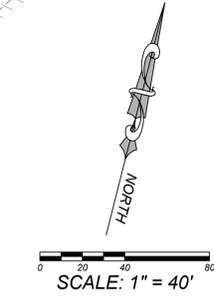
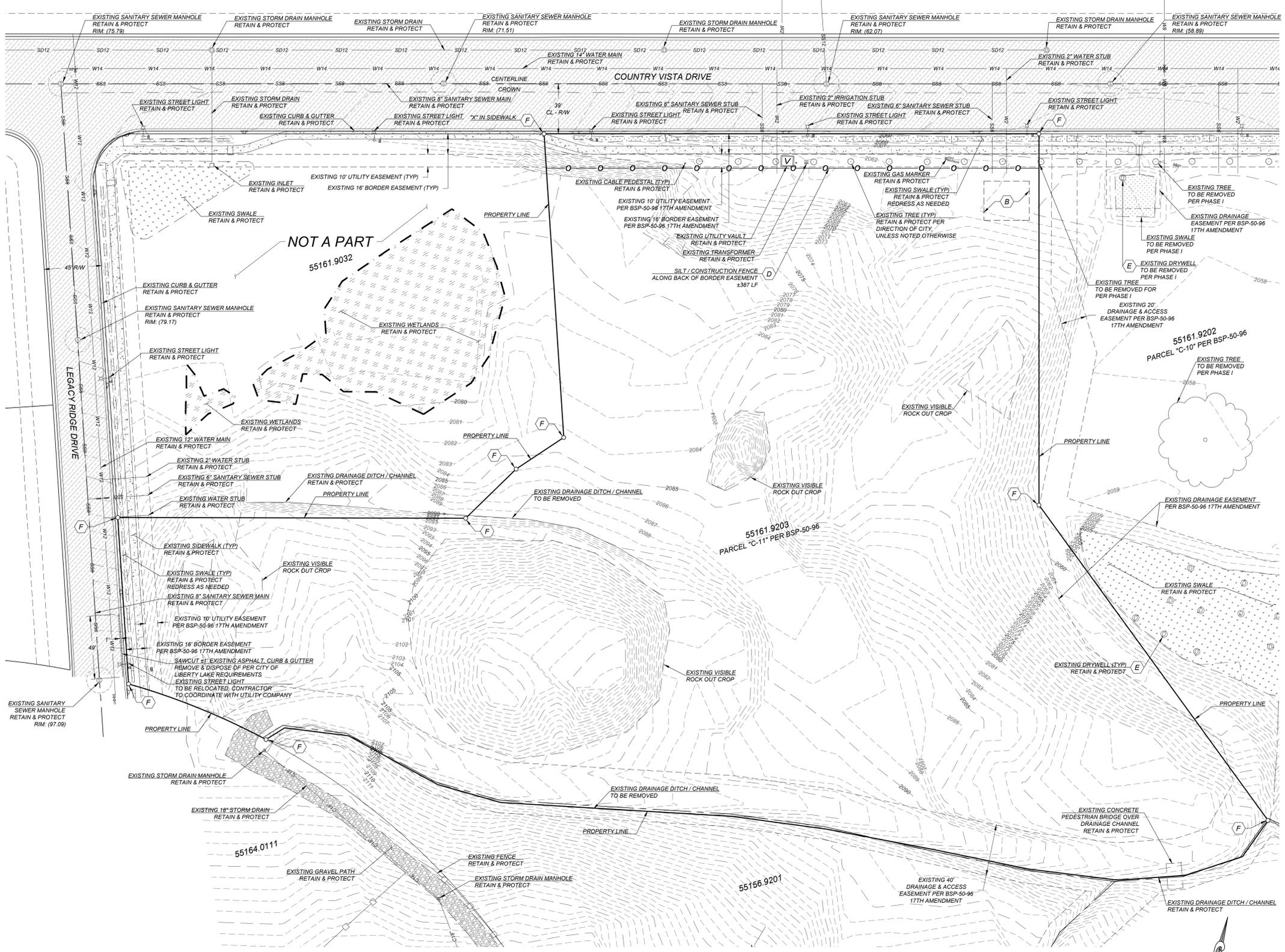


CONSTRUCTION KEY NOTES

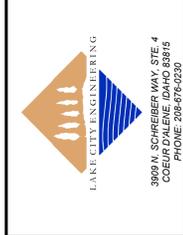
- (A) CONTRACTOR SHALL CONSTRUCT AND MAINTAIN A STABILIZED CONSTRUCTION ENTRANCE PER BMP C105 OF THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (LATEST EDITION). (SEE PHASE I FOR LOCATION)
- (B) CONTRACTOR TO CONSTRUCT AND MAINTAIN A CONSTRUCTION STAGING AREA IN THIS LOCATION. COORDINATE LOCATION WITH OWNER.
- (C) CONTRACTOR TO KEEP EXISTING ROAD CLEAR AND FREE FROM DIRT, MUD AND OTHER DEBRIS. ROAD SHALL BE SWEEPED AND WATERED AS REQUIRED.
- (D) INSTALL SILT FENCE PER BMP C233 OF THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (LATEST EDITION).
- (E) INSTALL INLET PROTECTION PER BMP C220 OF THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON (LATEST EDITION).
- (F) EXISTING SURVEY MONUMENT. RETAIN AND PROTECT.

GENERAL PROJECT & ESC NOTES

1. UNLESS SPECIFIED OTHERWISE, THE CONTRACTOR SHALL FOLLOW THE CONSTRUCTION SCHEDULING AND SEQUENCING GUIDELINES PER THE REQUIREMENTS OF THE SPOKANE REGIONAL STORMWATER MANUAL.
2. CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PRESERVE THE EXISTING VEGETATION ALONG THE SPECIFIED PROJECT LIMITS PER REQUIREMENTS OF THE SPOKANE REGIONAL STORMWATER MANUAL.
3. CONTRACTOR SHALL CONFINE CLEARING LIMITS TO WITHIN THE SPECIFIED PROJECT LIMITS PER REQUIREMENTS OF THE SPOKANE REGIONAL STORMWATER MANUAL.
4. CONTRACTOR SHALL IMPLEMENT AND MAINTAIN A DUST CONTROL PROGRAM ON A DAILY BASIS, INCLUDING WEEKEND AND HOLIDAYS PER THE REQUIREMENTS OF THE SPOKANE REGIONAL STORMWATER MANUAL.
5. UNLESS OTHERWISE SPECIFIED, THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO COVER ALL ONSITE MATERIALS AND EQUIPMENT PER THE REQUIREMENTS OF THE SPOKANE REGIONAL STORMWATER MANUAL.
6. NO WASHOUT FACILITIES, INCLUDING CONCRETE MATERIAL WASHOUT, SHOWN WITHIN THE SPECIFIED PROJECT LIMITS. THE CONTRACTOR SHALL DIRECT ALL WASHOUT ACTIVITIES TO BE CONDUCTED WITHIN DESIGNATED WASHOUT AREAS TO BE APPROVED BY THE OWNER. WASHOUT WILL NOT BE ALLOWED WITHIN A PUBLIC RIGHT-OF-WAY.
7. BASED ON THE GRADING AND BMP'S SHOWN HEREON, A SWPPP IS NOT REQUIRED AS STORMWATER GENERATED FROM THIS PROJECT SHALL NOT REACH ANY SURFACE WATERS OF THE UNITED STATES.
8. AT COMPLETION OF THE PROJECT AND PER THE DIRECTION OF THE ENGINEER OF RECORD, THE CONTRACTOR SHALL REMOVE AND DISPOSE OF TEMPORARY EROSION CONTROL.
9. THE CONTOURS SHOWN HEREON ARE BASED ON A FIELD TOPOGRAPHIC SURVEY PERFORMED BY LAKE CITY ENGINEERING. CONTRACTOR IS REQUIRED TO VERIFY EXISTING CONTOURS AT HIS OWN EXPENSE. CONTOURS ONLY SHOWN FOR THE LOTS TO BE DEVELOPED AS A PART OF THIS PROJECT.
10. THE FOLLOWING BMP'S FROM THE STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON:
 - BMP C101: PRESERVING NATURAL VEGETATION PURPOSE
 - BMP C105: STABILIZED CONSTRUCTION ENTRANCE
 - BMP C140: DUST CONTROL
 - BMP C151: CONCRETE HANDLING
 - BMP C152: SAWCUTTING AND SURFACING POLLUTION PREVENTION
 - BMP C220: INLET PROTECTION
 - BMP C233: SILT FENCE
11. THE BMP'S PROPOSED HEREON ARE DESIGNED TO PREVENT AND/OR MITIGATE THE POTENTIAL FOR STORMWATER TO BE CONVEYED TO WATERWAYS OF THE UNITED STATES. THE CONTRACTOR IS REQUIRED TO FILE A NOTICE OF INTENT WITH THE EPA AND PROCESS A CONSTRUCTION GENERAL PERMIT. THE CONTRACTOR SHALL POST APPROVED SWPPP, IF REQUIRED, AND NOI DOCUMENTS ONSITE IN A PUBLICLY VISIBLE LOCATION.



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LEGACY VILLAS
 EXISTING CONDITIONS AND ESC PLAN
 LIBERTY LAKE, WASHINGTON

DESIGNED BY: DCD
 DRAFTED BY: DLH
 DATE: 6/29/2016
 JOB NO: LCE 15-072.1

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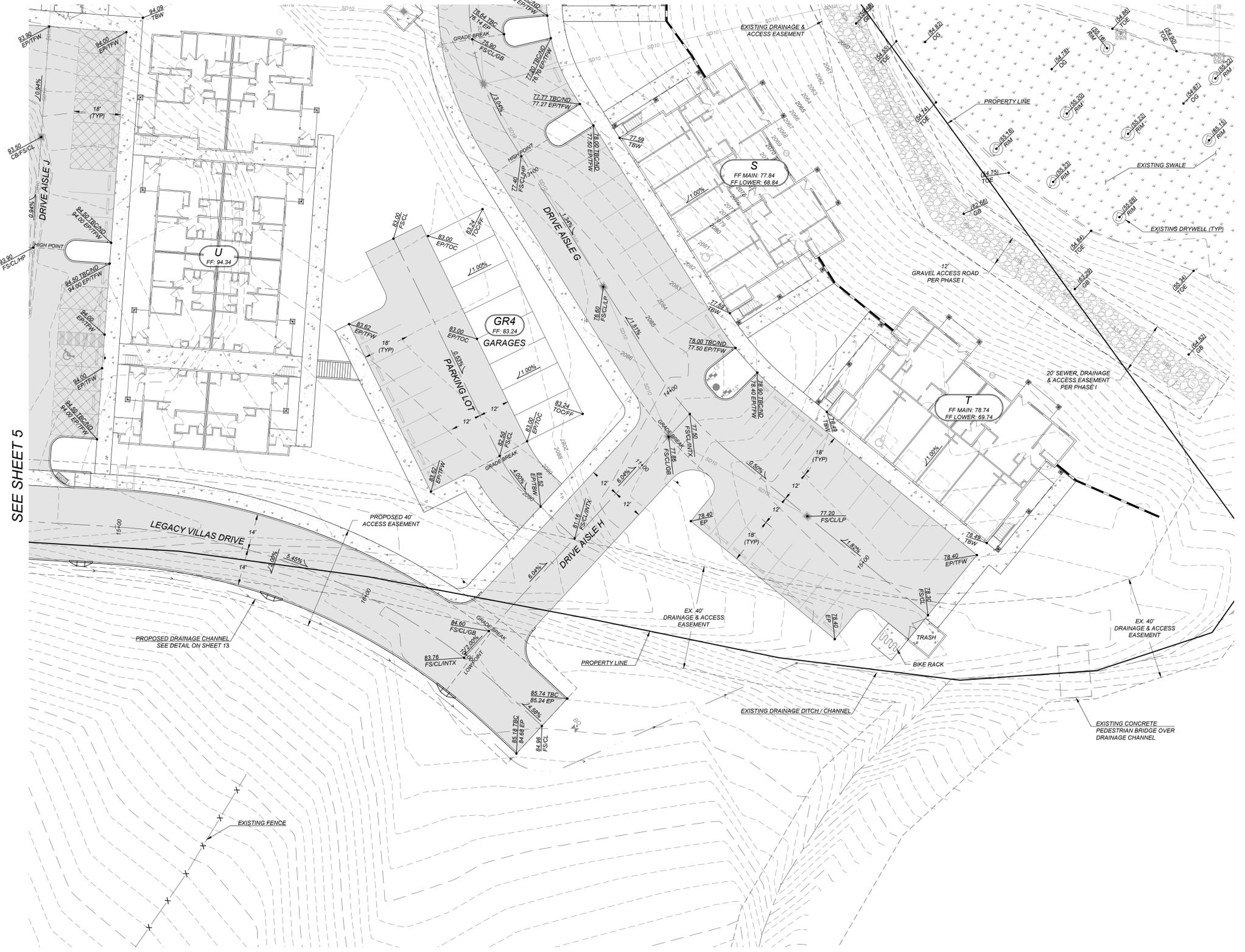
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811
 CALL TWO BUSINESS DAYS
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 WWW.DIGLINE.COM

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 Plotter: Jun 29, 2016 - 6:08pm

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SEE SHEET 3

SEE SHEET 5



- NOTES**
1. ALL SIDEWALK AT 1.5% MIN. SLOPE (2.0% MAX.).
 2. CURB NOSE DOWNS (ND) TO BE 18" UNLESS OTHERWISE NOTED.



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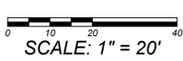
LEGACY VILLAS
 GRADING PLAN - SOUTH
 LIBERTY LAKE, WASHINGTON



DESIGNED BY: DCD
 DRAFTED BY: DLH
 DATE: 6/29/2016
 JOB NO: LCE 15-072.1

4 / **15**

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 ONE-CALL NUMBER
811
 CALL TWO BUSINESS DAYS BEFORE YOU DIG
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STREET KEY NOTES:

- 1 SAWCUT EXISTING CURB AND GUTTER, SIDEWALK AND PAVEMENT AS SHOWN AND DISPOSE PER BMP REQUIREMENTS.
- 2 INSTALL URBAN APPROACH PER DETAIL SHOWN ON SHEET 13.
- 3 INSTALL ASPHALT PAVEMENT SECTION TO MATCH EXISTING.
- 4 INSTALL 2" ASPHALT OVER 4" CRUSHED AGGREGATE BASE COURSE OVER COMPACTED APPROVED NATIVE SUB GRADE PER DETAIL ON SHEET 13.
- 5 INSTALL TYPE "B" STANDARD CURB AND GUTTER PER SPOKANE COUNTY STANDARD DRAWING A-3. SEE DETAIL ON SHEET 14.
- 6 INSTALL TYPE "A" STANDARD STRAIGHT CURB PER PER SPOKANE COUNTY STANDARD DRAWING A-3. SEE DETAIL ON SHEET 14.
- 7 INSTALL 6" CONCRETE SIDEWALK PER SPOKANE COUNTY STANDARD DRAWING A-4. SEE DETAIL ON SHEET 14.
- 8 INSTALL PEDESTRIAN RAMP WITH DETECTABLE WARNING SURFACE PER WSDOT STANDARD PLAN F-40.12-02, F-40.16-02 AND F-45.10.01. SEE GRADING PLANS FOR ELEVATIONS. SEE DETAIL ON SHEET 14.
- 9 INSTALL 8'x10' TRASH ENCLOSURE PER WASTE MANAGEMENT REQUIREMENTS. INSTALL SIGHT OBSCURING FENCE/WALL PER THE CITY OF LIBERTY LAKE REQUIREMENTS AND THE DIRECTION OF THE OWNER.
- 10 INSTALL BIKE RACK PER THE APPROVAL OF THE OWNER.
- 11 INSTALL WHEEL STOP PER CITY OF LIBERTY LAKE AND MANUFACTURER'S SPECIFICATIONS AND REQUIREMENTS. SEE DETAIL ON SHEET 13.

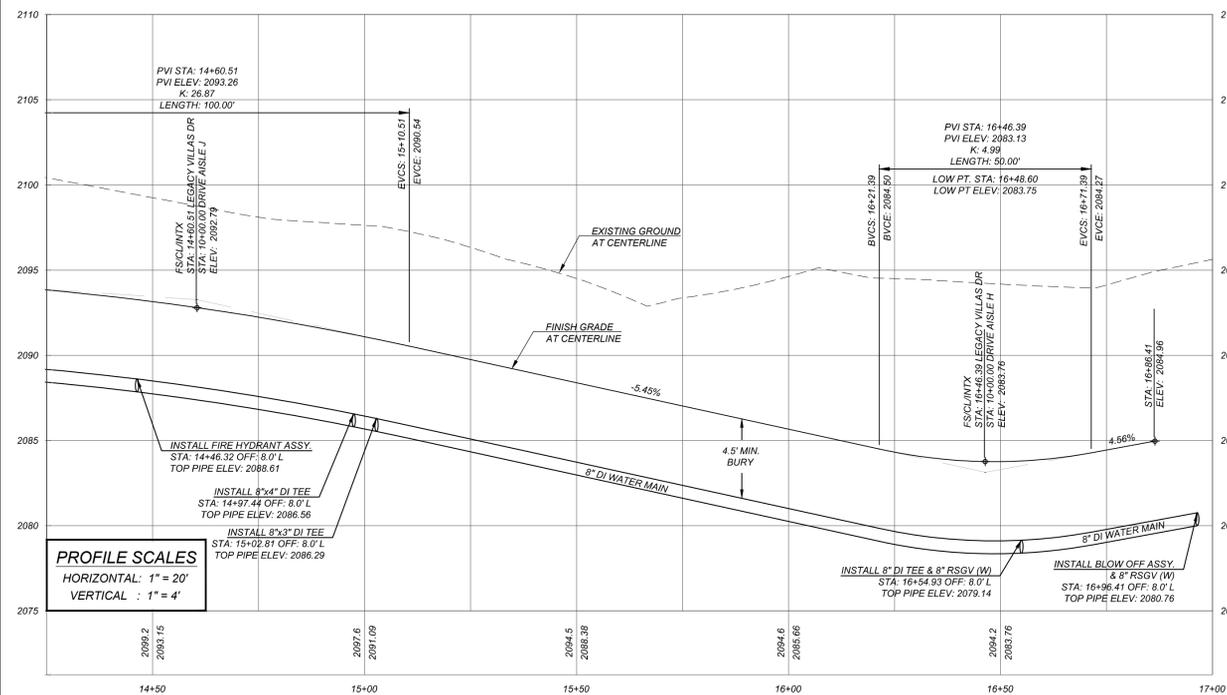
STORMWATER KEY NOTES:

- 20 INSTALL CURB INLET TYPE 1, L=3', PER SPOKANE COUNTY STANDARD DRAWING B-8. SEE DETAIL ON SHEET 14.
- 21 NOT USED.
- 22 CONSTRUCT GRASSED INFILTRATION AREA PER DETAIL ON SHEET 11.
- 23 INSTALL TYPE 1 CONCRETE INLET AND METAL GRATE TYPE 3 PER SPOKANE COUNTY STANDARD DRAWING B-4 AND B-14. SEE DETAILS ON SHEET 14.
- 24 INSTALL ROCK RIP-RAP LINED DRAINAGE CHANNEL PER DETAIL ON SHEET 13.
- 25 NOT USED.
- 26 INSTALL SDR 35 PVC STORM DRAIN OR APPROVED EQUAL, AND FITTINGS AS REQUIRED, PER MANUFACTURERS REQUIREMENTS AND SPECIFICATIONS. SIZE AS SPECIFIED.

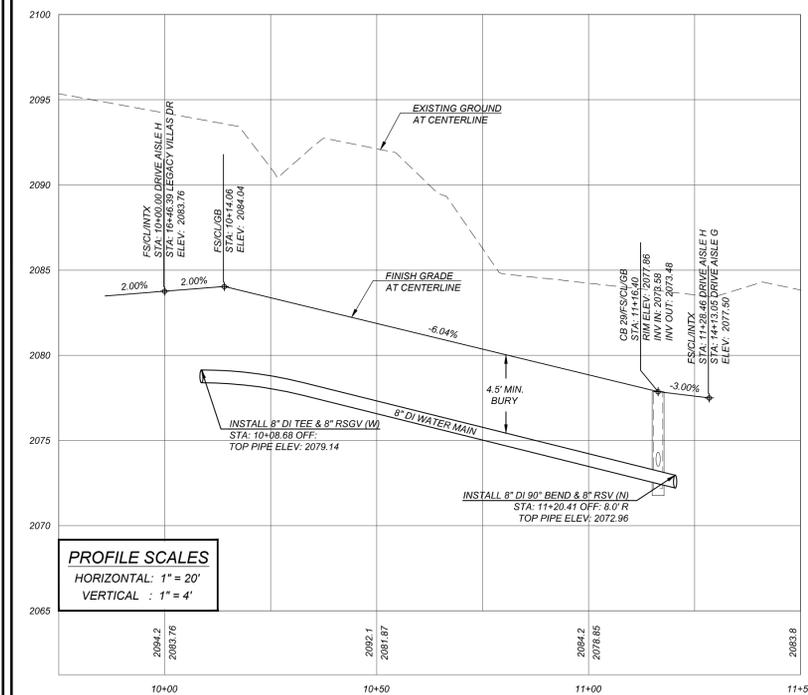
SEWER AND WATER KEY NOTES:

- 30 EXISTING SANITARY SEWER MANHOLE.
- 31 EXISTING SANITARY SEWER MAIN. PROTECT IN PLACE. SIZE AS SPECIFIED.
- 32 NOT USED.
- 33 INSTALL 48" DIAMETER SANITARY SEWER MANHOLE PER LLSWD STANDARD PLAN No. 7-05-A. SEE DETAIL ON SHEET 15.
- 34 INSTALL 8" SDR 35 PVC SANITARY SEWER MAIN PER MANUFACTURER'S SPECIFICATIONS AND LLSWD STANDARD PLAN No. 7-08-A. LENGTH AND SLOPE AS SPECIFIED. SEE DETAIL ON SHEET 15.
- 35 INSTALL SDR 35 PVC SANITARY SEWER SERVICE PER MANUFACTURER'S SPECIFICATIONS AND LLSWD STANDARD PLAN No. 7-18-A. SIZE, LENGTH AND SLOPE AS SPECIFIED. SEE DETAIL ON SHEET 15.
- 36 INSTALL SANITARY SEWER CLEANOUT PER LLSWD STANDARD PLAN No. 7-19-A. SEE DETAIL ON SHEET 15.
- 37 EXISTING DOMESTIC WATER MAIN. PROTECT IN PLACE. SIZE AS SPECIFIED.
- 38 NOT USED.
- 39 REMOVE EXISTING BLOW OFF AND CONNECT 8" DI WATER MAIN PER MANUFACTURER'S SPECIFICATIONS AND LLSWD PLAN No. 7-08-A. CONTRACTOR TO VERIFY DEPTH AND LOCATION PRIOR TO CONSTRUCTION. SEE DETAIL ON SHEET 15.
- 40 INSTALL 8" DI DOMESTIC WATER MAIN PER MANUFACTURER'S SPECIFICATIONS AND LLSWD PLAN No. 7-08-A. SEE DETAIL ON SHEET 15.
- 41 INSTALL DI TEE. SIZE AS SHOWN. PER MANUFACTURER'S AND LLSWD REQUIREMENTS AND SPECIFICATIONS.
- 42 INSTALL 8" RESILIENT SEAT GATE VALVE AND CAST IRON VALVE BOX PER MANUFACTURER'S AND LLSWD REQUIREMENTS AND SPECIFICATIONS.
- 43 INSTALL FIRE HYDRANT ASSEMBLY PER LLSWD STANDARD PLAN No. 7-14-A. SEE DETAIL ON SHEET 15.
- 44 INSTALL 8" DI BEND, ANGLE AS SHOWN, AND CAST IRON VALVE BOX PER MANUFACTURER'S SPECIFICATIONS AND LLSWD STANDARD PLAN No. 7-11-A. SEE DETAIL ON SHEET 15.
- 45 INSTALL 1" DOMESTIC WATER SERVICE AND 1" METER PER LLSWD STANDARD PLAN No. 7-15-A AND 7-15-C. SEE DETAILS ON SHEET 15.
- 46 INSTALL 1-1/2" DOMESTIC WATER SERVICE AND 1-1/2" METER PER LLSWD STANDARD PLAN No. 7-15-A AND 7-15-D. SEE DETAILS ON SHEET 15.
- 47 INSTALL 2" DOMESTIC WATER SERVICE AND 2" METER PER LLSWD STANDARD PLAN No. 7-15-A AND 7-15-D. SEE DETAIL ON SHEET 15.
- 48 INSTALL 3" DOMESTIC WATER SERVICE AND 3" METER VAULT PER LLSWD REQUIREMENTS AND DETAIL ON SHEET 15.
- 49 INSTALL FIRE SERVICE LINE. SIZE AS SHOWN. PER MANUFACTURER'S AND LLSWD SPECIFICATIONS. INSTALL VALVE AT MAIN. SIZE PER SERVICE LINE. PER LLSWD SPECIFICATIONS. BACKFLOW PREVENTION ASSEMBLY TO BE INSTALLED IN MECHANICAL ROOM PER APPROVED ARCHITECTURAL PLANS.
- 50 FIRE DEPARTMENT CONNECTION. SEE APPROVED ARCHITECTURAL PLANS.
- 51 INSTALL 2" BLOW OFF ASSEMBLY PER MANUFACTURER'S SPECIFICATIONS AND LLSWD STANDARD PLAN No. 7-11-B. SEE DETAIL ON SHEET 15.
- 52 INSTALL 2" IRRIGATION SERVICE WITH BACKFLOW PREVENTION ASSEMBLY PER MANUFACTURER'S SPECIFICATIONS AND LLSWD STANDARD PLAN No. 7-15-E. SEE DETAIL ON SHEET 15.
- 53 INSTALL SLEEVING / CASING PER LLSWD REQUIREMENTS AS REQUIRED. CONTRACTOR TO FIELD DETERMINE WITH ENGINEER OF RECORD.

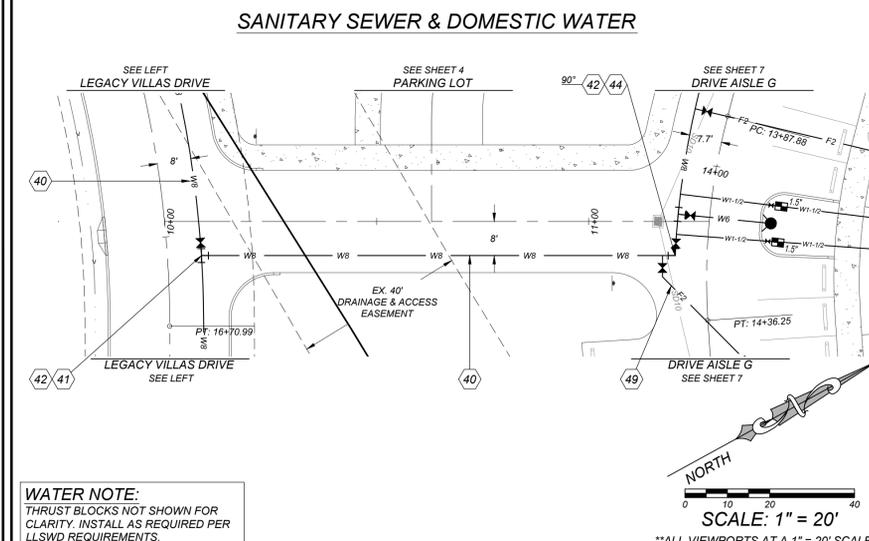
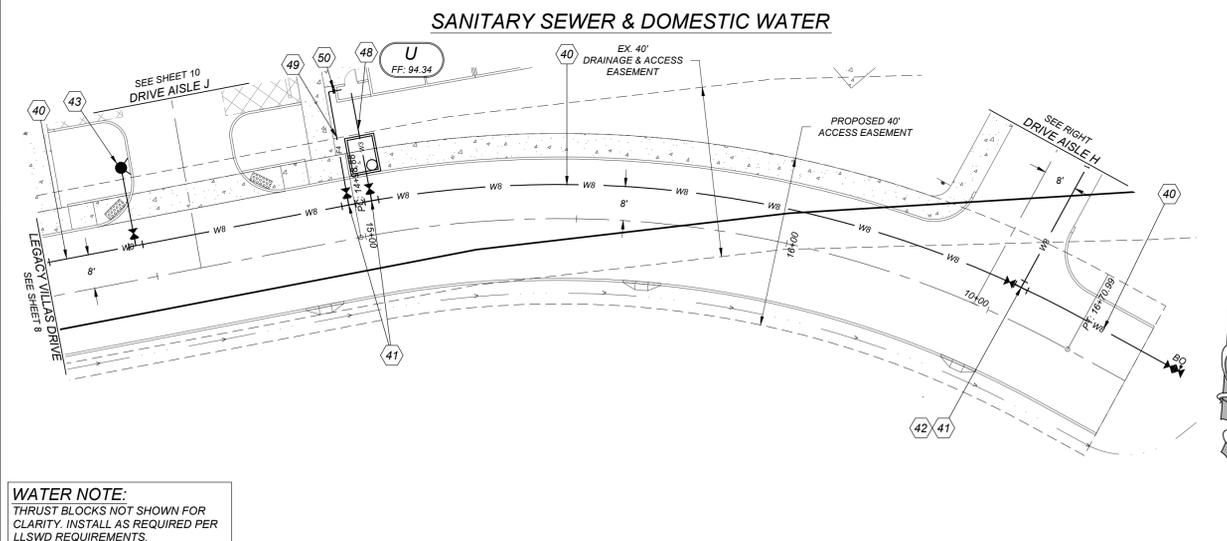
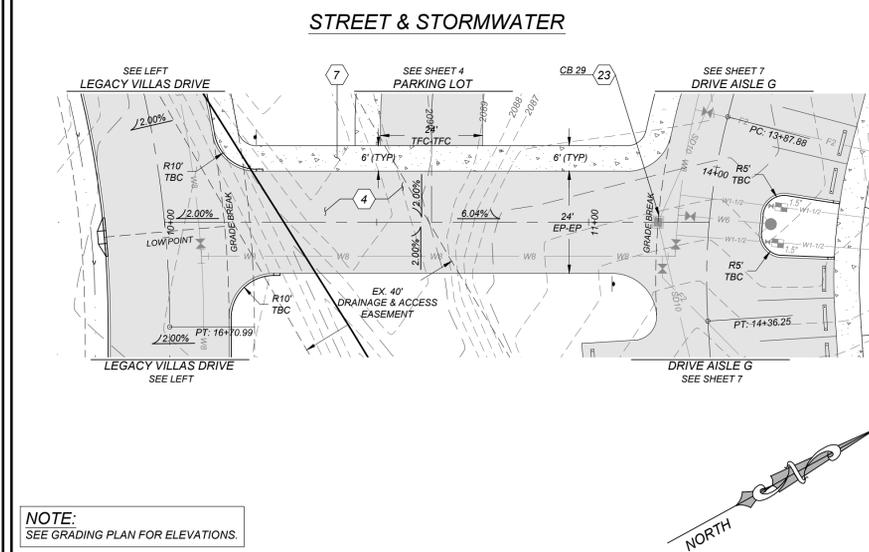
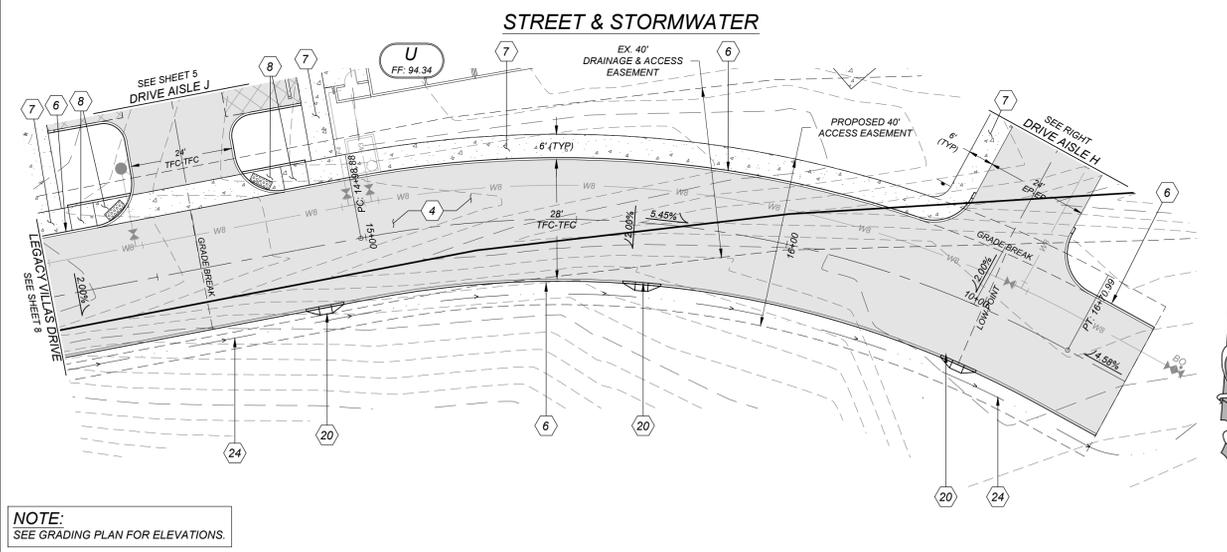
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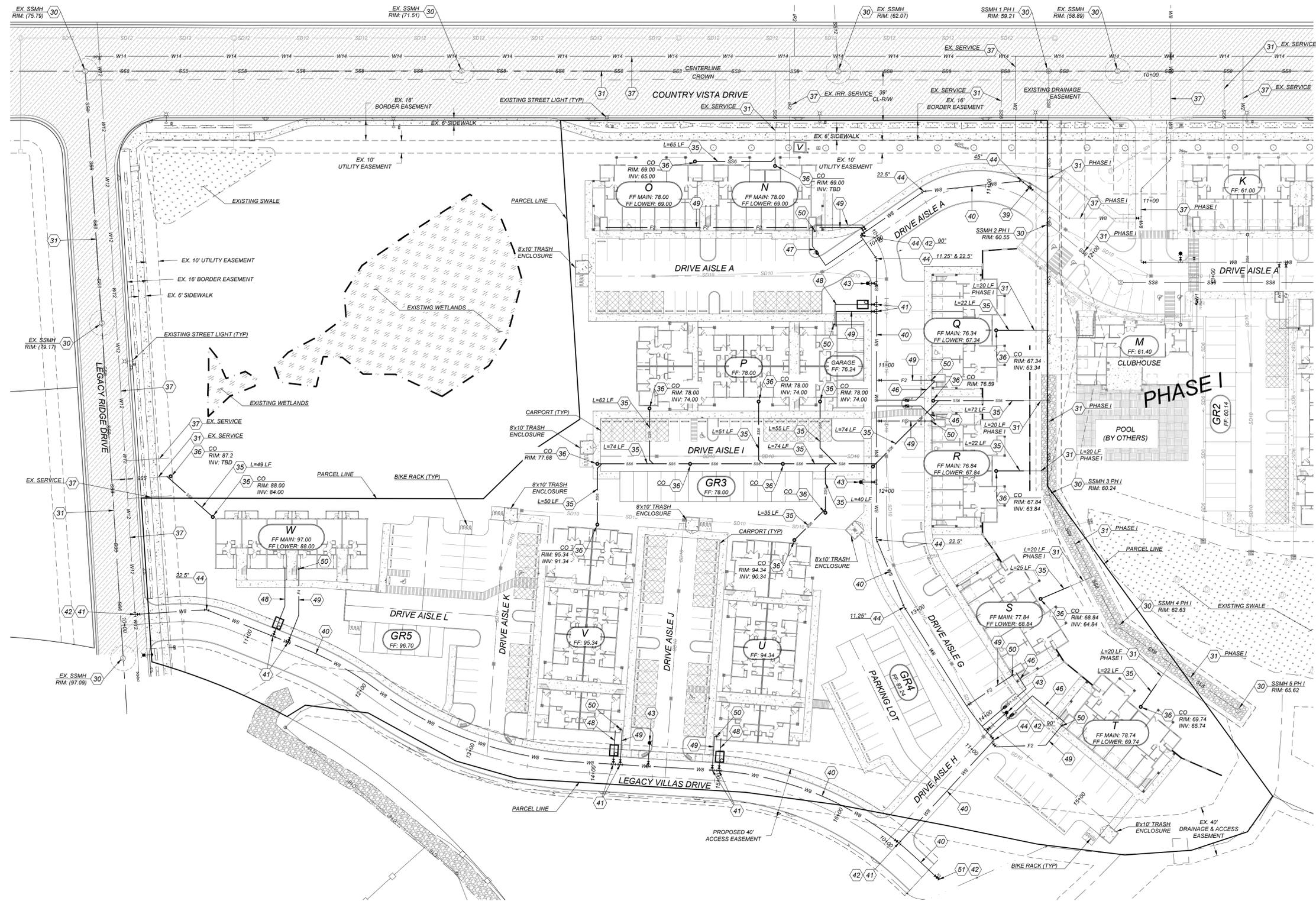
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PLAN AND PROFILE - LEGACY VILLAS DRIVE & DRIVE AISLE H
LIBERTY LAKE, WASHINGTON

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DATE: 6/29/2016
JOB NO: LCE 15-072.1

ONE INCH
AT FULL SIZE IF NOT ONE INCH SCALE ACCORDINGLY

SCALE: 1" = 20'
ALL VIEWPORTS AT A 1" = 20' SCALE

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SEWER AND WATER KEY NOTES:

- 30 EXISTING SANITARY SEWER MANHOLE.
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- 46 INSTALL 1-1/2" DOMESTIC WATER SERVICE AND 1-1/2" METER PER LLSWD STANDARD PLAN No. 7-15-A AND 7-15-D. SEE DETAILS ON SHEET 15.

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- 53 INSTALL SLEEVING / CASING PER LLSWD REQUIREMENTS AS REQUIRED. CONTRACTOR TO FIELD DETERMINE WITH ENGINEER OF RECORD.

SEWER SERVICE NOTE:
WYE FITTING ON SEWER SERVICE LINES FOR DRIVE AISLES D AND F.

WATER NOTE:
THRUST BLOCKS NOT SHOWN FOR CLARITY. INSTALL AS REQUIRED PER LLSWD REQUIREMENTS.

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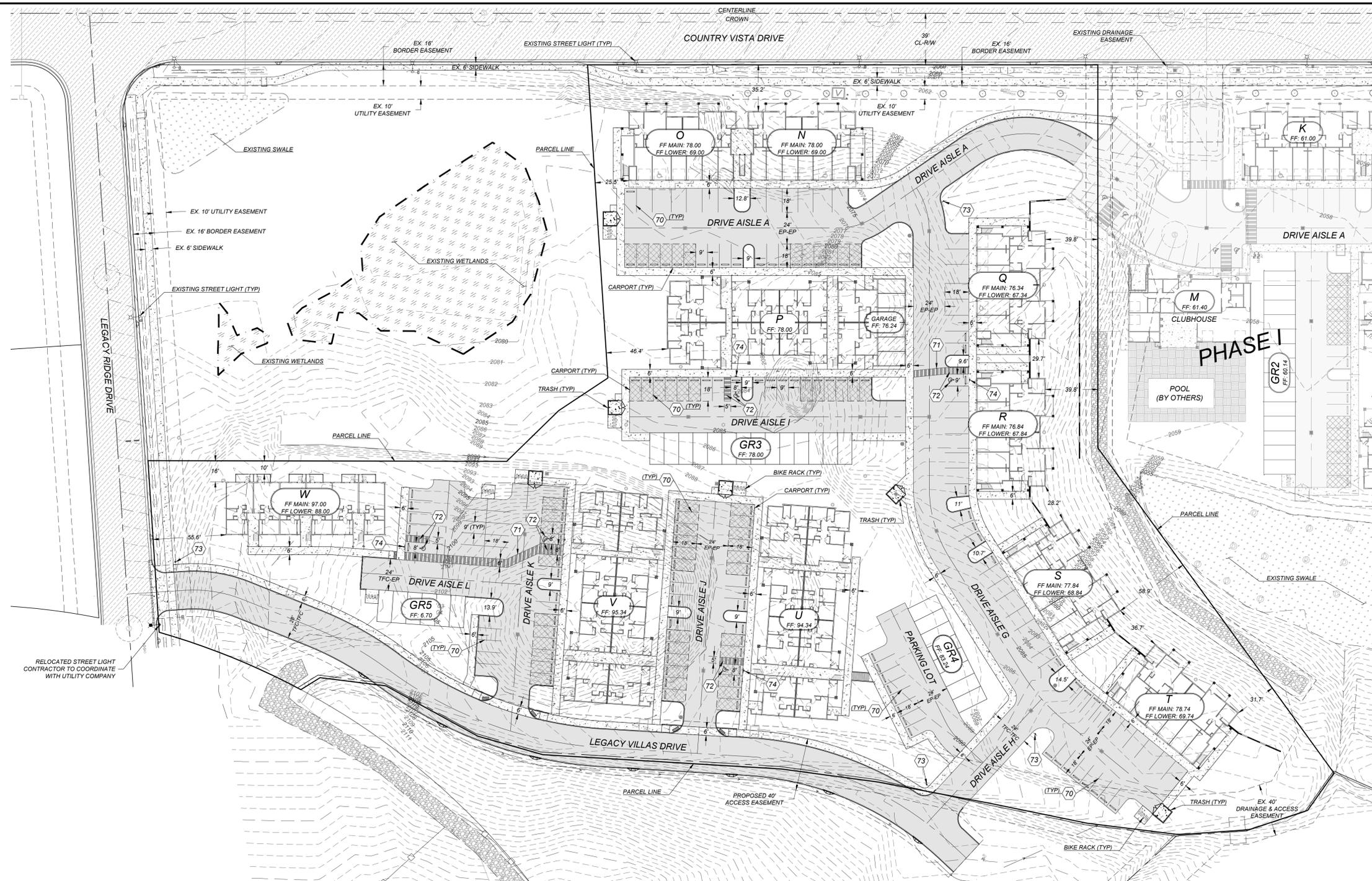


LEGACY VILLAS
MASTER UTILITY PLAN
LIBERTY LAKE, WASHINGTON

DESIGNED BY: DCD
DRAFTED BY: DLH
DATE: 6/29/2016
JOB NO: LCE 15-072.1

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LEGACY VILLAS
STRIPING, SIGNAGE AND CONDUIT PLAN
LIBERTY LAKE, WASHINGTON

- STRIPING, SIGNAGE & CONDUIT KEY NOTES:**
- 70 INSTALL 4" PARKING STRIPE PER WSDOT STANDARD PLAN M-17.10-02 AND CURRENT MUTCD REQUIREMENTS.
 - 71 INSTALL CROSS WALK STRIPING PER CURRENT MUTCD REQUIREMENTS.
 - 72 INSTALL ADA STRIPING PER WSDOT STANDARD PLAN M-17.10-02 AND CURRENT MUTCD REQUIREMENTS.
 - 73 INSTALL STREET STOP SIGN PER SPOKANE COUNTY STANDARD DRAWING A-16.
 - 74 INSTALL ADA SIGN PER DETAIL THIS SHEET.
 - 75 INSTALL 4" CONDUIT AT 18" BURY DEPTH FOR WATER SERVICE.
 - 76 INSTALL 4" CONDUIT AT 18" BURY DEPTH FOR FIRE LINE.
 - 77 INSTALL 1" CONDUIT AT 18" BURY DEPTH FOR FIRE CONTROLS.
 - 78 INSTALL 4" CONDUIT AT 18" BURY DEPTH FOR IRRIGATION MAIN.
 - 79 INSTALL (2) 4" CONDUITS AT 18" BURY DEPTH FOR IRRIGATION MAIN.
 - 80 INSTALL 2" CONDUIT AT 18" BURY DEPTH FOR ELECTRICAL FROM BUILDING PANEL TO CARPORTS. COORDINATE LOCATION WITH ARCHITECTURAL PLANS.
 - 81 INSTALL DIRECTIONAL PAVEMENT MARKINGS PER CURRENT MUTCD REQUIREMENTS.
 - 82 INSTALL LED STREET LIGHT PER ARCHITECTURAL PLANS (BY OTHERS).
- NOTES:**
- SITE ADDRESSING SHALL BE PLACED ON THE BUILDING SO THAT IT IS VISIBLE TO EMERGENCY SERVICES. CONTRACTOR TO COORDINATE WITH SVFD FOR EXACT LOCATION AND SPECIFICATIONS.
 - CONTRACTOR TO COORDINATE KNOX BOX LOCATIONS WITH SVFD.
 - CONTRACTOR TO INSTALL 8"x10" TRASH ENCLOSURE PER WASTE WATER MANAGEMENT REQUIREMENTS. CONTRACTOR TO INSTALL SIGHT OBSCURING FENCE/WALL PER CITY OF LIBERTY LAKE REQUIREMENTS PER MUNICIPAL CODE 10-3C-3H.
 - INSTALL BIKE RACK PER THE APPROVAL OF THE OWNER.

PARKING CALCULATIONS:

REQUIRED PER 10-3D-3:

PARKING REQUIREMENTS:

1 BED (>500 sf) = 1 SPACE	(0 x 1 = 0 SPACE)
1 BED (<500 sf) = 1.5 SPACES	(48 x 1.75 = 72 SPACES)
2 BED = 1.75 SPACES	(60 x 2 = 105 SPACES)
3 BED = 2 SPACES	(24 x 2 = 48 SPACES)

REQUIRED PARKING: 225 SPACES

BICYCLE PARKING: 1 SPACE PER UNIT (132)

- GARAGE SPACES (70)

TOTAL REQUIRED: 62 SPACES

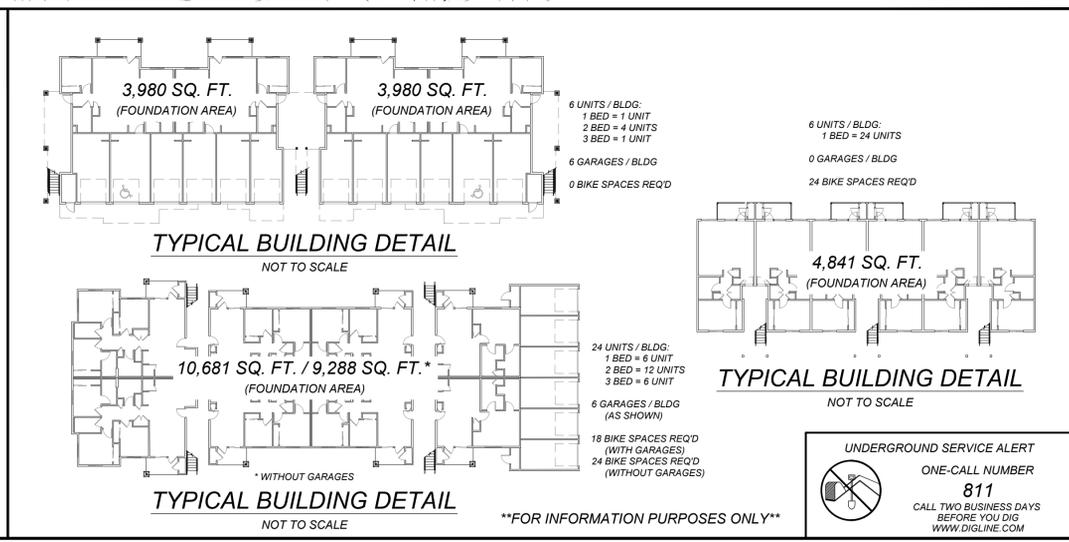
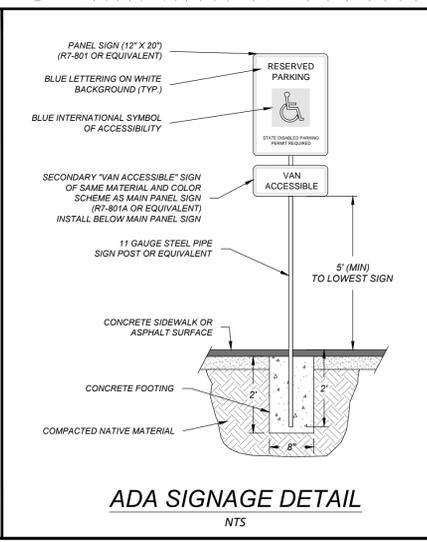
PROVIDED:

STANDARD PARKING SPACES:	131
COMPACT PARKING SPACES:	0
ADA PARKING SPACES:	5 (1 VAN ACCESSIBLE)
IN-FRONT BUILDING SPACES:	36
TOTAL SPACES:	173
ATTACHED GARAGES:	42
DETACHED GARAGES:	28
TOTAL PARKING:	242

BICYCLE PARKING: 6 RACKS / 9 SPACES

TOTAL BIKE PARKING: 54 SPACES

SEE GRADING PLAN FOR ADA PARKING DETAILS.



DESIGNED BY: DCD
DRAFTED BY: DLH
DATE: 6/29/2016
JOB NO: LCE 15-072.1

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LEGACY VILLAS

PHASE 2

SITE ANALYSIS NARRATIVE

Liberty Lake, Washington

June 29, 2016



3909 N. Schreiber Way, Suite 4
Coeur d'Alene, Idaho 83815
Phone/Fax: 208-676-0230

INTRODUCTION

The project proponent, Legacy Villas, LLC is requesting to develop Phase 2 of the Legacy Villas Apartments, which is a 6.9-acre piece of property in the City of Liberty Lake consisting of 132 apartments. This will be the second phase of a multiple phase multi-family development. The subject property is located at South of Country Vista Drive, East of Legacy Ridge Drive and West of Liberty Lake Road. The land is currently vacant, as can be seen in Figure 1 below.

SUBJECT PARCEL

The property being requested for development is as follows:

- Parcel No.: 55161.9203
- Area: ± 6.90 acres
- Zoning Designation: M-2 (Community Center Mixed-Use)

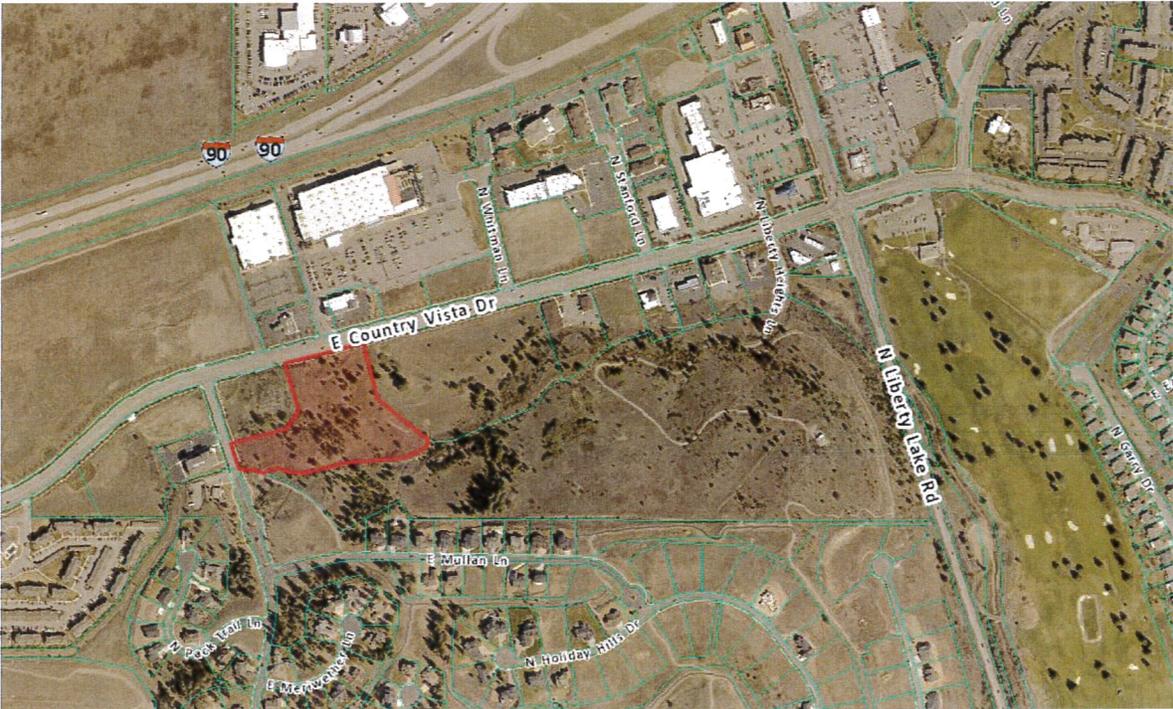


Figure 1: Vicinity Map

ZONING CLASSIFICATION

The property is currently zoned M-2 (Community Center Mixed-Use) in the City of Liberty Lake. The property to the North, West and East is zoned M-2 and the property to the South is zoned R-1. The purpose of the M-2 zoning classification is to “*promote the livability, stability, and improvement of the City’s community center mixed use areas*” as stated in Article 10-2F-1 of the City of Liberty Lake Development Code. These areas are encouraged to have efficient use of the land and urban services, encourage walking as an alternative to driving, provide more employment and housing options, connection to neighborhoods and other employment areas, be transit-oriented, provide formal and informal gathering places and provide retail and commercial services to the surrounding neighborhoods. As can be seen from Figure 2, the subject property is conveniently located to shopping and local businesses and would be consistent with the neighboring apartment complex to the west of Legacy Ridge Drive.

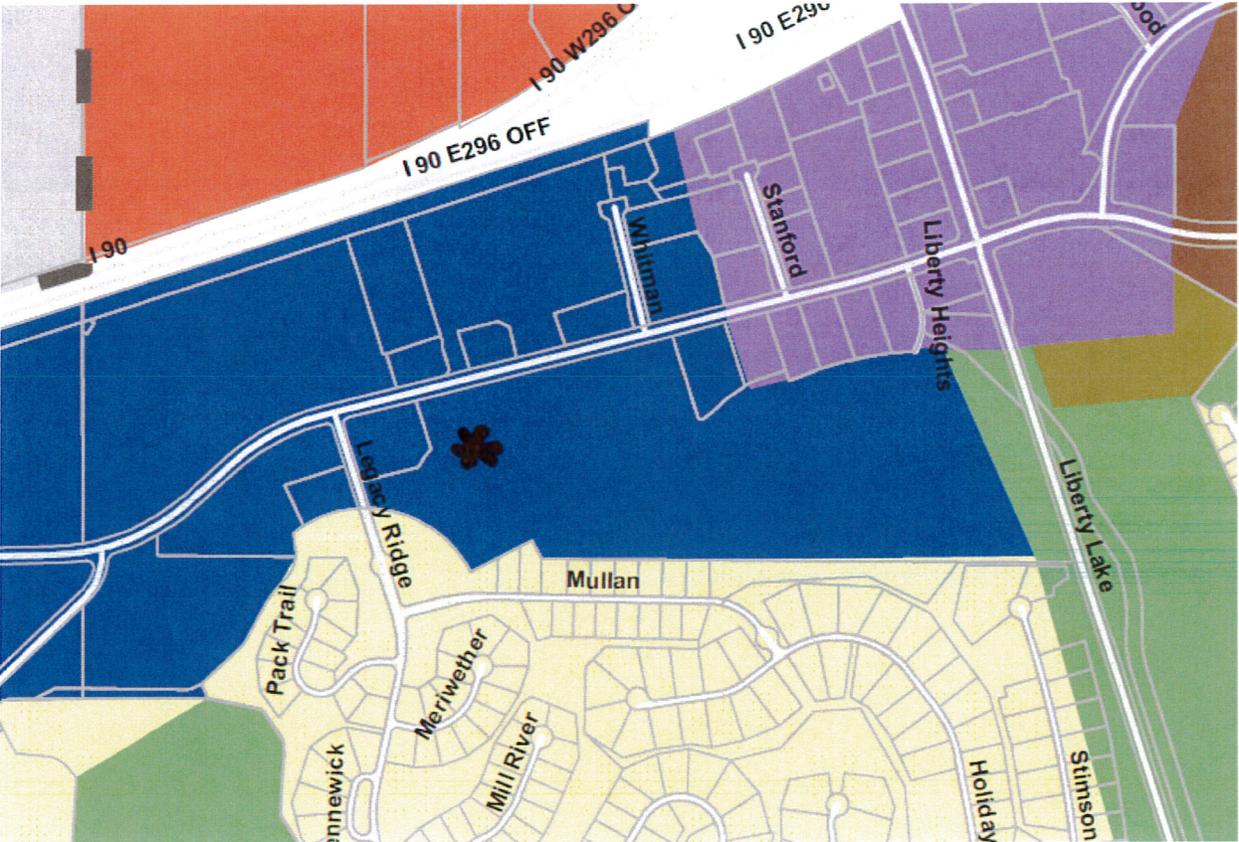


Figure 2: Zoning Map

Multi-family dwellings (apartments) are allowed by Limited Use in the M-2 zoning district. This use is allowed if the project complies with the development standards of the zone, and other applicable standards contained in the City Code. It is the project proponent’s belief that this project meets and/or exceeds those development standards. Below is a list of performance standards that are applicable to this project.

<u>Standard</u>	<u>M-2 Zone</u>	<u>Provided</u>
Lot Area (min):	7000 sf	6.9 acres
Lot Area (max):	None	
Lot width (min):	40' @ front PL	390'
Lot depth (max):	None	520'
Max Building Height:	50'	39' (max)
Lot Coverage:	70% (max)	30%
Residential Density:	12 du/ac (min) None (max)	19.1 du/ac

PRE-DEVELOPMENT CONDITIONS

The subject property is currently vacant. The general slope of the land is towards the north. The property is covered by fir and pine trees, native grasses and underbrush, and rock outcroppings.

The frontage improvements on Country Vista Drive are complete and include curb, gutter, drainage swales, and street trees.

Figure 3 below shows the current site conditions.



Figure 3: Existing Site Conditions

CRITICAL / ENVIRONMENTAL AREAS

The following critical and/or environmental areas have been identified on the project site according to the City of Liberty Lake Environmental Maps.

Flood Hazard Area

Figure 4 is an excerpt from the City of Liberty Lake *UGA Boundaries Study Flood Hazard Areas* map which shows a portion of the subject property being located within a designated FEMA Floodplain.

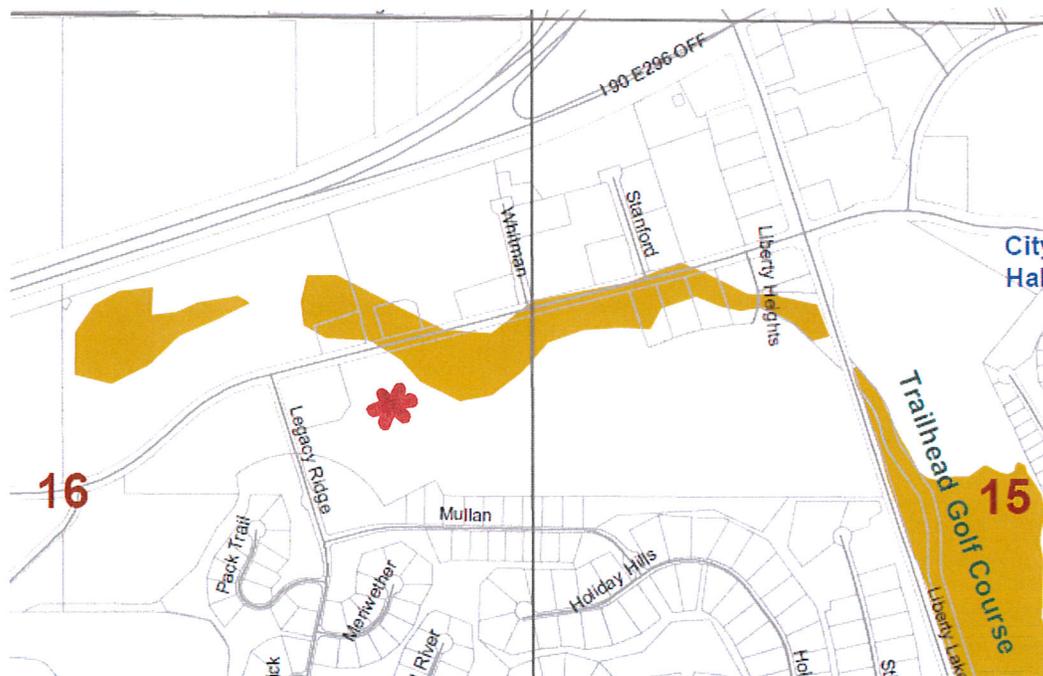


Figure 4: City of Liberty Lake UGA Boundaries Study Flood Hazard Areas

However, Figure 5 shows the FEMA Flood Insurance Rate Map, which does *not* show any areas of Special Flood Hazard (100 year flood). There is no evidence found onsite that would substantiate the location of the floodplains as shown on the City of Liberty Lake Map, therefore it is presumed that the FEMA map is more current and prevails.



Figure 5: FEMA Flood Insurance Rate Map

Wetlands

Figure 6 below is an excerpt from the City of Liberty Lake *UGA Boundaries Study Wetlands* map, which shows portions of the property containing Wetland Streams and DNR streams.

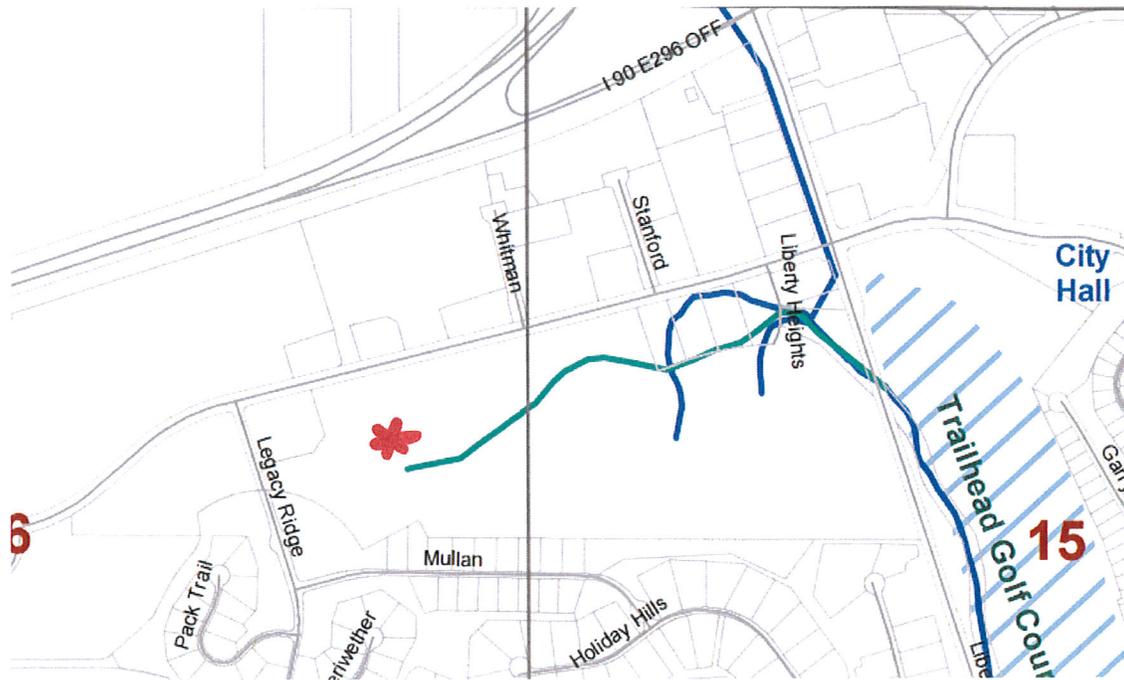


Figure 6: City of Liberty Lake UGA Boundaries Study Wetlands

Figure 7 shows all wetlands on the subject property as defined and accepted by the National Wetlands Inventory (US Fish and Wildlife Service). The DNR stream as defined by the City of Liberty Lake is shown on this map, however the Wetland Stream is not defined. There was no evidence discovered onsite to substantiate the location of the Wetland Stream as shown on the City of Liberty Lake Map, therefore it is assumed that the US Fish and Wildlife Service Map is correct.



Figure 7: US Fish and Wildlife Services National Wetlands Inventory Map

Geologic Hazards

The City of Liberty Lake has identified the subject property as containing erodible soils as shown in Figure 8 below. These soils were identified based on soil types recognized by Spokane County as having the potential for severe erosion. The services of a licensed Geotechnical Engineer have been retained, and a Geotechnical Evaluation has been completed to assess the subsurface soil conditions. Best Management Practices and ESC measures should be employed during construction to prevent any unnecessary erosion and sedimentation from occurring. Post Construction BMPs should also be utilized in accordance with the Spokane Regional Stormwater Manual and the recommendations of the project geotechnical engineer.

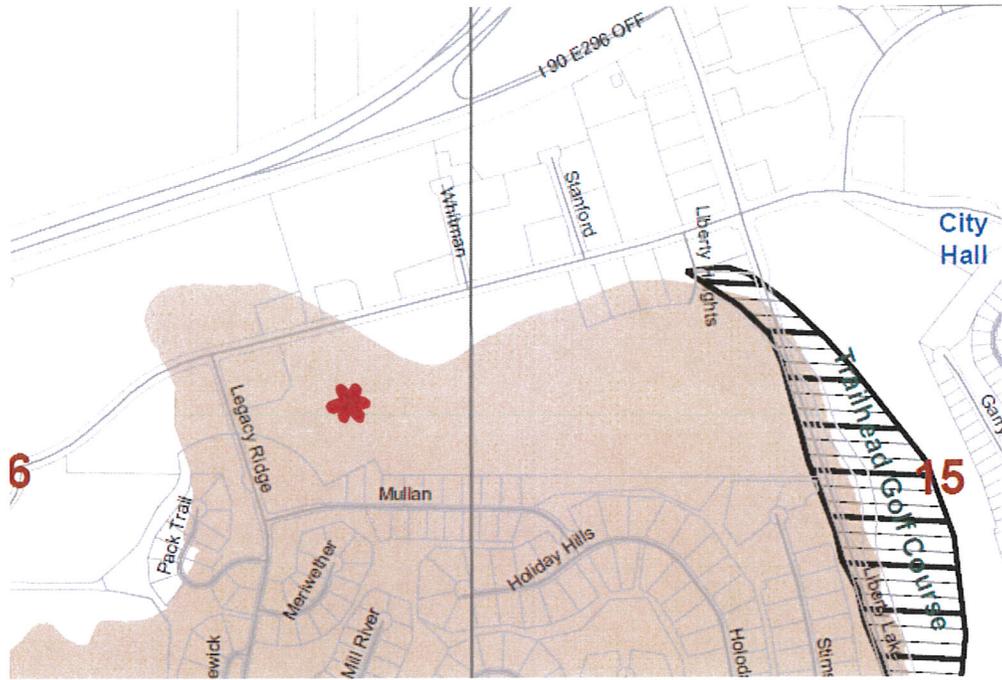


Figure 8: City of Liberty Lake UGA Boundaries Study Geologic Hazards & Constraints

LEGACY VILLAS

PHASE 2

STORMWATER DRAINAGE SUMMARY

Liberty Lake, Washington

June 29, 2016



3909 N. Schreiber Way, Suite 4
Coeur d'Alene, Idaho 83815
Phone/Fax: 208-676-0230

PROJECT OVERVIEW

This Stormwater Management Report supplements the accompanying Construction Plans submitted for review as part of the Legacy Villas Phase 2 project. This report describes the general drainage conditions on the site in relation to the stormwater requirements defined in the Spokane Regional Stormwater Manual and by the City of Liberty Lake.

The Legacy Villas Phase 2 site Improvements consist of the development of apartment buildings, parking lot, and stormwater treatment facilities of approximately 6.87+/- acres within the city limits of Liberty Lake, Washington. The Legacy Villas Phase 2 Site Improvements are generally located on the south side of Country Vista Drive and east of Legacy Ridge Drive in Liberty Lake. The project site is currently vacant land with natural dryland grass and some coniferous trees. The land generally slopes from south along from the rear of the Legacy Ridge Subdivision to the North property line along country Vista Drive. Sharing this site is a large existing stormwater treatment swale with multiple drywell structures spread throughout. This drainage system was previously used as a flood plain overflow for drainage from the adjacent property, however the development of the Legacy Estate Subdivision located uphill and to the South of the proposed project has eliminated the majority of the stormwater that utilizes the existing facility. Therefore, additional capacity is available in the existing swale and it is anticipated to be used by this project.

As shown in Appendix A, the United States Department of Agriculture Natural Resources Conservation Service (NRCS) has identified 2 predominant soils types for the Legacy Villas Phase 2 Site Improvements. Lenz-Rock outcrop complex 3 to 15 percent slopes is the first identified soil type for the area. Lenz-Rock soils consist of granitic and metamorphic rock, covered with mixed loess and ash in the upper portions of the soil unit. Permeability of the Lenz-Rock outcrop 3 to 15 percent soils is considered to be well drained and the hazard of water erosion is slight. Typically, this type of soil has a very low ability of water storage yet has more than 80 inches' depth to the water table.

Lenz-Rock outcrop complex 15 to 30 percent slopes is the second identified soil type for the area. Lenz-Rock soils consist of granitic and metamorphic rock, covered with mixed loess and ash in the upper portions of the soil unit. Permeability of the Lenz-Rock outcrop 15 to 30 percent soils is considered to be well drained and the hazard of water erosion is slight. Typically, this type of soil has a very low ability of water storage yet has more than 80 inches' depth to the water table.

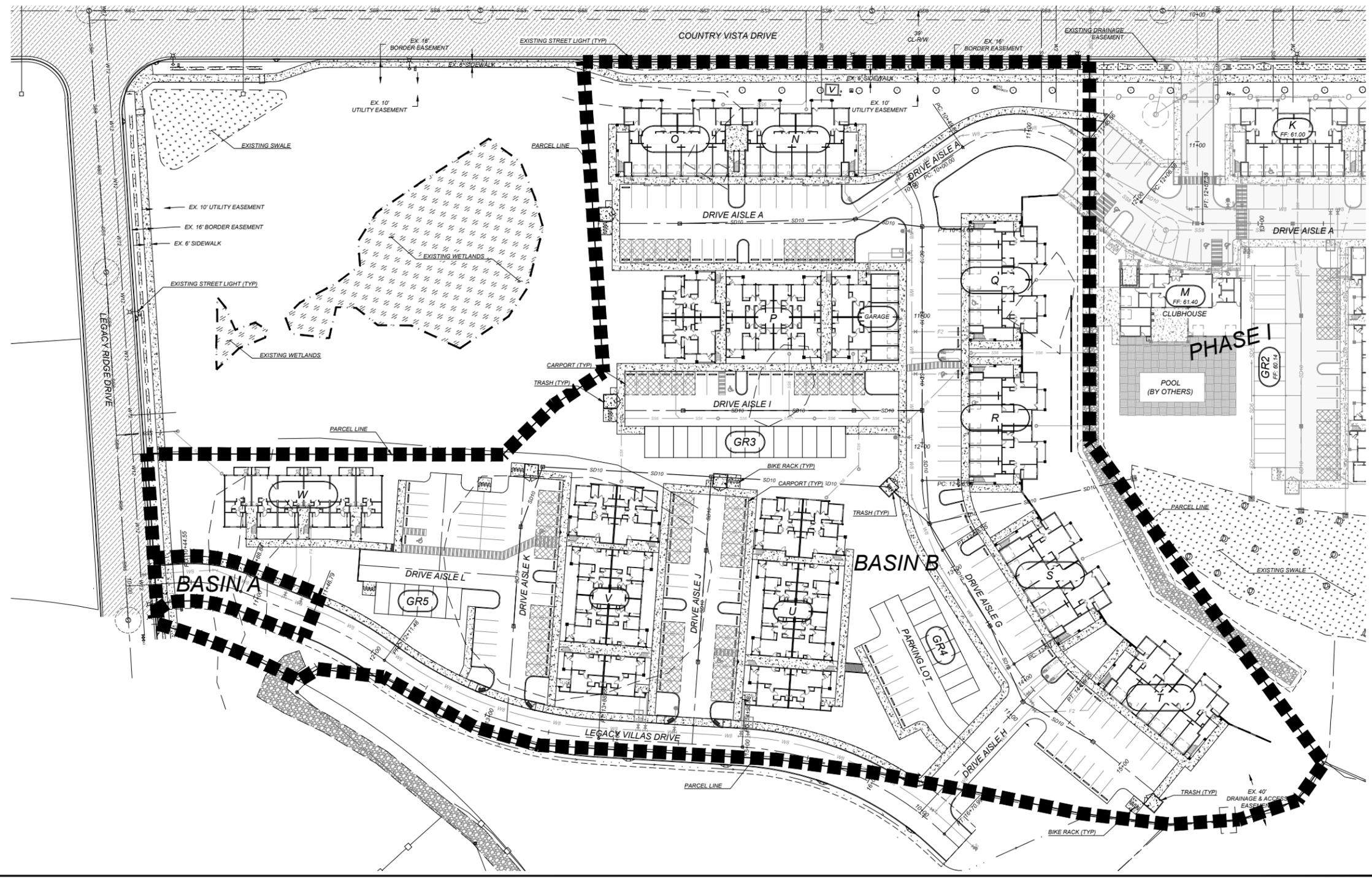
The stormwater system proposed for the Legacy Villas Phase 2 Site Improvements project will consist of a system of catch basins and underground piping to collect and convey stormwater to existing biofiltration swales and shallow injection facilities shared by the multiple drainage basins. Drainage basins were designed to drain to the structures between the proposed buildings to be conveyed to appropriately sized drainage swales with drywells. The roofs are directed to the stormwater treatment swales via roof gutters, downspouts and tight lines. The stormwater is mitigated through storage within the swale and infiltration into the ground. Drywells within the associated swales mitigate excess runoff through approved outflow rates of 0.3 cfs for a single depth drywell and 1.0 cfs for a double depth drywell.

The design analysis method used to determine the size of the stormwater facilities for this project conforms to the Spokane Regional Stormwater Manual – Biofiltration Swale. (208 Swale Design) The Bowstring Method was used to determine the required storage volume to affectively store the calculated stormwater runoff generated by a 25-year storm event

DRAINAGE BASIN MAP

The following map shows each of the drainage basins within the Legacy Villas Phase 2 Site Improvements.

popper: Plotted: Jun 30, 2016 - 8:41am. L:\2015\15-072\1\ACAD\15-072-1-CONST-PLM BASIN.dwg

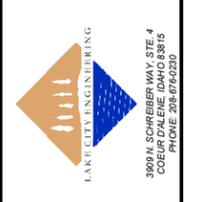


SCALE: 1" = 80'

LEGEND
 --- 2280 --- EXISTING 1' CONTOURS

UNDERGROUND SERVICE ALERT
 ONE-CALL NUMBER
811
 CALL TWO BUSINESS DAYS BEFORE YOU DIG
 WWW.DIGLINE.COM

NO.	DESCRIPTION	REVISION BLOCK	INITIAL	DATE



PRELIMINARY
 NOT FOR CONSTRUCTION

LEGACY VILLAS PHASE 2
 STORMWATER BASIN MAP
 LIBERTY LAKE, WASHINGTON

DESIGNED BY:	DCD
DRAFTED BY:	PLM
DATE:	6/29/2016
JOB NO:	LCE 15-072-1
1	1

CALCULATIONS

The following design parameters are applied to the Biofiltration Swale ('208" Swale Design) Calculations:

- All drainage basins within the site improvements are well below 10 acres.
- Assumed uniform rainfall intensity based on IDF curve
- Treatment Factor of 0.083 (first inch) used.
- Dry well rims are 0.5' above swale bottom elevation and below nearest inlet low point or pipe outfall elevations.
- All drywells are no less than 10' from the nearest curb cut or pipe outfall.
- No swale check dams are required as swale grades are < 2%.
- Onsite concrete washout area is designated on plans by the Engineer of Record.
- All swales shall be dressed with minimum of 3" top soil and seeded with an appropriate grass mixture per the Spokane Regional Stormwater Manual.

SUMMARY

As shown in the Calculations Section of this report, the storm water treatment and storage facilities provided for this project meet or exceed the requirements set forth in the Spokane Regional Stormwater Manual.

Legacy Villas Phase 2 Site Improvements								
Post Development								
Basin	Total Area	Composite "C"	Area _{imp}	I ₂₅	Q _{Runoff}	GIA Storage		
	(ac)		(ft ²)	(in/hr.)	(cfs)	Required (ft ³)	Provided (ft ³)	Drywell Type
A	0.09	0.90	4,015	3.32	0.28	104	210	-
B	6.78	0.69	199,864	3.32	15.53	7,679	130,157	-

Legacy Villas Phase 1 Site Improvements						
Pre-Development						
Basin	Total Area	Composite "C"		Area _{imp}	I ₂₅	Q _{Runoff}
	(ac)			(ft ²)	(in/hr.)	(cfs)
PRE	6.87	0.25		#####	2.62	4.50

Stormwater Summary
Roof drainage shall be collected via roof gutters, downspout, and tightline to the 208 treatment swales with drywell facilities. Catchbasins collect and convey surface drainage via underground piping to 208 treatment swales with drywell facilities.

STORMWATER DRAINAGE ANALYSIS AND DESIGN

PROJECT: **Legacy Villas Phase 2**

JOB #: **15-072.1**

CLIENT:

Date: **6/29/2016**

Drainage or Basin Area: .Basin 1

Case: **Post Development with total impervious area**

II. DRAINAGE AREA				
Drainage Area Description	Runoff Coefficient	Area (SF)	Area (acres)	A * C
Total Permeable Area:	0.25	-	0.00	0.00
Total Impervious Ground Area:	0.90	4,015	0.09	0.08
Total Impervious Roof Area:	0.90	-	0.00	0.00
Total Drainage or Basin Area:		4,015 SF	0.09 AC	
Calculated Composite "C" Factor:	0.90			

III. TIME OF CONCENTRATION				
Description	Segment #1	Segment #2	Segment #3	Segment #4
Surface Type:	Paved Areas			
Segment Length "L" (ft):	115			
Average Slope "s" (ft/ft):	2.000			
Ground Cover "K" (ft/min):	1200			
Calc. Time of Travel $T_t = (L/K(s)^{0.5})$:	0.07	0.00	0.00	0.00
Calc. Time of Concentration T_c *:	0.07	minutes		

* If less than 5.0 minutes, use 5.0 minutes as a minimum Time of Concentration or Duration

IV. STORM EVENT			
Storm Return Period:	2 yr event	10 yr event	25 yr event
Analysis Zone:			
Duration or Time of Concentration:	5 min	5 min	5 min
Rainfall Intensity for T_c :	1.42 in/hr	2.62 in/hr	3.32 in/hr
Calc. Impervious Area Runoff Rate:	0.12 cfs	0.20 cfs	0.25 cfs
Calculated Total Area Runoff Rate:	0.12 cfs	0.22 cfs	0.28 cfs

V. OUTFLOW AND STORAGE			
Drywell Capacities	Qty	Outflow	Storage
Type A Single Barrel Drywell @ 0.55 cfs:	0	0.00 cfs	0.0 CF
Type B Double Barrel Drywell @ 0.92 cfs:	0	0.00 cfs	0 CF
Calculated Total Outflow and Storage:		0.00 cfs	0 CF

VI. ROUTING CALCULATIONS USING THE BOWSTRING METHOD

Routing calcs applied to grassy infiltration area only.

Time (min)	Time (sec)	Intensity* (in/hr)	Q (cfs)	V _{IN} (CF)**	V _{OUT} (CF)	Storage (CF)
5	300	2.62	0.22	87	0	87
10	600	1.72	0.14	100	0	100
15	900	1.34	0.11	112	0	112
20	1200	1.13	0.09	122	0	122
25	1500	0.98	0.08	131	0	131
30	1800	0.88	0.07	139	0	139
35	2100	0.80	0.07	146	0	146
40	2400	0.74	0.06	153	0	153
45	2700	0.69	0.06	160	0	160
50	3000	0.64	0.05	166	0	166
55	3300	0.61	0.05	172	0	172
60	3600	0.58	0.05	177	0	177
65	3900	0.55	0.05	182	0	182

* Obtained from IDF Curve

** For Duration (t) ≤ T_c, V_{in} = 1.34 x (Q) x (T); Otherwise Duration (t) > T_c, V_{in} = (Q) x (T) + 0.34 x (Q) x T_c

VII. CALCULATED GIA AREA AND STORAGE CAPACITY

GIA Area Provided:	210	SF
Drywell Height Above GIA Bottom:	6	inches (6 inches maximum)
Total depth of GIA (bottom to top of berm):	12	inches

Calc. Treatment Volume Required (V): 104 CF (SRSM)

Calc. Bottom Area Required (A): 209 SF

GIA Area is Adequate

Calculated GIA Storage Provided:	210	CF
Calculated Drywell Storage Provided:	0	CF
Total Provided Storage Capacity:	210	CF

Calculated GIA Storage: 111 CF (Using Bowstring Method)

GIA Storage is Adequate

NOTE: Drainage of this basin is routed into the curb inlets along Legacy Ridge Drive where it is treated in the existing grass swale.

STORMWATER DRAINAGE ANALYSIS AND DESIGN

PROJECT: **Legacy Villas Phase 2**

JOB #: **15-072.1**

CLIENT:

Date: **6/29/2016**

Drainage or Basin Area: Basin 2

Case: **Post Development with total impervious area**

II. DRAINAGE AREA

Drainage Area Description	Runoff		Area	
	Coefficient	(SF)	(acres)	A * C
Total Permeable Area:	0.25	95,379	2.19	0.55
Total Impervious Ground Area:	0.90	115,205	2.64	2.38
Total Impervious Roof Area:	0.90	84,659	1.94	1.75
Total Drainage or Basin Area:		295,243 SF	6.78 AC	
Calculated Composite "C" Factor:	0.69			

III. TIME OF CONCENTRATION

Description	Segment #1	Segment #2	Segment #3	Segment #4
Surface Type:	Paved Areas			
Segment Length "L" (ft):	230			
Average Slope "s" (ft/ft):	2.000			
Ground Cover "K" (ft/min):	1200			
Calc. Time of Travel $T_t = (L/K(s)^{0.5})$:	0.14	0.00	0.00	0.00
Calc. Time of Concentration T_c *:	0.14	minutes		

* If less than 5.0 minutes, use 5.0 minutes as a minimum Time of Concentration or Duration

IV. STORM EVENT

Storm Return Period:	2 yr event	10 yr event	25 yr event
Analysis Zone:			
Duration or Time of Concentration:	5 min	5 min	5 min
Rainfall Intensity for T_c :	1.42 in/hr	2.62 in/hr	3.32 in/hr
Calc. Impervious Area Runoff Rate:	5.86 cfs	9.74 cfs	12.34 cfs
Calculated Total Area Runoff Rate:	6.64 cfs	12.25 cfs	15.53 cfs

V. OUTFLOW AND STORAGE

Drywell Capacities	Qty	Outflow	Storage
Type A Single Barrel Drywell @ 0.55 cfs:	0	0.00 cfs	0.0 CF
Type B Double Barrel Drywell @ 0.92 cfs:	32	29.44 cfs	3,497 CF
Calculated Total Outflow and Storage:		29.44 cfs	3,497 CF

VI. ROUTING CALCULATIONS USING THE BOWSTRING METHOD

Routing calcs applied to grassy infiltration area only.

Time (min)	Time (sec)	Intensity* (in/hr)	Q (cfs)	V _{IN} (CF)**	V _{OUT} (CF)	Storage (CF)
5	300	2.62	12.25	4924	8832	0
10	600	1.72	8.03	5638	17664	0
15	900	1.34	6.27	6287	26496	0
20	1200	1.13	5.27	6856	35328	0
25	1500	0.98	4.60	7364	44160	0
30	1800	0.88	4.11	7824	52992	0
35	2100	0.80	3.75	8247	61824	0
40	2400	0.74	3.45	8639	70656	0
45	2700	0.69	3.21	9005	79488	0
50	3000	0.64	3.01	9349	88320	0
55	3300	0.61	2.84	9675	97152	0
60	3600	0.58	2.70	9985	105984	0
65	3900	0.55	2.57	10281	114816	0

* Obtained from IDF Curve

** For Duration (t) ≤ T_c, V_{in} = 1.34 x (Q) x (T); Otherwise Duration (t) > T_c, V_{in} = (Q) x (T) + 0.34 x (Q) x T_c

VII. CALCULATED GIA AREA AND STORAGE CAPACITY

GIA Area Provided:	31665	SF
Storage Height Above GIA Bottom:	6	inches
Total depth of GIA (bottom to top of berm):	48	inches

Calc. Treatment Volume Required (V): 7,679 CF (SRSM)

Calc. Bottom Area Required (A): 15,359 SF

GIA Area is Adequate

Calculated GIA Storage Provided:	126660	CF
Calculated Drywell Storage Provided:	3497	CF
Total Provided Storage Capacity:	130157	CF

Calculated GIA Storage: 111 CF (Using Bowstring Method)

GIA Storage is Adequate

NOTE: Drainage basin 3 includes all undisturbed natural areas outside of the project work area. Basin 2 utilizes the existing stormwater 208 treatment swale and drywell facilities and assumes that all existing structures to be double depth structures.

Intensity-Duration-Frequency Curve

Washington State Rainfall Coefficients

Coefficient	2 yr	10 yr	25 yr	50 yr	100 yr
<i>m</i>	3.47	6.98	9.09	10.68	12.33
<i>n</i>	0.556	0.609	0.626	0.635	0.643

	Intensity (inches per hour)				
	2 yr event	10 yr event	25 yr event	50 yr event	100 yr event
5 min	1.42	2.62	3.32	3.84	4.38
10 min	0.96	1.72	2.15	2.47	2.81
15 min	0.77	1.34	1.67	1.91	2.16
20 min	0.66	1.13	1.39	1.59	1.80
25 min	0.58	0.98	1.21	1.38	1.56
30 min	0.52	0.88	1.08	1.23	1.38
35 min	0.48	0.80	0.98	1.12	1.25
40 min	0.45	0.74	0.90	1.03	1.15
45 min	0.42	0.69	0.84	0.95	1.07
50 min	0.39	0.64	0.79	0.89	1.00
55 min	0.37	0.61	0.74	0.84	0.94
60 min	0.36	0.58	0.70	0.79	0.89
65 min	0.34	0.55	0.67	0.75	0.84
1 hr	0.36	0.58	0.70	0.79	0.89
2 hr	0.24	0.38	0.45	0.51	0.57
4 hr	0.16	0.25	0.29	0.33	0.36
6 hr	0.13	0.19	0.23	0.25	0.28
8 hr	0.11	0.16	0.19	0.21	0.23
10 hr	0.10	0.14	0.17	0.18	0.20
12 hr	0.09	0.13	0.15	0.16	0.18
14 hr	0.08	0.12	0.13	0.15	0.16
16 hr	0.08	0.11	0.12	0.14	0.15
18 hr	0.07	0.10	0.11	0.13	0.14
20 hr	0.07	0.09	0.11	0.12	0.13
22 hr	0.06	0.09	0.10	0.11	0.12
24 hr	0.06	0.08	0.10	0.11	0.11

RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD

Type of Cover	FLAT <2%	ROLLING 2% - 10%	HILLY > 10%
Pavement and Roofs	0.90	0.90	0.90
Earth Shoulders	0.50	0.50	0.50
Drives and Walks	0.75	0.80	0.85
Gravel Pavement	0.85	0.85	0.85
City Business Areas	0.80	0.85	0.85
Apartment Dwelling Areas	0.50	0.60	0.70
Light Residential: 1 to 3 units/acre	0.35	0.40	0.45
Normal Residential: 3 to 6 units/acre	0.50	0.55	0.60
Dense Residential: 6 to 15 units/acre	0.70	0.75	0.80
Lawns	0.17	0.22	0.35
Grass Shoulders	0.25	0.25	0.25
Side Slopes, Earth	0.60	0.60	0.60
Side Slopes, Turf	0.30	0.30	0.30
Median Areas, Turf	0.25	0.30	0.30
Cultivated Land, Clay and Loam	0.50	0.55	0.60
Cultivated Land, Sand and Gravel	0.25	0.30	0.35
Industrial Areas, Light	0.50	0.70	0.80
Industrial Areas, Heavy	0.60	0.80	0.90
Parks and Cemeteries	0.10	0.15	0.25
Playgrounds	0.20	0.25	0.30
Woodland and Forest	0.10	0.15	0.20
Meadow and Pasture Land	0.25	0.30	0.35
Unimproved Areas	0.10	0.20	0.30

GROUND COVER COEFFICIENTS

Type of Ground Cover	K (ft/min)
Forest With Heavy Ground Cover	150
Minimum Tillage Cultivation	280
Short Pasture Grass Or Lawn	420
Nearly Bare Ground	600
Small Roadside Ditch W/Grass	900
Paved Area	1200
Gutter Flow:	
4 inches deep	1500
6 inches deep	2400
8 inches deep	3100
Storm Sewers:	
12 inch diameter	3000
18 inch diameter	3900
24 inch diameter	4700
Open Channel Flow (n = .040):	
12 inches deep	1100
Narrow Channel (w/d =1):	
2 feet deep	1800
4 feet deep	2800
Open Channel Flow (n = .040):	
1 foot deep	2000
Wide Channel (w/d =9):	
2 feet deep	3100
4 feet deep	5000

APPENDIX A
NRCS SOILS REPORT



United States
Department of
Agriculture

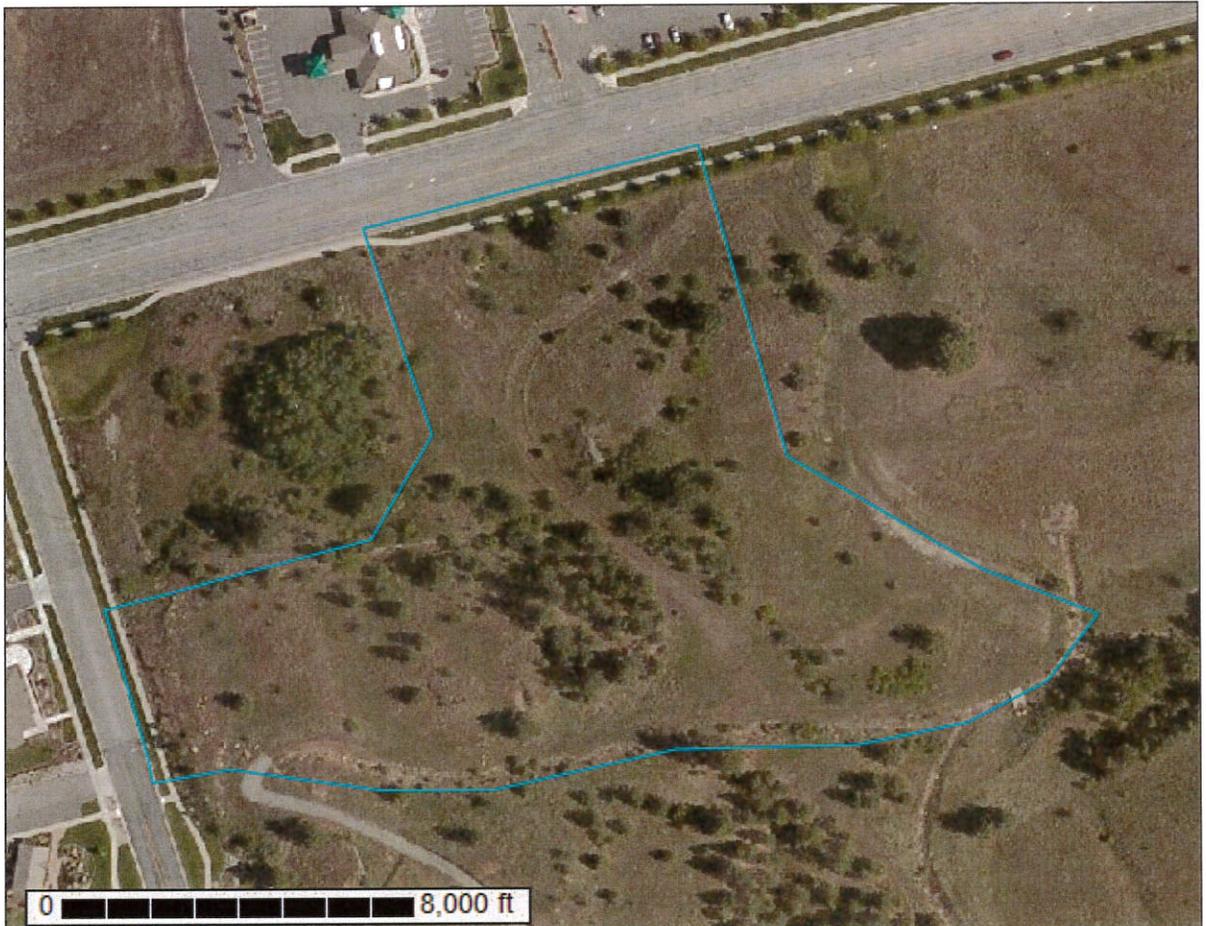
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Spokane County, Washington

Legacy Villas Phase 2



June 28, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

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individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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Soil Map



Map Scale: 1:1,590 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

-  Area of Interest (AOI)
-  Area of Interest (AOI)
- Soils**
-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points
- Special Point Features**
-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features
- 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 1:24,000.

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: Spokane County, Washington
 Survey Area Data: Version 6, Sep 25, 2015

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

Date(s) aerial images were photographed: Data not available.

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

Map Unit Legend

Spokane County, Washington (WA063)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5072	Lenz-Rock outcrop complex, 3 to 15 percent slopes	6.3	92.4%
5073	Lenz-Rock outcrop complex, 15 to 30 percent slopes	0.5	7.6%
Totals for Area of Interest		6.8	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

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intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Spokane County, Washington

5072—Lenz-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wby
Elevation: 1,700 to 3,600 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 42 to 50 degrees F
Frost-free period: 90 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenz and similar soils: 40 percent
Rock outcrop: 25 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenz

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 4 inches: very gravelly ashy sandy loam
A2 - 4 to 9 inches: very gravelly ashy sandy loam
Bw1 - 9 to 14 inches: very gravelly ashy sandy loam
Bw2 - 14 to 26 inches: very cobbly sandy loam
C - 26 to 38 inches: extremely stony sandy loam
R - 38 to 48 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 21 to 41 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Other vegetative classification: ponderosa pine/common snowberry (CN170)

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Minor Components

Swakane

Percent of map unit: 14 percent

Landform: Ridges on mountains, hills

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Interfluvium, nose slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Spokane

Percent of map unit: 10 percent

Landform: Hills

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: ponderosa pine/common snowberry (CN170)

Clayton

Percent of map unit: 5 percent

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: ponderosa pine/common snowberry (CN170)

Micapeak

Percent of map unit: 5 percent

Landform: Ridges, hills

Landform position (two-dimensional): Shoulder, summit, backslope

Landform position (three-dimensional): Interfluvium, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: Douglas-fir/ninebark (CN260)

Hardesty

Percent of map unit: 1 percent

Landform: Drainageways

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: ponderosa pine/ninebark (CN190)

5073—Lenz-Rock outcrop complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2wbz
Elevation: 1,700 to 3,600 feet
Mean annual precipitation: 18 to 24 inches
Mean annual air temperature: 42 to 50 degrees F
Frost-free period: 90 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenz and similar soils: 50 percent
Rock outcrop: 20 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenz

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess mixed with minor amounts of volcanic ash over residuum and/or colluvium derived from granitic and metamorphic rocks

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A1 - 1 to 4 inches: very gravelly ashy sandy loam
A2 - 4 to 9 inches: very gravelly ashy sandy loam
Bw1 - 9 to 14 inches: very gravelly ashy sandy loam
Bw2 - 14 to 26 inches: very cobbly sandy loam
C - 26 to 38 inches: extremely stony sandy loam
R - 38 to 48 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 21 to 41 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

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Hydrologic Soil Group: B

Other vegetative classification: ponderosa pine/common snowberry (CN170)

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Minor Components

Swakane

Percent of map unit: 14 percent

Landform: Ridges, hills

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Side slope, nose slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Spokane

Percent of map unit: 10 percent

Landform: Hills

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: ponderosa pine/common snowberry (CN170)

Micapeak

Percent of map unit: 6 percent

Landform: Ridges, hills

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Other vegetative classification: Douglas-fir/ninebark (CN260)