Boulder Run

19- Lot proposed development

19371 Pease Road

Oregon City, Oregon

PRELIMINARY DRAINAGE REPORT

April 2015

EXPIRES: 06-30-15

Prepared By:

Bruce D. Goldson, PE

Theta, llc

PO Box 1345, Lake Oswego, Oregon 97035

2014-129F

INDEX

NARRATIVE ASSUMPTIONS

Existing Conditions:

The subject property has two existing homes and out buildings on approximately 4.21 acres. The site is generally wooden to the south with a treeless area of lawn area of approximately one acre to the east and with slopes ranging from 2% to 8%. The site has the older South Hampton Estates on the north and west sides. This project, vintage 1998, has a detention pond adjacent to the property, but did not include this property in the calculations even though much of the property drains towards the South Hampton Estates. Storm water from the South Hampton Estates is conveyed via a 30-inch storm drain in Pease Road; through Pavilion II with discharge into a drainage way on 19400 Pease Road.

Developed conditions:

19-new lots are proposed connecting Windmill drive and extending Hampton Drive with frontage on Pease Road. A separate detention facility is proposed in a track adjacent to Pease Road. This facility would use the current access for the South Hampton Estates detention facility and connect into the 30-inch outfall line.

Drain Basin Description:

Existing

The easterly side of Pease Road has a natural low point at the common line between Boulder Run and the older South Hampton Estates. A 30-inch storm line carries the storm water down Pease Road to the southwest with discharge into a drainage course at 19400 Pease Road. This outfall has been upgraded with the development of Pavilion Park II and a portion of the storm water from the undeveloped Pavilion Park II has been redirected away from this outfall. An improved rip-rap outfall on Pavilion Park II has reduced the velocity and previous erosion problems.

Developed

In the developed condition there will no change in the discharge size or location. The overall drainage pattern will be the same. This new facility will meter the storm water at the pre-design rates.

Summary of storm water flow

	2-YEAR	5-YEAR	10-YEAR	25-YEAR
PRE-DEVELOP	0.66CFS	0.95CFS	1.13CFS	1.50CFS
POST-DEVELOP	1.37 CFS	1.76 CFS	2.00 CFS	2.49 CFS

DESIGN STORM	REQUIRED RELEASE	DESIGN RELEASE
25 YEAR-24 HR	1.13 CFS	1.13CFS
10 YEAR -24 HR	N/A	N/A
5 YEAR - 24 HR	0.95 CFS	0.49CFS
2 YEAR -24 HR	0.33 CFS	0.31 CFS

REGULATORY DESIGN CRITERIA

The storm water quantity management requirements of Oregon City are:

- City Code 13.12 Storm water management and the 1988 Drainage Mater Plan
- City of Oregon City, Public Works, Storm Water & Grading Design Standards.

References

1. King County Department of Public Works, Surface Water Management Division, Hydrographic Programs, Version 4.21B
2. South Hampton Estates Drainage Report (7/28/98) Sisul Engineering

Water Quality Facility

The required treatment rate is 1/3 of the 2-year design storm. For this project the calculations the 2-year storm is 1.37CF and the water quality quantity is 0.46CFS. The following options will

be considered in the final design: a swale inside the detention pond, infiltration at the bottom of the facility or a Stormceptor by CRS with the capacity to treat 100% of the flows.

Design Parameters

The design storm is a 24 hour standard SCS Type 1A

- 2-year.....2.6 inches
- 5-year.....3.1 inches
- 25-year.....4.0 inches
- 100-year.....4.5 inches

SOIL TYPES

8B Bornstedt silt - Type C soil

46B Jory Stony silt - Type C soil

Time of Concentration

$T = 0.42(n\ L)^{.8}/(P_2)^{0.5}(S_0)^{0.4}$ & $T = L/60k(s_0)^{0.5}$

Pre-Development: $(.42)[(0.25(300)]^{0.8}/(2.6)^{0.5}(0.025)^{4} = 36.0$ min & $370/(60)(13)(0.033)^{.5} =$ 2.6min : total 38.6 minutes

Post-Development $(.42)[(0.15(300)]^{0.8}/(2.6)^{0.5}(0.025)^{4} = 23.9$ min $90/(60)(27)(0.020)^{.5} = 0.4$ min + $200/(60)(42)(0.02)^{.5} = 0.6$ min: Total 24.9 minutes

HYDROGRAPH RESULTS

KING COUNTY DEPARTMENT OF PUBLIC WORKS

Surface Water Management Division

HYDROGRAPH PROGRAMS

Version 4.21B

1 - INFO ON THIS PROGRAM

2 - SBUHYD

3 - MODIFIELD SBUHYD

4 - ROUTE

5 - ROUTE2

6 - ADDHYD

7 - BASEFLOW

8 - PLOTHYD

9 - DTATA

10 - REFAC

11 - RETURN TO DOS

ENTER OPTION:

2

SBUN/SCS METHOD FOR COMPUTING RUNOFF HYDROGRAPH

STORM OPTIONS:

1 - S.C.S. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

2,24,2.6

Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

XXXXXXXXXXXX 2-YEAR 24-HOUR STORM xxxx 2.60 "TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx/

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

4.14,83,0.O7,98,38.6

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	4.1	83	.1	98	38.6

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
.66	8.00	17485

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:BR2pre

SPECIFY: C - CONTINUE, N - NEWSTORM, P -PRINT, S - STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.69,86,1.52,98,24.9

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	2.7	86	1.5	98	24.9

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
1.37	7.83	25866

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:BR2post

SPECIFY: C - CONTINUE, N - NEWSTORM, P - PRINT, S - STOP

STORM OPTIONS:

1 - S.C.S. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

5,24,3.1

Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

XXXXXXXXXXXX 5-YEAR 24-HOUR STORM xxxx 3.1O" TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

4.14,83,0.07,98,38.6

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	4.1	83	.1	98	38.6

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
0.95	8.00	23522

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:BR5pre

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.69,86,1.52,98,24.9

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	2.7	86	1.5	98	24.9

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
1.76	7.83	32706

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:br5post

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

N

STORM OPTIONS:

1 - s.c.s. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

10,24,3.4

Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

XXXXXXXXXXXX 10-YEAR 24-HOUR STORM xxxx 3.40" TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

4.14,83,0.07,98,38.6

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	4.1	83	.1	98	38.6

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
1.13	8.00	27294

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:br10pre

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.69,86,1.52,98,24.9

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	2.7	86	1.5	98	24.9

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)

2.00	7.83	36889

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:br10post

SPECIFY: C-CONTINUE, N-NEWSTORM,P-PRINT,S-STOP

N

STORM OPTIONS:

1 - S.C.S.. TYPE-1A

2 - 7-DAY DESIGN STORM

3 - STORM DATA FILE

SPECIFY STORM OPTION:

1

S.C.S. TYPE - 1A RAINFALL DISTRIBUTION

ENTER; FREQ(YEAR), DURATION(HOUR), PRECIP(INCHES)

25,24,4

Xxxxxxxxxxxxxxxxxxxxxx S.C.S.TYPE-1A DISTRIBUTION xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

XXXXXXXXXXXX 25-YEAR 24-HOUR STORM xxxx 4.00" TOTAL PRECIP Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

---

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

4.14,83,0.07,98,38.6

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	4.1	83	.1	98	38.6

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
1.51	7.83	35025

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:br25pre

C

ENTER: A(PERV),CN(PERV),A(IMPERV),CN(IMPERV),TC FOR BASIN NO. 1

2.69,86,1.52,98,24.9

DATA PRINT OUT:

AREA(ACRES)	PERVIOUS		IMPERVIOUS		TC(MINUTES)
	A	CN	A	CN	
4.2	2.7	86	1.5	98	24.9

PEAK-Q(CFS)	T-PEAK(HRS)	VOL(CU-FT)
2.49	7.83	45395

ENTER [d:][path]filename[.ext] FOR STORAGE OF COMPUTED HYDROGRAPH:

C:br25post

DETENTION SIZING

ENTER OPTION

10

R/D FACILITY DESIGN ROUTINE

SPEFICY TYPE OF R/D FACILTY

1 - POND 4 - INFILTRATION POND

2 - TANK 5 - INFILTRATION TANK

3 -VAULT 6 - GRAVEL TRENCH/BED

4

ENTER: POND SIDE SLOPE (HORIZ. COMPOENT)

3

ENTER: EFFECTIVE STORAGE DEPTH(ft) BEFORE OVERFLOW

5

ENTER: VERT-PERN(min/in), PERM-SURFACE (0 = SIDES ONLY, 1 = SIDES AND BOTTOM)

52.448,1

ENTER [d:][path]filename[.ext] OF PRIMARY DESIGN INFLOW HYDROGRAPH:

C:br25post

PRELIMINARY DESIGN INFLOW PEAK = 2.49

ENGER PRIMARY DESIGN RELEASE RATE(cfs)

1.13

ENTER NUMBER OF INFLOW HYDROGRAPHS TO BE TESTED FOR PERFORMANCE (5 MAXIMUM)

2

ENTER [d:][path]filename[ext] OF HYDROGRAPH 1:

C:br5post

ENTER TARGET RELEASE RATE(cfs)

0.95

ENTER [d:][path]filename[ext] OF HYDROGRAPH 2:

C:br2post

ENTER TARGET RELEASE RATE(cfs)

.33

ENTER: NUMBER OF ORIFICES, RISER-HEAD(ft), RISER-DIAMETER(in)

2,4,12

RISER OVERFLOW DEPTH FOR PRIMARY PEAK INFLOW= 0.42FT

SPECIFY ITERATION DISPLAY: Y -YES, N - NO

N

SPECIFY: R - REVIEW/REVISE INPUT, C - CONTINUE

C

INITIAL STORAGE VALUE FOR ITERATION PURPOSES: 22596 CU-FT

BOTTOM ORIFICE: ENTER Q-MAX(cfs)

0.38

DIA.=2.65 INCHES

TOP ORIFICE: ENTER HEIGHT (ft)

3.5

DIA.= 6.25 INCHES

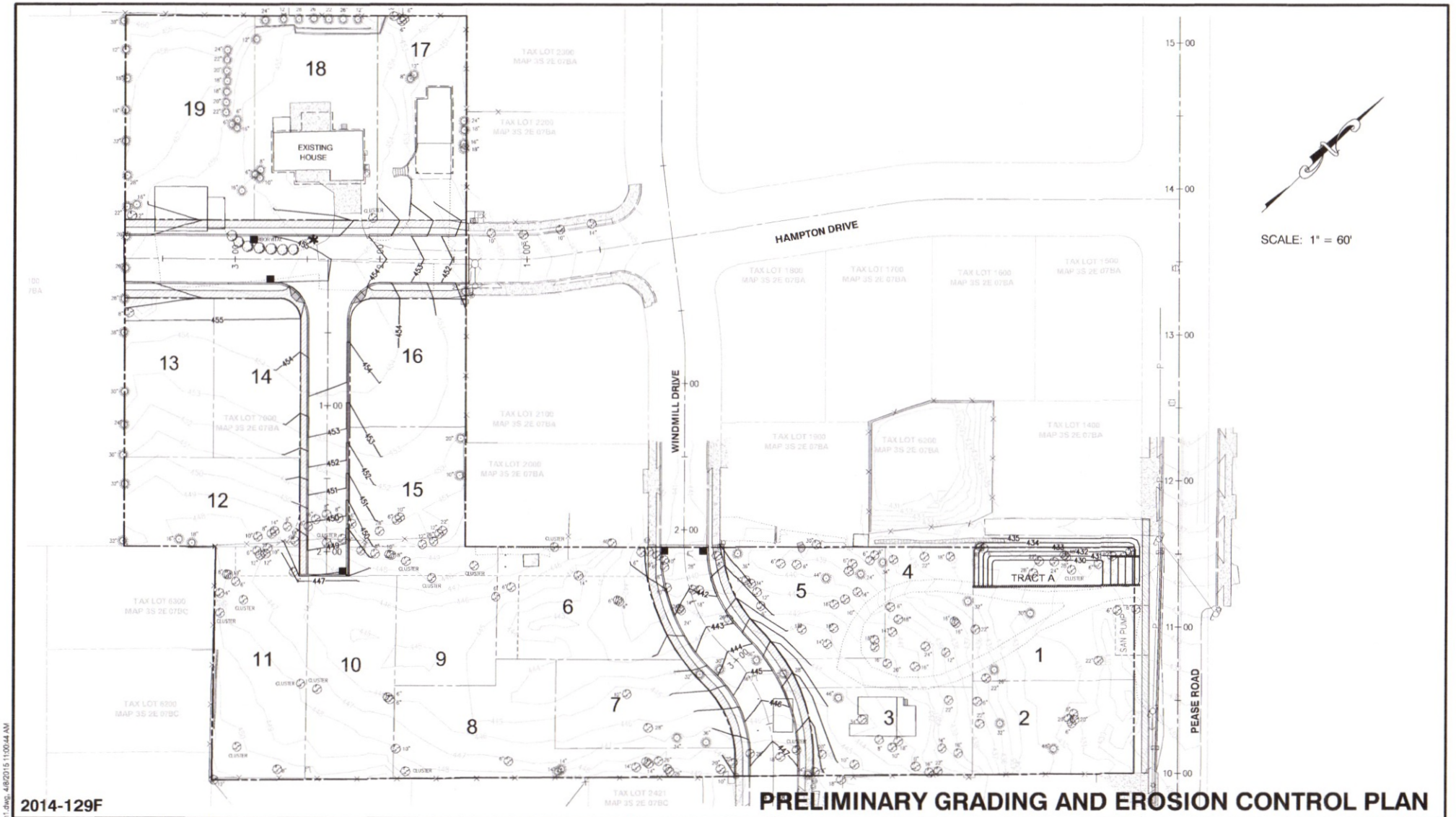
PERFORMANCE:	INFLOW	TARGET-OUTFLOW	ACTUAL-OUTFLOW	PK-STAGE	STORAGE
DESIGN HYD:	2.49	1.13	1.13	4.00	9326
TEST HYD 1:	1.76	.95	.49	3.54	7740
TEST HYD 2:	1.37	.33	.31	2.88	5730

SPECIFY: D - DOCUMENT, R -REVISE, A - ADJUST ORIF, E -ENLARGE, S -STOP

PRELIMINARY DESIGN:

A proposed detention and water quality pond is proposed on the property at the northwesterly corner of the property. This the low point of the tract and with direct access to the existing access way for the South Hampton Estates facility and the 30-inch outfall. The calculations indicate that a total of 9326 cubic feet of volume is required. Because of the elevation of the existing storm connection and topography of the detention area a retaining wall is proposed on one side of the facility. Infiltration and water quality requirements will be met by the type A pond configuration.

Appendix



PRELIMINARY GRADING AND EROSION CONTROL PLAN

2014-129F

DESIGNED:	BDG
DRAWN:	BJS
SCALE:	1" = 50'
DATE:	March, 2015
FILE:	Dosen Prelim1

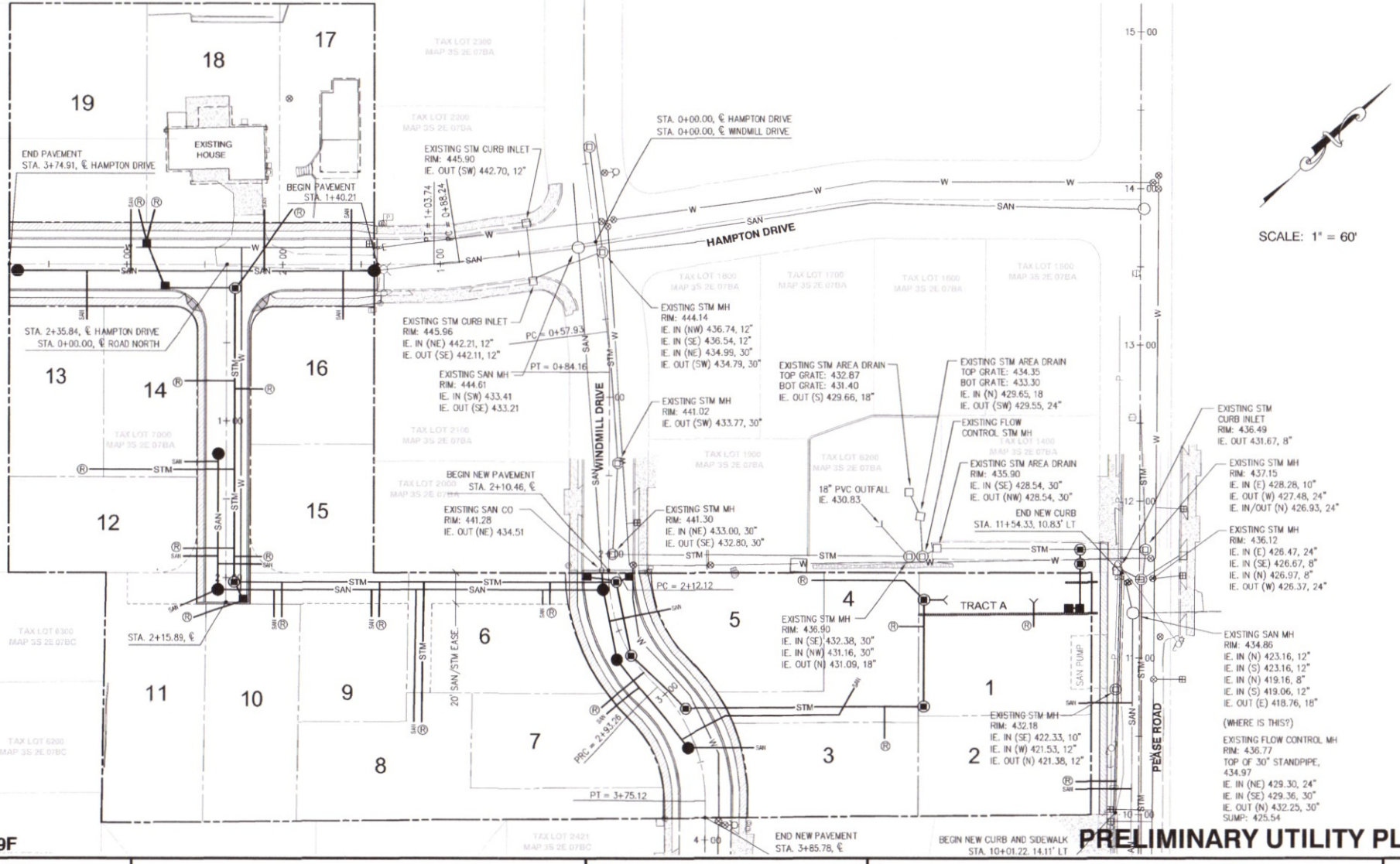
Theta, llc
ENGINEERING - SURVEYING - PLANNING
PO Box 1345
Lake Oswego, Oregon 97035
503/481-8822
email: thetaeng@comcast.net

APPLICANT:
Icon Construction & Development LLC
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
PH: (503) 657-0406

BOULDER RUN
Preliminary Plan

1/2

C:\Acad\Dosen\Dosen Prelim1.dwg, 4/8/2015 11:00:44 AM



2014-129F

PRELIMINARY UTILITY PLAN

DESIGNED:	BDG
DRAWN:	BJS
SCALE:	1" = 50'
DATE:	March, 2015
FILE:	Dosen Prelim1

Theta, llc
ENGINEERING - SURVEYING - PLANNING
PO Box 1345
Lake Oswego, Oregon 97035
503/481-8822
email: thetaeng@comcast.net

APPLICANT:
Icon Construction & Development LLC
1980 Willamette Falls Drive, Suite 200
West Linn, OR 97068
PH: (503) 657-0406

BOULDER RUN
Preliminary Plan

2/2

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4.1.2.1 RAINFALL DISTRIBUTION

The rainfall distribution to be used within the City is the design storm of 24-hour duration based on the standard SCS Type 1A rainfall distribution (See Figure 4-2).

Table 4-1 below links the total depth per year of reoccurrence.

Table 4-1: TOTAL DEPTH

Reoccurrence Year	Total Depth
2	2.6
5	3.1
10	3.4
25	4.0
50	4.4
100	4.5

Table 4-3 MODIFIED CURVE NUMBERS

SCS Western Washington Runoff Curve Numbers

Runoff curve numbers for selected agricultural, suburban, and urban land use for Type 1A rainfall distribution, 24-hour storm duration. (Published by SCS in 1982)

LAND USE DESCRIPTION		CURVE NUMBERS BY HYDROLOGIC SOIL GROUP			
		A	B	C	D
Cultivated land[1]	Winter Condition	86	91	94	95
Mountain Open Areas:	Low growing brush and grassland.	74	82	89	92
Meadow or pasture:		65	78	85	89
Wood or forest land:	Undisturbed	42	64	76	81
	Established second growth[2]	48	68	78	83
	Young second growth or brush	55	72	81	86
Orchard:	With over crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping					
Good Condition:	Grass cover on > =75% of area	68	80	86	90
Fair Condition:	Grass cover on 50-75% of area	77	85	90	92
Gravel Roads and Parking Lots:		76	85	89	91
Dirt Roads and Parking Lots:		72	82	87	89
Impervious surfaces, pavement, roofs, etc.		98	98	98	98
Open water bodies:	Lakes, wetlands, ponds, etc.	100	100	100	100
Single Family Residential [3]:					
Dwelling unit/gross acre	% Impervious[4]				
1.0 DU/GA	15				
1.5 DU/GA	20				
2.0 DU/GA	25				
2.5 DU/GA	30				
3.0 DU/GA	34	Select a separate curve number for pervious and impervious portions of the site or basin.			
3.5 DU/GA	38				
4.0 DU/GA	42				
4.5 DU/GA	46				
5.0 DU/GA	48				
5.5 DU/GA	50				
6.0 DU/GA	52				
6.5 DU/GA	54				
7.0 DU/GA	56				
Planned Unit Developments, condominiums, apartments, commercial businesses & industrial areas[3]	% impervious[4] Must be computed	Select a separate curve number for pervious and impervious portions of the site or basin.			

[1] For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Sec. 4, Hydrology, Chapter 9, August 1972.

[2] Modified by KCFW, 1995.

[3] Assumes roof and driveway runoff is directed into street/storm system.

[4] The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

Table 4-4 MANNING'S COEFFICIENTS/"K" FACTORS		
"n" AND "k" Value Used in Time Calculations for Hydrographs "n_s" Sheet Flow Equation Manning's Values (for initial 300 ft. of travel)		n_s
Smooth surfaces (concrete, asphalt, gravel, or bare hand packed soil)		0.01
Fallow fields or loose soil surface (no residue)		0.05
Cultivated soil with residue cover (s # 0.20 ft/ft)		0.06
Cultivated soil with residue cover (s > 0.20 ft/ft)		0.17
Short prairie grass and lawns		0.15
Dense grasses		0.24
Bermuda grass		0.41
Range (natural)		0.13
Woods or forest with light underbrush		0.40
Woods or forest with dense underbrush		0.80
* Manning values for sheet flow only, from Overton and Meadows 1976 (See SCS's TR-55, 1986) "K" Values Used in Travel Time/Time of Concentration Calculations Shallow Concentrated Flow (After the initial 300 ft. of sheet flow, R = 0.1)		k_s
1.	Forest with heavy ground litter and meadows (n = 0.10)	3
2.	Brushy ground with some trees (n = 0.060)	5
3.	Fallow or minimum tillage cultivation (n=0.040)	8
4.	High grass (n=0.035)	9
5.	Short grass, pasture, and lawns (n=0.030)	11
6.	Nearly bare ground (n=0.025)	13
7.	Paved and gravel areas (n=0.012)	27
** Channel flow (intermittent) (At beginning of visible channels R=0.2)		k_c
1.	Forested swale with heavy ground litter (n=0.10)	5
2.	Forested drainage course/ravine with defined channel bed (n=0.050)	10
3.	Rock-lined waterway (n=0.035)	15
4.	Grassed waterway (n=0.030)	17
5.	Earth-lined waterway (n=0.025)	20
6.	CMP pipe (n=0.024)	21
7.	Concrete pipe (0.012)	42
8.	Other waterways and pipe 0.508/n	
Channel flow (Continuous stream, R=0.4)		k_c
9.	Meandering stream with some pools (n=0.040)	20
10.	Rock-lined stream (n=0.035)	23
11.	Grass-lined stream (n=0.030)	27
12.	Other streams, man-made channels and pipe 0.807/n **	
** See Table 6-3 for additional Mannings "n" values for open channels.		

4.1.2.3 TIME OF CONCENTRATION

The time of concentration (T_c) is the length of time for runoff to travel from the hydraulically most distant point of a watershed to the point of discharge from the watershed. For computation purposes, it is assumed that water moves through the watershed as sheetflow, having a maximum depth of less than one tenth foot (0.1'), as shallow concentrated flow, having a maximum depth exceeding one tenth-foot (0.1'), and as open channel flow. Minimum T_c shall be five minutes.

It is assumed that runoff in a watershed begins as sheetflow. It is also assumed that regardless of site conditions, the maximum distance that runoff will travel in the form of sheetflow will not exceed 300 feet. Where there are no topographic features suggesting channel flow within the first 300 feet of flow, it may be assumed that the first 300 feet of flow is sheetflow and the remaining flow distance until water reaches a channel is shallow concentrated flow.

For further discussion of methods of computing time of concentration, the designer is referred to the Washington State Department of Ecology's Stormwater Management Manual for the Puget Sound Basin.

For computing the travel time of sheetflow, the following formula should be used:

$$T = \frac{0.42\,(n_s L)^{0.8}}{(P_2)^{0.5}(S_o)^{0.4}}$$

where T = travel time, in minutes
n_s = Manning's roughness coefficient.-sheetflow (Table 5-3)
L = flow length, in feet
P_2 = two-year, 24-hour rainfall, in inches
s_o = slope of land, in feet per foot

Travel time for shallow concentrated flow and open channel flow is computed using the following formula:

$$T = \frac{L}{60\,k\sqrt{s_o}}$$

where T = travel time, in minutes
L = flow length, in feet
60 = conversion factor from seconds to minutes
k = velocity factor, in feet per second (Table 5-3)
s_o = slope of flow path, in feet per foot
V = $60\,k\sqrt{s_o}$, average velocity, in feet per second

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Clackamas County Area, Oregon (OR610)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8B	Bornstedt silt loam, 0 to 8 percent slopes	C	2.9	28.0%
46C	Jory stony silt loam, 8 to 15 percent slopes	C	7.4	72.0%
Totals for Area of Interest			**10.2**	**100.0%**

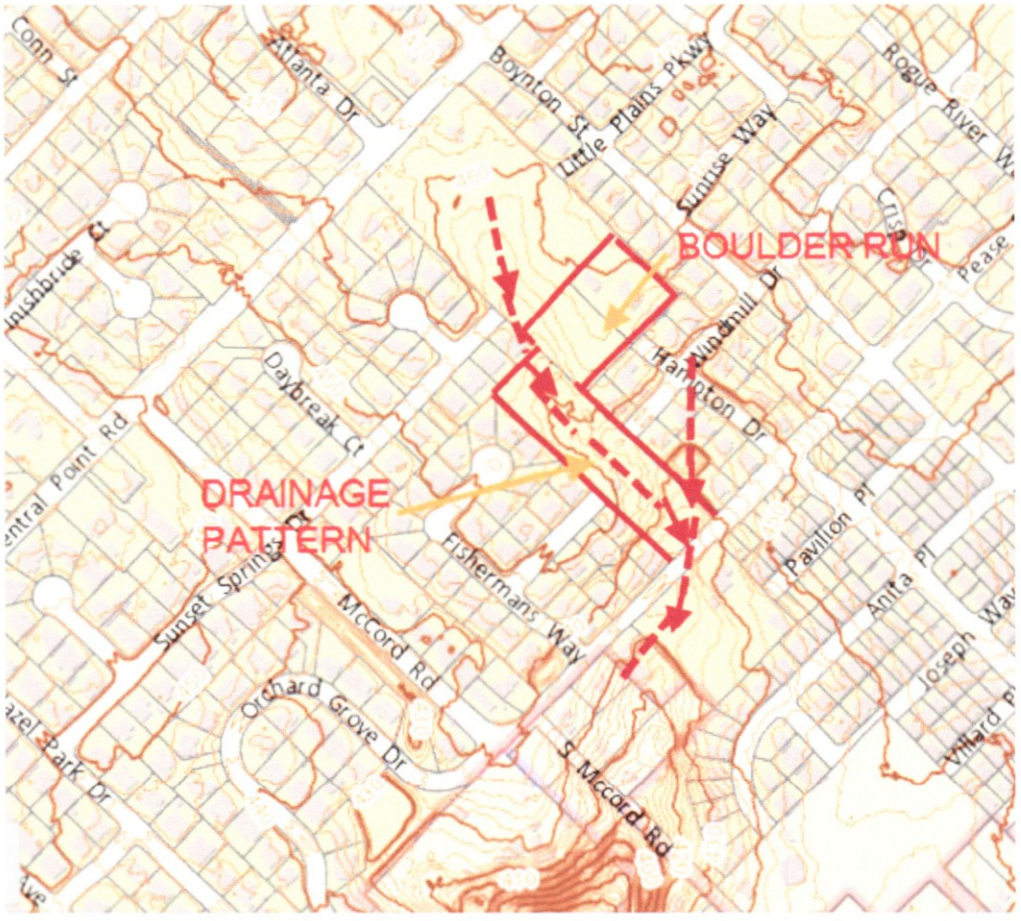
Boulder Run

Addendum to preliminary storm report

May 2015

Drainage Basin:

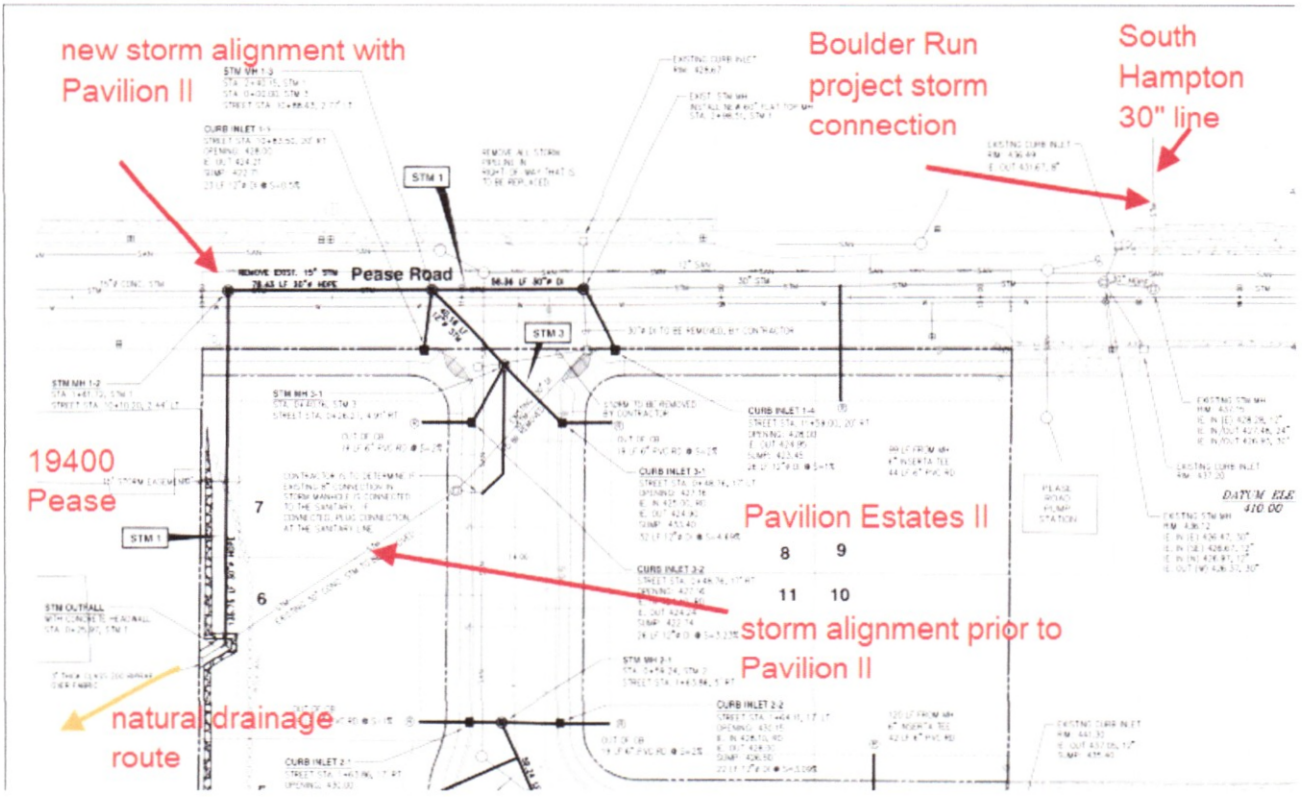
The proposed Boulder Run and the existing South Hampton Estates both naturally drain towards Pease Road. A 30-inch storm system beginning at the South Hampton Estates detention facility continues westerly along Pease Road. This line was redirected with the Pavilion Estates II project and discharges at the same natural drainage swale at 19400 Pease Rd. An improved rip-rap impact area has been provided at this discharge point to slow the storm water down before entering the natural channel.



As shown in the above sketch the proposed Boulder Run historically discharged at the same location that is proposed.

The pre-developed storm water flow for Pavilion II was all directed towards the natural channel at 19400 Pease Rd. Prior to Pavilion II development the storm water flow was calculated at 0.76 cfs, In the developed condition only 0.49cfs will flows towards the west with the balance of the flow redirected to the south east.

Both the existing South Hampton Estates and the proposed Boulder Run have and will have or will have detention facilities that meter the developed storm water out at pre-development rates.



Prepared By:

Bruce D. Goldson, PE

May 2015

REGISTERED PROFESSIONAL ENGINEER
7120
OREGON
July 16, 1971
BRUCE D. GOLDSON

EXPIRES: 06-30-15

DATE SIGNED: 5/12/15