City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 6, 1995

James Topmiller, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE
Albuquerque, N.M. 87109

RE: ENGINEER'S CERTIFICATION FOR GROUP NINE INDUSTRIAL PARK (E-17/D16)
RECEIVED NOVEMBER 24, 1995 FOR FINANCIAL GUARANTY RELEASE
ENGINEER'S STAMP DATED 11/8/95

Dear Mr. Topmiller:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification of grading & drainage including the private storm drain for Financial Guaranty Release. Contact Billy Goolsby to obtain the Financial Guaranty Release for City Project Number 5115.90.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Billy Goolsby, CPN 5115.90

95036479

1870

ENDED

PRIVATE FACILITY DRAINAGE COVENANT

Amended

This Drainage Covenant, between [state the name of the present real property owner exactly as shown on the real estate document conveying title to the present owner and state the legal status of the owner, for example, "single person," "husband and wife," "corporation of the State of _____," "partnership":] Bank of New Mexico Trust Co., a Delaware corporation ("Owner"), whose address is 4200 Osuna N.E., Albuquerque, NM 87109, and the City of Albuquerque, a New Mexico municipal corporation ("City"), whose address is P. O. Box 1293, Albuquerque, New Mexico 87103, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Owner signs this Covenant. **

1. Recital. The Owner is the owner of the following described real property located at [give legal description, and street address:] Tract C-3-D-1, C-3-D-2 and B-1-A, Group Nine Industrial Park in Bernalillo County, New Mexico (the "Property").

Pursuant to City ordinances, regulations and other applicable laws, the Owner is required to construct and maintain certain drainage facilities on the Property, and the parties wish to enter into this Covenant to establish the obligations and responsibilities of the parties.

2. Description and Construction of Drainage Facility. The Owner shall construct the following "Drainage Facility" within the Property at the Owner's sole expense in accordance with the standards, plans and specifications approved by the City:

private 24"-48" RCP storm drain and sediment pond

The Drainage Facility is more particularly described in Exhibit A attached hereto and made a part hereof.

3. Maintenance of Drainage Facility. The Owner shall maintain the Drainage Facility at the Owner's sole cost in accordance with the approved Drainage Report and plans.

4. Benefit to Property. The Owner acknowledges and understands that the Drainage Facility required herein to be constructed on the Owner's property is for the private benefit

88F

APPROVED AS TO FORM
LEGAL DEPT. 8/19/88

** This Amended Private Facility Drainage Covenant supersedes in its entirety that certain Private Facility Drainage Covenant dated 1/26/95 and recorded February 28, 1995 in Volume 95-5, pages 4318-4321.

and protection of the Owner's property and that failure to maintain such facility could result in damage or loss to the Property.

5. Inspection of Drainage Facility. The City shall have no duty or obligation whatsoever to perform any inspection, maintenance or repair of the Drainage Facility, it being the duty of the Owner, its heirs, successors and assigns to construct and maintain the facility in accordance with approved plans and specifications.

6. Liability of City. The Owner understands and agrees that the City shall not be liable to the Owner, its heirs, successors or assigns, or to any third parties for any damages resulting from the Owner's failure to construct, maintain or repair the Drainage Facility.

7. Indemnification. The Owner owns and controls the Drainage Facility and shall not permit the Drainage Facility to constitute a hazard to the health or safety of the general public. The Owner agrees to indemnify, defend and hold harmless the City, its officials, agents and employees, from any claims, actions, suits or other proceedings arising from or out of the negligent acts or omissions of the Owner, its agents, representatives, contractors or subcontractors or arising from the failure of the Owner, its agents, representatives, contractors or subcontractors to perform any act or duty required of the Owner herein; provided, however, to the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Agreement, this Agreement to indemnify will not extend to liability, claims, damages, losses or expenses, including attorney's fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the respective indemnitee, or the agents or employees of the respective indemnitee; or (2) the giving of or the failure to give direction or instructions by the respective indemnitee, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property.

8. Assessment. Nothing in this Covenant shall be construed to relieve the Owner, its heirs, assigns and successors from an assessment against the Owner's Property for improvements to the Property under a duly authorized and approved Special Assessment District. The parties specifically agree that the value of the Drainage Facility will not reduce the amount assessed by the City.

9. Binding on Owner's Property. The covenants and obligations of the Owner set forth herein shall be binding on the Owner, its heirs, assigns and successors and on the Owner's Property and constitute covenants running with the Owner's

APPROVED AS TO FORM
LEGAL DEPT. 8/19/88

Property until released by the City. This Covenant can only be released by the City's Chief Administrative Officer with the concurrence of the City Engineer.

10. Entire Covenant. This Covenant contains the entire agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

11. Changes to Covenant. Changes to this Covenant are not binding unless made in writing, signed by both parties.

12. Effective Date of Covenant. This Covenant shall be effective ~~as of the date of signature of the Owner~~ January 25, 1995.

OWNER:

By: John L Rust
Its: PRESIDENT
Dated: 3/29/95

STATE OF New Mexico)
) ss
COUNTY OF Bernalillo)

~~The foregoing~~ This instrument was acknowledged before me ~~this~~ on 29th day of March, 1995, by [name of person signing:] JOHN L RUST, [title or capacity, for instance, "President" or "Owner":] PRESIDENT of [name of the entity which owns the Property if other than the individual signing, for instance, the name of the corporation, partnership, or joint venture:] JOHN L RUST CO.

Notary Public

My Commission Expires:
6/12/95

CITY OF ALBUQUERQUE:

Accepted:

By: John P. Curtin
Title: For The City Engineer
Dated: 4-5-95

[EXHIBIT A ATTACHED]

1995 APR 10 AM 10:10
STATE OF N MEXICO
BERNALILLO
FILED & RECORDED
95-9-1870
JUDY D. WOOD
COUNTY CLERK
1873

APPROVED AS TO FORM
LEGAL DEPT. 8/19/88

TRACT B-1-A

48" SD

S00°15'51"W
335.69'

TRACT LINE

45' PRIVATE STORM DRAIN
AND SANITARY SEWER EASEMENT

PRIVATE STORM
EASEMENT

STA. 11+53.98, ℄ (MH #5)
BUILD 1-6' DIA. TYPE
"E" MANHOLE AS PER
COA STD. DWG. 2101

42" SD

N89°44'09"W
109.45'

7' UTILITY
MENT

STA. 12+63.43, ℄ (MH #6)
BUILD 1-6' DIA. TYPE MODIFIED
"C" MH AS PER COA
STD. DWG. 2101 & 2200
Q_{100} = 15.2 cfs SEE DETAILS
THIS SHEET & SHEET 5 OF 7.

STA. 12+75.00, 12.83' RT. (M
BUILD 1-4' DIA. TYPE "E" MH
RIM EL. = 5135.3
INV. 24" 23.48

12.91 LF 24" SD
@ S = 3.5%

325 LF 24" SD
@ S = 3.44%

20' PRIVATE STORM
DRAIN EASEMENT (TO
BE VACATED IN TRACT
C-3-D-1)

EXISTING 25' PUBLIC
WATER AND SANITARY
SEWER EASEMENT

S89°44'24"E

20' PRIVATE STORM
DRAIN EASEMENT

10'

TRACT C-3-D-1

TRACT LINE

N

1"=50'

10+00

11+00

13+00

14+00

TRACT LINE

INV. 34.00 AT
PROPERTY LINE

B

INV. (IN) = 34.67
Q_{100} = 16.3 cfs

SEDIMENT POND

TRACT C-3-D-2

A

A

40

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 13, 1995

James Topmiller, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE
Albuquerque, N.M. 87109

RE: DRAINAGE MASTER PLAN FOR GROUP NINE INDUSTRIAL PARK (E-17/D16)
RECEIVED JANUARY 4, 1995 FOR FINAL PLAT APPROVAL
ENGINEER'S STAMP DATED 12-21-94

Dear Mr. Topmiller:

Based on the information included in the submittal referenced above, City Hydrology accepts the revised Drainage Plan. Contact the DRB to have the Final Plat signed.

Make sure that Jefferson Street is called out correctly on all the documents. If the temporary access easement is vacated, a permanent Water, Sanitary Sewer and Drainage Easement must be granted.

In the future, any submittal for any type of plat approval must include the DRB #,a copy of proposed the Infrastructure List, and a copy of the proposed Plat.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre, DRB 94-479

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 21, 1994

James Topmiller, P.E.
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, N.M. 87109

RE: DRAINAGE REPORT FOR GROUP NINE INDUSTRIAL PARK (E-17/D16)
RECEIVED NOVEMBER 28, 1994 FOR S DEV PLAN & FINAL PLAT APPROVAL
ENGINEER'S STAMP DATED 11-23-94

Dear Mr. Topmiller:

Based on the information included in the submittal referenced above, City Hydrology accepts the concept for this project and approves the Site Development Plan.

The following comments must be addressed prior to Final Plat approval:

Is the Temporary Public Turnaround Easement adequate to construct the permanent public storm drain in? Street names on the Infrastructure List must match the names on the Drainage Plan & Final Plat. Basin 2 must not drain to a retention pond.

The following comments must be addressed prior to Work Order approval:

If AMAFCA will not approve an surface overflow, then the storm drain system must be designed for 2xQ100. Manholes are required for maintenance at every junction and bend.

It would expedite review of the report if a summary table of areas, land treatments and flows were provided. A summary table for the storm drain system would also be helpful.

If you have any questions about this project, You may contact me at 768-2727.

Sincerely,

John P. Curtin

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre, Z-94-148
Kurt Browning, AMAFCA

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

April 17, 1991

James Topmiller, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: REVISED DRAINAGE PLAN FOR GROUP NINE INDUSTRIAL PARK, (E-17/D16), ENGINEER'S STAMP DATED MARCH 28, 1991

Dear Mr. Topmiller:

Based on the information provided on the referenced submittal received April 1, 1991, the revised drainage easements are approved.

If you should have any questions, please do not hesitate to call me at 768-2650.

Cordially,

Gilbert Aldaz, P.E. & P.S.
Civil Engineer/ Hydrology

GA
wp+2105

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

FILE COPY

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

March 21, 1991

James Topmiller, P.E.
Bohannan-Huston, Inc.
7500 Jefferson Street, NE
Albuquerque, New Mexico 87109

RE: DRAINAGE PLAN FOR GROUP NINE INDUSTRIAL PARK, (E-17/D16)
ENGINEER'S STAMP DATED MARCH 1, 1991

Dear Mr. Topmiller:

Based on the information provided on the referenced submittal received March 13, 1991, the plan is approved for Site Plan for Subdivision and Final Plat. The Final Plat approval is based on a Bulk Land Variance.

If you should have any questions, please do not hesitate to call me at 768-2650.

Cordially,

Gilbert Aldaz, P.E. & P.S.
Civil Engineer/ Hydrology

GA
wp+2105

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson. Jr., P.E.
Assistant Director Public Works

ENGINEERING GROUP

Telephone (505) 768-2500

PIPE CAPACITY CALCULATIONS (flowing full pipe)

60" PIPE

assume "n" = 0.013

Slope = 0.0057 — Q = (K value) X $S^{1/2}$ (see table attached)

Q = 196 cfs (capacity, gravity flow)

↖ (report uses 196 cfs, OK) plan

48" PIPE

assume "n" = 0.013

Slope #1 =

Q = 108 cfs (cap.)

Slope #2 = 0.003

Q = 78 cfs (cap.)

24" PIPE

"n" = 0.013

Slope = 0.01

Q = 23 cfs (cap.)

BOHANNAN-HUSTON INC.

PROJECT NAME GROUP NINE IND. PARK SHEET 1 OF 2

PROJECT NO. DRAIN. CALCS. BY JAMEST DATE 3.13.91

SUBJECT 89274.04 CH'D _____ DATE _____

$Q = (K) S^{1/2}$

III: Circular Concrete and Corrugated Metal Pipe

Pipe Size (inch)	A Area (Square Feet)	R Hydraulic Radius (Feet)	Values of $1.486/n \times A \times R^{2/3}$ FLOWING FULL					
			Concrete Pipe			Corrugated Metal Pipe		
			n = 0.011	n = 0.012	n = 0.013	2-2/3" x 1/2" n = 0.024	3" x 1" n = 0.027	6" x 2" n = 0.033
8	0.349	0.167	14.3	13.1	12.1	6.5		
10	0.545	0.208	25.8	23.6	21.8	11.8		
12	0.785	0.250	42.1	38.6	35.7	19.3		
15	1.227	0.312	76.5	70.1	64.7	35.0		
18	1.767	0.375	124.2	113.8	105.1	56.9		
21	2.405	0.437	187.1	171.5	158.3	85.7		
24	3.142	0.500	267.4	245.1	226.2	122.5		
27	3.976	0.562	365.8	335.3	309.6	167.7		
30	4.909	0.625	484.7	444.3	410.1	222.2		
33	5.940	0.688	623.6	573.7	529.6	286.9		
36	7.069	0.750	788	722	666	361	321	
42	9.621	0.875	1189	1090	1006	545	484	
48	12.566	1.000	1698	1556	1436	778	692	
54	15.904	1.125	2325	2131	1967	1065	947	
60	19.635	1.250	3077	2821	2604	1410	1254	1026
66	23.758	1.375	3967	3636	3357	1818	1616	1323
72	28.274	1.500	5004	4587	4234	2293	2039	1668
78	33.183	1.625	6195	5679	5242	2839	2524	2065
84	38.485	1.750	7549	6920	6388	3460	3075	2517
90	44.179	1.875	9078	8321	7681		3698	3026
96	50.266	2.000	10776	9878	9119		4390	3592
102	56.745	2.125	12671	11615	10722			4224
108	63.617	2.250	14756	13526	12486			4919
114	70.882	2.375	17044	15624	14422			5682
120	78.540	2.500	19544	17915	16537			6515
126	86.590	2.625	22255	20397	18829			7417
132	95.030	2.750	25200	23104	21327			8401
138	103.870	2.875	28372	26009	24011			9459
144	113.100	3.000	31780	29133	26894			10594
150	122.720	3.125						11810
156	132.730	3.250						13115
162	143.140	3.375						14504
168	153.940	3.500						16160
174	165.130	3.625						17551
180	176.710	3.750						19212

$Q = (\text{above values}) S^{1/2}$

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

January 15, 1980

Mr. Peter Welsh
4520 N. Central
Phoenix, Arizona 85012

Reference: Proposed Pertec Site - PALA #8028

Dear Mr. Welsh:

The drainage report for the referenced development has been reviewed, and is approved in concept.

My assistant, Fred Aguirre, will review the plans for final grade consideration, and construction plan approval.

Very truly yours,

Bruno Conegliano
Assistant City Engineer/Hydrology

BC/lc
xc: Richard Leonard, AMAFCA
Fred Aguirre, Civil Engineer

CITY OF
Albuquerque

Martin J. Chávez, Mayor

October 27, 1997

Scott McGee, P.E.
Isaacson & Arfman
128 Monroe, NE
Albuquerque, NM 87108

RE: GIRL SCOUTS OF AMERICA (E17-D16). GRADING AND DRAINAGE PLAN FOR BUILDING PERMIT. ENGINEER'S STAMP DATED 9-22-97.

Dear Mr. McGee:

Based on the updated information provided on your October 27, 1997 submittal, the above referenced project is approved for Building Permit.

Prior to Certificate of Occupancy approval, an Engineer's Certification will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

CITY OF
Albuquerque

October 2, 1997

Martin J. Chávez, Mayor

Scott McGee, P.E.
Isaacson & Arfman
128 Monroe, NE
Albuquerque, NM 87108

RE: GIRL SCOUTS OF AMERICA (E17-D16). GRADING AND DRAINAGE PLAN FOR BUILDING PERMIT. ENGINEER'S STAMP DATED 9-12-97.

Dear Mr. McGee:

Based on the information provided on your September 12, 1997 submittal, the above referenced project is approved for Building Permit.

Prior to Certificate of Occupancy approval, an Engineer's Certification will be required.

If I can be of further assistance, please feel free to contact me at 924-3984.

Sincerely,

Lisa Ann Manwill, P.E.
Hydrology

c: Andrew Garcia
File

DESIGN ANALYSIS REPORT
STORM DRAIN INFRASTRUCTURE
FOR
GROUP NINE INDUSTRIAL PARK

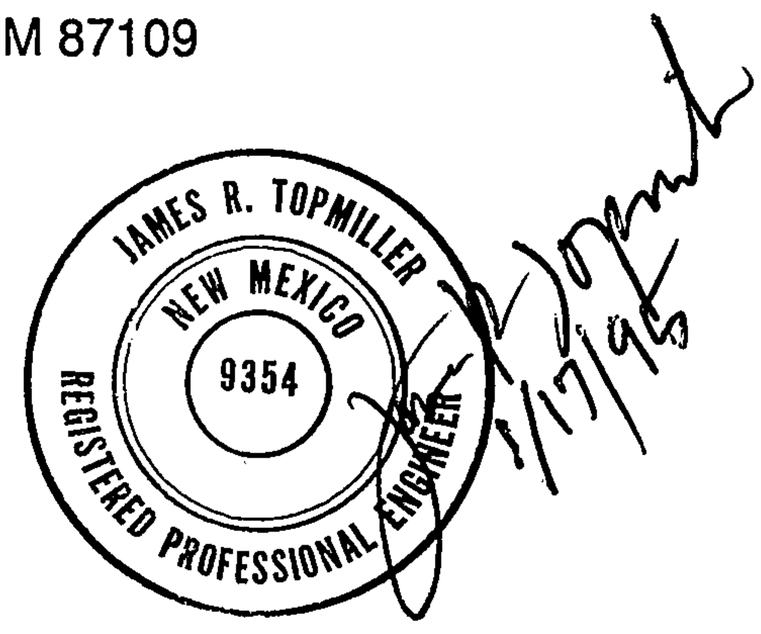
JANUARY 1995

PREPARED FOR:

JOHN L. RUST COMPANY
4000 OSUNA
P. O. BOX 25007
ALBUQUERQUE, NEW MEXICO 87125

PREPARED BY:

BOHANNAN-HUSTON INC.
COURTYARD 1, 7500 JEFFERSON NE
ALBUQUERQUE, NM 87109



James R. Topmiller P.E.

I:\CDP\9425742\DESIGN.RPT-1/17/95

Jefferson Plaza Storm Drain Inlet Analysis

Sta. 2+20.00, slope = 1.53 %

Q_{street} = 6.1 (street) + 3.3 (Tract C-3-E-1) = 9.4 cfs

depth = .34' < .67' okay ; v = 2.72 ft/sec

$v^2/2g + d = 2.72^2/2(32.2) + .34' = .45' < .87'$ EGL - okay

$Q_{grate} = 3.5 \times 2 = 7.0$ cfs

$Q_{street} = 9.4 - 7.0 = 2.4$ cfs passing the inlets

Build 1 pair of Type "A" single inlets, Sta. 2+20.00, 20' LT & RT
↳ this flow will drain into the 24" street line which will connect to the main 48" storm drain line.

Sta 1+00.00, slope = 1.53 %

Q_{street} = 2.4 cfs (Low point of cul de sac is at Sta 1+00.00, ℄)

Analyze Type "C" single inlet at low point as a 3-sided weir.

$Q = CLH^{3/2}$

$Q = 2.68\left(\frac{18.5'(2) + 37''}{12}\right)(.83')^{3/2} = 12.3$ cfs → meets capacity

Total capacity of storm drain system = 7.0 + 12.3 = 19.3 cfs

Q_{street} (100-year flow) = 9.4 cfs

19.3 cfs ≥ 9.4 × 2 = 18.8 cfs

As indicated above, 19.3 cfs meets the capacity requirement of twice the 100-year storm. This requirement must be met because the Jefferson Plaza cul-de-sac has no overland drainage outlet. The remaining street flow entering the Type "C" single inlet will be routed to the main 48" storm drain line.

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Industrial Park SHEET 1 OF 1

PROJECT NO. C9425742 BY DH DATE 12/20/94

SUBJECT Storm Drain Analysis CH'D _____ DATE _____

Dev. Flow = 47.7 cfs

What Conditions are necessary for a single "D" to accept this?

Sediment Pond (North)

Provide a sedimentation pond at the southwest corner of Tract C-3-A. This pond will accept flows from developed portions of Tracts C-4-A and C-4-B. and also from the undeveloped tracts of C-3-A, C-3-B, C-3-F, and C-3-G.

Q_{100} (Tracts C-4-A, C-4-B) = 26 cfs

Q_{100} (Tracts C-3-A, C-3-B, C-3-F, C-3-G) = (5.03 ac)(1.0)(1.56) = 7.8 cfs

Flow into pond = 33.8 cfs

$E_1 = [(6 \times .15 \times .78) + (6 \times .85 \times 2.12)]/6 = 1.92"$; $V_1 = \frac{1.92 \times 6}{12} = 0.96$ ac-ft

$E_2 = [(5.03 \times 1.0 \times .53)]/5.03 = 0.53"$; $V_2 = \frac{.53 \times 5.03}{12} = 0.22$ ac-ft

Volume = 0.96 + 022 = 1.18 ac-ft = 51,401 ft^3

Pond Size Based On Settling Velocity (V_s)

Assume: = Design particle medium sand, some silt (D = 0.3 mm)

V_s – 0.094 fps $Q_{10} = 33.8 \times .667 = 22.5$ cfs

100 % removal of design particle for 10 = year storms

Surface Area = SA = $(1.2)(Q_{10})/V_s$

SA = $(1.2)(22.5)/.094 = 288$ ft^2

Assume pond length = 3 × pond width = 3w

or $(3w)(w) = 288$ SF

w = 10', L = 30'

Pond Size Based On Sediment Storage

= From USLE spreadsheet (attached), the average annual sediment yield for the area is 7.415 CY or 201 ft^3

Assume: maximum sediment storage depth = 3'

minimum settling depth = 2'

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Ind. Park SHEET 1 OF 5

PROJECT NO. 94257.42 BY DH DATE 1/04/95

SUBJECT Sediment Ponds CH'D _____ DATE _____

Using SA = 288 SF from previous page where the volume is a function of the depth z.

Bottom Area = (10')(30') = 300 ft²

Top Area = (10 + 6z)(30 + 6z) = 300 + 240 z + 36 z²

$$\text{Volume} = \frac{(\text{Bottom Area} + \text{Top Area})}{2} z$$

$201 = 300z + 120z^2 + 18z^3$

$z = 0.54' < 3'$

Sediment storage depth = 0.54'

Pond Volumetrics

From site geometry : pond invert = 5127.50 pond depth = 3'

pond top = 5130.50

pond volume = 2466 ft³ = 0.06 ac-ft

Volume in = 51,401 ft³ = 1.18 ac-ft ; Q_{in} = 33.8 cfs

For a pond ; $V_{ponded} = \left(\frac{V_{Total}}{Q_{in}^2}\right) Q_{out}^2 - (\text{Duration}) Q_{out} + V_{Total}$

where $\text{Duration} = \frac{2V_{Total}}{Q_{in}} = \frac{2(51,401\ ft^3)}{33.8\ cfs} = 3042$ sec.

so $2466\ ft^3 = \left(\frac{51,401}{33.8^2}\right) Q_{out}^2 - 3042 Q_{out} + 51,401$

$44.99 Q_{out}^2 - 3042 Q_{out} + 48,935 = 0$

33 cfs *Developed Flow*

Q_{out} = 26.4 cfs to maintain pond volumetrics

Checking for weir control (4-sided Type "D" single grate)

Head (H) = hydraulic grade line - top of grate = 30.00 - 28.50 = 1.5'

$Q = CLH^{\frac{3}{2}}$ L = [(18.5" x 2) + (35.5" x 2)]/12 = 9' (Type "D" inlet)

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Ind. Park SHEET 2 OF 5

PROJECT NO. 94257.42 BY DH DATE 1/04/95

SUBJECT Sediment Ponds CH'D _____ DATE _____

$Q = 26.4$ cfs, $C = 2.68$

$26.4 = 2.68 L(1.5)^{3/2}$

$L = 5.36' < 9'$ use single "D" grate

Use Net Area

Check orifice control $h = 1.5'$

$A = \frac{Q}{.6\sqrt{2gh}} = \frac{26.4}{.6\sqrt{2(32.2)(1.5)}} = 4.5\ ft^2$; Area (D grate) $= \frac{18.5}{12} \times \frac{35.5}{12} = 4.56$

$4.5 \simeq 4.56$

Use 1 single Type "D" grate ; outlet is 30" RCP (inv. = 24.50)

Sediment Pond (South)

Provide a sedimentation pond at the northwest corner of Tract C-3-C. This pond will accept flows from Tract C-3-C (undeveloped).

$Q_{100} = (7.6\ ac)(1.0)(1.56) = 11.9$ cfs $\longrightarrow$ Flow into pond

$E = [(7.6 \times 1.0 \times .53)]/7.6 = 0.53"$; $V = \frac{0.53 \times 7.6}{12} = 0.34$ ac-ft

$V = 0.34$ ac-ft $= 14,811\ ft^3$

Pond Size Based On Settling Velocity (V_s)

Assume: Design particle medium sand, same silt ($D = 0.3$ mm)

100 % removal of design particle for 10-year storms

$V_s = 0.094$ fps for medium sand ; $Q_{10} = 11.9 \times .667 = 7.9$ cfs

Surface Area = $SA = (1.2)(Q_{10})/V_s$

$SA = (1.2)(7.9)/.094 = 101$ SF

Assume pond length = 3 × pond width = 3w

or $(3w)(w) = 101$ SF

$w = 6'$, $L = 18'$

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Ind. Park SHEET 3 OF 5

PROJECT NO. 9425.42 BY DH DATE 1/04/95

SUBJECT Sediment Ponds CH'D _____ DATE _____

Pond Size Based On Sediment Storage

From USLE spreadsheet (attached), the average annual sediment yield for the area is 5.234 CY = 142 ft^3

Assume: maximum sediment storage depth = 3'

minimum settling depth = 2'

Using SA = 101 SF from previous page where the volume is a function of the depth z.

Bottom Area = (6')(18') = 108 ft^2

Top Area = $(6+6z)(18+6z) = 108 + 144z + 36z^2$

$$\text{Volume} = \frac{(\text{Bottom Area} + \text{Top Area})}{2} z$$

$$142 = 108z + 122z^2 + 18z^3$$

$z = 0.80' < 3'$ sediment storage depth = 0.80'

Pond Volumetrics

Pond Invert = 5127.50 Pond Top = 5130.50

Pond Depth = 3'

Pond Volume = 1458 ft^3 = 0.03 ac-ft

Volume In = 14,811 ft^3 = 0.34 ac-ft

For a pond; $V_{ponded} = \left(\frac{V_{Total}}{Q^2_{in}}\right) Q^2_{out} - (\text{Duration}) Q_{out} + V_{Total}$

where $\text{Duration} = \frac{2V_{Total}}{Q_{in}} = \frac{2(14,811)}{11.9} = 2490$ sec.

so $1458\ ft^3 = \left(\frac{14,811}{11.9^2}\right) Q^2_{out} - 2490\, Q_{out} + 14,811$

Q_{out} = 15.7 cfs to maintain pond volumetrics

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Ind. Park SHEET 4 OF 5

PROJECT NO. 94257.42 BY DH DATE 1/04/95

SUBJECT Sediment Ponds CH'D _____ DATE _____

Checking for weir control (4-sided Type "D" single grate)

Head (H) = hydraulic grade line − top of grate = 30.00 − 28.50 = 1.5'

$Q = CLH^{3/2}$ $L = [(18.5" \times 2) + (35.5 \times 2)]/12 = 9'$ (Type "D" inlet)

$Q = 15.7$ cfs, $C = 2.68$, Area (grate) $= \frac{18.5}{12} \times \frac{35.5}{12} = 4.56$ Use Anet

$15.7 = 2.68 L (1.5)^{3/2}$ $L = 3.19 < 9'$ okay

Checking for orifice control

$$A = \frac{Q}{.6\sqrt{2gh}} = \frac{15.7}{.6\sqrt{2(32.2)(1.5)}} = 2.66 \text{ ft}^2 < 4.56 \text{ ft}^2$$

Use 1 single Type "D" grate

Inlet is 30" RCP (invert = 24.00)

Outlet is 42" RCP (invert = 23.00)

BOHANNAN-HUSTON INC.

PROJECT NAME Group Nine Ind. Park SHEET 5 OF 5

PROJECT NO. 94257.42 BY DH DATE 1/04/95

SUBJECT Sediment Ponds CH'D _____ DATE _____

GROUP NINE INDUSTRIAL PARK SEDIMENT YIELD ANALYSIS
UNIVERSAL SOIL LOSS EQUATIOI - NORTH POND

DESCRIPTION	VARIABLE	UNIT	
BASIN			3A-2
Drainage Area	DA	Sq. Mi.	0.017
Slope	S	Ft/Ft	0.025
Slope Angle	THETA	Radians	0.025
	L	Feet	800.000
Rainfall	R		25.000
Soil Erodability*	K		0.100
Slope Length Factor	LS		0.460
Cover*	C		0.200
Support Practice Factor	P		1.000
Sediment Yield	A	Tons/Acre	0.230
		Tons	2.502
		Cy	1.854
Estimated Soil Unit Weight	100.000	Lbs/Cf	

Total Annual Sediment Yield	1.854 Cy
Adjusted Sediment Yield	7.415 Cy

Adjustment Factor 4.000

NOTE: The Universal Soil Loss Equation typically underestimates the actual sediment yield by 4 times so a factor of 4 is applied to the total annual sediment yield.

GROUP NINE INDUSTRIAL PARK SEDIMENT YIELD ANALYSIS
UNIVERSAL SOIL LOSS EQUATIOI - SOUTH POND

DESCRIPTION	VARIABLE	UNIT	
BASIN			3A-2
Drainage Area	DA	Sq. Mi.	0.012
Slope	S	Ft/Ft	0.025
Slope Angle	THETA	Radians	0.025
	L	Feet	800.000
Rainfall	R		25.000
Soil Erodability*	K		0.100
Slope Length Factor	LS		0.460
Cover*	C		0.200
Support Practice Factor	P		1.000
Sediment Yield	A	Tons/Acre	0.230
		Tons	1.766
		Cy	1.308
Estimated Soil Unit Weight	100.000	Lbs/Cf	

Total Annual Sediment Yield	1.308 Cy
Adjusted Sediment Yield	5.234 Cy

Adjustment Factor 4.000

NOTE: The Universal Soil Loss Equation typically underestimates the actual sediment yield by 4 times so a factor of 4 is applied to the total annual sediment yield.

***** HYDRAULIC GRADE LINE CALCULATIONS *****
***** GROUP NINE INDUSTRIAL PARK *****

Station	Structure	Diam.	Q	Area	Vel.	K	Sf	Length	MH Dia.	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Low Point	HV	EGL(dn)	EGL(up)
0+35.00	OUTLET								0.00	0.00												
		72	188.2	28.27	6.66	4235	0.0020	65.00			0.13	0.00	0.00	0.00	0.07	0.07	5115.81	5115.81	5135.00	0.69	5116.50	5116.50
1+00.00	EXTG. MH								8.00	45.00						0.13						
		54	188.2	15.90	11.83	1966	0.0092	24.00			0.22	0.19	0.00	0.00	0.08	0.27	5115.94	5114.72	5134.00	2.17	5116.63	5116.90
1+28.00	WYE								0.00	0.00						0.22						
		54	144.8	15.90	9.10	1966	0.0054	27.91			0.15	0.00	-0.58	0.00	0.00	-0.58	5114.94	5115.25	5133.00	1.29	5117.12	5116.53
1+58.91	MH#1								6.00	45.00						0.15						
		54	144.8	15.90	9.10	1966	0.0054	255.15			1.38	0.18	0.00	0.06	0.00	0.25	5115.40	5115.64	5132.20	1.29	5116.68	5116.93
4+20.06	MH#2								6.00	90.00						1.38						
		48	144.8	12.57	11.52	1436	0.0102	286.09			2.91	0.33	0.00	0.00	0.02	0.35	5117.03	5116.60	5135.00	2.06	5118.31	5118.66
7+13.59	MH#3								6.00	0.00						2.91						
		48	112.2	12.57	8.93	1436	0.0061	98.14			0.60	0.00	0.28	0.00	0.00	0.28	5119.51	5120.61	5135.80	1.24	5121.57	5121.85
8+18.29	MH#4								6.00	45.00						0.60						
		48	112.2	12.57	8.93	1436	0.0061	329.69			2.01	0.18	0.00	0.06	0.00	0.24	5120.61	5120.85	5136.00	1.24	5121.85	5122.09
11+53.98	MH#5								6.00	90.00						2.01						
		42	112.2	9.62	11.66	1006	0.0124	103.45			1.29	0.33	0.00	0.00	0.02	0.35	5122.86	5122.34	5132.00	2.11	5124.10	5124.45
12+63.43	MH#6								6.00	90.00						1.29						
		42	97.0	9.62	10.08	1006	0.0093	8.57			0.08	0.37	0.00	0.00	0.00	0.37	5123.63	5124.53	5133.00	1.58	5125.74	5126.11
12+75.00	WYE								6.00	90.00						0.08						
		42	80.7	9.62	8.39	1006	0.0064	484.67			3.12	0.26	-0.39	0.00	0.00	-0.12	5124.61	5124.97	5132.80	1.09	5126.18	5126.06
17+59.67	INLET								6.00	0.00						3.12						
		30	47.7	4.91	9.72	410	0.0081	62.00			0.50	0.00	0.00	0.00	0.01	0.01	5128.09	5127.72	5130.00	1.47	5129.18	5129.18
18+21.67	INLET								6.00	0.00						0.50						
												0.00	0.00	0.00	0.29	0.29	5128.22	5129.98	5130.00	0.00	5129.69	5129.98

Manning's n = 0.013
for pipe