AGUA FRIA

WATERCOURSE MASTER PLAN ADDENDUM

CHANNELIZATION ALTERNATIVE - VOLUME II

ENGINEERING DESIGN

FINAL REPORT

01-11-05

Prepared by:

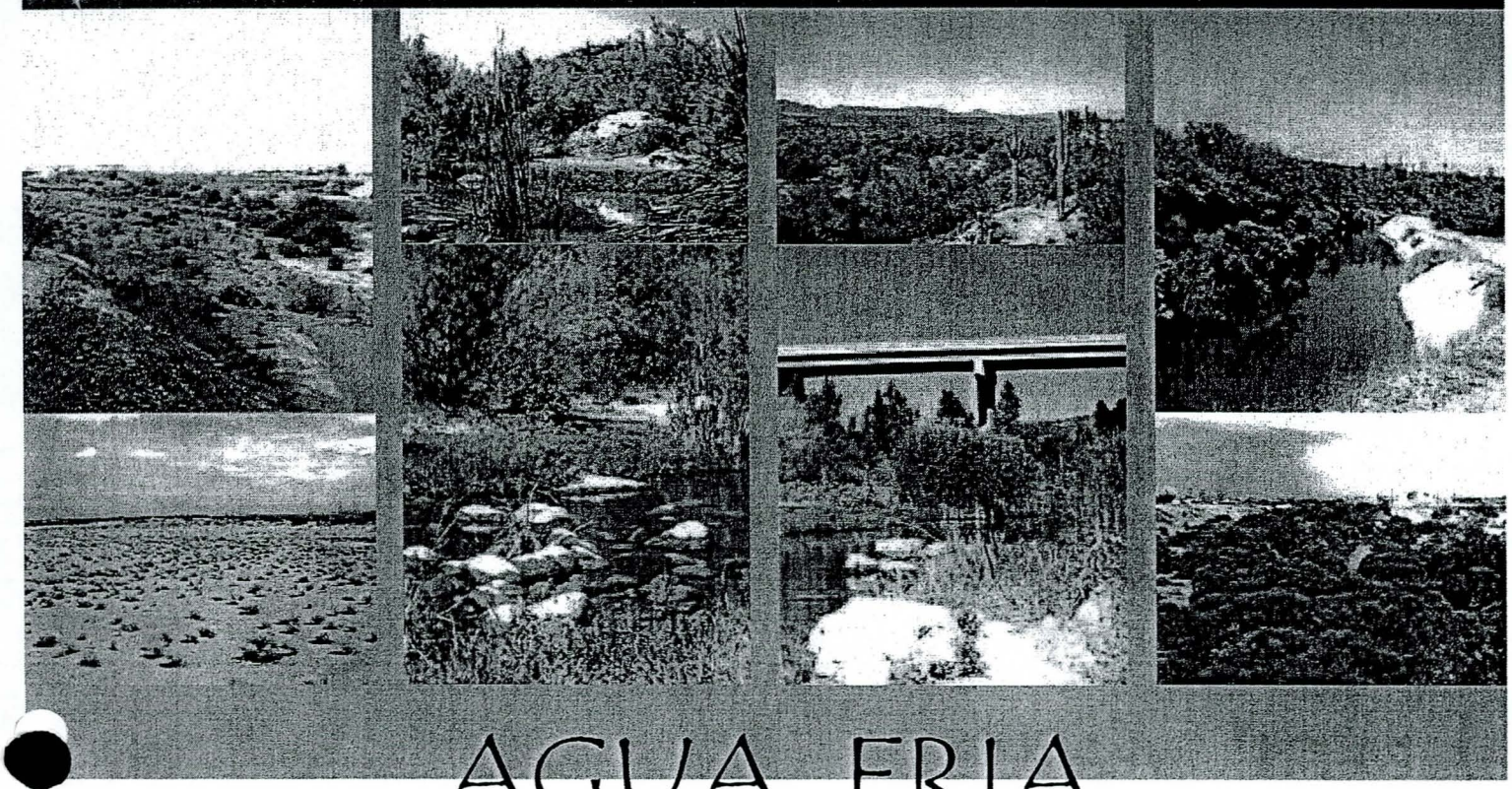
David Evans and Associates, Inc.
2141 East Highland Avenue, Suite 200
Phoenix, AZ 85016

EDAW

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC.

Flood Control District of Maricopa County

DAVID EVANS AND ASSOCIATES INC.



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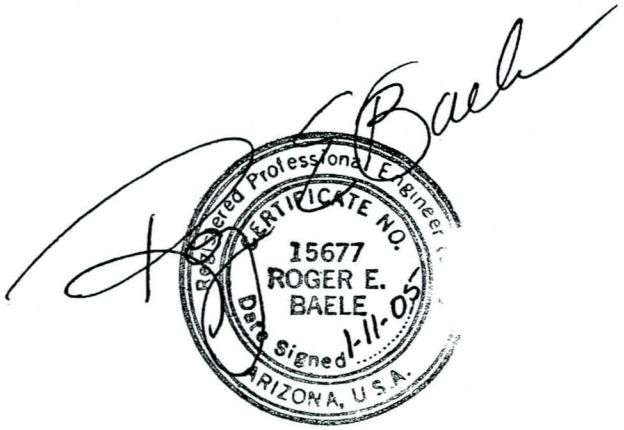

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I. INTRODUCTION

A. AUTHORITY

David Evans and Associates, Incorporated (DEA) is performing these services for the FLOOD CONTROL DISTRICT of Maricopa County (FCD) under the Authority of Contract FCD 2002C014, Assignments Nos. 4 and 5 and FCD 2004C026, Assignment No. 1.

B. PROJECT HISTORY

The FCD contracted with Kimley-Horn and Associates, Inc. (KHA) under contract FCD 99-24 to prepare the Agua Fria Watercourse Master Plan (AFR-WCMP). The Final Recommended Plan Report was issued in November, 2001. (KHA, 2001)

The three stated goals (or purposes) of the AFR-WCMP were:

- Regulating land use within this zone protects public interests by reducing development in areas prone to the hazards of flooding and erosion.
- It increases the potential area available for recreation.
- It increases opportunities for habitat enhancement and open space.

The AFR-WCMP considered structural solutions for channelization and levee protection of property including conceptual bank protection and levee locations. This alternative was not in the final recommended plan by and large due to the cost and lack of apparent cost-share partners. The recommended plan called for adoption of a Lateral Migration Erosion Hazard Zone (LMEHZ) and use of Non-structural Flood Control Methods. (Specific exceptions are listed in Section 16 of the AFR-WCMP).

Prior to adoption of the AFR-WCMP by the FCD Board of Directors, the FCD was approached by property owners and other interests for reconsideration of a channelization option upstream of Indian School Road.

In March, 2002, a Memorandum titled 'Agua Fria River Conceptual Channelization Plan' was prepared by JE Fuller/Hydrology & Geomorphology, Inc. (JEF) under contract to the FCD (contract FCD 2001CO05 Task Order #11). The purpose of the study was to prepare a concept channelization plan that is compatible with the overall goals of the AFR-WCMP and that accommodates open space, sand and gravel mining, and flood control. It returned a favorable conclusion and recommendations for further investigation toward preliminary design of a corridor that would meet the goals of the AFR-WCMP (JEF, 2002).

Since March 2002, more than 30 presentations have been made to small stakeholders' groups. DEA coordinated these meetings under services provided under contract FCD 2002C014, Work Assignments 2 and 3. The conclusions derived from these meetings were favorable, which lead to this study that is a more detailed analysis of the channelization option.

C. PURPOSE OF THIS STUDY

The purpose of this study is to prepare a more detailed conceptual design of the Agua Fria channelization corridor that develops a controlled centerline, detailed quantities of construction material, lands required for the project and lands recovered from the floodway, and floodplain or erosion impact area.

This study and design is not intended to be the final design of the Agua Fria Channelization Project, but is intended to lay out sufficient direction and design concepts so that uniform detailed design and analysis can be completed for specific construction projects. This study is also to outline other areas of investigation that should be provided by others at the time of specific construction project identification (e.g. groundwater migration, 404 permits, etc.)

The limits for the Agua Fria River channelization corridor extend immediately upstream of Indian School Road to the Central Arizona Project canal and channel crossing.

II. DISCUSSION OF INVESTIGATION

A. ALIGNMENT

The corridor should build on the goals of the AFR-WCMP, provide flood control protection from the Standard Project Flood (SPF), provide incentives for both private and public sector participation and create open space and a linear recreation corridor.

Development of a horizontal alignment should consider the following:

- maximize use of area within the floodway;
- "smooth out" sharp curves;
- minimize negative impacts of proximity to sand and gravel mining operations;
- accommodate significant side drainage ways;
- bridge locations;
- known future roadway crossings;
- existing developments;
- existing bank armoring;
- natural hard and/or high banks;
- minimize small partial parcel right of way "takes;"
- natural habitats;
- recreational opportunities;
- avoid known structures, developments, utilities, landfills.

The corridor is sub-divided into 20 reaches that generally follow the mile by mile roadway designations from Indian School Road to the CAP. Table 1 shows the reach designations.

Table 1. Reach Designations.

Reach	Downstream End of Reach	Downstream End of Reach
Reach 9	Indian School Rd.	Camelback Rd.
Reach 10	Camelback Rd.	Bethany Home Rd.
Reach 11	Bethany Home Rd.	Glendale Ave.
Reach 12	Glendale Ave.	Northern Ave.
Reach 13	Northern Ave.	Olive Ave.
Reach 14	Olive Ave.	Peoria Ave.
Reach 15	Peoria Ave.	Cactus Rd.
Reach 16	Cactus Rd.	Thunderbird Rd. Alignment
Reach 17	Thunderbird Rd. Alignment	Greenway Rd.
Reach 18	Greenway Rd.	Bell Rd.
Reach 19	Bell Rd.	Union Hills Dr.
Reach 20	Union Hills Dr.	Beardsley Rd.
Reach 21	Beardsley Rd.	Deer Valley Rd.
Reach 22	Deer Valley Rd.	Pinnacle Peak Rd.
Reach 23	Pinnacle Peak Rd.	Happy Valley Rd. Alignment
Reach 24	Happy Valley Rd. Alignment	Jomax Rd. Alignment
Reach 25	Jomax Rd. Alignment	Dynamite Blvd. Alignment
Reach 26	Dynamite Blvd. Alignment	Dixileta Dr. Alignment
Reach 27	Dixileta Dr. Alignment	Lone Mountain Rd. Alignment
Reach 28	Lone Mountain Rd. Alignment	Dove Valley Rd. Alignment

Development of a vertical alignment should consider:

- existing vertical tie-in point at Indian School Road;
- range of equilibrium slopes for a range of discharges;
- reasonable drops at grade control and drop structures;
- bridge pier depths;
- utility conflicts;
- impacts of local scour at constricted channel sections;
- desire to avoid "levee" situations.

The standard corridor section will be 1,200 feet wide. This includes a total conveyance channel that is 1,000 feet wide that consists of a 500-foot wide low-flow flood channel (flood channel) and a 500-foot wide terrace. There will be two 100-foot wide buffers on each side of the conveyance channel. A typical section is shown in Figure 1. The cross section of the multipurpose corridor provides for:

- containment of the SPF from bank to bank of the full channel;
- passage of a 10-25-year design flow in the flood channel;
- positive conveyance of nuisance flows;
- passage of groundwater recharge flows.

The terrace will experience infrequent flows above the 10-year return frequency discharge and will be available for certain recreation improvements. The flood channel will convey the most damaging flows below the 10-year return frequency discharge. The flood channel will be excavated to ultimate design flowline. Over-excavation within the flood channel should not be allowed. Over-excavation and refilling of the terrace with non-native material could be allowed if the profile is ultimately restored to finished design elevations. If the terrace area is excavated and refilled, material should be placed to minimize uncontrolled settlement and be capped with material that supports the ultimate surfacial use of the terrace while minimizing potential for downward movement of material and surface erosion.

There will be grade control structures throughout the entire project to protect local infrastructure and to stabilize the profile of the corridor. The longitudinal slope of the corridor should generally follow the ultimate "stable slopes" of the flowline. (JEF, 2002). Drop/grade control structures should be located where differences in long term stable channel bottom elevations create a deep channel (compared to undisturbed overbanks) and begin to require excessively high drops (i.e. >8 ft. measured design flowline to flowline) or where the bottom needs to be maintained for other reasons.

Drop/grade control structures, by their nature, can impose safety concerns for certain motorized and non-motorized activities in a channel. Design and signage of the structure should consider ways to minimize safety problems.

B. SURVEYING AND MAPPING

The Agua Fria floodplain has been actively modified due to development and ongoing sand and gravel mining operations since the time AFR-WCMP. Since, the nature of this study was to get a better determination of the impacts of the proposed horizontal and vertical channel alignments relative to the current physical conditions, as well as determining a more accurate estimation of earthwork, more recent mapping was utilized for this project. The mapping for this project was prepared based on a single control survey that would give the most recent data even though the mapping utilized a 10-foot contour interval. All ortho-photography images, Geographic Information System (GIS) data and Digital Terrain Model (DTM) data, for 10-foot contour interval mapping, were provided by the FCD. These were prepared from aerial flights performed in 2003.

A subsequent field check of cross sections was performed, generally at more stable sections in the vicinity of bridges. The comparison between these sections and those produced by use of the 10-ft mapping is shown in Appendix A. The points collected for the cross-sections were produced from a field survey, using Real-time kinematic (RTK), Global Positioning System (GPS) surveying procedures, performed by DEA. DEA also located established benchmarks from Flood Insurance Rate Maps (FIRM) as well as benchmarks shown on as-built plans of the existing bridge structures at the major river crossings within the project area. This allowed the as-built data to be used relative to the FCD's mapping.

All of the above data was delivered relative to Arizona State Plane Coordinates, Central Zone, North American Datum 1983 (NAD83) and North American Vertical Datum 1988 (NAVD88). Therefore, the field survey was performed using control points established by the Maricopa County Department of Transportation, as part of their Geodetic Control Densification and Cadastral Survey (GDACS) project. The GDACS project uses the same NAD83 and NAVD88 datums, as the basis of their horizontal and vertical control.

Table 2. Survey Points.

DEA Point No.	DEA NGVD29	FIRM Point No.	FIRM NGVD 29	Difference
5070	1469.44	RM949	1469.31	0.13
5206	1063.69	RM920	1063.68	0.01
5207	1053.9	RM3125	1053.92	-0.02
5254	1064.73	RM922	1064.7	0.03
5369	1022.34	RM917	1022.43	-0.09
5408	1355.95	RM945	1355.76	0.19

Table 2 shows how the DEA field survey compared to benchmarks, previously published on FIRM panels, after the elevations were converted to the National Geodetic Vertical Datum 1929 (NGVD 29), using the U.S. Army Corps of Engineers (USACE) VERTCON program. The other benchmarks collected did not check as consistently as those shown above, except for the ADOT benchmarks

found. However, enough benchmarks did check to confirm that the RTK data did conform to the project datum and that the conversion to NGVD29 was performed within allowable tolerances for the equipment and procedures used.

In conclusion, comparisons of the DTM from the FCD with the field cross-section data were found to be representative of the actual ground and graphically appear to be within National Map Accuracy Standards for 10-foot contour interval mapping. No error calculations were performed as part of this Scope of Work as this project called for the use of mapping products that had already been accepted by the FCD.

C. PROPERTY OWNERSHIP

Property ownership data within impacted areas of the watercourse were to be evaluated to determine lands within the proposed channel alignment and recovered lands from the regulatory floodway, floodplain, and lateral migration erosion zones. This was done by overlaying parcel ownership records including the parcel number and boundaries from the Maricopa County Assessor onto a working electronic base map and then evaluating the data to determine how each property owner was affected by the channel. The Assessor data was obtained from the FCD in January, 2004. The data was supplied on CD in GIS shapefile format and contained Parcel lot lines, Parcel Tax ID Numbers and Parcel ownership data.

The lot lines and parcel numbers were referenced to the base mapping files and proposed channel alignment. Tables were developed for the report that showed Parcel Tax ID Number, Ownership, Proposed Channel Reach Number, and property areas impacted (Channel Takes) by the proposed corridor. The Proposed Channel Takes were calculated by utilizing a standard 1,200-foot corridor width except in areas where certain physical constraints dictated a narrower or wider channel width. The corridor has a greater width between Indian School Road and Bethany Home Road for the conveyance of the additional discharge from the New River. The corridor has a more narrow width near the Grand Avenue Bridge and El Mirage Landfill. In all of these areas, the site specific channel widths were used to calculate the Proposed Channel Takes.

During various stakeholder meetings several property owners and sand & gravel operations representatives commented on the accuracy of the ownership of various parcels and supplied additional information. The majority of the parcel data and boundaries appear to be correct and current with a few minor exceptions.

D. UTILITIES

Utility infrastructure data collected during the AFR-WCMP (KHA, 2001) and the Agua Fria River Conceptual Channelization Plan (JEF, 2002) were reviewed. Data acquired under this contract was added to any previous data to identify 'fatal flaw' utility infrastructure conflicts.

Most of the data used in this study was retrieved from the AFR-WCMP. Tables from the Agua Fria River Conceptual Channelization Plan were reviewed and field visits were made to identify recent and obvious utility infrastructure installations.

Existing utilities and canals within the corridor were identified and the record maps, as obtained above, of known utilities existing within the proposed recreation

corridor were reviewed. Utility company maps and other infrastructure improvement records obtained and reviewed include:

El Paso Natural Gas-A 20-inch diameter pipeline runs in a north-south direction between Indian School Road and Glendale Municipal Airport along the easterly edge of the recreation corridor. The existing line is within the proposed recreation corridor for a 1200-foot long section. This occurs at the confluence of the Agua Fria River and New River.

Southwest Gas Corporation (SWG)-A review of collected record drawings indicate that there are four small-diameter gas lines crossing the Agua Fria River near bridge crossings. These include a 6-inch diameter line approximately 94 feet south of Glendale Avenue, a 6-inch diameter line approximately 100 feet north of Bell Road, a 4-inch diameter line near the south right-of-way line of Olive Avenue and a 4-inch diameter gas line downstream of the Grand Avenue (US60)/Agua Fria River bridge with a cover of approximately 17 feet (210 inches).

Discussions with SWG indicate that they have plans to install an 8-inch diameter gas line 85 feet downstream of Glendale Avenue to replace the existing 6-inch diameter line. SWG also pointed out that there is an existing 3-inch diameter gas service line in the vicinity of the Agua Fria River north of the Northern Avenue alignment. The line is approximately 1,000 feet north of Northern Avenue and provides service to a ready mix concrete facility on the west side of the river.

USWest (Qwest) Communications-USWest construction documents (a part of the US60/Agua Fria River bridge plans) show a concrete-encased duct bank crossing the river 60 feet downstream of the Grand Avenue Bridge with a cover of approximately 17 feet (210-inches).

Arizona Public Service-There are several electric transmission towers within the recreation corridor.

Sanitary Sewer-The bridge plans for Bell Road indicate an 18-inch diameter force main lying in the Agua Fria River 415 feet downstream of the bridge. Plans were obtained for a newly constructed sewer force main crossing (North Agua Fria Region Offsite Force Main) along the Rose Garden Lane alignment. This underground crossing is a concrete-encased, 18-inch diameter ductile iron pipe lying approximately 20 feet below the proposed flowline. These plans were not a part of the AFR-WCMP.

Central Arizona Project-Records of water delivery canals were reviewed for the Central Arizona Project-Agua Fria River Siphon. This structure lies upstream of the proposed improvements of the recreation corridor. The CAP recharge canal/ditch meanders within the proposed recreation corridor between Caterpillar Tank Wash and the upstream end of the project, a distance of approximately 19,000 linear feet. The recharge canal delivers groundwater recharge water from the CAP to the groundwater recharge facility located on the west side fo the river upstream of Agua Fria Blvd.

Beardsley Canal Flume-Records for the Beardsley Canal Flume were also reviewed. This structure also lies upstream of the proposed improvements of the recreation corridor.

CATV-There are no apparent underground river crossings of water and/or CATV.

E. BRIDGES

Bridge crossing data from previous analysis reports were obtained and reviewed to determine approximated impacts of the project and recommend any future steps in the detailed design of the proposed corridor. Table 3 lists the bridges impacted by the proposed channelization concept.

Table 3. Bridges Impacted by the Agua Fria Channelization Conceptual Plan.

Bridge	ADOT Structure No.	Proposed Channel Station Location	Bridge Span (ft)	Scour Assessment [1]
Indian School Road	9145	440+00	1623	Critical
Camelback Road	9859	499+14.61	1725	Stable
Glendale Avenue	9301	616+48.15	598.25	Critical
Olive Avenue	8981	723+69.69	1503.5	Stable
Grand Avenue (US60)	2185	882+33.11	504	Stable
BNSF RR	-	883+49.90	480' + 150	-
Bell Road	9691	1014+03.93	1110	Stable
Agua Fria Blvd.	-	1310+61.91	1250	-
Proposed Loop 303	-	1524+19.49	-	-

[1]Scour Assessment from Final Bridge Scour Reports for 16 MCDOT Bridges, Cannon and Associates, 1996 as seen in KHA, 2001 and JEF, 2002.

The majority of the bridge data is from the AFR-WCMP. Plans were obtained for a recently constructed Agua Fria Boulevard bridge along the Happy Valley Road Alignment (interim Loop 303). A Conceptual Alignment plan was obtained for the Loop 303 alignment across the Agua Fria River. No plans or design records were obtained for the BNSF Railroad bridges that lie immediately upstream of the Grand Avenue (US 60) bridge.

During this study, field surveys were performed at each bridge crossing to establish a correlation between the as-built plans and the design contour mapping that was provided by the FCD. The field surveys and the design contour mapping were on the same NAVD 88 datum, which was different than the NGVD 29 datum of some of the as-built plans. The survey results were correlated and as-built elevation information for the low-chord of the bridge (bottom of girders/bridge deck), pier/column tip, bottom of pile casing (where applicable), top of foundation (where applicable), and top of pier protection (where applicable) were adjusted to the NAVD 88 datum, which was then used in the conceptual design of the proposed channel. The results are shown in Table 4.

Table 4. Bridge Field Survey Results

Bridge	Bench Mark Per As-Built Plans	Bench Mark Measured	As-Built Channel Invert[1]	Left Low Chord Elev.[1]	Low Chord Elev. @ Centerline[1]	Right Low Chord Elev.[1]	Pier Tip Elev.[1]	Pier Protection
Indian School Road	1020.87	1021.50	1000.00	1015.7	1015.7	1015.7	980.8	Y
Camelback Road	1033.10	1032.06	1016.36	1026.37	1030.66	1026.37	944.96	Y
Glendale Avenue	1063.81	1065.01	1040.20	1060.20	1060.20	1060.20	1026.20	Y
Olive Avenue	1092.92	1094.73	1073.21	1088.15	1091.89	1088.15	1001.81	Y
Grand Avenue (US60)	1149.32	1150.07	1111.75	1124.68	1126.19	1127.70	1038.75	N
BNSF RR	-	-	-	-	-	-	-	-
Bell Road	1170.64	1171.84	1149.70	1167.15	1167.90	1164.45	1081.20	Y
Agua Fria Blvd.	1251.70	1251.70	1241.80	1254.16	1255.56	1253.95	1141.73	N
Loop 303	-	-	-	-	-	-	-	-

[1] Adjusted Elevation

The following is a discussion of the bridges from previous investigations:

Agua Fria River Conceptual Channelization Plan (JEF, 2002)-This report reviewed as-built bridge plans, and other source information from the AFR-WCMP, and generally positioned a channel alignment to match the location, dimensions, and alignment of the existing bridge openings. This report also tabulated ADOT/MCDOT bridge scour ratings, elevation at top of footing and/or pier cap, bottom elevation of piers, channel invert elevation, and other data. The tabulated elevations were obtained from as-built plans and not necessarily field verified. Even though the proposed channel took into account the existing bridge parameters, the report states that further evaluation of the impact of the proposed channel plan on the bridges would be required during preliminary designs. The report also proposed grade control structures at each of the bridges and stated that it was assumed that these would mitigate the scour hazards.

Agua Fria River Watercourse Master Plan (KHA, 2001)-This report identified existing bridges and two proposed bridges, the Loop 303 crossing and the Estrella Roadway crossing. This report concludes "grade control protection should be constructed at bridges upstream of in-stream gravel mining where the potential for headcutting and long-term degradation has been identified." This report also

references and summarizes key points of a previous report, which states that "bridge piers need to be protected from scour." The current study did not compute bridge scour, but generally concurs with the need for scour protection at the bridges, particularly long-term scour protection. Data obtained from this Master Plan's files included as-built bridge plans for Indian School Road, Camelback Road, Glendale Road, Olive Avenue, Grand Avenue, and Bell Road. Bridge Scour Reports were obtained for Indian School Road, Glendale Avenue, and Bell Road. No plans were found for the BNSF RR Railroad bridge crossing lying upstream of Grand Avenue. The existing length and low chord elevation were obtained from Watercourse Master Plan and the Grand Avenue (US 60) Agua Fria River bridge plans.

F. PUBLIC INVOLVEMENT

1. Community Outreach

As part of the contract to update and refine the AFR-WCMP, the DEA/BJ Communications (BJC) team organized a wide variety of stakeholder meetings and interviews to present a conceptual channelization plan and discuss opportunities to implement the overall master plan. As part of this effort, a PowerPoint presentation was developed, along with an informational brochure.

Starting in July 2003, the team began contacting west valley community groups, municipalities, state and regional organizations and private development interests. A draft of the invitation is included in Appendix C. The contacts included the following:

- Arizona House of Representatives and State Senate;

  Distinguished Members from Districts 4,6,9,12 & 16.
- Maricopa County:

  Supervisors;

  Planning Staff;

  Parks and Recreation staff.

  Flood Control;
- City of Avondale
- City of El Mirage
- City of Glendale
- City of Goodyear
- City of Peoria
- City of Phoenix
- City of Surprise
- Town of Youngtown
- Southwest Valley Chamber of Commerce
- WESTMARC
- Estrella Mountain Community College
- Arizona Rock Products Association
- State Land Department
- Central Arizona Project
- Staff briefing
- Board presentation
- Sun City Homeowner's Association Water Subcommittee
- Sun City Grand Cam Jam
- Sun City West PORA Executive Committee of the Board

Developers and Related Interests

- Sunbelt Holdings
- Diamond Ventures
- DMB and Associates
- Pivotal
- Pulte Homes
- John F. Long Properties
- Shea Homes
- Central AZ Homebuilders Association
- Gammage & Burnham
- Stardust Development

A sample agenda for these briefings in included in Appendix C. During these wide-ranging discussions, a variety of concerns and opportunities were discussed. Concerns expressed often related to funding, the timing of such an ambitious plan, as well as how the multiple jurisdictions could coordinate efforts. Technical issues involved discussions about existing industrial activities, environmental challenges such as the El Mirage landfill, as well as incorporating existing levees and other flood control structures.

The discussions also yielded some very creative ideas for new development opportunities, revitalization projects, new trails and recreational facilities, and potential economic development possibilities. A summary of some of the primary meetings is included in Appendix C.

2. Visioning Session

After most of the individual meetings had been conducted, the team thought it would be beneficial to bring everyone together to facilitate a more interactive discussion. On October 10, 2003 a "Visioning Session" was conducted at Estrella Mountain Community College. The media announcement for this workshop is included in Appendix C. A large number of community leaders were invited to attend or send representatives, and about 80 people participated in the visioning session. Representatives from almost every jurisdiction along the Agua Fria River attended and the team again received very positive feedback about the overall plan.

III. CONCLUSIONS AND RECOMMENDATIONS

A. Channel

1. Horizontal Alignment

The conceptual horizontal alignment of the channel was developed utilizing aerial photography, contour mapping and assessor lot lines from GIS data files as provided by the FCD. Field surveys will be required in the future to determine the exact location of bridges and other features necessary to provide detailed final designs to meet the intent of the concept designs.

The horizontal alignment of the channel was designed to generally follow the center of the floodway and the historic low flow channel. The horizontal alignment also closely follows the concept outlined in the March 2002 memo

(JEF, 2002). Other natural hardbank features along the river such as rock outcroppings and high banks were also considered to fix the horizontal alignment such as the outcrops near the McMicken Dam outfall channel. The alignment also rounds out sharp curves that currently exist in the floodway or low-flow channel, which have been caused by in-river activities. Bends were minimized to reduce the scour potential of the river. The horizontal alignment of the corridor can be seen in Exhibit 1.

The corridor is aligned with existing bridges at Indian School Road, Camelback Road, Glendale Avenue, Olive Avenue, Grand Avenue, Bell Road and Agua Fria Blvd/Happy Valley Road. The corridor avoids known structures, development, and landfills. The El Mirage landfill on the west side of the corridor south of Grand Avenue constrains the alignment of the corridor along with the Grand Avenue Bridge. Bank protection should be provided to protect the landfill from the potentially erosive action of the river even in its current state. The proposed channel has no bends through the deep pits at the Sunstate Sand and Rock Facility located about one mile north of Bell Road. This was done in an effort not to increase the extreme scour threat under the existing condition.

The CAP canal forms the northern boundary of the project and does not affect the horizontal alignment of the corridor. The Agua Fria Groundwater Recharge project, however, does constrain the alignment of the channel. The corridor stays on the east side of the recharge facility and will not affect the function of the facility. From the CAP to the recharge facility the terrace is on the west side of the corridor to provide for the uninterrupted flow of discharge to the recharge facility. The conveyance channel for the recharge facility that conveys flow from the CAP to the facility will be relocated to the west Buffer of the corridor.

The channel is stationed along the proposed centerline of the channel from Indian School Road to the upstream end of the channel. The channel station at Indian School Road Bridge is Station 440+00. The upstream end of the project is just downstream of the CAP and the Beardsley Canal flume at Station 1571+04.

2. Vertical Alignment

The vertical alignment matches the existing channel invert elevation at Indian School Road and the existing invert at Station 1571+04, the upstream end of the project. Minimal scour erosion potential was required at the El Mirage landfill, the Glendale Avenue Bridge and Sunstate Sand and Rock properties, so these locations also served as fixed vertical points along the channel profile. In addition to the fixed vertical elevation locations, the proposed channel profile was designed to utilize the SPF equilibrium slope regime (JEF, 2002). The vertical profile of the corridor is shown in Exhibit 1.

The vertical alignment of the channel includes drop structures or grade control structures at bridges and areas of instability or potential instability such as the El Mirage Landfill, Grand Avenue, or Sunstate. Large drop structures were not desirable from an aesthetic or safety point of view, so the height of the drops was minimized. All of the drops are below a height of 6 feet with three exceptions: the Agua Fria Blvd/Happy Valley Road Bridge where there is an

8-foot drop; downstream of Caterpillar Tank Wash where there is a 9-foot drop; and at the upstream end of the project where there is a 17-foot drop. The 17-foot tall drop at the upper end of the project could be designed as a series of three or more small drops.

At existing or proposed bridges, drop structures are located immediately downstream of the bridge. Other utility crossings besides bridges were also reviewed to confirm that the profile of the channel would have no major adverse impact on the utilities.

Grades controls were set at general locations along the channel. It is expected that during final design exact locations of these grade controls and structures will be located with detailed field surveys and the conceptual guidelines developed in this report. Figures 5 & 6 show the details of the grade control structures.

3. Cross Section

The overall standard width of the corridor is proposed to be 1,200 feet (See Figure 1). This includes the conveyance channel that has a top width of 1000-foot wide and two buffers on either side of the channel that are each 100 feet wide. This also follows the concept proposed by the March 2002 memo (JEF, 2002).

The corridor will have a low-flow flood channel that has a top width of 500 feet. The flood channel will carry the most damaging flows up to about 9,000 cfs, which is approximately the 10-year return frequency discharge without inundating the terrace. The capacity of the flood channel will safely convey the 9,000 cfs sustained design outflow from the New Waddell Dam (JE Fuller, 2002). The corridor will also have a terrace section that will have a top width of 500 feet and will convey discharges at any runoff event greater than 9,000 cfs in combination with the flood channel. Overall, the 1000-foot wide conveyance channel will safely convey the SPF discharge. The 100-foot wide buffers will be used for permanent trails, emergency access and setback for the sand and gravel operations outside and above the active conveyance area of the channel.

As shown on Figure 1, the depth of the flood channel below the buffer elevation will be 12 feet and the depth of the terrace will be 7 feet below the buffer elevation, meaning the depth of the flood channel will be 5 feet by design.

The corridor cross-section will vary from the standard section at some locations due to the existing conditions. In the far upstream reach of the channel from the CAP recharge facility to the upstream limit, the conveyance channel will be 900-feet wide including a 500-foot wide flood channel with a 400-foot wide terrace. The east buffer will be 100-feet wide and the west buffer will be 200-feet wide to provide sufficient area for the channel that delivers recharge water from the CAP to the recharge facility. The total corridor width will still be 1,200 feet. A typical cross-section for the upstream reach by the CAP is shown in Figure 2.

The corridor will transition to a width of 500 feet near the Grand Avenue Bridge where the Grand Avenue Bridge, development, and the El Mirage

landfill constrain the corridor. There is no terrace through this reach and all discharge will be conveyed through the flood channel. The proposed cross-section through the Grand Avenue Bridge is shown in Figure 3. The depth of the channel upstream of Grande Avenue will be 14 feet, 2 feet higher than the standard section to ensure the corridor had the required hydraulic capacity. The depth of the corridor downstream of Grande Avenue will be 12 feet.

Downstream of Bethany Home Road the channel begins to transition to a width of 1,700 feet, including the two 100-foot buffers to match the existing conditions. The SPF discharge greatly increases downstream of the New River confluence. After the transition, the total conveyance channel will be 1,500 feet. A typical cross-section for the reach downstream of the New River confluence is also shown in Figure 3. The width of the flood channel and terrace will vary as the channel transitions again to match the existing channel cross-section at Indian School Road.

4. Bank Protection

Bank protection is proposed on the slopes of the flood channel throughout the entire 22-miles of the project. For planning purposes it was assumed that soil cement would be used to stabilize the banks of the flood channel. As the project progresses individual landowners and sand and gravel operators may propose alternative bank protection schemes which would have to be approved by the FCD and meet FCD criteria.

Bank protection will be placed in the flood channel to a depth below the ultimate scour depth, which has been estimated to be approximately 10 feet (JEF, 2004). The side slopes of the traditional bank protections will be 1.5:1 to 2:1 as shown in Figure 4 and will be plated with a soil cover that has side slopes between 3:1-4:1. The soil plating will ultimately be vegetated. Bio-engineered bank protection will be located on the terrace slope, which will have a side slope of about 4:1.

The soil cement will be 8 feet wide and will be placed in 8 or 9-inch lifts from below the ultimate scour depth to the elevation of the buffer (12 feet above the flood channel invert elevation) for a total soil cement depth of approximately 22 feet. District standards indicate the required minimum nominal thickness of the soil cement should be at least 3.5 feet. At a 2:1 side slope, the nominal thickness of the bank protection provided for this project will be 3 feet and would be greater on the 1.5:1 side slope on the other side of the flood channel.

At this configuration, 22 feet high; 2:1 side slope; and nine feet wide, the soil cement would not be subject to seepage or uplift pressure concerns or significant erosion hazard potential.

5. Drop and Grade Control Structures

There will be 24 grade control structures located along the entire 22-mile corridor. They will be located about every mile and in other locations to protect the stability of the river profile. There will be 22 combination drop and grade control structures and 2 grade control structures with no drop. The grade control structures with no drop will be located at the Grand Avenue Bridge, which has been identified as scour critical, and at the El Mirage landfill.

The typical cross-section for the grade control/drop structures is shown in Figure 2. The width of the flood channel will be widened to 600 feet at the grade control/drop structures so the entire SPF discharge will be conveyed through the flood channel and no flow will be on the terrace. The terrace will gradually transition from the standard terrace elevation to the buffer elevation and then back to the standard terrace elevation downstream of each structure. The flood channel width through the grade control structures and drops was increased to 600 feet so the grade control structure would not have to be extended across the entire 1,200-foot width of the corridor. Through the area of the grade control structures, there will be no soil plating on the channel bank protection. This is shown in Figure 4. The only locations where the grade control structures/drops will vary from the 600-foot width standard are at the Grand Avenue Bridge, the El Mirage landfill and the Cactus Avenue alignment where there will be no terrace and the width of the channel is about 500 feet. A variation of the 600-foot width will also occur at Camelback Road where the drop structure will extend across the entire 1500-foot width of the channel downstream of the bridge.

The profiles for typical combination drop and grade control structures and grade control structures with no drop are shown in Figure 5. The height of the drop associated with the structures ranges from four to six feet high with three exceptions. One 8-foot high drop structure will be located at Agua Fria Blvd/Happy Valley Road and one 9-foot high drop structure will be location just upstream of Jomax Parkway. There is a 17-foot drop at the upstream end of the project, which could be designed as a series of small drops as opposed to one 17-foot drop.

As shown in Figure 5, the drop structures will have a slope of 6:1 so the impact of the drop can be diminished. The 6:1 slope will be paved with a 3-foot layer of soil cement to protect the invert of the channel. When the drops are constructed at bridge locations the slope paving will extend upstream so the entire area under the bridge will be protected from the potential pier scour and contraction erosion. The drop structures at the bridges will parallel the bridge and may be slightly skewed to the corridor to reduce the volume of slope paving that would be required if the drop structures were placed perpendicular to the direction of flow. Where proposed channel inverts fall below formed columns thereby exposing unformed concrete drilled shafts, the exposed drilled shafts are to be modified to match the columns above.

The toe down depth at the downstream end of the drops will be extended below the scour depth, which ranges from 10-18 feet (JEF, 2004). The toe down on the upstream end of the drop will be 10 feet below grade, which is the computed scour depth (JEF, 2004). The estimated toe down depths downstream of the grade control/drop structures are shown in Table 5.

Table 5. Grade Control/Drop Structure Data.

Drop Structure No.	Agua Fria River Station	Drop Height (ft)	Estimate Toe Down Depth Below Drop (ft) [1]
1	499+28	4	11.1
2	557+82	6	14.6
3	584+82	6	12.6
4	615+58.5	5.5	12.0
5	669+88	4	11.2
6	722+88	4	11.9
7	759+88	4	11.9
8	796+88	4	11.6
9	834+88	4	11.4
10 [2]	850+00	0	9.6
11 [2]	881+50	0	12.6
12	946+82	6	14.6
13	1012+38	4	12.8
14	1100+07	6	12.0
15	1149+82	6	14.3
16	1156+85	5	12.9
17	1204+88	4	12.0 [3]
18	1254+88	4	12.0 [3]
19	1308+76	8	15.0
20	1358+73	9	16.1
21	1408+85	6	12.9
22	1449+82	6	14.6
23	1519+88	4	12.3
24 [4]	1570+00	17	18.1

[1] (From JEF, 2004)
[2] Grade Control Structures Only-No Drop
[3] Estimated Scour Depth
[4] Could Be Designed as a Series of Two or Three Smaller Drops

Each grade control/drop structure is detailed to include a notch as shown in Figure 5. The notch has a 2-foot depth and 50-foot width. The notch should be located along the face of the grade control/drop structure to control the location of nuisance and low-flows in the area of the structure. The notch will

provide added protection and reduce maintenance needs for trails and/or haul roads located in the flood channel. It could also facilitate and control the location of linear groundwater recharge flows that may be introduced into the river in the future. Grading of the channel bottom between these 'notch' elevations is not proposed, but the river will be allowed to cut a channel that will provide more natural aesthetics.

During final design, any variations to the design of these structures must consider impacts on immediate upstream, downstream, and across river properties. The drop structures at the bridge locations should each be individually analyzed due to the skew in the structure, though the hydraulics should not vary significantly from the drop structures that are perpendicular to the corridor. The toe down on the downstream end of the drop should be below the total scour depth after the drop to ensure the stability of the drop.

6. Alternative Bank Protection.

Some property landowners or sand and gravel operators may propose alternative types of bank protection, which would have to be approved by the District. The alternative bank protection would need to resist bank scour and uphold the integrity of the channel and provide similar protection and life-cycle maintenance costs to those of soil cement. The cross-sectional details and the configuration of the composite section should not be altered. Modifying the location of the drop structures would require analysis of the impacts through the entire project and is not recommended.

B. Environmental Permits

1. 404 Permit

It is recommend that efforts begin immediately to coordinate with the USACE to obtain a Regional 404 Permit for the Agua Fria. The goals of the Regional Permit would be to:

- define parameters of "permittable" uses within the river;
- define local jurisdictional authority of the Regional Permit;
- reserve riparian habitat above the CAP siphon crossing of the river and below State Highway 74 (a three mile area of undeveloped and incised channel with high habitat value);
- determine other opportunities of Gila and Agua Fria Rivers including areas of habitat "banking" potential;
- include role of groundwater recharge opportunities.

It is recommended that the FCD take the lead in these discussions. The other municipal jurisdictions need to be brought into the discussion and concur with the plan for the Regional 404 Permit and process of administration after its creation. A means to develop this communication and ongoing support should be created during the next steps of the Public Outreach program.

C. Groundwater

No groundwater modeling was performed under this study. In general, the vertical alignment suggested in the report is lower than existing flowlines. Therefore, the design should not cause an increase in the horizontal extent of groundwater movement at a given elevation through the vadose zone during flooding events.

Impact to adjacent excavated areas in general from groundwater flow during flood flows should not be increased over current conditions. Any groundwater recharge projects or extended period of release from Lake Pleasant may pose some cumulative impact and should be considered by those projects.

It is recommended that any excavation proposed adjacent to the corridor include:

- 100 foot flat buffer (i.e. less than 5% slope measured from edge to edge across the 100 ft. buffer) from top of channel;
- side slopes on the face of excavation adjacent to the channel be no steeper than 3H:1V;
- bottom of excavation be above a line measured from the toe of slope of the main channel no less than 10H:1V.

(These recommendations are consistent with the currently proposed Sand and Gravel Mining Floodplain Use Permit Application Guidelines.)

In the event that anything less than these parameters is proposed, an applicant would need to prepare analysis of groundwater flow during passage of a series of flooding events to prove that failure of the channel bank will not occur from behind due to subsurface water movement and soil conditions.

D. LOMR/CLOMR

It is recommended that the channelization plans and supporting report be submitted to FEMA for consideration and issuance of a Conditional Letter of Map Revision (CLOMR) for the entire study limits (i.e. Indian School Road to CAP siphon). This will help provide a higher level of certainty of revised mapping of the 100-year floodplain if the channelization option is implemented. Conditions will be included in the CLOMR that, dependant of the specific comments, can either be addressed with a revised submittal of the entire report or addressed in the future with individual submittals of smaller sections of specific implementation plans.

It is anticipated that the project will likely be implemented in phases. Minimum reach lengths will be dependent on the ability to have a project that functions in the short run (i.e. without full up and downstream project implementation) and in the long run (i.e. with full implementation). It is hard to determine apriori minimum reach lengths, but in general, they would run from one grade control/drop structure to the next. Shorter lengths would require a plan to address interim conditions or propose an alternative to the concept plans herein. At a minimum, the plans would need to:

- Provide ultimate channel capacity although interim floodplain functionality of the ultimate channel may be to the 100-year level prior to full project implementation.
- Address upstream and downstream channel impacts vertically and horizontally

- Analyze far enough upstream and downstream to determine where conditions return to existing

Subsequent CLOMR applications should be made for specific subreach projects prior to construction. Upon completion of the entire subreach channelization project, including all bank protection and, if applicable, interim improvements a Letter of Map Revision (LOMR) can be applied for requesting the floodplain revisions be implemented.

E. Bridges

With the exception of the newly constructed Agua Fria Boulevard bridge on the Happy Valley alignment, the bridges within this corridor are generally older bridges with various modifications over the lifetime of the structure. Previous bridge modifications include abutment and pier scour protection, bridge widenings to include construction of a new and parallel bridge, and foundation replacements/enhancements.

Bridge scour analyses were performed on each existing structure during the 1990's (KHA, 2001). Of the seven existing structures within this project, two were found to be scour critical (Table 3); The Indian School and Glendale Road Bridges. At Indian School Road, which is one of the two scour-critical bridges, the proposed channel will match existing grade. In a previous modification, the bridge was repaired to prevent potential scour. Improvements included the replacement of some of the spread footings with drilled shafts and the use of a soil-cement blanket along the channel bottom in the area of the remaining spread footings.

At the Glendale Avenue Bridge, which is the other scour-critical bridge, the proposed flow-line elevation is approximately one-foot above the existing flow-line or four feet above the as-built flow-line design elevation.

The three-foot thick layer of soil cement (See Figure 5) will be placed on the proposed channel invert under the entire bridge to minimize the pier scour potential. During final design, it is recommended that a durability analysis be completed to confirm that the three-foot thick slope mat can withstand the flows across the drops over the life of the channel. If it is shown that soil cement or cement stabilized alluvium does not have the necessary durability, a richer RCC type of mix, with a higher cement ratio should be designed.

In Table 6, the proposed channel inverts are tabulated and compared with the elevations of the existing and design channel invert and the low chord elevations.

Proposed excavation cuts vary from 5-12 feet in depth (from as-built design elevations), but should not affect the bridges that were determined to be scour stable where the depths to pier tips (embedment) are between 56-88 feet. The three-foot layer of slope paving is proposed at every bridge, but a hydraulic, pier structural, scour and other required analyses should be completed at each bridge during final channel design to verify need. Detailed structural analyses using the proposed improvements should be performed on the bridge (focused primarily on the piers) and should address bends, skews, pier scour, and effectiveness of any proposed improvements. Where proposed channel inverts fall below formed columns thereby exposing unformed concrete drilled shafts, the exposed drilled shafts are to be modified to match the columns above.

The proposed design will match the existing grade at the Indian School Road Bridge. The setting of the final design gradient of the channel and the height of the drop at Camelback Road should be done after a field survey verification of the protection at Indian School Road and the grade control structure several hundred feet downstream of the bridge.

Where a 12-foot clearance under the bridge is necessary for equestrian facilities, the buffer will be cut down under the bridge to allow proper crossing height (EDAW, 2004).

Table 6. Bridge Data and Design Information

Bridge	Station	As-Built Channel Invert (ft)	Existing Channel Invert (ft)	Proposed Channel Invert (ft) [1]	Proposed Top of Buffer Elevation (ft)	Lowest Low Chord Elev. (ft)	Minimum Bridge Clearance at Buffer(ft)
Indian School Road	440+00	1000.00	1000.00	1000.00	1012.0	1015.57	3.57
Camelback Road	499+14.61	1016.36	1013.98	1009.36	1021.36	1026.37	5.01
Glendale Avenue	616+48.15	1040.20	1043.38	1044.32	1056.32	1060.20	3.88
Olive Avenue	723+69.69	1073.21	1065.31	1068.41	1080.41	1088.15	7.74
Grand Avenue (US60)	882+33.11	1111.75	1111.35	1106.56	1118.56	1124.68	6.12
BNSF RR	883+49.90		1111.35	-	-	-	Same as Grand Ave.
Bell Road	1014+03.93	1149.70	1151.80	1137.54	1149.54	1164.45	14.91
Agua Fria Blvd.	1310+61.91	1241.80	1239.38	1230.31	1242.31	1254.16	11.64
Proposed Loop 303	1524+19.49	-	1311.63	1304.58	1316.58	-	-

[1] Channel matches existing profile at Indian School Road Bridge.

F. Utilities

The following is a summary of utility conflicts.

El Paso Natural Gas-There should be no conflict with the 20-inch diameter El Paso Natural Gas pipeline that runs in a north-south direction between Indian School Road and Glendale Municipal Airport along the easterly edge of Reach 9. The existing line is within the proposed recreation corridor's 100' linear setback corridor. Any conflicts would be dependent upon proposed improvements within the New River channel and/or an WVRC recreation corridor linkage such as a bridge which would span New River within the WVRC 100' linear setback corridor.

Southwest Gas-Southwest Gas Corporation has an existing six-inch diameter natural gas line and a proposed eight-inch diameter line, approximately 94' and 85' downstream of Glendale Avenue, respectively. Both lines are approximately 10 and 24 feet downstream of the proposed drop structure at Glendale Road, respectively. Studies should be performed to determine if they are within the scour zone and thus require additional protection or relocation. Possible remedies could include locating the drop structure further downstream so the lines would lie beneath the structure or would be beneath the slope paving in the channel invert. There is another three-inch diameter natural gas line north of Glendale leading to a ready-mix concrete facility. It does not appear to be in conflict with the construction of the corridor.

Southwest Gas has another existing six-inch diameter natural gas line approximately 100 feet north of Bell Road. The proposed channel invert at this location is approximately 12 feet below the existing grade. This line should be field located vertically to determine whether it lies within the scour zone during final design.

There is another four-inch diameter gas line downstream of Olive Avenue near the south right-of-way line. This line could also be protected by a small downstream shift of the drop structure near Olive Avenue to mitigate any conflict with the corridor. This line should also be field verified during final design.

There is a four-inch diameter natural gas line downstream of Grand Avenue that has approximately 17 feet of cover. The channel is severely constricted resulting in deeper anticipated scour depths at this location. The grade control structure could be located to mitigate the potential of adverse impacts on the line or the line could be relocated to avoid conflict.

Qwest -There is a Qwest concrete encased ductbank about 60 feet downstream of the Grand Avenue Bridge. Again, the drop/grade control structure could be strategically located so there would actually be an increase in scour protection for these utilities. Mitigation efforts for the ductbank could be coordinated with the four-inch natural gas line identified.

Sanitary Sewer-An 18-inch diameter ductile iron sanitary sewer forced mains cross the Agua Fria River about 415 feet upstream of Rose Garden Lane and is located approximately 100 feet upstream of a drop structure. The sewer lines are concrete-encased lying approximately 20 feet below the proposed flowline so it does not appear there will be a conflict.

CAP-The corridor will begin downstream of the CAP canal and the Beardsley Canal flume. The CAP recharge canal/ditch generally meanders within the Agua Fria River bottom and it is proposed that the recharge ditch be relocated to the buffer along its entire reach (between Caterpillar Tank Wash and the upstream end of the project, a distance of approximately 19,000 linear feet). The buffer will be widened to a width of 200 feet to allow the recharge ditch to be located in the buffer.

In all cases where there are crossings of the Aqua Fria River, it is anticipated that there will likely be some conflicts with the existing buried utilities and the construction of the channel hardbank. It is anticipated that any conflicts would be mitigated by protecting the utility in place without any appreciable increase in costs.

Conceptual Plans should be shared with the various utility companies to verify location of facilities, identification of conflicts, proposed resolution of conflicts, and for the utility company's use in planning new improvements.

G. Quantities

Recovered Lands-Recovered lands are those lands lying outside of the constructed Agua Fria River Recreation Corridor that are currently in either the FEMA regulatory floodplain and floodway, or the erosion hazard zone. After the construction of the corridor, these lands would no longer be under the jurisdiction of the FCD. The project benefit to the landowners is that when the lands are outside the jurisdictional zone and not under the regulatory control of FCD and do not have to meet FEMA requirements, there would be a lower cost for using or developing property.

Table 7 shows the area required for the channel construction and the recovered lands for each reach of the project. Each of the three areas per parcel were totaled to provide the gross acreage of land recovered from FEMA regulated floodplain and floodway and the erosion hazard zone on a per reach, or mile-by-mile basis. The benefit cost savings is different for each zone, assuming the greatest cost benefit would be for those lands in the floodway, followed by the floodplain and lastly, the erosion hazard zone.

Table 7. Summary of Recovered Lands.

				Recovered Areas (Acres)			
Reach	**Beginning Alignment of Reach**	**Ending Alignment of Reach**	**Required Channel Area**	**Floodway**	**Floodplain**	**Lateral Migration Erosion Hazard Zone**	**Total Recovered for the Reach**
Reach 9	Indian School Rd.	Camelback Rd.	220.6	27.3	99.4	42.7	169.5
Reach 10	Camelback Rd.	Bethany Home Rd.	245.9	42.9	535.7	53.8	632.3
Reach 11	Bethany Home Rd.	Glendale Ave.	84.8	0.1	153.9	113.2	267.3
Reach 12	Glendale Ave.	Northern Ave.	145.6	41.7	165.4	80.4	287.5
Reach 13	Northern Ave.	Olive Ave.	141.7	23.0	91.7	281.8	396.5
Reach 14	Olive Ave.	Peoria Ave.	138.7	20.7	164.0	135.1	319.7
Reach 15	Peoria Ave.	Cactus Rd.	120.6	21.5	62.7	39.6	123.7
Reach 16	Cactus Rd.	Thunderbird Rd. Alignment	106.5	0.2	81.8	111.4	193.4
Reach 17	Thunderbird Rd. Alignment	Greenway Rd.	71.0	1.6	111.6	67.3	180.5
Reach 18	Greenway Rd.	Bell Rd.	175.6	4.1	165.1	51.9	221.1
Reach 19	Bell Rd.	Union Hills Dr.	161.5	109.3	142.0	26.6	277.8
Reach 20	Union Hills Dr.	Beardsley Rd.	101.5	16.2	84.7	44.0	144.8
Reach 21	Beardsley Rd.	Deer Valley Rd.	235.0	40.9	73.8	257.8	372.5
Reach 22	Deer Valley Rd.	Pinnacle Peak Rd.	136.5	148.2	132.2	127.3	407.7
Reach 23	Pinnacle Peak Rd.	Happy Valley Rd. Alignment	155.2	42.2	177.5	17.1	236.8
Reach 24	Happy Valley Rd. Alignment	Jomax Rd. Alignment	232.5	138.3	302.7	36.0	477.0
Reach 25	Jomax Rd. Alignment	Dynamite Blvd. Alignment	117.8	43.9	126.3	33.6	203.9
Reach 26	Dynamite Blvd. Alignment	Dixileta Dr. Alignment	115.5	20.9	136.4	49.4	206.6
Reach 27	Dixileta Dr. Alignment	Lone Mountain Rd. Alignment	150.5	0.0	106.3	96.3	202.5
Reach 28	Lone Mountain Rd. Alignment	Dove Valley Rd. Alignment	121.3	0.0	55.6	23.4	79.0
		Total Areas	**2978.2**	**742.9**	**2968.8**	**1688.4**	**5400.1**

(Note: Also include channel area and terrace vs. main channel)

H. Earthwork and other Construction Quantities and Conceptual Opinion of Probable Cost

Table 8 shows the total quantities estimated and summarized for the conceptual channelization plan.

The flood channel bank protection (12-foot height) typical section will require approximately 6.5 cubic yards of soil cement/cement stabilized alluvium per linear foot. The flood channel/terrace bank protection (5' Height) typical section will require approximately 4.4 cubic yards of soil cement/cement stabilized alluvium per linear foot. The flood channel/terrace bank protection typical section in the transition zone at the drops will require 5.5 cubic yards of soil cement/CSA per linear foot.

Each typical drop structure will require 4,100 cubic yards of soil cement/ cement stabilized alluvium for the drop and about 2,200 yards of slope paving for a total of 6,300 cubic yards for each drop structure where there is no bridge. An additional 5,000 cubic yards of slope paving will be required at the bridge locations bringing the total soil cement required for the drop and slope paving at the bridge locations to 11,100 cubic yards.

The drops at Camelback Road, the Sunstate Sand and Rock facility (Walker Pit), and upstream end of the project require more soil cement than the average structure. The drop structures at Camelback, Sunstate, and the upstream will require about 22,000, 19,000, 15,000 cubic yards, respectively.

The grade control structures with no drop at the El Mirage landfill and the Grande Avenue Bridge will require about 3,400 cubic yards to construct. The grade control structure at Grand Avenue will also require and additional 2,400 cubic yards of slope paving for a total of 5,800 cubic yards for the entire structure.

Channel excavation quantities were developed using the proposed profile and typical section as compared with the existing terrain developed from the 10-foot contour interval mapping. Beyond the 100-foot buffers, 2:1 fill and 1.5:1 cut slopes to daylight were used. Shrink/swell adjustments in earthwork were not applied. The total channel excavation includes an adjustment for the difference found in DEA field surveyed cross sections and the FCD DTM cross sections. On average the difference in depth between the DEA and the FCD cross-sections was 2 feet.

Table 8. Estimated Channelization Quantity Summary.

Item	Unit	Quantity
Soil Cement Bank Protection	yd^3	1,302,000
Soil Cement for Drop Structures and Slope Paving	yd^3	193,000
Channel Excavation	yd^3	43,200,000
Sunstate Rock (Walker) Pit Fill	yd^3	1,075,000
Landscape Plating	yd^3	715,000
Terrace Area	Acres	1017
Cost	$115,000,000 to $148,000,000	

All quantities were developed utilizing the typical sections proposed for this conceptual plan. Detailed designs will address other construction items and quantities necessary for project completion. This includes, but is not limited to, side-channel inlet treatments, CAP recharge canal, access/maintenance ramps, utility relocations, and bridge modifications.

I. Implementation

1. Construction/Final Design

Individual property owners, sand and gravel operators, and other parties will begin to develop the corridor at different times, meaning the corridor will be constructed in phases. As opposed to developing standards and details for phased implementation, the final design and construction should be required to meet a minimum performance standard. The standard should include the following criteria at a minimum:

- The ultimate corridor buildout must have the capacity to convey the SPF safely. In the interim, the corridor must function to safely convey the 100-year return frequency discharge;
- The final and interim designs and construction cannot adversely impact adjacent properties upstream, downstream, or across river of the subject property;
- No ponding of stormwater discharge will be allowed;
- All interim projects or phased corridor segments must provide positive drainage from adjacent unimproved properties;
- The minimum allowable scope for pilot projects should include the entire corridor between proposed grade control structures:
- Side-slopes, setbacks, mining depths, and other FCD sand and gravel mining regulations apply on the backside of the corridor.

During the corridor excavation and initial construction phasing, the corridor could also be used as a temporary haul road for sand and gravel materials to allow more ready access to production and processing facilities. Haul roads could have a hardened surface, but must conform to all current and relevant

city, county, state, and federal statutes. The design and construction of a haul road must not adversely impact the corridor or any existing infrastructure. The constructor of the haul road must ensure that the durability of the phased corridor segment, bank protection, or drop grade control structure not be compromised.

Process and studies required to update and finalize design of a reach should include:

- A revised HEC-RAS model which should be incorporated into the conceptual design model being created with this channelization model. It should be tied in at both the upstream and downstream ends. This will be used by all parties in submitting CLOMR application in phased corridor segments;
- Sediment transport analysis or modeling to show the impacts of proposed design. This will be very important to subreach implementation as suggested;
- Final design plans of a channel, bank protection and drop/grade control structures;
- Deisgn of overexcavation and backfill in channel terrace if necessary;
- Schedule for construction;
- Right-of-way analysis and plans;
- Cost estimate and quantity estimate;
- Financial plan including assurances that the County or other jurisdiction can rely on construction being completed once begun;
- Operation and Maintenance Plan;
- Recreation Corridor District Reports if this path is being suggested;
- Structural analysis at existing bridge structure discussing impact of scour and hydraulic forces.

2. Municipalities Role

Upon formal acceptance of the AFR-WCMP and Addenda by the County Board of Supervisors, each City within whose jurisdiction the corridor lies, should consider endorsement of the plan. Besides the moral support that this will give the plan, it will further give the basis for each jurisdiction to formally consider alternative land uses/zoning designations for recovered lands as well as other contiguous land.

In the event the channelization option is proposed within and through a municipality, the decision on whether to own, operate, and maintain the flood control components within the corridor rest on whether non-flood control components of the project would be made by the municipality (or Special District if created for that purpose).

It is also important that cities consider locating future recreational facilities adjacent to the corridor. This will enhance the overall corridor project which

will emphasize passive recreation as well as active recreation which does not require significant structural improvements or obstruction in the floodplain.

3. Land/Right-of-Way

There are nearly 3,000 acres within the proposed corridor through the project limits. There are over 4,000 individual parcels identified on the assessor's records that constitute that acreage. (Note: portions of individual parcels may extend outside of the corridor due to their location and shape.)

It is the intent that all areas within the corridor be in either County or Municipal or Special District ownership after completion of the flood control improvements in the corridor. Easements could be considered where permanent flood control structures are not proposed, although that would not be preferred. Liability issues would need to be considered thoroughly in that event.

4. Zoning/Land Use

The endorsement acceptance of the AFR-WCMP by each municipality is desirable. Cities and the County should subsequently look at considering revisions to the targeted land uses adjacent to the corridor. For large areas, General Plan Amendments may be warranted.

5. Funding

It is anticipated that the bulk of the costs to construct the flood control channel option would not be borne by the Public. Completed corridor segments would be turned over to the appropriate City, County, or Special District for operation and maintenance. Subreaches would need to be long enough to function properly and not increase erosion and flooding hazards beyond current levels.

Risk to portions of the existing public improvements within the corridor would be greatly reduced through implementation of the channelization option including grade control/drop structures. The respective agencies for each bridge crossing should consider construction of grade control/drop structures for that reason.

Currently, the USACE has not been approached for participation of the specific improvements suggested in this study.

The Sub Regional Operating Group (SROG) made up of the cities of Phoenix, Glendale, Scottsdale, Tempe, and Mesa are considering construction of a reclaimed waterline in the vicinity of the corridor. This line would convey flow from the 91st Avenue Wastewater Treatment Plant upstream for release into the Agua Fria River channel for groundwater recharge. Implementation of the channelization option would likely reduce the cost of this structure compared with construction within existing arterial road rights-of-way. Consideration of a river corridor alignment for this reclaimed water line should be promoted.

6. Recreation Corridor District

In June 2004, the first part of the Recreation Corridor District legislation was signed into law. There is additional work that needs to be completed on certain aspects of the District legislation to complete what is currently statute.

Most significant of this is the discussion of financing options which may specifically include some taxing authority.

Even without those specific options defined, most of what is required to facilitate development of the West Valley Recreation Corridor, including the flood control components, is in the statute.

This District could bridge the multi-jurisdictional issues and facilitate the varied means through which construction will occur and contribution of lands and other capital will flow.

The law requires that a waiting period occur. No Recreation Corridor District can be created until July 1, 2005. It is recommended that after approval of the WCMP by the Board, efforts continue to set up creation of an RCD along section(s) of the Agua Fria River where interest and support are highest.

7. Permits

Floodplain Use Permits will be the regulatory mechanism to ensure that the channel is built according to FCD approved plans and specifications. It is anticipated that FEMA will not issue a LOMR until the entire channel, or significant contiguous segments of the corridor are complete. Until that point, the entire floodplain will be regulated under the CLOMR and existing floodplain use permit condition.

The local sand and gravel operators and community will achieve significant benefits when the corridor is constructed because lands outside of the corridor will not be under FCD floodway/floodplain regulation when a LOMR is obtained by FCD. However, if the issuance of a LOMR is many years into the future, the operators may lose motivation to participate in the project if the status quo floodplain regulation is continued after the corridor is constructed, but before the LOMR is issued. To prevent any loss of motivation by the operators, the floodplain and floodway areas outside of the completed corridor could be effectively taken out of the floodway/floodplain at a given time under prescribed conditions, but before the LOMR is issued. For example, when the corridor is constructed to FCD plan and specification, the property outside of the corridor could be effectively regulated as if it were not in the jurisdictional floodplain or floodway.

8. Public Relations/Stakeholder Outreach

Suggested Next Steps

It will be very important to make an outreach to elected officials and their staff in each jurisdiction to get input for this plan. This should occur as early in the WCMP development as possible and certainly prior to scheduling the WCMP for Board approval.

From the feedback that has been received during this current phase of work, there is a number of follow up activities that should be undertaken. These include:

- a meeting with the planning staff from each of the jurisdictions adjacent to the Agua Fria River, to discuss their general plans and what potential changes might be required in order to accommodate

the possible economic opportunities generated from land removed from floodplain status;

- additional meetings with selected civic and business leaders to help refine ideas for one or two possible pilot projects along the corridor;
- possibly a joint meeting with parks and recreation directors and representatives from the State Parks Department to discuss grant opportunities through the Heritage Fund and federal trails programs.

9. Utilities

Utility providers who will be designing and installing facilities along this corridor should use this report as a guide when setting horizontal and vertical alignments for their projects. This will advance project implementation by eliminating the need for costly and unnecessary relocations in the future.

10. Side flows/trapped flows

Major sideflows from drainage outside of the corridor were identified by location. This was not intended to be an exhaustive look at all side drainage. Accommodations must be made during final design of any subreach to identify all side drainage and accommodate it. This may involve conveyance to the channel, necessary drainage structures, channel penetrations, and may also include other means to accommodate it (e.g. retention basins, etc.).

IV. REFERENCES

1. *Aqua Fria River Watercourse Master Plan,* A Report Completed for the Flood Control District of Maricopa County, (Phoenix, Arizona: Kimley-Horn and Associates, November, 2001).

2. *Agua Fria River Conceptual Channelization Plan*, A Memo Submitted to Tom Johnson, Joe Tram, Doug Williams, and Joe Rumann of the Flood Control District of Maricopa County (Tempe, Arizona: JE Fuller Hydrology and Geomorphology, March, 2002).

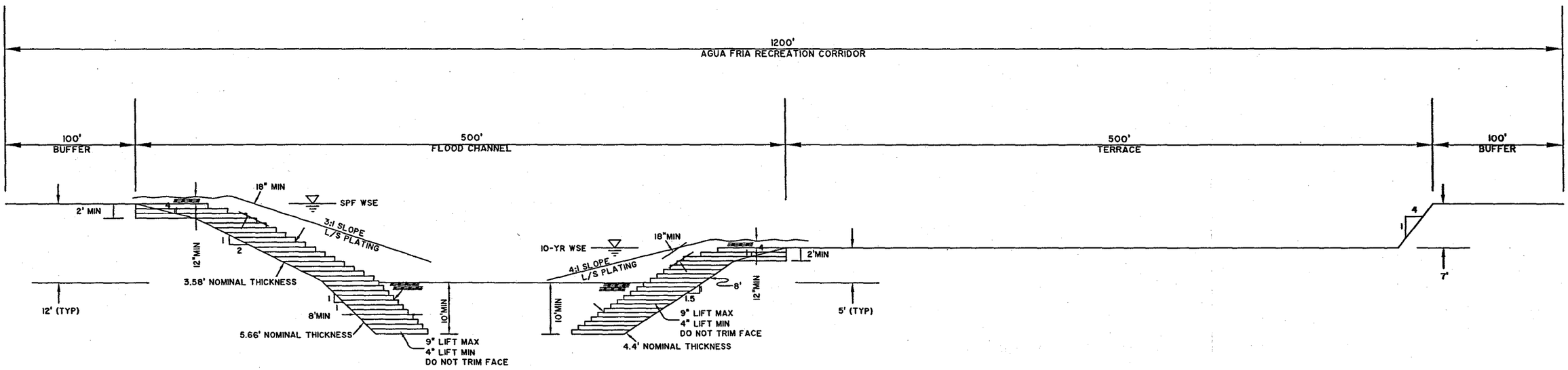
3. *Agua Fria Channelization Project*, A Memo Submitted the Flood Control District of Maricopa County (Tempe, Arizona: JE Fuller Hydrology and Geomorphology, July, 2004).

4. *Alignment Selection Report. Estrella Freeway (SR 303L), Happy Valley Road to I-17,* A Report Completed for the Arizona Department of Transportation (Phoenix, Arizona: URS Corporation, March, 2004).

5. *Interim Loop 303 and Happy Valley Parkway*, Maricopa County Highway Department Project No. 68840, (Phoenix, Arizona: Maricopa County Highway Department, September 2002).

6. Design and As-Built Plans for Twin 18-inch Diameter Forced Sanitary Sewer Main that Cross the Agua Fria River at Rose Garden Lane. (Phoenix, Arizona: Stanley Consultants, August, 2003).

FIGURES



AGUA FRIA RECREATION CORRIDOR
TYPICAL SECTION

DESIGNED IN CONJUNCTION WITH

EDAW

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC

SCALE: NOT TO SCALE

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
DRAFT REPORT

FIGURE 1

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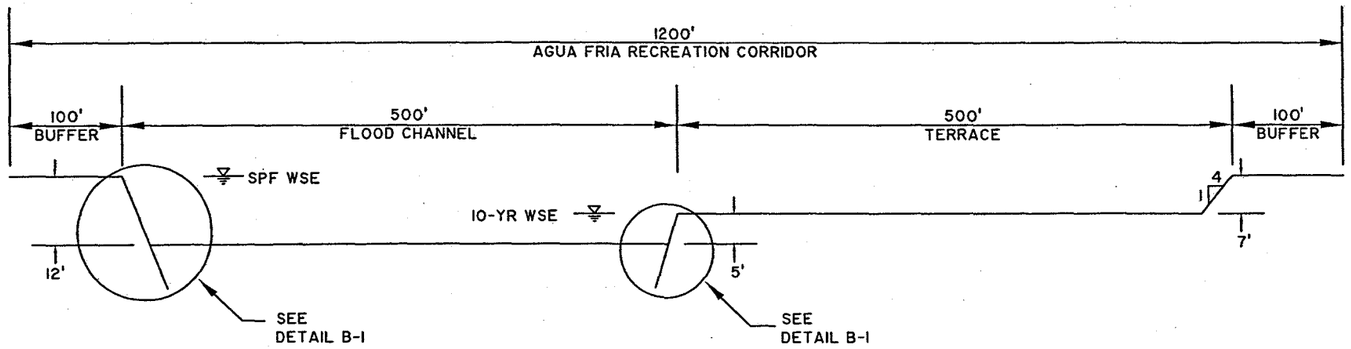
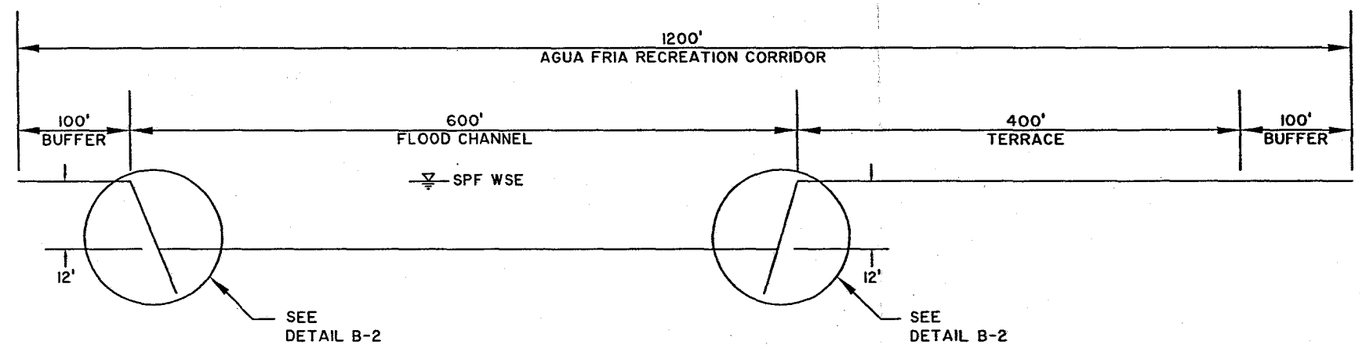
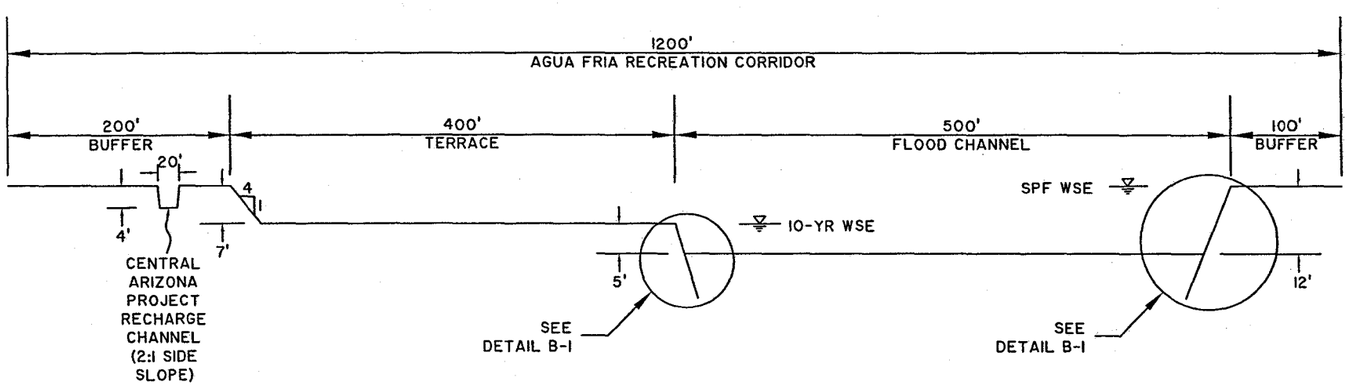


AGUA FRIA RECREATION CORRIDOR
TYPICAL SECTION - DETAIL A-1



DROP STRUCTURE/BRIDGE
TYPICAL SECTION - DETAIL A-2



AGUA FRIA RECREATION CORRIDOR
TYPICAL SECTION - DETAIL A-3

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CHANNELIZATION ALTERNATIVE

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FIGURE 2

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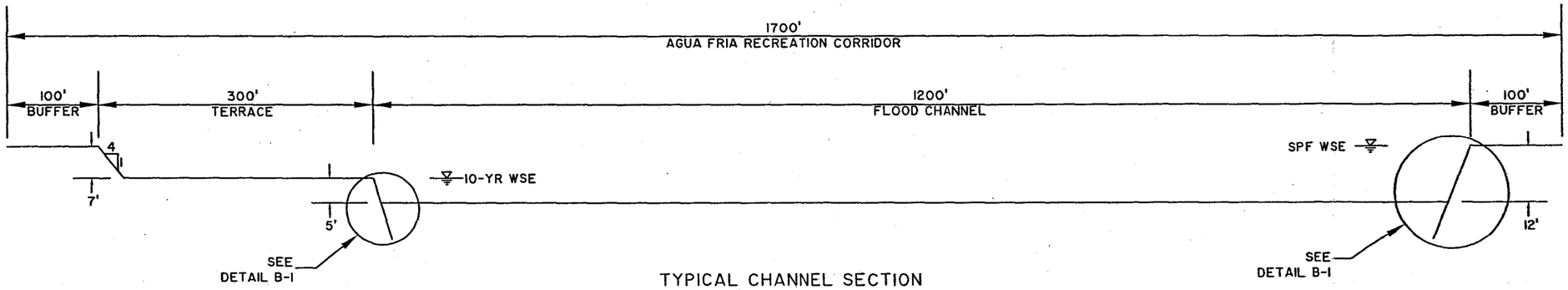
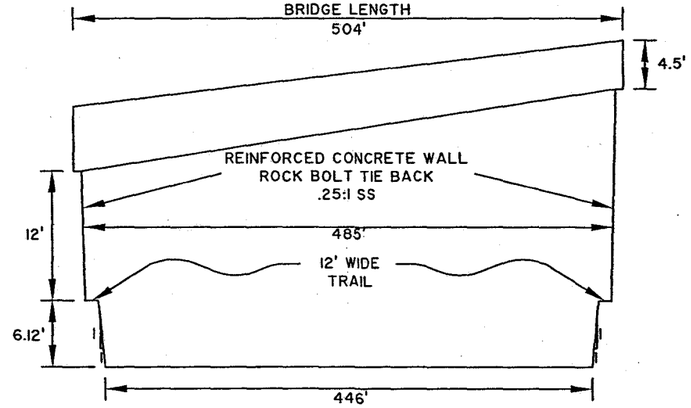


TYPICAL CHANNEL SECTION
BELOW NEW RIVER - DETAIL A-4



PROPOSED GRAND AVENUE BRIDGE
SECTION - DETAIL A-5

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CHANNELIZATION ALTERNATIVE

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FIGURE 3

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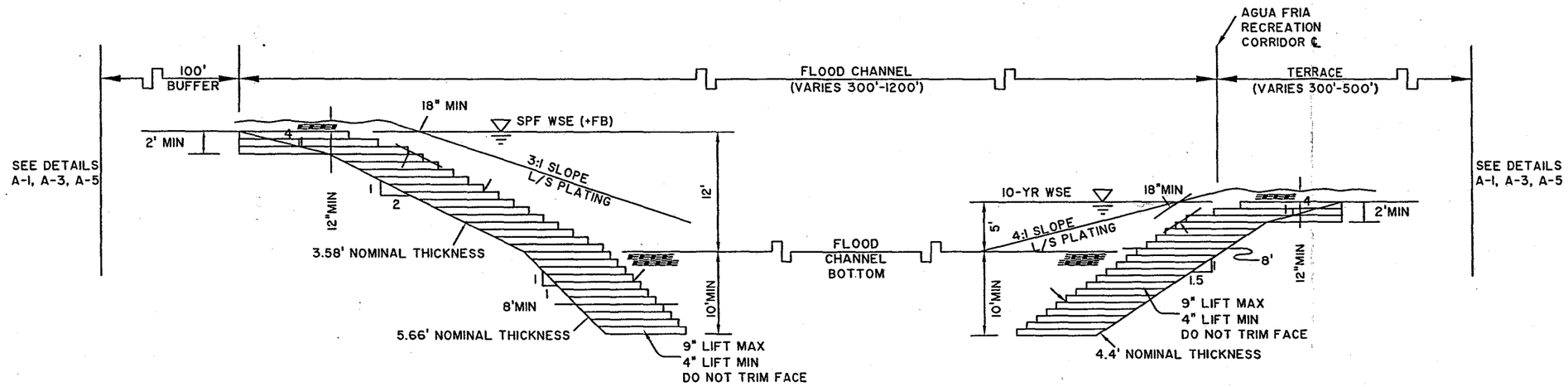
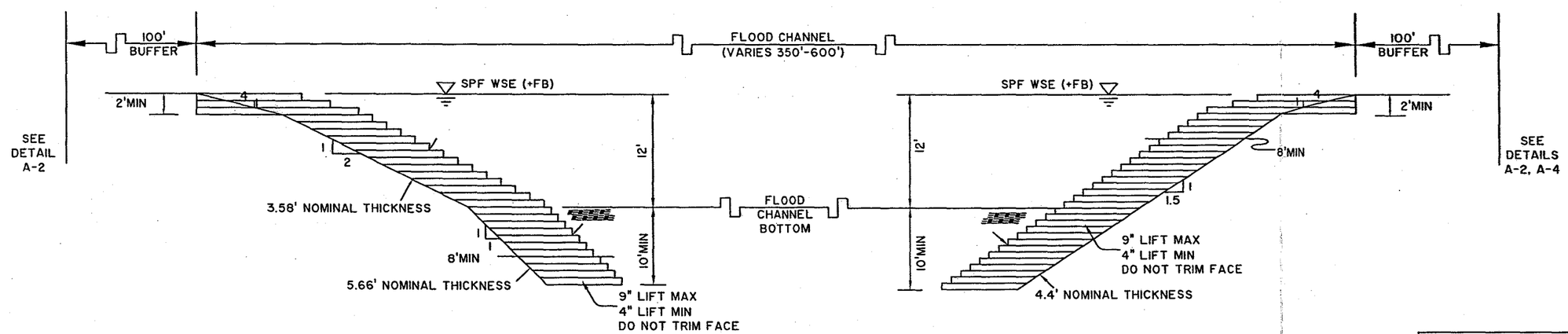


FLOOD CHANNEL/FLOODPLAIN TERRACE
BANK PROTECTION DETAIL - DETAIL B-1



FLOOD CHANNEL BANK PROTECTION
DETAIL - DETAIL B-2

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CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
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FIGURE 4

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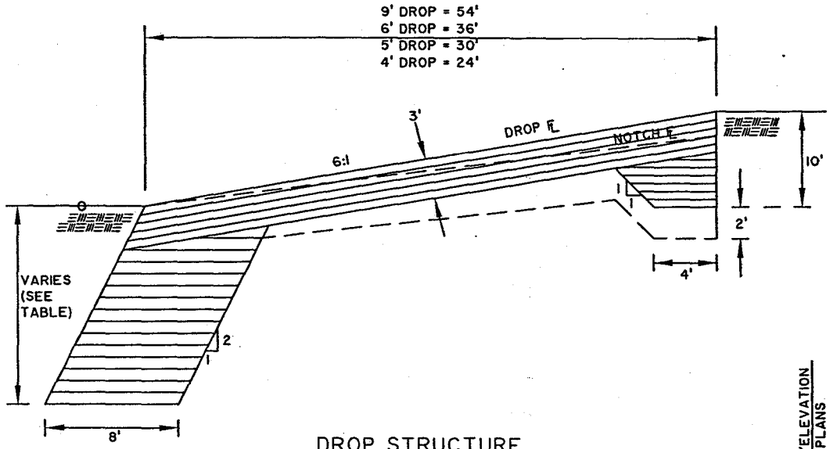
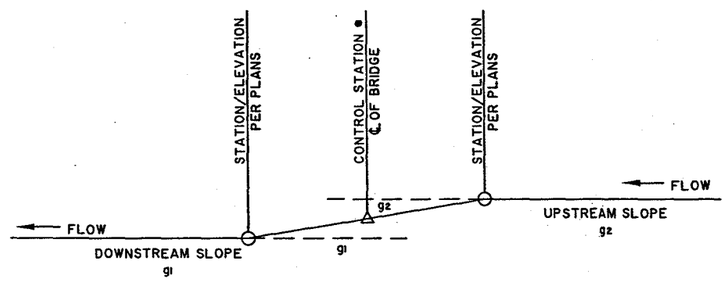
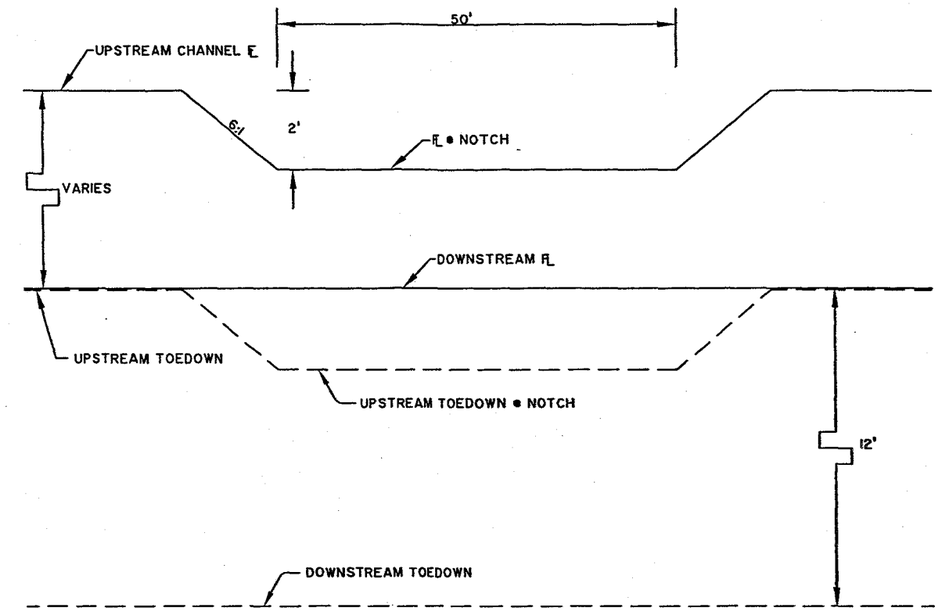


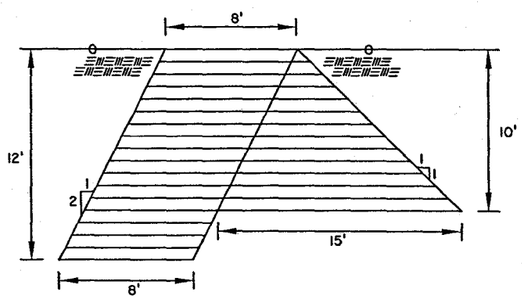
DROP STRUCTURE
DETAIL C-1



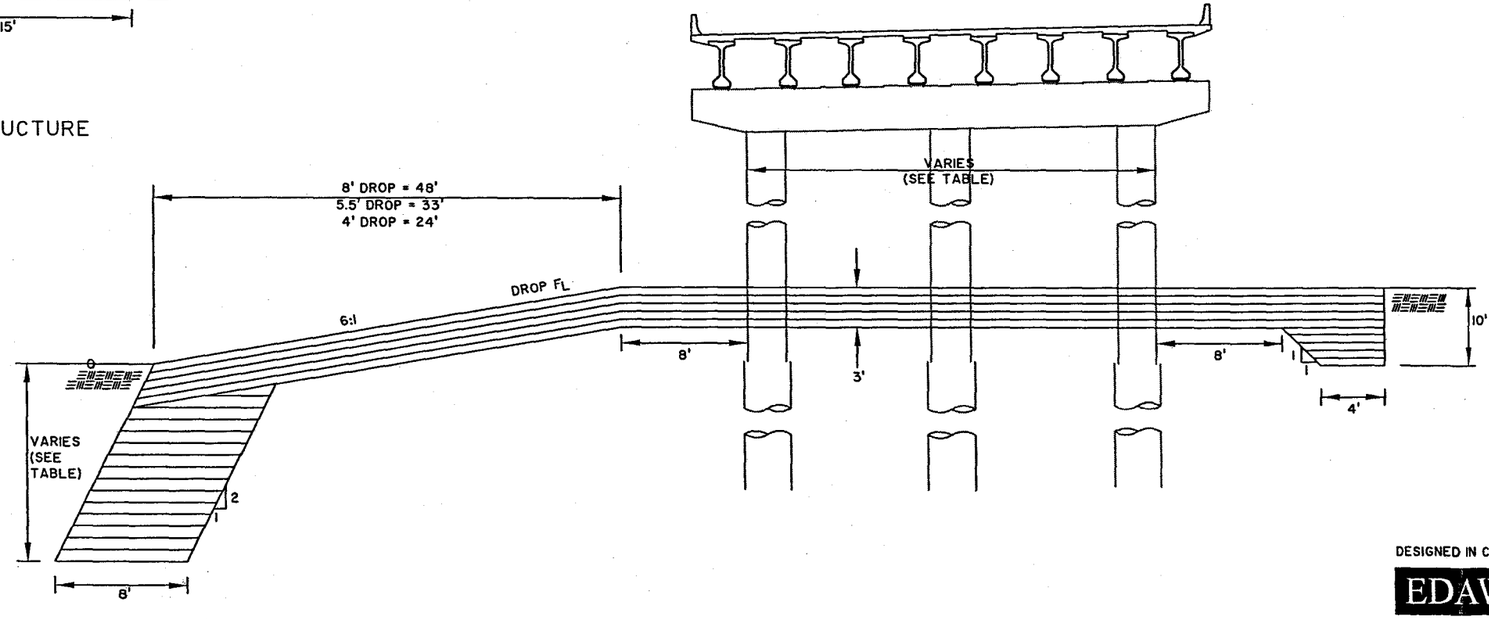
DETAIL C-4



DROP STRUCTURE
DETAIL C-2



GRADE CONTROL STRUCTURE
DETAIL C-3



DROP STRUCTURE W/APRON
DETAIL C-5

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CHANNELIZATION ALTERNATIVE

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FIGURE 5

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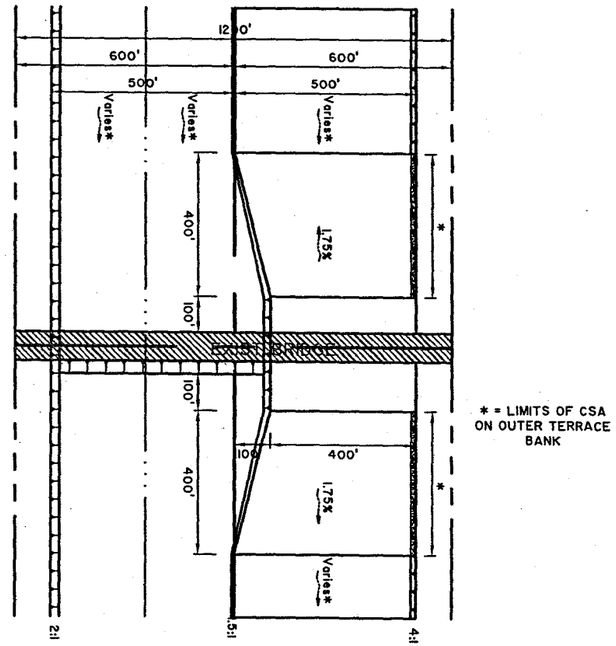

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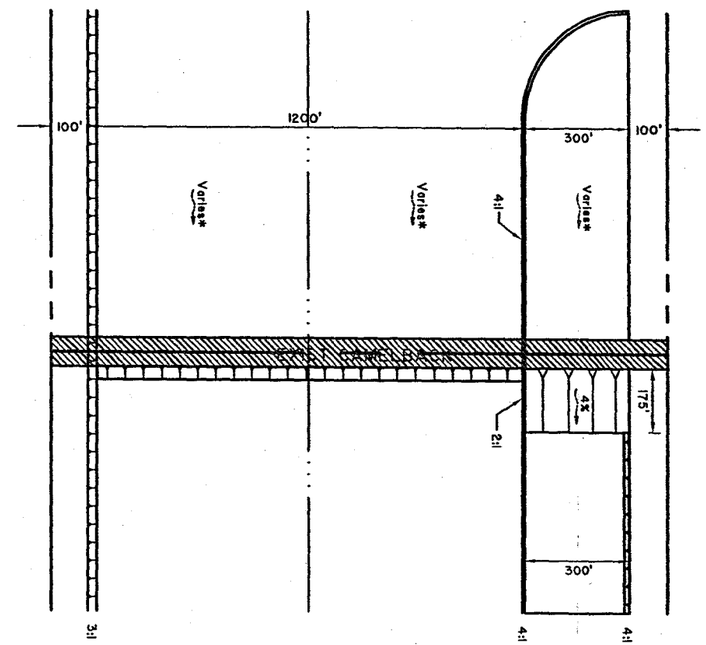
CHANNEL CONFIGURATION @ DROP STRUCTURE/BRIDGE - DETAIL D



CHANNEL CONFIGURATION @ CAMELBACK BRIDGE - DETAIL E

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CHANNELIZATION ALTERNATIVE

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FIGURE 6

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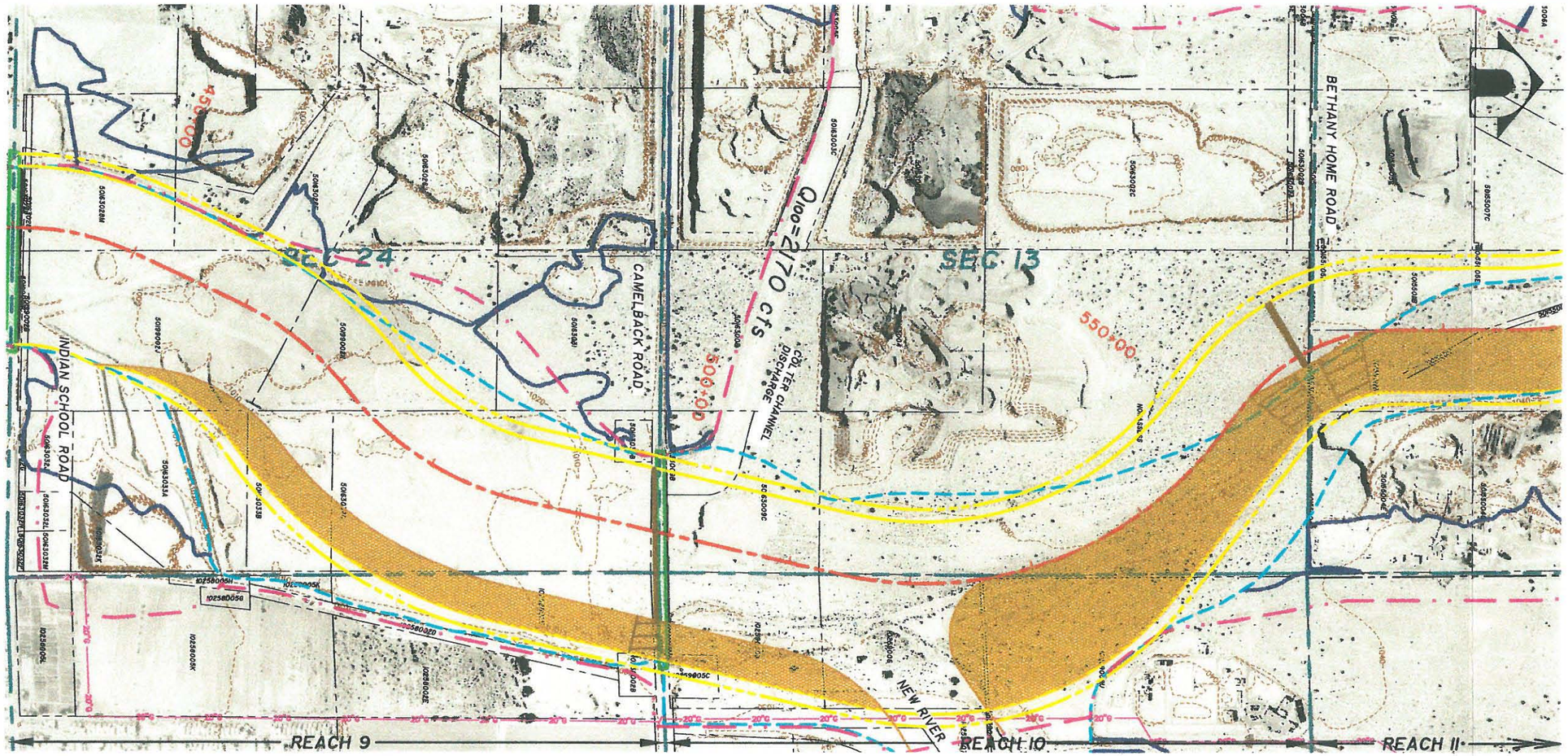
EXHIBIT 1
CORRIDOR PLAN AND PROFILE



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES — TYPE
- EXISTING GROUND CONTOURS — 1000

500' 0' 500' 1000'

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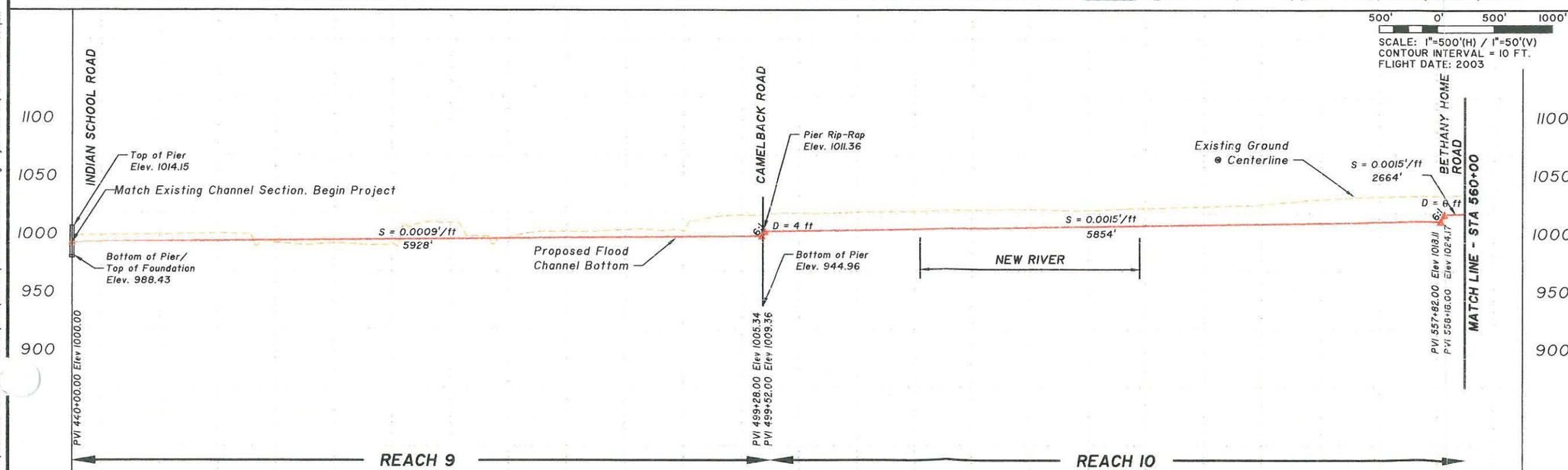
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

*"ADVISORY NOTE: LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

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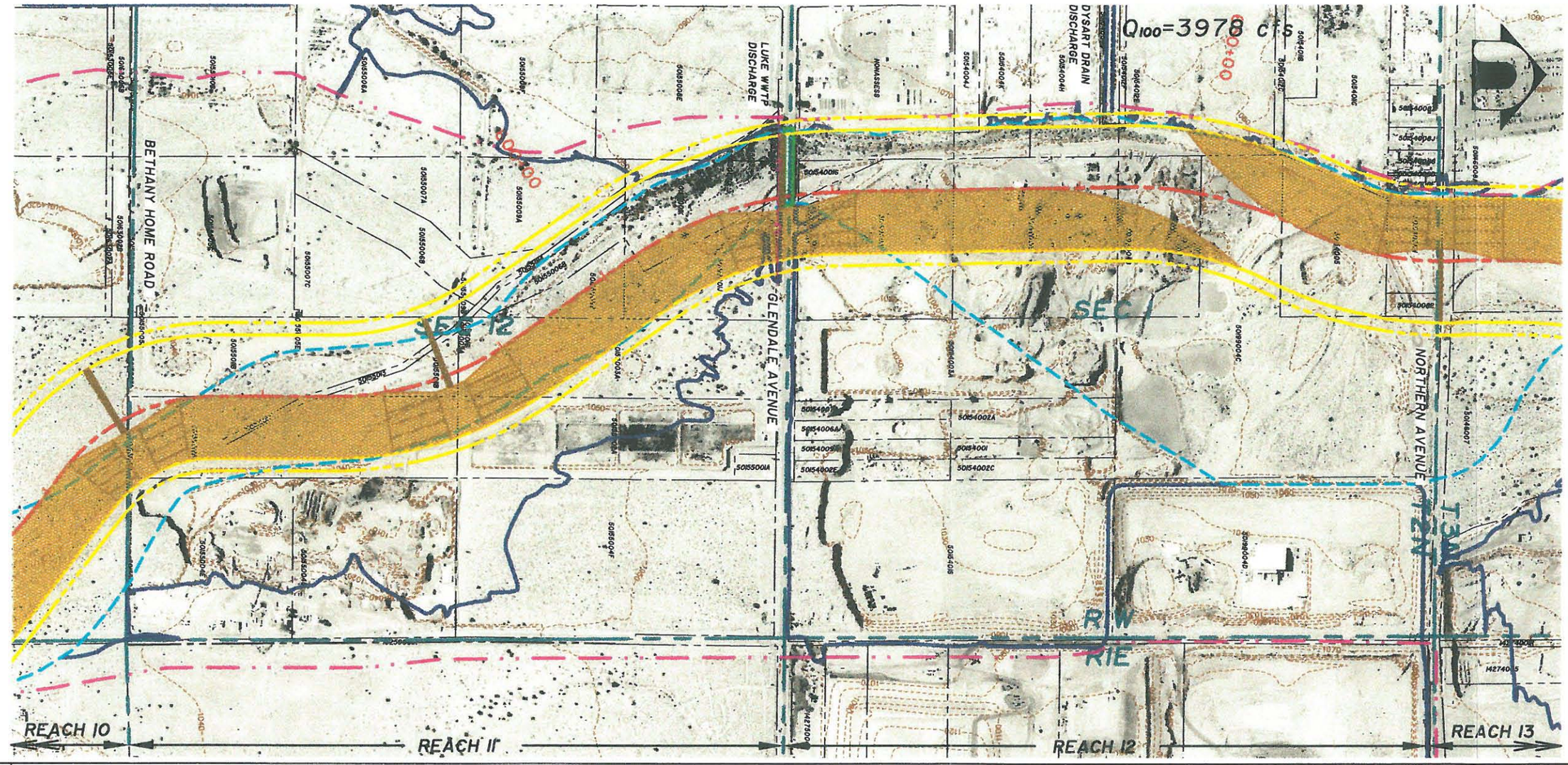

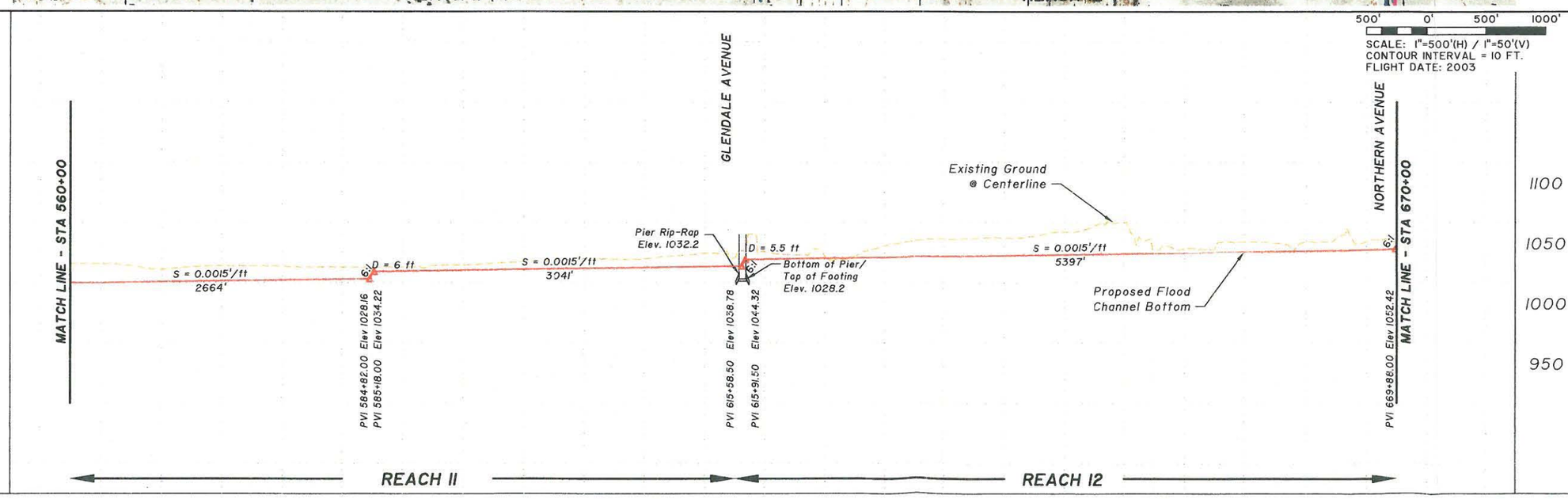

LEGEND

- FLOODWAY BOUNDARY
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- PROPOSED CHANNEL TOP
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- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

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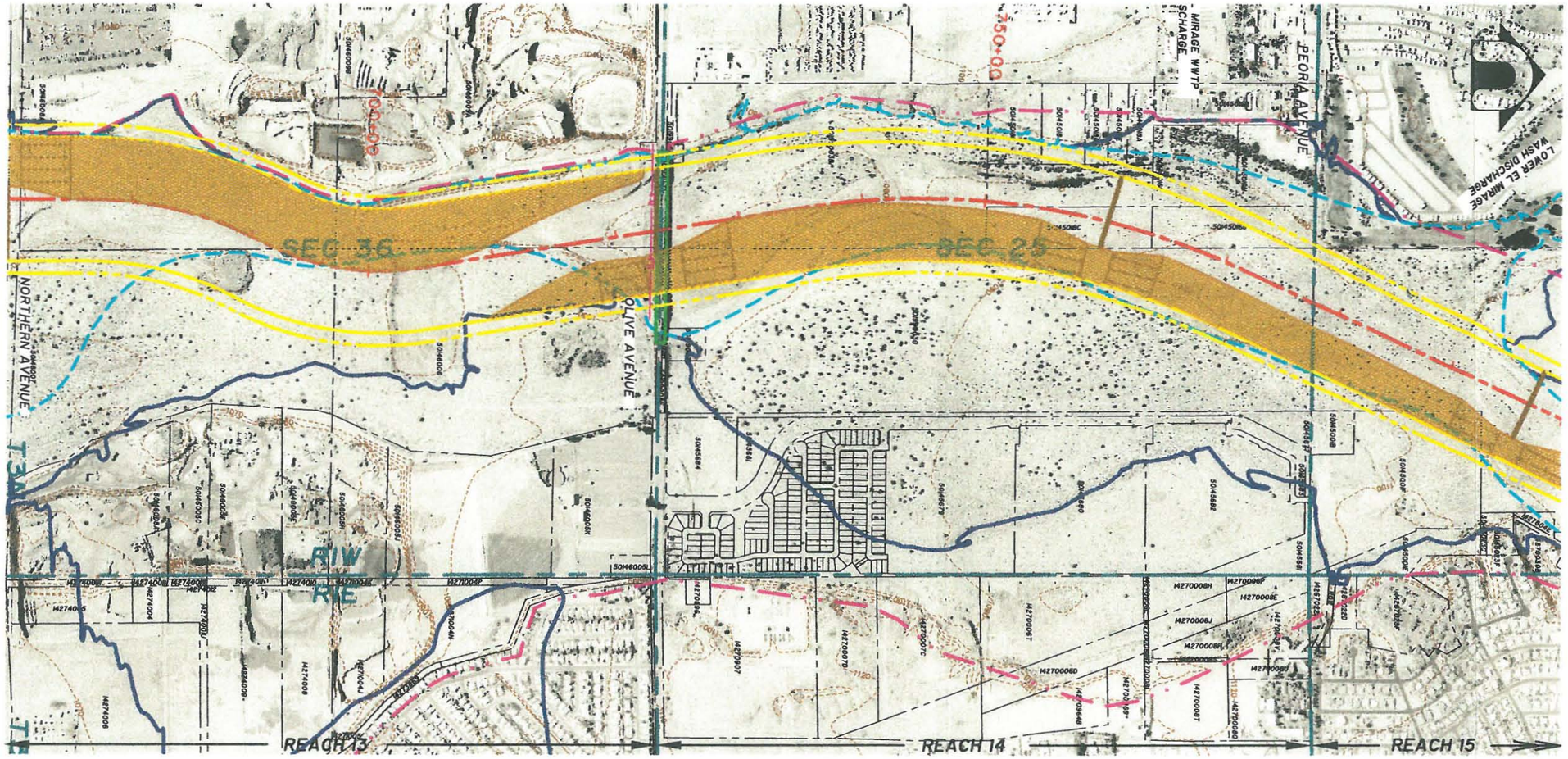

LEGEND

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- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

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FLIGHT DATE: 2003

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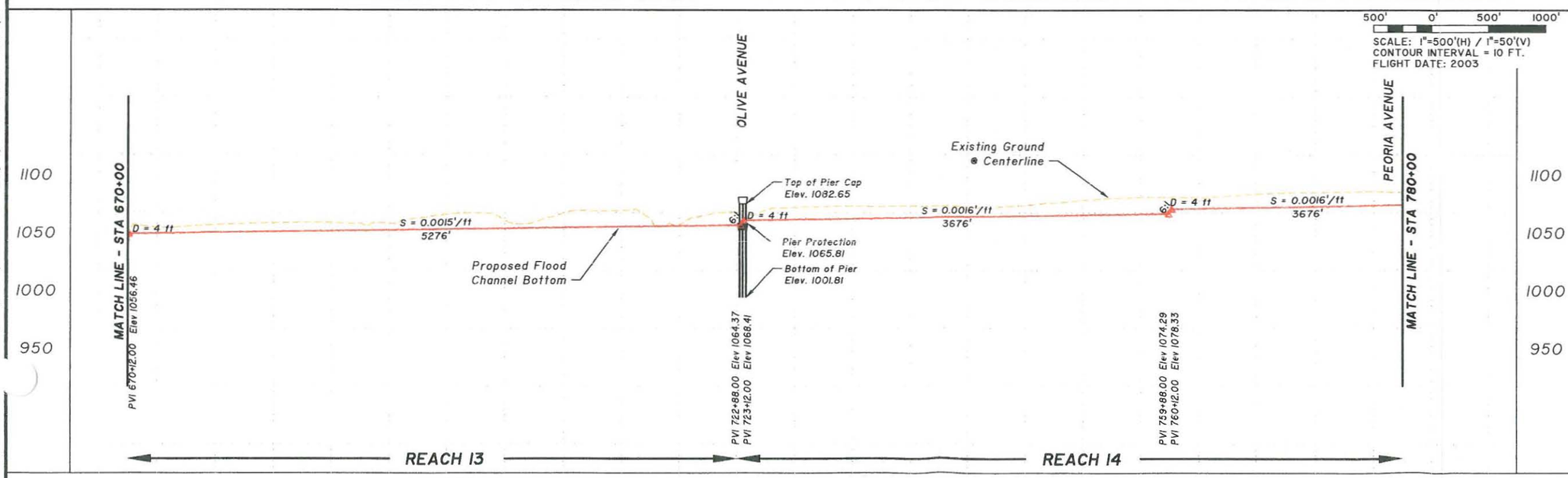

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

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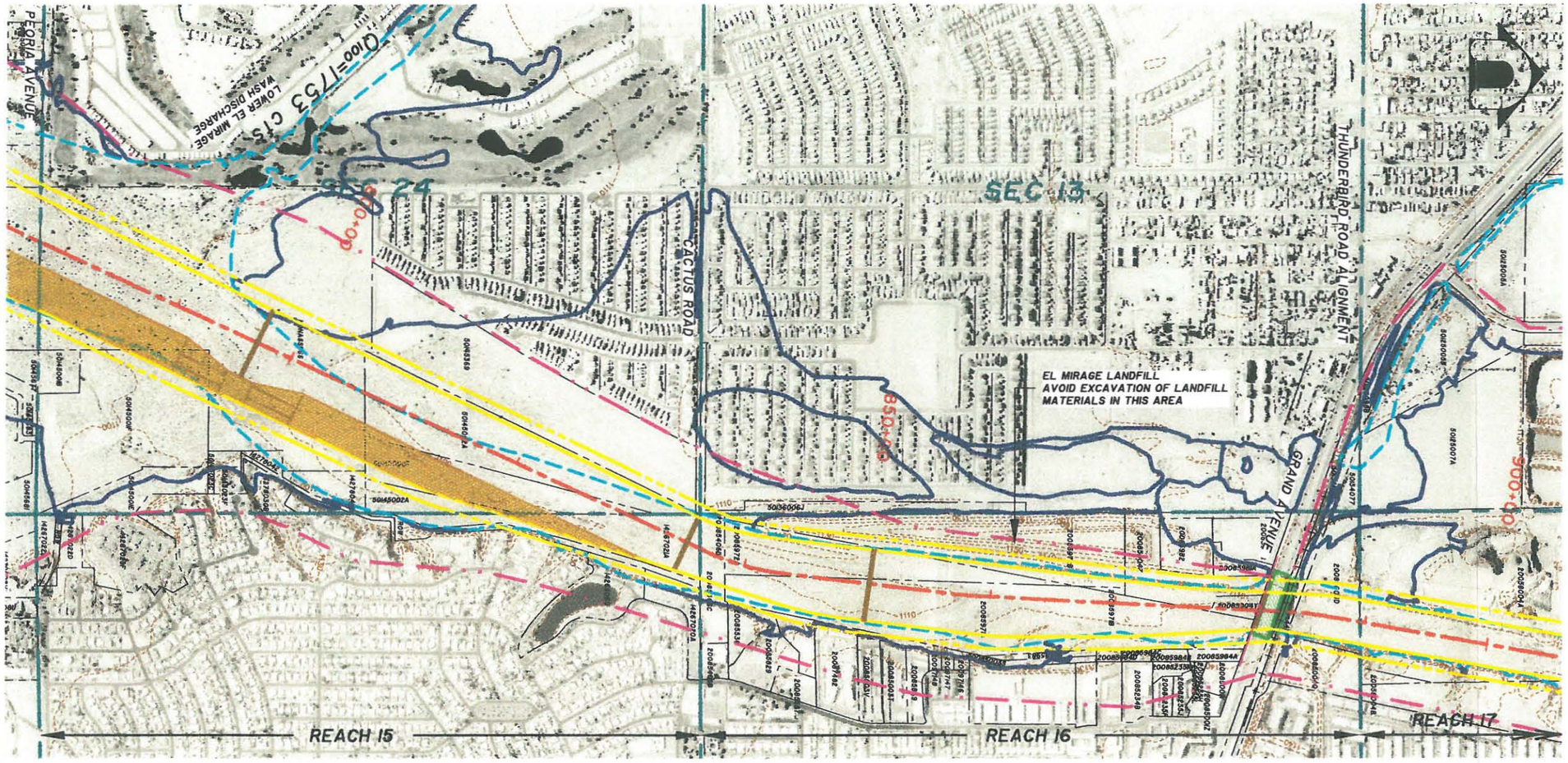

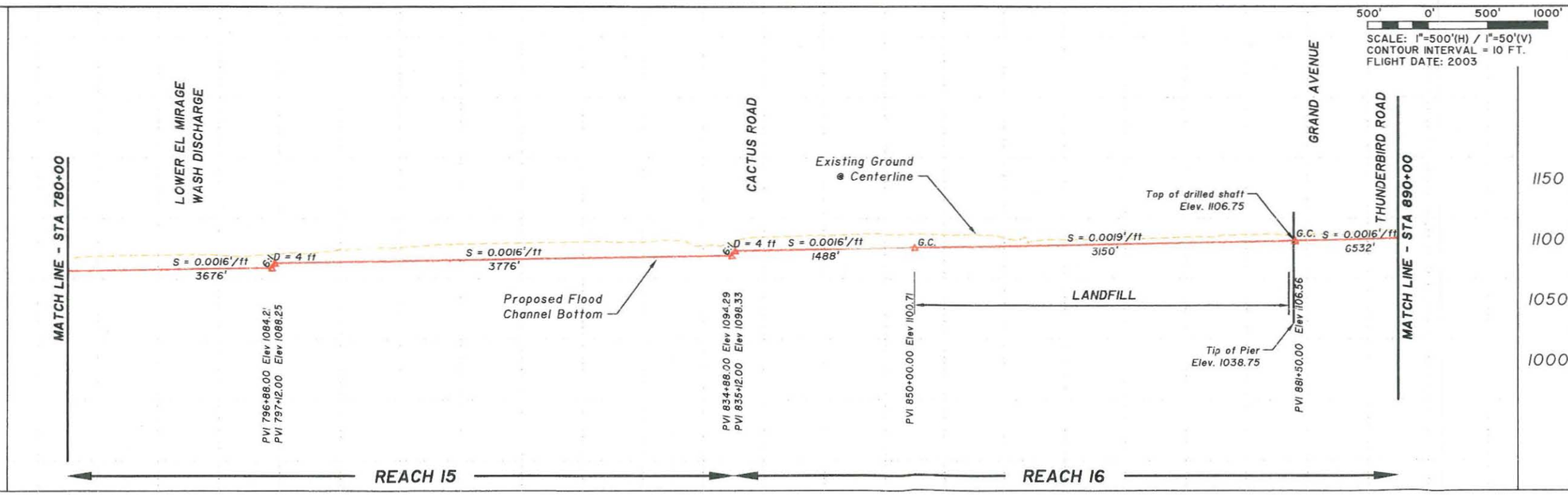

LEGEND

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- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

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WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN DRAFT REPORT
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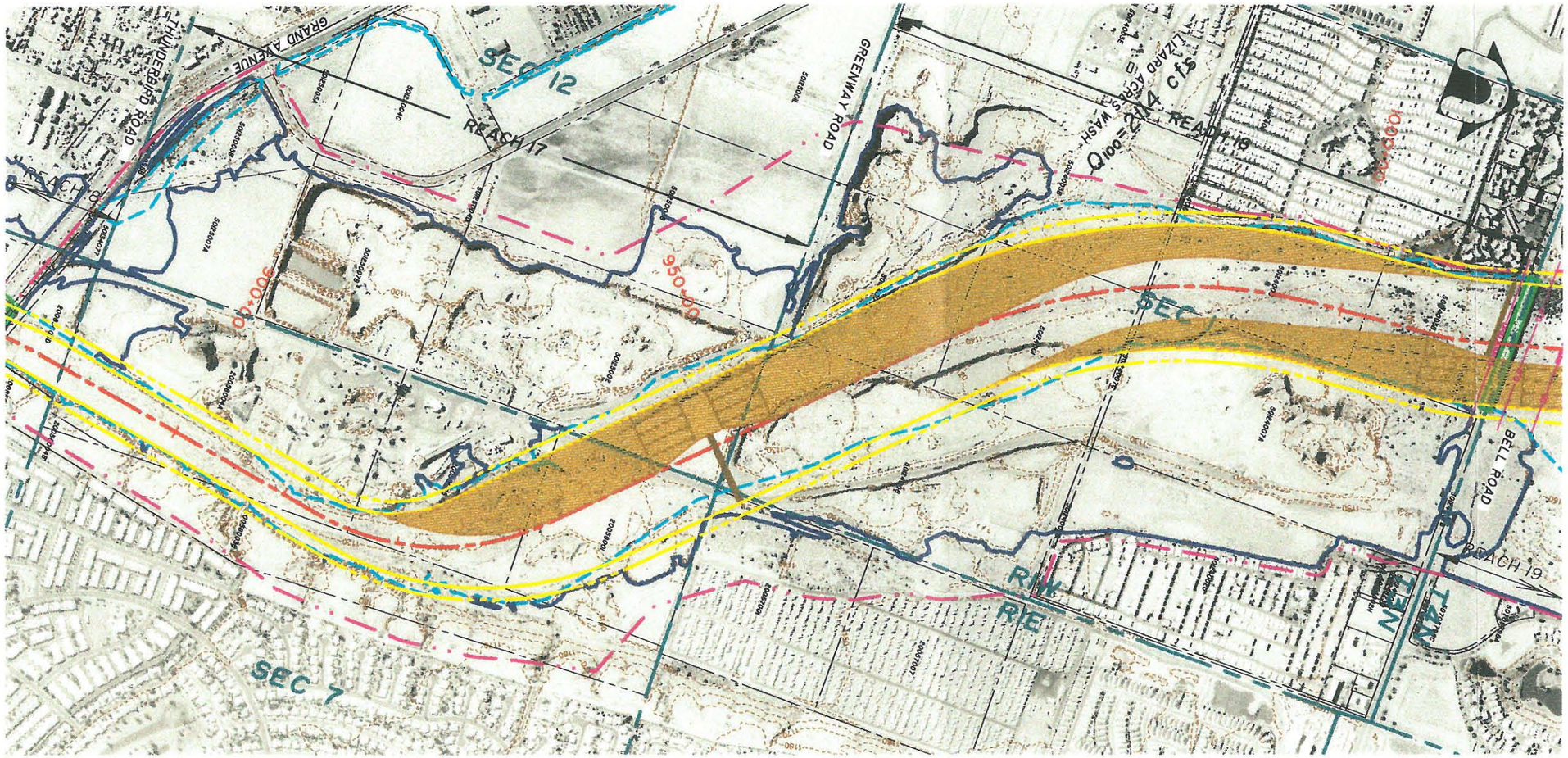

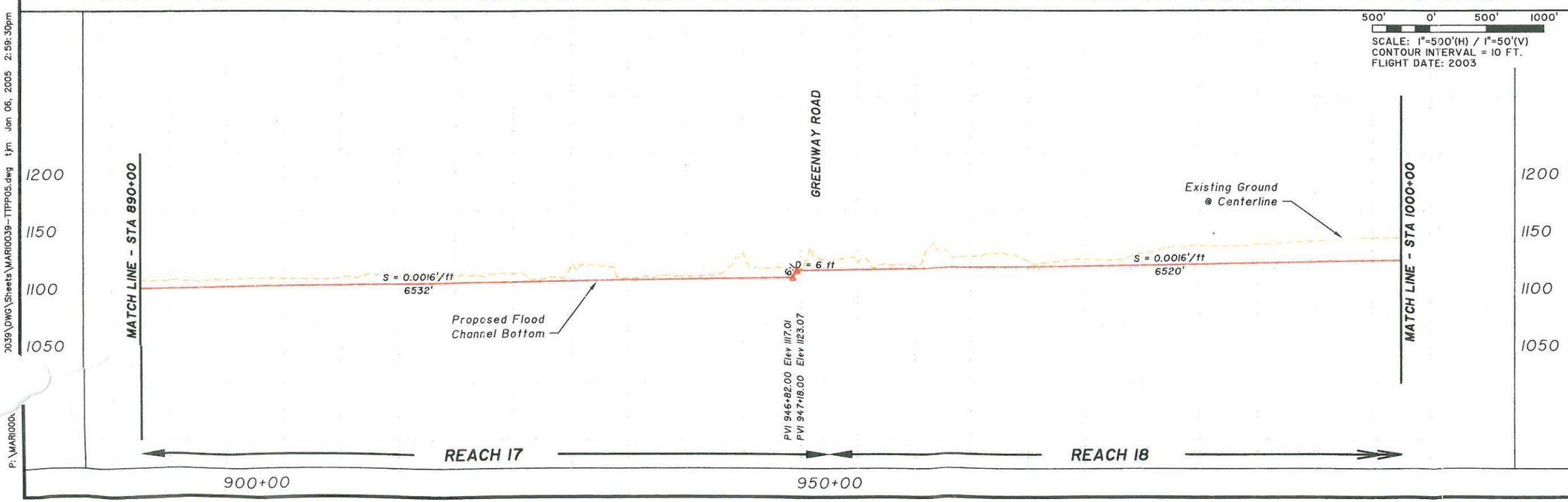

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES — TYPE
- EXISTING GROUND CONTOURS — 1000

"ADVISORY NOTE : LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."

DESIGNED IN CONJUNCTION WITH

EDAW

JE FULLER

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN DRAFT REPORT

EXHIBIT 1

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JANUARY 2005

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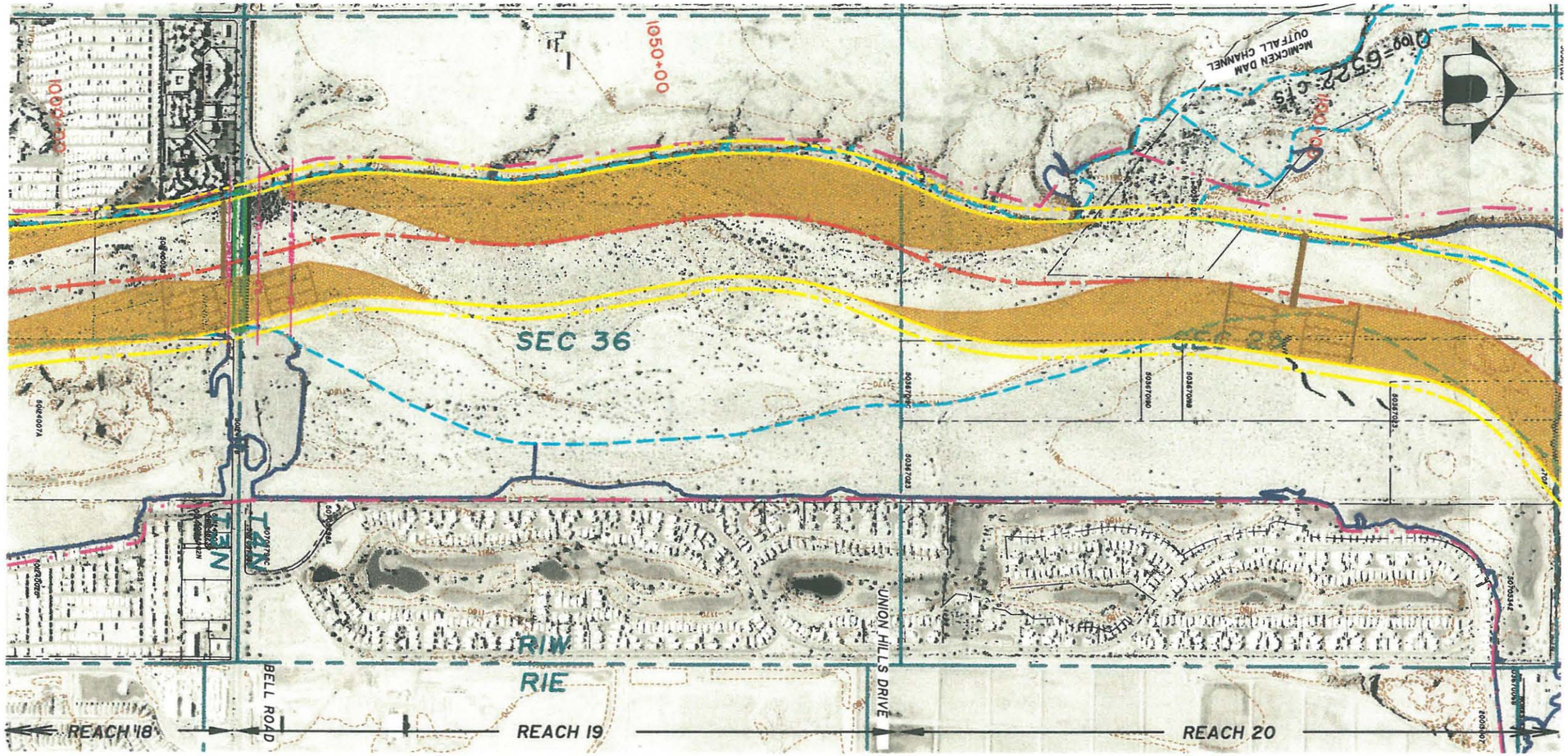

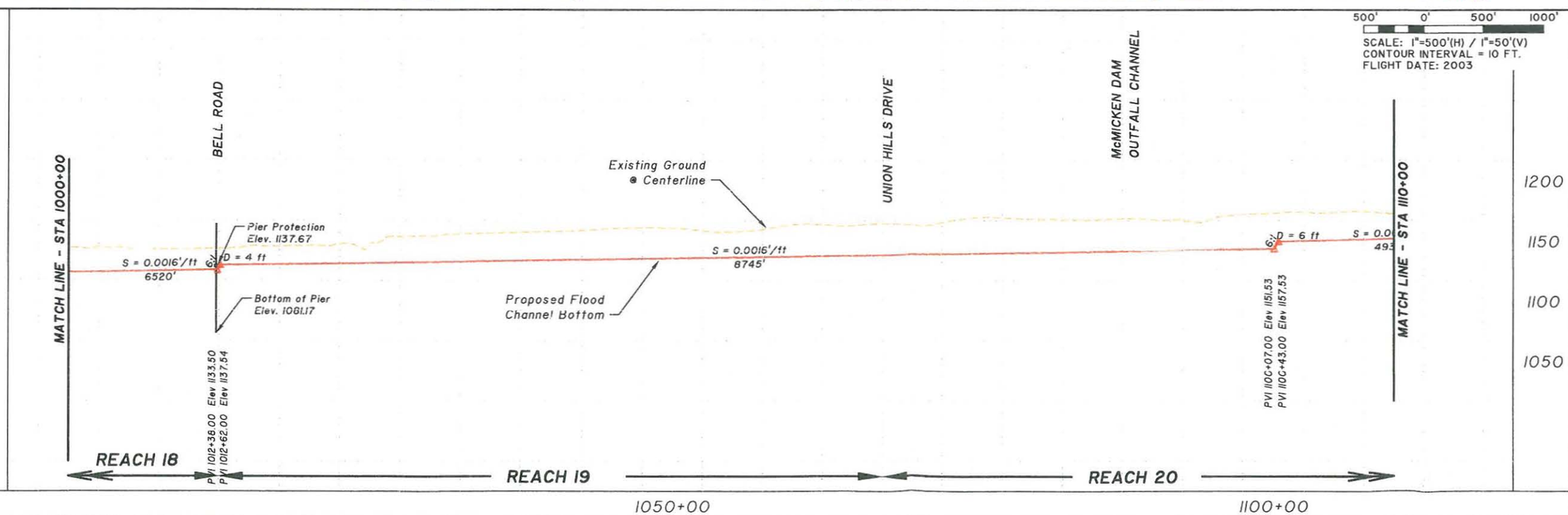

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES — TYPE
- EXISTING GROUND CONTOURS — 1000

***ADVISORY NOTE:** LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."*

DESIGNED IN CONJUNCTION WITH

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

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ENGINEERING DESIGN DRAFT REPORT
EXHIBIT 1

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JANUARY 2005

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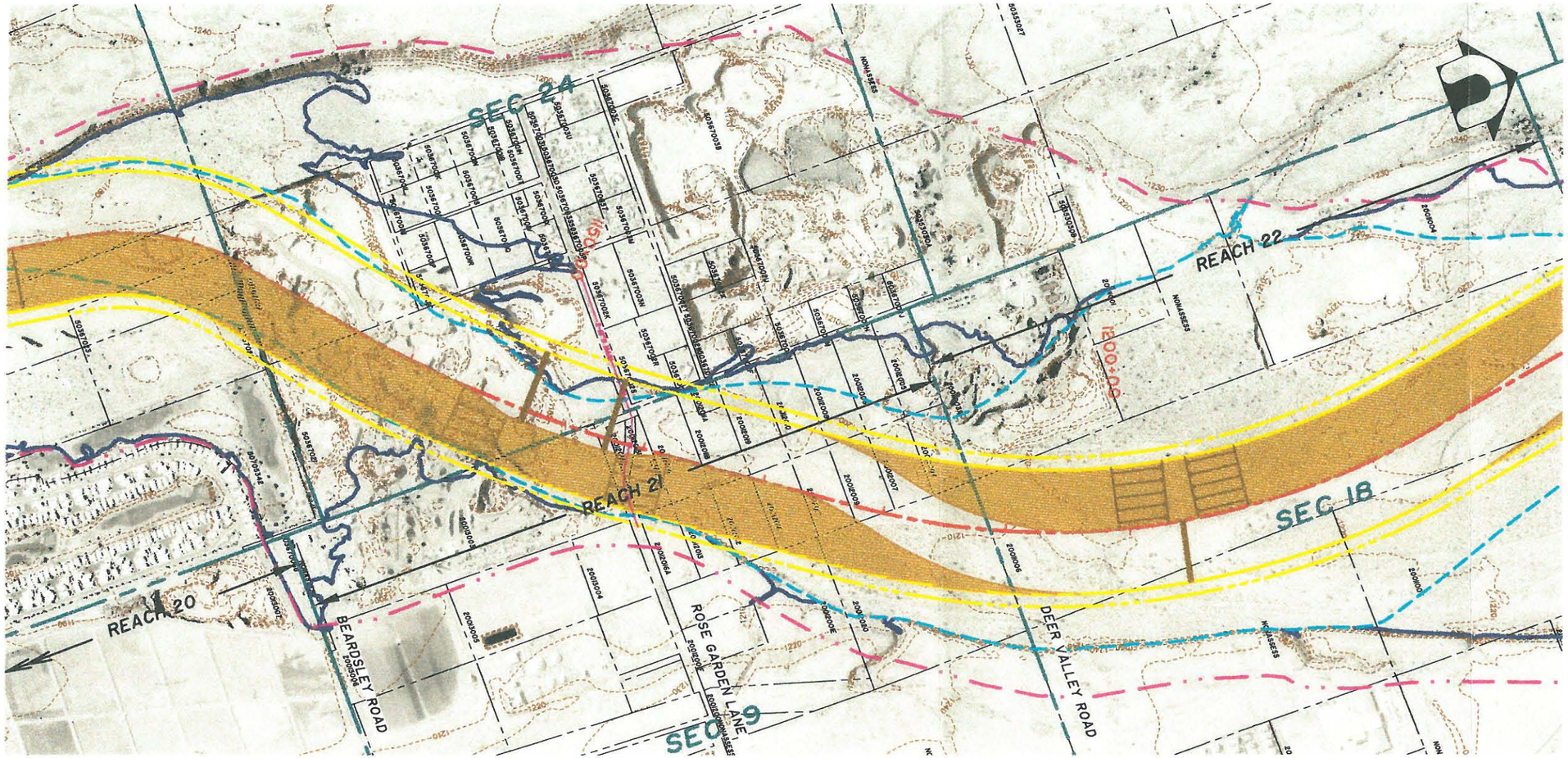

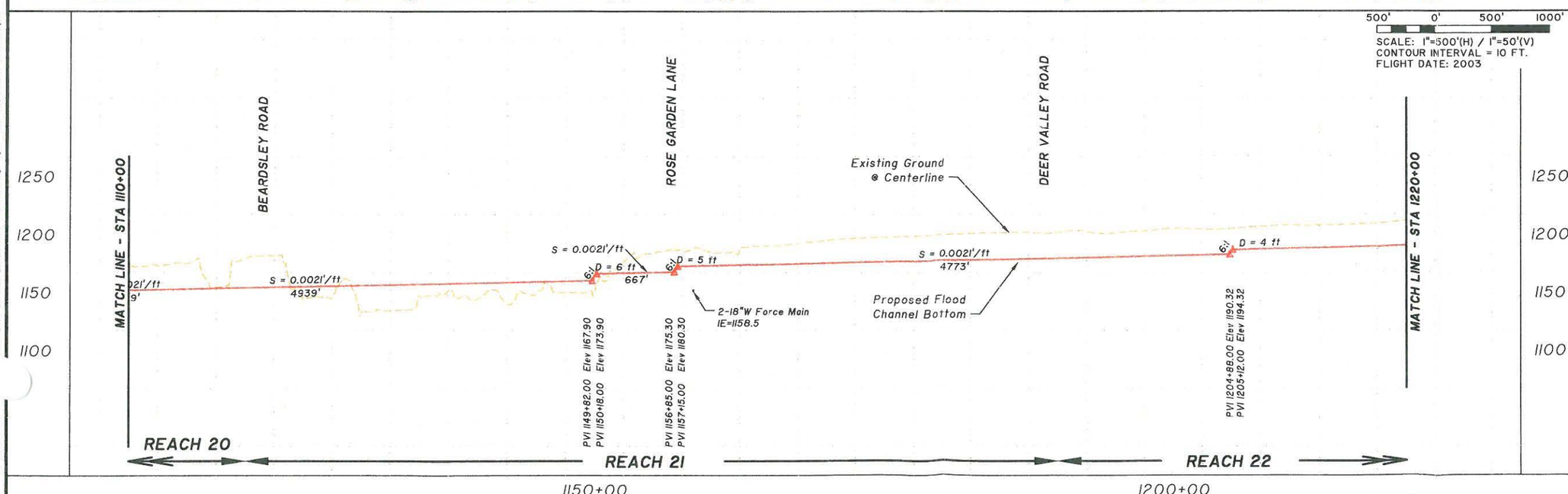

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES — TYPE
- EXISTING GROUND CONTOURS — 1000

***ADVISORY NOTE : LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."**

DESIGNED IN CONJUNCTION WITH

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JE FULLER FORREST & HOOPER O.D.C. INC.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN DRAFT REPORT

EXHIBIT 1

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2141 East Highland Avenue, Suite 200
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Phone: 602.678.5151

JANUARY 2005

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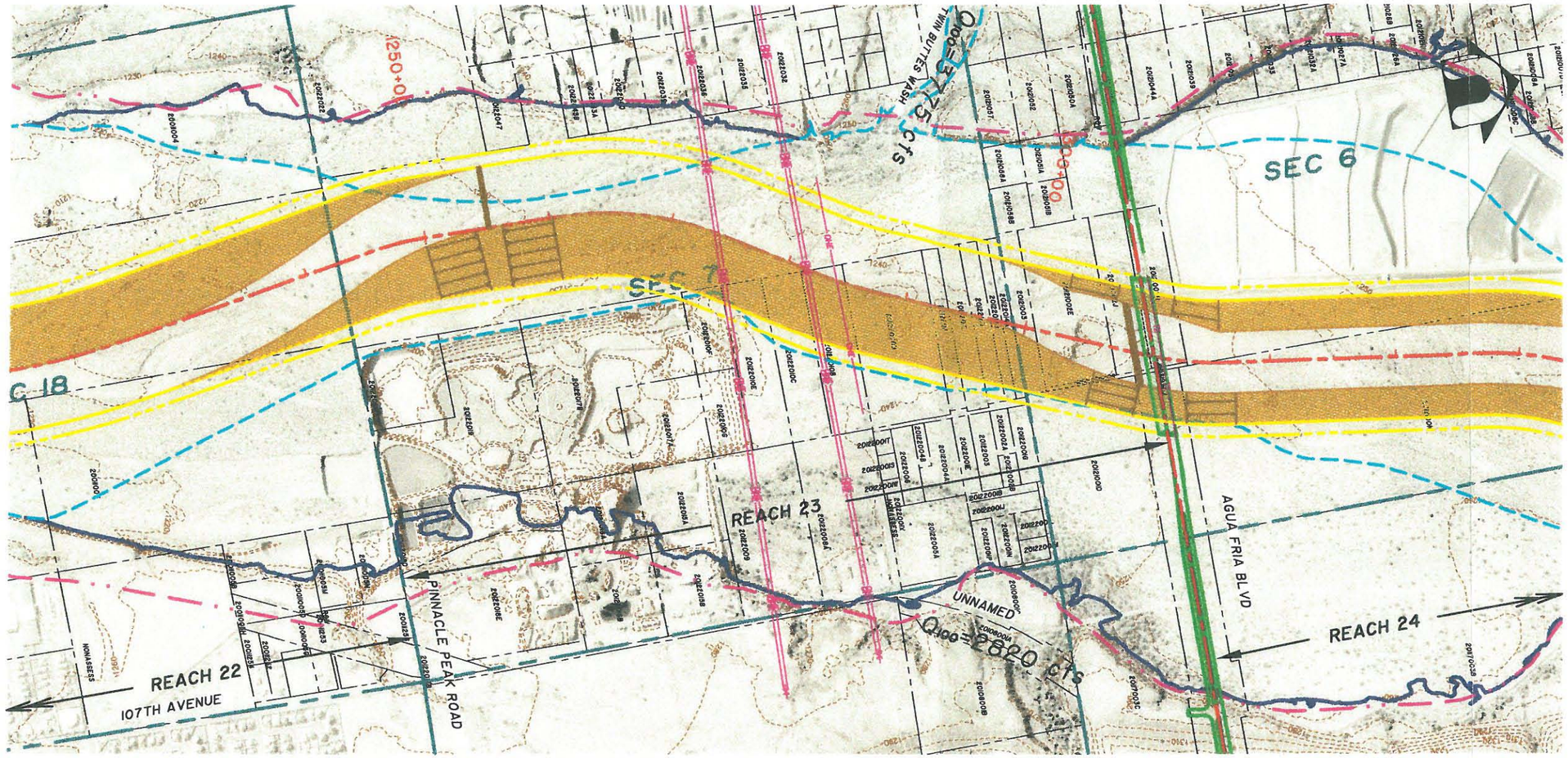

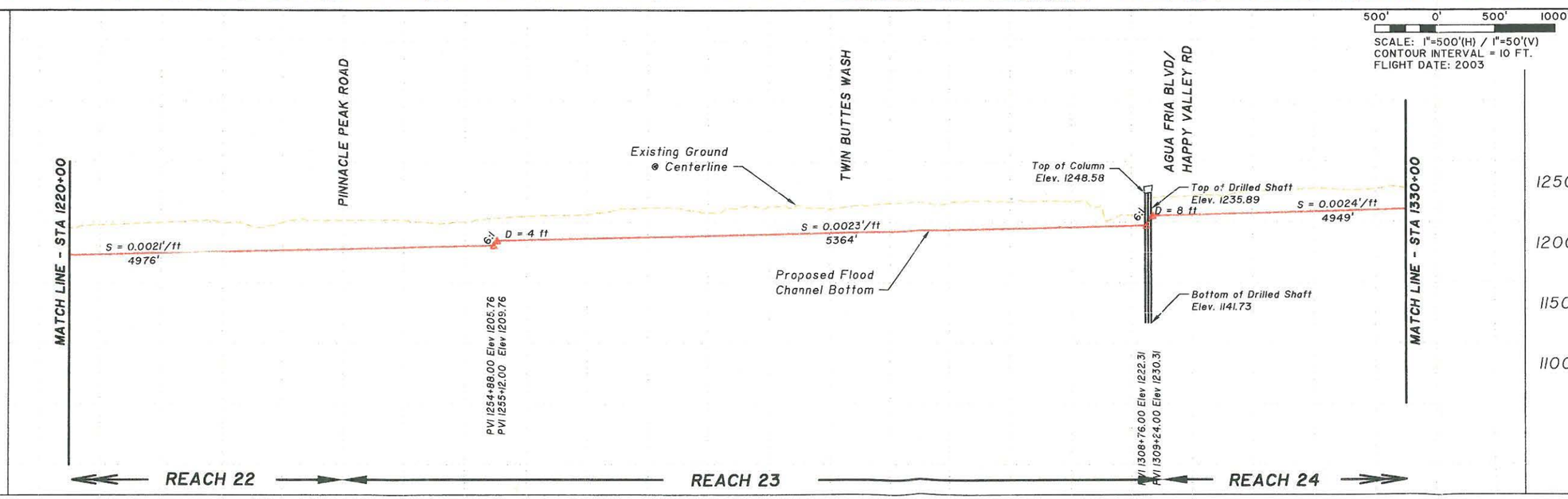

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES — TYPE
- EXISTING GROUND CONTOURS — 1000

***ADVISORY NOTE:** LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."*

DESIGNED IN CONJUNCTION WITH

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN DRAFT REPORT

EXHIBIT 1

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2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JANUARY 2005

SHEET 8 OF 11

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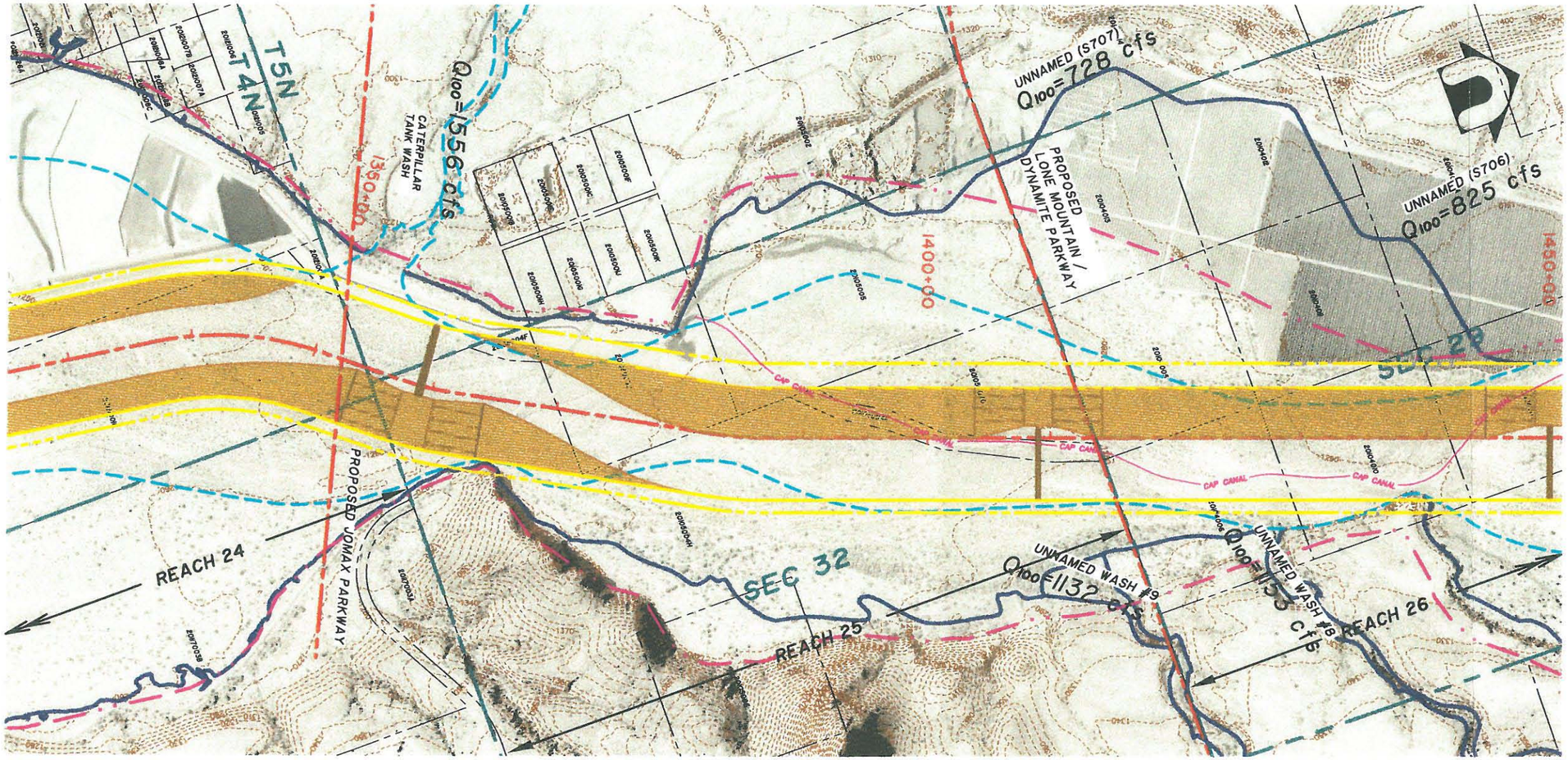


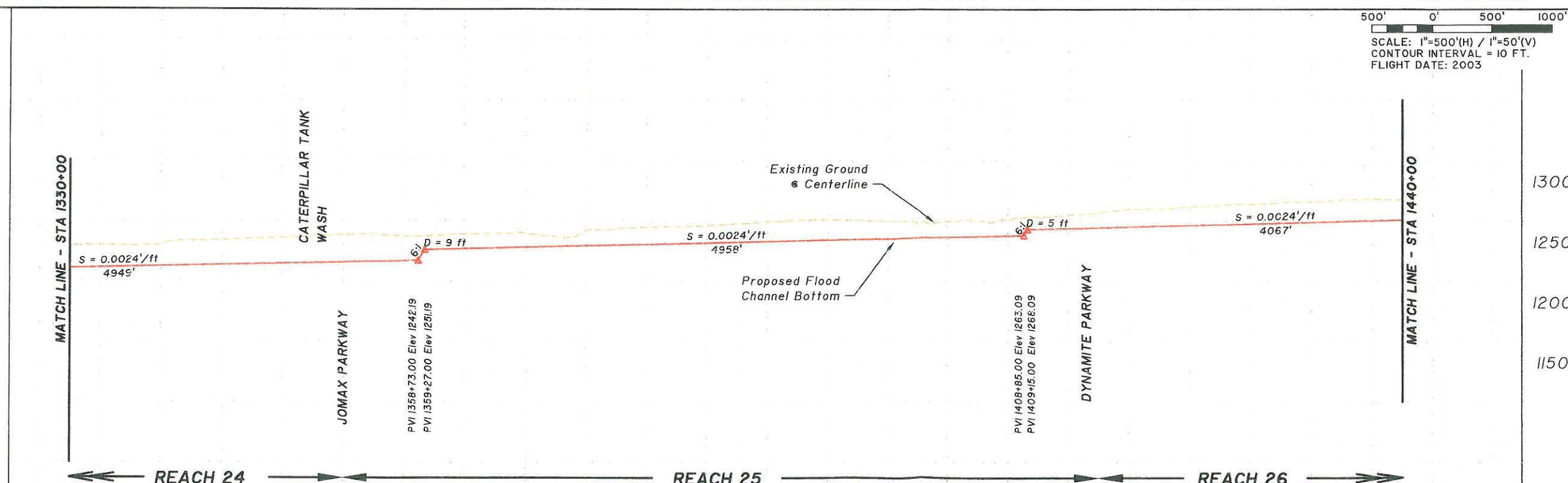
LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

500' 0' 500' 1000'

SCALE: 1"=500'(H) / 1"=50'(V)
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

*"ADVISORY NOTE: LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN DRAFT REPORT

EXHIBIT 1

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2141 East Highland Avenue, Suite 200
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Phone: 602.678.5151

JANUARY 2005

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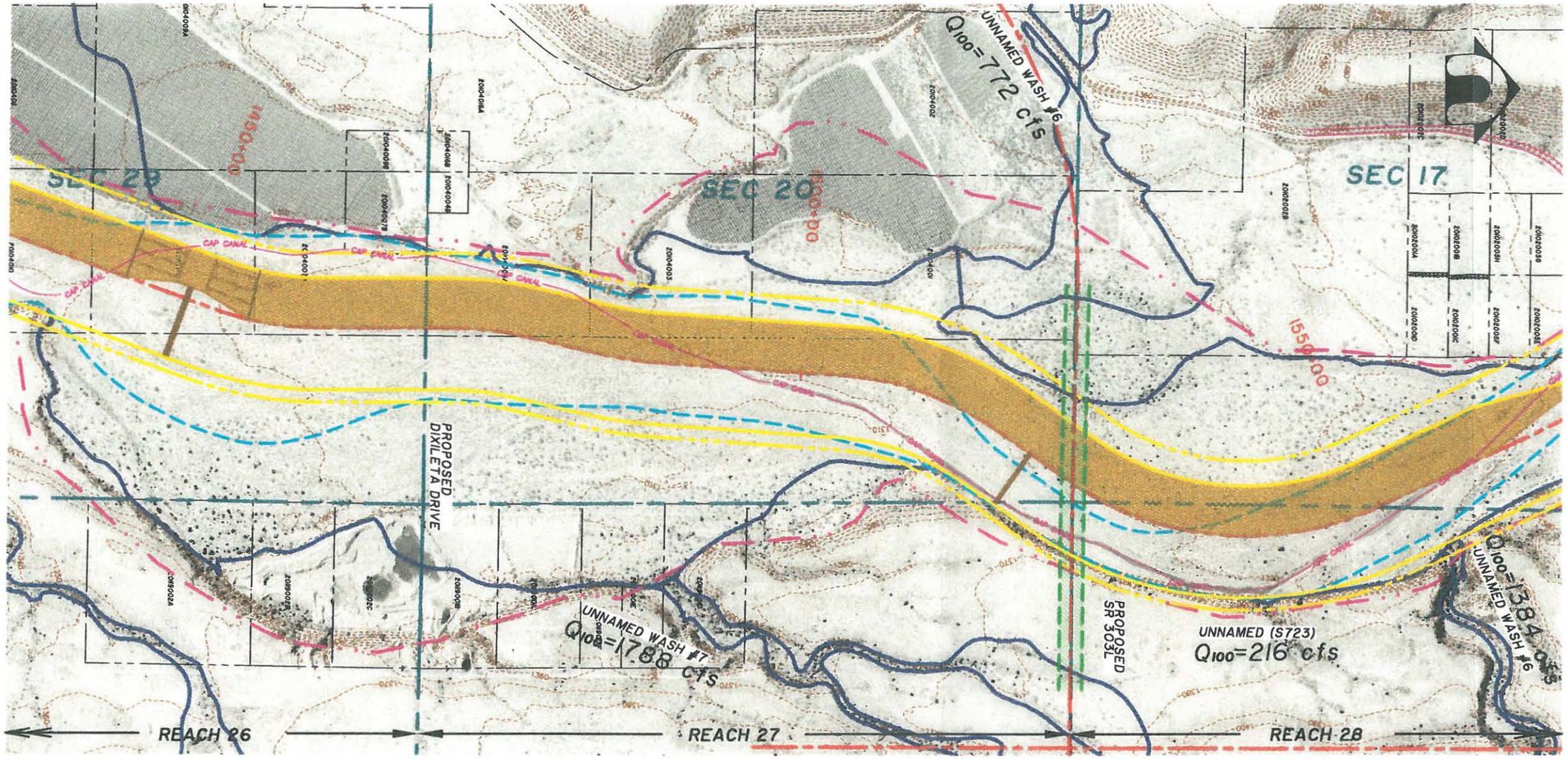


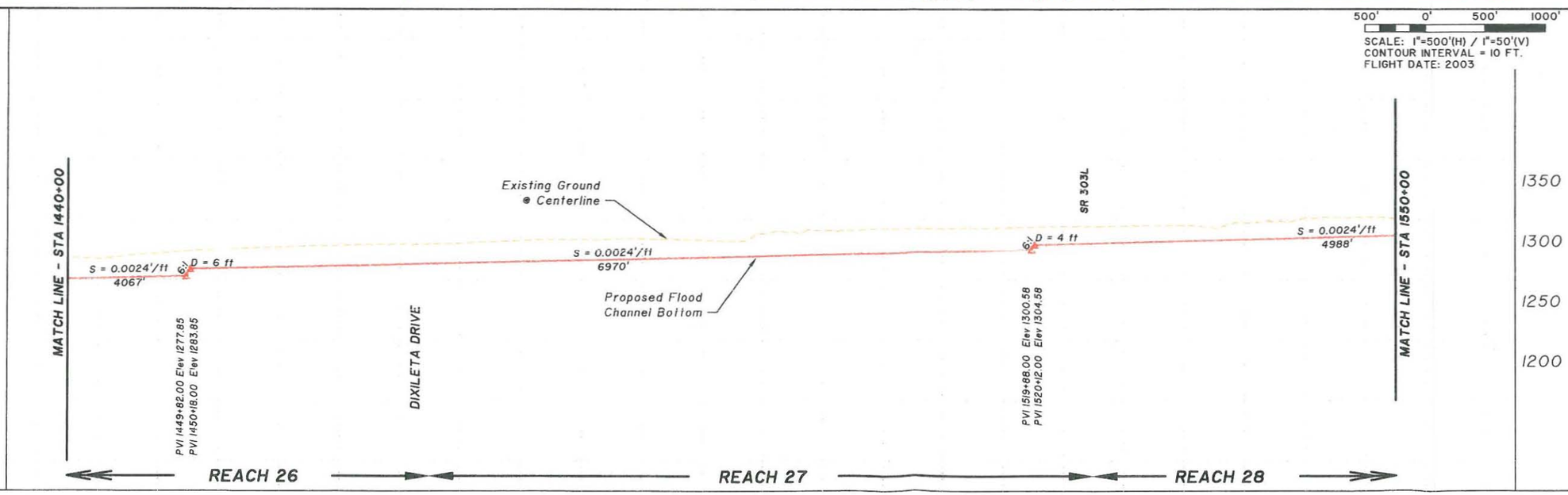
LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

500' 0' 500' 1000'

SCALE: 1"=500'(H) / 1"=50'(V)
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

*"ADVISORY NOTE: LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."



DESIGNED IN CONJUNCTION WITH

EDAW

JE FULLER

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
DRAFT REPORT
EXHIBIT 1

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JANUARY 2005

SHEET 10 OF 11

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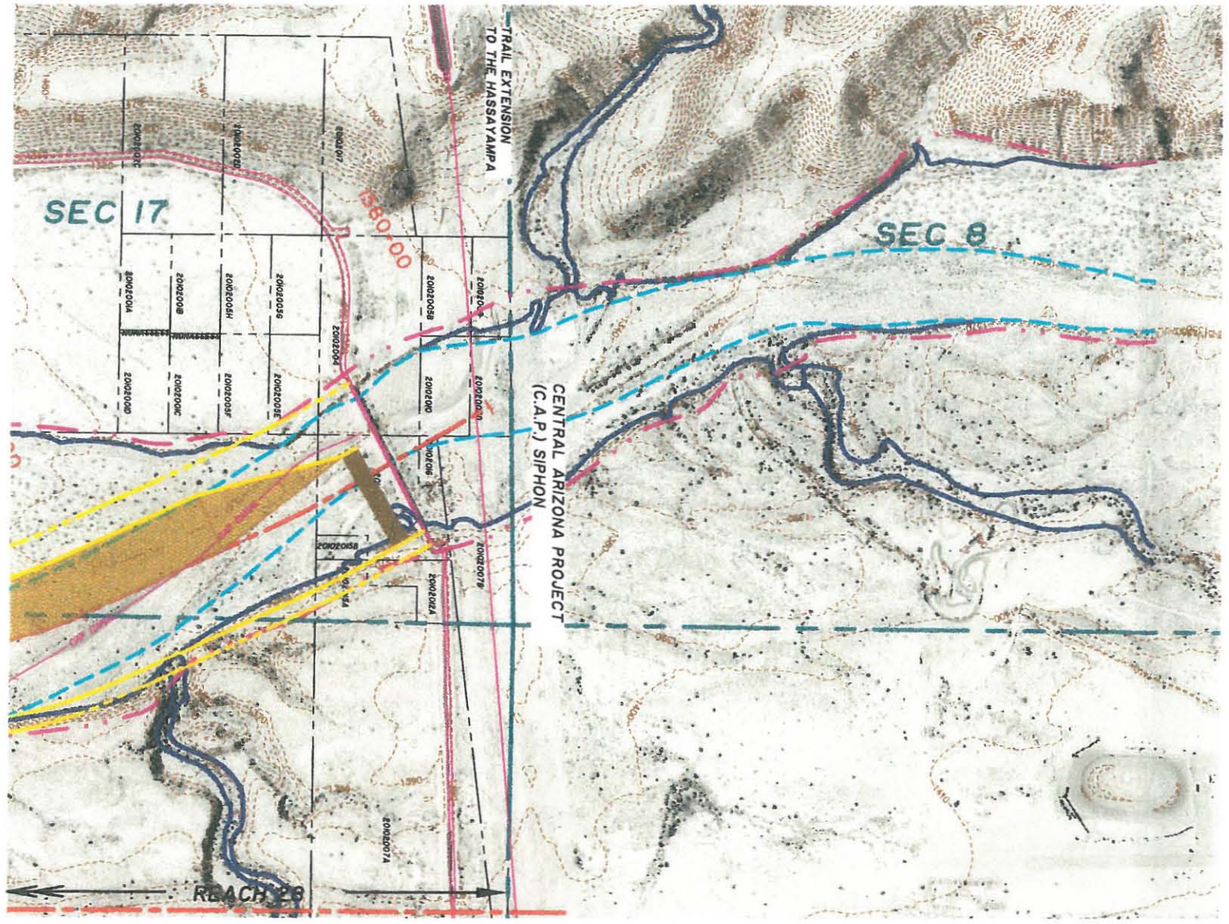

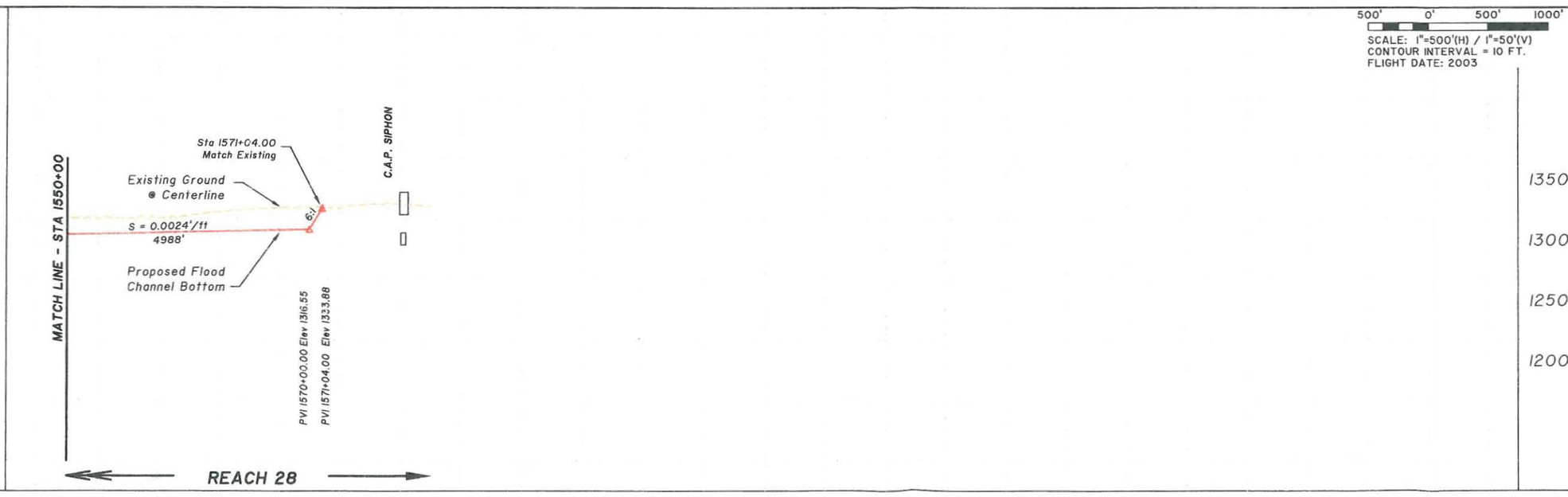

500' 0' 500' 1000'

SCALE: 1"=500'(H) / 1"=50'(V)
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- PROPOSED CHANNEL TOP
- CONCEPTUAL CHANNEL/ ROADWAY CENTERLINE
- BRIDGE CROSSING
- TERRACE
- PROPERTY LINE
- SECTION LINE
- EXISTING UTILITIES (TYPE)
- EXISTING GROUND CONTOURS (1000)

***ADVISORY NOTE:** LATERAL MIGRATION EROSION HAZARD ZONE IS ADVISORY ONLY UNLESS CONTAINED WITHIN THE FLOODPLAIN LIMIT OF UNINCORPORATED MARICOPA COUNTY."*

DESIGNED IN CONJUNCTION WITH

EDAW

JE FULLER
PROJECT : ALCOP O.D.C. INC.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
DRAFT REPORT
EXHIBIT 1

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JANUARY 2005

SHEET 11 OF 11

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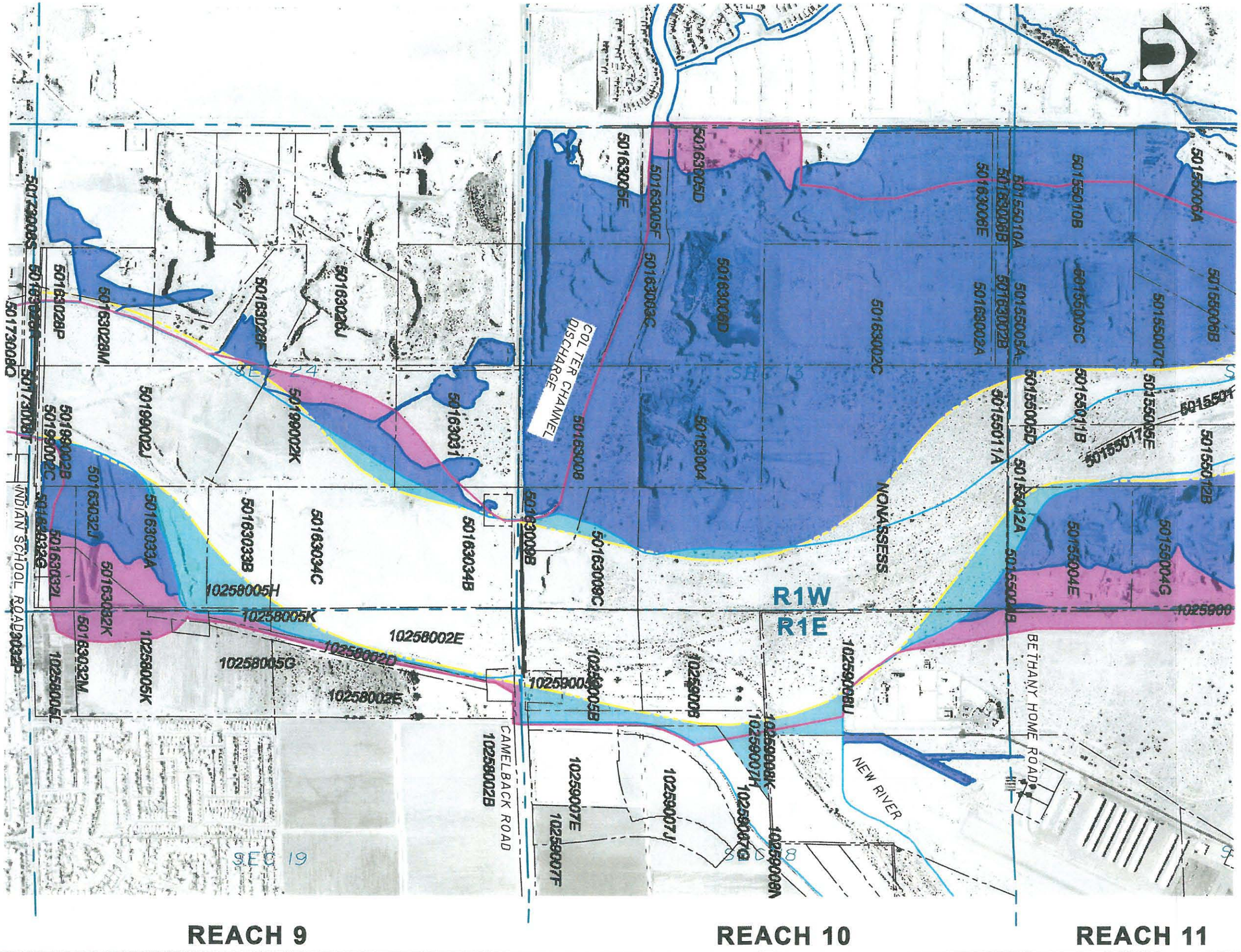
EXHIBIT 2
RECOVERED LANDS FROM THE FLOODWAY, FLOODPLAIN, AND LATERAL MIGRATION ZONE



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T2N R1W
Sec: 12,13,24

T2N R1E
Sec: 7,18,19

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

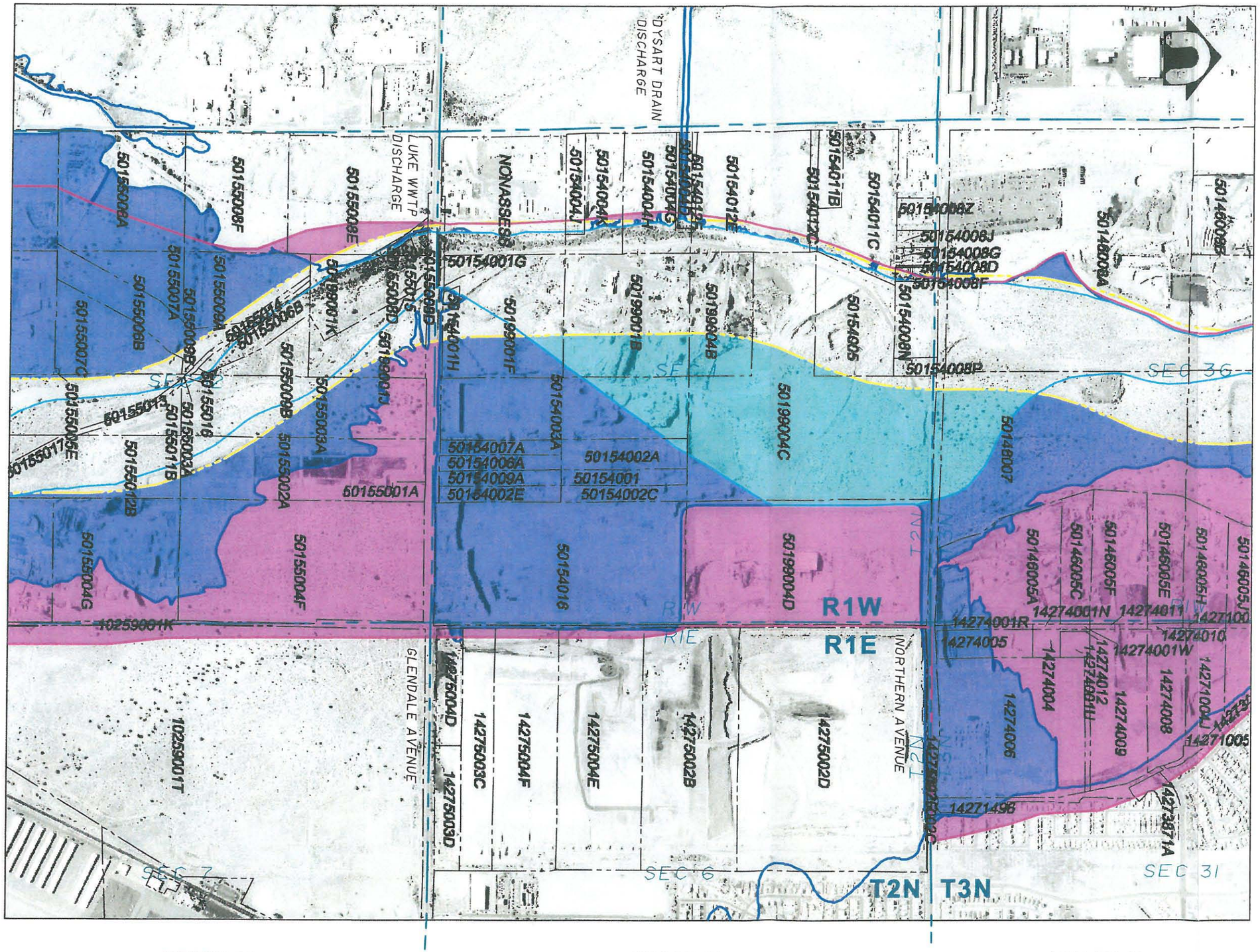
AGUA FRIA
Watercourse Master Plan Addendum
Channelization Alternative
Engineering Design

RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.675.5151

JUNE 2004



REACH 11 REACH 12 REACH 13

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T3N R1W
Sec: 36

T3N R1E
Sec: 31

T2N R1W
Sec: 1,12

T2N R1E
Sec: 6,7

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
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RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
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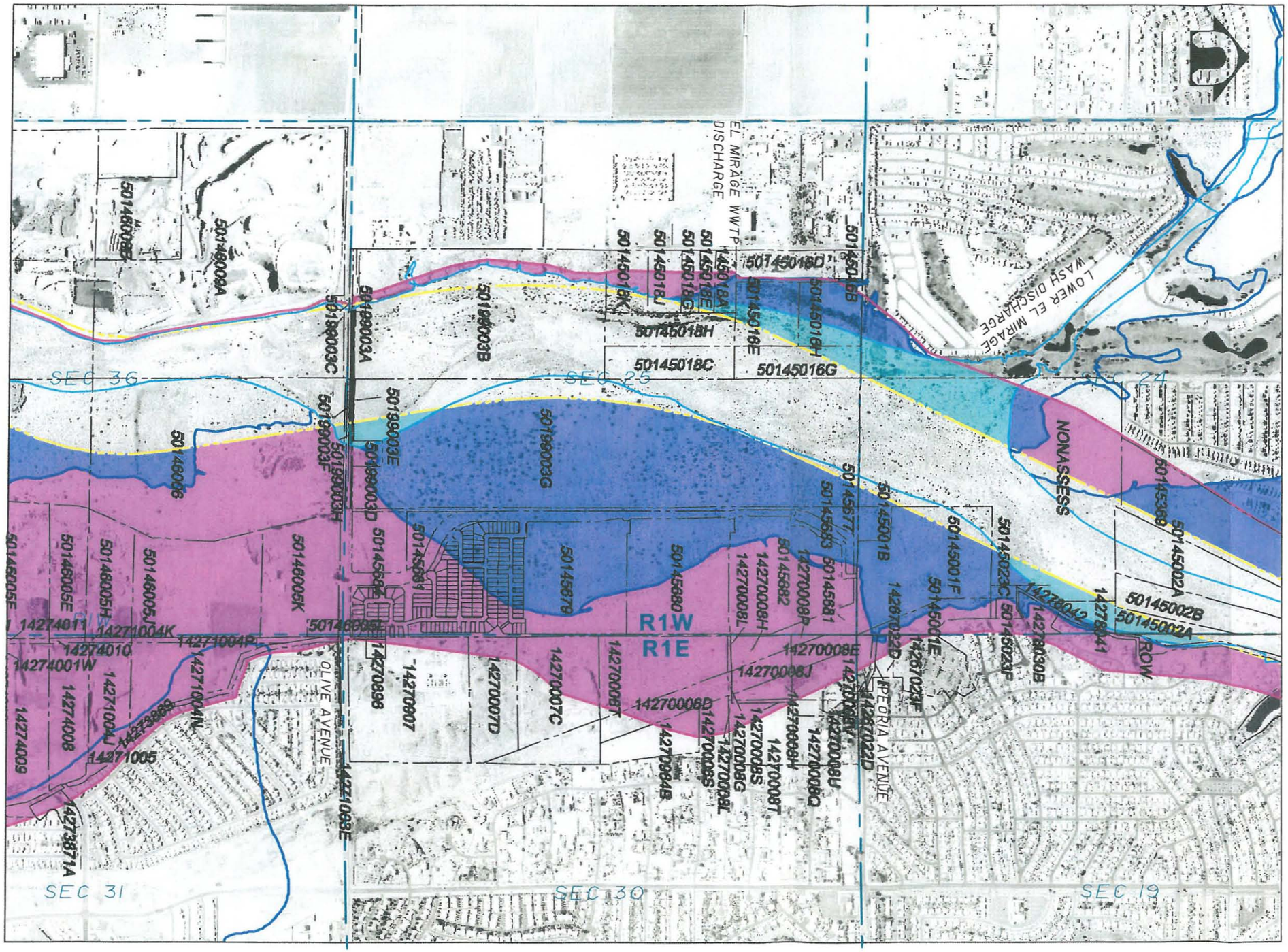
Phone: 602.678.5151

JUNE 2004



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T3N R1W
Sec: 24,25,36

T3N R1E
Sec: 19,30,31

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
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RECOVERED LANDS

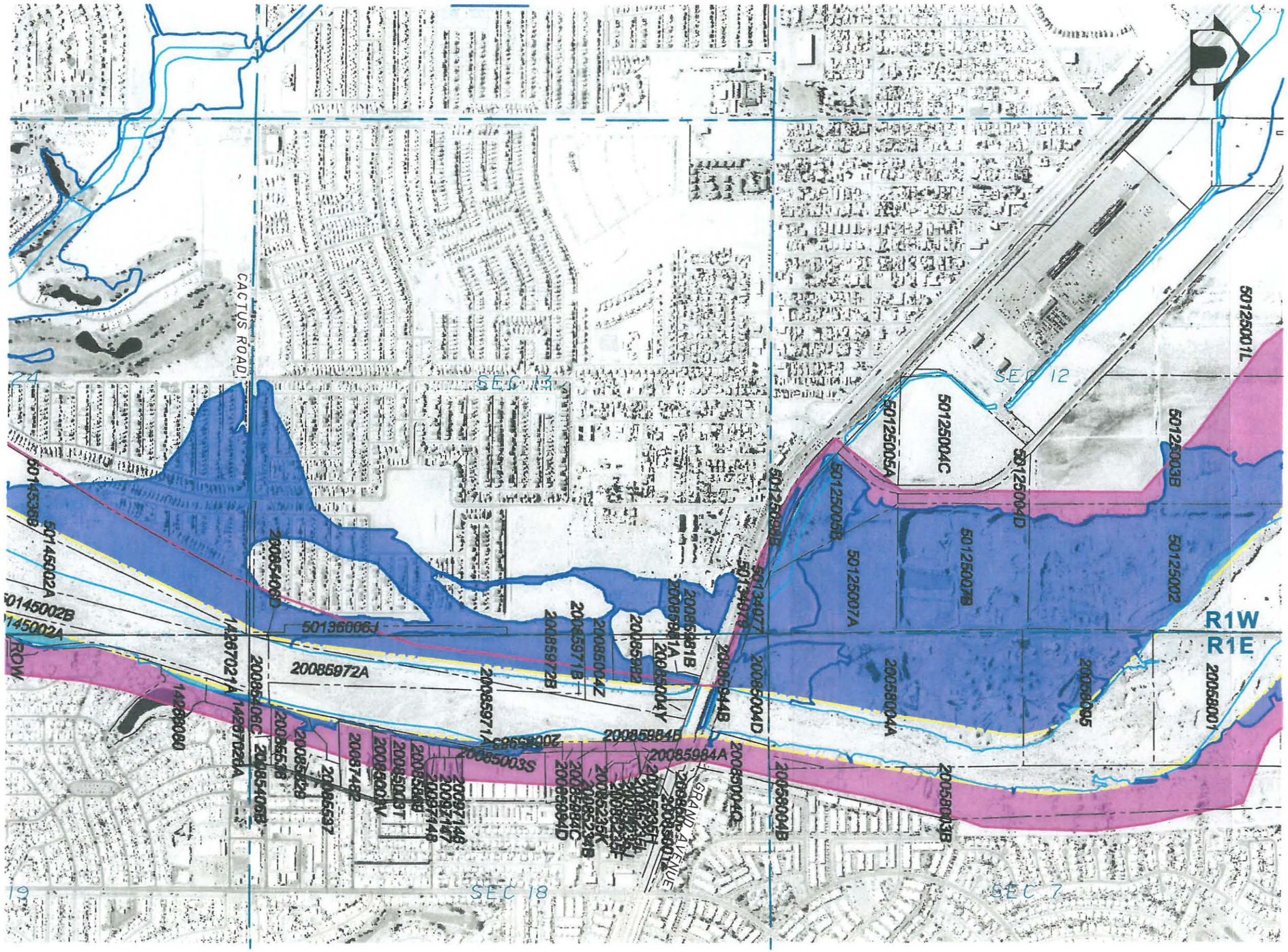
EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004

SHEET 3 OF 10

REACH 13 **REACH 14** **REACH 15**



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T3N R1W
Sec: 12,13,24

T3N R1E
Sec: 7,18,19

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
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Engineering Design

RECOVERED LANDS

EXHIBIT 2

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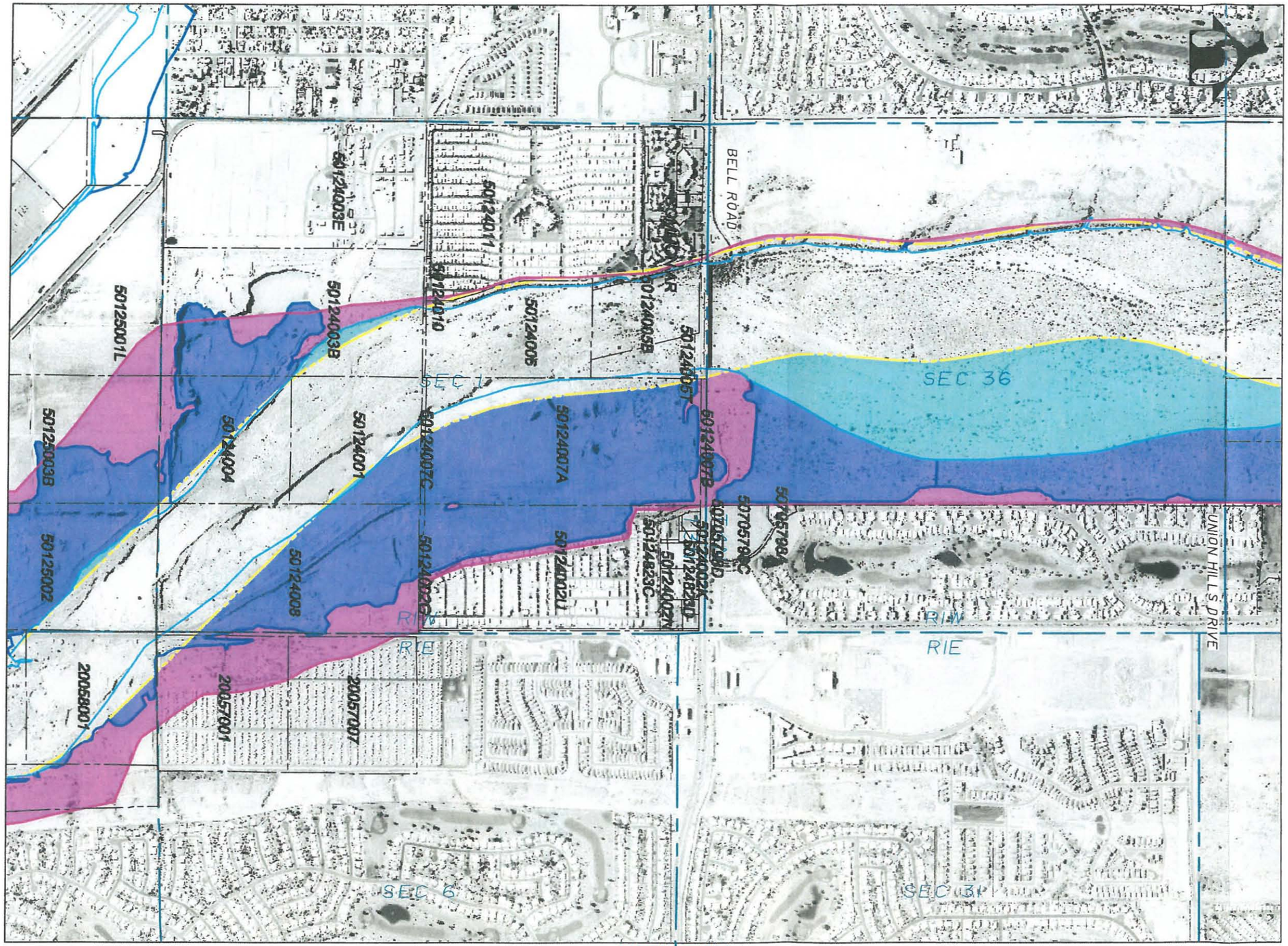
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T4N R1W
Sec: 36

T3N R1E
Sec: 6,7

T3N R1W
Sec: 1, 12

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
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RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
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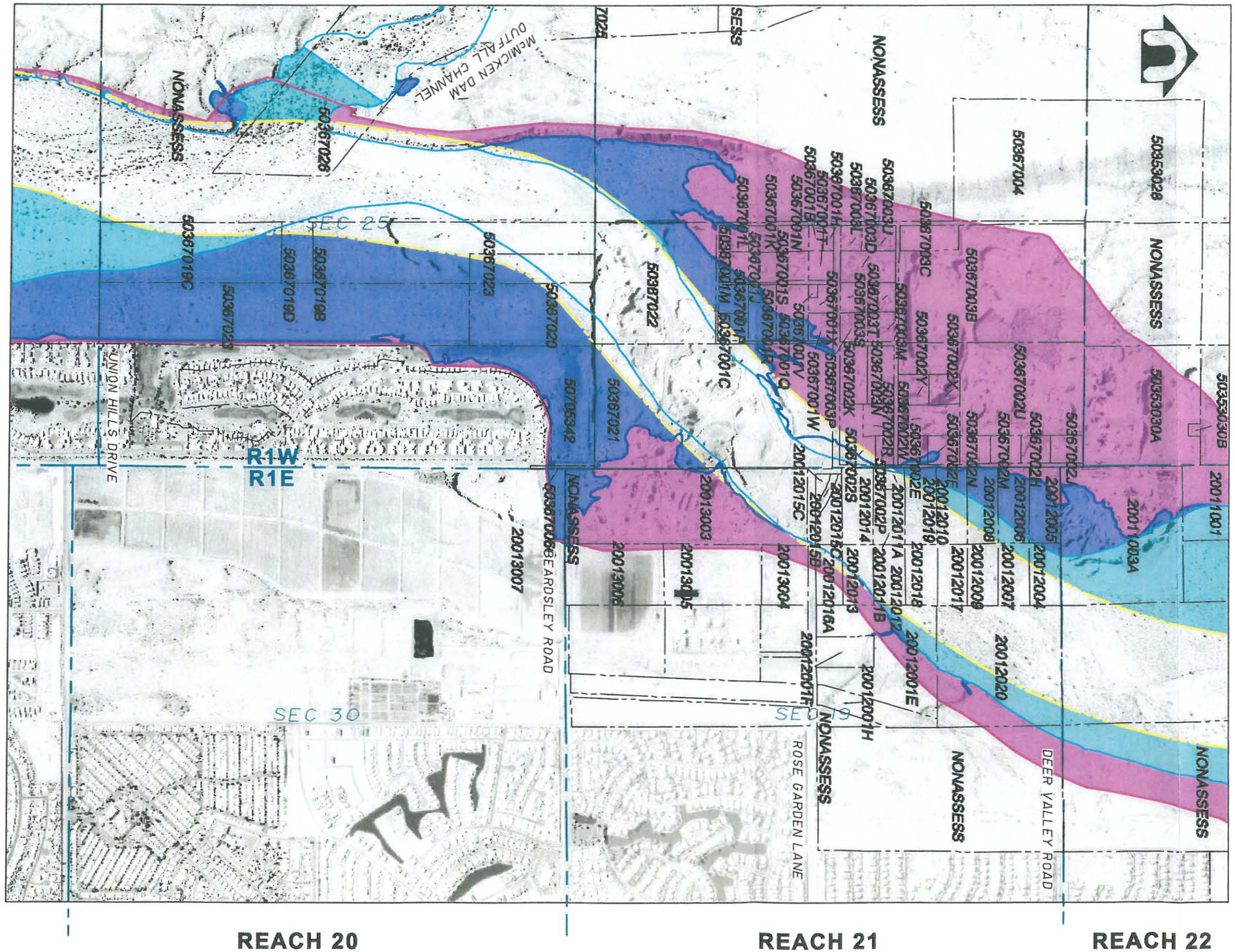
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004

SHEET 5 OF 10



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T4N R1E
Sec: 18,19,30

T4N R1W
Sec: 13,24,25

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
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RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
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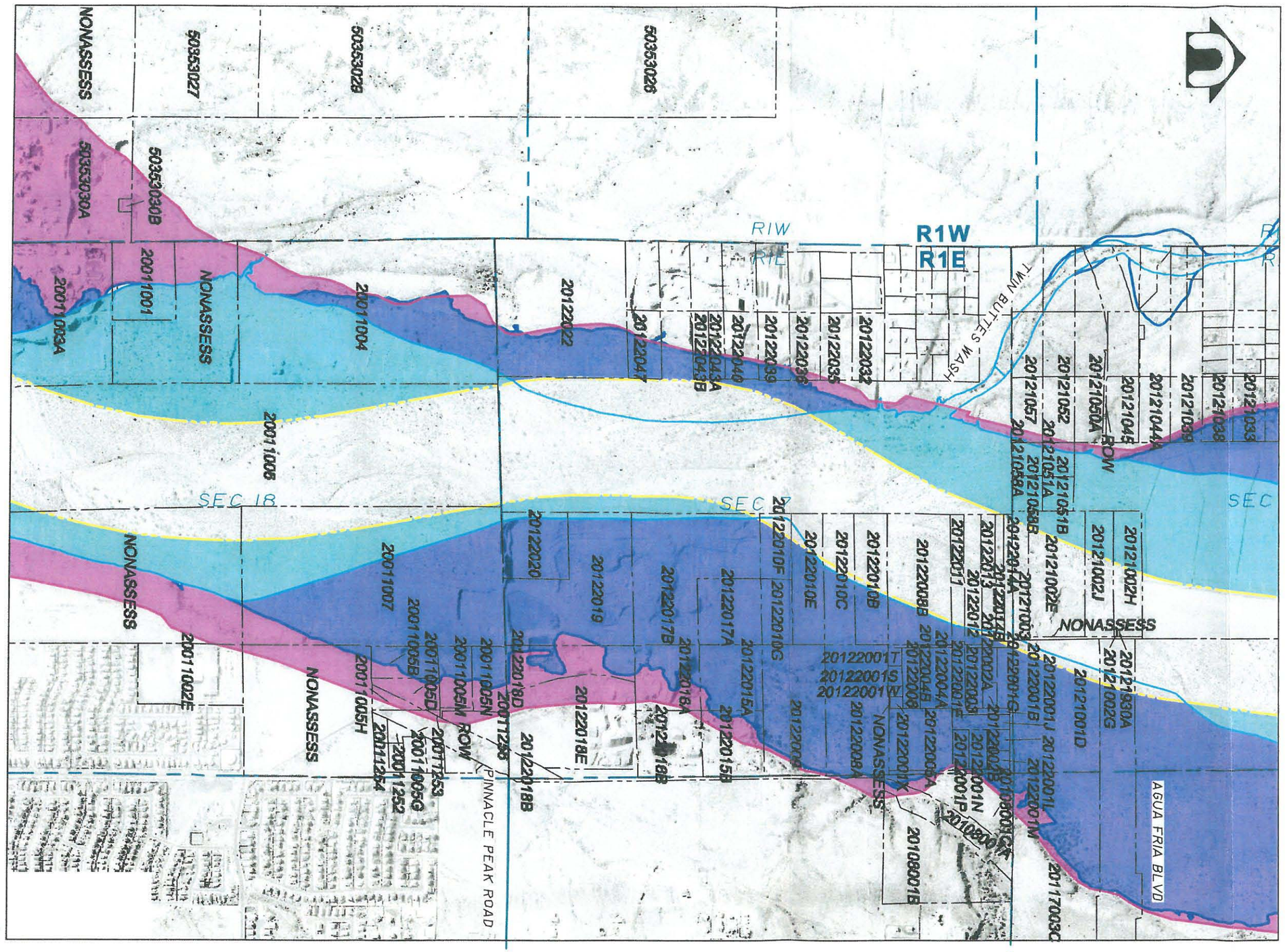
JUNE 2004

SHEET 6 OF 10



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T4N R1E
Sec: 5,6,7,8,18

T4N R1W
Sec: 13

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
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RECOVERED LANDS

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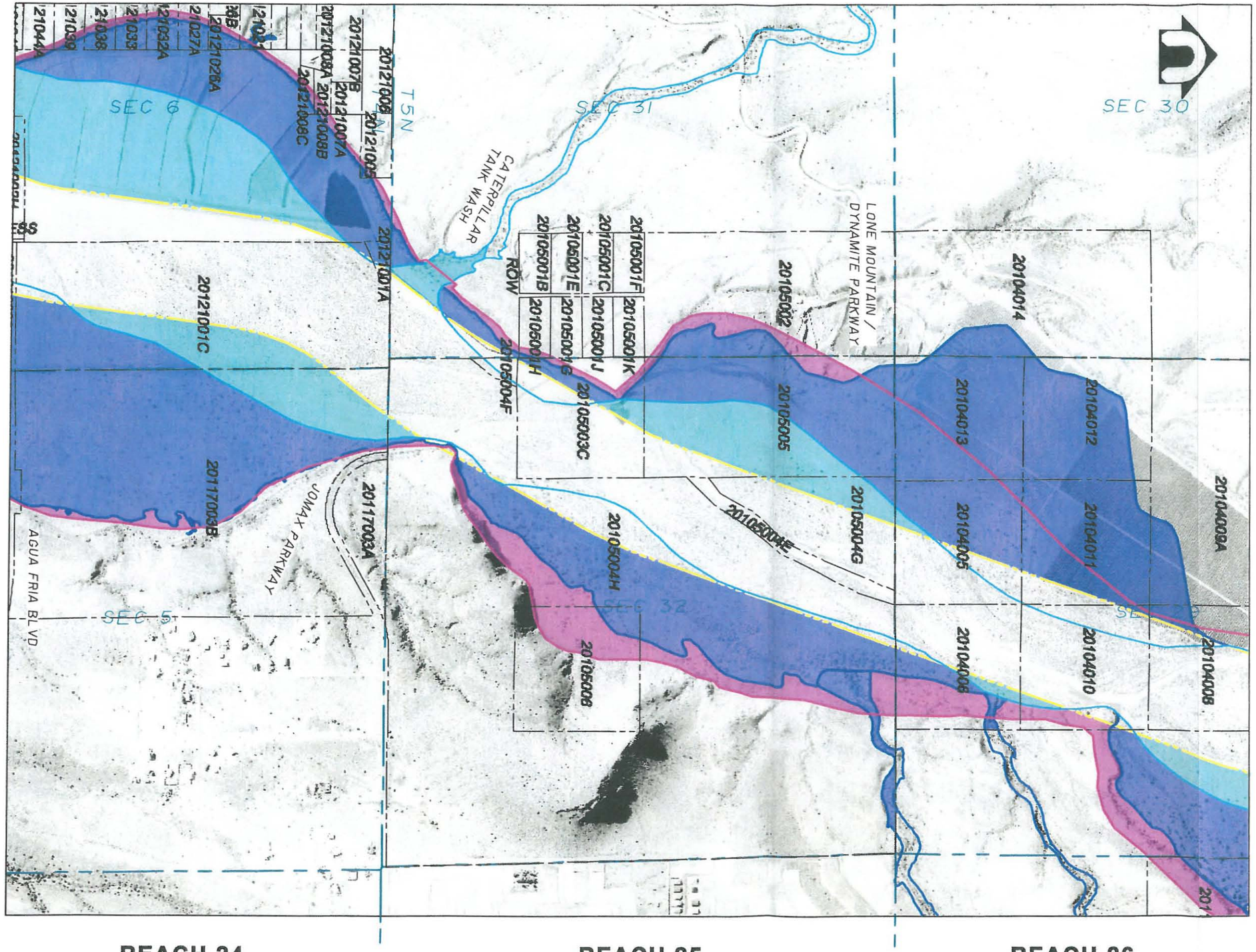
JUNE 2004

SHEET 7 OF 10



REACH 24 REACH 25 REACH 26

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T5N R1E
Sec: 29,30,31,32

T4N R1E
Sec: 5,6

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.*

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
Channelization Alternative
Engineering Design

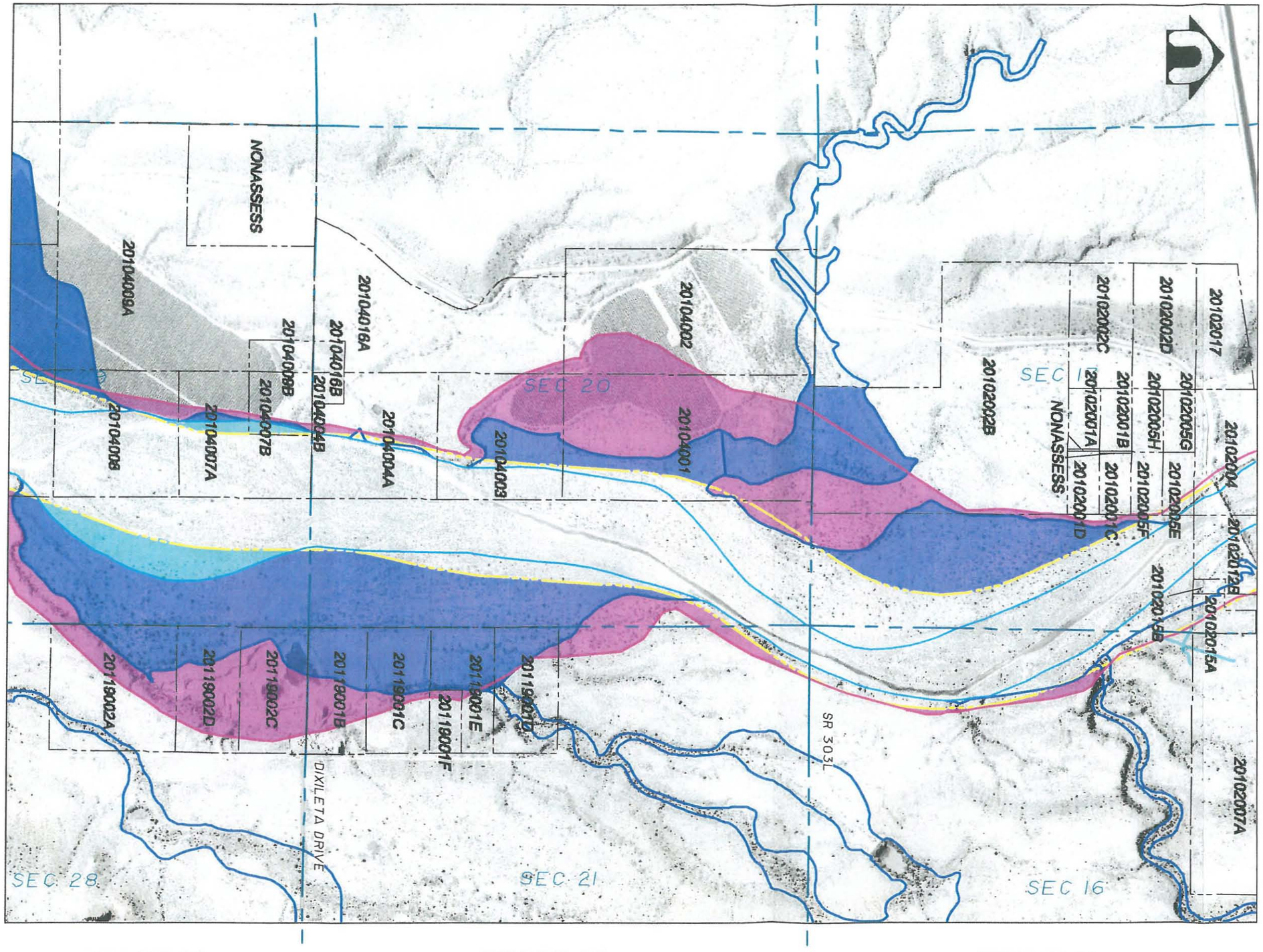
RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004

SHEET 8 OF 10



LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T5N R1E
Sec: 16,17,20, 21,28,29

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

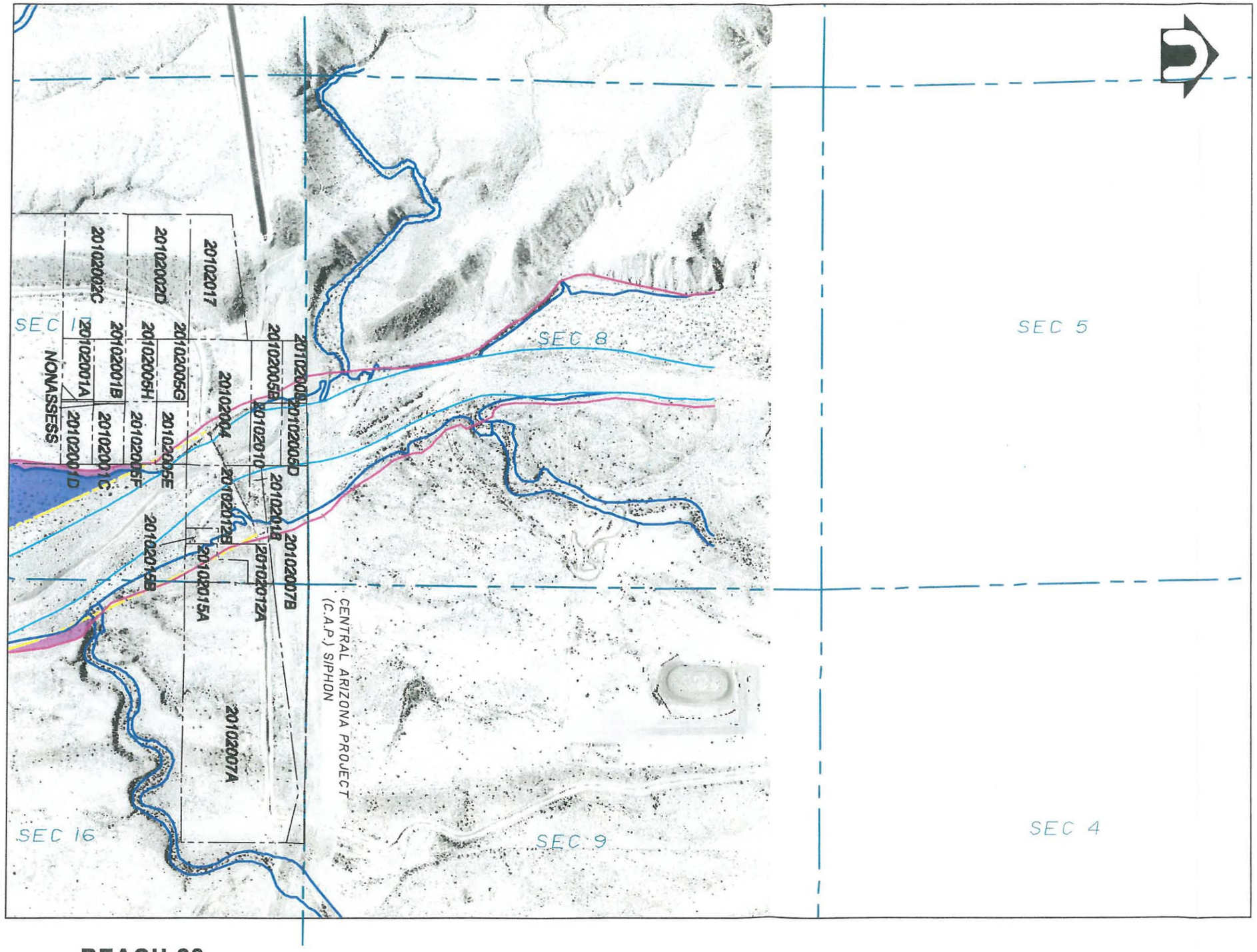
AGUA FRIA
Watercourse Master Plan Addendum
Channelization Alternative
Engineering Design

RECOVERED LANDS

EXHIBIT 2

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004



REACH 28

LEGEND

- FLOODWAY BOUNDARY
- 100-YR FLOODPLAIN BOUNDARY
- LATERAL MIGRATION EROSION HAZARD ZONE*
- PROPOSED CHANNEL SETBACK
- FLOODWAY RECOVERED
- FLOODPLAIN RECOVERED AREA
- LATERAL MIGRATION EROSION HAZARD RECOVERED AREA*
- PROPERTY LINES
- SECTION LINE

T5N R1E
Sec: 16,17

* ADVISORY NOTE: LATERAL MIGRATION HAZARD ZONE is advisory only unless contained within the Floodplain Limit within Unincorporated Maricopa County.."

1000' 0' 1000' 2000'
SCALE: 1"=1000'
CONTOUR INTERVAL = 10 FT.
FLIGHT DATE: 2003

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
Watercourse Master Plan Addendum
Channelization Alternative
Engineering Design

RECOVERED LANDS

EXHIBIT 2

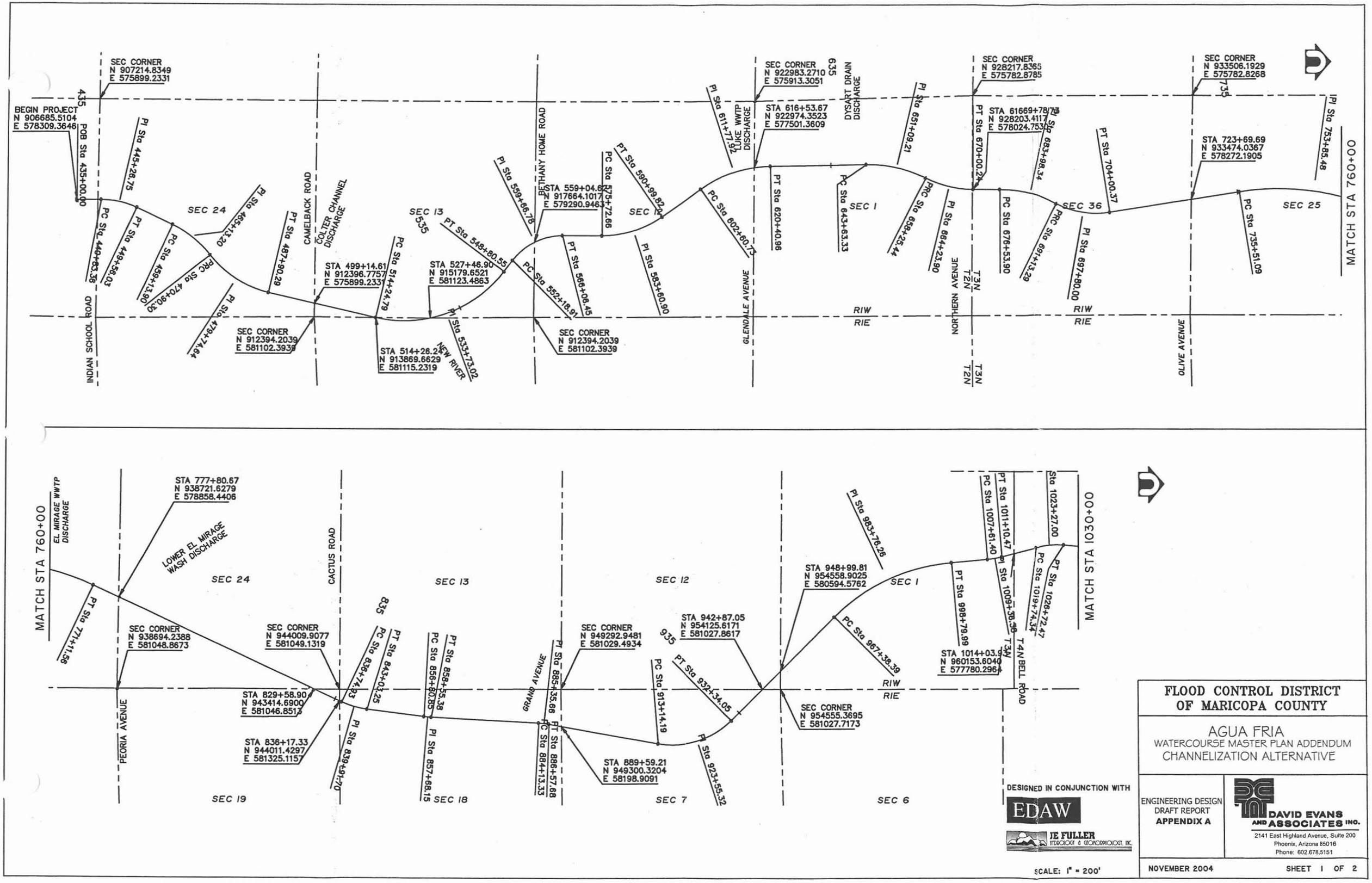
DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

JUNE 2004

SHEET 10 OF 10

APPENDIX A

GEOMETRIC CONTROL AND FIELD SURVEYED CROSS-SECTIONS



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

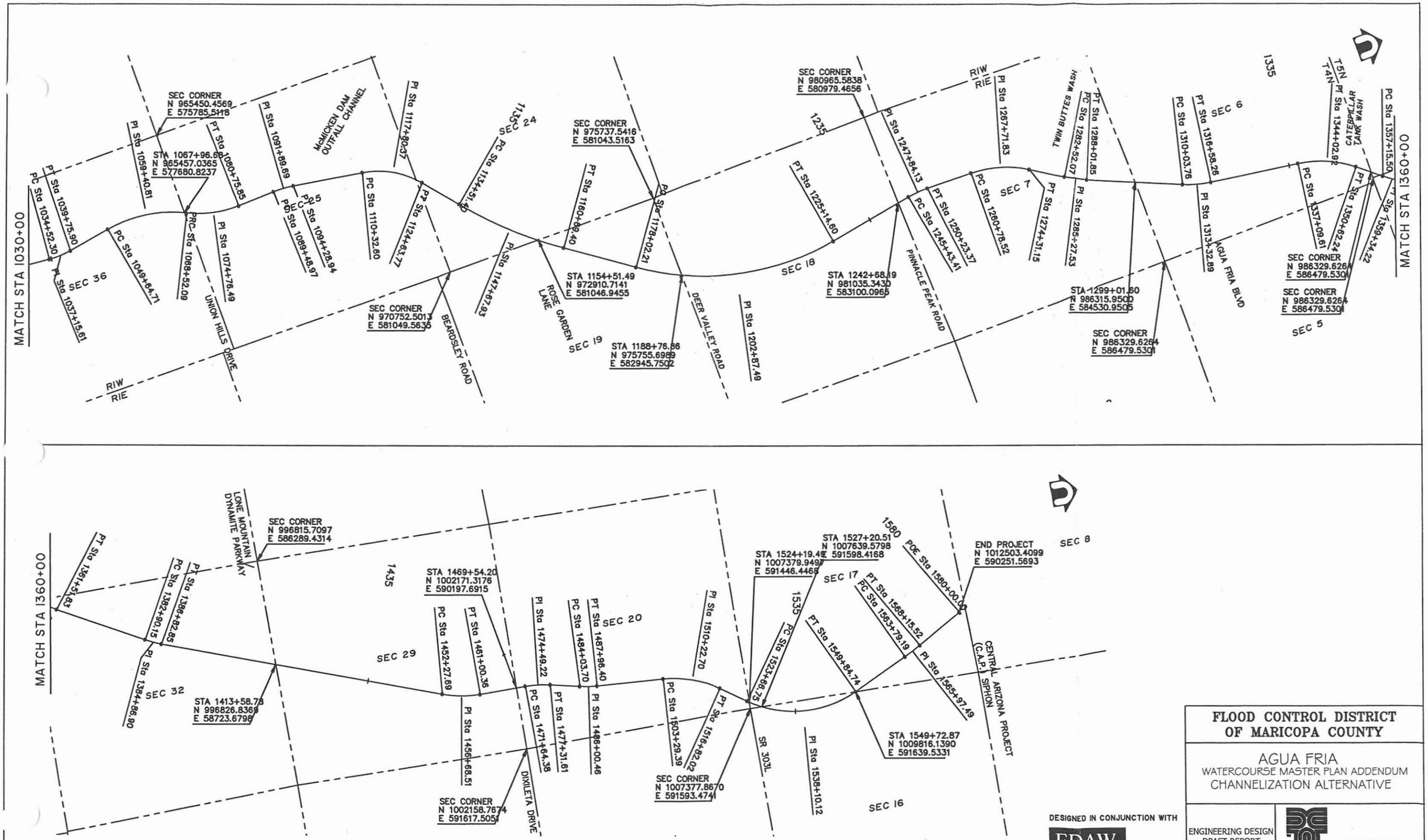
AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
DRAFT REPORT
APPENDIX A

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

NOVEMBER 2004

SHEET 1 OF 2



DESIGNED IN CONJUNCTION WITH

EDAW

JE FULLER HYDROLOGY & GEOMORPHOLOGY, INC.

SCALE: 1" = 200'

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

AGUA FRIA
WATERCOURSE MASTER PLAN ADDENDUM
CHANNELIZATION ALTERNATIVE

ENGINEERING DESIGN
DRAFT REPORT
APPENDIX A

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

NOVEMBER 2004

SHEET 2 OF 2

Project Name: AFR_PH1
Description: Agua Fria River PH1 Final
Horizontal Alignment Name: AFR
Description: Main Channel CL Rev. 6-14-04
Style: default
Vertical Alignment Name: AFR_v
Description: Main Channel CL Profile
Style: default
Input Factor: 1.0000

		STATION	ELEVATION
Element: Linear			
	POB	440+00.00	1000.00
	PVI	499+28.00	1005.34
	Tangent Grade:	0.09	
	Tangent Length:	5928.00	
Element: Linear			
	PVI	499+28.00	1005.34
	PVI	499+52.00	1009.36
	Tangent Grade:	16.79	
	Tangent Length:	24.00	
Element: Linear			
	PVI	499+52.00	1009.36
	PVI	557+82.00	1018.11
	Tangent Grade:	0.15	
	Tangent Length:	5830.00	
Element: Linear			
	PVI	557+82.00	1018.11
	PVI	558+18.00	1024.17
	Tangent Grade:	16.82	
	Tangent Length:	36.00	
Element: Linear			
	PVI	558+18.00	1024.17
	PVI	584+82.00	1028.16
	Tangent Grade:	0.15	
	Tangent Length:	2664.00	
Element: Linear			
	PVI	584+82.00	1028.16
	PVI	585+18.00	1034.22
	Tangent Grade:	16.82	
	Tangent Length:	36.00	
Element: Linear			
	PVI	585+18.00	1034.22
	PVI	615+58.50	1038.78
	Tangent Grade:	0.15	
	Tangent Length:	3040.50	
Element: Linear			
	PVI	615+58.50	1038.78
	PVI	615+91.50	1044.32
	Tangent Grade:	16.82	
	Tangent Length:	33.00	
Element: Linear			
	PVI	615+91.50	1044.32
	PVI	669+88.00	1052.42
	Tangent Grade:	0.15	
	Tangent Length:	5396.50	

Element: Linear

PVI	669+88.00	1052.42
PVI	670+12.00	1056.46
Tangent Grade:	16.82	
Tangent Length:	24.00	

Element: Linear

PVI	670+12.00	1056.46
PVI	722+88.00	1064.37
Tangent Grade:	0.15	
Tangent Length:	5276.00	

Element: Linear

PVI	722+88.00	1064.37
PVI	723+12.00	1068.41
Tangent Grade:	16.82	
Tangent Length:	24.00	

Element: Linear

PVI	723+12.00	1068.41
PVI	759+88.00	1074.29
Tangent Grade:	0.16	
Tangent Length:	3676.00	

Element: Linear

PVI	759+88.00	1074.29
PVI	760+12.00	1078.33
Tangent Grade:	16.83	
Tangent Length:	24.00	

Element: Linear

PVI	760+12.00	1078.33
PVI	796+88.00	1084.21
Tangent Grade:	0.16	
Tangent Length:	3676.00	

Element: Linear

PVI	796+88.00	1084.21
PVI	797+12.00	1088.25
Tangent Grade:	16.83	
Tangent Length:	24.00	

Element: Linear

PVI	797+12.00	1088.25
PVI	834+88.00	1094.29
Tangent Grade:	0.16	
Tangent Length:	3776.00	

Element: Linear

PVI	834+88.00	1094.29
PVI	835+12.00	1098.33
Tangent Grade:	16.83	
Tangent Length:	24.00	

Element: Linear

PVI	835+12.00	1098.33
PVI	850+00.00	1100.71
Tangent Grade:	0.16	
Tangent Length:	1488.00	

Element: Linear

PVI	850+00.00	1100.71
PVI	881+50.00	1106.56
Tangent Grade:	0.19	
Tangent Length:	3150.00	

Element: Linear

PVI	881+50.00	1106.56
PVI	946+82.00	1117.01
Tangent Grade:	0.16	
Tangent Length:	6532.00	

Element: Linear

PVI	946+82.00	1117.01
PVI	947+18.00	1123.07
Tangent Grade:	16.83	
Tangent Length:	36.00	

Element: Linear

PVI	947+18.00	1123.07
PVI	1012+38.00	1133.50
Tangent Grade:	0.16	
Tangent Length:	6520.00	

Element: Linear

PVI	1012+38.00	1133.50
PVI	1012+62.00	1137.54
Tangent Grade:	16.83	
Tangent Length:	24.00	

Element: Linear

PVI	1012+62.00	1137.54
PVI	1100+07.00	1151.53
Tangent Grade:	0.16	
Tangent Length:	8745.00	

Element: Linear

PVI	1100+07.00	1151.53
PVI	1100+43.00	1157.53
Tangent Grade:	16.67	
Tangent Length:	36.00	

Element: Linear

PVI	1100+43.00	1157.53
PVI	1149+82.00	1167.90
Tangent Grade:	0.21	
Tangent Length:	4939.00	

Element: Linear

PVI	1149+82.00	1167.90
PVI	1150+18.00	1173.90
Tangent Grade:	16.67	
Tangent Length:	36.00	

Element: Linear

PVI	1150+18.00	1173.90
PVI	1156+85.00	1175.30
Tangent Grade:	0.21	
Tangent Length:	667.00	

Element: Linear

PVI	1156+85.00	1175.30
PVI	1157+15.00	1180.30
Tangent Grade:	16.67	
Tangent Length:	30.00	

Element: Linear

PVI	1157+15.00	1180.30
PVI	1204+88.00	1190.32
Tangent Grade:	0.21	
Tangent Length:	4773.00	

Element: Linear

PVI	1204+88.00	1190.32
PVI	1205+12.00	1194.32
Tangent Grade:	16.67	
Tangent Length:	24.00	

Element: Linear

PVI	1205+12.00	1194.32
PVI	1254+88.00	1205.76
Tangent Grade:	0.23	
Tangent Length:	4976.00	

Element: Linear

PVI	1254+88.00	1205.76
PVI	1255+12.00	1209.76
Tangent Grade:	16.67	
Tangent Length:	24.00	

Element: Linear

PVI	1255+12.00	1209.76
PVI	1308+76.00	1222.31
Tangent Grade:	0.23	
Tangent Length:	5364.00	

Element: Linear

PVI	1308+76.00	1222.31
PVI	1309+24.00	1230.31
Tangent Grade:	16.67	
Tangent Length:	48.00	

Element: Linear

PVI	1309+24.00	1230.31
PVI	1358+73.00	1242.19
Tangent Grade:	0.24	
Tangent Length:	4949.00	

Element: Linear

PVI	1358+73.00	1242.19
PVI	1359+27.00	1251.19
Tangent Grade:	16.67	
Tangent Length:	54.00	

Element: Linear

PVI	1359+27.00	1251.19
PVI	1408+85.00	1263.09
Tangent Grade:	0.24	
Tangent Length:	4958.00	

Element: Linear

PVI	1408+85.00	1263.09
PVI	1409+15.00	1268.09
Tangent Grade:	16.67	
Tangent Length:	30.00	

Element: Linear

PVI	1409+15.00	1268.09
PVI	1449+82.00	1277.85
Tangent Grade:	0.24	
Tangent Length:	4067.00	

Element: Linear

PVI	1449+82.00	1277.85
PVI	1450+18.00	1283.85
Tangent Grade:	16.67	
Tangent Length:	36.00	

Element: Linear

PVI	1450+18.00	1283.85
PVI	1519+88.00	1300.58
Tangent Grade:	0.24	
Tangent Length:	6970.00	

Element: Linear

PVI	1519+88.00	1300.58
PVI	1520+12.00	1304.58
Tangent Grade:	16.67	
Tangent Length:	24.00	

Element: Linear

PVI	1520+12.00	1304.58
PVI	1570+00.00	1316.55
Tangent Grade:	0.24	
Tangent Length:	4988.00	

Element: Linear

PVI	1570+00.00	1316.55
POE	1571+04.00	1333.88
Tangent Grade:	16.66	
Tangent Length:	104.00	

```
            Project Name: AFR_PH1
             Description: Agua Fria River PH1 Final
Horizontal Alignment Name: AFR
             Description: Main Channel CL Rev. 5-13-04
                   Style: default
            Input Factor: 1.0000
                                          STATION      NORTHING       EASTING

Element: Linear
            POB (        )            435+00.00  906685.51044  578309.36463
             PC (        )            440+83.36  907268.87417  578309.36463
        Tangent Direction:       N  0^00'00" E
           Tangent Length:               583.36

Element: Circular
             PC (        )            440+83.36  907268.87417  578309.36463
             PI (        )            445+26.75  907712.26350  578309.36463
             CC (        )                       907268.87417  580309.36463
             PT (        )            449+56.03  908114.11070  578496.74905
                   Radius:              2000.00
                    Delta:            25^00'00" Right
  Degree of Curvature(Arc):            2^51'53"
                   Length:               872.66
                  Tangent:               443.39
                    Chord:               865.76
          Middle Ordinate:                47.41
                 External:                48.56
        Tangent Direction:       N  0^00'00" E
         Radial Direction:       N 90^00'00" E
          Chord Direction:       N 12^30'00" E
         Radial Direction:       S 65^00'00" E
        Tangent Direction:       N 25^00'00" E

Element: Linear
             PT (        )            449+56.03  908114.11070  578496.74905
             PC (        )            459+13.90  908982.23644  578901.56274
        Tangent Direction:       N 25^00'00" E
           Tangent Length:               957.87

Element: Circular
             PC (        )            459+13.90  908982.23644  578901.56274
             PI (        )            465+13.20  909525.38532  579154.83722
             CC (        )                       907925.69079  581167.33220
            PRC (        )            470+90.30  909894.67117  579626.83999
                   Radius:              2500.00
                    Delta:            26^57'40" Right
  Degree of Curvature(Arc):            2^17'31"
                   Length:              1176.40
                  Tangent:               599.30
                    Chord:              1165.57
          Middle Ordinate:                68.88
                 External:                70.83
        Tangent Direction:       N 25^00'00" E
         Radial Direction:       S 65^00'00" E
          Chord Direction:       N 38^28'50" E
         Radial Direction:       S 38^02'20" E
        Tangent Direction:       N 51^57'40" E

Element: Circular
            PRC (        )            470+90.30  909894.67117  579626.83999
             PI (        )            479+74.64  910439.59902  580323.33962
             CC (        )                       911863.65156  578086.34778
             PT (        )            487+90.29  911301.27392  580522.27294
```

```
                  Radius:          2500.00
                   Delta:         38^57'40" Left
  Degree of Curvature(Arc):        2^17'31"
                  Length:          1700.00
                 Tangent:           884.34
                   Chord:          1667.43
          Middle Ordinate:           143.11
                 External:           151.80
        Tangent Direction:      N 51^57'40" E
         Radial Direction:      S 38^02'20" E
          Chord Direction:      N 32^28'50" E
         Radial Direction:      S 77^00'00" E
        Tangent Direction:      N 13^00'00" E

Element: Linear
             PT (        )         487+90.29  911301.27392  580522.27294
             PC (        )         514+24.79  913868.25123  581114.90635
        Tangent Direction:      N 13^00'00" E
           Tangent Length:          2634.50

Element: Circular
             PC (        )         514+24.79  913868.25123  581114.90635
             PI (        )         533+73.02  915766.54119  581553.16112
             CC (        )                    914543.10439  578191.79616
             PT (        )         548+80.55  916939.01092  579997.24123
                  Radius:          3000.00
                   Delta:         66^00'00" Left
  Degree of Curvature(Arc):        1^54'35"
                  Length:          3455.75
                 Tangent:          1948.22
                   Chord:          3267.83
          Middle Ordinate:           483.99
                 External:           577.09
        Tangent Direction:      N 13^00'00" E
         Radial Direction:      S 77^00'00" E
          Chord Direction:      N 20^00'00" W
         Radial Direction:      N 37^00'00" E
        Tangent Direction:      N 53^00'00" W

Element: Linear
             PT (        )         548+80.55  916939.01092  579997.24123
             PC (        )         552+18.91  917142.64290  579727.01247
        Tangent Direction:      N 53^00'00" W
           Tangent Length:           338.36

Element: Circular
             PC (        )         552+18.91  917142.64290  579727.01247
             PI (        )         559+66.78  917592.72375  579129.73500
             CC (        )                    918340.59617  580629.73500
             PT (        )         566+06.45  918340.59617  579129.73500
                  Radius:          1500.00
                   Delta:         53^00'00" Right
  Degree of Curvature(Arc):        3^49'11"
                  Length:          1387.54
                 Tangent:           747.87
                   Chord:          1338.59
          Middle Ordinate:           157.60
                 External:           176.10
        Tangent Direction:      N 53^00'00" W
         Radial Direction:      N 37^00'00" E
          Chord Direction:      N 26^30'00" W
         Radial Direction:      N 90^00'00" E
        Tangent Direction:      N  0^00'00" E
```

```
Element: Linear
              PT (        )          566+06.45  918340.59617  579129.73500
              PC (        )          575+72.66  919306.80597  579129.73500
         Tangent Direction:      N  0^00'00" E
            Tangent Length:             966.21

Elements are not collinear

Element: Circular
              PC (        )          575+72.66  919306.80597  579129.73500
              PI (        )          583+60.90  920095.05294  579129.73500
              CC (        )                     919306.80597  576629.73500
              PT (        )          590+99.82  920740.74706  578677.61511
                    Radius:            2500.00
                     Delta:           35^00'00" Left
  Degree of Curvature(Arc):           2^17'31"
                    Length:            1527.16
                   Tangent:             788.25
                     Chord:            1503.53
           Middle Ordinate:             115.71
                  External:             121.32
         Tangent Direction:      N  0^00'00" W
          Radial Direction:      N 90^00'00" E
           Chord Direction:      N 17^30'00" W
          Radial Direction:      N 55^00'00" E
         Tangent Direction:      N 35^00'00" W

Element: Linear
              PT (        )          590+99.82  920740.74706  578677.61511
              PC (        )          602+60.73  921691.70632  578011.74627
         Tangent Direction:      N 35^00'00" W
            Tangent Length:            1160.91

Element: Circular
              PC (        )          602+60.73  921691.70632  578011.74627
              PI (        )          611+77.92  922443.02605  577485.66653
              CC (        )                     923412.43563  580469.20240
              PT (        )          620+40.96  923360.07841  577469.65932
                    Radius:            3000.00
                     Delta:           34^00'00" Right
  Degree of Curvature(Arc):           1^54'35"
                    Length:            1780.24
                   Tangent:             917.19
                     Chord:            1754.23
           Middle Ordinate:             131.09
                  External:             137.08
         Tangent Direction:      N 35^00'00" W
          Radial Direction:      N 55^00'00" E
           Chord Direction:      N 18^00'00" W
          Radial Direction:      N 89^00'00" E
         Tangent Direction:      N  1^00'00" W

Element: Linear
              PT (        )          620+40.96  923360.07841  577469.65932
              PC (        )          643+63.33  925682.08869  577429.12848
         Tangent Direction:      N  1^00'00" W
            Tangent Length:            2322.36

Element: Circular
              PC (        )          643+63.33  925682.08869  577429.12848
              PI (        )          651+09.21  926427.85739  577416.11104
              CC (        )                     925734.44591  580428.67156
```

```
            PRC (        )          658+25.44  927092.88957  577753.85740
                 Radius:              3000.00
                  Delta:             27^55'28" Right
  Degree of Curvature(Arc):           1^54'35"
                 Length:              1462.12
                Tangent:               745.88
                  Chord:              1447.69
          Middle Ordinate:               88.63
                 External:               91.33
        Tangent Direction:      N  1^00'00" W
         Radial Direction:      N 89^00'00" E
          Chord Direction:      N 12^57'44" E
         Radial Direction:      S 63^04'32" E
        Tangent Direction:      N 26^55'28" E

Element: Circular
            PRC (        )          658+25.44  927092.88957  577753.85740
             PI (        )          664+23.90  927626.47303  578024.84559
             CC (        )                     928224.92596  575524.84559
             PT (        )          670+00.24  928224.92596  578024.84559
                 Radius:              2500.00
                  Delta:             26^55'28" Left
  Degree of Curvature(Arc):           2^17'31"
                 Length:              1174.80
                Tangent:               598.45
                  Chord:              1164.02
          Middle Ordinate:               68.69
                 External:               70.63
        Tangent Direction:      N 26^55'28" E
         Radial Direction:      S 63^04'32" E
          Chord Direction:      N 13^27'44" E
         Radial Direction:      S 90^00'00" E
        Tangent Direction:      N  0^00'00" E

Element: Linear
             PT (        )          670+00.24  928224.92596  578024.84559
             PC (        )          676+53.90  928878.58849  578024.84559
        Tangent Direction:      N  0^00'00" E
           Tangent Length:              653.66

Element: Circular
             PC (        )          676+53.90  928878.58849  578024.84559
             PI (        )          683+98.34  929623.01999  578024.84559
             CC (        )                     928878.58849  581024.84559
            PRC (        )          691+13.29  930281.09184  578372.86815
                 Radius:              3000.00
                  Delta:             27^52'20" Right
  Degree of Curvature(Arc):           1^54'35"
                 Length:              1459.39
                Tangent:               744.43
                  Chord:              1445.04
          Middle Ordinate:               88.31
                 External:               90.98
        Tangent Direction:      N  0^00'00" E
         Radial Direction:      S 90^00'00" E
          Chord Direction:      N 13^56'10" E
         Radial Direction:      S 62^07'40" E
        Tangent Direction:      N 27^52'20" E

Element: Circular
            PRC (        )          691+13.29  930281.09184  578372.86815
             PI (        )          697+80.00  930870.45981  578684.55653
             CC (        )                     931216.09408  576604.88319
```

```
            PT (        )          704+00.37  931528.96301  578580.25987
                 Radius:             2000.00
                  Delta:            36^52'20" Left
  Degree of Curvature(Arc):          2^51'53"
                 Length:             1287.08
               Tangent:               666.71
                  Chord:             1264.99
          Middle Ordinate:             102.65
                 External:             108.20
        Tangent Direction:      N 27^52'20" E
         Radial Direction:      S 62^07'40" E
          Chord Direction:      N  9^26'10" E
         Radial Direction:      N 81^00'00" E
        Tangent Direction:      N  9^00'00" W

Element: Linear
            PT (        )          704+00.37  931528.96301  578580.25987
            PC (        )          735+51.09  934640.89126  578087.37886
        Tangent Direction:      N  9^00'00" W
           Tangent Length:            3150.72

Element: Circular
            PC (        )          735+51.09  934640.89126  578087.37886
            PI (        )          753+85.48  936452.69104  577800.41796
            CC (        )                     935579.49805  584013.50890
            PT (        )          771+11.56  938115.20762  578575.66218
                 Radius:             6000.00
                  Delta:            34^00'00" Right
  Degree of Curvature(Arc):          0^57'18"
                 Length:             3560.47
               Tangent:              1834.38
                  Chord:             3508.46
          Middle Ordinate:             262.17
                 External:             274.15
        Tangent Direction:      N  9^00'00" W
         Radial Direction:      N 81^00'00" E
          Chord Direction:      N  8^00'00" E
         Radial Direction:      S 65^00'00" E
        Tangent Direction:      N 25^00'00" E

Element: Linear
            PT (        )          771+11.56  938115.20762  578575.66218
            PC (        )          836+74.93  944063.63690  581349.46030
        Tangent Direction:      N 25^00'00" E
           Tangent Length:            6563.37

Element: Circular
            PC (        )          836+74.93  944063.63690  581349.46030
            PI (        )          839+91.70  944350.72700  581483.33262
            CC (        )                     944908.87342  579536.84473
            PT (        )          843+03.25  944665.13474  581521.93703
                 Radius:             2000.00
                  Delta:            18^00'00" Left
  Degree of Curvature(Arc):          2^51'53"
                 Length:               628.32
               Tangent:                316.77
                  Chord:               625.74
          Middle Ordinate:              24.62
                 External:              24.93
        Tangent Direction:      N 25^00'00" E
         Radial Direction:      S 65^00'00" E
          Chord Direction:      N 16^00'00" E
         Radial Direction:      S 83^00'00" E
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```
        Tangent Direction:      N  7^00'00" E

Element: Linear
             PT (        )          843+03.25  944665.13474  581521.93703
             PC (        )          856+80.85  946032.46860  581689.82452
        Tangent Direction:      N  7^00'00" E
           Tangent Length:            1377.60

Element: Circular
             PC (        )          856+80.85  946032.46860  581689.82452
             PI (        )          857+68.15  946119.11979  581700.46395
             CC (        )                     946337.14196  579208.45914
             PT (        )          858+55.38  946206.30207  581705.03298
                   Radius:            2500.00
                    Delta:           4^00'00" Left
  Degree of Curvature(Arc):          2^17'31"
                   Length:             174.53
                  Tangent:              87.30
                    Chord:             174.50
          Middle Ordinate:               1.52
                 External:               1.52
        Tangent Direction:      N  7^00'00" E
         Radial Direction:      S 83^00'00" E
          Chord Direction:      N  5^00'00" E
         Radial Direction:      S 87^00'00" E
        Tangent Direction:      N  3^00'00" E

Element: Linear
             PT (        )          858+55.38  946206.30207  581705.03298
             PC (        )          884+13.33  948760.74727  581838.90578
        Tangent Direction:      N  3^00'00" E
           Tangent Length:            2557.95

Element: Circular
             PC (        )          884+13.33  948760.74727  581838.90578
             PI (        )          885+35.66  948882.90487  581845.30779
             CC (        )                     948656.07536  583836.16485
             PT (        )          886+57.68  949003.37171  581866.54934
                   Radius:            2000.00
                    Delta:           7^00'00" Right
  Degree of Curvature(Arc):          2^51'53"
                   Length:             244.35
                  Tangent:             122.33
                    Chord:             244.19
          Middle Ordinate:               3.73
                 External:               3.74
        Tangent Direction:      N  3^00'00" E
         Radial Direction:      S 87^00'00" E
          Chord Direction:      N  6^30'00" E
         Radial Direction:      S 80^00'00" E
        Tangent Direction:      N 10^00'00" E

Element: Linear
             PT (        )          886+57.68  949003.37171  581866.54934
             PC (        )          913+14.19  951619.52333  582327.84746
        Tangent Direction:      N 10^00'00" E
           Tangent Length:            2656.51

Element: Circular
             PC (        )          913+14.19  951619.52333  582327.84746
             PI (        )          923+55.32  952644.84027  582508.63850
             CC (        )                     951966.81969  580358.23195
             PT (        )          932+34.05  953381.03325  581772.44551
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```
                  Radius:            2000.00
                   Delta:           55^00'00" Left
  Degree of Curvature(Arc):          2^51'53"
                  Length:            1919.86
                 Tangent:            1041.13
                   Chord:            1846.99
          Middle Ordinate:             225.98
                 External:             254.76
        Tangent Direction:      N 10^00'00" E
         Radial Direction:      S 80^00'00" E
          Chord Direction:      N 17^30'00" W
         Radial Direction:      N 45^00'00" E
        Tangent Direction:      N 45^00'00" W

Element: Linear
             PT (        )          932+34.05  953381.03325  581772.44551
             PC (        )          967+38.39  955858.97709  579294.50167
        Tangent Direction:      N 45^00'00" W
           Tangent Length:            3504.34

Element: Circular
             PC (        )          967+38.39  955858.97709  579294.50167
             PI (        )          983+76.26  957017.12328  578136.35548
             CC (        )                     959040.95761  582476.48219
             PT (        )          998+79.99  958648.75676  577993.60605
                  Radius:            4500.00
                   Delta:           40^00'00" Right
  Degree of Curvature(Arc):          1^16'24"
                  Length:            3141.59
                 Tangent:            1637.87
                   Chord:            3078.18
          Middle Ordinate:             271.38
                 External:             288.80
        Tangent Direction:      N 45^00'00" W
         Radial Direction:      N 45^00'00" E
          Chord Direction:      N 25^00'00" W
         Radial Direction:      N 85^00'00" E
        Tangent Direction:      N  5^00'00" W

Element: Linear
             PT (        )          998+79.99  958648.75676  577993.60605
             PC (        )         1007+61.40  959526.81987  577916.78548
        Tangent Direction:      N  5^00'00" W
           Tangent Length:             881.42

Element: Circular
             PC (        )         1007+61.40  959526.81987  577916.78548
             PI (        )         1009+36.38  959701.13136  577901.53520
             CC (        )                     959352.50839  575924.39608
             PT (        )         1011+10.47  959870.14648  577856.24774
                  Radius:            2000.00
                   Delta:           10^00'00" Left
  Degree of Curvature(Arc):          2^51'53"
                  Length:             349.07
                 Tangent:             174.98
                   Chord:             348.62
          Middle Ordinate:               7.61
                 External:               7.64
        Tangent Direction:      N  5^00'00" W
         Radial Direction:      N 85^00'00" E
          Chord Direction:      N 10^00'00" W
         Radial Direction:      N 75^00'00" E
        Tangent Direction:      N 15^00'00" W
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```
Element: Linear
              PT (        )        1011+10.47  959870.14648  577856.24774
              PC (        )        1019+74.34  960704.58350  577632.66101
         Tangent Direction:      N 15^00'00" W
            Tangent Length:             863.87

Element: Circular
              PC (        )        1019+74.34  960704.58350  577632.66101
              PI (        )        1023+27.00  961045.22106  577541.38745
              CC (        )                    961222.22159  579564.51266
              PT (        )        1026+72.47  961396.53307  577572.12327
                     Radius:           2000.00
                      Delta:         20^00'00" Right
  Degree of Curvature(Arc):           2^51'53"
                     Length:            698.13
                    Tangent:            352.65
                      Chord:            694.59
           Middle Ordinate:              30.38
                   External:             30.85
         Tangent Direction:      N 15^00'00" W
          Radial Direction:      N 75^00'00" E
           Chord Direction:      N  5^00'00" W
          Radial Direction:      S 85^00'00" E
         Tangent Direction:      N  5^00'00" E

Element: Linear
              PT (        )        1026+72.47  961396.53307  577572.12327
              PC (        )        1034+52.30  962173.39312  577640.08971
         Tangent Direction:      N  5^00'00" E
            Tangent Length:             779.83

Element: Circular
              PC (        )        1034+52.30  962173.39312  577640.08971
              PI (        )        1037+15.61  962435.69616  577663.03826
              CC (        )                    962347.70460  575647.70032
              PT (        )        1039+75.90  962695.00096  577617.31582
                     Radius:           2000.00
                      Delta:         15^00'00" Left
  Degree of Curvature(Arc):           2^51'53"
                     Length:            523.60
                    Tangent:            263.30
                      Chord:            522.10
           Middle Ordinate:              17.11
                   External:             17.26
         Tangent Direction:      N  5^00'00" E
          Radial Direction:      S 85^00'00" E
           Chord Direction:      N  2^30'00" W
          Radial Direction:      N 80^00'00" E
         Tangent Direction:      N 10^00'00" W

Element: Linear
              PT (        )        1039+75.90  962695.00096  577617.31582
              PC (        )        1049+64.71  963668.78440  577445.61153
         Tangent Direction:      N 10^00'00" W
            Tangent Length:             988.81

Element: Circular
              PC (        )        1049+64.71  963668.78440  577445.61153
              PI (        )        1059+40.81  964630.05761  577276.11313
              CC (        )                    964189.72894  580400.03479
             PRC (        )        1068+52.09  965507.02579  577704.71866
                     Radius:           3000.00
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```
                    Delta:          36^02'47" Right
  Degree of Curvature(Arc):          1^54'35"
                  Length:             1887.39
                 Tangent:              976.10
                   Chord:             1856.41
          Middle Ordinate:              147.21
                 External:              154.80
        Tangent Direction:      N 10^00'00" W
         Radial Direction:      N 80^00'00" E
          Chord Direction:      N  8^01'24" E
         Radial Direction:      S 63^57'13" E
        Tangent Direction:      N 26^02'47" E

Element: Circular
            PRC (        )         1068+52.09  965507.02579  577704.71866
             PI (        )         1074+76.49  966068.00682  577978.89005
             CC (        )                     966604.77316  575458.62189
             PT (        )         1080+75.85  966692.02190  577957.09896
                  Radius:             2500.00
                   Delta:          28^02'47" Left
  Degree of Curvature(Arc):          2^17'31"
                  Length:             1223.76
                 Tangent:              624.40
                   Chord:             1211.57
          Middle Ordinate:               74.51
                 External:               76.79
        Tangent Direction:      N 26^02'47" E
         Radial Direction:      S 63^57'13" E
          Chord Direction:      N 12^01'24" E
         Radial Direction:      N 88^00'00" E
        Tangent Direction:      N  2^00'00" W

Element: Linear
             PT (        )         1080+75.85  966692.02190  577957.09896
             PC (        )         1089+48.97  967564.61537  577926.62733
        Tangent Direction:      N  2^00'00" W
           Tangent Length:              873.13

Element: Circular
             PC (        )         1089+48.97  967564.61537  577926.62733
             PI (        )         1091+89.69  967805.19135  577918.22623
             CC (        )                     967651.86412  580425.10439
             PT (        )         1094+28.94  968042.95028  577955.88354
                  Radius:             2500.00
                   Delta:          11^00'00" Right
  Degree of Curvature(Arc):          2^17'31"
                  Length:              479.97
                 Tangent:              240.72
                   Chord:              479.23
          Middle Ordinate:               11.51
                 External:               11.56
        Tangent Direction:      N  2^00'00" W
         Radial Direction:      N 88^00'00" E
          Chord Direction:      N  3^30'00" E
         Radial Direction:      S 81^00'00" E
        Tangent Direction:      N  9^00'00" E

Element: Linear
             PT (        )         1094+28.94  968042.95028  577955.88354
             PC (        )         1110+32.60  969626.86571  578206.75110
        Tangent Direction:      N  9^00'00" E
           Tangent Length:             1603.66
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```
Element: Circular
              PC (        )        1110+32.60  969626.86571  578206.75110
              PI (        )        1117+80.37  970365.42878  578323.72800
              CC (        )                    969313.99678  580182.12778
              PT (        )        1124+63.77  970846.08566  578896.55256
                    Radius:           2000.00
                     Delta:          41^00'00" Right
  Degree of Curvature(Arc):          2^51'53"
                    Length:           1431.17
                   Tangent:            747.77
                     Chord:           1400.83
           Middle Ordinate:            126.66
                  External:            135.22
         Tangent Direction:      N  9^00'00" E
          Radial Direction:      S 81^00'00" E
           Chord Direction:      N 29^30'00" E
          Radial Direction:      S 40^00'00" E
         Tangent Direction:      N 50^00'00" E

Element: Linear
              PT (        )        1124+63.77  970846.08566  578896.55256
              PC (        )        1134+51.40  971480.92664  579653.12658
         Tangent Direction:      N 50^00'00" E
            Tangent Length:            987.64

Element: Circular
              PC (        )        1134+51.40  971480.92664  579653.12658
              PI (        )        1147+67.93  972327.17258  580661.64322
              CC (        )                    979141.37107  573225.25048
              PT (        )        1160+69.40  973405.60671  581416.77092
                    Radius:          10000.00
                     Delta:          15^00'00" Left
  Degree of Curvature(Arc):          0^34'23"
                    Length:           2617.99
                   Tangent:           1316.52
                     Chord:           2610.52
           Middle Ordinate:             85.55
                  External:             86.29
         Tangent Direction:      N 50^00'00" E
          Radial Direction:      S 40^00'00" E
           Chord Direction:      N 42^30'00" E
          Radial Direction:      S 55^00'00" E
         Tangent Direction:      N 35^00'00" E

Element: Linear
              PT (        )        1160+69.40  973405.60671  581416.77092
              PC (        )        1178+02.21  974825.04251  582410.67057
         Tangent Direction:      N 35^00'00" E
            Tangent Length:           1732.81

Element: Circular
              PC (        )        1178+02.21  974825.04251  582410.67057
              PI (        )        1202+87.49  976860.86583  583836.16941
              CC (        )                    978266.50113  577495.75831
              PT (        )        1225+14.60  979308.39020  583404.60483
                    Radius:           6000.00
                     Delta:          45^00'00" Left
  Degree of Curvature(Arc):          0^57'18"
                    Length:           4712.39
                   Tangent:           2485.28
                     Chord:           4592.20
           Middle Ordinate:            456.72
                  External:            494.35
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```
        Tangent Direction:      N 35^00'00" E
         Radial Direction:      S 55^00'00" E
          Chord Direction:      N 12^30'00" E
         Radial Direction:      N 80^00'00" E
        Tangent Direction:      N 10^00'00" W

Element: Linear
             PT (        )         1225+14.60  979308.39020  583404.60483
             PC (        )         1245+43.41  981306.37572  583052.30607
        Tangent Direction:      N 10^00'00" W
           Tangent Length:            2028.81

Element: Circular
             PC (        )         1245+43.41  981306.37572  583052.30607
             PI (        )         1247+84.13  981543.44122  583010.50503
             CC (        )                     981740.49616  585514.32546
             PT (        )         1250+23.37  981784.12718  583014.70622
                   Radius:            2500.00
                    Delta:           11^00'00" Right
  Degree of Curvature(Arc):          2^17'31"
                   Length:             479.97
                  Tangent:             240.72
                    Chord:             479.23
          Middle Ordinate:              11.51
                 External:              11.56
        Tangent Direction:      N 10^00'00" W
         Radial Direction:      N 80^00'00" E
          Chord Direction:      N  4^30'00" W
         Radial Direction:      S 89^00'00" E
        Tangent Direction:      N  1^00'00" E

Element: Linear
             PT (        )         1250+23.37  981784.12718  583014.70622
             PC (        )         1260+78.52  982839.11292  583033.12106
        Tangent Direction:      N  1^00'00" E
           Tangent Length:            1055.15

Element: Circular
             PC (        )         1260+78.52  982839.11292  583033.12106
             PI (        )         1267+71.83  983532.31869  583045.22101
             CC (        )                     982795.48191  585532.74030
             PT (        )         1274+31.15  984120.28007  583412.62006
                   Radius:            2500.00
                    Delta:           31^00'00" Right
  Degree of Curvature(Arc):          2^17'31"
                   Length:            1352.63
                  Tangent:             693.31
                    Chord:            1336.19
          Middle Ordinate:              90.92
                 External:              94.36
        Tangent Direction:      N  1^00'00" E
         Radial Direction:      S 89^00'00" E
          Chord Direction:      N 16^30'00" E
         Radial Direction:      S 58^00'00" E
        Tangent Direction:      N 32^00'00" E

Element: Linear
             PT (        )         1274+31.15  984120.28007  583412.62006
             PC (        )         1282+52.07  984816.46543  583847.64496
        Tangent Direction:      N 32^00'00" E
           Tangent Length:             820.93

Element: Circular
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              PC (        )          1282+52.07  984816.46543  583847.64496
              PI (        )          1285+27.53  985050.06534  583993.61438
              CC (        )                      986671.18285  580879.47662
              PT (        )          1288+01.85  985303.62390  584101.24361
                    Radius:             3500.00
                     Delta:            9^00'00" Left
  Degree of Curvature(Arc):            1^38'13"
                    Length:              549.78
                   Tangent:              275.46
                     Chord:              549.21
            Middle Ordinate:              10.79
                  External:               10.82
          Tangent Direction:       N 32^00'00" E
           Radial Direction:       S 58^00'00" E
            Chord Direction:       N 27^30'00" E
           Radial Direction:       S 67^00'00" E
          Tangent Direction:       N 23^00'00" E

Element: Linear
              PT (        )          1288+01.85  985303.62390  584101.24361
              PC (        )          1310+03.76  987330.49076  584961.59754
          Tangent Direction:       N 23^00'00" E
             Tangent Length:             2201.91

Element: Circular
              PC (        )          1310+03.76  987330.49076  584961.59754
              PI (        )          1313+32.89  987633.45766  585090.19936
              CC (        )                      988307.31858  582660.33541
              PT (        )          1316+58.26  987959.38583  585136.00558
                    Radius:             2500.00
                     Delta:           15^00'00" Left
  Degree of Curvature(Arc):            2^17'31"
                    Length:              654.50
                   Tangent:              329.13
                     Chord:              652.63
            Middle Ordinate:              21.39
                  External:               21.57
          Tangent Direction:       N 23^00'00" E
           Radial Direction:       S 67^00'00" E
            Chord Direction:       N 15^30'00" E
           Radial Direction:       S 82^00'00" E
          Tangent Direction:       N  8^00'00" E

Element: Linear
              PT (        )          1316+58.26  987959.38583  585136.00558
              PC (        )          1337+09.61  989990.76958  585421.49795
          Tangent Direction:       N  8^00'00" E
             Tangent Length:             2051.35

Element: Circular
              PC (        )          1337+09.61  989990.76958  585421.49795
              PI (        )          1344+02.92  990677.33368  585517.98824
              CC (        )                      989642.83682  587897.16812
              PT (        )          1350+62.24  991216.13780  585954.30321
                    Radius:             2500.00
                     Delta:           31^00'00" Right
  Degree of Curvature(Arc):            2^17'31"
                    Length:             1352.63
                   Tangent:              693.31
                     Chord:             1336.19
            Middle Ordinate:              90.92
                  External:               94.36
          Tangent Direction:       N  8^00'00" E
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          Radial Direction:      S 82^00'00" E
           Chord Direction:      N 23^30'00" E
          Radial Direction:      S 51^00'00" E
         Tangent Direction:      N 39^00'00" E

Element: Linear
              PT (        )        1350+62.24  991216.13780  585954.30321
              PC (        )        1357+15.50  991723.81568  586365.41265
         Tangent Direction:      N 39^00'00" E
            Tangent Length:            653.26

Element: Circular
              PC (        )        1357+15.50  991723.81568  586365.41265
              PI (        )        1359+34.22  991893.79433  586503.05865
              CC (        )                    993297.11665  584422.54775
              PT (        )        1361+51.83  992085.09260  586609.09702
                     Radius:           2500.00
                      Delta:          10^00'00" Left
  Degree of Curvature(Arc):           2^17'31"
                     Length:            436.33
                    Tangent:            218.72
                      Chord:            435.78
           Middle Ordinate:               9.51
                   External:              9.55
         Tangent Direction:      N 39^00'00" E
          Radial Direction:      S 51^00'00" E
           Chord Direction:      N 34^00'00" E
          Radial Direction:      S 61^00'00" E
         Tangent Direction:      N 29^00'00" E

Element: Linear
              PT (        )        1361+51.83  992085.09260  586609.09702
              PC (        )        1382+90.15  993955.30774  587645.77420
         Tangent Direction:      N 29^00'00" E
            Tangent Length:           2138.32

Element: Circular
              PC (        )        1382+90.15  993955.30774  587645.77420
              PI (        )        1384+86.90  994127.39290  587741.16256
              CC (        )                    995167.33179  585459.22493
              PT (        )        1386+82.85  994312.28144  587808.45648
                     Radius:           2500.00
                      Delta:           9^00'00" Left
  Degree of Curvature(Arc):           2^17'31"
                     Length:            392.70
                    Tangent:            196.75
                      Chord:            392.30
           Middle Ordinate:               7.71
                   External:              7.73
         Tangent Direction:      N 29^00'00" E
          Radial Direction:      S 61^00'00" E
           Chord Direction:      N 24^30'00" E
          Radial Direction:      S 70^00'00" E
         Tangent Direction:      N 20^00'00" E

Element: Linear
              PT (        )        1386+82.85  994312.28144  587808.45648
              PC (        )        1452+27.69 1000462.42466  590046.92555
         Tangent Direction:      N 20^00'00" E
            Tangent Length:           6544.85

Element: Circular
              PC (        )        1452+27.69 1000462.42466  590046.92555
```

```
            PI (        )        1456+68.51 1000876.65757  590197.69400
            CC (        )                   1001317.47502  587697.69400
            PT (        )        1461+00.36 1001317.47502  590197.69400
                   Radius:           2500.00
                    Delta:         20^00'00" Left
  Degree of Curvature(Arc):         2^17'31"
                   Length:            872.66
                  Tangent:            440.82
                    Chord:            868.24
          Middle Ordinate:             37.98
                 External:             38.57
        Tangent Direction:      N 20^00'00" E
         Radial Direction:      S 70^00'00" E
          Chord Direction:      N 10^00'00" E
         Radial Direction:      N 90^00'00" E
        Tangent Direction:      N  0^00'00" W

Element: Linear
            PT (        )        1461+00.36 1001317.47502  590197.69400
            PC (        )        1471+64.38 1002381.49815  590197.69400
        Tangent Direction:      N  0^00'00" W
           Tangent Length:           1064.02

Elements are not collinear

Element: Circular
            PC (        )        1471+64.38 1002381.49815  590197.69400
            PI (        )        1474+49.22 1002666.33717  590197.69400
            CC (        )                   1002381.49815  592697.69400
            PT (        )        1477+31.61 1002943.87579  590261.76884
                   Radius:           2500.00
                    Delta:         13^00'00" Right
  Degree of Curvature(Arc):         2^17'31"
                   Length:            567.23
                  Tangent:            284.84
                    Chord:            566.02
          Middle Ordinate:             16.07
                 External:             16.17
        Tangent Direction:      N  0^00'00" E
         Radial Direction:      S 90^00'00" E
          Chord Direction:      N  6^30'00" E
         Radial Direction:      S 77^00'00" E
        Tangent Direction:      N 13^00'00" E

Element: Linear
            PT (        )        1477+31.61 1002943.87579  590261.76884
            PC (        )        1484+03.70 1003598.74275  590412.95679
        Tangent Direction:      N 13^00'00" E
           Tangent Length:            672.09

Element: Circular
            PC (        )        1484+03.70 1003598.74275  590412.95679
            PI (        )        1486+00.46 1003790.45422  590457.21687
            CC (        )                   1004161.12039  587977.03163
            PT (        )        1487+96.40 1003986.72920  590470.94175
                   Radius:           2500.00
                    Delta:          9^00'00" Left
  Degree of Curvature(Arc):         2^17'31"
                   Length:            392.70
                  Tangent:            196.75
                    Chord:            392.30
          Middle Ordinate:              7.71
                 External:              7.73
```

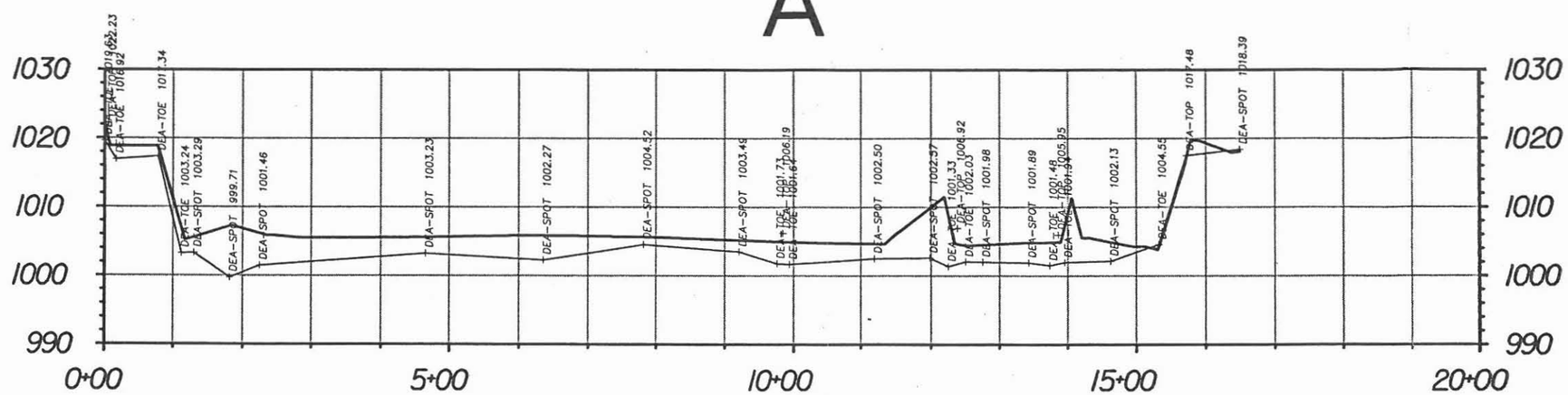
```
          Tangent Direction:      N 13^00'00" E
           Radial Direction:      S 77^00'00" E
            Chord Direction:      N  8^30'00" E
           Radial Direction:      S 86^00'00" E
          Tangent Direction:      N  4^00'00" E

Element: Linear
               PT (        )         1487+96.40 1003986.72920  590470.94175
               PC (        )         1503+29.39 1005515.97899  590577.87732
          Tangent Direction:      N  4^00'00" E
             Tangent Length:            1532.98

Element: Circular
               PC (        )         1503+29.39 1005515.97899  590577.87732
               PI (        )         1510+22.70 1006207.60148  590626.24027
               CC (        )                    1005341.58781  593071.78744
               PT (        )         1516+82.02 1006775.52890  591023.90733
                     Radius:            2500.00
                      Delta:           31^00'00" Right
  Degree of Curvature(Arc):            2^17'31"
                     Length:            1352.63
                    Tangent:             693.31
                      Chord:            1336.19
            Middle Ordinate:              90.92
                   External:              94.36
          Tangent Direction:      N  4^00'00" E
           Radial Direction:      S 86^00'00" E
            Chord Direction:      N 19^30'00" E
           Radial Direction:      S 55^00'00" E
          Tangent Direction:      N 35^00'00" E

Element: Linear
               PT (        )         1516+82.02 1006775.52890  591023.90733
               PC (        )         1523+66.75 1007336.42541  591416.65130
          Tangent Direction:      N 35^00'00" E
             Tangent Length:             684.73

Element: Circular
               PC (        )         1523+66.75 1007336.42541  591416.65130
               PI (        )         1538+10.12 1008518.76955  592244.53757
               CC (        )                    1008770.36651  589368.77119
               PT (        )         1549+84.74 1009826.91216  591634.54066
                     Radius:            2500.00
                      Delta:           60^00'00" Left
  Degree of Curvature(Arc):            2^17'31"
                     Length:            2617.99
                    Tangent:            1443.38
                      Chord:            2500.00
            Middle Ordinate:             334.94
                   External:             386.75
          Tangent Direction:      N 35^00'00" E
           Radial Direction:      S 55^00'00" E
            Chord Direction:      N  5^00'00" E
           Radial Direction:      N 65^00'00" E
          Tangent Direction:      N 25^00'00" W

Element: Linear
               PT (        )         1549+84.74 1009826.91216  591634.54066
               PC (        )         1563+79.19 1011090.71088  591045.22163
          Tangent Direction:      N 25^00'00" W
             Tangent Length:            1394.45

Element: Circular
```

PC ( )	1563+79.19	1011090.71088	591045.22163
PI ( )	1565+97.49	1011288.56215	590952.96207
CC ( )		1008977.61958	586513.68270
PT ( )	1568+15.52	1011477.61958	590843.80972
Radius:	5000.00		
Delta:	5^00'00" Left		
Degree of Curvature(Arc):	1^08'45"		
Length:	436.33		
Tangent:	218.30		
Chord:	436.19		
Middle Ordinate:	4.76		
External:	4.76		
Tangent Direction:	N 25^00'00" W		
Radial Direction:	N 65^00'00" E		
Chord Direction:	N 27^30'00" W		
Radial Direction:	N 60^00'00" E		
Tangent Direction:	N 30^00'00" W		

Element: Linear

PT ( )	1568+15.52	1011477.61958	590843.80972
POE ( )	1580+00.00	1012503.40991	590251.56939
Tangent Direction:	N 30^00'00" W		
Tangent Length:	1184.48		

A



INDIAN SCHOOL ROAD

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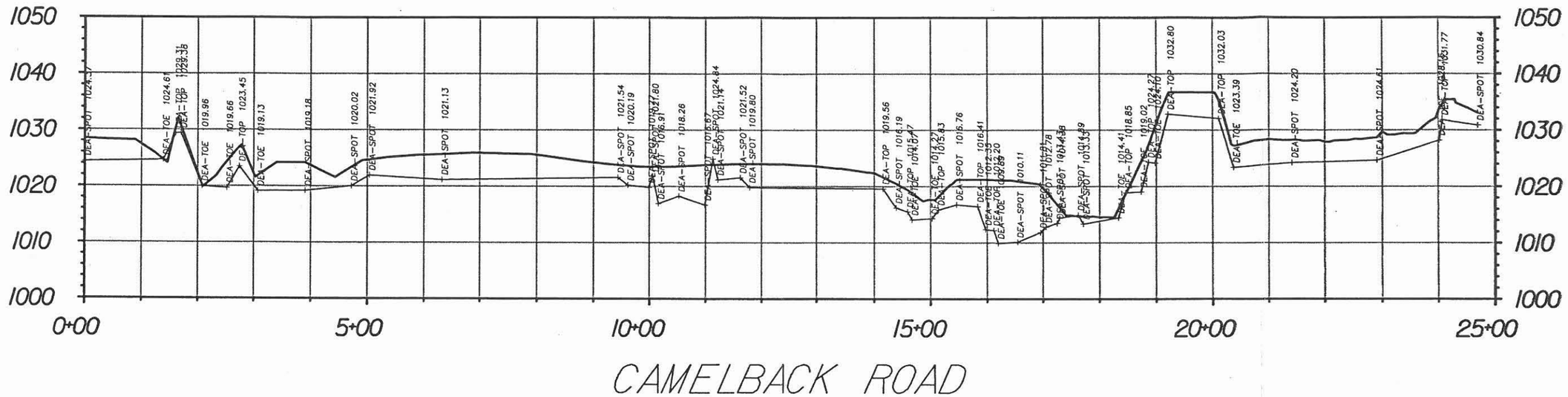
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.8161

AGUA FRIA RIVER
FIELD CROSS SECTION

B



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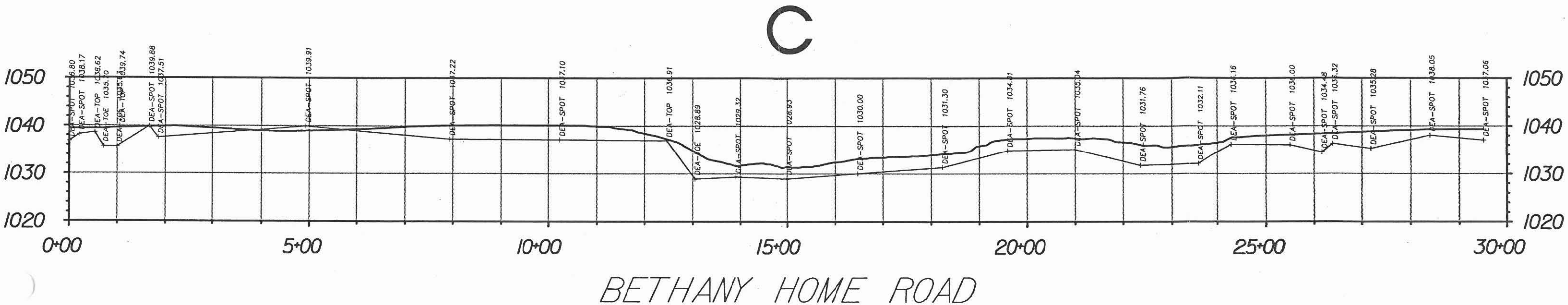
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

AGUA FRIA RIVER
FIELD CROSS SECTION



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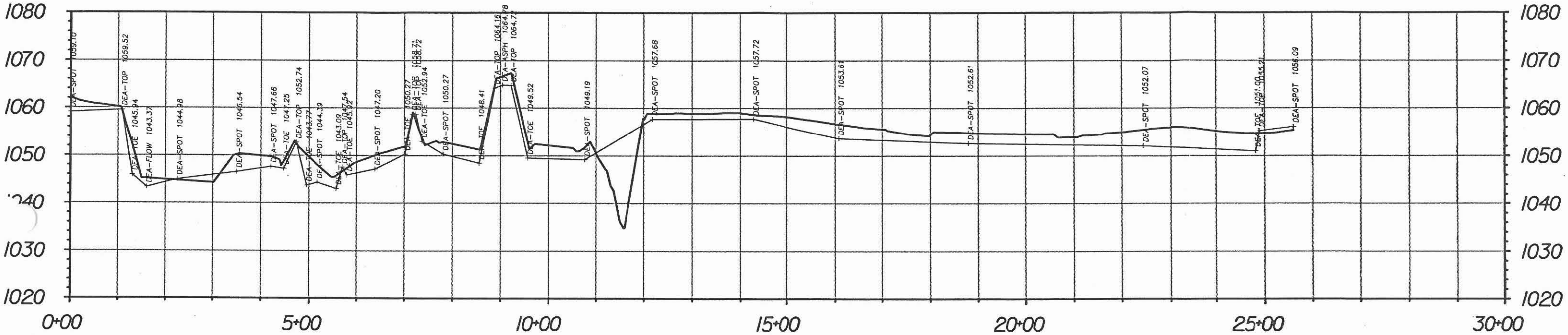
Phoenix, Arizona 85016
Phone: 602.678.5151

AGUA FRIA RIVER FIELD CROSS SECTION

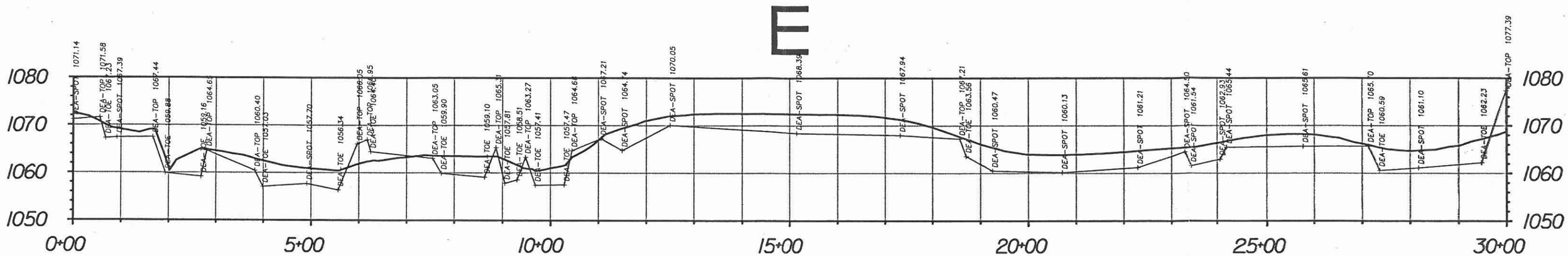
D



GLENDALE AVENUE

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.578.5151

AGUA FRIA RIVER FIELD CROSS SECTION



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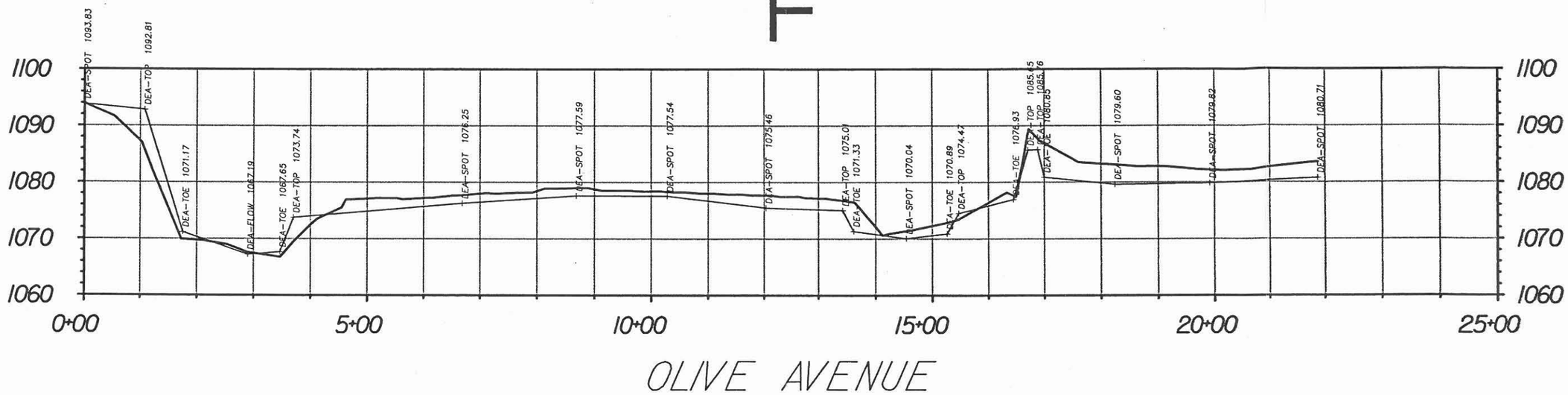
AGUA FRIA RIVER
FIELD CROSS SECTION

F

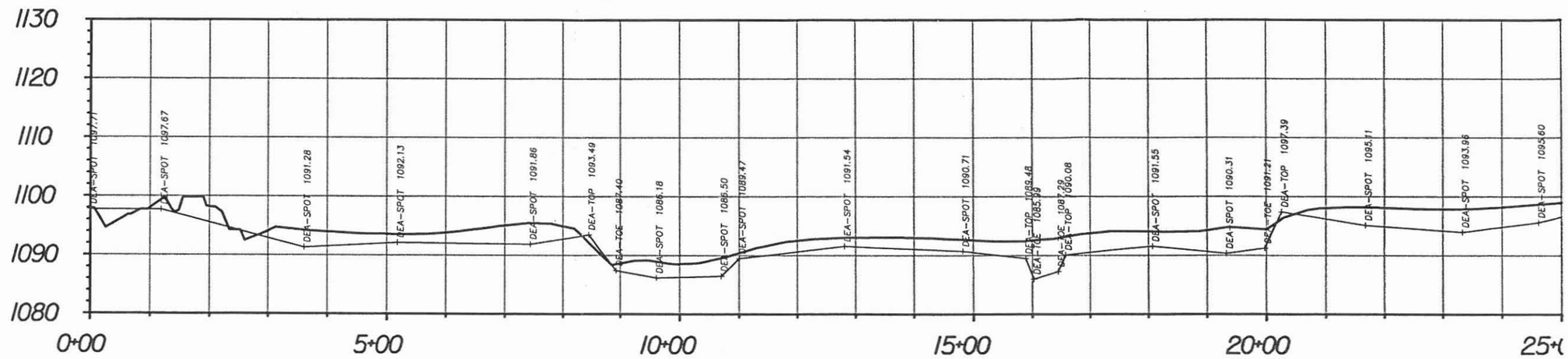


OLIVE AVENUE

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.578.5151

AGUA FRIA RIVER FIELD CROSS SECTION

G



PEORIA AVENUE

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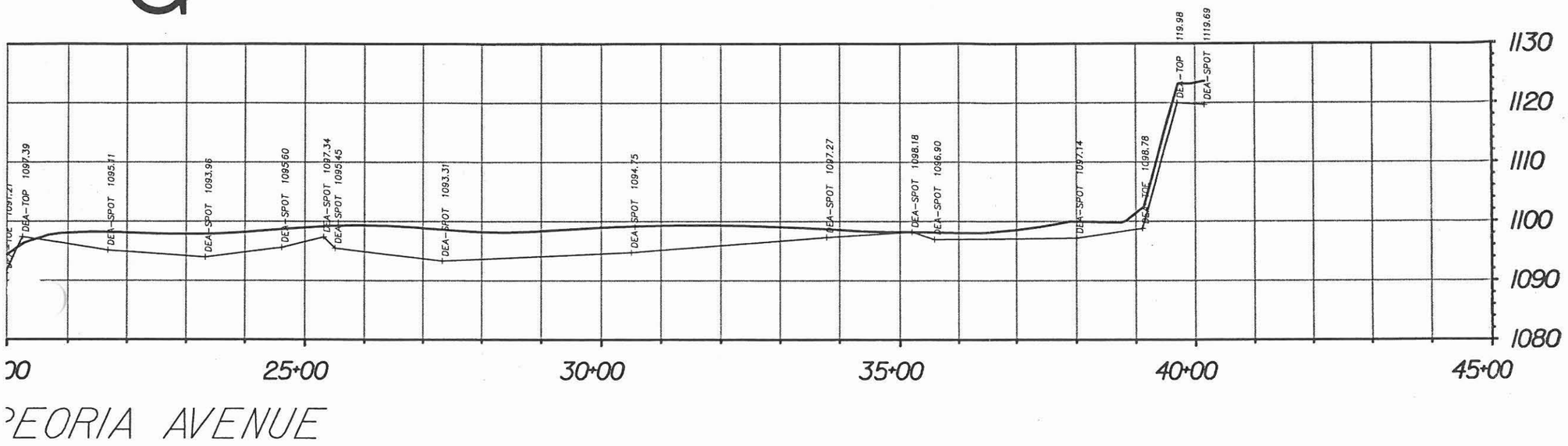

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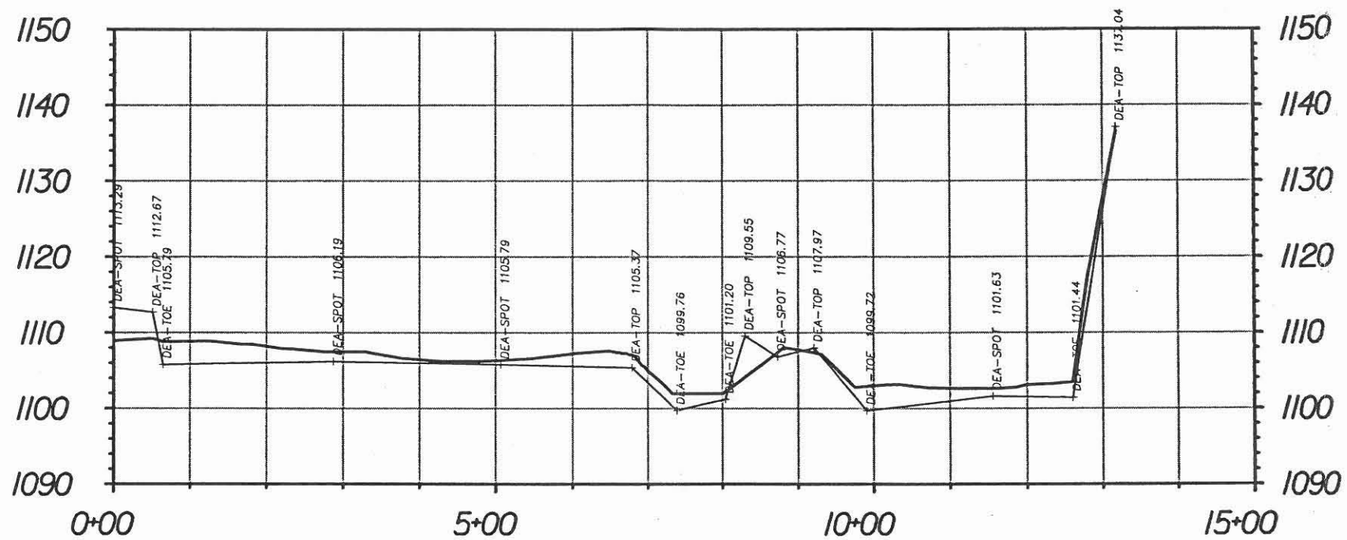
AGUA FRIA RIVER FIELD CROSS SECTION

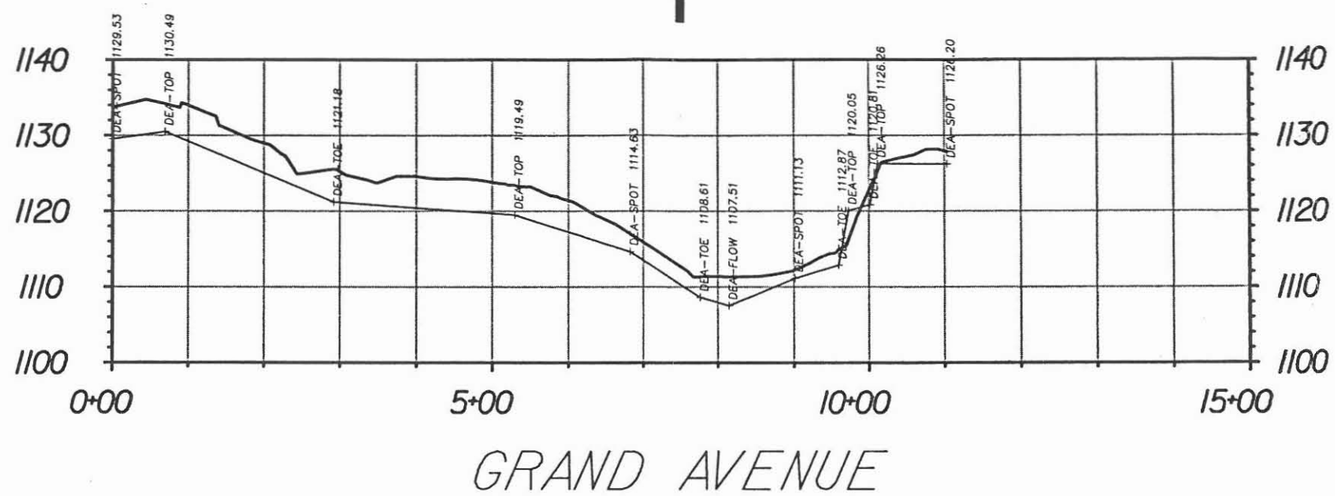
H



CACTUS ROAD

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.578.5161

AGUA FRIA RIVER FIELD CROSS SECTION



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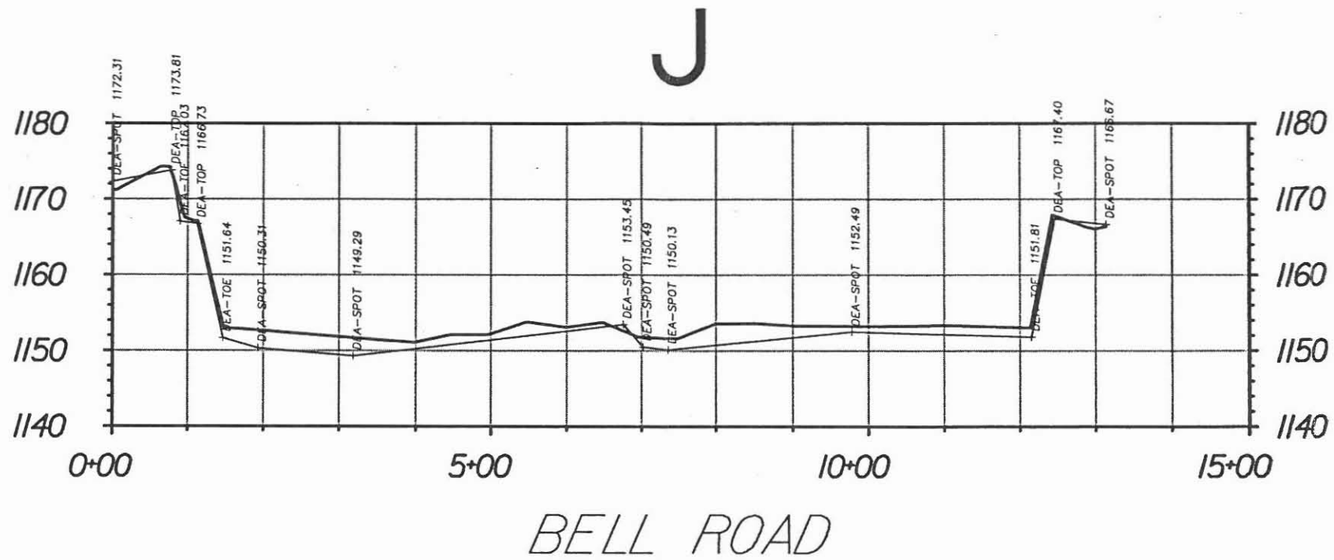
AGUA FRIA RIVER FIELD CROSS SECTION



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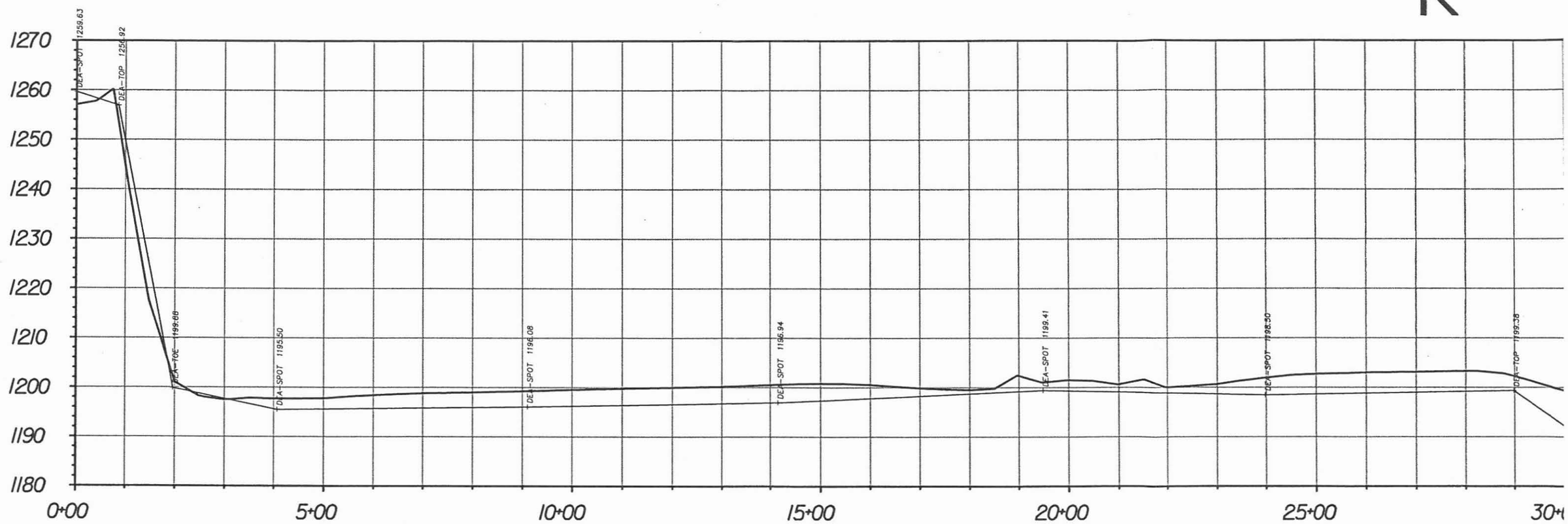
Phoenix, Arizona 85016
Phone: 602.678.5181

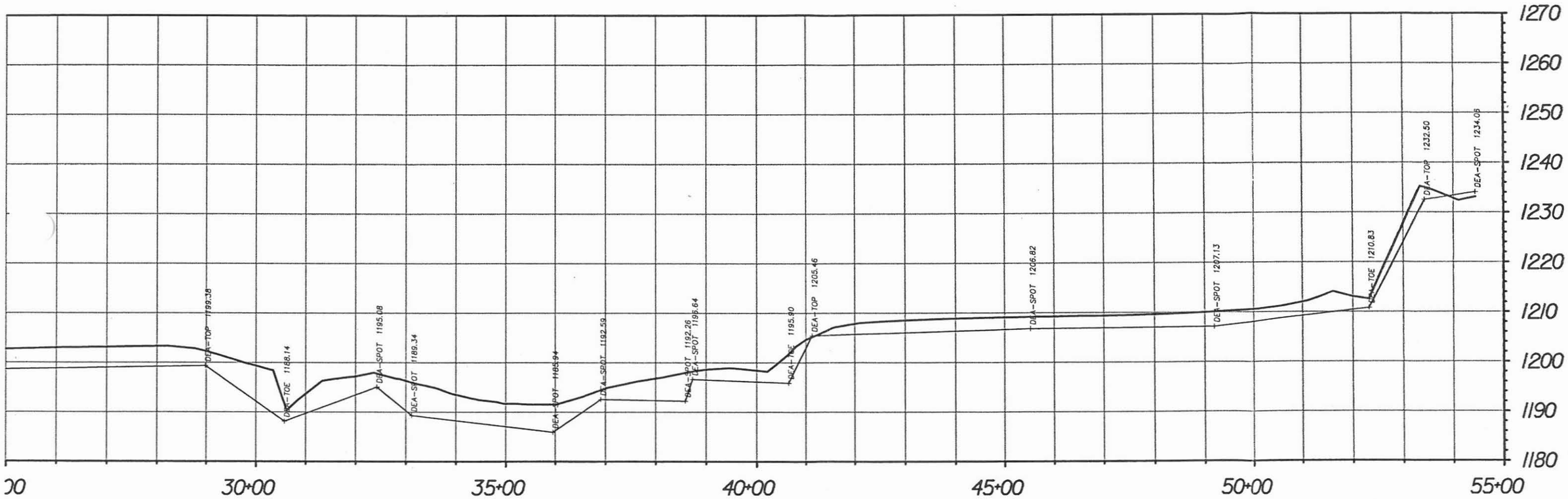
AGUA FRIA RIVER
FIELD CROSS SECTION

K



ROSE GARDEN L

K



SE GARDEN LANE

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
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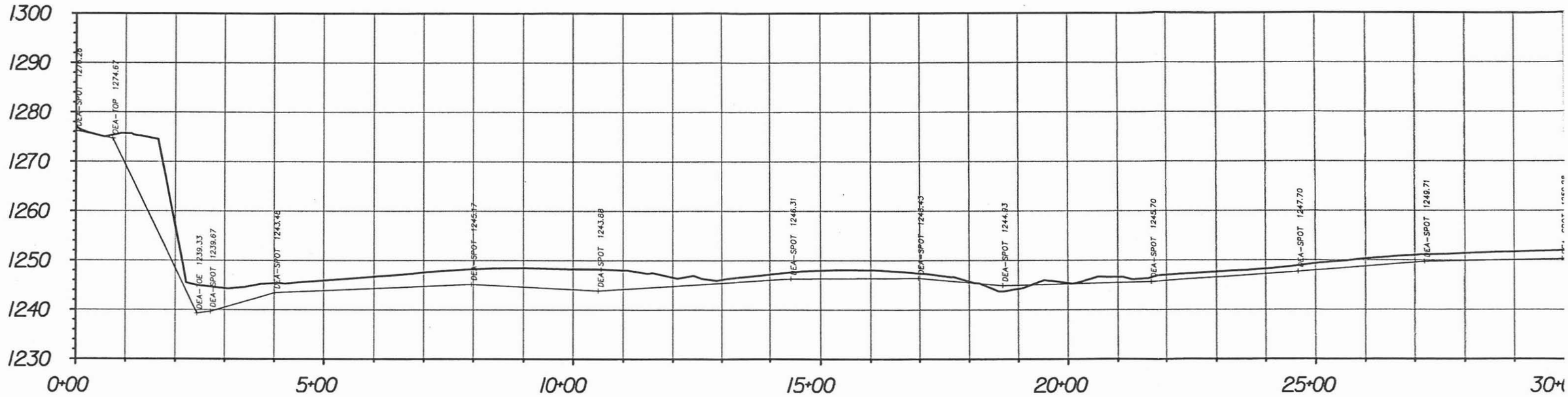
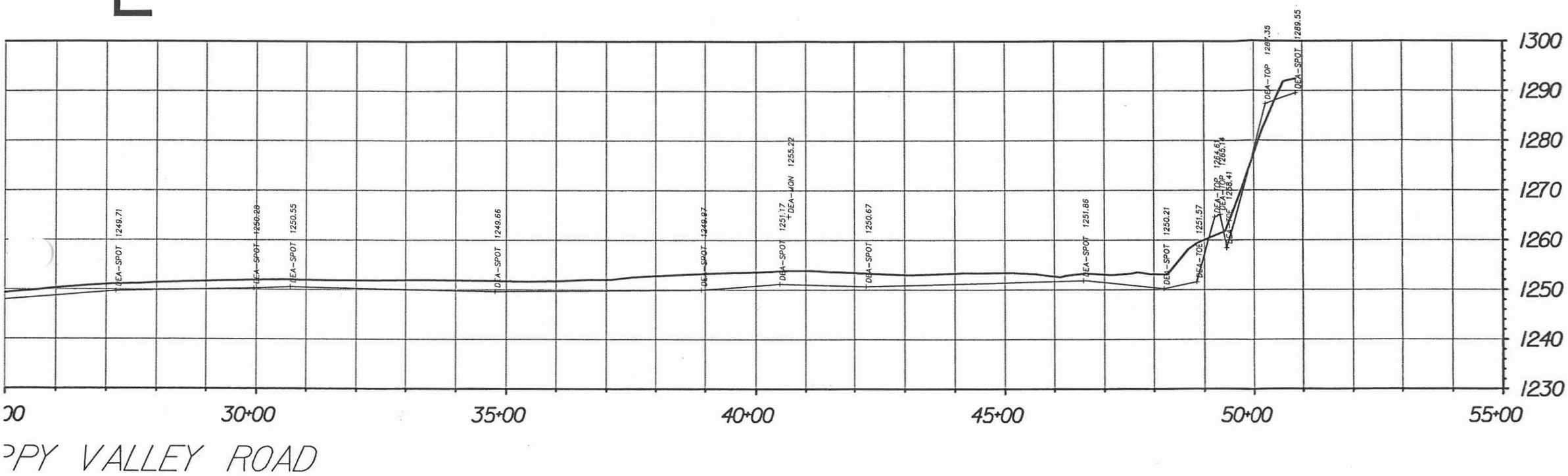
AGUA FRIA RIVER
FIELD CROSS SECTION



HAPPY VALLEY R



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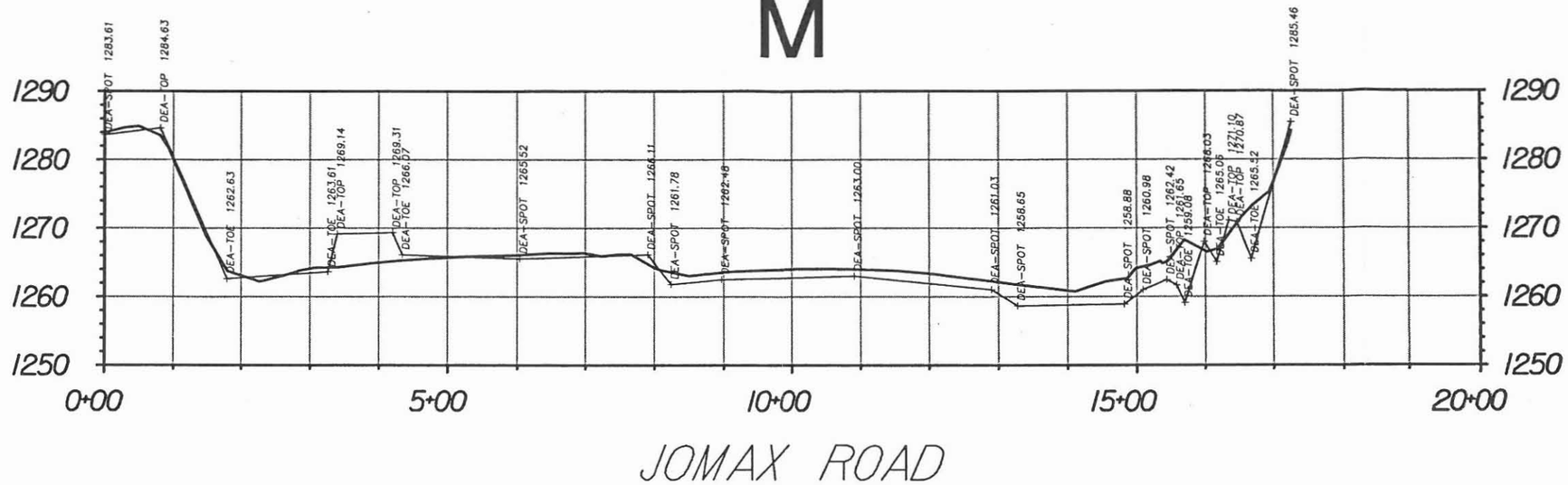
AGUA FRIA RIVER
FIELD CROSS SECTION

M



JOMAX ROAD

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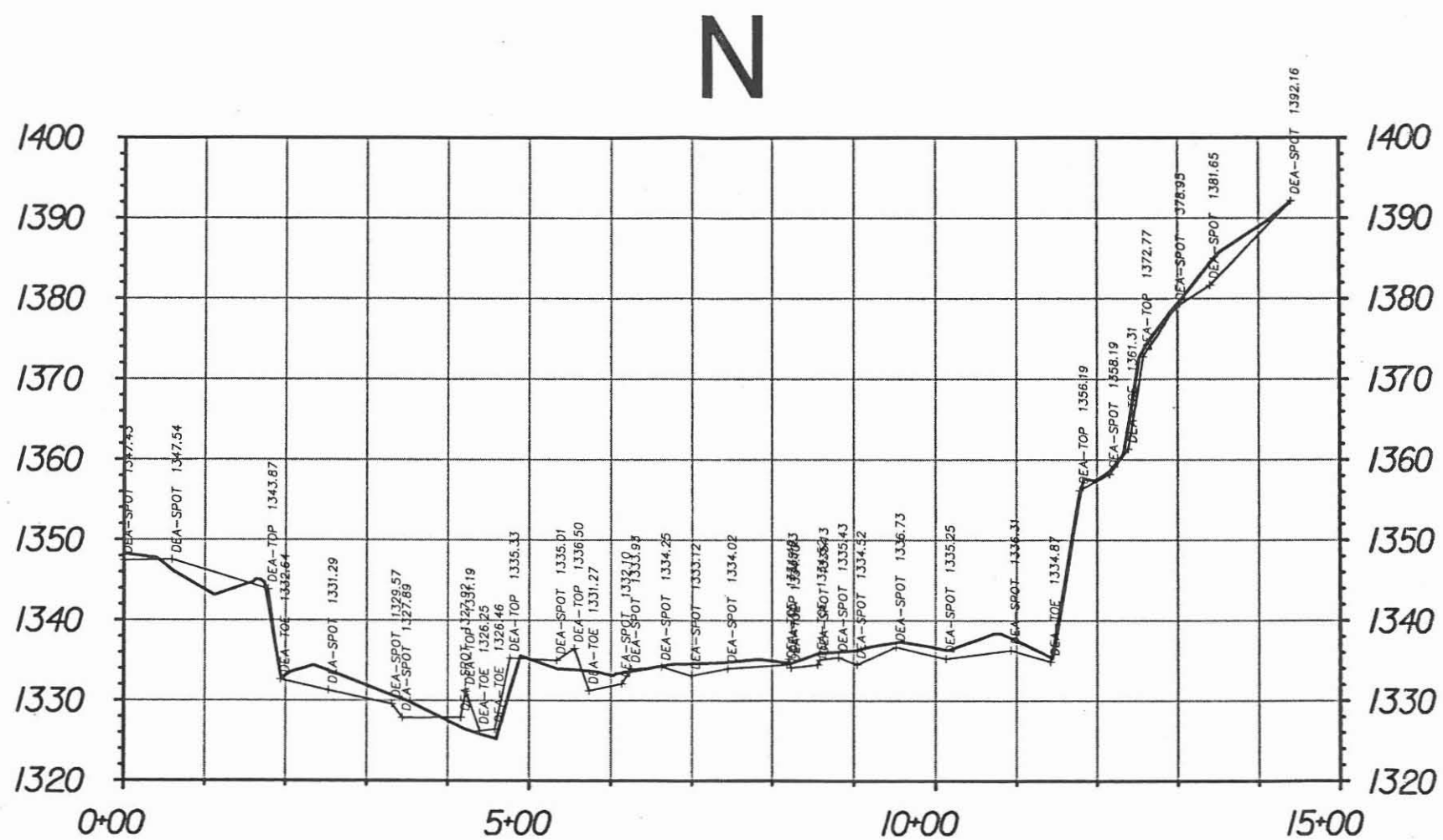
AGUA FRIA RIVER
FIELD CROSS SECTION



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AGUA FRIA RIVER FIELD CROSS SECTION

APPENDIX B
DETAILED RECOVERED LANDS TABLES

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 9

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
10258002B	MARICOPA COUNTY FLOOD CONTROL	0.74	0.02		0.66	**0.68**
10258002D	MARICOPA COUNTY FLOOD CONTROL				2.58	**2.58**
10258005G	MARICOPA COUNTY FLOOD CONTROL				0.25	**0.25**
10258002E	JOHNSON STEWART MATERIALS L L C	26.38	4.64		0.46	**5.10**
10258005H	MARICOPA COUNTY FLOOD CONTROL		0.09		1.26	**1.35**
10258005K	JOHNSON STEWART MATERIALS L L C		1.15		7.05	**8.20**
10258005L	BLAKE LES W				1.35	**1.35**
50163008	UNITED STATES OF AMERICA			37.59		**37.59**
50163024W	LANDCREST PARTNERS LLC			3.99		**3.99**
50163026F	MARICOPA COUNTY FLOOD CONTROL	5.81		3.49		**3.49**
50163026G	LAWYERS TITLE OF AZ INC TR 7720 T			1.28		**1.28**
50163028L	CLAYTON A ARNOLD/OLIVE L TR			6.10		**6.10**
50163028M	MARICOPA COUNTY FLOOD CONTROL	18.27		0.11		**0.11**
50163028P	MARICOPA COUNTY FLOOD CONTROL	0.90				
50163028R	MARICOPA COUNTY FLOOD CONTROL	0.37				
50163029	TEDWARD OPERATIONS CO LLC			2.20		**2.20**
50163031	UNITED STATES OF AMERICA		0.53	8.79	2.91	**12.23**
50163032G	FLOOD CONTROL DISTRICT OF MARICOPA COUNTY			0.15		**0.15**
50163032J	MARICOPA COUNTY FLOOD CONTROL DIST			2.72	0.90	**3.62**
50163032K	JOHNSON STEWART MATERIALS L L C				5.83	**5.83**
50163032L	115TH & INDIAN SCHOOL PARTNERS				2.00	**2.00**
50163032M	UNIQUE PROPERTIES INC				1.99	**1.99**
50163033A	MARICOPA COUNTY FLOOD CONTROL	3.04	9.75	16.20	7.21	**33.16**
50163033B	JOHNSON STEWART CO	14.60	5.90			**5.90**
50163034B	MARICOPA COUNTY DEPT OF TRANSPORTATION	0.66		0.29		**0.29**
50163034C	JOHNSON STEWART MATERIALS L L C	70.02	1.54	1.65	0.40	**3.59**
50199002B	RIVER SAND AND ROCK COMPANY INC	0.87	0.02		0.02	**0.04**
50199002C	RIVER SAND AND ROCK COMPANY INC	0.36			0.01	**0.01**
50199002J	RIVER SAND AND ROCK COMPANY INC	53.45	0.52	7.92	0.25	**8.69**
50199002K	MARICOPA COUNTY FLOOD CONTROL DIST	25.11	3.14	6.96	7.58	**17.68**
	SUBTOTAL	**220.58**	**27.30**	**99.44**	**42.71**	**169.45**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 10

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
10259005B	JOHNSON ENTERPRISES	25.69	2.41			**2.41**
10259008K	GLENDALE CITY OF	1.71	0.25	0.13	0.07	**0.45**
10259008U	GLENDALE CITY OF	30.95	7.84	0.71	5.07	**13.62**
50155004E	GRAVEL RESOURCES OF AZ	0.87	4.36	21.56	12.84	**38.76**
50155005A	M R TANNER MINING INC			0.30		**0.30**
50155005C	M R TANNER MINING INC			39.49		**39.49**
50155010A	HAAZ ACQUISITION COMPANY LLC			0.28		**0.28**
50155010B	HAAZ ACQUISITION COMPANY LLC			37.56		**37.56**
50155011A	M R TANNER MINING INC	0.11		0.04		**0.04**
50155011B	M R TANNER MINING INC	29.87		2.58		**2.58**
50155012A	GLENDALE CITY OF	0.08				
50155012B	GLENDALE CITY OF	34.97	0.67	3.51		**4.18**
50163001B	HAAZ ACQUISITION COMPANY LLC			22.16		**22.16**
50163002A	SUNCOR DEVELOPMENT COMPANY			1.49		**1.49**
50163002B	SUNCOR DEVELOPMENT COMPANY			3.88		**3.88**
50163002C	M R TANNER MINING INC			79.92		**79.92**
50163004	DJW INVESTMENTS L L C			39.64		**39.64**
50163005D	MARICOPA COUNTY				0.24	**0.24**
50163006B	HAAZ ACQUISITION COMPANY LLC			3.68	0.51	**4.19**
50163006D	HAAZ ACQUISITION COMPANY LLC			133.62	13.91	**147.53**
50163006D	HAAZ ACQUISITION COMPANY LLC			29.59		**29.59**
50163009B	MARICOPA COUNTY FLOOD CONTROL	2.85	1.71	4.39		**6.10**
50163009C	JOHNSON STEWART MATERIALS L L C	19.75	1.54	6.77		**8.31**
10259001K	JOHN F LONG				0.63	**0.63**
10259001T	JOHN F LONG				18.15	**18.15**
10259005C	MARICOPA COUNTY OF	2.13	1.38			**1.38**
10259007G	MARICOPA COUNTY FLOOD CONTROL DIST		2.08		0.21	**2.29**
10259007H	MARICOPA COUNTY FLOOD CONTROL	3.38	10.00		0.48	**10.48**
10259008Y	GLENDALE CITY OF			3.80		**3.80**
50163005F	MARICOPA COUNTY FLOOD CONTROL			5.11	1.64	**6.75**
50163006E	HAAZ ACQUISITION COMPANY LLC			2.10		**2.10**
NONASSESS		93.54	10.61	93.39		**104.00**
	SUBTOTAL	**245.90**	**42.85**	**535.70**	**53.75**	**632.30**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 11

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50155004F	GRAVEL RESOURCES OF ARIZONA/GLENDALE/115 LLC			11.18	63.88	**75.06**
50155001A	ELLER MEDIA COMPANY				1.60	**1.60**
50155002A	GLENDALE CITY OF	4.63		15.93	16.52	**32.45**
50155003A	GLENDALE CITY OF	18.76		10.85	8.18	**19.03**
50155004B	GRAVEL RESOURCES OF ARIZONA	0.06	0.14	0.09		**0.23**
50155004G	GRAVEL RESOURCES OF AZ			27.29	11.84	**39.13**
50155005D	LITCHFIELD PARK SERVICE COMPANY			0.10		**0.10**
50155005E	LITCHFIELD PARK SERVICE COMPANY			0.07		**0.07**
50155006B	M R TANNER MINING INC	6.24				
50155006B	M R TANNER MINING INC	3.47		12.75		**12.75**
50155007A	M R TANNER MINING INC			9.19		**9.19**
50155007C	M R TANNER MINING INC	1.31		17.49		**17.49**
50155008D	SUNCOR DEVELOPMENT COMPANY	0.29				
50155008D	SUNCOR DEVELOPMENT COMPANY	1.55			0.02	**0.02**
50155008E	M R TANNER MINING INC	1.65			6.33	**6.33**
50155008F	M R TANNER MINING INC			3.72	1.22	**4.94**
50155009A	M R TANNER MINING INC	2.27		16.31	0.43	**16.74**
50155009B	M R TANNER MINING INC	0.29				
50155009B	M R TANNER MINING INC	7.54				
50155013	UNITED STATES OF AMERICA	1.52				
50155014	UNITED STATES OF AMERICA	1.84				
50155015	UNITED STATES OF AMERICA	0.56			0.10	**0.10**
50155017	UNITED STATES OF AMERICA	0.92				
50199001J	GLENDALE CITY OF	14.46		1.35	2.77	**4.12**
50199001K	MARICOPA COUNTY OF	17.40			0.35	**0.35**
50155006A	M R TANNER MINING INC			27.61		**27.61**
	SUBTOTAL	**84.76**	**0.14**	**153.93**	**113.24**	**267.31**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 12

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50154001	CAVE CREEK MANAGEMENT INC			5.01		5.01
50154002A	ACCESS 101 LLC		0.51	9.23		9.74
50154002C	CALIFORNIA PORTLAND CEMENT COMPANY			5.18		5.18
50154002E	ACCESS 101 L L C			4.97		4.97
50154003A	GLENDALE CITY OF		10.24	28.73		38.97
50154004D	CALIFORNIA PORTLAND CEMENT COMPANY	0.26			0.09	0.09
50154004G	UNITED STATES OF AMERICA	0.22			0.04	0.04
50154004H	AMERICAN SAND & ROCK INC	5.25		0.04	1.01	1.05
50154004J	AZCO MINING INC/ETAL	0.61			0.08	0.08
50154004K	AMERICAN SAND AND ROCK INC	4.21			0.46	0.46
50154005	CALIFORNIA PORTLAND CEMENT COMPANY	21.23	0.46			0.46
50154006A	CAVE CREEK MGMT INC			4.66		4.66
50154007A	ACCESS 101 LLC			4.69		4.69
50154008F	MIZRACHI SHERI M	0.70		0.06	0.07	0.13
50154008N	CALIFORNIA PORTLAND CEMENT COMPANY	8.35				
50154008P	ATLAS CONSTRUCTION INC	1.95				
50154009A	ACCESS 101 L L C			4.77		4.77
50154011C	IVAN & GLADYS QUASS TRUST	2.40			0.39	0.39
50154012C	GRAVES C E TR	0.23				
50154012E	SMT INVESTORS LP/BOA SORTE LP ETAL	8.10			0.31	0.31
50154012F	UNITED STATES OF AMERICA	0.16			0.07	0.07
50199001B	CALIFORNIA PORTLAND CEMENT COMPANY	25.96	13.30	0.31		13.61
50199001F	GLENDALE CITY OF	21.84	1.36	11.29		12.65
50199001G	MARICOPA COUNTY OF	2.45				
50199001H	MARICOPA COUNTY OF	0.63				
50199004B	CALIFORNIA PORTLAND CEMENT COMPANY	13.29	6.57			6.57
50199004C	CALIFORNIA PORTLAND CEMENT CO ETAL	17.93	7.03	4.40		11.43
14275002B	GLENDALE CITY OF			0.17	0.47	0.64
14275002C	GLENDALE CITY OF			0.47		0.47
14275002D	GLENDALE CITY OF			0.61		0.61
14275002E	GLENDALE CITY OF			0.28		0.28
14275003C	GLENDALE CITY OF				0.74	0.74
14275004D	GLENDALE CITY OF			0.31	0.35	0.66
14275004E	GLENDALE CITY OF			0.31	1.78	2.09
14275004F	GLENDALE CITY OF			0.03	1.46	1.49
50154016	GLENDALE CITY OF			76.70	1.33	78.03
50199004D	GLENDALE CITY OF		2.24	3.18	71.78	77.20
NONASSESS		9.87				
	SUBTOTAL	**145.64**	**41.71**	**165.40**	**80.43**	**287.54**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 13

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
14271003E	MARICOPA COUNTY				0.02	0.02
14271004J	LONG W D TR/WILSON MAX W/JUDITH A				10.85	10.85
14271004K	LONG W D TR/WILSON MAX W/JUDITH A				0.59	0.59
14271004N	LONG W D TR/WILSON MAX W/JUDITH A				15.70	15.70
14271004P	LONG W D TR/WILSON MAX W/JUDITH A				1.67	1.67
14271005	LONG W D TR/WILSON MAX W/JUDITH A				0.19	0.19
14271496	SUNCLIFF III AND IV HOMEOWNERS ASSOCIATION			2.30	3.12	5.42
14273869	CITY OF PEORIA A MUNICIPAL CORPORATION				1.60	1.60
14273871A	CITY OF PEORIA A MUNICIPAL CORPORATION				1.13	1.13
14274001N	LONG W D TR/WILSON MAX W/JUDITH A				0.36	0.36
14274001R	LONG W D TR/WILSON MAX W/JUDITH A			0.80	0.55	1.35
14274001U	LONG W D TR/WILSON MAX W/JUDITH A				3.74	3.74
14274001W	LONG W D TR/WILSON MAX W/JUDITH A				0.39	0.39
14274004	LONG W D TR/WILSON MAX W/JUDITH A				1.92	1.92
14274005	LONG W D TR/WILSON MAX W/JUDITH A			3.95	2.88	6.83
14274006	LONG W D TR/WILSON MAX W/JUDITH A			34.92	15.21	50.13
14274008	LONG W D TR/WILSON MAX W/JUDITH A				13.18	13.18
14274009	LONG W D TR/WILSON MAX W/JUDITH A				22.54	22.54
14274010	LONG W D TR/WILSON MAX W/JUDITH A				0.47	0.47
14274011	LONG W D TR/WILSON MAX W/JUDITH A				0.76	0.76
14274012	LONG W D TR/WILSON MAX W/JUDITH A				0.18	0.18
50146005A	AGUA FRIA INDUSTRIES INC			7.78	23.88	31.66
50146005C	AGUA FRIA INDUSTRIES INC				10.01	10.01
50146005E	AGUA FRIA INDUSTRIES INC				12.04	12.04
50146005H	LONG W D TR/WILSON MAX W/JUDITH A				12.96	12.96
50146005J	LONG W D TR/WILSON MAX W/JUDITH A				31.16	31.16
50146005K	LONG W D TR/WILSON MAX W/JUDITH A				20.44	20.44
50146005F	AGUA FRIA INDUSTRIES INC				18.75	18.75
50146005L	LONG W D/WILSON MAX W/JUDITH A				1.33	1.33
50146006	ARIZONA STATE OF	39.10	7.40	0.35	44.88	52.63
50146007	ARIZONA STATE OF	22.03	14.82	39.39	7.52	61.73
50146008A	UNION ROCK & MATERIAL CORP	47.25		2.21	0.31	2.52
50146009A	UNION ROCK & MATERIAL CORP	32.54	0.63		1.15	1.78
50199003C	G-H HOLDINGS CORP INC	0.58				
50199003F	G-H HOLDINGS CORP INC	0.24	0.11		0.35	0.46
	SUBTOTAL	**141.74**	**22.96**	**91.70**	**281.83**	**396.49**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 14

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50145016D	EL MIRAGE CITY OF			0.92	0.05	**0.97**
50145016E	EL MIRAGE CITY OF	2.15	3.56	4.36		**7.92**
50145016G	EL MIRAGE CITY OF	7.82	2.27			**2.27**
50145016H	EL MIRAGE CITY OF		2.89	6.49		**9.38**
50145018A	BLODGETT CAREY/EILEEN		0.46	1.07	0.49	**2.02**
50145018C	EL MIRAGE CITY OF	10.22				
50145018E	MARQUEZ GEORGE S/CONNIE V	0.07	0.34	0.44	0.66	**1.44**
50145018G	PARKS DONALD J JR/USUSAN M TR	0.28	0.27	0.22	1.04	**1.53**
50145018H	EL MIRAGE CITY OF	10.30	0.18			**0.18**
50145018J	AUERBACH RICHARD/LORREEN	1.02	0.19	0.05	2.16	**2.40**
50145018K	SMT INVESTORS LP/BOA SORTE LP ETAL	1.94	0.45		1.81	**2.26**
50145661	PULTE HOME CORPORATION			1.74	1.62	**3.36**
50145677	PULTE HOME CORPORATION			5.88	0.08	**5.96**
50145679	PULTE HOME CORPORATION			21.18	6.68	**27.86**
50145680	PULTE HOME CORPORATION			13.27	15.43	**28.70**
50145682	PULTE HOME CORPORATION			6.67	21.56	**28.23**
50145683	PULTE HOME CORPORATION			1.99	0.20	**2.19**
50145684	PULTE HOME CORPORATION				7.89	**7.89**
50199003A	MARICOPA COUNTY HY-WAY DEPT	0.77			0.19	**0.19**
50199003B	SALT RIVER PIMA-MARICOPA INDIAN COMM	53.08	6.25		4.14	**10.39**
50199003D	MARICOPA COUNTY HY-WAY DEPT	0.10	0.35	0.67	1.00	**2.02**
50199003E	G-H HOLDINGS CORP INC	0.10	0.05		0.15	**0.20**
50199003G	G-H HOLDINGS CORP INC	50.48	3.24	99.01	2.29	**104.54**
50199003H	MARICOPA COUNTY HY-WAY DEPT	0.33	0.17		0.47	**0.64**
14270006D	SRPAI & PD				5.33	**5.33**
14270006S	BUSH ALGER LEE/WILMA L TR				2.35	**2.35**
14270006T	USLIFE TITLE COMPANY OF ARIZONA TR # 456				18.22	**18.22**
14270007C	HATCHER LANDFILL L L C				9.97	**9.97**
14270007D	COLLINS TIMOTHY ERIC/MICHAEL PATRICK				2.38	**2.38**
14270008E	SRPAI & PD				3.32	**3.32**
14270008G	SRPAI & PD				0.20	**0.20**
14270008H	ARIZONA BAPTIST RETIREMENT CENTERS INC				3.53	**3.53**
14270008H	ARIZONA BAPTIST RETIREMENT CENTERS INC				2.47	**2.47**
14270008J	SRPAI & PD				3.55	**3.55**
14270008L	GINNOW KARL W/LORRAINE A TR				0.30	**0.30**
14270008L	GINNOW KARL W/LORRAINE A TR				0.04	**0.04**
14270008P	ARIZONA BAPTIST RETIREMENT CENTERS INC				0.53	**0.53**
14270008S	GINNOW KARL W/LORRAINE A GINNOW TR				0.41	**0.41**
14270008T	GINNOW KARL W/LORRAINE A TR				2.36	**2.36**
14270008U	ARIZONA BAPTIST RETIREMENT CENTERS INC				0.01	**0.01**
14270008V	ARIZONA BAPTIST RETIREMENT CENTERS INC				4.19	**4.19**
14270896	ARIZONA PUBLIC SERVICE CO.				0.13	**0.13**
14270907	ARIZONA PUBLIC SERVICE CO.				2.28	**2.28**
14270964B	BUSH ALGER LEE/WILMA L TR				1.74	**1.74**
50145681	PULTE HOME CORPORATION				3.84	**3.84**
	SUBTOTAL	**138.66**	**20.67**	**163.96**	**135.06**	**319.69**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 15

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
4266080	YOUNGTOWN TOWN OF	0.34	0.60		3.07	**3.67**
14267020A	YOUNGTOWN TOWN OF	0.33	0.41	0.27	1.73	**2.41**
14267021A	CHAIM YANKEL INC	10.94	1.17			**1.17**
14267022D	ARIZONA BAPTIST RETIREMENT CENTER INC				1.12	**1.12**
14267022D	ARIZONA BAPTIST RETIREMENT CENTER INC			0.11	0.73	**0.84**
14267023F	ARIZONA BAPTIST RETIREMENT CENTERS INC				0.61	**0.61**
50145001E	ARIZONA BAPTIST RETIREMENT CENTERS INC			2.44	3.53	**5.97**
50145001F	/GRAND CANYON UNVRSTY FNDTN/AZ BAPTIST RETIRE	4.42		25.28	1.14	**26.42**
14278030B	ARNOLD GARY D/CAROL J			0.60	1.75	**2.35**
14278041	ARIZONA BAPTIST RETIREMENT CENTER INC	0.03	2.47	0.60	0.13	**3.20**
14278042	ARIZONA BAPTIST RETIREMENT CENTER INC		0.26	0.59		**0.85**
50145001B	RALPH HUNTLEY AND SON INC			2.69		**2.69**
50145002A	WAGNER ROBERT M & S C P CONSTRUCT	23.60				
50145002A	WAGNER ROBERT M & S C P CONSTRUCT	1.65	2.39		0.07	**2.46**
50145002B	SRPAI & PD	12.65	0.03			**0.03**
50145023C	ARIZONA BAPTIST RETIREMENT CENTER INC			0.81	0.22	**1.03**
50145023F	SCHMIDT CONNIE M/SALERNO RONALD G			0.06	1.06	**1.12**
50145369	SUNDAIL WEST IV HOA	4.78		26.18	4.95	**31.13**
NONASSESS		61.86	14.12	3.10	19.44	**36.66**
	SUBTOTAL	**120.60**	**21.45**	**62.73**	**39.55**	**123.73**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 16

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20058004A	ARIZONA SAND & ROCK CO	28.80		7.40	45.71	**53.11**
20085004D	ARIZONA SAND & ROCK CO	5.79		3.05		**3.05**
20085406D	SIERRA LAND GROUP INC	0.09				
20085972B	MUCHO DINERO INC	7.86		17.35		**17.35**
50125005B	DREISESZUN HERBERT E/PATRICIA A/JEROME V			13.43	1.66	**15.09**
50125007A	DREISESZUN HERBERT E/PATRICIA A/JEROME V			21.34	0.04	**21.38**
50134077	DREISESZUN HERBERT E/PATRICIA A/JEROME V			1.43		**1.43**
50134079	A T & S F			1.34	1.61	**2.95**
50136006J	L C SPRAKER TR	0.15		5.65		**5.65**
20058003B	SRPAI & PD	12.20	0.24	0.21	33.44	**33.89**
20058004B	SRPAI & PD				0.92	**0.92**
20085001Y	HURD PHOENIX LLC				1.12	**1.12**
20085003S	STEWART TITLE & TR OF PHOENIX TR	0.31		1.60		**1.60**
20085003T	G E M CAPITAL MANAGEMENT L L C			0.03	1.66	**1.69**
20085003V	MULVANEY JOHN				1.53	**1.53**
20085004Q	SRPAI & PD	0.67		0.06	4.04	**4.10**
20085004S	FORSYTHE HENRY KIRK & MARSHA				1.31	**1.31**
20085004Y	MUCHO DINERO INC	1.34				
20085004Z	M R C LAND & DEV CORP	5.30		3.37		**3.37**
20085234B	NEW JOY MINISTRIES				1.96	**1.96**
20085235F	FREUND AND FAMILY LIMITED PARTNERSHIP L L L P				0.61	**0.61**
20085235H	HURD PHOENIX LLC				0.28	**0.28**
20085235J	FREUND AND FAMILY LIMITED PARTNERSHIP L L L P				0.61	**0.61**
20085235K	FREUND AND FAMILY LIMITED PARTNERSHIP L L L P				0.83	**0.83**
20085235L	HURD PHOENIX LLC				0.08	**0.08**
20085406C	SIERRA LAND GROUP INC	2.92		0.26	1.40	**1.66**
20085536	ELDERCARE CENTERS INC	0.43		0.84	2.77	**3.61**
20085829	ELDERCARE CENTERS INC			0.18	1.25	**1.43**
20085869	RIVER BEND APARTMENTS L P				1.30	**1.30**
20085944B	ATCHISON TOPEKA & SANTA FE RAILWAY CO.	1.66				
20085971A	ARIZONA STATE OF	38.62			0.55	**0.55**
20085971B	ARIZONA STATE OF	0.27				
20085981A	JOSS-ARIZONA TRUST			1.17		**1.17**
20085981B	CALMAT COMPANY			0.02		**0.02**
20085982	BAGBY RICHARD/SUSAN			2.56		**2.56**
20085983	MUCHO DINERO INC			0.50	0.37	**0.87**
20085984A	HURD PHOENIX LLC				0.96	**0.96**
20085984B	H P FREUND CO				0.68	**0.68**
20085984C	NEW JOY MINISTRIES				0.55	**0.55**
20085984D	YOUNGTOWN TOWN OF				0.45	**0.45**
20087482	VESTIN MORTGAGE INC	0.10			2.75	**2.75**
20097146	OPREA PETER A/EMANUELA				0.28	**0.28**
20097147	OPREA PETER A/EMANUELA				0.29	**0.29**
20097148	BLANCHARD JOHN P/ MARY A			0.02	0.34	**0.36**
	SUBTOTAL	**106.51**	**0.24**	**81.81**	**111.35**	**193.40**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 17

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20057481	ARIZ TITLE INS & TR CO TR				0.02	**0.02**
20058758	DEL WEBB HOME CONSTRUCTION INC				6.44	**6.44**
20058001	ARIZONA SAND & ROCK CO	31.19	0.19	2.38	6.88	**9.45**
20058005	ARIZONA SAND & ROCK CO	21.21	0.24	1.63	19.45	**21.32**
50125001L	DREISESZUN HERBERT E/PATRICIA A ETAL				3.20	**3.20**
50125002	ARIZONA SAND & ROCK CO	18.56	1.16	53.91	4.12	**59.19**
50125003B	DREISESZUN HERBERT E/PATRICIA A/JEROME V			14.69	18.90	**33.59**
50125004D	DREISESZUN HERBERT E/PATRICIA A/JEROME V				3.48	**3.48**
50125005A	DREISESZUN HERBERT E/PATRICIA A/JEROME V				0.50	**0.50**
50125007B	ARIZONA SAND & ROCK CO			37.96	1.84	**39.80**
50125098B	A T & S F			0.98	2.51	**3.49**
	SUBTOTAL	**70.96**	**1.59**	**111.55**	**67.34**	**180.48**

REACH 18

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50124001	ARIZONA SAND & ROCK CO	31.47	0.67	7.74		**8.41**
50124002G	ROSE GARDEN III LIMITED PARTNERSHIP			0.75	0.56	**1.31**
50124002U	ROSE GARDEN III LIMITED PARTNERSHIP			21.72	4.29	**26.01**
50124003B	ARIZONA SAND & ROCK CO	11.63	3.40	7.67	9.83	**20.90**
50124004	ARIZONA SAND & ROCK CO	19.61	0.03	17.19	3.35	**20.57**
50124005B	MARICOPA COUNTY OF	18.07				
50124005T	MARICOPA COUNTY OF HWY DEPT	7.79				
50124006	J AND J PROPERTY HOLDINGS LC	35.59				
50124007A	CALMAT LAND CO	14.16		67.51	1.07	**68.58**
50124007B	CALMAT LAND CO			0.06	1.58	**1.64**
50124007C	CALMAT LAND CO	0.61		0.73		**0.73**
50124008	CALMAT LAND CO	32.55	0.03	40.64	7.82	**48.49**
50124010	KARNO NORTON S TR	0.02			0.24	**0.24**
50124010	KARNO NORTON S TR				0.24	**0.24**
50124011	KARNO NORTON S TR	1.62			0.62	**0.62**
50124823C	CARIOCA COMPANY				0.23	**0.23**
COMMONAR		0.75				
20057001	SUN CITIES RV COMPUND INC	1.69		1.04	16.56	**17.60**
20057007	SUN CITIES RV COMPUND INC				5.49	**5.49**
	SUBTOTAL	**175.56**	**4.13**	**165.05**	**51.88**	**221.06**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 19

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50367019C	COWLEY REVOCABLE TRUST/ETAL	4.41	11.27	13.45		**24.72**
50367023	COWLEY REVOCABLE TRUST/ETAL	6.51		3.21	1.98	**5.19**
50367023	COWLEY REVOCABLE TRUST/ETAL			56.48	1.98	**58.46**
NONASSESS		150.59	98.01	68.86	22.60	**189.47**
	SUBTOTAL	**161.51**	**109.28**	**142.00**	**26.56**	**277.84**

REACH 20

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20013003	HOPE RESOURCES L L C	10.57		4.27	33.09	**37.36**
50367006G	NO OWNER			0.36		**0.36**
50367019B	COWLEY REVOCABLE TRUST/ETAL	19.48		27.05		**27.05**
50367019D	COWLEY REVOCABLE TRUST/ETAL	0.88		4.14		**4.14**
50367020	WAW L L C	4.10		16.69		**16.69**
50367026	MARICOPA COUNTY FLOOD CONTROL DIST	16.32	11.47	0.19		**11.66**
50705342	NATL GOLF OPERATING PARTNERSHIP LP			21.35	1.34	**22.69**
NONASSESS		50.17	4.69	7.98	9.38	**22.05**
20013001U	COYOTE LAKES JOINT VENTURE			2.63	0.14	**2.77**
	SUBTOTAL	**101.52**	**16.16**	**84.66**	**43.95**	**144.77**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 21

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20012001E	ARIZONA-AMERICAN WATER COMPANY	1.98	2.81	0.65	5.35	**8.81**
20012004	CAMELBACK TRUST CO CUSTODIAN	2.60	2.02	0.41		**2.43**
20012007	FINLEY HIBBERT INVESTMENT CO	4.21	0.87			**0.87**
20012009	CAMELBACK TRUST CO CUSTODIAN	5.01				
20012012	CAMELBACK TRUST CO CUSTODIAN	74.31	0.17			**0.17**
20012013	CAMELBACK TRUST CO CUSTODIAN	3.17	0.02		1.53	**1.55**
20012015B	MARICOPA COUNTY OF	0.91				
20012015C	C A NORRIS ENTERPRISES LTD ETAL	3.94				
20012016A	CAMELBACK TRUST CO CUSTODIAN	1.26			1.13	**1.13**
20012017	SEWALK RICHARD M & IRMA R	4.87				
20012018	HOPE RESOURCES L L C	5.14				
20012020	ARIZONA STATE OF	22.64	8.52	0.11	6.48	**15.11**
20013004	ARIZONA-AMERICAN WATER COMPANY	0.01			1.53	**1.53**
20013005	FIRST AMERICAN TITLE TR 3995				1.31	**1.31**
20013006	ARIZONA-AMERICAN WATER COMPANY				1.26	**1.26**
20011003A	FINLEY HIBBERT INVESTMENT ETAL	1.43	18.81	9.28	14.42	**42.51**
20012005	CAMELBACK TRUST CO CUSTODIAN		0.03	4.25	1.75	**6.03**
20012006	CAMELBACK TRUST CO CUSTODIAN		1.30	4.54	1.75	**7.59**
20012008	CAMELBACK TRUST CO CUSTODIAN	0.88	2.28	2.93	0.04	**5.25**
20012010	SUNDEEN NEAL S & JANE W TR	2.59	1.85	1.54	0.15	**3.54**
20012011A	HAYES GEORGE R TR	0.93	0.06	0.15		**0.21**
20012011B	C A NORRIS ENTERPRISES LTD ETAL	5.20				
20012019	CAMELBACK TRUST CO CUSTODIAN	4.57	0.97	0.82		**1.79**
50367001B	MACDONALD EDWARD E				0.96	**0.96**
50367001C	HOPE RESOURCES L L C	0.69		1.50		**1.50**
50367001H	WEHBE RICHARD J				0.71	**0.71**
50367001J	GILBERT BILLIE GENE			0.01	2.37	**2.38**
50367001K	ROSS D D/VAN DUSEN D E/LIBERTY 9 LLC				2.01	**2.01**
50367001L	GILES STANLEY D/DANIELLE R			0.13	1.95	**2.08**
50367001M	WALLACE VIRGINIA L			0.92	1.52	**2.44**
50367001N	MACDONALD EDWARD E				2.15	**2.15**
50367001P	ACAMEL LLC			2.25		**2.25**
50367001Q	BARNES MICHAEL T			1.80	2.84	**4.64**
50367001R	ACAEL L L C			3.37	0.91	**4.28**
50367001S	VAUGHN ROSE ANN				2.40	**2.40**
50367001T	WEHBE RICHARD J				1.87	**1.87**
50367001V	STOVALL CORAL MAY				0.32	**0.32**
50367001W	GRIGGS DAVID/SUE			0.28	1.50	**1.78**
50367001X	STOVALL CORAL MAY				1.53	**1.53**
50367002E	BOUTIN JEAN C			0.31	1.92	**2.23**
50367002F	GRAVEL RESOURCES OF AZ			0.23	2.08	**2.31**
50367002H	GRAVEL RESOURCES OF ARIZONA				2.05	**2.05**
50367002J	GRAVEL RESOURCES OF ARIZONA				2.35	**2.35**
50367002K	ANDERSON CECIL A/SALLY J				4.22	**4.22**
50367002M	KETTELSEN DALE & MIKE REIMERS				2.31	**2.31**
50367002N	GRAVEL RESOURCES OF AZ				2.22	**2.22**
50367002P	TUTTLE ROY W	0.08			1.31	**1.31**
50367002R	TROUT FRANCES O				2.63	**2.63**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

50367002S	TUTTLE ROY & JANE	1.81			2.81	**2.81**
50367002U	SUN CITY ROCK LLC				35.34	**35.34**
50367002W	GRAVEL RESOURCES OF AZ				5.09	**5.09**
50367002X	GRAVEL RESOURCES OF ARIZONA				2.45	**2.45**
50367002Y	GRAVEL RESOURCES OF ARIZONA				2.46	**2.46**
50367003B	SUN CITY ROCK LLC				49.04	**49.04**
50367003C	DELGADO PEDRO & JULIA A				3.96	**3.96**
50367003D	BOUTIN BERTRAND & SANDRA C				4.64	**4.64**
50367003L	CULP ROBERT TR				1.40	**1.40**
50367003M	THOMAS OLA MAE				2.10	**2.10**
50367003N	FREEMAN THOMAS W TR				4.19	**4.19**
50367003P	THOMAS OLA MAE				2.10	**2.10**
50367003S	FEARS CECIL F/MARGARET TR				2.17	**2.17**
50367003T	FEARS CECIL F/MARGARET TR				2.15	**2.15**
50367003U	FULTON VIRGIL D & MARTHA P				2.30	**2.30**
50367021	WAW L L C	54.73		11.50	14.35	**25.85**
50367022	WAW L L C	29.69	0.63	6.96		**7.59**
NONASSESS				0.71	0.07	**0.78**
NONASSESS			0.54		5.43	**5.97**
NONASSESS		2.38		19.19	34.90	**54.09**
	SUBTOTAL	**235.03**	**40.88**	**73.84**	**257.78**	**372.50**

REACH 22

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
50353030B	ARIZONA-AMERICAN WATER COMPANY				0.40	**0.40**
20011001	ARIZONA STATE OF DEPT OF LAND		5.24	0.26	6.45	**11.95**
20011002E	PEORIA UNIFIED SCHOOL DISTRICT NO 11				0.22	**0.22**
20011004	ROSE LARRY DALE/ETAL		37.86	15.65	8.02	**61.53**
20011005B	CEMEX CONSTRUCTION MATERIALS INC			4.09	1.04	**5.13**
20011005D	CEMEX CONSTRUCTION MATERIALS INC			0.24	3.39	**3.63**
20011005G	SRPAI & PD				0.26	**0.26**
20011005H	SRPAI & PD				1.14	**1.14**
20011005M	CEMEX CONSTRUCTION MATERIALS INC			2.66	2.38	**5.04**
20011005N	CEMEX CONSTRUCTION MATERIALS INC			3.15	2.16	**5.31**
20011006	ARIZONA STATE DEPT OF TRANSPORTATION	124.35	29.87		0.52	**30.39**
20011007	ARIZONA STATE DEPT OF TRANSPORTATION	1.03	24.18	47.51	4.17	**75.86**
20011253	BOOKER DOUGLAS K				0.11	**0.11**
20011256	FIELDS JAMES L/EDITH J/RICHARD G				1.43	**1.43**
20122018D	BCW INC			4.26	6.93	**11.19**
20122018E	HARDY GORDON L/DONNA TR				7.81	**7.81**
20122019	BCW INC		0.96	29.30	0.81	**31.07**
20122020	BCW INC		1.03	9.58		**10.61**
20122022	ROSE LARRY DALE/ETAL		0.04	14.71	1.07	**15.82**
50353030A	SUN CITY ROCK LLC				35.55	**35.55**
NONASSESS					4.64	**4.64**
NONASSESS		11.15	23.47	0.11	24.73	**48.31**
NONASSESS				0.65	8.26	**8.91**
NONASSESS			25.59		5.80	**31.39**
	SUBTOTAL	**136.53**	**148.24**	**132.17**	**127.29**	**407.70**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 23

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20108001C	MOYLE INVESTMENT INC			1.64	1.41	**3.05**
20122001B	ARIZONA STATE LAND DEPT			0.94		**0.94**
20122001E	ARIZONA STATE LAND DEPT			1.95		**1.95**
20122001G	ARIZONA STATE LAND DEPT			2.42		**2.42**
20122001J	ARIZONA STATE LAND DEPT			2.01		**2.01**
20122001L	ARIZONA STATE LAND DEPT			1.17		**1.17**
20122001M	MANCILLAS MARY E/RHONDA/CHARLES			1.00		**1.00**
20122001N	ARIZONA STATE LAND DEPT			1.73		**1.73**
20122001P	TATTIE LAND LP			1.46	0.06	**1.52**
20122001S	ARIZONA STATE LAND DEPT			0.68		**0.68**
20122001T	ARIZONA STATE LAND DEPT			0.64		**0.64**
20122001W	ARIZONA STATE LAND DEPT			0.36		**0.36**
20122001X	ARIZONA STATE LAND DEPT			0.34		**0.34**
20122002A	ARIZONA STATE LAND DEPT			1.23		**1.23**
20122002B	ARIZONA STATE LAND DEPT			0.85		**0.85**
20122003	ARIZONA STATE LAND DEPT			2.55		**2.55**
20122004A	ARIZONA STATE LAND DEPT			4.00		**4.00**
20122004B	ARIZONA STATE LAND DEPT			0.81		**0.81**
20122005A	ARIZONA STATE LAND DEPT			9.54		**9.54**
20122006	ARIZONA STATE LAND DEPT			2.53		**2.53**
20122008A	LORIMOR ENTERPRISES INC			19.66	0.09	**19.75**
20122008B	THOMAS RALPH W/CAROLEE	14.50	0.46	5.22		**5.68**
20122009	ARIZONA STATE LAND DEPT			17.74	0.61	**18.35**
20122010B	SALT RIVER PROJECT A I P D	5.73	0.25	4.27		**4.52**
20122010C	ARIZONA STATE LAND DEPT	4.23	0.40	5.35		**5.75**
20122010E	CEMEX CONSTRUCTION MATERIALS LP	2.78	0.06	7.35		**7.41**
20122010F	BCW INC	1.20		3.82		**3.82**
20122010G	BCW INC			5.05		**5.05**
20122011	ARIZONA STATE LAND DEPT	3.59	0.07	0.49		**0.56**
20122012	ARIZONA STATE LAND DEPT	4.81		0.58		**0.58**
20122013	ARIZONA STATE LAND DEPT	4.17		0.14		**0.14**
20122014A	ARIZONA STATE LAND DEPT	2.51	0.09			**0.09**
20122014B	ARIZONA STATE LAND DEPT	2.62	0.02			**0.02**
20122015A	ARIZONA STATE LAND DEPT			9.58	0.42	**10.00**
20122015B	BCW INC			1.35	2.61	**3.96**
20122016A	BCW INC			4.85	4.56	**9.41**
20122016B	BCW INC				0.14	**0.14**
20122017A	BCW INC			10.19		**10.19**
20122017B	BCW INC	0.09	1.60	29.12		**30.72**
20122035	JWR INC				0.06	**0.06**
20122036	JWR INC			0.09	0.54	**0.63**
20122039	JWR INC			1.02	0.18	**1.20**
20122040	JWR INC			1.52	0.27	**1.79**
20122043A	JWR INC			0.86	0.10	**0.96**
20122043B	JWR INC			0.94	0.11	**1.05**
20122047	JWR INC			3.25	0.06	**3.31**
20108001A	MARICOPA COUNTY HIGHWAY DEPT			0.19	0.69	**0.88**
20108001B	MOYLE INVESTMENT INC				0.10	**0.10**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

NONASSESS		108.86	39.22	5.89	5.10	**50.21**
NONASSESS		0.10		1.10		**1.10**
NONASSESS				0.05		**0.05**
	SUBTOTAL	**155.19**	**42.17**	**177.52**	**17.11**	**236.80**

REACH 24

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20105004H	LAWYERS TITLE OF ARIZONA INC TR	84.31	0.91	74.80	23.47	**99.18**
20121001C	MOYLE INVESTMENT INC	81.15	18.17	20.56		**38.73**
20117003B	LAWYERS TITLE OF ARIZONA INC TR	3.88	18.38	98.51	3.04	**119.93**
20117003C	MOYLE INVESTMENT INC			14.56	3.17	**17.73**
20121001A	CENTRAL ARIZONA WATER CONSERVATION DISTRICT	0.54	0.08	1.27		**1.35**
20121001D	MOYLE INVESTMENT INC	5.39		22.32		**22.32**
20121002E	SOUTH WEST SAND AND GRAVEL INC	13.36	3.77			**3.77**
20121002G	PEORIA CITY OF	0.02				
20121002H	ARIZONA STATE LAND DEPT	4.56	3.92			**3.92**
20121002J	MARICOPA COUNTY DEPT OF TRANSPORTATION	5.43	3.11			**3.11**
20121003	ARIZONA STATE LAND DEPT	4.53	0.47			**0.47**
20121005	VITTORI JANET A & JERRY			0.14	0.20	**0.34**
20121008B	FRANKLIN RONALD N/CARRIE B			0.03	0.43	**0.46**
20121008C	ROARK RICHARD			0.64	0.39	**1.03**
20121020B	SCOTT SUSAN JANE			0.04		**0.04**
20121021	LOCK & A L L C			0.59	0.17	**0.76**
20121026A	VORDERER RONALD L			1.27	0.50	**1.77**
20121027A	ELLIS MICHAEL R			2.12	0.59	**2.71**
20121032A	MAHAFFEY HELENE JULIA			2.41	0.57	**2.98**
20121033	LAUGHTON GEORGE E & SHERRILL E			2.10	0.58	**2.68**
20121038	BRYANT RUSSELL A/DONNA L			1.45	0.63	**2.08**
20121039	GOSS DAVID L/VICKY L			0.46	0.60	**1.06**
20121044A	STOLK HENRY G & IRENE M TR				0.12	**0.12**
20121051A	PHOENIX CITY OF		2.08		0.55	**2.63**
20121051B	PHOENIX CITY OF		2.65			**2.65**
20121052	VORDERER RONALD L				0.22	**0.22**
20121057	BAYHAM EDYTHE J/ETAL		0.10		0.68	**0.78**
20121058A	PHOENIX CITY OF		2.32		0.08	**2.40**
20121058B	PHOENIX CITY OF		2.59			**2.59**
20121930A	PEORIA CITY OF	0.30				
NONASSESS		0.79				
NONASSESS		28.23	79.74	59.45		**139.19**
	SUBTOTAL	**232.49**	**138.29**	**302.72**	**35.99**	**477.00**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 25

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20104014	DTHC-ARIZONA CORP			5.71		**5.71**
20105001G	CHICAGO TITLE & TRUST CO TR				0.01	**0.01**
20105001H	CHICAGO TITLE & TRUST CO TR			0.08	0.47	**0.55**
20105002	DTHC-ARIZONA CORP			7.04	5.77	**12.81**
20104005	CENTRAL ARIZONA WATER CONSERVATION DISTRICT	17.89	0.98	21.09		**22.07**
20104006	CENTRAL ARIZONA WATER CONSERVATION DISTRICT	20.73	1.75	5.09	8.50	**15.34**
20104013	DESERET TITLE HOLDING CORP			39.68		**39.68**
20105003C	CENTRAL ARIZONA WATER CONS DISTRICT	26.72	2.06	4.16	2.03	**8.25**
20105004E	CENTRAL ARIZONA WATER CONSERVATION DISTRICT	8.33				
20105004F	CENTRAL ARIZONA WATER CONSERVATION DISTRICT	2.01				
20105004G	LAWYERS TITLE OF ARIZONA INC TR	23.30	7.28	1.23		**8.51**
20105005	DTHC-ARIZONA CORP	6.44	25.83	39.67	2.65	**68.15**
20105006	LAWYERS TITLE OF ARIZONA INC TR			2.58	9.66	**12.24**
NONASSESS		12.36	6.03		4.51	**10.54**
		117.78	**43.93**	**126.33**	**33.60**	**203.86**

REACH 26

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20119002A	RAVEN ROCK CONSTRUCTION LLC			7.60	8.93	**16.53**
20104007A	DTHC-ARIZONA CORP	21.19	1.97	0.90		**2.87**
20104007B	DTHC-ARIZONA CORP		1.46	0.29	0.58	**2.33**
20104008	DTHC-ARIZONA CORP	28.77	0.33	2.36	2.37	**5.06**
20104009A	DTHC-ARIZONA CORP			6.84		**6.84**
20104010	DTHC-ARIZONA CORP	35.11	0.88	0.64	2.96	**4.48**
20104011	DTHC-ARIZONA CORP	3.98		35.55		**35.55**
20104012	DTHC-ARIZONA CORP			27.28		**27.28**
20119002C	RAVEN ROCK CONSTRUCTION LLC			4.53	14.34	**18.87**
20119002D	RAVEN ROCK CONSTRUCTION LLC			5.46	11.30	**16.76**
NONASSESS		26.42	16.22	44.96	8.88	**70.06**
	SUBTOTAL	**115.47**	**20.86**	**136.41**	**49.36**	**206.63**

AGUA FRIA RIVER CHANNELIZATION
RECOVERED LAND

REACH 27

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20104001	DTHC-ARIZONA CORP	10.79		20.28	43.92	64.20
20104002	DTHC-ARIZONA CORP				9.41	9.41
20104003	DTHC-ARIZONA CORP	12.01		7.30	12.21	19.51
20104004A	DTHC-ARIZONA CORP	18.47		0.10	2.00	2.10
20104016A	DTHC-ARIZONA CORP				0.64	0.64
20119001B	RAVEN ROCK CONSTRUCTION LLC			8.04	6.67	14.71
20119001C	RAVEN ROCK CONSTRUCTION LLC			10.32	2.29	12.61
20119001D	RAVEN ROCK CONSTRUCTION LLC			5.75	0.56	6.31
20119001E	RAVEN ROCK CONSTRUCTION LLC			9.91	0.29	10.20
20119001F	RAVEN ROCK CONSTRUCTION LLC				0.67	0.67
NONASSESS		103.79		44.05	10.21	54.26
NONASSESS		5.43		0.51	7.39	7.90
	SUBTOTAL	150.49		106.26	96.26	202.52

REACH 28

APN	OWNER	CHANNEL TAKE	RECOVERED AREAS (ACRES)			
			FW	FP	LMEHZ	TOTAL
20102015A	MARICOPA COUNTY MUNI WATER CONS DIST #1	1.79				
20102002B	COHEN-MORROW HOLDINGS LLC			18.39	11.56	29.95
20102005E	ENOCH WEED ENTERPRISES INC	1.01			0.16	0.16
20102005F	ENOCH WEED ENTERPRISES INC	0.03				
20102012A	MARICOPA CNTY MUNI WATER CONS DIST NO 1	0.37				
20102015B	MARICOPA COUNTY MUNI WATER CONS DIST #1	1.25				
NONASSESS		53.19			3.05	3.05
NONASSESS		63.64		37.23	8.61	45.84
	SUBTOTAL	121.28		55.62	23.38	79.00
	TOTAL	2,978.20	742.85	2,968.80	1,688.42	5,400.07

Channel Reaches of the Agua Fria River-Indian School Road to Beardsley Flume

REACH NO.	TOWNSHIP	RANGE	SECTION	BEGINNING ROAD ALIGNMENT	CHANNEL STATION	ENDING ROAD ALIGNMENT	CHANNEL TAKES	RECOVERED FLOODWAY (Ac.)	RECOVERED FLOODPLAIN (Ac.)	RECOVERED EROSION HAZARD (Ac.)	CHANNEL STATION	RIVER MILE*	LENGTH	COMMENTS
9	T2N	R1W, R1E	24W, 19E	Indian School Rd.	440+00.00	Camelback Rd.	220.58	27.3	99.44	42.71	499+14.61	0.00	5915	
10	T2N	R1W, R1E	13W, 18E	Camelback Rd.	499+14.61	Bethany Home Rd.	245.9	42.85	535.7	53.75	559+04.62	1.12	5990	
11	T2N	R1W, R1E	12W, 7E	Bethany Home Rd.	559+04.62	Glendale Ave.	84.76	0.14	153.93	113.24	616+48.15	2.25	5744	
12	T2N	R1W, R1E	1W, 6E	Glendale Ave.	616+48.15	Northern Ave.	145.64	41.71	165.4	80.43	669+78.73	3.34	5331	
13	T3N	R1W, R1E	36W, 31E	Northern Ave.	669+78.73	Olive Ave.	141.74	22.96	91.7	281.83	723+69.69	4.35	5391	
14	T3N	R1W, R1E	25W, 30E	Olive Ave.	723+69.69	Peoria Ave.	138.66	20.67	163.96	135.06	777+80.67	5.37	5411	
15	T3N	R1W, R1E	24W, 19E	Peoria Ave.	777+80.67	Cactus Rd.	120.6	21.45	62.73	39.55	836+17.33	6.40	5837	
16	T3N	R1W, R1E	13W, 18E	Cactus Rd.	836+17.33	Thunderbird Rd. Alignment	106.51	0.24	81.81	111.35	889+59.21	7.50	5342	Grand Ave. (US 60) & UPRR Railroad Bridge approx. 600' dnstrm. of Thunderbird Rd.
17	T3N	R1W, R1E	12W, 7E	Thunderbird Rd. Alignment	889+59.21	Greenway Rd.	70.96	1.59	111.55	67.34	948+99.81	8.52	5941	
18	T3N	R1W, R1E	1W, 6E	Greenway Rd.	948+99.81	Bell Rd.	175.56	4.13	165.05	51.88	1014+03.93	9.64	6504	
19	T4N	R1W	36	Bell Rd.	1014+03.93	Union Hills Dr.	161.51	109.28	142	26.56	1067+96.61	10.87	5393	
20	T4N	R1W, R1E	25W, 30E	Union Hills Dr.	1067+96.61	Beardsley Rd.	101.52	16.16	84.66	43.95	1123+06.62	11.89	5510	
21	T4N	R1W, R1E	24W, 19E	Beardsley Rd.	1123+06.62	Deer Valley Rd.	235.03	40.88	73.84	257.78	1188+76.86	12.94	6570	Rose Garden Lane X-ing @ mid-section line
22	T4N	R1W, R1E	13W, 18E	Deer Valley Rd.	1188+76.86	Pinnacle Peak Rd.	136.53	148.24	132.17	127.29	1242+68.19	14.18	5391	
23	T4N	R1E	7, 8	Pinnacle Peak Rd.	1242+68.19	Happy Valley Rd. Alignment	155.19	42.74	177.52	17.11	1299+01.60	15.20	5633	
24	T4N	R1E	5, 6	Happy Valley Rd. Alignment	1299+01.60	Jomax Rd. Alignment	232.49	138.29	302.72	35.99	1354+35.05	16.27	5533	Agua Fria Blvd. (Interim Loop 303) approx. 1000' North of Happy Valley Rd. Align. aka Happy Valley Parkway
25	T5N	R1E	31, 32	Jomax Rd. Alignment	1354+35.05	Dynamite Blvd. Alignment	117.78	43.93	126.33	33.6	1413+58.78	17.32	5924	Proposed Jomax Pkwy. near Jomax Rd. Align.
26	T5N	R1E	28, 29	Dynamite Blvd. Alignment	1413+58.78	Dixileta Dr. Alignment	115.47	20.86	136.41	49.36	1469+54.07	18.44	5595	Proposed Lone Mtn./Dynamite Pkwy. along Dynamite Blvd. Align.
27	T5N	R1E	20, 21	Dixileta Dr. Alignment	1469+54.07	Lone Mtn. Rd. Alignment	150.49	0	106.26	96.26	1524+19.44	19.50	5465	Proposed Estrella Freeway (SR 303L) along Lone Mtn. Rd. Align.
28	T5N	R1E	16, 17	Lone Mtn. Rd. Alignment	1524+19.44	Dove Valley Rd. Alignment	121.28	0	55.62	23.38	1580+00.00	20.53	5581	Project ends approx. 800' so. of Dove Valley Rd. Align.

* *River Mile (RM) @ Indian School Rd. = RM0*

APPENDIX C
STAKEHOLDER OUTREACH

VALLEY FORWARD

WESTMARC
Western Maricopa Coalition

FRIENDS of
WEST VALLEY RECREATION CORRIDOR

Dear name:

Westmarc and Valley Forward have been working cooperatively with West Valley community leaders to create the Friends of the West Valley Recreation Corridor. This group is a non-profit organization comprised of nearly 1,500 stakeholders who are dedicated to re-invigorating the corridors along the Agua Fria and New Rivers within Maricopa County.

Our immediate focus is the 32-mile stretch of the Agua Fria River that extends from the Gila River in Goodyear to the New Waddell Dam at Lake Pleasant. Due to repeated flooding over the past few decades, the river has created a wide swath of undevelopable land that now makes up a floodplain encompassing more than 8,000 acres.

If the Agua Fria was better planned and its flows better controlled, we believe more than 5,800 acres of land along the river banks might be made productive and available for new uses, including recreational amenities as well as commercial and residential development.

This is where we need your help.

We are working with the Maricopa County Flood Control District to develop a new vision of this area through its Agua Fria Watercourse Master Plan, and we would like the opportunity to discuss this project with you. We also want to brainstorm some ideas on how we might bring together public and private interests to make this vision a reality.

We would like to meet with you to discuss this Plan and solicit your ideas for how we might begin to implement the changes necessary to increase the productivity of this area. Julie Graham from BJ Communications will be contacting you soon to set up a time for the meeting. If you have any questions in the meantime, please contact her at 602-277-9530 ext. 229.

We look forward to talking with you about this project.

Sincerely,

Diane McCarthy
Executive Director

Westmarc

Board Member

Friends of WVRC

Diane Brossart
Executive Director

Valley Forward

Board Member

Friends of WVRC

DRAFT AGENDA FOR STAKEHOLDER MEETINGS

Estimated timeframe: 1 ½ hours

Typical group size: 2-4 people

Welcome: Friends of the West Valley Recreation Corridor member

We appreciate meeting with you

Our objectives today:

Update you on the Agua Fria Watercourse Master Plan

Discuss some possible new initiatives to move the implementation of the plan forward

Seek your advice and ideas on ways to proceed

Overview of the Master Plan – 15 minute slide presentation

Summarize challenges & possibilities

Review maps of several specific areas to show the possibility of a pilot project

Background on the new Recreation Corridor Channelization District Task Force

What the Task Force is charged with doing

Final recommendations do in December

Anything coming from this group would require new legislation and would likely not take effect until 2005.

Our questions to you-

Developers

What is your advice on how to work with the multiple landowners and jurisdictions that are involved, in order to move forward on the channelization and land use changes?

Are there enough legal mechanisms in place to create some form of a planning overlay or cooperative arrangement with landowners to get something like this done, or is more needed?

How would you finance something like this in the private sector?

What is your advice on what we should do to move this vision forward?

City officials

What is your advice on how to work with the multiple landowners and jurisdictions that are involved, in order to move forward on the channelization and land use changes?

Are there enough legal mechanisms in place to create some form of a planning overlay or cooperative arrangement with landowners to get something like this done, or is more needed?

What is your advice on what we should do to move this vision forward?

Groundwater recharge interests

How can we best balance the interests of increasing recharge opportunities with this master plan?

Are there locations within the river corridor that could be used for both recharge and recreational amenities?

Sand and gravel interests

Can the channelization be done in segments so a pilot project could be developed? What would need to be in place to make this possible?

Summary – where do we go from here?

We will collect all the ideas from these stakeholder meetings

Work with the County Supervisors to approve a final Master Plan

Look for a potential pilot project to begin a segment of the plan

Conduct additional community outreach to inform the public about these efforts and solicit any additional ideas

Thank you for your interest and ideas.

SUMMARY OF MEETING MINUTES

October 1, 2003

ARPA (8/18/03)
City of Phoenix (8/25/03)
District Board of Supervisors (8/26/03)
City of Avondale (8/29/03)
City of Glendale (9/2/03)
Town of El Mirage (9/3/03)
Town of Youngtown (9/5/03)

Recreation – All the cities (that we have minutes for) are interested in the recreation option for the corridor. Several cities identified particular areas of opportunity, these include:

Avondale - the confluence of the Agua Fria and Gila Rivers. Specifically south of Broadway, near the waster water treatment plan

Glendale – west of the Glendale Landfill and the Agua Fria (between Glendale & Northern),

El Mirage –the landfill, near the new development (already working w/Youngtown to make it a recreational amenity)

Youngtown – from Grand Avenue, south to Olive

Board of supervisors – in Peoria or Glendale, in the heart of the area

Pilot Project - Every city (we have minutes for) agreed a pilot project would be beneficial, and most agree that more than one pilot project would be necessary. Entities that made suggestions regarding the location of the pilot include:

Board of Supervisors – An area that would have the strongest impact, and the most community support

El Mirage - near Thompson Ranch development Glendale recommended a pilot project in El Mirage or Avondale

Glendale – El Mirage or Avondale

What the recreational opportunity should look like:

An Indian Bend Wash type development (Board of Supervisors)

A showpiece, with different agencies working together

What the residents want (Avondale)

A project that could work with several existing uses (in Glendale…the airport, landfill and recharge)

Something to show the connectivity of the trail

Similar to the Carefree Conference Center, near stadiums (Glendale)

An area neighboring horse ranchers could use, as well as low income people (Youngtown)

Most cities welcomed the recreational component of the project because it provides amenities to new home developments (El Mirage, Youngtown)

There was great interest in combining recreation opportunities and recharge (Glendale, Board of Supervisors, El Mirage)

Cities that have landfills and want to utilize the area as recreational land use are concerned about the various impacts of combining recreation and landfill, specifically:

Impact of landscaping on landfills (City of Phoenix, Karen w/Rio Salado conducting studies)

Impact the project would have on their Landfill Master Plan (Glendale)

Several cities are interested in meeting with sand and gravel companies to work out potential channelization concepts (Avondale, Youngtown)

Rock product owners are interested in meeting with the County about channelization opportunities

Several cities had concerns about sand and gravel operations; specifically the necessity to "manage" Vulcan (Avondale & Youngtown)

The Board of Supervisors and Youngtown cautioned us regarding issues with Luke Air Force Base

Cities in close proximity to Glendale Municipal Airport were concerned about birdstrikes

The subject of overlay districts came up:

City of Phoenix put an overlay district to limit excavation and create compaction requirements. Overlay districts on the outbanks were suggested as a way to curb illegal dumping in pits.

Avondale - they have a 10-year plan that doesn't take into account the potential change in floodplain activity. They mentioned it would be helpful to have an overlay.

MEDIA RELEASE

Media Contact: Suzanne Pfister

B..J. Communications, Inc.

602-277-9530 ext. 232

A NEW VISION FOR THE AGUA FRIA RIVER CORRIDOR

Friends of the West Valley Recreation Corridor Sponsor Visioning Session

WHAT:The Friends of the West Valley Recreation Corridor are inviting valley business and community leaders to a special vision session, to explore the potential of a recreation and economic development corridor along the Agua Fria River.

The Flood Control District of Maricopa County led the initial efforts to study this area with the Agua Fria Watercourse Master Plan, and the Friends group has been meeting individually with civic and business leaders to discuss potential opportunities.

The Friends believe the unique character of the river will be lost unless a comprehensive program is developed to bring together the various and often disparate interests for uses in the corridor. So the group intends to bring leaders together in a special forum to summarize the redevelopment possibilities and discuss further how to bringing this landmark amenity to reality.

WHERE: Estrella Mountain Community College
3000 N. Dysart Road, Avondale

WHEN: 8:30 am to 10:30 am
Friday, October 10, 2003

SPONSORS: Friends of the West Valley Recreation Corridor
Flood Control District of Maricopa County
Arizona Rock Products Association
Valley Forward
Westmarc

ABOUT THE FRIENDS:

The Friends of the West Valley Recreation Corridor (WVRC) is a non-profit organization comprised of nearly 1,000 stakeholders, including volunteers, public and private sector representatives and community leaders, who are dedicated to creating an enhanced corridor along the Agua Fria and New Rivers within Maricopa County. The group was initiated in 2001 through a partnership of Westmarc and Valley Forward Association.

APPENDIX D
MISCELLANEOUS DESIGN INFORMATION

AGUA FRIA RIVER CHANNELIZATION
EARTHWORK CALCULATIONS

Project Length	***21.42***	*MI*
Top Channel Area	***2498.7***	*ACRE*

CHANNELIZATION NET VOLUME

Channel w/o Terraces (CY)	*59,536,941*	
Terraces (CY)	*(8,206,527)*	
Landscape Plating (CY)	*(714,228)*	
Subtotal (CY)	***50,616,185***	
Volume Adjustment (CY)		*(8,177,917)*
Subtotal (CY)	***50,616,185***	***42,438,268***
Walker Pit Fill (CY)	*1,074,233*	*1,074,233*
Total (CY)	***51,690,418***	***43,512,501***

AGUA FRIA RIVER CHANNELIZATION
EARTHWORK CALCULATIONS

CHANNEL (w/o Terraces)

InRoads Triangle Volume

	Volume (CF)	Volume (CY)
Cut	1,706,106,714	63,189,138
Fill	98,609,316	3,652,197
Net	1,607,497,398	**59,536,941**

TERRACES

Terrace Height (FT) = 5

Terace No.	Area (ACRE)	Volume (CY)
1	41.7	336,567
2	156.4	1,261,903
3	71.4	575,715
4	84.2	679,498
5	74.7	602,210
6	33.2	267,855
7	61.1	492,533
8	116.7	941,456
9	65.5	528,669
10	116.5	940,115
11	22.7	183,448
12	173.1	1,396,560
Terrace Total	1,017.3	**8,206,527**

LANDSCAPE PLATING

Per Bank Protection Detail

	4:1 Slope	3:1 Slope
Length (FT)	128,755	100,565
Area (SF)	54.36	122.16
Volume (CY)	259,227	455,001
Plating Total (CY)		**714,228**

WALKER PIT FILL

InRoads End-Area Volume

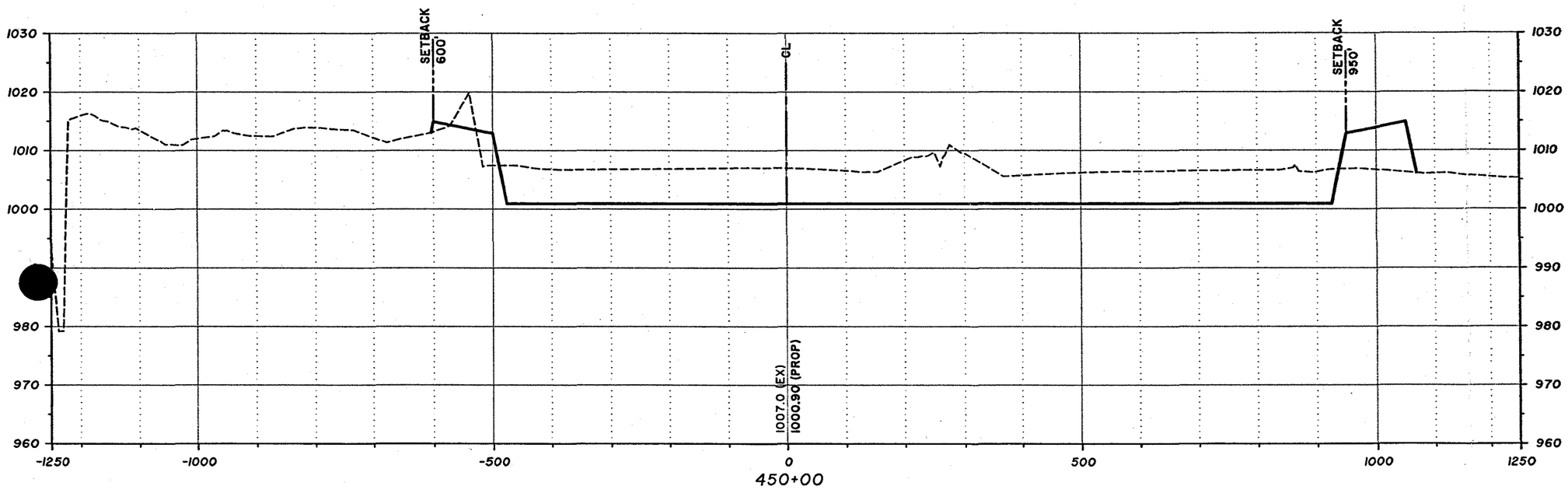
Sta 1124+00 to Sta 1152+00

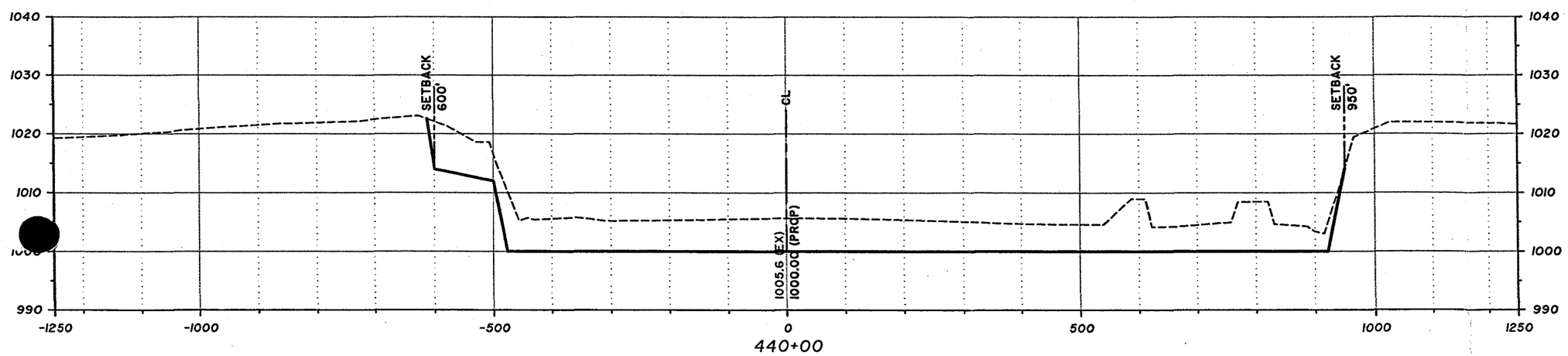
Fill Volume **1,074,233**

VOLUME ADJUSTMENT

Volume correction to account for the difference between DEA surveyed field sections and FCD DTM cross sections

Average Depth Difference (FT)	-2.03
Channel Top Area (SF)	108,842,789
Volume Difference (CY)	**(8,177,917)**





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West Valley Recreation Corridor
Agua Fria River
Conceptual Cross Sections

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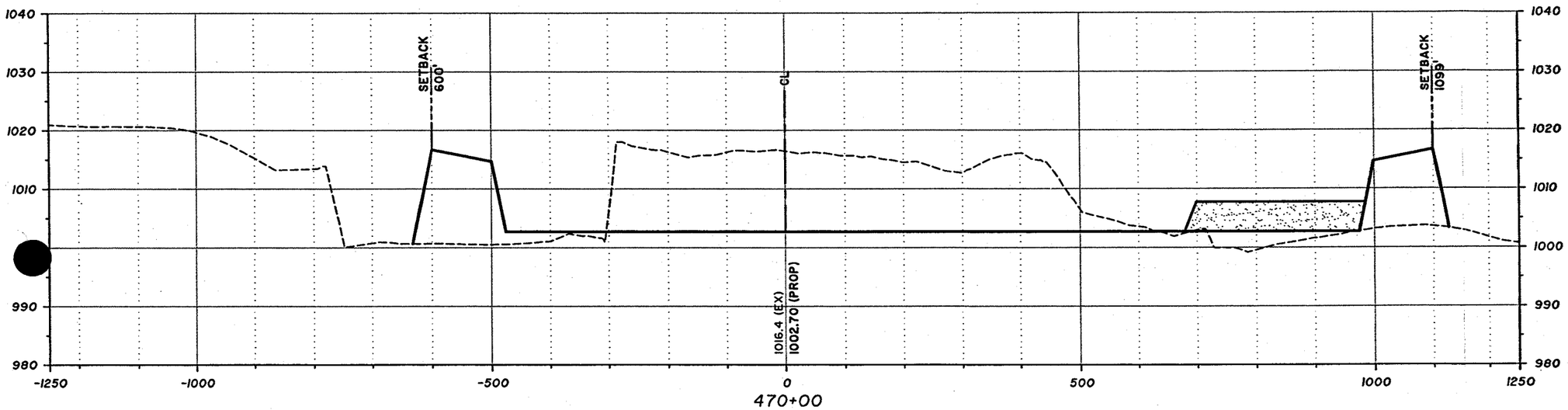

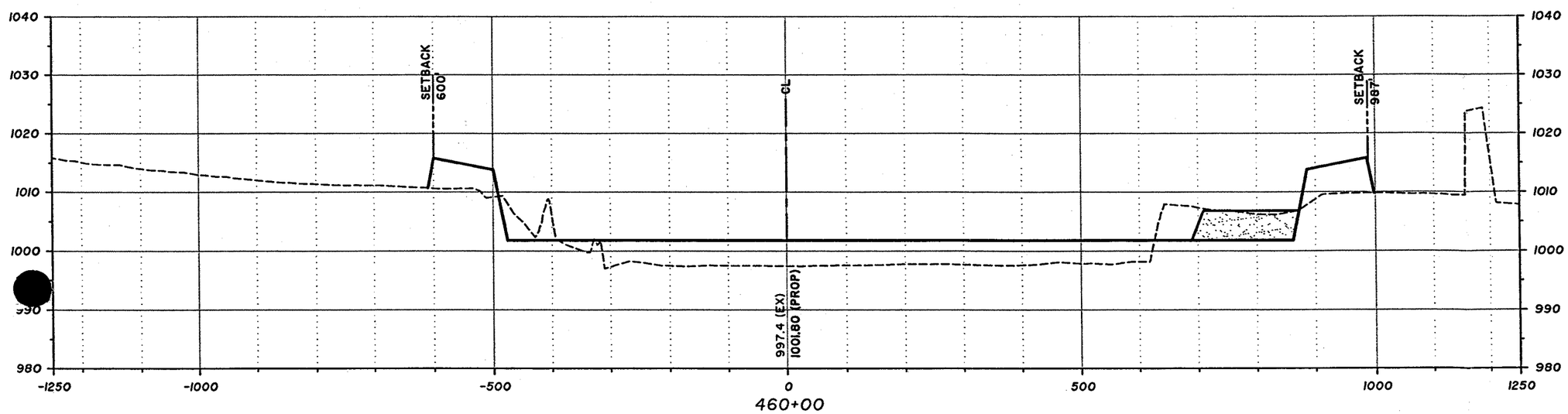

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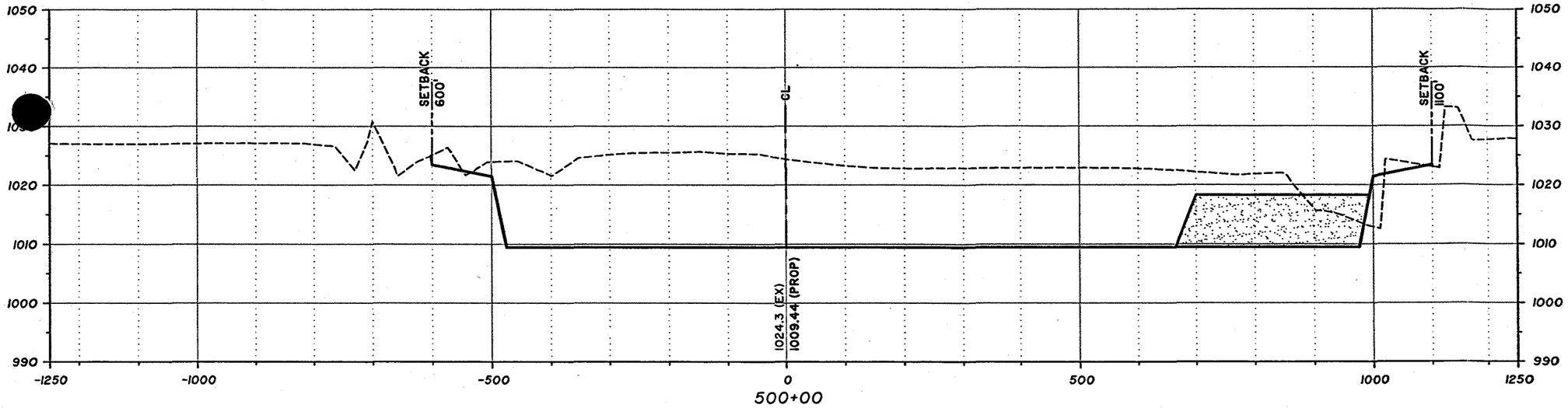

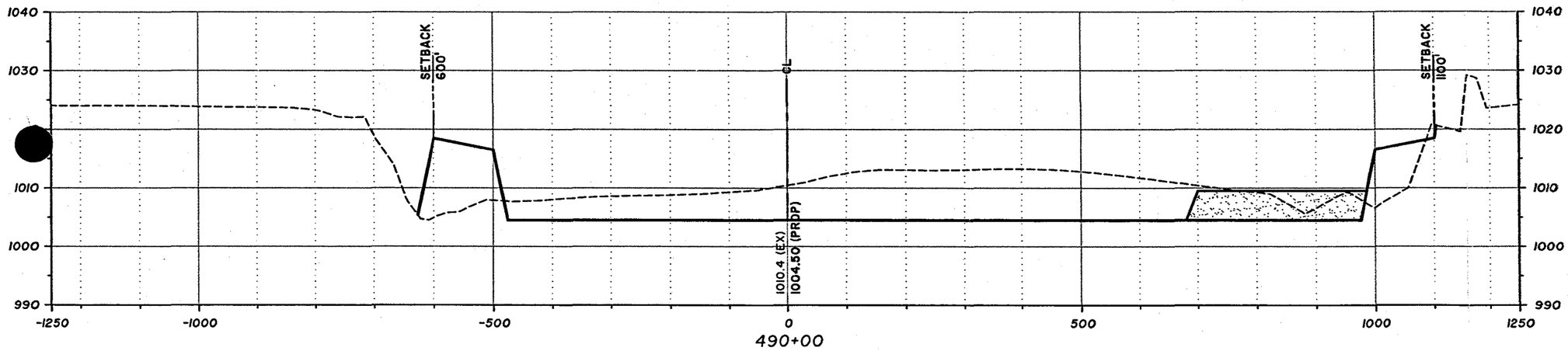

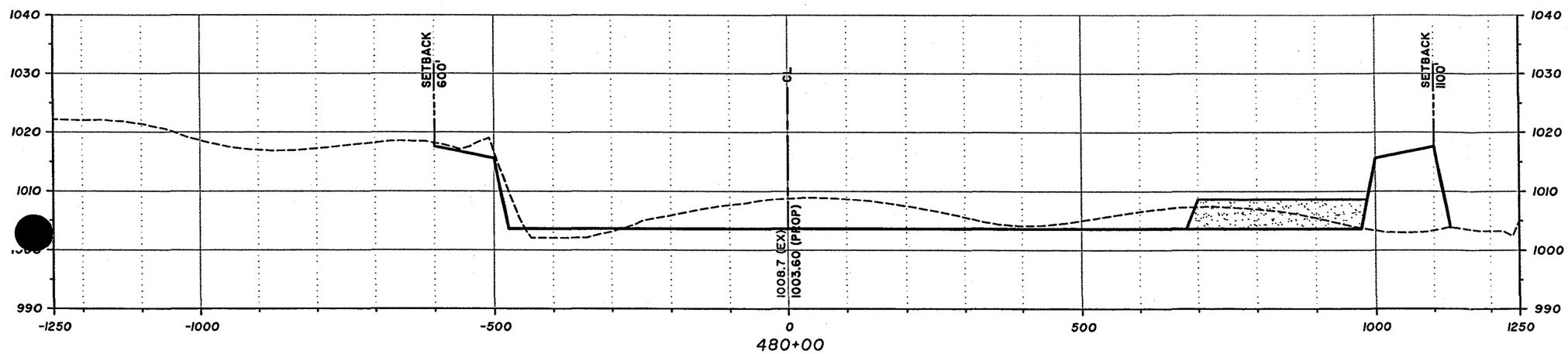

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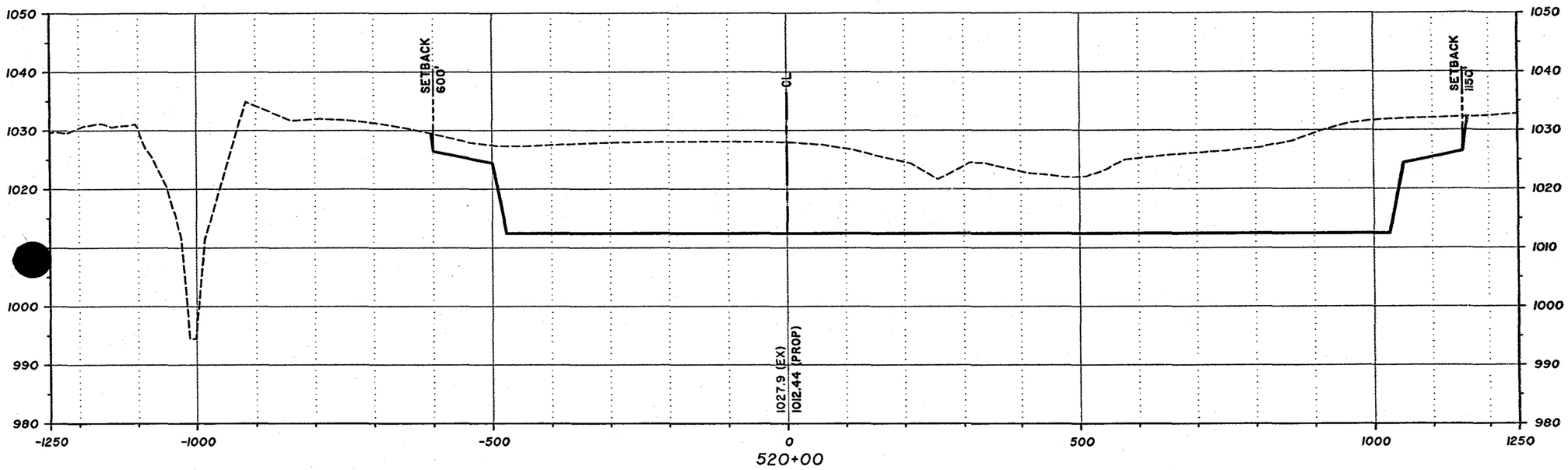

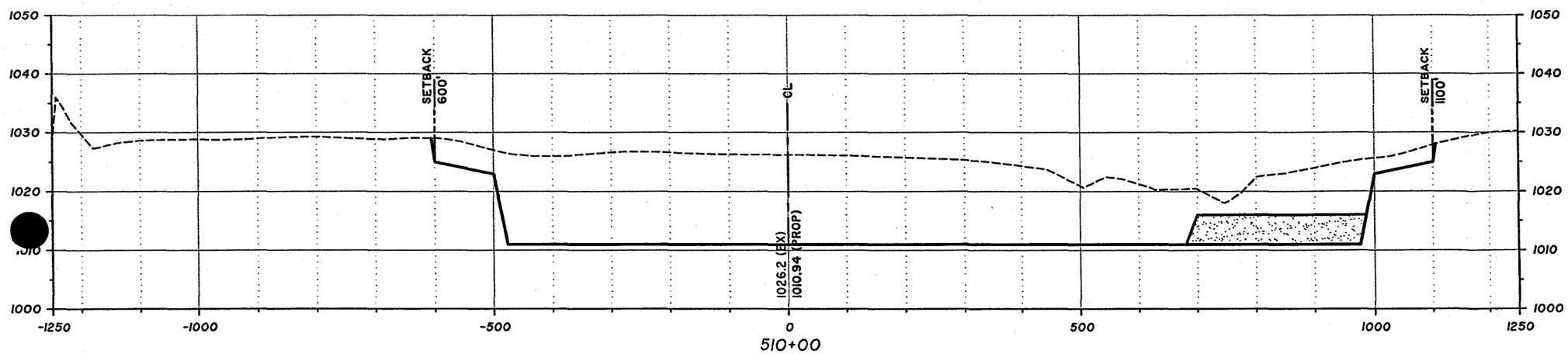

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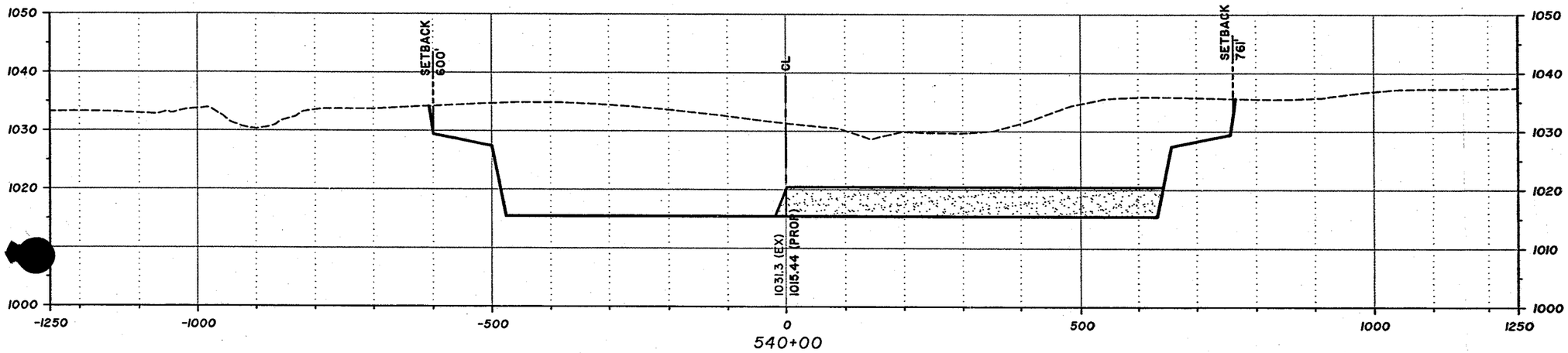

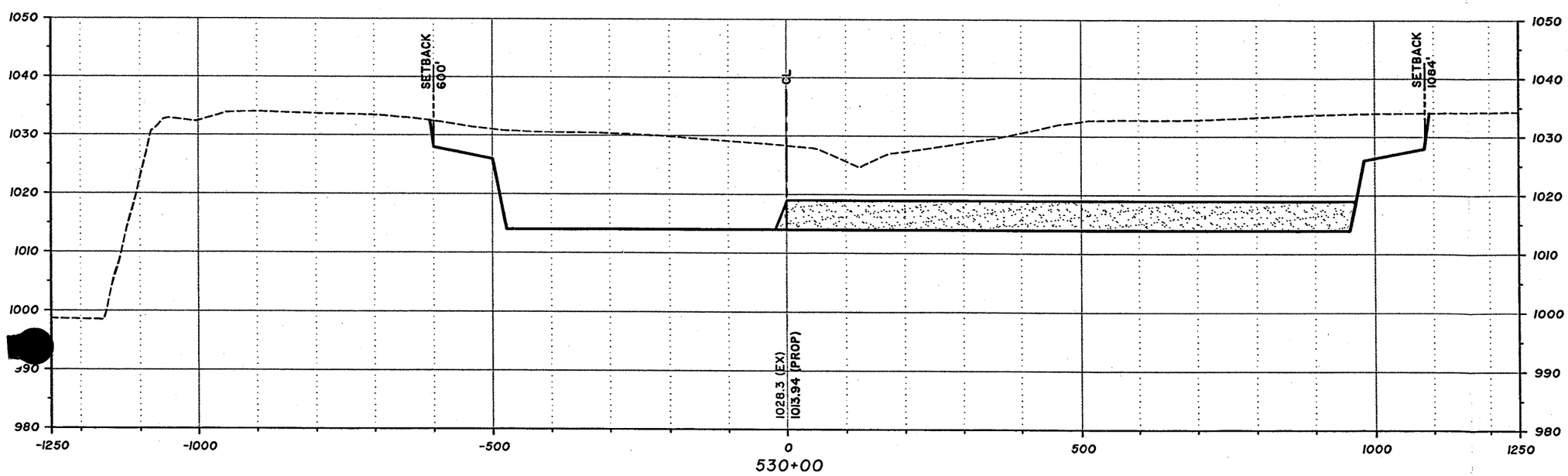

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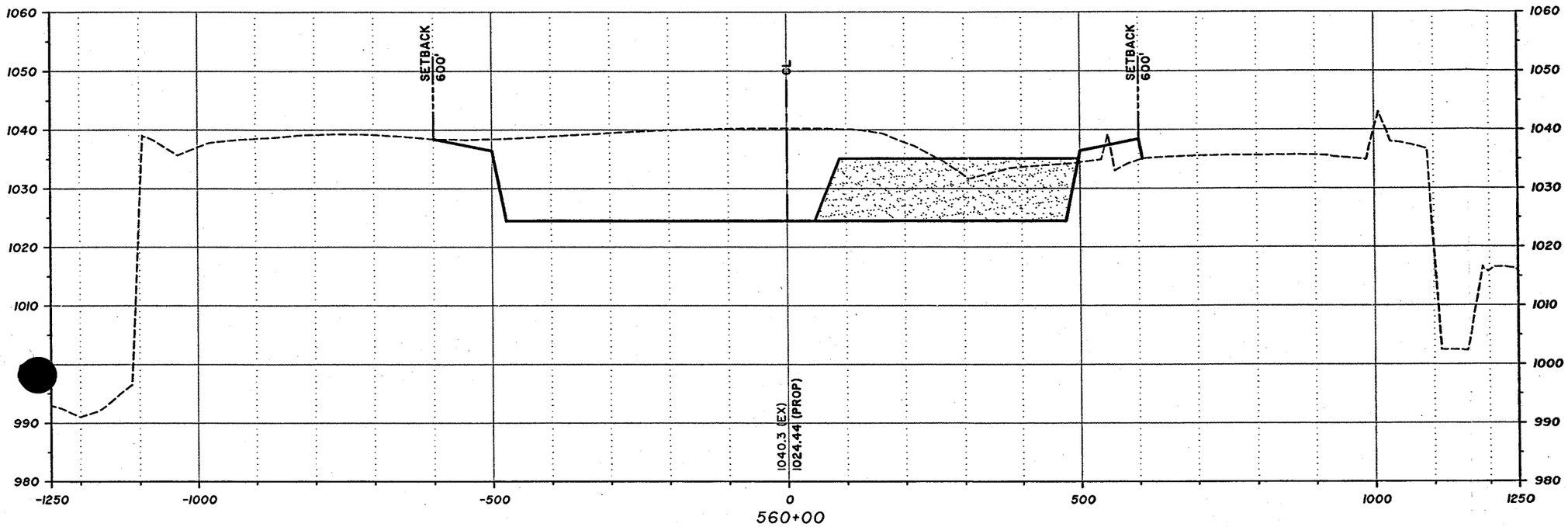

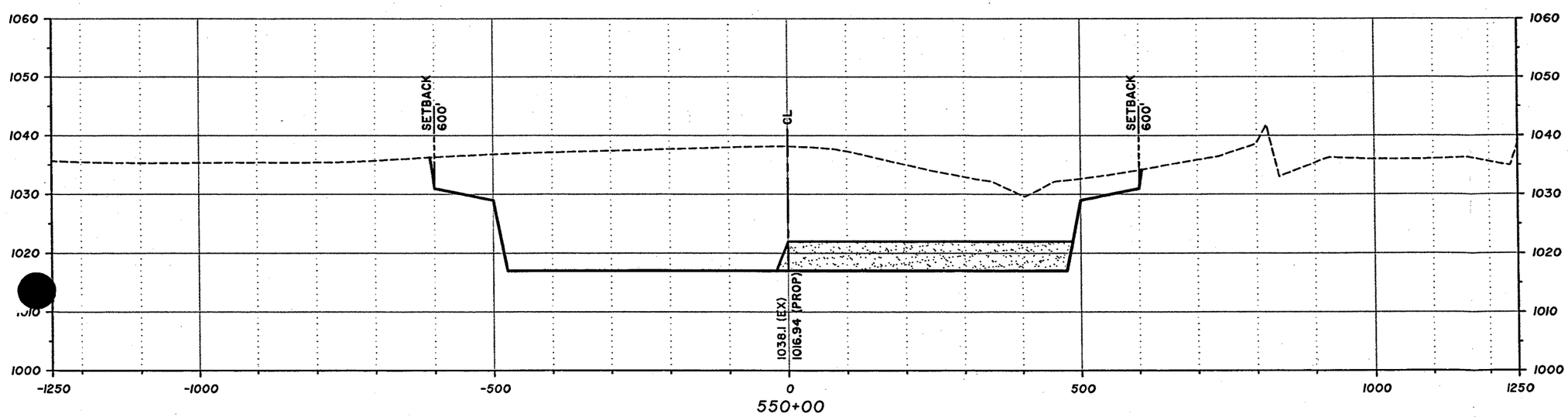

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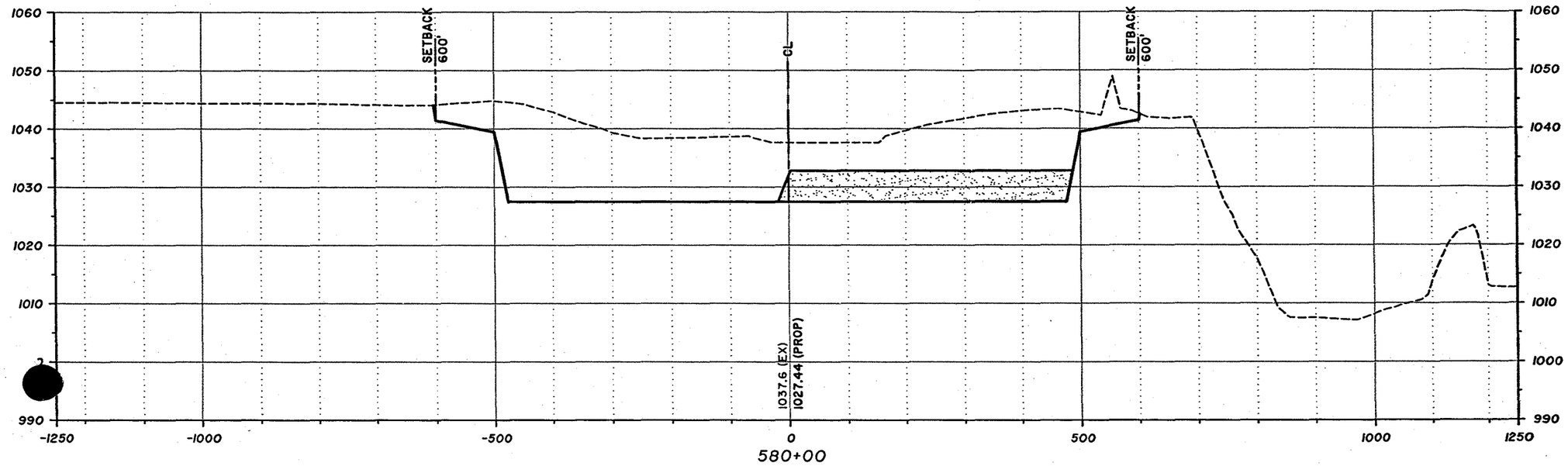

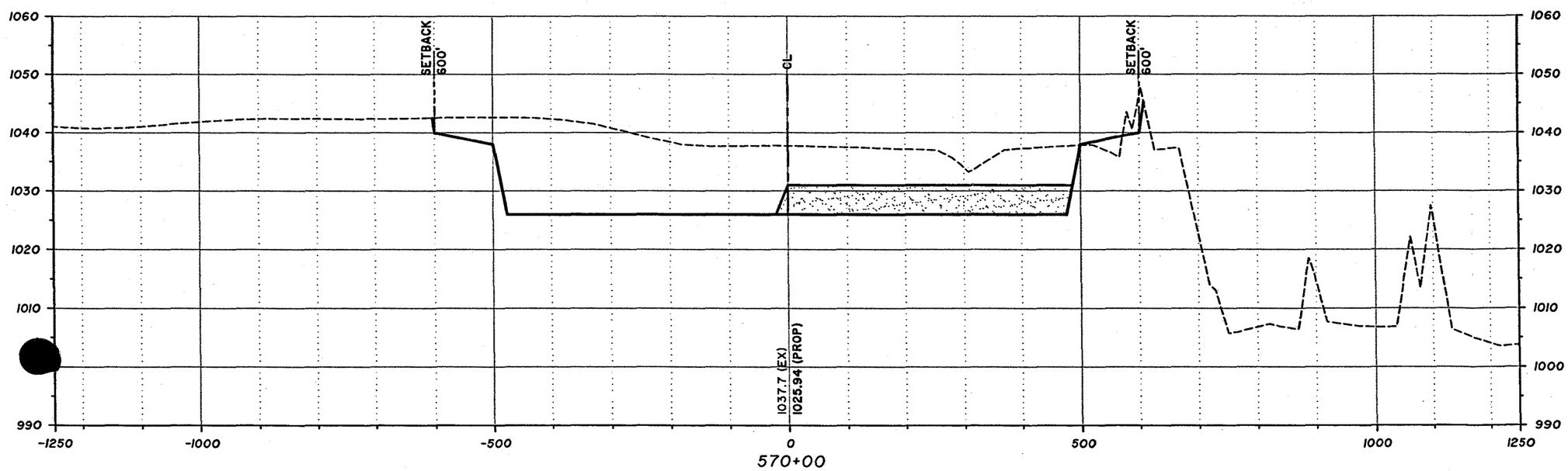

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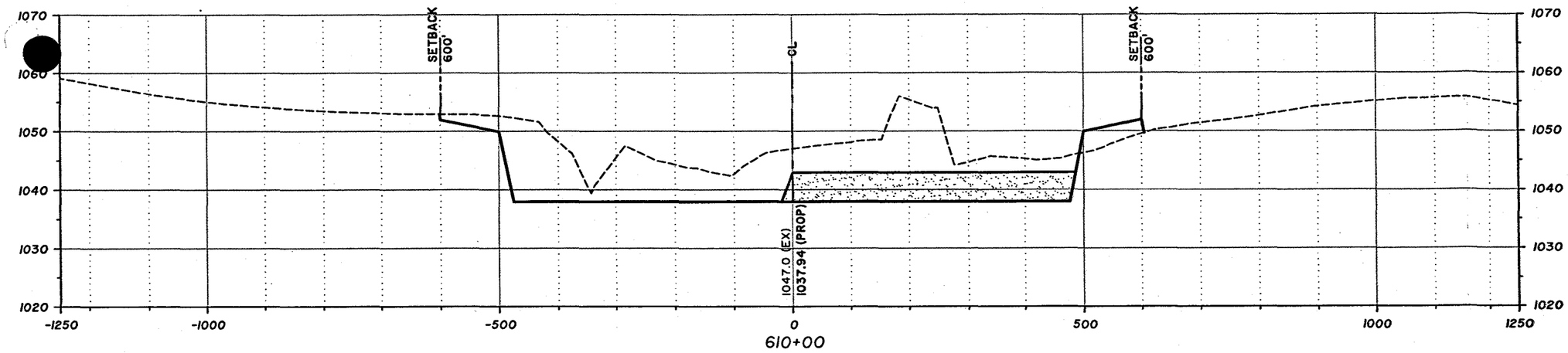

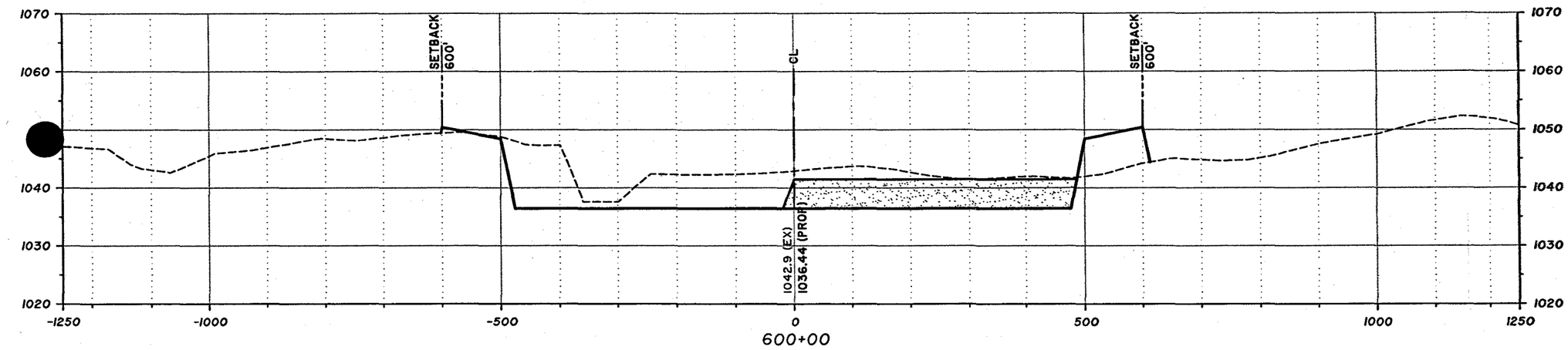

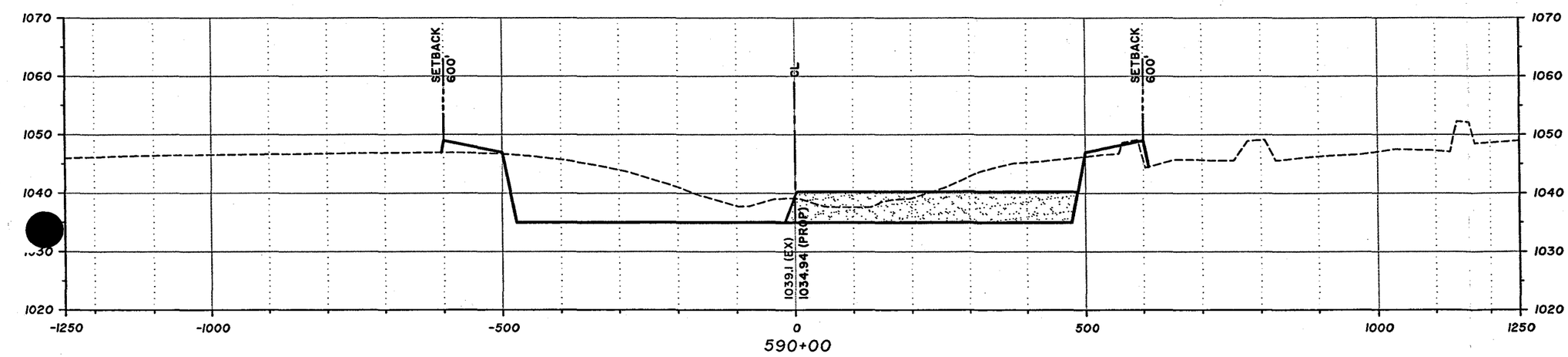

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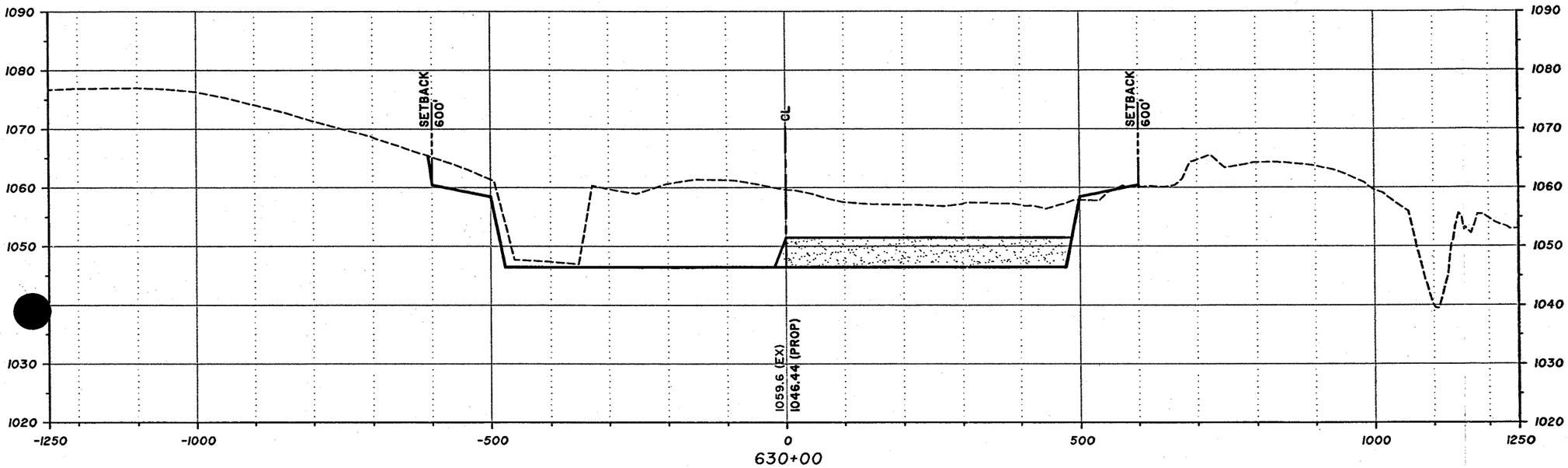

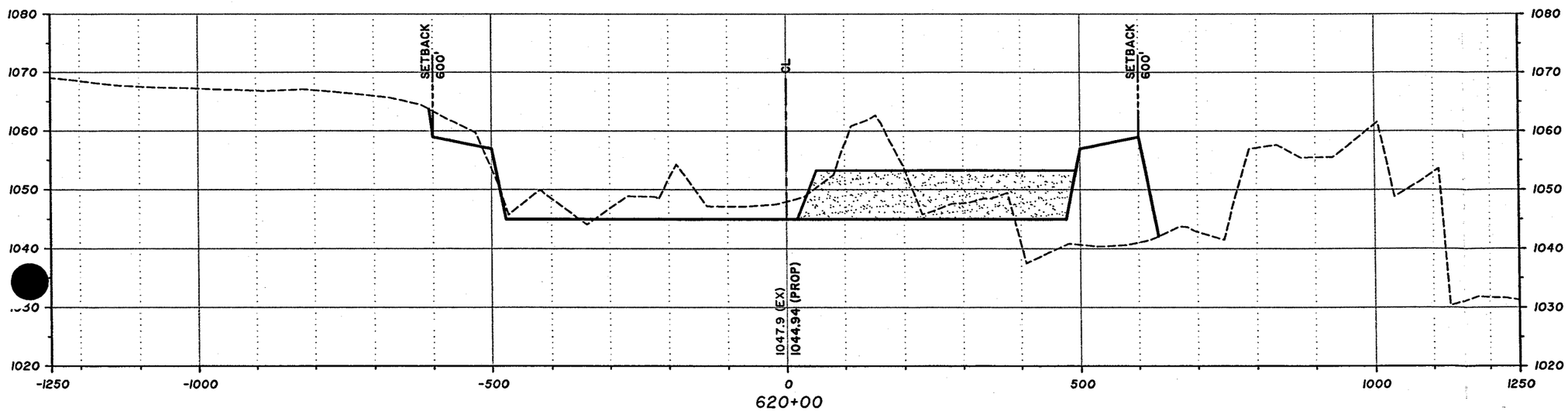

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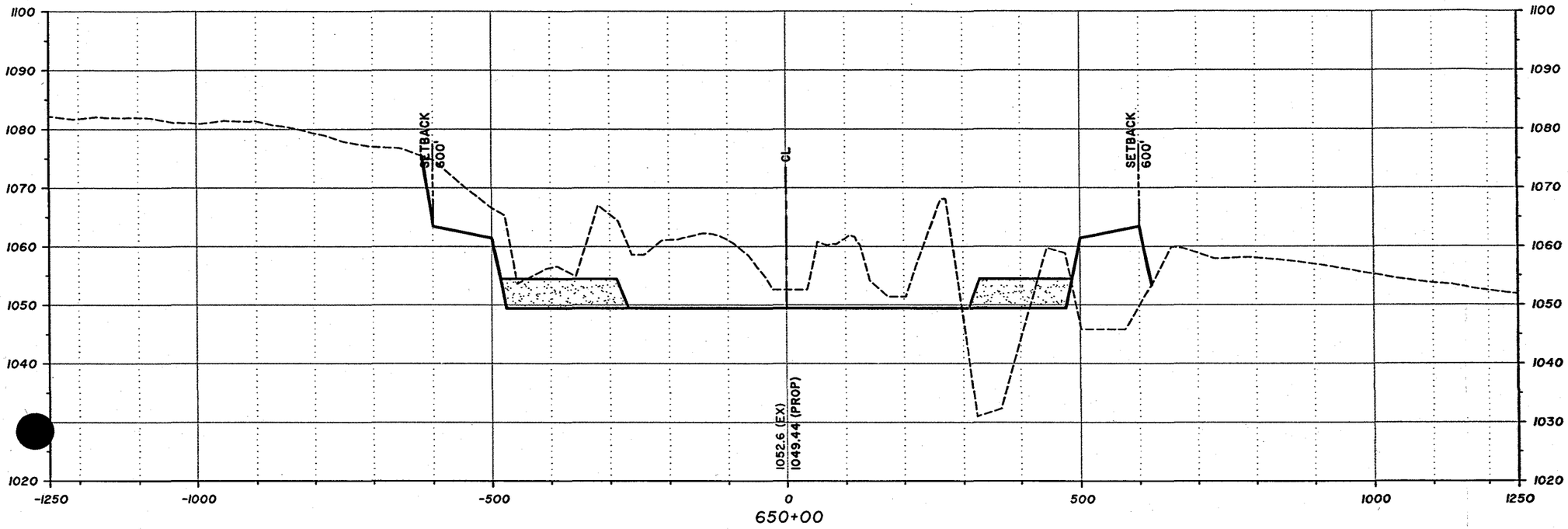

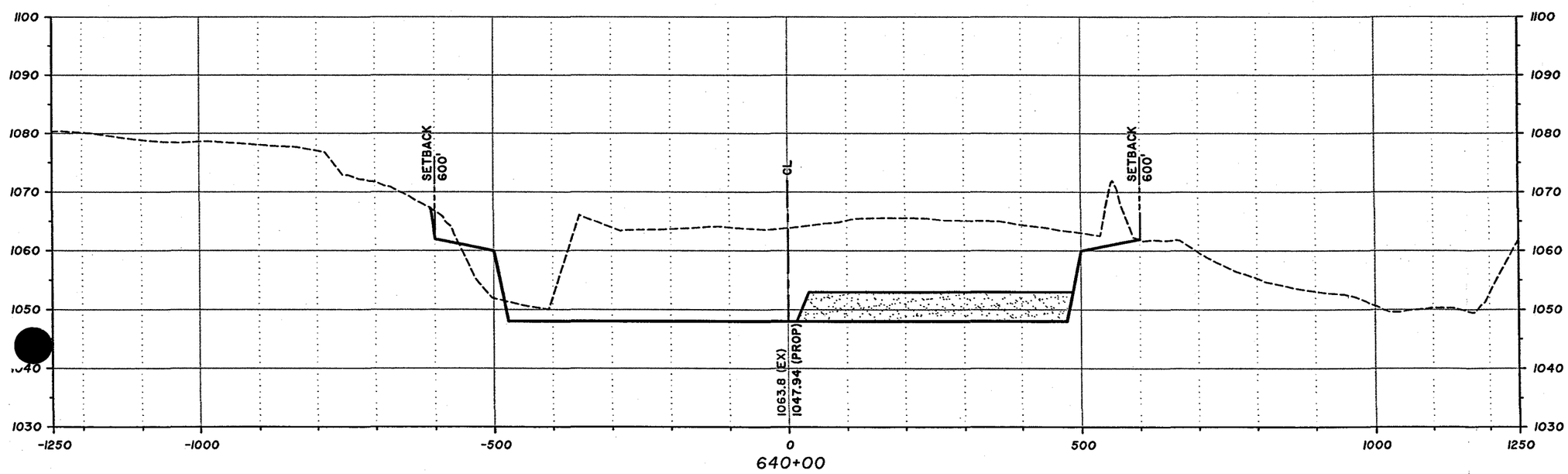

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100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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West Valley Recreation Corridor
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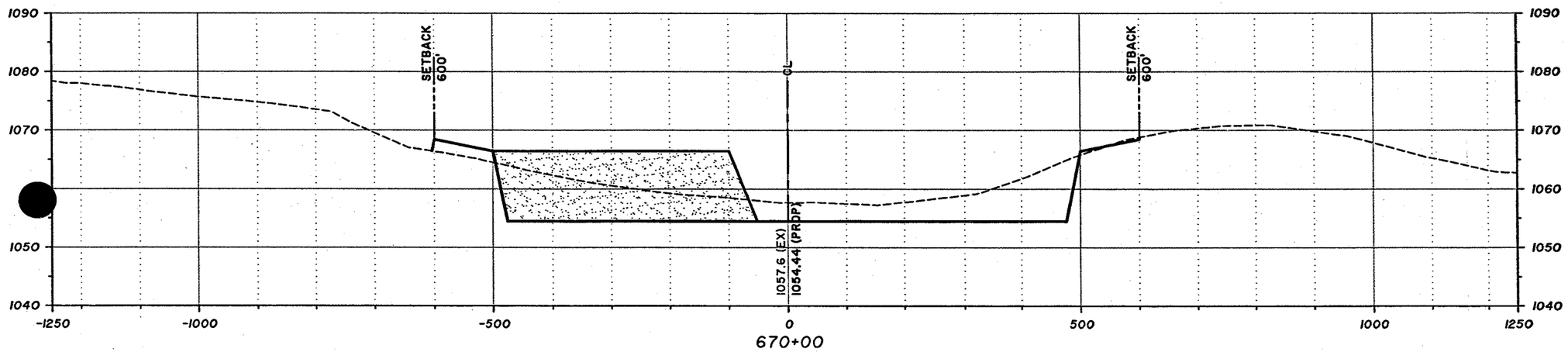

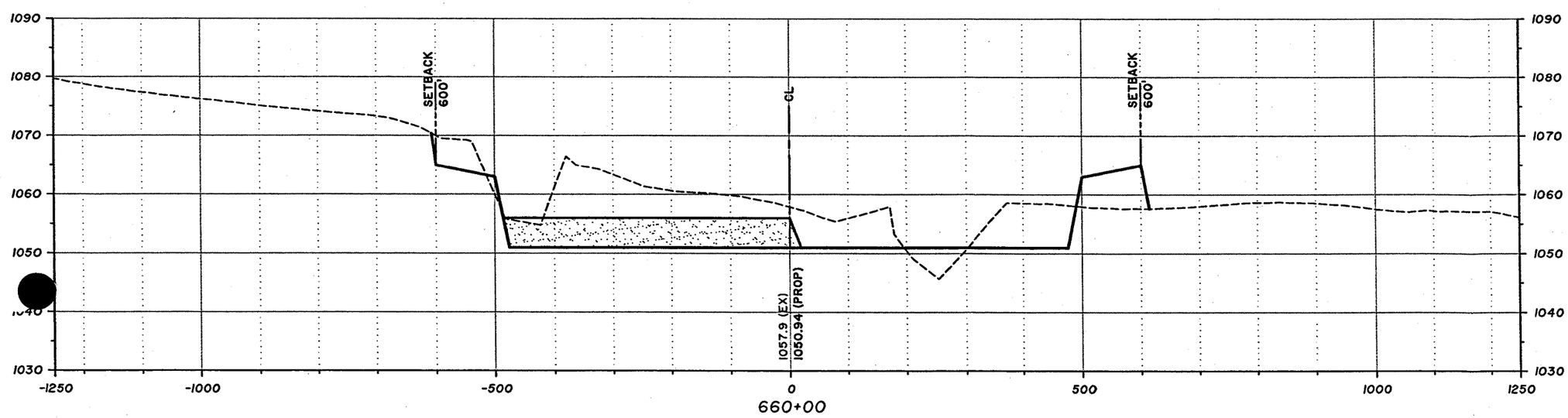

Sta 660+00 - Sta 670+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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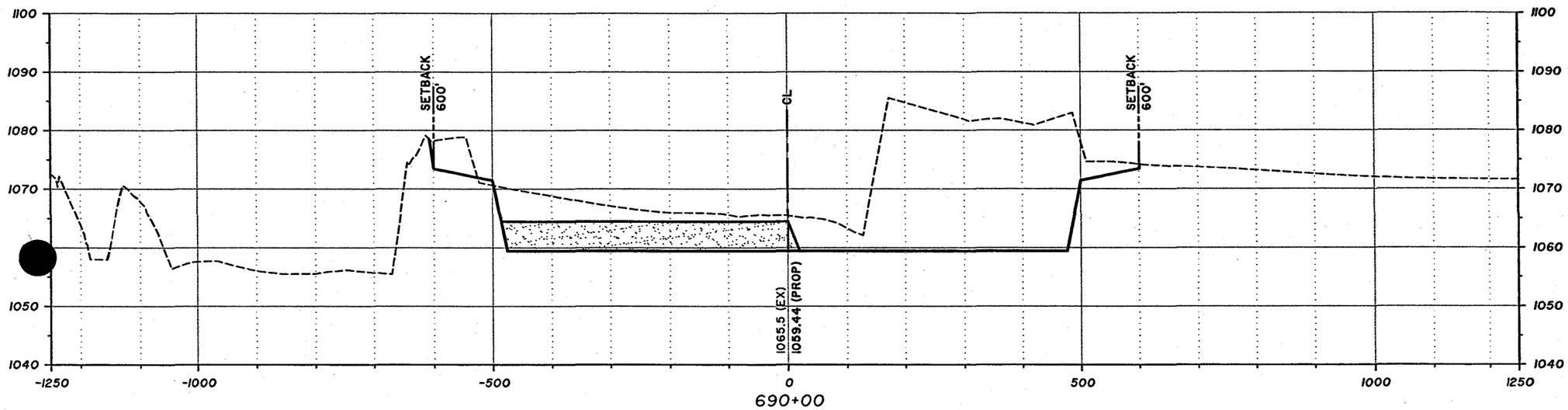

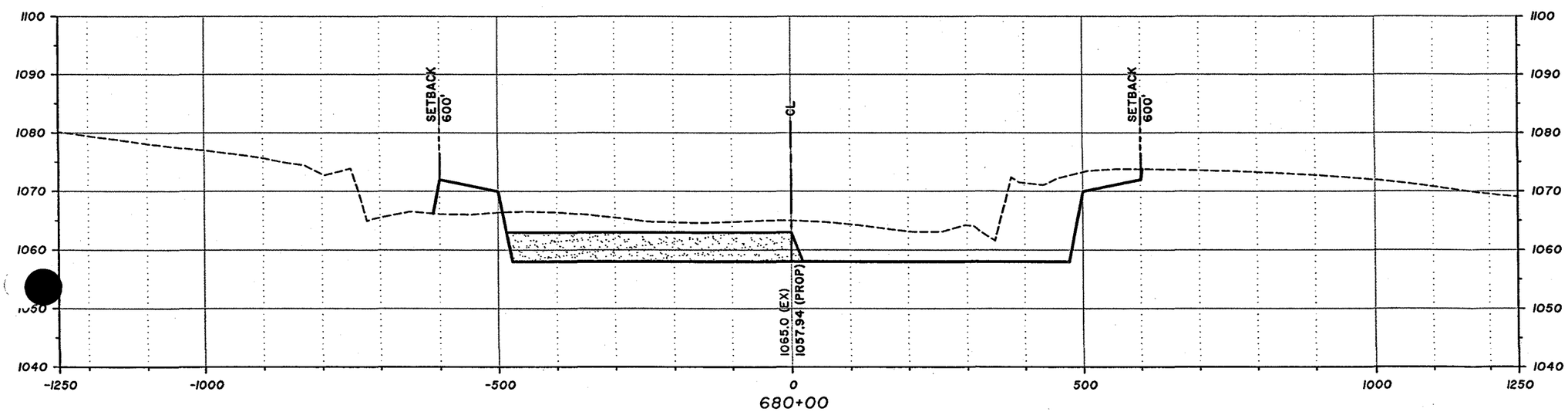

Sta 680+00 - Sta 690+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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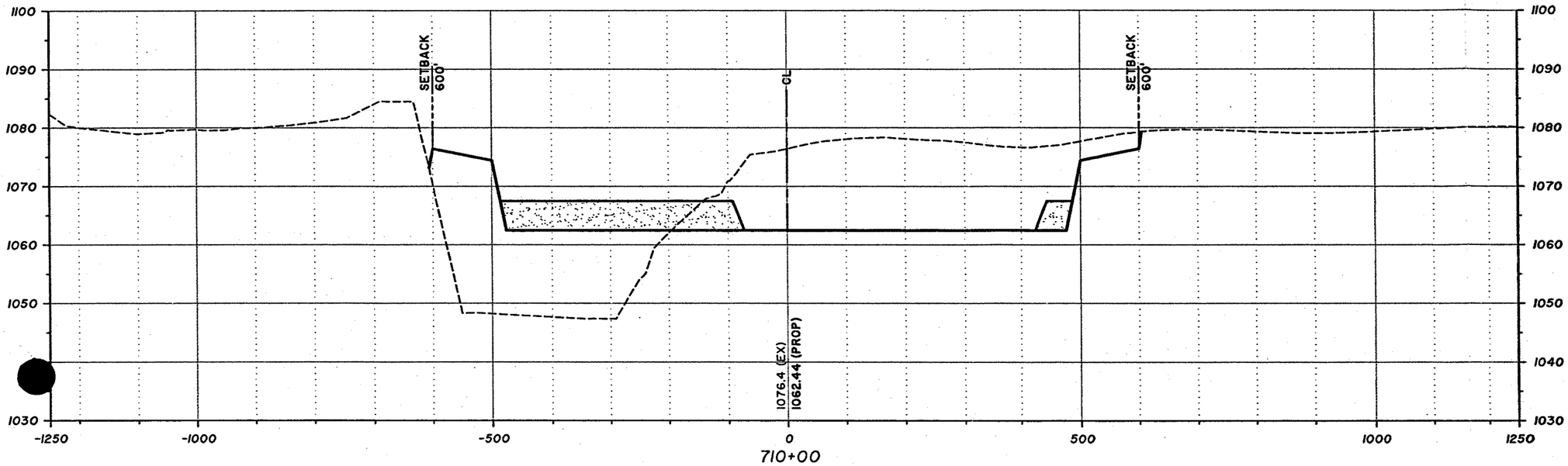

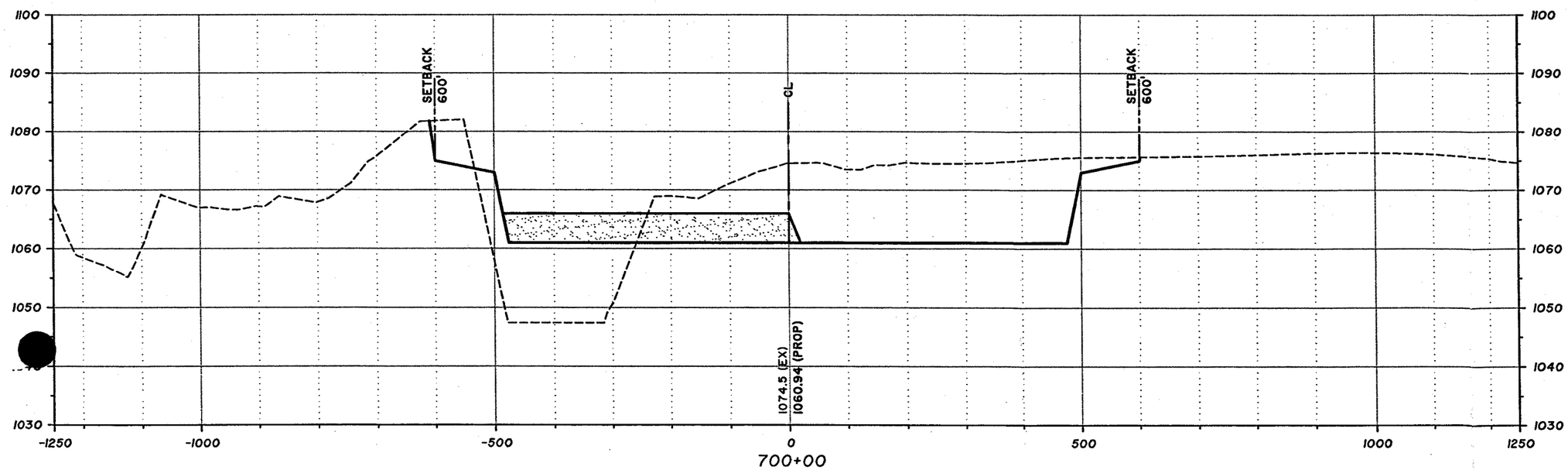

Sta 700+00 - Sta 710+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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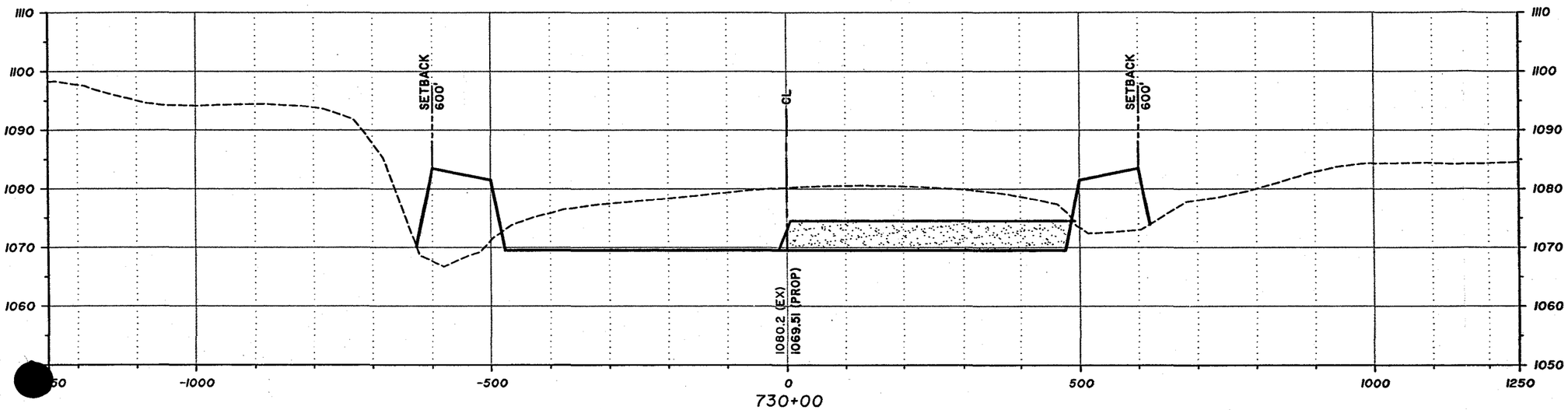

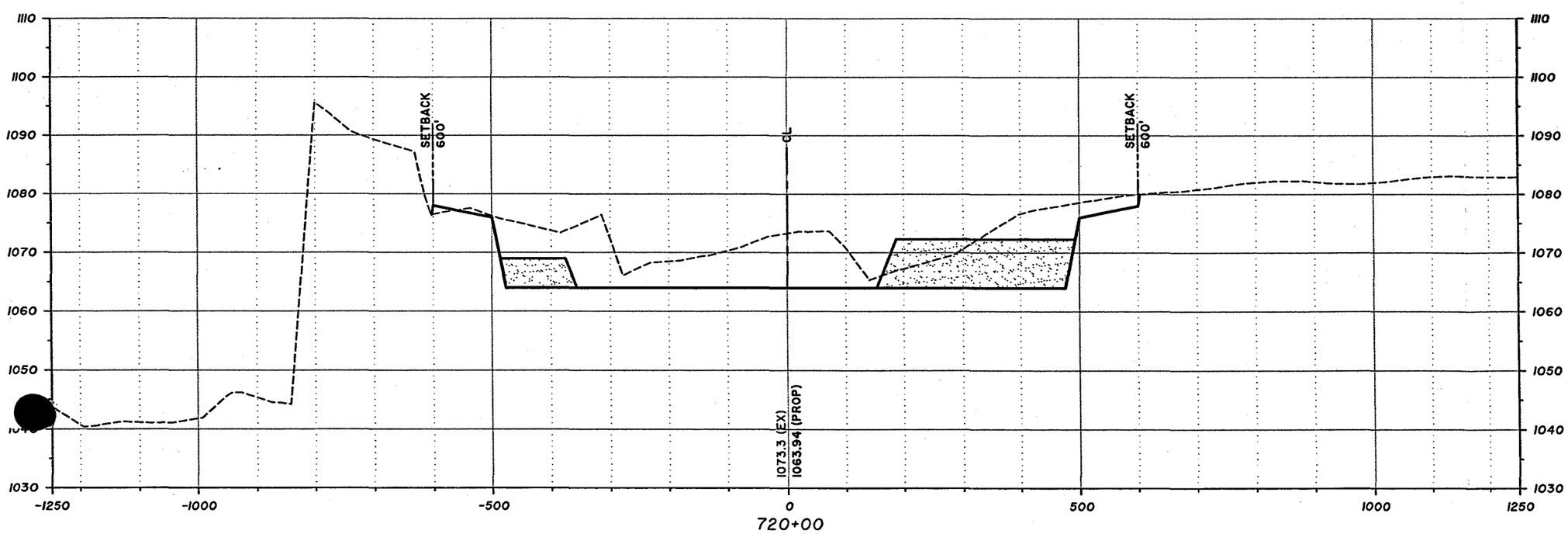

Sta 720+00 - Sta 730+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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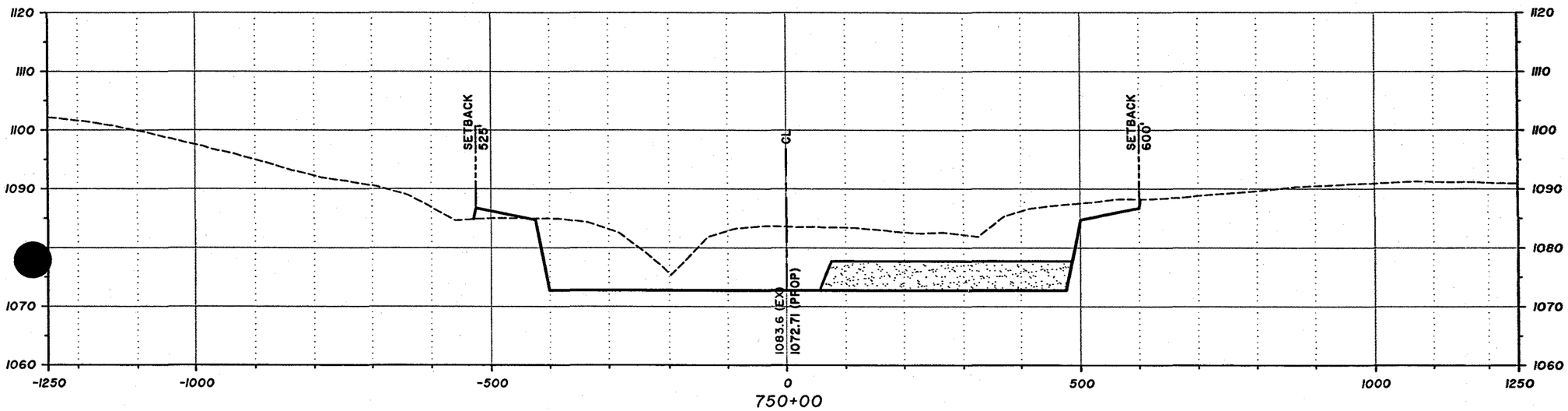

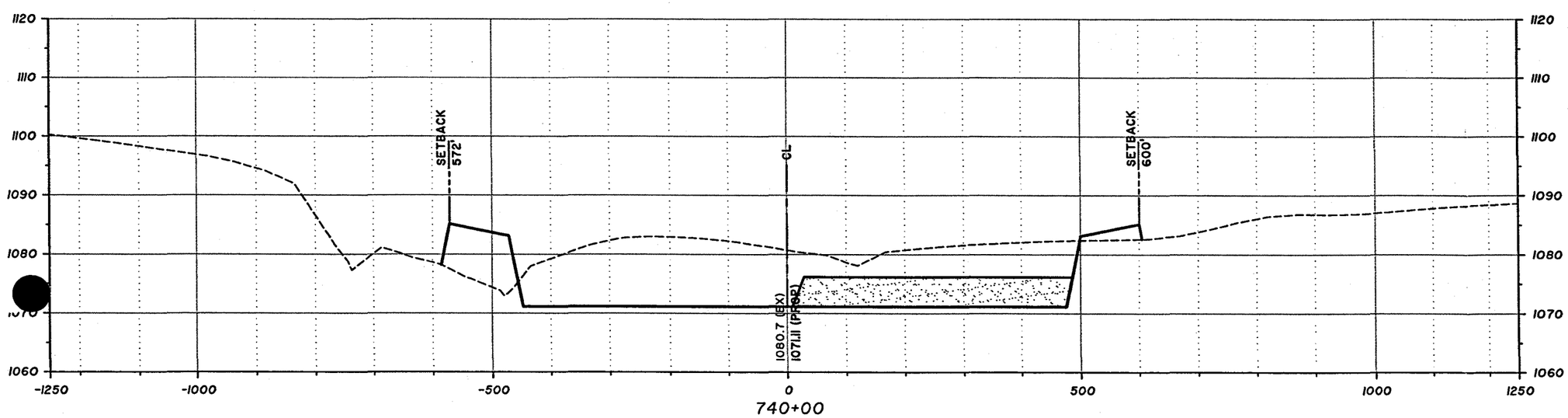

Sta 740+00 - Sta 750+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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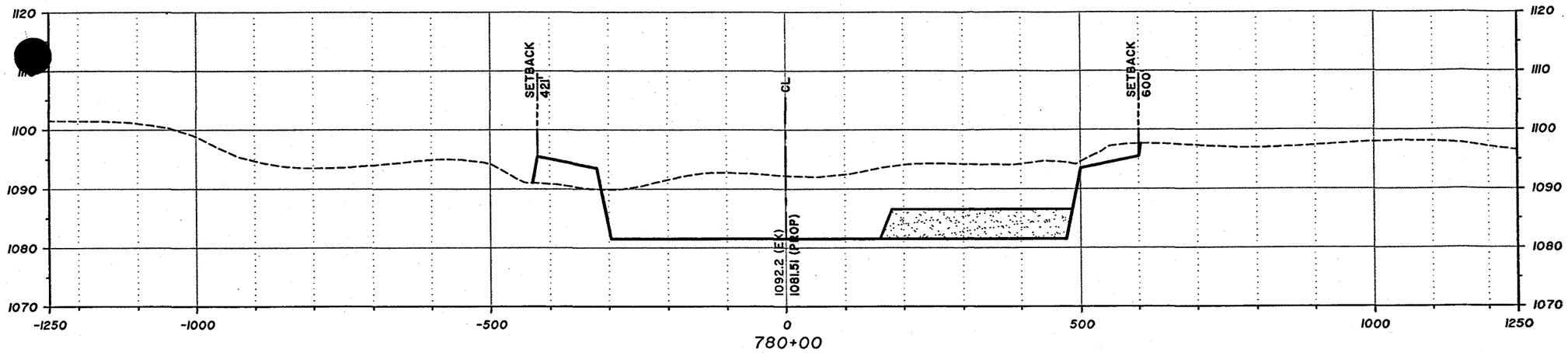

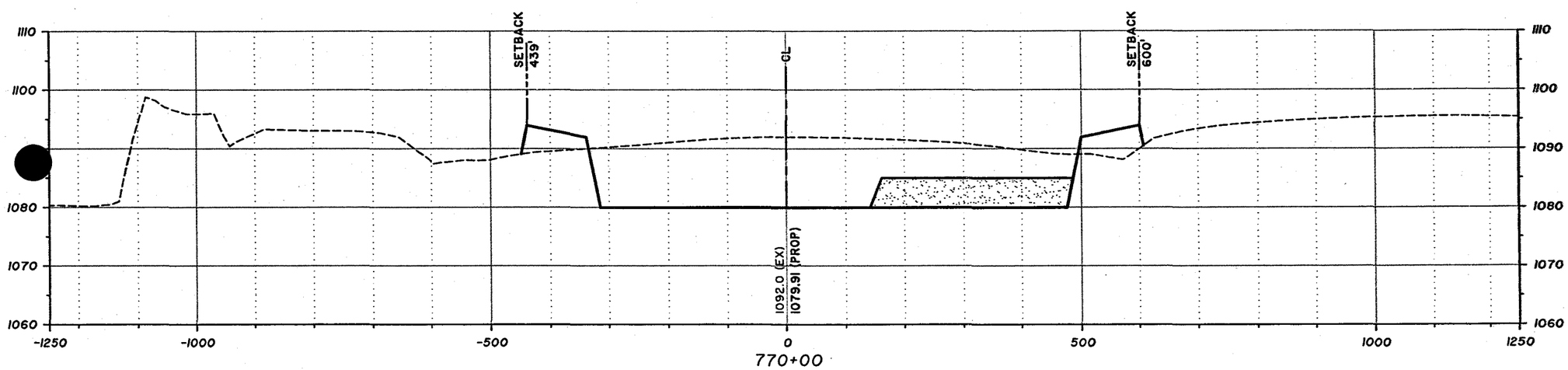

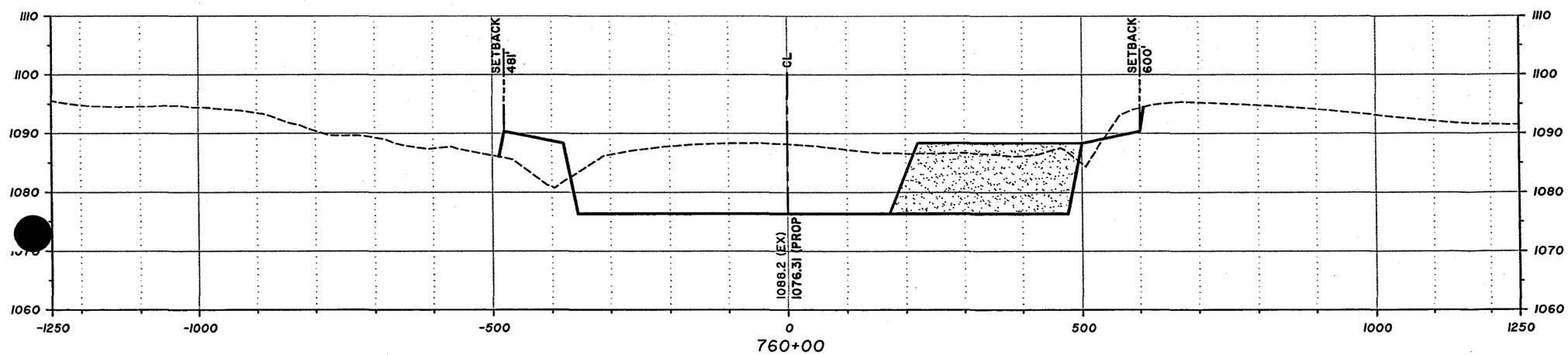

Sta 760+00 - Sta 780+00

100' 0' 100' 200'
SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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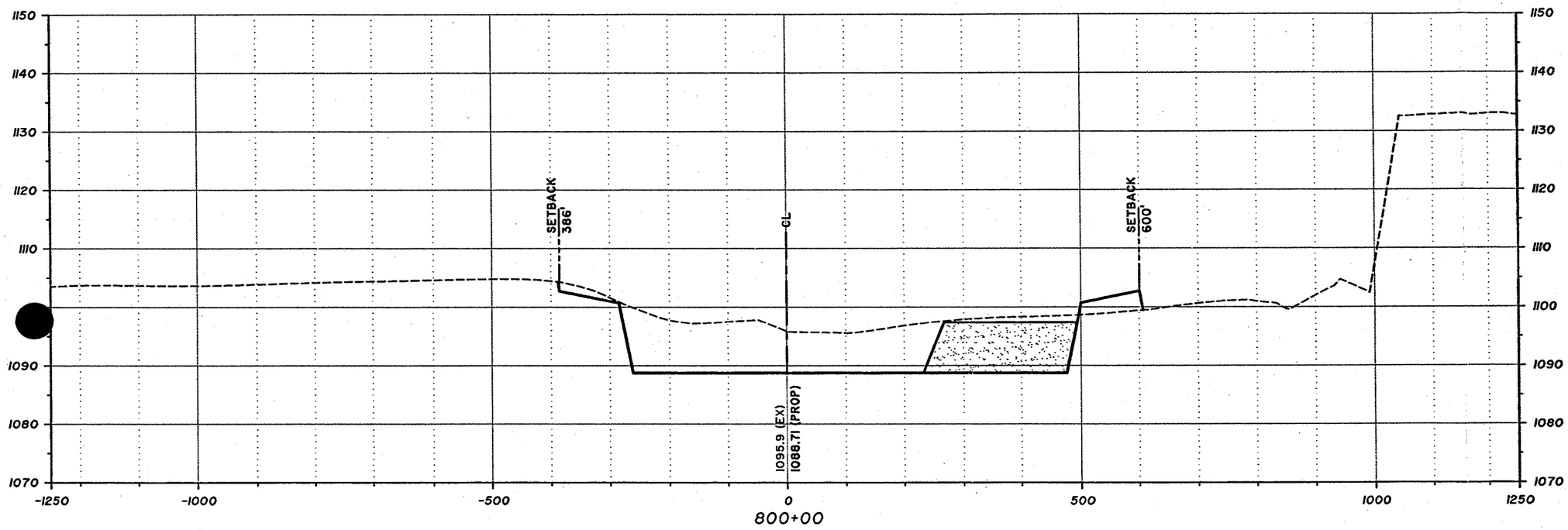

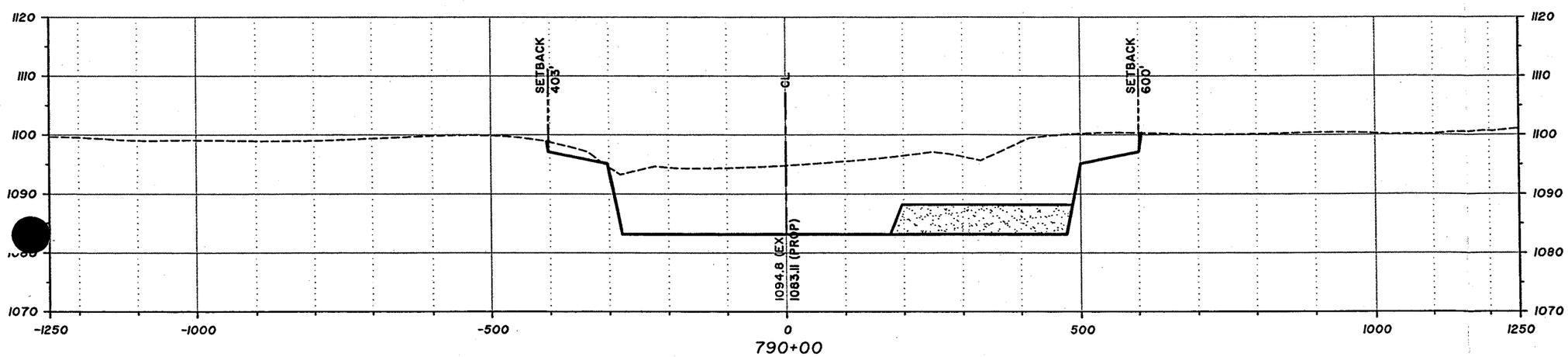

Sta 790+00 - Sta 800+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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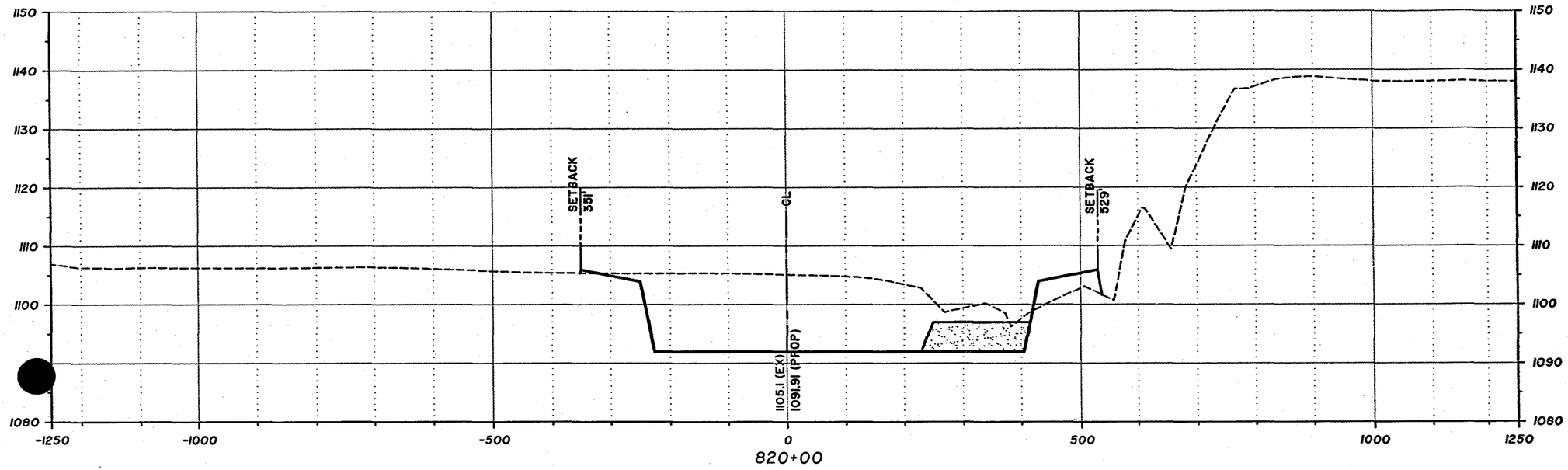

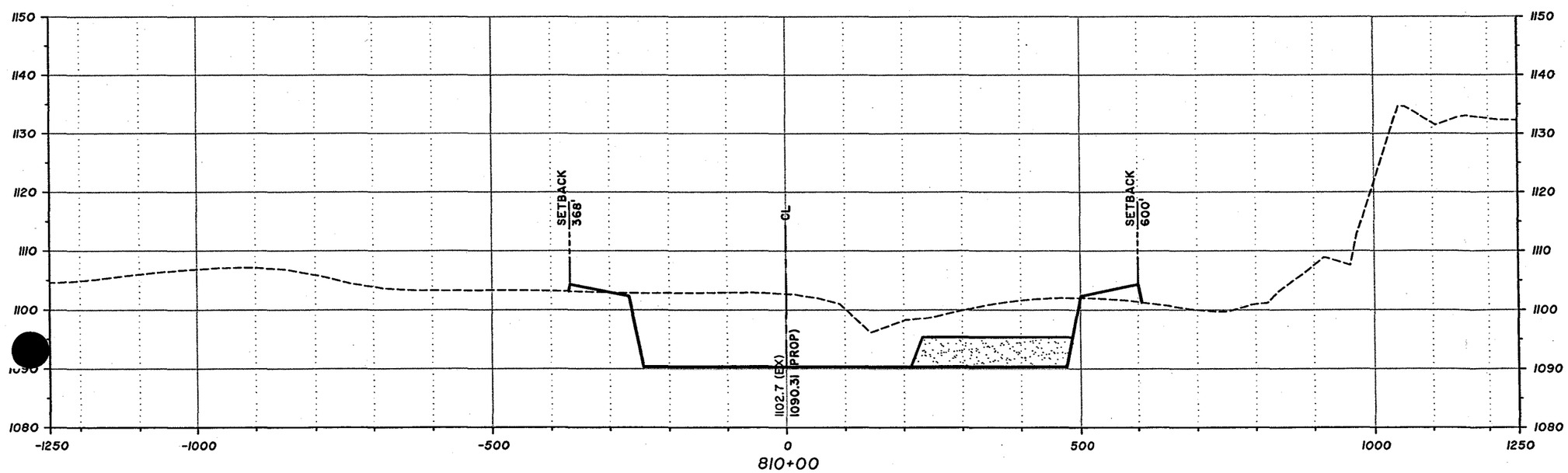

Sta 810+00 - Sta 820+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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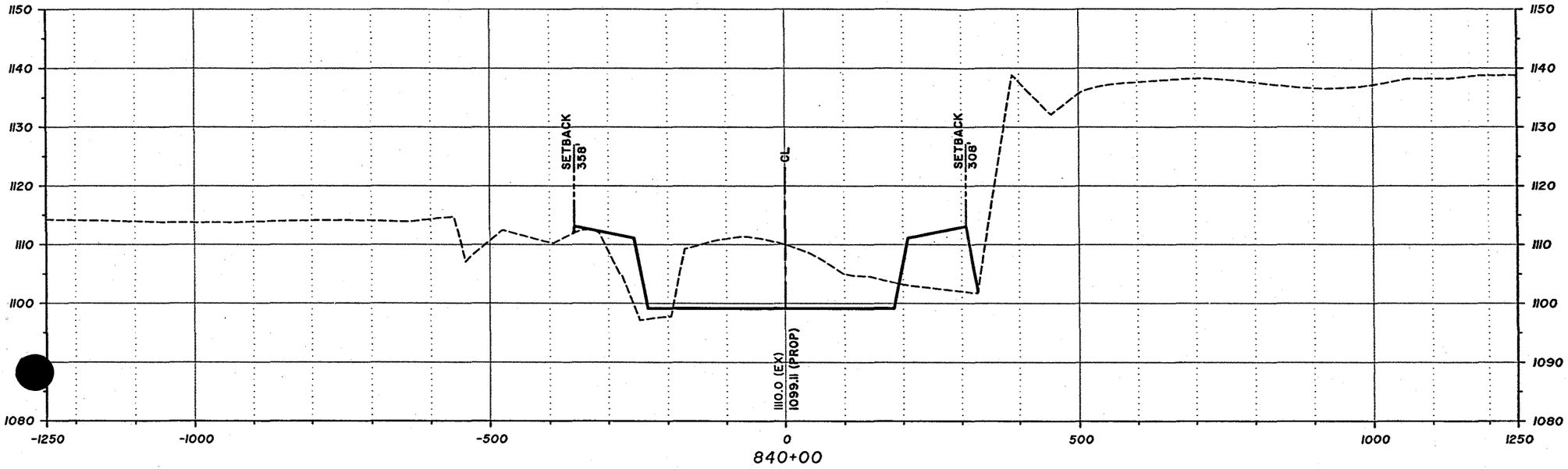

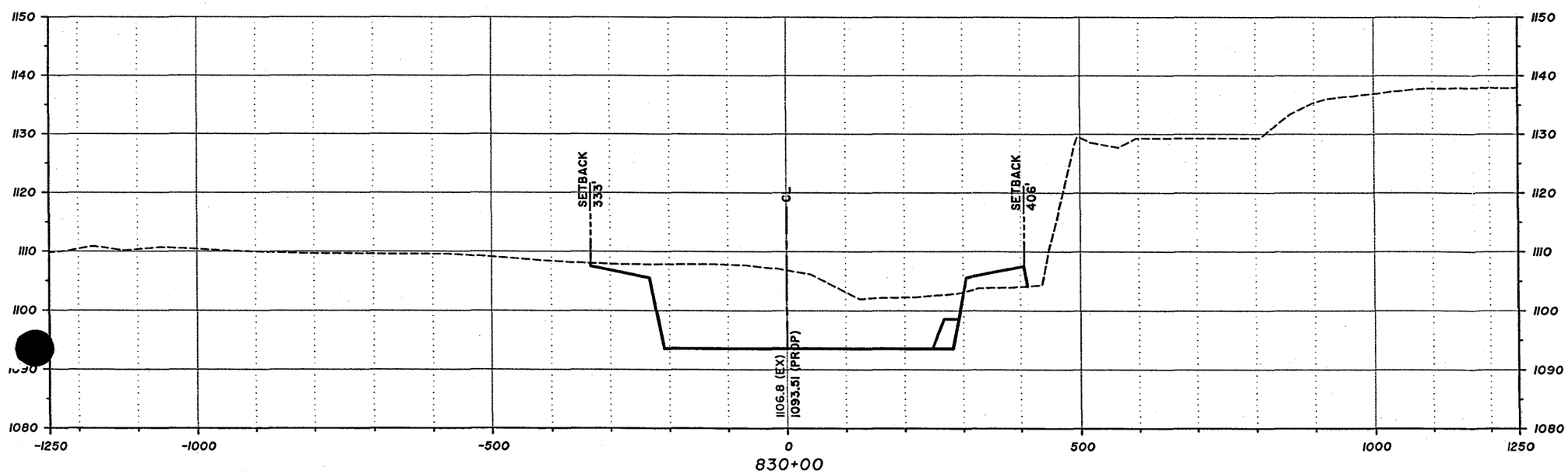

Sta 830+00 - Sta 840+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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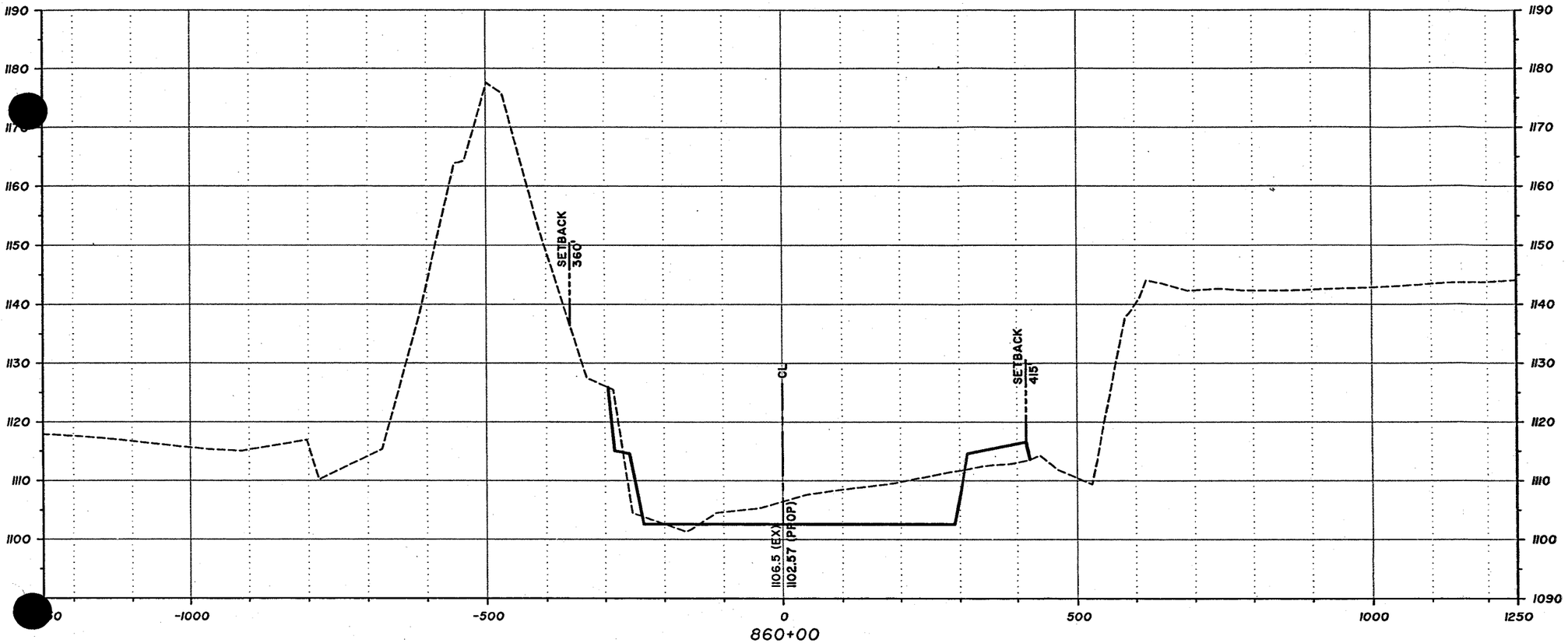

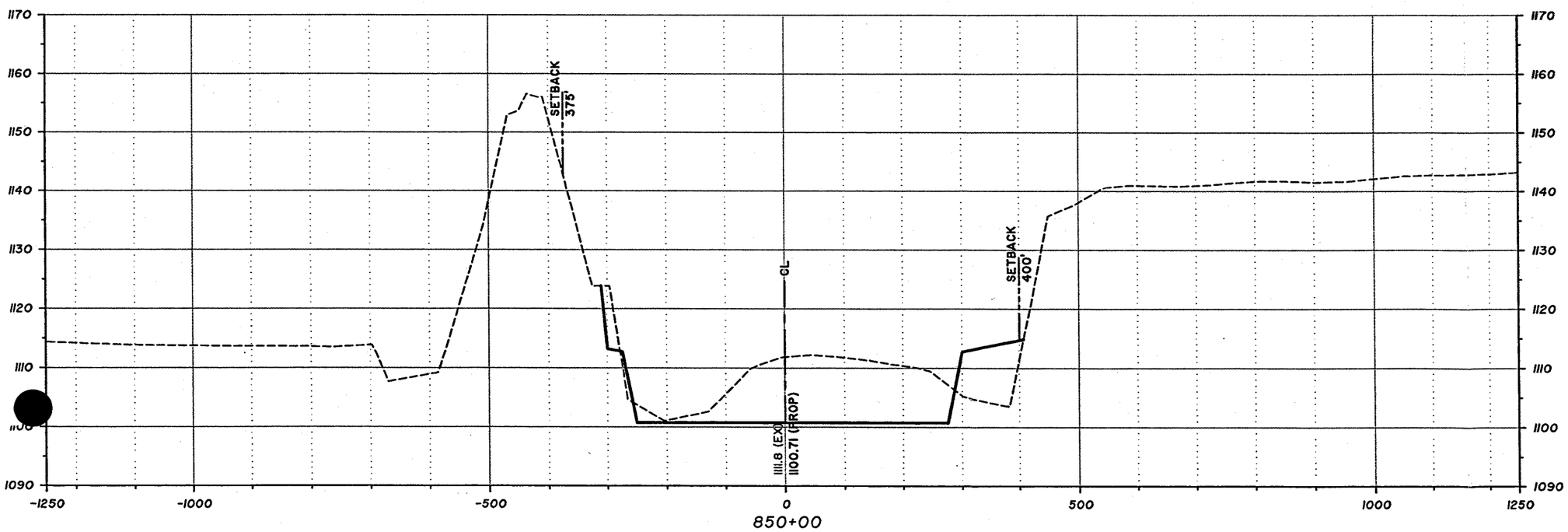

Sta 850+00 - Sta 860+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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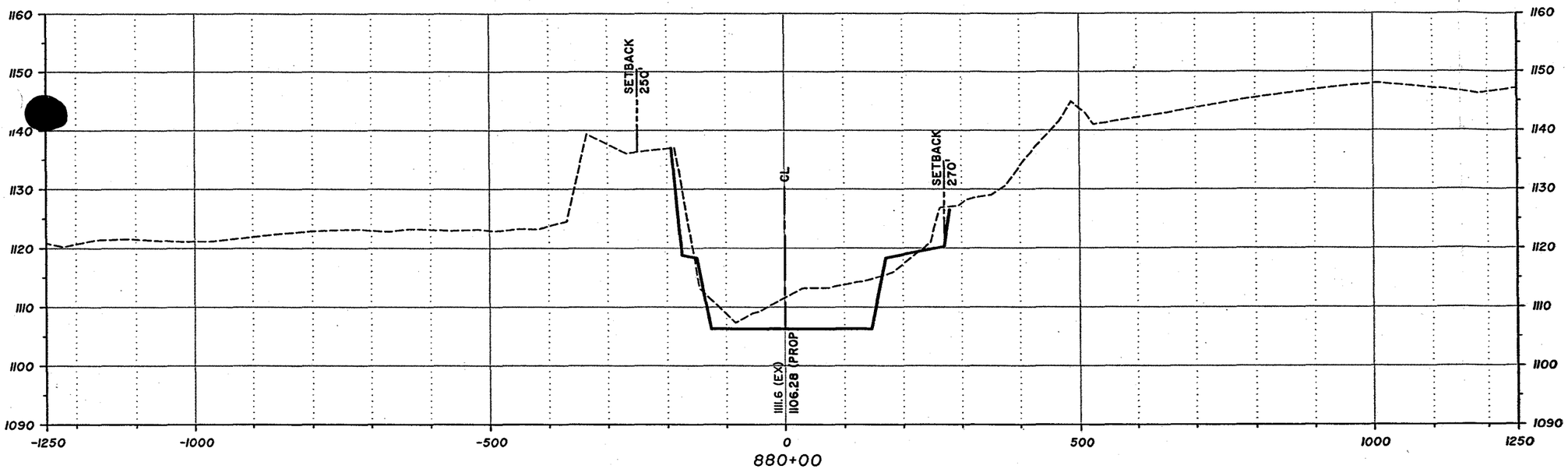

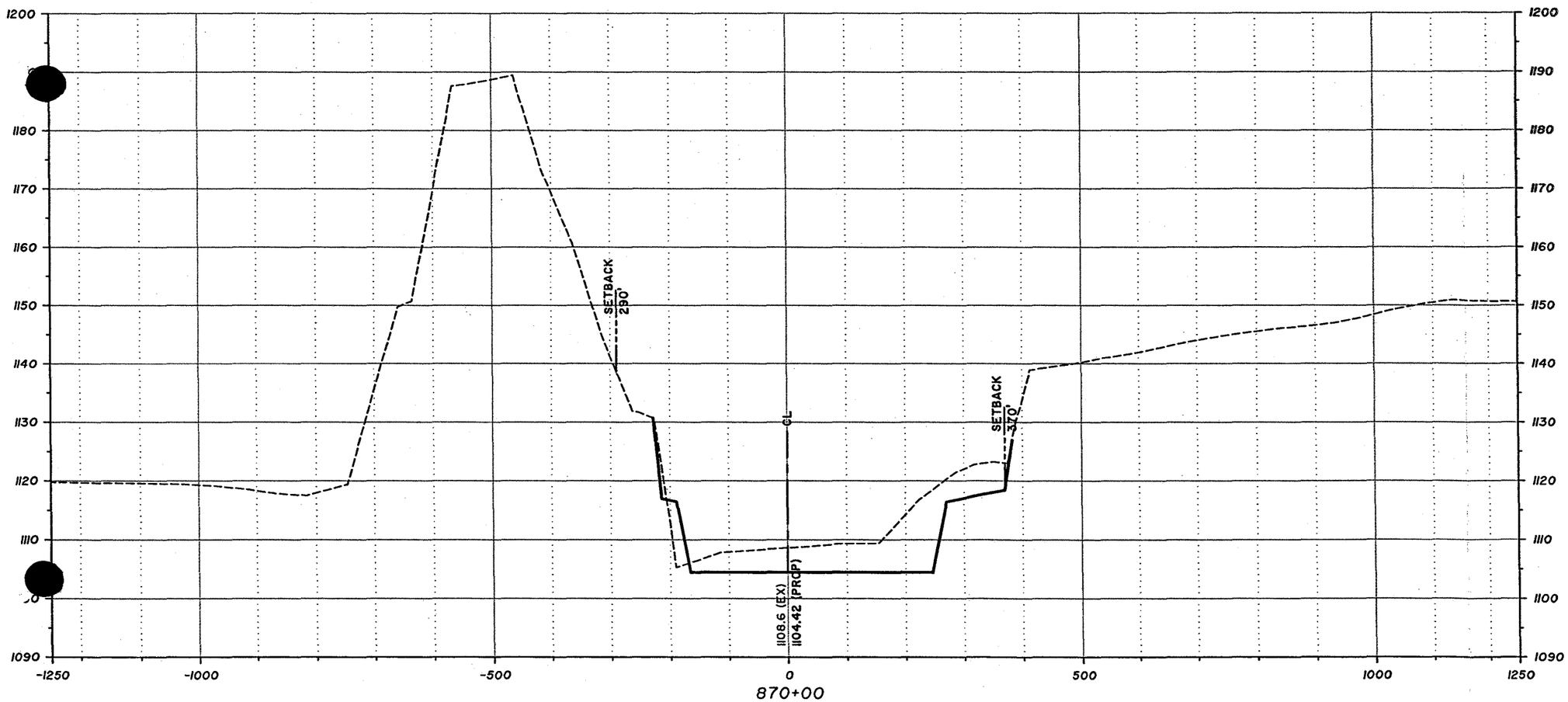

Sta 870+00 - Sta 880+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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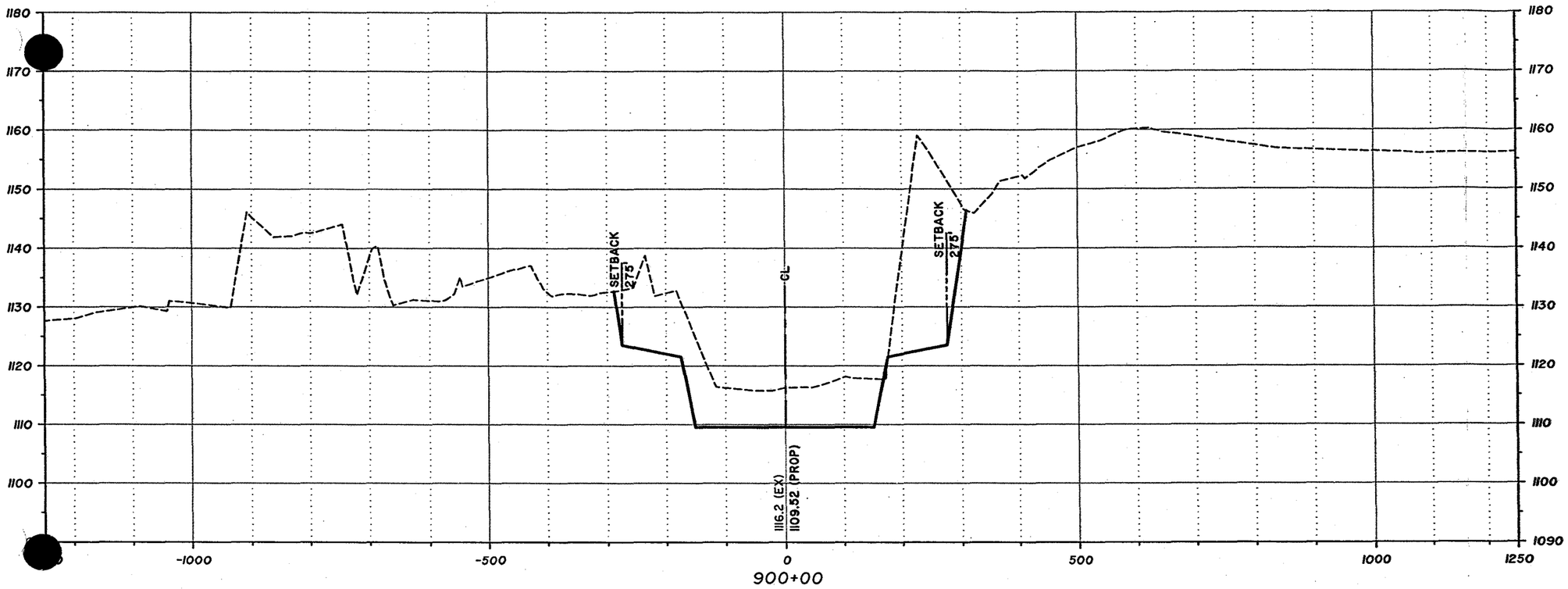

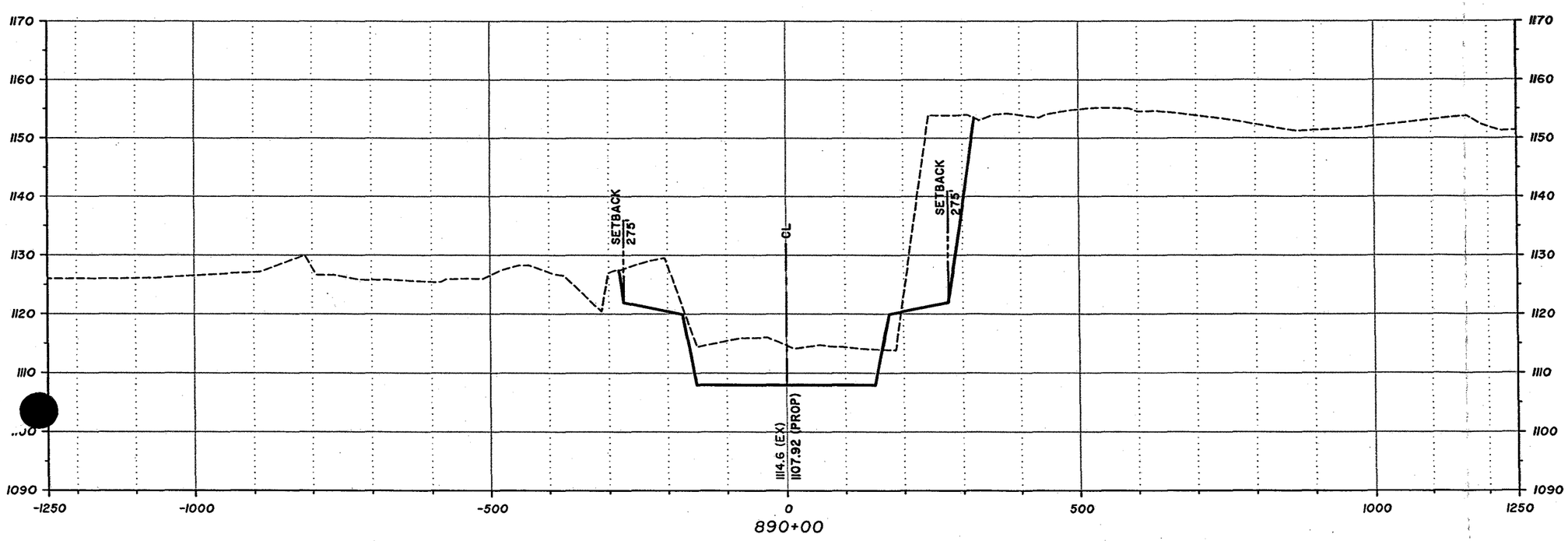

Sta 890+00 - Sta 900+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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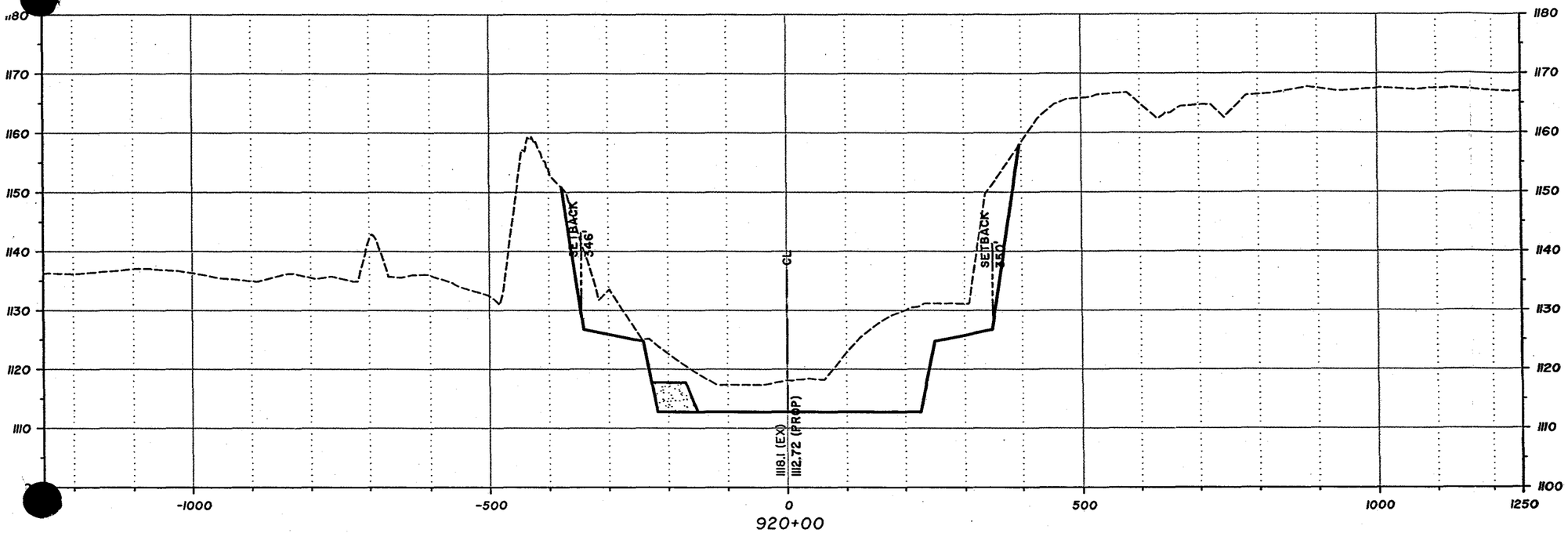

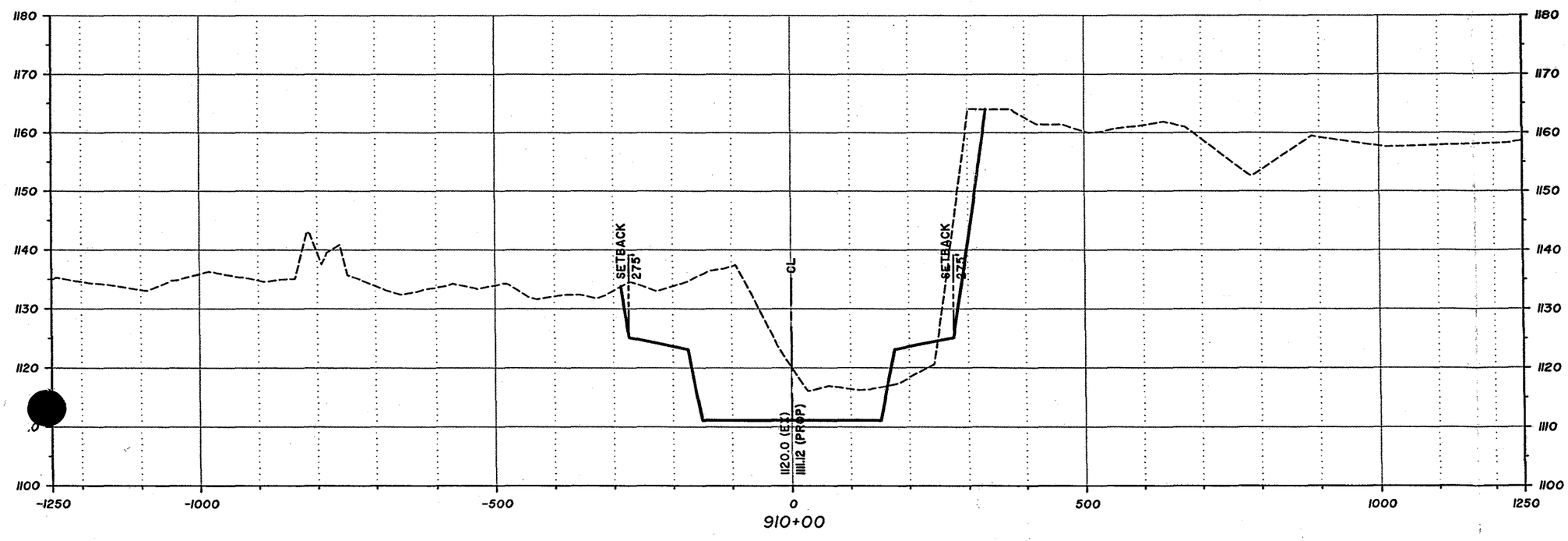

Sta 910+00 - Sta 920+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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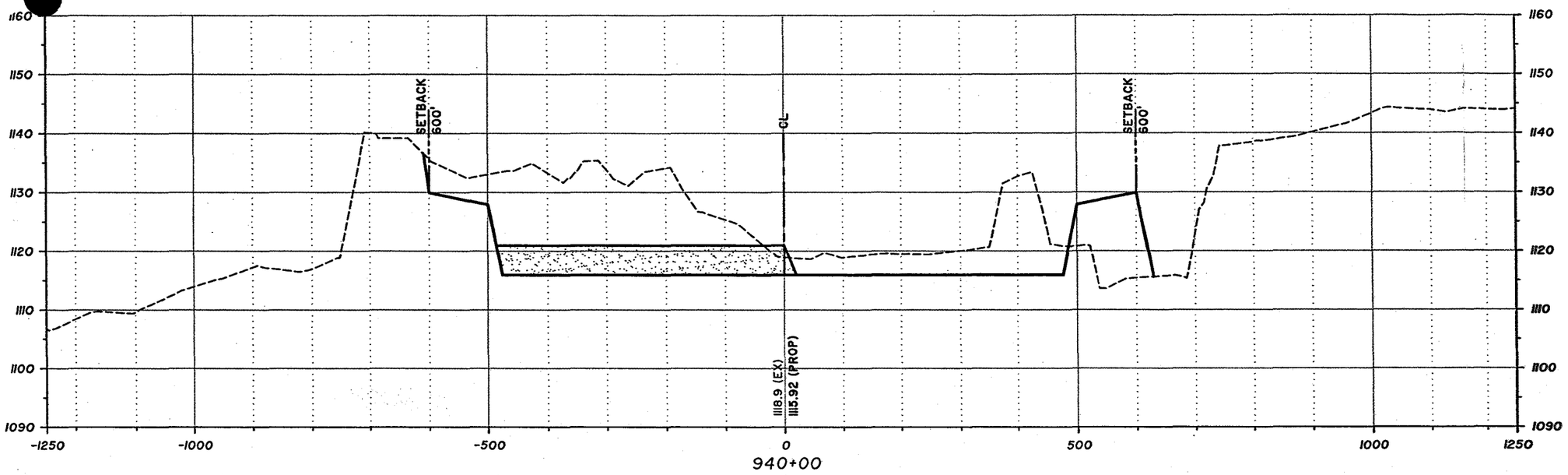

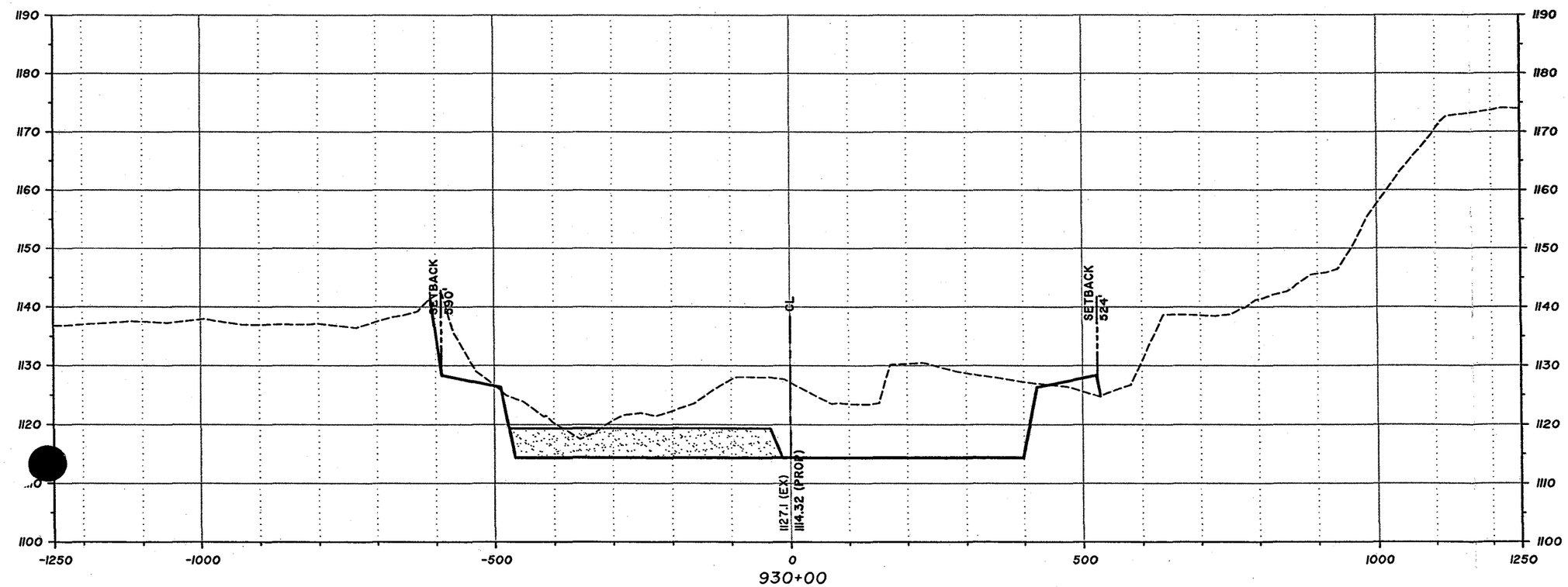

Sta 930+00 - Sta 940+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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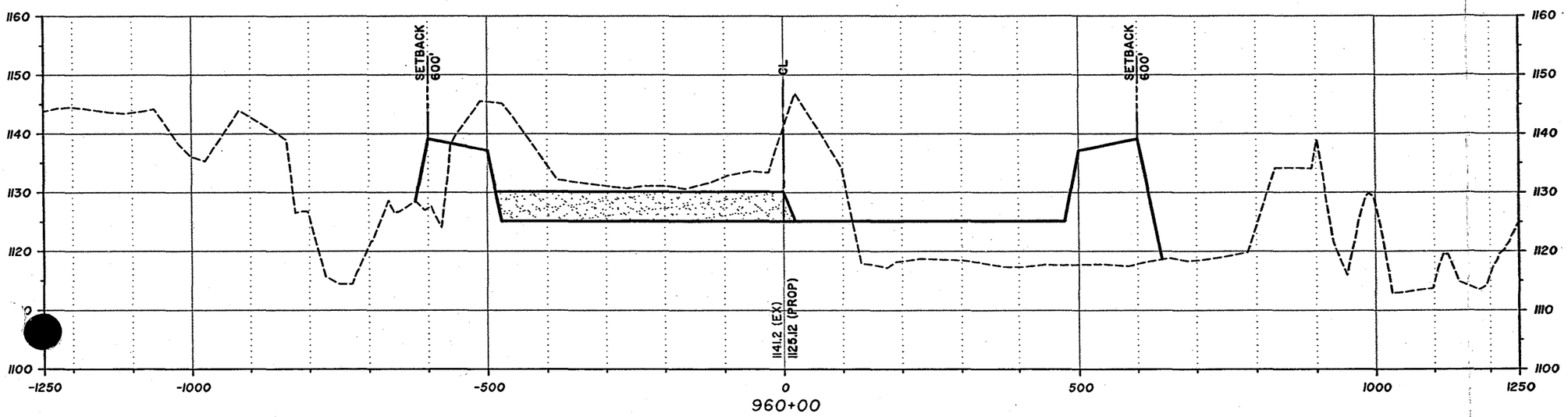

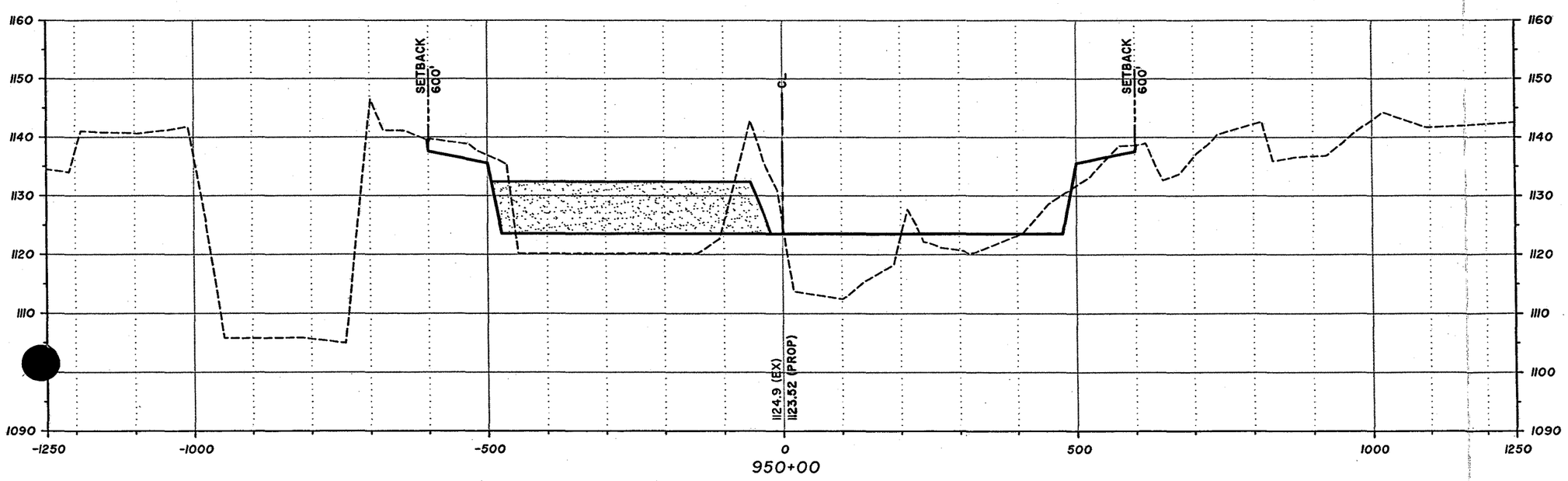

Sta 950+00 - Sta 960+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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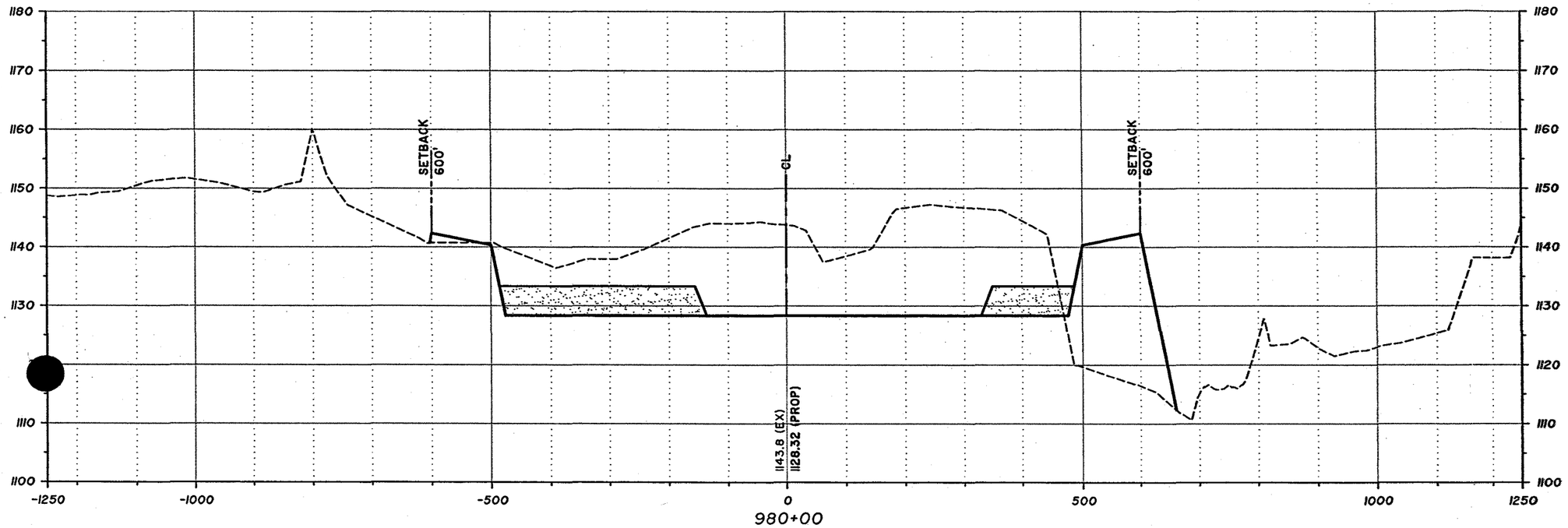

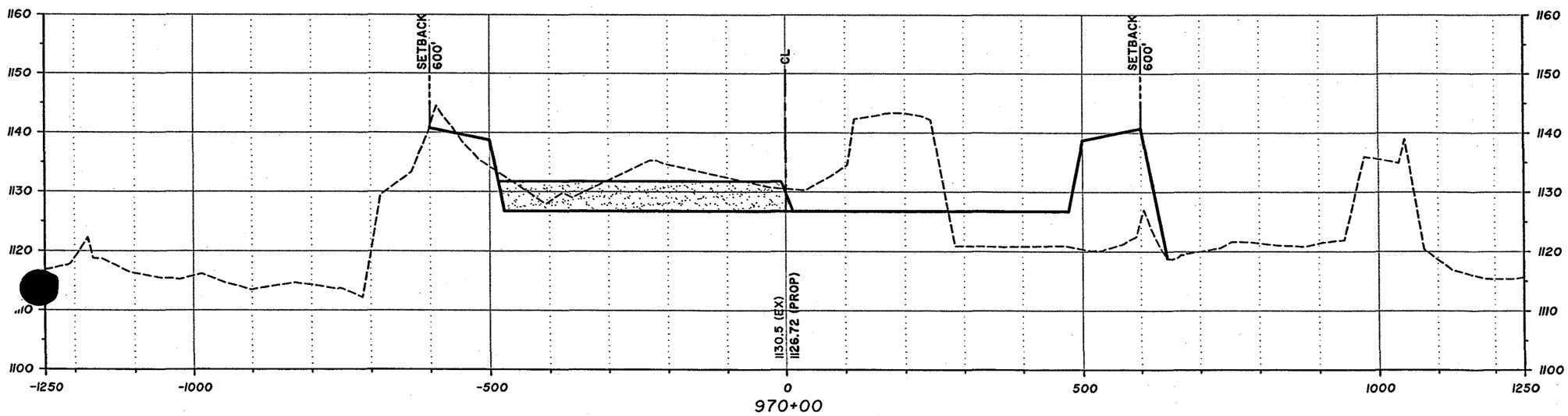

Sta 970+00 - Sta 980+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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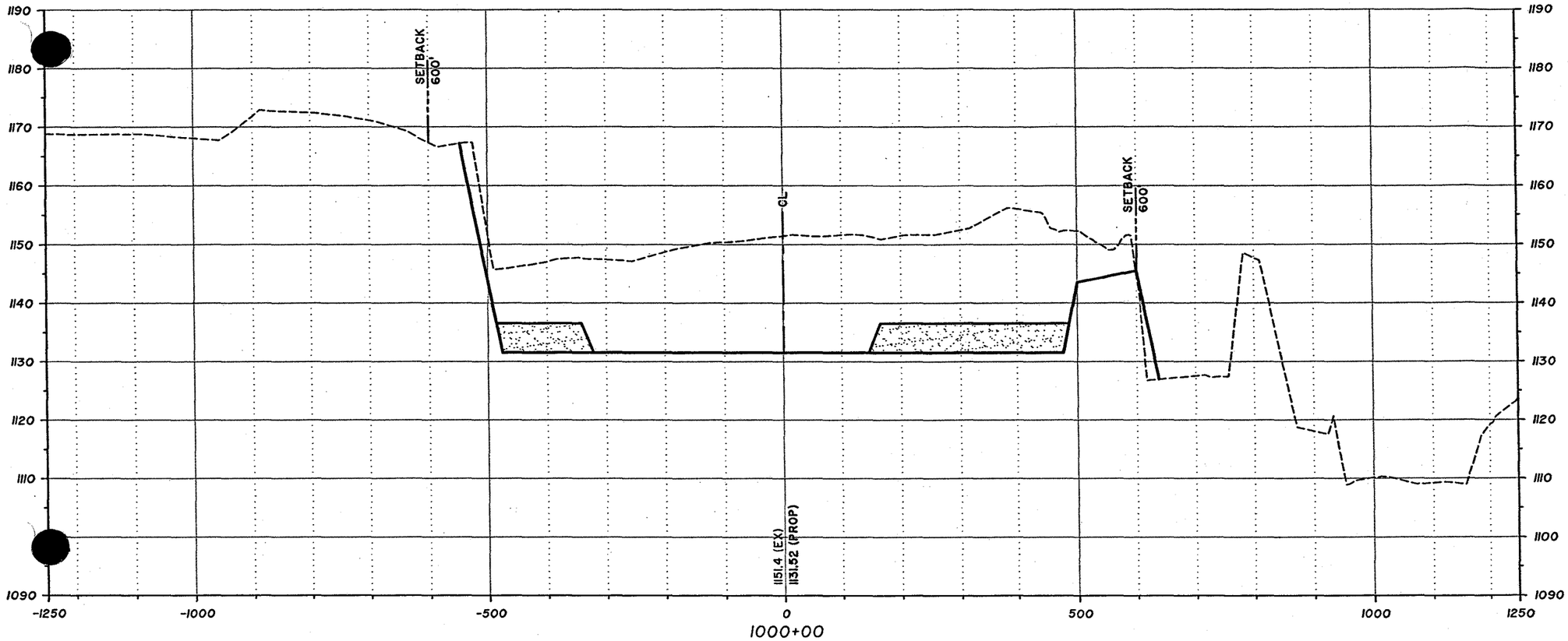

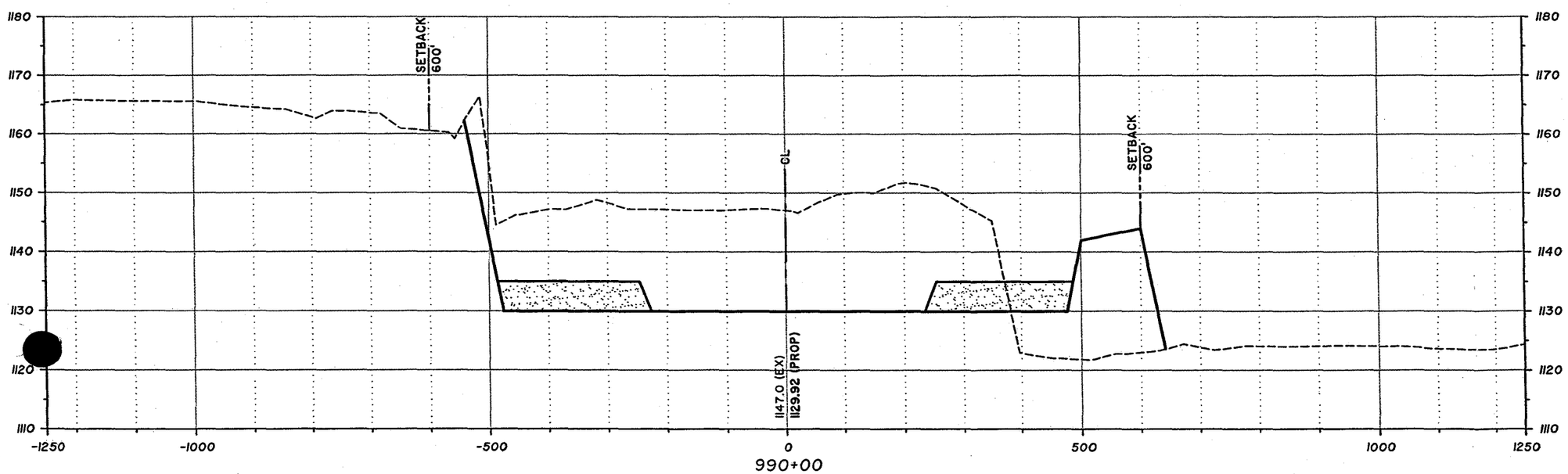

Sta 990+00 - Sta 1000+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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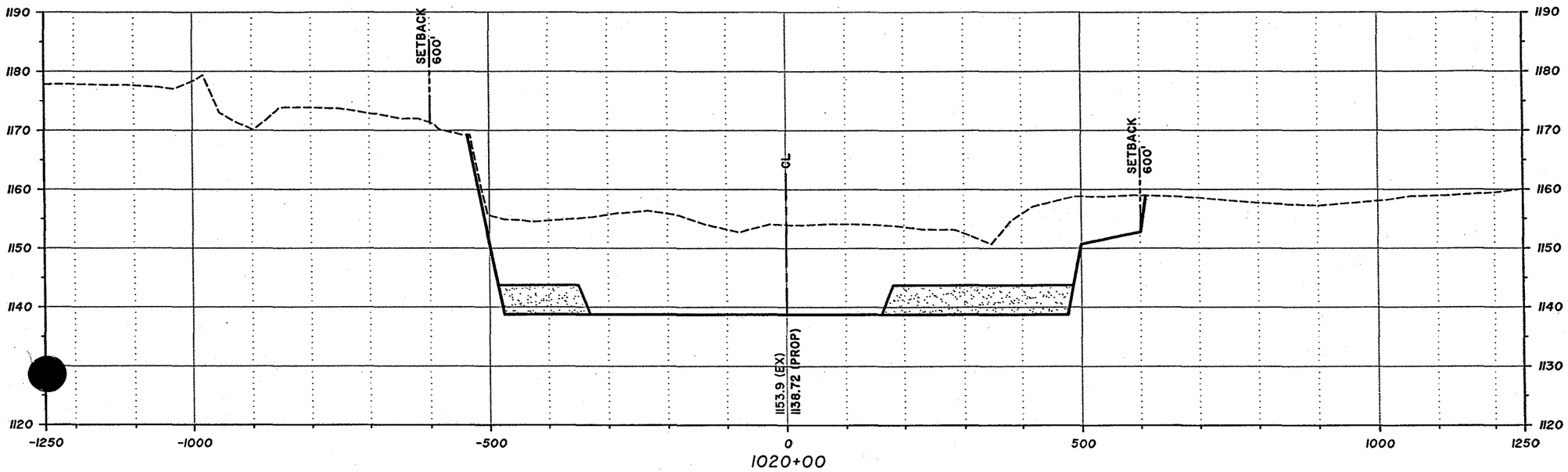

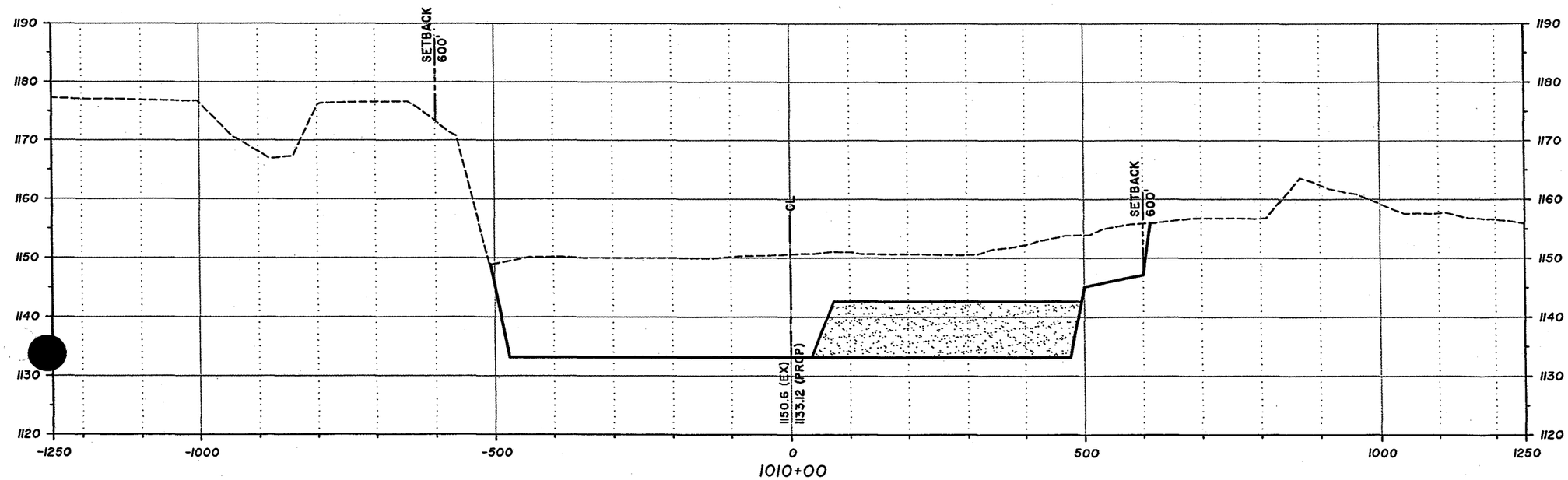

Sta 1010+00 - Sta 1020+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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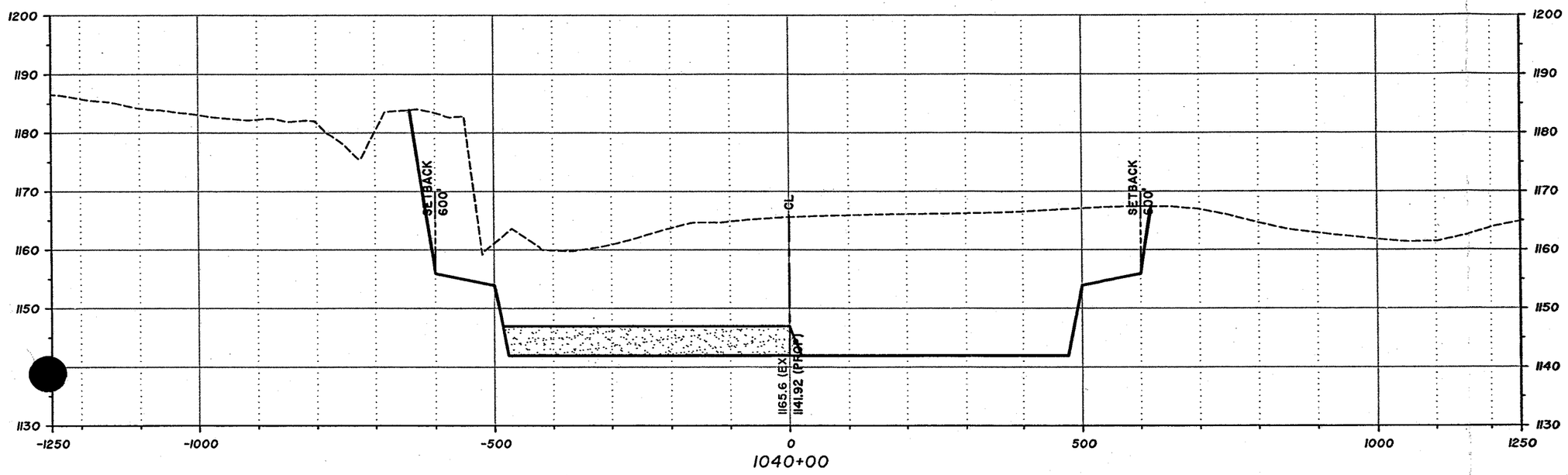

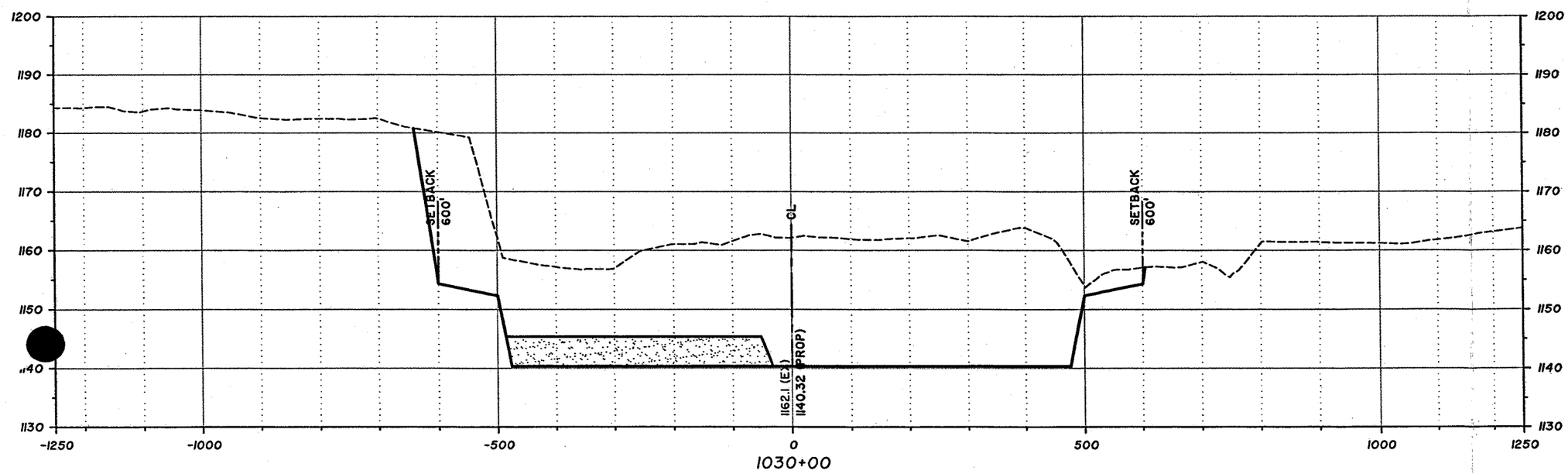

Sta. 1030+00 - Sta 1040+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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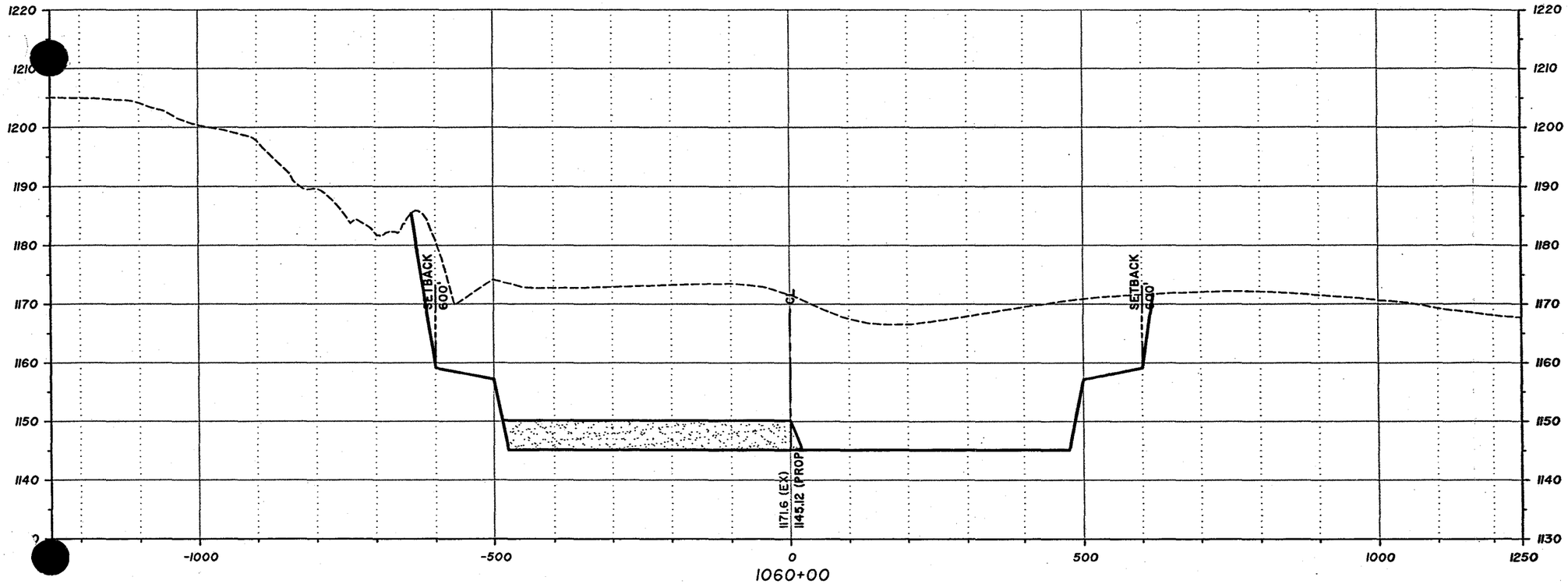

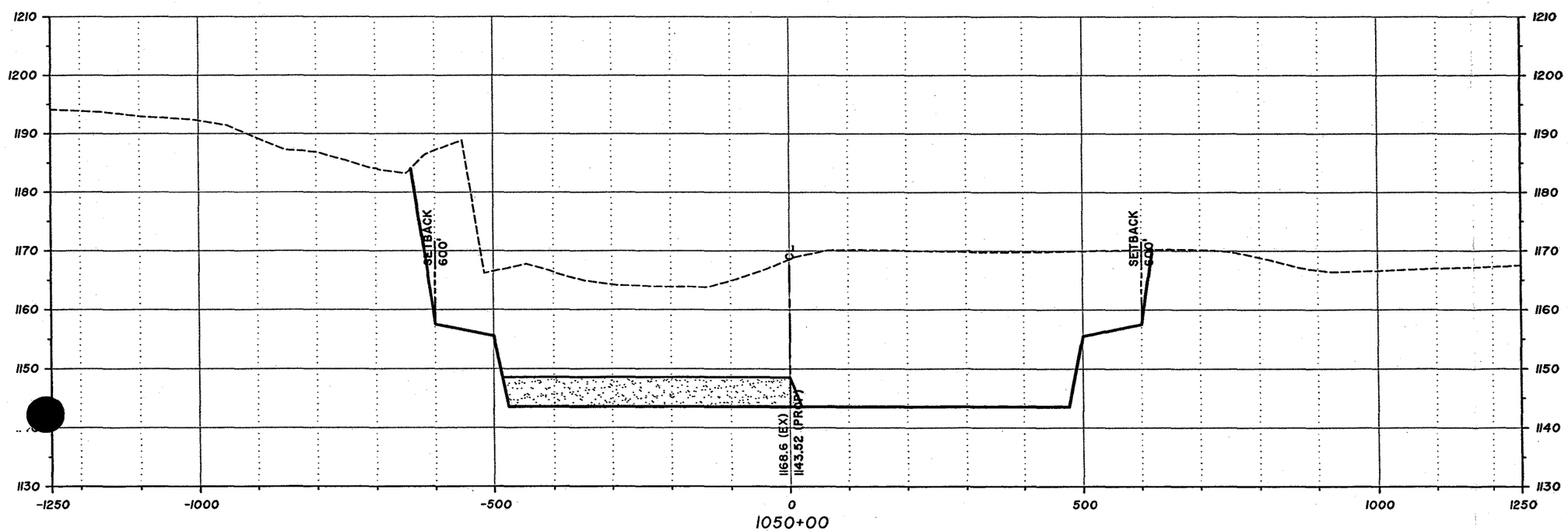

Sta 1050+00 - Sta 1060+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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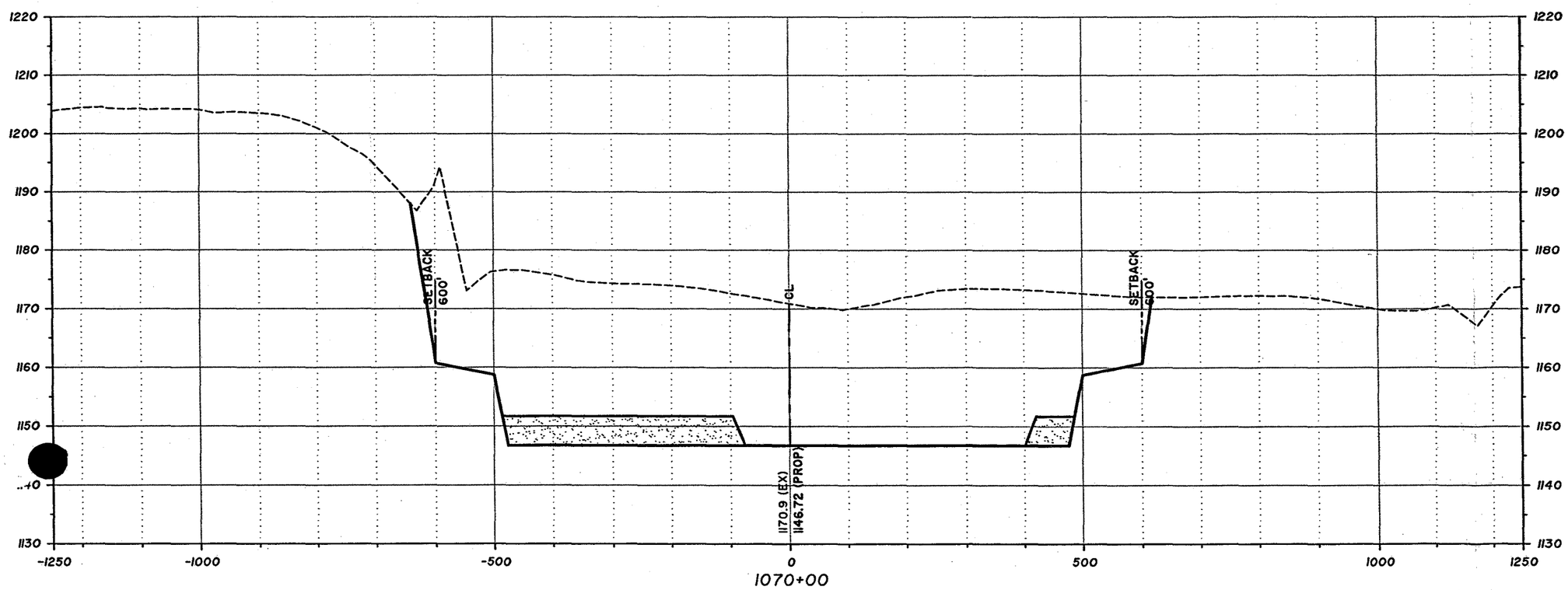

Sta 1070+00 - Sta 1070+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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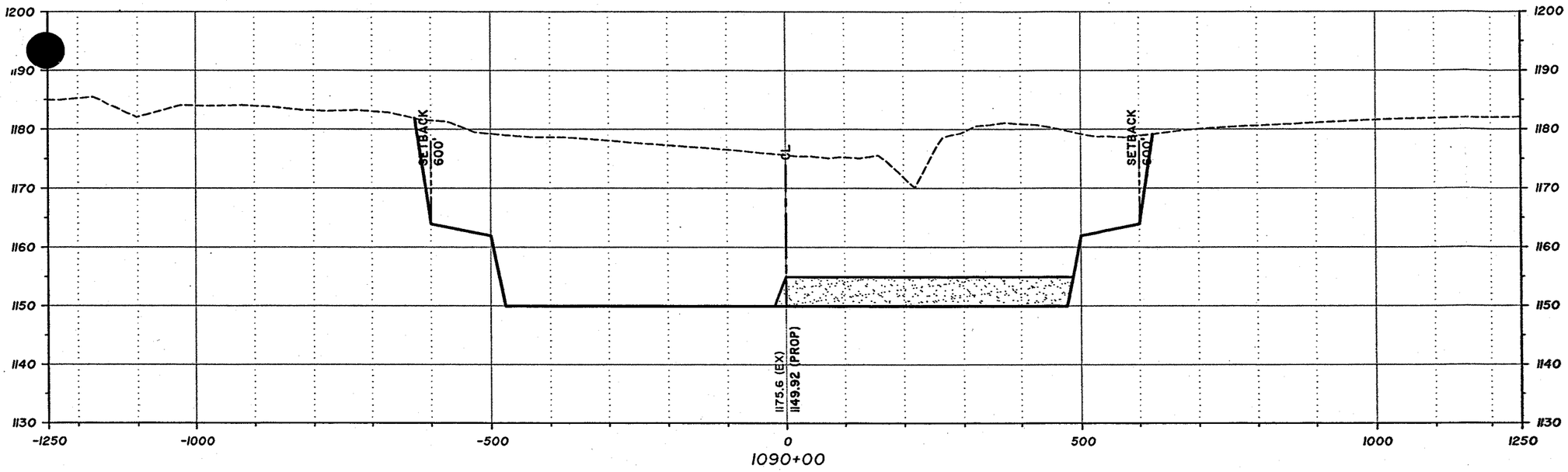

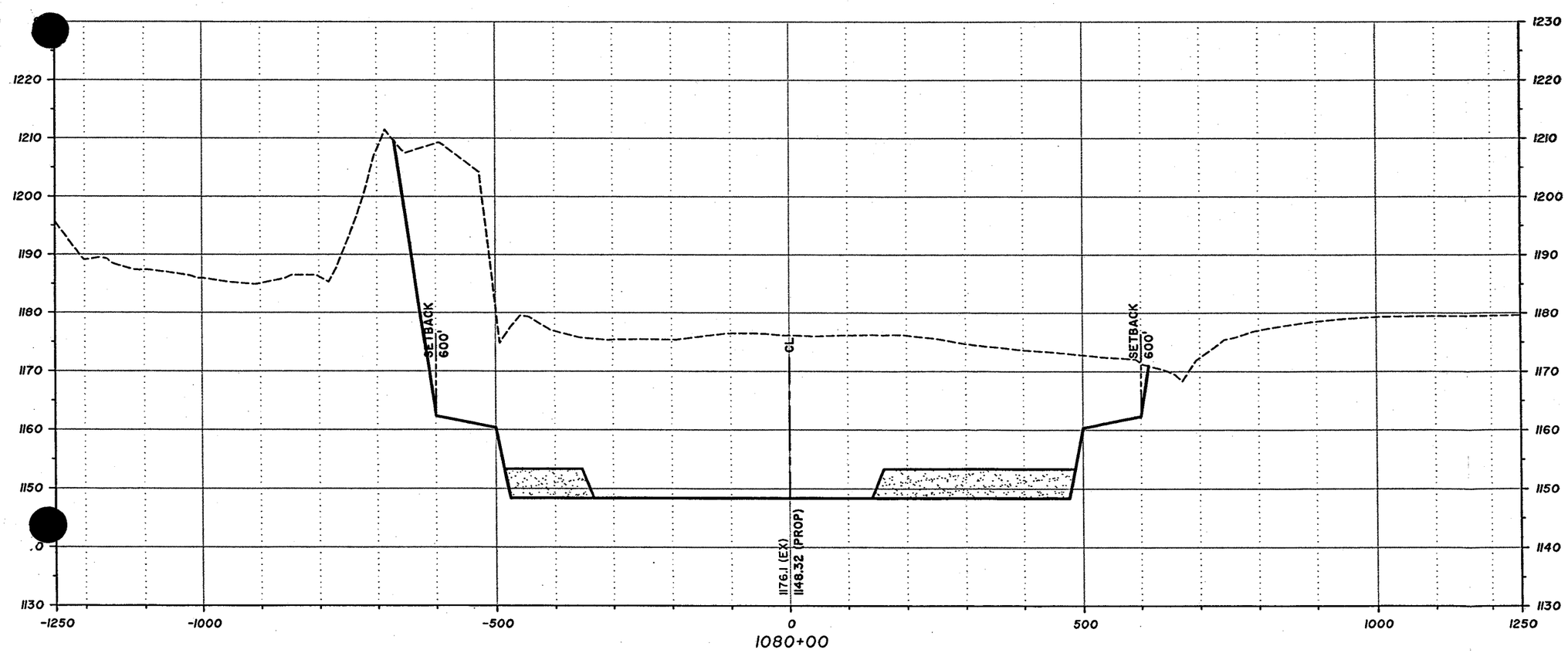

Sta 1080+00 - Sta 1090+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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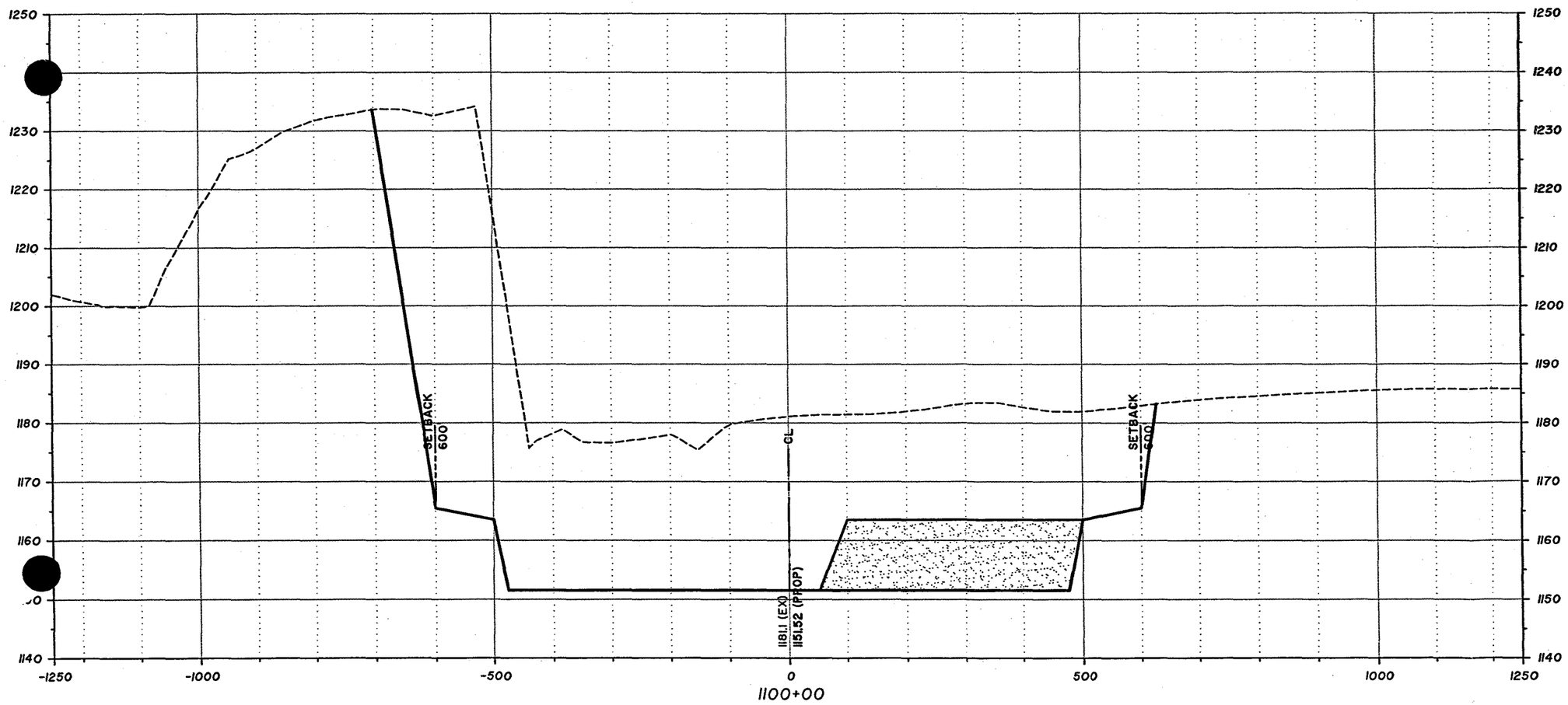
West Valley Recreation Corridor
Agua Fria River
Conceptual Cross Sections



Sta 1100+00 - Sta 1100+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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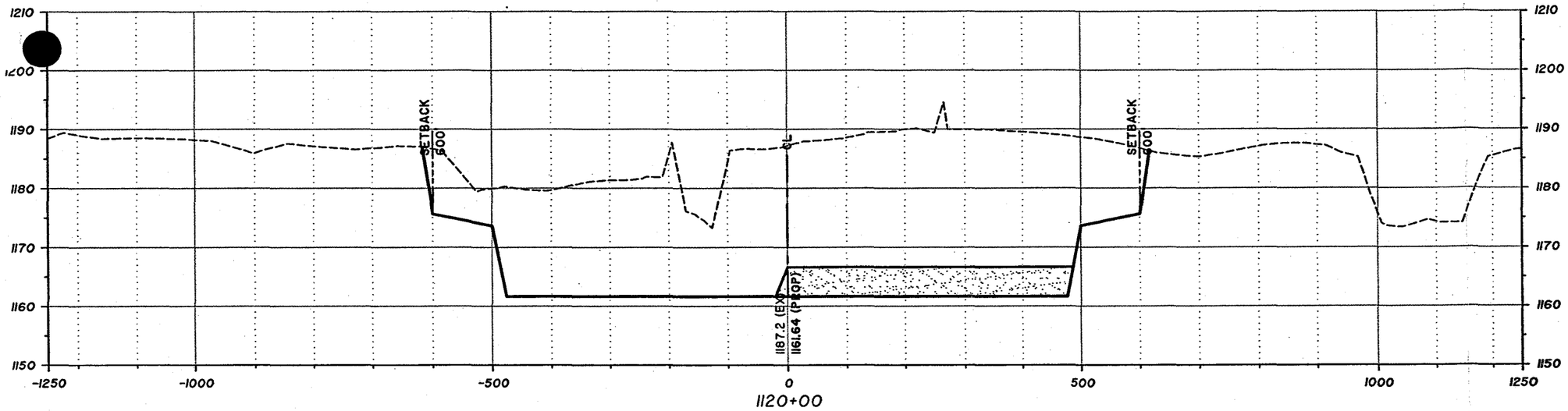

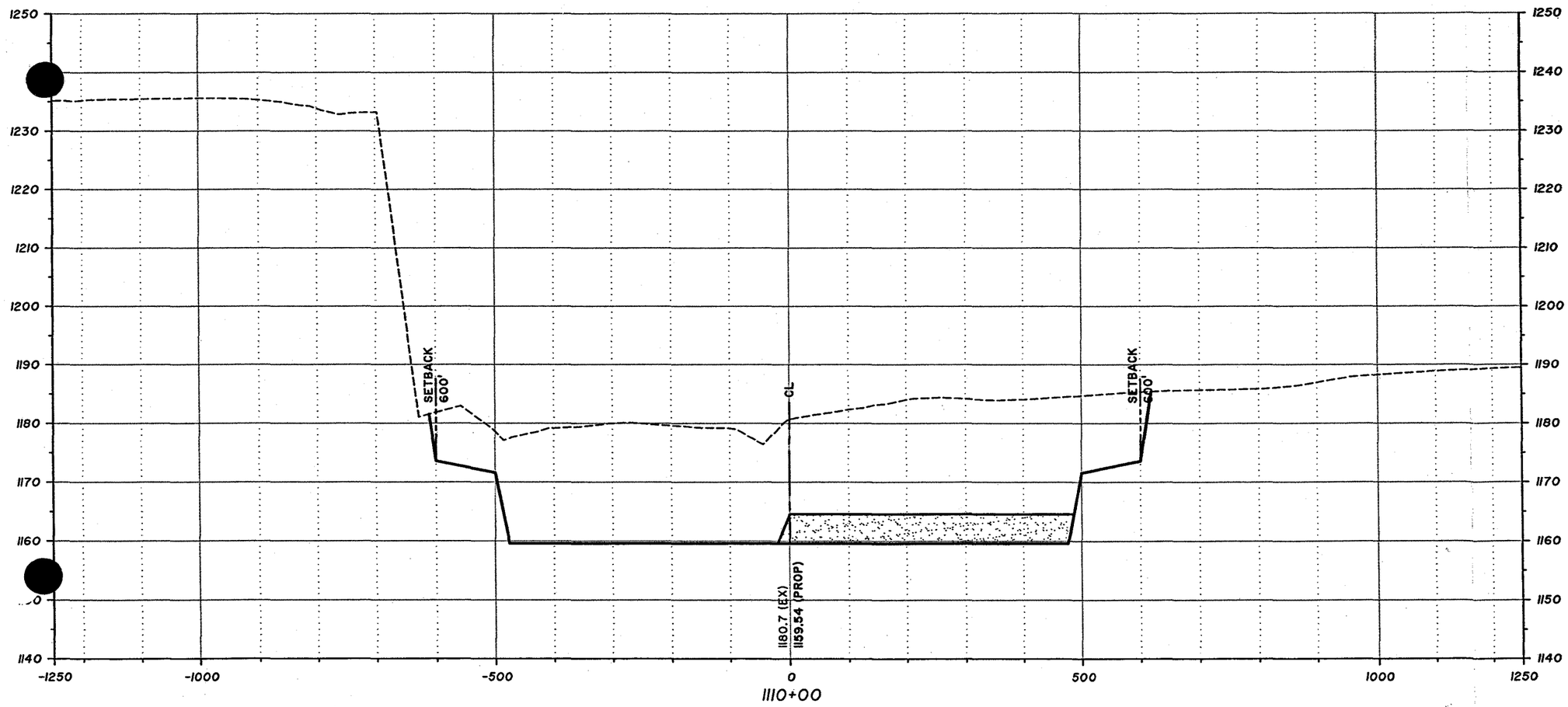

Sta 1110+00 - Sta 1120+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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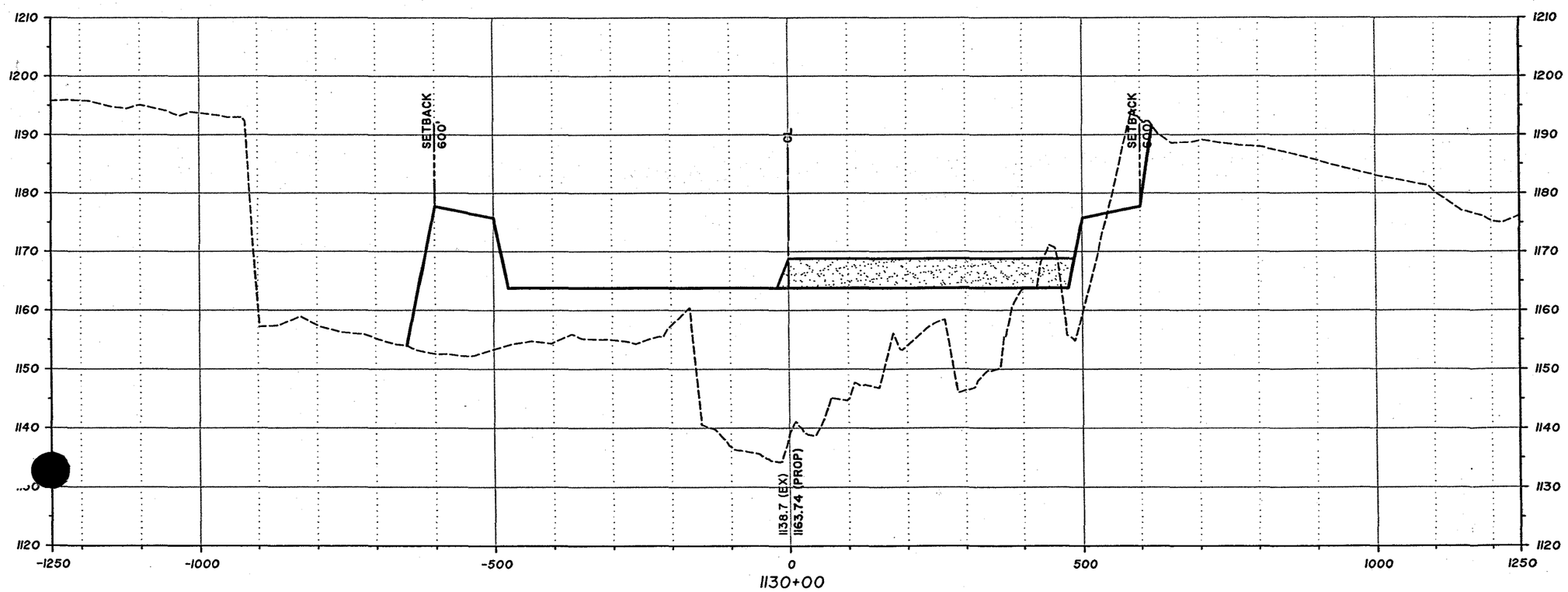
Sta 1130+00 - Sta 1130+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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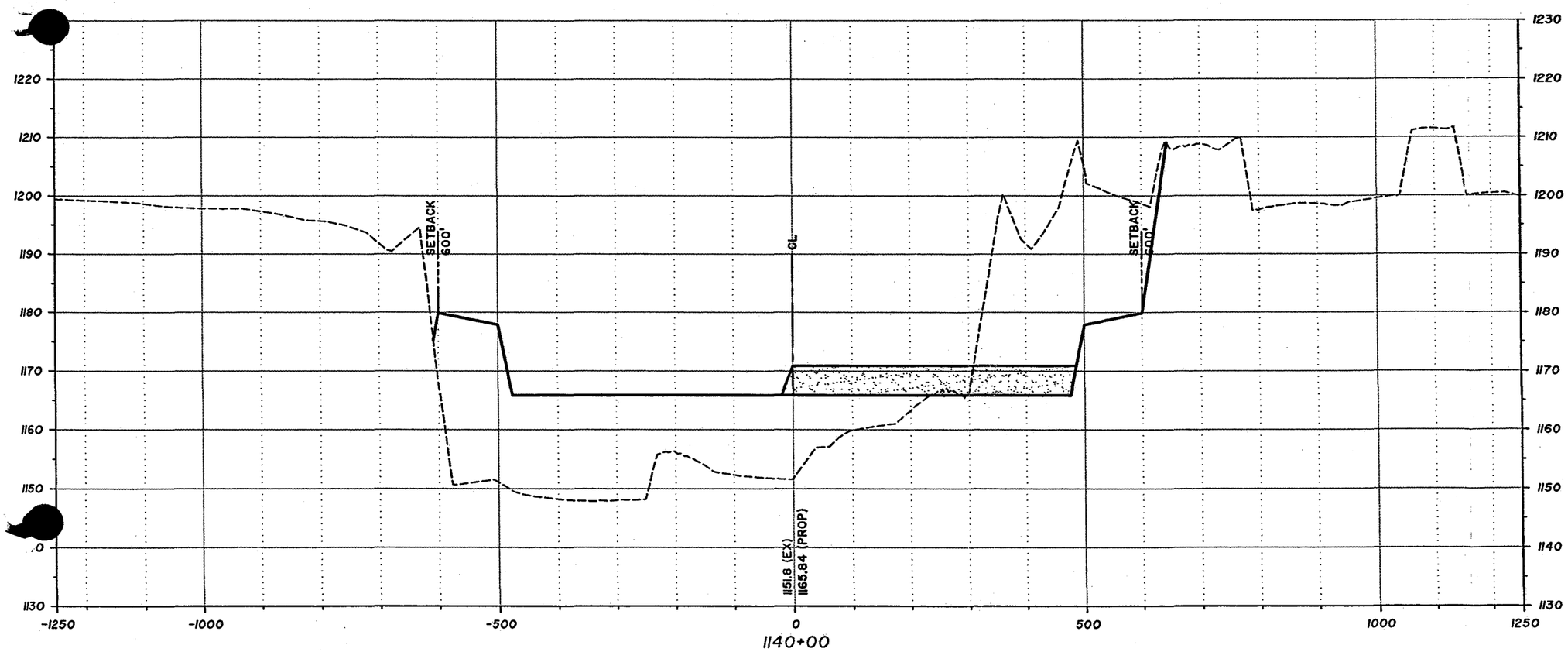
Sta 1140+00 - Sta 1140+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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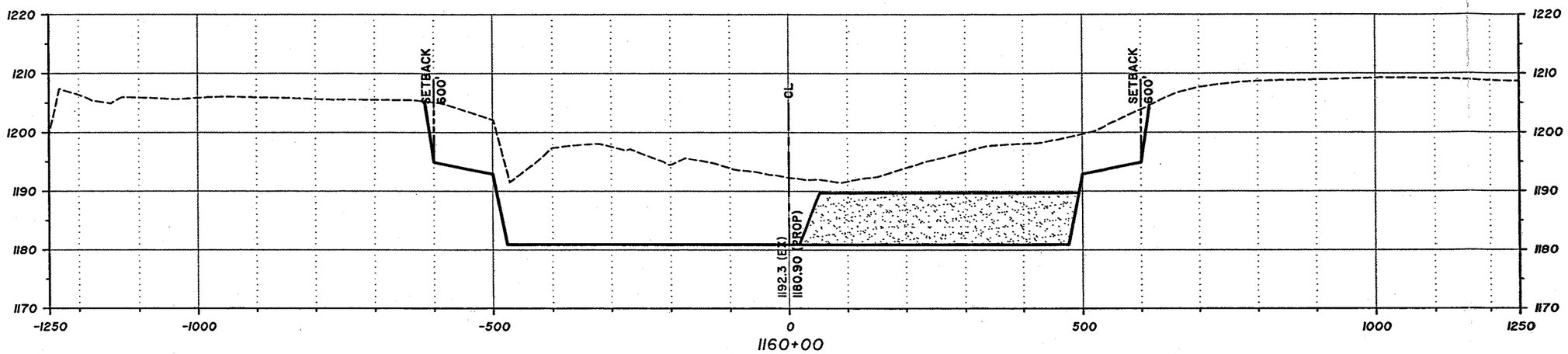
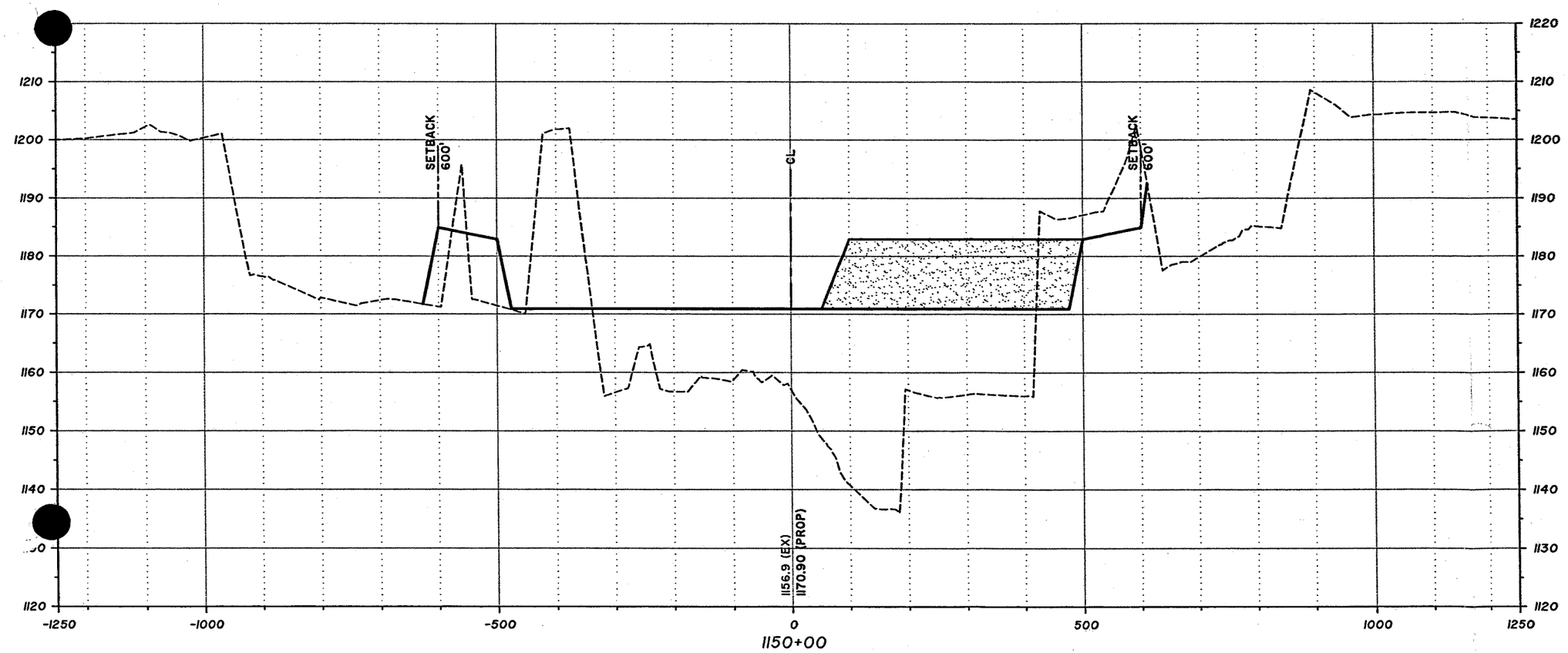
Conceptual Cross Sections





Sta 1150+00 - Sta 1160+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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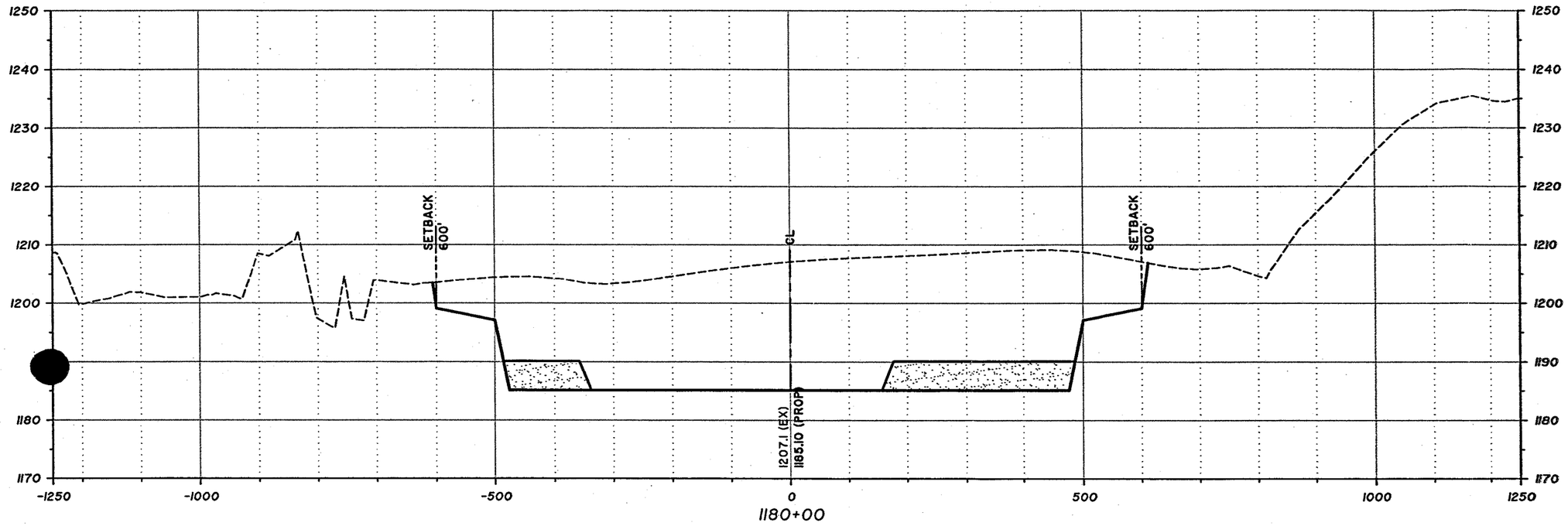

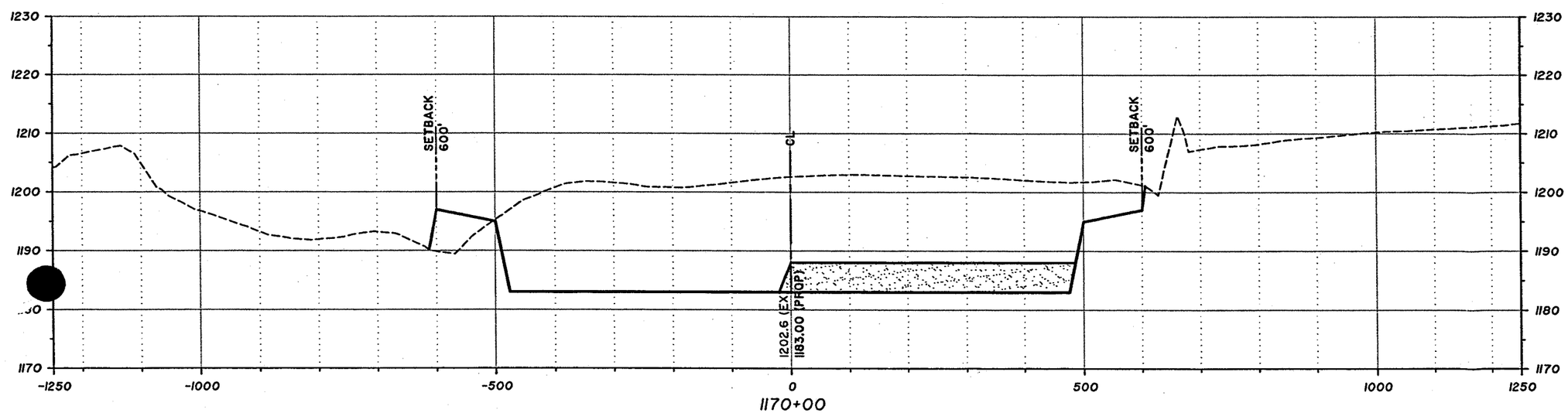

Sta 1170+00 - Sta 1180+00

100' 0' 100' 200'
SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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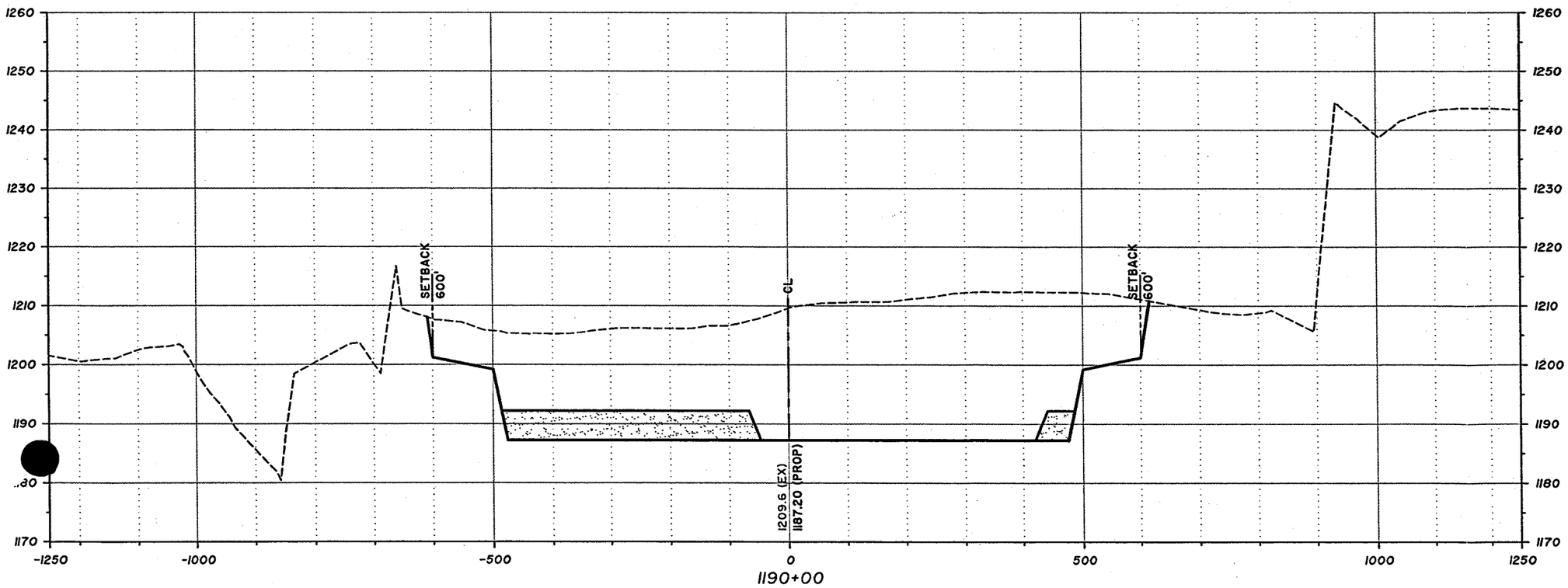
Sta 1190+00 - Sta 1190+00



100' 0' 100' 200'
SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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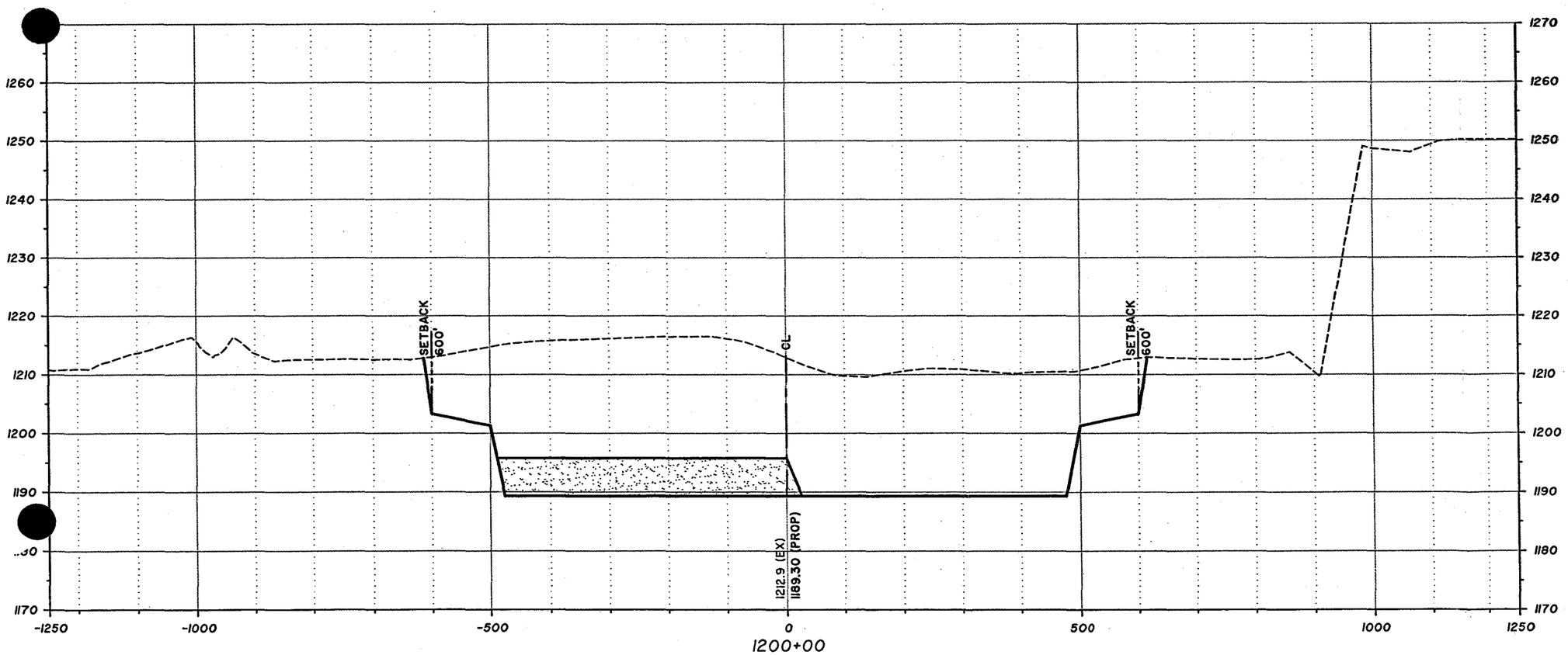
Sta 1200+00 - Sta 1200+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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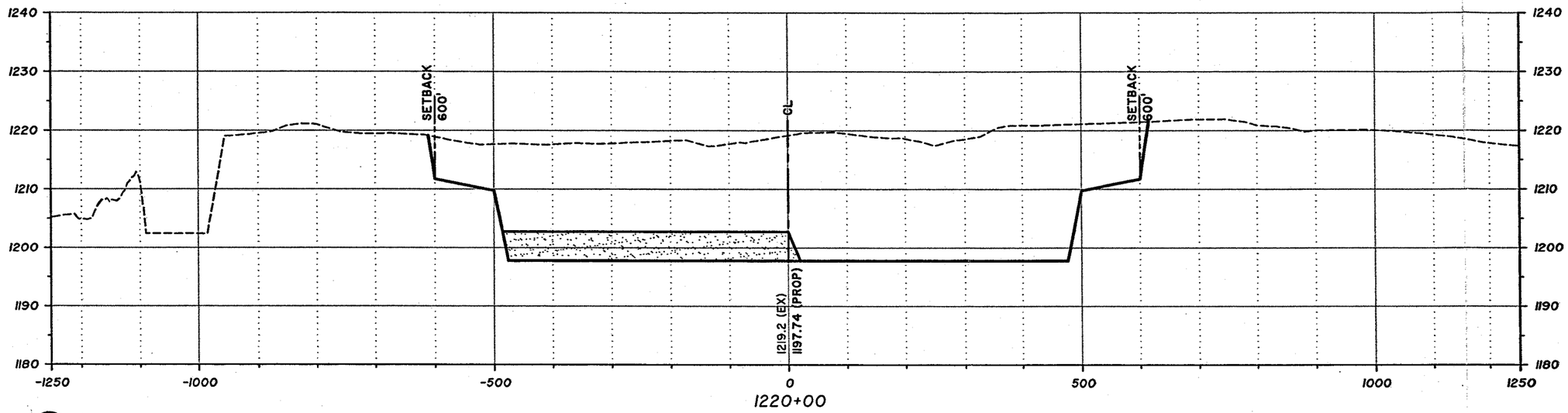

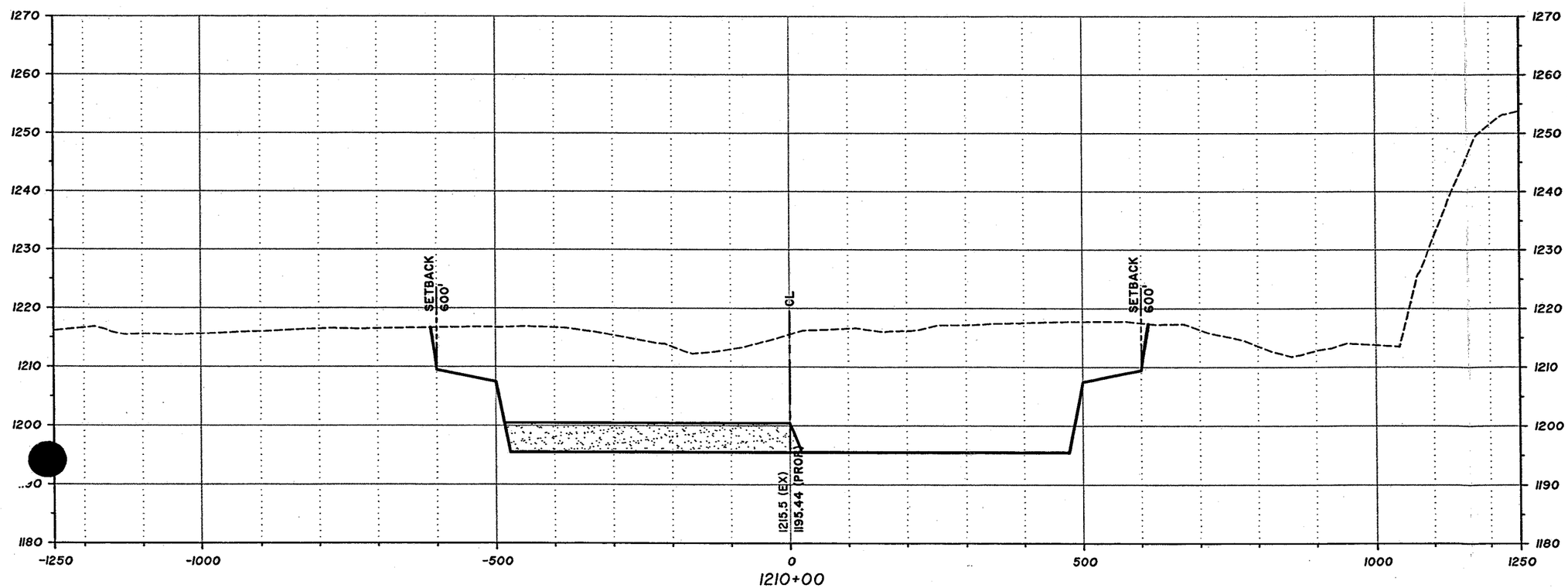

Sta 1210+00 - Sta 1220+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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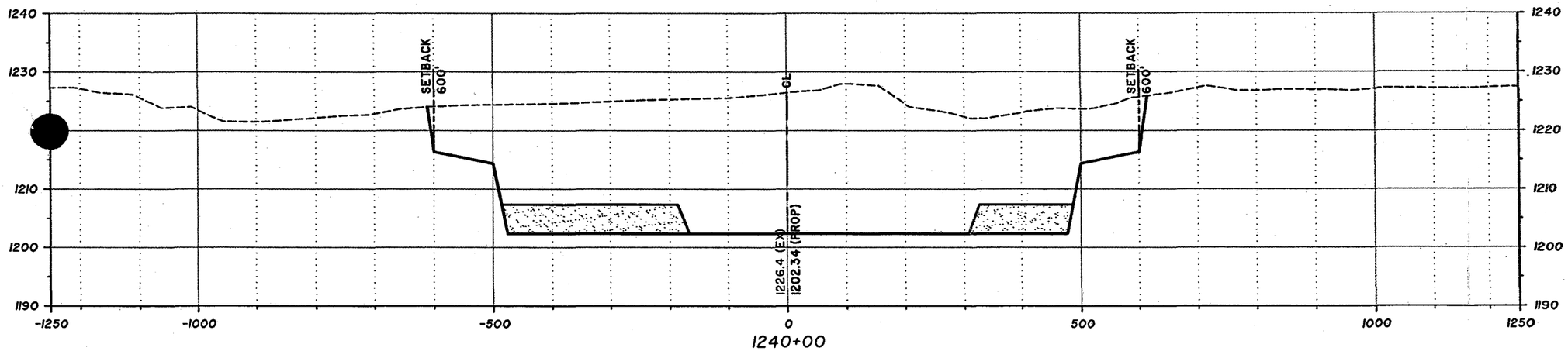

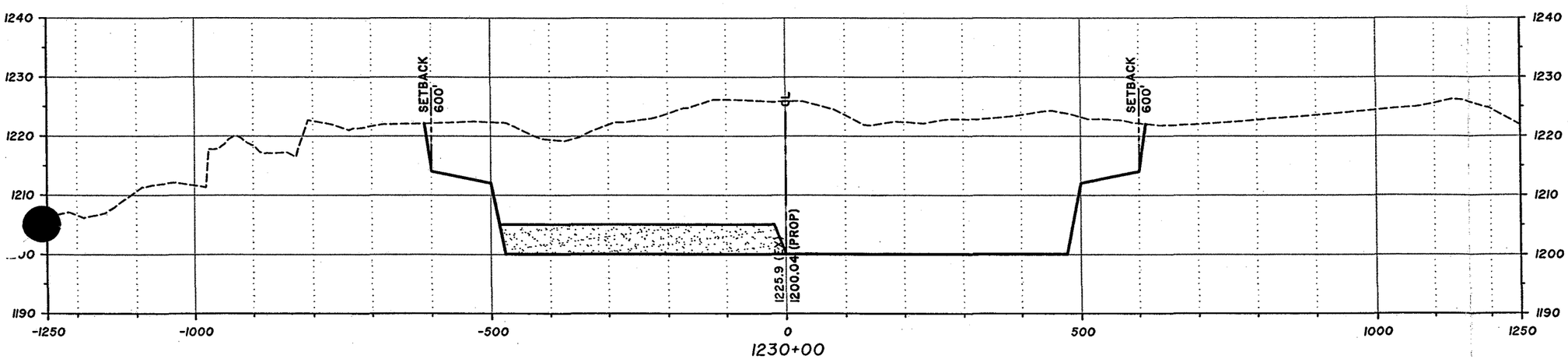

Sta 1230+00 - Sta 1240+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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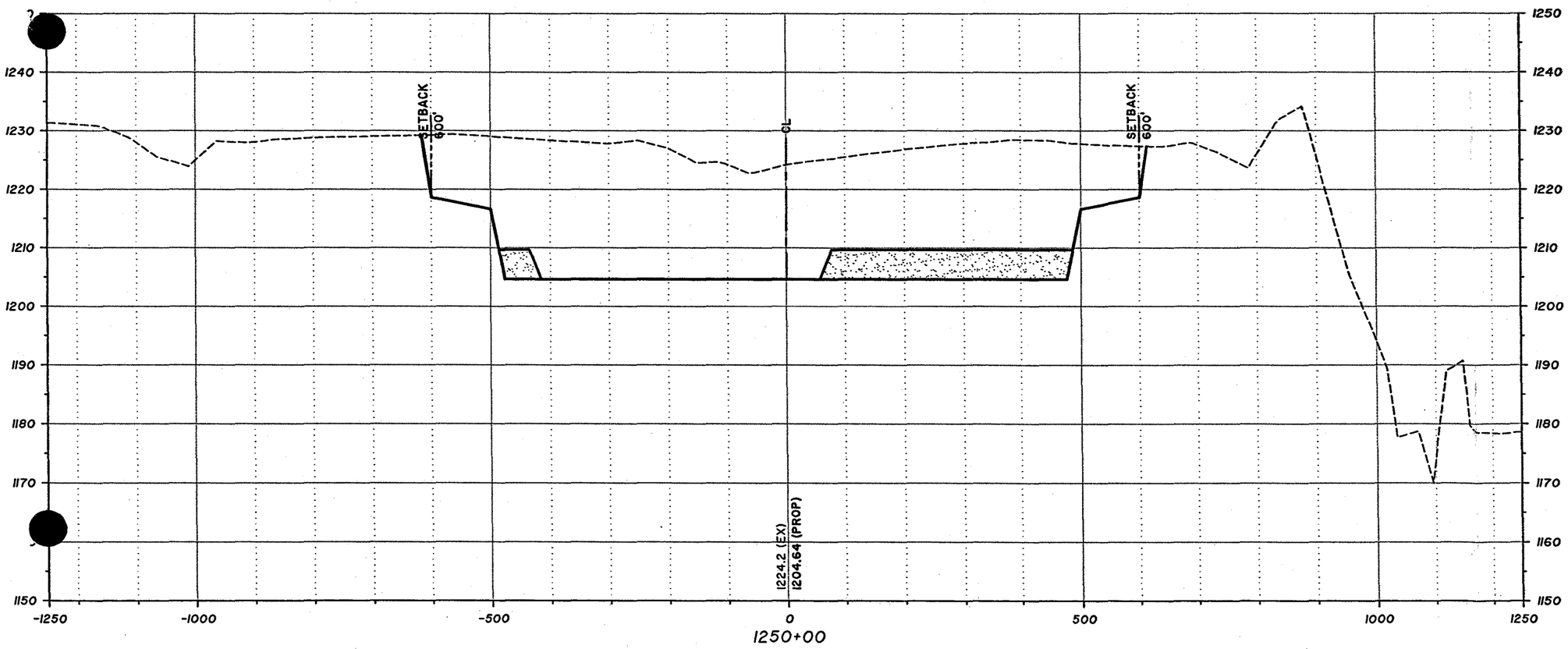

Sta 1250+00 - Sta 1250+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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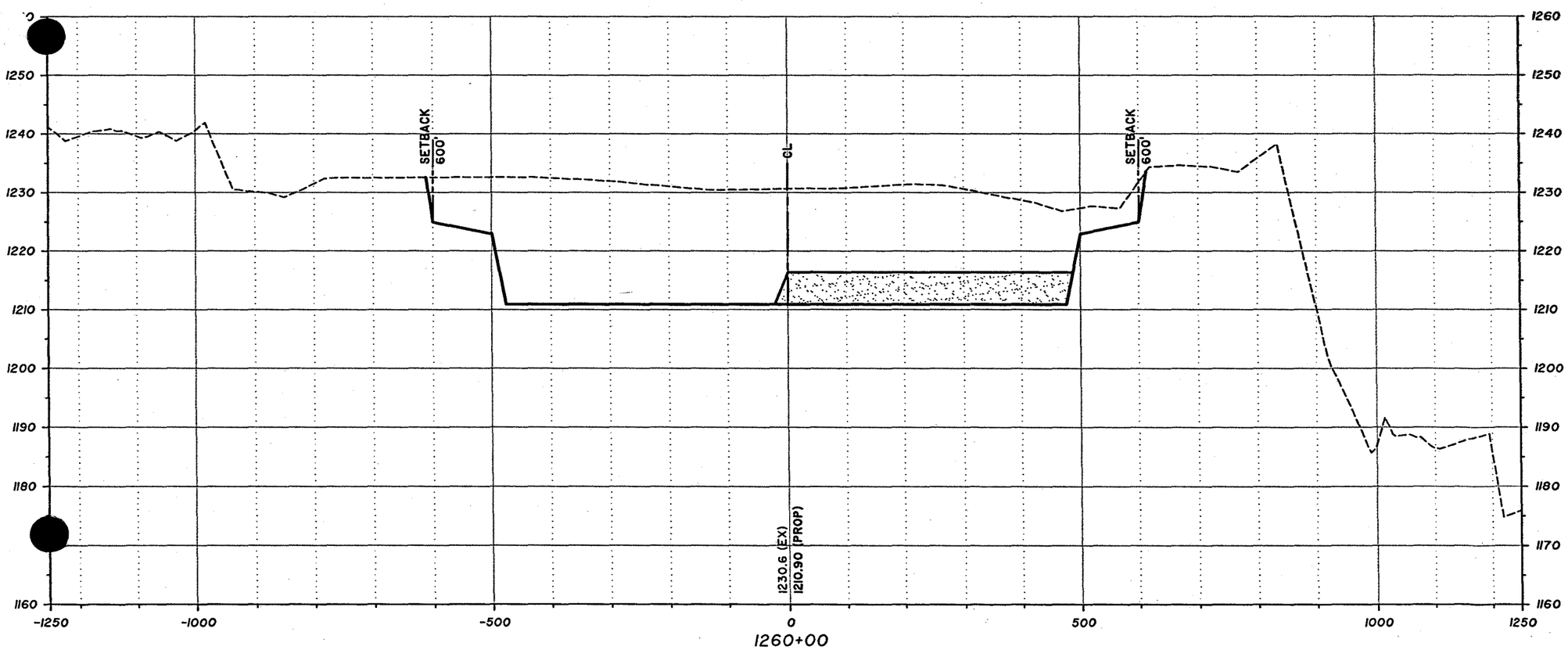

Sta 1260+00 - Sta 1260+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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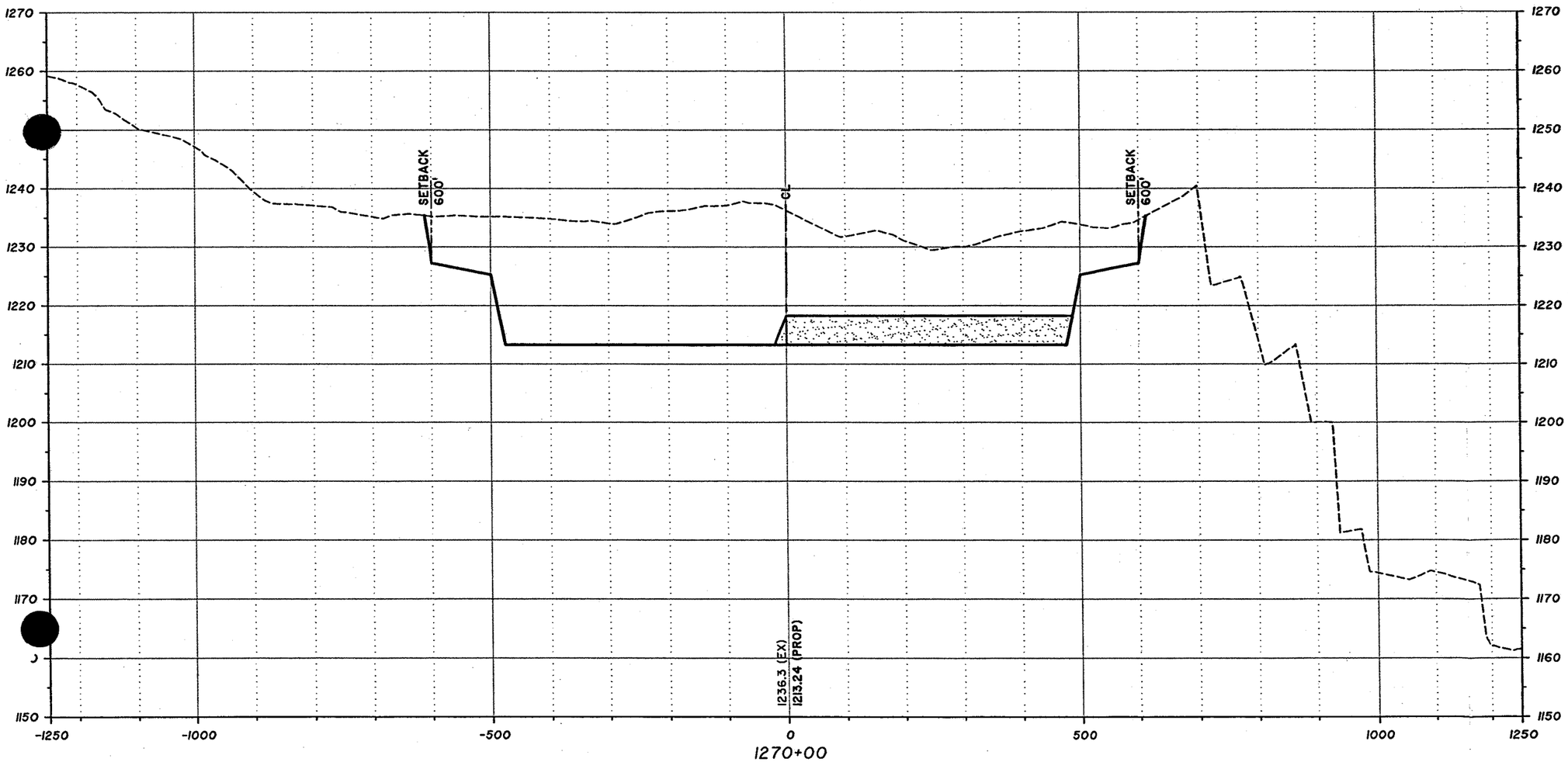

Sta 1270+00 - Sta 1270+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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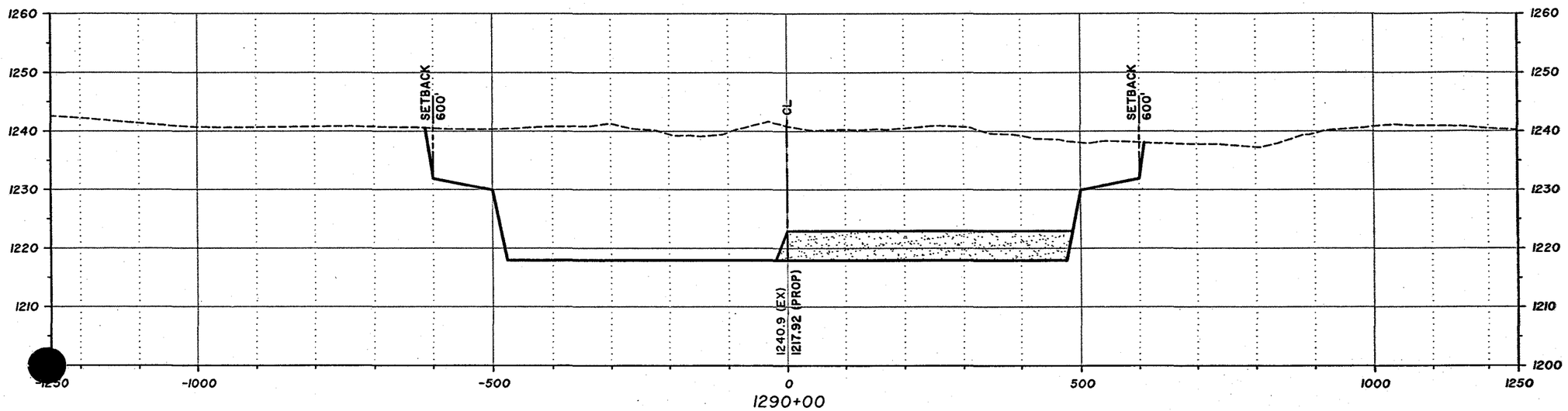

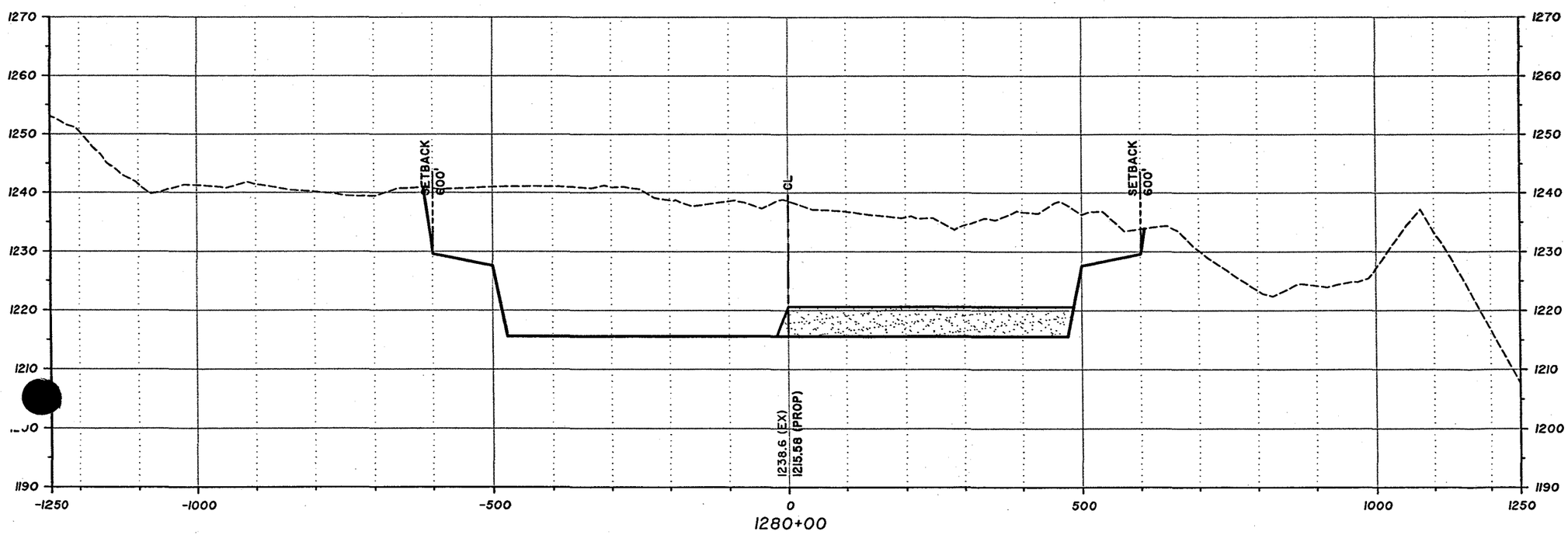

Sta 1280+00 - Sta 1290+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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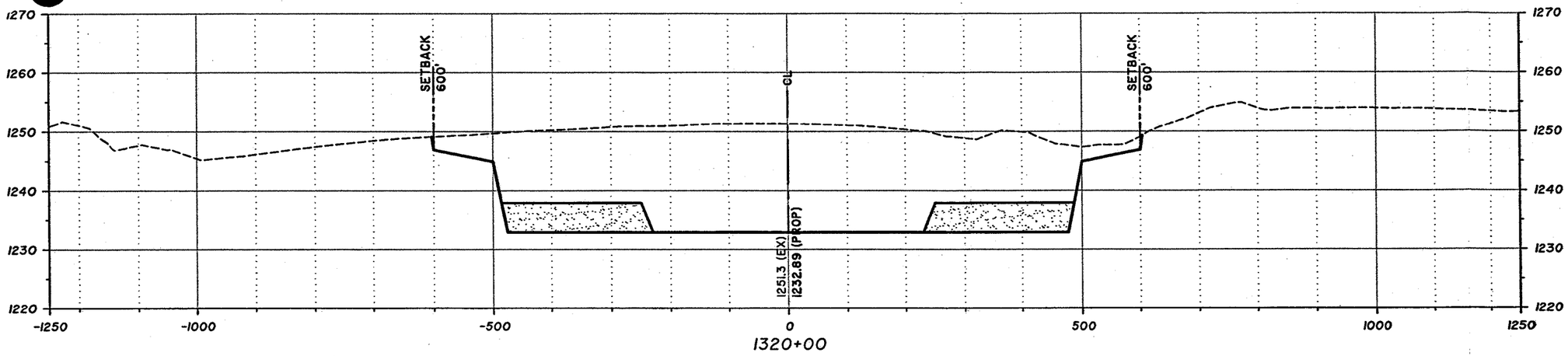

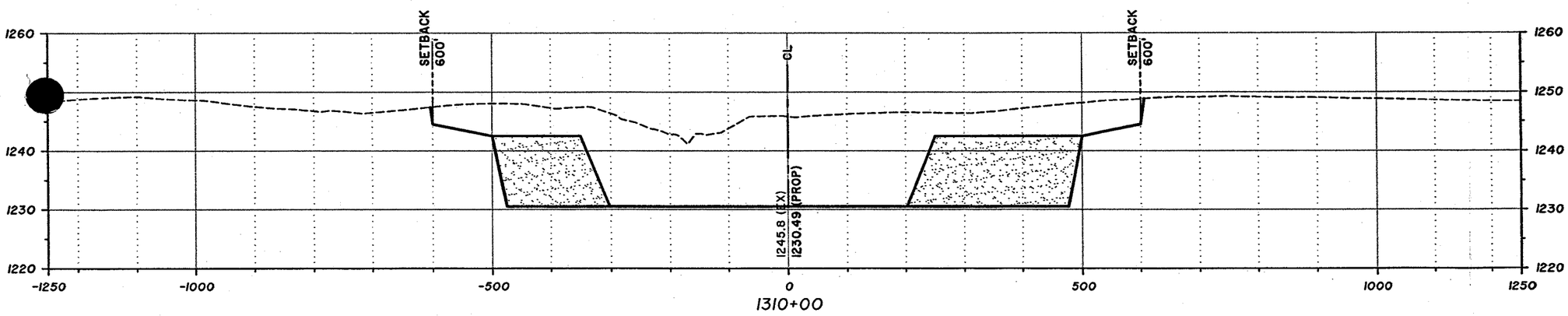

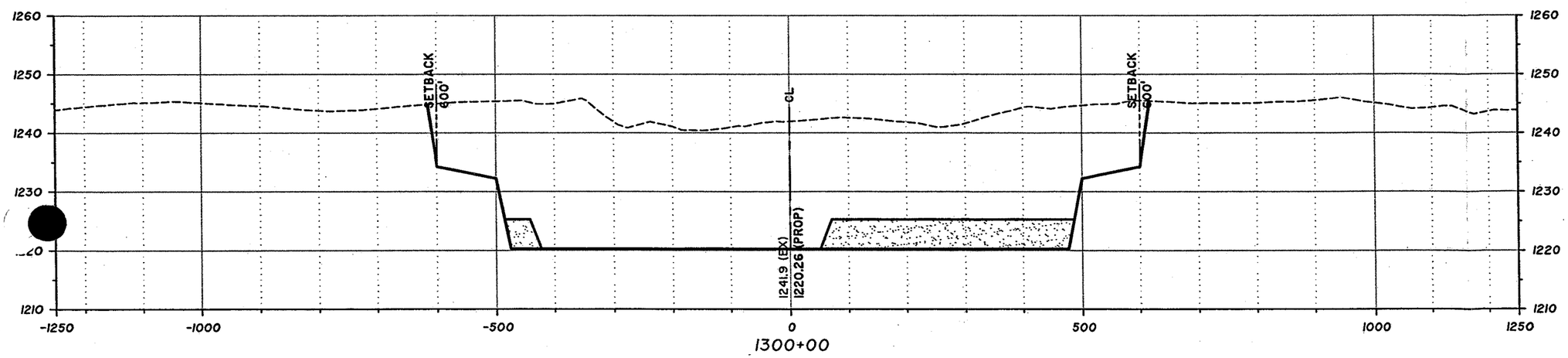

Sta 1300+00 - Sta 1320+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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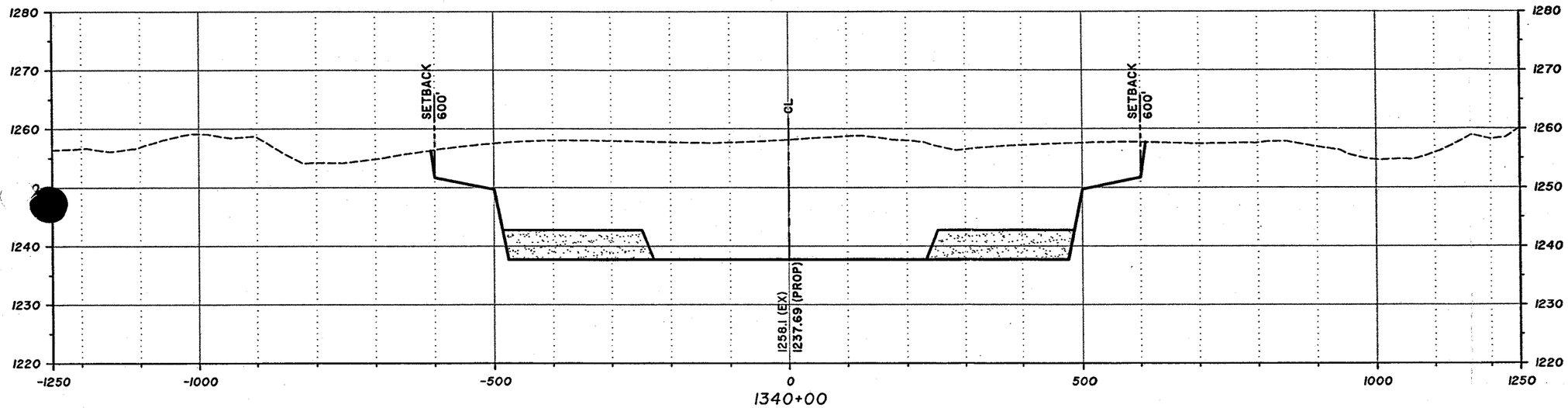

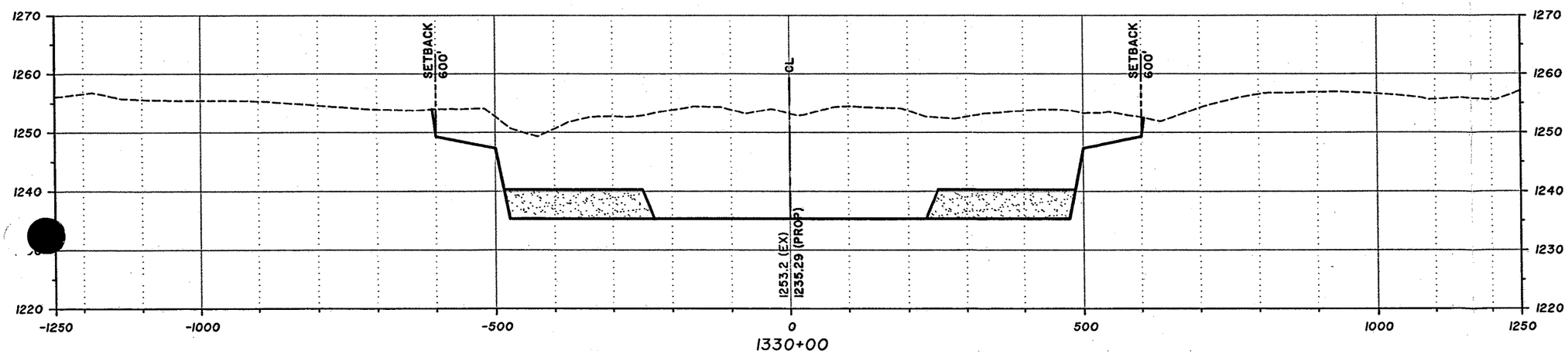

Sta 1330+00 - Sta 1340+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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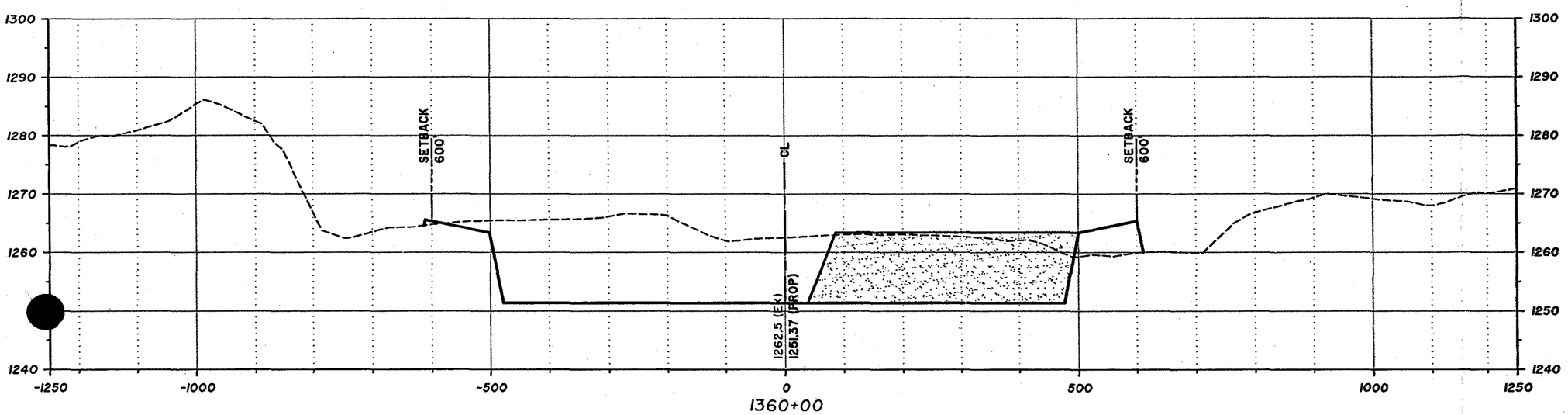

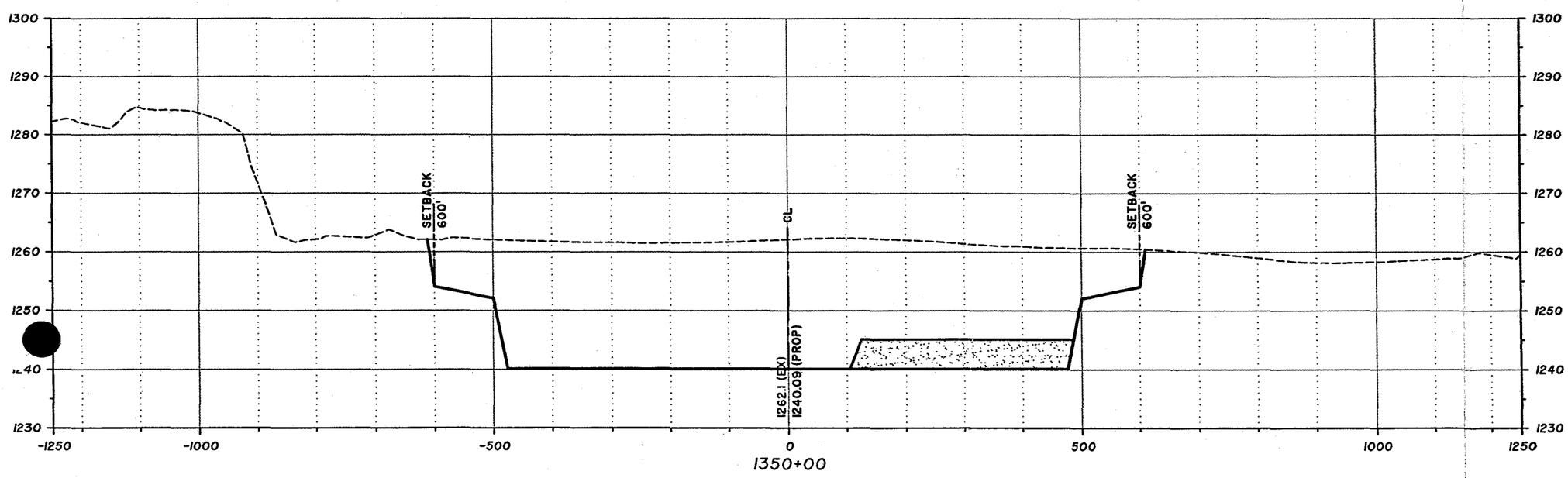

Sta 1350+00 - Sta 1360+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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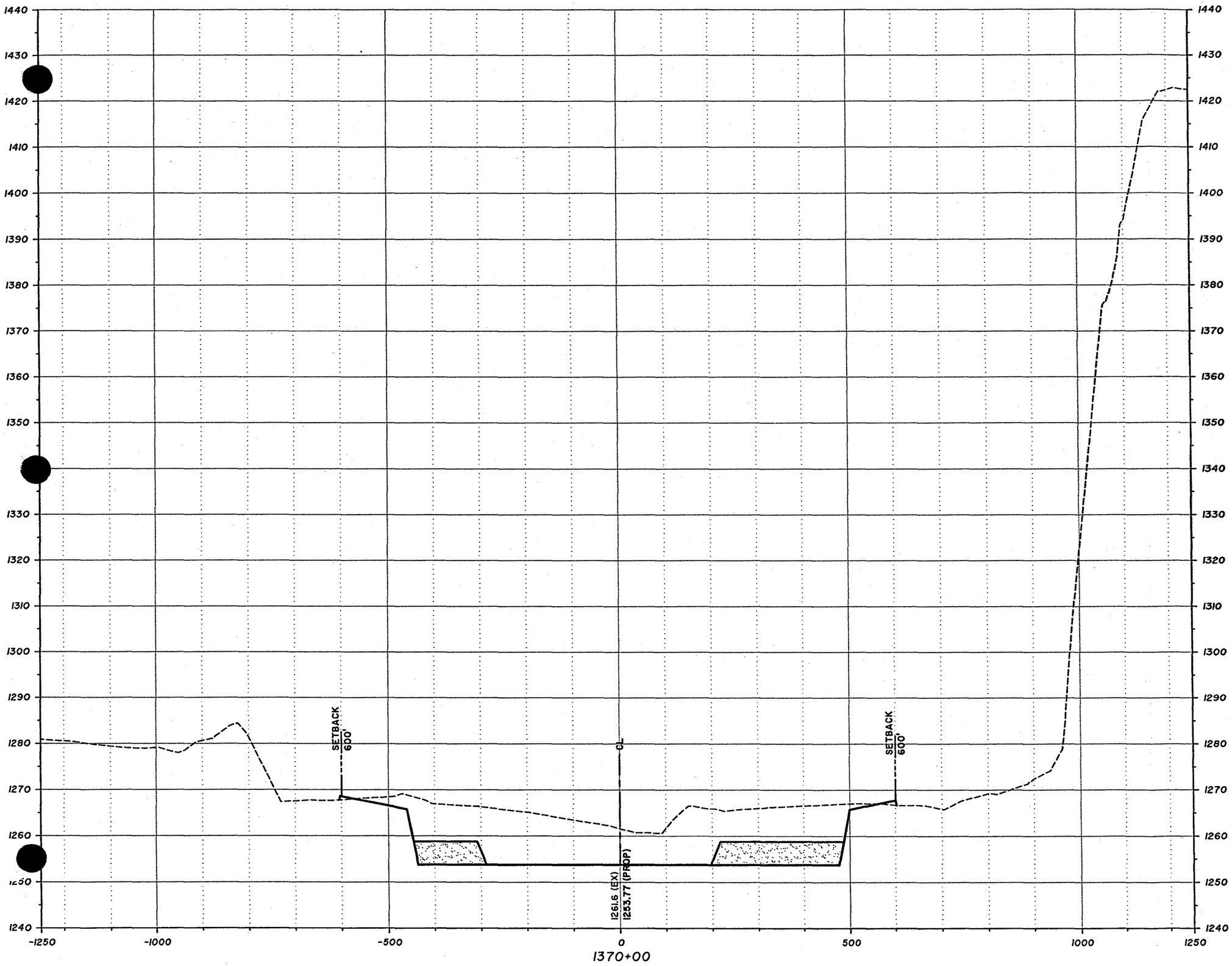
NOVEMBER 2004



Sta 1370+00 - Sta 1370+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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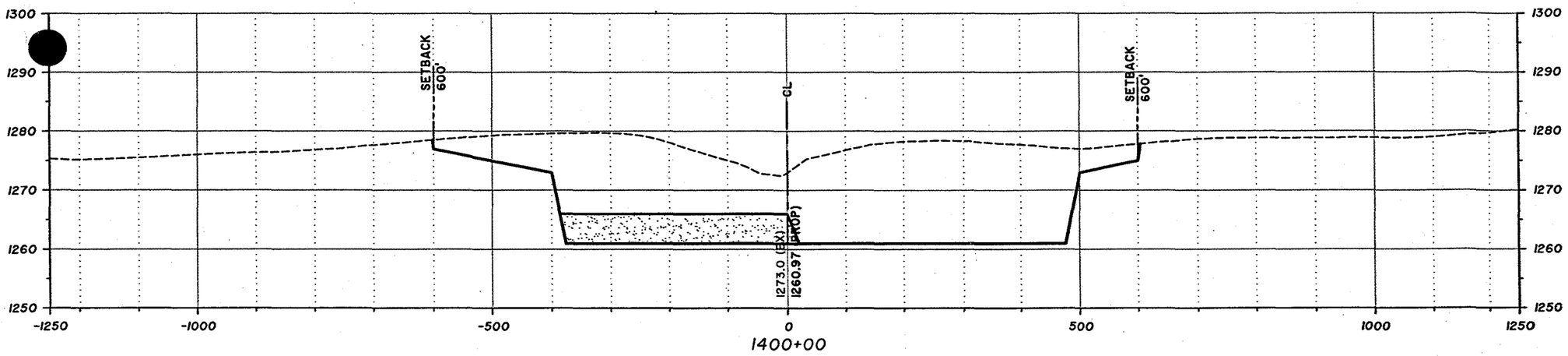

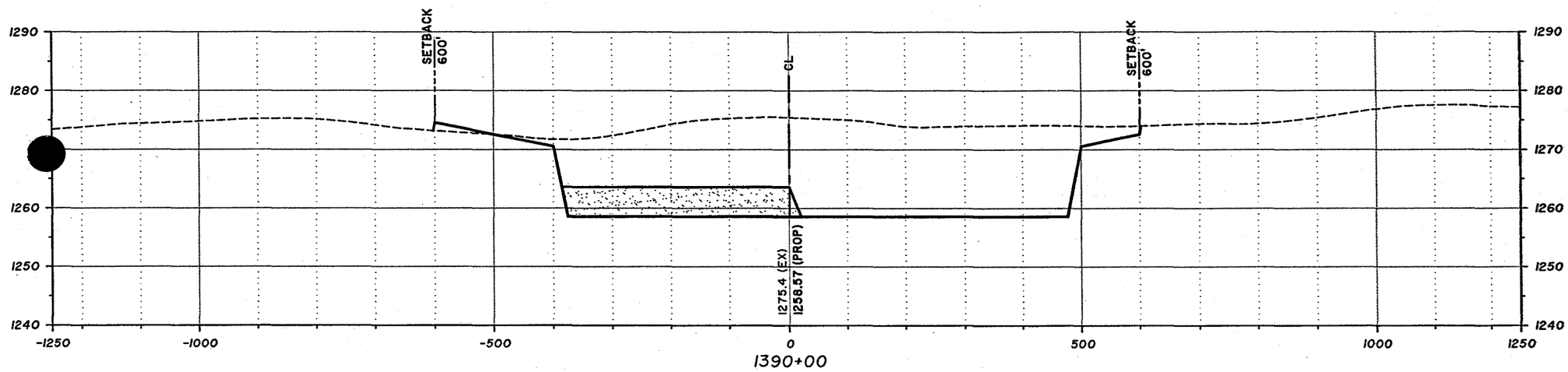

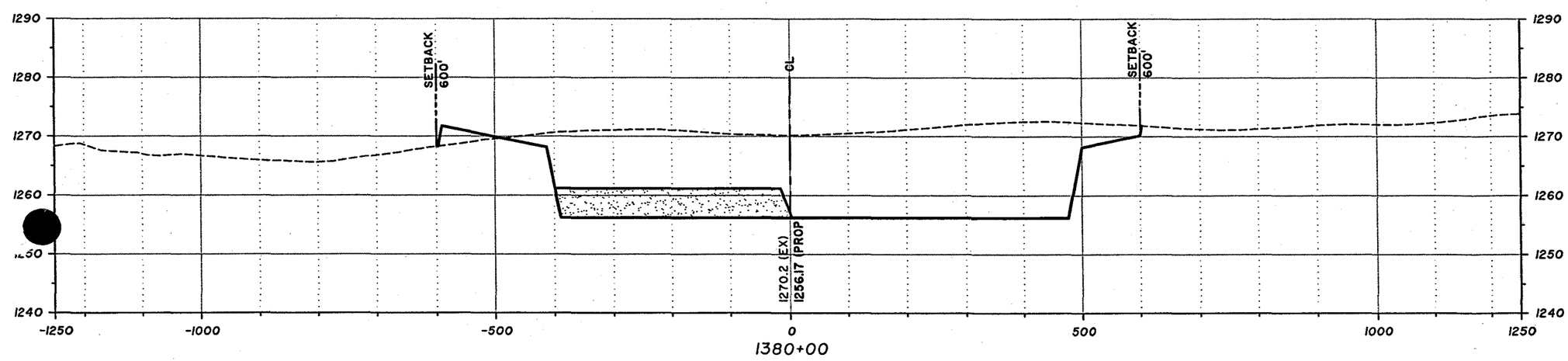

Sta 1380+00 - Sta 1400+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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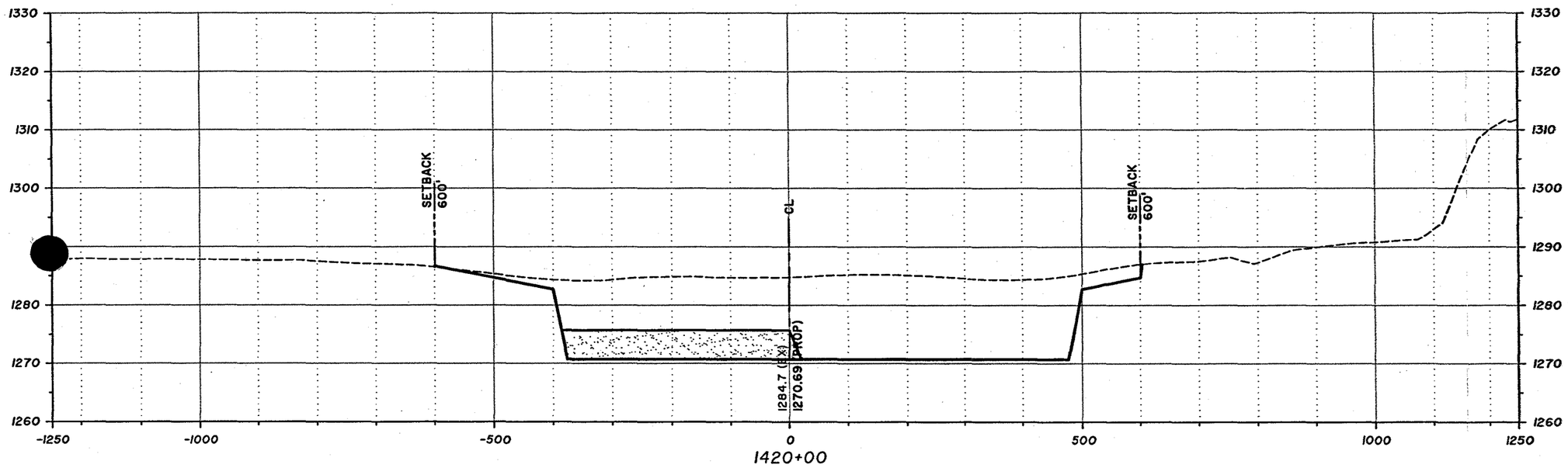

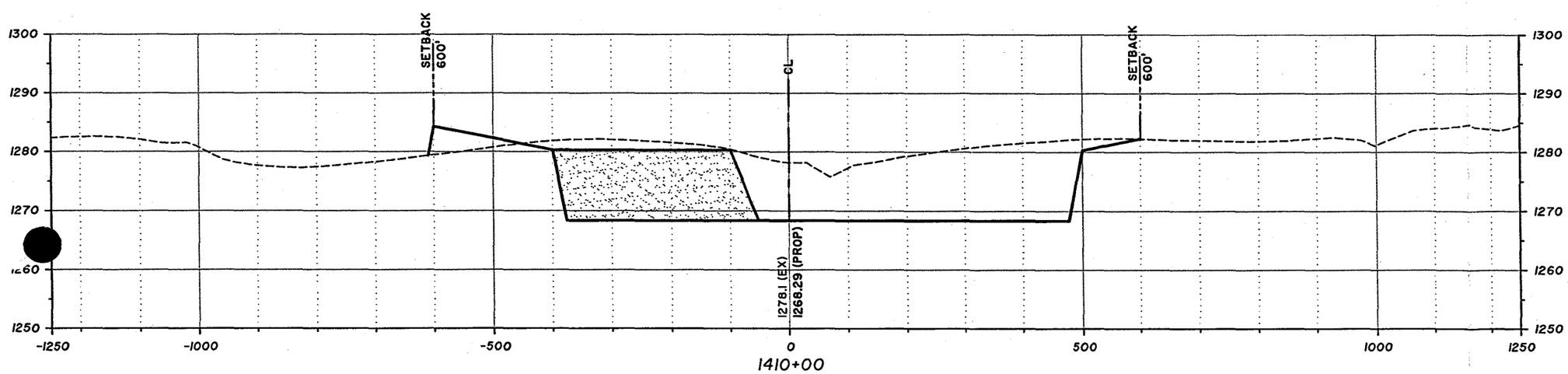

Sta 1410+00 - Sta 1420+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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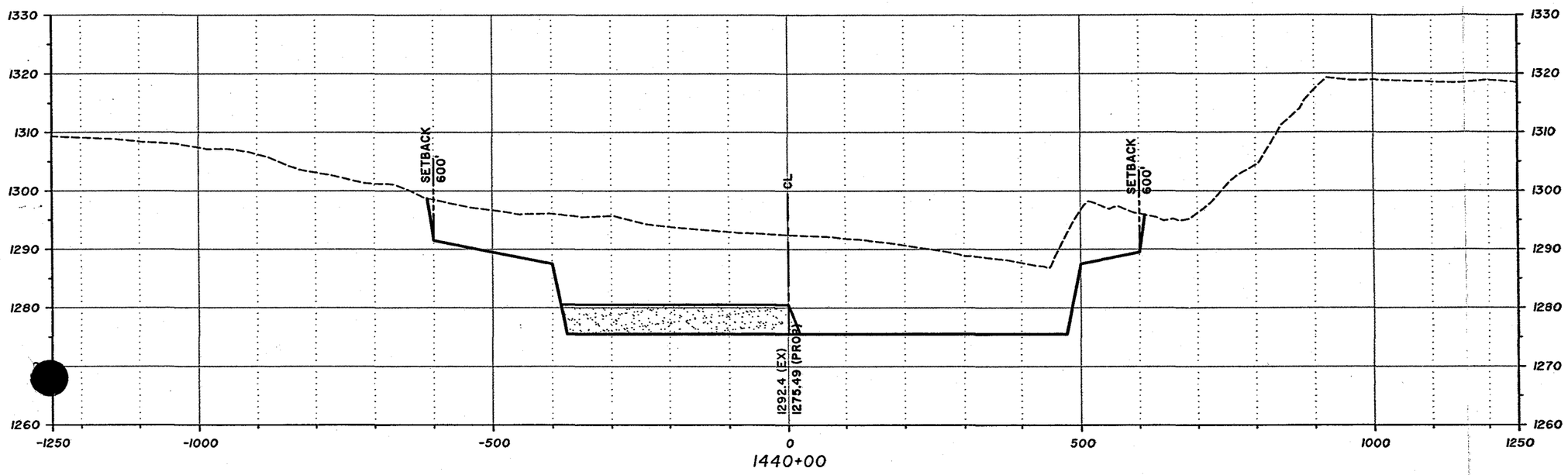

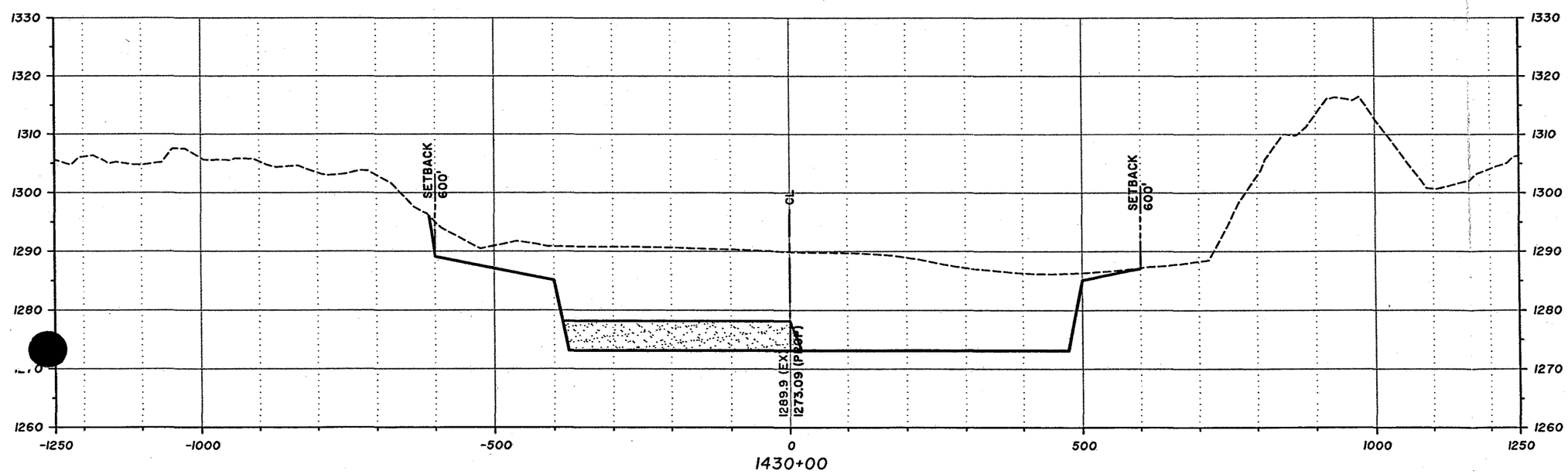

Sta 1430+00 - Sta 1440+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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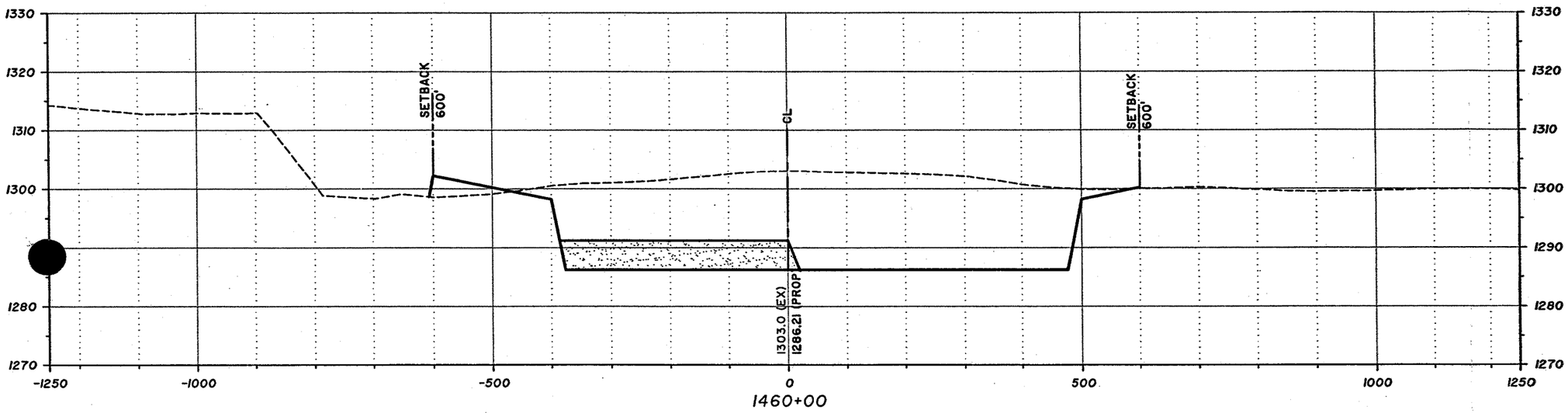

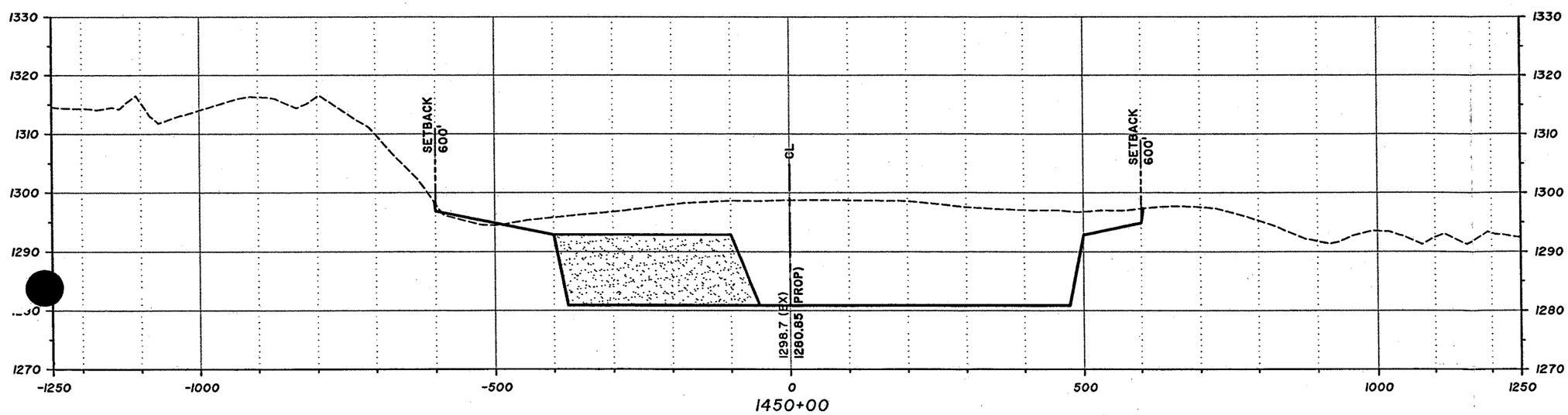

Sta 1450+00 - Sta 1460+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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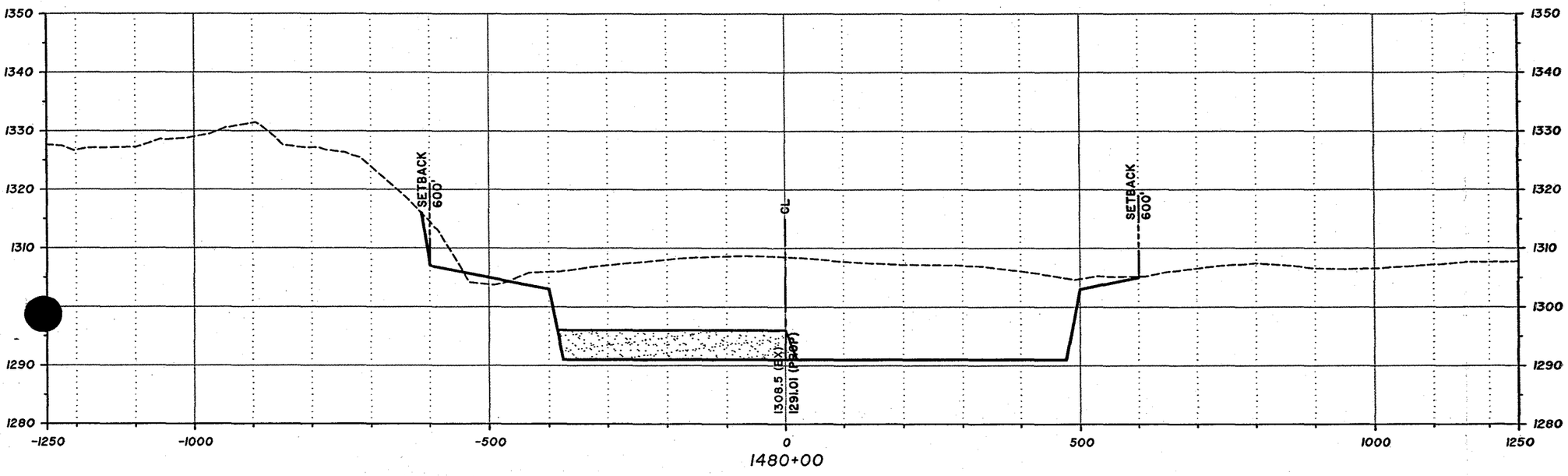

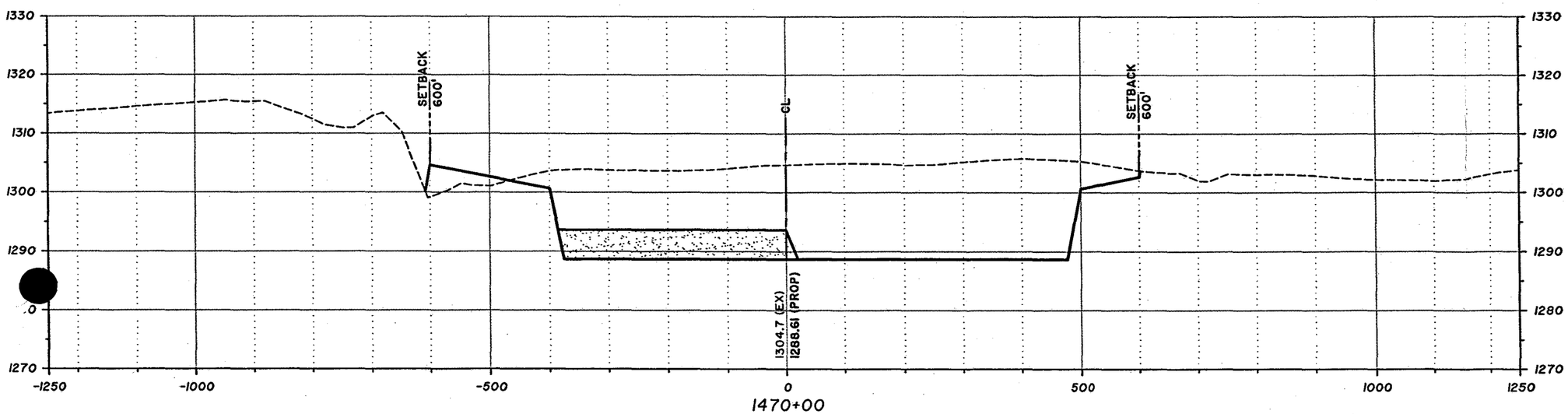

Sta 1470+00 - Sta 1480+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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Phone: 602.678.5151

West Valley Recreation Corridor
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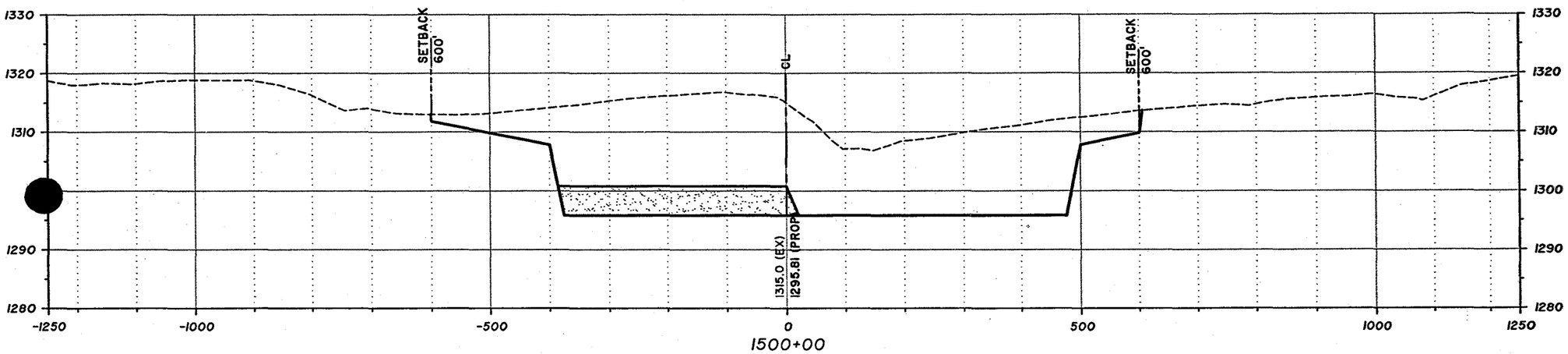

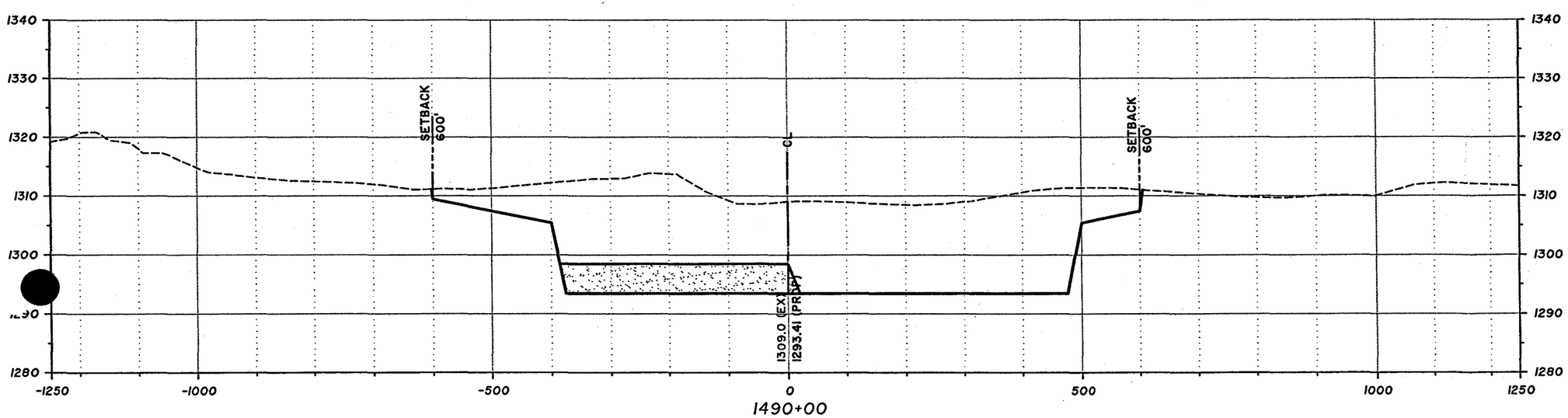

Sta 1490+00 - Sta 1500+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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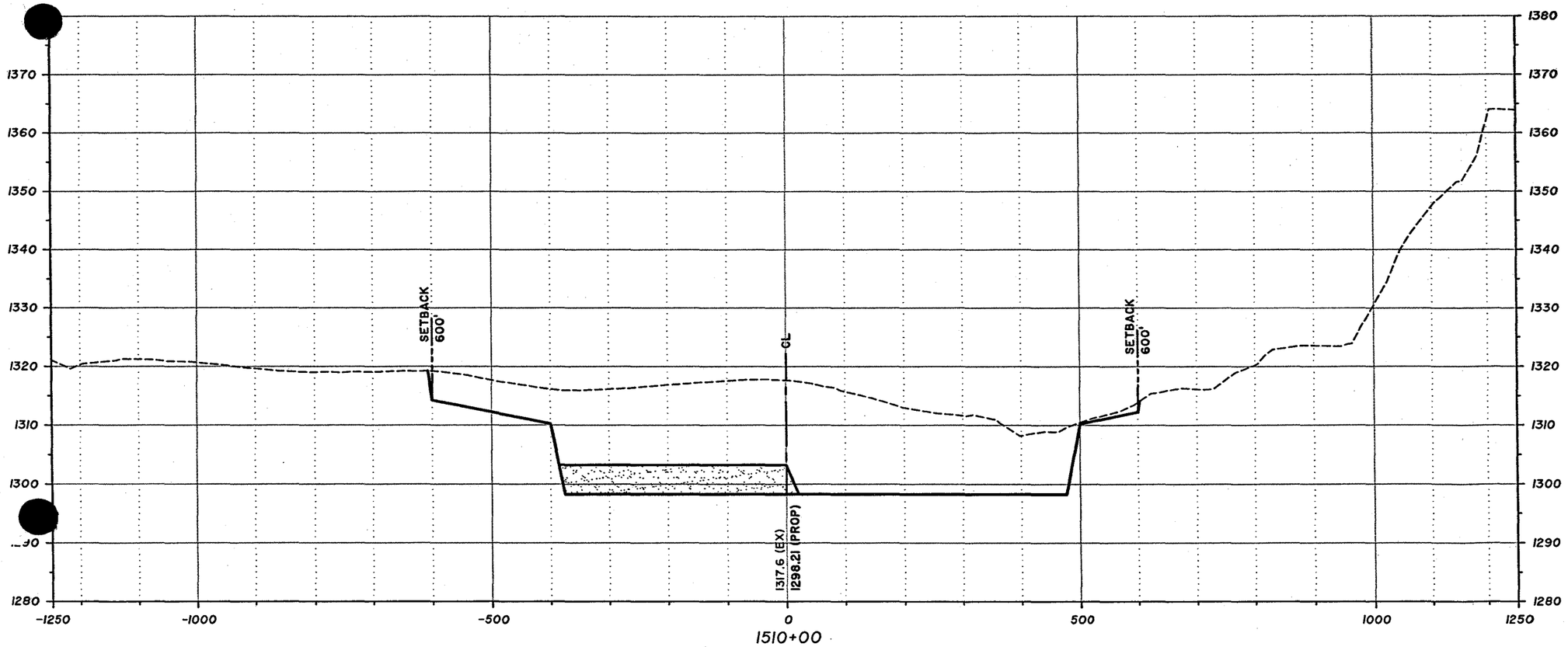
Sta 1510+00 - Sta 1510+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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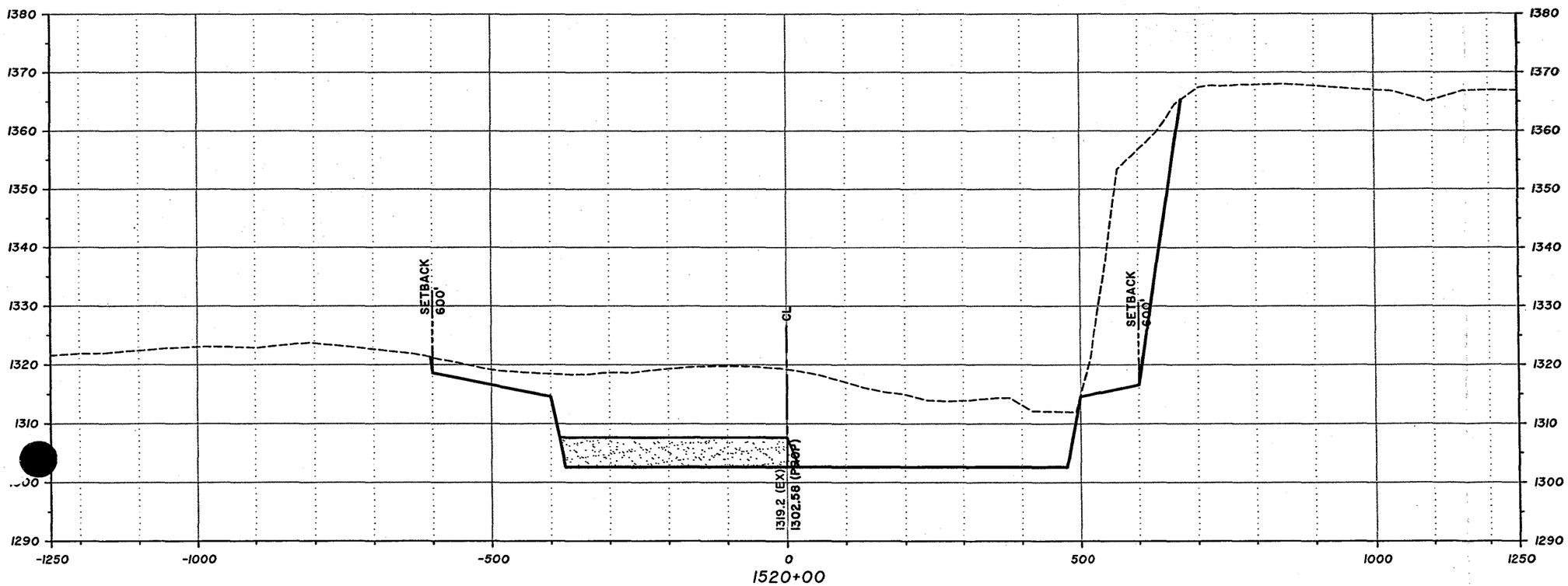
Sta 1520+00 - Sta 1520+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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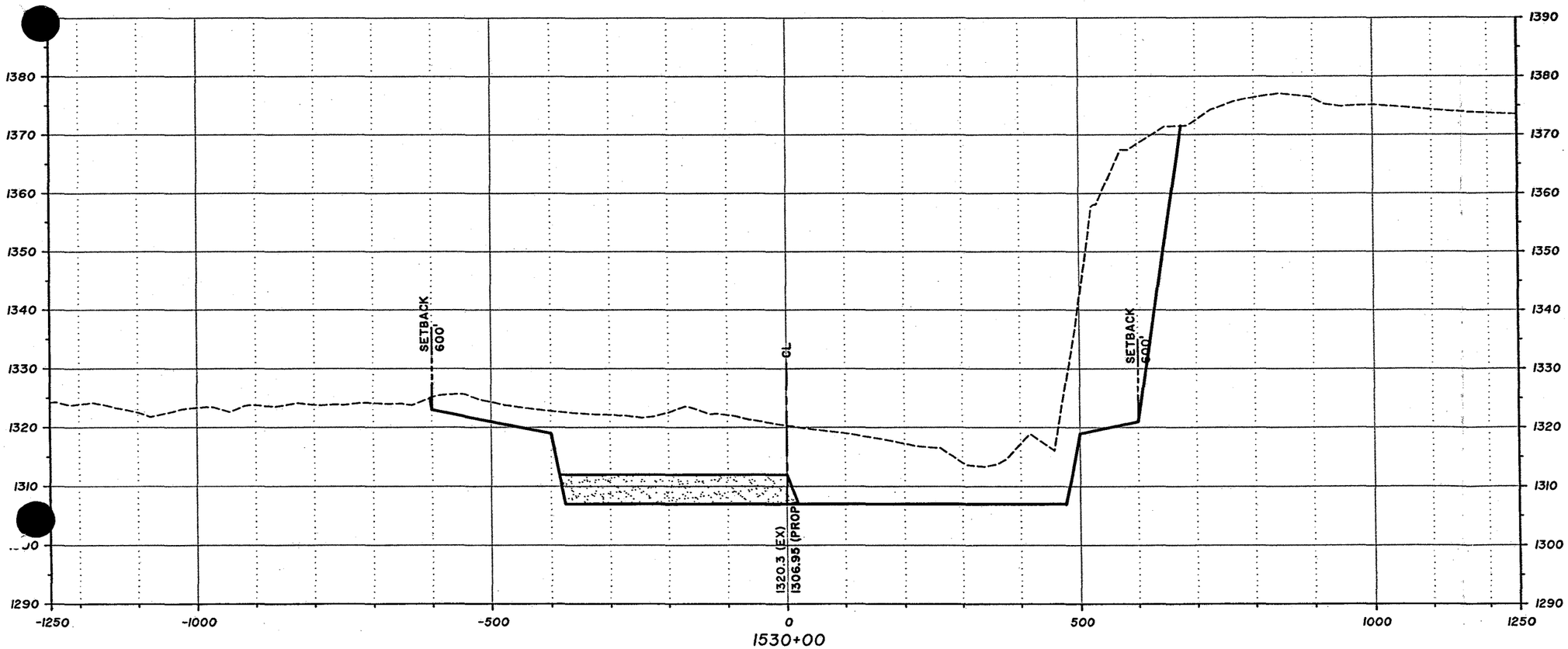

Sta 1530+00 - Sta 1530+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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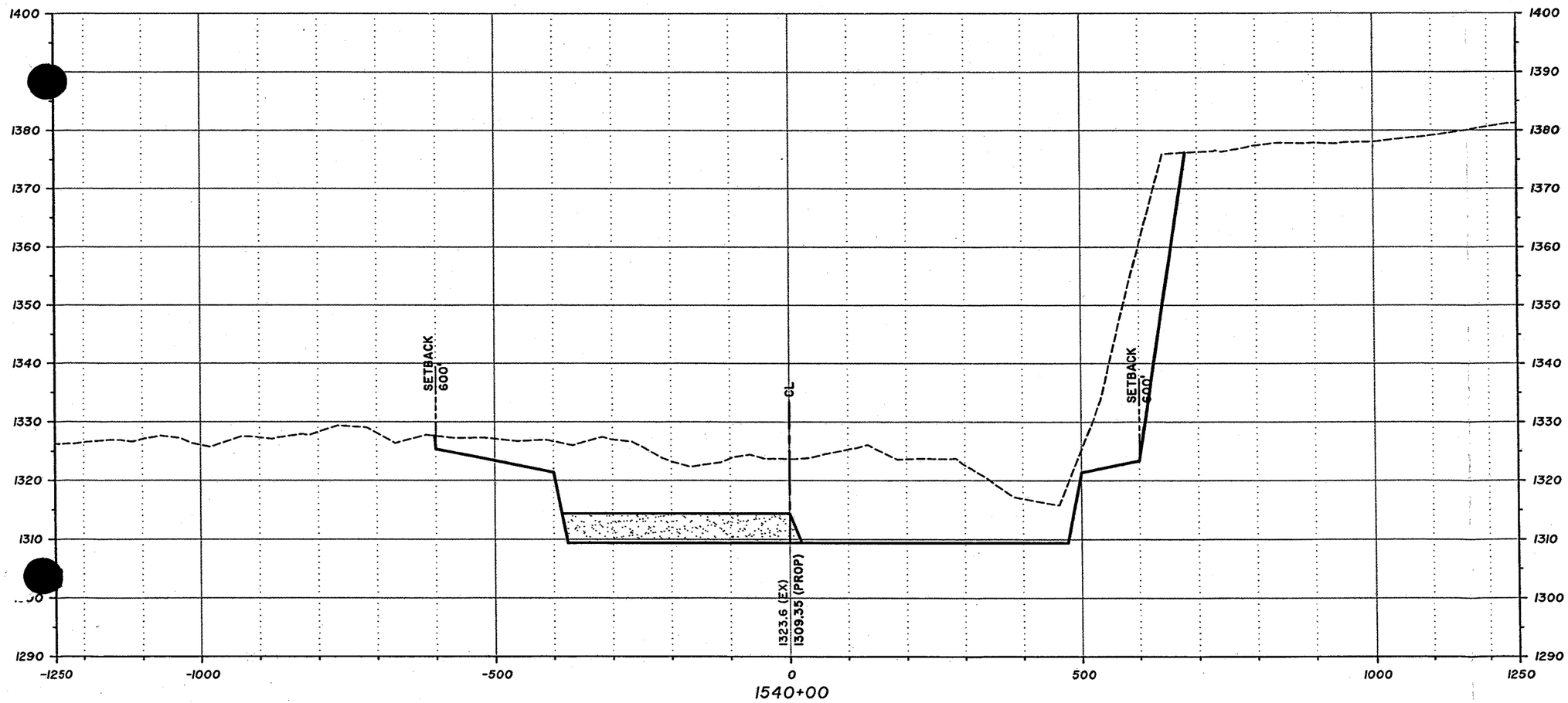

Sta 1540+00 - Sta 1540+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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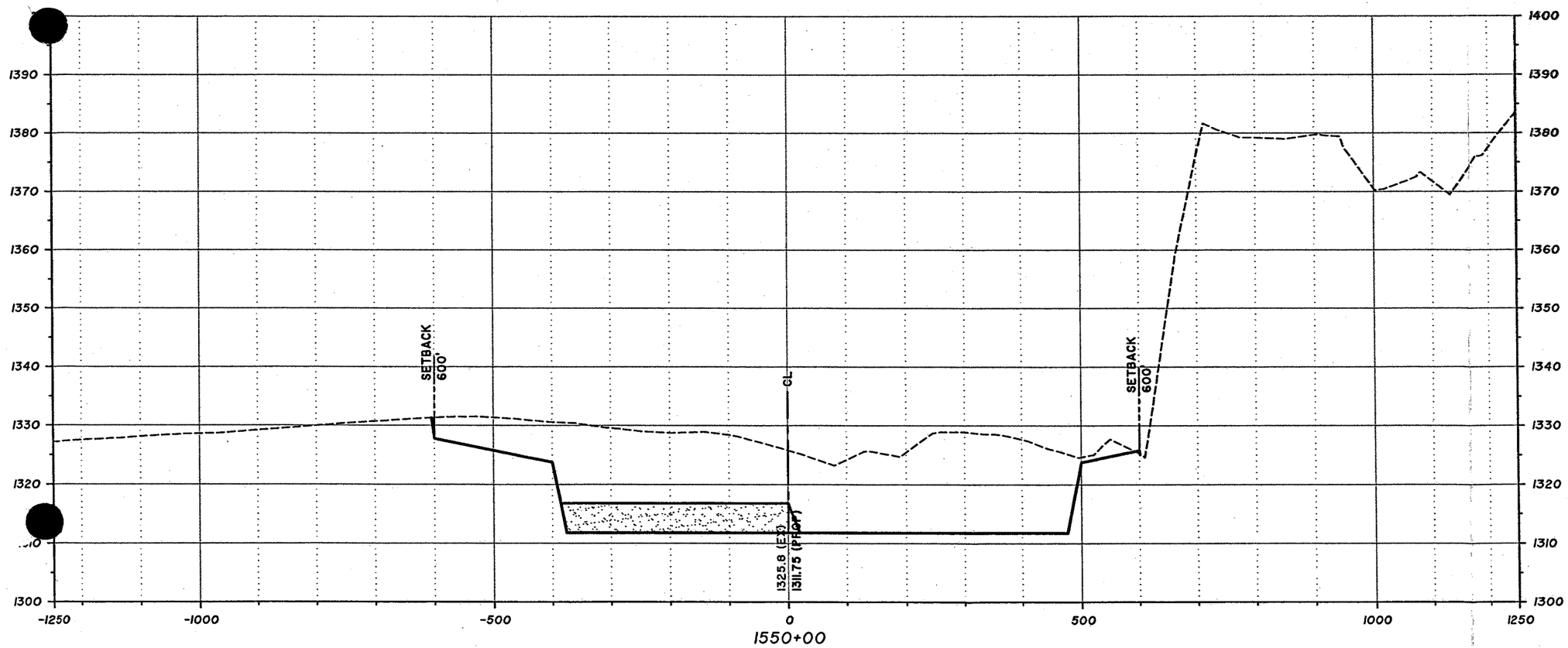
Sta 1550+00 - Sta 1550+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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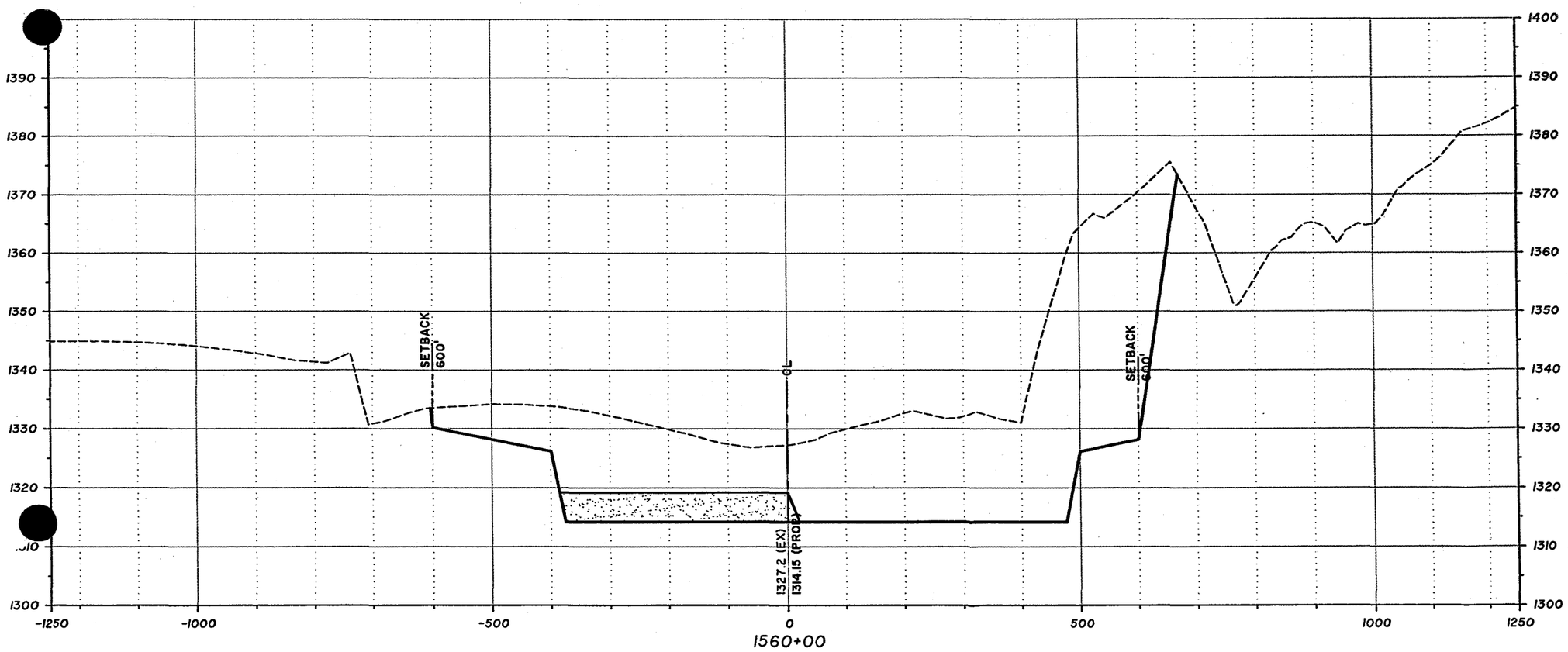
Sta 1560+00 - Sta 1560+00



100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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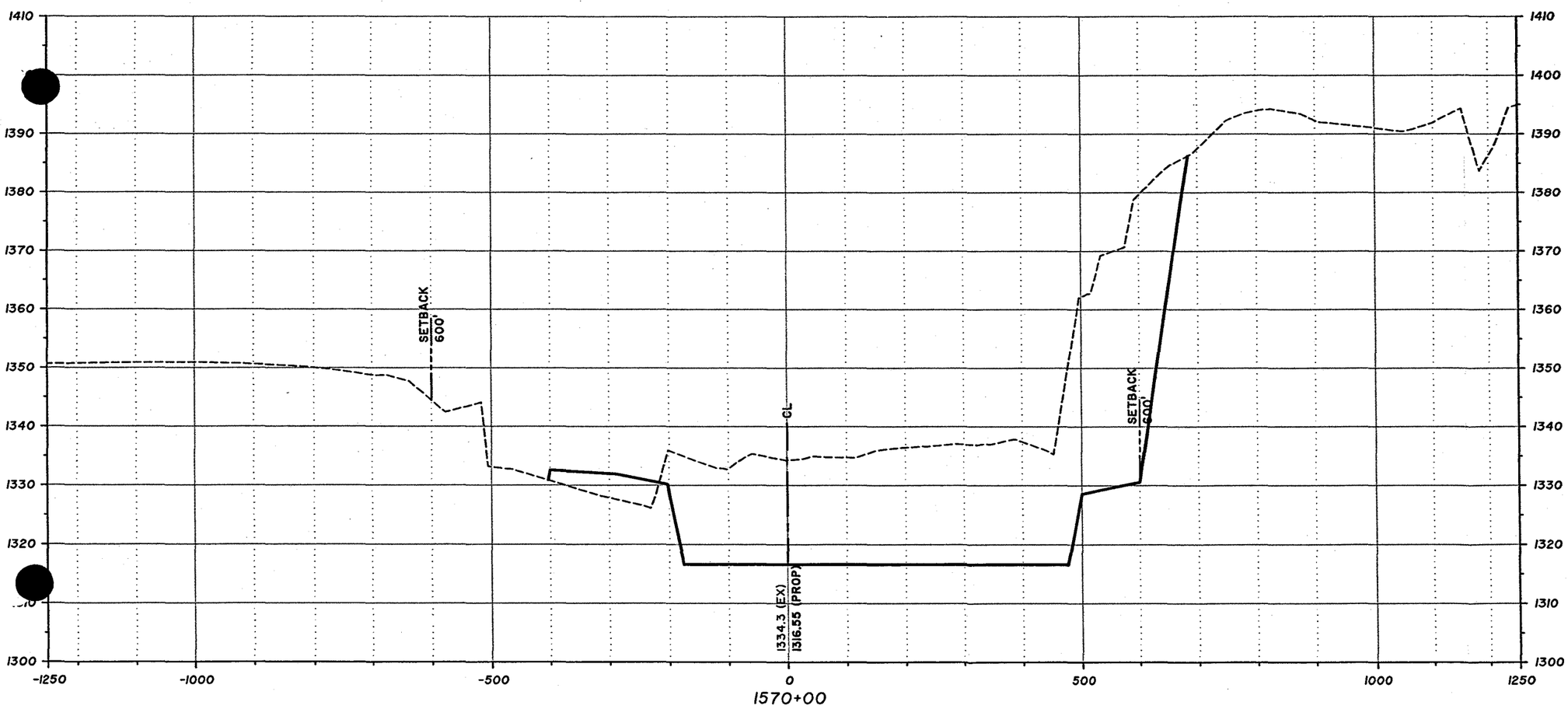

Sta 1570+00 - Sta 1570+00

100' 0' 100' 200'

SCALE: 1"=200' (H)
SCALE: 1"=20' (V)

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