



CITY OF TUALATIN
 18880 SW Martinazzi Ave
 Tualatin, OR 97062-7092
 Phone: (503) 692-2000
 Fax: (503) 692-0147

**DEVELOPMENT APPLICATION:
 SUBDIVISION/PARTITION/
 PROPERTY LINE ADJUSTMENT**

Application for: Subdivision Partition Property Line Adjustment

Project Address: 8815, 8865, 8915 SW Avery Street; Tualatin Planning District: RL

Project Tax Map Number: 2S, 1W, 26AA Tax Lot Number(s): 400, 500, 790

Property Owner(s): Sharon Brown

Property Owner's Address: 8815 SW Avery Street; Tualatin, OR 97062

Owner's Phone Number: _____ Fax Number: _____

Owner's Email Address: _____

Owner's Signature: _____ Date: _____

Owner's Signature: _____ Date: _____

Owner's Signature: _____

Applicant's Name: Mission Homes Northwest, LLC

Applicant's Address: P.O. Box 1689; Lake Oswego, OR 97035

Applicant's Phone Number: 503-781-1814 Fax Number: _____

Applicant's Email Address: kdalbey@gmail.com

Applicant's Signature: *[Handwritten Signature]* Date: 2/18/15

Consultant's Name: Len Schelsky, PLS

Consultant's Company: Westlake Consultants, Inc.

Consultant's Address: 15115 SW Sequoia Parkway, Suite 150; Tigard, OR 97224

Consultant's Phone Number: 503-684-0652 Fax Number: 503-624-0157

Consultant's Email Address: lschelsky@westlakeconsultants.com

Direct Communication to: Owner Applicant Consultant

Existing Use: Residential Proposed Use: Residential

Total Acreage: 2.97 acres No. of Lots/Parcels: 13

Average Lot/Parcel Width: 60 Average Lot/Parcel Area: 7965 sq. ft.

Subdivision Name (if applicable): Mission Terrace

Receipt Number: _____ Fee: \$ _____ Date: _____
 By: _____ Job Number: _____



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Property Owner's Address: 8815 SW Avery Street; Tualatin, OR 97062

Owner's Phone Number: _____ Fax Number: _____

Owner's Email Address: Juliacross@aol.com

Owner's Signature: Sharon Brown Date: 2-18-15

Owner's Signature: _____ Date: _____

Owner's Signature: _____

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**DEVELOPMENT APPLICATION:
 SUBDIVISION/PARTITION/
 PROPERTY LINE ADJUSTMENT**

ADDITIONAL OWNERS

Project Address: 8865 SW Avery Street; Tualatin, OR 97062

Project Tax Map Number: 2S, 1W, 26AA Tax Lot Number(s): 500

Property Owner's Name: David & Gail Lander

Property Owner's Address: 8865 SW Avery Street; Tualatin, OR 97062

Owner's Phone Number: 503 691-9340 Fax Number: _____

Owner's Email Address: dglander65@gmail.com

Owner's Signature: [Signature] Date: 2/19/15

Owner's Signature: [Signature] Date: _____

Project Address: 8915 SW Avery Street; Tualatin, OR 97062

Project Tax Map Number: 2S, 1W, 26AA Tax Lot Number(s): _____

Property Owner's Name: Ralph & Amalia Salmon

Property Owner's Address: 8915 SW Avery Street; Tualatin, OR 97062

Owner's Phone Number: 971 832 2965 Fax Number: _____

Owner's Email Address: _____

Owner's Signature: Amalia Salmon Date: _____

Owner's Signature: _____ Date: _____

~~Project Address: _____~~

~~Project Tax Map Number: _____ Tax Lot Number(s): _____~~

~~Property Owner's Name: _____~~

~~Property Owner's Address: _____~~

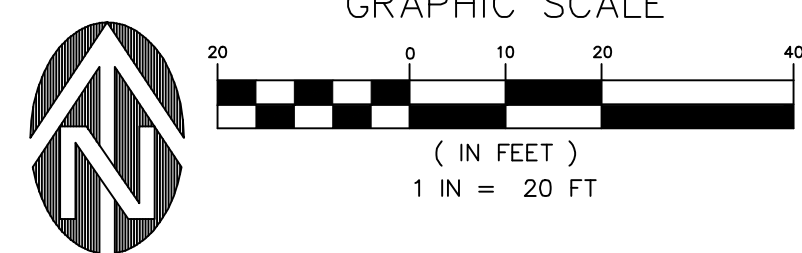
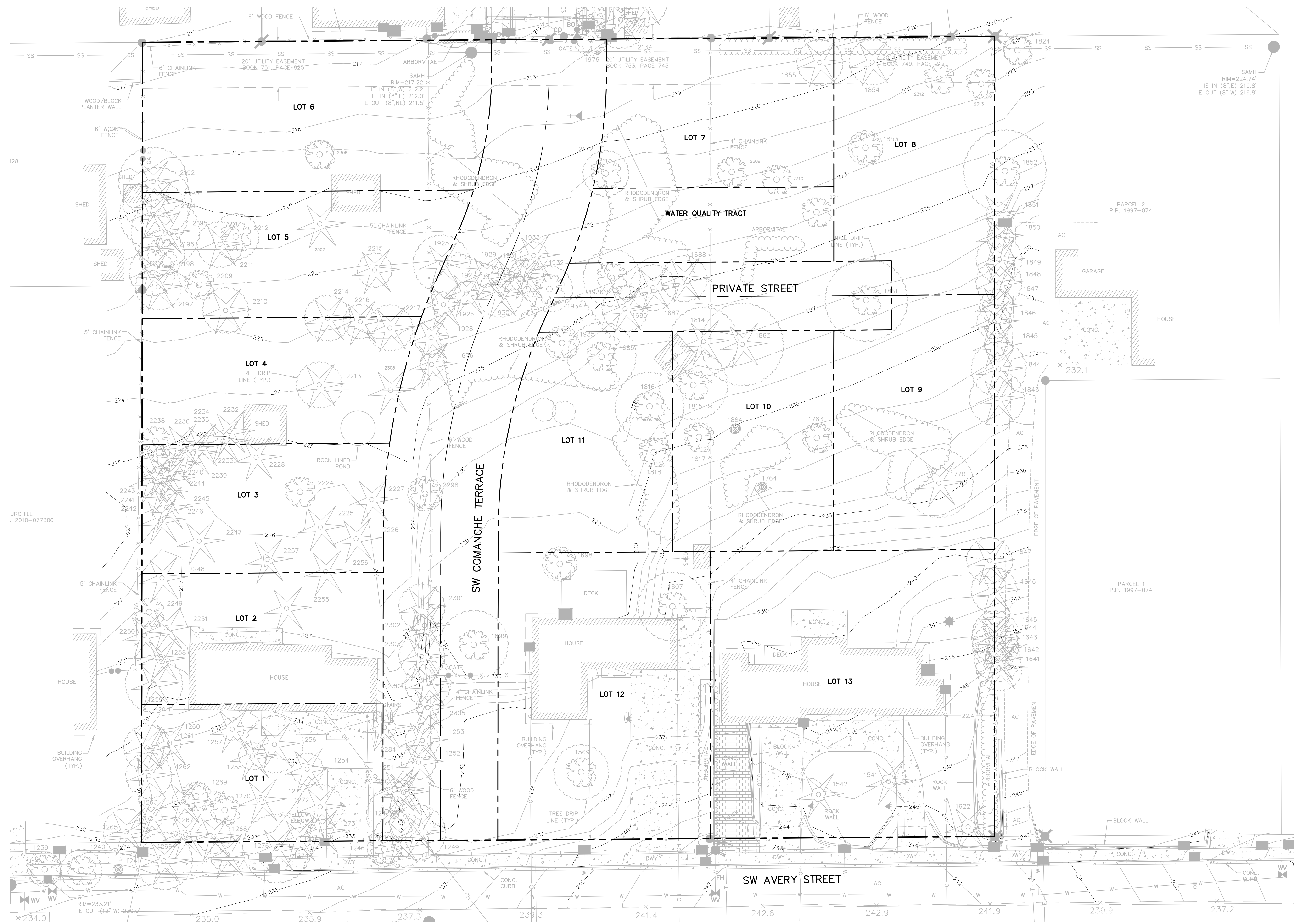
~~Owner's Phone Number: _____ Fax Number: _____~~

~~Owner's Email Address: _____~~

~~Owner's Signature: _____ Date: _____~~

~~Owner's Signature: _____ Date: _____~~

Drawing Name: \\2312-0141\Engin\DAO\Draw\Production\Engineering\231210P200.dwg Jan 13, 2015 4:44pm - AKC



WESTLAKE
 CONSULTANTS INC.
 ENGINEERING SURVEYING PLANNING
 10000 N. CENTRAL AVENUE SUITE 150
 TIGARD, OREGON 97224
 (503) 884-0682
 FAX (503) 884-0157

MISSION TERRACE
 TUALATIN, OR
 EXISTING CONDITIONS PLAN

REGISTERED PROFESSIONAL ENGINEER
 LICENSE NO. 63213PE
 OREGON
 MEMBER IN GOOD STANDING
 ANDREW PAUL
 EXPIRES: 12/31/2016

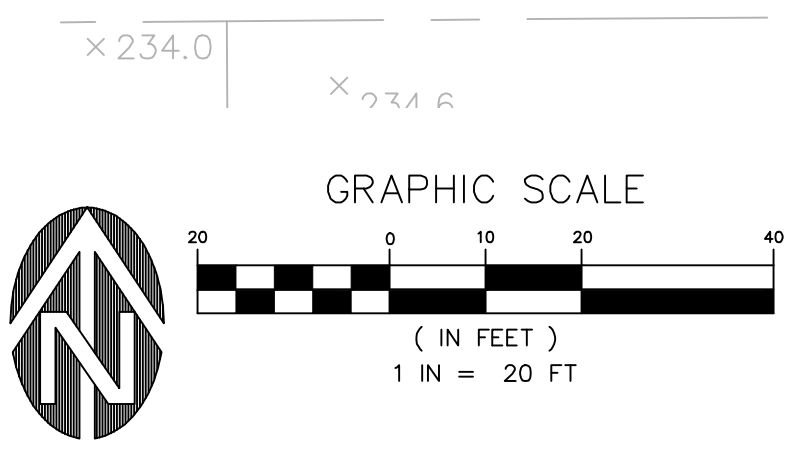
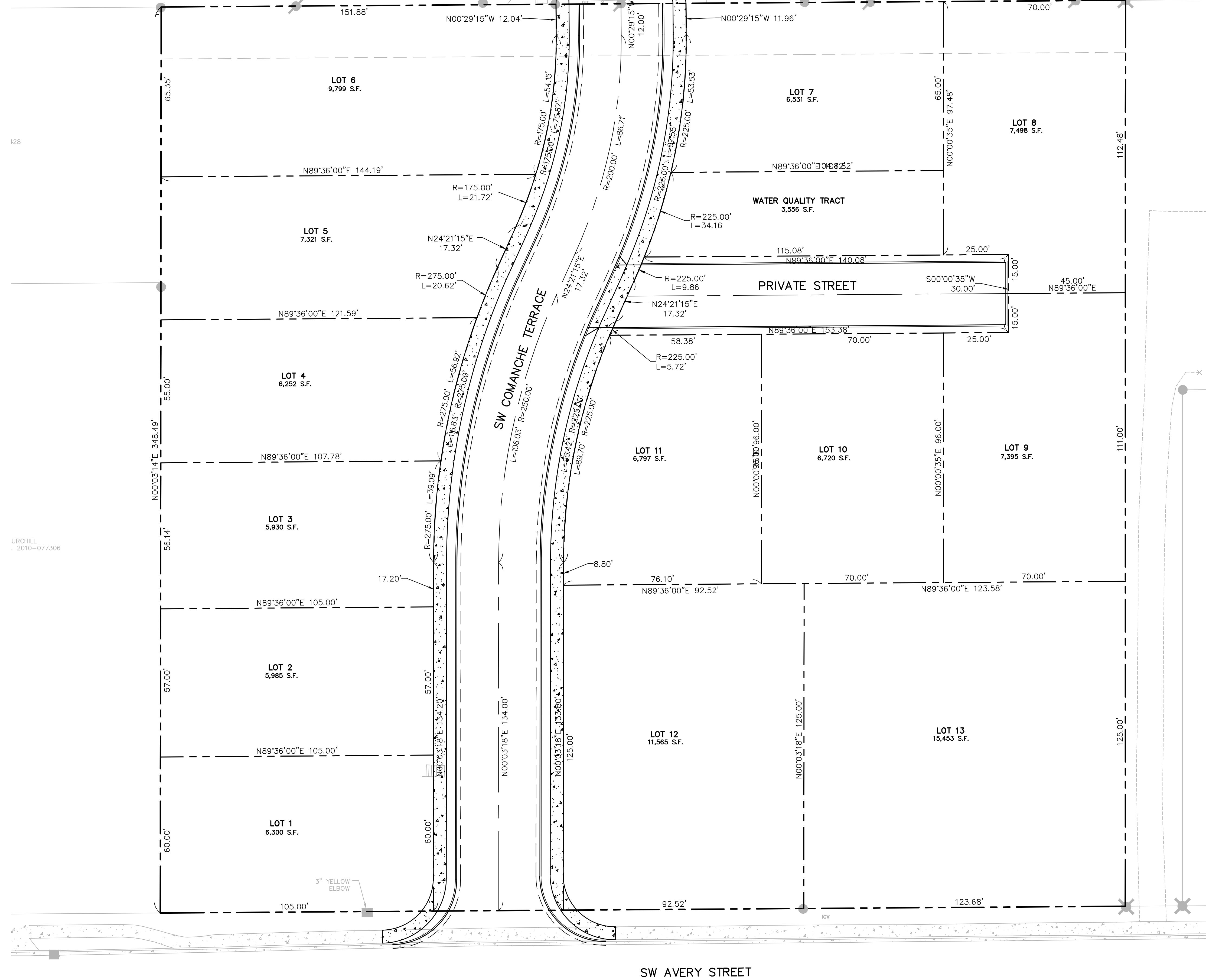
THESE DRAWINGS ARE THE PROPERTY OF WESTLAKE CONSULTANTS INC. (WCI) AND ARE NOT TO BE REPRODUCED IN ANY MANNER EXCEPT WITH THE WRITTEN PERMISSION OF WCI

REVISIONS	DATE	DESCRIPTION	DESIGN	CHECKED

SHEET
P200
 JOB NO. 2312-14

EXHIBIT 1-12-15

Drawing Name: \\12312-0141\Eng\1200\Draw\Production\Engineering\231210P300.dwg Jan 13, 2015 4:27pm - AKC



WESTLAKE
 CONSULTANTS INC.

ENGINEERING • SURVEYING • PLANNING

10000 NE 28TH AVENUE SUITE 150
 TIGARD, OREGON 97224
 (503) 884-0682
 FAX (503) 884-0157

MISSION TERRACE

TUALATIN, OR

PRELIMINARY SITE PLAN

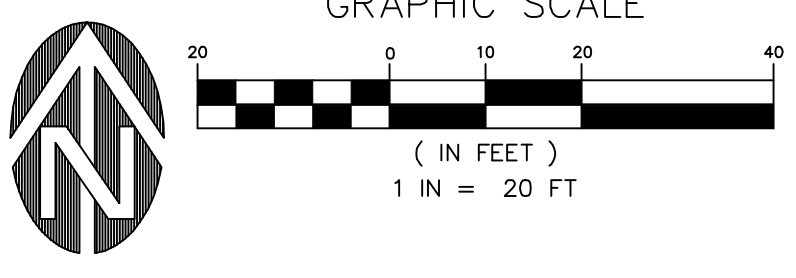
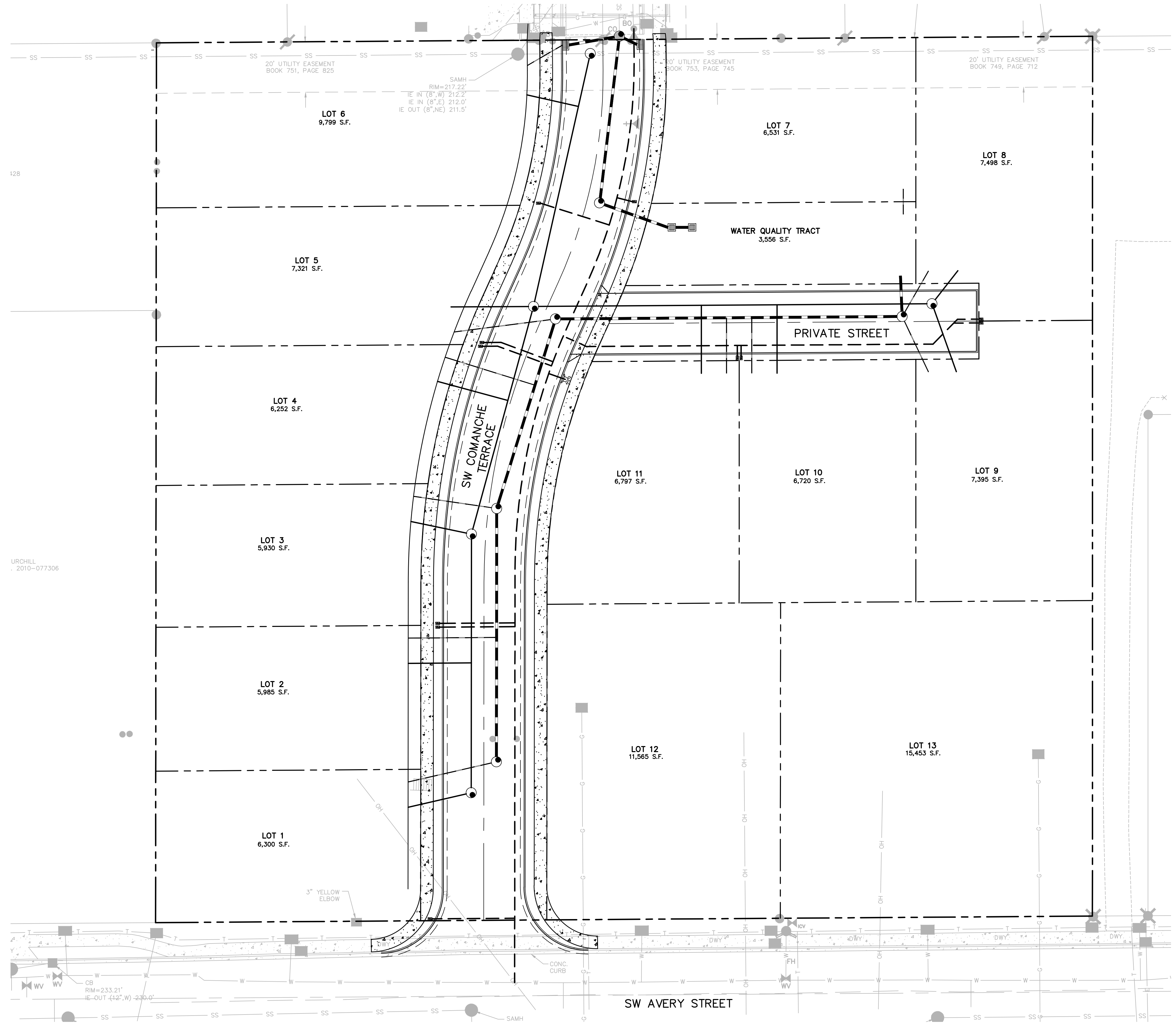
REGISTERED PROFESSIONAL ENGINEER
 6321JPE
 OREGON PROFESSIONAL ENGINEERING BOARD
 ANDREW PAUL
 EXPIRES: 12/31/2016

THESE DRAWINGS ARE THE PROPERTY OF WESTLAKE CONSULTANTS INC. (WCI) AND ARE NOT TO BE REPRODUCED IN ANY MANNER EXCEPT WITH THE WRITTEN PERMISSION OF WCI

REVISIONS	DATE	DESCRIPTION	DESIGN BY	CHECKED BY

SHEET
P300
 JOB NO. 2312-14

Drawing Name: \\2312-0141\Eng\LD\01\001\Production\Engineering\231210P400.dwg Jan 13, 2015 4:44pm - AKC



WESTLAKE
CONSULTANTS INC.

ENGINEERING ♦ SURVEYING ♦ PLANNING

1000 S. OREGON AVENUE SUITE 150 TIGARD, OREGON 97224
(503) 884-0652
FAX (503) 884-0157

MISSION TERRACE
TUALATIN, OR
PRELIMINARY UTILITY PLAN

REGISTERED PROFESSIONAL ENGINEER
63213PE
OREGON
REVISED 12/31/2016
ANDREW PAUL

THESE DRAWINGS ARE THE PROPERTY OF WESTLAKE CONSULTANTS INC. (WCI) AND ARE NOT TO BE REPRODUCED IN ANY MANNER EXCEPT WITH THE WRITTEN PERMISSION OF WCI

REVISIONS	DATE	DESCRIPTION	DESIGN	CHECKED

SHEET
P400
JOB NO. 2312-14

EXHIBIT 1-12-15



Clean Water Services File Number

14-003427

Sensitive Area Pre-Screening Site Assessment

1. Jurisdiction: Tualatin

2. Property Information (example 1S234AB01400)

Tax lot ID(s): 2S1, 26AA, tax lots 400, 500 & 790
Site Address: 8815 SW Avery Street
City, State, Zip: Tualatin, Oregon
Nearest Cross Street: SW 90th Ave

3. Owner Information

Name: Kurt Dalbey
Company: Mission Homes
Address: PO Box 1689
City, State, Zip: Lake Oswego, Or 97035
Phone/Fax: 503-781-1814
E-Mail: kdalbey@gmail.com

4. Development Activity (check all that apply)

- Addition to Single Family Residence (rooms, deck, garage)
- Lot Line Adjustment Minor Land Partition
- Residential Condominium Commercial Condominium
- Residential Subdivision Commercial Subdivision
- Single Lot Commercial Multi Lot Commercial
- Other _____

5. Applicant Information

Name: Lee Leighton
Company: Westlake Consultants
Address: 15115 SW Sequoia Pkwy
City, State, Zip: Tigard, Or 97224
Phone/Fax: 503-684-0652
E-Mail: lleighton@westlakeconsultants.com

6. Will the project involve any off-site work? Yes No Unknown

Location and description of off-site work _____

7. Additional comments or information that may be needed to understand your project _____

This application does NOT replace Grading and Erosion Control Permits, Connection Permits, Building Permits, Site Development Permits, DEQ 1200-C Permit or other permits as issued by the Department of Environmental Quality, Department of State Lands and/or Department of the Army COE. All required permits and approvals must be obtained and completed under applicable local, state, and federal law.

By signing this form, the Owner or Owner's authorized agent or representative, acknowledges and agrees that employees of Clean Water Services have authority to enter the project site at all reasonable times for the purpose of inspecting project site conditions and gathering information related to the project site. I certify that I am familiar with the information contained in this document, and to the best of my knowledge and belief, this information is true, complete, and accurate.

Print/Type Name Lee Leighton Print/Type Title _____

ONLINE SUBMITTAL

Date 12/17/2014

FOR DISTRICT USE ONLY

- Sensitive areas potentially exist on site or within 200' of the site. **THE APPLICANT MUST PERFORM A SITE ASSESSMENT PRIOR TO ISSUANCE OF A SERVICE PROVIDER LETTER.** If Sensitive Areas exist on the site or within 200 feet on adjacent properties, a Natural Resources Assessment Report may also be required.
- Based on review of the submitted materials and best available information Sensitive areas do not appear to exist on site or within 200' of the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider letter as required by Resolution and Order 07-20, Section 3.02.1. All required permits and approvals must be obtained and completed under applicable local, State, and federal law.
- Based on review of the submitted materials and best available information the above referenced project will not significantly impact the existing or potentially sensitive area(s) found near the site. This Sensitive Area Pre-Screening Site Assessment does NOT eliminate the need to evaluate and protect additional water quality sensitive areas if they are subsequently discovered. This document will serve as your Service Provider letter as required by Resolution and Order 07-20, Section 3.02.1. All required permits and approvals must be obtained and completed under applicable local, state and federal law.
- This Service Provider Letter is not valid unless _____ CWS approved site plan(s) are attached.
- The proposed activity does not meet the definition of development or the lot was platted after 9/9/95 ORS 92.040(2). NO SITE ASSESSMENT OR SERVICE PROVIDER LETTER IS REQUIRED.

Reviewed by Laurie Harris Date 12/22/14



SCHOTT & ASSOCIATES
Ecologists & Wetlands Specialists

21018 NE Hwy 99E • P.O. Box 589 • Aurora, OR 97002 • (503) 678-6007 • FAX: (503) 678-6011

January 5, 2015

Clean Water Services
2550 SW Hillsboro Highway
Hillsboro, Oregon 97123

Re: Sensitive Area Pre-Screening Site Assessment for 8815 SW Avery St, Tualatin, OR

Clean Water Services identified sensitive areas potentially existing on the site or within 200' of the site, requiring a more detailed examination of the site. On December 30, 2014, Schott and Associates conducted a site visit on the property located at 8815 SW Avery Street, Washington County, Tualatin, Oregon. The site is located south of SW Comanche Terrace and north of SW Avery Street (T2S, R1W, Section 26AA, Tax Lots # 400, 500 and 790). The three tax lots total 2.97 acres in size. The property is bordered on all sides by residential housing.

The Washington County soils map, Local Wetland Inventory (LWI) for Tualatin, aerial photographs and the natural resource overlay were reviewed for any potential wetlands or sensitive areas. The soils map showed Hillsboro loam 3 to 7 percent slopes and 7-12 percent slopes and Quatama loam 3 to 7 percent slopes. Only the Quatama loam has hydric soil inclusions, which are the Huberly series. The LWI and natural resource overlay do not indicate any potential wetlands or sensitive areas being located on the property or within 200 feet of the property.

One sample plot was taken on site, where Quatama soils were indicated. Sample plot 1 was located in Tax Lot 790 and soils were 10YR 3/2 down to 13 inches. Vegetation was dominated by lawn grasses to the north. To the south was tree canopy largely forested by Douglas fir (*Pseudotsuga menziesii*), a few cherry trees (*Prunus emarginata*) and a madrone tree (*Arbutus menziesii*). The understory of the canopy is litter and bare ground and used as storage for numerous items ranging from old vehicles to junk piles. Tax lots 400 and 500 are maintained landscaped lawns. A man-made, rock lined, landscaped pond was located within Tax Lot 790. This pond is not jurisdictional because it is manmade, isolated and less than an acre in size. Outside of the man-made pond, hydrology was not present in the project area.

The sample plot was placed in the only area indicated to have hydric components on the property. Vegetation met hydric criteria, because most lawn species are hydrophytic. Soils and hydrology did not meet criteria. There were no indications of wetlands or sensitive areas on the property.

Attached is a copy of the soils map, an aerial photograph, the LWI and Natural Resource overlay for the City of Tualatin.

Martin Schott



Hydric Soil List - All Components—DR067-Washington County, Oregon					
Map symbol and map unit name	Component/Local Phase	Comp. pct.	Landform	Hydric status	Hydric criteria met (code)
21B: Hillsboro loam, 3 to 7 percent slopes	Hillsboro	90	Terraces	No	—
21C: Hillsboro loam, 7 to 12 percent slopes	Hillsboro	90	Terraces	No	—
37B: Qualama loam, 3 to 7 percent slopes	Qualama	85	Terraces	No	—
	Huberty	4	Terraces	Yes	2

Soil Survey
 8815 SW Avery Street
 S&A #2345

Schott & Associates
 P.O. Box 589
 Aurora, OR. 97002
 503.678.6007



Aerial Photograph
8815 SW Avery Street
S&A #2345

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007



Photo Point 1. Facing east.



Photo Point 1. Facing south.



Photo Point 2. Pond on TL 790.

Ground Level Photographs
8815 SW Avery Street
S&A #2345

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007



Ground Level Photographs
8815 SW Avery Street
S&A #2345

Schott & Associates
P.O. Box 589
Aurora, OR. 97002
503.678.6007

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: 8815 SW Avery Steef City/County: Tualatin/Washington Sampling Date: December 30, 2014
 Applicant/Owner: Kurt Dalbey State: OR Sampling Point: 1
 Investigator(s): M. Schott/J. Reed Section, Township, Range: 26AA, T2S, R1W
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR): LRRA Lat: 45.372192 Long: 122.768683 Datum: _____
 Soil Map Unit Name: Quatama Loam, 3 to 7 percent slopes NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology Significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			

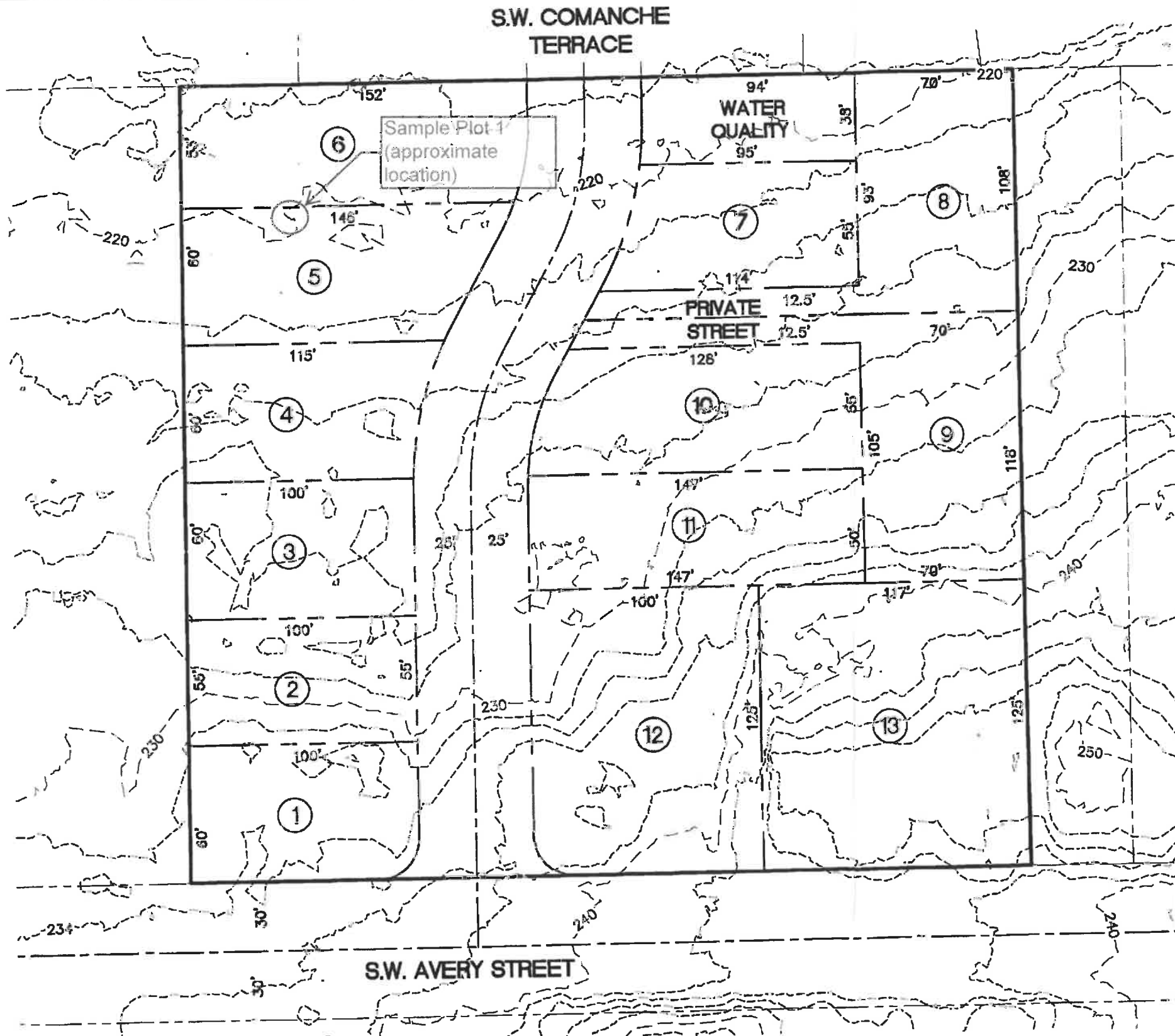
Remarks: The property is landscaped property. This plot was placed in the north end of Tax Lot 790. To the north the area is landscaped lawn grasses. To the south the property is heavily canopied by large trees. However, the understory is bare ground and used as storage for cars, car parts, furniture etc.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>20'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. <u>Pseudotsuga menziesii</u>	40	X	FACU	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>2</u> (A)
2. _____				Total Number of Dominant Species Across All Strata:	<u>3</u> (B)
3. _____				Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>67</u> (A/B)
4. _____					
<u>40</u> = Total Cover					
Sapling/Shrub Stratum (Plot size: _____)				Prevalence Index worksheet:	
1. _____				Total % Cover of:	Multiply by:
2. _____				OBL species _____	x 1 = _____
3. _____				FACW species _____	x 2 = _____
4. _____				FAC species _____	x 3 = _____
5. _____				FACU species _____	x 4 = _____
_____ = Total Cover				UPL species _____	x 5 = _____
				Column Totals: _____	(A) _____ (B) _____
				Prevalence Index = B/A = _____	
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators:	
1. <u>Poa pratensis</u>	40	X	FAC	<input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation	
2. <u>Agrostis capillaris</u>	20	X	FAC	<input checked="" type="checkbox"/> 2 - Dominance Test is >50%	
3. _____				<input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹	
4. _____				<input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
5. _____				<input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹	
6. _____				<input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain)	
7. _____				¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____					
9. _____					
10. _____					
11. _____					
<u>60</u> = Total Cover					
Woody Vine Stratum (Plot size: _____)				Hydrophytic Vegetation Present?	
1. _____				Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____					
_____ = Total Cover					
% Bare Ground in Herb Stratum <u>30</u>					

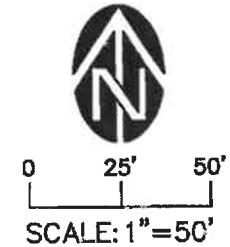
Remarks:

Drawing Name: L:\Promo\P120-077 Cherokee Lan Sub\Work in Progress\P120-077_PRELIM_ALT_D.dwg Dec 10, 2014 - 12:45pm - mpc



PRELIMINARY SITE PLAN

A PORTION OF LOT 12 & LOTS 13-15
 "BRYN GWELED"
 LOCATED IN THE NE 1/4 OF SECTION 26
 TOWNSHIP 2 SOUTH, RANGE 1 WEST, W.M.
 CITY OF TUALATIN
 WASHINGTON COUNTY, OREGON



STREET ADDRESS

8815 SW AVERY STREET
 TUALATIN, OR

PROPERTY OWNER

MISSION HOMES NW, LLC
 PO BOX 1689 LAKE OSWEGO, OR 97035
 PHONE: (503) 570-8828
 FAX: (503) 781-1814
 CONTACT: KURT DALBEY

ENGINEER / SURVEYOR

WESTLAKE CONSULTANTS, INC.
 PACIFIC CORPORATE CENTER
 15115 S.W. SEQUOIA PARKWAY,
 SUITE 150 TIGARD, OREGON 97224
 PHONE: (503) 684-0652
 FAX: (503) 624-0157
 CONTACT: LEN SCHELSKY, PLS

PRELIMINARY SITE PLAN - ALTERNATE D

SCALE: 1"=50'

DATE	10 DEC 14
DRAWN BY	MPC
CHECKED BY	LJS
REVISION	-
JOB NO.	P120-077

WESTLAKE
 CONSULTANTS INC.

ENGINEERING • SURVEYING • PLANNING

PACIFIC CORPORATE CENTER
 15115 S.W. SEQUOIA PARKWAY, SUITE 150 TIGARD, OREGON 97224
 PHONE: (503) 684-0652
 FAX: (503) 624-0157



Mission Terrace – Tualatin, Oregon Tree Assessment Report February 15, 2015

MHA15007

Purpose

This Tree Assessment Report for the Mission Terrace project site located at 8815, 8865, and 8915 SW Avery Street in Tualatin, Oregon, is provided pursuant to City of Tualatin Development Code Chapters 34 and 73. This report describes the existing trees located on the project site, as well as recommendations for tree removal, retention, and protection during construction. This report is based on observations made by International Society of Arboriculture (ISA) Certified Arborist Morgan Holen (PN-6145A) during a site visit conducted on January 28, 2015. A complete description of individual trees is provided in the enclosed tree data.

Scope of Work and Limitations

Morgan Holen & Associates, LLC, was contracted by Mission Homes NW LLC to collect tree inventory data for individual trees measuring eight inches and larger in diameter and to develop an arborist report and tree plan for the project. The site is planned for residential development, including 13 building lots, a water quality tract, private street, and north-south extension of SW Comanche Terrace. A site plan was provided by Westlake Consultants illustrating the location of existing trees and proposed construction impacts.

Visual Tree Assessment (VTA) was performed on individual trees measuring at least eight inches in diameter located across the site and on neighboring properties directly adjacent to the project site. VTA is the standard process whereby the inspector visually assesses the tree from a distance and up close, looking for defect symptoms and evaluating overall condition and vitality of individual trees. Trees were evaluated in terms of general condition and potential construction impacts.

The client may choose to accept or disregard the recommendations contained herein, or seek additional advice. Neither this author nor Morgan Holen & Associates, LLC, have assumed any responsibility for liability associated with the trees on or adjacent to this site.

General Description

Each of the three existing lots includes one single family residence and relatively large backyards. As described in the enclosed tree data, the existing trees are variable in species, size and condition.

At 8815 SW Avery Street, the best existing trees include relatively large evergreens along the eastern and northern property boundaries; this property also includes a mix of smaller ornamental landscape trees and fruit trees. At 8865 SW Avery Street, the existing trees are primarily located in the rear of the lot and are in generally good condition with a diverse mix of species that have been well-maintained over time. The existing trees at 8915 SW Avery Street are primarily even-aged stand grown Douglas-firs (*Pseudotsuga menziesii*). As a group, the stand is in generally good condition, but individual trees are in variable condition because of natural stand dynamics. Removal of individual trees from the stand is likely to result in significant negative impacts to the protection of adjacent trees; therefore, these stand grown trees are most suitable for preservation as an intact group which is challenging considering the proposed site development.

In all, 144 trees measuring eight inches and larger in diameter were inventoried, including 118 (82%) on-site trees, 16 (11%) off-site trees, and 10 (7%) trees located on property boundaries. Douglas-fir accounts for 45% of the inventoried trees, but 33 different tree species were identified. Table 1 provides a summary of the number of trees by species.

Table 1. Number of Inventoried Trees by Species – Mission Terrace, Tualatin.

Common Name	Species Name	On-	Off-	On	Total	%
Atlas cedar	<i>Cedrus atlantica</i>	2			2	1.39%
Austrian pine	<i>Pinus nigra</i>	1			1	0.69%
beech	<i>Fagus spp.</i>	1			1	0.69%
bigleaf maple	<i>Acer macrophyllum</i>	1	1		2	1.39%
cherry	<i>Prunus spp.</i>	4	2		6	4.17%
deodar cedar	<i>Cedrus deodara</i>	1			1	0.69%
Douglas-fir	<i>Pseudotsuga menziesii</i>	52	9	4	65	45.14%
English hawthorn	<i>Crataegus monogyna</i>	1			1	0.69%
English walnut	<i>Juglans regia</i>	1			1	0.69%
European white birch	<i>Betula pendula</i>		1		1	0.69%
incense cedar	<i>Calocedrus decurrens</i>		1		1	0.69%
Japanese maple	<i>Acer japonicum</i>	1			1	0.69%
Japanese stewartia	<i>Stewartia pseudocamellia</i>	1			1	0.69%
larch	<i>Larix occidentalis</i>	1			1	0.69%
lodgepole pine	<i>Pinus contorta</i>	7	1		8	5.56%
madrone	<i>Arbutus menziesii</i>	2			2	1.39%
magnolia	<i>Magolia spp.</i>	2			2	1.39%
maple	<i>Acer spp.</i>			1	1	0.69%
Norway maple	<i>Acer platanoides</i>	1			1	0.69%
palm	<i>Arecaceae</i>	3			3	2.08%
pear	<i>Pyrus spp.</i>	1			1	0.69%
ponderosa pine	<i>Pinus ponderosa</i>	7			7	4.86%
princess tree	<i>Paulownia tomentosa</i>	2			2	1.39%
red oak	<i>Quercus rubra</i>	1			1	0.69%
Scots pine	<i>Pinus sylvestris</i>	4			4	2.78%
silver maple	<i>Acer saccharinum</i>	1			1	0.69%
spruce	<i>Picea spp.</i>	7			7	4.86%
sweet cherry	<i>Prunus avium</i>	2			2	1.39%
sweetgum	<i>Liquidambar styraciflua</i>	2			2	1.39%
tuliptree	<i>Liriodendron tulipifera</i>	1			1	0.69%
unknown	<i>unknown</i>	1			1	0.69%
western hemlock	<i>Tsuga heterophylla</i>	1			1	0.69%
western redcedar	<i>Thuja plicata</i>	6	1	5	12	8.33%
Total		118	16	10	144	100%
Percent of Total		82%	11%	7%	100%	

Tree Plan Recommendations

Prior to preparation of this report we coordinated with Mission Homes and Westlake Consultants in regard to the best existing trees and potential construction impacts, and reviewed and considered the approval criteria identified in the Tualatin Development Code Section 34.230 which requires a detailed justification for proposed tree removal. The enclosed tree data and this written report, along with the proposed grading and utility plans address the relevant criteria.

As provided in the enclosed tree data, individual trees were rated in terms of general condition as either: 1-dead or hazardous, 2-poor, 3-fair, 4-good, or 5-excellent. Individual trees recommended for removal were also assigned a reason for removal (shown for each tree to be removed under “criteria” in the tree inventory data table) based on the removal criteria as follows:

Criteria for Tree Removal per TDC 34.230:

- **D1** – Diseased and the disease threatens the structural integrity of the tree.
- **D2** – Diseased and the disease permanently and severely diminishes the aesthetic value of the tree.
- **D3** – Diseased and the continued retention of the tree could result in other trees being infected with a disease that threatens either their structural integrity or aesthetic value.
- **H** – Hazardous.
- **C** – Construction necessitates tree removal.

Table 2 provides a summary of the number of inventoried trees by general condition rating and treatment recommendation.

Table 2. Number of Inventoried Trees by Condition Rating and Treatment Recommendation.

Treatment Recommendation	Condition Rating					Total	%
	1-Dead/Haz	2-Poor	3-Fair	4-Good	5-Excellent		
Retain	0	4	8	17	8	37	26%
Remove for Construction	4	11	54	32	6	107	74%
Total	4	15	62	49	14	144	100%
Percent	3%	10%	43%	34%	10%		

Of the 144 inventoried trees, 37 (26%) are recommended for retention with tree protection fencing established at the dripline or as otherwise directed by the project arborist. Twelve of these trees are located on-site, 16 are located off-site but adjacent to proposed development, and nine are located on property boundaries. The trees planned for preservation on the west side of the project site should be re-evaluated at the time of clearing in terms of suitability for preservation with removal of adjacent stand grown trees, but the potential for preservation of these particular trees seems likely; these trees are good candidates for retention with adjacent tree removal because they are predominantly edge grown, have relatively good live crown ratios and height to diameter ratios, which are indicators of stability. Seven of the trees recommended for retention are also recommended for pruning and additional pruning may be recommended by the project arborist following clearing and once the site is staked and prepared for construction.

The remaining 107 (74%) trees are recommended for removal, including 106 on-site trees and one street tree located on the northern property boundary. Tree removal is only recommended because of construction and not based on any of the other criteria of TDC 34.230. Construction necessitating tree removal includes site grading and construction of building lots, streets, a water quality facility, and other site improvements. Please refer to site plan drawings for specific construction impacts to individual trees. Note that six of the trees recommended for removal are identified as being suitable for transplanting, as provided in the tree data.

Tree Protection Standards

The trees recommended for preservation will need special consideration to assure their protection during construction. We recommend a preconstruction meeting with the owner, contractors, and project arborist to review tree protection measures and address questions or concerns on site. Tree protection measures include:

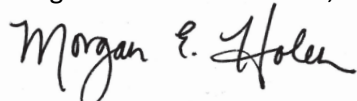
- **Pruning.** The project arborist should help identify whether pruning is necessary once trees recommended for removal have been removed and the site is staked and prepared for construction. Tree removal and pruning should be performed by a Qualified Tree Service.
- **Protection Fencing.** Trees to be preserved should be protected by installation of tree protection fencing to prevent injury to tree trunks or roots, or soil compaction within the root protection area, which generally coincides with tree driplines. Fences should be 6-foot high steel on concrete blocks or orange plastic construction fencing on metal stakes. The project arborist should determine the exact location and type of tree protection fencing. Trees located more than 30-feet from construction activity shall not require fencing.
- **Tree Protection Zone.** Without authorization from the Project Arborist, none of the following should occur beneath the dripline of any protected tree:
 1. Grade change or cut and fill;
 2. New impervious surfaces;
 3. Utility or drainage field placement;
 4. Staging or storage of materials and equipment; or
 5. Vehicle maneuvering.

Root protection zones may be entered for tasks like surveying, measuring, and, sampling. Fences must be closed upon completion of these tasks. Construction that is necessary beneath protected tree driplines should be performed under the on-site supervision of the project arborist.

- **Excavation beneath Protected Tree Driplines.** Excavation beneath tree driplines should be avoided if alternatives are available. If excavation is unavoidable, the developer should coordinate with the project arborist to evaluate the proposed excavation to determine methods to minimize impacts to trees. This can include tunneling, hand digging, or other approaches.
- **Quality Assurance.** The project arborist should supervise proper execution of this plan during construction and is available on-call. It is the developer's responsibility to coordinate with the project arborist as needed.
- **Final Report.** After the project has been completed, the project arborist should provide a final report that describes the measures needed to maintain and protect the remaining trees.

Please contact us if you have questions or need any additional information. Thank you for choosing Morgan Holen & Associates, LLC, to provide consulting arborist services for the Mission Terrace project.

Thank you,
Morgan Holen & Associates, LLC



Morgan E. Holen, Owner
ISA Certified Arborist, PN-6145A
ISA Tree Risk Assessment Qualified
Forest Biologist

Enclosures: MHA15007 Mission Terrace – Tree Data 1-28-15

No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
1239	cherry	<i>Prunus</i> spp.	12	12	2	street tree, poor structure, hollows with decay, dead and broken branches					X	X
1240	cherry	<i>Prunus</i> spp.	2x10	12	2	street tree, poor structure, hollows with decay, dead and broken branches					X	X
1247	spruce	<i>Picea</i> spp.	24	25	3	multiple leaders, codominant crown class, mushrooms at base	X	C				
1248	lodgepole pine	<i>Pinus contorta</i>	14	0	1	dead	X	C				
1249	spruce	<i>Picea</i> spp.	24	25	2	codominant crown class, multiple leaders, mushrooms at base	X	C				
1250	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	18	4	codominant crown class, multiple leaders, mushrooms at base	X	C				
1251	ponderosa pine	<i>Pinus ponderosa</i>	28	20	4	codominant crown class, forked top, mushrooms at base	X	C				
1252	spruce	<i>Picea</i> spp.	20	12	2	poor structure, multiple leaders, dead and broken branches	X	C				
1253	Douglas-fir	<i>Pseudotsuga menziesii</i>	26	16	4	codominant crown class, in row	X	C				
1254	western hemlock	<i>Tsuga heterophylla</i>	2x14	10	3	some included bark, high live crown	X	C				
1255	western redcedar	<i>Thuja plicata</i>	10	10	3	one-sided crown	X	C				
1256	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	18	4	no major defects	X	C				
1257	Scots pine	<i>Pinus sylvestris</i>	15	12	3	small high live crown	X	C				
1258	Scots pine	<i>Pinus sylvestris</i>	16	0	2	mostly dead, very poor structure	X	C				
1259	Douglas-fir	<i>Pseudotsuga menziesii</i>	38	20	4	dominant crown class, spur leader, no major defects, tree house				X	X	
1260	Douglas-fir	<i>Pseudotsuga menziesii</i>	36	16	4	codominant crown class	X	C				
1261	western redcedar	<i>Thuja plicata</i>	10	16	3	one-sided crown	X	C				
1262	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	16	3	codominant leaders, included bark	X	C				
1263	western redcedar	<i>Thuja plicata</i>	12	12	3	one-sided crown	X	C				
1264	western redcedar	<i>Thuja plicata</i>	11	8	4	no major defects	X	C				
1265	incense cedar	<i>Calocedrus decurrens</i>	14	15	3	one-sided crown to west					X	X
1266	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	26	4	southern buttress restricted by sidewalk/street, infrastructure damage, one-sided crown to south					X	X

No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
1267	unknown	<i>unknown</i>	10	0	1	dead	X	C				
1268	Douglas-fir	<i>Pseudotsuga menziesii</i>	26	12	4	codominant crown class					X	X
1269	madrone	<i>Arbutus menziesii</i>	2x16	16	4	interior of stand, high live crown, few dead branches	X	C				
1270	Douglas-fir	<i>Pseudotsuga menziesii</i>	17	10	3	codominant crown class, old broken top	X	C				
1272	Douglas-fir	<i>Pseudotsuga menziesii</i>	16,24	16	3	included bark with resin flow	X	C				
1273	spruce	<i>Picea spp.</i>	12	14	3	poor structure, dead and broken branches, one-sided crown	X	C				
1274	Douglas-fir	<i>Pseudotsuga menziesii</i>	20	14	3	codominant crown class, one-sided crown					X	
1275	Douglas-fir	<i>Pseudotsuga menziesii</i>	34	28	4	no major defects, one-sided crown, codominant crown class, infrastructure damage					X	X
1276	lodgepole pine	<i>Pinus contorta</i>	10	18	3	poor structure, one-sided crown, dead and broken branches					X	X
1541	palm	<i>Arecaceae</i>	8	5	5	no major defects	X	C	X			
1542	palm	<i>Arecaceae</i>	8	4	5	no major defects	X	C	X			
1569	red oak	<i>Quercus rubra</i>	20	24	5	no major defects					X	
1622	palm	<i>Arecaceae</i>	8	5	5	no major defects	X	C	X			
1641	western redcedar	<i>Thuja plicata</i>	48	18	5	codominant stems, appears stable					X	X
1642	western redcedar	<i>Thuja plicata</i>	12	18	4	intermediate crown class					X	partially
1643	western redcedar	<i>Thuja plicata</i>	20	18	5	codominant crown class					X	partially
1644	western redcedar	<i>Thuja plicata</i>	22	18	5	codominant crown class					X	partially
1645	western redcedar	<i>Thuja plicata</i>	16	18	5	codominant crown class					X	partially
1646	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	20	5	no major defects				X	X	partially
1647	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	20	5	no major defects				X	X	
1676	Austrian pine	<i>Pinus nigra</i>	16	16	4	crown asymmetry	X	C				
1685	tuliptree	<i>Liriodendron tulipifera</i>	32	22	5	codominant leaders, some included bark, aerial inspection and prune if retained	X	C				
1686	deodar cedar	<i>Cedrus deodara</i>	30	18	4	old broken top, forked new leaders	X	C				
1687	Atlas cedar	<i>Cedrus atlantica</i>	28	18	4	codominant leaders, included bark	X	C				
1688	larch	<i>Larix occidentalis</i>	9	14	3	poor structure, one-sided crown	X	C				

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No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
1698	magnolia	<i>Magolia</i> spp.	20	20	4	moderate structure					X	
1699	silver maple	<i>Acer saccharinum</i>	24	35	3	multiple leaders at 8', one-sided crown, few dead and broken branches, branch decay	X	C				
1763	cherry	<i>Acer saccharinum</i>	10,2x12	18	3	moderate structure, trunk damage	X	C				
1770	Douglas-fir	<i>Pseudotsuga menziesii</i>	42	24	4	some history of branch failure	X	C				
1807	Japanese maple	<i>Acer japonicum</i>	2x18	16	4	some decay	X	C	X			
1814	spruce	<i>Picea</i> spp.	18	10	3	dead branches, small live crown	X	C				
1815	beech	<i>Fagus</i> spp.	27	22	5	no major defects	X	C				
1816	sweetgum	<i>Liquidambar styraciflua</i>	24	18	3	dead and broken branches, one-sided crown, moderate structure	X	C				
1817	Japanese Stewartia	<i>Stewartia pseudocamellia</i>	8	10	5	no major defects	X	C	X			
1818	magnolia	<i>Magolia</i> spp.	3x8	16	4	moderate structure, well-maintained	X	C				
1824	European white birch	<i>Betula pendula</i>	10	12	3	invasive species, poor structure					X	X
1843	western redcedar	<i>Thuja plicata</i>	40	18	4	codominant stems, included bark, suspect basal decay					X	partially
1844	Douglas-fir	<i>Pseudotsuga menziesii</i>	34	22	4	dense row					X	X
1845	Douglas-fir	<i>Pseudotsuga menziesii</i>	14	20	3	dense row					X	partially
1846	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	22	3	dense row					X	partially
1847	Douglas-fir	<i>Pseudotsuga menziesii</i>	18	20	3	dense row					X	partially
1848	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	22	4	dense row					X	X
1849	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	22	3	dense row					X	X
1850	Douglas-fir	<i>Pseudotsuga menziesii</i>	20	10	2	broken top, habitat value					X	X
1851	Douglas-fir	<i>Pseudotsuga menziesii</i>	20	8	2	dead and broken branches, poor structure, thin crown					X	X
1852	bigleaf maple	<i>Acer macrophyllum</i>	48	30	4	moderate structure, some decay					X	X
1853	cherry	<i>Prunus</i> spp.	24	14	3	decay, fairly well-maintained	X	C				
1854	ponderosa pine	<i>Pinus ponderosa</i>	26	20	5	no major defects, some gall rust					X	
1855	ponderosa pine	<i>Pinus ponderosa</i>	26	20	4	codom leaders, some included bark, some gall rust					X	
1861	English walnut	<i>Juglans regia</i>	24	28	4	codominant leaders, some included bark	X	C				

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No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
1863	Douglas-fir	<i>Pseudotsuga menziesii</i>	48	26	4	no major defects, some crown asymmetry	X	C				
1925	spruce	<i>Picea spp.</i>	20	16	4	no major defects, few dead lower limbs	X	C				
1926	Scots pine	<i>Pinus sylvestris</i>	10	6	3	small high live crown, dieback	X	C				
1927	Scots pine	<i>Pinus sylvestris</i>	17	10	3	poor structure, high live crown	X	C				
1928	lodgepole pine	<i>Pinus contorta</i>	11	14	3	poor structure, dead and broken branches, one-sided crown, 18-degree lean northeast	X	C				
1929	ponderosa pine	<i>Pinus ponderosa</i>	14	10	3	small high live crown, one-sided	X	C				
1930	ponderosa pine	<i>Pinus ponderosa</i>	20	18	4	codominant leaders, crown asymmetry, natural lean	X	C				
1931	ponderosa pine	<i>Pinus ponderosa</i>	14	8	3	small high live crown, one-sided	X	C				
1932	ponderosa pine	<i>Pinus ponderosa</i>	12	6	2	very small high live crown	X	C				
1933	lodgepole pine	<i>Pinus contorta</i>	16	12	3	one-sided crown	X	C				
1934	Norway maple	<i>Acer platanoides</i>	18	16	3	invasive species, moderate structure, trunk wound, decay	X	C				
1935	princess tree	<i>Paulownia tomentosa</i>	8	12	3	invasive species	X	C				
1936	sweetgum	<i>Liquidambar styraciflua</i>	20	18	3	one-sided crown	X	C				
1976	maple	<i>Acer spp.</i>	10	14	2	poor crown structure, advanced decay in crown	X	C				partially
2134	Douglas-fir	<i>Pseudotsuga menziesii</i>	34	22	4	codominant crown class, minor asymmetry, no major defects					X	X
2172	princess tree	<i>Paulownia tomentosa</i>	36	25	3	invasive species, poor structure, decay	X	C				
2192	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	18	3	old broken top or topping cut, new large diameter off-center leaders with hazard potential, dense row	X	C				
2193	Douglas-fir	<i>Pseudotsuga menziesii</i>	22	118	3	old broken top or topping cut, new large diameter off-center leaders with hazard potential, dense row	X	C				
2194	Douglas-fir	<i>Pseudotsuga menziesii</i>	16	14	3	old broken top or topping cut, new large diameter off-center leaders with hazard potential, dense row	X	C				

No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
2195	Douglas-fir	<i>Pseudotsuga menziesii</i>	20	14	3	old broken top or topping cut, new large diameter off-center leaders with hazard potential, dense row	X	C				
2196	Douglas-fir	<i>Pseudotsuga menziesii</i>	22	14	3	old broken top or topping cut, new large diameter off-center leaders with hazard potential, dense row	X	C				
2197	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	14	4	codominant crown class				X	X	
2198	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	14	4	codominant crown class				X	X	
2209	madrone	<i>Arbutus menziesii</i>	10	16	4	no major defects, few dead and broken branches	X	C				
2210	Douglas-fir	<i>Pseudotsuga menziesii</i>	40	22	4	codominant stems at 6' with included bark, forked leaders	X	C				
2211	lodgepole pine	<i>Pinus contorta</i>	14	16	3	poor structure, dead and broken branches, broken top, forked leaders	X	C				
2212	sweet cherry	<i>Prunus avium</i>	9	16	3	invasive species, poor structure	X	C				
2213	Douglas-fir	<i>Pseudotsuga menziesii</i>	36	22	4	interior of stand, not suitable for preservation with clearing	X	C				
2214	Douglas-fir	<i>Pseudotsuga menziesii</i>	42	24	4	codominant crown class, multiple leaders	X	C				
2215	spruce	<i>Picea spp.</i>	24	14	4	few dead branches	X	C				
2216	Douglas-fir	<i>Pseudotsuga menziesii</i>	19	14	4	codominant crown class	X	C				
2217	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	16	4	codominant leaders, included bark	X	C				
2224	sweet cherry	<i>Prunus avium</i>	11	8	2	invasive species, dead and broken branches, broken leader	X	C				
2225	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	14	4	codominant crown class, not suitable for preservation with clearing	X	C				
2226	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	14	4	codominant crown class, not suitable for preservation with clearing	X	C				
2227	Douglas-fir	<i>Pseudotsuga menziesii</i>	34	14	4	codominant crown class, not suitable for preservation with clearing	X	C				
2228	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	18	3	codominant crown class, one-sided crown, resin flow 0-6' east face	X	C				
2232	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	12	3	codominant crown class, one-sided crown, self-correcting lean	X	C				

No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
2233	Douglas-fir	<i>Pseudotsuga menziesii</i>	15	8	3	intermediate crown class	X	C				
2233.1	Douglas-fir	<i>Pseudotsuga menziesii</i>	20	14	3	codominant crown class, high live crown	X	C				
2234	Douglas-fir	<i>Pseudotsuga menziesii</i>	16	8	3	intermediate crown class, small high live crown	X	C				
2235	Douglas-fir	<i>Pseudotsuga menziesii</i>	14	8	3	intermediate crown class, small high live crown	X	C				
2235.1	Douglas-fir	<i>Pseudotsuga menziesii</i>	18	10	3	small high live crown	X	C				
2235.2	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	18	3	interior of stand, high live crown, not suitable for preservation with clearing	X	C				
2236	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	26	3	codominant crown class, very one-sided crown	X	C				
2238	English hawthorn	<i>Crataegus monogyna</i>	2x8	12	2	invasive species, poor structure, one-sided crown, dead and broken branches, decay	X	C				
2239	Douglas-fir	<i>Pseudotsuga menziesii</i>	16	8	3	codominant crown class, small high live crown	X	C				
2240	Douglas-fir	<i>Pseudotsuga menziesii</i>	10	0	1	dead	X	C				
2241	Douglas-fir	<i>Pseudotsuga menziesii</i>	10	0	2	suppressed, not viable	X	C				
2242	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	16	4	codominant crown class, one-sided crown to west	X	C				
2243	cherry	<i>Prunus spp.</i>	3x8	0	1	dead, decay	X	C				
2244	Douglas-fir	<i>Pseudotsuga menziesii</i>	18	8	3	codominant crown class, poor structure, codominant leaders with included bark, high live crown	X	C				
2245	Douglas-fir	<i>Pseudotsuga menziesii</i>	18	10	3	codominant crown class, high live crown	X	C				
2246	Douglas-fir	<i>Pseudotsuga menziesii</i>	28	12	3	codominant crown class, poor structure, codominant leaders with included bark, high live crown	X	C				
2247	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	12	3	codominant crown class, old broken top	X	C				
2248	Douglas-fir	<i>Pseudotsuga menziesii</i>	40	16	4	dominant crown class, one-sided to west				X	X	
2249	bigleaf maple	<i>Acer macrophyllum</i>	24	14	2	overtopped by firs, poor structure	X	C				
2250	western redcedar	<i>Thuja plicata</i>	10	6	4	no major defects					X	

No.	Common Name	Species Name	DBH ¹	C-Rad ²	Cond ³	Comments	Remove	Criteria ⁴	Transplant	Prune	Retain	Off-Site
2251	Douglas-fir	<i>Pseudotsuga menziesii</i>	30	18	4	dominant crown class, no major defects				X	X	
2255	Atlas cedar	<i>Cedrus atlantica</i>	28	12	3	multiple leaders, relatively thin crown	X	C				
2256	Douglas-fir	<i>Pseudotsuga menziesii</i>	22	14	4	codominant crown class	X	C				
2257	Douglas-fir	<i>Pseudotsuga menziesii</i>	32	12	4	codominant crown class	X	C				
2284	lodgepole pine	<i>Pinus contorta</i>	15	6	2	dead branches, very small high live crown	X	C				
2298	cherry	<i>Prunus spp.</i>	8	10	3	poor structure	X	C				
2301	Douglas-fir	<i>Pseudotsuga menziesii</i>	26	12	3	dead and broken branches, high live crown	X	C				
2302	lodgepole pine	<i>Pinus contorta</i>	12	0	2	mostly dead, not viable	X	C				
2303	Douglas-fir	<i>Pseudotsuga menziesii</i>	26	18	4	codominant crown class, dense row	X	C				
2304	Douglas-fir	<i>Pseudotsuga menziesii</i>	26	18	4	codominant crown class, dense row	X	C				
2305	western redcedar	<i>Thuja plicata</i>	8	8	3	mechanical damage lower trunk	X	C				
2306	pear	<i>Pyrus spp.</i>	12	14	3	unmaintained	X	C				
2307	Douglas-fir	<i>Pseudotsuga menziesii</i>	24	15	3	old broken top, crown asymmetry	X	C				
2308	lodgepole pine	<i>Pinus contorta</i>	12	10	3	one-sided high live crown	X	C				

¹DBH is tree diameter measured at 4.5-feet above the ground level in inches; multiple trunks splitting below DBH are measured separately and individual trunk measurements are separated by a comma, except multiple trunks of the same size are indicated with an asterisk (quantity x size).

²C-Rad is crown radius measured in feet.

³Cond is an arborist assigned rating to generally describe the condition of individual trees as follows-

1: Dead / Hazardous; 2: Poor Condition; 3: Fair Condition; 4: Good Condition; and 5: Excellent Condition

⁴Criteria provides justification for the proposed tree removal (per TDC 34.230):

D1: Diseased and the disease threatens the structural integrity of the tree;

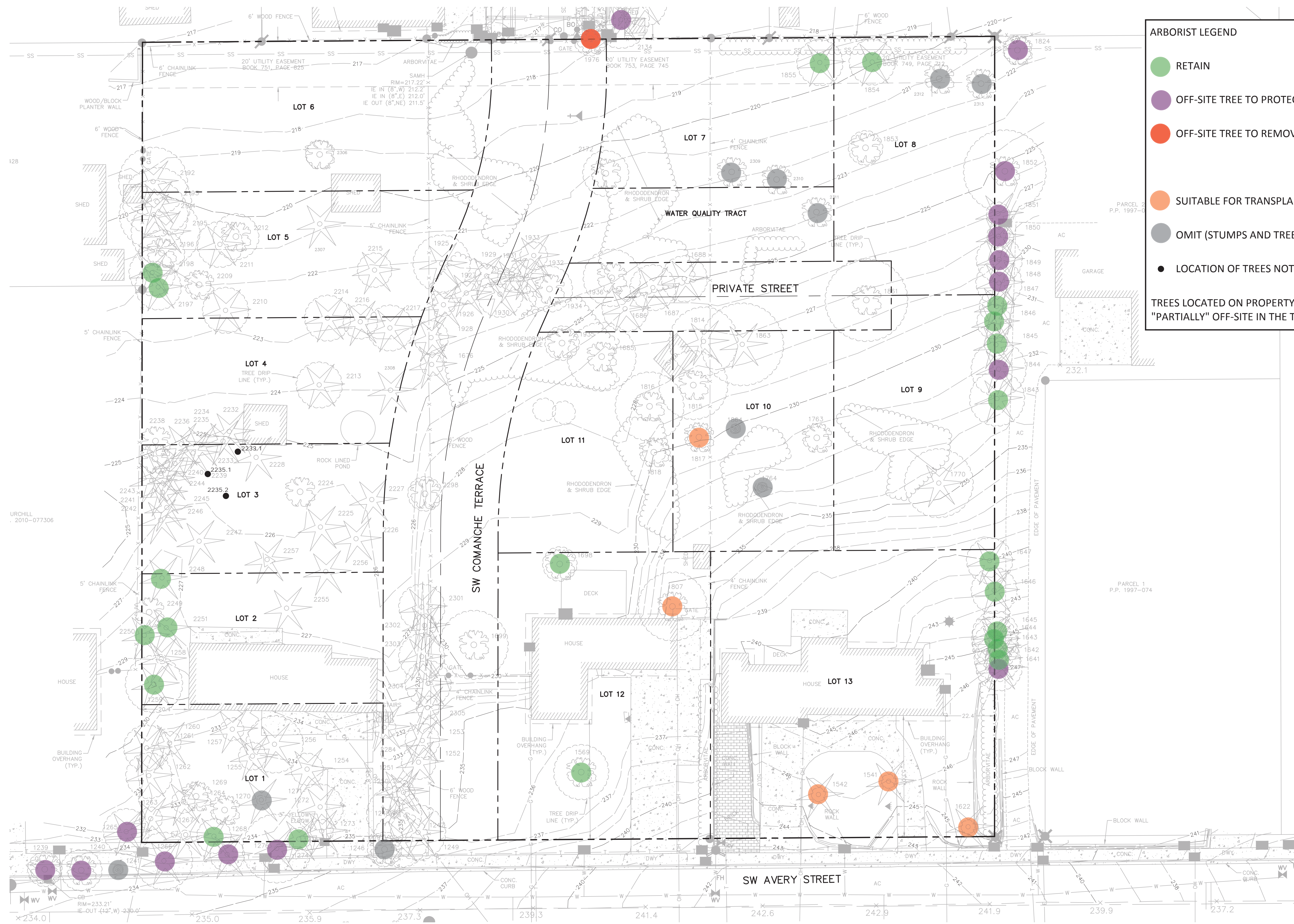
D2: Diseased and the disease permanently and severely diminishes the aesthetic value of the tree; or

D3: Diseased and the continued retention of the tree could result in other trees being infected with a disease that threatens either their structural integrity or aesthetic value.

H: Hazardous.

C: Construction necessitates tree removal (1-Building Lot; 2-Street; 3-Water Quality Facility; 4-Other Grading/Site Improvements)

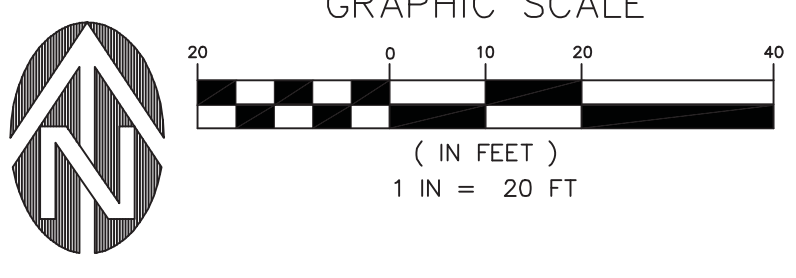
Drawing Name: \\12312-0141\Engin\DWG\Production\Engineering\231210P200.dwg Jan 13, 2015 4:44pm - AKC



ARBORIST LEGEND

- RETAIN
- OFF-SITE TREE TO PROTECT
- OFF-SITE TREE TO REMOVE
- SUITABLE FOR TRANSPLANTING
- OMIT (STUMPS AND TREES SMALLER THAN 8")
- LOCATION OF TREES NOT SURVEYED

TREES LOCATED ON PROPERTY LINES ARE NOTED AS "PARTIALLY" OFF-SITE IN THE TREE DATA



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MISSION TERRACE
 TUALATIN, OR
 EXISTING CONDITIONS PLAN

REGISTERED PROFESSIONAL ENGINEER
 63213PE
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 ANDREW PAUL
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REVISIONS	DATE	DESCRIPTION	DESIGN	CHECKED

SHEET
P200
 JOB NO. 2312-14

Preliminary Stormwater Report

for

Mission Terrace

Washington County, OR

January 21, 2015

Prepared by:

Westlake Consultants, Inc.
15115 SW Sequoia Parkway, Ste. 150
Tigard, OR 97224

Phone: (503) 684-0652

Fax: (503) 624-0157

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- 2.2 Water Quality Volume
- 2.3 Extended Dry Basin Orifice Sizing
- 2.4 Water Quality Manhole Sizing Calculations

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- Appendix B: Basin Map
- Appendix C: Downstream Analysis Basin Map
- Appendix D: Downstream Analysis HydroCAD Analysis
- Appendix E: Downstream Analysis Soil Map and Hydrologic Group

1.0 PROJECT OVERVIEW

1.1 Introduction

This project is located on SW Avery Street with a total area of 2.97 acres. The site contains three existing residential homes with several storage sheds. One of the existing houses will be removed. The remainder of the site consists of a combination of grassed and treed areas. The site topography slopes from the southeast to the northwest.

This development will provide 11 new residential homes with public and private streets. Storm laterals will be provided to each lot and will be directed to a new public storm main. The public storm main will discharge into a new water quality facility located at the southwest corner of the property.

A fee in lieu is requested for lot 6 and the portion of the SW Comanche Terrace to the north of the proposed private street due to slope and cover constraints affecting the stormwater system. Although it is assumed that the fee will be paid in lieu of the treatment, preliminary water quality calculations have been performed to show treatment all impervious area on-site.

The water quality and detention facility will be designed according to the requirements set forth in Clean Water Services "Design and Construction Standards for Sanitary Sewer and Surface Water Management", R&O 07-20. The facility will be designed to handle the expected runoff from the entire 11 lot development. The outfall from this facility will be directed into an onsite water quality tract, north of the private street.

1.2 Analysis Purpose

The purpose of this preliminary analysis is to determine the following:

1. Water quality treatment design
2. Detention pond sizing
3. Downstream Analysis

1.3 Water Quality Calculations

For water quality, the system shall treat the total precipitation of 0.36 inches falling in 4 hours with a storm return period of 96 hours. For water quality treatment, the treatment will be completed by the extended dry basin. The water quality volume was calculated to be **1,563 cubic feet** for the dry basin. These water quality treatment facilities will be designed according to Clean Water Services and City requirements.

Prior to the water quality facility, a water quality manhole will be constructed. The water quality manhole is sized accordingly to the 25-year peak runoff rate.

1.4 Downstream Analysis

The downstream analysis was performed per clean water services standards. The outflow from the site for the 25-year storm was found to be 1.36 cfs, with the project being at the upstream end of an existing stormwater conveyance system in SW Comanche Terrace. The calculations for the analysis can be found in appendices C-E, and show that the pipes contain adequate capacity through the point where the on-site runoff makes up less than 5% of the total flow within the pipes.

2.0 WATER QUALITY CALCULATIONS

2.1 Total impervious area

Extended Dry Basin

11 lots x 2,640 impervious area per lot = 29,040 sq. ft.
Public street & sidewalk impervious area = 23,070 sq. ft.

Total site impervious area = **52,110 sq. ft.**

2.2 Water Quality Volume

Extended Dry Basin

$$\begin{aligned} \text{WQV (cf)} &= \frac{0.36 \text{ (in)} \times \text{Impervious area (sf)}}{12 \text{ (in/ft)}} \\ &= \frac{0.36 \text{ (in)} \times 52,110 \text{ (sf)}}{12 \text{ (in/ft)}} \\ &= \mathbf{1,563 \text{ cubic feet}} \end{aligned}$$

2.3 Extended Dry Basin Orifice Sizing

$$D = 24 * [(Q/(C[2gH]^{0.5})) / \pi]^{0.5}$$

Where: D (in) = diameter of orifice

$$Q(\text{cfs}) = \text{WQV (cf)} / (48*60*60)$$

$$C=0.62$$

$$H(\text{ft}) = 2/3 \times \text{temporary detention height to centerline of orifice}$$

$$D = 24 * [(0.009/(0.62[2(32.2)(0.8)]^{0.5})) / \pi]^{0.5}$$

$$D = 0.61''$$

2.4 Water Quality Manhole Sizing Calculations

WQMH1

Total runoff area = 129,278 sq. ft.

25-year runoff (SBUH Method) = 1.36 cfs.

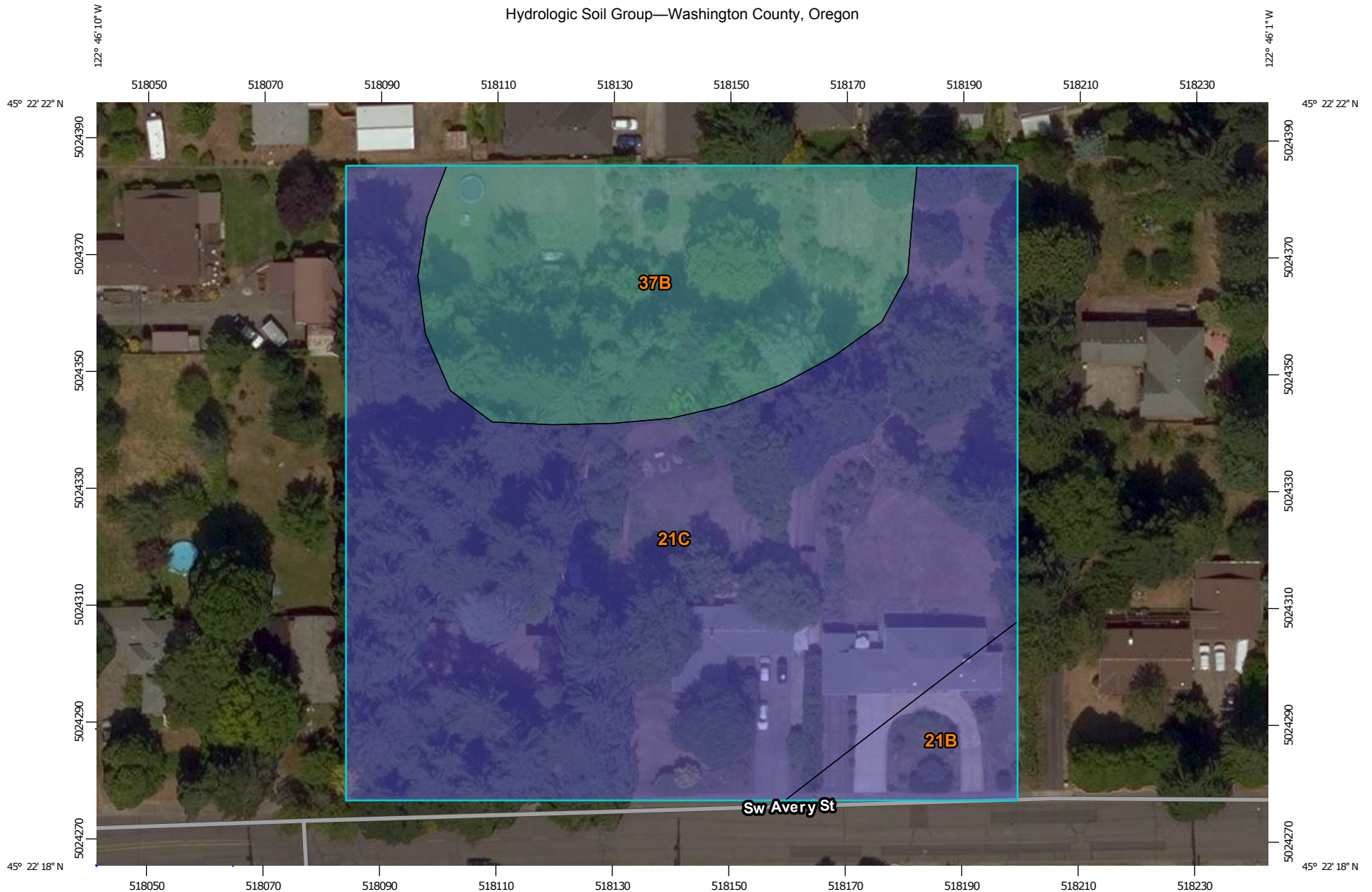
Sump size = 20 cu. ft./1 cfs = 21.8 cu. ft.*1.36 = 29.65 cu. ft.

60" diameter MH = 19.63 sq. ft.

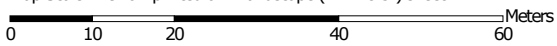
Depth of sump = 29.65/19.63 = 1.51' will use 3' as minimum

Appendix A:
**On-Site Soil Map and Hydrologic
Group**

Hydrologic Soil Group—Washington County, Oregon



Map Scale: 1:920 if printed on A landscape (11" x 8.5") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County, Oregon
 Survey Area Data: Version 12, Sep 19, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 3, 2014—Aug 23, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Washington County, Oregon (OR067)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
21B	Hillsboro loam, 3 to 7 percent slopes	B	0.2	4.9%
21C	Hillsboro loam, 7 to 12 percent slopes	B	2.2	69.3%
37B	Quatama loam, 3 to 7 percent slopes	C	0.8	25.8%
Totals for Area of Interest			3.1	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

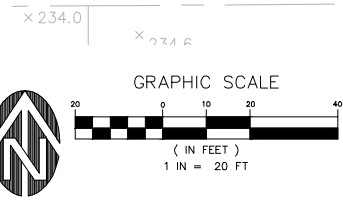
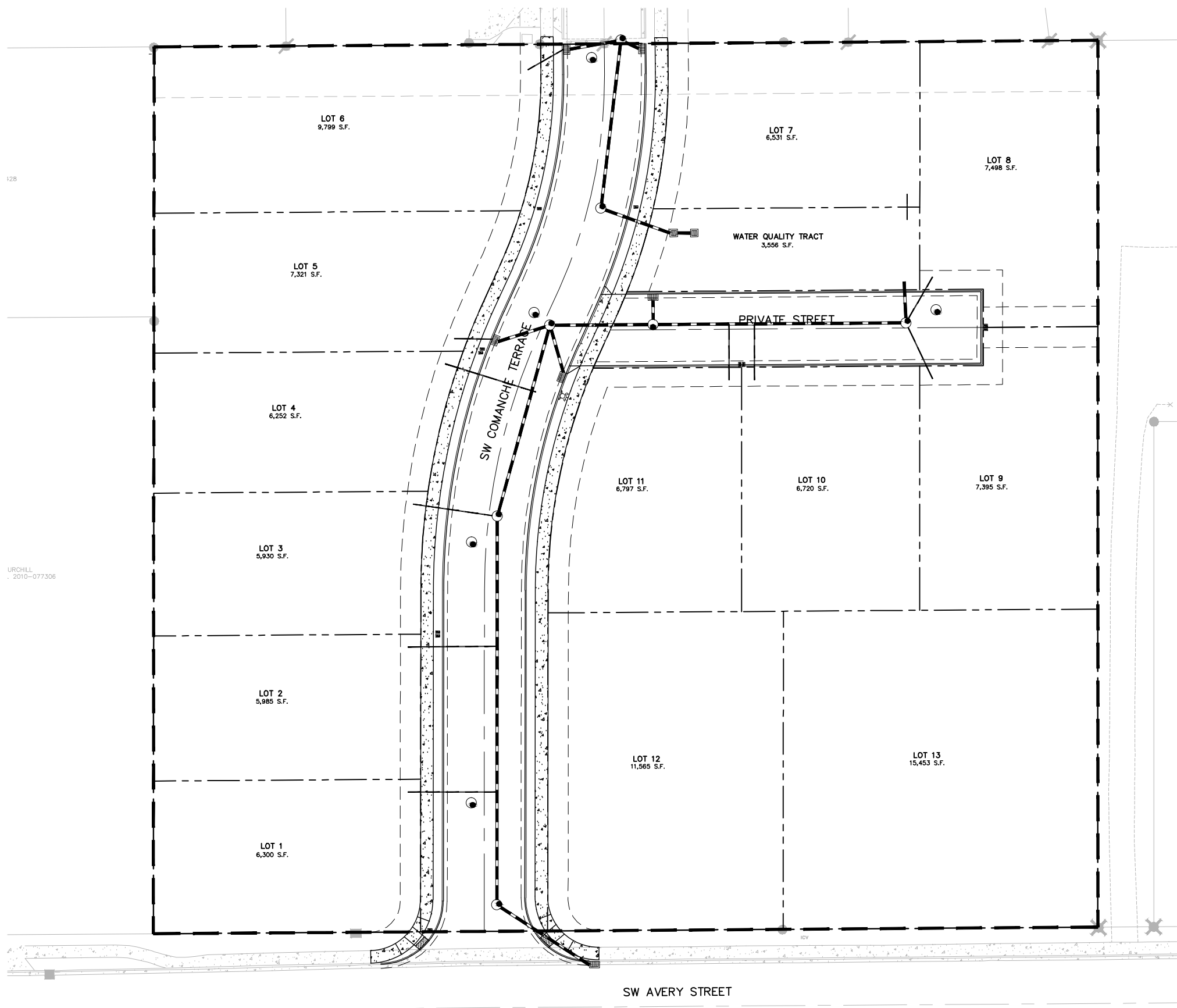
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B: Basin Map



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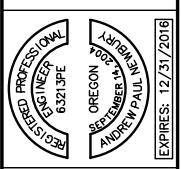
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MISSION TERRACE

TUALATIN, OR

BASIN MAP



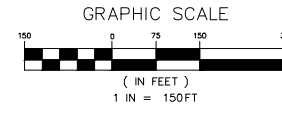
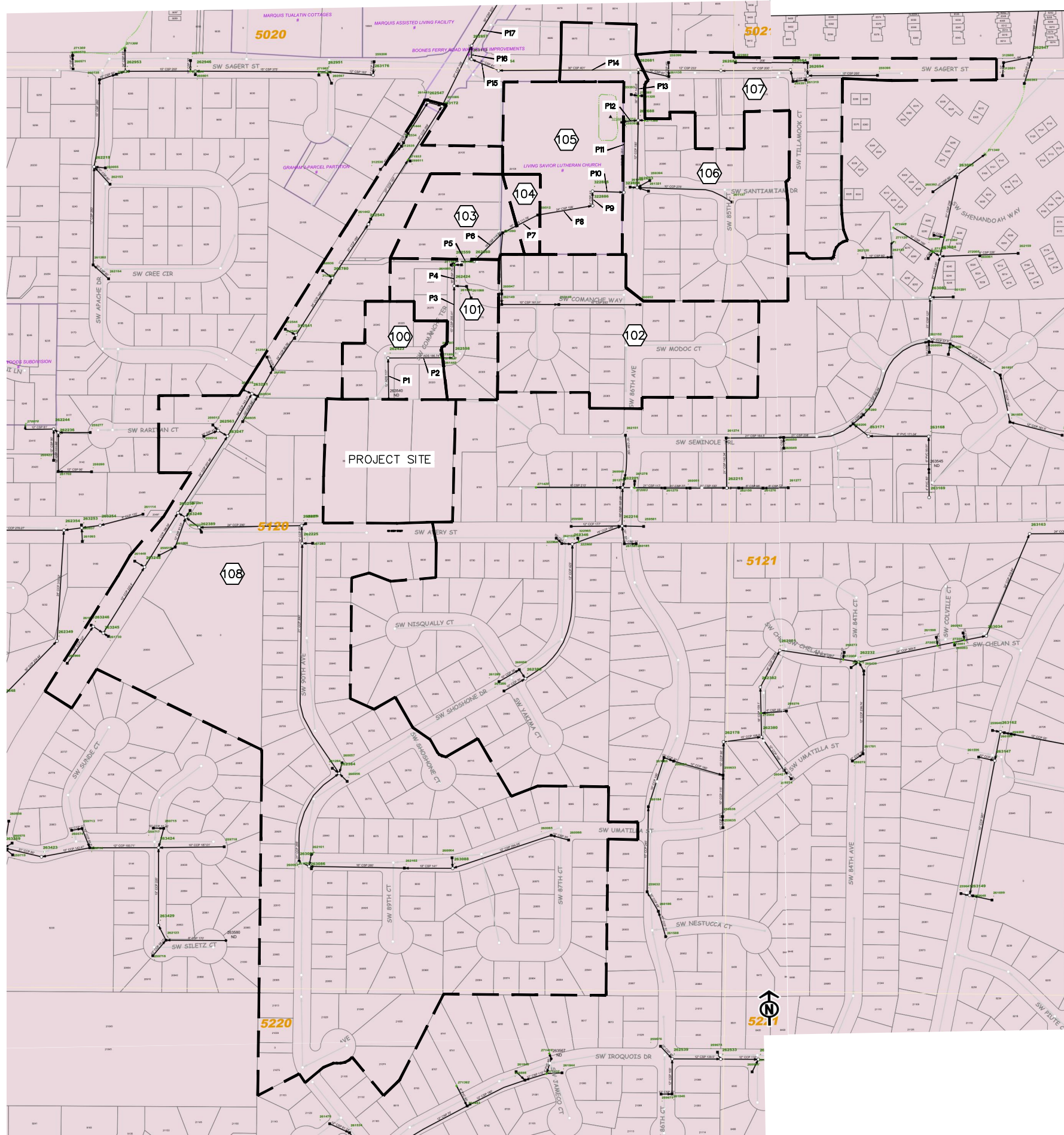
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Appendix C:

Downstream Analysis Basin Map



DOWNSTREAM BASIN AREA TABLE

BASIN	AREA (ac)	Tc (min)	FLOW (cfs)
SITE			1.36
100	1.610 AC	5.0	1.12
101	1.961 AC	5.0	1.31
102	5.617 AC	5.0	3.43
103	1.644 AC	21.3	0.16
104	0.401 AC	11.6	0.12
105	3.347 AC	5.0	2.93
106	6.470 AC	5.0	4.13
107	4.562 SF	5.0	2.84
108	36.583 AC	19.9	15.59

DATA CONTAINED IN THIS TABLE WAS OBTAINED FROM CWS STORM WATER MAPPING, AVAILABLE AS-BUILTS, LIDAR DATA, AND FIELD INVESTIGATION.

LIDAR ELEVATION COUPLED WITH CWS PROVIDED DEPTHS WERE USED TO ESTIMATE EXISTING UNDERGROUND CONVEYANCE SLOPES, AT LOCATIONS WITHOUT AS-BUILT DATA.

LOCATIONS WHERE DEPTHS WERE UNKNOWN LIDAR SURFACE SLOPE WAS USED TO APPROXIMATE UNDERGROUND PIPE SLOPES.

NRCS SOILS MAP WAS USED TO DETERMINE HYDROLOGIC SOIL GROUPS.

DOWNSTREAM CONVEYANCE SUMMARY

REACH	LENGTH	SIZE/MAT'L	SLOPE (%)	FLOW (CFS)	CAPACITY (CFS)
P1	117'	12" ADS	3.11	1.36	4.54
P2	186.7'	12" ADS	1.99	2.48	3.63
P3	205.4'	15" CSP	1.04	2.47	6.58
P4	70.4'	18" CSP	0.47	3.77	7.19
P5	57.8'	18" CSP	0.69	3.76	8.74
P6	115'	18" CSP	0.61	3.75	8.20
P7	111.8'	18" CSP	1.18	7.33	7.42
P8	158'	24" CSP	0.50	7.42	16.00
P9	41'	24" CSP	0.50	7.39	15.80
P10	88.5"	24" CSP	1.40	7.39	26.78
P11	201'	24" PVC	1.44	7.38	27.17
P12	40.0'	24" PVC	0.50	10.15	16.00
P13	145.6'	30" CSP	0.50	14.31	29.04
P14	401.0'	36" CSP	0.46	16.92	45.18
P15	81.0'	36" CSP	0.74	16.92	57.40
P16	41.0	36" CSP	0.85	16.89	61.63
P17	260.7	30" CSP	2.91	32.34	69.94

CSP=CONCRETE SEWER PIPE
 DIP = DUCTILE IRON PIPE
 PVC = POLYVINYL CHLORIDE
 RCP = REINFORCED CONCRETE PIPE

P = PIPE LOCATION
 D = DITCH LOCATION

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DOWNSTREAM ANALYSIS BASIN MAP

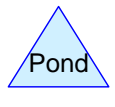
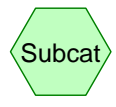
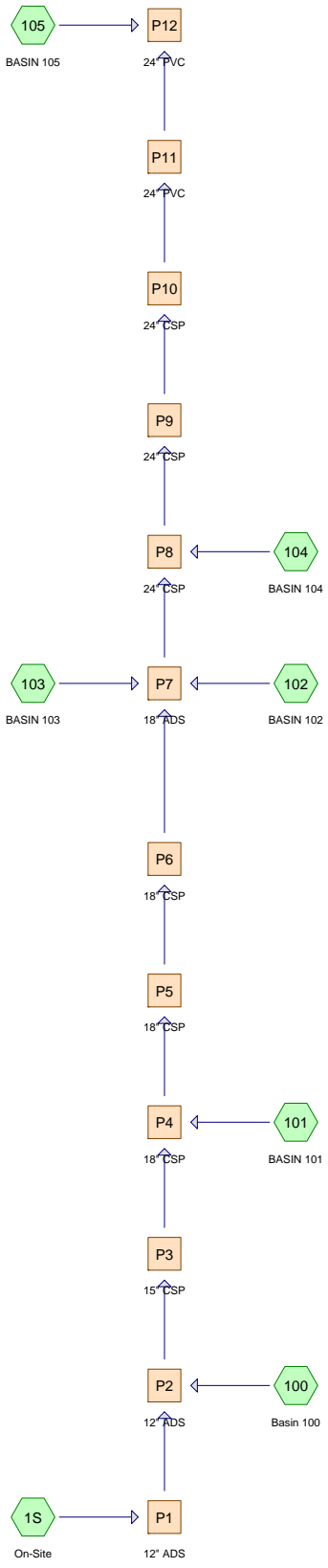
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Appendix D:
Downstream Analysis HydroCAD
Analysis



Drainage Diagram for Mission Terrace - Downstream Analysis
 Prepared by WESTLAKE CONSULTANTS, INC. 2/17/2015
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Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

Prepared by WESTLAKE CONSULTANTS, INC.

Page 2

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2/17/2015

Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points

Runoff by SBUH method

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: On-SiteRunoff Area=129,278 sf Runoff Depth>1.96"
Tc=5.0 min CN=79 Runoff=1.36 cfs 0.484 af**Subcatchment 100: Basin 100**Runoff Area=1.610 ac Runoff Depth>2.72"
Tc=5.0 min CN=88 Runoff=1.12 cfs 0.365 af**Subcatchment 101: BASIN 101**Runoff Area=1.961 ac Runoff Depth>2.63"
Tc=5.0 min CN=87 Runoff=1.31 cfs 0.430 af**Subcatchment 102: BASIN 102**Runoff Area=5.617 ac Runoff Depth>2.45"
Tc=5.0 min CN=85 Runoff=3.43 cfs 1.148 af**Subcatchment 103: BASIN 103**Runoff Area=1.644 ac Runoff Depth>0.96"
Flow Length=321' Tc=21.6 min CN=64 Runoff=0.16 cfs 0.131 af**Subcatchment 104: BASIN 104**Runoff Area=0.401 ac Runoff Depth>1.59"
Flow Length=140' Tc=11.6 min CN=74 Runoff=0.12 cfs 0.053 af**Subcatchment 105: BASIN 105**Runoff Area=3.347 ac Runoff Depth>3.32"
Tc=0.0 min CN=94 Runoff=2.93 cfs 0.927 af**Reach P1: 12" ADS**Peak Depth=0.38' Max Vel=5.0 fps Inflow=1.36 cfs 0.484 af
D=12.0" n=0.018 L=117.0' S=0.0311 '/' Capacity=4.54 cfs Outflow=1.36 cfs 0.484 af**Reach P10: 24" CSP**Peak Depth=0.72' Max Vel=7.3 fps Inflow=7.39 cfs 2.605 af
D=24.0" n=0.013 L=88.5' S=0.0140 '/' Capacity=26.78 cfs Outflow=7.38 cfs 2.604 af**Reach P11: 24" PVC**Peak Depth=0.71' Max Vel=7.4 fps Inflow=7.38 cfs 2.604 af
D=24.0" n=0.013 L=201.0' S=0.0144 '/' Capacity=27.17 cfs Outflow=7.36 cfs 2.602 af**Reach P12: 24" PVC**Peak Depth=1.16' Max Vel=5.4 fps Inflow=10.15 cfs 3.529 af
D=24.0" n=0.013 L=40.0' S=0.0050 '/' Capacity=16.00 cfs Outflow=10.15 cfs 3.529 af**Reach P2: 12" ADS**Peak Depth=0.61' Max Vel=5.0 fps Inflow=2.48 cfs 0.849 af
D=12.0" n=0.018 L=186.7' S=0.0199 '/' Capacity=3.63 cfs Outflow=2.47 cfs 0.849 af**Reach P3: 15" CSP**Peak Depth=0.53' Max Vel=5.0 fps Inflow=2.47 cfs 0.849 af
D=15.0" n=0.013 L=205.4' S=0.0104 '/' Capacity=6.58 cfs Outflow=2.45 cfs 0.848 af**Reach P4: 18" CSP**Peak Depth=0.77' Max Vel=4.1 fps Inflow=3.77 cfs 1.278 af
D=18.0" n=0.013 L=70.4' S=0.0047 '/' Capacity=7.19 cfs Outflow=3.76 cfs 1.277 af**Reach P5: 18" CSP**Peak Depth=0.69' Max Vel=4.8 fps Inflow=3.76 cfs 1.277 af
D=18.0" n=0.013 L=57.8' S=0.0069 '/' Capacity=8.74 cfs Outflow=3.75 cfs 1.277 af

Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P6: 18" CSP

Peak Depth=0.71' Max Vel=4.5 fps Inflow=3.75 cfs 1.277 af
D=18.0" n=0.013 L=115.0' S=0.0061 '/' Capacity=8.20 cfs Outflow=3.74 cfs 1.276 af

Reach P7: 18" ADS

Peak Depth=1.21' Max Vel=4.8 fps Inflow=7.33 cfs 2.555 af
D=18.0" n=0.020 L=111.8' S=0.0118 '/' Capacity=7.42 cfs Outflow=7.30 cfs 2.554 af

Reach P8: 24" CSP

Peak Depth=0.96' Max Vel=5.0 fps Inflow=7.42 cfs 2.607 af
D=24.0" n=0.013 L=158.0' S=0.0050 '/' Capacity=16.00 cfs Outflow=7.39 cfs 2.605 af

Reach P9: 24" CSP

Peak Depth=0.96' Max Vel=4.9 fps Inflow=7.39 cfs 2.605 af
D=24.0" n=0.013 L=41.0' S=0.0049 '/' Capacity=15.80 cfs Outflow=7.39 cfs 2.605 af

Total Runoff Area = 17.548 ac Runoff Volume = 3.539 af Average Runoff Depth = 2.42"

Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Page 4

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Subcatchment 1S: On-Site

Runoff = 1.36 cfs @ 7.98 hrs, Volume= 0.484 af, Depth> 1.96"

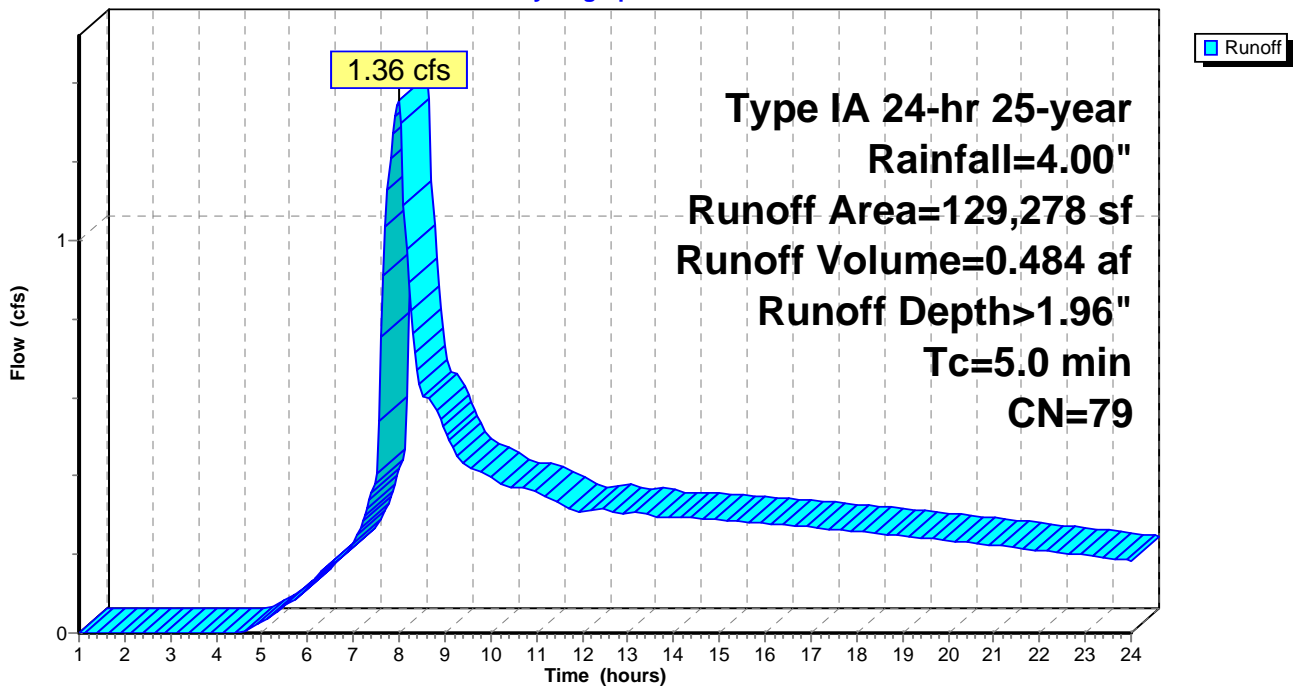
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (sf)	CN	Description
29,040	98	2,640 SF impervious area/lot
65,651	61	>75% Grass cover, Good, HSG B
34,587	98	Paved parking & roofs
129,278	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: On-Site

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

Page 5

2/17/2015

Subcatchment 100: Basin 100

Runoff = 1.12 cfs @ 7.94 hrs, Volume= 0.365 af, Depth> 2.72"

Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

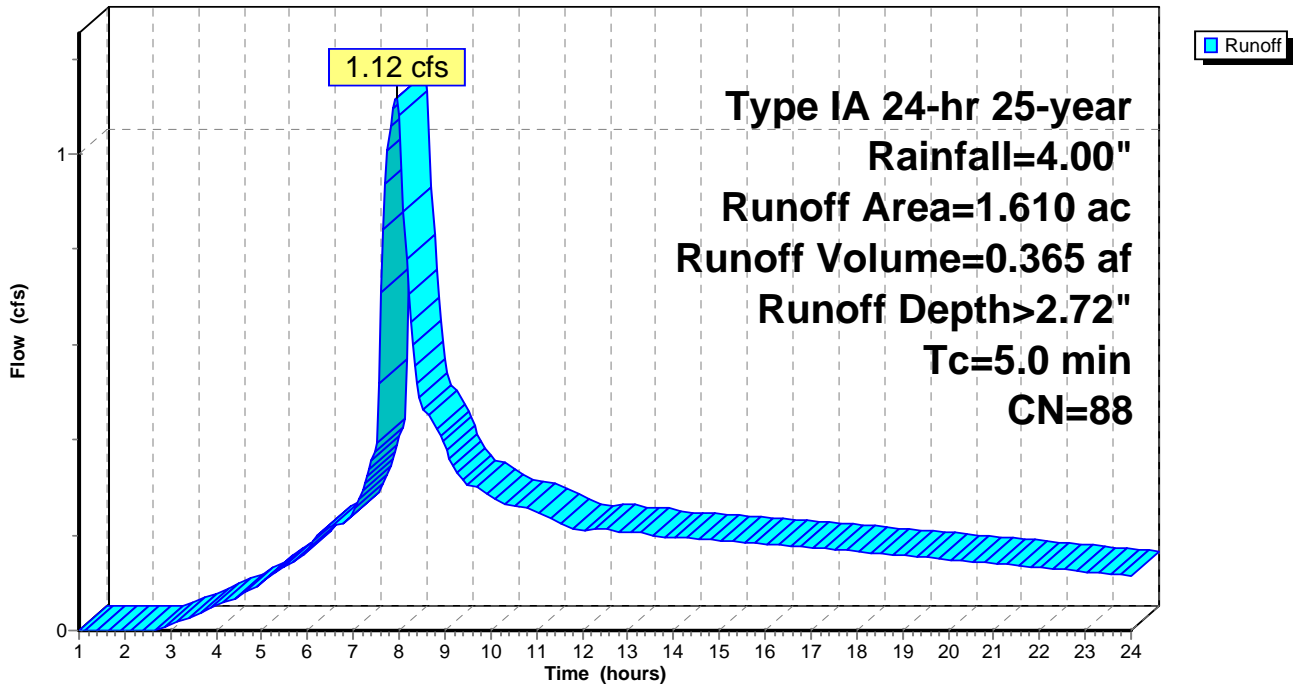
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
0.984	90	1/8 acre lots, 65% imp, HSG C
0.626	85	1/8 acre lots, 65% imp, HSG B
1.610	88	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 100: Basin 100

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 101: BASIN 101

Runoff = 1.31 cfs @ 7.95 hrs, Volume= 0.430 af, Depth> 2.63"

Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

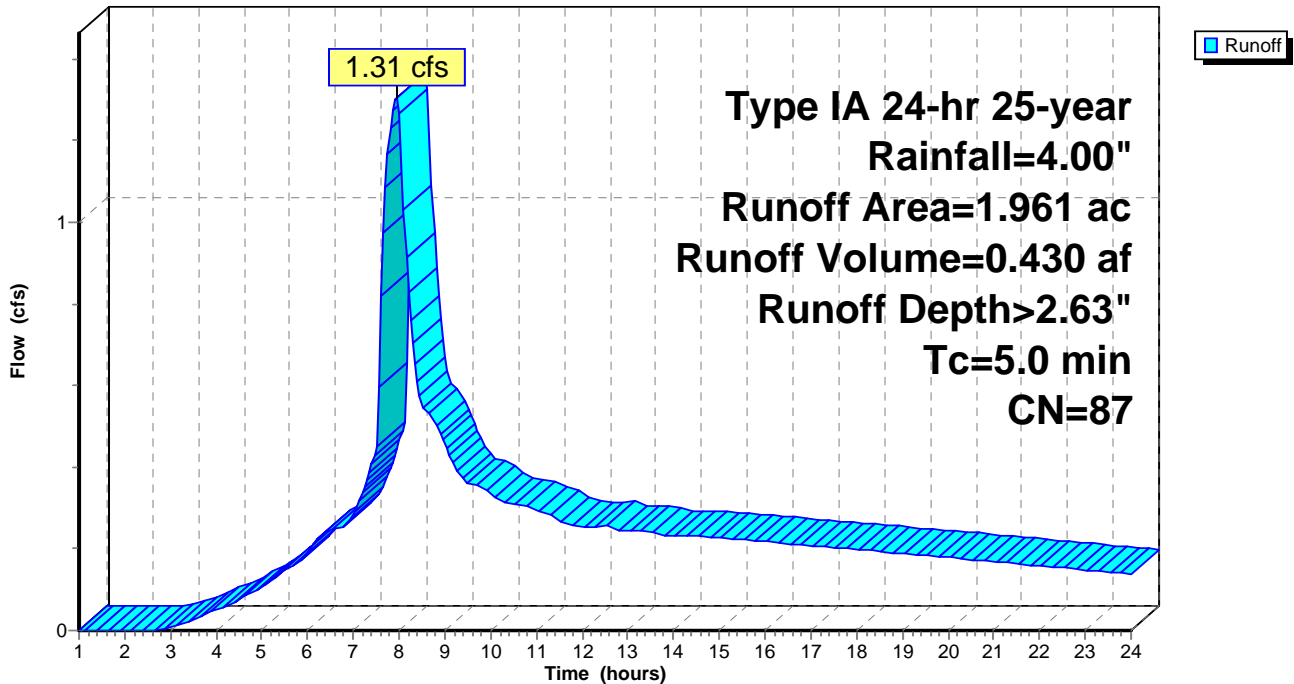
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
0.854	90	1/8 acre lots, 65% imp, HSG C
1.107	85	1/8 acre lots, 65% imp, HSG B
1.961	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 101: BASIN 101

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 102: BASIN 102

Runoff = 3.43 cfs @ 7.96 hrs, Volume= 1.148 af, Depth> 2.45"

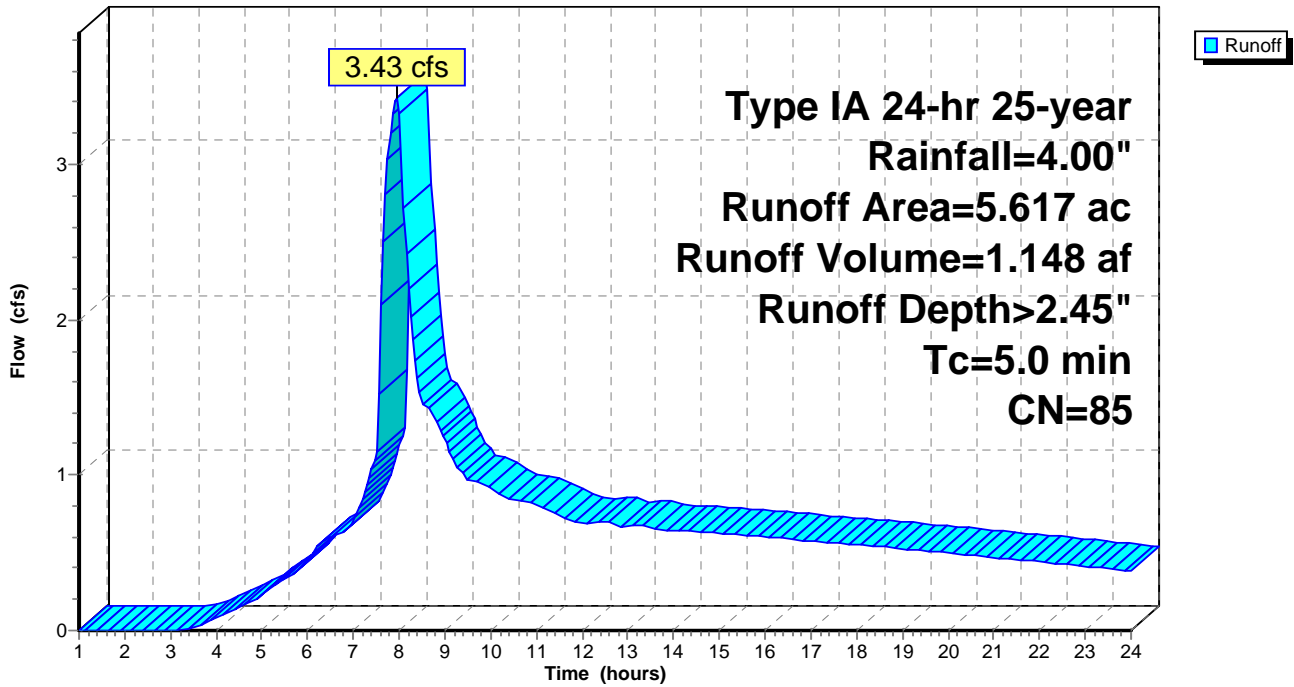
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
0.256	90	1/8 acre lots, 65% imp, HSG C
5.361	85	1/8 acre lots, 65% imp, HSG B
5.617	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 102: BASIN 102

Hydrograph



Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 103: BASIN 103

Runoff = 0.16 cfs @ 8.22 hrs, Volume= 0.131 af, Depth> 0.96"

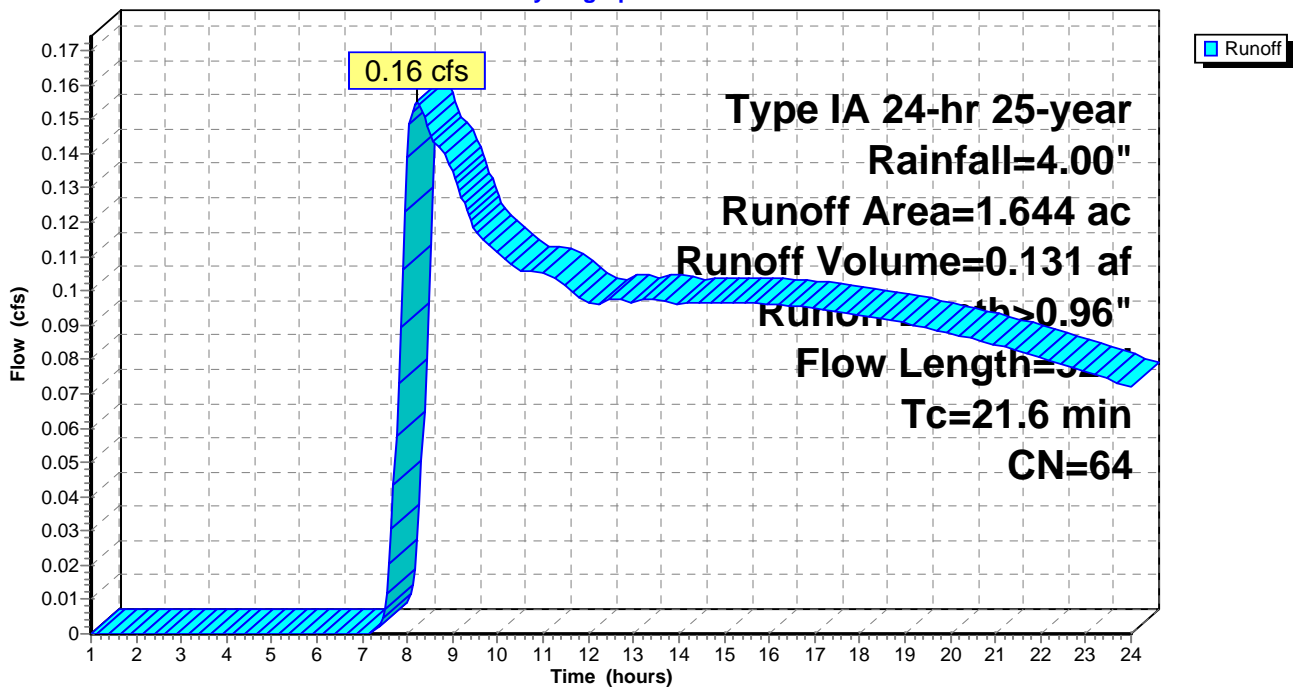
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
0.396	74	>75% Grass cover, Good, HSG C
1.248	61	>75% Grass cover, Good, HSG B
1.644	64	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	300	0.0350	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.50"
0.3	21	0.0350	1.3		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.6	321	Total			

Subcatchment 103: BASIN 103

Hydrograph



Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 104: BASIN 104

Runoff = 0.12 cfs @ 8.02 hrs, Volume= 0.053 af, Depth> 1.59"

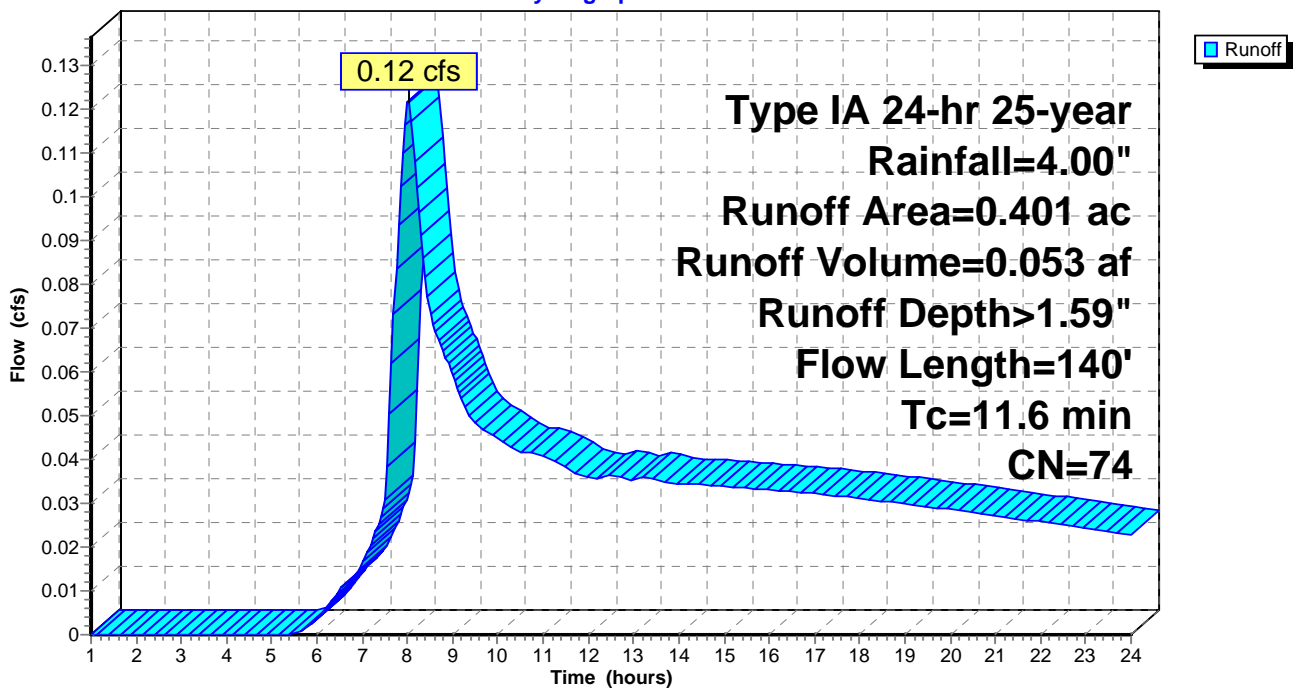
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
0.401	74	>75% Grass cover, Good, HSG C

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	140	0.0350	0.2		Sheet Flow, Grass: Short n= 0.150 P2= 2.50"

Subcatchment 104: BASIN 104

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 105: BASIN 105

Runoff = 2.93 cfs @ 7.82 hrs, Volume= 0.927 af, Depth> 3.32"

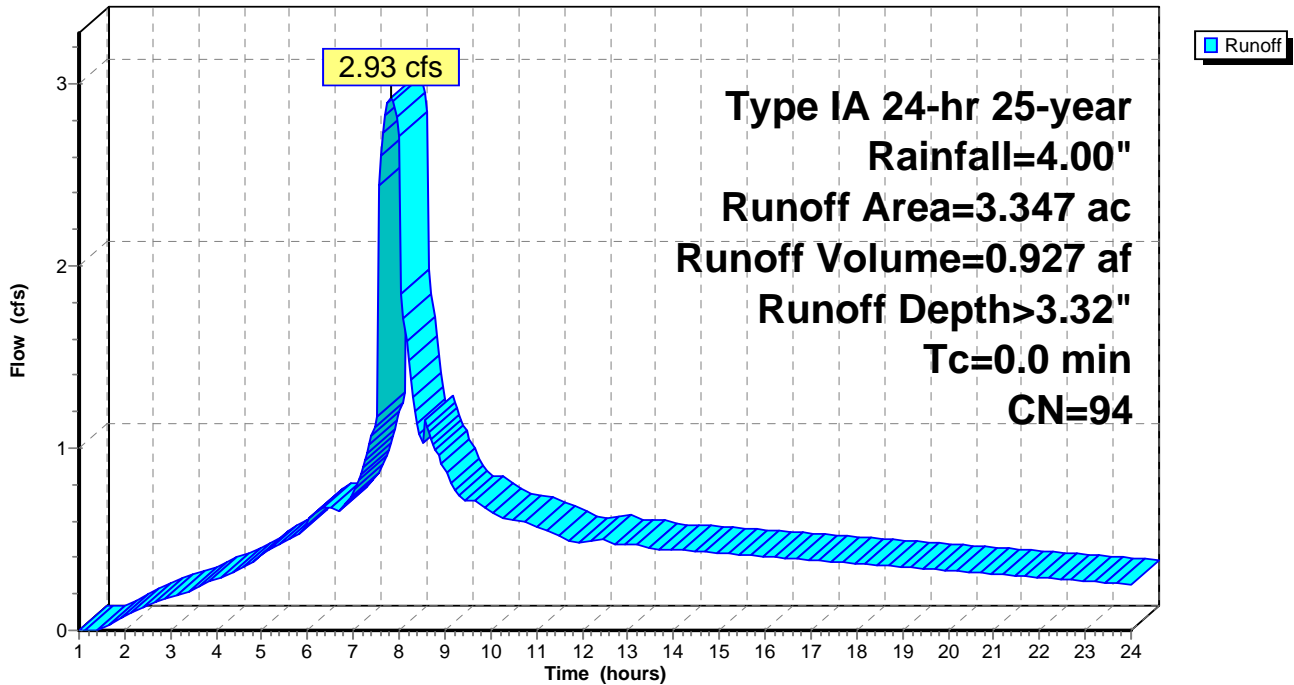
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
2.578	94	Urban commercial, 85% imp, HSG C
0.769	92	Urban commercial, 85% imp, HSG B
3.347	94	Weighted Average

Subcatchment 105: BASIN 105

Hydrograph



Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P1: 12" ADS

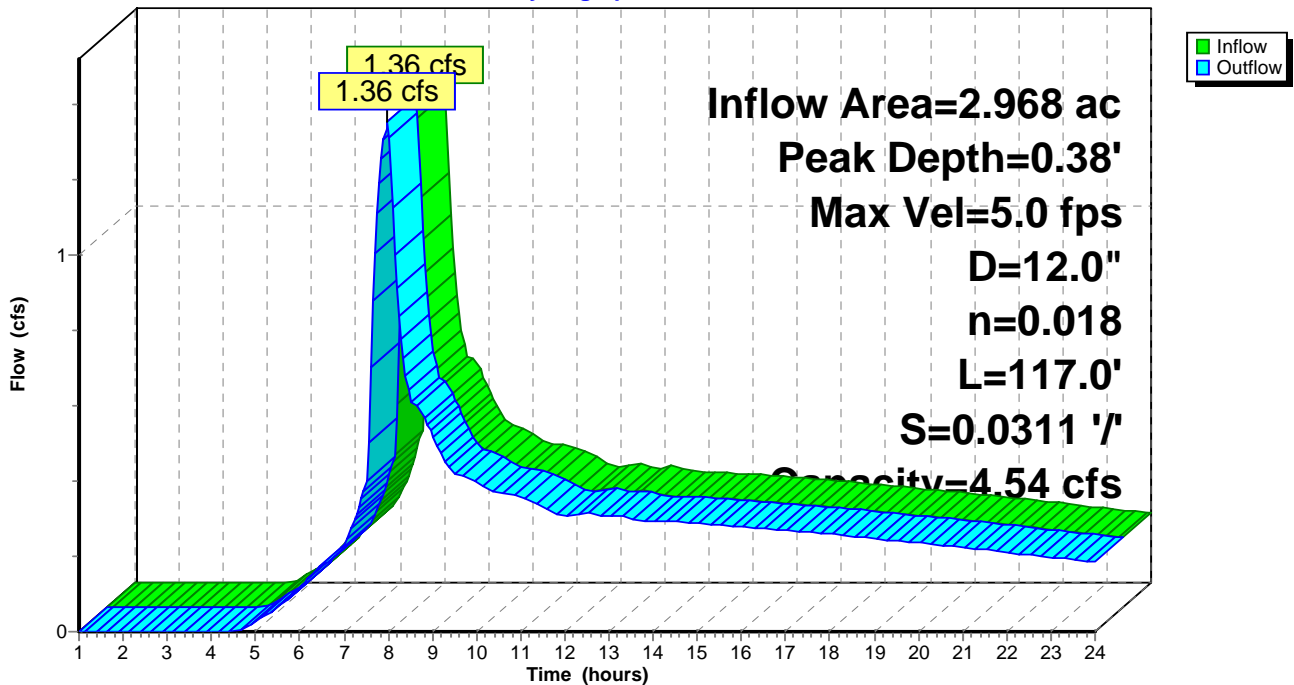
Inflow Area = 2.968 ac, Inflow Depth > 1.96" for 25-year event
Inflow = 1.36 cfs @ 7.98 hrs, Volume= 0.484 af
Outflow = 1.36 cfs @ 7.98 hrs, Volume= 0.484 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 0.6 min

Peak Depth= 0.38' @ 7.98 hrs
Capacity at bank full= 4.54 cfs
Inlet Invert= 212.26', Outlet Invert= 208.62'
12.0" Diameter Pipe, n= 0.018
Length= 117.0' Slope= 0.0311 1/'

Reach P1: 12" ADS

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P10: 24" CSP

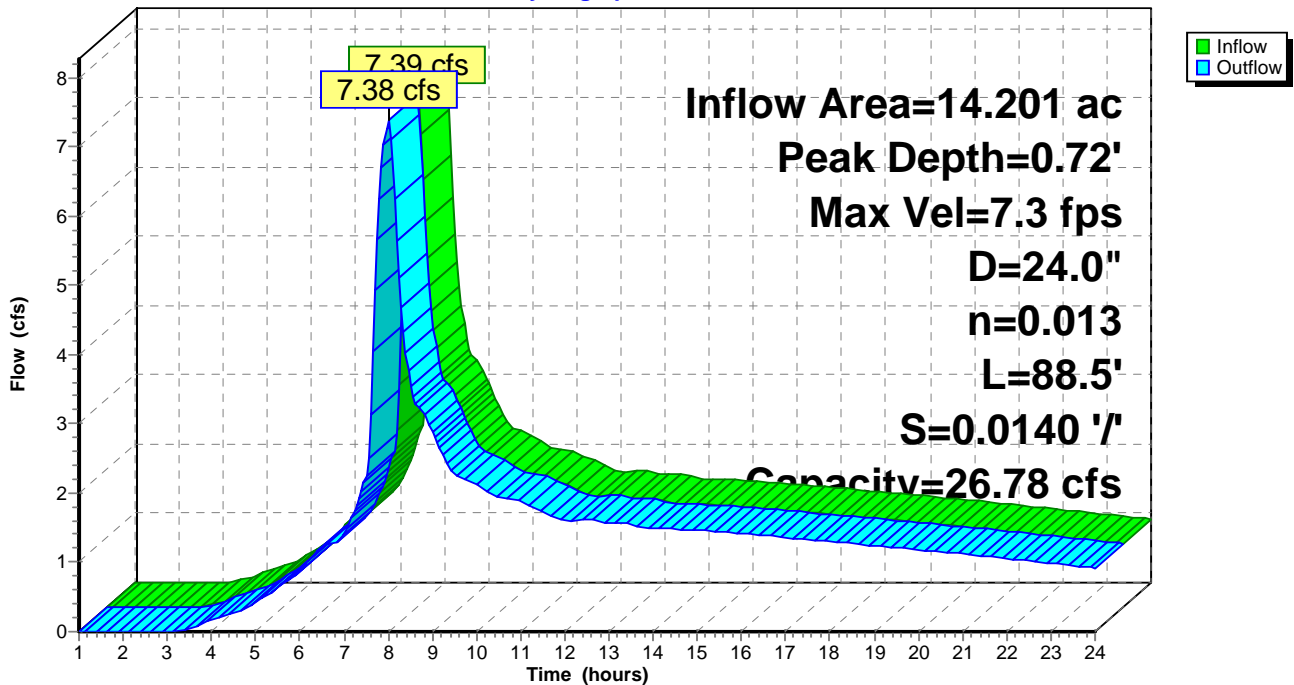
Inflow Area = 14.201 ac, Inflow Depth > 2.20" for 25-year event
Inflow = 7.39 cfs @ 8.00 hrs, Volume= 2.605 af
Outflow = 7.38 cfs @ 8.01 hrs, Volume= 2.604 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.3 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.4 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.72' @ 8.00 hrs
Capacity at bank full= 26.78 cfs
Inlet Invert= 192.38', Outlet Invert= 191.14'
24.0" Diameter Pipe, n= 0.013
Length= 88.5' Slope= 0.0140 '/

Reach P10: 24" CSP

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P11: 24" PVC

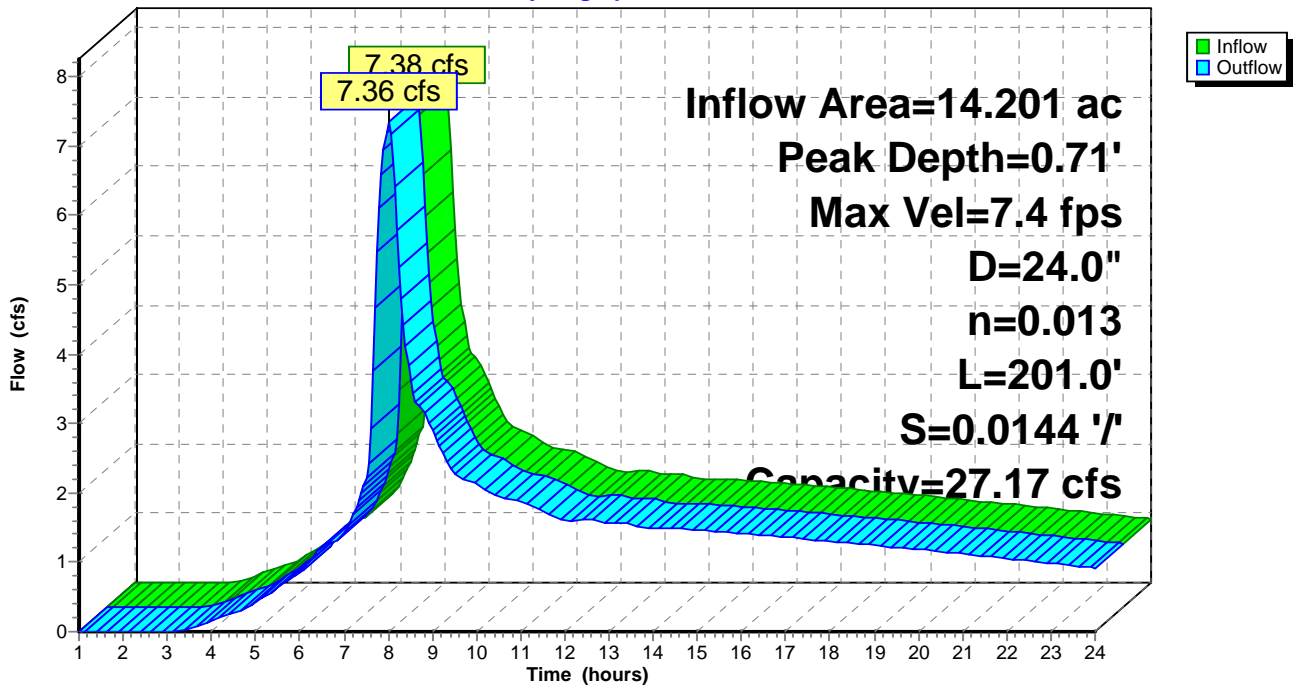
Inflow Area = 14.201 ac, Inflow Depth > 2.20" for 25-year event
Inflow = 7.38 cfs @ 8.01 hrs, Volume= 2.604 af
Outflow = 7.36 cfs @ 8.02 hrs, Volume= 2.602 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.4 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 4.4 fps, Avg. Travel Time= 0.8 min

Peak Depth= 0.71' @ 8.01 hrs
Capacity at bank full= 27.17 cfs
Inlet Invert= 190.94', Outlet Invert= 188.04'
24.0" Diameter Pipe, n= 0.013
Length= 201.0' Slope= 0.0144 '/'

Reach P11: 24" PVC

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P12: 24" PVC

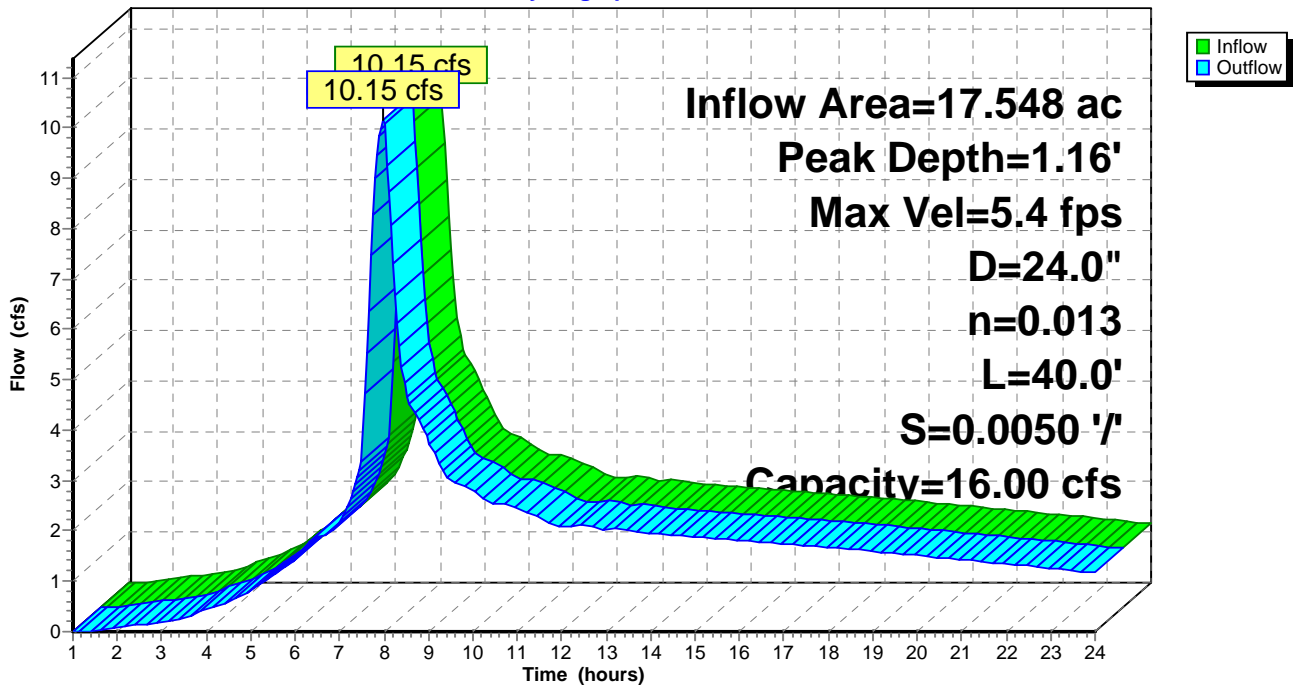
Inflow Area = 17.548 ac, Inflow Depth > 2.41" for 25-year event
Inflow = 10.15 cfs @ 7.98 hrs, Volume= 3.529 af
Outflow = 10.15 cfs @ 7.98 hrs, Volume= 3.529 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.2 fps, Avg. Travel Time= 0.2 min

Peak Depth= 1.16' @ 7.98 hrs
Capacity at bank full= 16.00 cfs
Inlet Invert= 100.00', Outlet Invert= 99.80'
24.0" Diameter Pipe, n= 0.013
Length= 40.0' Slope= 0.0050 '/'

Reach P12: 24" PVC

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P2: 12" ADS

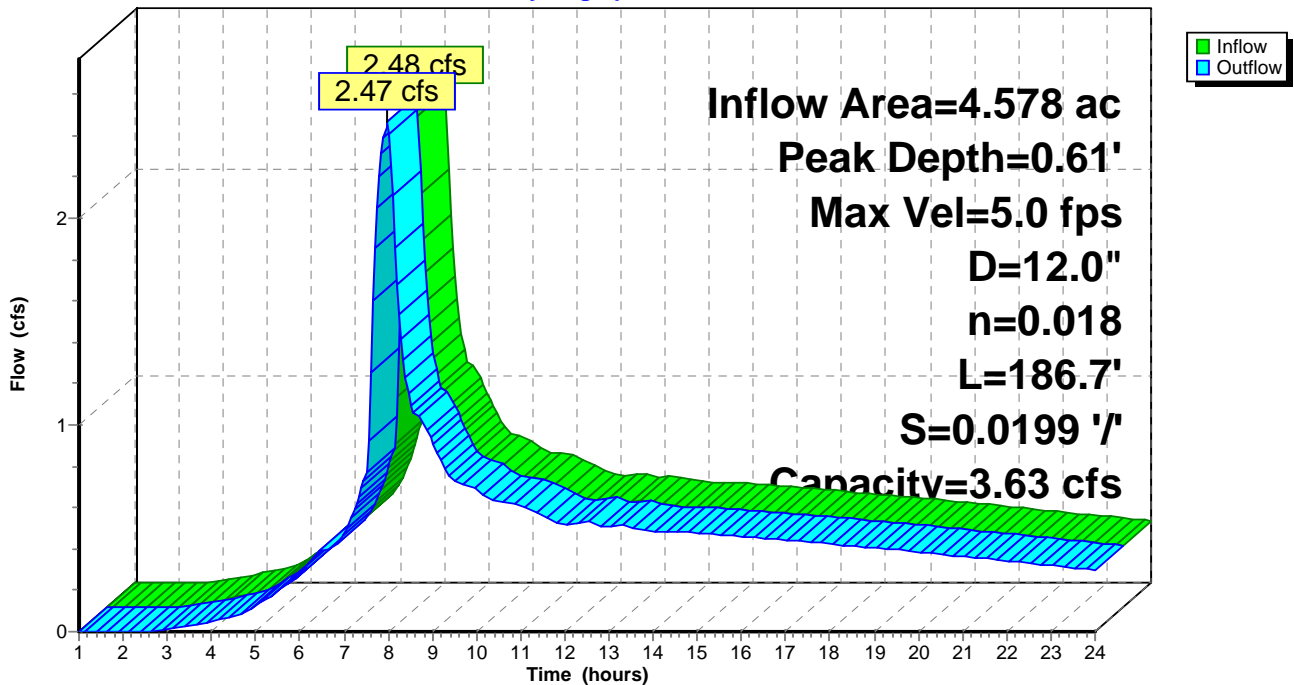
Inflow Area = 4.578 ac, Inflow Depth > 2.23" for 25-year event
Inflow = 2.48 cfs @ 7.98 hrs, Volume= 0.849 af
Outflow = 2.47 cfs @ 7.98 hrs, Volume= 0.849 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 1.0 min

Peak Depth= 0.61' @ 7.98 hrs
Capacity at bank full= 3.63 cfs
Inlet Invert= 208.42', Outlet Invert= 204.70'
12.0" Diameter Pipe, n= 0.018
Length= 186.7' Slope= 0.0199 1'

Reach P2: 12" ADS

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P3: 15" CSP

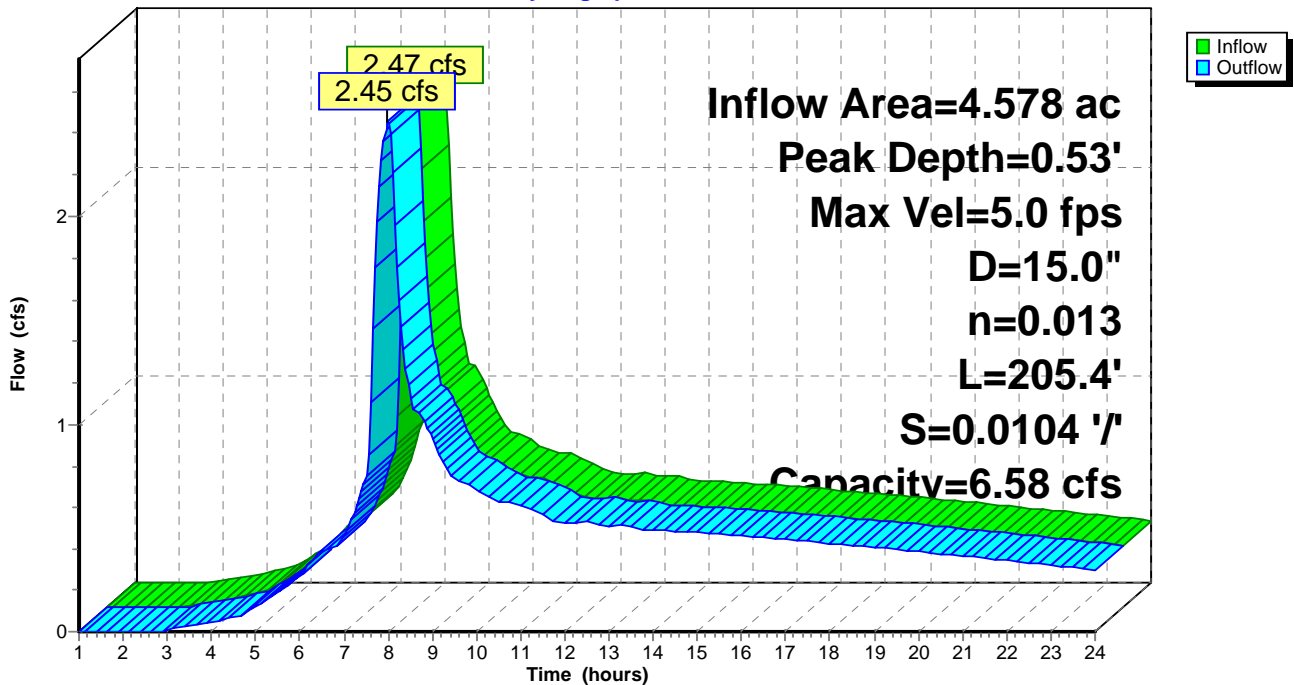
Inflow Area = 4.578 ac, Inflow Depth > 2.22" for 25-year event
Inflow = 2.47 cfs @ 7.98 hrs, Volume= 0.849 af
Outflow = 2.45 cfs @ 7.99 hrs, Volume= 0.848 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.9 fps, Avg. Travel Time= 1.2 min

Peak Depth= 0.53' @ 7.99 hrs
Capacity at bank full= 6.58 cfs
Inlet Invert= 204.40', Outlet Invert= 202.27'
15.0" Diameter Pipe, n= 0.013
Length= 205.4' Slope= 0.0104 1/100

Reach P3: 15" CSP

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P4: 18" CSP

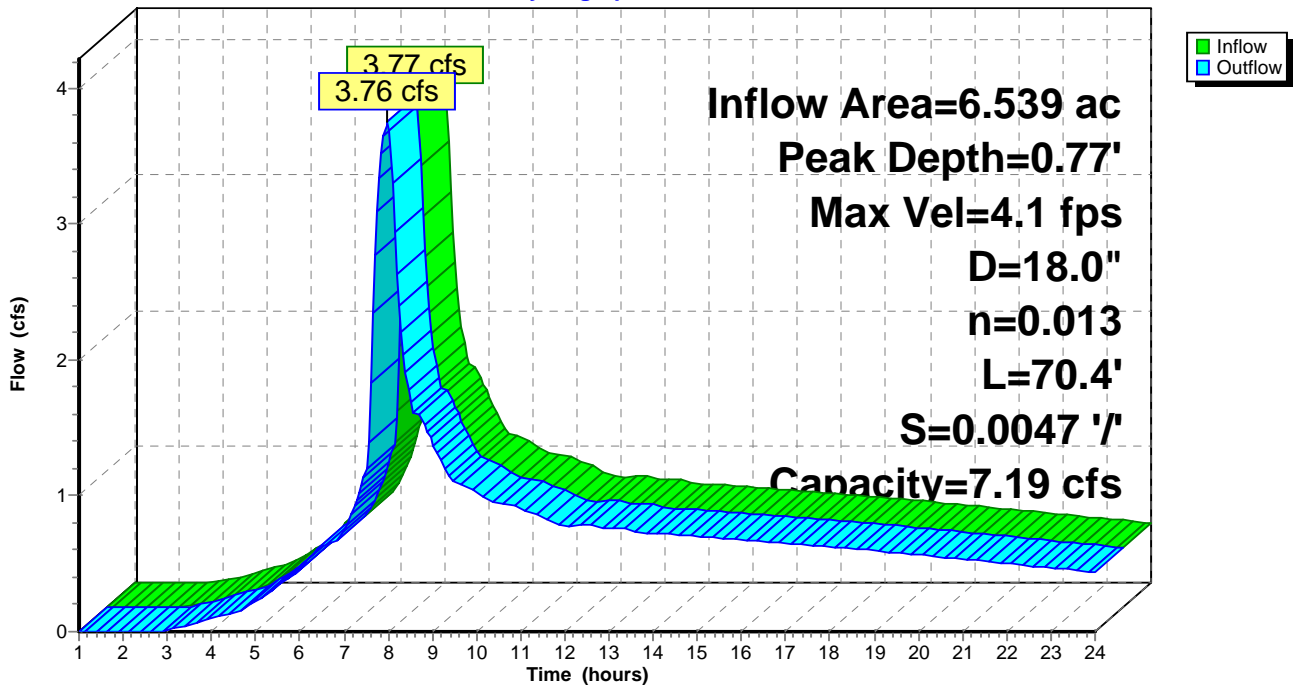
Inflow Area = 6.539 ac, Inflow Depth > 2.35" for 25-year event
Inflow = 3.77 cfs @ 7.98 hrs, Volume= 1.278 af
Outflow = 3.76 cfs @ 7.98 hrs, Volume= 1.277 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.1 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 0.5 min

Peak Depth= 0.77' @ 7.98 hrs
Capacity at bank full= 7.19 cfs
Inlet Invert= 202.07', Outlet Invert= 201.74'
18.0" Diameter Pipe, n= 0.013
Length= 70.4' Slope= 0.0047 '/'

Reach P4: 18" CSP

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P5: 18" CSP

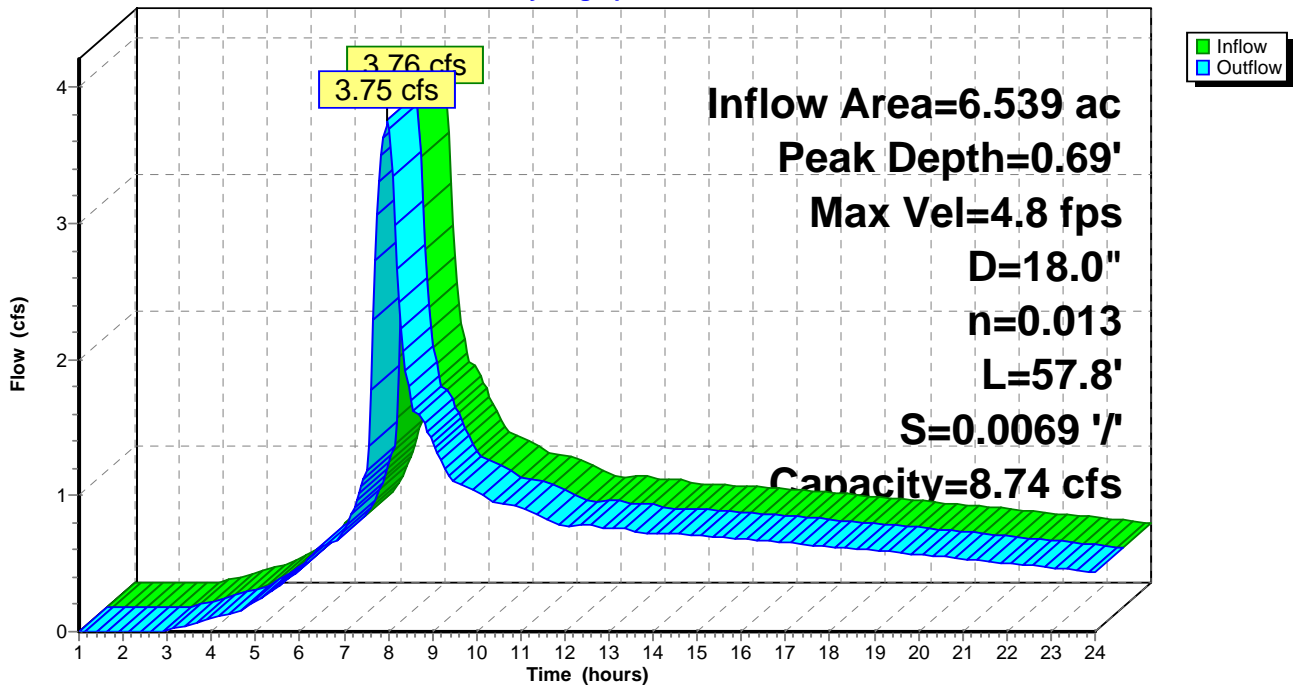
Inflow Area = 6.539 ac, Inflow Depth > 2.34" for 25-year event
Inflow = 3.76 cfs @ 7.98 hrs, Volume= 1.277 af
Outflow = 3.75 cfs @ 7.99 hrs, Volume= 1.277 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.8 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 0.3 min

Peak Depth= 0.69' @ 7.99 hrs
Capacity at bank full= 8.74 cfs
Inlet Invert= 201.49', Outlet Invert= 201.09'
18.0" Diameter Pipe, n= 0.013
Length= 57.8' Slope= 0.0069 '/'

Reach P5: 18" CSP

Hydrograph



Mission Terrace - Downstream Analysis

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Reach P6: 18" CSP

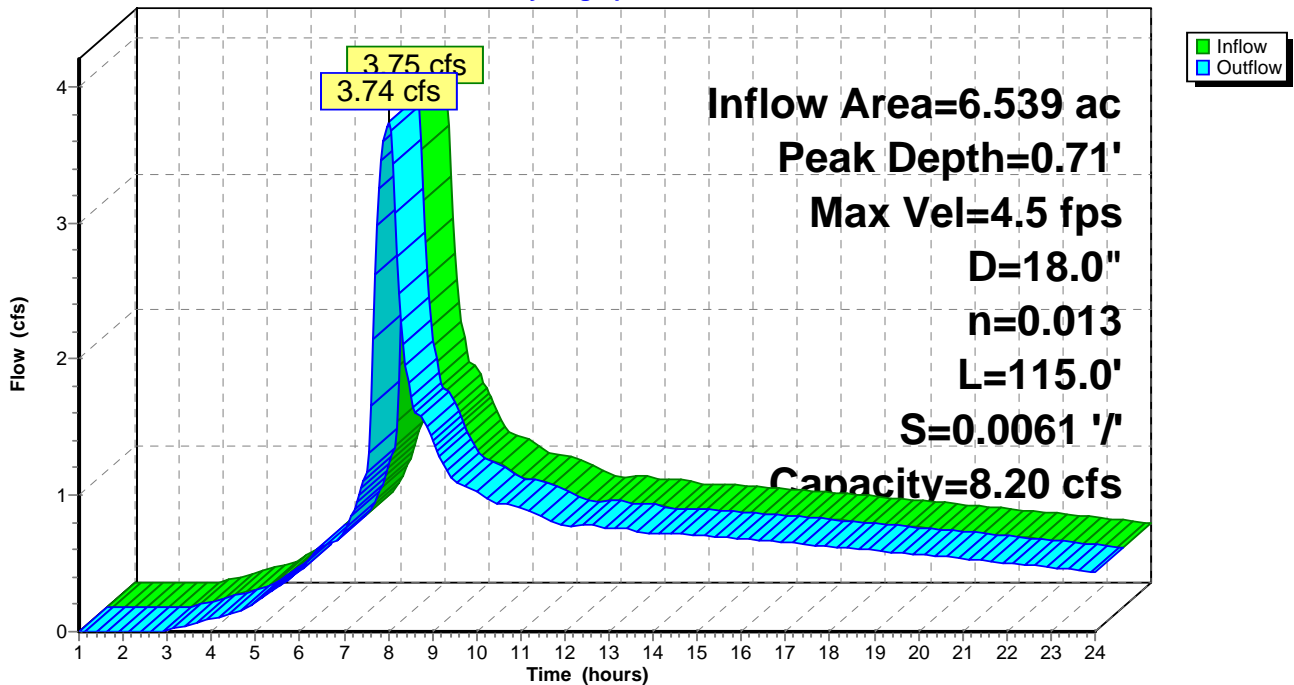
Inflow Area = 6.539 ac, Inflow Depth > 2.34" for 25-year event
Inflow = 3.75 cfs @ 7.99 hrs, Volume= 1.277 af
Outflow = 3.74 cfs @ 8.00 hrs, Volume= 1.276 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.7 fps, Avg. Travel Time= 0.7 min

Peak Depth= 0.71' @ 7.99 hrs
Capacity at bank full= 8.20 cfs
Inlet Invert= 200.89', Outlet Invert= 200.19'
18.0" Diameter Pipe, n= 0.013
Length= 115.0' Slope= 0.0061 '/'

Reach P6: 18" CSP

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P7: 18" ADS

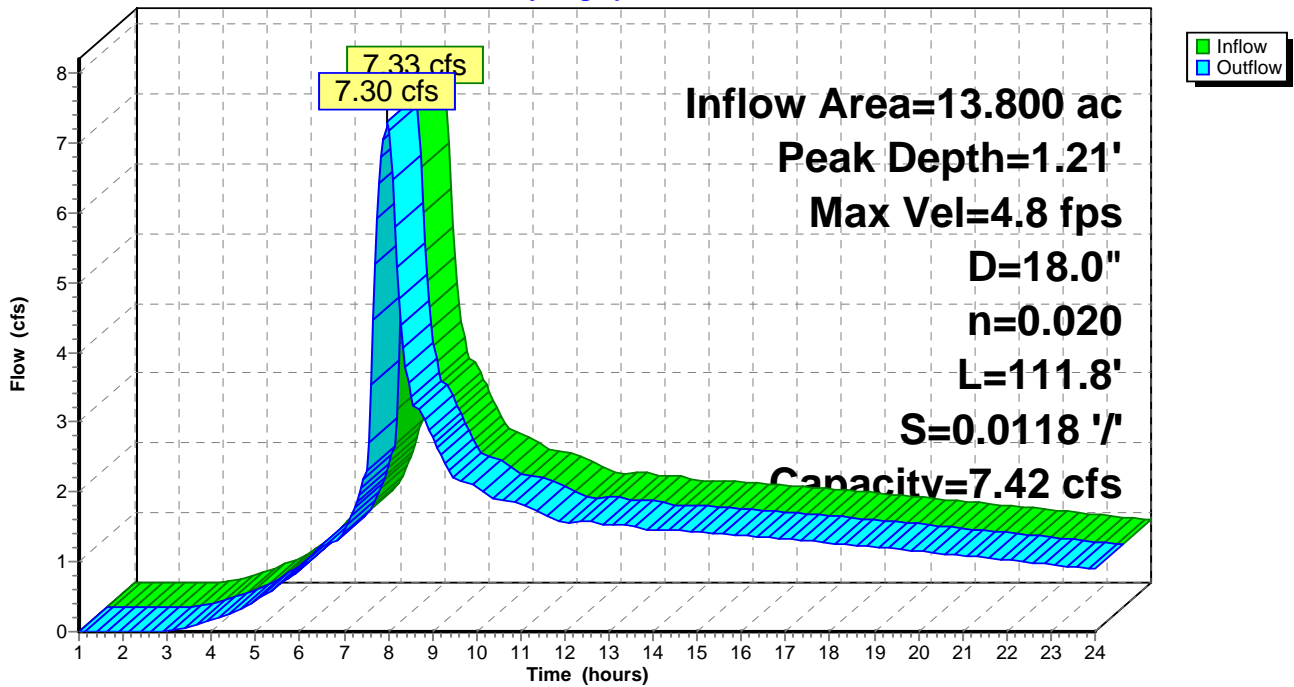
Inflow Area = 13.800 ac, Inflow Depth > 2.22" for 25-year event
Inflow = 7.33 cfs @ 7.98 hrs, Volume= 2.555 af
Outflow = 7.30 cfs @ 7.99 hrs, Volume= 2.554 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.8 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.1 fps, Avg. Travel Time= 0.6 min

Peak Depth= 1.21' @ 7.98 hrs
Capacity at bank full= 7.42 cfs
Inlet Invert= 198.34', Outlet Invert= 197.02'
18.0" Diameter Pipe, n= 0.020
Length= 111.8' Slope= 0.0118 '/'

Reach P7: 18" ADS

Hydrograph



Mission Terrace - Downstream Analysis

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Type IA 24-hr 25-year Rainfall=4.00"

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Reach P8: 24" CSP

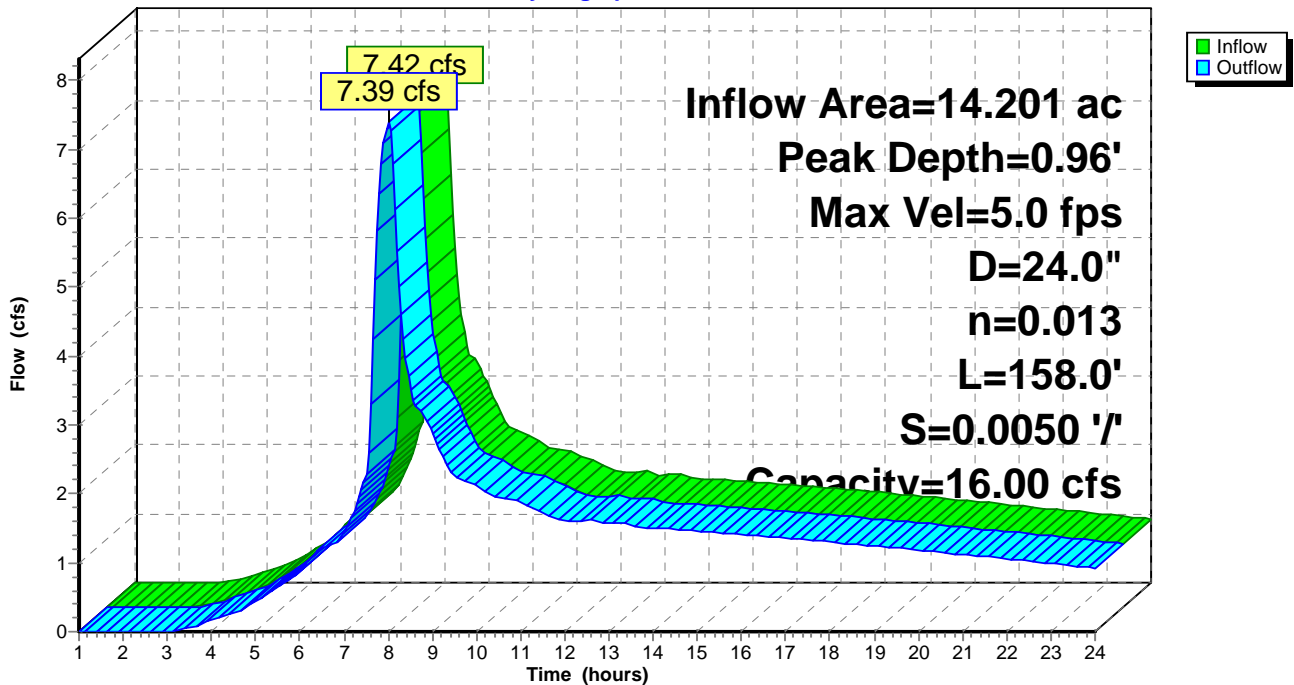
Inflow Area = 14.201 ac, Inflow Depth > 2.20" for 25-year event
Inflow = 7.42 cfs @ 7.99 hrs, Volume= 2.607 af
Outflow = 7.39 cfs @ 8.00 hrs, Volume= 2.605 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.9 min

Peak Depth= 0.96' @ 7.99 hrs
Capacity at bank full= 16.00 cfs
Inlet Invert= 100.00', Outlet Invert= 99.21'
24.0" Diameter Pipe, n= 0.013
Length= 158.0' Slope= 0.0050 '/'

Reach P8: 24" CSP

Hydrograph



Mission Terrace - Downstream Analysis

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P9: 24" CSP

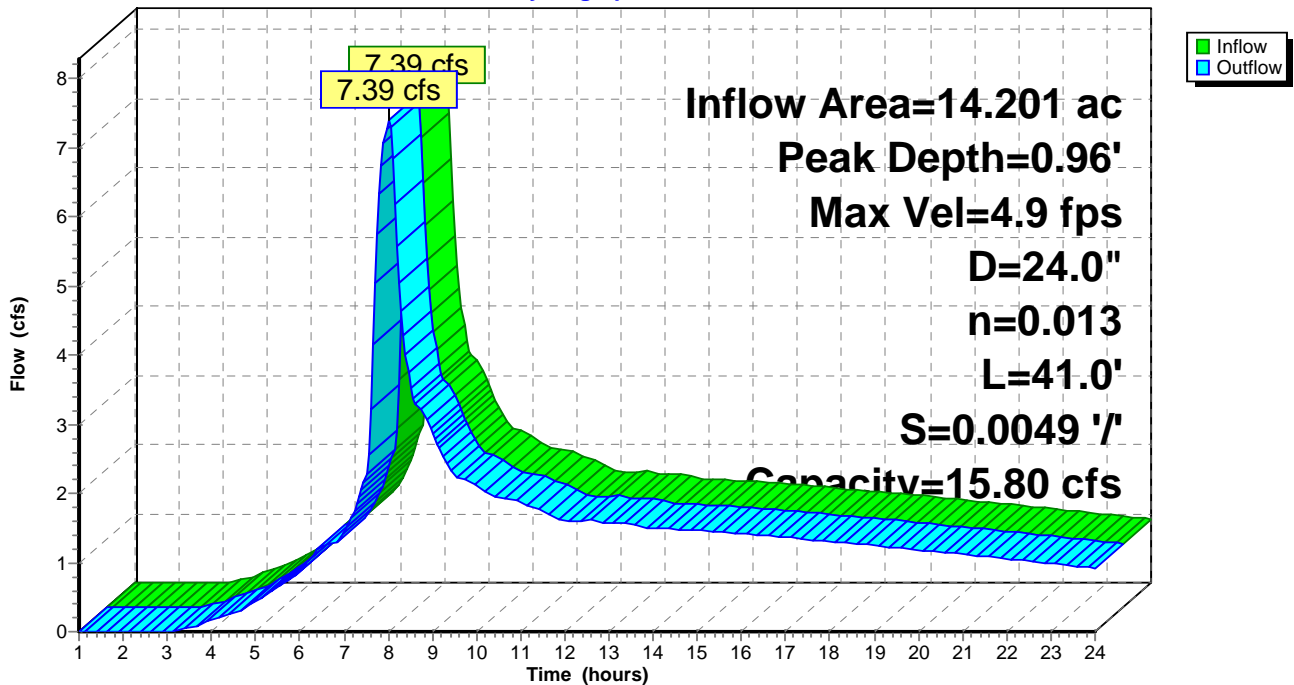
Inflow Area = 14.201 ac, Inflow Depth > 2.20" for 25-year event
Inflow = 7.39 cfs @ 8.00 hrs, Volume= 2.605 af
Outflow = 7.39 cfs @ 8.00 hrs, Volume= 2.605 af, Atten= 0%, Lag= 0.2 min

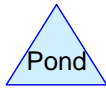
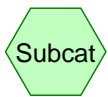
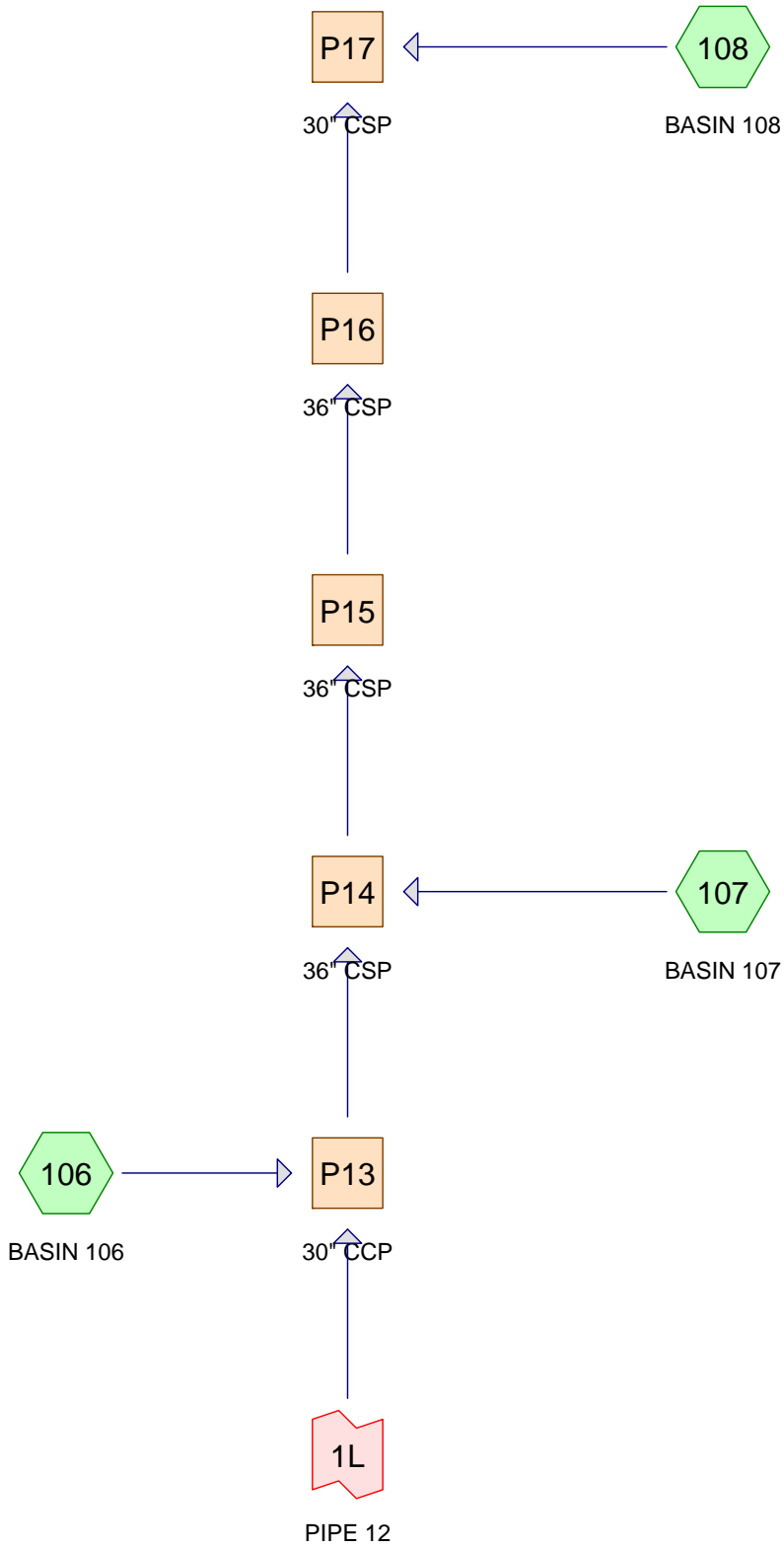
Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.9 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 0.2 min

Peak Depth= 0.96' @ 8.00 hrs
Capacity at bank full= 15.80 cfs
Inlet Invert= 100.00', Outlet Invert= 99.80'
24.0" Diameter Pipe, n= 0.013
Length= 41.0' Slope= 0.0049 '/'

Reach P9: 24" CSP

Hydrograph





Drainage Diagram for Mission Terrace - Downstream Analysis - 2

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Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points

Runoff by SBUH method

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 106: BASIN 106

Runoff Area=6.470 ac Runoff Depth>2.54"
Tc=5.0 min CN=86 Runoff=4.13 cfs 1.370 af

Subcatchment 107: BASIN 107

Runoff Area=4.562 ac Runoff Depth>2.46"
Tc=0.0 min CN=85 Runoff=2.84 cfs 0.934 af

Subcatchment 108: BASIN 108

Runoff Area=36.583 ac Runoff Depth>2.18"
Flow Length=4,141' Tc=19.9 min CN=82 Runoff=15.59 cfs 6.649 af

Reach P13: 30" CCP

Peak Depth=1.24' Max Vel=5.9 fps Inflow=14.31 cfs 4.899 af
D=30.0" n=0.013 L=145.6' S=0.0050 '/ Capacity=29.04 cfs Outflow=14.24 cfs 4.896 af

Reach P14: 36" CSP

Peak Depth=1.28' Max Vel=5.9 fps Inflow=16.92 cfs 5.830 af
D=36.0" n=0.013 L=401.0' S=0.0046 '/ Capacity=45.18 cfs Outflow=16.92 cfs 5.822 af

Reach P15: 36" CSP

Peak Depth=1.12' Max Vel=7.1 fps Inflow=16.92 cfs 5.822 af
D=36.0" n=0.013 L=81.0' S=0.0074 '/ Capacity=57.40 cfs Outflow=16.89 cfs 5.820 af

Reach P16: 36" CSP

Peak Depth=1.07' Max Vel=7.4 fps Inflow=16.89 cfs 5.820 af
D=36.0" n=0.013 L=41.0' S=0.0085 '/ Capacity=61.63 cfs Outflow=16.88 cfs 5.820 af

Reach P17: 30" CSP

Peak Depth=1.19' Max Vel=14.0 fps Inflow=32.34 cfs 12.469 af
D=30.0" n=0.013 L=260.7' S=0.0291 '/ Capacity=69.94 cfs Outflow=32.25 cfs 12.464 af

Li 25-year Outflow Imported from Mission Terrace - Downstream Analysis~Reach P12 Inflow=10.15 cfs 3.529 af
Primary=10.15 cfs 3.529 af

Total Runoff Area = 47.615 ac Runoff Volume = 8.954 af Average Runoff Depth = 2.26"

Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 106: BASIN 106

Runoff = 4.13 cfs @ 7.95 hrs, Volume= 1.370 af, Depth> 2.54"

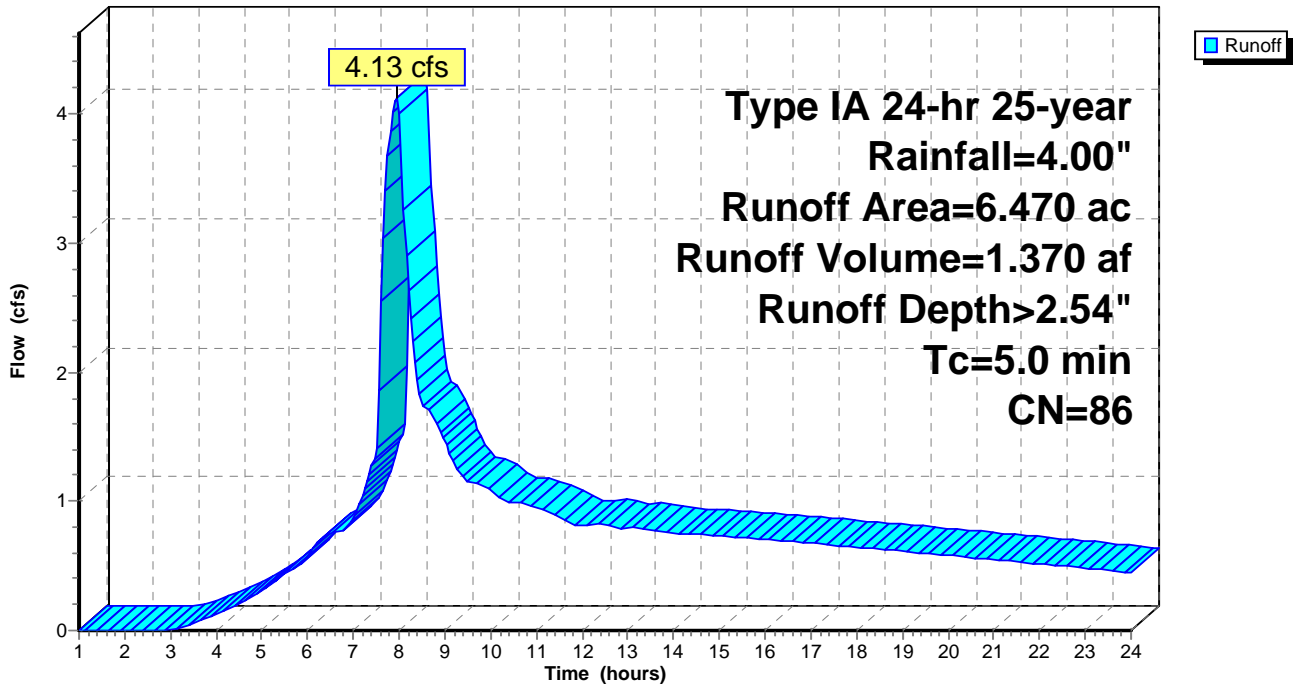
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
1.224	90	1/8 acre lots, 65% imp, HSG C
5.246	85	1/8 acre lots, 65% imp, HSG B
6.470	86	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 106: BASIN 106

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 107: BASIN 107

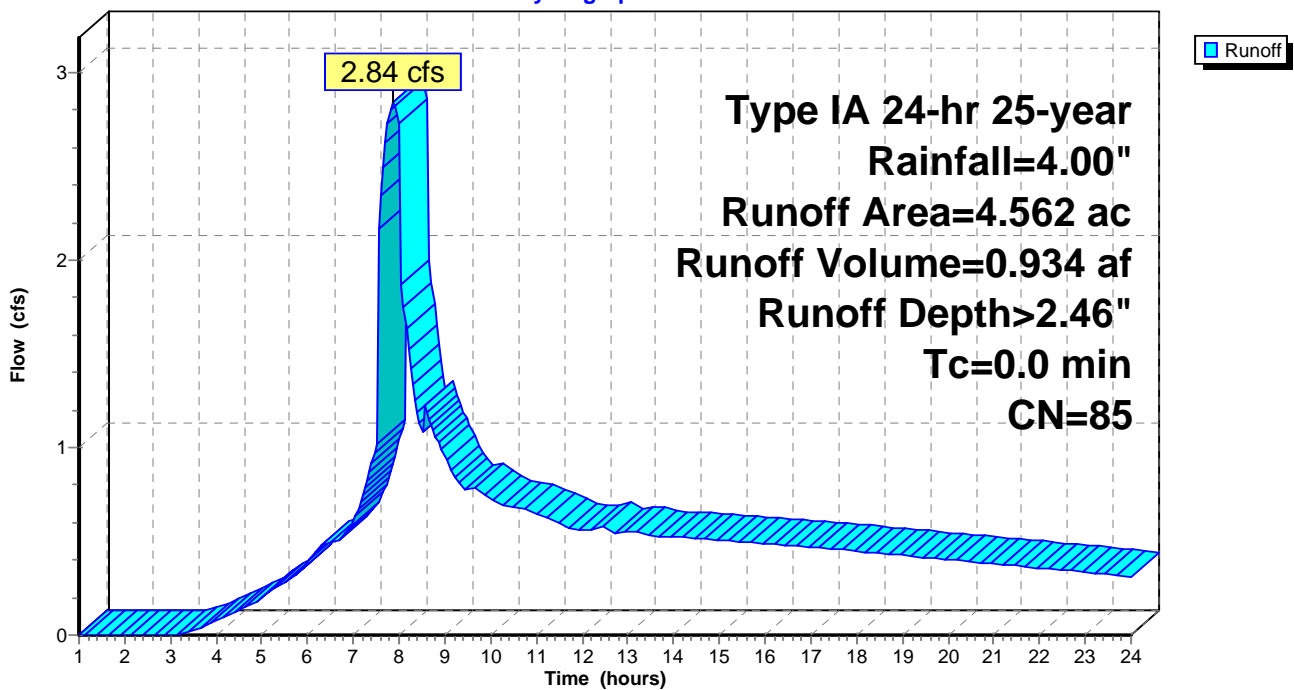
Runoff = 2.84 cfs @ 7.88 hrs, Volume= 0.934 af, Depth> 2.46"

Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
4.562	85	1/8 acre lots, 65% imp, HSG B

Subcatchment 107: BASIN 107

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Subcatchment 108: BASIN 108

Runoff = 15.59 cfs @ 8.04 hrs, Volume= 6.649 af, Depth> 2.18"

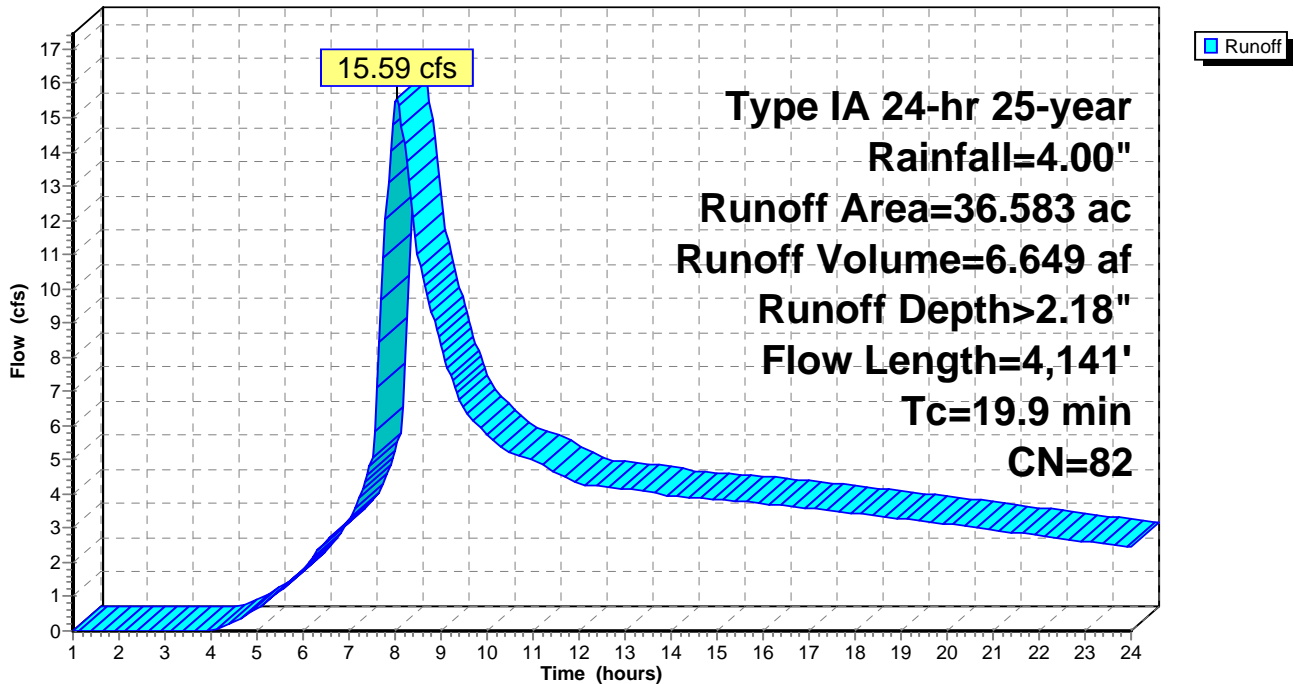
Runoff by SBUH method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-year Rainfall=4.00"

Area (ac)	CN	Description
7.023	72	1/3 acre lots, 30% imp, HSG B
6.551	81	1/3 acre lots, 30% imp, HSG C
20.847	85	1/8 acre lots, 65% imp, HSG B
2.162	90	1/8 acre lots, 65% imp, HSG C
36.583	82	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	120	0.0300	0.2		Sheet Flow, Yard Grass: Short n= 0.150 P2= 2.50"
2.1	520	0.0400	4.1		Shallow Concentrated Flow, Gutter Paved Kv= 20.3 fps
6.9	3,501	0.0200	8.4	14.86	Circular Channel (pipe), Pipe Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013
19.9	4,141	Total			

Subcatchment 108: BASIN 108

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P13: 30" CCP

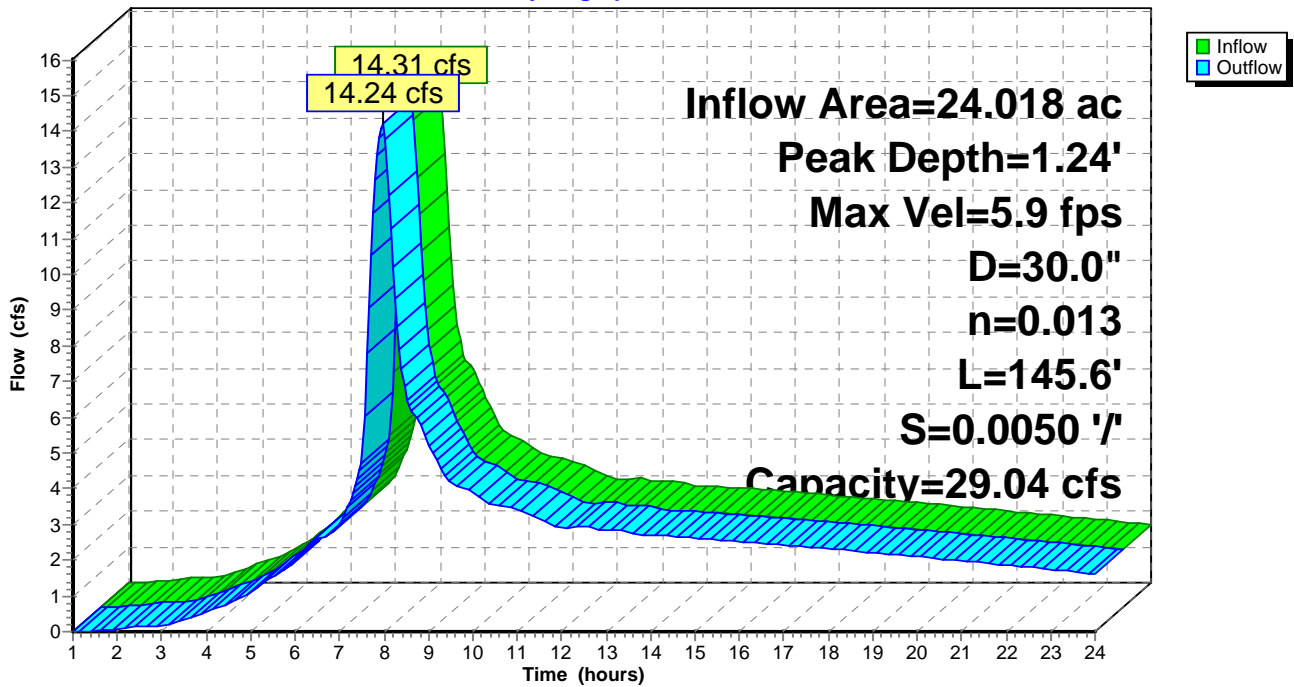
Inflow Area = 24.018 ac, Inflow Depth > 2.45" for 25-year event
Inflow = 14.31 cfs @ 7.98 hrs, Volume= 4.899 af
Outflow = 14.24 cfs @ 7.98 hrs, Volume= 4.896 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.9 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.4 fps, Avg. Travel Time= 0.7 min

Peak Depth= 1.24' @ 7.98 hrs
Capacity at bank full= 29.04 cfs
Inlet Invert= 100.00', Outlet Invert= 99.27'
30.0" Diameter Pipe, n= 0.013
Length= 145.6' Slope= 0.0050 '/'

Reach P13: 30" CCP

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P14: 36" CSP

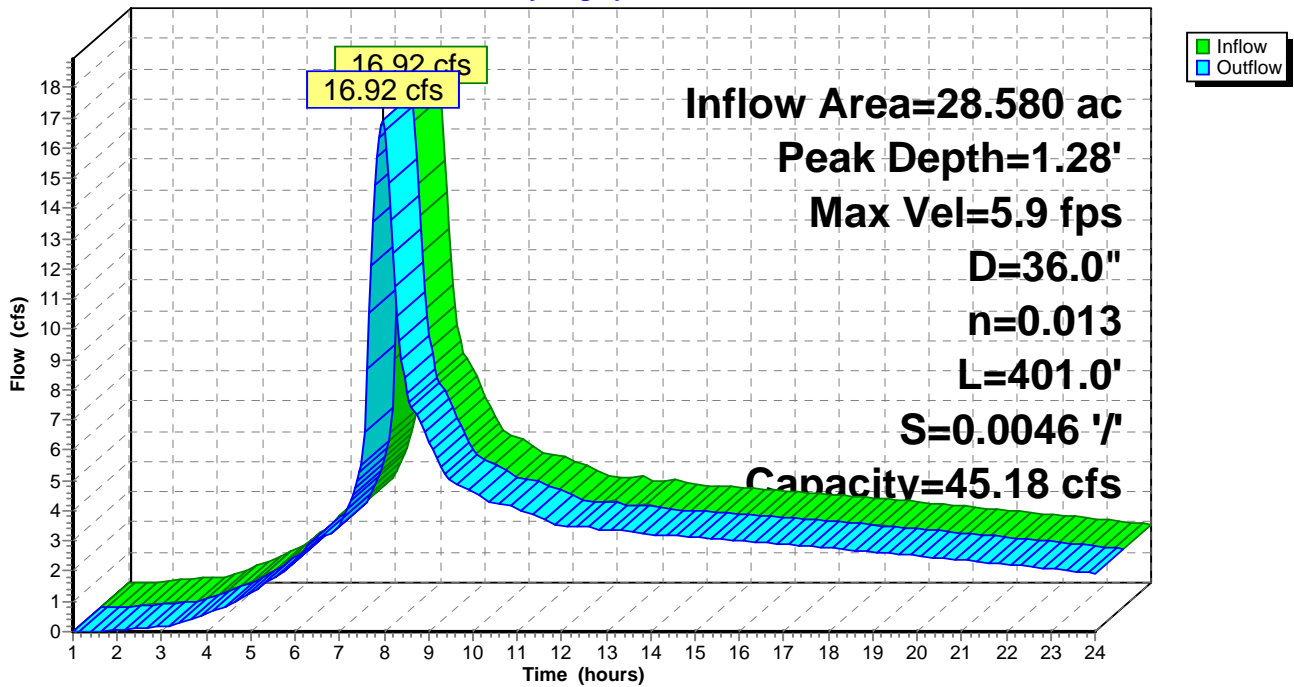
Inflow Area = 28.580 ac, Inflow Depth > 2.45" for 25-year event
Inflow = 16.92 cfs @ 7.97 hrs, Volume= 5.830 af
Outflow = 16.92 cfs @ 7.98 hrs, Volume= 5.822 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.9 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 3.4 fps, Avg. Travel Time= 2.0 min

Peak Depth= 1.28' @ 7.98 hrs
Capacity at bank full= 45.18 cfs
Inlet Invert= 183.44', Outlet Invert= 181.60'
36.0" Diameter Pipe, n= 0.013
Length= 401.0' Slope= 0.0046 '/'

Reach P14: 36" CSP

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P15: 36" CSP

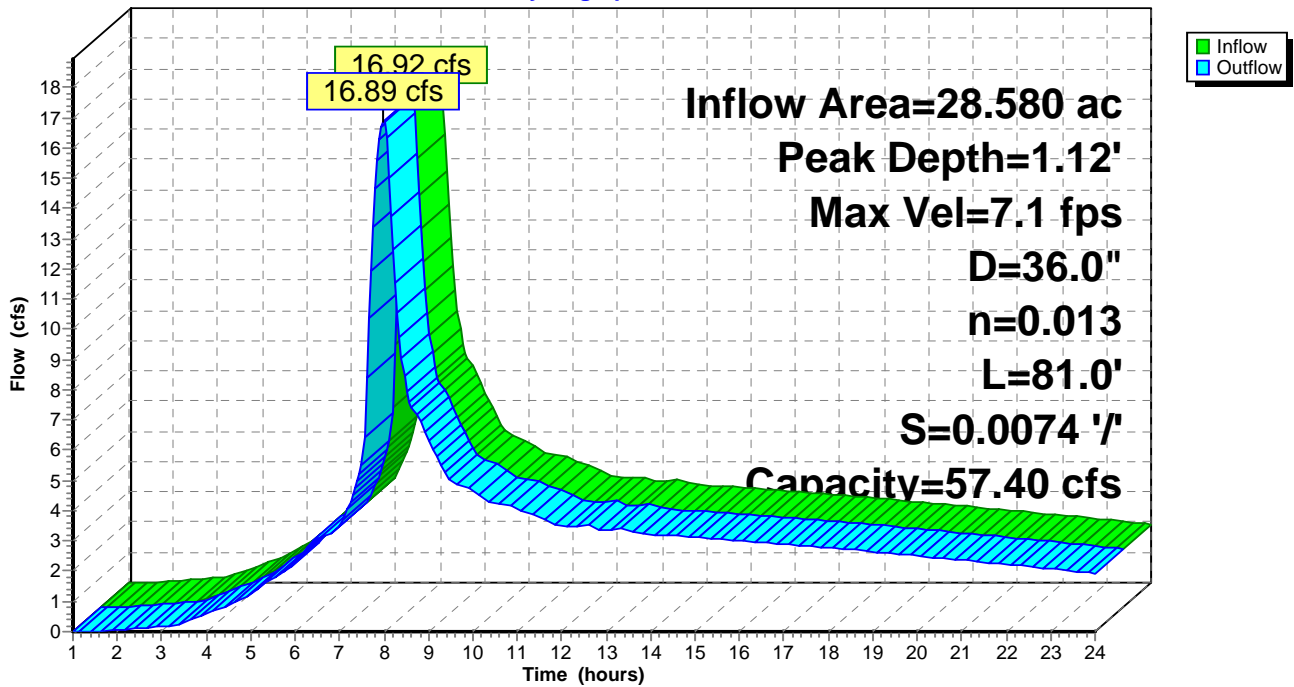
Inflow Area = 28.580 ac, Inflow Depth > 2.44" for 25-year event
Inflow = 16.92 cfs @ 7.98 hrs, Volume= 5.822 af
Outflow = 16.89 cfs @ 7.99 hrs, Volume= 5.820 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.1 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.0 fps, Avg. Travel Time= 0.3 min

Peak Depth= 1.12' @ 7.99 hrs
Capacity at bank full= 57.40 cfs
Inlet Invert= 181.60', Outlet Invert= 181.00'
36.0" Diameter Pipe, n= 0.013
Length= 81.0' Slope= 0.0074 '/'

Reach P15: 36" CSP

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P16: 36" CSP

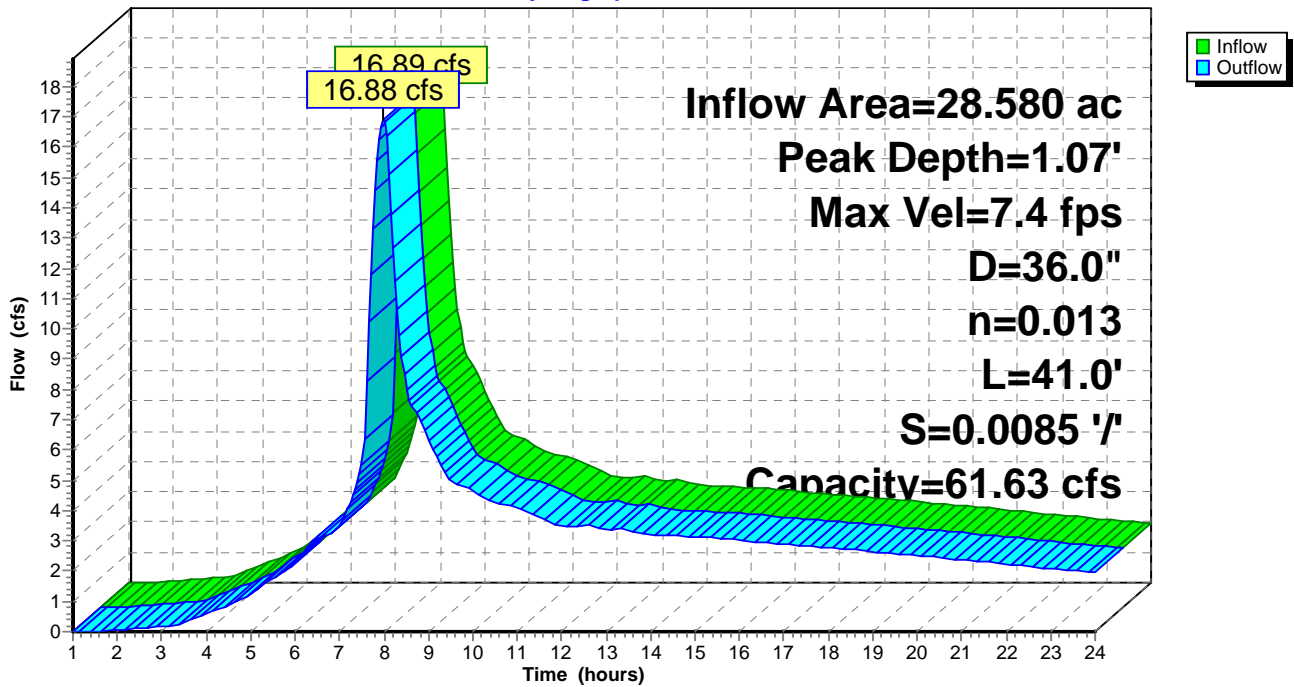
Inflow Area = 28.580 ac, Inflow Depth > 2.44" for 25-year event
Inflow = 16.89 cfs @ 7.99 hrs, Volume= 5.820 af
Outflow = 16.88 cfs @ 7.99 hrs, Volume= 5.820 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.4 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.3 fps, Avg. Travel Time= 0.2 min

Peak Depth= 1.07' @ 7.99 hrs
Capacity at bank full= 61.63 cfs
Inlet Invert= 180.93', Outlet Invert= 180.58'
36.0" Diameter Pipe, n= 0.013
Length= 41.0' Slope= 0.0085 '/'

Reach P16: 36" CSP

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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Reach P17: 30" CSP

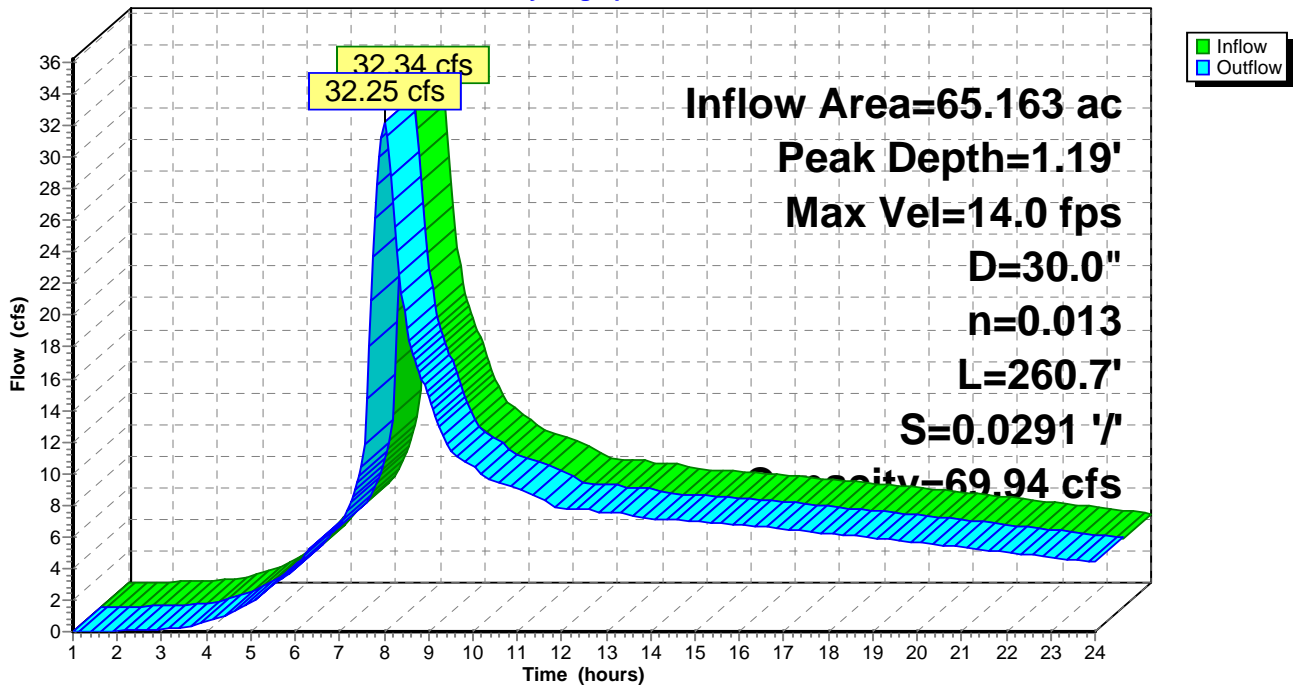
Inflow Area = 65.163 ac, Inflow Depth > 2.30" for 25-year event
Inflow = 32.34 cfs @ 8.01 hrs, Volume= 12.469 af
Outflow = 32.25 cfs @ 8.02 hrs, Volume= 12.464 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.0 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 8.3 fps, Avg. Travel Time= 0.5 min

Peak Depth= 1.19' @ 8.01 hrs
Capacity at bank full= 69.94 cfs
Inlet Invert= 180.58', Outlet Invert= 173.00'
30.0" Diameter Pipe, n= 0.013
Length= 260.7' Slope= 0.0291 1'

Reach P17: 30" CSP

Hydrograph



Mission Terrace - Downstream Analysis - 2

Type IA 24-hr 25-year Rainfall=4.00"

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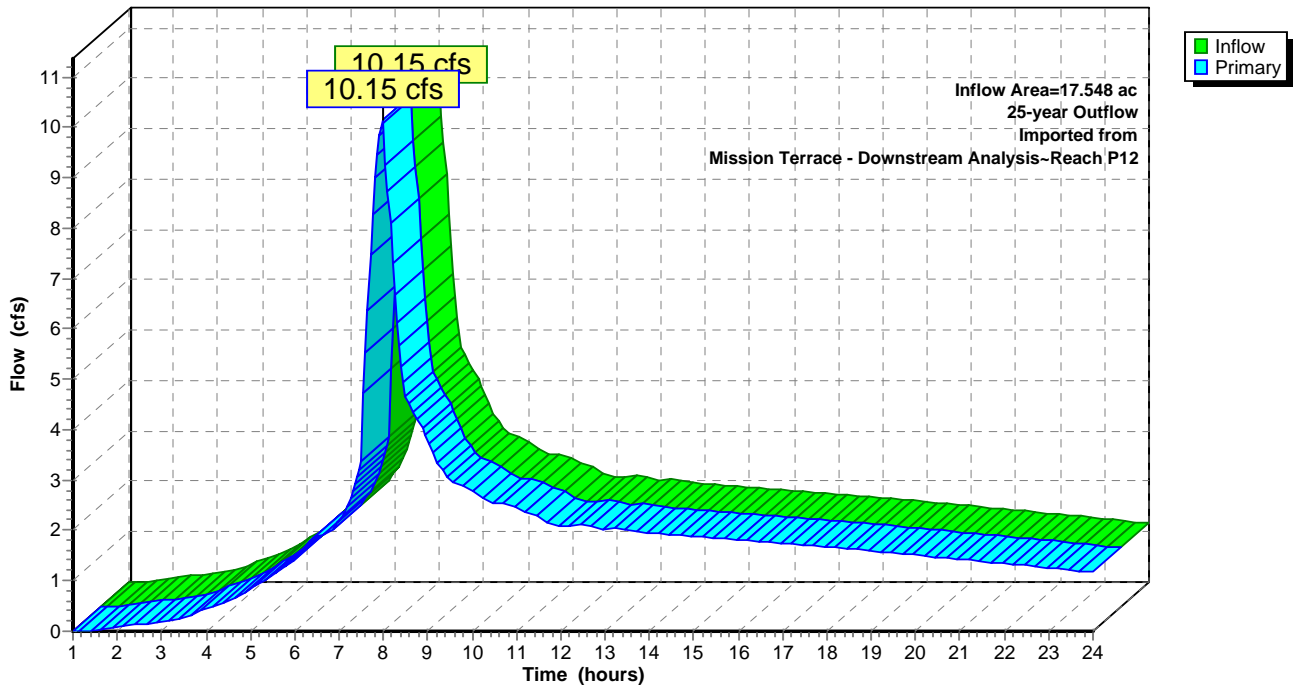
Link 1L: PIPE 12

Inflow Area = 17.548 ac, Inflow Depth > 2.41" for 25-year event
Inflow = 10.15 cfs @ 7.98 hrs, Volume= 3.529 af
Primary = 10.15 cfs @ 7.98 hrs, Volume= 3.529 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
25-year Outflow Imported from Mission Terrace - Downstream Analysis~Reach P12

Link 1L: PIPE 12

Hydrograph



Appendix E:

**Downstream Analysis Soil Map and
Hydrologic Group**

Hydrologic Soil Group—Washington County, Oregon



Map Scale: 1:6,500 if printed on A portrait (8.5" x 11") sheet.

0 50 100 200 300 Meters

0 300 600 1200 1800 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84











MAP LEGEND









Area of Interest (AOI)
 Area of Interest (AOI)

Soils

Soil Rating Polygons





-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines


-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points






-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County, Oregon
 Survey Area Data: Version 12, Sep 19, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 8, 2010—Aug 23, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Washington County, Oregon (OR067)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
21B	Hillsboro loam, 3 to 7 percent slopes	B	25.8	36.9%
21C	Hillsboro loam, 7 to 12 percent slopes	B	19.9	28.4%
21D	Hillsboro loam, 12 to 20 percent slopes	B	8.3	11.9%
37A	Quatama loam, 0 to 3 percent slopes	C	2.2	3.2%
37B	Quatama loam, 3 to 7 percent slopes	C	13.7	19.6%
Totals for Area of Interest			69.9	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Mission Terrace

Subdivision Application

February 18, 2015

Mission Terrace

Subdivision Application

Prepared for:

Kurt Dalbey

Mission Homes Northwest, LLC

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Lake Oswego, Or 97035

Phone: (503) 781-1814

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Fax: (503) 624-0157

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Exhibits

A	Application Form
B	Preliminary Subdivision Plan Drawings (11"x17" reduced)
C	Neighborhood/Developer Meeting Documentation
D	Washington County Surveyor Plat Name Reservation
E	Clean Water Services Service Provider Letter
F	Map and Form of Mailing Label Sheets for Notices
G	Certification of Sign Posting
H	Excerpts from Tualatin Transportation System Plan (TSP)
I	Storm Drainage Report
J	Arborist's Report
K	Title Report

Narrative Project Description

Mission Terrace Subdivision proposes to create 11 lots for detached single-family residential construction in the City of Tualatin. The rectangular project site, at 8815 SW Avery Street (Tax Map 2S1 26AA, Tax Lots 500, 400 & 790) contains 2.97 acres of land. It is located on the north side of SW Avery Street in the area between SW Boones Ferry Road and SW 86th Avenue. Existing improvements include three existing residences and several outbuildings. Two of the existing residences will remain. Surrounding development consists entirely of detached single-family residences.

All eleven of the proposed lots will have access to new streets within the development. SW Comanche Terrace will be extended southerly from its current terminus on the north property line of the parcel to an intersection with SW Avery Street. A new private street (shared driveway) will extend easterly from the extended portion of Comanche Terrace, and provide access to four of the lots. In addition, an access easement will be provided from the terminus of the private street to the east line of the project.

The plat will include two tracts:

- **Water Quality Tract**, containing 3,556 square feet located north of the private street, will contain a surface water management facility to treat and (if required) detain storm water runoff.
- **Private Street, containing 4,500 square feet that will provide access and utilities for four of the proposed lots.**

With respect to construction of infrastructure elements:

- Existing sanitary sewer and storm drain lines will provide service to the site from SW Comanche Terrace.
- Water connections are available from SW Avery Street and SW Comanche Terrace.
- Storm water runoff from streets, driveways and roof drains will be collected and conveyed in pipes to the storm water management facility in the Water Quality Tract, then conveyed in a pipe to connect to the extended portion of the storm line on SW Comanche Terrace.
- SW Comanche Terrace will be fully constructed to meet applicable City street standards, extending south from its existing stub terminus to intersect SW Avery Street.
- The unnamed private street will be fully constructed to meet applicable City street standards, extending west from Lots 8 and 9 to its intersection with SW Comanche Terrace.

A copy of the City of Tualatin application form is provided in Exhibit A. Full-size drawings have been submitted with this application; Exhibit B contains a reduced-size (11" x 17") set.

Findings of Compliance with Applicable Regulations

TDC Chapter 36: Subdividing, Partitioning and Property Line Adjustments

Section 36.070 Land Divisions and Property Line Adjustments.

- (1) *All land divisions shall be created by a subdivision or partition plat and must comply with ORS Chapter 92 and this Chapter.*

Applicant's Response: This narrative, together with drawings and other exhibits, provides evidence demonstrating that the proposed development complies with all applicable regulations of the City of Tualatin and ORS Chapter 92.

Section 36.080 Approval of Streets and Ways.

- (1) *The subdivision or partition plat shall provide for the dedication of all public rights-of-way, reserve strips, easements, tracts and accessways, together with public improvements therein approved and accepted for public use.*
 - (a) *The applicant shall comply with the requirements of TDC Chapter 74, Public Improvement Requirements.*
 - (b) *The applicant shall comply with the design and construction standards set forth in the Public Works Construction Code.*
 - (c) *The applicant shall provide evidence to the City that property intended to be dedicated to the public is free of all liens, encumbrances, claims and encroachments.*
- (2) *The subdivision or partition plat shall indicate the ownership and location of private easements and tracts, and the ownership and location of private improvements within public rights-of-way and easements.*
- (3) *Approval of the subdivision or partition plat by the City shall constitute acceptance of all public rights-of-way, reserve strips, easements, tracts and accessways shown thereon, as well as public facilities located therein. [Ord. 590-83 §1, 4/11/83]*

Response: This is an application for preliminary plat approval. The Applicant's evidence illustrates how right-of-way dedication, construction of utilities and streets, and all other improvements necessary to satisfy Tualatin Development Code requirements will be completed in conjunction with the final subdivision plat process.

Section 36.090 Issuance of Building Permits. [detailed provisions omitted for brevity]

Response: The Applicant acknowledges, and will comply with, the limitations placed on issuance of building permits prior to completion of the final plat and all public improvements associated with the subdivision.

PROCEDURE FOR SUBDIVIDING

Section 36.110 Approval Required.

- (1) *No land may be subdivided or replatted except in accordance with this Chapter and if a variance or minor variance is requested to the dimensional standards of the lots, or the minimum lot size, in accordance with the approval criteria in TDC Chapter 33.*

- (2) *The procedure for review and action on subdivision applications, and requested variances and minor variances, is intended to provide orderly and expeditious processing of such applications and to require conditions of development approval to protect the health and safety of the citizens. [Ord. 590-83 §1, 04/11/83; Ord. 1009-98 §11, 11/9/98; Ord. 1096-02 §17, 01/28/02]*

Section 36.120 Applications and Filing Fee.

- (1) *A request for a Subdivision shall be subject to a Neighborhood/Developer Meeting pursuant to TDC 31.063.*
- (2) *The applicant shall discuss the preliminary plans with the City Engineer in a pre-application conference prior to submitting an application. An applicant for a subdivision shall conduct a Neighborhood/Developer Meeting subject to TDC 31.063. Following the pre-application conference and the Neighborhood/Developer Meeting, the applicant shall prepare and submit a City of Tualatin development application, available from the City Engineer.*

Response: The Applicant and members of his design team met with City staff (Tony Doran and other city staff member) on December 19, 2014 in a scoping and pre-application meeting. Following that work session, the design team prepared a notice area mailing list and provided it to Tony Doran for review and confirmation before sending notices of the Neighborhood/Developer Meeting. That meeting was held on the evening of Wednesday, January 14, 2015, at the Juanita Pohl Center in Tualatin Community Park. The applicant and his design team presented the project to the neighbors and answered a number of questions. Tony Doran also attended and responded to questions from citizens in the course of the meeting. Affidavits and other process documentation, including copies of mailed notices and the on-site notice posting, are provided in Exhibit C.

- (3) *The application shall contain:*
- (a) *the proposed plat name, approved by the County Surveyor;*
 - (b) *the names, addresses and telephone numbers of the property owners and applicants, and when applicable, the name and address of the design engineer or surveyor;*
 - (c) *the signatures of the property owners and applicants; and*
 - (d) *the site location by address and current County Tax Assessor's map and tax lot numbers.*
 - (e) *A description of the manner in which the proposed division complies with each of the expedited criterion for an Expedited Subdivision Application.*
 - (f) *If a variance or minor variance is requested to the dimensional standards of the lots, or the minimum lot size, adequate information to show compliance with the approval criteria in TDC Chapter 33.*
 - (g) *A "Service Provider Letter" from Clean Water Services indicating that a "Stormwater Connection Permit" will likely be issued.*
 - (h) *The information on the Neighborhood/Developer Meeting specified in TDC 31.063(10).*
 - (i) *If a railroad-highway grade crossing provides or will provide the only access to the subject property, the applicant must indicate that fact in the application, and the City must notify the ODOT Rail Division and the railroad company that the application has been received.*

Response: The Washington County Surveyor Plat Name Reservation per subsection (a) is contained in Exhibit D. The submitted application form contains the information and signatures required by subsections (b) through (d). Subsections (d) and (e) are not applicable because this is not a request for Expedited Subdivision, Variance or Minor Variance review. The Service Provider Letter from Clean Water Services, pursuant to subsection (g), is contained in Exhibit E. Neighborhood meeting documentation, pursuant to subsection (h), is contained in Exhibit C. Subsection (i) is not applicable because access does not involve a railroad-highway grade crossing.

- (4) *The subdivision application shall be submitted to the City Engineer, along with:*
- (a) *the subdivision plan;*
 - (b) *preliminary utility plans for streets, water, sanitary sewer and storm drainage;*
 - (c) *a black and white 8&1/2" x 11" site plan suitable for reproduction;*
 - (d) *a completed City fact sheet;*
 - (e) *a Clean Water Services Service Provider letter; and*
 - (f) *other supplementary material as may be required, such as:*
 - (i) *deed restrictions; or*
 - (ii) *for all non-buildable areas or tracts to be dedicated or reserved for public use, a statement of ownership, use, covenants, conditions, limitations and responsibility for maintenance.*

Response: Drawings and other evidence necessary to understand and evaluate this application have been included in the submitted materials, including the specific items listed in this Section for which the City Engineer has provided a form or direction to the Applicant.

- (5) *The following general information shall be shown on the subdivision plan:*
[detailed list of items omitted for brevity]

Response: The preliminary subdivision plan set includes all of the items required by this Section. (See Exhibit B.)

- (6) *The subdivision application shall be accompanied by a nonrefundable fee as established by City Council resolution. The subdivision application shall not be accepted until the fee has been paid to the City. This fee does not apply towards any building permit or other fees that may later be required.*

Response: The Applicant has paid the application fee.

- (7) *The applicant shall submit, along with the subdivision application:*
- (a) *A list of mailing recipients pursuant to TDC .31.064(1).*
 - (b) *Proof of sign posting pursuant to TDC 31.064(2).*

Response: Exhibit F contains a map provided to the Applicant by City of Tualatin staff to delineate the required notice area, and a copy of the forms for printing the corresponding set of mailing labels. The Applicant has posted a Notice/Subdivision sign at the site using the sign template provided by the City, as documented by the completed form provided in Exhibit G.

- (8) *Unless otherwise specified in the subdivision application, or approval, or in express direction from the City Engineer, any material submitted by the applicant with a subdivision application which exceeds the TDC requirements shall be considered a part of the subdivision plan approval.*

Response: All materials submitted by the Applicant in connection with this request are intended for the record.

- (9) *The applicant has the burden of demonstrating compliance with the applicable development regulations.*

Response: The Applicant has presented substantial evidence to demonstrate compliance with all applicable development regulations.

- (10) *The applicable time period for action on the subdivision application shall not commence until the City Engineer has determined that the application is complete.*
- (a) *If the City Engineer fails to make such determination of completeness within 30 days of the date of its submission, or re-submission, the subdivision application shall be deemed complete upon the expiration of the 30-day period for purposes of commencing the applicable time period, unless:*
- (i) *the application lacks information required to be submitted; or*
 - (ii) *the required fees have not been submitted; or*
 - (iii) *the City Engineer has notified the applicant in writing of the deficiencies in the application within 30 days of submission of the subdivision application.*
- (b) *The City Engineer may subsequently require correction of any information found to be in error or submission of additional information not specified in this Chapter, as the City Engineer deems necessary to make an informed decision.*

Response: This subsection provides procedural guidance to City staff and requires no statement from the Applicant.

- (11) *The City Engineer shall prepare the standard form of Development Application for subdivision plans, including provisions which will best accomplish the intent of this section. [Ord. 590-83 §1, 4/11/83; Ord. 931-94 §3, 9/12/94; Ord. 933-94 §12, 11/28/94; Ord. 954-95 §2, 12/11/95; Ord. 1009-98 §12, 11/9/98; Ord. 1070-01 §6, 4/9/01; Ord. 1096-02 §18, 1/28/02; Ord. 1157-04, 3/8/04; Ord. 1149-03, 10/13/03; Ord. 1096-02, 1/28/02; Ord. 1070-01, 4/9/01; Ord. 1304-10 §19, 4/14/10]*

Response: The Applicant has prepared and submitted this request using the forms provided by the City Engineer for that purpose.

Section 36.130 Phasing. [detailed provisions omitted for brevity]

Response: This Section is not applicable because the Applicant has not requested approval for implementation in multiple phases.

Section 36.140 Review Process.

[Subsections (1) through (7), (9) and (10) provide procedural guidance and are omitted for brevity]

- (8) *Approval or denial of a subdivision shall be based upon and accompanied by a brief statement that*
- (a) *explains the criteria and standards considered relevant to the decision;*
 - (b) *states the facts relied upon in making the decision; and*
 - (c) *explains the justification for the decision based on the criteria, standards and facts set forth.*

Response: The Applicant has submitted this narrative statement and recommended findings, together with the accompanying drawings and other Exhibits, to provide information the City Engineer can use in preparing the statement required by subsection 8.

Section 36.160 Subdivision Plan Approval.

- (1) *A subdivision or expedited subdivision application shall not be approved unless the City Engineer first finds that adequate public improvements are, or will be, made available to serve the proposed subdivision.*

Response: The preliminary subdivision plans indicate where public improvements are present adjacent to the Subject Property, including street improvement conditions and existing City utility services. The plans also indicate how water and sewer utility services will be extended to serve the proposed lots, how storm water quality treatment and detention will be achieved, and how street improvements will be constructed to satisfy all applicable development standards. (See full-size plan drawings; reduced copies in Exhibit B.)

- (2) *The City Engineer may approve, approve with conditions, or deny the application based upon demonstrated compliance with applicable City regulations. The City Engineer's decision shall be supported by written findings and reasons for the decision. Findings and reasons may consist of references to the applicable Tualatin Development Code (TDC) or Tualatin Municipal Code (TMC), provisions or special studies. The decision shall also include an explanation of the rights of each party to request a review of the decision.*
- (3) *One copy of the subdivision plan and decision shall be filed with both the City Recorder and the City Engineer.*
- (4) *The decision of the City Engineer on a subdivision shall become final 14 calendar days after the date the notice of the decision is given, unless the applicant submits a written request for review.*
- (5) *The approval for the subdivision shall expire 2 years from the date the decision is issued unless the applicant requests an extension and the City Engineer approves it pursuant to Subsection (6).*

Response: These subsections provide procedural guidance and require no statement from the Applicant.

- (6) *Before approving an extension of a subdivision approval, the City Engineer shall find the request meets these criteria: [detailed provisions omitted for brevity]*

Response: This provision is not applicable because this is not a request for an extension.

- (7) *A subdivision plan approval may include restrictions and conditions. These restrictions and conditions shall be reasonably conceived to:*
- (a) *protect the public from the potentially deleterious effects of the proposal;*
 - (b) *fulfill the need for public facilities and services created by the proposal, or increased or in part attributable to the impacts of the proposal; or*
 - (c) *further the implementation of the requirements of the TDC. [Ord. 590-83 §1, 4/11/83; Ord. 933-94 §13 and 14, 11/28/94; Ord. 954-95 §4, 12/11/95; Ord. 1009-98 §16, 11/9/98; Ord. 1026-99 §17, 8/9/99. Ord. 1058-00 §2, 9/25/00; Ord. 1096-02 §22, 01/28/02; Ord. 1272-08 §2, 11/10/08; Ord. 1333-11 §3, 9/12/11]*

Response: This submittal provides plans showing how all applicable development standards will be satisfied by the proposed development, together with evidence demonstrating the feasibility of doing so. The Applicant understands that conditions of approval will be used to clarify specific construction requirements for the benefit of all parties.

Section 36.161 Requests for Review of Subdivision and Partition Decision. [detailed provisions omitted for brevity]

Response: This Section is not applicable because this application is not a request for review of a prior decision. The Applicant retains the right to request review of the City Engineer's decision on this application.

Section 36.162 Modifications to Subdivision Plan Approval. [detailed provisions omitted for brevity]

Response: This Section is not applicable because this application is not a request to modify a prior decision.

Section 36.170 Subdivision Plat. [detailed provisions omitted for brevity]

Section 36.172 Information on Subdivision Plat. [detailed provisions omitted for brevity]

Section 36.174 Agreement for Public Improvements. [detailed provisions omitted for brevity]

Section 36.176 Approval of the Subdivision Plat by the City. [detailed provisions omitted for brevity]

Section 36.178 Recording of Subdivision Plat. [detailed provisions omitted for brevity]

Response: These Sections are not applicable because this application is not a request for approval of a final subdivision plat.

LOT REQUIREMENTS

Section 36.410 Double Frontage and Reverse Frontage. (detailed provisions omitted for brevity)

Response: This Section is not applicable because the proposed lot layout will not create any double-frontage or reverse-frontage lots.

Section 36.420 Existing Structures and Appurtenances.

- (1) *Any existing structures proposed to be demolished shall be removed prior to the City approval of the subdivision or partition plat. Any structures determined to be a historic City landmark shall be reviewed in accordance with TDC Chapter 68.*
- (2) *Any existing wells shall be abandoned in the manner prescribed by State and County regulations prior to the City approval of the subdivision or partition plat.*
- (3) *Any existing underground fuel or oil tanks, septic tanks and similar underground storage tanks shall be removed or filled as required by the Department of Environmental Quality prior to the City's approval of the subdivision or partition plat. [Ord. 590-83 §1, 4/11/83.]*

Response: The Applicant will demolish all existing structures, abandon wells, and remove underground tanks in compliance with this Section prior to final plat approval. None of the structures on the site are designated historic City landmarks.

Section 36.430 Large Lots.

When subdividing, partitioning or adjusting land into large lots which at some future time are possible to be resubdivided, repartitioned or readjusted to a size which more closely conforms to the other lots in the subdivision or area, the applicant shall submit a future streets plan. The future streets plan shall indicate that proposed large lots be of such size and shape and contain such building site restrictions as will provide for the extension and opening of streets at such intervals and the subsequent division of any such large lot into smaller size lots which meet the requirements of the TDC. [Ord. 590-83 §1, 4/11/83]

Response: One lot, Lot 13, is possible for future development. If divided, it would have direct access to SW Avery and because of its size and dimension, no future street plan is warranted.

Section 36.440 Monuments.

Survey markers and monumentation shall be placed as required by State law. Any monuments that are disturbed before all improvements are completed shall be replaced by the applicant to conform to the requirements of State law. [Ord. 590-83 §1, 4/11/83]

Response: The applicant's Surveyor will set monuments, including re-setting monuments disturbed during construction, as required by State law.

Section 36.450 Side Lot Lines.

The side lines of lots, as far as practicable, shall run at right angles to the street upon which the lots face. [Ord. 590-83 §1, 4/11/83]

Response: The Subject Property is a small, infill development site containing 2.97 gross acres. Other than the lots (lots 4, 5, 6, and 7) along the curve of SW Comanche Terrace, the side lines of the rectangular lots that front on SW Comanche Terrace and the unnamed private road will be perpendicular to the street.

Section 36.460 Size and Shape.

- (1) *The lot size, width, shape and orientation shall be appropriate for the location of the lot and shall comply with the planning district standards for the type of development and use contemplated.*
- (2) *These minimum standards shall apply with the following exceptions:
[subsections (a), (b) and (c) are not applicable and are omitted for brevity]*

Response: All of the lots are suitable in size, width, shape and orientation for construction of detached single-family residential construction and use.

Section 36.470 Frontage on Public Streets.

All lots created after September 1, 1979 shall abut a public street, except for the following:

- (1) *Secondary condominium lots, which shall conform to TDC 73.400 and TDC 75;*
- (2) *Lots and tracts created to preserve wetlands, greenways, Natural Areas and Stormwater Quality Control Facilities identified by TDC Chapters 71, 72 Figure 3-4 of the Parks and Recreation Master Plan and the Surface Water Management Ordinance, TMC Chapter 3-5 respectively, or for the purpose of preserving park lands in accordance with the Parks and Recreation Master Plan;*
- (3) *Residential lots where frontage along a public street is impractical due to physical site restraints. Access to lots shall occur via a shared driveway within a tract. The tract shall have no adverse impacts to surrounding properties or roads and may only be approved if it meets the following criteria:*
 - (a) *Does not exceed 250 feet in length,*
 - (b) *If the tract exceeds 150 feet in length, it has a turnaround facility as approved by the Fire Marshal for fire and life safety,*
 - (c) *The tract does not serve more than 6 lots,*
 - (d) *A public street is not needed to provide access to other adjacent properties as required by TDC Chapter 74,*
 - (e) *A recorded document providing for the ownership, use rights, and allocation for liability for construction and maintenance has been submitted to the City Engineer prior to issuance of a building permit, and*
 - (f) *Access easements have been provided to all properties needing access to the driveway.*
- (4) *Lots in the Manufacturing Park Planning District which have access to the public right-of-way in accordance with TDC 73.400 and TDC Chapter 75 via permanent access easement over one or more adjoining properties, creating uninterrupted vehicle and pedestrian access between the subject lot and the public right-of-way. [Ord. 1054-00 §1, 8/14/00]*

Response: All lots in the proposed development will have frontage/access to a public roadway, with the exception of four lots which will have access from a shared driveway (the private street). The proposed shared driveway meets all requirements in sections (a)-(f).

RL PLANNING DISTRICT REQUIREMENTS

Tualatin Development Code Chapter 40: Low Density Residential Planning District (RL)

Section 40.010 Purpose.

The purpose of this district is to provide low density residential areas in the City that are appropriate for dwellings on individual lots, as well as other miscellaneous land uses compatible with a low density residential environment. [Ord. 590-83 §1, 4/11/83; Ord. 592-83 §6, 6/13/83; Ord. 661-85 §3, 3/25/85; Ord. 956-96 §10, 1/8/96]

Section 40.015 Permitted Density.

Housing density shall not exceed 6.4 units per net acre, except as set forth below:

- (1) The maximum density for small-lot subdivisions, and partitions and subdivisions affected by TDC 40.055, shall not exceed 7.5 dwelling units per net acre.*
- (2) The maximum density for retirement housing in accordance with TDC 34.170(2) shall not exceed 10 dwelling units per net acre. [Ord. 956-96 §11, 1/8/96. by Ord. 1026-99 §21, 8/9/99; Ord. 1272-08 §5, 11/10/08; Ord. 1317-10 §3, 12/13/10]*

Response: The proposed development will have a total of thirteen residential dwellings within its net land area of 2.375 net acres. “Housing Density” is defined in TDC Chapter 1 as “The number of dwelling units per acre of land rounded to the nearest whole number.” The maximum allowed density for the RL zone is 6.4 units per net acre, thus 6.4 du/acre times 2.375 acres equals 15.2 dwelling units, which is rounded down to 15. The proposed density does not exceed the maximum.

Section 40.020 Permitted Uses.

- (1) Single-family dwellings, including manufactured homes.
[additional listed Permitted Uses omitted for brevity]*

Response: The proposed subdivision is designed to create thirteen lots specifically for detached single-family dwellings, which are a Permitted Use in the RL Planning District. Two of the lots have existing residences that will be saved.

Section 40.030 Conditional Uses Permitted. [detailed provisions omitted for brevity]

Response: This Section is not applicable because no Conditional Use is proposed.

40.050 Lot Size for Permitted Uses.

Except as otherwise provided, the lot size for a single-family dwelling shall be:

- (1) The minimum lot area shall be an average of 6,500 square feet.*
- (2) The average lot width shall be at least 30 feet.*
- (3) When a lot has frontage on a public street, the minimum lot width shall be 50 feet on a street and 30 feet around a cul-de-sac bulb.*
- (4) The maximum building coverage shall be 45 percent.*
- (5) For flag lots, the minimum lot width at the street shall be sufficient to comply with at least the minimum access requirements contained in [TDC 73.400\(7\) - \(12\)](#). [Ord. 590-83 §1, 4/11/83; Ord. 592-83 §6, 6/13/83; Ord. 866-92 §1, 4/27/92; Ord. 920-94 §2, 4/11/94;]*

Ord. 956-96 §12, 1/8/96; Ord. 1010-98 §1, 12/14/98, Ord. 1026-99 § 24, 8/9/99; Ord. 1054-00 §6, 8/14/00; Ord. 1055-00 §1, 8/28/00; Ord. 1272-08 §6, 11/10/08]

Response: The proposed lots range in size from 5,930 square feet (Lot 3) to 15,453 square feet (Lot 13), with an overall average lot area of 7,965 square feet, which exceeds the minimum 6,500 square foot requirement in subsection (1).

The narrowest lot is Lot 4, whose width is 55.0 feet, when measured from the south lot line to the north lot line; therefore, all lots exceed the 30-foot minimum average lot width in subsection (2).

All lots with frontage to a public street meet the minimum width requirement of 50 feet, ranging in width from 55.0 to 123.68 feet. All lots on the private street have a minimum width of 50 feet with the exception of lots 8 and 9, which have widths of 40 feet. These lots comply with subsection (5) because one driveway width of up to 15 feet will fit within the 25-foot wide flagpole with minimum 5-foot wide landscaping strips on both sides, as required by the TDC. The other lots on the private street have widths of 58.4 and 70 feet, which meets the minimum width requirement of 50 feet.

Subsection (4) is not applicable at this time because maximum building coverage compliance needs to be determined in conjunction with issuance of building permits for dwellings, which can only occur after the final plat is recorded.

*Section 40.055 Lot Size for Greenway and Natural Area Tracts and Lots.
[detailed provisions omitted for brevity]*

Response: This Section is not applicable because no Greenway- or Natural Area Tracts or Lots are proposed.

*Section 40.060 Lot Size for Conditional Uses.
[detailed provisions omitted for brevity]*

Response: This Section is not applicable because no Conditional Use is proposed.

Section 40.070 Setback Requirements for Permitted Uses.

Except as otherwise provided, the setbacks for permitted uses shall be:

- (1) *The front yard setback shall be a minimum of 15 feet, except to an unenclosed porch, which shall be 12 feet.*
- (2) *The setback to a garage door shall be a minimum of 20 feet.*
- (3) *The side yard setback shall be a minimum of five feet.*
- (4) *For a corner lot, the following provisions shall apply:*
 - (a) *one front yard setback shall be a minimum of 15 feet; it shall be determined by the orientation of the structure based on the location of the front door.*
 - (b) *the second front yard setback shall be a minimum of 10 feet.*
- (5) *The rear yard setback shall be a minimum of 15 feet. [Ord. 590-83 §1, 4/11/83; Ord. 592-83 §6, 6/13/83; Ord. 731-87 §1, 9/14/87; Ord. 743-88 §46, 3/28/88; Ord. 956-96 §15, 1/8/96; Ord. 965-96 §8, 12/9/96; Ord. 1026-99 §27 8/9/99; Ord. 1076-01 §1, 7/9/01]*

Response: As noted above, the overall size and dimensions of all of the proposed lots exceed minimum requirements. This ensures that the new lots have sufficient area for construction of a new single-family dwelling that is compatible with neighboring homes while complying with the building setback requirements of this Section.

*Section 40.080 Setback Requirements for Conditional Uses.
[detailed provisions omitted for brevity]*

Response: This Section is not applicable because no Conditional Use is proposed.

*Section 40.085 Setback Requirements Adjacent to the Norwood Expressway.
A setback no less than 50 feet in depth will be provided adjacent to the Norwood Expressway right-of-way. [Ord. 592-83 §69, 6/13/83]*

Response: This Section is not applicable because the Subject Property is not adjacent to the Norwood Expressway.

*Section 40.090 Projections Into Required Yards.
Cornices, eaves, canopies, decks, sun-shades, gutters, chimneys, flues, belt courses, leaders, sills, pilasters, lintels, ornamental features, and other similar architectural features may extend or project into a required front or rear yard setback area not more than three feet and into a required side yard not more than two feet, or into the required open space as established by coverage standards in this chapter. [Ord. 590-83 §1, 4/11/83; Ord. 592-83 §6, 6/13/83; Ord. 731-87 §2, 9/14/87]*

Response: Future construction of dwellings on the proposed lots will be required to comply with the provisions of this Section.

*Section 40.100 Structure Height.
Except as otherwise provided, the maximum structure height is 35 feet. [Ord. 590-83 §1, 4/11/83; Ord. 592-83 §6, 6/13/83; Ord. 956-96 §16, 1/8/96; Ord. 965-96 §9, 12/9/96]*

Response: Future construction of dwellings on the proposed lots will be required to comply with the provisions of this Section.

Section 40.110 Access.

Refer to TDC 36.470 [see Applicant's response statement, above] and 73.400.

Section 73.400 Access. *[Subsections applicable to single-family residential development]*

- (8) *To afford safe pedestrian access and egress for properties within the City, a sidewalk shall be constructed along all street frontage, prior to use or occupancy of the building or structure proposed for said property. The sidewalks required by this section shall be constructed to City standards, except in the case of streets with inadequate right-of-way width or where the final street design and grade have not been established, in which case the sidewalks shall be constructed to a design and in a manner approved by the City Engineer. Sidewalks approved by the City Engineer may include temporary sidewalks and sidewalks constructed on private property; provided, however, that such sidewalks shall provide continuity with sidewalks of adjoining commercial developments existing or proposed. When*

a sidewalk is to adjoin a future street improvement, the sidewalk construction shall include construction of the curb and gutter section to grades and alignment established by the City Engineer.

Response: The Applicant proposes to construct curb/gutter and sidewalk improvements on the extension of SW Comanche from the north line of the project to the intersection with SW Avery Street. Sidewalks will not be provided on the private street. Curb and sidewalks are currently in place along SW Avery and no changes are proposed along the Avery Street frontage.

- (10) *Minimum access requirements for residential uses:*
- (a) *Ingress and egress for single-family residential uses, including townhouses, shall be paved to a minimum width of 10 feet. Maximum driveway widths shall not exceed 26 feet for one and two car garages, and 37 feet for three or more car garages. For the purposes of this section, driveway widths shall be measured at the property line.*

Response: All of the proposed lots are wide enough to accommodate homes with two-car garages and driveways meeting these dimensional requirements.

- (15) *Distance between Driveways and Intersections.*
Except for single-family dwellings, the minimum distance between driveways and intersections shall be as provided below. Distances listed shall be measured from the stop bar at the intersection.
- (a) *At the intersection of collector or arterial streets, driveways shall be located a minimum of 150 feet from the intersection.*
- (b) *At the intersection of two local streets, driveways shall be located a minimum of 30 feet from the intersection.*
- (c) *If the subject property is not of sufficient width to allow for the separation between driveway and intersection as provided, the driveway shall be constructed as far from the intersection as possible, while still maintaining the 5-foot setback between the driveway and property line as required by TDC 73.400(14)(b).*
- (d) *When considering a public facilities plan that has been submitted as part of an Architectural Review plan in accordance with TDC 31.071(6), the City Engineer may approve the location of a driveway closer than 150 feet from the intersection of collector or arterial streets, based on written findings of fact in support of the decision. The written approval shall be incorporated into the decision of the City Engineer for the utility facilities portion of the Architectural Review plan under the process set forth in TDC 31.071 through 31.077.*

Response: All driveways will comply with this section as they will front on SW Comanche Terrace or the private street, which are both local streets. The driveway for lot 1 will be located on the north side of the lot as close to the property as allowed by code. The driveways for lots 12 and 13 are existing and will remain in their current location. Lot 13 has a circular driveway with two access points to SW Avery and the eastern portion will be removed so the lot has only one access point. Lot 12 driveway will be reconfigured to allow only one access with a width of 26'.

- (16) *Vision Clearance Area.*
 - (a) *Local Streets - A vision clearance area for all local street intersections, local street and driveway intersections, and local street or driveway and railroad intersections shall be that triangular area formed by the right-of-way lines along such lots and a straight line joining the right-of-way lines at points which are 10 feet from the intersection point of the right-of-way lines, as measured along such lines (see Figure 73-2 for illustration).*
 - (b) *Collector Streets – [not applicable – detailed provisions omitted for brevity]*
 - (c) *Vertical Height Restriction - Except for items associated with utilities or publicly owned structures such as poles and signs and existing street trees, no vehicular parking, hedge, planting, fence, wall structure, or temporary or permanent physical obstruction shall be permitted between 30 inches and 8 feet above the established height of the curb in the clear vision area (see Figure 73-2 for illustration).*

Response: At the corner of SW Avery Street and SW Comanche Terrace, and at the corner of SW Comanche Terrace and the private street, Lots 1 and 11 respectively, will have a minimum 15-foot front setback and a minimum 10-foot street side yard setback, so no building encroachment into the vision clearance area will be possible. The existing residence on Lot 12 meets the minimum setback requirements. The owners of these lots will maintain vegetation in their front/side yards in compliance with vision clearance requirements.

*Section 40.120 Off-Street Parking and Loading.
Refer to TDC Chapter 73.
Section 73.370(2) Off-Street Parking Provisions*

USE	MINIMUM MOTOR VEHICLE PARKING REQUIREMENT	MAXIMUM MOTOR VEHICLE PARKING REQUIREMENT	BICYCLE PARKING REQUIREMENT	PERCENTAGE OF BICYCLE PARKING TO BE COVERED
<i>Residential Uses:</i>				
<i>(i) Detached single-family dwelling, residential home, residential facilities (located in low density (RL) planning districts) Townhouse</i>	<i>2.00 vehicle parking spaces per dwelling unit, residential home or residential facility (stalls or spaces within a residential garage not included, except as approved in Architectural Review).</i>	<i>None</i>	<i>None Required</i>	<i>N/A</i>

Response: All of the proposed lots have sufficient area and width to allow home construction with two-car garages and two off-street parking spaces. Compliance can be assured at the time of residential building permit issuance.

*Section 40.130 Floodplain District.
Refer to TDC Chapter 70.*

Response: Per FEMA and CWS mapping, the site does not lie within a 100 year flood plain.

Section 40.140 Community Design Standards.

- (1) *Development of the following is subject to the provisions set forth in TDC 40.140(2) and standards and criteria set forth in TDC Chapter 73, in addition to all other applicable TDC standards:*
 - (a) *A new single-family dwelling.*
 - (b) *[not applicable – omitted for brevity]*
- (2) *No building permits shall be issued for development described in TDC 40.140(1) until plans for the proposed development have been approved pursuant to one of the following two review options, and all other applicable TDC standards are met:
[detailed provisions omitted for brevity]*
- (3) *A Level II (Discretionary) Single-family Architectural Review application shall be processed as a limited land use decision pursuant to the provisions set forth in TDC 31.071(7)(b).*
- (4) *Where a site, structure, or object is designated a historic landmark, and pro-posed development is subject to TDC Chapter 68 Historic Certificate of Appropriateness review, conditions of Certificate of Appropriateness approval may, at the discretion of the decision-making authority, include modification of one or more of the standards set forth in TDC 73.190(1)(a), or modification of one or more of the discretionary approval criteria set forth in TDC 73.190(1)(b), in order to meet the Certificate of Appropriateness approval criteria. [Ord. 1260-08 §4, 5/12/08]*

Response: This Section is not applicable because this proposal does not include any request for approval of new single-family residential construction plans. Following final plat recording, review pursuant to this Section will be required prior to construction of homes on the proposed subdivision lots.

*Section 40.145 Placement Standards for Manufactured Homes.
[detailed provisions omitted for brevity]*

Response: This Section is not applicable because this application does not request approval to place a Manufactured Home.

*Section 40.150 Landscape Standards.
Refer to TDC Chapter 73. [Ord. 725-87 §13, 6/22/87]*

Response: This Section is not applicable because Chapter 73 does not contain landscape standards applicable to single-family residential use in the RL Planning District.

TREE REMOVAL

Section 34.210 Application for Architectural Review, Sub-division or Partition Review, or Tree Removal Permit.

(1) Architectural Review, Subdivision, or Partition. When a property owner wishes to remove trees, other than the exemptions permitted under TDC 34.200(3), to develop property, and the development is subject to Architectural Review, Subdivision Review, or Partition Review approval, the property owner shall apply for approval to remove trees as part of the Architectural Review, Subdivision Review, or Partition Review application process.

(a) The application for tree removal shall include:

(i) A Tree Preservation Site Plan, drawn to a legible scale, showing the following information: a north arrow; existing and proposed property lines; existing and proposed topographical contour lines; existing and proposed structures, impervious surfaces, wells, septic systems, and stormwater retention/detention facilities; existing and proposed utility and access locations/easements; illustration of vision clearance areas; and illustration of all trees on-site that are eight inches or more in diameter (including size, species, and tag i.d. number). All trees proposed for removal and all trees proposed for preservation shall be indicated on the site plan as such by identifying symbols, except as follows:

(A) Where Clean Water Services (CWS) has issued a Service Provider Letter that addresses the proposed development currently under consideration, and

(B) Where CWS has approved delineation of a “sensitive area” or “vegetated corridor” on the subject property, and

(C) Where CWS has required dedication of an easement that prohibits encroachment into the delineated area, then

(D) All trees located within the CWS-required easement need not be individually identified on the Tree Preservation Site Plan if the CWS-required easement boundary is clearly illustrated and identified on the Tree Preservation Site Plan.

(ii) A tree assessment prepared by a qualified arborist, including the following information: an analysis as to whether trees proposed for preservation can in fact be preserved in light of the development proposed, are healthy specimens, and do not pose an imminent hazard to persons or property if preserved; an analysis as to whether any trees proposed for removal could be reasonably preserved in light of the development proposed and health of the tree; a statement addressing the approval criteria set forth in TDC 34.230; and arborist’s signature and contact information. The tree assessment report shall have been prepared and dated no more than one calendar year preceding the date the development application is deemed complete by the City. Where TDC 34.210(1)(a)(i)(A) through (D) are applicable, trees located within the CWS-required easement need not be included in the tree assessment report.

(iii) All trees on-site shall be physically identified and numbered in the field with an arborist-approved tagging system. The tag i.d. numbers shall correspond with the tag i.d. numbers illustrated on the site plan. Where TDC 34.210(1)(a)(i)(A) through (D) are applicable, trees located in the CWS-required easement need not be tagged.

*(b) The application for tree removal shall be approved or denied based on the criteria in **TDC 34.230**.*

(c) The approval or denial of an application to remove trees shall be a part of the Architectural Review, Subdivision Review, or Partition Review decision.

(2) Existing Single-Family Dwelling.

[not applicable; detailed provisions omitted for brevity]

*(3) Other. When a property owner wishes to remove trees, other than the exemptions permitted under **TDC 34.200(3)**, for reasons other than those identified in **TDC 34.210(1) and (2)**, the property owner shall apply for a Tree Removal Permit as follows:*

[not applicable; detailed provisions omitted for brevity]

Response: The Grading Plan (Sheet P300 in Exhibit B) shows the locations of identified trees with notations for their disposition in the site construction process. Exhibit J contains an arborist's report prepared by Morgan Holen. Sheet P300 in Exhibit B shows the locations of trees in relation to the lot layout and potential building envelopes. There are no sensitive land areas within the project limits, per CWS provider letter, that impact tree removal.

Section 34.230 Criteria.

The Community Development Director shall consider the following criteria when approving, approving with conditions, or denying a request to cut trees.

(1) An applicant must satisfactorily demonstrate that any of the following criteria are met:

(a) The tree is diseased, and

(i) The disease threatens the structural integrity of the tree; or

(ii) The disease permanently and severely diminishes the esthetic value of the tree; or

(iii) The continued retention of the tree could result in other trees being infected with a disease that threatens either their structural integrity or esthetic value.

(b) The tree represents a hazard which may include but not be limited to:

(i) The tree is in danger of falling;

(ii) Substantial portions of the tree are in danger of falling.

(c) It is necessary to remove the tree to construct proposed improvements based on Architectural Review approval, building permit, or approval of a Subdivision or Partition Review.

*(2) If none of the conditions in **TDC 34.240(1)** are met, the Community Development Director shall evaluate the condition of each tree based on the following criteria. A tree given a rating of one on a factor will not be required to be retained*

Response: As described in the arborist report, a majority of the trees on the property will be removed to accommodate construction. The street extensions necessary for adequate access to the property are required to comply with City standards for alignment with the existing SW Comanche Terrace street stub, and for the private street. Construction of roads on the appropriate horizontal and vertical alignments will significantly affect the root zones of existing trees within the property, making it infeasible to conserve trees within the vicinity of the proposed streets. As noted by the arborist's report, because the large trees on the site have grown up as members of dense stands, individual trees will become subject to windthrow hazard if exposed by removal of neighboring trees. Additionally, the resulting layout of lots and corresponding building envelopes for homes causes many conflicts with existing tree locations (See Sheet P200 in Exhibit

B). For these reasons, the arborist's report recommends against attempting to conserve a majority of the trees within the subject property. Based on this evidence, tree removal as proposed is necessary to remove the trees to construct the proposed improvements, consistent with Approval Criterion (c).

ARCHITECTURAL REVIEW APPROVAL

Section 73.040 Architectural Review Plan Approval Required.

- (1) *Except for [a less-than 35% expansion of a single-family residence] as permitted by these standards, no new building, condominium, townhouse, **single family dwelling** [emphasis added; additional list items omitted for brevity], or exterior major remodeling shall occur until the architectural review plan required under TDC 31.071 has been reviewed and approved by the Community Development Director and City Engineer or their designees, or by the Architectural Review Board or City Council for conformity with applicable standards or criteria.*
- (2) *No new single-family dwelling or [35% or more expansion of a single-family residence] as permitted by these standards, shall occur until the architectural review application under TDC 31.071(7) has been reviewed and approved by the Community Development Director or their designee for conformity with the applicable standards or criteria.*

Response: This Section is not directly applicable to this application because it does not include plans for construction of a dwelling. This Section will apply to requests to construct homes on the lots to be created by this proposed subdivision.

IMPROVEMENTS

Section 74.110 Phasing of Improvements.

Section 74.120 Public Improvements.

- (1) *Except as specially provided, all public improvements shall be installed at the expense of the applicant. All public improvements installed by the applicant shall be constructed and guaranteed as to workmanship and material as required by the Public Works Construction Code prior to acceptance by the City. No work shall be undertaken on any public improvement until after the construction plans have been approved by the City Engineer and a Public Works Permit issued and the required fees paid.*
- (2) *In accordance with the Tualatin Basin Program for fish and wildlife habitat the City intends to minimize or eliminate the negative affects of public streets by modifying right-of-way widths and street improvements when appropriate. The City Engineer is authorized to modify right-of-way widths and street improvements to address the negative affects on fish and wildlife habitat. [Ord. 1224-06 §35, 11/13/06]*

Response: Conceptual project drawings in Exhibit B (and full-size drawings submitted with this request) show proposed public water, sanitary sewer and storm drainage facilities meeting City requirements to serve the proposed development. Conditions of approval can be used to ensure that detailed construction plans are submitted and approved prior to commencement of public works construction.

Section 74.130 Private Improvements.

All private improvements shall be installed at the expense of the applicant. The property owner shall retain maintenance responsibilities over all private improvements.

Response: Conceptual project drawings in Exhibit B show proposed public water, sanitary sewer, storm drain facilities and street improvements for the private Street in Tract B. These improvements will be constructed to meet city standards. Conditions of approval can be used to ensure that detailed construction plans are submitted and approved prior to commencement of construction.

Section 74.140 Construction Timing.

- (1) *All the public improvements required under this chapter shall be completed and accepted by the City prior to the issuance of a Certificate of Occupancy; or, for subdivision and partition applications, in accordance with the requirements of the Subdivision regulations.*
- (2) *All private improvements required under this chapter shall be approved by the City prior to the issuance of a Certificate of Occupancy; or for subdivision and partition applications, in accordance with the requirements of the Subdivision regulations.*

Response: This Section provides procedural guidance and requires no statement from the Applicant.

RIGHT-OF-WAY*Section 74.210 Minimum Street Right-of-Way Widths.*

The width of streets in feet shall not be less than the width required to accommodate a street improvement needed to mitigate the impact of a proposed development. In cases where a street is required to be improved according to the standards of the TDC, the width of the right-of-way shall not be less than the minimums indicated in TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G.

- (1) *For subdivision and partition applications, wherever existing or future streets adjacent to property proposed for development are of inadequate right-of-way width the additional right-of-way necessary to comply with TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G shall be shown on the final subdivision or partition plat prior to approval of the plat by the City. This right-of-way dedication shall be for the full width of the property abutting the roadway and, if required by the City Engineer, additional dedications shall be provided for slope and utility easements if deemed necessary.*
- (2) *For development applications other than subdivisions and partitions, [not applicable; detailed provisions omitted for brevity].*
- (3) *For development applications that will impact existing streets not adjacent to the applicant's property, and to construct necessary street improvements to mitigate those impacts would require additional right-of-way, the applicant shall be responsible for obtaining the necessary right-of-way from the property owner. A right-of-way dedication deed form shall be obtained from the City Engineer and upon completion returned to the*

City Engineer for acceptance by the City. On subdivision and partition plats the right-of-way dedication shall be accepted by the City prior to acceptance of the final plat by the City. On other development applications the right-of-way dedication shall be accepted by the City prior to issuance of building permits. The City may elect to exercise eminent domain and condemn necessary off-site right-of-way at the applicant's request and expense. The City Council shall determine when condemnation proceedings are to be used.

- (4) *If the City Engineer deems that it is impractical to acquire the additional right-of-way as required in subsections (1)-(3) of this section from both sides of the center-line in equal amounts, the City Engineer may require that the right-of-way be dedicated in a manner that would result in unequal dedication from each side of the road. This requirement will also apply to slope and utility easements as discussed in TDC 74.320 and 74.330. The City Engineer's recommendation shall be presented to the City Council in the preliminary plat approval for subdivisions and partitions, and in the recommended decision on all other development applications, prior to finalization of the right-of-way dedication requirements.*
- (5) *Whenever a proposed development is bisected by an existing or future road or street that is of inadequate right-of-way width according to TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G, additional right-of-way shall be dedicated from both sides or from one side only as determined by the City Engineer to bring the road right-of-way in compliance with this section.*
- (6) *When a proposed development is adjacent to or bisected by a street proposed in TDC Chapter 11, Transportation Plan (Figure 11-3) and no street right-of-way exists at the time the development is proposed, the entire right-of-way as shown in TDC Chapter 74, Public Improvement Requirements, Figures 74-2A through 74-2G shall be dedicated by the applicant. The dedication of right-of-way required in this subsection shall be along the route of the road as determined by the City. [Ord. 933-94 §50, 11/28/94; Ord. 979-97 §52, 7/14/97; Ord. 1026-99 §98, 8/9/99; Ord. 1354-13 §17, 02/25/13]*

Response: The 2013 Tualatin Transportation System Plan designates SW Avery Street as a “Minor Collector.” (See excerpts from TSP in Exhibit H.) According to TSP Figure 2 and Table 3, the preferred width for a Collector Street is a 62-foot wide right-of-way with curb-to-curb pavement width of 40 feet for two 11-foot travel lanes, two 5-foot bike lanes, one 8-foot parking strip and with a 6-foot planter strip and 5-foot sidewalk on each side. Current improvements along the project frontage, and several hundred feet in each direction, have a curb to curb width of 36 feet and with a curb tight 5-foot-wide sidewalk. The Applicant does not propose any modifications to SW Avery Street that would involve widening, bike lanes, parking strips, planter strips, or modifications to existing sidewalk width. The existing right of way from centerline is 30 feet. Current collector street standards indicate a 31’ right of way. An additional 1 foot can be dedicated if required without any impact to existing improvements.

New public streets within the development will have a 50 foot right of way with 32 feet of improvements from curb to curb. A 5 foot sidewalk and 3.5-foot-wide planter strip will be behind the curb.

Section 74.220 Parcels Excluded from Development.

On subdivision development applications which include land partitioned off or having adjusted property lines from the original parcel, but do not include the original parcel,

the applicant shall be responsible for obtaining any necessary right-of-way from the owner of the original parcel if the right-of-way is needed to accommodate street improvements required of the applicant. The applicant shall submit a completed right-of-way dedication deed to the City Engineer for acceptance. The right-of-way dedication shall be accepted by the City prior to the City approving the final subdivision plat. [Ord. 933-94, § 49, 11/28/94]

Response: This Section is not applicable because the Subject Property does not involve its threshold situation.

EASEMENTS AND TRACTS

Section 74.310 Greenway, Natural Area, Bike, and Pedestrian Path Dedications and Easements.

- (1) Areas dedicated to the City for Greenway or Natural Area purposes or easements or dedications for bike and pedestrian facilities during the development application process shall be surveyed, staked and marked with a City approved boundary marker prior to acceptance by the City.*
- (2) For subdivision and partition applications, the Greenway, Natural Area, bike, and pedestrian path dedication and easement areas shall be shown to be dedicated to the City on the final subdivision or partition plat prior to approval of the plat by the City; or*
- (3) For all other development applications, Greenway, Natural Area, bike, and pedestrian path dedications and easements shall be submitted to the City Engineer; building permits shall not be issued for the development prior to acceptance of the dedication or easement by the City. [Ord. 933-94 §50, 11/28/94; Ord. 979-97 §52, 7/14/97; Ord. 1026-99 §98, 8/9/99].*

Response: This Section is not applicable because the Subject Property is not situated in or adjacent to an identified Greenway or Natural Area, or bike or pedestrian path corridor. Because of the way surrounding development has occurred, there is no existing corridor (i.e., public access tract or easement) to which a connection could be made on the Subject Property's boundaries.

Section 74.320 Slope Easements.

- (1) The applicant shall obtain and convey to the City any slope easements determined by the City Engineer to be necessary adjacent to the proposed development site to support the street improvements in the public right-of-way or accessway or utility improvements required to be constructed by the applicant.*
- (2) For subdivision and partition applications, the slope easement dedication area shall be shown to be dedicated to the City on the final subdivision or partition plat prior to approval of the plat by the City; or*
- (3) For all other development applications, a slope easement dedication shall be submitted to the City Engineer; building permits shall not be issued for the development prior to acceptance of the easement by the City. [Ord. 933-94, § 51, 11/28/94]*

Response: This Section is not applicable because the site's topography and relationship to the abutting streets of SW Avery Street and SW Comanche Terrace, does not involve grades for which a slope easement would be warranted.

Section 74.330 Utility Easements.

- (1) *Utility easements for water, sanitary sewer and storm drainage facilities, telephone, television cable, gas, electric lines and other public utilities shall be granted to the City.*
- (2) *For subdivision and partition applications, the on-site public utility easement dedication area shall be shown to be dedicated to the City on the final subdivision or partition plat prior to approval of the plat by the City; and*
- (3) *For subdivision and partition applications which require off-site public utility easements to serve the proposed development, a utility easement shall be granted to the City prior to approval of the final plat by the City. The City may elect to exercise eminent domain and condemn necessary off-site public utility easements at the applicant's request and expense. The City Council shall determine when condemnation proceedings are to be used.*
- (4) *For development applications other than subdivisions and partitions, and for both on-site and off-site easement areas, a utility easement shall be granted to the City; building permits shall not be issued for the development prior to acceptance of the easement by the City. The City may elect to exercise eminent domain and condemn necessary off-site public utility easements at the applicant's request and expense. The City Council shall determine when condemnation proceedings are to be used.*
- (5) *The width of the public utility easement shall meet the requirements of the Public Works Construction Code. All subdivisions and partitions shall have a 6-foot public utility easement adjacent to the street and a 5-foot public utility easement adjacent to all side and rear lot lines. [Ord. 933-94, § 52, 11/28/94]*

Response: The Applicant has submitted plans showing public utilities installed within proposed SW Comanche Terrace and the private street. Connections to existing sanitary sewer and storm drain lines are noted as lying at the northerly line of the property. The plans also illustrate a six-foot Public Utility Easement (PUE) for natural gas, telephone, electric, cable television and other public utilities, located adjacent to the SW Avery Street, SW Comanche Terrace, and the private street rights-of-way, and a five-foot PUE along the side and rear lot lines, to provide services to all of the proposed lots.

Section 74.340 Watercourse Easements.

- (1) *Where a proposed development site is traversed by or adjacent to a watercourse, drainage way, channel or stream, the applicant shall provide a storm water easement, drainage right-of-way, or other means of preservation approved by the City Engineer, conforming substantially with the lines of the watercourse. The City Engineer shall determine the width of the easement, or other means of preservation, required to accommodate all the requirements of the Surface Water Management Ordinance, existing and future storm drainage needs and access for operation and maintenance.*
- (2) *For subdivision and partition applications, any watercourse easement dedication area shall be shown to be dedicated to the City on the final subdivision or partition plat prior to approval of the plat by the City; or*
- (3) *For all other development applications, any watercourse easement shall be executed on a dedication form submitted to the City Engineer; building permits shall not be issued for the development prior to acceptance of the easement by the City.*
- (4) *The storm water easement shall be sized to accommodate the existing water course and all future improvements in the drainage basin. There may be additional requirements as set forth in TDC Chapter 72, Greenway and Riverbank Protection District, and the*

Surface Water Management Ordinance. Water quality facilities may require additional easements as described in the Surface Water Management Ordinance. [Ord. 933-94, § 53, 11/28/94]

Response: There are no water courses that cross the property so this section is not applicable.

Section 74.350 Tracts.

A dedicated tract or easement will be required when access to public improvements for operation and maintenance is required, as determined by the City Engineer. Access for maintenance vehicles shall be constructed of an all-weather driving surface capable of carrying a 50,000-pound vehicle. The width of the tract or easement shall be 15-feet in order to accommodate City maintenance vehicles. In subdivisions and partitions, the tract shall be dedicated to the City on the final plat. In any other development, an access easement shall be granted to the City and recorded prior to issuance of a building permit. [Ord. 933-94, § 54, 11/28/94]

Response: The Water Quality Tract is located adjacent to the private street, in the northwest corner of the Subject Property. Because it can be accessed directly from SW Comanche right-of-way, no special easement is required to allow access for operation and maintenance.

TRANSPORTATION

Section 74.410 Future Street Extensions.

- (1) *Streets shall be extended to the proposed development site boundary where necessary to:

 - (a) *give access to, or permit future development of adjoining land;*
 - (b) *provide additional access for emergency vehicles;*
 - (c) *provide for additional direct and convenient pedestrian, bicycle and vehicle circulation;*
 - (d) *eliminate the use of cul-de-sacs except where topography, barriers such as railroads or freeways, existing development, or environmental constraints such as major streams and rivers prevent street extension.*
 - (e) *eliminate circuitous routes. The resulting dead end streets may be approved without a turnaround. A reserve strip may be required to preserve the objectives of future street extensions.**
- (2) *Proposed streets shall comply with the general location, orientation and spacing identified in the Functional Classification Plan (Figure 11-1), Local Streets Plan (TDC 11.630 and Figure 11-3) and the Street Design Standards (Figures 74-2A through 74-2G).*
 - (a) *Streets and major driveways, as defined in TDC 31.060, proposed as part of new residential or mixed residential/commercial developments shall comply with the following standards:

 - (i) *full street connections with spacing of no more than 530 feet between connections, except where prevented by barriers;*
 - (ii) *bicycle and pedestrian accessway easements where full street connections are not possible, with spacing of no more than 330 feet, except where prevented by barriers;**

- (iii) *limiting cul-de-sacs and other closed-end street systems to situations where barriers prevent full street extensions; and*
- (iv) *allowing cul-de-sacs and closed-end streets to be no longer than 200 feet or with more than 25 dwelling units, except for streets stubbed to future developable areas.*

Response: Prior development surrounding the Subject Property provides no right-of-way corridor by which a through street or accessway connection can be made to the east and western portion of the Subject Property. SW Comanche Street abuts the property on the north line. The Applicant has proposed to extend SW Comanche Terrace from its terminus at the north boundary of the site and connect it to SW Avery Street. In order to serve the central portion of the site, a private street extending from SW Comanche Terrace will be constructed not exceeding 150 feet in length east of the intersection. To provide possible access to a parcel on the east side of the site, an access easement (16' in width) will be extended from the terminus of the private street to the east line of the development. The easement will not be improved, however wording will be provided that will allow the neighboring parcel to improve the access at the time of any development. (The prior developments surrounding the Subject Property also provide no pedestrian accessway corridors to its perimeter, so no pedestrian connection can be made either). No mapping for future streets has been provided due to the limitations of any connections.

Section 74.420 Street Improvements.

When an applicant proposes to develop land adjacent to an existing or proposed street, including land which has been excluded under [TDC 74.220](#), the applicant should be responsible for the improvements to the adjacent existing or proposed street that will bring the improvement of the street into conformance with the Transportation Plan (TDC Chapter 11), TDC 74.425 (Street Design Standards), and the City's Public Works Construction Code, subject to the following provisions:

- (1) *For any development proposed within the City, roadway facilities within the right-of-way described in TDC 74.210 shall be improved to standards as set out in the Public Works Construction Code.*
- (2) *The required improvements may include the rebuilding or the reconstruction of any existing facilities located within the right-of-way adjacent to the proposed development to bring the facilities into compliance with the Public Works Construction Code.*
- (3) *The required improvements may include the construction or rebuilding of off-site improvements which are identified to mitigate the impact of the development.*
- (4) *Where development abuts an existing street, the improvement required shall apply only to that portion of the street right-of-way located between the property line of the parcel proposed for development and the centerline of the right-of-way, plus any additional pavement beyond the centerline deemed necessary by the City Engineer to ensure a smooth transition between a new improvement and the existing roadway (half-street improvement). Additional right-of-way and street improvements and off-site right-of-way and street improvements may be required by the City to mitigate the impact of the development. The new pavement shall connect to the existing pavement at the ends of the section being improved by tapering in accordance with the Public Works Construction Code.*
- (5) *If additional improvements are required as part of the Access Management Plan of the City, TDC Chapter 75, the improvements shall be required in the same manner as the half-street improvement requirements.*

- (6) *All required street improvements shall include curbs, sidewalks with appropriate buffering, storm drainage, street lights, street signs, street trees, and, where designated, bikeways and transit facilities.*
- (7) *For subdivision and partition applications, the street improvements required by TDC Chapter 74 shall be completed and accepted by the City prior to signing the final subdivision or partition plat, or prior to releasing the security provided by the applicant to assure completion of such improvements or as otherwise specified in the development application approval.*
- (8) *For development applications other than subdivisions and partitions, all street improvements required by this section shall be completed and accepted by the City prior to the issuance of a Certificate of Occupancy.*
- (9) *In addition to land adjacent to an existing or proposed street, the requirements of this section shall apply to land separated from such a street only by a railroad right-of-way.*
- (10) *Streets within, or partially within, a proposed development site shall be graded for the entire right-of-way width and constructed and surfaced in accordance with the Public Works Construction Code.*
- (11) *Existing streets which abut the proposed development site shall be graded, constructed, reconstructed, surfaced or repaired as necessary in accordance with the Public Works Construction Code and TDC Chapter 11, Transportation Plan, and TDC 74.425 (Street Design Standards).*
- (12) *Sidewalks with appropriate buffering shall be constructed along both sides of each internal street and at a minimum along the development side of each external street in accordance with the Public Works Construction Code.*
- (13) *The applicant shall comply with the requirements of the Oregon Department of Transportation (ODOT), Tri-Met, Washington County and Clackamas County when a proposed development site is adjacent to a roadway under any of their jurisdictions, in addition to the requirements of this chapter.*
- (14) *The applicant shall construct any required street improvements adjacent to parcels excluded from development, as set forth in TDC 74.220 of this chapter.*
- (15) *Except as provided in TDC 74.430, whenever an applicant proposes to develop land with frontage on certain arterial streets and, due to the access management provisions of TDC Chapter 75, is not allowed direct access onto the arterial, but instead must take access from another existing or future public street thereby providing an alternate to direct arterial access, the applicant shall be required to construct and place at a minimum street signage, a sidewalk, street trees and street lights along that portion of the arterial street adjacent to the applicant's property. The three certain arterial streets are S.W. Tualatin-Sherwood Road, S.W. Pacific Highway (99W) and S.W. 124th Avenue. In addition, the applicant may be required to construct and place on the arterial at the intersection of the arterial and an existing or future public non-arterial street warranted traffic control devices (in accordance with the Manual on Uniform Traffic Control Devices, latest edition), pavement markings, street tapers and turning lanes, in accordance with the Public Works Construction Code.*
- (16) *The City Engineer may determine that, although concurrent construction and placement of the improvements in (14) and (15) of this section, either individually or collectively, are impractical at the time of development, the improvements will be necessary at some future date. In such a case, the applicant shall sign a written agreement guaranteeing future performance by the applicant and any successors in interest of the property being developed. The agreement shall be subject to the City's approval.*

- (17) *Intersections should be improved to operate at a level of service of at least D and E for signalized and unsignalized intersections, respectively.*
- (18) *Pursuant to requirements for off-site improvements as conditions of development approval in TDC 73.055(2)(e) and TDC 36.160(8), proposed multi-family residential, commercial, or institutional uses that are adjacent to a major transit stop will be required to comply with the City's Mid-Block Crossing Policy.*

Response: The Applicant's submitted plans show public street, storm drainage and sidewalk improvements in the SW Avery Street right-of-way, in compliance with these requirements.

SW Comanche Terrace will be fully constructed to meet applicable City street standards, extending south from its existing stub terminus to intersect SW Avery Street.

SW Comanche Terrace and the private street will be constructed in accordance with city standards.

Section 74.430 Streets, Modifications of Requirements in Cases of Unusual Conditions.

- (1) *When, in the opinion of the City Engineer, the construction of street improvements in accordance with TDC 74.420 would result in the creation of a hazard, or would be impractical, or would be detrimental to the City, the City Engineer may modify the scope of the required improvement to eliminate such hazardous, impractical, or detrimental results. Examples of conditions requiring modifications to improvement requirements include but are not limited to horizontal alignment, vertical alignment, significant stands of trees, fish and wildlife habitat areas, the amount of traffic generated by the proposed development, timing of the development or other conditions creating hazards for pedestrian, bicycle or motor vehicle traffic. The City Engineer may determine that, although an improvement may be impractical at the time of development, it will be necessary at some future date. In such cases, a written agreement guaranteeing future performance by the applicant in installing the required improvements must be signed by the applicant and approved by the City.*
- (2) *When the City Engineer determines that modification of the street improvement requirements in TDC 74.420 is warranted pursuant to subsection (1) of this section, the City Engineer shall prepare written findings of modification. The City Engineer shall forward a copy of said findings and description of modification to the applicant, or his authorized agent, as part of the Utility Facilities Review for the proposed development, as provided by TDC 31.072. The decision of the City Engineer may be appealed to the City Council in accordance with TDC 31.076 and 31.077.*
- (3) *To accommodate bicyclists on streets prior to those streets being upgraded to the full standards, an interim standard may be implemented by the City. These interim standards include reduction in motor vehicle lane width to 10 feet [the minimum specified in AASHTO's A Policy on Geo-metric Design of Highways and Streets (1990)], a reduction of bike lane width to 4-feet (as measured from the longitudinal gutter joint to the centerline of the bike lane stripe), and a paint-striped separation 2 to 4 feet wide in lieu of a center turn lane. Where available roadway width does not provide for these minimums, the roadway can be signed for shared use by bicycle and motor vehicle travel. When width constraints occur at an intersection, bike lanes should terminate 50 feet from the intersection with appropriate signing.*

- (4) *The Local Commercial-Industrial Street Section, B-CI, may have an interim reduced cross-section as determined by the City Engineer. The interim reduced standard would include 24-28 feet of pavement, 3-foot gravel shoulders, 2:1 side slopes to a drainage ditch and a 5-foot asphalt sidewalk on one side. Development to the full B-CI Standard will be determined subject to required traffic study analysis. See Figure 75-2F for the Interim B-CI Street Standard. [Ord. 1124-02, 12/9/02; Ord. 1224-06 §37, 11/13/06]*

Response: Street improvements are proposed for construction as part of a single phase of subdivision project construction. No modifications or variances are requested for the new development improvements. For SW Avery Street, minor modification of the applicable Collector Street Design Section is appropriate because the existing curb/sidewalk configuration matches both to the north and to the south of the Subject Property, but it differs from the current standards. The Applicant's proposal is simply to match the curb and sidewalk to fill in the existing gap, and perform necessary ADA upgrades to the crossing at SW Comanche Terrace.

The Applicant has also proposed a sidewalk and planter strip adjacent to the curb alignment on both sides of SW Comanche Terrace from its current terminus to the proposed intersection at SW Avery Street.

Section 74.440 Streets, Traffic Study Required.

- (1) *The City Engineer may require a traffic study to be provided by the applicant and furnished to the City as part of the development approval process as provided by this Code, when the City Engineer determines that such a study is necessary in connection with a proposed development project in order to:*
- (a) *Assure that the existing or proposed transportation facilities in the vicinity of the proposed development are capable of accommodating the amount of traffic that is expected to be generated by the proposed development, and/or*
 - (b) *Assure that the internal traffic circulation of the proposed development will not result in conflicts between on-site parking movements and/or on-site loading movements and/or on-site traffic movements, or impact traffic on the adjacent streets.*
- (2) *The required traffic study shall be completed prior to the approval of the development application.*
- (3) *The traffic study shall include, at a minimum:*
- (a) *an analysis of the existing situation, including the level of service on adjacent and impacted facilities.*
 - (b) *an analysis of any existing safety deficiencies.*
 - (c) *proposed trip generation and distribution for the proposed development.*
 - (d) *projected levels of service on adjacent and impacted facilities.*
 - (e) *recommendation of necessary improvements to ensure an acceptable level of service for roadways and a level of service of at least D and E for signalized and unsignalized intersections respectively, after the future traffic impacts are considered.*
 - (f) *The City Engineer will determine which facilities are impacted and need to be included in the study.*
 - (g) *The study shall be conducted by a registered engineer.*

- (4) *The applicant shall implement all or a portion of the improvements called for in the traffic study as determined by the City Engineer. [Ord. 1103-02, 3/25/02]*

Response: The limited size of the proposed subdivision (13 total lots) represents a net addition of 10 residences along the segment of SW Avery Street between SW Boones Ferry Road and SW 86th Avenue. The additional volume of vehicle trips attributable to this development is small and is not expected to significantly affect intersections in the vicinity. No traffic impact study should be required.

Section 74.450 Bikeways and Pedestrian Paths.

- (1) *Where proposed development abuts or contains an existing or proposed bikeway, pedestrian path, or multi-use path, as set forth in [TDC Chapter 11](#), Transportation Figure 11-4, the City may require that a bikeway, pedestrian path, or multi-use path be constructed, and an easement or dedication provided to the City.*
- (2) *Where required, bikeways and pedestrian paths shall be provided as follows:*
- (a) *Bike and pedestrian paths shall be constructed and surfaced in accordance with the Public Works Construction Code.*
- (b) *The applicant shall install the striping and signing of the bike lanes and shared roadway facilities, where designated. [Ord. 933-94, § 57, 11/28/94; Ord. 1354-13 §21, 02/25/13]*

Response: No bikeway or pedestrian path is required because the Subject Property is not adjacent to any proposed bikeway, pedestrian path, or multi-use path, as identified in Figure 7, Bicycle and Pedestrian Element of the 2013 Tualatin TSP (see excerpts in Exhibit H).

Section 74.460 Accessways in Residential, Commercial and Industrial Subdivisions and Partitions.

- (1) *Accessways shall be constructed by the applicant, dedicated to the City on the final residential, commercial or industrial subdivision or partition plat, and accepted by the City.*
- (2) *Accessways shall be located between the proposed subdivision or partition and all of the following locations that apply:*
- (a) *adjoining publicly-owned land intended for public use, including schools and parks. Where a bridge or culvert would be necessary to span a designated greenway or wetland to provide a connection, the City may limit the number and location of accessways to reduce the impact on the greenway or wetland;*
- (b) *adjoining arterial or collector streets upon which transit stops or bike lanes are provided or designated;*
- (c) *adjoining undeveloped residential, commercial or industrial properties;*
- (d) *adjoining developed sites where an accessway is planned or provided.*
- [additional subsections (3) through (13) omitted for brevity]*

Response: To provide future access to a parcel that lies east of the development, a 16 foot wide access easement will be provided from the terminus of the private street to the east line of the site. The access easement will not be improved until such time as the land owner to the east partitions their site.

Section 74.470 Street Lights.

- (1) *Street light poles and luminaries shall be installed in accordance with the Public Works Construction Code.*
- (2) *The applicant shall submit a street lighting plan for all interior and exterior streets on the proposed development site prior to issuance of a Public Works Permit.*

Response: The Applicant recognizes that street lighting is an essential component of the streetscape and will comply with the applicable Public Works standards.

Section 74.475 Street Names.

- (1) *No street name shall be used which will duplicate or be confused with the names of existing streets in the Counties of Washington or Clackamas, except for extensions of existing streets. Street names and numbers shall conform to the established pattern in the surrounding area.*
- (2) *The City Engineer shall maintain the approved list of street names from which the applicant may choose. Prior to the creation of any street, the street name shall be approved by the City Engineer.*

Response: The Applicant proposes to name the north/south Street within the development “SW Comanche Terrace” as an extension of the existing street. The private street within the development is unnamed (shared driveway), and the lots will have SW Comanche Terrace addresses.

Section 74.480 Street Signs.

- (1) *Street name signs shall be installed at all street intersections in accordance with standards adopted by the City.*
- (2) *Stop signs and other traffic control signs (speed limit, dead-end, etc.) may be required by the City.*
- (3) *Prior to approval of the final subdivision or partition plat, the applicant shall pay the City a non-refundable fee equal to the cost of the purchase and installation of street signs, traffic control signs and street name signs. The location, placement, and cost of the signs shall be determined by the City. [Ord.. 1192-05, 7/24/05]*

Response: The Applicant will provide funding for street signs in accordance with this Section.

Section 74.485 Street Trees.

- (1) *Prior to approval of a residential sub-division or partition final plat, the applicant shall pay the City a non-refundable fee equal to the cost of the purchase and installation of street trees. The location, placement, and cost of the trees shall be determined by the City. This sum shall be calculated on the interior and exterior streets as indicated on the final subdivision or partition plat.*
- (2) *In nonresidential subdivisions and partitions street trees shall be planted by the owners of the individual lots as development occurs.*
- (3) *The Street Tree Ordinance specifies the species of tree which is to be planted and the spacing between trees. [Ord. 1192-05, 7/25/05]*

Response: The Applicant will provide funding for street trees in accordance with this Section.

UTILITIES*Section 74.610 Water Service.*

- (1) *Water lines shall be installed to serve each property in accordance with the Public Works Construction Code. Water line construction plans shall be submitted to the City Engineer for review and approval prior to construction.*
- (2) *If there are undeveloped properties adjacent to the subject site, public water lines shall be extended by the applicant to the common boundary line of these properties. The lines shall be sized to provide service to future development, in accordance with the City's Water System Master Plan, TDC Chapter 12.*
- (3) *As set forth in TDC Chapter 12, Water Service, the City has three water service levels. All development applicants shall be required to connect the proposed development site to the service level in which the development site is located. If the development site is located on a boundary line between two service levels the applicant shall be required to connect to the service level with the higher reservoir elevation. The applicant may also be required to install or provide pressure reducing valves to supply appropriate water pressure to the properties in the proposed development site. [Ord. 933-94, § 59, 11/28/94]*

Response: The Applicant has submitted a Utility Plan drawing (See Sheet P400 in Exhibit B) showing how water lines will be installed to serve the proposed lots. Detailed plans will be submitted for review and approval prior to construction, in accordance with subsection (1). Provisions - Water service connection(s) will be made as directed by the City Engineer, in accordance with subsection (3).

Section 74.620 Sanitary Sewer Service.

- (1) *Sanitary sewer lines shall be installed to serve each property in accordance with the Public Works Construction Code. Sanitary sewer construction plans and calculations shall be submitted to the City Engineer for review and approval prior to construction.*
- (2) *If there are undeveloped properties adjacent to the proposed development site which can be served by the gravity sewer system on the proposed development site, the applicant shall extend public sanitary sewer lines to the common boundary line with these properties. The lines shall be sized to convey flows to include all future development from all up stream areas that can be expected to drain through the lines on the site, in accordance with the City's Sanitary Sewer System Master Plan, TDC Chapter 13. [Ord. 933-94, § 60, 11/28/94]*

Response: The Applicant has submitted a Utility Plan drawing (See Sheet P400 in Exhibit B) showing how sanitary sewer lines will be installed to serve the proposed lots. Detailed plans will be submitted for review and approval prior to construction, in accordance with subsection (1). Subsection (2) is not applicable because there are no undeveloped properties adjacent to the Subject Property.

Section 74.630 Storm Drainage System.

- (1) *Storm drainage lines shall be installed to serve each property in accordance with City standards. Storm drainage construction plans and calculations shall be submitted to the City Engineer for review and approval prior to construction.*

- (2) *The storm drainage calculations shall confirm that adequate capacity exists to serve the site. The discharge from the development shall be analyzed in accordance with the City's Storm and Surface Water Regulations.*
- (3) *If there are undeveloped properties adjacent to the proposed development site which can be served by the storm drainage system on the proposed development site, the applicant shall extend storm drainage lines to the common boundary line with these properties. The lines shall be sized to convey expected flows to include all future development from all up stream areas that will drain through the lines on the site, in accordance with the Tualatin Drainage Plan in TDC Chapter 14. [Ord. 933-94, § 61, 11/28/94; Ord. 952-95, § 2, 10/23/95]*

Response: The Applicant has submitted a Utility Plan drawing (See Sheet P400 in Exhibit B) showing how storm drainage lines and a storm water management facility will be installed to serve the proposed lots. Detailed plans will be submitted for review and approval prior to construction, in accordance with subsection (1). In accordance with Subsection (2), the Applicant has provided a Storm Drainage Report (See Exhibit I).

Section 74.640 Grading.

- (1) *Development sites shall be graded to minimize the impact of storm water runoff onto adjacent properties and to allow adjacent properties to drain as they did before the new development.*
- (2) *A development applicant shall submit a grading plan showing that all lots in all portions of the development will be served by gravity drainage from the building crawl spaces; and that this development will not affect the drainage on adjacent properties. The City Engineer may require the applicant to remove all excess material from the development site.*

Response: Site grading will be primarily limited to street construction and the water quality facility. Grading on individual lots will be minimal with disposal of strippings from street construction spread across the lots. Drainage from new structures will be routed to the street with connections to the storm drain system.

Section 74.650 Water Quality, Storm Water Detention and Erosion Control.

The applicant shall comply with the water quality, storm water detention and erosion control requirements in the Surface Water Management Ordinance. If required:

- (1) *On subdivision and partition development applications, prior to approval of the final plat, the applicant shall arrange to construct a permanent on-site water quality facility and storm water detention facility and submit a design and calculations indicating that the requirements of the Surface Water Management Ordinance will be satisfied and obtain a Stormwater Connection Permit from Clean Water Services; or*
- (2) *On all other development applications, prior to issuance of any building permit, the applicant shall arrange to construct a permanent on-site water quality facility and storm water detention facility and submit a design and calculations indicating that the requirements of the Surface Water Management Ordinance will be met and obtain a Stormwater Connection Permit from Clean Water Services.*
- (3) *For on-site private and regional non-residential public facilities, the applicant shall submit a stormwater facility agreement, which will include an operation and maintenance plan provided by the City, for the water quality facility for the City's review*

and approval. The applicant shall submit an erosion control plan prior to issuance of a Public Works Permit. No construction or disturbing of the site shall occur until the erosion control plan is approved by the City and the required measures are in place and approved by the City. [Ord. 952-95, § 3, 10/23/95; Ord. 1070-01, 4/9/01; Ord. 1327-11 §1; 6/27/11]

Response: The Applicant's engineer has provided a Storm Drainage Report in Exhibit I to demonstrate the feasibility of constructing a storm water quality treatment and detention pond within the Water Quality Tract, as indicated in the submitted plans (See Exhibit B and full-size drawings).

Section 74.660 Underground.

- (1) All utility lines including, but not limited to, those required for gas, electric, communication, lighting and cable television services and related facilities shall be placed underground. Surface-mounted transformers, surface-mounted connection boxes and meter cabinets may be placed above ground. Temporary utility service facilities, high capacity electric and communication feeder lines, and utility transmission lines operating at 50,000 volts or above may be placed above ground. The applicant shall make all necessary arrangements with all utility companies to provide the underground services. The City reserves the right to approve the location of all surface-mounted transformers.*
- (2) Any existing overhead utilities may not be upgraded to serve any proposed development. If existing overhead utilities are not adequate to serve the proposed development, the applicant shall, at their own expense, provide an underground system. The applicant shall be responsible for obtaining any off-site deeds and/or easements necessary to provide utility service to this site; the deeds and/or easements shall be submitted to the City Engineer for acceptance by the City prior to issuance of the Public Works Permit.*

Response: The Applicant understands and will comply with the underground requirements of the Development Code and the Public Works Code in constructing improvements for the proposed subdivision.

Section 74.670 Existing Structures.

- (1) Any existing structures requested to be retained by the applicant on a proposed development site shall be connected to all available City utilities at the expense of the applicant.*
- (2) The applicant shall convert any existing overhead utilities serving existing structures to underground utilities, at the expense of the applicant.*
- (3) The applicant shall be responsible for continuing all required street improvements adjacent to the existing structure, within the boundaries of the proposed development site.*

Response: Two of the residential structures on Lots 12 and 13 will be retained, with no improvements to their City utilities. Overhead utilities are not addressed in this portion of the Applicant's submittal and will be reviewed upon preparation of final construction documents and permitting.

Section 74.700 Removal, Destruction or Injury of Trees.

It is unlawful for a person, without a written permit from the Operations Director, to remove, destroy, break or injure a tree, plant or shrub, that is planted or growing in or upon a public right-of-way within the City, or cause, authorize, or procure a person to do so, authorize or procure a person to injure, misuse or remove a device set for the protection of any tree, in or upon a public right-of-way. [Ord. 963-96, § 9, 6/24/96. Ord. 1079-01, § 1, 7/23/01; Ord. 1079-01, 7/23/01]

Response: There are trees along the right of way of SW Avery Street, which were reviewed by a certified arborist and noted in a report. Several trees along the frontage of Lot 1 that are adjacent to SW Avery are in good health and can be saved per the arborist report. The applicant is willing to retain these trees if approved by city staff.

*Section 74.705 Street Tree Removal Permit.**Section 74.706 Street Tree Fees.**Section 74.707 Street Tree Voluntary Planting.**Section 74.708 Street Tree Emergencies.**Section 74.710 Open Ground.**Section 74.715 Attachments to Trees.**Section 74.720 Protection of Trees During Construction.*

Response: The Applicant will obtain any necessary Tree Removal Permits per City requirements and provide fees to the City for planting of street trees pursuant to Section 74.485.

Section 74.725 Maintenance Responsibilities.

Trees, shrubs or plants standing in or upon a public right-of-way, on public or private grounds that have branches projecting into the public street or sidewalk shall be kept trimmed by the owner of the property adjacent to or in front of where such trees, shrubs or plants are growing so that:

- (1) The lowest branches are not less than 12 feet above the surface of the street, and are not be less than 14 feet above the surface of streets designated as state highways.*
- (2) The lowest branches are not less than eight feet above the surface of a sidewalk or footpath.*
- (3) No plant, tree, bush or shrub shall be more than 24 inches in height in the triangular area at the street or highway corner of a corner lot, or the alley-street intersection of a lot, such an area defined by a line across the corner between the points on the street right-of-way line measured 10 feet back from the corner, and extending the line to the street curbs or, if there are no curbs, then to that portion of the street or alley used for vehicular traffic.*
- (4) Newly planted trees may remain untrimmed if they do not interfere with street traffic or persons using the sidewalk or obstruct the light of a street electric lamp.*
- (5) Maintenance responsibilities of the property owner include repair and upkeep of the sidewalk in accordance with the City Sidewalk Maintenance Ordinance. [Ord. 963-96, § 9, 6/24/96]*

*Section 74.730 Notice of Violation. [detailed provisions omitted for brevity]**Section 74.735 Trimming by City. [detailed provisions omitted for brevity]**Section 74.740 Prohibited Trees.*

Section 74.745 Cutting and Planting Specifications.

Section 74.750 Removal or Treatment by City.

Section 74.755 Appeal of Permit Denial.

Section 74.760 Penalties.

Response: The above provisions will apply to ongoing care and maintenance of street trees following final plat recording and planting of street trees by the City of Tualatin.

Section 74.765 Street Tree Species and Planting Locations.

All trees, plants or shrubs planted in the right-of-way of the City shall conform in species and location and in accordance with the street tree plan in Schedule A. If the Operations Director determines that none of the species in Schedule A is appropriate or finds appropriate a species not listed, the Director may substitute an unlisted species.

[Schedule A: Street Tree Species omitted for brevity]

Response: This Section provides guidance to City staff for selecting and planting street trees, and requires no statement by the Applicant.

Summary and Request

The Applicant has provided substantial evidence to demonstrate that the proposed eleven-lot Mission Terrace Subdivision meets all applicable development standards, and respectfully requests approval of the preliminary subdivision plan.