

**SUBSIDENCE MONITORING REPORT
1996
STAR POINT MINE
ACT/007/006**

**Cyprus Plateau Mining Corporation
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INTRODUCTION

During the months June through September, subsidence monitoring was conducted on surface lands above underground mining. The land surface above all full extraction mining was visually searched for evidence of surface disturbance. Monitoring points on the north half of the area above longwall panels 1 through 7, and 13 and 14, (Map 521.121e) have reached effective maximum subsidence and therefore were not surveyed in 1995. The monitoring points on the south half of this area have reached effective maximum subsidence and therefore were not surveyed. Monitoring points U1, U2, U3, U4, have reached effective maximum subsidence and therefore were not surveyed. Monitoring points U-5 through U-17 and GS-1 were not surveyed, these points have reached complete subsidence movement and do not need to be surveyed again. Monitoring points U-18 through U-32 have reached complete subsidence movement and therefore not surveyed. Monitoring points G-1 through G-19 have reached maximum effective subsidence and therefore not surveyed in 1996. Monitoring points G-20 through G-94 (Map 521.121f and 521.121g1) were surveyed for vertical movement. Monitoring points G-95 through G-104 were installed and surveyed ahead of mining.

Mining during 1996 was conducted in the areas shown on Maps W-4 and W-5, located at the end of this report.

SURFACE EFFECTS

Longwall Mining Panels 1- 7, 13-14, 8-12 and 15 and 16

Surface cracks, as shown on Map 521.121e, over longwall mining in Section 18, T15S, R8E, and Section 12, T15S, R7E, are associated with known faults in the south half and in the northeast quarter of Section 12, and with fractures in Section 18,

The cracks in the south half and in the northeast quarter of Section 12 originally varied in width from hairline to 6 inches, and displacement across the cracks varied from none to two feet. These cracks are continuing to heal nicely; there are not known open holes or unsafe areas. The cracks do not pose a safety hazard to humans, livestock or wildlife. The cracks in the northwest quarter of Section 12 developed during the winter of 1990; they vary in width from hairline to about 2 feet. These cracks were fenced during the summer of 1991 in compliance with the Manti La-Sal National Forest based upon site evaluation and recommendations.

Subsidence contours have been plotted using survey data in the Section 12 area. Monitoring in 1994 showed minimal new subsidence movement, the subsidence contours did not change from last year. As can be seen on Map 521-121e, subsidence contours reflect a reaction to the east-west trending faults. On the west side of Section 12, two short cracks appeared in 1989 at north-south trending faults. These cracks were very small, and have healed to a point where they are almost impossible to find.

Overburden in the Section 12 area ranges from 800 to 1,500 feet. The area is characterized by a mounded ridge with a steeply incised canyon on the north end. Several areas of outcropping sandstone channels in Section 18 failed due to surface and near surface movement. No massive failures have occurred.

Overburden in the Section 18 area ranges from 0 to 1,100 feet. The area is characterized by a ridge at the north end with a cliff of exposed Castle Gate Sandstone. The majority of the area comprises the headwaters of a small drainage basin characterized by steep canyon sides and very rugged, tree covered terrain. Because the terrain in Section 18 is so rugged, a grid of monitoring points is impractical. Subsidence contours cannot be plotted for this same reason. The cracks in Section 18 vary in width from hairline to 60 inches; displacement across the cracks varies from none to 2 feet.

Cross sections have been plotted through Panels 1-7, 13 and 14 (Figure 1), Panel 2 (Figure 2), and Panel 4 (Figure 3). Cross Section F-F has been plotted of monitoring points U-18 through U-32 (Figure 10) showing the angle of draw at this location of 15 degrees. Please refer to Map 521.121e for cross section locations.

As can be seen on Figures 1, 2, and 3, subsidence has stopped above the longwall panels in the area of longwall panels 1-7 and 13 and 14. Subsidence reached its maximum during the third year after mining. Figure 1 shows the subsidence profile diagonally through the nine longwall panels. The progression of subsidence can be seen to the north as successive panels were mined.

A cross section through Points U5-U17 in Section 18 (Figure 4) indicates a maximum vertical drop of 3.4 feet. These monitoring points were not monitored in 1991 due to hazardous conditions but, were monitored again in 1992. They were not monitored in 1993 due to hazardous conditions. As can be seen on the cross section, mining of longwall panels 16 and 17 in the Third Seam caused additional movement.

Horizontal and vertical movement graphs have been made of monitoring points U1, U2, U3, and U4, Figures 5, 6, 7, and 8 respectively. Point U1, which is located directly above the north edge of longwall mining in the Wattis coal seam, shows the most vertical and horizontal movement. Point U4 which is located north of mining in the Wattis Seam and at the north edge of mining in the Third Seam shows the least movement.

A horizontal and vertical movement graph (Figure 9) has been plotted of monitoring point GS-1 near the stream in Section 18. Probably because of the shallow overburden at the GS-1 point location, maximum subsidence occurred within 15 weeks of the longwall face passing the point. This monitoring point was not surveyed in 1991 and 1993 because of the hazardous condition previously discussed but, was surveyed in 1992. Mining of the Third seam was approximately 220 feet away and appears to have had only minor additional impact on this point.

Longwall Mining Panels 18 through 33

Mining in 1995 included about half of Panel 29, all of Panels 30, 31, 32 and most of 33 as shown on Maps W-4 and W-5, a very minor amount of pillar extraction in Section 23, T15S, R7E as shown on Map W-4; also Longwall development mining in Castle Valley Ridge Lease as shown on Map W-5.

Monitoring points G-1 through G-63 as shown on Map 521.121f were surveyed for vertical movement. Cross Sections D-D (Figure 11), E-E (Figure 12), G-G, and H-H were plotted from the data at these monitoring points. As can be seen on the cross sections, maximum subsidence is 5.33 feet at monitoring station G-15. Subsidence at the Fox points is greatest at Fox 3, at 5.74 feet.

As shown on Cross Sections D-D and E-E, the angle of draw at these locations is 26 degrees and 24 degrees respectively. The angle of draw at Cross Sections G-G and H-H are 26 degrees and 5 degrees, respectively. It appears that the angle of draw is affected by faulting or jointing of the strata.

Subsidence monitoring of stations G-44 through G-63 is shown on the attached subsidence data sheets.

Longwall Mining Panels 33 through 38

Mining in 1996 included a small portion of Panel 33, all of Panels 34, 35, 36, 37 and about half of 38, as shown of Map W-5. A minor amount of CM mining was conducted in the south as shown of Map W-4; also longwall development mining to the north was performed as depicted on Map W-5.

It should be noted that, due to geologic conditions, the 3rd North Mains are being developed more northward than previously presented. Subsidence monitoring has been established to detect any vertical movement.

Monitoring points G-20 through G-94, as shown of Maps 521.121f and 521.121g1, were surveyed for vertical movement. Cross section G-G (Figure 13) and H-H (Figure 14) were plotted from some of the data at these monitoring points. Maximum subsidence during the 1996 monitoring is 6.59 feet a station G-58.

Subsidence monitoring of stations G-20 through G-104 is shown on the attached subsidence data sheets.

MITIGATION

The surface cracks crossing the U.S. Forest Service development road in Section 12 were repaired in 1987, and have shown no further cracking, or movement.

A portion of the surface cracks near monitoring points U1 and U2 in Section 18 have been repaired to reduce the likelihood of accidents. The cracks were backfilled and the area fenced. Signs are in place in the area warning the public of the potential danger of the unstable ground. This area is fee land owned by the U.S. Fuel Company; Cyprus Plateau Mining Corporation has an agreement with U.S. Fuel which allows mining impacts. In the fall of 1995, the cracks were plugged with foam to provide additional protection to the public and provide a base for future backfilling.

The cracks in the northwest quarter of Section 12 are fenced and danger signs placed to warn the public of the hazards. They are in a very rugged area where very few people travel.

VEGETATION

Subsidence in the Section 12 area has caused minimal vegetation loss. Grasses, shrubs and trees near the cracks do not appear to be affected.

Some vegetation in Section 18 has been lost to the small outcrop failures. Natural reseedling is occurring and the area is reestablishing itself nicely.

SURFACE WATER AND GROUND WATER

There has been no identified impact to ground water in the Section 12 area and there is no surface water in the area.

The Section 18 is the subject of a study of the effects of longwall mining on ground water and surface water; the study ran through 1992, with the final report completed in 1995. The study was undertaken in conjunction with the U.S. Geological Survey and the Division of Oil, Gas and Mining, the U.S. G. S. published the final report.

The stream in Section 18 (North Fork Right Fork Miller Creek) had continuous flow in July, but during the low flow period in October the flow disappeared between monitoring points M-2 and M-4 as shown on Permit Map 722.100d. The water reappeared below monitoring point M-4 at an area below M-3. M-3 had a flow of 2.75 gpm and at a spot below the confluence of M-3 and the North Fork the flow was 15.0 gpm. The approximate 13.0 gpm increase in the North Fork below M-3 is consistent with the July monitoring. However, stream flow was dry in the vicinity of M-6 and M-5, but reappeared in the vicinity of the tank seam outcrop. The stream water was diverted into the mine near monitoring point GS-1 because of subsidence during mining in 1989. The stream at this location was small, about 6 GPM before mining. Springs and base flow from the canyon bottom recharge the stream below this point. A section of stream approximately 800 feet long appears to have been affected. Additional time is needed to monitor the stream to determine whether mudstones and siltstones will expand and stop the downflow of stream water. Water rights in the stream are held by U.S. Fuel Company, with which Cyprus Plateau has an agreement allowing impacts due to mining. Flow below the lower dry section begins again

below monitoring station M-6 as shown on Map 722.100d, and at monitoring station M-8 the flow averaged 8.40 gpm from June through October 1996.

A small side canyon to the North Fork of the Right Fork of Miller Creek in the southeast quarter of the northwest quarter of Section 12, monitoring station M-3, had a small flow prior to mining; the flow in this stream channel was diverted into the ground presumably due to subsidence in 1989. There was flow from the channel in early July of 1990, but no flow in September of 1990. In early July of 1991, there was a flow of 1.5 GPM coming from the channel again. The flow may be an indication that the mudstone and siltstones are healing, there was no flow in 1992 possibly due to the drought. In 1993 the side canyon was flowing again both in July and September. In 1996, this canyon flowed both in July and in October. The wetter winter of 1992-1993, 1993-1994, 1994-1995 may have caused the side canyon to flow again. The 1995-1996 winter was not as wet as the previous and compounded with a drier spring and summer, it was encouraging to have flow during the monitoring period. Additional time is needed to monitor this channel for flows to determine healing, but information gathered to date is encouraging.

A complete discussion of hydrologic impacts can be found in the 1994 Annual Hydrologic Report.

SURFACE STRUCTURES

The only impact to surface structures has been the settling of the U.S. Forest Service development road discussed previously in this report. Repairs to this road were made in 1987, and no further road damage has occurred.

MONITORING

Monitoring in 1996 will include the following:

1. Survey monitoring points G-20 through G-104 above longwall panels 18 through 42, as shown on Map 521.121f and Map 521.121g1. Install monitoring points above Longwall Panels 43 through 45, and along the Castle Valley Ridge Trail as shown on Map 521.121g1.
2. Monitor points U-5 through U-17, GS-1, points P-112 through P-121, Fox, Fox 2, and Fox 3.
3. Visual observations of the ground surface above all mined areas for surface effects of mining.
4. Visually inspect the Wild Cattle Hollow stream west of longwall panels 18 through 30 for evidence of surface impacts from mining.

CYPRUS-PLATEAU MINING CORPORATION
 SUBSIDENCE MONITORING ELEVATIONS

SUBSIDENCE IN FEET
 - INDICATES DROP IN GROUND SURFACE

ELEVATIONS		ELEVATIONS										SUBSIDENCE IN FEET														
STATION	STATION	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	STATION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
U-23	U-23								9655.21	9654.91	9654.84	9654.83	9654.81			U-23	-0.30	-0.37	-0.38	-0.40						
U-24	U-24								9662.01	9661.97	9661.88	9661.87	9661.87			U-24	-0.04	-0.15	-0.14	-0.14						
U-25	U-25								9690.25	9690.38	9690.37	9690.41	9690.4			U-25	0.13	0.12	0.16	0.16						
U-26	U-26								9676.44	9676.68	9676.65	9676.7	9676.90			U-26	0.24	0.21	0.26	0.25						
U-27	U-27								9682.95	9683.28	9683.23	9683.29	9683.25			U-27	0.31	0.28	0.34	0.30						
U-28	U-28								9691.63	9691.95	9691.94	9691.99	9691.98			U-28	0.32	0.31	0.36	0.35						
U-29	U-29								9705.69	9706.25	9706.25	9706.29	9706.31			U-29	0.28	0.28	0.30	0.32						
U-30	U-30								9721.34	9721.71	9721.70	9721.75	9721.74			U-30	0.37	0.36	0.41	0.40						
U-31	U-31								9734.67	9735.04	9735.06	9735.12	9735.1			U-31	0.37	0.41	0.45	0.43						
U-32	U-32								9755.32	9755.60	9755.61	9755.66	9755.63			U-32	0.28	0.29	0.34	0.31						
Gentry Ridge	Gentry Ridge															Gentry Ridge										
G1	G1								9635.44	9635.44	9635.44	9635.44	9635.5			G1	0.00	0.00	0.00	0.06						
G2	G2								9699.56	9699.54	9699.55	9699.48	9699.59			G2	-0.04	-0.03	-0.10	0.01						
G3	G3								9657.86	9657.80	9657.52	9657.5	9657.58			G3	-0.06	-0.14	-0.16	-0.06						
G4	G4								9619.37	9619.26	9619.14	9619.13	9619.19			G4	-0.11	-0.23	-0.24	-0.16						
G5	G5								9795.90	9795.66	9795.52	9795.45	9795.56			G5	-0.22	-0.36	-0.45	-0.34						
G6	G6								9777.95	9777.35	9776.96	9776.87	9776.96			G6	-0.60	-0.97	-1.06	-0.97						
G7	G7								9767.64	9765.58	9764.59	9764.44	9764.55			G7	-2.06	-3.05	-3.20	-3.09						
G8	G8								9763.47	9760.43	9759.01	9758.88	9759			G8	-3.04	-4.46	-4.59	-4.47						
G9	G9								9780.85	9758.73	9756.36	9756.25	9756.35			G9	-2.12	-4.49	-4.80	-4.50						
G10	G10								9776.22	9774.97	9771.56	9771.37	9771.52			G10	-1.25	-4.66	-4.85	-4.70						
G11	G11								9766.81	9765.90	9761.99	9761.8	9761.82			G11	-0.91	-4.82	-5.01	-4.89						
G12	G12								9614.63	9614.30	9609.87	9609.52	9609.64			G12	-0.33	-4.76	-5.11	-4.99						
G13	G13								9747.45	9747.03	9742.6	9742.22	9742.32			G13	-0.42	-4.65	-5.23	-5.13						
G14	G14								9711.85	9711.95	9707.81	9706.77	9706.77			G14	0.10	-4.04	-5.06	-5.06						
G15	G15								9740.52	9740.63	9736.66	9735.16	9735.19			G15	0.11	-3.66	-5.36	-5.33						
G16	G16								9605.81	9605.26	9605.29	9605.29	9605.36			G16	-0.35	-0.32	-0.32	-0.25						
G17	G17								9606.11	9605.89	9605.93	9605.93	9606.01			G17	-0.22	-0.18	-0.18	-0.10						
G18	G18								9696.98	9696.85	9696.91	9696.91	9697			G18	-0.13	-0.07	-0.07	0.02						
G19	G19								9663.97	9663.96	9663.96	9663.96	9663.96			G19	0.01	0.01	0.01	0.01						
G20	G20											9650.6	9646.86	9646.86	9646.48	G20	-3.94	-3.94	-4.12							
G21	G21											9646.96	9642.43	9642.36	9642.20	G21	-4.53	-4.80	-4.76							

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FIGURE 1 CROSS SECTION A-A

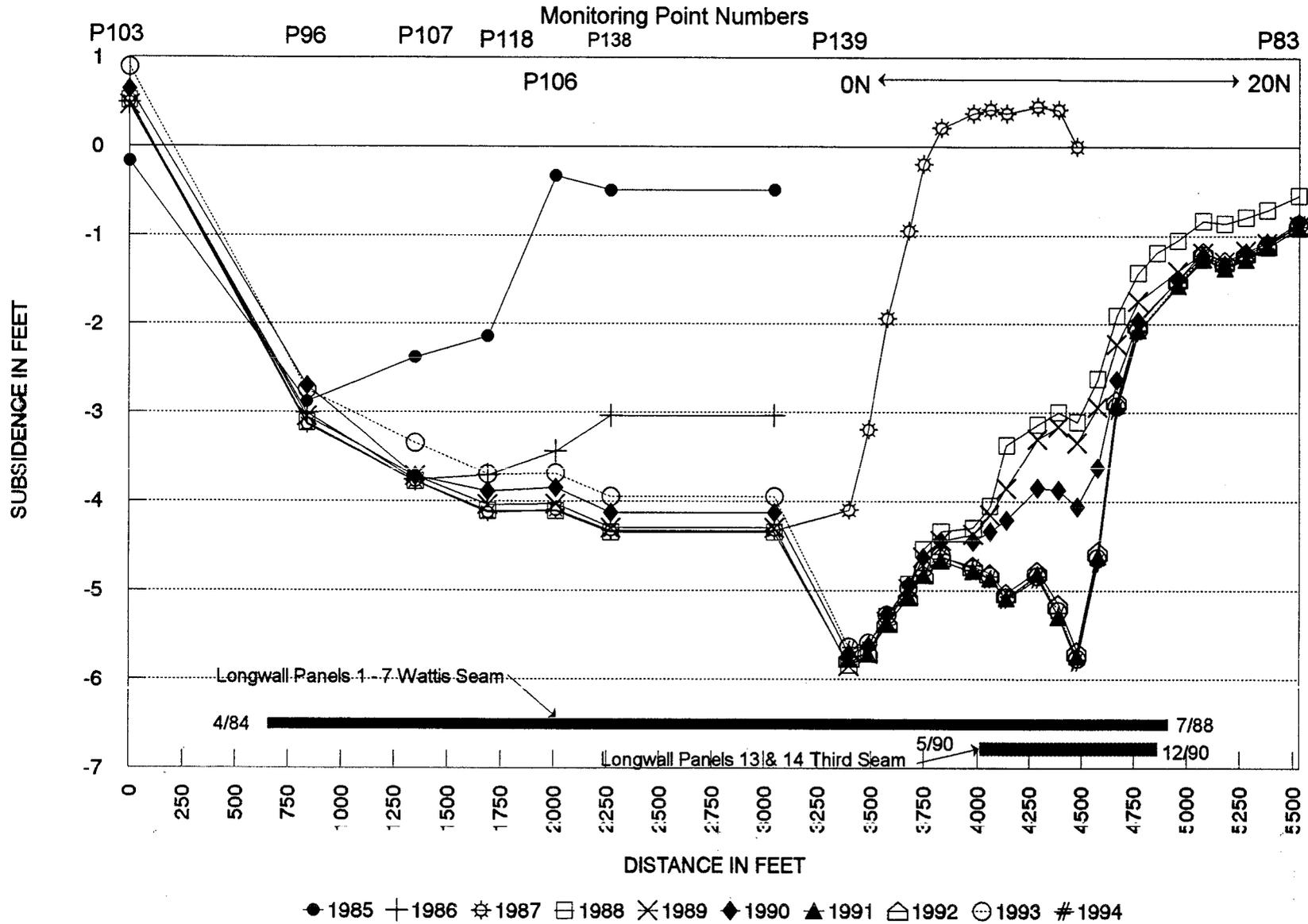
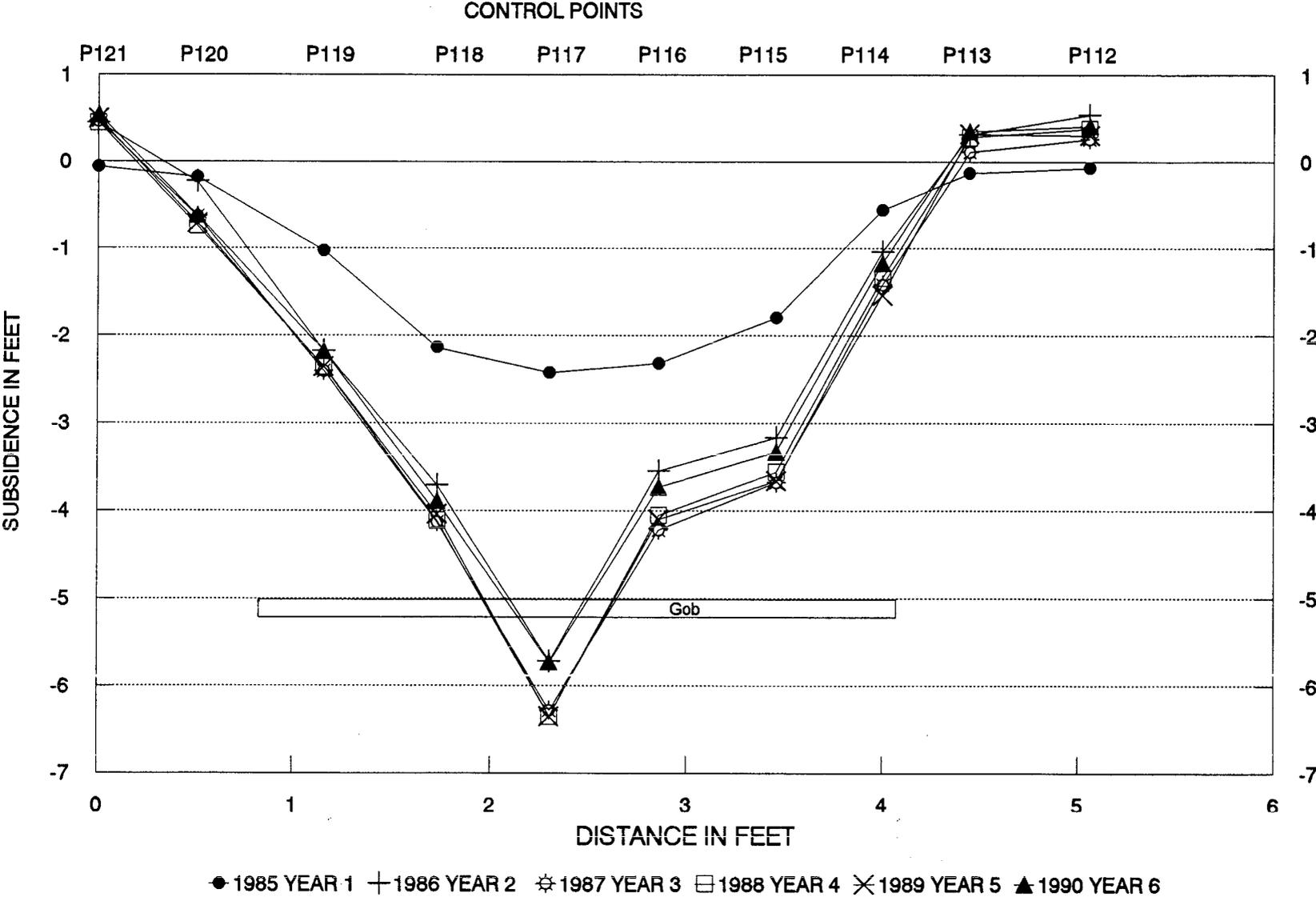
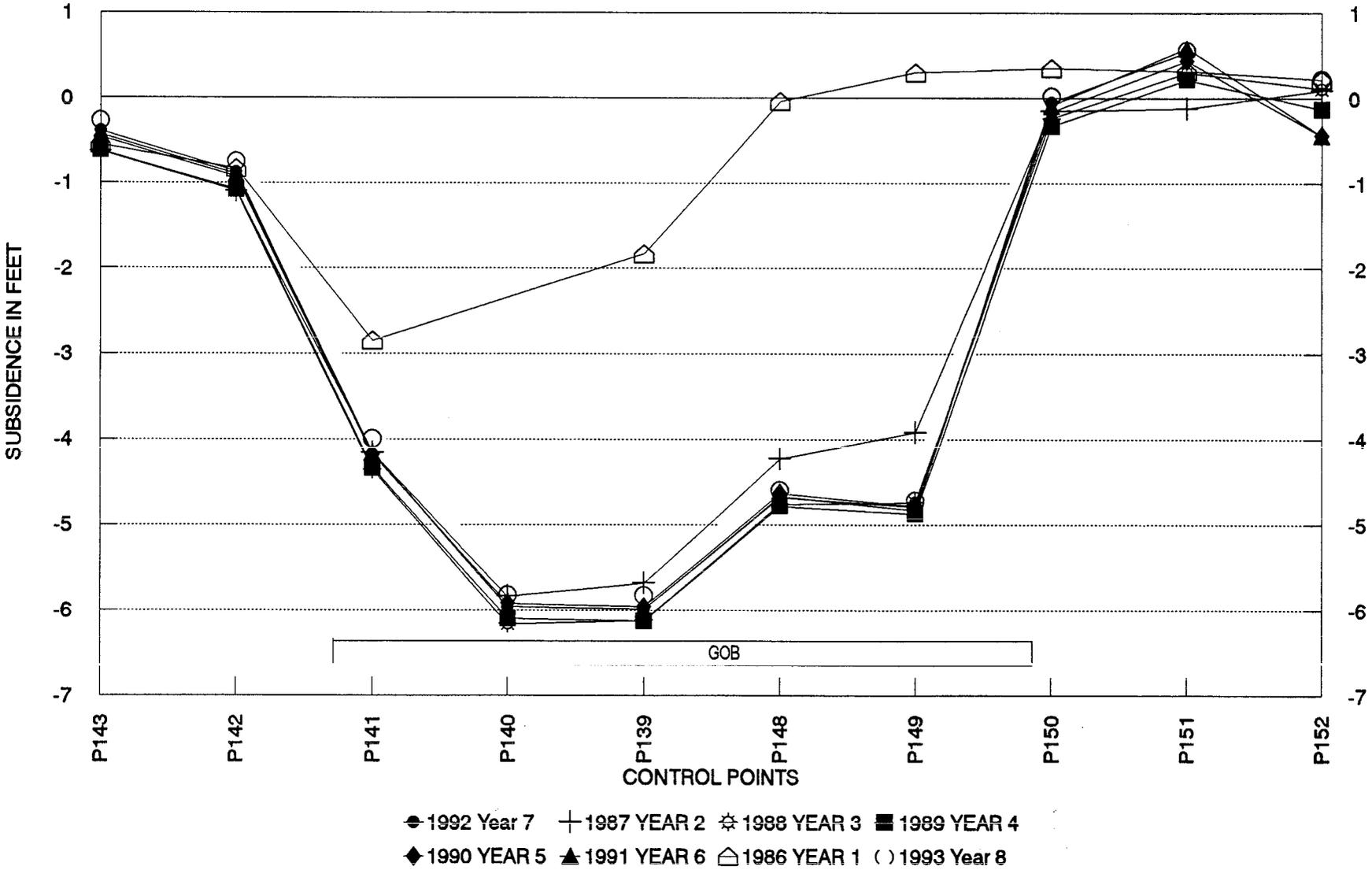


FIGURE 2
 CROSS SECTION B-B LONGWALL PANEL 2



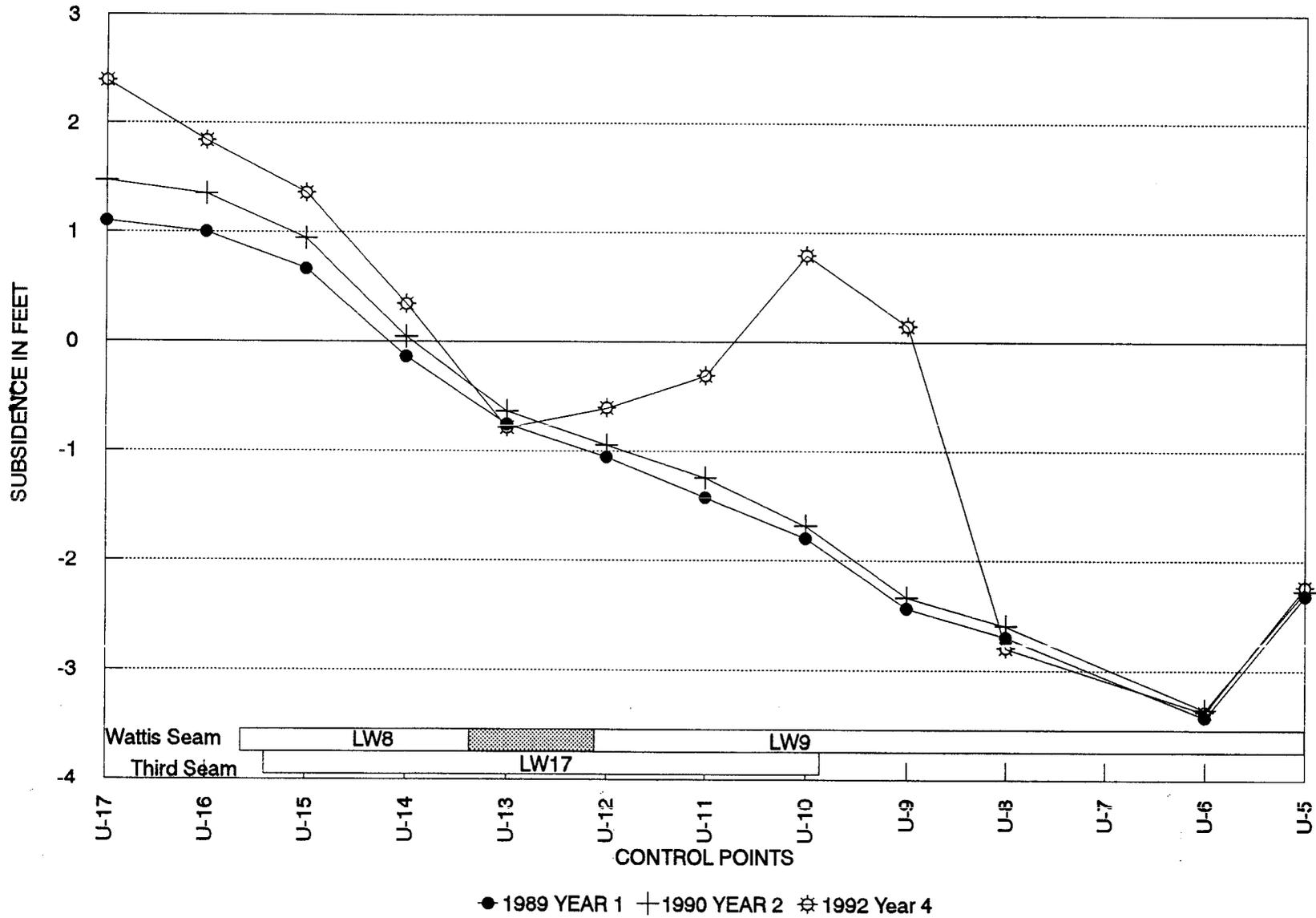
1- Control points are not to scale horizontally - shown in relative position to each other.

FIGURE 3
 CROSS SECTION C-C LONGWALL PANEL 4



1- Control points are not to scale horizontally - shown in relative position to each other.

FIGURE 4
U-NORTH NEAR-STREAM PROFILE



1- Control points are not to scale horizontally - shown in relative position to each other

FIGURE 5
U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U1

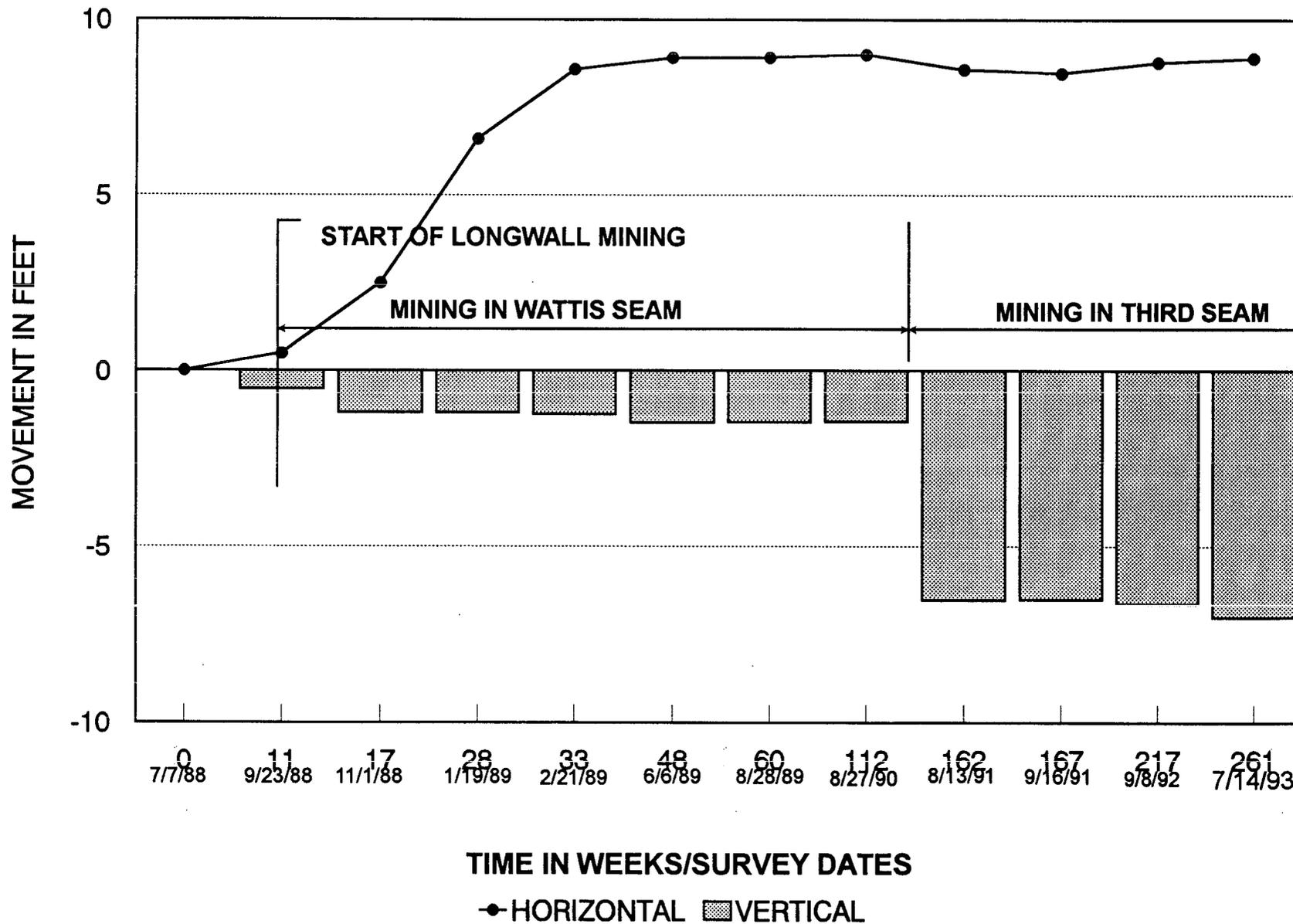


FIGURE 6
U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U2

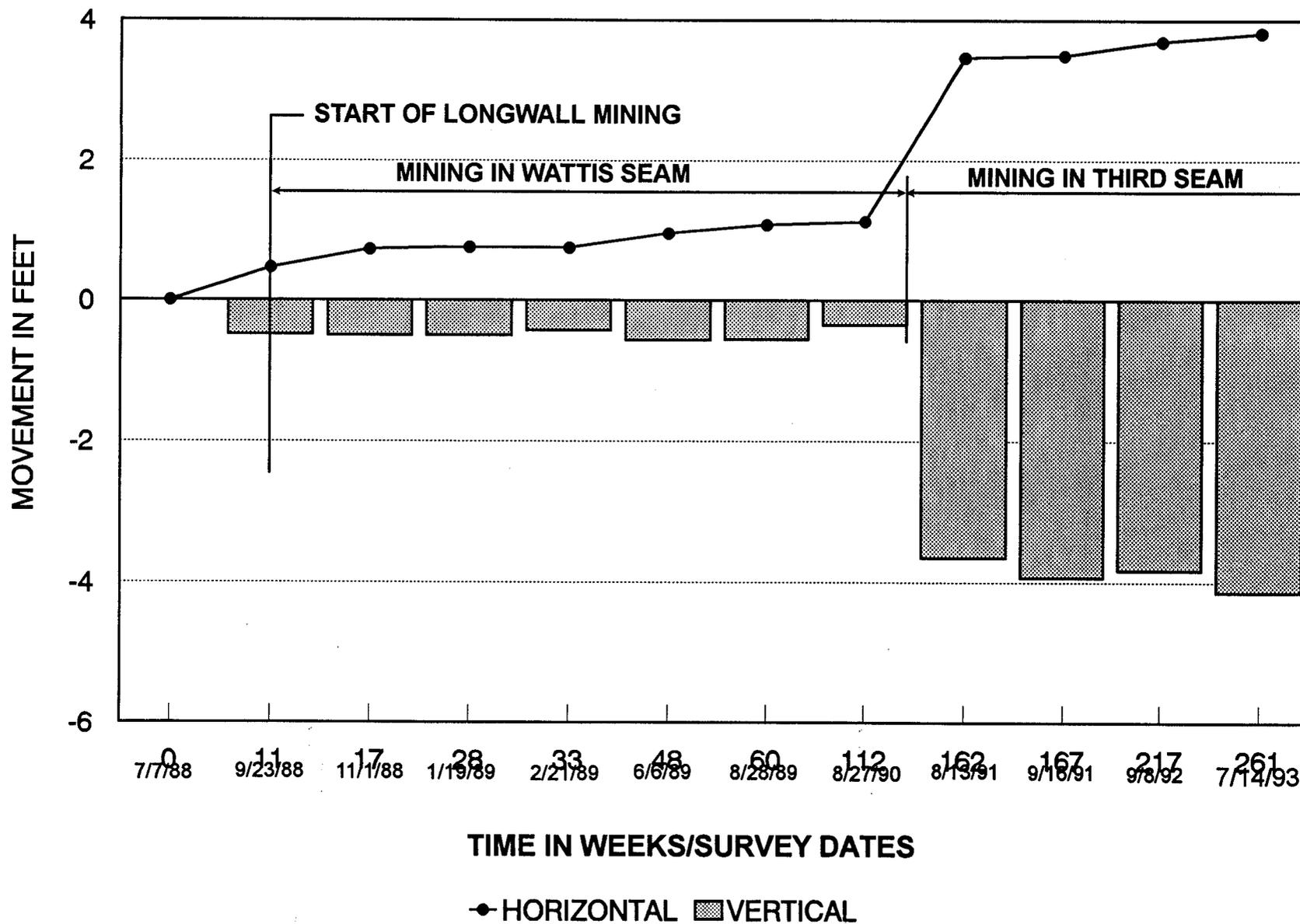


FIGURE 8
U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U4

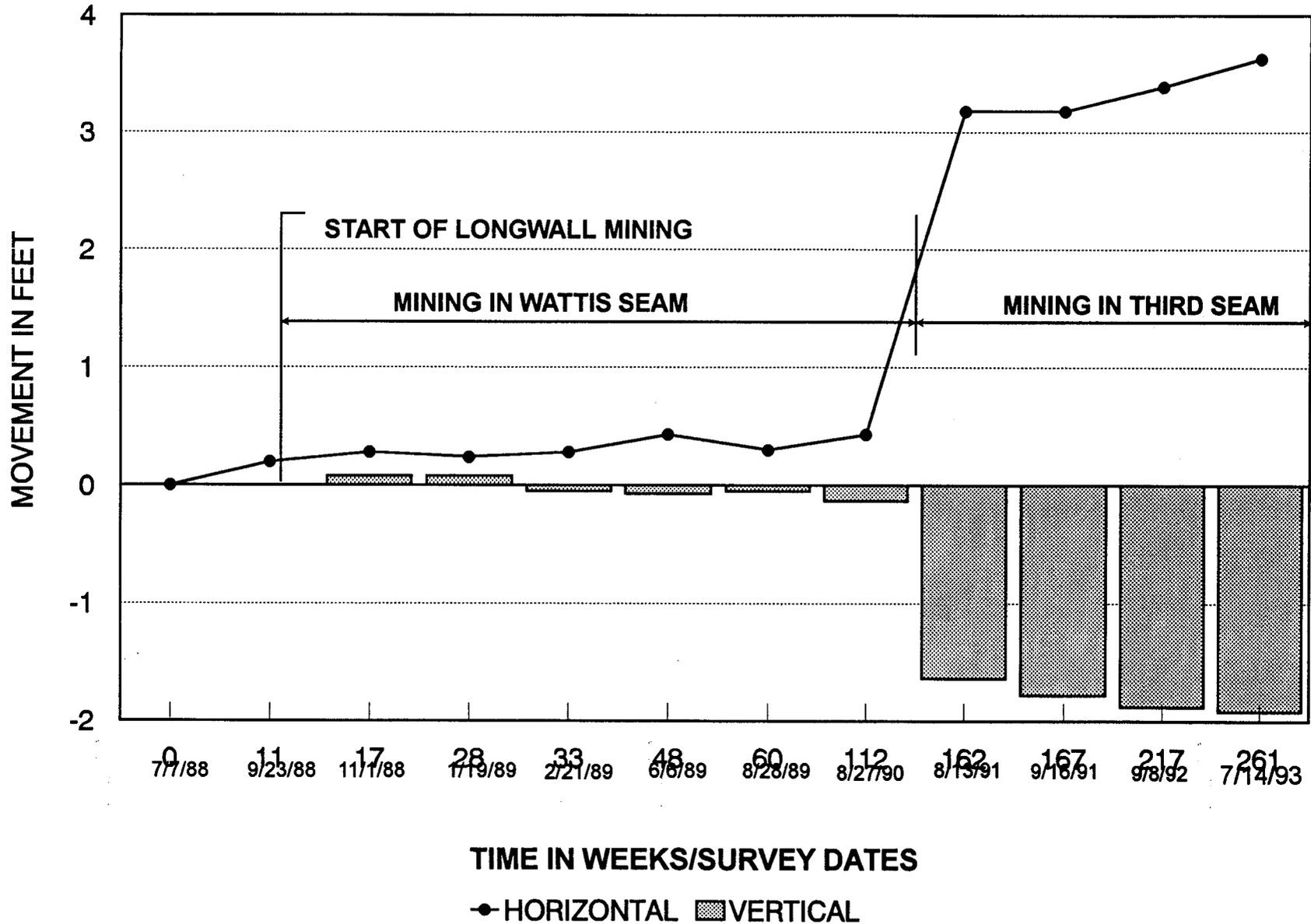


FIGURE 9
STATION GS-1 U-NORTH
HORIZONTAL AND VERTICAL MOVEMENT GRAPH

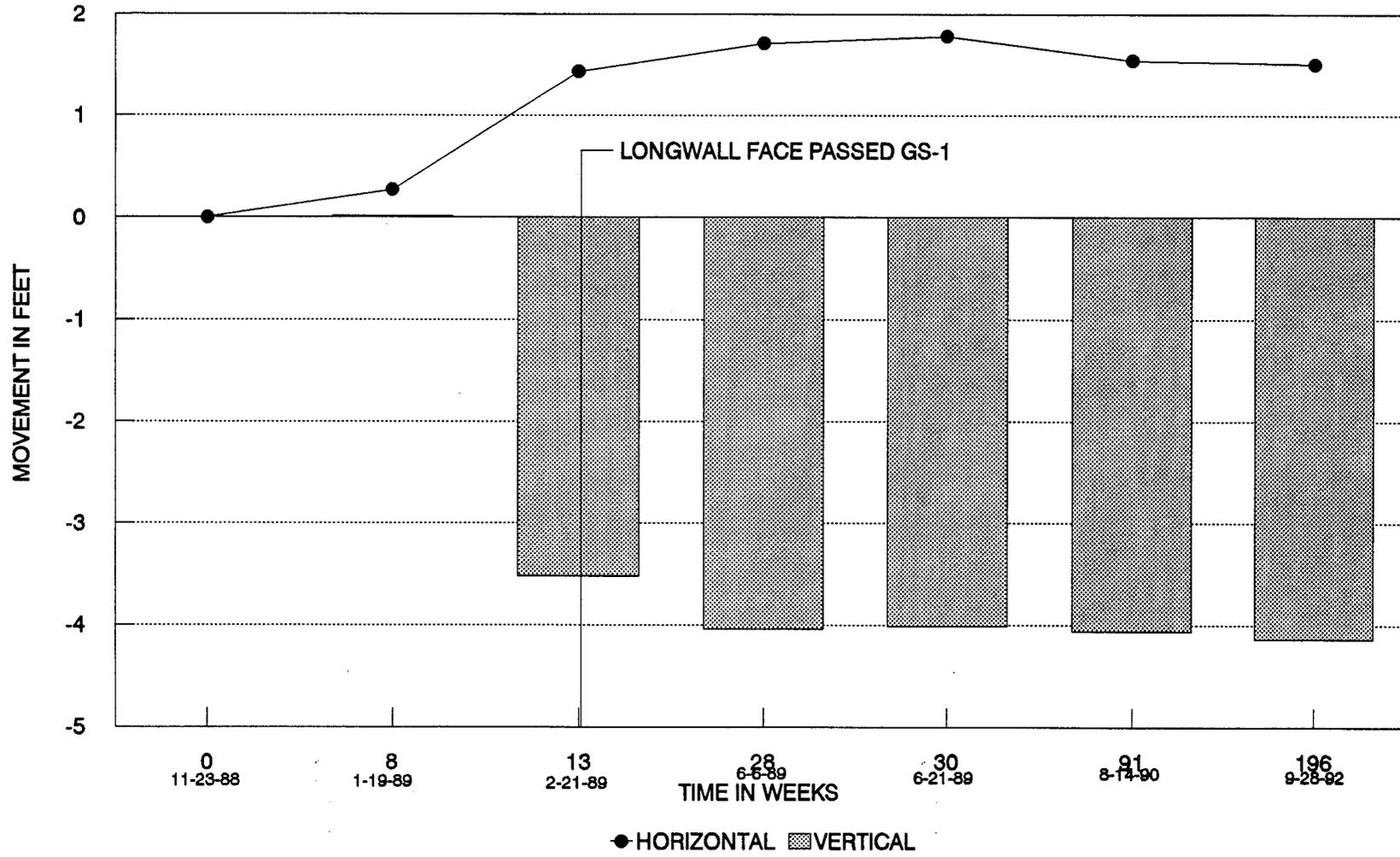


FIGURE 10
CROSS SECTION F-F

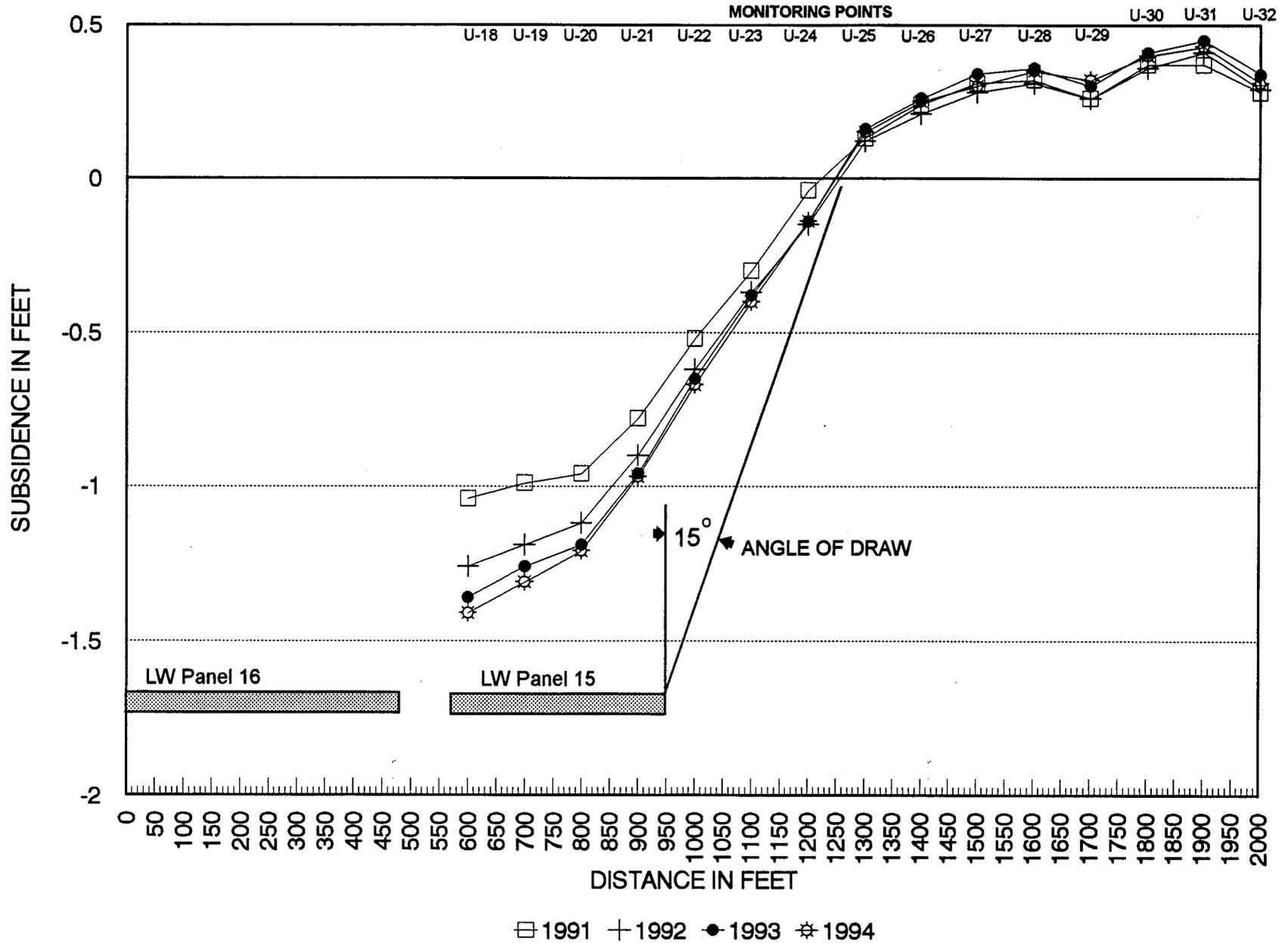
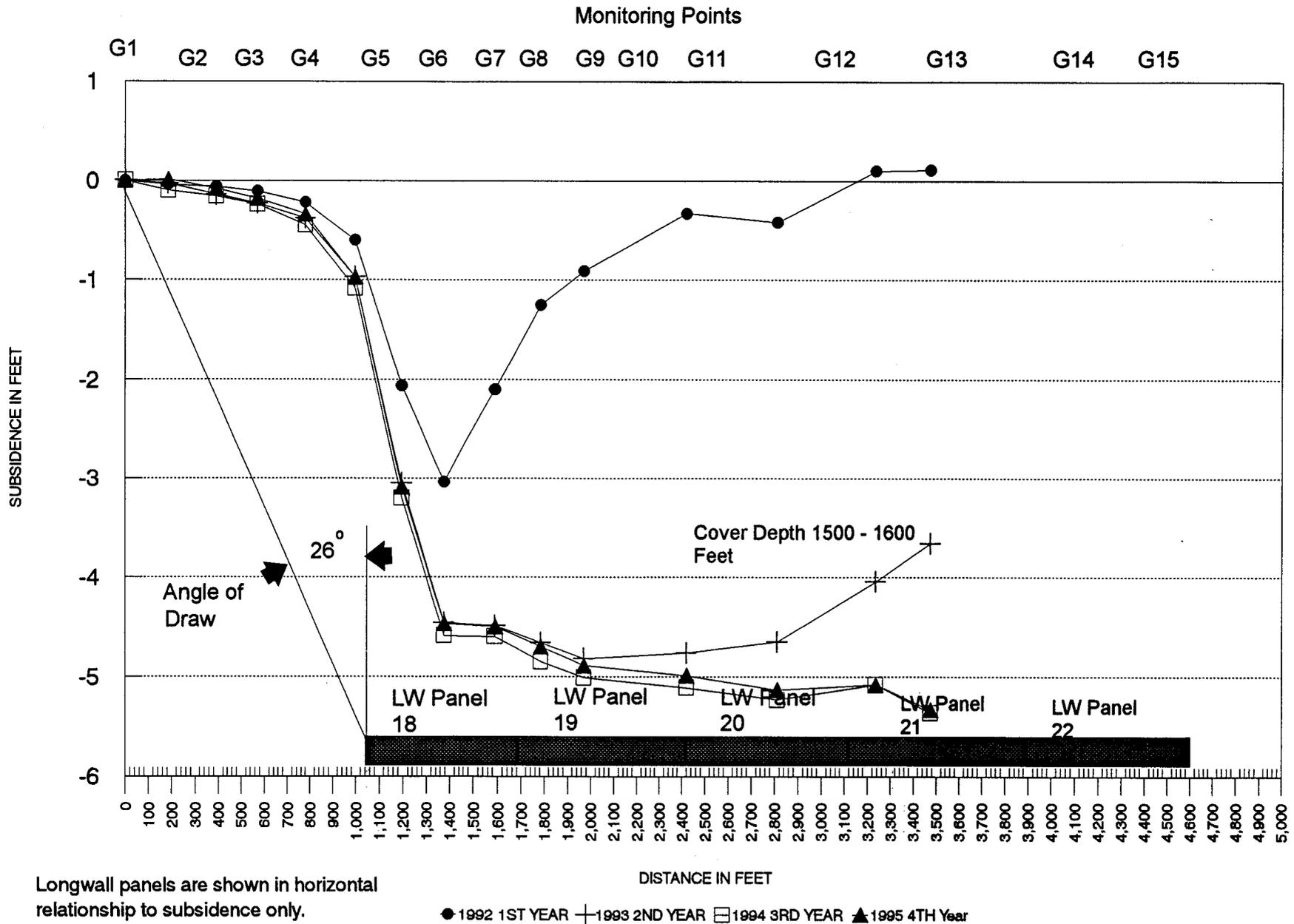


FIGURE 11 CROSS SECTION D-D



Longwall panels are shown in horizontal relationship to subsidence only.

FIGURE 12
CROSS SECTION E-E

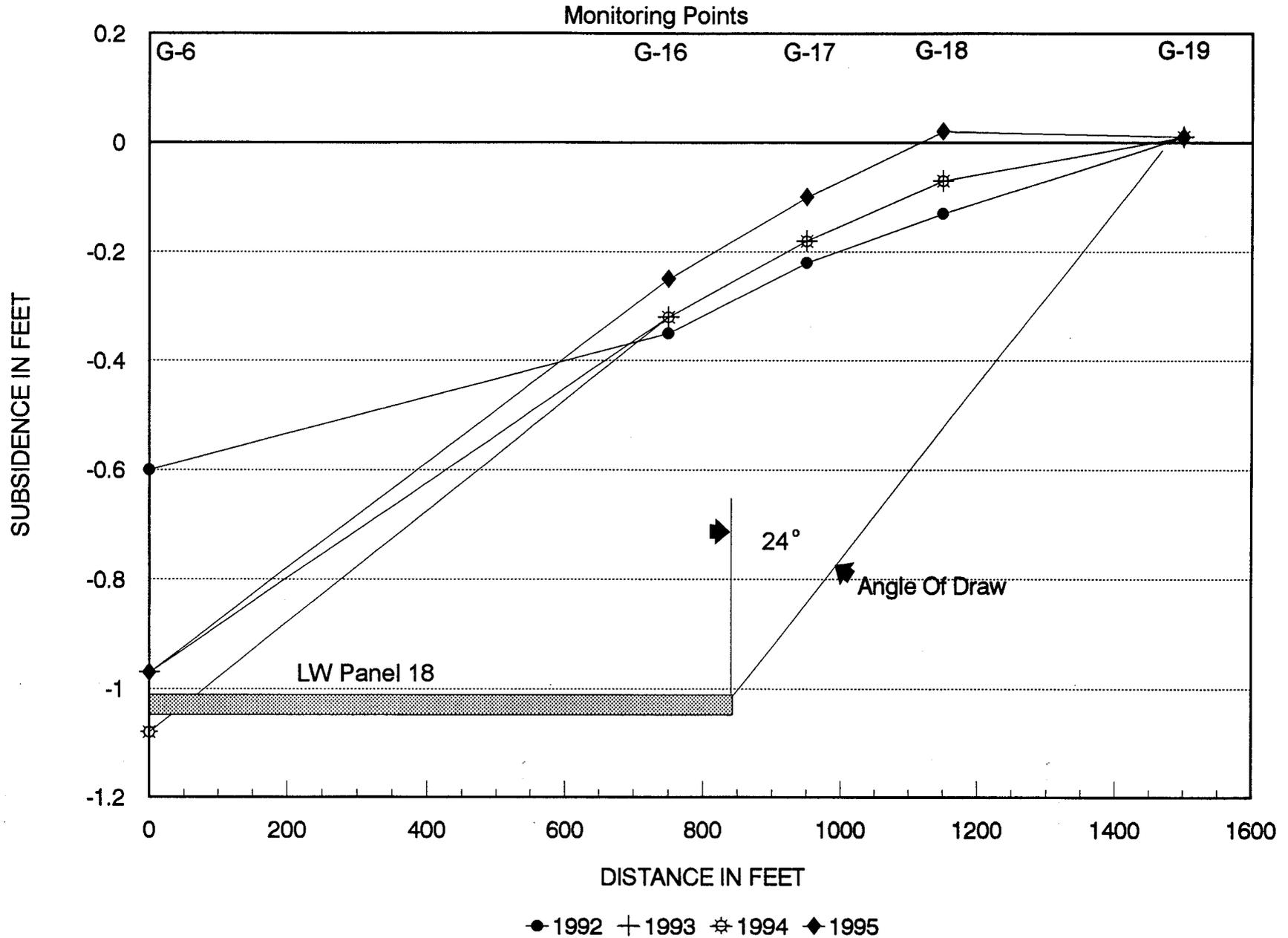


FIGURE 13
CROSS SECTION G - G

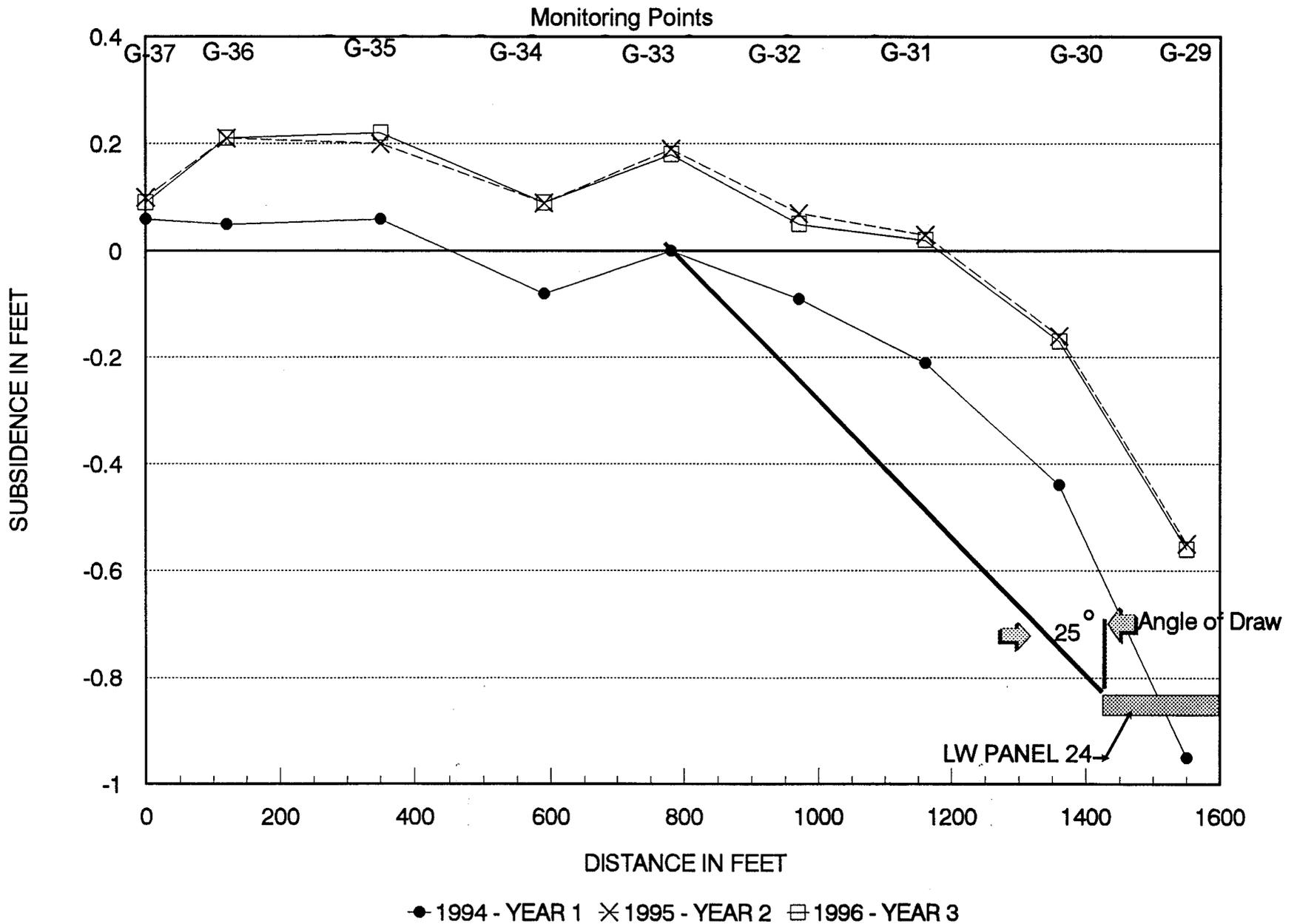


FIGURE 14
CROSS SECTION H-H

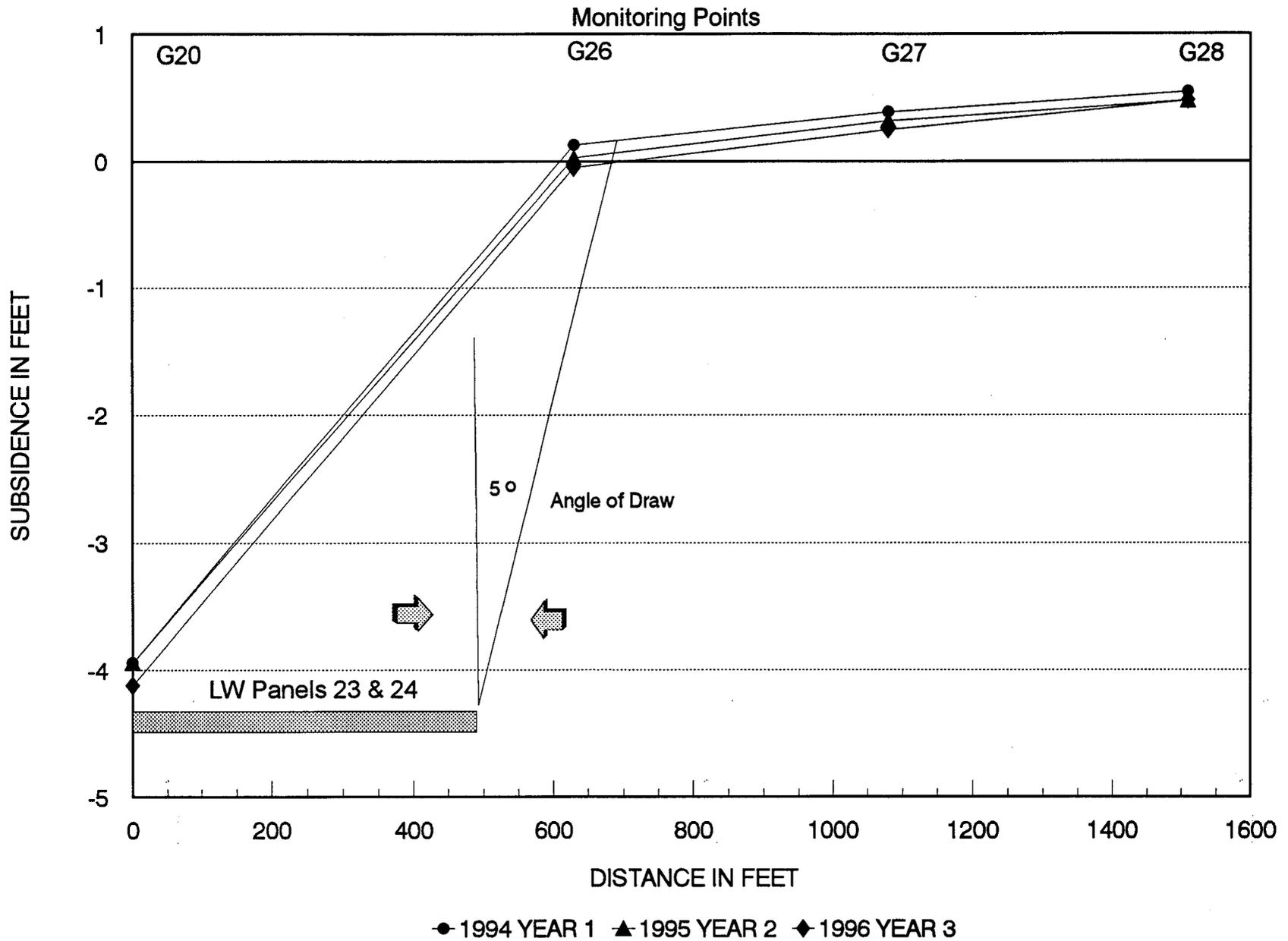


FIGURE 14
CROSS SECTION H-H

