DRAINAGE INFORMATION SHEET

PROJECT TITLE: AYERS RESIDENCE ZONE ATLAS/DRNG. FILE #: C-20/D22, PWDN 9900139

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 16 BLOCK 13, Tract 3, Unit 3, NORTH ALBUQUERQUE ACRES

CITY ADDRESS: 9520 OAKLAND AVENUE, NE, ALB., NM 87122

ENGINEERING FIRM: Advanced Engineering and Consulting, LLC CONTACT: Shahab Biazar

ADDRESS: 10205 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: ROGER AYERS CONTACT: _____

ADDRESS: 8300 Wyoming, NE, # 3013, Alb., NM 87113 PHONE: _____

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

_____ DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAINAGE PLAN

__X__ GRADING PLAN

_____ EROSION CONTROL PLAN

_____ ENGINEER'S CERTIFICATION

_____ OTHER

PRE-DESIGN MEETING:

_____ YES

_____ NO

_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ S. DEV. PLAN FOR SUB'D. APPROVAL

_____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL

_____ SECTOR PLAN APPROVAL

_____ FINAL PLAT APPROVAL

_____ FOUNDATION PERMIT APPROVAL

__X__ BUILDING PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY APPROVAL

__X__ GRADING PERMIT APPROVAL

_____ PAVING PERMIT APPROVAL

_____ S. A. D. DRAINAGE REPORT

_____ DRAINAGE REQUIREMENTS

_____ OTHER

DATE SUBMITTED: 08 / 04 / 99

BY: *SHAHAB BIAZAR*

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

August 19, 1999

Shahab Biazar, P.E.
Advanced Engineering and Consulting
10209 Snowflake Ct. NW
Albuquerque, New Mexico 87114

RE: Drainage Report and Grading and Drainage Plan for Ayers Residence, Lot 16, Block 13, Tract 3, Unit 3, NAA, (C20/D22) (PWDN 990139) Engineer's Stamp Dated 8/4/99.

Dear Shahab:

Based on the information provided in the submittal of August 4, 1999, the above referenced plan is approved for Building Permit release.

As you are aware, the Engineer's Certification is required prior to the release of the Certificate of Occupancy for this residence.

If you have any questions, or if I may be of further assistance to you, please call me at 924-3982, or contact Brad Catanach at the County.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Brad Catanach, P.E., Bernalillo County Public Works Division
Lisa Ann Manwill, P.E., Albuquerque Metropolitan Arroyo Flood Control Authority
File

County of Bernalillo

State of New Mexico

2400 BROADWAY, S.E.
ALBUQUERQUE, NEW MEXICO 87102
PUBLIC WORKS (505) 848-1500

July 21, 1999

Shahab Biazar, P.E.
Advanced Engineering and Consulting
10209 Snowflake Ct. NW
Albuquerque, New Mexico 87114

RE: Drainage Report and Grading and Drainage Plan for Ayers Residence, Lot 16, Block 13, Tract 3, Unit 3, NAA, (C20/D22) (PWDN 990139) Engineer's Stamp Dated 7/7/99.

Dear Shahab:

This letter is a compilation of comments from my office as well as from County Public Works and AMAFCA. Prior to approval of the above referenced plan, the following comments must be addressed:

1. This site is located along the main La Cueva arroyo, one of the major arroyos in NAA. Since this arroyo is very wide and braided, predicting the dominant flow path can be difficult. It appears that the runoff from smaller rainfall events may occur predominately within the northern thalweg located just south of this Lot, thus becoming the dominant flow path in the 100-year events. Therefore, it may not be prudent to assume that the dominant flow is 130' south of the property. Please plot the erosion setback (ESB) limits on the plan. Any development proposed within the ESB must be constructed to scour depth, therefore a scour analysis and scour protection is required.

2. The plan shows the limits of the 100-year WSEL. Is this the water surface from your calculations, or the FEMA floodplain limit? Please plot the FEMA floodplain limit on the plan. Also plot the WSEL and EGL from your analysis for comparison. Show the locations of some of the cross sections through the Lot on the plan. Also plot the energy grade line (EGL) and proposed AMAFCA easement. Is the finish floor elevation higher than the EGL?

Due to the difficulty of this Lot, you may wish to research the drainage plan for Lot 15 adjacent to this site (City drainage file C20/D13). If you have any questions regarding these comments, please call me at 924-3982, or contact Brad Catanach at the County.

Sincerely,

Susan M. Calongne, P.E.
City/County Floodplain Administrator

c: Brad Catanach, P.E., Bernalillo County Public Works Division
Lisa Ann Manwill, P.E., Albuquerque Metropolitan Arroyo Flood Control Authority
File

DRAINAGE INFORMATION SHEET

PROJECT TITLE: AYERS RESIDENCE ZONE ATLAS/DRNG. FILE #: C-20 / D20

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 16 BLOCK 13, Tract 3, Unit 3, NORTH ALBUQUERQUE ACRES

CITY ADDRESS: 9520 OAKLAND AVENUE, NE, ALB., NM 87122

ENGINEERING FIRM: Advanced Engineering and Consulting, LLC CONTACT: Shahab Biazar

ADDRESS: 10205 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: ROGER AYERS CONTACT: _____

ADDRESS: 8300 Wyoming, NE, # 3013, Alb., NM 87113 PHONE: _____

ARCHITECT: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

SURVEYOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

CONTRACTOR: _____ CONTACT: _____

ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- _____ DRAINAGE PLAN
- _____ CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- _____ EROSION CONTROL PLAN
- _____ ENGINEER'S CERTIFICATION
- _____ OTHER

PRE-DESIGN MEETING:

- _____ YES
- _____ NO
- _____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

- _____ SKETCH PLAN APPROVAL
- _____ PRELIMINARY PLAT APPROVAL
- _____ S. DEV. PLAN FOR SUB'D. APPROVAL
- _____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- _____ SECTOR PLAN APPROVAL
- _____ FINAL PLAT APPROVAL
- _____ FOUNDATION PERMIT APPROVAL
- X BUILDING PERMIT APPROVAL
- _____ CERTIFICATE OF OCCUPANCY APPROVAL
- X GRADING PERMIT APPROVAL
- _____ PAVING PERMIT APPROVAL
- _____ S. A. D. DRAINAGE REPORT
- _____ DRAINAGE REQUIREMENTS
- _____ OTHER

RECEIVED
JUL 07 1999
HYDROLOGY SECTION

DATE SUBMITTED: 07 / 06 / 99

BY: *SHAHAB BIAZAR*

DRAINAGE INFORMATION SHEET

PROJECT TITLE: AYERS RESIDENCE ZONE ATLAS/DRNG. FILE #: C-20

DRB #: _____ EPC #: _____ WORK ORDER #: _____

LEGAL DESCRIPTION: LOTS 16 BLOCK 13, Tract 3, Unit 3, NORTH ALBUQUERQUE ACRES

CITY ADDRESS: 9520 OAKLAND AVENUE, NE, ALB., NM 87122

ENGINEERING FIRM: Advanced Engineering and Consulting, LLC CONTACT: Shahab Biazar

ADDRESS: 10205 Snowflake Ct. NW Alb., NM 87114 PHONE: (505) 899-5570

OWNER: ROGER AYERS CONTACT: _____

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ADDRESS: _____ PHONE: _____

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ADDRESS: _____ PHONE: _____

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ADDRESS: _____ PHONE: _____

TYPE OF SUBMITTAL:

X DRAINAGE REPORT

_____ DRAINAGE PLAN

_____ CONCEPTUAL GRADING & DRAINAGE PLAN

X GRADING PLAN

_____ EROSION CONTROL PLAN

_____ ENGINEER'S CERTIFICATION

_____ OTHER

PRE-DESIGN MEETING:

_____ YES

_____ NO

_____ COPY PROVIDED

CHECK TYPE OF APPROVAL SOUGHT:

_____ SKETCH PLAN APPROVAL

_____ PRELIMINARY PLAT APPROVAL

_____ S. DEV. PLAN FOR SUB'D. APPROVAL

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_____ SECTOR PLAN APPROVAL

_____ FINAL PLAT APPROVAL

_____ FOUNDATION PERMIT APPROVAL

X BUILDING PERMIT APPROVAL

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X GRADING PERMIT APPROVAL

_____ PAVING PERMIT APPROVAL

_____ S. A. D. DRAINAGE REPORT

_____ DRAINAGE REQUIREMENTS

_____ OTHER

DATE SUBMITTED: 07 / 06 / 99

BY: *SHAHAB BIAZAR*

RECEIVED
JUL 07 1999
HYDROLOGY SECTION

DRAINAGE REPORT
FOR

Lots 16, Block 13, Tract 3, Unit 3, North Albuquerque Acres

Prepared by:

ADVANCED
ENGINEERING
and CONSULTING, LLC

10205 Snowflake Ct. NW
Albuquerque, New Mexico 87114

Prepared For:

Roger Ayers
8300 Wyoming Boulevard, NE, Apt.# 3013
Albuquerque, New Mexico 87113

July, 1999

Shahab Biazar
PE NO. 13479

Location

Lots 16, Block 13, Tract 3, Unit 3 of North Albuquerque Acres is a ±0.727 acre site which is located at southwest corner of Oakland Avenue and Holbrook Street. See attached vicinity map for location.

Purpose

Advanced Engineering and Consulting, LLC on behalf of Roger Ayers has prepared this grading and drainage solution for the proposed site. This grading and drainage plan is prepared in order to obtain grading and drainage approval as well as building permit approval for Mr. Ayers future house.

Existing Drainage Conditions

The site slopes from north to south and drains to an existing arroyo located at the southerly portion of the property. The site at existing conditions generates 1.37 cfs under a 100-year, 6-hour storm. As shown on FIRM Map number 35001C0141-D the southerly portion of the site falls within a 100-year flood plain, Zone AO (depth 2). Based on the Resource Technology, Inc. Hydrology Maps Exhibit 8, Basin 110.0, AP (analysis point and flow rates) 110.90, the flood plain is created based on a 100-year storm runoff of 3048.00 cfs. A reduced copy the Exhibit 8 is located in the map pocket.

Proposed Conditions and On-Site/Offsite Drainage Management Plan

The owners are proposing to build ±4000 sf new building. The drainage patterns, for on-site and offsite, will remain the same. Under proposed conditions the site, at a flow rate of 2.08 cfs, will continue to drain south to the existing arroyo.

Floodplain Analysis

We have calculated the 100-year water surface elevation using HEC-RAS. The approximate location of the bank line of the main arroyo are shown on the HEC-RAS Cross-Section Plan. The main arroyo which carries the dominant flow is located ±130' south of the southerly boundary line.

An erosion setback was calculated using the Center line Setback (CSB, 178.54') and Bankline Setback (BSB, 208.45'). A Center Line Setback of 219.79' also was calculated using the 6 feet per 100 cfs plus the half of the W_D. The floodplain is fairly wide, and the setbacks (CSB & BSB) falls within the 100-year water surface elevation. Since the floodplain is so wide and the main arroyo is ±130' south of the southerly boundary line no flood damage will danger the Ayers future resident. The house will be maintained 30' away from the 100-year water surface elevation.

what if all flow in north channel?

Calculations

City of Albuquerque, Development Process Manuel, Section 22.2, Hydrology Section, revised January 1993, was used for the runoff calculations. The site falls under Zone 4 based on Figure A-1 of page A-1. We used HEC-Ras program to calculate the hydraulics of the arroyo. We also used "Sediment and Erosion Design Guide" prepared by AMAFCA to calculate the erosion set back into the tract.

RUNOFF DRAINAGE DATA

The site is @ Zone 3

DEPTH (INCHES) @ 100-YEAR STORM

P_{60} = 2.14 inches

P_{360} = 2.60 inches

P_{1440} = 3.10 inches

DEPTH (INCHES) @ 10-YEAR STORM

P_{60} = 2.14 x 0.667
= 1.43 inches

P_{360} = 1.73

P_{1440} = 2.07

See the summary output from AHYMO calculations.

Also see the following summary tables.

RUNOFF CALCULATION RESULTS

BASIN	AREA (SF)	AREA (AC)	AREA (MI^2)
Lots 16	31675.09	0.72716	0.001136

PROPOSED

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A, B, C, D
Lots 16	2.08	1.00	43%, 20%, 20%, 17%

EXISTING

BASIN	Q-100 CFS	Q-10 CFS	TREATMENT A, B, C, D
Lots 16	1.37	0.41	100%, 0%, 0%, 0%

EROSION SETBACK

Erosion setback per Sediment & Erosion Design Guide Section 3.4.5:

Assuming the worse case scenario (Q=3048.00 cfs, end of Basin 110.0, AP 110.90*)

Q_d = Dominant Discharge

$Q_d = 0.2\ Q_{100}$ **(Eq. 3.77)**

$Q_d = 0.2(3048) = 609.60$ cfs

Sc =Critical Slope

$Sc = 0.037Q_D^{-0.133}$ **(Eq. 3.80)**

$Sc = 0.037(609.60)^{-0.133} = 0.0158$

$W_D = 4.6Q_D^{0.4}$ **(Eq. 3.78)**

$W_D = 4.6(609.60)^{0.4} = 59.81$

For 200 cfs < $Q_D \leq$ 2000 cfs
Use **$Y/W_D = 0.80+4\log(Q_D)$** **(Eq. 3.74b)**

$Y = 59.81(0.80+4\log(609.60)) = 714.14$

Lateral Erosion Distance Lv = *y*/2

Lv =714.14/2 = 357.07

ΔMax = Lv/2 307.07/2 = 178.54' (bankline setback, BSB)

CSB $= \Delta Max + 0.50\ W_D$
$= 178.54 + 0.50(59.81) = 208.45'$ (centerline setback, CSB)

The width of the floodplain is fairly wide and the setback falls within the floodplain.

Also, the setback can be calculated as:

CSB = 3048/100*6 + 0.50(59.81) = 212.79' (use this instead fof 208.45')

* Exhibit 8, Hydrology Maps, Prepared by Resource Technology. See this report for a copy of this exhibit.

```
*
* LOTS 16, ZONE 3
*
**********************************************************************
*        100-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)           *
**********************************************************************
*
START
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                      RAIN DELAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD        ID=1 HYD NO=100.0 AREA=0.001136 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
*
**********************************************************************
*         10-YEAR,  6-HR STORM (UNDER EXISTING CONDITIONS)           *
**********************************************************************
*
START                 TIME=0.0
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=1.43 IN RAIN SIX=1.73 IN
                      RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD        ID=1 HYD NO=110.0 AREA=0.001136 SQ MI
                      PER A=100.00 PER B=0.00 PER C=0.00 PER D=0.00
                      TP=0.1333 HR MASS RAINFALL=-1
*
**********************************************************************
*        100-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)           *
**********************************************************************
*
START
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=2.14 IN RAIN SIX=2.60 IN
                      RAIN DELAY=3.10 IN DT=0.03333 HR
COMPUTE NM HYD        ID=1 HYD NO=101.0 AREA=0.001136 SQ MI
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                      TP=0.1333 HR MASS RAINFALL=-1
*
**********************************************************************
*         10-YEAR,  6-HR STORM (UNDER PROPOSED CONDITIONS)           *
**********************************************************************
*
START                 TIME=0.0
RAINFALL              TYPE=1 RAIN QUARTER=0.0 IN
                      RAIN ONE=1.43 IN RAIN SIX=1.73 IN
                      RAIN DAY=2.07 IN DT=0.03333 HR
COMPUTE NM HYD        ID=1 HYD NO=111.0 AREA=0.001136 SQ MI
                      PER A=43.00 PER B=20.00 PER C=20.00 PER D=17.00
                      TP=0.1333 HR MASS RAINFALL=-1
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FINISH
```

AHYMO SUMMARY TABLE (AHYMO194) - AMAFCA Hydrologic Model - January, 1994 RUN DATE (MON/DAY/YR) =07/05/1999

INPUT FILE = 9933

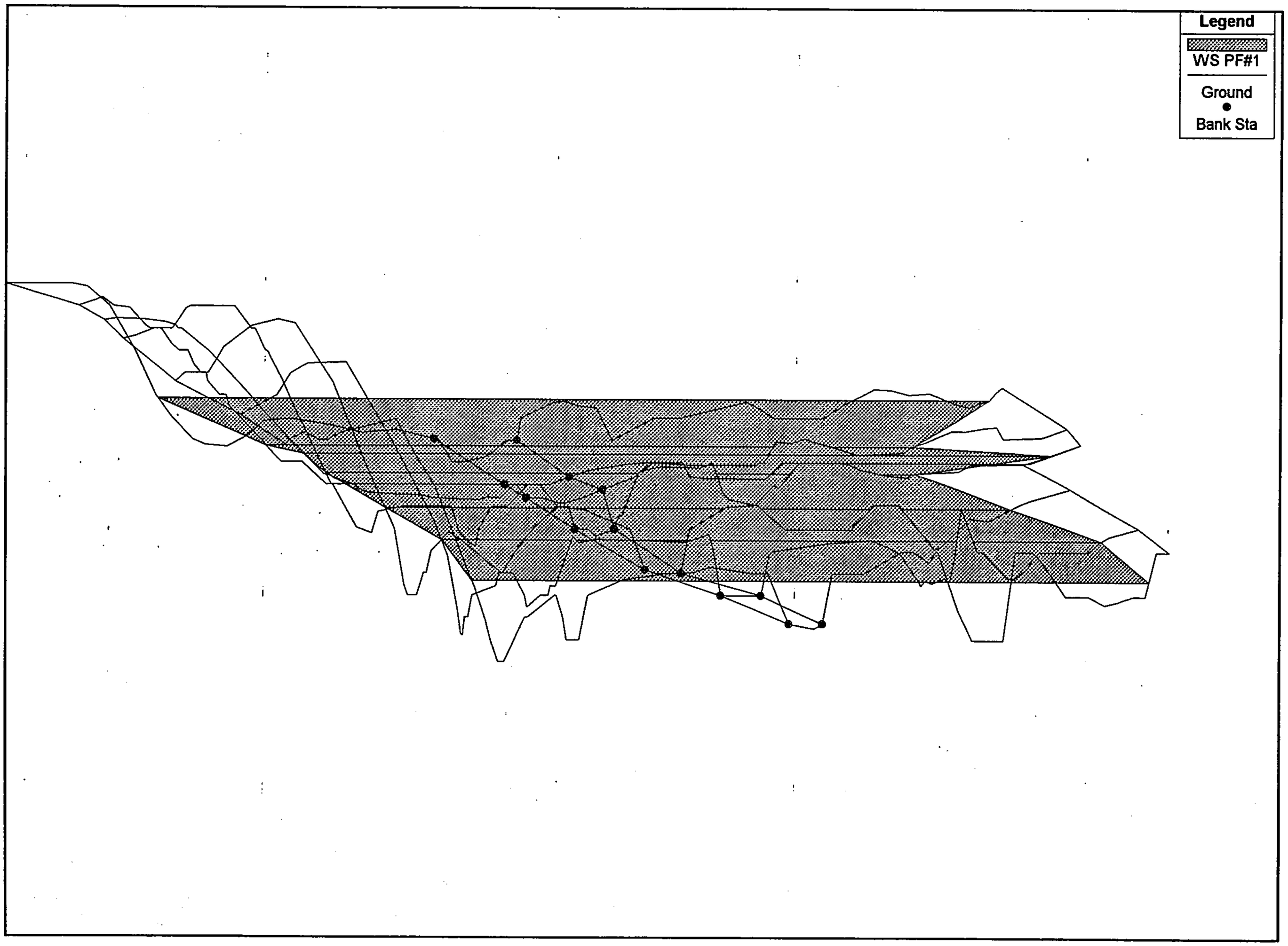
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.600
COMPUTE NM HYD	100.00	-	1	.00114	1.37	.040	.65514	1.533	1.882	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.730
COMPUTE NM HYD	110.00	-	1	.00114	.41	.011	.18834	1.533	.564	PER IMP= .00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.600
COMPUTE NM HYD	101.00	-	1	.00114	2.08	.067	1.09771	1.500	2.860	PER IMP= 17.00
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 1.730
COMPUTE NM HYD	111.00	-	1	.00114	1.00	.031	.50572	1.500	1.370	PER IMP= 17.00

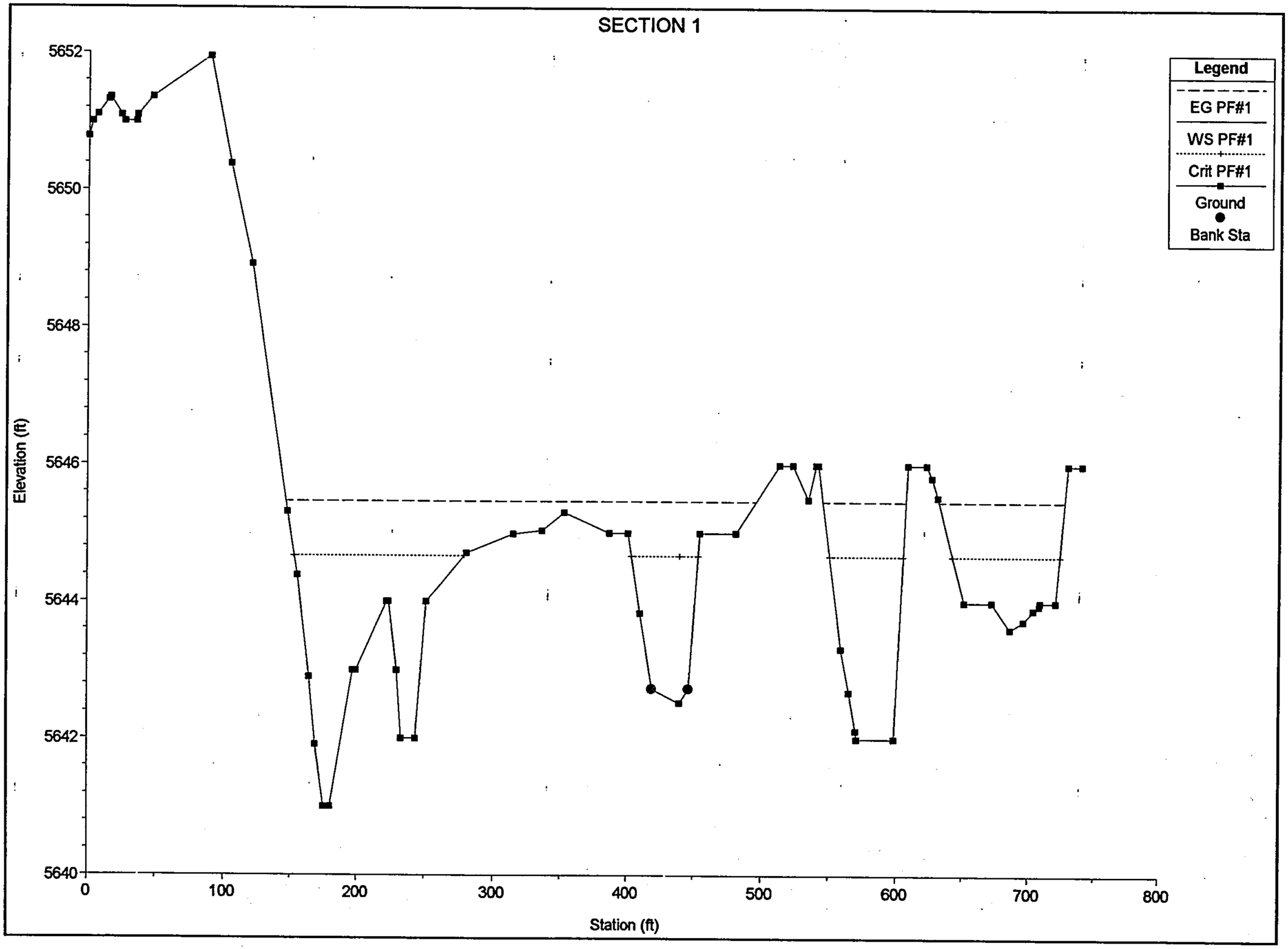
FINISH

HEC-RAS OUTPUT FILE

HEC-RAS Plan: N Alb. Acres BASIN 110.0 Reach: LOT 16

River Sta.	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (sq ft)	Froude # Chl (ft)
7	3048	5650.00	5652.84	5652.84	5653.34	0.0101	7.61	674.07	615.76	0.87
6	3048	5649.00	5650.74	5650.74	5651.30	0.0172	7.89	555.40	489.62	1.07
5	3048	5648.17	5650.37	5650.37	5650.87	0.0125	7.49	644.16	624.70	0.94
4	3048	5646.70	5649.52	5649.52	5650.25	0.0148	9.80	509.26	353.97	1.07
3	3048	5645.00	5647.93	5647.93	5648.64	0.0134	10.00	561.02	451.97	1.03
2	3048	5644.00	5646.50	5646.50	5647.24	0.0150	9.57	519.58	492.63	1.07
1	3048	5642.52	5644.67	5644.67	5645.46	0.0210	9.92	449.27	311.64	1.22


Legend
WS PF#1
Ground
Bank Sta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Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
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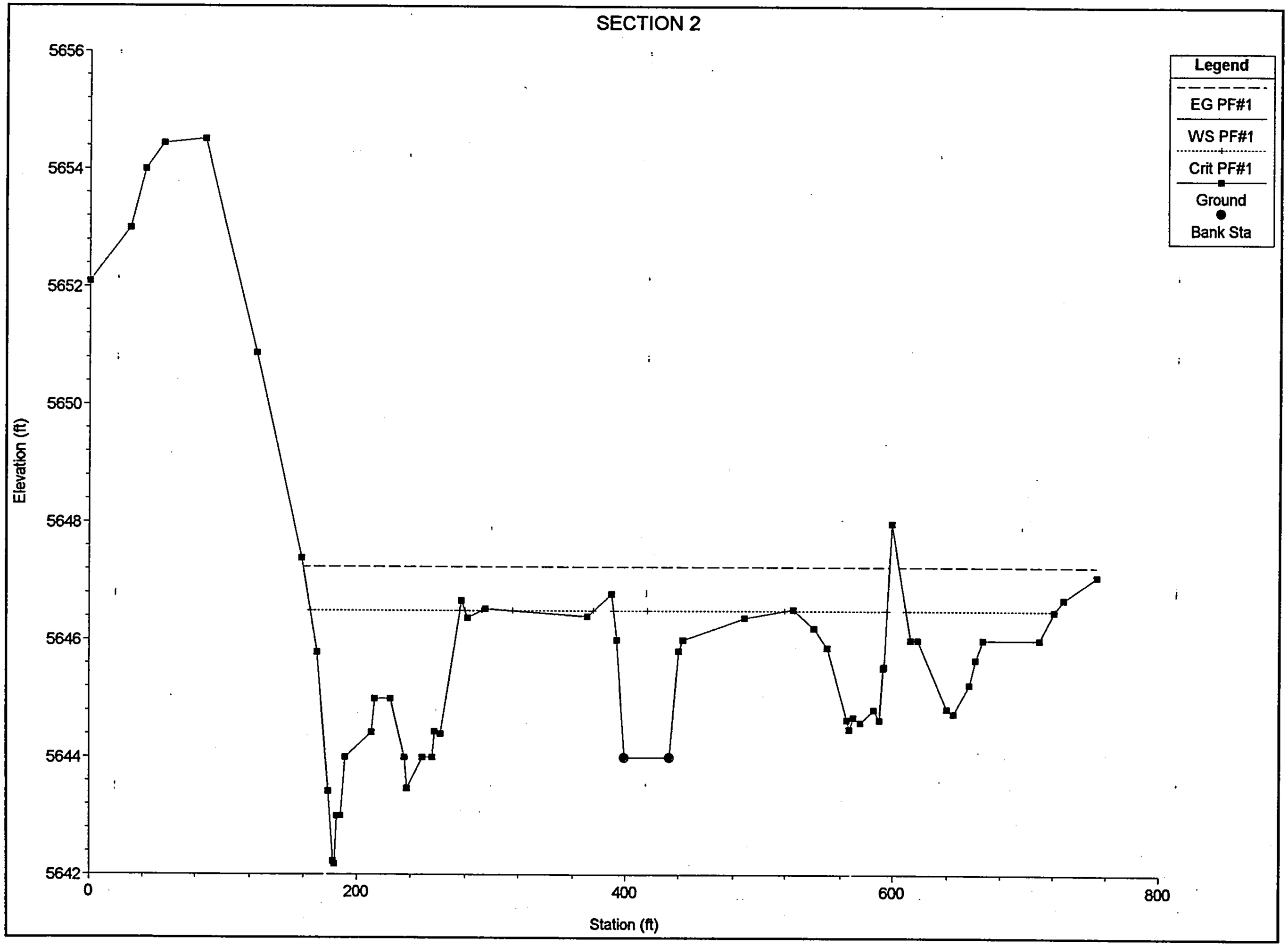
5650
5648
5646
5644
5642
5640
0
100
200
300
400
500
600
700
800
Station (ft)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WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
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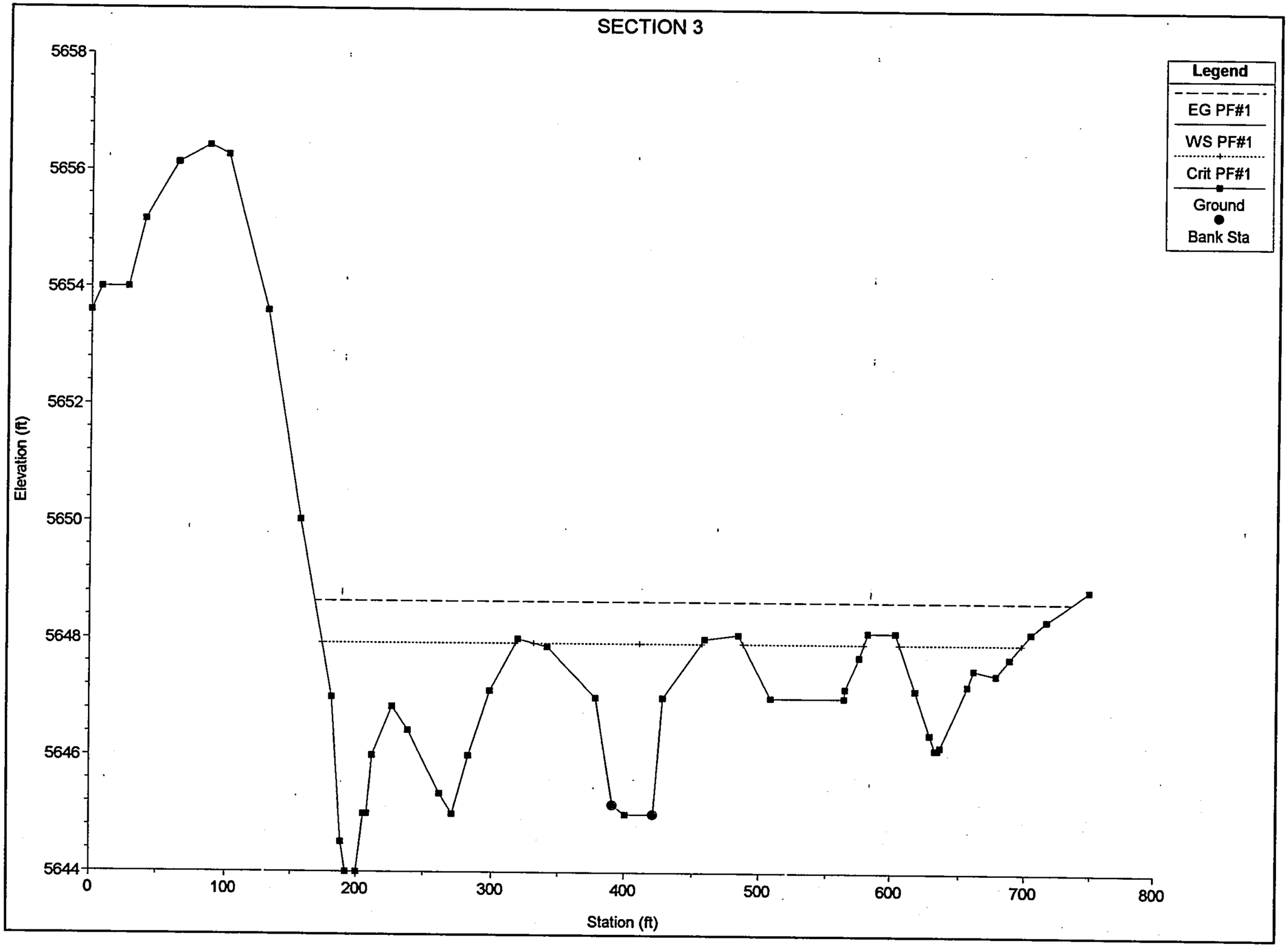
5654
5652
5650
5648
5646
5644
5642
0
200
400
600
800
Station (ft)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WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
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5656
5654
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5650
5648
5646
5644
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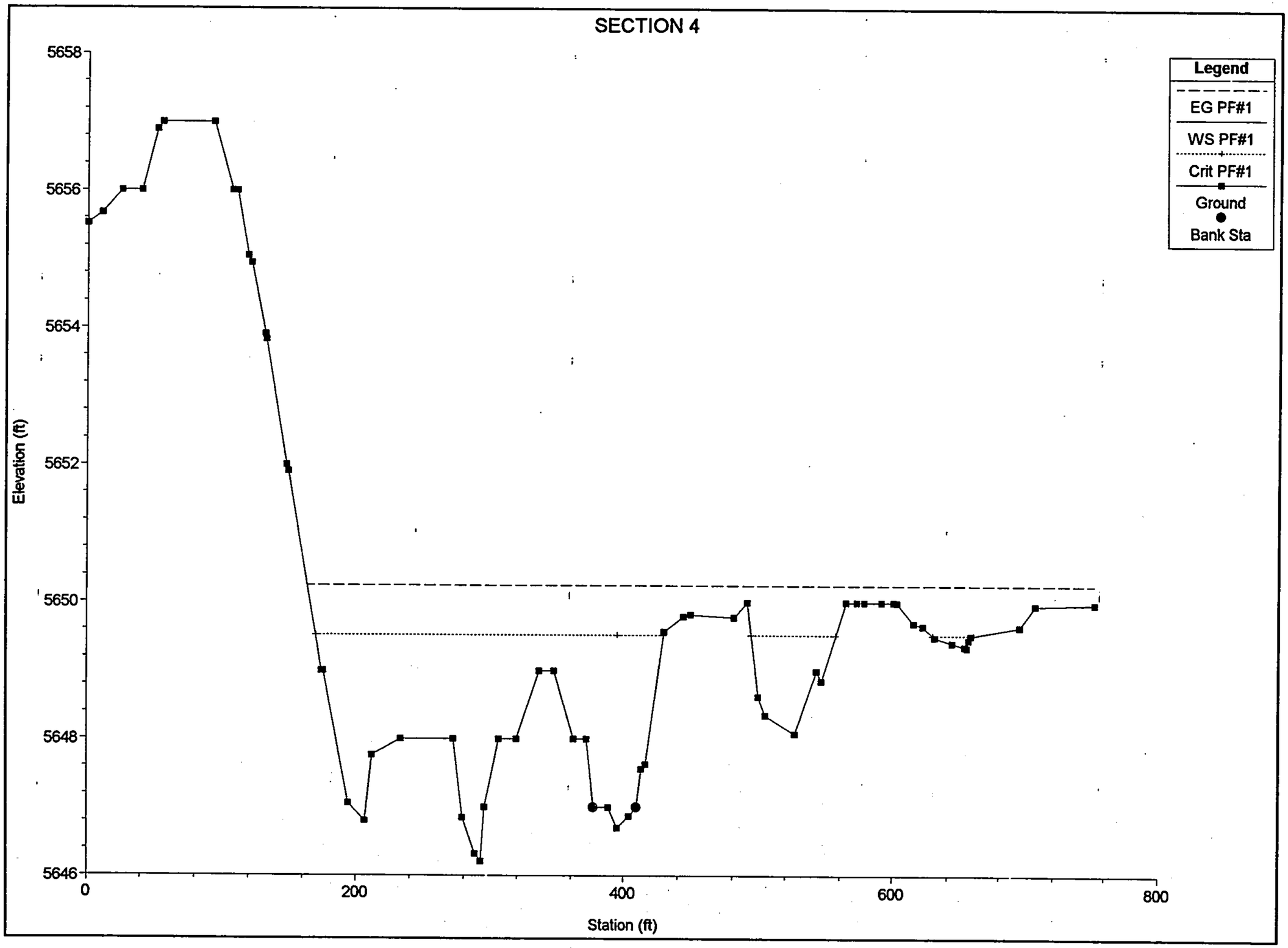
100
200
300
400
500
600
700
800
Station (ft)

SECTION 4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Ground
Bank Sta
Elevation (ft)
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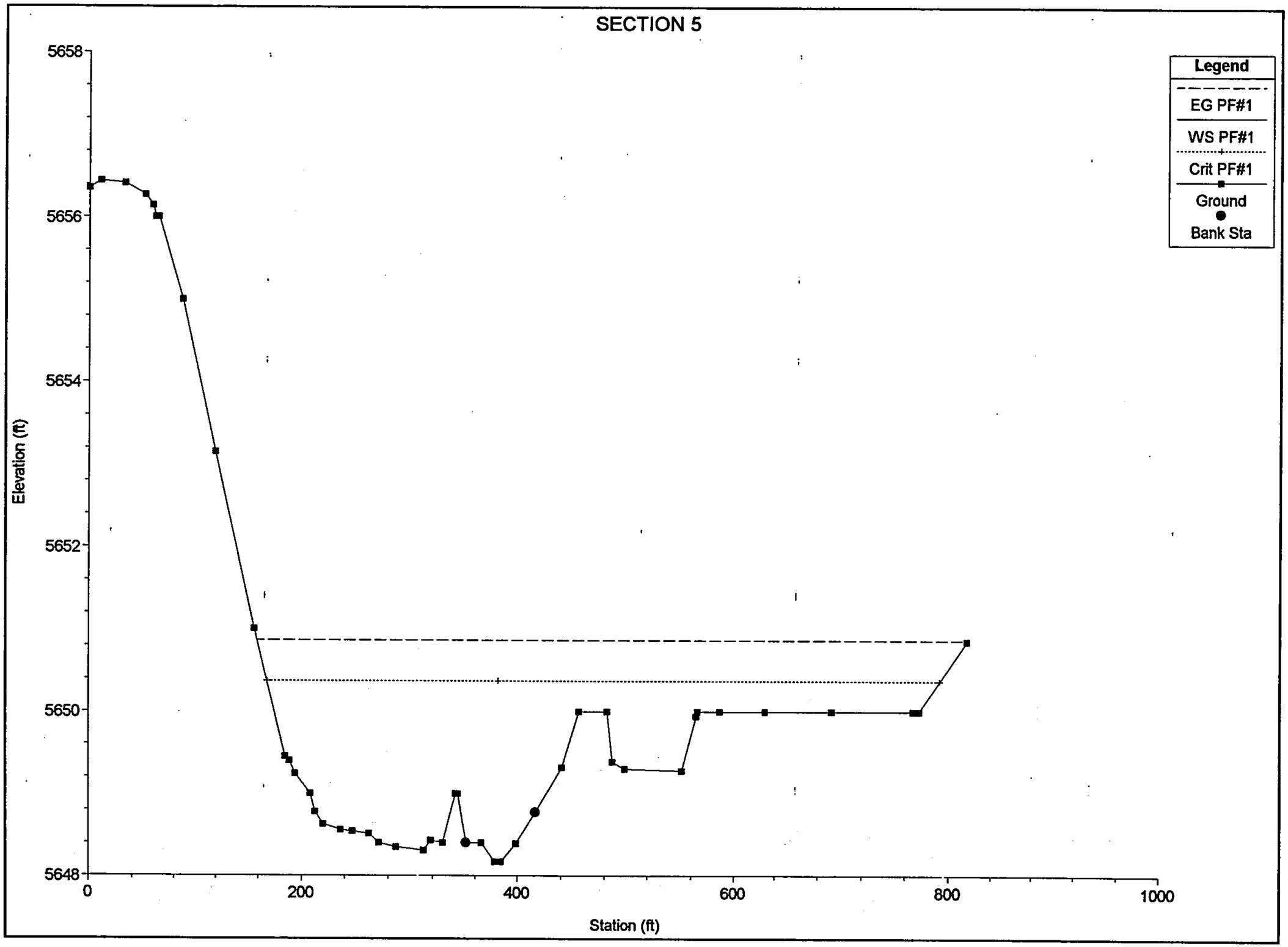
5654
5652
5650
5648
5646
0
200
400
600
800
Station (ft)

SECTION 5


Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
5658
5656
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5652
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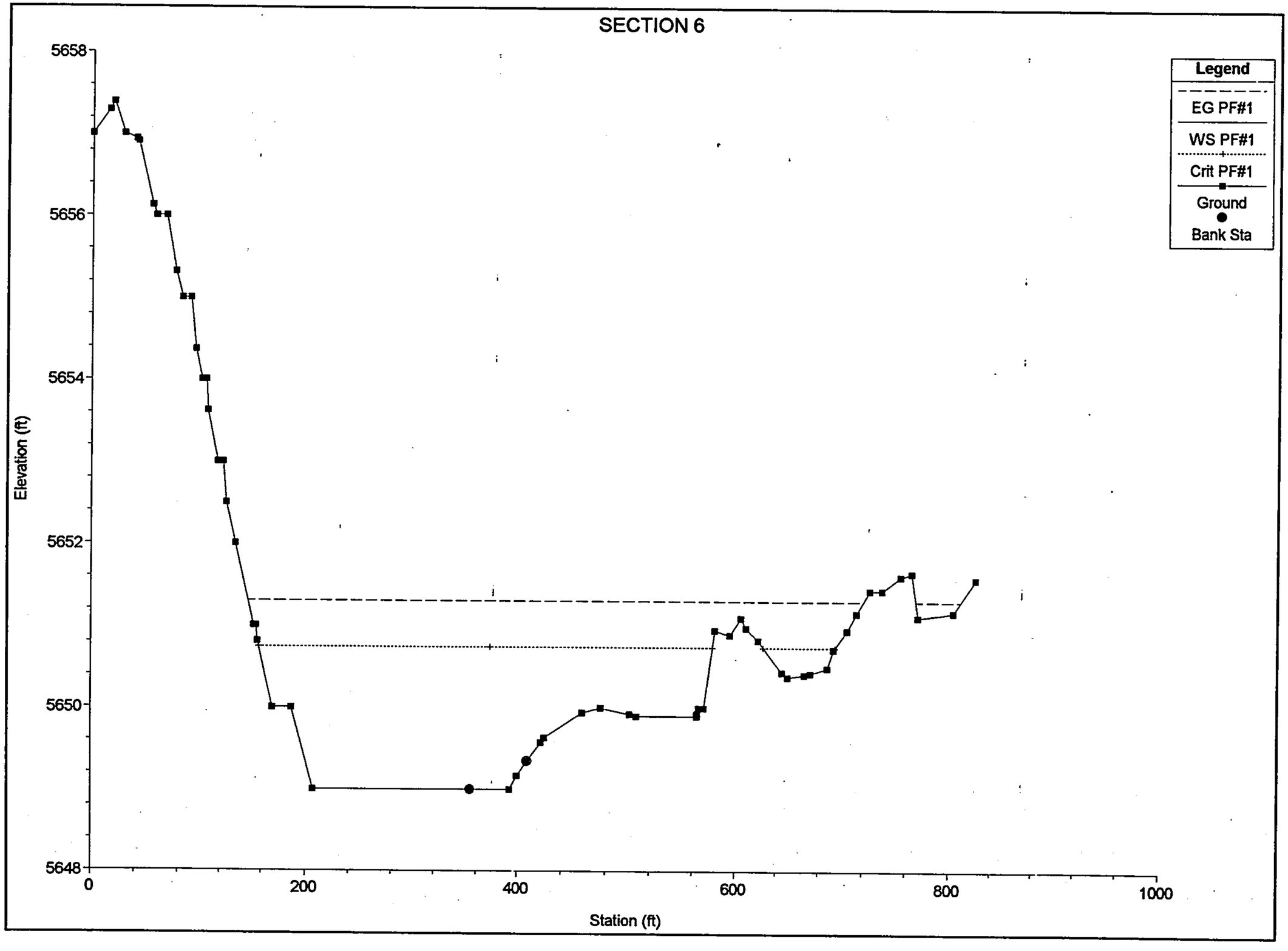
5648
0
200
400
600
800
1000
Station (ft)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WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
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5650
5648
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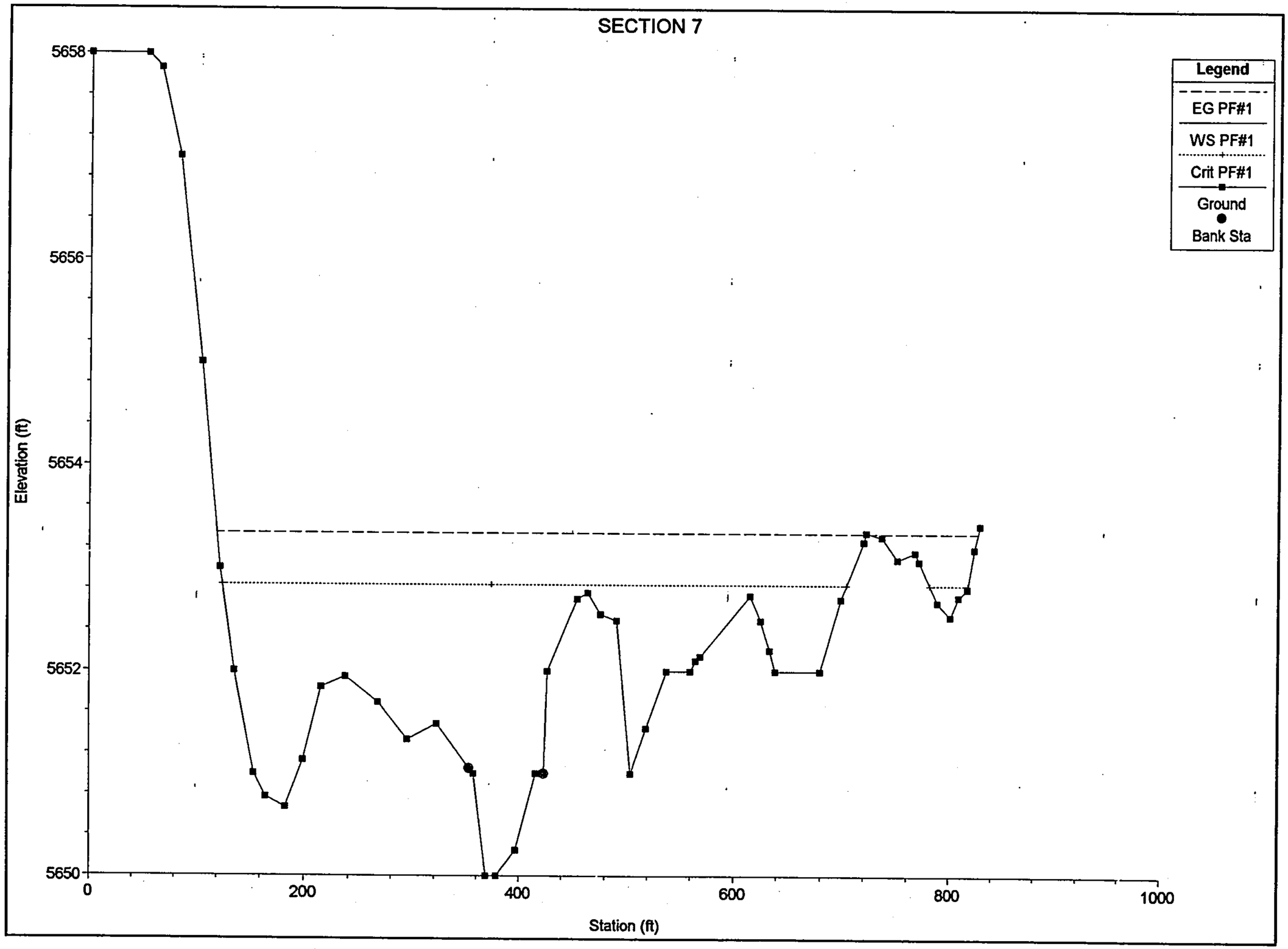
200
400
600
800
1000
Station (ft)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EG PF#1
WS PF#1
Crit PF#1
Ground
Bank Sta
Elevation (ft)
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5652
5650
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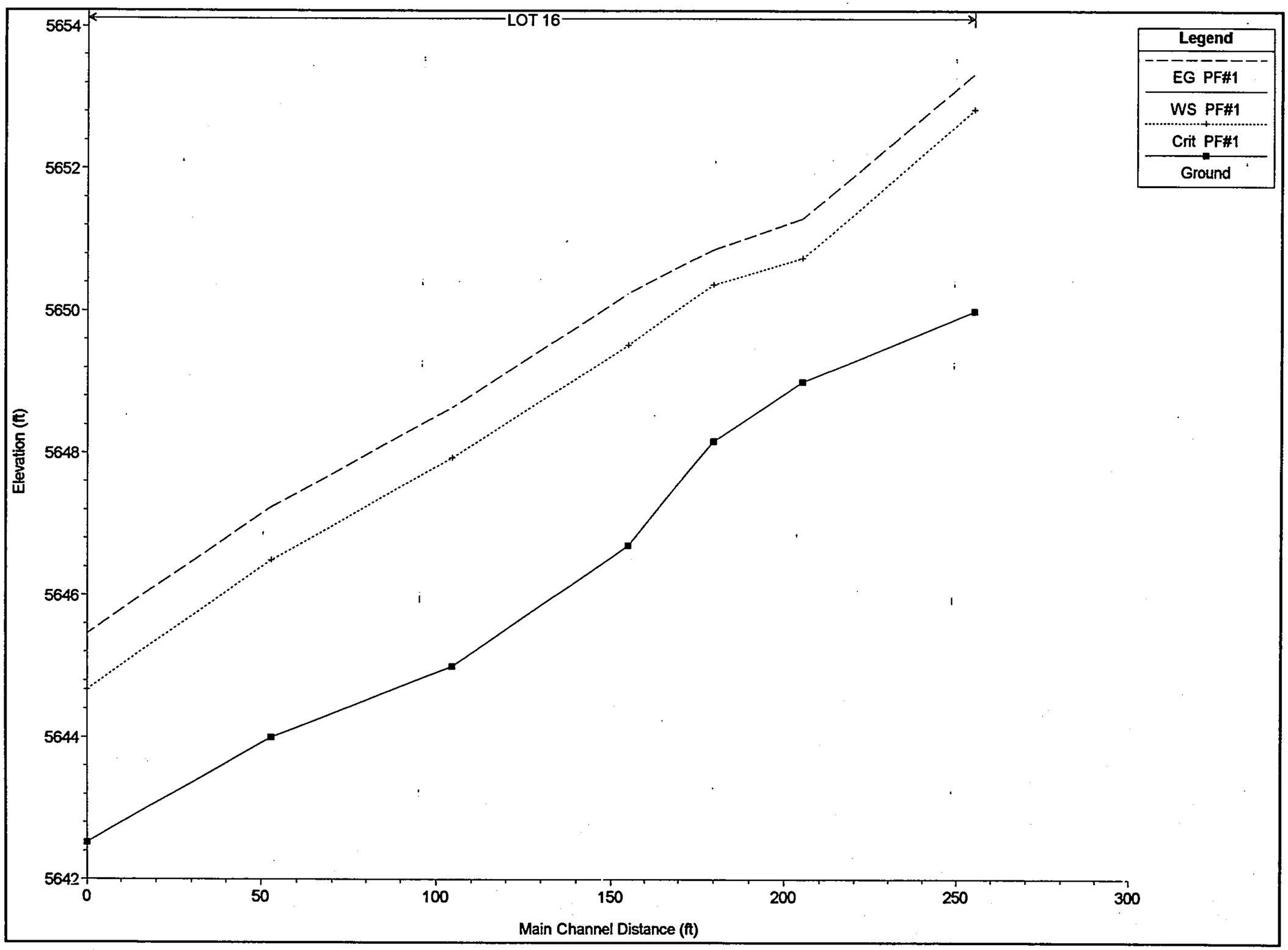
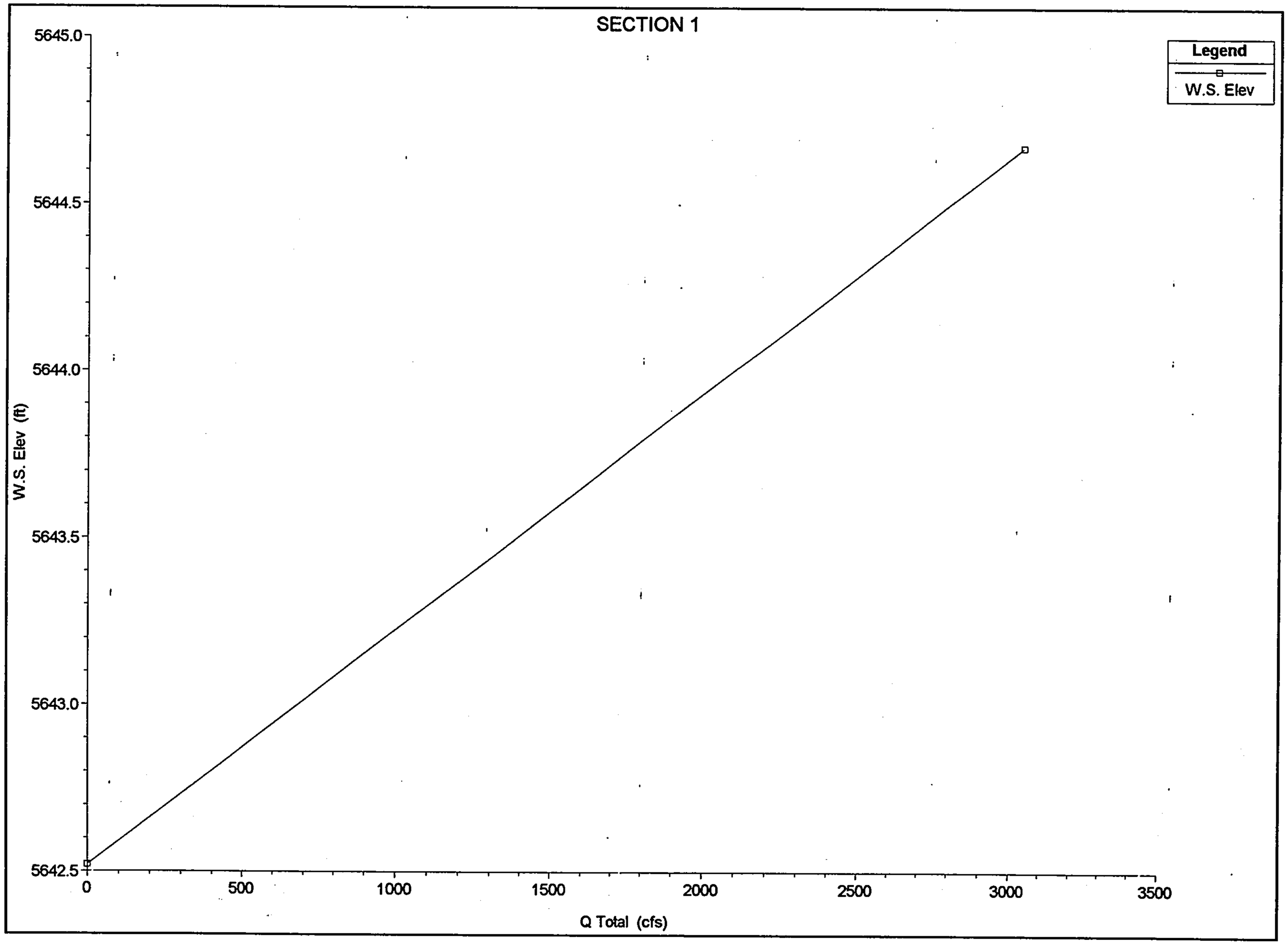
200
400
600
800
1000
Station (ft)


LOT 16
Legend
EG PF#1
WS PF#1
Crit PF#1
Ground
Elevation (ft)
5654
5652
5650
5648
5646
5644
5642
0
50
100
150
200
250
300
Main Channel Distance (ft)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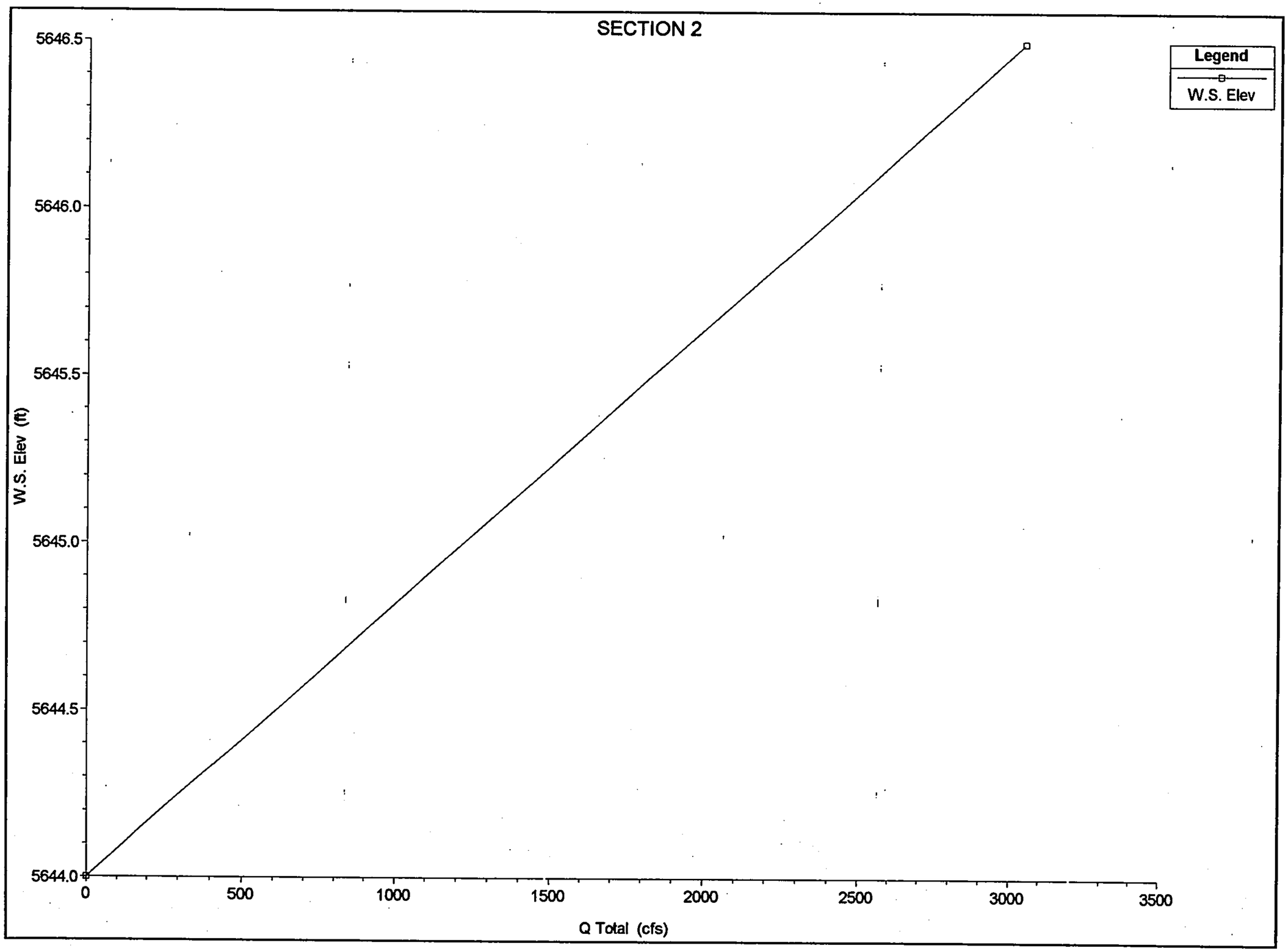
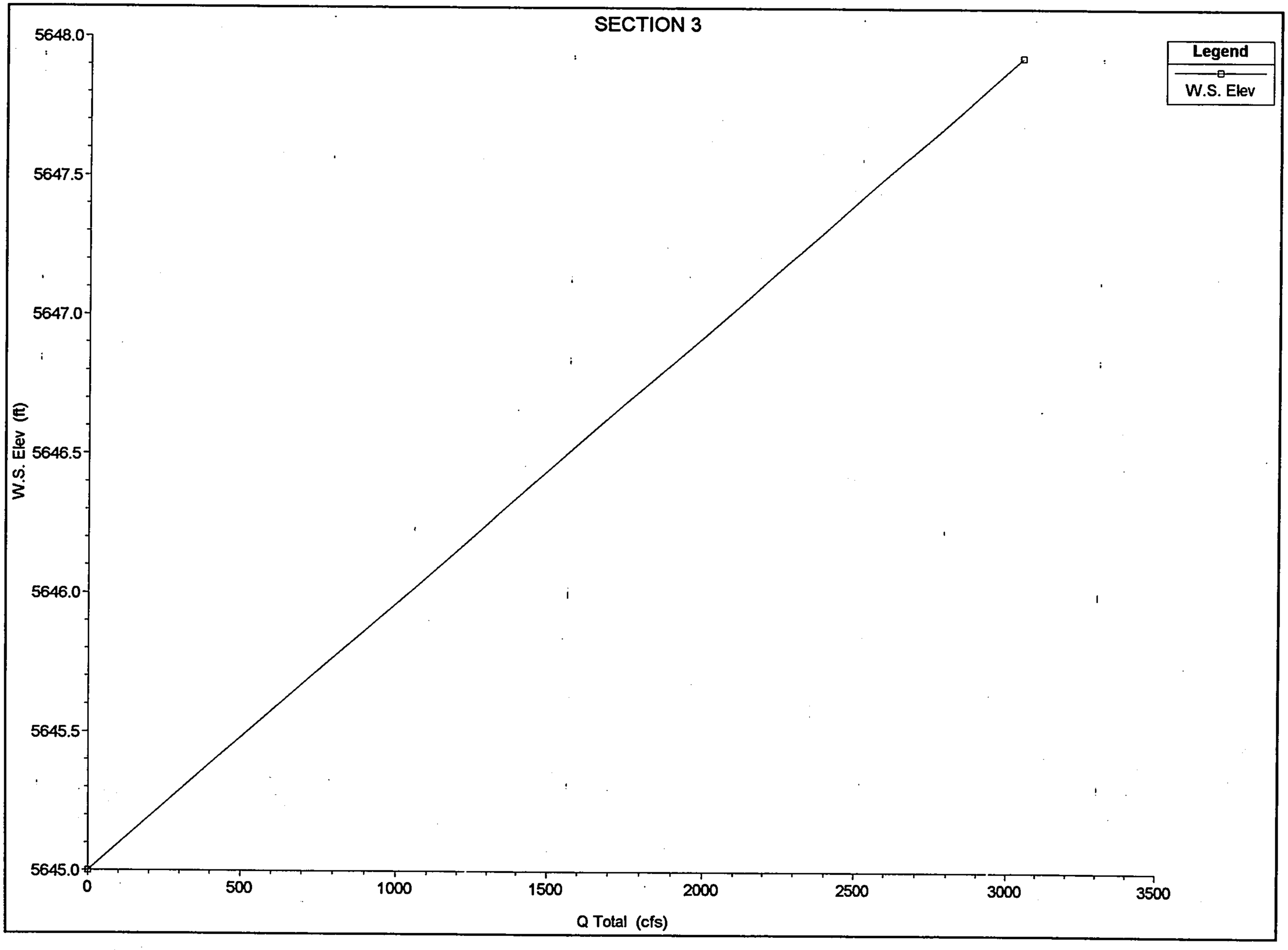
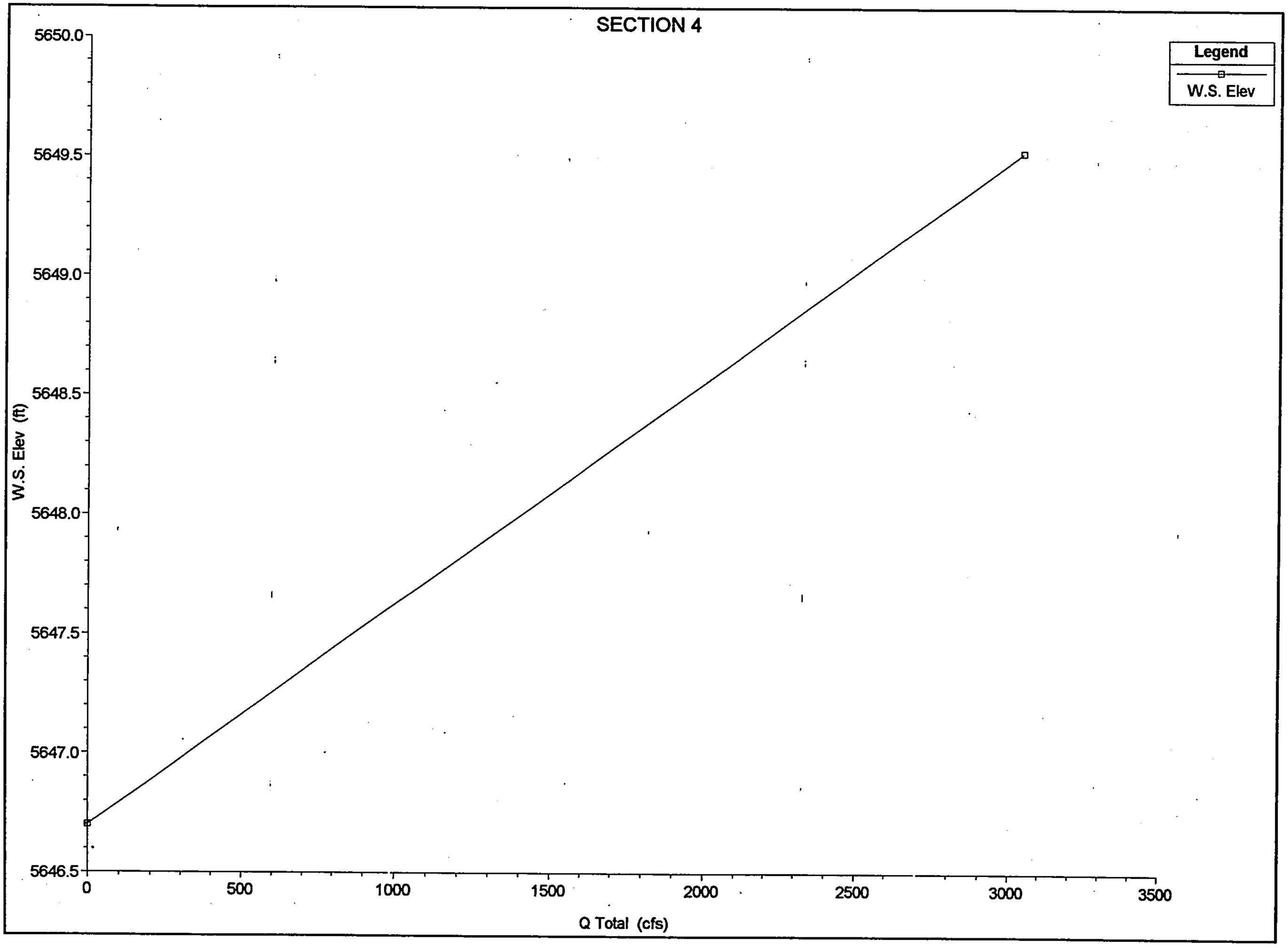
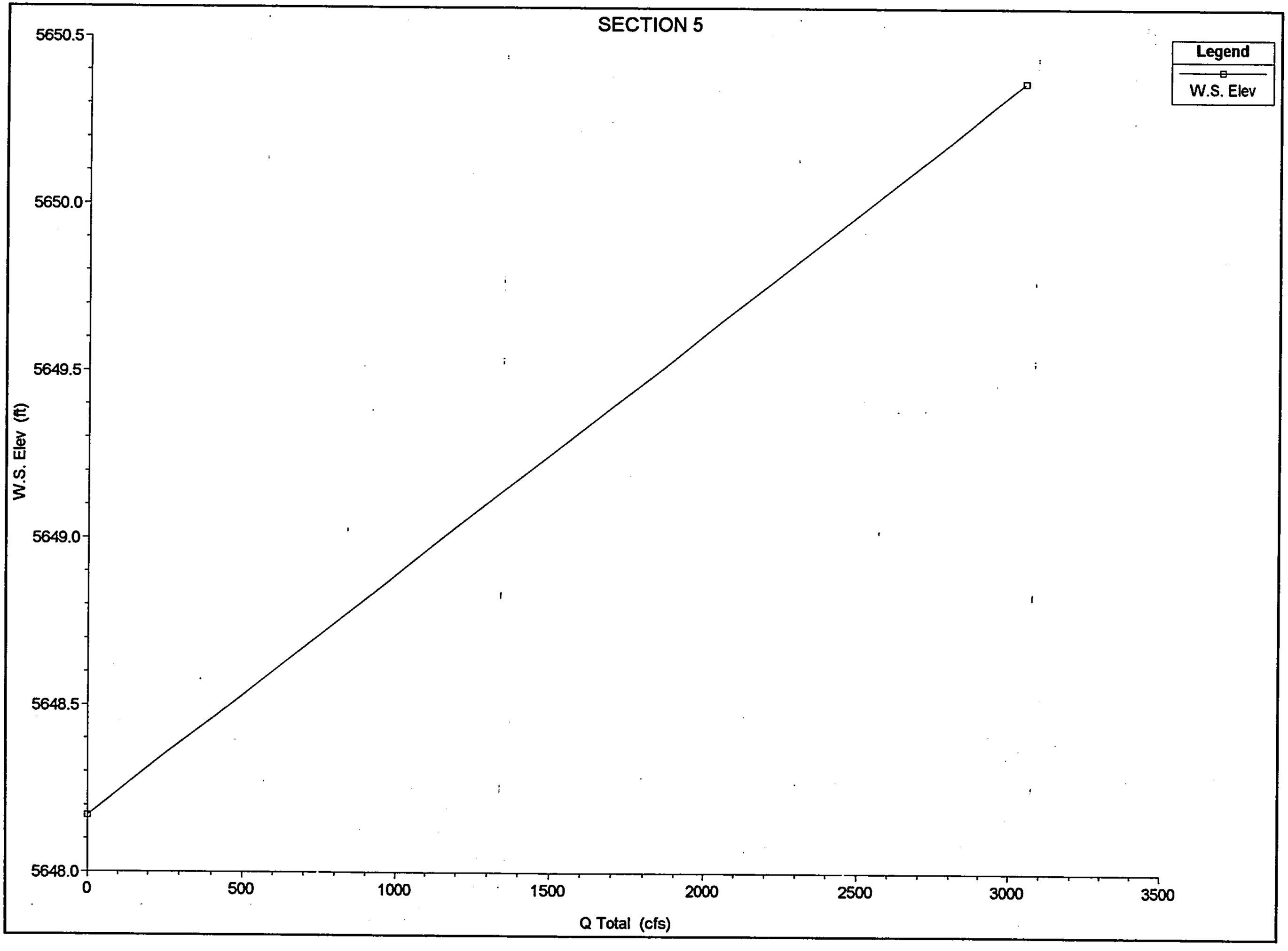
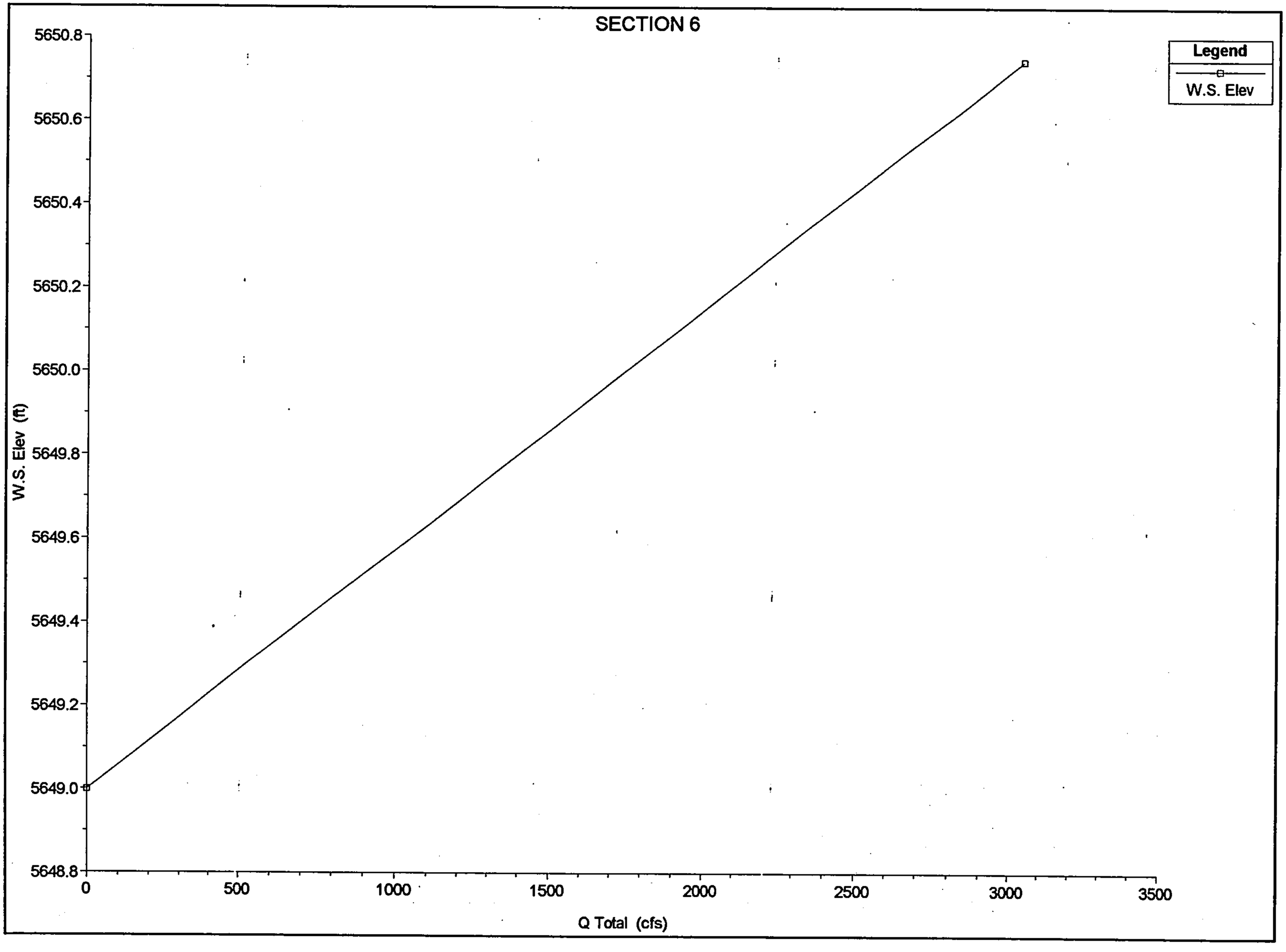
Legend
W.S. Elev
5645.0
5644.5
5644.0
5643.5
5643.0
5642.5
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)

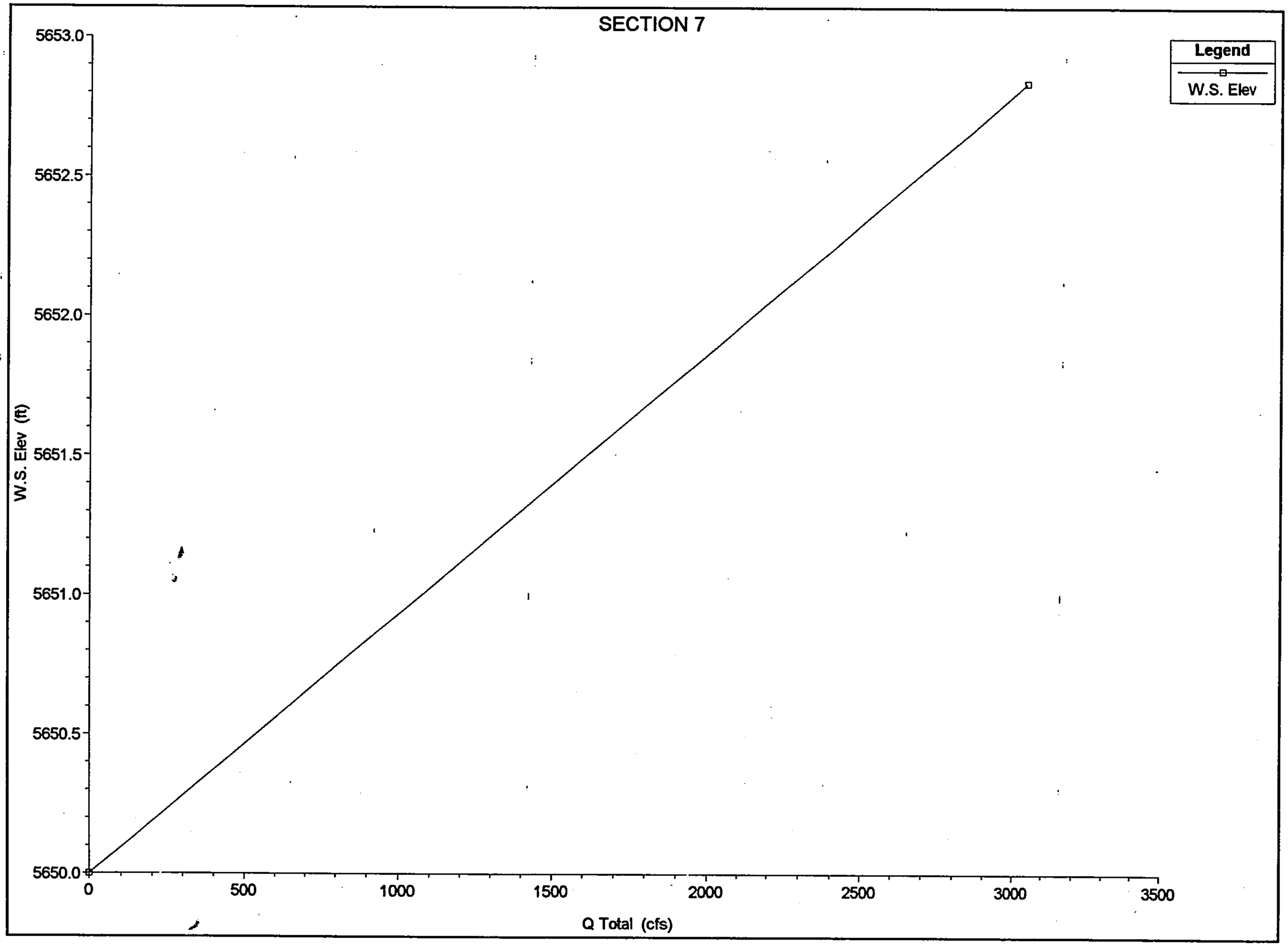

SECTION 2
Legend
W.S. Elev
5646.5
5646.0
5645.5
5645.0
5644.5
5644.0
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)


SECTION 3
Legend
W.S. Elev
5648.0
5647.5
5647.0
5646.5
5646.0
5645.5
5645.0
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)


SECTION 4
Legend
W.S. Elev
5650.0
5649.5
5649.0
5648.5
5648.0
5647.5
5647.0
5646.5
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)


SECTION 5
Legend
W.S. Elev
5650.5
5650.0
5649.5
5649.0
5648.5
5648.0
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)


SECTION 6
Legend
W.S. Elev
W.S. Elev (ft)
5650.8
5650.6
5650.4
5650.2
5650.0
5649.8
5649.6
5649.4
5649.2
5649.0
5648.8
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)


SECTION 7
Legend
W.S. Elev
5653.0
5652.5
5652.0
5651.5
5651.0
5650.5
5650.0
W.S. Elev (ft)
0
500
1000
1500
2000
2500
3000
3500
Q Total (cfs)