FILE 98-00004

Branch Engineering

310 5th Street
Springfield, Oregon 97477
(541) 746-0637
Fax (541) 746-0389

May 5, 1998

Eric M. Sandoval
Development Services
City of Corvallis
501 SW Madison
Corvallis, OR 97339-1083

ADDENDUM

RECEIVED
MAY 07 '98
DEVELOPMENT SERVICES

Re: Floodplain Impact Analysis for Bi-Mart Corporation

Dear Eric,

This letter summarizes the methodology and results of the floodplain impact analysis performed for Bi-Mart Corporation as requested. As you know a drainage channel (Squaw Creek) runs north-south through the project site. With the development, a bridge is proposed to be constructed crossing Squaw Creek approximately 350 feet downstream of Philomath Boulevard (see Attachment A). This floodplain impact analysis was performed to assess the impacts the proposed bridge construction will have to the 100-year water surface elevations in the project vicinity.

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Base Information

The hydraulic computer program HEC-RAS was used to assist in calculating the 100-year flood water surface elevations along the project site. Inputs into the model include the geometry of the channel, the 100-year flood discharge, Manning's roughness coefficients, and a starting water surface elevation. The geometry of the Squaw Creek was determined based on a field topographic survey performed by Branch Engineering in October 1996. Seven cross sections (Cross Sections 10-70) across the project site were developed from this data and input in the computer model (see Attachments B-I).

The 100-year flood discharge of Squaw Creek at the project site was based on a value given by the City of Corvallis.

The Manning's roughness coefficients were estimated to be 0.030 for the channel and 0.035 for the overbank areas. These values were based on descriptions provided in Open Channel Hydraulics by Ven T. Chow, 1959.

The starting water surface elevation was obtained by performing a normal depth calculation at the Cross Section 10. The calculation was performed by the HEC-RAS computer program.

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Hydraulic Analysis

There were two scenarios generated in the HEC-RAS program to evaluate the impacts due to the construction of the bridge. The first scenario is an existing conditions model which was used as a base or pre-development conditions. For the second scenario, the bridge was added to the pre-development model. The following is the resulting water surface elevations computed for each scenario:

Cross Section	100-Year Water Surface Elevations (Ft)	
	Pre-Development	Post Development
10	241.19	241.19
20	244.00	244.00
30	245.33	245.33
40	245.22	245.22
50	245.67	246.34
60	245.77	246.35
70	246.15	246.42

The results of the analysis indicate the proposed bridge structure will not affect downstream water surface elevations. Upstream of the bridge however, increases to the 100-year water surface elevations were detected. The maximum impact to the water surface elevation will be 0.67 feet, located immediately upstream of the bridge. The impact reduces to 0.50 feet approximately 30 feet upstream of the bridge. The areas in which the 100-year flood elevation increases by more than 0.50 feet are contained on-site. As a result, based on this analysis, impacts to the 100-year flood elevation due to the construction of the bridge will not exceed 0.50 feet upstream or downstream of the project site.

Please call if you have any questions. Also, please forward this request to Greg Gesher.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER 19218 PE OREGON JULY 15, 1997 STEPHEN G. KEATING

EXPIRES 6-30-99

Stephen G. Keating, P.E.

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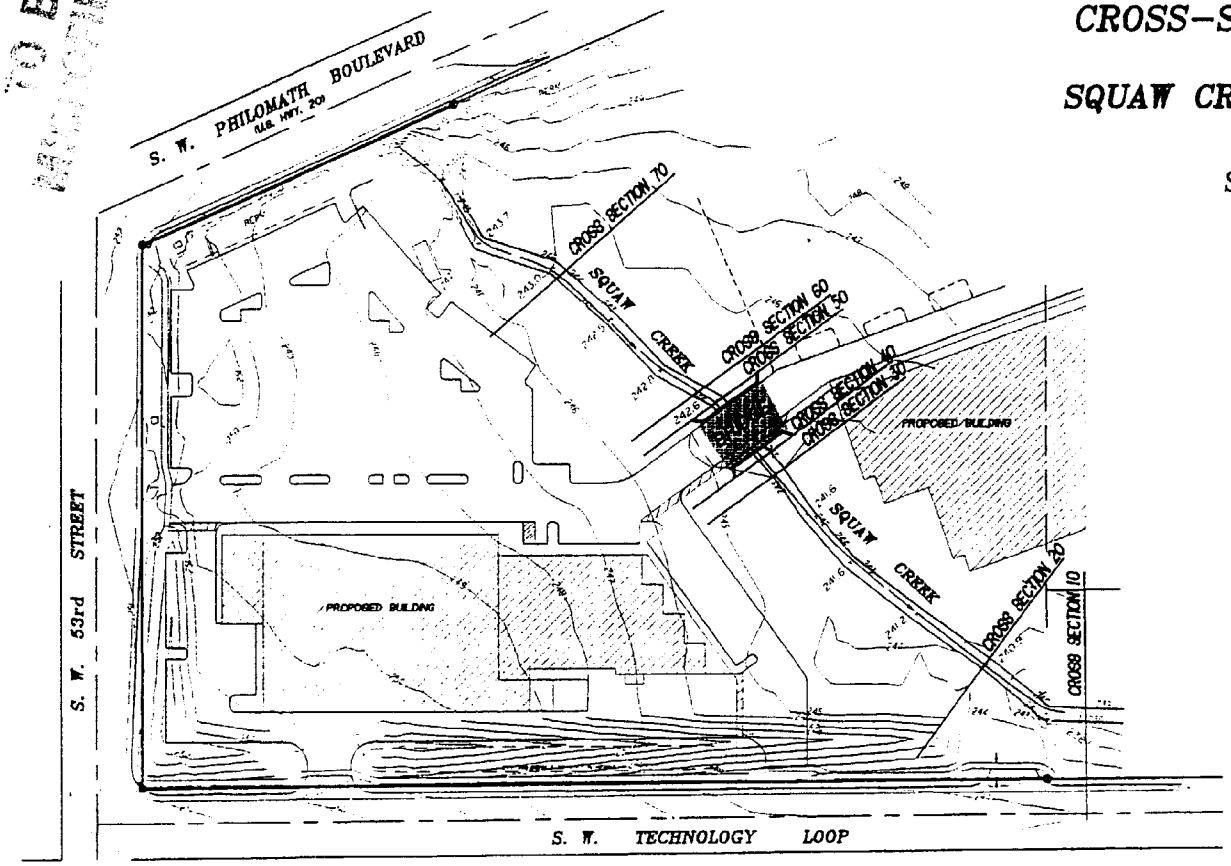
ATTACHMENT "A"

CROSS-SECTION LOCATIONS FOR SQUAW CREEK DRAINAGE STUDY

MAY 5, 1998

SCALE 1"=100'



Branch Engineering
310 Fifth Street
Springfield, Oregon 97477
(541)746-0637 FAX (541)746-0389

PROJECT No. 96-288

DWG. No. E:/96/96-288/96288CSL.DWG 5-5-98 AMW

100-YR FLOOD

HEC-RAS Plan: Plan 01 River: 1 Reach: 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	70	240.00	243.00	246.42		246.50	0.000990	3.07	148.59	163.33	0.31
1	60	240.00	242.60	246.35		246.38	0.000469	2.16	232.47	263.49	0.21
1	50	240.00	242.60	246.34	245.61	246.38	0.000475	2.17	231.22	262.81	0.21
1	45	Bridge									
1	40	240.00	242.00	245.22	244.47	245.67	0.004305	5.62	60.94	128.28	0.59
1	30	240.00	242.00	245.33		245.54	0.002070	4.19	96.94	144.66	0.43
1	20	240.00	240.90	244.00	244.00	244.67	0.006598	7.04	44.76	41.93	0.76
1	10	240.00	238.30	241.19	241.19	242.31	0.012916	8.51	28.21	12.56	1.00

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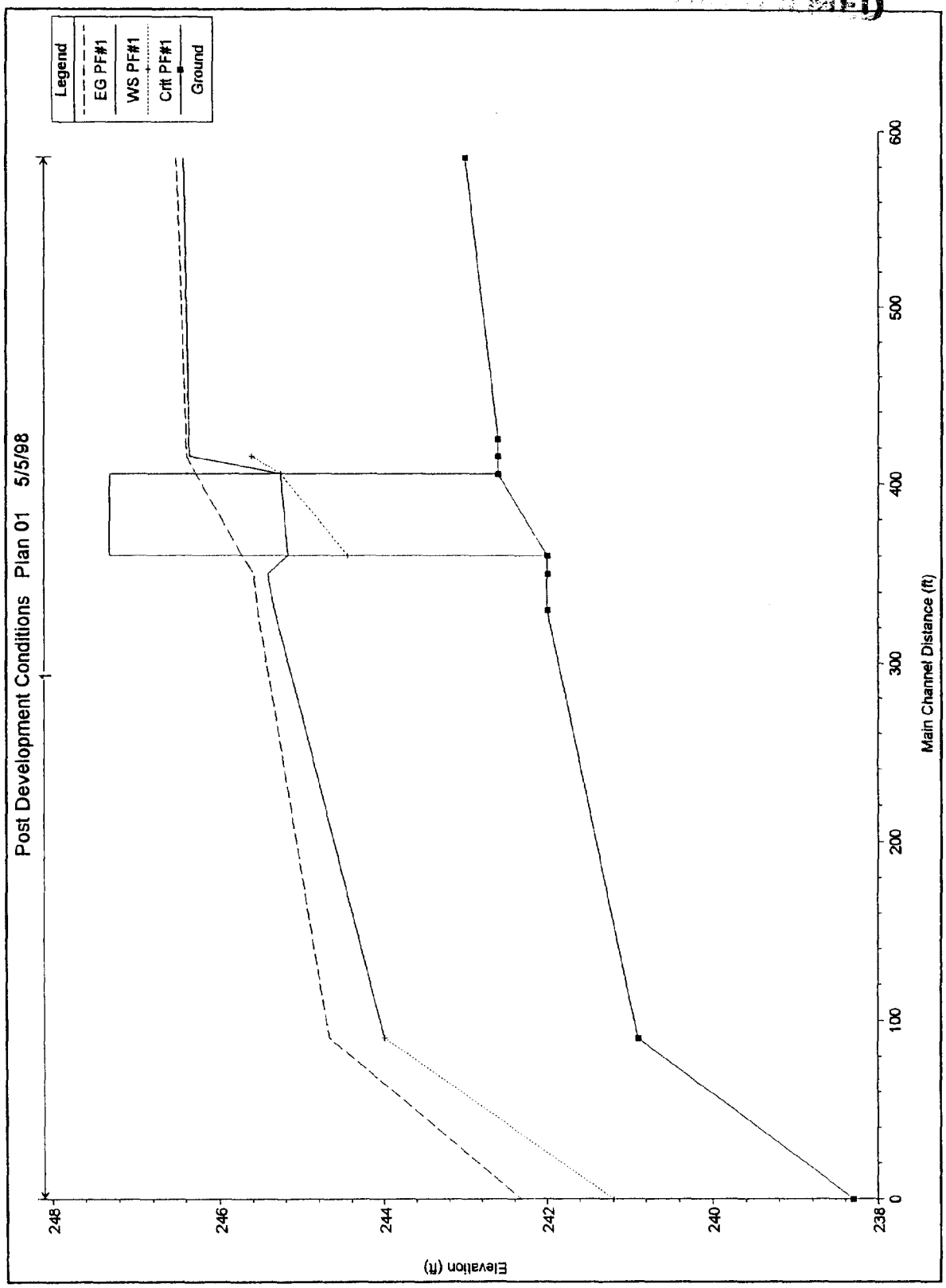

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100-YR FLOOD

HEC-RAS Plan: Plan 01 River: 1 Reach: 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	70	240.00	243.00	246.15		246.31	0.001928	4.02	107.72	135.73	0.42
1	60	240.00	242.60	245.77		245.97	0.002387	4.27	105.67	172.28	0.46
1	50	240.00	242.60	245.67		245.94	0.003207	4.83	89.28	154.31	0.53
1	40	240.00	242.00	245.22	244.47	245.67	0.004305	5.62	60.94	128.28	0.59
1	30	240.00	242.00	245.33		245.54	0.002070	4.19	96.94	144.66	0.43
1	20	240.00	240.90	244.00	244.00	244.67	0.006598	7.04	44.76	41.93	0.76
1	10	240.00	238.30	241.19	241.19	242.31	0.012916	8.51	28.21	12.56	1.00

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TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

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TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

FROM 'CHOW', OPEN CHANNEL HYDRAULICS

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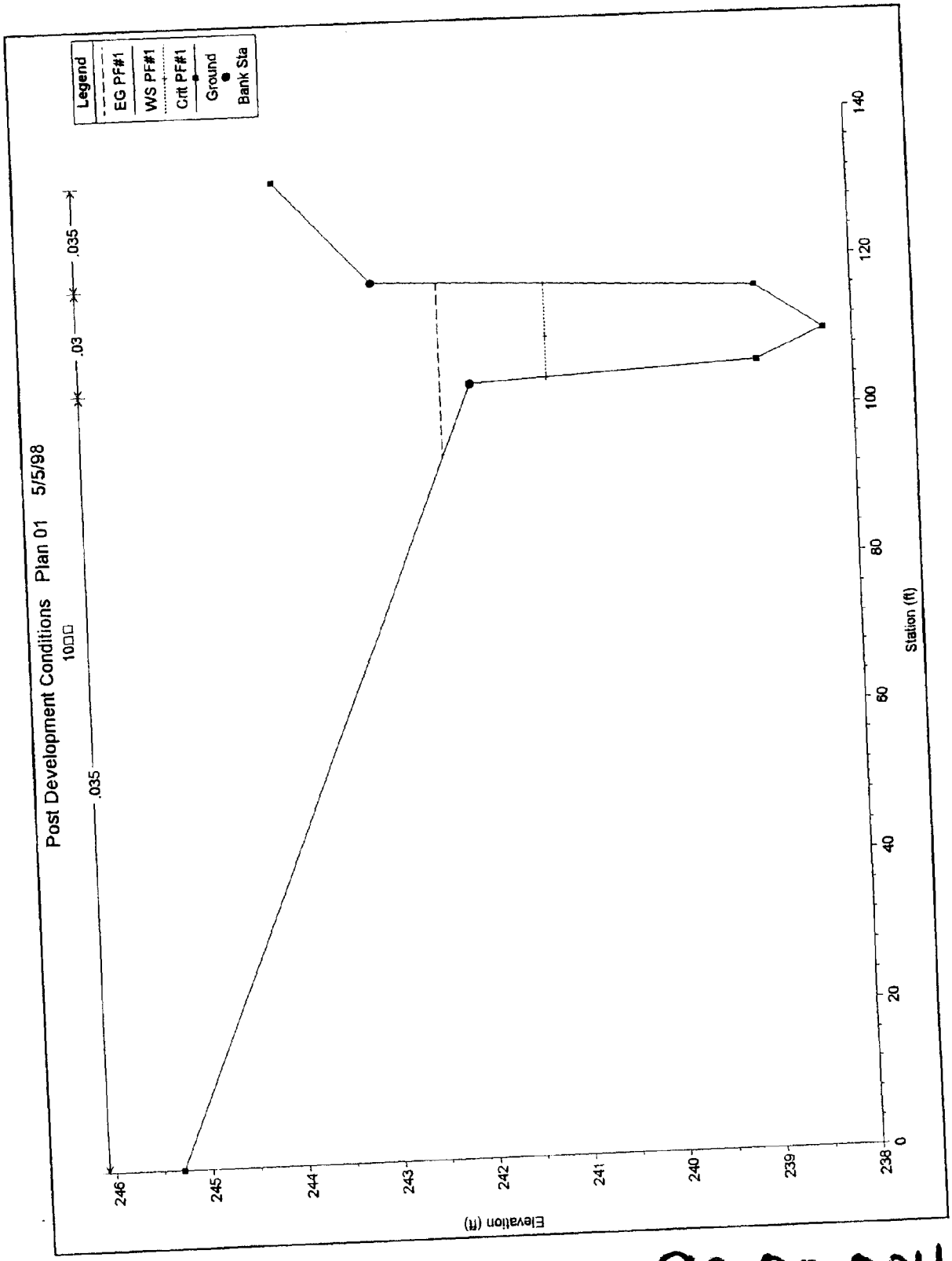

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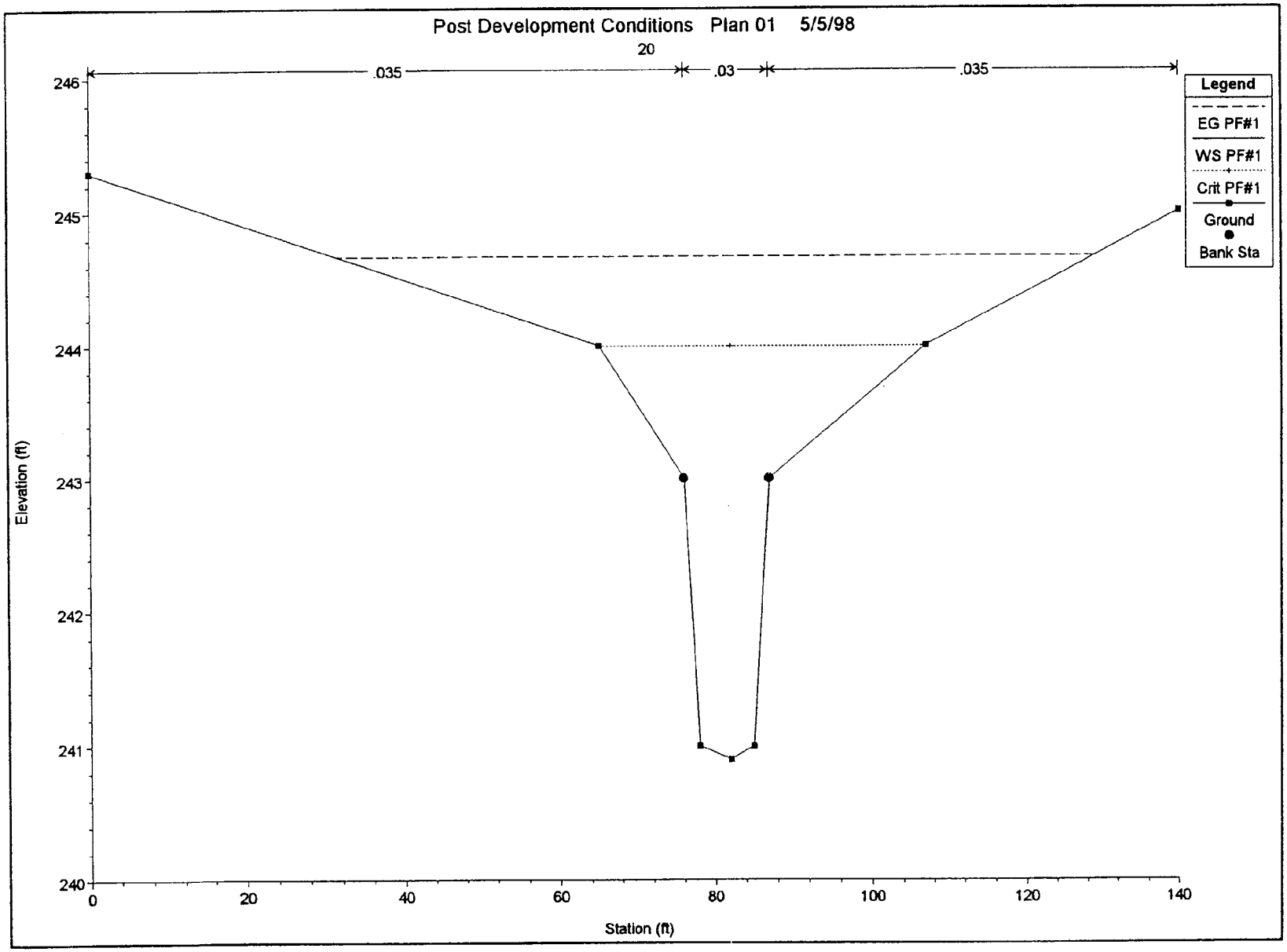

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ATTACHMENT C

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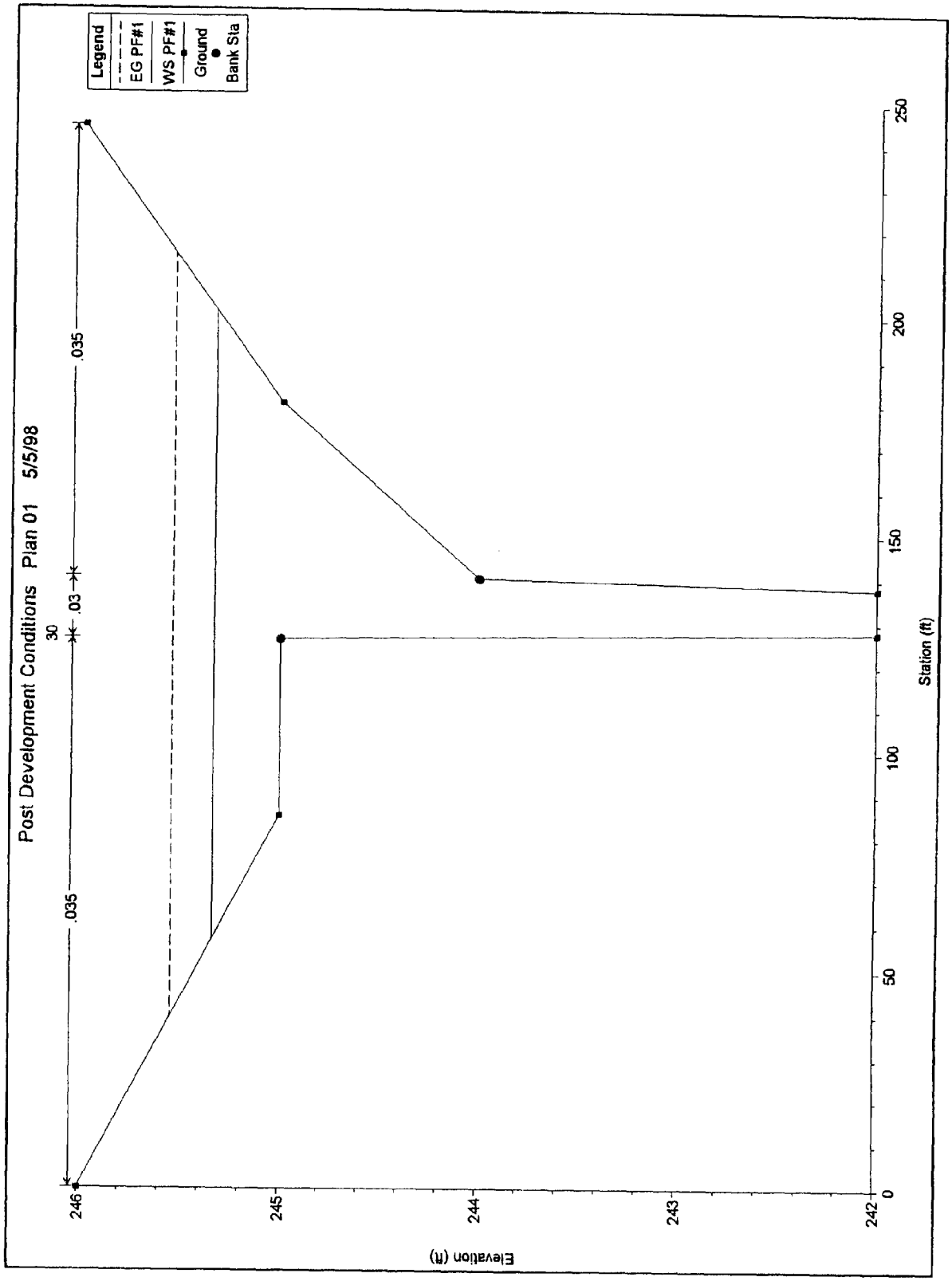
ATTACHMENT D



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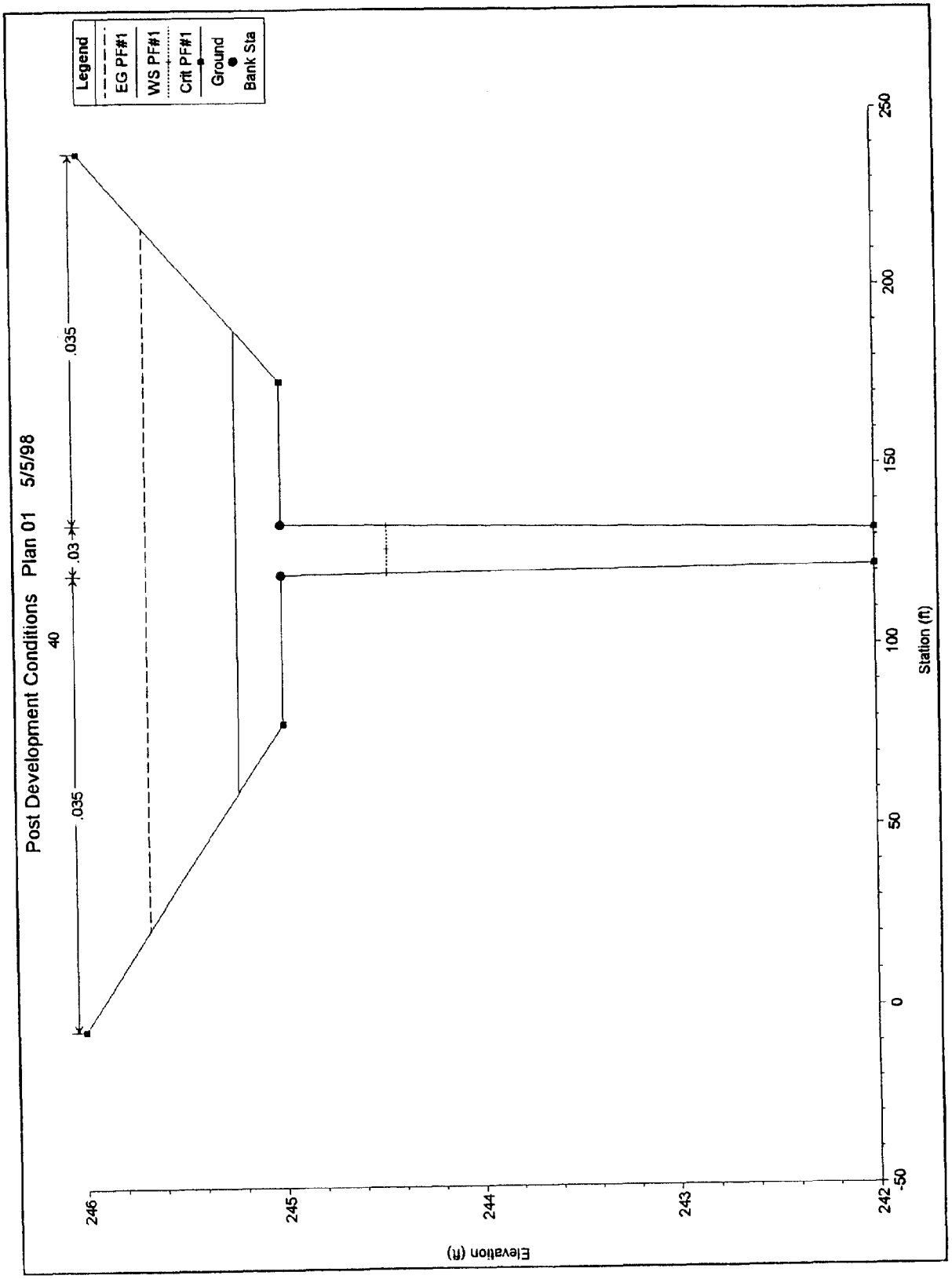

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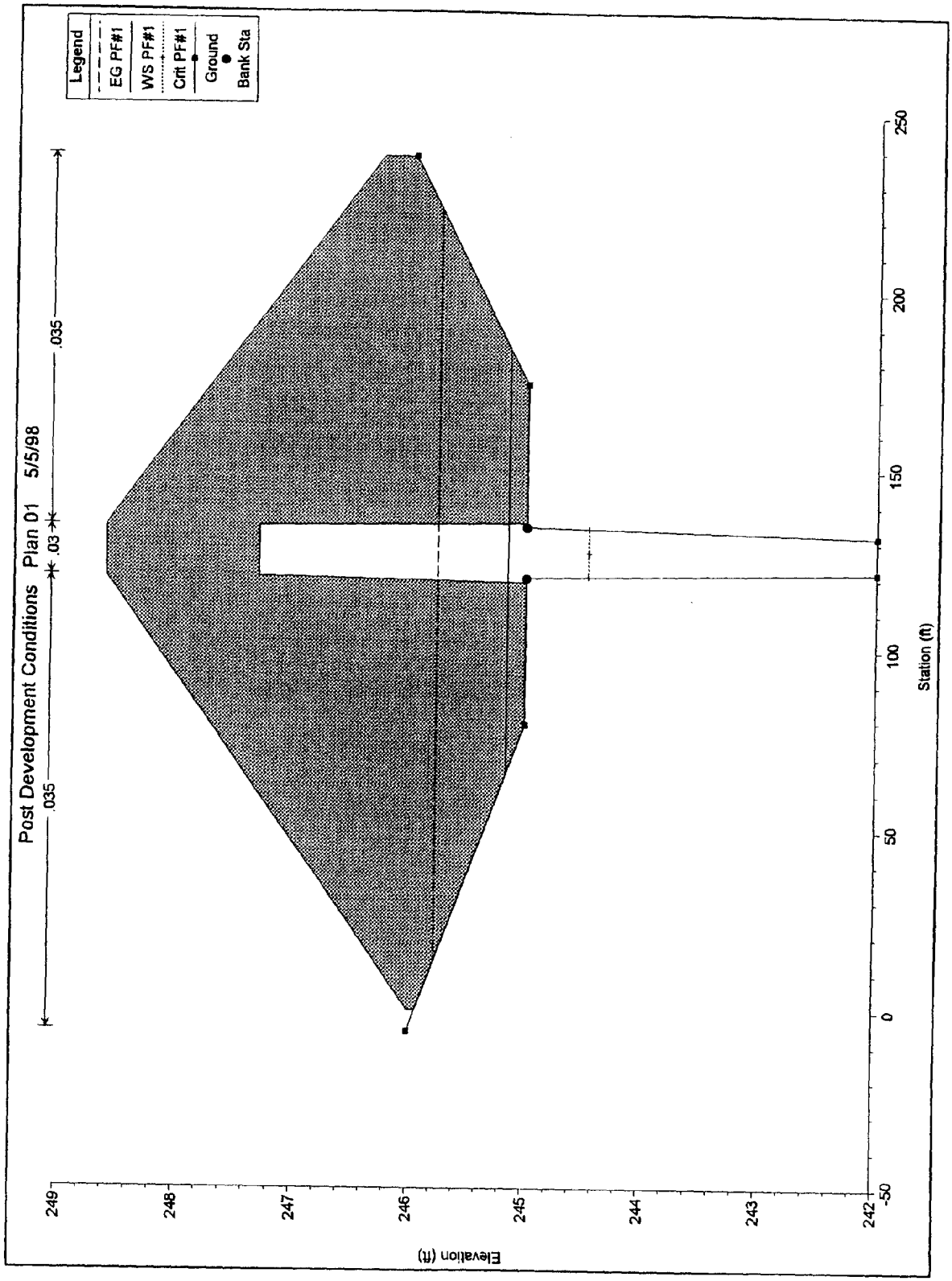

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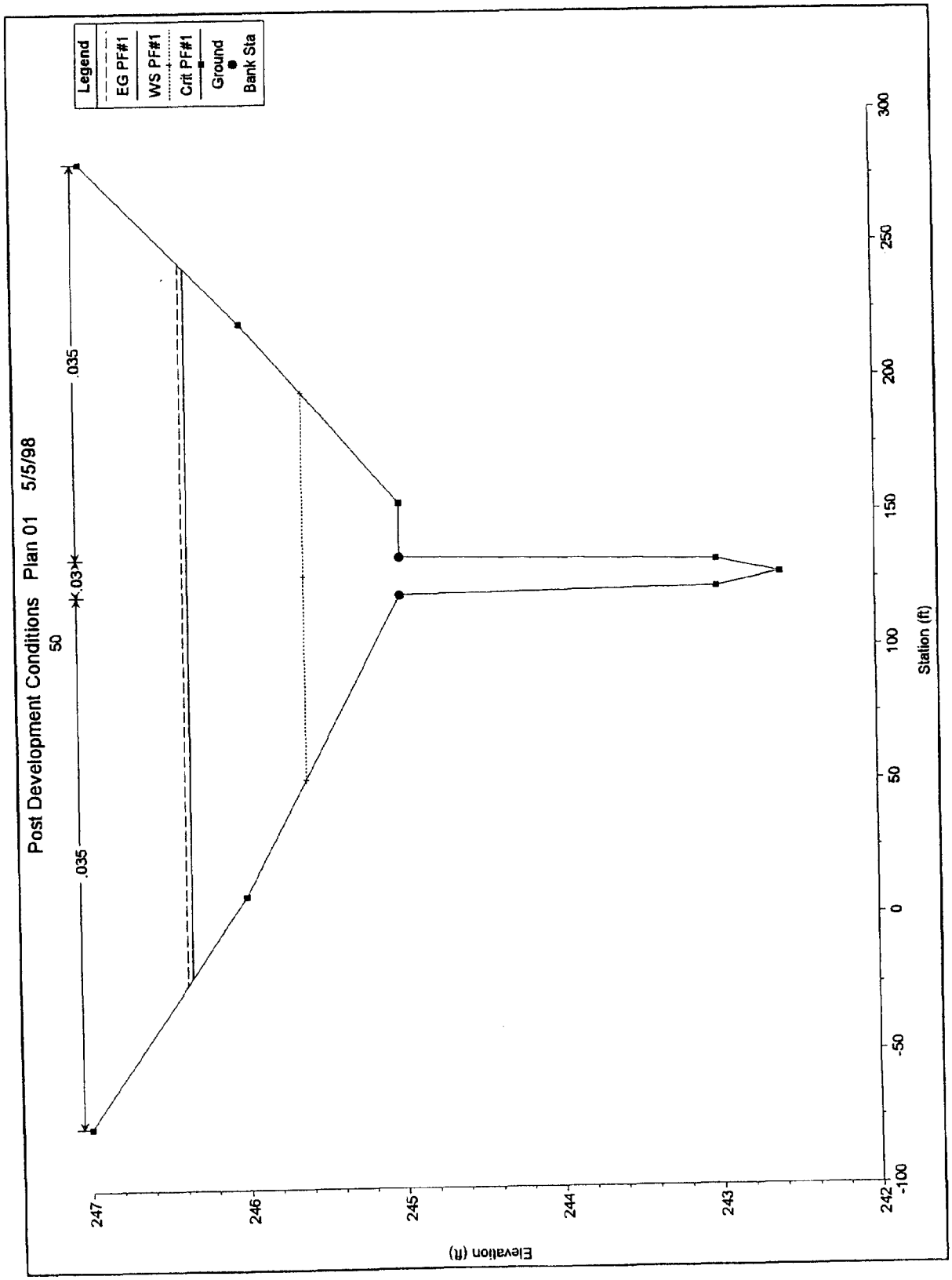

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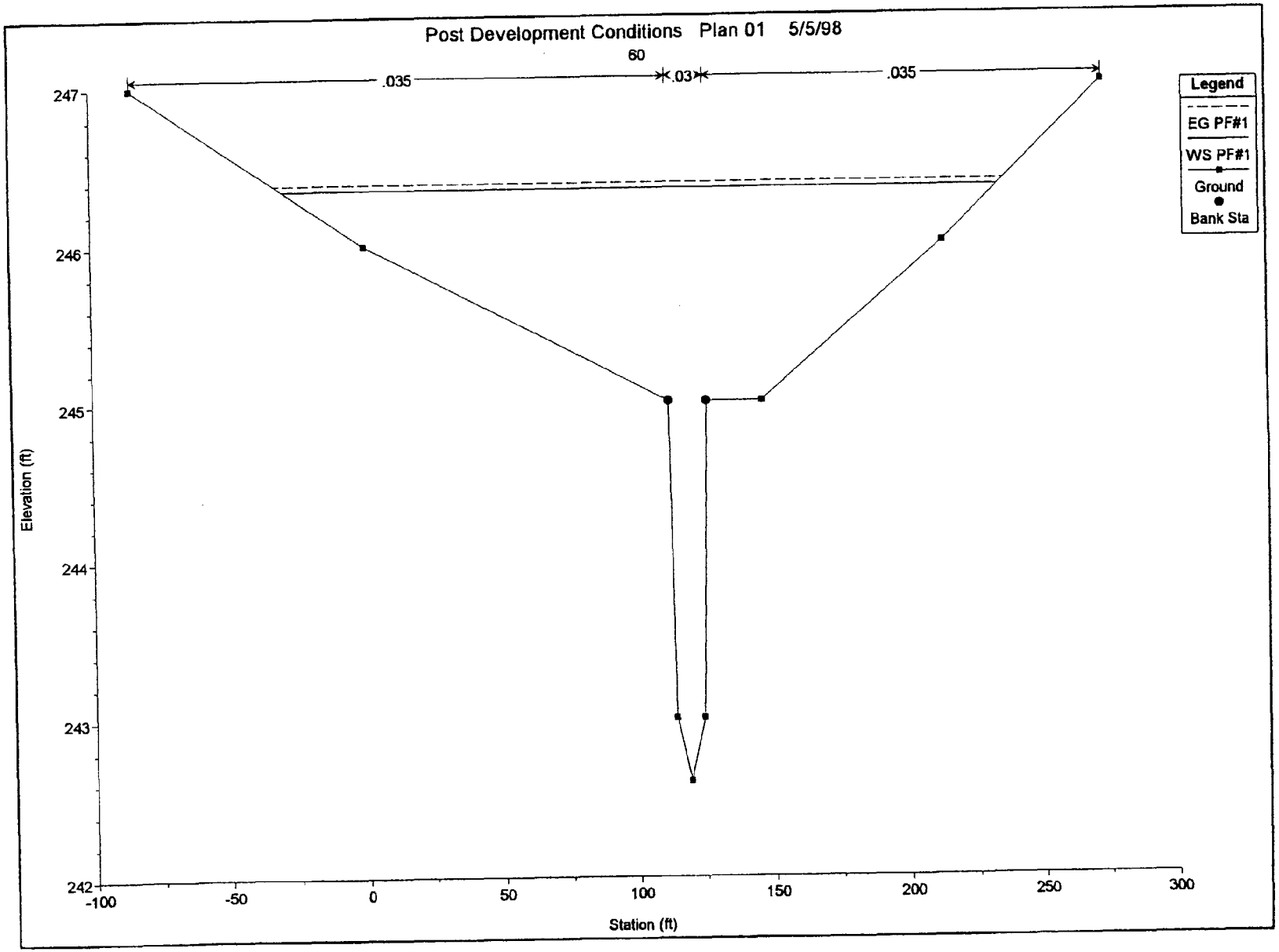

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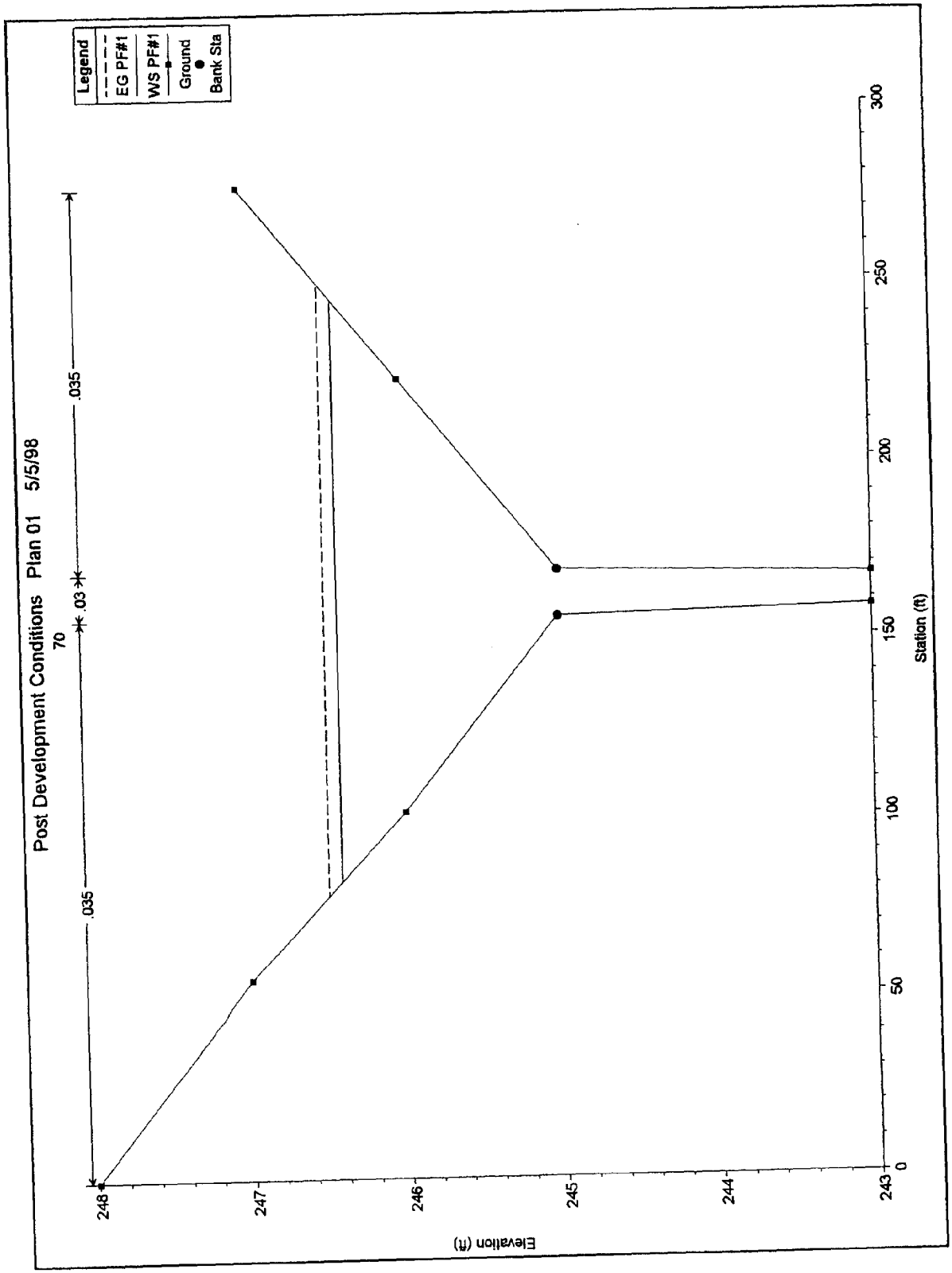

ATTACHMENT I

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