

CIVIL SPECIFICATION PACKAGE  
ISSUE FOR BID

**EXC00-00022**  
October 11, 2000

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**ADDENDUM**

DEVELOPMENT SERVICES

**Prepared For:**

Oregon State University  
606 SW 15<sup>th</sup> Street, 100 Adams Hall  
Corvallis, OR 97331



Exp. 12/31/01

**TO BE  
MICROFILMED**

**Prepared By:**

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# STORM DRAINAGE CALCULATIONS

for  
**OSU Hazardous Waste Facility**  
**Corvallis, Oregon**

RECEIVED  
SEP 11 2000  
DEVELOPMENT SERVICES

Prepared for:  
**Oregon State University**  
**Corvallis, Oregon**

SJO Project Number: 2277.01

September 08, 2000



*Exp. 12/31/01*



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**EXC00-00022**

**OSU Hazardous Waste Facility  
Corvallis, Oregon**

**Storm Drainage Calculations**

May 09, 2000

**TOTAL SITE CHARACTERISTICS**

**Total Pervious Site Area**

Total Site Area = 150' x 230' = 34,500 sf = 0.81 Acres

**Site Impervious Paved Areas**

Roofs = 100' x 80' = 8,000 sf = 0.19 Acres

Parking = 75' x 40' = 3,000 sf = 0.07 Acres

**Total = 0.26 Acres**

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**Pre-Development Condition Total Area Summary**

Basin Area = 0.81 Acres

Impervious Area = 0.0 Acres

Pervious Area = 0.81 Acres (*CN = 84, cultivated land, winter condition*)

Overland Flow Distance = 280 lf (*From furthest point on site to Ditch*)

General Overland Slope = 1%

Overland Flow Velocity = 1 fps

Tc = 5 min + 280/(1x60) = 9.67 minutes

**Post-Development Condition Total Area Summary**

Basin Area = 0.81 Acres

Impervious Area = 0.26 Acres (*CN = 98, pavements and roofs*)

Pervious Area = 0.55 Acres (*CN = 80, grassed lawns and playing fields*)

Overland Flow Distance = 240 lf (*From furthest point on site to Detention*)

General Overland Slope = 1%

Overland Flow Velocity = 1 fps

Tc = 5 min + 240/(1x60) = 9.0 minutes

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**STORM WATER HYDRAULIC ANALYSIS**

Using the TR-55 graphical peak discharge method, the Design Storm Distribution Chart corresponds to a standard SCS Type 1A rainfall distribution. Based on the attached table, peak flows for the design storms in the pre-development and post development condition for both the total site and "developed" area of the site are tabulated as follows.

**EXC 00-00022**

**Total Site Peak Flows**

Design Storm	24 Hour Rainfall*	Pre-Development Peak Flow	Post-Development Peak Flow
10-Year	3.45"	8.0 cfs	10.0 cfs

\* Per Chapter 3, Page 3 of *USA Design and Construction Standards for Sanitary Sewer and Surface Water Management, July 1996*

**STORM WATER QUANTITY DETENTION ANALYSIS**

**Detention Based on Total Site Flows**

**10-Year Storm**

*(Restrict 0.7 cfs peak flow of the post-development Table to 0.6 cfs predevelopment peak flow.)*

$$\begin{aligned} \text{Detention Volume} &= [(0.7+0.7)-2(0.6)] \times 600 \\ &= 120 \text{ cf} \end{aligned}$$

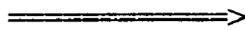
**Proposed Detention Pipe:**

Using an 18" diameter Pipe as a detention/darinage aparatus we'll calculate the volume carrying capacity of this pipe:

$$\text{Length} = 90 \text{ lf}$$

$$R = 0.75 \text{ ft.}$$

$$\text{Volume} = (3.1416)(0.75)(0.75)(90) = 159 > 120 \text{ cf} \dots \text{OK}$$



**USE `8" PVC AS A DETENTION PIPE**

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5/10/02

**STORMWATER CALCULATION MATRIX - SANTA BARBARA HYDROGRAPGH METHOD**

Date: **May-00**

Given: **Project = OSU Hazardous Waste Facility**

**Area = 24.48 acres**

**Pt = 5 inches 10 Year / 24 Hour Storm**

**dt = 10 min.**

**Tc = 9.67 min. (Pre-Developed Site Conditions)**

**PERVIOUS Parcel**

**IMPERVIOUS Parcel**

**Area = 0.81 acres**

**Area = 0 acres**

**CN = 80**

**CN = 98**

**S = 2.50**

**S = 0.20**

**0.2S = 0.50**

**0.2S = 0.04**

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Compute Developed Conditions Runoff hydrograph

Column (3) = SCS Type IA Rainfall Distribution

Column (4) = Col. (3) x Pt = 10 year - 24 Hour Hyetograph at this location.

Column (5) = Accumulated Sum of Col. (4)

Column (6) = [If P <= 0.2S] = 0; Note, use PERVIOUS Area "S" value.

[If P > 0.2S] = (Col.(5) - 0.2S)^2 / (Col.(5) + 0.8S); Using the PERVIOUS Area "S" value.

Column (7) = Col.(6) of Present Time Step - Col.(6) of Previous Time Step

Column (8) = Same method as for Col.(6), except use the IMPERVIOUS Area "S" value.

Column (9) = Col.(8) of the present time step - Col.(8) of the previous time step.

Column (10) = ((PERVIOUS area / Total area) x Col.(7)) + ((IMPERVIOUS area / Total area) x Col.(9))

Column (11) = (60.5 x Col.(10) x Total Area) / 10 (dt = 10 minutes)

Routing Constant, w = dt / (2Tc + dt) = 0.3408

Column (12) = Col.(12) of Previous Time Step + (w x [Col.(11) of Previous Time Step

+ Col.(11) of Present Time Step - (2 x Col.(12) of Previous Time Step))

(1) Time Increment	(2) Time min.	(3) Rainfall distrib- ution % of Pt	(4) Incre- mental Rainfall in.	(5) Accumu- lated Rainfall in.	Pervious Area		Impervious Area		(10) Total Runoff in.	(11) Instant hydro- graph cfs	(12) design hydro- graph cfs
					(6) Accumu- lated Runoff in.	(7) Incre- mental Runoff in.	(8) Accumu- lated Runoff in.	(9) Incre- mental Runoff in.			
1	10	0.0040	0.0200	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
2	20	0.0040	0.0200	0.0400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0	0.0
3	30	0.0040	0.0200	0.0600	0.0000	0.0000	0.0016	0.0016	0.0000	0.0	0.0
4	40	0.0040	0.0200	0.0800	0.0000	0.0000	0.0063	0.0047	0.0000	0.0	0.0
5	50	0.0040	0.0200	0.1000	0.0000	0.0000	0.0133	0.0070	0.0000	0.0	0.0
6	60	0.0040	0.0200	0.1200	0.0000	0.0000	0.0221	0.0088	0.0000	0.0	0.0
7	70	0.0040	0.0200	0.1400	0.0000	0.0000	0.0324	0.0103	0.0000	0.0	0.0
8	80	0.0040	0.0200	0.1600	0.0000	0.0000	0.0439	0.0115	0.0000	0.0	0.0
9	90	0.0040	0.0200	0.1800	0.0000	0.0000	0.0564	0.0125	0.0000	0.0	0.0
10	100	0.0040	0.0200	0.2000	0.0000	0.0000	0.0698	0.0133	0.0000	0.0	0.0
11	110	0.0050	0.0250	0.2250	0.0000	0.0000	0.0874	0.0176	0.0000	0.0	0.0
12	120	0.0050	0.0250	0.2500	0.0000	0.0000	0.1059	0.0185	0.0000	0.0	0.0
13	130	0.0050	0.0250	0.2750	0.0000	0.0000	0.1251	0.0193	0.0000	0.0	0.0
14	140	0.0050	0.0250	0.3000	0.0000	0.0000	0.1450	0.0199	0.0000	0.0	0.0
15	150	0.0050	0.0250	0.3250	0.0000	0.0000	0.1654	0.0204	0.0000	0.0	0.0
16	160	0.0050	0.0250	0.3500	0.0000	0.0000	0.1862	0.0208	0.0000	0.0	0.0
17	170	0.0060	0.0300	0.3800	0.0000	0.0000	0.2118	0.0255	0.0000	0.0	0.0
18	180	0.0060	0.0300	0.4100	0.0000	0.0000	0.2378	0.0260	0.0000	0.0	0.0
19	190	0.0060	0.0300	0.4400	0.0000	0.0000	0.2641	0.0264	0.0000	0.0	0.0
20	200	0.0060	0.0300	0.4700	0.0000	0.0000	0.2909	0.0267	0.0000	0.0	0.0
21	210	0.0060	0.0300	0.5000	0.0000	0.0000	0.3179	0.0270	0.0000	0.0	0.0
22	220	0.0060	0.0300	0.5300	0.0004	0.0004	0.3452	0.0273	0.0000	0.0	0.0
23	230	0.0070	0.0350	0.5650	0.0016	0.0013	0.3773	0.0321	0.0000	0.0	0.0
24	240	0.0070	0.0350	0.6000	0.0038	0.0022	0.4097	0.0324	0.0001	0.0	0.0
25	250	0.0070	0.0350	0.6350	0.0069	0.0031	0.4423	0.0326	0.0001	0.0	0.0
26	260	0.0070	0.0350	0.6700	0.0108	0.0039	0.4751	0.0328	0.0001	0.0	0.0
27	270	0.0070	0.0350	0.7050	0.0155	0.0047	0.5081	0.0330	0.0002	0.0	0.0

*SV 00 00 00*

**MEMORANDUM**

Project No.: 2277.03

Project Name: **OSU Hazardous Waste Facility (Permit Number: EXC00-00022)**

To: F. Gale Farley, City of Corvallis

From: Mark Wharry, SJO Consulting Engineers

Copies To: Seward Meintsma, OSU Facilities

Subject: Response to Comment Letter from City of Corvallis

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Gale -

Per our telephone discussion, the following are the responses to your comments. The original City of Covallis review letter has been attached for reference.

Comment 1: Provide on plans location of construction entrance. May need to install a rockered construction entrance as detailed in City erosion control standards.

**Response: The access to the site will be through the graveled parking lot to the east of the site which will act as a rockered construction entrance. A note has been added to the drawings which specifies this. Also, erosion inlet protection has been added to the existing drain in the parking lot to the east of the Radiation Lab.**

Comment 2: Provide quantities of cut and fills in CY's.

**Response: Quantities of cut and fill have been added to the drawing C-2. The quantities are tabulated as follows:**

<b>Cut:</b>	<b>Site Stripping</b>	<b>375 cy</b>
	<b>Excavate Footing &amp; Pits</b>	<b><u>500 cy</u></b>
		<b>875 cy</b>
<b>Fill:</b>	<b>Imported Structural Fill</b>	<b>450 cy</b>
	<b>8" Layer Crushed Rock Under Floor</b>	<b>150 cy</b>
	<b>General Site Fill</b>	<b>150 cy</b>
	<b>Backfill Footing &amp; Pits</b>	<b>350 cy</b>
	<b>Place Site Topsoil</b>	<b><u>200 cy</u></b>
		<b>1300 cy</b>

**EXC00-00022 ADDENDUM**

OCT 16 2000