June through September. In regards to the gently to moderately steep sloping site conditions across the site, we are of the opinion that site grading and/or structural fill placement should be minimized where possible and should generally limit cuts and/or fills to about fifteen (15) feet unless approved by the Geotechnical Engineer. Additionally, where existing site slopes and/or surface grades exceed about 20 percent $(1 \mathrm{~V}: 5 \mathrm{H})$ and in order to construct the proposed new site improvements, benching and keying of all fills into the natural site slopes will be required. Further, due to the presence of the existing seasonal drainage basins at the site, the use of subdrains will be required beneath all structural fills and/or within all fill slopes. In addition to the above, we recommend that each lot which borders the moderately steep slopes (Lots 33 through 40 and Lots 57 through 71) engage a Geotechnical Engineer to provide site specific design and construction recommendations for the proposed single-family residential structure. With regard to the relatively low infiltration rates anticipated within the clayey and silty subgrade soils beneath the site, we generally do not recommend any storm water detention and/or infiltration within structural and/or embankment fills. However, storm water detention and some infiltration may be feasible within storm water detention basins excavated into the existing medium stiff to stiff, sandy, clayey silt residual soils. In this regard, we recommend that all proposed storm water detention and/or infiltration systems for the project be reviewed and approved by Redmond Geotechnical Services, LLC.

The following sections of this report provide specific recommendations regarding subgrade preparation and grading as well as foundation and floor slab design and construction for the new The Views planned development project.

## Site Preparation

As an initial step in site preparation, we recommend that the proposed new The Views planned development site as well as any associated structural and/or site improvement area(s) be stripped and cleared of all existing improvements, any existing unsuitable fill materials, surface debris, existing vegetation, topsoil materials, and/or any other deleterious materials present at the time of construction. In general, we envision that the site stripping to remove existing vegetation and topsoil materials will generally be about 12 inches. However, localized areas requiring deeper removals, such as any existing undocumented and/or unsuitable fill materials as well as old foundation remnants, will likely be encountered and should be evaluated at the time of construction by the Geotechnical Engineer. The stripped and cleared materials should be properly disposed of as they are generally considered unsuitable for use/reuse as fill materials.

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Following the completion of the site stripping and clearing work and prior to the placement of any required structural fill materials and/or structural improvements, the exposed subgrade soils within the planned structural improvement area(s) should be inspected and approved by the Geotechnical Engineer and possibly proof-rolled with a half and/or fully loaded dump truck. Areas found to be soft or otherwise unsuitable should be over-excavated and removed or scarified and recompacted as structural fill. During wet and/or inclement weather conditions, proof rolling and/or scarification and recompaction as noted above may not be appropriate.

The on-site native sandy, clayey silt subgrade soil materials are generally considered suitable for use/reuse as structural fill materials provided that they are free of organic materials, debris, and rock fragments in excess of about 6 inches in dimension. However, if site grading is performed during wet or inclement weather conditions, the use of some of the on-site native soil materials which contain significant silt and clay sized particles will be difficult at best. In this regard, during wet or inclement weather conditions, we recommend that an import structural fill material be utilized which should consist of a free-draining (clean) granular fill (sand \& gravel) containing no more than about 5 percent fines. Representative samples of the materials which are to be used as structural fill materials should be submitted to the Geotechnical Engineer and/or laboratory for approval and determination of the maximum dry density and optimum moisture content for compaction.

In general, all site earthwork and grading activities should be scheduled for the drier summer months (June through September) if possible. However, if wet weather site preparation and grading is required, it is generally recommended that the stripping of topsoil materials be accomplished with a tracked excavator utilizing a large smooth-toothed bucket working from areas yet to be excavated. Additionally, the loading of strippings into trucks and/or protection of moisture sensitive subgrade soils will also be required during wet weather grading and construction. In this regard, we recommend that areas in which construction equipment will be traveling be protected by covering the exposed subgrade soils with a geotextile fabric such as Mirafi FW404 followed by at least 12 inches or more of crushed aggregate base rock. Further, the geotextile fabric should have a minimum Mullen burst strength of at least 250 pounds per square inch for puncture resistance and an apparent opening size (AOS) between the U.S. Standard No. 70 and No. 100 sieves.

All structural fill materials placed within the new building and/or pavement areas should be moistened or dried as necessary to near (within 3 percent) optimum moisture conditions and compacted by mechanical means to a minimum of 92 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Structural fill materials should be placed in lifts (layers) such that when compacted do not exceed about 8 inches. Additionally, all fill materials placed within five (5) lineal feet of the perimeter (limits) of the proposed single-family and/or multi-family structures and/or pavements should be considered structural fill. Additionally, due to the sloping site conditions, we recommend that all structural fill materials planned in areas where existing surface and/or slope gradients exceed about 20 percent ( $1 \mathrm{~V}: 5 \mathrm{H}$ ) be properly benched and/or keyed into the native (natural) slope subgrade soils. In general, a bench width of about eight (8) to ten (10) feet and a keyway depth of about one (1) to one and one-half (1.5) feet is recommended (see Typical Fill Slope Key and Bench Detail, Figure No. 3).


However, the actual bench width and keyway depth should be determined at the time of construction by the Geotechnical Engineer. Further, all fill slopes should be constructed with a finish slope surface gradient no steeper than about $2 \mathrm{H}: 1 \mathrm{~V}$. All aspects of the site grading, including a review of the proposed site grading plan(s), should be approved and/or monitored by a representative of Redmond Geotechnical Services, LLC.

## Foundation Support

Based on the results of our investigation, it is our opinion that the site of the proposed new The Views planned development is suitable for support of the planned single- and/or three-story woodframe structures provided that the following foundation design recommendations are followed. The following sections of this report present specific foundation design and construction recommendations for the planned new single-family and/or multi-family structures.

## Shallow Foundations

In general, conventional shallow continuous (strip) footings and individual (spread) column footings may be supported by approved native (untreated) subgrade soil materials and/or clayey silt structural fill soils based on an allowable contact bearing pressure of about 2,000 pounds per square foot (psf). This recommended allowable contact bearing pressure is intended for dead loads and sustained live loads and may be increased by one-third for the total of all loads including short-term wind or seismic loads. In general, continuous strip footings should have a minimum width of at least 16 inches and be embedded at least 18 inches below the lowest adjacent finish grade (includes frost protection). Individual column footings (where required) should be embedded at least 18 inches below grade and have a minimum width of at least 24 inches. Additionally, if foundation excavation and construction work is planned to be performed during wet and/or inclement weather conditions, we recommend that a 2 - to 4 -inch layer of compacted crushed rock be used to help protect the exposed foundation bearing surfaces until the placement of concrete.

Total and differential settlements of foundations constructed as recommended above and supported by approved native subgrade soils or by properly compacted structural fill materials are expected to be well within the tolerable limits for this type of wood-frame structure and should generally be less than about 1 -inch and $1 / 2$-inch, respectively.

Allowable lateral frictional resistance between the base of the footing element and the supporting subgrade bearing soil can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.30 and 0.45 for native silty subgrade soils and/or import gravel fill materials, respectively. In addition, lateral loads may be resisted by passive earth pressures on footings poured "neat" against in-situ (native) subgrade soils or properly backfilled with structural fill materials based on an equivalent fluid density of 250 pounds per cubic foot ( pcf ). This recommended value includes a factor of safety of approximately 1.5 which is appropriate due to the amount of movement required to develop full passive resistance.

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## Floor Slab Support

In order to provide uniform subgrade reaction beneath concrete slab-on-grade floors, we recommend that the floor slab area be underlain by a minimum of 6 inches of free-draining (less than 5 percent passing the No. 200 sieve), well-graded, crushed rock. The crushed rock should help provide a capillary break to prevent migration of moisture through the slab. However, additional moisture protection can be provided by using a 10-mil polyolefin geo-membrane sheet such as StegoWrap.

The base course materials should be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Where floor slab subgrade materials are undisturbed, firm and stable and where the underslab aggregate base rock section has been prepared and compacted as recommended above, we recommend that a modulus of subgrade reaction of 150 pci be used for design.

## Retaining/Below Grade Walls

Retaining and/or below grade walls should be designed to resist lateral earth pressures imposed by native soils or granular backfill materials as well as any adjacent surcharge loads. For walls which are unrestrained at the top and free to rotate about their base, we recommend that active earth pressures be computed on the basis of the following equivalent fluid densities:

Non-Restrained Retaining Wall Pressure Design Recommendations

| Slope Backfill <br> (Horizontal/Vertical) | Equivalent Fluid Density/Silt <br> (pcf) | Equivalent Fluid <br> Density/Gravel (pcf) |
| :---: | :---: | :---: |
| Level | 35 | 30 |
| $3 \mathrm{H}: 1 \mathrm{~V}$ | 60 | 50 |
| $2 \mathrm{H}: 1 \mathrm{~V}$ | 90 | 80 |

For walls which are fully restrained at the top and prevented from rotation about their base, we recommend that at-rest earth pressures be computed on the basis of the following equivalent fluid densities:

Restrained Retaining Wall Pressure Design Recommendations

| Slope Backfill <br> (Horizontal/Vertical) | Equivalent Fluid Density/Silt <br> (pcf) | Equivalent Fluid <br> Density/Gravel (pcf) |
| :---: | :---: | :---: |
| Level | 45 | 35 |
| $3 \mathrm{H}: 1 \mathrm{~V}$ | 65 | 60 |
| $2 \mathrm{H}: 1 \mathrm{~V}$ | 95 | 90 |

The above recommended values assume that the walls will be adequately drained to prevent the buildup of hydrostatic pressures. Where wall drainage will not be present and/or if adjacent surcharge loading is present, the above recommended values will be significantly higher.

Backfill materials behind walls should be compacted to 90 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. Special care should be taken to avoid over-compaction near the walls which could result in higher lateral earth pressures than those indicated herein. In areas within three (3) to five (5) feet behind walls, we recommend the use of hand-operated compaction equipment.

## Pavements

Flexible pavement design for the proposed new public street improvements as well as the proposed new private drives and parking area improvements for The Views planned development was determined in accordance with the City of Sandy and/or Clackamas County Department of Public Works standards.

The subgrade soil samples collected at the site were tested in the laboratory in accordance with the ASTM Vol. 4.08 Part D-2844-69 (AASHTO T-190-93) test method for the determination of the subgrade soil " R "-value and expansion pressure. The results of the " R "-value testing was then converted to an equivalent Resilient Modulus (MrSG) in accordance with current AASHTO methodology. The results of the laboratory " R "-value tests revealed that the subgrade soils have an apparent " $R$ "-value of between 29 and 31 with an average " $R$ "-value of 30 (see Figure No. A-15). Using the current AASHTO methodology for converting "R"-value to Resilient Modulus (MRSG), the subgrade soils have a Resilient Modulus (MRsG) of about 6,070 psi which is classified a "Fair" (MRSG = $5,000 \mathrm{psi}$ to $10,000 \mathrm{psi})$. Based on the above, we recommend that the asphaltic concrete pavement section(s) for the new The Views planned development areas at the site consist of the following:

## Collector Streets

The following documents and/or design input parameters were used to help determine the flexible pavement section design for improvements to new and/or existing Collector Streets:
. Street Classification: Collector Street
. Design Life: 20 years
. Serviceability: 4.2 initial, 2.5 terminal
. Traffic Loading Data: 1,000,000 18-kip EAL's
. Reliability Level: 90\%
. Drainage Coefficient: 1.0 (asphalt), 0.8 (aggregate)
. Asphalt Structural Coefficient: 0.41
. Aggregate Structural Coefficient: 0.10
Based on the above design input parameters and using the design procedures contained within the AASHTO 1993 Design of Pavement Structures Manual, a Structural Number (SN) of 4.1 was determined. In this regard, we recommend the following flexible pavement section for the new improvements to new and/or existing Collector Streets:

## Material Type

Asphaltic Concrete 5.0
Aggregate Base Rock

## Pavement Section (inches)

14.0

## Local Residential Streets

The following documents and/or design input parameters were used to help determine the flexible pavement section design for new local residential streets:
. Street Classification: Local Residential Street
. Design Life: 25 years
. Serviceability: 4.2 initial, 2.5 terminal
. Traffic Loading Data: 100,000 18-kip EAL's
. Reliability Level: 90\%
. Drainage Coefficient: 1.0 (asphalt), 0.8 (aggregate)
. Asphalt Structural Coefficient: 0.41
. Aggregate Structural Coefficient: 0.10
Based on the above design input parameters and using the design procedures contained within the AASHTO 1993 Design of Pavement Structures Manual, a Structural Number (SN) of 2.6 was determined. In this regard, we recommend the following flexible pavement section for the construction of new Local Residential Streets:

## Material Type

Asphaltic Concrete 4.0
Aggregate Base Rock 10.0

## Private Access Drives and Parking Areas

We recommend that the asphaltic concrete pavement section(s) for any private access drives and parking areas associated with The Views planned development areas consist of the following:

| Asphaltic Concrete <br> Thickness (inches) | Crushed Base Rock <br> Thickness (inches) |
| :---: | :---: |
|  |  |
| 3.0 | 8.0 |
| 3.5 | 10.0 |


#### Abstract

Note: Where heavy vehicle traffic is anticipated such as those required for fire and/or garbage trucks, we recommend that the automobile drive area pavement section be increased by adding 0.5 inches of asphaltic concrete and 2.0 inches of aggregate base rock. Additionally, the above recommended flexible pavement section(s) assumes a design life of 20 years.


## Pavement Subgrade, Base Course \& Asphalt Materials

The above recommended pavement section(s) were based on the design assumptions listed herein and on the assumption that construction of the pavement section(s) will be completed during an extended period of reasonably dry weather. All thicknesses given are intended to be the minimum acceptable. Increased base rock sections and the use of a woven geotextile fabric may be required during wet and/or inclement weather conditions and/or in order to adequately support construction traffic and protect the subgrade during construction. Additionally, the above recommended pavement section(s) assume that the subgrade will be prepared as recommended herein, that the exposed subgrade soils will be properly protected from rain and construction traffic, and that the subgrade is firm and unyielding at the time of paving. Further, it assumes that the subgrade is graded to prevent any ponding of water which may tend to accumulate in the base course.

Pavement base course materials should consist of well-graded 1-1/2 inch and/or 3/4-inch minus crushed base rock having less than 5 percent fine materials passing the No. 200 sieve. The base course and asphaltic concrete materials should conform to the requirements set forth in the latest edition of the Oregon Department of Transportation, Standard Specifications for Highway Construction. The base course materials should be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D-1557 (AASHTO T-180) test procedures. The asphaltic concrete paving materials should be compacted to at least 92 percent of the theoretical maximum density as determined by the ASTM D-2041 (Rice Gravity) test method.

## Wet Weather Grading and Soft Spot Mitigation

Construction of the proposed new paved site improvements is generally recommended during dry weather. However, during wet weather grading and construction, excavation to subgrade can proceed during periods of light to moderate rainfall provided that the subgrade remains covered with aggregate. A total aggregate thickness of 8 - to 12 -inches may be necessary to protect the subgrade soils from heavy construction traffic. Construction traffic should not be allowed directly on the exposed subgrade but only atop a sufficient compacted base rock thickness to help mitigate subgrade pumping. If the subgrade becomes wet and pumps, no construction traffic shall be allowed on the road alignment. Positive site drainage shall be maintained if site paving will not occur before the on-set of the wet season.

Depending on the timing for the project, any soft subgrade found during proof-rolling or by visual observations can either be removed and replaced with properly dried and compacted fill soils or removed and replaced with compacted crushed aggregate. However, and where approved by the Geotechnical Engineer, the soft area may be covered with a bi-axial geogrid and covered with compacted crushed aggregate.

## Soil Shrink-Swell and Frost Heave

The results of the laboratory "R"-value tests indicate that the native subgrade soils possess a low to moderate expansion potential. As such, the exposed subgrade soils should not be allowed to completely dry and should be moistened to near optimum moisture content (plus or minus 3 percent) at the time of the placement of the crushed aggregate base rock materials. Additionally, exposure of the subgrade soils to freezing weather may result in frost heave and softening of the subgrade. As such, all subgrade soils exposed to freezing weather should be evaluated and approved by the Geotechnical Engineer prior to the placement of the crushed aggregate base rock materials.

## Excavation/Slopes

Temporary excavations of up to about four (4) feet in depth may be constructed with near vertical inclinations. Temporary excavations greater than about four (4) feet but less than eight (8) feet should be excavated with inclinations of at least 1 to 1 (horizontal to vertical) or properly braced/shored. Where excavations are planned to exceed about eight (8) feet, this office should be consulted. All shoring systems and/or temporary excavation bracing for the project should be the responsibility of the excavation contractor. Permanent slopes should be constructed no steeper than about 2 H to 1 V unless approved by the Geotechnical Engineer.

Depending on the time of year in which trench excavations occur, trench dewatering may be required in order to maintain dry working conditions if the invert elevations of the proposed utilities are located at and/or below the groundwater level. If groundwater is encountered during utility excavation work, we recommend placing trench stabilization materials along the base of the excavation.

Trench stabilization materials should consist of 1-foot of well-graded gravel, crushed gravel, or crushed rock with a maximum particle size of 4 inches and less than 5 percent fines passing the No. 200 sieve. The material should be free of organic matter and other deleterious material and placed in a single lift and compacted until well keyed.

## Surface Drainage/Groundwater

We recommend that positive measures be taken to properly finish grade the site so that drainage waters from the residential structures and landscaping areas as well as adjacent properties or buildings are directed away from the new single- and/or multi-family residential structures foundations and/or floor slabs. All roof drainage should be directed into conduits that carry runoff water away from the residential structures to a suitable outfall. Roof downspouts should not be connected to foundation drains. A minimum ground slope of about 2 percent is generally recommended in unpaved areas around the proposed new residential structures.

Groundwater was not encountered at the site within any of the exploratory test pits excavated at the site at the time of excavation to depths of up to 8.0 feet beneath existing site grades. However, the northerly, easterly and southerly portion(s) of the site contain existing seasonal drainage basins. Further, groundwater elevations in the area and/or across the subject property may fluctuate seasonally and may temporarily pond/perch near the ground surface during periods of prolonged rainfall.

As such, based on our current understand of the possible site grading required to bring the subject site to finish design grade(s), we are of the opinion that an underslab drainage system is generally not required for the proposed multi-family residential structures. However, a perimeter foundation drain is recommended for any perimeter footings and/or below grade retaining walls. A typical recommended perimeter footing/retaining wall drain detail is shown on Figure No. 4. Additionally, a subdrain is recommended beneath and/or within all structural fills which are constructed within and/or above the existing seasonal drainage basins. Further, due to our understanding that various storm water detention and/or infiltration basins will be utilized for the project as well as the relatively low infiltration rates of the near surface sandy, clayey silt subgrade soils and/or highly weathered bedrock deposits anticipated within and/or near to the foundation bearing level of the proposed residential structures, we are generally of the opinion that storm water detention basins and/or infiltration systems should not be utilized around and/or up-gradient of the proposed residential structures unless approved by the Geotechnical Engineer.

## Design Infiltration Rates

Based on the results of our field infiltration testing, we recommend using the following infiltration rate to design any on-site near surface storm water infiltration and/or disposal systems for the project:

## Subgrade Soil Type

sandy, clayey SILT (ML)

## Recommended Infiltration Rate

less than 0.1 inches per hour (in/hr)

Note: A safety factor of two (2) was used to calculate the above recommended design infiltration rate. Additionally, given the gradational variability of the on-site sandy, clayey sit subgrade soils beneath the site as well as the anticipation of some site grading for the project, it is generally recommended that field testing be performed during and/or following construction of any on-site storm water infiltration system(s) in order to confirm that the above recommended design infiltration rates are appropriate.

## Seismic Design Considerations

Structures at the site should be designed to resist earthquake loading in accordance with the methodology described in the 2019 and/or latest edition of the State of Oregon Structural Specialty Code (OSSC) and/or Amendments to the 2015 International Building Code (IBC).

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NOTES:

1. Filter Fabric to be non-woven geotextile (Amoco 4545, Mirafi 140N, or equivalent)
2. Lay perforated drain pipe on minimum $0.5 \%$ gradient, widening excavation as required. Maintain pipe above $2: 1$ slope, as shown.
3. All-granular backfill is recommended for support of siabs, pavements, etc. (see text for structural fill).
4. Drain gravel to be clean, washed $3 / 4^{n \prime}$ to $11 / 2^{\prime \prime}$ gravel.
5. General backfill to be on-site gravels, or $3 / 4^{m m}-0$ or $11 / 2^{\prime \prime}-0$ crushed rock compacted to $92 \%$ Modified Proctor (AASHTO T-180).
6. Chimney drainage zone to be $12^{\text {" }}$ wide (minimum) zone of clean washed, medium to coarse sand or drain gravel if protected with filter fabric. Altematively, prefabricated drainage structures (Miradrain 6000 or similar) may be used.

PERIMETER FOOTING/RETAINING WALL DRAIN DETAIL

|  | THE VIEWS |  |
| :---: | :---: | :--- |
| Project No. 1666.002.G | TAX LOT NO'S. 200 AND 500 | Figure No. 4 |

The maximum considered earthquake ground motion for short period and 1.0 period spectral response may be determined from the Oregon Structural Specialty Code and/or from the National Earthquake Hazard Reduction Program (NEHRP) "Recommended Provisions for Seismic Regulations for New Buildings and Other Structures" published by the Building Seismic Safety Council. We recommend Site Class " $D$ " be used for design. Using this information, the structural engineer can select the appropriate site coefficient values ( Fa and Fv ) from the 2015 IBC and/or ASCE 7-16 to determine the maximum considered earthquake spectral response acceleration for the project. However, we have assumed the following response spectrum for the project:

Table 1. Recommended Seismic Design Parameters

| Site <br> Class | SS | S1 | Fa | FV | SMS | SM1 | SDS | SD1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| D | 0.698 | 0.311 | 1.241 | 1.989 | 0.867 | 0.619 | 0.578 | 0.413 |

Notes: 1. Ss and S1 were established based on the ASCE 7-16 mapped maximum considered earthquake spectral acceleration maps for $2 \%$ probability of exceedence in 50 years.
2. Fa and Fv were established based on the ASCE 7-16 using the selected Ss and S 1 values.

## CONSTRUCTION MONITORING AND TESTING

We recommend that Redmond Geotechnical Services, LLC be retained to provide construction monitoring and testing services during all earthwork operations for the proposed new The Views planned development. The purpose of our monitoring services would be to confirm that the site conditions reported herein are as anticipated, provide field recommendations as required based on the actual conditions encountered, document the activities of the grading contractor and assess his/her compliance with the project specifications and recommendations. It is important that our representative meet with the contractor prior to any site grading to help establish a plan that will minimize costly over-excavation and site preparation work. Of primary importance will be observations made during site preparation and stripping, structural fill placement, footing excavations and construction as well as retaining wall backfill.

## CLOSURE AND LIMITATIONS

This report is intended for the exclusive use of the addressee and/or their representative(s) to use to design and construct the proposed new single-and/or multi-family residential structures and their associated site improvements described herein as well as to prepare any related construction documents. The conclusions and recommendations contained in this report are based on site conditions as they presently exist and assume that the explorations are representative of the subsurface conditions between the explorations and/or at other locations across the study area. The data, analyses, and recommendations herein may not be appropriate for other structures and/or purposes.

We recommend that parties contemplating other structures and/or purposes contact our office. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. Additionally, the above recommendations are contingent on Redmond Geotechnical Services, LLC being retained to provide all site inspections and constriction monitoring services for this project. Redmond Geotechnical Services, LLC will not assume any responsibility and/or liability for any engineering judgment, inspection and/or testing services performed by others.

It is the owners/developers responsibility for insuring that the project designers and/or contractors involved with this project implement our recommendations into the final design plans, specifications and/or construction activities for the project. Further, in order to avoid delays during construction, we recommend that the final design plans and specifications for the project be reviewed by our office to evaluate as to whether our recommendations have been properly interpreted and incorporated into the project.

If during any future site grading and construction, subsurface conditions different from those encountered in the explorations are observed or appear to be present beneath excavations, we should be advised immediately so that we may review these conditions and evaluate whether modifications of the design criteria are required. We also should be advised if significant modifications of the proposed site development are anticipated so that we may review our conclusions and recommendations.

## LEVEL OF CARE

The services performed by the Geotechnical Engineer for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in the area under similar budget and time restraints. No warranty or other conditions, either expressed or implied, is made.

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Appendix "A"
Test Pit Logs and Laboratory Test Data

## APPENDIX

## FIELD EXPLORATIONS AND LABORATORY TESTING

## FIELD EXPLORATION

Subsurface conditions at the site were explored by excavating eleven (11) exploratory test pits (TH\#1 through TH-\#11) on April 15, 2020. The approximate location of the test pit explorations are shown in relation to the existing site features and/or site improvements on the Site Exploration Plan, Figure No's. 2A and 2B.

The test pits were excavated using track-mounted excavating equipment in general conformance with ASTM Methods in Vol. 4.08, D-1586-94 and D-1587-83. The test pits were excavated to depths ranging from about 5.0 to 8.0 feet beneath existing site grades. Detailed logs of the test pits are presented on the Log of Test Pits, Figure No's. A-4 through A-9. The soils were classified in accordance with the Unified Soil Classification System (USCS), which is outlined on Figure No. A-3.

The exploration program was coordinated by a field engineer who monitored the excavating and exploration activity, obtained representative samples of the subsurface soils encountered, classified the soils by visual and textural examination, and maintained continuous logs of the subsurface conditions. Disturbed and/or undisturbed samples of the subsurface soils were obtained at appropriate depths and/or intervals and placed in plastic bags and/or with a thin walled ring sample.

Groundwater was not encountered within any of the exploratory test pits (TH-\#1 through TH-\#11) at the time of excavating to depths of up to 8.0 feet beneath existing surface grades.

## LABORATORY TESTING

Pertinent physical and engineering characteristics of the soils encountered during our subsurface investigation were evaluated by a laboratory testing program to be used as a basis for selection of soil design parameters and for correlation purposes. Selected tests were conducted on representative soil samples. The program consisted of tests to evaluate the existing (in-situ) moisture-density, maximum dry density and optimum moisture content, Atterberg Limits and gradational characteristics as well as direct shear strength and " $R$ "-value tests.

## Dry Density and Moisture Content Determinations

Density and moisture content determinations were performed on both disturbed and relatively undisturbed samples from the test pit explorations in general conformance with ASTM Vol. 4.08 Part D-216. The results of these tests were used to calculate existing overburden pressures and to correlate strength and compressibility characteristics of the soils. Test results are shown on the test pit logs at the appropriate sample depths.

## A-2

## Maximum Dry Density

Two (2) Maximum Dry Density and Optimum Moisture Content tests were performed on representative samples of the on-site sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-1557. This test was conducted to help establish various engineering properties for use as structural fill. The test results are presented on Figure No. A-10.

## Atterberg Limits

Two (2) Liquid Limit (LL) and Plastic Limit (PL) tests were performed on representative samples of the sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-4318-85. These tests were conducted to facilitate classification of the soils and for correlation purposes. The test results appear on Figure No. A-11.

## Gradation Analysis

Two (2) Gradation analyses were performed on representative samples of the sandy, clayey silt subsurface soils in accordance with ASTM Vol. 4.08 Part D-422. The test results were used to classify the soil in accordance with the Unified Soil Classification System (USCS). The test results are shown graphically on Figure No. A-12.

## Direct Shear Strength Test

Two (2) Direct Shear Strength tests were performed on undisturbed and/or remolded samples of the sandy, clayey silt subgrade soils at a continuous rate of shearing deflection ( 0.02 inches per minute) in accordance with ASTM Vol. 4.08 Part D-3080-79. The test results were used to determine engineering strength properties and are shown graphically on Figure No's. A-13 and A-14.

## "R"-Value Tests

Two (2) "R"-value tests were performed on remolded samples of the sandy, clayey silt subgrade soils in accordance with ASTM Vol. 4.08 Part D-2844. The test results were used to help evaluate the subgrade soils supporting and performance capabilities when subjected to traffic loading. The test results are shown on Figure No. A-15.

The following figures are attached and complete the Appendix:

Figure No. A-3
Figure No's. A-4 through A-9
Figure No. A-10
Figure No. A-11
Figure No. A-12
Figure No's. A-13 and A-14
Figure No. A-15
Figure No's. A-16 and A-17

Key To Exploratory Test Pit Logs
Log of Test Pits
Maximum Dry Density
Atterberg Limits Test Results
Gradation Test Results
Direct Shear Strength Test Results
Results of "R"-Value Tests
Field Infiltration Test Results

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| PRIMARY DIVISIONS |  |  |  |  | $\begin{aligned} & \text { GROUP } \\ & \text { SYMBOL } \end{aligned}$ | SECONDARY DIVISIONS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE |  | CLEANGRAVELS(LESS THAN$5 \%$ FINES ) | GW | Well graded gravets, gravel-sand mixtures, little or no fines. |  |  |  |  |
|  |  | GP | Poorly graded gravels or gravel-sand mixtures, little or no fines. |  |  |  |  |
|  |  | GRAVEL WITH FINES | GM |  | Silty gravels, gravel-sand-silt mixtures, non-plastic fines. |  |  |  |  |
|  |  | GC | Clayey graveis, gravel-sand-clay mixtures, plastic fines. |  |  |  |  |
|  |  | SANDS <br> MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE |  | CLEAN <br> SANDS <br> (LESS THAN <br> $5 \%$ FINES) | SW | Well graded sands, gravelly sands, little or no fines. |  |  |  |  |
|  |  | SP | Poorly graded sands or gravelly sands, little or no fines. |  |  |  |  |
|  |  | SANDS WITH FINES | SM |  | Silty sands, sand-silt mixtures, non-plastic fines. |  |  |  |  |
|  |  | SC | Clayey sands, sand-clay mixtures, plastic fines. |  |  |  |  |
|  |  |  | SILTS AND CLAYS <br> LIQUID LIMIT IS LESS THAN 50\% |  |  | ML | Inorganic silts and very fine sands, rock flour, silty orclayey fine sands or clayey silts with slight plasticity. |  |  |  |  |
|  |  | CL |  |  |  | Inorganic clays of low to medium plasticity. gravelly clays, sandy clays, silty clays, lean clays. |  |  |  |  |
|  |  | OL |  |  |  | Organic silts and organic silty clays of low plasticity. |  |  |  |  |
|  |  | SILTS AND CLAYS <br> LIOUID LIMIT IS GREATER THAN 50\% |  |  | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |  |  |  |  |
|  |  | CH | Inorganic clays of high plasticity, fat clays. |  |  |  |  |
|  |  | OH | Organic clays of medium to high plasticity, organic silts. |  |  |  |  |
| HIGHLY ORGANIC SOILS |  |  |  |  | Pt | Peat and other highly organic soils. |  |  |  |  |
| DEFINITION OF TERMS |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SILTS AND CLAYS |  |  | SAND |  |  |  | GRAVEL |  | COBBLES | BOULDERS |
|  |  |  | FINE | MEDIUM | COARSE |  | FINE | COARSE |  |  |
| GRAIN SIZES |  |  |  |  |  |  |  |  |  |  |
| SANDS, GRAVELS AND BLOWS/FO <br> NON-PLASTIC SILTS  <br> VERY LOOSE $0-4$ <br> LOOSE $4-10$ <br> MEDIUM DENSE $10-30$ <br> DENSE $30-50$ <br> VERY DENSE OVER 50 |  |  |  |  | CLAYS AND PLASTIC SILTS |  |  | STRENGTH ${ }^{\ddagger}$ | BLOWS/FOOT ${ }^{+}$ |  |
|  |  |  |  |  | $\begin{aligned} & \text { VERY SOFT } \\ & \text { SOFT } \\ & \text { FIRM } \\ & \text { STIFF } \\ & \text { VERY STIFF } \\ & \text { HARD } \end{aligned}$ |  |  | O-1/4 $1 / 4-1 / 2$ $1 / 2-1$ $1-2$ $2-4$ OVER 4 | $0-2$$2-4$$4-8$$8-16$$16-32$OVER 32 |  |
| RELATIVE DENSITY <br> CONSISTENCY <br> umber of blows of 140 pound hammer falling 30 inches to drive a 2 inch 0.0. (1-3/8 inch I.D.) spoon (ASTM D-1586). <br> confined compressive strength in tons $/ \mathrm{sq}$. ft. as determined by laboratory testing or approximated he standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation. |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | KEY TO EXPLORATORY TEST PIT LOGS Unified Soil Classification System (ASTM D-2487) |  |  |  |  |  |
|  |  |  |  |  | THE VIEWS <br> Sandy, Oregon |  |  |  |  |  |
|  |  |  |  |  | PROJECT NO. |  |  | DATE | Figure A-3 |  |
|  |  |  |  |  | $1666.002 . \mathrm{G}$ |  | 5/1 | 15/20 |  |  |  |








MAXIMUM DENSITY TEST RESULTS

| SAMPLE <br> LOCATION | SOIL DESCRIPTION | MAXIMUMM <br> DRY DENSITY <br> (DCf) | OPTIMUM <br> MOISTURE <br> CONTENT (W) |
| :---: | :---: | :---: | :---: |
| TH-\#1 <br> @ <br> $2.0^{\prime}$ | Medium to reddish-brown, sandy, <br> clayey SILT (ML) | 34.0 | 100.0 |
| TH-\#8 <br> @ <br> $3.0^{\prime}$ | Medium to reddish-brown, sandy, <br> clayey SILT (ML) | 36.0 | 98.0 |

EXPANSION INDEX TEST RESULTS

| SAMPLE <br> LOCATION | INITIAL <br> MOISTURE (\%) | COMPACTED <br> DRY DENITY <br> (PCF) | FINAL <br> MOISTURE (\%) | VOLUMETRIC <br> SWELL ( $\%$ ) | EXPANSION <br> INDEX | EXPANSIVE <br> CLASS. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

MAXINUM DENSITY \& EXPANGION INDEX TEST RESULTS





## RESULTS OF R (RESISTANCE) VALUE TESTS

SAMPLE LOCATION: TH-\#2
SAMPLE DEPTH: 2.5 feet bgs

| Specimen | A | B | C |
| :--- | :---: | :---: | :---: |
| Exudation Pressure (psi) | 219 | 329 | 431 |
| Expansion Dial (o.ooo1") | 0 | 1 | 2 |
| Expansion Pressure (psf) | 0 | 3 | 8 |
| Moisture Content (\%) | 37.6 | 34.4 | 31.1 |
| Dry Density (pcf) | 92.4 | 96.2 | 100.6 |
| Resistance Value, "R" | 18 | 29 | 36 |

"R"-Value at 300 psi Exudation Pressure $=28$

## SAMPLE LOCATION: TH-\#6

SAMPLE DEPTH: 3.0 feet bgs

| Specimen | A | B | C |
| :--- | :---: | :---: | :---: |
| Exudation Pressure (psi) | 208 | 326 | 439 |
| Expansion Dial (0.0001") | 0 | 1 | 2 |
| Expansion Pressure (psf) | 0 | 3 | 8 |
| Moisture Content (\%) | 37.2 | 34.1 | 30.7 |
| Dry Density (pcf) | 92.9 | 97.1 | 101.4 |
| Resistance Value "R" | 19 | 31 | 40 |
| "R"-Value at 300 psi Exudation Pressure $=30$ |  |  |  |

## Division 004 Appendix C - Infiltration Testing

| Location: The Views Planned Development | Date: April 15, 2020 | Test Hole: TH-\#4 |
| :--- | :--- | :--- |
| Depth to Bottom of Hole: 5.0 feet | Hole Diameter: 6 inches | Test Method: Encased Falling Head |
| Tester's Name: Daniel M. Redmond, P.E., G.E.   <br> Tester's Company: Redmond Geotechnical Services, LLC Tester's Contact Number: 503-285-0598  <br> Depth (feet) Soil Characteristics  <br> $0-1.0$ Dark brown Topsoil  <br> $1.0-5.0$ Medium to reddish-brown, sandy, clayey SILT (ML)  <br>    |  |  |


| Time | Time Interval <br> (Minutes) | Measurement <br> (inches) | Drop in Water <br> (inches) | Infiltration Rate <br> (inches/hour) | Remarks |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 11:00 | 0 | 48.00 | --- |  | Filled w/12" water |
| $11: 20$ | 20 | 48.20 | 0.20 | 0.60 |  |
| $11: 40$ | 20 | 48.34 | 0.14 | 0.42 |  |
| $12: 00$ | 20 | 48.45 | 0.11 | 0.33 |  |
| $12: 20$ | 20 | 48.54 | 0.09 | 0.27 |  |
| $12: 40$ | 20 | 48.62 | 0.08 | 0.24 |  |
| $1: 00$ | 20 | 48.69 | 0.07 | 0.21 |  |
| $1: 20$ | 20 | 48.76 | 0.07 | 0.21 |  |
| $1: 40$ | 20 | 48.83 | 0.07 | 0.21 |  |
|  |  |  |  |  |  |

[^8]Figure No. A-16

## Division 004 Appendix C - Infiltration Testing

| Location: The Views Planned Development | Date: April 15, 2020 | Test Hole: TH-\#11 |
| :--- | :--- | :--- |
| Depth to Bottom of Hole: 6.0 feet | Hole Diameter: 6 inches | Test Method: Encased Falling Head |
| Tester's Name: Daniel M. Redmond, P.E., G.E.  <br> Tester's Company: Redmond Geotechnical Services, LLC Tester's Contact Number: 503-285-0598 <br> Depth (feet) Soil Characteristics <br> $0-1.0$ Dark brown Topsoil <br> $1.0-6.0$ Medium to reddish-brown, sandy, clayey SILT (ML) <br>   |  |  |


| Time | Time Interval <br> (Minutes) | Measurement <br> (inches) | Drop in Water <br> (inches) | Infiltration Rate <br> (inches/hour) | Remarks |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $11: 30$ | 0 | 60.00 | --- |  | Filled w/12" water |
| $11: 50$ | 20 | 60.15 | 0.15 | 0.45 |  |
| $12: 10$ | 20 | 60.25 | 0.10 | 0.30 |  |
| $12: 30$ | 20 | 60.32 | 0.07 | 0.21 |  |
| $12: 50$ | 20 | 60.37 | 0.05 | 0.15 |  |
| $1: 10$ | 20 | 60.41 | 0.04 | 0.12 |  |
| $1: 30$ | 20 | 60.44 | 0.03 | 0.09 |  |
| $1: 50$ | 20 | 60.47 | 0.03 | 0.09 |  |
| $2: 10$ | 20 | 60.50 | 0.03 | 0.09 |  |
|  |  |  |  |  |  |

Infiltration Test Data Table

Figure No. A-17

## Slide Analysis Information The Views Static

## Project Summary

File Name:
Slide Modeler Version:
Compute Time:
Project Title:
Author:
Company:
Date Created:

The Views Static.sImd

00h:00m:00.673s
The Views
Daniel M. Redmond
Redmond Geotechnical Services, LLC
May 11, 2020

## General Settings

Units of Measurement: Imperial Units
Time Units:
days
Permeability Units: feet/second
Data Output:
Standard
Failure Direction:
Right to Left

## Analysis Options

Slices Type:

## Analysis Methods Used

Bishop simplified
Janbu simplified
Number of slices: 50
Tolerance: 0.005
Maximum number of iterations: 75
Check malpha < 0.2: Yes
Create Interslice boundaries at intersections Yes
with water tables and piezos:
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

| Groundwater Method: | Water Surfaces |
| :--- | ---: |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

Pseudo-random Seed:
10116
Random Number Generation Method: Park and Miller v. 3

## Surface Options

| Surface Type: | Circular |
| :--- | ---: |
| Search Method: | Auto Refine Search |
| Divisions along slope: | 20 |
| Circles per division: | 10 |
| Number of iterations: | 10 |
| Divisions to use in next iteration: | $50 \%$ |
| Composite Surfaces: | Disabled |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

## Materials

| Property | Material 1 | Material 2 |
| :--- | ---: | ---: |
| Color | $\square$ | $\square$ |
| Strength Type | Mohr-Coulomb | Mohr-Coulomb |
| Unit Weight [lbs/ft3] | 100 | 100 |
| Cohesion [psf] | 400 | 450 |
| Friction Angle [${ }^{\circ}$ ] | 24 | 24 |
| Water Surface | None | None |
| Ru Value | 0 | 0 |

## Global Minimums

## Method: bishop simplified

FS
Center:
Radius:
Left Slip Surface Endpoint: $\quad 11.725,15.737$
Right Slip Surface Endpoint: $112.819,44.000$
Resisting Moment: $\quad 9.25215 \mathrm{e}+06 \mathrm{lb}-\mathrm{ft}$
Driving Moment: $\quad 3.21013 \mathrm{e}+06 \mathrm{lb}-\mathrm{ft}$
Total Slice Area:
Surface Horizontal Width: 101.094 ft
Surface Average Height: $\quad 13.3921 \mathrm{ft}$
1353.86 ft2
2.882170
43.648, 96.485
86.829
$3.21013 \mathrm{e}+06 \mathrm{lb}-\mathrm{ft}$

## Method: janbu simplified

| FS | $\mathbf{2 . 6 1 5 2 1 0}$ |
| :--- | ---: |
| Center: | $49.090,67.552$ |
| Radius: | 62.814 |
| Left Slip Surface Endpoint: | $13.254,15.964$ |
| Right Slip Surface Endpoint: | $107.322,44.000$ |
| Resisting Horizontal Force: | 105805 lb |
| Driving Horizontal Force: | 40457.4 lb |
| Total Slice Area: | 1637.73 ft 2 |
| Surface Horizontal Width: | 94.0679 ft |
| Surface Average Height: | 17.4101 ft |

## Valid/Invalid Surfaces

## Method: bishop simplified

Number of Valid Surfaces: 9861
Number of Invalid Surfaces: 8

## Error Codes:

Error Code - 112 reported for 8 surfaces

## Method: janbu simplified

Number of Valid Surfaces: 9293
Number of Invalid Surfaces: 576

## Error Codes:

Error Code -108 reported for 238 surfaces
Error Code -111 reported for 338 surfaces

## Error Codes

The following errors were encountered during the computation:
$-108=$ Total driving moment or total driving force $<0.1$. This is to limit the calculation of extremely high safety factors if the driving force is very small ( 0.1 is an arbitrary number).
-111 $=$ safety factor equation did not converge
$-112=$ The coefficient M -Alpha $=\cos (\mathrm{alpha})(1+\tan (\mathrm{alpha}) \tan (\mathrm{phi}) / \mathrm{F})<0.2$ for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

## Slice Data

- Global Minimum Query (bishop simplified) - Safety Factor: 2.88217

| Slice Number | Width <br> [ft] | Weight <br> [lbs] | Angle of Slice Base [degrees] | Base <br> Material | Base Cohesion [psf] | Base <br> Friction <br> Angle <br> [degrees] | Shear <br> Stress <br> [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective <br> Normal <br> Stress [psf] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2.03095 | 109.117 | -20.8537 | Material $1$ | 400 | 24 | 156.278 | 450.42 | 113.246 | 0 | 113.246 |
| 2 | 2.03095 | 321.522 | -19.4261 | Material $1$ | 400 | 24 | 172.643 | 497.587 | 219.183 | 0 | 219.18: |
| 3 | 2.03095 | 522.417 | -18.0109 | Material 1 | 400 | 24 | 187.958 | 541.728 | 318.325 | 0 | 318.32! |
| 4 | 2.03095 | 712.089 | -16.6071 | Material 1 | 400 | 24 | 202.264 | 582.958 | 410.93 | 0 | 410.9: |
| 5 | 2.03095 | 890.791 | -15.2134 | Material $1$ | 400 | 24 | 215.594 | 621.379 | 497.223 | 0 | 497.22: |
| 6 | 2.03095 | 1058.75 | -13.8288 | Material 1 | 400 | 24 | 227.982 | 657.082 | 577.416 | 0 | 577.411 |
| 7 | 2.03095 | 1216.17 | -12.4525 | Material $1$ | 400 | 24 | 239.454 | 690.148 | 651.682 | 0 | 651.68: |
| 8 | 2.03095 | 1373.52 | -11.0834 | Material 1 | 400 | 24 | 250.845 | 722.979 | 725.423 | 0 | 725.42: |
| 9 | 2.03095 | 1588.08 | -9.72076 | Material $1$ | 400 | 24 | 266.63 | 768.473 | 827.606 | 0 | 827.60 |
| 10 | 2.03095 | 1804.78 | -8.36361 | Material 1 | 400 | 24 | 282.472 | 814.132 | 930.158 | 0 | 930.15 ¢ |
| 11 | 2.03095 | 2011.51 | -7.01117 | Material 1 | 400 | 24 | 297.432 | 857.249 | 1027 | 0 | 102: |
| 12 | 2.03095 | 2208.37 | -5.66266 | Material $1$ | 400 | 24 | 311.527 | 897.873 | 1118.24 | 0 | 1118.2 |
| 13 | 2.03095 | 2395.44 | -4.31728 | Material 1 | 400 | 24 | 324.771 | 936.046 | 1203.98 | 0 | 1203.98 |
| 14 | 2.03095 | 2572.77 | -2.97428 | Material 1 | 400 | 24 | 337.179 | 971.806 | 1284.3 | 0 | 1284.: |
| 15 | 2.03095 | 2740.41 | -1.63292 | Material $1$ | 400 | 24 | 348.759 | 1005.18 | 1359.27 | 0 | 1359.2 |
| 16 | 2.03095 | 2898.39 | -0.292458 | Material $1$ | 400 | 24 | 359.524 | 1036.21 | 1428.94 | 0 | 1428.9 |
| 17 | 2.03095 | 3046.72 | 1.04785 | Material $1$ | 400 | 24 | 369.478 | 1064.9 | 1493.39 | 0 | 1493.3! |
| 18 | 2.03095 | 3185.39 | 2.38873 | Material 1 | 400 | 24 | 378.63 | 1091.28 | 1552.63 | 0 | 1552.6: |
| 19 | 2.03095 | 3314.39 | 3.73092 | Material 1 | 400 | 24 | 386.984 | 1115.35 | 1606.71 | 0 | 1606.7: |
| 20 | 2.03095 | 3433.67 | 5.07516 | Material 1 | 400 | 24 | 394.543 | 1137.14 | 1655.64 | 0 | 1655.6 |
| 21 | 2.03095 | 3543.19 | 6.42221 | Material 1 | 400 | 24 | 401.308 | 1156.64 | 1699.43 | 0 | 1699.4: |
| 22 | 2.03095 | 3642.87 | 7.77284 | Material 1 | 400 | 24 | 407.28 | 1173.85 | 1738.1 | 0 | 1738.: |
| 23 | 2.03095 | 3732.63 | 9.12784 | Material 1 | 400 | 24 | 412.458 | 1188.78 | 1771.62 | 0 | 1771.6: |


| 24 | 2.03095 | 3812.36 | 10.488 | Material $1$ | 400 | 24 | 416.84 | 1201.4 | 1799.98 | 0 | 1799.9! |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 | 2.03095 | 3881.94 | 11.8542 | Material 1 | 400 | 24 | 420.421 | 1211.72 | 1823.16 | 0 | 1823.11 |
| 26 | 2.03095 | 3941.22 | 13.2272 | Material 1 | 400 | 24 | 423.196 | 1219.72 | 1841.13 | 0 | 1841.1: |
| 27 | 2.03095 | 3990.04 | 14.6081 | Material $1$ | 400 | 24 | 425.159 | 1225.38 | 1853.83 | 0 | 1853.8: |
| 28 | 2.03095 | 4028.21 | 15.9976 | Material 1 | 400 | 24 | 426.3 | 1228.67 | 1861.22 | 0 | 1861.2: |
| 29 | 2.03095 | 4055.51 | 17.3969 | Material 1 | 400 | 24 | 426.608 | 1229.56 | 1863.22 | 0 | 1863.2: |
| 30 | 2.03095 | 4071.7 | 18.807 | Material 1 | 400 | 24 | 426.073 | 1228.01 | 1859.75 | 0 | 1859.7! |
| 31 | 2.03095 | 4076.51 | 20.2291 | Material 1 | 400 | 24 | 424.68 | 1224 | 1850.73 | 0 | 1850.7: |
| 32 | 2.03095 | 4069.63 | 21.6642 | Material 1 | 400 | 24 | 422.412 | 1217.46 | 1836.05 | 0 | 1836.0! |
| 33 | 2.03095 | 4050.73 | 23.1138 | Material 1 | 400 | 24 | 419.252 | 1208.36 | 1815.6 | 0 | 1815.1 |
| 34 | 2.03095 | 4019.42 | 24.5793 | Material $1$ | 400 | 24 | 415.178 | 1196.61 | 1789.23 | 0 | 1789.2: |
| 35 | 2.03095 | 3975.27 | 26.0621 | Material $1$ | 400 | 24 | 410.167 | 1182.17 | 1756.78 | 0 | 1756.78 |
| 36 | 2.03095 | 3917.8 | 27.5639 | Material 1 | 400 | 24 | 404.193 | 1164.95 | 1718.11 | 0 | 1718.1: |
| 37 | 2.03095 | 3846.46 | 29.0866 | Material $1$ | 400 | 24 | 397.225 | 1144.87 | 1673 | 0 | 167: |
| 38 | 2.03095 | 3760.66 | 30.6322 | Material $1$ | 400 | 24 | 389.229 | 1121.82 | 1621.24 | 0 | 1621.2 ${ }^{\text {c }}$ |
| 39 | 2.03095 | 3659.69 | 32.2029 | Material 1 | 400 | 24 | 380.167 | 1095.71 | 1562.58 | 0 | 1562.5 |
| 40 | 2.03095 | 3542.78 | 33.8012 | Material 1 | 400 | 24 | 369.997 | 1066.39 | 1496.75 | 0 | 1496.7! |
| 41 | 2.03095 | 3409.03 | 35.43 | Material 1 | 400 | 24 | 358.67 | 1033.75 | 1423.42 | 0 | 1423.4: |
| 42 | 2.03095 | 3257.41 | 37.0925 | Material 1 | 400 | 24 | 346.129 | 997.604 | 1342.24 | 0 | 1342.2 |
| 43 | 2.03095 | 3066.35 | 38.7923 | Material $1$ | 400 | 24 | 330.933 | 953.806 | 1243.87 | 0 | 1243.8 |
| 44 | 2.03095 | 2741.65 | 40.5337 | Material 1 | 400 | 24 | 306.801 | 884.253 | 1087.65 | 0 | 1087.6! |
| 45 | 1.95539 | 2295.97 | 42.2875 | Material 2 | 450 | 24 | 295.944 | 852.962 | 905.067 | 0 | 905.06: |
| 46 | 1.95539 | 1937.1 | 44.0574 | Material 2 | 450 | 24 | 268.97 | 775.216 | 730.446 | 0 | 730.441 |
| 47 | 1.95539 | 1554.96 | 45.882 | Material 2 | 450 | 24 | 240.647 | 693.586 | 547.104 | 0 | 547.10، |
| 48 | 1.95539 | 1147.2 | 47.7687 | Material $2$ | 450 | 24 | 210.883 | 607.8 | 354.424 | 0 | 354.42، |

file:///C:/Users/Denise/AppData/Local/Temp/RocscienceTempSlid..

| 49 | 1.95539 | 710.952 | 49.7266 | Material $2$ | 450 | 24 | 179.566 | 517.54 | 151.698 | 0 | 151.69 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 50 | 1.95539 | 242.656 | 51.7672 | Material <br> 2 | 450 | 24 | 146.57 | 422.44 | -61.8999 | 0 | -61.899 |

- Global Minimum Query (janbu simplified) - Safety Factor: 2.61521

| Slice Number | Width <br> [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base <br> Friction Angle [degrees] | Shear <br> Stress <br> [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective <br> Normal <br> Stress <br> [psf] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 1.8932 | 146.283 | -33.7476 | Material $1$ | 400 | 24 | 187.44 | 490.195 | 202.583 | 0 | 202.58: |
| 2 | 1.8932 | 429.775 | -31.6943 | Material $1$ | 400 | 24 | 214.123 | 559.976 | 359.312 | 0 | 359.31; |
| 3 | 1.8932 | 695.692 | -29.6855 | Material $1$ | 400 | 24 | 238.692 | 624.229 | 503.624 | 0 | 503.62، |
| 4 | 1.8932 | 945.103 | -27.7162 | Material $1$ | 400 | 24 | 261.329 | 683.43 | 636.596 | 0 | 636.598 |
| 5 | 1.8932 | 1178.92 | -25.7819 | Material $1$ | 400 | 24 | 282.186 | 737.976 | 759.105 | 0 | 759.10! |
| 6 | 1.8932 | 1397.92 | -23.8786 | Material $1$ | 400 | 24 | 301.388 | 788.194 | 871.896 | 0 | 871.891 |
| 7 | 1.8932 | 1602.77 | -22.003 | Material $1$ | 400 | 24 | 319.043 | 834.364 | 975.599 | 0 | 975.59! |
| 8 | 1.8932 | 1815.4 | -20.1519 | Material $1$ | 400 | 24 | 337.288 | 882.078 | 1082.77 | 0 | 1082.7. |
| 9 | 1.8932 | 2069.11 | -18.3226 | Material $1$ | 400 | 24 | 359.285 | 939.606 | 1211.97 | 0 | 1211.9: |
| 10 | 1.8932 | 2312.84 | -16.5123 | Material $1$ | 400 | 24 | 380.13 | 994.121 | 1334.42 | 0 | 1334.4: |
| 11 | 1.8932 | 2544.3 | -14.719 | Material $1$ | 400 | 24 | 399.631 | 1045.12 | 1448.97 | 0 | 1448.9: |
| 12 | 1.8932 | 2763.8 | -12.9402 | Material $1$ | 400 | 24 | 417.842 | 1092.74 | 1555.93 | 0 | 1555.9: |
| 13 | 1.8932 | 2971.63 | -11.1741 | Material $1$ | 400 | 24 | 434.807 | 1137.11 | 1655.58 | 0 | 1655.5 |
| 14 | 1.8932 | 3168.02 | -9.41865 | Material $1$ | 400 | 24 | 450.568 | 1178.33 | 1748.16 | 0 | 1748.14 |
| 15 | 1.8932 | 3353.14 | -7.6721 | Material 1 | 400 | 24 | 465.157 | 1216.48 | 1833.85 | 0 | 1833.8! |
| 16 | 1.8932 | 3527.15 | -5.93271 | Material $1$ | 400 | 24 | 478.603 | 1251.65 | 1912.83 | 0 | 1912.8: |
| 17 | 1.8932 | 3690.19 | -4.19879 | Material $1$ | 400 | 24 | 490.931 | 1283.89 | 1985.24 | 0 | 1985.24 |
| 18 | 1.8932 | 3842.32 | -2.46872 | Material 1 | 400 | 24 | 502.16 | 1313.25 | 2051.2 | 0 | 2051.: |
| 19 | 1.8932 | 3983.62 | -0.740899 | Material $1$ | 400 | 24 | 512.306 | 1339.79 | 2110.8 | 0 | 2110. \% |
| 20 | 1.8932 | 4114.1 | 0.986245 | Material $1$ | 400 | 24 | 521.383 | 1363.53 | 2164.11 | 0 | 2164.1: |
| 21 | 1.8932 | 4233.78 | 2.71429 | Material $1$ | 400 | 24 | 529.398 | 1384.49 | 2211.19 | 0 | 2211.1 |
| 22 | 1.8932 | 4342.6 | 4.44481 | Material $1$ | 400 | 24 | 536.358 | 1402.69 | 2252.07 | 0 | 2252.0 |
| 23 | 1.8932 | 4440.52 | 6.1794 | Material $1$ | 400 | 24 | 542.262 | 1418.13 | 2286.76 | 0 | 2286.71 |


| 24 | 1.8932 | 4527.44 | 7.91971 | Material 1 | 400 | 24 | 547.115 | 1430.82 | 2315.26 | 0 | 2315.26 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 | 1.8932 | 4603.23 | 9.66741 | Material $1$ | 400 | 24 | 550.908 | 1440.74 | 2337.55 | 0 | 2337.5! |
| 26 | 1.8932 | 4667.74 | 11.4242 | Material 1 | 400 | 24 | 553.638 | 1447.88 | 2353.58 | 0 | 2353.5 |
| 27 | 1.8932 | 4720.78 | 13.1921 | Material 1 | 400 | 24 | 555.294 | 1452.21 | 2363.29 | 0 | 2363.2! |
| 28 | 1.8932 | 4762.09 | 14.9728 | Material $1$ | 400 | 24 | 555.856 | 1453.68 | 2366.61 | 0 | 2366.6: |
| 29 | 1.8932 | 4791.42 | 16.7684 | Material $1$ | 400 | 24 | 555.313 | 1452.26 | 2363.42 | 0 | 2363.4* |
| 30 | 1.8932 | 4808.43 | 18.5812 | Material 1 | 400 | 24 | 553.642 | 1447.89 | 2353.6 | 0 | 2353.1 |
| 31 | 1.8932 | 4812.74 | 20.4135 | Material $1$ | 400 | 24 | 550.812 | 1440.49 | 2336.99 | 0 | 2336.9! |
| 32 | 1.8932 | 4803.91 | 22.2679 | Material 1 | 400 | 24 | 546.801 | 1430 | 2313.41 | 0 | 2313.4: |
| 33 | 1.8932 | 4781.44 | 24.1472 | Material 1 | 400 | 24 | 541.563 | 1416.3 | 2282.64 | 0 | 2282.6 |
| 34 | 1.8932 | 4744.73 | 26.0547 | Material $1$ | 400 | 24 | 535.056 | 1399.28 | 2244.43 | 0 | 2244.4: |
| 35 | 1.8932 | 4693.11 | 27.9937 | Material 1 | 400 | 24 | 527.234 | 1378.83 | 2198.48 | 0 | 2198.4§ |
| 36 | 1.8932 | 4625.76 | 29.9684 | Material 1 | 400 | 24 | 518.036 | 1354.77 | 2144.45 | 0 | 2144.4! |
| 37 | 1.8932 | 4541.77 | 31.9831 | Material $1$ | 400 | 24 | 507.392 | 1326.94 | 2081.93 | 0 | 2081.9: |
| 38 | 1.8932 | 4440.04 | 34.0432 | Material $1$ | 400 | 24 | 495.223 | 1295.11 | 2010.46 | 0 | 2010.41 |
| 39 | 1.8932 | 4319.27 | 36.1547 | Material 1 | 400 | 24 | 481.434 | 1259.05 | 1929.46 | 0 | 1929.41 |
| 40 | 1.8932 | 4177.92 | 38.3249 | Material 1 | 400 | 24 | 465.911 | 1218.45 | 1838.28 | 0 | 1838.2 |
| 41 | 1.8932 | 4014.11 | 40.5622 | Material 1 | 400 | 24 | 448.518 | 1172.97 | 1736.12 | 0 | 1736.1: |
| 42 | 1.8932 | 3825.57 | 42.8771 | Material 1 | 400 | 24 | 429.092 | 1122.17 | 1622.01 | 0 | 1622.0: |
| 43 | 1.8932 | 3609.44 | 45.2827 | Material $1$ | 400 | 24 | 407.432 | 1065.52 | 1494.78 | 0 | 1494.78 |
| 44 | 1.8932 | 3362.09 | 47.7954 | Material $1$ | 400 | 24 | 383.287 | 1002.38 | 1352.96 | 0 | 1352.94 |
| 45 | 1.8932 | 3075.15 | 50.4365 | Material 1 | 400 | 24 | 356.065 | 931.186 | 1193.06 | 0 | 1193.0t |
| 46 | 1.8932 | 2656.63 | 53.235 | Material 1 | 400 | 24 | 319.091 | 834.491 | 975.884 | 0 | 975.88 |
| 47 | 1.74518 | 2001.14 | 56.1051 | Material $2$ | 450 | 24 | 292.993 | 766.237 | 710.282 | 0 | 710.28: |
| 48 | 1.74518 | 1520.22 | 59.0818 | Material 2 | 450 | 24 | 249.424 | 652.297 | 454.366 | 0 | 454.361 |

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| 49 | 1.74518 | 975.333 | 62.3462 | Material | 450 | 24 | 201.654 | 527.368 | 173.772 | 0 | $173.77:$ |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 50 | 1.74518 | 342.355 | 66.0201 | Material | 450 | 24 | 148.568 | 388.536 | -138.052 | 0 | $-138.05:$ |

## Interslice Data

- Global Minimum Query (bishop simplified) - Safety Factor: 2.88217

| Slice Number | X <br> coordinate [ft] | ```Y coordinate - Bottom [ft]``` | Interslice Normal Force [lbs] | Interslice <br> Shear Force [lbs] | Interslice Force Angle [degrees] |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 11.7246 | 15.737 | 0 | 0 | 0 |
| 2 | 13.7556 | 14.9633 | 404.936 | 0 | 0 |
| 3 | 15.7865 | 14.2471 | 912.476 | 0 | 0 |
| 4 | 17.8175 | 13.5867 | 1504.32 | 0 | 0 |
| 5 | 19.8484 | 12.981 | 2163.93 | 0 | 0 |
| 6 | 21.8794 | 12.4287 | 2876.31 | 0 | 0 |
| 7 | 23.9103 | 11.9288 | 3627.89 | 0 | 0 |
| 8 | 25.9413 | 11.4803 | 4406.37 | 0 | 0 |
| 9 | 27.9722 | 11.0824 | 5204.32 | 0 | 0 |
| 10 | 30.0032 | 10.7345 | 6033.64 | 0 | 0 |
| 11 | 32.0341 | 10.4359 | 6884.93 | 0 | 0 |
| 12 | 34.0651 | 10.1862 | 7745.38 | 0 | 0 |
| 13 | 36.096 | 9.9848 | 8603.12 | 0 | 0 |
| 14 | 38.127 | 9.83147 | 9447.17 | 0 | 0 |
| 15 | 40.1579 | 9.72595 | 10267.3 | 0 | 0 |
| 16 | 42.1889 | 9.66805 | 11054.2 | 0 | 0 |
| 17 | 44.2198 | 9.65768 | 11799 | 0 | 0 |
| 18 | 46.2508 | 9.69483 | 12493.7 | 0 | 0 |
| 19 | 48.2817 | 9.77955 | 13131 | 0 | 0 |
| 20 | 50.3127 | 9.91199 | 13704 | 0 | 0 |
| 21 | 52.3436 | 10.0924 | 14206.5 | 0 | 0 |
| 22 | 54.3746 | 10.321 | 14632.8 | 0 | 0 |
| 23 | 56.4055 | 10.5982 | 14978 | 0 | 0 |
| 24 | 58.4365 | 10.9245 | 15237.4 | 0 | 0 |
| 25 | 60.4674 | 11.3005 | 15407 | 0 | 0 |
| 26 | 62.4983 | 11.7268 | 15483.5 | 0 | 0 |
| 27 | 64.5293 | 12.2041 | 15463.8 | 0 | 0 |
| 28 | 66.5602 | 12.7335 | 15345.8 | 0 | 0 |
| 29 | 68.5912 | 13.3157 | 15127.7 | 0 | 0 |
| 30 | 70.6221 | 13.9521 | 14808.3 | 0 | 0 |
| 31 | 72.6531 | 14.6438 | 14387.1 | 0 | 0 |
| 32 | 74.684 | 15.3922 | 13864.3 | 0 | 0 |
| 33 | 76.715 | 16.1989 | 13240.8 | 0 | 0 |
| 34 | 78.7459 | 17.0658 | 12518.2 | 0 | 0 |
| 35 | 80.7769 | 17.9947 | 11699.1 | 0 | 0 |
| 36 | 82.8078 | 18.988 | 10786.9 | 0 | 0 |
| 37 | 84.8388 | 20.0481 | 9786.24 | 0 | 0 |
| 38 | 86.8697 | 21.1779 | 8702.66 | 0 | 0 |
| 39 | 88.9007 | 22.3806 | 7543.21 | 0 | 0 |
| 40 | 90.9316 | 23.6597 | 6316.44 | 0 | 0 |
| 41 | 92.9626 | 25.0193 | 5032.64 | 0 | 0 |
| 42 | 94.9935 | 26.4643 | 3704.18 | 0 | 0 |
| 43 | 97.0245 | 27.9998 | 2345.88 | 0 | 0 |


| 44 | 99.0554 | 29.6323 | 987.255 | 0 | 0 |
| :--- | ---: | ---: | ---: | :--- | :--- |
| 45 | 101.086 | 31.369 | -278.67 | 0 | 0 |
| 46 | 103.042 | 33.1475 | -1309.77 | 0 | 0 |
| 47 | 104.997 | 35.0395 | -2166.01 | 0 | 0 |
| 48 | 106.953 | 37.0561 | -2798.81 | 0 | 0 |
| 49 | 108.908 | 39.2102 | -3150.02 | 0 | 0 |
| 50 | 110.863 | 41.5181 | -3149.08 | 0 | 0 |
| 51 | 112.819 | 44 | 0 | 0 | 0 |

- Global Minimum Query (janbu simplified) - Safety Factor: 2.61521

| Slice Number | X coordinate [ft] | coordinate-Bottom <br> [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice <br> Force Angle <br> [degrees] |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 13.2539 | 15.9635 | 0 | 0 | 0 |
| 2 | 15.1471 | 14.6987 | 611.338 | 0 | 0 |
| 3 | 17.0403 | 13.5297 | 1437.02 | 0 | 0 |
| 4 | 18.9335 | 12.4504 | 2432.73 | 0 | 0 |
| 5 | 20.8267 | 11.4558 | 3560.99 | 0 | 0 |
| 6 | 22.7199 | 10.5413 | 4789.75 | 0 | 0 |
| 7 | 24.6131 | 9.70321 | 6091.46 | 0 | 0 |
| 8 | 26.5063 | 8.93819 | 7442.22 | 0 | 0 |
| 9 | 28.3995 | 8.24344 | 8833.46 | 0 | 0 |
| 10 | 30.2927 | 7.61649 | 10273.9 | 0 | 0 |
| 11 | 32.1859 | 7.05526 | 11743 | 0 | 0 |
| 12 | 34.0791 | 6.55792 | 13220.7 | 0 | 0 |
| 13 | 35.9723 | 6.12292 | 14689.1 | 0 | 0 |
| 14 | 37.8655 | 5.74894 | 16132 | 0 | 0 |
| 15 | 39.7587 | 5.43489 | 17534.6 | 0 | 0 |
| 16 | 41.6519 | 5.17986 | 18883.5 | 0 | 0 |
| 17 | 43.5451 | 4.98312 | 20166.5 | 0 | 0 |
| 18 | 45.4383 | 4.84414 | 21372.4 | 0 | 0 |
| 19 | 47.3315 | 4.76251 | 22491.2 | 0 | 0 |
| 20 | 49.2247 | 4.73803 | 23513.4 | 0 | 0 |
| 21 | 51.1179 | 4.77062 | 24430.6 | 0 | 0 |
| 22 | 53.0111 | 4.86038 | 25235 | 0 | 0 |
| 23 | 54.9043 | 5.00754 | 25919.7 | 0 | 0 |
| 24 | 56.7975 | 5.21252 | 26478.3 | 0 | 0 |
| 25 | 58.6907 | 5.47589 | 26905 | 0 | 0 |
| 26 | 60.5839 | 5.79839 | 27194.8 | 0 | 0 |
| 27 | 62.4771 | 6.18096 | 27343.2 | 0 | 0 |
| 28 | 64.3703 | 6.62473 | 27346.4 | 0 | 0 |
| 29 | 66.2635 | 7.13104 | 27201.2 | 0 | 0 |
| 30 | 68.1567 | 7.7015 | 26905 | 0 | 0 |
| 31 | 70.0499 | 8.33794 | 26455.9 | 0 | 0 |
| 32 | 71.9431 | 9.04252 | 25852.8 | 0 | 0 |
| 33 | 73.8363 | 9.81774 | 25095.3 | 0 | 0 |
| 34 | 75.7295 | 10.6665 | 24183.9 | 0 | 0 |
| 35 | 77.6227 | 11.5921 | 23120 | 0 | 0 |
| 36 | 79.5159 | 12.5985 | 21906.4 | 0 | 0 |
| 37 | 81.4091 | 13.6901 | 20546.8 | 0 | 0 |
| 38 | 83.3023 | 14.8723 | 19046.7 | 0 | 0 |
| 39 | 85.1955 | 16.1514 | 17413.4 | 0 | 0 |
| 40 | 87.0887 | 17.5347 | 15656.4 | 0 | 0 |
| 41 | 88.9819 | 19.0312 | 13788 | 0 | 0 |
| 42 | 90.8751 | 20.6517 | 11824.4 | 0 | 0 |
| 43 | 92.7683 | 22.4096 | 9785.98 | 0 | 0 |


| 44 | 94.6615 | 24.3215 | 7699.85 | 0 | 0 |
| :--- | ---: | ---: | ---: | :--- | :--- |
| 45 | 96.5547 | 26.4091 | 5601.56 | 0 | 0 |
| 46 | 98.4479 | 28.7006 | 3542.25 | 0 | 0 |
| 47 | 100.341 | 31.2345 | 1673.94 | 0 | 0 |
| 48 | 102.086 | 33.8321 | 340.576 | 0 | 0 |
| 49 | 103.831 | 36.746 | -547.815 | 0 | 0 |
| 50 | 105.577 | 40.0766 | -774.426 | 0 | 0 |
| 51 | 107.322 | 44 | 0 | 0 | 0 |

## Entity Information

## Group: Group 1$\rangle$

Shared Entities

| Type | Coordinates |  |
| :---: | :---: | :---: |
|  | $\mathbf{X}$ $\mathbf{Y}$ <br> 160 0 <br> 160 42 <br> 160 44 <br> 98 44 <br> 27 18 <br> 0 14 <br> 0 0 |  |
|  | $\mathbf{X}$ $\mathbf{Y}$ <br> 27 18 <br> 160 42 |  |

## Slide Analysis Information

The Views Seismic

## Project Summary

| File Name: | The Views Seismic.slmd |
| :--- | ---: |
| Slide Modeler Version: | 8.02 |
| Compute Time: | 00h:00m:00.586s |
| Project Title: | The Views |
| Author: | Daniel M. Redmond |
| Company: | Redmond Geotechnical Services, LLC |
| Date Created: | May 11, 2020 |

## General Settings

| Units of Measurement: | Imperial Units |
| :--- | ---: |
| Time Units: | days |
| Permeability Units: | feet/second |
| Data Output: | Standard |
| Failure Direction: | Right to Left |

## Analysis Options

Slices Type:
Vertical

## Analysis Methods Used

Bishop simplified Janbu simplified
Number of slices: ..... 50
Tolerance: ..... 0.005
Maximum number of iterations: ..... 75
Check malpha < 0.2: ..... Yes
Create Interslice boundaries at intersections ..... Yeswith water tables and piezos:Initial trial value of FS:1
Steffensen Iteration: ..... Yes
Groundwater Analysis

| Groundwater Method: | Water Surfaces |
| :--- | ---: |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

Pseudo-random Seed: 10116
Random Number Generation Method: Park and Miller v. 3

## Surface Options

| Surface Type: | Circular <br> Search Method: |
| :--- | ---: |
| Auto Refine Search |  |
| Divisions along slope: | 20 |
| Circles per division: | 10 |
| Number of iterations: | 10 |
| Divisions to use in next iteration: | $50 \%$ |
| Composite Surfaces: | Disabled |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.24

## Materials

| Property | Material 1 | Material 2 |
| :--- | ---: | ---: |
| Color | $\square$ | $\square$ |
| Strength Type | Mohr-Coulomb | Mohr-Coulomb |
| Unit Weight [lbs/ft3] | 100 | 100 |
| Cohesion [psf] | 400 | 450 |
| Friction Angle [ ${ }^{\circ}$ ] | 24 | 24 |
| Water Surface | None | None |
| Ru Value | 0 | 0 |

## Global Minimums

## Method: bishop simplified

| FS | 1.566590 |
| :--- | ---: |
| Center: | $45.226,109.816$ |
| Radius: | 105.925 |
| Left Slip Surface Endpoint: | $0.051,14.008$ |
| Right Slip Surface Endpoint: | $128.221,44.000$ |
| Resisting Moment: | $1.66238 \mathrm{e}+07 \mathrm{lb}-\mathrm{ft}$ |
| Driving Moment: | $1.06114 \mathrm{e}+07 \mathrm{lb}-\mathrm{ft}$ |
| Total Slice Area: | 2303.82 ft 2 |
| Surface Horizontal Width: | 128.17 ft |
| Surface Average Height: | 17.9747 ft |

Method: janbu simplified

| FS | 1.416710 |
| :--- | ---: |
| Center: | $48.300,89.634$ |
| Radius: | 89.606 |
| Left Slip Surface Endpoint: | $0.204,14.030$ |
| Right Slip Surface Endpoint: | $125.416,44.000$ |
| Resisting Horizontal Force: | 156706 lb |
| Driving Horizontal Force: | 110613 lb |
| Total Slice Area: | $2625.28 \mathrm{ft2}$ |
| Surface Horizontal Width: | 125.212 ft |
| Surface Average Height: | 20.9667 ft |

## Valid/Invalid Surfaces

## Method: bishop simplified

Number of Valid Surfaces: 9986
Number of Invalid Surfaces: 3

## Error Codes:

Error Code -112 reported for 3 surfaces

## Method: janbu simplified

Number of Valid Surfaces: 9260
Number of Invalid Surfaces: 729

## Error Codes:

Error Code -108 reported for 188 surfaces Error Code - 111 reported for 539 surfaces Error Code - 112 reported for 2 surfaces

## Error Codes

The following errors were encountered during the computation:
$-108=$ Total driving moment or total driving force $<0.1$. This is to limit the calculation of extremely high safety factors if the driving force is very small ( 0.1 is an arbitrary number).
-111 = safety factor equation did not converge
$-112=$ The coefficient M-Alpha $=\cos ($ alpha $)(1+\tan ($ alpha $) \tan ($ phi $) / F)<0.2$ for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

## Slice Data

- Global Minimum Query (bishop simplified) - Safety Factor: 1.56659

| Slice <br> Number | Width <br> [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base <br> Material | Base Cohesion [psf] | Base <br> Friction <br> Angle [degrees] | Shear <br> Stress <br> [psf] | Shear Strength [psf] | Base <br> Normal <br> Stress <br> [psf] | Pore Pressure [psf] | Effective <br> Normal <br> Stress <br> [psf] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2.55188 | 196.528 | -24.4859 | Material $1$ | 400 | 24 | 318.4 | 498.803 | 221.915 | 0 | 221.915 |
| 2 | 2.55188 | 579.356 | -22.9778 | Material $1$ | 400 | 24 | 363.644 | 569.681 | 381.109 | 0 | 381.109 |
| 3 | 2.55188 | 942.064 | -21.4864 | Material $1$ | 400 | 24 | 405.59 | 635.393 | 528.702 | 0 | 528.702 |
| 4 | 2.55188 | 1285.29 | -20.0101 | Material $1$ | 400 | 24 | 444.439 | 696.253 | 665.395 | 0 | 665.395 |
| 5 | 2.55188 | 1609.58 | -18.5476 | Material $1$ | 400 | 24 | 480.362 | 752.53 | 791.796 | 0 | 791.796 |
| 6 | 2.55188 | 1915.46 | -17.0975 | Material $1$ | 400 | 24 | 513.513 | 804.465 | 908.443 | 0 | 908.443 |
| 7 | 2.55188 | 2203.36 | -15.6586 | Material $1$ | 400 | 24 | 544.027 | 852.267 | 1015.81 | 0 | 1015.81 |
| 8 | 2.55188 | 2473.68 | -14.2298 | Material $1$ | 400 | 24 | 572.02 | 896.121 | 1114.31 | 0 | 1114.31 |
| 9 | 2.55188 | 2726.76 | -12.81 | Material $1$ | 400 | 24 | 597.599 | 936.193 | 1204.31 | 0 | 1204.31 |
| 10 | 2.55188 | 2962.91 | -11.3981 | Material $1$ | 400 | 24 | 620.856 | 972.627 | 1286.14 | 0 | 1286.14 |
| 11 | 2.55188 | 3196.12 | -9.99319 | Material $1$ | 400 | 24 | 643.483 | 1008.07 | 1365.76 | 0 | 1365.76 |
| 12 | 2.55188 | 3518.87 | -8.59435 | Material 1 | 400 | 24 | 676.253 | 1059.41 | 1481.06 | 0 | 1481.06 |
| 13 | 2.55188 | 3847.69 | -7.20065 | Material 1 | 400 | 24 | 709.297 | 1111.18 | 1597.33 | 0 | 1597.33 |
| 14 | 2.55188 | 4160.44 | -5.81123 | Material $1$ | 400 | 24 | 740.069 | 1159.38 | 1705.61 | 0 | 1705.61 |
| 15 | 2.55188 | 4457.25 | -4.42523 | Material 1 | 400 | 24 | 768.627 | 1204.12 | 1806.09 | 0 | 1806.09 |
| 16 | 2.55188 | 4738.22 | -3.04182 | Material 1 | 400 | 24 | 795.024 | 1245.48 | 1898.97 | 0 | 1898.97 |
| 17 | 2.55188 | 5003.43 | -1.66018 | Material 1 | 400 | 24 | 819.306 | 1283.52 | 1984.41 | 0 | 1984.41 |
| 18 | 2.55188 | 5252.93 | -0.279513 | Material 1 | 400 | 24 | 841.514 | 1318.31 | 2062.55 | 0 | 2062.55 |
| 19 | 2.55188 | 5486.73 | 1.10099 | Material $1$ | 400 | 24 | 861.684 | 1349.91 | 2133.52 | 0 | 2133.52 |
| 20 | 2.55188 | 5704.83 | 2.48214 | Material $1$ | 400 | 24 | 879.845 | 1378.36 | 2197.43 | 0 | 2197.43 |
| 21 | 2.55188 | 5907.19 | 3.86473 | Material 1 | 400 | 24 | 896.023 | 1403.7 | 2254.35 | 0 | 2254.35 |
| 22 | 2.55188 | 6093.75 | 5.24958 | Material 1 | 400 | 24 | 910.238 | 1425.97 | 2304.37 | 0 | 2304.37 |
| 23 | 2.55188 | 6264.41 | 6.63752 | Material $1$ | 400 | 24 | 922.513 | 1445.2 | 2347.55 | 0 | 2347.55 |


| 24 | 2.55188 | 6419.06 | 8.02938 | Material $1$ | 400 | 24 | 932.848 | 1461.39 | 2383.93 | $1$ | 2383.93 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 | 2.55188 | 6557.55 | 9.42603 | Material | 400 | 24 | 941.267 | 1474.58 | 2413.54 | 0 | 2413.54 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 26 | 2.55188 | 6679.69 | 10.8284 | Material | 400 | 24 | 947.766 | 1484.76 | 2436.4 | 0 | 2436.4 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 27 | 2.55188 | 6785.26 | 12.2373 | Material | 400 | 24 | 952.342 | 1491.93 | 2452.52 | 0 | 2452.52 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 28 | 2.55188 | 6874.01 | 13.6538 | Material | 400 | 24 | 955.004 | 1496.1 | 2461.88 | 0 | 2461.88 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 29 | 2.55188 | 6945.66 | 15.0788 | Material | 400 | 24 | 955.738 | 1497.25 | 2464.47 | 0 | 2464.47 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 30 | 2.55188 | 6999.87 | 16.5135 | Material | 400 | 24 | 954.538 | 1495.37 | 2460.24 | 0 | 2460.24 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 31 | 2.55188 | 7036.28 | 17.9589 | Material | 400 | 24 | 951.385 | 1490.43 | 2449.15 | 0 | 2449.15 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 32 | 2.55188 | 7054.44 | 19.4163 | Material | 400 | 24 | 946.259 | 1482.4 | 2431.12 | 0 | 2431.12 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 33 | 2.55188 | 7053.9 | 20.8868 | Material | 400 | 24 | 939.148 | 1471.26 | 2406.08 | 0 | 2406.08 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 34 | 2.55188 | 7034.1 | 22.3719 | Material | 400 | 24 | 930.007 | 1456.94 | 2373.93 | 0 | 2373.93 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 35 | 2.55188 | 6994.45 | 23.873 | Material | 400 | 24 | 918.817 | 1439.41 | 2334.55 | 0 | 2334.55 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 36 | 2.55188 | 6934.26 | 25.3918 | Material | 400 | 24 | 905.534 | 1418.6 | 2287.81 | 0 | 2287.81 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 37 | 2.55188 | 6852.78 | 26.9299 | Material | 400 | 24 | 890.112 | 1394.44 | 2233.55 | 0 | 2233.55 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 38 | 2.55188 | 6749.14 | 28.4894 | Material | 400 | 24 | 872.504 | 1366.86 | 2171.59 | 0 | 2171.59 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 39 | 2.55188 | 6576.97 | 30.0722 | Material | 400 | 24 | 848.31 | 1328.95 | 2086.46 | 0 | 2086.46 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 40 | 2.55188 | 6204.99 | 31.6808 | Material | 400 | 24 | 805.246 | 1261.49 | 1934.94 | 0 | 1934.94 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 41 | 2.55188 | 5790.01 | 33.3178 | Material | 400 | 24 | 758.559 | 1188.35 | 1770.67 | 0 | 1770.67 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 42 | 2.55188 | 5348.11 | 34.9862 | Material | 400 | 24 | 709.862 | 1112.06 | 1599.32 | 0 | 1599.32 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 43 | 2.55188 | 4877.63 | 36.6893 | Material | 400 | 24 | 659.089 | 1032.52 | 1420.67 | 0 | 1420.67 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 44 | 2.55188 | 4376.67 | 38.4311 | Material | 400 | 24 | 606.166 | 949.613 | 1234.45 | 0 | 1234.45 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 45 | 2.55188 | 3843 | 40.216 | Material | 400 | 24 | 551.011 | 863.208 | 1040.38 | 0 | 1040.38 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 46 | 2.55188 | 3274 | 42.0493 | Material | 400 | 24 | 493.536 | 773.168 | 838.148 | 0 | 838.148 |
| 1 |  |  |  |  |  |  |  |  |  |  |  |
| 47 | 2.55188 | 2666.57 | 43.9373 | Material | 400 | 24 | 433.641 | 679.337 | 627.401 | 0 | 627.401 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 48 | 2.74395 | 2140.57 | 45.9634 | Material | 450 | 24 | 393.408 | 616.309 | 373.536 | 0 | 373.536 |
|  |  |  |  | 2 |  |  |  |  |  |  |  |


| 49 | 2.74395 | 1331.01 | 48.1434 | Material | 450 | 24 | 322.784 | 505.67 | 125.038 | 0 | 125.038 |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 50 | 2.74395 | 455.397 | 50.4204 | Material | 450 | 24 | 248.906 | 389.934 | -134.91 | 0 | -134.91 |

- Global Minimum Query (janbu simplified) - Safety Factor: 1.41671

| Slice Number | Width <br> [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base <br> Material | Base Cohesion [psf] | Base <br> Friction <br> Angle <br> [degrees] | Shear <br> Stress <br> [psf] | Shear Strength [psf] | Base <br> Normal <br> Stress <br> [psf] | Pore Pressure [psf] | Effective <br> Normal <br> Stress <br> [psf] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2.52796 | 243.26 | -31.5148 | Material $1$ | 400 | 24 | 387.262 | 548.638 | 333.847 | 0 | 333.847 |
| 2 | 2.52796 | 715.647 | -29.6369 | Material $1$ | 400 | 24 | 452.225 | 640.672 | 540.558 | 0 | 540.558 |
| 3 | 2.52796 | 1160.53 | -27.7933 | Material $1$ | 400 | 24 | 511.389 | 724.49 | 728.817 | 0 | 728.817 |
| 4 | 2.52796 | 1579.34 | -25.9805 | Material $1$ | 400 | 24 | 565.322 | 800.898 | 900.432 | 0 | 900.432 |
| 5 | 2.52796 | 1973.3 | -24.1954 | Material $1$ | 400 | 24 | 614.491 | 870.556 | 1056.89 | 0 | 1056.89 |
| 6 | 2.52796 | 2343.47 | -22.4348 | Material $1$ | 400 | 24 | 659.285 | 934.016 | 1199.42 | 0 | 1199.42 |
| 7 | 2.52796 | 2690.79 | -20.6964 | Material $1$ | 400 | 24 | 700.03 | 991.739 | 1329.07 | 0 | 1329.07 |
| 8 | 2.52796 | 3016.07 | -18.9777 | Material $1$ | 400 | 24 | 737.001 | 1044.12 | 1446.71 | 0 | 1446.71 |
| 9 | 2.52796 | 3320.01 | -17.2766 | Material 1 | 400 | 24 | 770.437 | 1091.49 | 1553.1 | 0 | 1553.1 |
| 10 | 2.52796 | 3603.23 | -15.591 | Material $1$ | 400 | 24 | 800.538 | 1134.13 | 1648.88 | 0 | 1648.88 |
| 11 | 2.52796 | 3877.41 | -13.9192 | Material 1 | 400 | 24 | 828.984 | 1174.43 | 1739.4 | 0 | 1739.4 |
| 12 | 2.52796 | 4234.98 | -12.2594 | Material 1 | 400 | 24 | 868.152 | 1229.92 | 1864.03 | 0 | 1864.03 |
| 13 | 2.52796 | 4598.29 | -10.61 | Material $1$ | 400 | 24 | 907.451 | 1285.6 | 1989.08 | 0 | 1989.08 |
| 14 | 2.52796 | 4942.6 | -8.9695 | Material $1$ | 400 | 24 | 943.636 | 1336.86 | 2104.22 | 0 | 2104.22 |
| 15 | 2.52796 | 5268.19 | -7.33635 | Material $1$ | 400 | 24 | 976.823 | 1383.88 | 2209.82 | 0 | 2209.82 |
| 16 | 2.52796 | 5575.3 | -5.70917 | Material $1$ | 400 | 24 | 1007.12 | 1426.79 | 2306.21 | 0 | 2306.21 |
| 17 | 2.52796 | 5864.1 | -4.0866 | Material 1 | 400 | 24 | 1034.6 | 1465.73 | 2393.66 | 0 | 2393.66 |
| 18 | 2.52796 | 6134.71 | -2.46731 | Material $1$ | 400 | 24 | 1059.35 | 1500.79 | 2472.42 | 0 | 2472.42 |
| 19 | 2.52796 | 6387.25 | -0.849997 | Material 1 | 400 | 24 | 1081.44 | 1532.08 | 2542.69 | 0 | 2542.69 |
| 20 | 2.52796 | 6621.73 | 0.766642 | Material 1 | 400 | 24 | 1100.91 | 1559.67 | 2604.65 | 0 | 2604.65 |
| 21 | 2.52796 | 6838.18 | 2.38389 | Material 1 | 400 | 24 | 1117.82 | 1583.62 | 2658.44 | 0 | 2658.44 |
| 22 | 2.52796 | 7036.53 | 4.00305 | Material 1 | 400 | 24 | 1132.19 | 1603.98 | 2704.19 | 0 | 2704.19 |
| 23 | 2.52796 | 7216.72 | 5.62541 | Material 1 | 400 | 24 | 1144.07 | 1620.81 | 2741.99 | 0 | 2741.99 |


| 24 | 2.52796 | 7378.61 | 7.25232 | Material 1 | 400 | 24 | 1153.47 | 1634.13 | 2771.91 | 0 | 2771.91 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 25 | 2.52796 | 7522.02 | 8.88513 | Material $1$ | 400 | 24 | 1160.41 | 1643.96 | 2793.99 | 0 | 2793.99 |
| 26 | 2.52796 | 7646.72 | 10.5253 | Material $1$ | 400 | 24 | 1164.9 | 1650.32 | 2808.27 | 0 | 2808.27 |
| 27 | 2.52796 | 7752.44 | 12.1742 | Material 1 | 400 | 24 | 1166.94 | 1653.21 | 2814.75 | 0 | 2814.75 |
| 28 | 2.52796 | 7838.85 | 13.8334 | Material $1$ | 400 | 24 | 1166.51 | 1652.61 | 2813.41 | 0 | 2813.41 |
| 29 | 2.52796 | 7905.55 | 15.5045 | Material 1 | 400 | 24 | 1163.63 | 1648.52 | 2804.21 | 0 | 2804.21 |
| 30 | 2.52796 | 7952.08 | 17.1893 | Material 1 | 400 | 24 | 1158.25 | 1640.9 | 2787.1 | 0 | 2787.1 |
| 31 | 2.52796 | 7977.92 | 18.8896 | Material $1$ | 400 | 24 | 1150.35 | 1629.71 | 2761.97 | 0 | 2761.97 |
| 32 | 2.52796 | 7982.46 | 20.6073 | Material 1 | 400 | 24 | 1139.9 | 1614.91 | 2728.74 | 0 | 2728.74 |
| 33 | 2.52796 | 7964.99 | 22.3447 | Material $1$ | 400 | 24 | 1126.86 | 1596.44 | 2687.24 | 0 | 2687.24 |
| 34 | 2.52796 | 7924.71 | 24.104 | Material $1$ | 400 | 24 | 1111.17 | 1574.21 | 2637.32 | 0 | 2637.32 |
| 35 | 2.52796 | 7860.7 | 25.8879 | Material $1$ | 400 | 24 | 1092.78 | 1548.15 | 2578.79 | 0 | 2578.79 |
| 36 | 2.52796 | 7771.9 | 27.6991 | Material 1 | 400 | 24 | 1071.6 | 1518.15 | 2511.4 | 0 | 2511.4 |
| 37 | 2.52796 | 7657.09 | 29.541 | Material $1$ | 400 | 24 | 1047.55 | 1484.08 | 2434.87 | 0 | 2434.87 |
| 38 | 2.52796 | 7514.86 | 31.4171 | Material 1 | 400 | 24 | 1020.53 | 1445.8 | 2348.9 | 0 | 2348.9 |
| 39 | 2.52796 | 7332.01 | 33.3316 | Material 1 | 400 | 24 | 989.236 | 1401.46 | 2249.32 | 0 | 2249.32 |
| 40 | 2.52796 | 6950.73 | 35.2892 | Material $1$ | 400 | 24 | 937.721 | 1328.48 | 2085.4 | 0 | 2085.4 |
| 41 | 2.52796 | 6481.21 | 37.2954 | Material $1$ | 400 | 24 | 877.804 | 1243.59 | 1894.74 | 0 | 1894.74 |
| 42 | 2.52796 | 5975.77 | 39.3567 | Material $1$ | 400 | 24 | 815.02 | 1154.65 | 1694.97 | 0 | 1694.97 |
| 43 | 2.52796 | 5431.21 | 41.4809 | Material 1 | 400 | 24 | 749.217 | 1061.42 | 1485.58 | 0 | 1485.58 |
| 44 | 2.52796 | 4843.59 | 43.6773 | Material 1 | 400 | 24 | 680.22 | 963.674 | 1266.03 | 0 | 1266.03 |
| 45 | 2.52796 | 4208.09 | 45.9575 | Material $1$ | 400 | 24 | 607.829 | 861.117 | 1035.69 | 0 | 1035.69 |
| 46 | 2.52796 | 3518.61 | 48.3361 | Material 1 | 400 | 24 | 531.813 | 753.425 | 793.806 | 0 | 793.806 |
| 47 | 2.52796 | 2767.3 | 50.8317 | Material $1$ | 400 | 24 | 451.913 | 640.229 | 539.562 | 0 | 539.562 |
| 48 | 2.1325 | 1699.02 | 53.251 | Material $2$ | 450 | 24 | 399.689 | 566.243 | 261.086 | 0 | 261.086 |

file:///C:/Users/Denise/AppData/Local/Temp/RocscienceTempSlid...

| 49 | 2.1325 | 1062.47 | 55.5974 | Material | 450 | 24 | 324.971 | 460.389 | 23.3352 | 0 | 23.3352 |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| 50 | 2.1325 | 365.215 | 58.0942 | Material | 450 | 24 | 246.795 | 349.637 | -225.42 | 0 | -225.42 |
|  |  |  |  |  |  |  |  |  |  |  |  |

## Interslice Data

- Global Minimum Query (bishop simplified) - Safety Factor: 1.56659

| Slice Number | X coordinate [ft] | ```Y coordinate - Bottom [ft]``` | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.0509766 | 14.0076 | 0 | 0 | 0 |
| 2 | 2.60286 | 12.8454 | 1022.67 | 0 | 0 |
| 3 | 5.15474 | 11.7633 | 2223.29 | 0 | 0 |
| 4 | 7.70663 | 10.7588 | 3562.54 | 0 | 0 |
| 5 | 10.2585 | 9.82947 | 5005.76 | 0 | 0 |
| 6 | 12.8104 | 8.97327 | 6522.33 | 0 | 0 |
| 7 | 15.3623 | 8.18833 | 8085.16 | 0 | 0 |
| 8 | 17.9142 | 7.47302 | 9670.25 | 0 | 0 |
| 9 | 20.466 | 6.82588 | 11256.3 | 0 | 0 |
| 10 | 23.0179 | 6.24564 | 12824.6 | 0 | 0 |
| 11 | 25.5698 | 5.73118 | 14358.3 | 0 | 0 |
| 12 | 28.1217 | 5.28152 | 15846.3 | 0 | 0 |
| 13 | 30.6736 | 4.89585 | 17297.4 | 0 | 0 |
| 14 | 33.2255 | 4.57344 | 18697.7 | 0 | 0 |
| 15 | 35.7773 | 4.31372 | 20029.3 | 0 | 0 |
| 16 | 38.3292 | 4.11624 | 21276.3 | 0 | 0 |
| 17 | 40.8811 | 3.98063 | 22423.9 | 0 | 0 |
| 18 | 43.433 | 3.90667 | 23459.1 | 0 | 0 |
| 19 | 45.9849 | 3.89422 | 24370 | 0 | 0 |
| 20 | 48.5368 | 3.94326 | 25145.8 | 0 | 0 |
| 21 | 51.0886 | 4.05388 | 25777.2 | 0 | 0 |
| 22 | 53.6405 | 4.22627 | 26255.7 | 0 | 0 |
| 23 | 56.1924 | 4.46074 | 26574 | 0 | 0 |
| 24 | 58.7443 | 4.7577 | 26725.9 | 0 | 0 |
| 25 | 61.2962 | 5.11767 | 26705.9 | 0 | 0 |
| 26 | 63.848 | 5.54133 | 26509.8 | 0 | 0 |
| 27 | 66.3999 | 6.02943 | 26134.3 | 0 | 0 |
| 28 | 68.9518 | 6.58291 | 25576.9 | 0 | 0 |
| 29 | 71.5037 | 7.20281 | 24836.3 | 0 | 0 |
| 30 | 74.0556 | 7.89035 | 23912 | 0 | 0 |
| 31 | 76.6075 | 8.64691 | 22804.8 | 0 | 0 |
| 32 | 79.1593 | 9.47404 | 21516.4 | 0 | 0 |
| 33 | 81.7112 | 10.3735 | 20049.6 | 0 | 0 |
| 34 | 84.2631 | 11.3473 | 18408.4 | 0 | 0 |
| 35 | 86.815 | 12.3977 | 16598.3 | 0 | 0 |
| 36 | 89.3669 | 13.5271 | 14626 | 0 | 0 |
| 37 | 91.9188 | 14.7383 | 12499.7 | 0 | 0 |
| 38 | 94.4706 | 16.0347 | 10229.5 | 0 | 0 |
| 39 | 97.0225 | 17.4196 | 7827.02 | 0 | 0 |
| 40 | 99.5744 | 18.8972 | 5328.74 | 0 | 0 |
| 41 | 102.126 | 20.4721 | 2845.61 | 0 | 0 |
| 42 | 104.678 | 22.1495 | 420.21 | 0 | 0 |
| 43 | 107.23 | 23.9355 | -1909.45 | 0 | 0 |


| 44 | 109.782 | 25.8368 | -4100.62 | 0 | 0 |
| ---: | ---: | ---: | ---: | :--- | :--- |
| 45 | 112.334 | 27.8617 | -6104.87 | 0 | 0 |
| 46 | 114.886 | 30.0194 | -7866.98 | 0 | 0 |
| 47 | 117.438 | 32.3211 | -9323.39 | 0 | 0 |
| 48 | 119.989 | 34.7801 | -10400.3 | 0 | 0 |
| 49 | 122.733 | 37.6179 | -10895.4 | 0 | 0 |
| 50 | 125.477 | 40.6807 | -10712.7 | 0 | 0 |
| 51 | 128.221 | 44 | 0 | 0 | 0 |

- Global Minimum Query (janbu simplified) - Safety Factor: 1.41671

| Slice Number | X coordinate [ft] | coordinate - Bottom <br> [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 0.203906 | 14.0302 | 0 | 0 | 0 |
| 2 | 2.73187 | 12.4802 | 1438.76 | 0 | 0 |
| 3 | 5.25983 | 11.0419 | 3188.47 | 0 | 0 |
| 4 | 7.78779 | 9.70947 | 5174.74 | 0 | 0 |
| 5 | 10.3158 | 8.47756 | 7335.06 | 0 | 0 |
| 6 | 12.8437 | 7.3417 | 9616.45 | 0 | 0 |
| 7 | 15.3717 | 6.29795 | 11973.7 | 0 | 0 |
| 8 | 17.8996 | 5.34289 | 14368.2 | 0 | 0 |
| 9 | 20.4276 | 4.47354 | 16766.4 | 0 | 0 |
| 10 | 22.9556 | 3.6873 | 19139.7 | 0 | 0 |
| 11 | 25.4835 | 2.98191 | 21463.2 | 0 | 0 |
| 12 | 28.0115 | 2.3554 | 23719.5 | 0 | 0 |
| 13 | 30.5395 | 1.80609 | 25923.2 | 0 | 0 |
| 14 | 33.0674 | 1.33253 | 28057.2 | 0 | 0 |
| 15 | 35.5954 | 0.933523 | 30097.7 | 0 | 0 |
| 16 | 38.1233 | 0.608053 | 32023.7 | 0 | 0 |
| 17 | 40.6513 | 0.35532 | 33816.2 | 0 | 0 |
| 18 | 43.1793 | 0.174708 | 35458.4 | 0 | 0 |
| 19 | 45.7072 | 0.0657796 | 36935.3 | 0 | 0 |
| 20 | 48.2352 | 0.0282739 | 38233.5 | 0 | 0 |
| 21 | 50.7632 | 0.0621012 | 39341.1 | 0 | 0 |
| 22 | 53.2911 | 0.167342 | 40248 | 0 | 0 |
| 23 | 55.8191 | 0.34425 | 40945 | 0 | 0 |
| 24 | 58.347 | 0.593251 | 41424.4 | 0 | 0 |
| 25 | 60.875 | 0.914952 | 41679.8 | 0 | 0 |
| 26 | 63.403 | 1.31015 | 41705.8 | 0 | 0 |
| 27 | 65.9309 | 1.77983 | 41498.5 | 0 | 0 |
| 28 | 68.4589 | 2.3252 | 41054.9 | 0 | 0 |
| 29 | 70.9869 | 2.94769 | 40373.2 | 0 | 0 |
| 30 | 73.5148 | 3.64897 | 39453 | 0 | 0 |
| 31 | 76.0428 | 4.43099 | 38295 | 0 | 0 |
| 32 | 78.5707 | 5.296 | 36901.2 | 0 | 0 |
| 33 | 81.0987 | 6.24657 | 35275.3 | 0 | 0 |
| 34 | 83.6267 | 7.28566 | 33422 | 0 | 0 |
| 35 | 86.1546 | 8.41669 | 31348.2 | 0 | 0 |
| 36 | 88.6826 | 9.64354 | 29062.3 | 0 | 0 |
| 37 | 91.2106 | 10.9707 | 26574.8 | 0 | 0 |
| 38 | 93.7385 | 12.4033 | 23898.9 | 0 | 0 |
| 39 | 96.2665 | 13.9475 | 21050 | 0 | 0 |
| 40 | 98.7944 | 15.61 | 18053.2 | 0 | 0 |
| 41 | 101.322 | 17.3992 | 15026.1 | 0 | 0 |
| 42 | 103.85 | 19.3247 | 12042.9 | 0 | 0 |
| 43 | 106.378 | 21.398 | 9156.38 | 0 | 0 |


| 44 | 108.906 | 23.633 | 6427.86 | 0 | 0 |
| ---: | ---: | ---: | ---: | ---: | ---: |
| 45 | 111.434 | 26.0469 | 3930.15 | 0 | 0 |
| 46 | 113.962 | 28.6608 | 1750.67 | 0 | 0 |
| 47 | 116.49 | 31.5017 | -3.58852 | 0 | 0 |
| 48 | 119.018 | 34.6048 | -1198.83 | 0 | 0 |
| 49 | 121.151 | 37.4606 | -1499.29 | 0 | 0 |
| 50 | 123.283 | 40.5748 | -1133.47 | 0 | 0 |
| 51 | 125.416 | 44 | 0 | 0 | 0 |

## Entity Information

## Group: Group 1

Shared Entities

| Type | Coordinates |
| :---: | :---: |
| External Boundary | $\mathbf{X}$ $\mathbf{Y}$ <br> 160 0 <br> 160 42 <br> 160 44 <br> 98 44 <br> 27 18 <br> 0 14 <br> 0 0 |
|  | $\mathbf{X}$ $\mathbf{Y}$ <br> 27 18 <br> 160 42 |

EXHIBIT J

fiRCHIITECTURAL DLAITS

The Views
Upper \& Lower Views S.F. Detached Houses

Table 17.90.150 - A: Number of Required Design Elements
Garage Width Percent:
Greater than 60 percent and up to 70 percent or a garage under home design 7 elements
Typical Design Elements:

1. Covered porch entry - minimum 40 square foot covered front porch, minimum five (5) feet deep.
2. Building face containing two (2) or more off-sets of 16 inches or greater
3. Roof overhang of 16 inches or greater
4. Columns, pillars or posts at least four (4) inches wide and containing larger base materials.
5. Decorative gables - cross or diagonal bracing, shingles, trim, corbels, exposed rafter ends, or brackets
6. Decorative "belly-band" between building floors or gables
7. Windows and front door - occupying a minimum of 10 percent of the primary street facing façade
8. Sidelight and/or transom windows associated with the front door or windows in the front door
9. Window grids on all façade windows
10. Other item - mixing board and batt siding with lap siding for architectural detail


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The Views
Lower Views S.F. Attached Townhouses

Table 17.90.150 - A: Number of Required Design Elements
*Detached Garage
(An independent, self-supporting structure separated from the dwelling by at least 6 feet)
4 elements plus 4 elements on the garage
*Rear Loaded Garage
4 elements (zero for garage)
Townhouse Design Elements:
Front Façade:

1. Covered porch entry - minimum 40 square foot covered front porch, minimum five (5) feet deep.
2. Building face containing two (2) or more off-sets of 16 inches or greater
3. Roof overhang of 16 inches or greater
4. Columns, pillars or posts at least four (4) inches wide and containing larger base materials.
5. Decorative gables - cross or diagonal bracing, shingles, trim, corbels, exposed rafter ends, or brackets
6. Decorative "belly-band" between building floors or gables
7. Windows and front door - occupying a minimum of 10 percent of the primary street facing façade
8. Sidelight and/or transom windows associated with the front door or windows in the front door
9. Window grids on all façade windows
10. Other item - mixing board and batt siding with lap siding for architectural detail

Additional Street Facing Façades (3) minimum:

1. Roof overhang of 16 inches or greater.
2. Decorative "belly-band" between building floors or gables
3. Window grids on all façade windows

## ADDITIONAL REQUIREMENTS

Roofs shall be gabled or hip type roofs (minimum pitch 3:12)
Proposed: 7:12 pitch
Garage Design Elements:

1. Roof overhang of 16 inches or greater
2. Decorative gables - cross or diagonal bracing, shingles, trim, corbels, exposed rafter ends, or brackets
3. Decorative "belly-band" between building floors or gables


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## EXHIBIT O

| - |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Botanical name Common Name |  |  |  |  |
| प०० | 710.] | १円) | - |  |
|  | Acer circinatum Vine Maple | 6-7' | B\&B | Multi-stem Collected |
|  | Acer rubrum 'Bowhall' Bowhall Maple | 1.5" Cal. | B\&B |  |
|  | Betulus 'Heritage' River Birch | 2" Cal. | B\&B |  |
|  | Calocedrus decurrens Incense Cedar | 6-7' | $B \& B$ |  |
|  |  <br>  | 1.5" Cal. | B\&B |  |
|  | Cercidiphylum japonicum Katsura | $1.5{ }^{\text {" Cal. }}$ | B\&B |  |
|  | Chamaecyparis lawsoniana Port Orford Cedar | 6-7' | $B \& B$ |  |
|  | Cornus kousa Kousa Dogwood | $1.5{ }^{\text {" Cal. }}$ | $B \& B$ |  |
|  | Metasequoia glyptostroboides Dawn Redwood | 6-7' | $B \& B$ |  |
|  | Styrax japonica J apanese Snowbell | 1.5" Cal. | $B \& B$ |  |
|  | Thuja x plicata 'Excelsa' Excelsa Western Red Cedar | 6-7' | B\&B |  |
|  | Tilia cordata 'Greenspire' Greenspire Linden | 2" Cal. | $B \& B$ |  |
|  | Zelkova serrata 'Village Green' Village Green Zelkova | 2" Cal. | $B \& B$ |  |


| - |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Botanical name Common Name |  |  |  |  |
| १०० |  |  | - |  |
| ${ }^{+}$ | Berberis thunbergii 'Crimson Pygmy' Crimson Pygmy Barberry | 1 Gal | Can |  |
| - | Calamagrostis x acutiflora 'Karl Foerster' Foerster's Feather Reed Grass | 1 Gal | Can |  |
| Q | Carex 'Bowles Golden' Bowles Golden Sedge | 1 Gal | Can |  |
| * | Choisya ternata Mexican Orange | 5 Gal | Can |  |
| - | Cornus alba 'Elegantissima' Variegated Redtwig Dogwood | 2 Gal | Can |  |
| $\bigcirc$ | Cornus sericea 'Kelseyi' <br> Kelseyi Dwarf Redtwig Dogwood | 2 Gal | Can |  |
| $\bigcirc$ | Euonymus alata Burning Bush | 5 Gal | Can |  |
| - | Imperata cylindrica 'Rubra' J apanese Blood Grass | 1 Gal | Can |  |
| 0 | Pennisetum alopecuroides 'Hameln' Dwarf Fountain Grass | 1 Gal | Can |  |
| 䈃 | Polystichum munitum Sword Fern | 1 Gal | Can |  |
| * | Prunus lusticantica Portuguese Laurel | 5 Gal | Can |  |
| - | Prunus 'Otto Luken' Otto Luken Laurel | 5 Gal | Can |  |
| $\theta$ | Rhododendron 'Nova Zembla' Nova Zembla Rhododendron | 18-24" | Can |  |
| - | Rosa 'Double Red Knockout' Double Red Knockout Rose | 2 Gal | Can |  |
| * | Sarcococca confusa Fragrant Box | 2 Gal | Can |  |
| 6 | Spiraea Anthony Watereri Anthony Waterer Spirea | 2 Gal | Can |  |
| $\dagger$ | Viburnum plicatum 'Maresii' Shasta Viburnum | 5 Gal | Can |  |
| प०० | - | - | - |  |
|  | Rudbeckia fulgida 'Little Goldstar' Black Eye Susan | $4{ }^{4}$ | Pots | 18" O.C. |
|  | Fragaria chiloensis Coastal Strawberry | $4{ }^{\prime \prime}$ | Pots | 24" O.C. |
|  | Hemerocallis 'Stella d'oro' Stella d'oro Daylily | 1 gal | Can | 24" O.C. |
|  | Rosa Flower Carpet Pink Supreme Pink Supreme Carpet Rose | 1 gal | Can | 24" O.C. |
|  | Lawn (hydro-seed) |  |  |  |
| $\because \because$ | Native Seed Mix |  |  |  |
| \% | Wood chips - 4" depth minimum |  |  |  |

## EXHIBIT P

| Botanical | Common |
| :---: | :---: |
| Tree |  |
| Acer circinatum | Vine Maple |
| Acer rubrum 'Bowhall' | Bowhall Red Maple |
| Betula nigra | River Birch |
| Cercidiphyllum japonicum | Katsura Tree |
| Cornus kousa | Kousa or Japanese Dogwood |
| Styrax japonicus | Japanese Snowbell |
| Tilia cordata | Littleleaf Linden |
| Zelkova serrata | Sawleaf Zelkova |
| Shrub |  |
| Berberis thunbergii 'Rose Glow' | Rose Glow Barberry |
| Choisya ternata | Mexican Orange, Mex. Mock Orange |
| Cornus alba 'Elegantissima' | Variegated Red Twig Dogwood |
| Cornus sericea 'Kelseyi' | Kelsey's Dwarf Red-Osier Dogwood |
| Euonymus alatus 'Compactus' | Compact Burning Bush |
| Hemerocallis 'Stella de Oro' | Stella de Oro Daylily |
| Prunus laurocerasus 'Otto Luyken' | Luykens Laurel |
| Rosa 'Radtko' KNOCK OUT | Double Red Knock Out® Rose |
| Sarcococca confusa | Sweet Box |
| Spiraea japonica 'Anthony Waterer' | Anthony Waterer Pink Spirea |
| Viburnum pli. tom. 'Shasta' | Shasta Doublefile Viburnum |
| Ground cover |  |
| Fragaria chiloensis | Coastal Strawberry |
| Rosa Flower Carpet Pink Supreme | Pink Supreme Carpet Rose |
| Perennial |  |
| Rudbeckia f.s. 'Goldstrum' | Blackeyed Susan |
| Grass |  |


| Botanical | Common |
| :--- | :--- |
| Calamagrostis X acu. 'Karl Foerster' | Karl Foerster Feather Reed Grass |
| Carex 'Bowles Golden' | Bowles Golden Sedge |
| Imperata cylindrica 'Rubra' | Japanese Blood Grass |
| Pennisetum alo. 'Hamelin' | Hamelin Dwarf Fountain Grass |
| Broadleaf Evergreen | Nova Zembla Rhododendron |
| Conifer | Port Orford Cedar |
| Calocedrus decurrens | Dawn Redwood |
| Chamaecyparis lawsoniana | Excelsa Western Red Cedar |
| Metasequoia glyptostroboides 'Nova Zembla' | Western Sword Fern |
| Polystichum munitum | Praja |



## Acer circinatum

## Vine Maple

This plant is either a shrub or small tree that reaches 35 ' in height. It has light green leaves which turn orange-scarlet in the fall. It also has new spring foliage with a reddish hue. A. circinatum can be used as an espalier against a wall. To accent Vine Maple effectively, plant it with the Douglas Fir, Western Sword Fern, as well as the Oregon-Grape. It has a color that is especially striking during the fall season.


## Designer Notes



## Acer rubrum 'Bowhall'

## Bowhall Red Maple

40 ' tall with a 15 ' spread. Upright, pyramidal form. Reliable scarlet-red fall color.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | sun |  |
| Tree | Full, Half |  |
| height range | water |  |
| 40-60' | Medium |  |
| WIDTH RANGE | SOIL TYPE |  |
| FLOWER COLOR | Loam |  |
| n/a | SOIL CONDITION |  |
| flower season | Average, Moist |  |
| n/a | growth rate |  |
| leaf color | Moderate |  |
| Dark Green | tolerances |  |
|  | n/a |  |

## Designer Notes



## Betula nigra

## River Birch

The River Birch is a deciduous tree that reaches $40^{\prime}$ tall by 30 ' wide. It has a less pendulous habit than the European White Birch. Its bark is closer to paper birch, peeling off in dark, translucent orange sheets from cherry-like trunks. It has a good, strong yellow fall color. It should be grown in sun to part shade, receiving at least average watering. It resists bronze birch borer, and will tolerate wetter soils than the pendula. Also known as: Black or Red Birch


## Designer Notes



## Cercidiphyllum japonicum

## Katsura Tree

Katsura Tree is an attractive deciduous tree that can reach 40'-60' tall. It is typically a multi-trunked tree. Spring foliage is rounded and reddish purple, changing to blue green in summer and then gold, red or orange in fall. Leaf litter in fall is considered aromatic as some describe it like cinnamon or burnt sugar. Small flowers do appear before spring foliage but are considered insignificant. This tree does well in full or part sun with well draining, moist, fertile soil. It does not tolerate drought when still growing. It can be used as a street or lawn tree.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Tree | Full, Half |  |
| HEIGHT RANGE | WATER |  |
| 40-60' | Medium, Extra in Summer |  |
| WIDTH RANGE | SOIL TYPE |  |
|  | Loam |  |
| FLOWER COLOR |  |  |
| n/a | SOIL CONDITION |  |
| FLOWER SEASON | Rich, Well-drained, Moist |  |
| FLOWER SEASON |  |  |
| n/a | GROWTH RATE |  |
| LEAF COLOR | Fast, Moderate |  |
| Green, Purple, Red | tolerances |  |
|  | $\mathrm{n} / \mathrm{a}$ |  |

## Designer Notes



## Cornus kousa

## Kousa or Japanese Dogwood

Cornus kousa is a deciduous tree that slowly grows $15^{\prime}-20$ tall and wide. Foliage is dark green on top and light green on bottom. In the fall, the leaves turn red. White flowers appear in spring followed by red fruit that resemble raspberries in late summer and early fall, attracting birds. The bark is smooth and light brown but will exfoliate when more mature, looking like a patchwork of tan and brown. Overall shape of tree is very attractive especially for mature trees, as the branches spread in a horizontal pattern. It likes well drained, loamy, moist, acidic soil. It likes half shade to full sun. It is not drought or heat tolerant. Falling fruit cause some litter. It is prone to some insects and disease especially dogwood canker.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Tree | Full, Half |  |
| HEIGHT RANGE | WATER |  |
| 12-25', 25-40' | Medium, Extra in Summer | \% |
| WIDTH RANGE | SOIL TYPE | Sensmon en. unviest. |
| 12-25', 25-40' | Loam |  |
| FLOWER COLOR | SOIL CONDITION |  |
| White | Rich, Well-drained, Moist | 2 |
| FLOWER SEASON | GROWTH RATE |  |
| Spring | Slow |  |
| LEAF COLOR | TOLERANCES |  |
| Dark Green, Light Green | Verticillium |  |

## Designer Notes



## Styrax japonicus

## Japanese Snowbell

Japanese Snowbell is a small deciduous tree that slowly grows from 20 to 30 feet in height and has rounded canopy with a horizontal branching pattern (Fig. 1). With lower branches removed, it forms a more vase-shaped patio-sized shade tree. The smooth, attractive bark has orange-brown interlacing fissures adding winter interest to any landscape. The white, bell-shaped, drooping flower clusters of Japanese Snowbell are quite showy in May to June.

| Anatomy | Culture | 3ava |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Tree | Full, Half |  |
| HEIGHT RANGE | WATER |  |
| 12-25', 25-40' | Medium |  |
| WIDTH RANGE | SOIL TYPE | \% |
| 6-12', 12-25' | Loam |  |
| FLOWER COLOR | SOIL CONDITION | 4, |
| White | Average |  |
| flower Season | GROWTH RATE |  |
| Spring | Moderate |  |
| LEAF COLOR | TOLERANCES | - |
| Green | n/a |  |

## Designer Notes



## Tilia cordata

## Littleleaf Linden

A large deciduous tree that can reach 30'-50' tall, Littleleaf Linden creates a dense pyramid that can be used as a screen. It blooms with white fragrant flowers. It does well in urban settings. Its cultivars are budded onto the understocks of the seedlings. Should the native soil be of a clay-like nature, then plant the tree high so as to allow for drainage. They combine well with bulbs, azaleas, Japanese Holly, and Burkwood viburnum.


## Designer Notes



## Zelkova serrata

## Sawleaf Zelkova

A moderately growing, deciduous tree, the Sawleaf Zelkova usually reaches a size 50'-60' high and as wide. Its 2"-3" leaves are elm-like, with a size that is $1 / 2^{\prime \prime}$ long and $1.5^{\prime \prime}$ wide. The fall foliage color ranges from yellow to red shades.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Tree | Full |  |
| HEIGHT RANGE | WATER |  |
| 25-40' | Medium |  |
| WIDTH RANGE | SOIL TYPE |  |
| 25-40' | Sandy, Clay, Loam, Rocky, |  |
|  | Unparticular |  |
| FLOWER COLOR |  |  |
| $\mathrm{n} / \mathrm{a}$ | SOIL CONDITION |  |
|  | Average, Poor | H1 worce |
| FLOWER SEASON |  |  |
| $\mathrm{n} / \mathrm{a}$ | growth rate |  |
|  | Fast |  |
| LEAF COLOR |  |  |
| Dark Green, Red, Yellow | tolerances |  |
|  | Heat, Windy Conditions, |  |
|  | Smog, Alkaline Soil |  |

## Designer Notes



## Berberis thunbergii 'Rose Glow'

## Rose Glow Barberry

A deciduous shrub (4-6' tall and wide) with bronze-red foliage that is mottled with pinkish cream coloring; it deepens to rose and bronze. Full sun is needed to develop the colors. Bright red berries appear in the fall. Each branch has long, sharp thorns so it forms a good barrier.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Shrub | Full | 3) 0 \% |
| HEIGHT RANGE | WATER |  |
| 3-6' | Very Low, Medium |  |
| WIDTH RANGE | SOIL TYPE |  |
| 1-3' | Sandy, Loam | ORNT |
| FLOWER COLOR | SOIL CONDITION |  |
| Yellow | Average, Rich, Poor, Welldrained |  |
| FLOWER SEASON |  |  |
| Spring | GROWTH RATE | -s, moser |
|  | Fast | +10t |
| LEAF COLOR |  |  |
| Red, Variegated | TOLERANCES |  |
|  | Heat, Smog, Rabbits |  |

## Designer Notes



## Choisya ternata

## Mexican Orange, Mex. Mock Orange

This evergreen shrub has glossy yellow-green leaves and produces clusters of white flowers that have a fragrance similar to that of orange blossoms. It makes an excellent informal hedge or screen. It requires full sun for growth and partial shade when grown in hot areas. It will need soil amendments if grown in alkaline soil or if water is high in salts.



## Cornus alba 'Elegantissima'

## Variegated Red Twig Dogwood

Growing to 6'-8' tall and 4'-6' wide, this deciduous shrub produces white fragrant flowers in late spring, which are followed by white berries that have blue or green tinges. Leaves are green with white margins. During winter, this shrub is outstanding with its red stems. It does best in full to part sun with regular watering and more during hot spells. Birds love this plant. Prune in late winter to get desired shape and refresh red stems.


## Designer Notes

This dogwood plant is best known for its leaf color as well as the color of its fall-winter wood color. This plant needs protection from the hot afternoon sun. Plant on the eastside of the house. This plant will not hold up to hot dry winds.


## Cornus sericea 'Kelseyi'

Kelsey's Dwarf Red-Osier Dogwood
A dwarf dogwood with a low, compact form and lush green foliage that perfectly foils less attractive bases of larger shrubs. Its neat, rounded shape works well in mass plantings and border foundations. Excellent for erosion control on steep slopes. Bare red stems provide striking seasonal color to dormant winterscapes. Deciduous. -Monrovia Nursery


## Designer Notes



## Euonymus alatus 'Compactus'

## Compact Burning Bush

The Euonymus 'Compactus' is really not that compact since it can grow to about 10'. So it is a large shrub with horizontal branching, reaching 10 ' tall and wide. Foliage is deciduous, dark green and fine-toothed. Yellow flowers bloom in spring followed by reddish purple fruit that hide under the foliage. While it may withstand heavy pruning, it is intolerant of water-logged and drought-inflicted soils. It tolerates full to part sun with well draining, moist soil, needing regular watering and more during hot summer months. It has stunning fall color with red "burning" leaves.


## Designer Notes



## Hemerocallis 'Stella de Oro'

## Stella de Oro Daylily

The most popular daylily around has 2.5 " diameter, sunny yellow blooms that appear during summer. This perennial may reach an overall height of $2.5^{\prime}$ tall. Encourage more blooming by removing spent flowers; this daylily may rest and rebloom up to 4 times, depending on conditions. Foliage is deciduous and attractive. New leaves appear in spring. This plant does best in areas with cool winters. It does not do well in coastal Southern California or Florida. It tolerates full sun but will appreciate afternoon shade in warm, inland areas. It does best with regular watering and more during hot spells. Established plants need only occasional watering. 'Stella de Oro' prefers well draining soil and a thick layer of mulch around the plants.



## Prunus laurocerasus 'Otto Luyken'

## Luykens Laurel

Otto Luyken Laurel is a dwarf form of English laurel growing to about 3' in height. This lush growing, compact, evergreen shrub offers year-round interest with glossy dark green leaves and showy, fragrant, creamy white flower spikes, followed by small black ornamental fruit. Dense foliage provides winter shelter for birds. This plant works well as a hedge, an accent plant or filler. It is shade tolerant.


## Designer Notes



## Rosa 'Radtko' KNOCK OUT

Double Red Knock Out® Rose
Single petals, just like the original, but in a beautiful shade of bright pink! Like the other members of the family, The Pink Knock Out® Rose is black spot resistant, drought-tolerant and self-cleaning. A perfect companion to other shrubs, roses and perennials

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN | 8 |
| Shrub | Full, Half |  |
| HEIGHT RANGE | WATER |  |
| 3-6' | Medium, Extra in Summer |  |
| WIDTH RANGE | SOIL TYPE | 1 |
| 3-6' | Loam |  |
| FLOWER COLOR | SOIL CONDITION | 8 |
| Red | Rich, Well-drained, Dry | Wद大\% |
| FLOWER SEASON | GROWTH RATE |  |
| Spring, Summer, Fall | Fast | - 1 is moctisctime. |
| leaf color | TOLERANCES |  |
| Dark Green | Heat |  |

## Designer Notes



## Sarcococca confusa

## Sweet Box

Sarcococca confusa, the sweet box, is a species of flowering plant in the family Buxaceae. It is an evergreen shrub growing to 7 ft tall by 3 ft broad, with glossy green ovate leaves and honey-scented white flowers in winter, followed by glossy black spherical fruits, 5 mm in diameter. It is a very adaptable and reliable shrub that is easily grown in many situations, including dense shade with very dry soil. It will however grow in full sun, even though the foliage appears to "bleach" a little. The soil should be kept damp if grown in sun or part shade. The shrub is midwinter flowering with a delightful sweet scent. The small black berries are eaten by birds which disperse the seeds

| Anatomy | Culture |
| :---: | :---: |
| PLANT TYPE | SUN |
| Shrub | Shade, Deep Shade |
| HEIGHT RANGE | WATER |
| 3-6', 6-12' | Low, Medium |
| WIDTH RANGE | SOIL TYPE |
| 1-3' | Loam |
| FLOWER COLOR | SOIL CONDITION |
| White | Rich, Well-drained |
| FLOWER SEASON | GROWTH RATE |
| Winter, Spring | Slow |
| LEAF COLOR | tolerances |
| Green | Deer |

## Designer Notes



## Spiraea japonica 'Anthony Waterer'

## Anthony Waterer Pink Spirea

This 'Anthony Waterer' is a broad shrub, growing 2'-3' with a flattop and dark, blue green leaves. The immature growth is a pinkish red color. From summer until early fall, the flowers are a deep carmine pink color. The pink color of the shrub's flowers makes a nice focal point, and the plant provides structure to a perennial border. It is presented well around lilacs.


## Designer Notes

After cutting this shrub to the ground in early spring, it will be able to rejuvenate every 3-4 years. Regular, seasonla pruning keeps the shrub bushy and neat. After leaves have emerged, the twiggy, dead wood should be removed.


## Viburnum pli. tom. 'Shasta'

## Shasta Doublefile Viburnum

This deciduous shrub reaches 4'-6' tall and 9'-12' wide. Attractive, white flowers that look like flat-topped clusters bloom in the spring and summer. Later in the season, flowers give way to large clusters of red berries which mature to a black color. Birds and wildlife love the fruit. Ovate, dark green leaves turn an attractive reddish purple in fall. This shrub likes full to partial sun (plant in shade in hot summer areas) and medium watering. It makes a nice hedge. It needs well-drained soil. It has a tiered horizontal branching habit with profuse white blooms in Spring. Compact habit - 6 feet tall and 11 feet wide

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN | C |
| Shrub | Full, Half | N |
| HEIGHT RANGE | WATER |  |
| 3-6' | Medium, Extra in Summer | (3) |
| WIDTH RANGE | SOIL TYPE | 4 a |
| 6-12' | Sandy, Loam |  |
| FLOWER COLOR | SOIL CONDITION | SFing. -a |
| White | Average, Rich, Welldrained |  |
| FLOWER SEASON |  |  |
| Spring, Summer | GROWTH RATE | , |
|  | Moderate | , |
| leaf color |  |  |
| Green | tolerances |  |
|  | n/a |  |

## Designer Notes



## Fragaria chiloensis

## Coastal Strawberry

This perennial, used as a ground cover, grows 1' high and 3' wide. It has tooth-edged, reddish green, evergreen leaves. Tiny white flowers with yellow centers appear in spring through early fall, followed by edible red fruit. This perennial can be used as a lawn replacement, in coastal areas as it tolerates sand and hot inland areas as long as it has afternoon shade. It needs regular watering. Birds love this plant.


## Designer Notes



## Rosa Flower Carpet Pink Supreme

Pink Supreme Carpet Rose
Flower Carpet® Pink Supreme is one of the NEXT GENERATION Flower Carpet® roses where refined breeding has produced improved heat \& humidity tolerance on top of its existing disease resistance. Masses of rich lipstick pink blooms cover the bush from late Spring to late Fall and even early Winter. Flower Carpet® Pink Supreme has rich glossy green foliage, on a bush which is more compact than the original Flower Carpet® Pink.


Designer Notes


## Rudbeckia f.s. 'Goldstrum'

## Blackeyed Susan

This cultivar is an eastern native, with long-lasting, golden daisy-like flowers with black cones. It should be placed under full sun or part sun and in average soil. The flowers are great for cutting and are abundant from July through September. Overall height of perennial is $2^{\prime}$ tall. Butterflies love this plant. Cut spent flowers to encourage more blooming.


Designer Notes


## Calamagrostis X acu. 'Karl Foerster'

## Karl Foerster Feather Reed Grass

This ornamental perennial grass grows 4-6' tall x 1-1.5' wide and has semi-evergreen foliage that is green in spring and summer and turns green/brown in fall. The flowers look like feathery plumes; they bloom in mid June and emerge a light green but quickly turn to pink/purple. Flowers look great in a dried flower arrangement. This grass does well in full sun but will tolerate afternoon shade in warm, inland valleys. It needs regular watering and fertile soil. Great for erosion control and in wet areas.


## Designer Notes



## Carex 'Bowles Golden'

## Bowles Golden Sedge

This sedge has bright gold foliage with thin green margins and is taller than most other sedges. It is an excellent choice as a highlight plant for a shade or water garden. 'Bowles Golden' is a moisture loving grass that needs to be constantly wet or moist to thrive


## Designer Notes



## Imperata cylindrica 'Rubra'

## Japanese Blood Grass

This groundcover/grass can slowly reach up to 1 ' tall and 18" wide. During spring, thin lime green blades of grass rise, with red tips. With warmer weather, blades turn completely red. During fall and winter, grass turns gray brown. This attractive and dramatic looking grass tolerates full to part sun, preferring moist, well draining soil. This plant looks great in containers, with rocks, in alpine gardens, in borders. It is dramatic when back lit.


## Designer Notes



## Pennisetum alo. 'Hamelin'

## Hamelin Dwarf Fountain Grass

More compact and shorter than the species, 'Hameln' has finely textured leaves that are especially lovely when backlit by the early morning or late afternoon sun. Soft, greenish-cream colored panicles begin to appear in midsummer, a few weeks earlier than the species. This grass works most effectively in mass plantings, but also can be used as an accent plant in gardens and in containers.

| Anatomy | Culture | $x=1$ |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Perennial, Grass | Full, Half |  |
| HEIGHT RANGE | WATER | s |
| 1-3' | Low, Medium | 3 |
| WIDTH RANGE | SOIL TYPE | 3 |
| 1-3' | Sandy, Clay, Loam, Rocky, |  |
|  | Unparticular | cu |
| FLOWER COLOR |  |  |
| White | SOIL CONDITION | +2y |
|  | Average |  |
| FLOWER SEASON |  |  |
| Summer, Fall | GROWTH RATE | 10\% |
|  | Fast | 2 |
| LEAF COLOR |  |  |
| Green | TOLERANCES |  |
|  | Windy Conditions |  |

## Designer Notes



## Rhododendron 'Nova Zembla'

## Nova Zembla Rhododendron

A popular and attractive broadleaf evergreen shrub with rich red flowers in spring and an upright rounded habit, quite hardy, good in partial shade; absolutely must have well-drained, highly acidic and organic soil, use plenty of peat moss when planting. Nova Zembla Rhododendron is draped in stunning clusters of crimson trumpet-shaped flowers with dark red spots at the ends of the branches in mid spring. It has green foliage. The large narrow leaves remain green throughout the winter.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN |  |
| Broadleaf Evergreen, Shrub | Full, Half, Shade |  |
| HEIGHT RANGE | WATER |  |
| 6-12' | Medium, Extra in Summer |  |
| WIDTH RANGE | SOIL TYPE |  |
| 6-12' | Sandy, Loam |  |
| FLOWER COLOR | SOIL CONDITION | - -1 |
| Red | Rich, Well-drained, Moist | $\bigcirc \mathrm{T}$ |
| FLOWER SEASON | GROWTH RATE | + -2 |
| Spring | Moderate |  |
| LEAF COLOR | tolerances |  |
| Dark Green | n/a |  |



## Calocedrus decurrens

## Incense Cedar

The Cedar is an attractive, stiff, narrow evergreen tree which has a columnar growing pattern and maintains a central leader. The foliage is aromatic, dark green and needle-like, while the coarse bark has an attractive cinnamon red-brown coloring. The cedar retains its color in winter and under good cultural conditons, will maintain its foliage to the ground. It grows slowly to about 30' tall and $8^{\prime}-12^{\prime}$ wide. Brown cones are on the tree most of the year, attracting birds for the seeds.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN | -6. ${ }^{\text {a }}$ |
| Tree, Conifer | Full, Half |  |
| HEIGHT RANGE | WATER | $15 \%$ a |
| 25-40' | Very Low, Low | \% |
| WIDTH RANGE | SOIL TYPE |  |
| 12-25', 25-40' | Sandy, Clay, Loam, Rocky, Unparticular |  |
| FLOWER COLOR |  |  |
| n/a | SOIL CONDITION | \% |
|  | Average, Rich, Poor, Well- |  |
| FLOWER SEASON | drained, Moist, Dry |  |
| n/a |  |  |
|  | GROWTH RATE |  |
| LEAF COLOR | Slow |  |
| Dark Green |  |  |
|  | tolerances |  |
|  | Heat, Windy Conditions, |  |
|  | Smog, Oak Root Fungus, |  |
|  | Wet Conditions |  |

## Designer Notes



## Chamaecyparis lawsoniana

## Port Orford Cedar

Port Orford Cedar is a handsome pyramid shaped tree to 60' tall. Drooping tips of the wide branches give this elegant tree a pendulate appearance. This plant also comes in many cultivar forms, including dwarf cultivars. Foliage is evergreen, blue green and flattened with a fern-like appearance. Mature trunk becomes furrowed and reddish brown. Flowers and fruit are inconspicuous. This tree does best in full sun with well draining, moist soil. It does not tolerate clay soil and windy areas. It can be grown in containers for bonsai.

| Anatomy | Culture |  |
| :---: | :---: | :---: |
| PLANT TYPE | SUN | gixagy |
| Tree, Conifer | Full | mesencat |
| HEIGHT RANGE | WATER | 3 |
| 40-60', 60-100' | Medium, Extra in Summer |  |
| WIDTH RANGE | SOIL TYPE | - inder washentriv |
|  | Loam | - 3 , ava |
| FLOWER COLOR |  | max |
| n/a | SOIL CONDITION | 7ext ap |
| FLOWER SEASON | Rich, Well-drained, Moist |  |
| n/a | GROWTH RATE |  |
| COLOR | Slow |  |
| Blue Green | TOLERANCES |  |
|  | Heat, Windy Conditions |  |

## Designer Notes



## Metasequoia glyptostroboides

## Dawn Redwood

The Metasequoia is a dense, pyramidal, deciduous conifer with a central leader, quickly reaching 70-90' tall and spreading 15-25'. It has an opposite branching pattern, with branchlets of long, simple needles that appear to be flattened. During the spring, its foliage is feathery, fern-like and light green, changing to dark green in summer, and bronzy red during fall. Its furrowed bark is attractive, orange-brown to red-brown and peels in vertical strips. This attractive tree needs space to grow, needs full sun with moist, even wet, rich, well draining soil. Also known as: Water Fir


## Designer Notes



## Thuja X plicata 'Excelsa'

## Excelsa Western Red Cedar

The Excelsa Western Red Cedar is a gorgeous fast-growing, full-bodied conifer that can reach up to 35 feet tall with a 20 ft spread. Its bright green fan-like foliage emits an unmistakable aroma loved by many. Excelsa is suitable for both urban and rural settings and acts as an excellent sound barrier and privacy screen. Thuja plicata and its cultivars are native to the Pacific Northwest and are thus well adapted to thrive in the region. This tree prefers full to partial sun with moist soils, although it can tolerate wet soils. Once established, it is tolerant of drought, clay soils, and urban pollution. -Plant Oregon


## Designer Notes



## Polystichum munitum

## Western Sword Fern

This Fern produces upright fronds, reaching 4'-5' tall in moist, cool forests in Northern California. This size is usually lower, especially without summer watering. It is great in containers or dry shade landscapes. This species is especially useful to give the illusion of lush, moist gardens where little water is actually being used. It should receive part shade to dense shade. -Monterey Bay Nursery

| Anatomy | Culture |
| :---: | :---: |
| PLANT TYPE | SUN |
| Fern | Half, Shade |
| HEIGHT RANGE | WATER |
| 1-3' | Medium |
| WIDTH RANGE | SOIL TYPE |
| 1-3' | Loam |
| FLOWER COLOR | SOIL CONDITION |
| n/a | Rich, Well-drained, Moist |
| FLOWER SEASON | GROWTH RATE |
| n/a | Moderate |
| LEAF COLOR | TOLERANCES |
| Dark Green | $\mathrm{n} / \mathrm{a}$ |

## Designer Notes

## EXHIBIT Q

## Department of State Lands

775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200

FAX (503) 378-4844
www.oregon.gov/dsl
State Land Board

Kate Brown
Governor

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State Treasurer

Re: WD \# 2020-0086 Approved
Wetland Delineation Report for the Views Clackamas County; T2S R5E S19 TL200 City of Sandy Local Wetland Inventory CC3, CC4

Dear Mr. Even and Mr. Moore:
The Department of State Lands has reviewed the wetland delineation report prepared by Schott \& Associates, Inc. for the site referenced above. Based upon the information presented in the report, we concur with the wetland and waterway boundaries as mapped in revised Figures $6 a$ and $6 b$ of the report. Please replace all copies of the preliminary wetland maps with these final Department-approved maps.

Within the study area, 2 wetlands (Wetland 1 and 2, totaling approximately 0.47 acres) and 2 streams (Stream 1 and 2) were identified. The wetlands and streams are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high-water line ( OHWL ) of the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined).

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Since measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction. Individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. If you have any questions, please contact Chris Stevenson, the Jurisdiction Coordinator for Clackamas County at (503) 986-5246.

Sincerely,


Peter Ryan, PWS
Aquatic Resource Specialist

## Enclosures

ec: Kim Biafora, Schott \& Associates
City of Sandy Planning Department (Maps enclosed for updating LWI) Jessica Menichino, Corps of Engineers
Anita Huffman, DSL

## WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

Fully completed and signed report cover forms and applicable fees are required before report review timelines are mitiated by the Department of State Lands Make checks payable to the Oregon Department of State Lands To pay fees by credit card go online at https//apps oregon gov/OSL/EPS/program $2 k e y=4$

Attach this completed and signed form to the front of an unbound report or include a hard copy with a digital version (single PDF file of the report cover form and report. minimum 300 dpi resolution) and submit to Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279. A single PDF of the completed cover from and report may be e-mailed to:

$$
\text { Wetland_Delineation@dsI.state.or.us For submittal of PDF files larger than } 10 \mathrm{MB} \text {. e-mall DSL instructions on how to access the }
$$ file from your ftp or other file sharing website.

| Contact and Authorization Information |  |  |  |
| :---: | :---: | :---: | :---: |
| $\square$ Applicant $\square$ Owner Name. Firm and Address: Mac Even. Even Better Homes Inc PO Box 2021 Gresham. Oregon 97030 |  | Business phone \# (503) 348-5602 <br> Mobile phone \# (optional) <br> E-mail mac@evenbetterhomes com |  |
| $\boxed{X}$ Authorized Legal Agent, Name and Address (if different) Business phone \# (503) 668-3151 <br> Ray Moore, All County Surveyors \& Planners, Inc Mobile phone \# (optional) <br> PO Box 955 E-mail raym@allcountysurveyors com <br> Sandy, Oregon 97055  |  |  |  |
| Typed/Printed Name: Mac Even $\qquad$ Signature: <br> Date: 2/17/2020 <br> Special instructions regarding site access: |  |  |  |
| Project and Site Information |  |  |  |
| Project Name: The Views |  | Latitude: $45386736^{\circ} \quad$ Longitude $-122.232202^{\circ}$decimal degree - centroid of site or start \& end points of linear project |  |
| Proposed Use: Residential development |  | Tax Map \#25E19 Tax Lot(s) 200 |  |
|  |  | Tax Map \# Tax Lot(s) |  |
| Project Street Address (or other descriptive location) 41717 Hwy 26 |  | Township 2S Range 5E Section $19 \quad$ QQ NE/NEUse separate sheet for additional tax and location information |  |
| City Sandy County Clackamas Waterway: $n / a \quad$ River Mile: n/a <br> Wetland Delineation Information  <br> W  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Primary Contact for report review and site access is $\square$ Consultant $\square$ Applicant/Owner $\boxtimes$ Authorized Agent |  |  |  |
| Wetland/Waters Present? $\quad$ Yes $\square$ No ${ }^{\text {S }}$ | Study Ar | Area size: 23.24 Tota | etland Acreage 0.4700 |
| Check Applicable Boxes Below |  |  |  |
| R-F permit application submitted Mitigation bank site Industrial Land Certification Program Site Wetland restoration/enhancement project (not mitigation) <br> $\boxed{\square}$ Previous delineation/application on parcel <br> If known, previous DSL \# WD2014-0465 |  | Fee payment submitted \$ $\qquad$ Fee (\$100) for resubmittal of rejected report Request for Reissuance See eligibility criteria (no fee) <br> DSL \# $\qquad$ Expiration date $\qquad$ <br> $\boxed{\text { LWI shows wetlands or waters on parcel }}$ Wetland ID code CC-3 CC-4 |  |
| For Office Use Only |  |  |  |
|  |  |  |  |



Date: 1/27/2020
Figure 1. Location Map

0



Date: 1/27/2020
Data Source: ESRI, 20120; Clackamas County GIS Dept., 2019; USFWS, NWI, 2019; ODF, 2019

Figure 2. Clackamas County Tax Map 2S5E19

The Views Project Site: S\&A \#2748


Mapping Method and Precision Statement: The mapped areas were based on indicators of OHWM as well as vegetation, soils, and hydrology data gathered in the field by Schott \& Associates. The sample plots and feature boundaries were recorded utilizing aTrimble Geo XT hand-held unit and post-processed to a +/- 3 foot accuracy. The GPS data were then imported into ArcGIS software to produce maps.

## Legend

| $\square$ | Study Site Tax Lot <br> Boundary: 23.24 acres |  |
| ---: | ---: | :--- |
| Wetlands: 0.47 acre | Contours: 5-ft. Interval |  |
| Whoto Points |  |  |
| Stream OHWM: 0.04 | $\otimes$ | Sample Plots |
| acre |  | Feature Continues <br> Offsite |

Offsite

Date: 1/28/2020
1 inch $=125$ feet
Data Source: ESRI, 2020; Clackamas GIS
Dept., 2019; USGS, NED, 2011

DSL WD \# 2020-0086
Approval Issued 4/15/2020
Approval Expires 4/15/2025

The Views Project Site: S\&A \#2748

Figure 6b. Wetland Delineation
Map - Detail

## WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

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\text { Wetland_Delineation@dsI.state.or.us For submittal of PDF files larger than } 10 \mathrm{MB} \text {. e-mall DSL instructions on how to access the }
$$ file from your ftp or other file sharing website.



## EXHIBIT R

## The Views PD Sound Wall Details

The applicant proposes using a Verti-Crete (https:// verti-crete.com) wall system for the sound wall along Highway 26 in the Upper Views. The wall panels have a ledge stone finish on both sides and the posts are Ashlar finished. The applicant proposes installing a six foot tall wall. The posts are 20 -inch $\times 20$-inches. The posts and panels come to the site in a concrete gray color and are stained in the field after the wall is installed. The applicant proposes staining the wall "Nutmeg" from the attached color chart.


Color Chart

Colors


Khaki Bronze


Sepia


Plum


Heather Grey


Limestone


Beige


Chestnut


Taupe


Stonewall


Sunset


Washed Suede


Western Cedar


Brick Red


Deep Grey


Harvest Gold


Smokey Beige


Cocoa Brown


Island Spruce


Charcoal


Nutmeg


Terra Cotta


Dark Walnut


Blue Slate


Wrought Iron


- Interior \& exterior use
- Easy soap-and-water cleanup
- Available in a variety of premixed and tintable colors


## H\&C ${ }^{\circledR}$ COLORTOP™ <br> WATER-BASED SOLID COLOR CONCRETE STAIN

- Satin finish


## PRODUCT DESCRIPTION

H\&C ${ }^{\circledR}$ COLORTOP ${ }^{\text {TM }}$ Water-Based Solid Color Concrete Stain is a water-based stain that provides a long-lasting, durable and decorative finish to interior or exterior concrete, masonry, or asphalt surfaces.

* H\&C ${ }^{\oplus}$ COLORTOP ${ }^{\text {M }}$ Water-Based Solid Color Concrete Stain is formerly known as H\&C ${ }^{\circledR}$ Concrete Stain Solid Color Water-Based.


## FEATURES \& BENEFITS

- Provides a durable finish that extends the life of concrete and masonry surfaces
- Highly resistant to pool chemicals and many other household chemicals for long lasting beauty and protection
- Water-Based formulation allows for easier application and clean-up
- Can be applied to previously painted surfaces with proper preparation


## RECOMMENDED USES

H\&C ${ }^{\circledR}$ COLORTOP ${ }^{\text {™ }}$ Water-Based Solid Color Concrete Stain is formulated for use on concrete, masonry and asphalt. It can be used on both interior and exterior surfaces including walkways, patios, pool decks, basement floors, and block and stucco walls.

## COVERAGE RATES

| Substrate* | sq ft/gal |
| :--- | :--- |
| Concrete floors | $200-300$ |
| Porous concrete | $150-250$ |
| Concrete block | $100-150$ |
| Split-faced block | $75-125$ |
| Fluted block | $50-100$ |
| Brick (clay) | $100-150$ |
| Asphalt | $200-250$ |
|  |  |
| *Coverage will vary depending on the porosity and texture of the substrate. |  |

## JOBSITE TEST SECTION

Due to the wide variety of substrates, preparation methods, application methods and environments, it is important to test the product in an inconspicuous spot for adhesion and compatibility prior to full-scale application.

## LIMITATIONS

Do not use on wood surfaces.

## SURFACE PREPARATION

New Concrete: Allow new concrete to cure at least 28 days. Concrete surfaces should be able to absorb water. To test absorption, spray various sections of the surface to be stained with water. If the water does not absorb rapidly, then acid etch the surface using $\mathrm{H} \& \mathrm{C}^{\text {TM }}$ CONCRETEREADY ${ }^{\text {TM }}$ Etching Solution, following label instructions. After proper etching, the surface should feel like 120-grit sandpaper. If not, then etch again. Mechanical abrasion methods may be necessary to achieve proper profile. Do not apply the stain until all surfaces are porous. Allow all surfaces to dry at least 24 hours before staining. Prepared concrete must have a pH of 6 to 10.

Existing and Previously Painted Concrete: All concrete must be porous, clean, dry and free of grease, oil and other contaminates. To spot clean, use $\mathrm{H} \& \mathrm{C}^{\text {TM }}$ CONCRETEREADY ${ }^{\text {™ }}$ Cleaner Degreaser, following label directions. If mold, mildew, or fungus is present, kill and remove with a solution of 1 cup household bleach to 1 gallon of water. If surface has been previously painted, remove all old, peeling, flaking paint by rough sanding to ensure adhesion of $\mathrm{H} \& \mathrm{C}^{\circledR}$ COLORTOP ${ }^{\text {m }}$. Rinse away sanding dust before stain application.* DO NOT ETCH PREVIOUSLY PAINTED SURFACES.
*WARNING: Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. To avoid exposure to lead dust, wear proper protective equipment, such as a properly fitted respirator (NIOSH approved) and follow proper containment and cleanup procedures. For more information, call the National Lead Information Center at 1-800-424-LEAD (in U.S.) or contact your local health authority.

Garage Floors and Driveways: Proper surface preparation is crucial for garage floors and driveways. For garage floors, apply H\&C ${ }^{\circledR}$ SHIELD-CRETE Water-Based Epoxy Garage Floor Coating. On driveways, use H\&C ${ }^{\circledR}$ COLORTOP ${ }^{\text {™ }}$ Solvent-Based Solid Color Concrete Sealer.

Asphalt: Asphalt surfaces must be free of grease, oil, dirt, wax, and other surface contaminates. Scrub with a solvent-free cleaner, following label directions. Do not etch asphalt. Not recommended for use on freshly sealed asphalt.

Repair: For the best repair on vertical and horizontal concrete and masonry surfaces, use H\&C ${ }^{\text {TM }}$ CONCRETEREADY ${ }^{\text {TM }}$ Quick Patch and Repair to fill low spots and spalled concrete. Please note that patching compounds will generally be visible through clear coatings.

H\&C Products Group
101 W. Prospect Avenue
Cleveland, Ohio 44115

Technical Service 1.800.867.8246
www.hcconcrete.com

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TOOLS REQUIRED
Brush: Use nylon or polyester paint brushes.
Roller: Use a solvent-resistant soft woven roller (3/8- to $1 / 2$-inch nap).
Airless sprayer: Pressure 1500 psi; tip .013 to .017 inch.
Conventional sprayer: Air pressure $30-50$ psi; fluid pressure 15-20 psi; cap/tip 704/FX or equivalent.
HVLP: Cap/needle Titan \#3 or equivalent.
NOTE: Back rolling is recommended after spraying.
APPLICATION INSTRUCTIONS
Apply H\&C ${ }^{\oplus}$ COLORTOP ${ }^{\text {TM }}$ Water-Based Solid Color Concrete Stain onto dry surfaces only. Moisture content should not exceed $3 \mathrm{lbs} / 1,000$ sq. ft. of surface (ASTM F710). Air, surface and material temperatures must be between $50^{\circ}$ and $90^{\circ} \mathrm{F}$ and at least $5^{\circ} \mathrm{F}$ above the dew point during and for 24 hours after application. Do not apply H\&C ${ }^{\oplus}$ COLORTOP ${ }^{\text {TM }}$ WaterBased if rain is expected within 12 hours following application. A minimum of two coats are required.

How to Apply: Apply with a brush, roller, or sprayer. Stir product thoroughly before and during application. When using more than one container, intermix all containers together to ensure color uniformity. Prior to applying the first coat, dry sweep the concrete with a stiff broom or shop vacuum to remove all loose surface contaminants.

First Coat: Apply first coat evenly, working in one direction. Allow to dry at least 2 hours before applying the second coat.

Second Coat: For best coverage, apply the second coat perpendicular to the first coat. Two coats of $\mathrm{H} \& \mathrm{C}^{\circledR}$ COLORTOP ${ }^{\text {TM }}$ Water-Based Solid Color Concrete Stain are usually sufficient. However, extremely porous surfaces may require a third coat for a uniform appearance. Allow 2 hours of dry time between coats.

## SLIP RESISTANCE

Some surfaces such as inclined driveways, garage floors, steps and patios may require a slip-resistant additive for safety. Add H\&C ${ }^{\circledR}$ SHARKGRIP® Slip-Resistant Additive to the final coat, following label directions. This product should not be used in place of a nonskid finish.

## CLEANUP

Clean tools and any spills or spatters immediately using soap and warm water.

DISPOSAL
Follow your state or local regulations for disposal methods.

PHYSICAL PROPERTIES

| Typical Physical Properties and Characteristics |  |  |
| :---: | :---: | :---: |
| Property | Test Method | Value |
| Dry Time (@ $77^{\circ} \mathrm{F}, 50 \% \mathrm{RH}$ ) | Dry-to-touch | 30 minutes |
|  | Light traffic (foot) | 2 hours |
|  | Heavy traffic | 72-96 hours |
|  | Recoat | 2 hours |
|  | Full cure | 7-14 days |
| Flash Point | ASTM D93, PMCC | 499 deg. F. |
| VOC | EPA Method 24 | <224 g/L; $1.87 \mathrm{lb} / \mathrm{gal}^{*}$ |
| Static Coefficient of Friction | ANSI/NFSI B1011-2007 | 0.9 |
| Water-Vapor Transmission | ASTM D1653, Method A | $\begin{gathered} 5.21 \pm 0.12 \text { grains } / \mathrm{sq} \\ \mathrm{ft} / \mathrm{hr} \end{gathered}$ |
| Perm Rating | ASTM D1653 | $\begin{gathered} 11.2 \pm 0.3 \text { grains } /\left(\mathrm{hr} \mathrm{ft}^{2}\right. \\ \text { in } \mathrm{Hg} \text { ) } \end{gathered}$ |
| Accelerated Weathering | ASTM G154 <br> Color change | 3,000 hrs., no effect Delta E = 0.35 |
| Wind-Driven Rain Resistance | Rilem Tube Method \#11.4 | Zero water penetration after 60 mins. exposure |
| Salt Spray Resistance | ASTM B117 | No film defect after 500 hrs . exposure |
| Chemical Resistance | - $10 \%$ sodium hydroxide <br> - $10 \%$ ammonium hydroxide <br> - Mineral spirits (KB value 38) | No softening or color change |
| Sulfide Staining Resistance | ASTM D1712 | No change after 15 mins. |
| Chloride Ion Penetration | AASHTO T 259/T 260 | Reduction of 54\% @ 0.0625-0.5"penetration, 83\% @ 0.51.0"penetration, 36\% @ 1.0-1.5"penetration |
| Impact Resistance <br> (6 inch-pounds direct impact) | Fed. Std. 141A Method 2051 ASTM D2794 | No film chipping |
| Abrasion Resistance | ASTM D968 | >2,000 liters of sand |
| Flexibility <br> (1-inch-diameter mandrel) | ASTM D522 Method B | No cracking or breaking |
| Scrub-Resistance Testing | ASTM D2486 | 1,200 cycles, no failure |
| Adhesion Testing | ASTM 3359 <br> - Method A X-cut tape test <br> - Method B crosscut tape test | No film loss; Classification 5A <br> Less than 5\% removed; Classification 4B |
| Reflectance of White | ASTM E1331 | 86\% $\pm 3 \%$ |
| Color \& Gloss Retention | ASTM G90 | Color: Less than 0.30 change Sheen: 0.5 difference <br> @ $60^{\circ}$ |
| Sheen (pigmented \& clear) | ASTM D523 | Low luster < 35 |
| Volume Solids Pigmented: <br> Solids by Weight <br> Solids by Volume <br> Volume Solids Clear: <br> Solids by Weight <br> Solids by Volume | ASTM D2832 | $\begin{gathered} 43 \% \pm 2 \%^{*} \\ 30 \% \pm 2 \%^{*} \\ \\ 22 \% \\ 19 \% \end{gathered}$ |
| Weight per Gallon | ASTM D1475 | 10 lbs * |

H\&C Products Group
101 W. Prospect Avenue
Cleveland, Ohio 44115

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| MAINTENANCE |  |
| :---: | :---: |
| Surfaces treated with H\&C ${ }^{\circledR}$ COLORTOP ${ }^{\text {™ }}$ Water-Based are easily cleaned using 3 parts water to 1 part $\mathrm{H} \& \mathrm{C}^{\text {TM }}$ |  |
| CONCRETEREADY ${ }^{\text {™ }}$ Cleaner Degreaser. |  |
| ORDERING INFORMATION |  |
| Clear | Part Number/SMIS |
| 1 gallon | 20.001204/163-2702 |
| 5 gallons | 20.001205/163-2710 |
| Extra White | Part Number/SMIS |
| 1 gallon | 20.101214/6507-11450 |
| 5 gallons | 20.101215/6507-11468 |
| Deep Base | Part Number/SMIS |
| 1 gallon | 20.102214/6507-11633 |
| 5 gallons | 20.102215/6507-11641 |
| Ultra Deep | Part Number/SMIS |
| 1 gallon | 20.103214/6507-11690 |
| 5 gallons | 20.103215/6507-11708 |
| Bombay | Part Number/SMIS |
| 1 gallon | 20.101254/6507-11492 |
| 5 gallons | 20.101255/6507-11500 |
| Sandstone | Part Number/SMIS |
| 1 gallon | 20.101324/6507-11559 |
| Terracotta | Part Number/SMIS |
| 1 gallon | 20.101354/6507-11575 |
| 5 gallons | 20.101255/6507-11583 |
| Tile Red | Part Number/SMIS |
| 1 gallon | 20.101364/6507-11591 |
| 5 gallons | 20.101365/6507-11609 |
| Pearl Gray | Part Number/SMIS |
| 1 gallon | 20.101314/6507-11534 |
| 5 gallons | 20.101314/6507-11542 |
| Gull Gray | Part Number/SMIS |
| 1 gallon | 20.101284/6507-11518 |
| 5 gallons | 20.101285/6507-11526 |
| Silver Gray | Part Number/SMIS |
| 1 gallon | 20.101344/6507-11567 |
| Black | Part Number/SMIS |
| 1 gallon | 20.101224/6507-11476 |
| 5 gallons | 20.10225/6507-11484 |

## CAUTION

CAUTIONS: CONTAINS CRYSTALLINE SILICA. Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Adequate ventilation required when sanding or abrading the dried film. If adequate ventilation cannot be provided wear an approved particulate respirator (NIOSH approved). Follow respirator manufacturer's directions for respirator use. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.
FIRST AID: In case of eye contact, fl ush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. DELAYED EFFECTS FROM
LONG TERM OVEREXPOSURE. Abrading or sanding of the dry fi Im may release crystalline silica which has been shown to cause lung damage and cancer under long term exposure.
WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.

## LIMITED WARRANTY

Seller's and manufacturers only obligations shall be to replace such quantity of product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising from the applicator's inability to use the product for his/her intended use. The user assumes all risk and liability.

## TECHNICAL SERVICES

The information and recommendations set forth in this product data sheet are based on tests conducted by or on behalf of H\&C® Products Group and The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your $\mathrm{H} \mathrm{\& C}{ }^{\circledR}$ or Sherwin-Williams representative to obtain the most recent product data sheet.

For technical assistance, call 1-800-867-8246 or visit www.hcconcrete.com.

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## EXHIBIT S

## REPLINGER \& ASSOCIATES LLC

TRANSPORTATION ENGINEERING

September 14, 2020

Ms. Shelley Denison
City of Sandy
39250 Pioneer Blvd.
Sandy, OR 97055

## SUBJECT: REVIEW OF TRANSPORTATION IMPACT STUDY - THE VIEWS SUBDIVISION

Dear Shelley:
In response to your request, I have reviewed materials submitted in support of The Views subdivision on SE Vista Loop in the east part of Sandy. The Transportation Impact Study (TIS), dated June 15, 2020 was prepared under the direction of Michael Ard, PE of Ard Engineering.

The TIS describes a proposal to subdivide the properties and construct 168 dwelling units consisting of 48 apartments, 32 units in four-plex buildings and 88 single-family homes. The development is on the north side of US 26 abutting SE Vista Loop. Some of the development is proposed on the east side of SE Vista Loop; some is proposed on the west side of Vista Loop. Access will be on SE Vista Loop. Three new access points on SE Vista Loop are proposed: two serving the development on the west side of SE Vista Loop and one serving the development on the east side of Vista Loop.

## Overall

I find the TIS addresses the city's requirements and provides an adequate basis to evaluate impacts of the proposed development.

## Comments

1. Study Area. The study addresses the appropriate intersections. It includes analyses of:

- Highway 26 at SE Vista Loop (west)
- Highway 26 at SE Vista Loop (east)
- SE Vista Loop at Ortiz Street Site Access
- SE Vista Loop at S Knapp Site Access
- SE Vista Loop at Picking Site Access

2. Traffic Counts. The AM and PM peak hour traffic counts were conducted during March 2019 for US 26 at SE Vista Loop (west) and in July 2019 for US 26 at SE Vista Loop (east). The engineer adjusted the traffic counts to account for seasonal variations. The engineer used a combination approach to account for seasonal variation of recreational traffic and separately for commuter traffic. The methodology appears consistent with the procedures defined by the Oregon Department of Transportation (ODOT). The adjusted counts appear reasonable.
3. Trip Generation. The TIS uses trip generation for single-family dwellings and multifamily dwellings (land use code 210 and 220, respectively) from the Institute of Transportation Engineers' (ITE) Trip Generation Manual. The engineer calculates that the subdivision would produce 109 total AM peak hour trips; 136 total PM peak hour trips; and 1564 total daily trips.

The engineer also calculated trips based on the underlying zoning using single-family dwellings based on 152 single-family dwellings. The trip generation of the proposed development is not significantly different from the 152 single-family dwellings. Slightly lower trips would be generated during the AM and PM peak hours and slightly more for a daily total. The engineer concludes the trip generation will not be significantly different than under the existing zoning. I concur.

The calculation of trips generated by the development appears reasonable.
4. Trip Distribution. The TIS provided information about trip distribution from the site. The engineer assumed 85 percent of the traffic would travel to and from the northwest on Highway 26 and 15 percent would travel to and from the southeast on Highway 26. The engineer notes that a future connection of Dubarko Road on the southwest side of Highway 26 could alter trip distribution with an estimated 15 percent of trips using this future facility. The trip distribution seems reasonable.
5. Traffic Growth. The TIS uses a 1.93 percent annual increase for Highway 26 based on projected volumes at the west boundary of Sandy. For other facilities it uses a 2.0 percent annual growth rated background traffic growth. A development on the west side of US 26 at Dubarko Road was also included as an in-process development. These assumptions account for future traffic and appear reasonable.
6. Analysis. Traffic volumes were calculated for the intersections cited in \#1, above. Intersection level-of-service (LOS) and the volume-to-capacity (v/c) ratio were provided. All three existing intersections and the two new intersections are stop-controlled. The analyses were conducted for existing conditions, 2022 background conditions, and 2022 with the development.

The engineer calculates that the intersections of US 26 with Vista Loop (west) and Vista Loop (east) meet the v/c standards specified by ODOT for both the main highway and the minor street approaches under all scenarios. Delays may increase on the minor street approaches and could be most pronounced for minor street vehicles attempting to make left turns.

The operations at SE Vista Loop with Ortiz Street and with the two new proposed intersections on SE Vista Loop were determined to meet standards.

A queuing analysis was also undertaken to determine whether there would be any interference along SE Vista Loop with the new access points. The engineer calculated the queues would be short and that adequate storage distance was provided. I concur.
7. Crash Information. The TIA provides information on crashes for the most recent available five-year period. No crashes were reported at any of the subject intersections. The engineer did not recommend safety mitigations. I concur.
8. Site Plan and Access. The site plan provides for three access points. One would be opposite Ortiz Street; two would be new access points intersecting SE Vista Loop as Tintersections. The locations appear appropriate.
9. Sight Distance. The engineer analyzed sight distance at the intersection of SE Vista Loop and SE Ortiz Street and at the two new proposed access points. The engineer determined that sight distance in excess of 280 feet, the distance associated with 25 mph, could be achieved with vegetation removal at Ortiz Street and the other access serving the westerly part of the development. The proposed access serving the easterly part of the development is located 230 feet from the intersection of US 26 and SE Vista Loop, which is less than the desirable 280 feet. Based on a speed of 25 mph for traffic exiting westbound US 26 onto SE Vista Loop, the engineer calculated stopping sight distance to be 155 feet. Since the access is 230 feet from US 26, he determined stopping sight distance would be adequate for safe operation of the new site access.

The engineer recommended no mitigation for sight distance for any of the proposed site access points. I concur.
10. Left-Turn Lane and Signal Warrants. The TIA indicates that left turn lanes are provided on eastbound US 26 at SE Vista Loop (west) and SE Vista Loop (east).

The engineer indicates right-turn lane warrants for westbound traffic on US 26 are not met at the intersections with either SE Vista Loop (east) or SE Vista Loop (west).

Ms. Shelley Denison
September 14, 2020
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The engineer determined that turn lanes were not needed on SE Vista Loop for any of the access points serving this development.

Traffic signal warrants are not met for US 26 at either SE Vista Loop (west) or SE Vista Loop (east).
11. Conclusions and Recommendations. The engineer concludes that the intersections will meet ODOT operational standards for both the highway approaches on US 26 and the minor street approaches with or without the proposed development. Traffic signal warrants are not met for either intersection on Highway 26. The engineer recommends no mitigation for operations, sight distance or safety. I concur with his conclusions.

## Conclusion and Recommendations

Based on the information provided by the applicant, I find the TIS meets City requirements.
I recommend that that ODOT requirements and standards associated with frontage improvements where the development abuts US 26 be made conditions of approval for the development.

If you have any questions or need any further information concerning this review, please contact me at replinger-associates@comcast.net.

Sincerely,


John Replinger, PE
Principal
TheViewsTIS091420

## EXHIBIT T

September 14, 2020

Ms. Shelley Denison City of Sandy 39250 Pioneer Blvd. Sandy, OR 97055

## RE: CITY OF SANDY <br> THE VIEWS PUD (FILE NO. 20-028 SUB/TREE/FSH/PD) PRELIMINARY REVIEW

Dear Shelley:
We have reviewed the submittal preliminary plans and supporting documents for the above noted development and have the following comments:

1. A Geotechnical Engineering Report was not submitted with this application. Due to the site terrain, it is recommended that such a report be prepared addressing the in-situ site conditions and any future considerations being taken during the grading activities, utilities and home construction. The developer shall retain appropriate professional geotechnical services for observation of grading activities. The grading setbacks, drainage and terracing should comply with the Oregon Structural Specialty Code (OSSC) requirements. When the final grading is completed, a final report should be submitted to the City by the Geotechnical Engineer stating that adequate inspections and testing have been performed on the lots and all of the work is in compliance the OSSC.
2. We have reviewed the preliminary stormwater calculations that was provided with this submittal. The calculations are found to meet the water quality/quantity criteria as stated in the City of Sandy Development Code (SDC) 13.18 Standards and the 2016 City of Portland Stormwater Management Manual (SWMM) Standards, that were adopted by reference into the Sandy Development Code. However, a detailed final report stamped by a licensed professional shall be submitted for review with the final construction plans.
3. The detention ponds shall be constructed to meet the requirements of the 2016 City of Portland Stormwater Management Manual (SWWM) for landscaping section 2.4.1 and escape route, section 2.30.
4. The access to the detention shall be paved or all-weather surface to a minimum of 12foot in width as per the 2016 City of Portland Stormwater Management Manual (SWWM).

## Ms. Shelley Denison

September 14, 2020
Page 2
5. A Wetlands Report outlining the delineated wetlands/ high water level was not submitted with this application based on the National Wetland Inventory (NWI) or the Local Wetland Inventory (LWI). The report shall concur with by the State of Oregon Division of State Lands (ODSL) and the US Army Corps of Engineers (COE) and the Oregon Department of Fish and Wildlife.
6. FSH Overlay District line should be reviewed by the City of Sandy Planning Department in conformance with Sandy Municipal Code (SDC), section 17.60.
7. Traffic Impact Analysis was not submitted with this application. It is recommended that such a study be prepared and submitted to identify if any offsite improvements will be required as a result of this development.
8. US Hwy 26 is under the jurisdiction of the Oregon Department of Transportation (ODOT). We recommend a copy of the application and the preliminary plans be submitted to the Oregon Department of Transportation Development Section for review and comments for the required improvements along the site frontage.
9. All interior streets shall be constructed to local street standards (28-foot wide paved surface, curbs on both sides, 5 -foot planter strips and 5-foot wide sidewalks) in compliance with the City of Sandy Transportation System Plan (TSP), figure 12. The proposed 50 -foot right of way is adequate.
10. The proposed right of way width for The Views Drive and Bonnie Street don't meet the minimum right of way width requirement 50 feet as per the City of Sandy Transportation System Plan (TSP), figure 12. Sidewalk is also proposed to be on one side of the road which doesn't comply with the City Municipal Code and City public works standards.
11. The proposed cul-de-sacs curb radii aren't shown on the preliminary plans. The curb radii shall be a minimum of 48 feet measured to the face of the curb in conformance with Oregon Fire Code Metro Code Committee minimum requirements. A review by the Fire Department to confirm compliance will be recommended.
12. The cul de sac at the terminus of Bonnie street and the Public Alley has three street connections which makes the traffic movement slightly confusing. We recommend a raised island or a median be constructed at the center of the cul de sac.
13. Vista Loop Drive is classified in the City of Sandy Transportation System Plan (TSP), figure 5 as a collector street. Half Street improvements plus a minimum of 10 additional 10 feet of paved surface width shall be required including curb on one side, 5 -foot planter

Ms. Shelley Denison
September 14, 2020
Page 3
strips and 6-foot wide sidewalks along the entire plat boundary as per the City of Sandy Development Code, chapter 17.84. A structural section core will be required to determine if the existing section meets Crushed Base Equivalence (CBE) of 20 " for collector street.
14. The vertical design grade for landing at all the Tee intersections where controlled with "Stop" signs should be no greater than $8 \%$ for a minimum of 50 feet or two car lengths.
15. The preliminary plans are not clear if a 50-foot tangent is provided at the of the following intersections as per Sandy Municipal Code (SDC), section 17.84.50.H.5.c: Vista Loop Drive and The View Drive, Bonnie Street and Public Alley, The View Drive and Public Alley.
16. The developer's engineer should provide a profile design for a minimum of 200 feet at the terminus of Bonnie Street past the project boundary to ensure future grades can be met.
17. All ADA ramps shall be designed, inspected by the design engineer and constructed by the contractor to meet the most current PROWAG requirements.
18. All public sanitary sewer, waterline mains to be a minimum of 8-inches in diameter and a minimum of 12 -inches in diameter for storm drains and be extended to the plat boundaries where practical to provide future connections to adjoining properties. All utilities are extended to the plat boundary for future connections.

We have no concerns about the proceedings with this project subject to the above stated comments.

Very truly yours,
CURRAN-McLEOPINC.


Hassan A. Ibrahim, PE
cc: Mr. Mike Walker, City of Sandy

## EXHIBIT U

# SANDY FIRE DISTRICT NO. 72 Fire Prevention Division 

E-mail Memorandum

To: Shelley Denison
From: Gary Boyles
Date: September 15, 2020
Re: File 20-028 SUB/TREE/FSH/PD The Views PD (120-SFD and 48 MFD)

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 $\mathrm{B}, \mathrm{C}$ 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 upon building permit submittal.
2. Approved fire apparatus access roadways and an approved water supply for fire protection, either temporary or permanent, shall be installed and operational prior to any combustible construction or storage of combustible materials on site in accordance with OFC Chapter 33.
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. The address shall be plainly legible and visible from the road fronting the property
5. A key lock box or key switch for multi-family buildings and/or any gated access points will be required. Sandy Fire District NO. 72 uses KNOX brand key lock boxes. To order a KNOX lock box or KNOX key switch that is compatible with the Fire District, please visit the resources tab located on Sandy Fire's website (sandyfire.org) for ordering information.
6. In order to comply with the requirements for two remotely separated fire apparatus access roads, an emergency vehicle access easement and maintenance agreement (EVAE) will be required with the Johnson RV recreational vehicle business. The EVAE shall be deeded and recorded as a condition of approval and a copy provided to the Fire District. In lieu of an EVAE, an approved second means of access will not be required provided that ALL dwelling units in the Lower Views are equipped throughout with an approved automatic sprinkler system.
7. Regarding the three private drives in the Lower Views, a deeded and recorded access easement and maintenance agreement shall be deeded and recorded as a condition of approval and a copy provided to the Fire District.

## Fire Apparatus Access

1. Fire apparatus access roads shall be within 150 feet of all portions of the exterior wall of the first story of any building as measured by an approved route around the exterior of the building. An approved turnaround 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.
2. Dead end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround.
3. Dead-end streets in excess of 150 ft., resulting from a phased project or future development, are to be provided with an approved temporary turnaround.
4. For developments of one- and two-family dwellings where the number of dwelling units exceed 30 , or multiple-family residential projects where the number of dwelling units exceeds 100, at least two approved means of access shall be provided.
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. Multi-family buildings exceeding three stories or 30 feet in height shall have not fewer than two means of fire apparatus access for each building.
7. Multi-family 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.
8. Fire apparatus access roads shall have an unobstructed driving surface width of not less than 20 feet ( 26 feet when adjacent to a fire hydrants) and an unobstructed vertical clearance of 13 feet 6 inches.
9. When the vertical distance between the grade plane and the highest roof surface of any building 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.
10. 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). Documentation from a registered engineer that the final construction is in accordance with the requirements of the OFC may be requested.
11. 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.
12. The installation of security gates or barricades across a fire apparatus access road shall comply with the following:
a. Minimum unobstructed width shall be 16 -feet, or two 12 -foot sections with a center post or island.
b. Gates or barricades shall be set back a minimum of 30 feet from the intersecting roadway.
c. Gates shall be of the swinging or sliding type.
d. Electric gates shall be equipped with an approved means of emergency operation. A KNOX box or KNOX key switch may be required.
e. The security gates or barricades and the emergency operation shall be maintained in an operative condition at all times and replaced when defective.
13. 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. Fire apparatus access roads that are 20-26 feet wide require fire lane signs to be posted on both sides. Fire apparatus access roads that are more than 26 feet wide and less than 32 feet wide require fire lane signs to be posted on one side.
14. Streets and roads shall be identified with approved signs. Temporary signs shall be installed at each street intersection when construction of new roadways allows passage by vehicles.

## Firefighting Water Supplies

1. Approved vehicle access for fire fighting shall be provided to all construction or demolition sites. Vehicle access shall be provided to within 100 feet of temporary or permanent fire department connections. Vehicle access shall be provided by either temporary or permanent roads, capable of supporting vehicle loading under all weather conditions and maintained until permanent apparatus access roads are available in accordance with OFC Chapter 33.
2. 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 fireflow be less than $1,500 \mathrm{gpm}$ at 20 psi residual.

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4 \mid \mathrm{Page}
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3. The minimum available fire flow for one- and two-family dwellings served by a municipal water supply shall be $1,000 \mathrm{gpm}$ at 20 psi residual provided the fire area of the dwelling(s) does not exceed 3,600 square feet. For dwellings that exceed 3,600 square feet, the required fire-flow shall be determined in accordance with OFC Appendix B, Table B105.1(2).
4. 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.
5. For one- and two-family dwellings served by a municipal water system, all portions of the dwellings shall be located within 600 feet from a fire hydrant on a fire apparatus access road, as measured in an approved route that is approved by the fire code official.
6. For multi-family buildings served by a municipal water system where a portion of the building is more than 400 feet from a fire hydrant on a fire apparatus access road (600 feet for buildings equipped throughout with an approved automatic sprinkler system), as measured in an approved route around the exterior of the building, on-site fire hydrants and mains shall be provided.
7. Fire department connections (FDC) shall be located within 100 feet of a 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.
8. Prior to the start of combustible construction, required fire hydrants shall be operational and accessible.
9. 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. 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. The minimum number and distribution of fire hydrants shall be in accordance with City of Sandy requirements and OFC Appendix C.

## 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.

## TRANSMITTAL: FILE NO. 20-028 SUB/TREE/FSH/PD (THE VIEWS PD)

Shelley Denison [sdenison@ci.sandy.or.us](mailto:sdenison@ci.sandy.or.us)
To: Marisol Martinez [mmartinez@ci.sandy.or.us](mailto:mmartinez@ci.sandy.or.us)
Hey Marisol,
Go ahead and add Greg's email to 20-028 too. Thanks!
---------- Forwarded message $\qquad$
From: Greg Brewster [gbrewster@ci.sandy.or.us](mailto:gbrewster@ci.sandy.or.us)
Date: Wed, Sep 16, 2020 at 11:02 AM
Subject: Re: TRANSMITTAL: FILE NO. 20-028 SUB/TREE/FSH/PD (THE VIEWS PD)
To: Shelley Denison [sdenison@ci.sandy.or.us](mailto:sdenison@ci.sandy.or.us)

Shelley,
In regards to The Views, the only thing we need is a note stating that SandyNet shall receive a set of PGE utility plans to design and return a SandyNet broadband deployment plan. You can just direct it to gbrewster@ci.sandy.or.us for now.

Thanks,
Greg Brewster
[Quoted text hidden]
IT Director/SandyNet General Manager
City of Sandy/SandyNet
SandyNet: 503-668-2923
Desk Phone: 503-489-0937

Shelley Denison
Associate Planner
City of Sandy
Development Services Department
39250 Pioneer Blvd
Sandy, OR 97055
503-783-2587
sdenison@ci.sandy.or.us

Oregon
Kate Brown, Governor

Department of Transportation
Region 1 Headquarters
123 NW Flanders Street
Portland, Oregon 97209
(503) 731.8200

FAX (503) 731.8259

| Project Name: The Views Planned Development <br> (Vista Loop) | Applicant: Mac Even |
| :--- | :--- |
| Jurisdiction: City of Sandy | Jurisdiction Case \#: 20-028 <br> SUB/TREE/FSH/PD: |
| Site Address: 41717 Mt Hood Hwy (US 26), <br> Sandy, OR 97055 | Legal Description: 02S 05E 19 <br> Tax Lot(s): 00100 |
| State Highway: US 26 |  |

The site of this proposed land use action is adjacent 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. Please direct the applicant to the District Contact indicated below to determine permit requirements and obtain application information.

## COMMENTS/FINDINGS

The proposed land use notice is to construct 128 single family residential units and 48 multifamily units within the vicinity of the US 26/Vista Loop Drive intersection. The "Upper Views" site is located adjacent to the highway. ODOT has review the Traffic Impact Study prepared by Ard Engineering for the development. The development will increase the number of vehicles turning right onto Vista Loop Drive from the highway. The posted speed on the highway is 55 mph and vehicles making this turning movement must to slow down significantly to safely make the turn. Due to the high speed of through traffic, increasing the number of vehicles turning from the through lane onto Vista Loop Drive is a safety concern. In order to separate the right turning vehicles from the through movement, ODOT recommends that the city require the applicant to provide space for right turning vehicles to utilize while turning right onto Vista Loop Drive.
The city's Transportation System Plan (TSP) cross section for the highway includes a planter strip and a sidewalk. We recommend the city require frontage improvements along the "Upper Views" highway frontage consistent with the
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

## Frontage Improvements

$\boxtimes \quad$ The applicant shall install pedestrian improvements along the US 26 frontage consistent with the city's Transportation System Plan and ODOT/ADA standards.

Roadway Improvements
இ The applicant shall provide additional space on US 26 to accommodate westbound right turning vehicles from US 26 onto Vista Loop Drive.

## Permits and Agreements to Work in State Right of Way

$\boxtimes \quad$ An ODOT Permit to Occupy or Perform Operations Upon a State Highway shall be obtained for all work in the State highway right of way. When the total value of improvements within the ODOT right of way is estimated to be $\$ 100,000$ or more, an agreement with ODOT is required to address the ownership, maintenance, and operations of any improvements or alterations made in highway right of way. An Intergovernmental Agreement (IGA) is required for agreements involving local governments and a Cooperative Improvement Agreement (CIA) is required for private sector agreements. The agreement shall address the project standards that must be followed, compliance with ORS 276.071, which includes State of Oregon prevailing wage requirements, and any other ODOT requirements for project construction, including costs for ODOT staff time for project approvals, inspection, and completion. Application for ODOT Permit to Occupy or Perform Operations Upon a State Highway.

Note: If a CIA is required, it may take up to $\mathbf{6}$ months to process.

## 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.state.or.us

| Development Review Planner: Marah Danielson | 503.731 .8258, <br> marah.b.danielson@odot.state.or.us |
| :--- | :--- |
| Traffic Contact: Avi Tayar, P.E. | 503.731 .8221 <br> Abraham.tayar@odot.state.or.us |
| District Contact: Loretta Kieffer | 503.667 .7441 <br>  Loretta.L.KIEFFER@odot.state.or.us |

EXHIBIT X

## Transit

## Memorandum

Date: $\quad$ September 21, 2020
To: Kelly O'Neill, Planning Director
Shelly Denison, Associate Planner
From: Andi Howell, Transit Director
Re: Transit Amenities
The Views Subdivision

The proposed development will require a concrete bus shelter pad and a green bench (Fairweather model PL-3, powder-coated RAL6028). The required pad size is 7' x 9.5 ' and should be located at the entrance of the view Drive (see blue x for preferred location). Engineering specifications are available from the transit department.

If I can be of further assistance please contact me at 503-489-0925.

## 20-028 SUB/TREE/FSH/PD: The Views

Site Plan


# EXHIBIT Y 

MEMORANDUM

TO: Shelley Dennision, Associate Planner
FROM: Mike Walker, Public Works Director
RE: File 2020-028 The Views PD
DATE: November 6, 2020
The following are Public Works' comments on the above-referenced application:

## Utilities

There are two private storm drain lines crossing the proposed right of way of View Dr. These lines serve private developments to the south of the site. Private utility facilities serving single sites are not permitted in public rights of way. When the land use application for the private development south of the site was processed the City made it clear that the location of these lines would present a conflict if a public right-of-way was ever dedicated across these private lines.

The applicant has three options: 1) relocate these lines outside the public right-of-way; 2) Replace the existing lines with materials conforming to City standards or demonstrate that the pipeline materials comply with and were installed in conformance with City standards and dedicate these improvements as public; 3) Have the owner of the adjacent site served by these lines apply for a revocable permit to place private drainage facilities in a public right-of-way. Since the exact location relative to proposed improvements in the right-of-way is unknown at this time the City will determine the most suitable option during construction plan review.

The proposed public utility layout is provided solely to comply with the planned development submission requirements in section 17.64.90(B)2 Sandy Municipal Code (SMC). Approval of the land use application does not connote approval of the public improvement plans (which may be submitted and reviewed later) and shall not be considered as such.

## Transportation

The applicant shall improve all public street frontages (including the US 26 right-of-way, and the street frontage of Tracts H and O ) in conformance with the requirements of 17.84.30 and 17.84.50 SMC. Street frontage improvements include but are not limited to: street widening, curbs, sidewalks, storm drainage, street lighting and street trees. The applicant is not showing any street frontage improvements along US 26. The intent of providing an urban section (curbs, sidewalks, lighting, etc.) inside the city limits is to provide motorists with a visual cue that they are entering an urbanized area and to adjust their speed and alertness to match the visual cues. The area on both sides of US 26 is within the UBG and Urban Reserve so it will eventually become urbanized. It is a facile argument that speeds on US 26 make it unsafe to provide sidewalks in the adjacent right-of-way. If the highway right-of-way makes drivers aware that they are
entering a city (and in this case a neighborhood) they will adjust their speed to match the conditions. As the city grows and these areas become urbanized the posted speed limit will be lowered to match the conditions. This is the case at the west end of Sandy where US 26 is an arterial street instead of a rural highway. This is also the case east of the couplet where the speed limit drops from basic rule to 40 mph and then to 25 mph as one travels west.

The east-west alley shall be widened by 2 feet to provide the minimum 28 ft . required width. The mountable curb will only be permitted on the north (driveway) side of the alley, a Type $C$ (vertical) curb will be required on the parking side of the alley to prevent vehicles from parking on the curb. The shed section shown in the original submittal could create icing problems in an alley with a two-story dwellings on a northern exposure. A crown section will be required during construction plan review. Since the east-west alley functions as a local street as it is the sole means of vehicle access to the adjacent lots street lighting shall be required in the alley.

The various streets and public alleys shall include a minimum four-foot wide utility and sign easement on both sides to provide enough room for street name, traffic control and regulatory signage and utility pedestals, fire hydrants, water meters, etc.

The applicant has submitted a turning diagram demonstrating that there should be sufficient room for a 22 ft . long vehicle to back out of a driveway (with an adjacent parked car in the driveway) and into the public alley with cars parked on the opposite side of the alley in a single motion without any conflict. The garage face setback from the alley shall meet or exceed that shown in the turning diagram.

The proposed public sidewalks outside of the street right-of-way will require pedestrian scale bollard lighting conforming to the City's standards. Use of full-cutoff, Type II roadway distribution streetlights will not provide sufficient illumination for pedestrians where the sidewalk is set back so far from the street and obscured by trees. In lieu of this requirement the applicant shall submit a photometric design demonstrating that pedestrian lighting standards can be met in and along all pedestrian easements located outside of public rights-of-way with the proposed roadway illumination while still complying with section 15.30 SMC.

The applicant proposes extensive use of sidewalks located in easements as an alternative to the sidewalk and planter strip in the public right-of-way required in 17.84.30 SMC. The applicant proposes using a Homeowners Association to maintain sidewalks, planter strips and trees adjacent to public rights-of-way. The applicant shall submit a draft agreement between the City and the HOA detailing the minimum maintenance requirements and responsibilities including a means for the City to remedy any failure to meet the agreed-upon standards. The agreement shall be finalized and recorded prior to plat approval and referenced on the face of the plat.

Please let me know if you have any questions or need more information.

# EXHIBIT Z <br> PRE-APPLICATION CONFERENCE NOTES 

## Project Name: The Views PD

Pre-Application Conference Date: May 29, 2019
Address: 41717 HWY 26 (24E19 00200) Owner: Brad Picking
Address: No situs (24E19 00500) Owner: John Knapp
Applicant Name: Mac Even
Engineer Name: All County Surveyors and Planners
Staff: Kelly O’Neill Jr., Greg Brewster, Avi Tayar and Marah Danielson (ODOT)
Applicant Representatives: Tracy Brown, Mike Ard, Ray Moore, Dale Hult, G.W. Hartley

## PLANNING DEPARTMENT REVIEW

Sandy Development Code (SDC): Sandy Development Code (SDC) Sections 17.12 Procedures for Decision Making; 17.18 Processing Applications; 17.22 Notices; 17.26 Zoning Map Amendments; 17.30 Zoning Districts; 17.36 R-1 Low Density Residential Zoning District; 17.38 R-2 Medium Density Residential Zoning District; R-3 High Density Residential District; C-3 Village Commercial Zoning District; 17.66 Adjustments and Variances; 17.80 Additional Setbacks on Collectors; 17.82 Special Setbacks on Transit Streets; 17.84 Improvements Required with Development; 17.86 Parkland and Open Space; 17.90 Landscaping and Design Standards; 17.92 Landscaping and Screening; 17.98 Parking, Loading and Access Requirements; 17.100 Land Division; 17.102 Urban Forestry; and Chapter 15.30 Dark Sky.

Caveat: This analysis includes a review of those code sections that may conflict with the proposed design as submitted. 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 land use review.

## Amendments Needed for Proposal

- Comprehensive Map Amendment not needed (Single Family Residential (SFR) will remain)
- Zoning Map Amendment (SFR with PD Overlay), but Chapter 17.26 is not applicable
- Transportation Planning Rule (TPR) findings for the zoning map amendment are required.
- Variances/exceptions to code: setbacks, density, minimum average lot widths, dwelling types, block lengths, parking courts per block and block face, etc. Please list all of the variances/exceptions to the code in the narrative and explain why they are being requested. These will be evaluated by staff.
- Additional consideration to meet the 'outstanding PD Planning' is to provide a viewpoint of Mt. Hood along Park Street similar to the Jonsrud Viewpoint, but necessarily signed as a viewpoint from the highway so it doesn't trigger additional vehicle trips.
- Additional consideration to meet the 'outstanding PD Planning' is to provide a mix of affordable housing units and market rate housing units in the apartment buildings.
- Additional consideration to meet the 'outstanding PD Planning' is to provide a sound barrier wall along HWY 26 on the Knapp property for the lots abutting the ODOT right-of-way.
- Additional consideration to meet the 'outstanding PD Planning' is to make some or all of the townhouses compatible with recreational vehicles (RV). These buildings could be three-stories in height to separate the Johnson RV site better from the single-family home lots and to accommodate rear entry RV parking. Planning staff is not sure how to accommodate off-street single user vehicle parking and an RV, but this could be a unique idea and be of interest to a specific demographic.


## PD Process

- Conceptual Plan is reviewed by Planning Commission and then the decision on the proposal is decided by City Council. If adopted by City Council the PD designation is added to the zoning map.
- Detailed Development Plan is reviewed by Planning Commission and shall be submitted within 12 months of the Conceptual Plan approval. The detailed plan is essentially the subdivision plan and the tentative approval is valid for 24 months.
- Density is allowed to exceed 25 percent beyond the normal density for the zoning district, but is not allowed to be less than the minimum density of the base zoning district.
- A detailed building lot area plan will be required with the Conceptual Plan detailing setbacks and area remaining for structures.


## Parking Analysis

- No on-street parking will be permitted on Vista Loop Drive.
- Locations of the driveways should be identified for review (SDC 17.90.90.B.5).
- 2 off-street parking spaces per dwelling required (SDC 17.98.20) for single family homes and rowhouses.
- On-street parking plan shall be submitted for review. One space required for every dwelling unit within 200 feet of each lot (SDC 17.98.200).
- Parking Courts:
- Some of the proposed parking courts on the Knapp property seem to have inadequate distance to Vista Loop Drive.
- Some of the proposed blocks have multiple parking courts on a block face and more than two parking courts in a block.
- Several of the parking courts exceed the maximum vehicle parking allowed in a parking court (8 parking spaces is the maximum number allowed).
- Landscaping and fences in the parking courts to shield headlights and create an aesthetic buffer between parking courts and lots.
- Must adhere to Section 17.98.200(A)(6) and shall be publicly owned and maintained.
- With regards to the proposed multi-family dwelling development on Lots 70 and 120: 17.98 outlines the parking standards which includes location, design, minimum parking requirements, etc.


## Access and Utilities

- Frontage improvements along each proposed street frontage within the development is required per Public Works standards.
- Submit a traffic impact analysis (TIA). TIA should demonstrate that the maximum permitted density of the subject property can be accommodated including multi-family dwelling units. Will require $\$ 1,500$ for third party traffic consultant.
- Existing public sanitary sewer location is at Ortiz Street. Pump station needed for sanitary sewer?
- Vision clearance areas must remain unobstructed (SDC 17.74.30).
- Easements for public sanitary sewer, water, storm drain, pedestrian and bicycle facilities shall be provided whenever these facilities are located outside a public right-of-way.
- What is the plan with the existing fire emergency access on the Johnson RV property?
- VNAR is required along Vista Loop Drive for the Tracts and Lot 120. VNAR will also be required at the east terminus of Park Street and along the south line of the public alley along Johnson RV.
- Proposed Public Access Lane on the Picking property needs to adhere to standards in 17.100.160, including but not limited to the following:
- The proposed public access lane is 28 feet in width which meets the width requirements of a Type A lane. However, Lots 57 and 62 are located on the ends of the lane, not on single loaded in accordance with the standards of a Type A public access lane.
- Sidewalk can be curb tight and is required along the lot frontages.
- Street trees can be located on private property.
- Parking spaces in the public access lane shall be delineated.
- What is the plan for fire apparatus access into the public access lane?
- 17.100.110(E) recommends spacing of 8-10 local streets per mile (528-660 feet). With submitted plans detail the local street spacing.
- The proposed 28 foot and 30 foot wide alley's seem adequate in width, but if Johnson RV emergency access is maintained then turning templates for the alley are needed.
- Consolidate the driveway accesses on the cul-de-sacs.
- SandyNet. Conduit and vault infrastructure are required for all new developments. Please coordinate with SandyNet General manager for infrastructure requirements and design standards.

PreApplication Notes - The Views PD

## Other Planning Items

- Tracts H an G appear to have an error with path located on private property.
- Tracts L and T should be combined into one tract.
- Density Calculations based on base zoning district. SFR requires between 3 and 5.8 dwelling units per net acre of land.
- Refer to Density Calculations provided by applicant.
- Appears the total number of proposed dwelling units is 86 single family homes, 32 row houses, and 48 apartment units for a total of 166 dwelling units.
- According to applicant density calculations the net site area is 26.17 acres and the restricted development area is 6.635 acres for a unrestricted development area of 19.535 acres.
- $19.535 \times 3=59$ dwelling units
- $26.17 \times 5.8=152$ dwelling units
- 25 percent increase $=$ dwelling 190 units
- Section 17.80 .20 states any structure located on streets identified in the Transportation System Plan as an arterial or collector shall have a minimum setback of 20 feet measured from the property line. This applies to applicable front, rear and side yards.
- Orientation of the multifamily housing on Lot 120 will need to be reviewed.
- Blocks can't be greater than 400 feet unless justified by topographic, natural area, or other physical conditions. Blocks greater than 400 feet require a variance. Blocks greater than 600 feet require a pedestrian and bicycle access way (17.100.120.B).
- A geotechnical study will need to be done for any area at 25 percent slope or greater that is proposed to contain development.
- A wetland mitigation study will define restricted development areas on the site, which in turn will define tree retention requirements in those areas. Applicant responsible for researching and providing any communication from the appropriate agency regarding this element of the project.
- Tree retention at 3 trees per acre. Trees must be 11 " DBH or greater and in good health. Identify on the plans which trees are to be removed as well as retained.
- Multi-Family Dwelling proposal would need to be more detailed with site planning, proposed pedestrian connections, parking, design of buildings, etc. Another pre-application meeting to follow just based on the multi-family developments.
- Multi-Family Dwelling shared outdoor recreation area cannot overlap with open space or parkland dedication percentages.


## Parkland and Open Space

- A minimum of 25 percent of the development shall be open space.
- Any parkland dedications proposed need to be reviewed by the Parks and Trails Advisory Board and then the decision for dedication will be decided by City Council.
- Per SDC 17.86.10 Minimum Parkland Dedication Requirements the project would need to provide 1.93 acres $(69,696 \mathrm{SF})$ for parks
$(118 \times 3 \times .0043=1.5222$ rounded to 1.52 acres $)$ SF, Zero Lot line \& Duplex
( $48 \times 2 \times .0043=0.4128$ rounded to 0.41 acres ) Multifamily
- Section 17.86.40 details that Cash In-Lieu of Dedication is at the city's discretion. The cash in-lieu amount would be $\$ 241,000$ per acre or $\$ 265,000$ per acre if a portion of the in-lieu is paid at the individual building permit level.
- Land to be dedicated may need to be identified as Parks and Open Space (POS) and go through a Zone Map Amendment process (can possibly be done simultaneously with any proposed Zone Map Amendments needed for the project).
- Buildings and streets surrounding proposed parks would need to adhere to Section 17.86.20 design standards for layout.


## Transit Amenity

- The proposed development will require a transit amenity on Vista Loop Drive. The amenity required is a $5^{\prime}$ X $7.5^{\prime}$ bus shelter, which includes a bench, mounted on a 7 ' $\mathrm{X} 9.5^{\prime}$ pad. Discuss with Transit Director.

Application Process: Type IV PD Review, Type III SUB review, tree removal permit, FSH Overlay review. Need to determine process, cost, and scoping of TSP Modification.

## Projected Processing Steps:

- Submittal Requirements: Once a desired proposal is chosen staff will provide an accurate submittal list. In the meantime, see requirements lists on City of Sandy website. https://www.ci.sandy.or.us/Planning-Requirements/
- Fees as of May 29, 2019 subject to change: $\$ 4,275$ for Conceptual Planned Development plus $\$ 640.00$ (+ subdivision fees) for Detailed Development Plan; $\$ 3,210$ for Type III subdivision review plus $\$ 86$ per lot ( $\$ 10,320$ for 120 lots); $\$ 750$ for FSH Overlay review; $\$ 160$ for Tree Removal review; $\$ 1,500$ for Third Party traffic consultant. Other fees may be identified.
Does not include Design Review fees associated with Multi-Family Dwelling development.
- Staff review for completeness (30 days max.), if determined incomplete then the applicant submits additional information as required, staff then reviews for completeness again, if the application is deemed complete then the application is processed.


## EXHIBIT AA

## Re: The Views Application

Kelly O'Neill Jr. [koneill@ci.sandy.or.us](mailto:koneill@ci.sandy.or.us)
Wed, Sep 23, 2020 at 4:06 PM
To: "Robinson, Michael C." [MRobinson@schwabe.com](mailto:MRobinson@schwabe.com)
Cc: "David Doughman Esq." [david@gov-law.com](mailto:david@gov-law.com), Emily Meharg [emeharg@ci.sandy.or.us](mailto:emeharg@ci.sandy.or.us), Shelley Denison
[sdenison@ci.sandy.or.us](mailto:sdenison@ci.sandy.or.us), Marisol Martinez [mmartinez@ci.sandy.or.us](mailto:mmartinez@ci.sandy.or.us)
Thanks Mike.
Shelley and Marisol - This will need to be an exhibit.
On Wed, Sep 23, 2020 at 9:20 AM Robinson, Michael C. [MRobinson@schwabe.com](mailto:MRobinson@schwabe.com) wrote:

Good morning, Kelly. I represent the applicant and the applicant has authorized me to send this email and to extend the 120-day period.

I am writing to confirm our discussion this morning:

1. The applicant wants the application removed from the $9 / 28$ Sandy Planning Commission meeting agenda. You agreed to do so. You won't issue a public staff report this week.
2. You will place the application on the $11 / 23$ Sandy Planning Commission meeting agenda. This will require new public hearing notice on $11 / 3$ and, as we discussed, if a Sandy Comprehensive Plan Amendment is required, new pre-hearing notice to DLCD must be mailed by 10/19. The draft report must be available to the public by 11/16
3. Based on the above, the applicant will extend the 120-day period in ORS 227.278(1) by 56 days, the period of time between $9 / 28$ and 11/23.
4. You'll issue a draft staff report for the applicant's review this week and we'll contact you to schedule a call next week to review the issues identified in the staff report. Our goal is to agree on a path to resolve the outstanding issues so that you can recommend that the Planning Commission recommend approval of the application to the Sandy City Council.

Please let me know if you have any questions. Please confirm that you've received this email and that we are in agreement on this path.

Thanks for giving us a heads-up on the issues.
Mike
Sent from my iPhone

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NOTICE: This email may contain material that is confidential, privileged and/or attorney work product for the sole use of the intended recipient. Any review, reliance or distribution by others or forwarding without express permission is strictly prohibited. If you are not the intended recipient, please contact the sender and delete all copies.
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Kelly O'Neill Jr.
Development Services Director
City of Sandy
Development Services Department
39250 Pioneer Blvd

Sandy, OR 97055
(503) 489-2163
koneill@ci.sandy.or.us

## EXHIBIT BB

COMMENT SHEET for File No. 20-028 SUB/TREE/FSH/PD:

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APPLICABLE CRITERIA: Sandy Municipal Code: 17.12 Procedures for Decision Making; 17.18 Processing Applications; 17.20 Public Hearings; 17.22 Notices; 17.30 Zoning Districts; 17.34 Single Family Residential (SFR); 17.56 Hillside Development; 17.60 Flood and Slope Hazard Overlay; 17.64 Planned Development; 17.80 Additional Setbacks on Collector and Arterial Streets; 17.82 Special Setbacks on Transit Streets; 17.84 Improvements Required with Development; 17.86 Parkland and Open Space; 17.90 Design Standards; 17.92 Landscaping and Screening; 17.98 Parking, Loading, and Access Requirements; 17.100 Land Division; 17.102 Urban Forestry; 15.30 Dark Sky Ordinance

## EXHIBIT CC

COMMENT SHEET for File No. 20-028 SUB/TREE/FSH/PD:
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APPLICABLE CRITERIA: Sandy Municipal Code: 17.12 Procedures for Decision Making; 17.18 Processing Applications; 17.20 Public Hearings; 17.22 Notices; 17.30 Zoning Districts; 17.34 Single Family Residential (SFR); 17.56 Hillside Development; 17.60 Flood and Slope Hazard Overlay; 17.64 Planned Development; 17.80 Additional Setbacks on Collector and Arterial Streets; 17.82 Special Setbacks on Transit Streets; 17.84 Improvements Required with Development; 17.86 Parkland and Open Space; 17.90 Design Standards; 17.92 Landscaping and Screening; 17.98 Parking, Loading, and Access Requirements; 17.100 Land Division; 17.102 Urban Forestry; 15.30 Dark Sky Ordinance

# EXHIBIT DD 

NEW HOUSING PROPOSAL

## 20-028 SUB/TREE/FSH/PD

(ref Gandy
There have been 3 letters (9/8/2020, 9/24/2020, 10/21/2020) proposing housing development on land adjacent to Vista Loop Dr. Each has very confusing descriptions of the properties.
"The applicant proposes constructiong 120 single family dwellings(32 attached dwellings and 88 detached dwellings) and 48 multi family dwellings on two lots."

120 single family dwellings and 48 multi family dwellings adding up to 168 dwellings, not 120!

The notices also state that the land is currently zoned "SFR, Single Family Residential" yet goes on to state that 48 units are to be "Multifamily dwellings". This is inconsistent with the zoning.

To further add to the confusion, the included map shows 122 lots. Which ones are being developed? Some, all, or are some not even on the map? The contradictory nature of these inadequate descriptions leaves me wondering about the acuracy of this entire project.

Lot 72 appears to be in the FSH zone. Is this to be developed? Will it be in the future? There are just too many unanswered, inacurate issues here.

SE Vista Loop Dr. is a narrow street without a sidewalk. It is frequented by the residents for walking dogs and for exercise as it has been for many, many years.

The addition 120+(?) homes would add well over 120 cars and would put an overwhelming demand on a street that is not designed to handle that much car traffic.

With the addition of families, school aged children are inevitable. Where is a bus stop planned? Nobody wants dozens of children in front of their homes waiting for the bus to arrive each morning.

Parking presents another problem. The apartments on the west end of Vista Loop were promised adequate parking space. This was never realized as 30 cars are parked on Vista Loop nightly. Two lane traffic is impossible. Emergency response is limited at times. How is this being addressed in the new houses. By the time you factor in multiple cars per family you are probably talking about $200+$ cars.

The proposed "THE VIEW DR.", on the eastern property, is very close to neighboring houses and looks to be very narrow. It would create a stream of noise, lights, and be an eyesore to those properties. The proposed "KNAPP STREET", on the western property, looks to be aimed directly into my driveway

NEW HOUSING PROPOSAL
and front windows at 41613 SE Vista Loop Dr. This would create the same noise and lights issue, let alone the use of my driveway being used for a 'turnaround'. Both of these new streets would also produce traffic jams daily. The exit from the eastern end of Vista Loop to hwy 26 backs up as it stands today. Put 200 more cars into that equation.

The newly built Doug Fir Apts (approx 25 units) has already increased car traffic on Vista Loop. The speed limit is definitely not being inforced. Cars whip through the area well over 25 mph regularly. Without a sidewalk, this certainly increases the risk of injuries and fatalities to walkers. Again I must mention, 200 more cars!

The addition of more houses invites more crime to the area. This is a reality. Is the police department ready to handle this? Are they on board with this proposal and what actions are being taken to tackle this additional burdon?

Is the fire department ready for the addition of more houses? What about emergency services?

Public utilities are another problem. Can the current water facilities handle this influx of $120+$ new homes? Where is the water coming from? The official Sandy website suggests that most all of Vista Loop is "generally" not serviced by the Bullrun watershed but will that water be used to accomodate the new demand? There have been reports of cryptosporidium detected in the Bullrun watershed and the idea of a new treatment plant has been thrown around but nothing is in place.

Is the current electric grid ready to handle the new demand created by 1204 new homes? Is PGE aware?

Is the current gas supply ready for this additional demand? Is NW Natural in the loop?

Where are the new sewer lines to be run. There is a huge downslope from Vista Loop to the eastern portion of this proposed project. After talking with contractors I discovered that the pipes would have to be 20-30 feet deep. Is this even reasonable?

This proposal would completely destroy the bucolic community that has lived and enjoyed the semirural nature of our homes and views of the surrounding land for years. It puts a huge strain on utilities and public services. It dislocates wildlife and creates an ugly crowded housing tract. It also stands in stark contrast to the "Sandy Style" code that is imposed elsewhere in the town. I am not in favor of creating a town with nothing but crowded houses and gas stations. I have not heard one single resident in favor of this plan. Most are VERY angry.

Please reject this proposal. It goes beyond reasonable, responsible housing in
Page 2

## NEW HOUSING PROPOSAL

an area where it just doesn't fit.
John and Linda Barmettler
41613 SE Vista Loop Dr.
Sandy, OR 97055
(503)800-8555

Page 3

## EXHIBIT EE

October 29, 2020


To whom it may concern,

## City of Sandy

The astonishing number of housing that has been proposed to place on our quarter mile small stretch of Vista loop drive comes as a big surprise. The number of housing units will not fit our street load. We already have people speeding on our street since the build of the apartments. It has changed the formality of the neighborhood and continuing to add more to it will increasingly separate our neighbors. We are completely against more housing/apartments being put on vista loop drive especially a whole 120 units!

We know that Sandy is a funnel and we have seen increasing traffic especially on the weekends backing up all the way to Calamity Janes and sometimes further East in the last few years. As well as many fatalities in this area of 26 getting off and on the highway. This traffic last for hours and makes it hard for families who have lived on this street, some for decades, to get in and out of our street. As well as making it dangerous. Adding more cars to this problem by 240 (estimating 2 per family) will make it an even greater risk and congestion in this area.

This area was dedicated farmland since the beginning, and it is sad how Sandy is getting overcrowded and now it is continuing to spread. We highly recommend you rethink this project and not settle for the Dollar. Don't let the dollar overpower the quality of life!

Sincerely,

Dustin and Bonnie Bettencourt
A1460 SE VISTA LOOP DR.
SANDY, OR 97055

COMMENT SHEET for File No. 20-028 SUB/TREE/FSH/PD:

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APPLICABLE CRITERIA: Sandy Municipal Code: 17.12 Procedures for Decision Making; 17.18 Processing Applications; 17.20 Public Hearings; 17.22 Notices; 17.30 Zoning Districts; 17.34 Single Family Residential (SFR); 17.56 Hillside Development; 17.60 Flood and Slope Hazard Overlay; 17.64 Planned Development; 17.80 Additional Setbacks on Collector and Arterial Streets; 17.82 Special Setbacks on Transit Streets; 17.84 Improvements Required with Development; 17.86 Parkland and Open Space; 17.90 Design Standards; 17.92 Landscaping and Screening; 17.98 Parking, Loading, and Access Requirements; 17.100 Land Division; 17.102 Urban Forestry; 15.30 Dark Sky Ordinance

Housing Proposal on Nita Loop Duse
COMMENT SHEET for File No. 20-028 SUB/TREE/FSH/PD:

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APPLICABLE CRITERIA: Sandy Municipal Code: 17.12 Procedures for Decision Making; 17.18 Processing Applications; 17.20 Public Hearings; 17.22 Notices; 17.30 Zoning Districts; 17.34 Single Family Residential (SFR); 17.56 Hillside Development; 17.60 Flood and Slope Hazard Overlay; 17.64 Planned Development; 17.80 Additional Setbacks on Collector and Arterial Streets; 17.82 Special Setbacks on Transit Streets; 17.84 Improvements Required with Development; 17.86 Parkland and Open Space; 17.90 Design Standards; 17.92 Landscaping and Screening; 17.98 Parking, Loading, and Access Requirements; 17.100 Land Division; 17.102 Urban Forestry; 15.30 Dark Sky Ordinance

Page 3 of 3


## EXHIBIT GQ

City of Sandy
Planning Division
39250 Pioneer Boulevard
Sandy, OR 97055
Email comments to: planning@ci.sandy.or.us
As a city taxpayer and resident near the proposed development on Vista Loop Drive, I/We ask that the City of Sandy, Oregon deny the proposal put forth by Even Better Homes, Inc. for a Planned Unit Development - Low Density Housing development. File Number: 20-028 SUB/TREE/FSH/PD The Views PD. The city should make every effort to maintain the current tax base and home investment appeal by preserving the noted and in-place zoning for SFR, Single Family Homes, while not permitting any additional dense development on Vista Loop Drive, Sandy OR. 97055.
Sandy is known for having a little town feel, so why allow Even Better Homes to line our city roadways with high density, chicken-coop style housing? This will only lower the area tax base with smaller lot sizes that eventually turn into rental properties, all while decreasing the surround home values and increasing the crime rate in the area.

## Proposed Low Density Residential vs. Currently Zoned Single Family Residential

The average family consisted of $\mathbf{3 . 1 4}$ persons per the 2019 The U.S. Census Bureau, while the average vehicle per household is $\mathbf{2 . 2 8}$ vehicles.

- Proposed Low Density Residential:
- Tax Lot 500 would account for 49 Low Density Lots, 154 people, and 112 vehicles.
- Tax Lot 200 would account for 71 Low Density Lots, 223 people, and 162 vehicles. *This does estimates for long-term visitors, street parking and other activities

That is an estimated increase of 377 people and 274 vehicles in an area less than an eighth of a mile.

- Approved Single Family Residential:
- Tax Lot 500 and 200 can provide Single Family Residential homes with higher valued taxable lots (as currently zoned). This will also provide a reduced environmental impact and construction footprint. Preserving the surrounding wildlife, FSH protected areas, and increasing the pleasure and value of moving to the City of Sandy and outlying areas.

Please consider the overall impact to Vista Loop Drive and the current residents who have moved to this area to avoid high density growth. Thank you, City of Sandy Planning Commission for your consideration in declining this new development request from Even Better Homes, Inc. File Number: 20-028.

## Name: Gerald and Judith Pittbenner

Address: 41545 Se. VISTa Loop Dr. Sandy, or 97055
Contact Info:
H- 503-826-0596
c-503-701-6234

File \#: 20-028
1 message
Kim Turin [kimmturin@gmail.com](mailto:kimmturin@gmail.com)
Fri, Nov 6, 2020 at 11:17 AM
To: planning@ci.sandy.or.us
Dear Planning Division,
We are residents and city taxpayers near the proposed development on Vista Loop Drive. We recently became aware of a proposal put forth by Even Better Homes, Inc for a Planned Unit Development-low density Housing development. Seriously? Is this actually being considered? If so, we are adamantly requesting this proposal be DENIED! It would be in the city's best interest to maintain the current tax base and home investment appeal by preserving the already in place zoning for Single Family Homes and not permitting any additional dense development on Vista Loop Drive. You already allowed for an apartment complex that ruined the nature of Vista Loop, so we are asking you don't make the same mistake again. Sandy has very few areas of higher taxed lots so why lower the area tax base with smaller lot sizes and high density cookie cutter style houses? It just doesn't make sense. Please dont allow Even Better Homes to ruin Vista Loops small town country feel and decrease the surrounding home values. Please consider the overall impact to Vista Loop Drive and the current residents who have intentionally moved to this area to avoid high density growth. You've already allowed enough with the current apartment complex. Thank you for your consideration and again, we request that you deny this new development request from Even Better Homes, Inc., File number: 20-028.
Thank you,
Tony and Kim Turin
503-544-5340
18235 SE Vista View Ct, Sandy, OR 97055

# EXHIBIT II 

City of Sandy
Planning Division
39250 Pioneer Boulevard
Sandy, OR 97055
Email comments to: planning@ci.sandy.or.us
As a city taxpayer and resident near the proposed development on Vista Loop Drive, I/We ask that the City of Sandy, Oregon deny the proposal put forth by Even Better Homes, Inc. for a Planned Unit Development - Low Density Housing development. File Number: 20-028 SUB/TREE/FSH/PD The Views PD. The city should make every effort to maintain the current tax base and home investment appeal by preserving the noted and in-place zoning for SFR, Single Family Homes, while not permitting any additional dense development on Vista Loop Drive, Sandy OR. 97055.
Sandy is known for having a little town feel, so why allow Even Better Homes to line our city roadways with high density, chicken-coop style housing? This will only lower the area tax base with smaller lot sizes that eventually turn into rental properties, all while decreasing the surround home values and increasing the crime rate in the area.

## Proposed Low Density Residential vs. Currently Zoned Single Family Residential

The average family consisted of 3.14 persons per the 2019 The U.S. Census Bureau, while the average vehicle per household is $\mathbf{2 . 2 8}$ vehicles.

- Proposed Low Density Residential:
- Tax Lot 500 would account for 49 Low Density Lots, 154 people, and 112 vehicles.
- Tax Lot 200 would account for 71 Low Density Lots, 223 people, and 162 vehicles. *This does estimates for long-term visitors, street parking and other activities

That is an estimated increase of 377 people and 274 vehicles in an area less than an eighth of a mile.

- Approved Single Family Residential:
- Tax Lot 500 and 200 can provide Single Family Residential homes with higher valued taxable lots (as currently zoned). This will also provide a reduced environmental impact and construction footprint. Preserving the surrounding wildlife, FSH protected areas, and increasing the pleasure and value of moving to the City of Sandy and outlying areas.

Please consider the overall impact to Vista Loop Drive and the current residents who have moved to this area to avoid high density growth. Thank you, City of Sandy Planning Commission for your consideration in declining this new development request from Even Better Homes, Inc, File Number: 20-028.

Name: John \& Christine Andrade


Address: 18509 Ortiz Street, Sandy, OR 97055
Contact Info: johnnyco82@yahoo.com - 503-516-7629

## EXHIBIT JJ

City of Sandy
Planning Division
39250 Pioneer Boulevard
Sandy, OR 97055
Email comments to: planning@ci.sandy.or.us
As a LONG TIME city taxpayer and resident near the proposed development on Vista Loop Drive, I/We ask that the City of Sandy, Oregon deny the proposal put forth by Even Better Homes, Inc. for a Planned Unit Development - Low Density Housing development. File Number: 20-028 SUB/TREE/FSH/PD The Views PD.
The city should make every effort to maintain the current tax base and home investment appeal by preserving the noted and in-place zoning for SFR, Single Family Homes, while not permitting any additional dense development on Vista Loop Drive, Sandy OR. 97055.
Sandy is known for having a little town feel, so why allow Even Better Homes to line our city roadways with high density, chicken-coop style housing? This will only lower the area tax base with smaller lot sizes that eventually turn into rental properties, all while decreasing the surround home values and increasing the crime rate in the area.

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- Approved Single Family Residential:
- Tax Lot 500 and 200 can provide Single Family Residential homes with higher valued taxable lots (as currently zoned). This will also provide a reduced environmental impact and construction footprint. Preserving the surrounding wildlife, FSH protected areas, and increasing the pleasure and value of moving to the City of Sandy and outlying areas.

Please consider the overall impact to Vista Loop Drive and the current residents who have moved to this area to avoid high density growth. Thank you, City of Sandy Planning Commission for your consideration in declining this new development request from Even Better Homes, Inc. File Number: 20-028.


Contact Info: Todd Springer 971-409-1356 toddlisa33@gmail.com


EXHIBIT KK

Fwd: comments: File No. 20-028 SUB/TREE/FSH/PD The Views PD

Shelley Denison [sdenison@ci.sandy.or.us](mailto:sdenison@ci.sandy.or.us)
Thu, Nov 12, 2020 at 7:46 AM
To: Planning [planning@ci.sandy.or.us](mailto:planning@ci.sandy.or.us)
Marisol,
Here's a comment for 20-028. Thanks!
---------- Forwarded message
From: Rick [mtn_hiker@hotmail.com](mailto:mtn_hiker@hotmail.com)
Date: Mon, Nov 9, 2020 at 1:43 PM
Subject: comments: File No. 20-028 SUB/TREE/FSH/PD The Views PD
To: [sdenison@ci.sandy.or.us](mailto:sdenison@ci.sandy.or.us)

City of Sandy, Planning Dept:
I am a Civil Engineer (ret) and I have lived on SE Vista View Court (which is north of Vista Loop Drive and west of The Views planned development) for 22 years.

My comments on The Views development:
Vista Loop has no sidewalks or street lights and is very narrow. My neighbors and I, including residents of 54 unit Sandy Vista and 24 unit Doug Fir apartments enjoy walking on the road, no doubt future residents of The Views would do the same adding to a safety issue that already exists. The primary access to Hwy 26 will likely be the east-end of Vista Loop, however some residents of The Views are bound to use the west entrance/exit, as do residents of the existing Ortiz St. This will increase traffic at the congested west-end where it is already less than full width due overflow parking on both sides from the Sandy Vista apartments. Vista Loop is poorly maintained and has several sink holes in the traveled portion of the street - likely caused by previous sewer construction. It is reasonable to expect that added traffic will worsen its condition. Paying for any upgrades or improvements to Vista Loop, necessary to support this subdivision, should not fall on the citizens of Sandy.

Access onto Hwy 26 to the east is problematic. The speed limit is 55 , but in reality vehicles are traveling much faster. Making turns into traffic at this point is very hazardous because of the traffic speed and limited sight distance to the east. The recent realignment of the exit off of Hwy 26 from the west bound lanes has made exiting onto Vista Loop hazardous; requiring drivers to slow for the turn while still in fast moving traffic - there is no deceleration lane any more. The addition of 168 families will create ample opportunity for high speed accidents at this intersection. As noted, the intersection at the west of Vista Loop is already very congested. High speeds on Hwy 26 here also create a dangerous situation which adding additional cars will exacerbate.

It is 0.7 miles from the end of sidewalks at Ten Eyck to the west end of Vista Loop. Due to the narrow shoulder, walking east puts one just two to three feet from Hwy 26 traffic

City of Sandy Mail - Fwd: comments: File No. 20-028 SUB/TREE/FSH/PD The Views PD
traveling at highway speed. I have personally walked this in the rain on dark nights and it is truly frightening. The City has announced planned sidewalks and traffic calming over the years. Neither has happened, and is one reason I strongly oppose the addition of an approximately 600 people and 300 cars onto Vista Loop (my estimate). The infrastructure to connect so many more families to the rest of the City does not exist.

Creating housing for over 600 people on tiny lots on land presently in the Comprehensive Plan as "Low Density Residential" will blight a very livable part of the City. It is appropriately designated low density and in planning for development here regulatory requirements should be observed and maintained. This part of the City is far away from city core services and resources, has no safe pedestrian access and lacks the public amenities that will be desired by the new 168 families. The small green spaces and trails proposed within The Views are not adequate for such a large number of families. In my estimation this will result in a large number of under-served citizens that will detract from the livability in this part of Sandy and who will, rightly, lobby the City to provide the infrastructure they should have. Estimates of the cost of sidewalks and traffic calming has been reported and are substantial and beyond what the City has been able to fund. This is not a cost that the existing citizens of Sandy should be expected to pay for without developers paying an allocatable share. It does not appear that this is part of the development plan. In fact the developer proposes not to build any sidewalks exterior to the project.

In my opinion, this development is poorly conceived and will have impacts that have not been thought through, nor mitigations proposed. This project has far too many people to be viable for its location. Therefore, I recommend that the City deny all zoning variances and reject the proposed project as being negatively impactful on several levels and not meeting Sandy's standards for livability.

John R Eskridge, PE (retired)
18265 SE Vista View Ct.
971-940-4787

[^9]City of Sandy
Planning Division 39250 Pioneer Boulevard
Sandy, OR 97055

## City of Sandy

As a city taxpayer and resident near the proposed development on Vista Loop Drive, I/We ask that the City of Sandy, Oregon deny the proposal put forth by Even Better Homes, Inc. for a Planned Unit Development - Low Density Housing development. File Number: 20-028 SUB/TREE/FSH/PD The Views PD. The city should make every effort to maintain the current tax base and home investment appeal by preserving the noted and in-place zoning for SFR, Single Family Homes, while not permitting any additional dense development on Vista Loop Drive, Sandy OR. 97055. Sandy is known for having a little town feel, so why allow Even Better Homes to line our city roadways with high density, chicken-coop style housing? This will only lower the area tax base with smaller lot sizes that eventually turn into rental properties, all while decreasing the surround home values and increasing the crime rate in the area.

## Proposed Low Density Residential vs. Currently Zoned Single Family Residential

The average family consisted of $\mathbf{3 . 1 4}$ persons per the 2019 The U.S. Census Bureau, while the average vehicle per household is 2.28 vehicles.

- Proposed Low Density Residential:
- Tax Lot 500 would account for 49 Low Density Lots, 154 people, and 112 vehicles.
- Tax Lot 200 would account for 71 Low Density Lots, 223 people, and 162 vehicles.
*This does estimates for long-term visitors, street parking and other activities

That is an estimated increase of $\mathbf{3 7 7}$ people and $\mathbf{2 7 4}$ vehicles in an area less than an eighth of a mile.

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Please consider the overall impact to Vista Loop Drive and the current residents who have moved to this area to avoid high density growth. Thank you, City of Sandy Planning Commission for your consideration in declining this new development request from Even Better Homes, Inc. File Number: 20-028.

Name:



 Sandy. OPP. 97055.

Address:

contact info: wrote a long, letter, es lake Ocher, giving. mus
 personal arsed Homes, on Vested hose drive to close thees developencest for housing. \&s

City of Sandy
Planning Division
39250 Pioneer Boulevard

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Sandy, OR 97055
Email comments to: planning@ci.sandy.or.us
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 $11 / 1612020$
Address: 41515 SEUisto Fop $D_{n}$.
Contact Info:

City of Sandy
Planning Division
39250 Pioneer Boulevard
Sandy, OR 97055


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Email comments to: planning@ci.sandy.or.us

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## Proposed Low Density Residential vs. Currently Zoned Single Family Residential

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That is an estimated increase of 377 people and 274 vehicles in an area less than an eighth of a mile.
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Name:



Address s HI36el SE Vista Loop DR Contact Info:

City of Sandy
Planning Division
39250 Pioneer Boulevard
Sandy, OR 97055

## DECEIVE

City of Sari mil il Email comments to: planning@ci.sandy.or.us

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Name:
$\qquad$
$\qquad$ Date $\qquad$


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Name:


Date: October 28, 2020
To: City of Sandy Planning Department
From: Tracy Brown, Tracy Brown Planning Consultants, LLC
Re: File No. 20-028, The Views Planned Development - Supplemental Materials
This memo responds to items contained in the draft staff report for this project dated September 24, 2020. The following items are included:

1. Special Variance fee - The applicant is requesting two Special Variances (a narrative is attached as A6. A check in the amount of $\$ 2,198(\$ 1,099 \times 2)$ is included.
2. Revised Plan Set - The plan set has been revised based on comments contained in the staff report as follows. (A1)

- The boundary between Tract A and Tract K has been revised so all FSH areas are contained within Tract A. No construction activities or trail building will occur within FSH areas.
- A new Tract P is included in the Lower Views so the proposed gate structure on the south side of this road will be located in a private tract rather than within a public right-of-way.
- A Future Street Plan northwest of the Upper Views is shown on Sheet C10.

3. Supplemental Plan Details (A2)

- Seven additional trees (\#531 - \#537) are proposed to be retained and protected as shown on Sheets C6 and C7.
- Because the tract boundaries were adjusted and a new Tract P created, the density calculations for the development were adjusted accordingly.

4. Revised Landscape Plan - The Landscape Concept Plan has been revised to correspond with the revised preliminary plat (A3a) and the Landscape Plans for both The Upper (A3b) and Lower Views (A3c) Landscape Plans have been revised to remove all landscaping within FSH areas and contain plant quantities and sizes of proposed plantings as requested.
5. Sound Wall Details - The attached document provides additional details regarding the proposed six foot tall retaining wall to be constructed along the Highway 26 frontage. (A4)
6. Private Drives in Tracts - There is a question in the staff report whether the County allows private drives to be platted as a tract. An email chain from the County Surveyors office confirms tracts are permissible. (A5)
7. Special Variance - The applicant is requesting two Special Variances as reviewed in the attached document. (A6)
8. Future Street Plan Property Owner (A7) - An email from J ohn Knapp the property owner to the north of Ortiz Street is included confirming that he does not see the need for a street stub in The Views to his property.
9. ODOT (Additional Space on Highway Westbound) (A8) - The project Traffic Engineer, Ard Engineering, has provided a letter discussing ODOT's comments. With this, the applicant is confident Highway widening in this location as part of the current application is not justified.
10. Phasing - A question was raised in the staff report whether the application is proposing a phased development or not. To clarify, the applicant plans to develop and plat the project in two phases. The Lower Views will be developed as Phase 1 and The Upper Views as Phase 2. These two phases will be identified as Phase 1 and Phase 2 of The Views Planned Development.

## Private Drive Tracts

messages
Tracy Brown [tbrownplan@gmail.com](mailto:tbrownplan@gmail.com)
Thu, Oct 8, 2020 at 11:31 AM
To: "Olson, Wayne" [WayneOls@co.clackamas.or.us](mailto:WayneOls@co.clackamas.or.us)
Hi Wayne, I talked to you about this a couple of weeks ago and you said the County Surveyor allows private drives to be established as tracts as long as there is clear ownership and maintenance responsibility.

In my recent discussion with the City of Sandy on this matter this morning they requested I ask you to provide a written statement to this effect.

Please confirm my statement above regarding the platting of private drive tracts is correct.
Thanks, Tracy
Tracy Brown Planning Consultants, LLC
Sandy, Oregon
503-781-0453
tbrownplan@gmail.com
www.tracybrownplanningconsultants.com

Olson, Wayne [WayneOIs@clackamas.us](mailto:WayneOIs@clackamas.us)
To: Tracy Brown [tbrownplan@gmail.com](mailto:tbrownplan@gmail.com)

Tracy,

Yep......it's done all the time.

Please review the attached Plat sheet 2 and the document for Tract "K". Lots 375 to 380 have access across Tracts "J" and "K".

Maybe I didn't understand the question or I'm answering the wrong question?

If anyone has any questions don't hesitate to call or reply.

Later

Wayne

From: Tracy Brown [tbrownplan@gmail.com](mailto:tbrownplan@gmail.com)
Sent: Thursday, October 8, 2020 11:32 AM
To: Olson, Wayne [WayneOls@clackamas.us](mailto:WayneOls@clackamas.us)
Subject: Private Drive Tracts

Warning: External email. Be cautious opening attachments and links.
[Quoted text hidden]

4 attachments


Tracy Brown [tbrownplan@gmail.com](mailto:tbrownplan@gmail.com) Thu, Oct 8, 2020 at 1:30 PM To: "Olson, Wayne" [WayneOls@clackamas.us](mailto:WayneOls@clackamas.us)

Hi , you answered the question that private drive tracts are allowed by the Surveyors Office.
Thanks
Tracy Brown Planning Consultants, LLC
Sandy, Oregon
503-781-0453
tbrownplan@gmail.com
www.tracybrownplanningconsultants.com

## Vista Loop Road

1 message

To: Tracy Brown [tbrownplan@gmail.com](mailto:tbrownplan@gmail.com)
To: City of Sandy
From: John and Regena Knapp
The future street plan through my property on Vista Loop is no longer required. I am comfortable with the plan proposed by the Views application and do not require a street for my other property. Thank you, John and Regena Knapp

## Technical Memorandum



Expares: $13 / 31 / 2021$
To: Shelley Denison and Kelly O'Neill, City of Sandy
From: Michael Ard, PE
Date: October 27, 2020
Re: $\quad$ The Views - Highway 26 at Vista Loop Drive

In anticipation of residential development within The Views, ODOT staff have requested additional space (i.e. widening) on Highway 26 westbound at the approach to Vista Loop Drive. This memorandum is written to provide information regarding applicable standards, improvement history, and the project teams understanding of this request.

As part of the traffic impact study conducted for The Views (dated June 15, 2020), we examined warrants for a westbound right-turn lane from Highway 26 onto Vista Loop Drive. The projected through traffic volume westbound on Highway 26 under year 2022 conditions following completion of The Views was determined to be 597 vehicles during the morning peak hour, with 5 additional vehicles making westbound right turns onto Vista Loop Drive. This represents an increase of 4 westbound right-turn movements during the morning peak hour associated with the proposed development. During the evening peak hour, 900 through vehicles are projected to travel westbound on Highway 26, with 16 vehicles making the right turn from Highway 26 onto Vista Loop Drive. This represents an increase of 13 westbound right-turn movements during the evening peak hour associated with the proposed development.
ODOT warrants for a right-turn lane are based on the total volume of traffic in the right lane (from which right turns are made) as well as the volume of right-turning vehicles. Since there are two westbound travel lanes on Highway 26, the traffic volume in the outer lane was estimated to consist of half the through volume plus all right-turning vehicles. This assumption means that slightly more than half of westbound vehicles are assumed to be in the right lane. Based on the resulting design-hour volumes of 304 vehicles in the outer lane during the morning peak hour and 466 vehicles in the outer lane during the evening peak hour, the minimum thresholds which would warrant installation of right-turn lane were calculated to be 36 and 23 vehicles, respectively. The projected number of right-turning vehicles falls below both thresholds. Accordingly, the warrants for installation of a right-turn lane are not met and no specific mitigations were recommended for this movement in the traffic impact study.

The standard ODOT traffic volume warrants also include a note that applies where the approaching design hour volume is in excess of 700 vehicles per hour. Under such circumstances, "If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right-turn lane is needed." Notably, the projected design hour volumes are well below 700 vehicles per hour, so this note is not applicable at this location. Accordingly, shoulder improvements are also not recommended based on the ODOT methodology.

In addition to the volume-based warrants, installation of a right-turn lane may be warranted by crash history in circumstances where "a history of crashes of the type susceptible to correction by a right turn lane" is evident. However, no significant crash history exists at the intersection of Highway 26 and Vista Loop


The Views - Highway 26 at Vista Loop Drive October 27, 2020

Drive. Examination of the crash history over the 10-year period from January 1, 2020 through December 31, 2019 shows only three westbound rear-end collisions, one of which was caused by a vehicle that lost control in snow/ice conditions. The other two occurred prior to removal of the slip lane at the intersection.

Finally, a right-turn treatment may be recommended in "special cases" such as locations in the vicinity of rail crossings, passing lanes, specific geometric/safety concerns, or where "other surrounding conditions, such as a drawbridge, could adversely affect right turns and must be treated in a manner similar to that for railroad crossings."

The section titled "Geometric/Safety concerns" elaborates "Consider sight distance, alignment, operating speeds, nearby access movements and other safety related concerns." In this instance sight lines are favorable, the roadway segment alignment is straight, and there are no nearby access movements or other safety related concerns that are applicable. Since no other criteria are met, it can only be assumed that ODOT's recommendation for "additional space" on Highway 26 is predicated on the idea that operating speeds dictate this as an appropriate treatment despite not meeting any of the explicit requirements of any applicable warrant or relevant design note.

In addition to the lack of a clear standard used to justify a request for improvements on Highway 26, it should be noted that a recent improvement has already been undertaken at the request of the Oregon Department of Transportation in anticipation of supporting residential development within the subject property. The prior configuration of the intersection of Highway 26 at Vista Loop Drive included a westbound slip lane which allowed vehicles to turn onto Vista Loop Drive at high speeds. At the request of ODOT, this slip lane was removed and the then-existing shoulder was widened by 6.75 feet immediately east of Vista Loop Drive.

This improvement project was required as part of a lot partition and residential development. The condition of approval carried onto both the approval for the Timber Valley Subdivision, and the Johnson RV expansion that occurred on another piece of the partitioned property. Since the condition was applied to both the residential development and the Johnson RV property, the first one to develop ultimately had to make the improvements. When Johnson RV constructed their parking lot expansion, they were required to bond for the street improvements and were required to complete the improvements by October 31, 2018. As a result, the conditioned improvements for Highway 26 at Vista Loop Drive were completed approximately 2 years ago. Notably, the Timber Valley Subdivision was approved on property that is now The Views. Accordingly, the completed mitigation was specifically intended to support residential development on the subject property.

Since warrants are not met for intersection improvements at Highway 26 and Vista Loop Drive in conjunction with the proposed development and recent improvements at the intersection were specifically intended to support both development of the Johnson RV parking lot expansion and the residential development within what is now The Views property, it does not appear to be either appropriate or proportional to request a second round of intersection improvements in association with the current residential development proposal. Accordingly, we request that there be no condition of approval requiring further widening or improvements on Highway 26 at Vista Loop Drive.

## Appendix




Right-Turn Lane Warrant Analysis (ODOT Methodology)

Project Name: The Views<br>Approach: Northwest-Bound Highway 26 at SE Vista Loop Drive (East)<br>Scenario: 2022 Background Plus Site Trips

Major-Street Design Speed: 60 mph

|  | AM Volume | PM Volume |
| :--- | :---: | :---: |
| Number of Right Turns per Hour: | 5 | 16 |
| Approaching DVH in Outside Lane: | 304 | 466 |
| Calculated Turn Volume Threshold: | 36 | 23 |
| Right Turn Volume Exceeds Threshold? | NO | NO |

## Criterion 1: Vehicular Volume

The vehicular volume criterion is intended for application where the volume of intersecting traffic is the principal reason for considering installation of a right turn lane. The vehicular volume criteria are determined using the curve in Exhibit 7-2

Exhibit 7-2 Right Turn Lane Criterion


Note: If there is no right turn lane, a shoulder needs to be provided. If this intersection is in a rural area and is a connection to a public street, a right turn lane is needed.
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## The Views Planned Development File No. 20-028 Special Variance Request and Narrative

Request: The applicant requests two special variances with this application as detailed below.

1. Special Variance to Section 17.84.30(A) to not construct sidewalk improvements adjacent to a single street frontage and to construct a meandering sidewalk design along three street segments;
2. Special Variance to Section $17.82 .20(A)$ and (B) to not orient the front doors of homes constructed on lots adjacent to Highway 26 towards the internal street rather than the highway.

## CHAPTER 17.66-ADJ USTMENTS AND VARIANCES 17.66.80 TYPE III SPECIAL VARIANCES

The Planning Commission may grant a special variance waiving a specified provision under the Type III procedure if it finds that the provision is unreasonable and unwarranted due to the specific nature of the proposed development. In submitting an application for a Type III Special Variance, the proposed development explanation shall provide facts and evidence sufficient to enable the Planning Commission to make findings in compliance with the criteria set forth in this section while avoiding conflict with the Comprehensive Plan.

## Special Variance No. 1

The applicant requests a Special Variance to Section 17.84.30(A) to not construct a sidewalk along the South side of The Views Drive from Vista Loop Drive to the alley and to construct meandering sidewalks within a private tract along the north side of The Views Drive and the west side of Bonnie Street in The Lower Views and along Vista Loop Drive in The Upper Views.

One of the following sets of criteria shall be applied as appropriate.
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
Response: Section 17.84.30(A) requires sidewalks to be constructed along both sides of all arterial, collector, and local streets according to city standards. As noted above, the applicant proposes constructing a sidewalk only on the north side of The Views Drive from Vista Loop Drive to the alley. City standards require a five foot wide sidewalk along both sides of a local street. The applicant proposes constructing a six-foot wide meandering sidewalk within a privately landscaped on the north side of this street only.

This facility will be located within Tract E, a private tract owned and maintained by the Homeowner's Association. The intent of this proposal is to create an enhanced pedestrian environment for residents and visitors walking between the Upper and Lower Views portions of the development. A similar meandering sidewalk configuration is proposed along Vista Loop Drive in The Upper Views and the West side of Bonnie Street in The Lower Views. The applicant believes these facilities will provide a more pleasant and unique pedestrian experience for the residents and visitors of the Planned Development. The proposed amenities are more than adequate to serve pedestrian volumes anticipated to use these facilities and the needs of this neighborhood. Approval of this request will not violate the intent and purpose of these regulations as an enhanced sidewalk will be constructed in these locations. The proposal complies with this criteria.
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.
Response: The proposed variance to eliminate a sidewalk along the south side of The Views Drive and to construct meandering sidewalks along three street segments will not be detrimental to the public welfare or will they be injurious to other property in the area. On the contrary, the applicant believes these facilities will enhance the pedestrian experience for residents and visitors of the development and will have no affect on adjoining properties. The proposal complies with this criteria.
B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
Response: The requested Special Variance is the minimum needed to facilitate creation of the intended character and design of the proposed Planned Development. The proposal complies with this criteria.
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.
Response: The proposal does not involve nonconforming development.
Special Variance No. 2
The applicant requests a special Variance to Sections $17.82 .20(A)$ and (B) to orient the front doors of homes constructed on the lots adjacent to Highway 26 towards the internal street rather than to Highway 26.
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

Response: Section 17.82.20(A) specifies that all residential dwellings shall have their primary entrances oriented toward a transit street or toward a public right-of-way or private walkway which leads to a transit street. Section 17.82.20(B) requires that "dwellings shall have a primary entrance connecting directly between the street and building interior." A transit street is defined as any collector or arterial street. The site has frontage on both Highway 26, an arterial and Vista Loop Drive, a collector street. The applicant proposes orienting the front door of homes abutting Highway 26 (Lots 99 and 103-121) towards the internal street rather than highway. The reason for this request is because there is a signification grade separating the elevation of these lots and the highway. In addition, because of concerns of increased sound levels from the highway traffic adversely affecting homes constructed adjacent to this road, a six-foot tall sound wall will be constructed at the back of these lots. This facility will essentially block access to the transit street and the sidewalk proposed to be constructed at the top of this bank. As contained in Chapter 17.82, this chapter "is to provide for convenient, direct, and accessible pedestrian access to and from public sidewalks and transit facilities". Given vehicle speeds along Highway 26 and site specific constraints it is highly unlikely a transit stop or boarding will ever be allowed along this portion of the Highway 26. As such, orienting homes towards this road and requiring constructing of a sidewalk connection is not warranted and should not be required. Given these factors, compliance with these standards is not practical. The unique site conditions described in this review warrants approval of a. Special Variance as the proposal does not violate the intent and purpose of these regulations.
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.
Response: The requested variance to this standard will have no effect on the public welfare or other properties in the area. The proposal includes front doors of homes constructed on these lots facing the internal street and a sidewalk connecting to a sidewalk along this facility. The proposal complies with this criteria.
B. The variance approved is the minimum variance needed to permit practical compliance with a requirement of another law or regulation.
Response: The requested variance is the minimum variance needed to permit practical compliance with this 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.
Response: The proposal does not involve nonconforming development.

Date: November 22, 2020
To: City of Sandy Planning Staff and Planning Commission
From: Tracy Brown, Tracy Brown Planning Consultants, LLC
Re: Requested modifications to The Views PD Conditions (File No. 20-028)
This document lists requested modifications and additions to Conditions in the Planning Commission staff report for this project dated November 16, 2020.
Requested additions to the Findings are identified in underline text and Conditions in bold underline text. Deletions are identified in red strikethrough.

## 1. Modify Condition $\mathbf{8 0}$ to read:

As has been noted in this document, staff is not supportive of the alternative sidewalk plan along Highway 26. Per the Public Works Director, tThe applicant
shall improve all public street frontages (including the Highway 26 right-of-way, and the street frontage of all tracts) in conformance with the requirements of 17.84.30 and 17.84.50 except as otherwise specified in this document.Street frontage improvements include, but are not limited to: street widening, curbs, sidewalks, storm drainage, strect lighting and street trees. One of the reasons for providing an urban street section (curbs, sidewalks, lighting, etc.) inside the city Himits is to provide motorists with a visual cue that they are entering an urbanized area and to adjust their speed and alertness to match the visual cues. The area on both sides of Highway 26 is within the UBG and Urban Reserve so it will eventually become urbanized. An urbanized right of way makes drivers aware that they are entering a city and hopefully lead to adjusted speeds to match the conditions. As the city grows and these areas become urbanized the posted speed limit will likely be lowered to match the conditions. This is the case at the west end of Sandy where Highway 26 is an arterial street instead of a rural highway. This is also the ease east of the couplet where the speed limit drops from basic rule to 40 mph and then to 25 mph as one travels west.

Response: The applicant requests this Condition be modified as identified above. In addition, the applicant requests additional Findings and Conditions be added to reflect modifications to this standard for Highway 26 and The Views Drive as detailed below.
2. New Findings and Condition Regarding Highway Improvements:

The subject property contains frontage along Highway 26. The applicant's plan set shows a six-foot sidewalk is proposed to be constructed at the top of the bank along the site's entire highway frontage. The applicant's Engineer corresponded by email with the City's Public Works Director and an ODOT representative regarding if a curb will be required along the highway frontage. The Public Works Director indicated the decision on a curb is up to ODOT as they have authority over Highway 26. The ODOT representative stated that construction of a curb is not required along Highway 26 and construction of a sidewalk at the top of the bank is acceptable. With this, staff recommends the following condition: Improvements
adjacent to the site's Highway 26 frontage shall consist of a six-foot wide sidewalk constructed at the top of the bank, lighting, and street trees only as approved and permitted by ODOT.

Response: As discussed through email correspondence between the applicant's Engineer, City Public Works Director, and ODOT (See Attachment), ODOT has jurisdiction over Highway 26 and does not require construction of a curb along the highway frontage. The applicant proposes constructing a sidewalk at the top of the bank and installing street trees and lighting as necessary. The applicant requests Findings and a Condition be added to clarify what improvements are required along the Highway 26 frontage.
3. New Finding and Condition regarding sidewalk on south side of The Views Drive if Special Variance is approved:
The applicant requested Special Variance approval to only construct a curb on the south side of The Views Drive from the intersection of The Views Drive with Vista Loop Drive to the alley in the Lower Views. The Planning Commission reviewed this request and found that it met the approval criteria in Section 17.66.80 and approved the request. With approval of this Special Variance staff recommends the following condition be added: Only a curb is required to be constructed on the south side of The Views Drive from the intersection of The Views Drive with Vista Loop Drive to the alley in the Lower Views.

Response: The applicant requests a new Finding and Condition be added clarifying required improvements on south side of The Views Drive if a approval of the Special Variance requested is granted.
4. Modify Condition 110 to read:

The proposed public sidewalks located outside of the street right-of-way shall provide lighting levels in conformance with will require pedestrian scale bollard lighting conforming to the City standards. Use of full-cutoff, Type II roadway distribution strectlights will not provide sufficient illumination for pedestrians where the sidewalk is set back so far from the street and obscured by trees. The
applicant shall submit a photometric analysis demonstrating that pedestrian lighting standards are met along all pedestrian facilities outside a public right-of-way.

Response: The applicant requests this Condition be modified to allow all pedestrian sidewalks outside a public right-of-way to be lite without installation of bollard style lighting if illumination standards can be met using overhead fixtures.
5. Modify Finding 118 to read:

Section 17.98.100 has specifications for driveways. The minimum driveway width for a single-family dwelling shall be 10 feet and the maximum driveway approach within the public right-of-way shall be 24 feet wide measured at the bottom of the
curb transition. Shared driveway approaches may be required for adjacent lots in cul-de-sacs in order to maximize room for street trees and minimize conflicts with utility facilities (power and telecom pedestals, fire hydrants, streetlights, meter boxes, etc.). The applicant shall update the driveway plan to detail shared driveways for the following pairs of Lots: 43 and 44, 45 and 46, 59 and 60 , and 63 and 64 . As shown on the applicant's submittal, allowing each cul-de-sac lot to be accessed by a separate driveway complies with the intent of this section.

Per Section 17.98.100(G), the sum of the width of all driveway approaches within the build of a cul-de-sac as measure in Section 17.98.100(B) shall not exceed fifty percent of the circumference of the cul-de-sac bulb. The applicant submitted additional analysis (Exhibit ) showing that cul-de-sacs in the development comply with this standard. This requirement is satisfied.

Response: The applicant requests this Condition be modified to allow lots accessed from a cul-de-sac to have their own driveway rather than a shared driveway. The reason for this request is these are the premium lots in the development, likely to contain three car garages and RV parking. A shared driveway configuration makes maneuvering in and out of these lots more challenging and detracts from the benefit of having a large lot. As shown on the sketch below, the proposal for individual driveways provides an opportunity to plant three trees within the cul-de-sac. In addition, as the attachment below shows, the sum of the width of all driveway approaches in the two proposed cul-de-sacs do not exceed 50 percent as required.


Attachments:

- Email Correspondence Regarding Highway Improvements
- Driveway Approaches on Cul-de-sacs


## Email Chain Regarding Highway 26 Frontage Improvements

From: MW
Sent: Tuesday, October 27, 2020 12:48 PM
To: DANIELSON Marah B
Cc: Ray Moore ; Mike Walker ; KIEFFER Loretta L
Subject: Re: 19-071 - The Views PD - Sandy OR
Marah,
I wanted to clarify a few items in Ray Moore's email. The standard arterial street section in the municipal Code and the City's TSP is a curb separated from a six-foot wide sidewalk by a planter strip of varying width (minimum 6 ft .). In my discussions with Ray Moore I indicated that the decision on a curb was up to ODOT since US 26 is their facility. I don't think characterizing the City's position as "not requiring a curb along the highway" is accurate. The same is true for the sidewalk location. It can go anywhere within the right-of-way (existing or dedicated to ODOT) with ODOT making the final determination on location. Placing the sidewalk at the right-of-way line (near or at the top of the cut slope) is also an ODOT decision. However, I would caution that it may be difficult to stay under the ODOT maximum 7.5\% design grade following the existing top of the cut slope. I assume these decisions would be made during ODOT's construction plan review and permitting process.

The City's condition will indicate that required street frontage improvements shall comply with ODOT standards and requirements.

Please let me know if you have any questions or wish to discuss this further.

On Thu, Oct 15, 2020 at 3:16 PM DANIELSON Marah B
<Marah.B.DANIELSON@ odot.state.or.us> wrote:
Hi Ray,

ODOT is ok with the sidewalk being at the top of slope probably behind the utility poles. You may need to donate right of way to ODOT for the sidewalk. Also, you do not need to install a curb in this location.

When you are ready to work on your construction plans for your highway improvements and ODOT permit application, please send an email to Loretta Kieffer at Loretta.L.KIEFFER @ odot.state.or.us. She is out of the office through October $30^{\text {th }}$. Let me know if you have any follow up questions.

Marah Danielson, Senior Planner
ODOT Development Review Program
Marah.b.danielson@odot.state.or.us
503.731.8258

From: Ray Moore [raym@allcountysurveyors.com](mailto:raym@allcountysurveyors.com)
Sent: Friday, October 9, 2020 3:44 PM
To: DANIELSON Marah B [Marah.B.DANIELSON@odot.state.or.us](mailto:Marah.B.DANIELSON@odot.state.or.us)
Subject: 19-071 - The Views PD - Sandy OR


This message was sent from outside the organization. Treat attachments, links and requests with caution. Be conscious of the information you share if you respond.
Hi Marah, thanks for the call. Just to follow-up The City is not requiring a curb along the highway, Mike Walker said that will be up to ODOT. Mike has also ok'd that the pedestrian sidewalk can be placed at the top of the slope and that the existing drainage ditch can remain.

Please let me know if ODOT is going to require curbing the frontage. Keep in mind we are on a 55 mph section of highway.

Thanks,
Ray Moore, PE, PLS
All County Surveyors \& Planners, Inc.
PO Box 955, Sandy, OR 97055
Phone: 503-668-3151
email: raym@allcountysurveyors.com

Supplemental Information to Address
Section 17.98.100 (G) regarding driveways on a cul-de-sac



November 23, 2020

Sandy Planning Commission
39250 Pioneer Blvd
Sandy, OR 97055

Re: Even Better Homes, Inc., is proposing to subdivide and develop a Planned Development on the subject properties adjacent to Vista Loop Drive, just east of Highway 26. (20-028)

Dear Commissioners:

This letter is submitted jointly by Housing Land Advocates (HLA) and the Fair Housing Council of Oregon (FHCO). Both HLA and FHCO are non-profit organizations that advocate for land use policies and practices that ensure an adequate and appropriate supply of affordable housing for all Oregonians. FHCO's interests relate to a jurisdiction's obligation to affirmatively further fair housing. Please include these comments in the record for the above-referenced proposed amendment.

As you know, all amendments to the City's Comprehensive Plan and Zoning map must comply with the Statewide Planning Goals. ORS 197.175(2)(a). When a decision is made affecting the residential land supply, the City must refer to its Housing Needs Analysis (HNA) and Buildable Land Inventory (BLI) in order to show that an adequate number of needed housing units (both housing type and affordability level) will be supported by the residential land supply after enactment of the proposed change. Goal 10 findings are also required for code changes affecting residential development feasibility, such as parking standards and setbacks.

The staff report for 20-028 recommends its approval. However, the report does not include findings for Statewide Planning Goal 10, describing the effects of the amendments on the City. It should be noted that many of the details that would be contained within Goal 10 findings, such as the number and type of units proposed, are already contained within the staff report. Therefore, it is even more confusing why the staff chose to omit these required findings. Goal 10 findings must demonstrate that the proposed change does not leave the City with less than adequate
residential land supplies in the types, locations, and affordability ranges affected. See Milford $v$. Town of Lakeview, 36 Or LUBA 715, 731 (1999) (rezoning residential land for industrial uses); Gresham v. Fairview, 3 Or LUBA 219 (same); see also, Home Builders Assn. of Lane City. v. City of Eugene, 41 Or LUBA 370, 422 (2002) (subjecting Goal 10 inventories to tree and waterway protection zones of indefinite quantities and locations). Further, because the proposed changes have the potential to add future units to the City, the report should reference the City's HNA to demonstrate the appropriate magnitude of the impacts to the housing supply. Only with a complete analysis quantifying the changes as compared to the HNA and BLI, can FHCO, HLA, and the public understand whether the City is achieving its housing goals through File 20-028.

HLA and FHCO urge the Commission to defer approval of File 20-028 until Goal 10 findings can be made, and the proposal evaluated under the HNA and BLI. Thank you for your consideration. Please provide written notice of your decision to, FHCO, c/o Allan Laze, at 1221 SW Yamhill Street, \#305, Portland, OR 97205 and HLA, coo Jennifer Bragar, at 121 SW Morrison Street, Suite 1850, Portland, OR 97204. Please feel free to email Allan Lazo at information@fhco.org or reach him by phone at (503) 223-8197 ext. 104.

Thank you for your consideration.


Allan Lazo
Executive Director
Fair Housing Council of Oregon
/s/ Jennifer Bragar
Jennifer Bragar
President
Housing Land Advocates
cc: Kevin Young (kevin.young@state.or.us)


[^0]:    19-071 - Detention-2-pond.xls

[^1]:    19-071 - Detention-3-pond.xls

[^2]:    *Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.

    | Commuter Adjustment for Hwy 26: (per Seasonal Trend Table) |  |  |  |  |
    | :---: | :---: | :---: | :---: | :---: |
    | 15-Jul | 1-Aug | Delta | 18-Jul | Adjustment |
    | 0.9119 | 0.9020 | -0.0023 | 0.9049 | 1.014 |

[^3]:    Teragan \& Associates, Inc.
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    Phone: 971.295.4835 • Fax: 503.697.1976
    Email: todd@teragan.com •Website: teragan.com

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[^8]:    Infiltration Test Data Table

[^9]:    Shelley Denison Associate Planner

    City of Sandy
    Development Services Department
    39250 Pioneer Blvd
    Sandy, OR 97055
    503-783-2587
    sdenison@ci.sandy.or.us

[^10]:    

[^11]:    
    

