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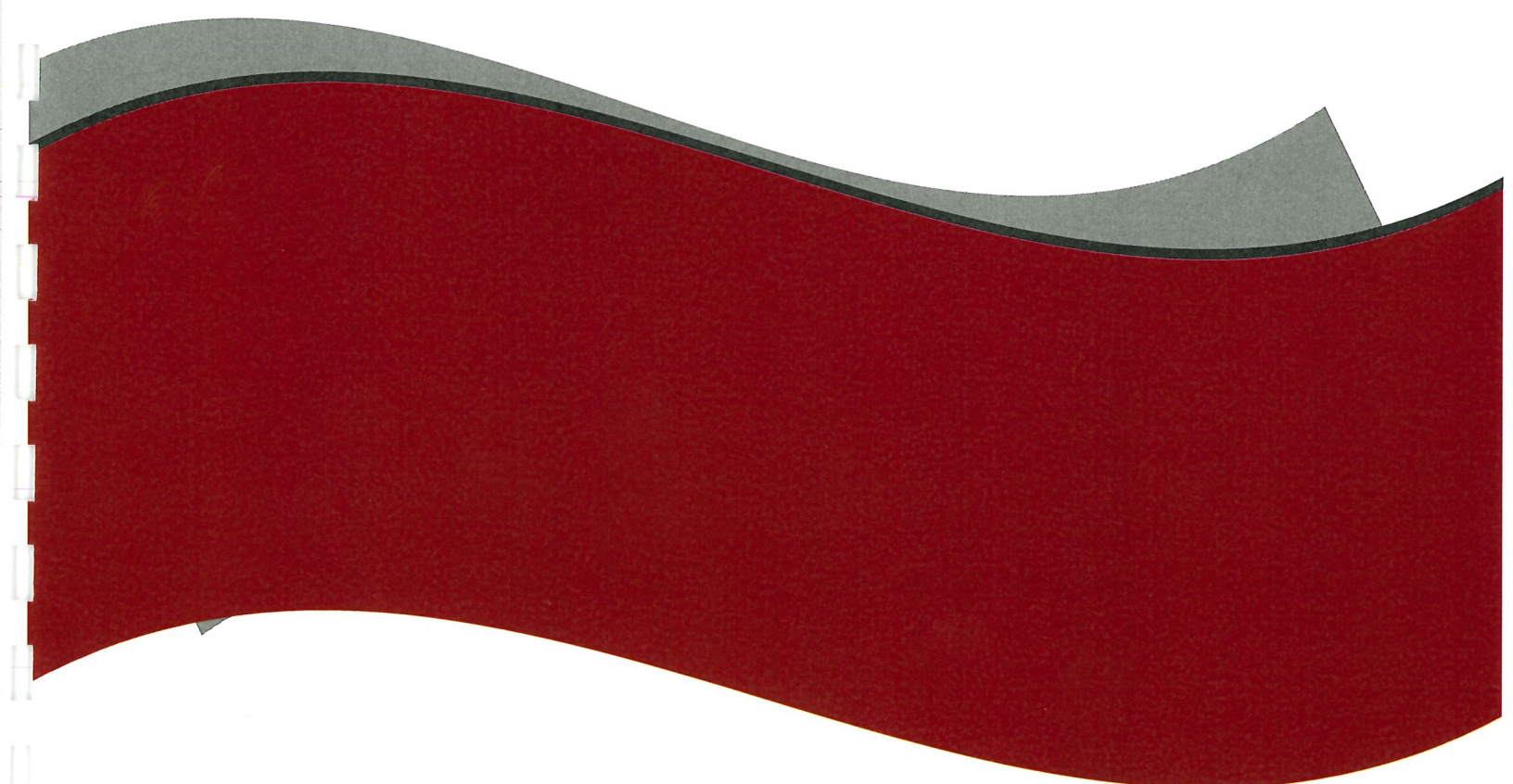
JACKSON PARK II

PRELIMINARY DRAINAGE REPORT

JANUARY 2021

RB Engineering

DESIGN → PERMIT → MANAGE



Reviewing Agency

Jurisdiction: City of Chehalis, Washington
Project Number: Pending Application
Project Contact: Celest Wilder

References

City of Chehalis Stormwater Management Program

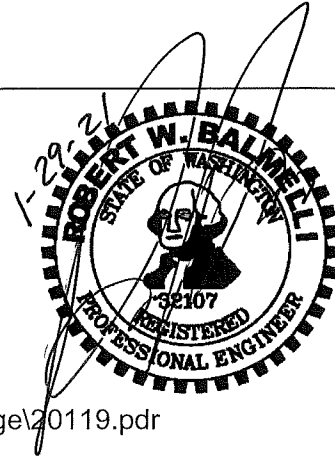
Project Engineer

Prepared by: RB Engineering, Inc.
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Contact: Robert W. Balmelli PE

RBE Project No: 20119

File Number: g:\rbengr\projects\2020\20119\drainage\20119.pdr

**PROJECT ENGINEERS CERTIFICATION**

"I hereby certify that this Drainage and Erosion Control Plan for the **Jackson Park II** has been prepared by me or under my supervision and meets minimum standards of the **City of Chehalis Stormwater Management Program** and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me."

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PART 1 – PROJECT OVERVIEW

Site Address: 2169 Jackson Hwy
Chehalis, WA 98532

Parcel Numbers: 010783000000

Total Site Area: 1.0 Acres

Zoned: General Commercial

Section, Township, Range: Section 4
Township 13 North
Range 2 West, W.M.

Proposed Onsite Improvements

Proposed is the construction of ²7-unit and ²12-unit multi-family buildings for a total of 19 residential units with 7 garages. Associated parking and utilities will be extended to the new buildings for domestic services. Onsite drainage improvements include treatment and flow control facilities discussed below.

PART 2 – EXISTING CONDITIONS SUMMARY

The project site is located on Jackson Highway in Chehalis, Washington. The 1-acre site is served by City water and sewer. The entire site slopes to the southwest at an average grade of 5%. One ~~onsite~~ residential home exists onsite and will be removed as part of this project. A City sewer ^{line} crosses the property around the midpoint of the site.

PART 3 – DOWN STREAM ANALYSIS

The stormwater runoff for the northern parcel currently sheet flows through native lawn grass vegetation and then over the existing gravel fill material located on the south half of the parcel. At the south property boundary, the runoff is channeled to a discharge point at the southwest corner of the site and then disperses onto the adjacent parcel.

At the south property boundary there is no defined drainage ditch and runoff disperses and then sheet flows through that parcel. The flow is eventually collected by a manmade ditch. This ditch runs east to west on the southern border of the large adjacent parcel. This ditch is 520 feet long and has a 2-foot bottom width, 3-foot depth and 2:1 slide slopes and collects runoff from developed properties south of the project site. At the intersection with SW 21st Street, the ditch enters a 24-inch diameter cross culvert that continues west under SW 21st Street. The discharge side of SW 21st Street includes dual 24-inch culverts. One is a discharge for the storm main in SW 21st and one is the cross culvert. These two

culverts discharge into a grass swale that has a 4-foot bottom width, 4-foot depth and 2:1 slide slopes. This swale continues west and eventually connects to the City stormwater system in SW 20th Street.

Below is a table showing the maximum flow calculations we performed on the downstream conveyance system. With an onsite detention system, the new project will discharge water at the current pre-developed rates of the 2, 10 and 100-year storm events. Runoff will be discharged into an armored dispersal pad and then discharge at the natural location on the adjacent parcel and sheet flow to the existing conveyance ditch. The flow rate impact of the project on each segment downstream is listed below. Due to the low percentage of impact to the overall capacity of the downstream conveyance, a full basin analysis was deemed un-necessary.

Segment	Maximum Capacity (cfs)	Site Percent of Flow (%)
Swale A	202.4	0.7
24" Culvert	23.1	6.5
Swale B	508.6	0.3

Swale A:

$$Q = \frac{1.49}{\eta} * A * R^{2/3} * S^{1/2}$$

- $Q = 202.38$ Discharge (cfs)
 $\eta = 0.026$ Mannings Number (Roughness Coefficient)
 $A = 24.00$ Area (ft²)
 $w = 2$ (ft)
 $d = 3.00$ (ft)
 $Z = 2 :1$
 $P = 15.42$ Wetted Perimeter (ft)
 $R = 1.56$ Hydraulic Radius (ft)
 $S = 0.0120$ Slope (ft/ft)

Swale B:

$Q = 508.6$ Discharge (cfs)
 $n = 0.026$ Mannings Number (Roughness Coefficient)
 $A = 48.00$ Area (ft²)
 $w = 4$ (ft)
 $d = 4.00$ (ft)
 $Z = 2 : 1$
 $P = 21.89$ Wetted Perimeter (ft)
 $R = 2.19$ Hydraulic Radius (ft)
 $S = 0.0120$ Slope (ft/ft)

24-Inch Culvert

Inputs:

Pipe Diameter, d _o	2.000	ft
Manning Roughness, n ?	0.014	
Pressure slope (possibly equal to pipe slope), S _o	0.012	rise/run
Percent of (or ratio to) full depth (100% or 1 if flowing full)	1.000	fraction

Results:

Full Flow, Q	23.073	ft ³ /s
Velocity, v	7.344	ft/s
Velocity head, hv	0.838	ft
Flow Area, A	3.142	ft ² /s
Wetted Perimeter, P	6.283	ft
Hydraulic Radius	0.500	ft

PART 4 – APPLICABLE MINIMUM REQUIREMENTS

The minimum requirements for stormwater development and redevelopment sites are listed in City of Chehalis Stormwater Program. Based on the thresholds given in the standards, the project must address or comment on the requirements listed below. These requirements as they apply to the project are discussed in more detail below.

Stormwater Site Plans:

The proposed total of new plus replaced impervious surfaces is over 5,000 square feet and therefore a Stormwater Site Plan is required. A drainage plan is included with this report.

Runoff Treatment:

The proposed project shall redevelop more than 5,000 square feet of openly exposed pollution generating impervious surface and therefore meets the threshold requirements of this section. Stormwater runoff from the paved and sidewalks areas is routed through an Old Castle treatment vault. See treatment section below for sizing data.

Flow Control:

The stormwater runoff will be detained in the stormwater pipe and released at the predeveloped rate. Design calculations are included in this report.

Operation & Maintenance:

The stormwater facility will be owned and maintained by the owner. A stormwater covenant will be prepared and recorded upon completion of construction.

PART 5 – PERMANENT STORMWATER CONTROL PLAN

Existing Site Hydrology

Existing site hydrology is based on our site investigation and field survey of the properties. The eastern half of the site, onsite soils were classified as hydrologic soil Groups C/D: Lacamas Silt Loam. The southeastern half of the site, onsite soils were classified as hydrologic soil Groups C/D: Galvin Silt Loam. These soil types are classified as poorly drained.

Basin ID	Total Pre-developed Basin Coverage Summary		
	Undisturbed Pervious	Existing Impervious	Total Area (acres)
P1	0.95	0.5	1.0

Developed Site Hydrology

Below is the summary of areas associated with the developed site included offsite runoff from the new frontage improvements along Jackson Hwy.

Basin ID	Developed Site Basin Coverage Summary		
	Land Use Cover		Total Area (acres)
D1	Disturbed Pervious		0.21
	Parking/Sidewalk		0.48
	Roof		0.31
	Total Basin Area		1.0

Flow Control System Design & Analysis

The proposed stormwater facility was designed with StormShed hydrology software per the City of Chehalis stormwater regulations. Flow control is provided to meet the peak 2-yr, 10-yr and 100-year pre-developed runoff rate. Two 80 linear foot 42-inch diameter pipe vaults are proposed to provide detention for this project. Final design calculations will be included in the Final Drainage Report.

Project Modeling Data Summary

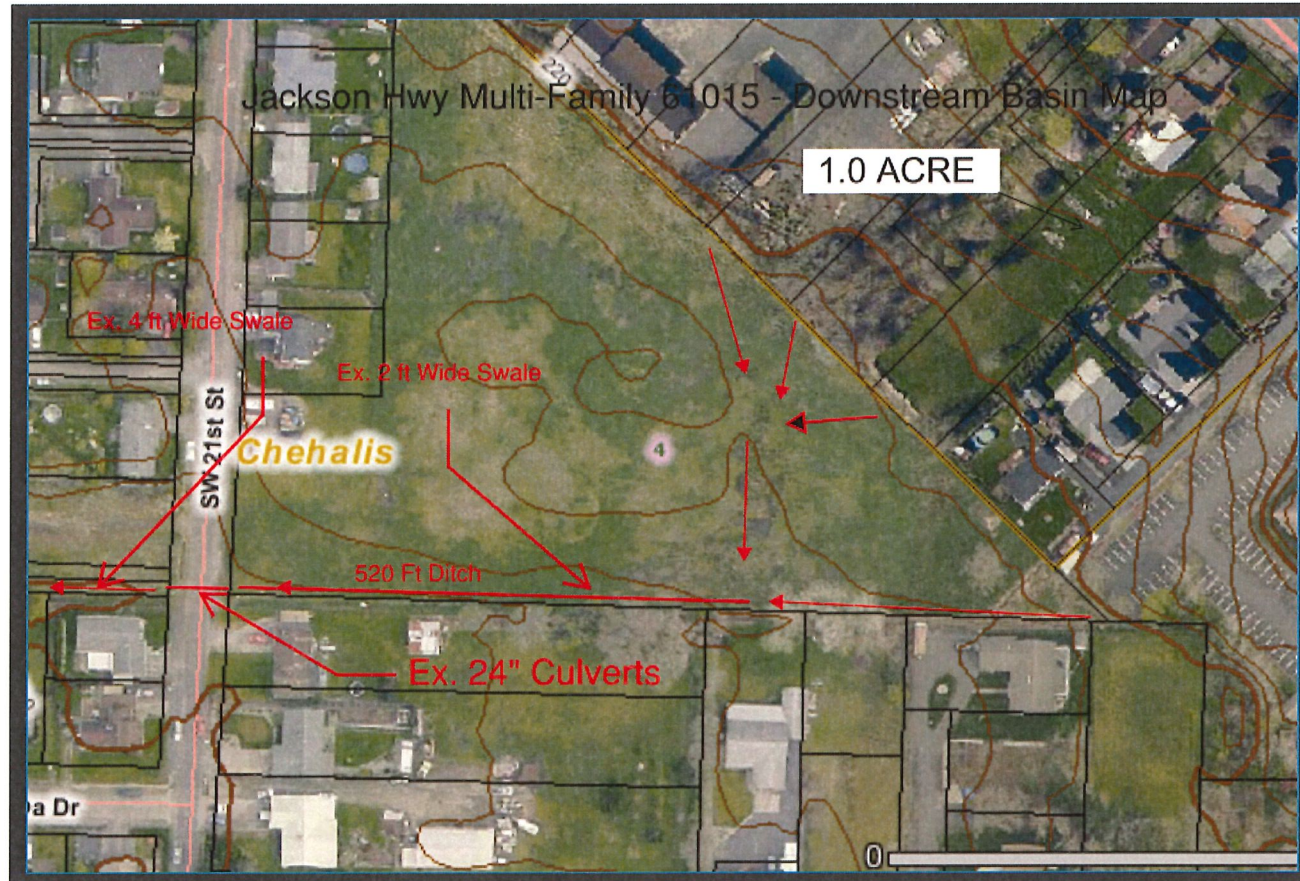
The final stormwater modeling data will be included in the Final Drainage Report. It is assumed that since this project is half the size of the Jackson Park Phase 1 development the required piping length will be approximately 140 LF.

Water Quality Design & Analysis

The proposed stormwater facility will be designed using the WWHM modeling software to determine the online and offline flow rates. The tributary area to the onsite treatment vault is the new asphalt parking, access and frontage improvements along Jackson Highway. All roof runoff will be routed directly into the future detention pipes and does not require treatment. Below is the summary of impervious surface tributary to the treatment vault and the output from WWHM run.

Using the offline flow rate an Oldcastle Dual Vortex treatment manhole is proposed for this project. The DVS-36 unit has a treatment flow rate of 0.56 cfs which exceeds the required treatment flow rate for the Jackson Park Phase 1 project. With this project being half the size, this unit will meet the treatment threshold. Final calculations will be included in the Final Drainage Report.

Drainage Basin/ Down Stream Map



PART 6 – CONVEYANCE SYSTEM

The proposed onsite storm pipe system has been analyzed to ensure it can pass a 100-year storm event for the entire 1.0 acre developed basin. All onsite piping will be either 6, 8 or 12-inch pipe.

Emergency Overflow Spillway

In an emergency overflow event were the orifices were to plug, stormwater will bubble out the top of the 18-inch diameter control structure and exit the structure, and continue to flow southwest into the downstream drainage.

PART 7 – CONSTRUCTION SWPPP

All new development and redevelopment shall comply with Construction Storm Water Pollution Prevention Plan (SWPPP) Elements #1 through #12. A standalone SWPPP plan will be prepared and submitted with the final drainage report.

PART 8 – SPECIAL REPORTS

NRCS Soils Classifications and Map

MAP LEGEND		MAP INFORMATION	
<p>Area of Interest (AOI)</p> <p>□ Area of Interest (AOI)</p> <p>Soils</p> <p>Soil Rating Polygons</p> <p>■ A</p> <p>■ A/D</p> <p>■ B</p> <p>■ B/D</p> <p>■ C</p> <p>■ C/D</p> <p>■ D</p> <p>□ Not rated or not available</p> <p>Soil Rating Lines</p> <p>— A</p> <p>— A/D</p> <p>— B</p> <p>— B/D</p> <p>— C</p> <p>— C/D</p> <p>— D</p> <p>— Not rated or not available</p> <p>Soil Rating Points</p> <p>● A</p> <p>● A/D</p> <p>● B</p> <p>● B/D</p>		<p>Water Features</p> <p>— Streams and Canals</p> <p>Transportation</p> <p>— Rails</p> <p>— Interstate Highways</p> <p>— US Routes</p> <p>— Major Roads</p> <p>— Local Roads</p> <p>Background</p> <p>■ Aerial Photography</p>	
		<p>The soil surveys that comprise your AOI were mapped at 1:24,000.</p> <p>Warning: Soil Map may not be valid at this scale.</p> <p>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.</p> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</p> <p>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.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Lewis County Area, Washington Survey Area Data: Version 16, Nov 9, 2017</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Mar 29, 2016—Oct 10, 2016</p> <p>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.</p>	

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
89	Colvin silt loam, 0 to 8 percent slopes	C/D	0.3	33.1%
118	Lacamas silt loam, 0 to 3 percent slopes	C/D	0.5	66.9%
Totals for Area of Interest			0.8	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

Lewis County Area, Washington

118—Lacamas silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2h81
Elevation: 250 to 1,200 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 125 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Lacamas, drained, and similar soils: 60 percent
Lacamas, undrained, and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lacamas, Drained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Description of Lacamas, Undrained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 17 inches: silt loam
H3 - 17 to 27 inches: silty clay
H4 - 27 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Minor Components

Klaber

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Prather

Percent of map unit: 3 percent
Hydric soil rating: No

Scamman

Percent of map unit: 2 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 16, Nov 9, 2017

Lewis County Area, Washington

89—Galvin silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2hht
Elevation: 100 to 1,770 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 52 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Galvin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galvin

Setting

Landform: Alluvial fans
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 41 inches: silty clay loam
H3 - 41 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: CID
Other vegetative classification: Wet Soils (G001XY102WA)
Hydric soil rating: No

Minor Components

Alvor

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Lacamas

Percent of map unit: 5 percent

Landform: Terraces

Hydric soil rating: Yes

Reed

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: Yes

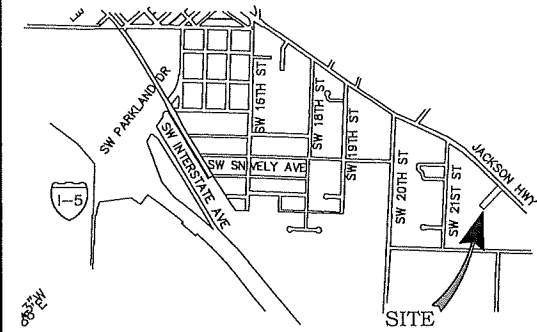
Data Source Information

Soil Survey Area: Lewis County Area, Washington

Survey Area Data: Version 16, Nov 9, 2017

PART 9 – PRELIMINARY GRADING AND DRAINAGE PLANS

VICINITY MAP
N.T.S.



JACKSON PARK PHASE II

SECTION 4, TOWNSHIP 13 NORTH, RANGE 2 WEST, W.M.
"CHEHALIS", WASHINGTON

PROJECT INFORMATION

APPLICANT: K&W PROPERTIES, LLC.
148 ROSEWOOD DR.
CHEHALIS, WA 98532
(360) 520-4080
STEPHANIEWERNER@MSN.COM

PARCEL NO: 010783000000

SITE ADDRESS: 2169 JACKSON HIGHWAY, CHEHALIS, WA. 98532

ZONING: CG - GENERAL COMMERCIAL (UGA)

SITE AREA: 1.0 ACRE

PARKING - REQUIRED: 38 STALLS (2 PER UNIT)
PROVIDED: 37 STALLS PLUS 7 GARAGES - 42 TOTAL

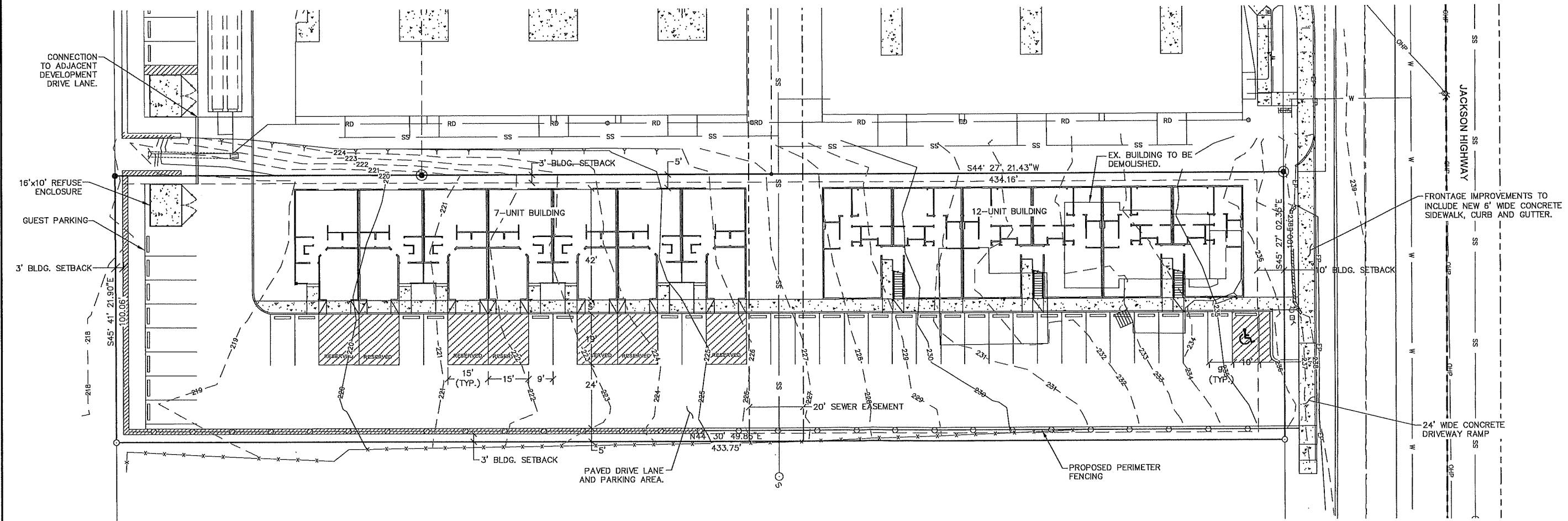
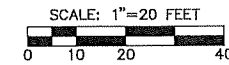
SOILS: GALVIN SILT LOAM, LACAMAS SILT LOAM

WATER: CITY OF CHEHALIS

SEWER: CITY OF CHEHALIS

FIRE DISTRICT: FIRE DISTRICT 6

BUILDING SETBACKS: FRONT YARD = 10'
ADJACENT PARCELS = 3'



DESIGNED BY: ALE	NO. 1	DATE
DRAWN BY: ALE	REVISION	
CHECKED BY: RWB		
DATE: 1/29/2021		
SCALE: 1" = 20'		

JACKSON PARK PHASE II

LEWIS COUNTY WA.

PRELIMINARY SITE PLAN

RB Engineering
CIVIL ENGINEERING - LAND PLANNING - UTILITIES
OFF: (360) 740-8819
FAX: (360) 740-8812
P.O. Box 923
CHEHALIS WA 98532

JOB NUMBER: 20119
DRAWING NAME: 20119_PSP

1 OF 2

