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cetec ENGINEERING SERVICES, INC.
Phone (605) 341-7800
Fax (605) 341-7864
www.cetecengineering.com

Design Memorandum

RECEIVED
FEB 09 2007
Rapid City Growth Management Department

To: Mr. Bob Dominicak, P.E.
City of Rapid City
Growth Management
300 6th Street
Rapid City, SD 57701-2726

From: Rich Marsh
CETEC Engineering Services, Inc.
P.O. Box 9014
Rapid City, SD 57709-9014

Date: February 7, 2007

Project: **AIRC Warehouse**

Purpose: This memorandum is an addendum to the drainage report titled *"Drainage Report for AIRC, February 2006"*. It summarizes a drainage review of proposed changes to the AIRC Warehouse project. It also lists the necessary improvements needed as a result of the proposed changes.

Background: A drainage report for the above referenced project was submitted in February 2006 as required by the City of Rapid City development process.

Presently, the owner is proposing to add a 2,432 square foot office addition onto the existing warehouse. The office addition is proposed at the same location as the original plan detention pond. Therefore, the detention pond will be moved and will need to be increased in size to account for the increase in impervious area created by the addition.

Findings: The modified rational equation as outlined in chapter 9 of the City of Rapid City Drainage Criteria Manual was used to determine the necessary increase in detention storage. The necessary increase in storage volume is approximately 132 cubic feet. (see attached calculations). The original pond design provided approximately 14,375 cubic feet of storage. The revised pond provides 15,255 cubic feet of storage with 1 foot of freeboard. 15,255 cubic feet is greater than the 14,507 cubic feet required and therefore is sufficient for the proposed changes. See proposed changes on revised plans.

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
6313
RICHARD A.
MARSH
SOUTH DAKOTA
2-7-07

CETEC ENGINEERING SERVICES, INC.
P.O. Box 9014
RAPID CITY, SOUTH DAKOTA 57709-9014
(605) 341-7800 FAX (605) 341-7864
www.cetecengineering.com

JOB 2716.01
SHEET NO. 1 OF
CALCULATED BY RM DATE 2-6-2007
CHECKED BY DATE
SCALE

Design Revision to AIPC.

- Added approx. 3300 ft² (Bldg + Impervious Area)

Determine necessary Increase in retention storage?

Use 100 YR 5min for Storage Volume

Existing $Q = CIA$ $C = 0.4$ - Undeveloped

$Tc = \leq 5$ min ∴ use 5 min.

$I_{100} = 9.48$ in/hr.

$A = 3300 ft^2 = 0.076$ Ac.

Existing Q_{100}: $(0.4)(9.48)(0.076) = \underline{0.29 \text{ CFS}} = Q_o$

Developed. 100 Year $C \Rightarrow 0.9$. Use modified Rational to determine increase in storage Volume.

Peak Flow at Time Int.

5 min $Q_p = (0.9)(9.48)(.076) = 0.65$ CFS.
10 min $Q_p = (0.9)(7.5)(.076) = 0.51$ CFS
15 min $Q_p = (0.9)(6.33)(.076) = 0.43$ CFS.
25 min $Q_p = (0.9)(5.39)(.076) = 0.37$ CFS.

Determine Critical Volume. $V_s = 60(D)(Q_p - Q_o)$ - Eqn 9.5 RCDM

(D = Time Duration (min))

$V_{s5} = 60(5)(0.65 - 0.29) = 108 \text{ Ft}^3$
$10 = 60(10)(0.51 - 0.29) = 132 \text{ Ft}^3$ ← Critical Volume.
$15 = 60(15)(0.43 - 0.29) = 126 \text{ Ft}^3$
$25 = 60(25)(0.37 - 0.29) = 96 \text{ Ft}^3$

Increase in Storage Volume must be $\underline{132 \text{ Ft}^3}$

STAGE-STORAGE FOR IRREGULAR GEOMETRY

Project: AIRC-Revision 2-6-2007

Basin ID: Small Detention

Design Information (Input):

From the pond site grading plan, enter water surface elevations and measured contour areas in ascending order.

Water Surface Elevation ft (input)	Eq-elev. Contour Area square feet (input)	Volume above Datum acre-ft (output)	Ft^3
3189.80	0	0.00	0
3189.90	195	0.00	0.00448
3191.00	4,220	0.06	0.09688
3192.00	5,047	0.16	0.11586
3193.00	6,291	0.29	0.14442
3193.30	6,645	0.34	0.15255
3194.00	9,661	0.47	0.22179
3194.30	10,483	0.54	0.24066