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DRAINAGE REPORT
FOR

Liberty Road Apartments
Salem, Oregon
Case No. SUB-UGA-ADJ20-05

Prepared For:
Harrison Industries, LLC
10355 Liberty Road S
Salem, Oregon 97306

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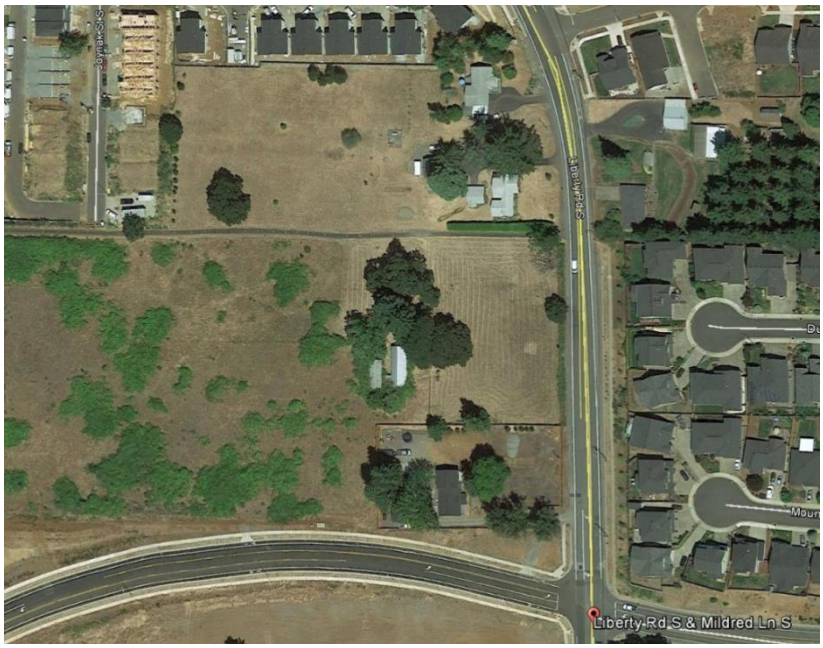
INTRODUCTION

The Liberty Road apartments are a proposed 66-unit complex approved under planning case no. SUB-UGA-ADJ20-05, located at 5871 Liberty Road S. The parcel of land to be developed is a portion of Tax Lot 600 of Marion County Assessor's Map 08 3W 16C. A vicinity map and supporting maps are in Appendix A of this report. An aerial image of the site can be seen below.



Project Site

Green Stormwater Infrastructure (GSI) to the Maximum Extent Feasible (MEF) is being used for the new developed areas per City of Salem Administrative Rules, Chapter 109, Division 004, Stormwater System, Appendix 4E (Standards). Stormwater facilities will be constructed to meet the City of Salem standards.

EXISTING CONDITIONS

The 3.08-acre site is generally rectangular in the shape. Surface conditions consists of grass, brush and minimal trees. There are no identified wetlands, streams or sensitive areas located on the property. A topographical high point is located on the southwesterly corner of the site. Drainage from this high point flows predominately northeasterly. The maximum relief is approximately 25-feet with a high point elevation of 563. The abutting properties are zoned residential with nearby public improvements that include storm water conveyance systems. Appendix A contains multiple maps of the site.

It should be noted that the westerly portion of the site will be subdivided into multiple lots. Stormwater infrastructure will be designed and constructed to serve the development. This includes a storm main that traverses through the apartment site. In addition, the existing storm main located in Liberty Road is under sized and will be upgraded as part of the subdivision improvements.

Soils

The Natural Resources Conservation Service (NRCS) Soil Resource Report for Marion County was used to determine a Hydrological Soil Group classification for runoff calculations. The report identifies the site soils to be Jory, and McAlpin soils. All the soils are in the hydrologic soil group C. The report is in Appendix B.

Infiltration

Infiltration testing was performed at the site to determine percolation rates of the soil. Test results indicate rates at 0.18 inches. The geotechnical report for the site is in Appendix B. Due to these poor percolation rates of the soils, green stormwater facilities will be designed as combination facilities.

Water Quality Analysis

Water quality flow rates were calculated with HydroCAD 10.10. The SCS TR-20 Unit Hydrograph method will be used to generate the hydrographs. A Type 1A storm and a 24-hour rainfall depth of 1.38 inches per hour was used to determine the water quality flow rate.

Developed Conditions

The proposed development will have six multi-family apartment buildings and a recreation building with paved parking, sidewalks and structures that will create impervious surfaces. The site area is approximately 3.08 acres which will be disturbed and required to have detention. Other portions disturbed during construction will be restored to existing conditions. Detention will be provided via a newly constructed Contech ChamberMaxx® retention chamber system located in the parking lot in the NE corner of the lot, connected with a combination facility. The detention system has a maximum capacity to detain approximately 10,000 cubic feet of water. The development will utilize approximately 9,400 cubic feet of storage capacity.

STORMWATER QUANTITY ANALYSIS

Stormwater quantity (Flow Control) is being handled by on-site detention. Runoff from the 3.08-acre development is being routed to the on-site facility that ultimately controls runoff to pre-developed flow rates.

Per Subsection 4.2(p)(3)(A) of the standards, one-half of the post development peak runoff rate of the two-year storm must be equal to or less than one-half of the peak runoff rate of the pre-developed two-year, 24-hour storm. This also applies to the 10, 25, and 100-year storm events. The pre-developed flow rates were calculated using HydroCAD 10.10. Table 1 below lists the 24-hour rainfall depths used in the analysis of each storm event. Please note that the 2-year event was halved and then analyzed.

Table 1

Storm Event (year)	24-hour Rainfall Depth (in)
Half of 2	1.1
10	3.2
25	3.6
100	4.4
WQ	1.38

For the pre-developed conditions, a time of concentration of 24 minutes was calculated. The time of concentration data is in Appendix C. The calculations are incorporated in the HydroCAD output located in Appendix D. The entire area was classified as “City of Salem Pre-Development, HSG C” with a Curve Number (CN) of 72. A pre-developed basin map is in Appendix A.

The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with the above rainfall depths. Table 2 below identifies the allowable pre-developed release rates for each storm event.

Table 2

Storm Event	Allowable Release Rate (cfs)
Half of 2-year	0.01
10-year	0.37
25-year	0.52
100-year	0.88

The post-developed flow rates were calculated using HydroCAD 10.10. A time of concentration of 5 minutes was assumed for the basin. The calculations are incorporated in the HydroCAD output located in Appendix D. Developed areas were determined by an AutoCAD analysis and Table 3 below lists the CN values and areas. A developed basin map is in Appendix A.

Table 3

Basin	Impervious Area (Ac) CN = 98	>75% Grass Cover (Ac) CN = 74	TOTAL Area (Ac)	Composite CN
Lot 1	1.825	1.25	3.075	88

DETENTION SYSTEM

In the detention analysis, the 3.08-acre site was considered a single basin draining into the proposed detention system. Site grading and conveyance pipe will direct stormwater runoff to the system. It should be noted that the facility has a capacity to detain approximately 10,000 cubic feet of water. This exceeds the required detention volume of 9,400 cubic feet.

The allowable pre-developed release rates are 0.01, 0.37, 0.52 and 0.88 cfs. The release rates and detention requirements were generated from the HydroCAD software, which can be seen in Appendix D. Table 4 below summarizes the requirements for the required storm events.

Table 4

Storm Event	Allowable Release Rate (cfs)	Release Rate (cfs)	Required Detention Volume (ft^3)	Provided Detention Volume (ft^3)
Half of 2-year	0.01	0.01	3,168	10,016
10-year	0.37	0.36	6,622	10,016
25-year	0.52	0.51	7,615	10,016
100-year	0.88	0.81	9,409	10,016

(Detention Summary)

Flow control is achieved with multiple orifices in a standard City of Salem control structure. The sizing of the orifice uses the standard orifice equation provided in the City of Salem Stormwater Management Manual. Table 5 below identifies orifice size, elevation and the water surface elevation.

Table 5

Storm Event	Control Orifice (#)	Release Rate (cfs)	Orifice Diameter (inches)	Elevation (feet)	W.S. Elevation (feet)
Half of 2-year	1	0.01	0.50	538.00	539.17
10-year	2	0.36	$3\frac{1}{8}$	539.25	541.25
25-year	3	0.51	5.00	541.25	541.47
100-year	3	0.81	5.00	541.25	541.87
Overflow	Weir			542.00	

(Orifice Summary)

STORMWATER QUALITY ANALYSIS

Water quality flow rates were calculated using HydroCAD 10.10. The SCS TR-20 Unit Hydrograph method was used to generate the hydrographs. A Type 1A rainfall distribution was used with a 1.38 rainfall depth. Appendix E contains the analysis.

Table 6 below identifies the top of media elevation, water surface elevation and overflow elevation for the combination facility.

Table 6

Basin	WQ Flow Rate (cfs)	Media Elevation (feet)	W.S. Elevation (feet)	Rim Elevation (feet)
1	0.31	541.00	541.02	542.00

(Water Quality Summary)

CONCLUSION

Based on the presented information, the preliminary design can meet the City of Salem water quality and quantity standards. If there are any questions regarding this analysis or the design, please contact Matthew Hendrick at Multi/Tech Engineering by phone at (503) 363-9227 or via e-mail at mhendrick@mtengineering.net.

APPENDIX A

APPENDIX B

APPENDIX C

Appendix D

Appendix E