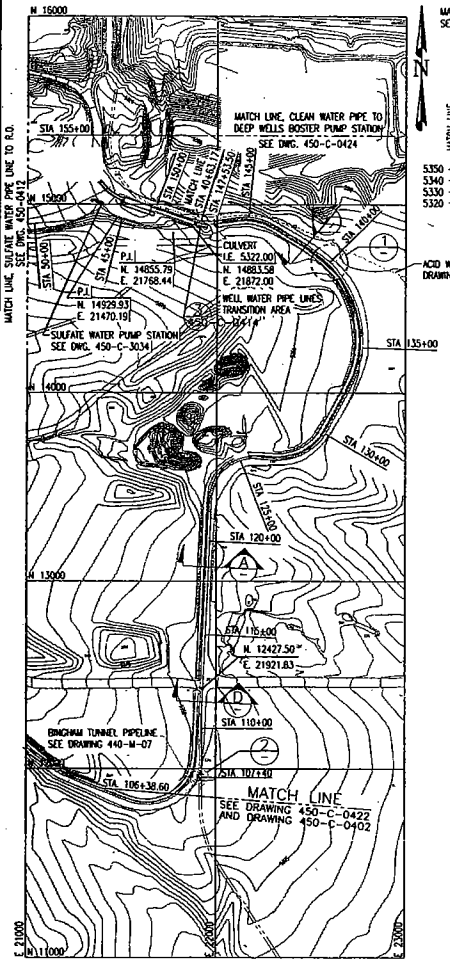

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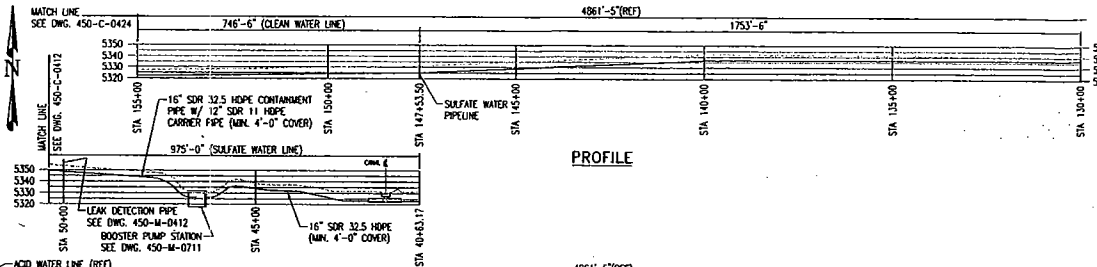

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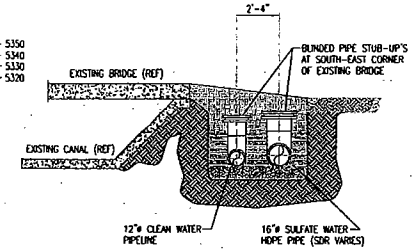

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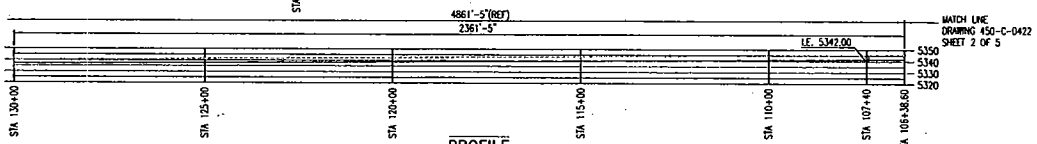
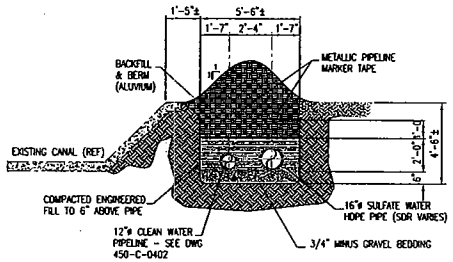
ACID WATER LINE (REF) DRAWING 450-C-0411



PROFILE



NOTE: COMPACTION SPECIFICATIONS PER SPEC. NO. 02200.5

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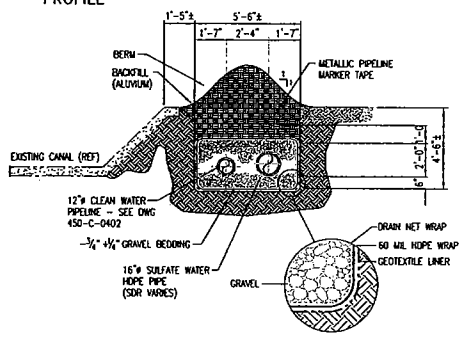

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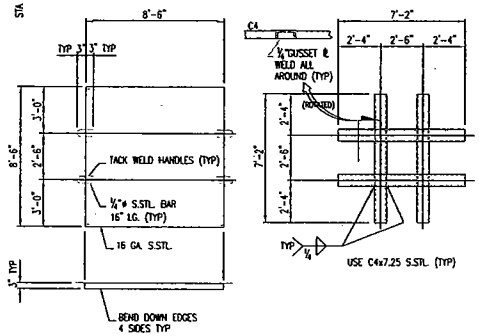
BEGINS @ STA 140+00



⚠ COVER / SUPPORT DETAIL
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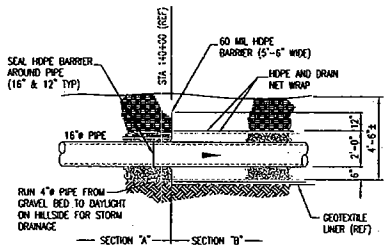

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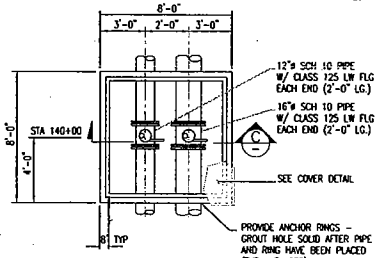

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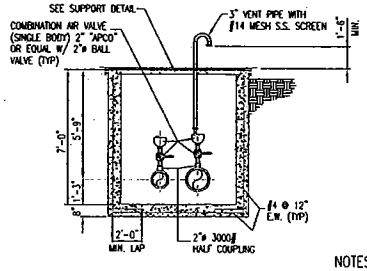
450-C-0422 & THIS DWG.



⚠ SECTION (C)
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NOTES:
1. TOPOGRAPHY BASED ON 1993 AERIAL SURVEY BY AERO GRAPHICS.

M.O.C. No. TW00154
DOCUMENT CHANGE DISCARD PREVIOUS REVISIONS
4-7-06
MBC INTERNATIONAL
DOCUMENT CHANGE DISCARD PREVIOUS REVISIONS
2-21-96
KENNECOTT ENGINEERING SERVICES

NO.	DATE	REVISION	BY	CHK	APP
⚠	4/7/06	REV'D. TO SHOW SULFATE LINE TO R.O.	GSK	LRT	LRT
⚠	2/21/96	REVISED BOX & ADDED LID	BBB	RA	RA
⚠	10/31/95	REVISED TITLE BLOCK	BBB		
⚠	10/6/95	GENERAL REVISIONS	BBB	RA	RA
⚠	9/27/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA
⚠	8/31/95	ISSUE FOR CHECKING AND REVIEW	BBB	RA	RA

NO.	DATE	REVISION	BY	CHK	APP

NUMBER	REFERENCE DRAWINGS
	WELL WATER PIPE LINES TRANSITION AREA
	SULFATE WATER BOOSTER PUMP STATION
	SULFATE WATER PIPE LINE TO R.O.
	CLEAN WATER TO DEEP WELLS B.P.S.
	SULFATE WATER PIPELINE (SHEET 2 OF 3)
	SULFATE WATER PIPELINE (SHEET 1 OF 3)
	SULFATE #1 PUMPHOUSE G.A.

NUMBER	REFERENCE DRAWINGS
450-C-3063	
450-C-3034	
450-C-0412	
450-C-0424	
450-C-0422	
450-C-0421	
450-M-0225	

ENGINEERING SERVICES

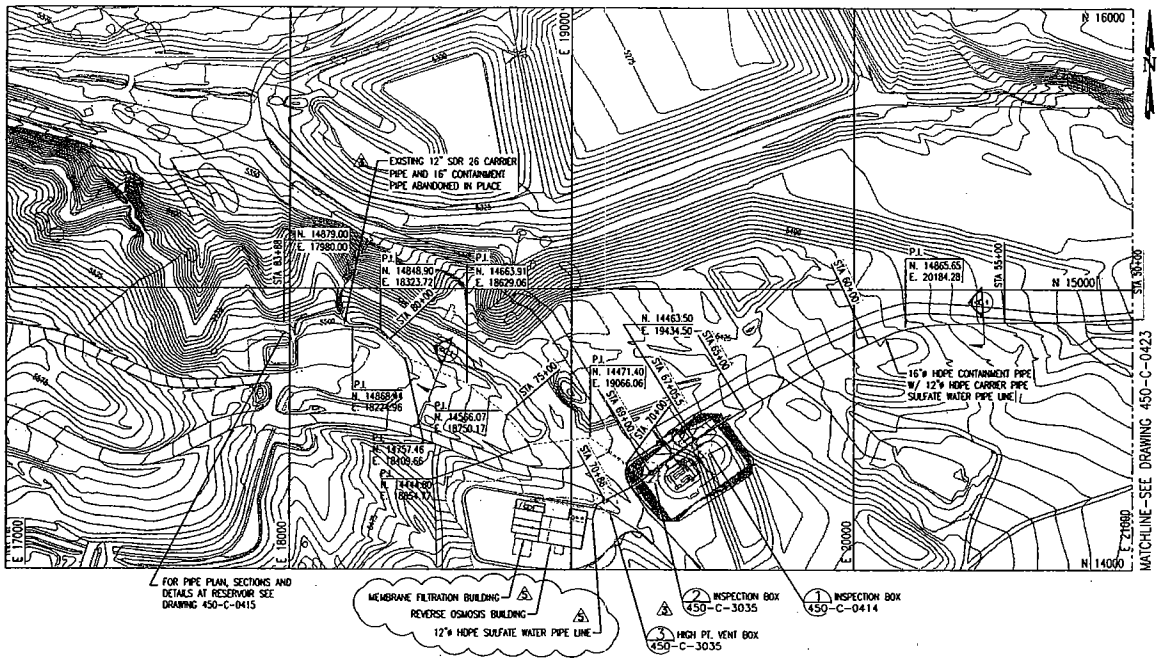
	APPROVAL	DATE
SCALE: AS NOTED		
DESIGNED JLC/RA	CM	9/27/95
DRAWN BBB	JLC	9/27/95
CHECKED RA	LJW	9/27/95
PROJECT ENGINEER JLC	BVD	
PROJECT MANAGER RA		

DATE
7/14/95
8/28/95
8/31/95
9/27/95
9/27/95

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
EAST SIDE SULFATE & CLEAN WATER PIPELINES
PLAN AND PROFILE (SHEET 3 OF 3)

Job No. ---- | Dwg. No. 450-C-0423 | REV 4



PLAN
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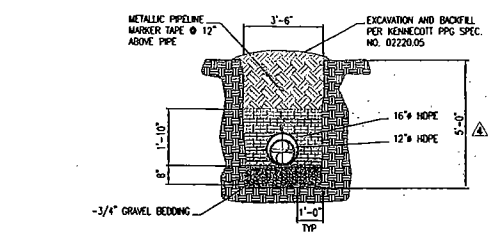

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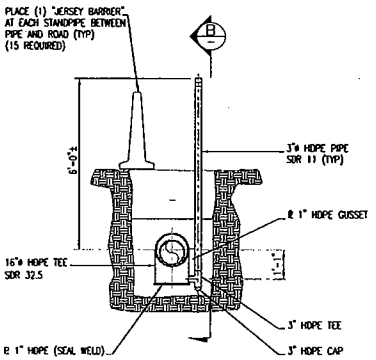
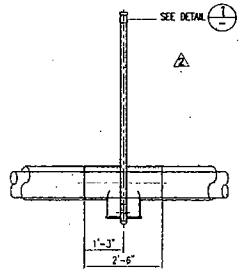


LEAK DETECTION STANDPIPE DETAIL
(TYPICAL @ 500' - 6 REQUIRED)



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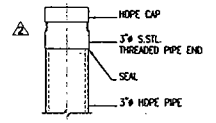

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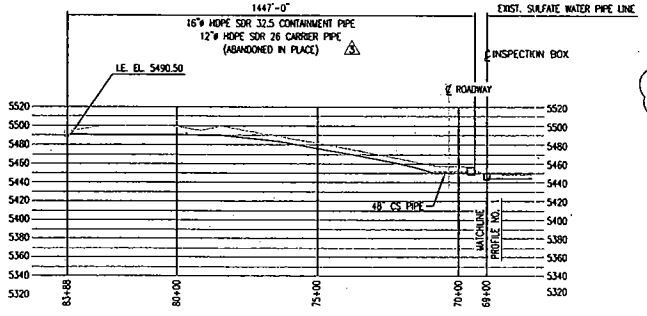
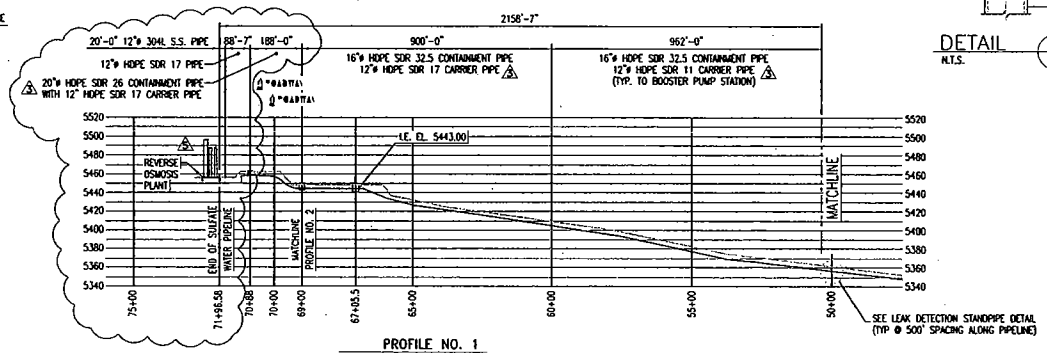


PROFILE NO. 2
SCALE VERT: 1"=60'
HORIZ: 1"=200'



PROFILE NO. 1
SCALE VERT: 1"=60'
HORIZ: 1"=200'

M.O.C. No. TW00154
DOCUMENT CHANGE DISCARD PREVIOUS REVISIONS
4-6-06
HDC INTERNATIONAL
ISSUED FOR CONSTRUCTION
8-16-95
KENNECOTT ENGINEERING SERVICES

NO.	DATE	REVISION	BY	CHK	APP
4	4-5-06	REV'D TO SHOW SULFATE LINE TO R.O.	GSK	LRT	LRT
3	11-3-95	REVISED AND ADDED COORDINATES	LRT		
2	9-25-95	ABANDONDED PIPE TO E.S. RESERVOIR	LRT		
1	9-11-95	CHANGED PIPE PLUG TO CAP	BBB	RA	RA
A	8/21/95	CHANGED PIPE CAP TO PLUG	BBB	RA	RA
0	8/16/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA

NO.	DATE	REVISION	BY	CHK	APP

REFERENCE DRAWINGS	NUMBER

REFERENCE DRAWINGS	NUMBER
AREA PIPING AROUND R.O. BUILDING	450-C-3062
VENT & INSPECTION BOX DETAILS	450-C-3035
SULFATE WATER BOOSTER PUMP STATION	450-C-3034
SULFATE AND CLEAN WATER PIPE LINES	450-C-0423
UTILITY VAULT DETAILS	450-C-0414

ENGINEERING SERVICES

APPROVAL	DATE	SCALE: 1"=200'	DATE
JLC	7/28/95	DESIGNED BBB	6-95
JH	8/3/95	DRAWN BBB	6-95
CM	8/4/95	CHECKED RA	7-95
LJW	8/10/95	PROJECT ENGINEER	
BVD		PROJECT MANAGER	

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
SULFATE WATER PIPELINE TO R.O.
PLAN AND PROFILE

Job No. ---- Dwg. No. 450-C-0412 REV 5

APPENDIX D

Reverse Osmosis Treatment Plant

Final Design

KENNECOTT UTAH COPPER CORPORATION

ZONE A
REVERSE OSMOSIS PLANT
Water System #18160

FINAL DESIGN
December 15, 2005

Zone A Reverse Osmosis Plant - Final Design

1 Design Criteria

In compliance with the ROD, which was issued by the USEPA on December 13, 2000 and the NRD settlement from 1995, the Zone A Reverse Osmosis Plant is designed to produce 3,500 acft of treated municipal quality water per year. At a maximum daily production of 3.55 million gallons (MGD), and an average per capita consumption of 246 gallons per day (gpcd), the plant would be capable of supplying a population of 14,435. The produced water will meet, at a minimum, Municipal Water Quality standards (MWQ) and will be delivered to the distribution system of JVWCD or other water purveyor(s). The membrane filtration concentrate from the Zone A RO Plant will be discharged to the tailings pipeline via the Wastewater Disposal Pump Station (WDPS).

A stream factor of 89% is used as basis for the RO system design. Two RO skids with a feed water capacity of 1,500 gpm each are the core of the plant. The skids are each arranged in two-stage arrays in which the concentrate of the first stage becomes the feed to the second stage, which contains half the number of pressure vessels as the first stage. An average permeate flux rate of 11.9 gallons per square foot per day (gfd) was used as design basis for the required membrane area. The permeate recovery will be in the range of 70% to 80%, depending on the feed water quality. All chemicals used in the process will be NSF compliant.

The process design of the Zone A RO Plant incorporates the experience gained from operating membrane filtration facilities on KUCC specific waters for the last eight years. During design, construction, and operation of KUCC's membrane filtration plants, extensive consultations with experts from membrane and RO system suppliers as well as manufacturers of antiscalants and wash chemicals took place. The members of the Technical Review Committee reviewed the Preliminary Design for the plant. An independent third party engineering review by Montgomery Watson Harza endorsed the design. The Final Design for Remedial Action at South Facilities Groundwater was completed in December 2002 and subsequently reviewed and approved.

The site for building the Zone A plant (Site Key Plan Dwg. 456-M-0200) is adjacent to Kennecott's existing membrane filtration plant. This is a central location for the various water sources to be processed at the plant, namely deep wells B2G1193 (K60), BFG1200 (K109) and the sulfate extraction well LTG1147.

The feed water pipeline from the tie-in near the Copperton cemetery to the feed water tank at the RO Plant was built in compliance with applicable National Sanitation Foundation (NSF) and American Water Works Association (AWWA) standards. The permeate pipeline from the RO Plant to the distribution system of the JVWCD also complies with these standards.

2 Project Delivery Strategy

The Zone A Reverse Osmosis Plant was built in three phases. Phase 1, consisting of constructing and installing the first full-scale RO skid (Rack 3) in the existing KUCC membrane filtration building, was completed and has been in operation since September 2003. The produced permeate was delivered to the Copperton Concentrator and used as mill water.

Phase 2 consisted of erection of the new building for the Zone A RO Plant, the installation of the second RO skid (Rack 4) and the related prefiltration equipment. Feed water tank and pump as well as Degasifier 1 were relocated in this phase. Furthermore Degasifier 2 was installed. The design of Phase 2 was started in fall of 2003, construction was started on September 1, 2004, and the start-up occurred in June of 2005.

Phase 3 consisted of relocation of Rack 3, its feed pumps and prefiltration system into the new building, installation of chlorination and corrosion control systems, and the preparation of the plant for delivering drinking water to the JVWCD. Furthermore, the control room and other facilities in the new building were completed. The plant will continue to be operated by KUCC or a subcontractor from the new control room. The design for Phase 3 began in the first quarter of 2005, and start-up occurred in the August of 2005.

3 Design Specifics

3.1 Building

The site for building the Zone A RO Plant (General Arrangement Site Plan, Dwg. 456-M-0201) is adjacent to KUCC's existing membrane filtration plant. This is a central location for the various water sources to be processed at the plant, namely deep wells B2G1193 (K60), BFG1200 (K109) and the sulfate extraction well LTG1147. In the phased development of the plant this site also provides synergies with KUCC's existing membrane filtration plant operation.

The building is a pre-engineered style steel building with an eave height of 20'0". The roofing and siding material are high tensile steel with a silicon polyester finish. The structure is closed and sealed for weather tightness. Building finish color matches the existing structures in the area. The roof has a slope of a minimum of 2" rise to 12" run. There is a covered breezeway between the existing membrane filtration building and the Zone A RO Plant building. A 12' x 14' roll-up door provides weather-protected access from the breezeway on the west side of the building. Chemical deliveries can also be received at access doors on the north side of the building.

The interior of the building is insulated with a fiberglass batt insulation system. A control room, electrical room, conference/lunch room, mechanical room, lab, locker room, and restroom facilities are located inside the building. The building is adequately lighted, vented, heated and all normally occupied areas are air-conditioned. A concrete utility service trench was cast into the floor of the main operations area. All operation floors slope to the service trench. The trench shall serve as a pipe way and spill containment basin for the process. The RO building utility service trench shall be sloped and connected to the existing Membrane Filtration utility service trench. The trench floor will be at an elevation to stop liquid from flowing back from the Membrane Filtration utility service trench. All wastewater will be pumped and disposed of by the building sump pump. There is a 15" diameter emergency gravity overflow line connected to the existing Membrane Filtration utility service trench to ensure that no wastewater will overflow the service trench. The overflow gravity line drains to KUCC's desilting basin located in Bingham Canyon.

Facility design and construction complies with federal, state, and local regulatory agencies for items such as design, earthquake, flood, fire, safety, and handicap access requirements. A septic tank / leach field system is provided for sanitary sewage from the plant.

The building layout is shown on the general arrangement plan (Drawing No. 456-M-0202). The general building dimensions are summarized in Table 1. Building elevations are presented in Drawing No. 456-M-0203.

Table 1. Zone A RO Plant - Building Dimensions

		Length ft	Width ft	Area ft^2
Main Process Area		101.5	54	5,481
Membrane Storage / Antiscalant		81	21	1,701
Chlorination		41	21	861
Electrical Room		47	21	987
Control Room		14.5	21	305
Laboratory		20	20	400
Auxiliary Facilities	1.	41	21	861
	2.	36	21	756
	3.	21	21	441
Degasifier & UV Disinfection		40	62	2,480
Total				14,273

3.2 Process

This section describes the major process steps and the respective equipment. The process flow diagram is presented in Drawing No. 456-F-0101.

The following design parameters were used:
Stream Factor: 89%;
Feed Water Quality Limits: TDS < 3,000 ppm; Sulfate < 1,500 ppm; Turbidity < 0.5 NTU; SDI < 0.3.
RO recovery rate: 70 - 80%;
Average permeate flux rate: 11.9 gfd;
Process Flows: well water 3,370 gpm; RO feed 3,170 gpm; by-pass water 200 gpm; permeate 2246 gpm; product water: 2,446 gpm; concentrate 924 gpm;
Antiscalant dosage: 7 ppm;
Chemical cleaning frequency: 6 – 12 times per year;
Chemical cleaning: flow rate 40 – 50 gpm per vessel; wash tanks: 3,500 gal;
Degasifier: efficiency > 80%; air: water ratio 22 – 30 : 1 ft^3 / ft^3;
Product water will meet appropriate drinking water standards and will have a slightly positive Langlier Saturation Index (LSI).

The presently foreseen water sources for the Zone A RO Plant are deep wells B2G1193 (K60), BFG1200 (K109), and the sulfate extraction well LTG1147. Water from these wells will be delivered to the feed water tank at the plant by the well booster pumps. The focus of blending the waters from three wells is to keep the sulfate concentration in the feed water to the Zone A RO Plant below 1,500 ppm. During Phases 1 and 2, the produced permeate was pumped through existing piping to the Copperton Concentrator. In Phase 3, the permeate pipeline from the Zone

A plant to the point of delivery of the JVWCD distribution system was completed. Delivery of municipal quality product water to JVWCD will begin as soon as the JVWCD pipeline has been completed. The produced concentrate will be discharged to the tailings pipeline.

Deep well water from the feed water tank is pumped through prefiltration for removal of suspended solids to the high-pressure pumps, which convey the water through the RO system. NSF grade sodium bisulfite may be injected upstream of the prefilters in case biological fouling cannot be controlled sufficiently by UV disinfection. An antiscalant approved for drinking water system use is injected into the feed water to the RO system in order to minimize scale formation in any of the piping and equipment that it contacts. The RO filtration process uses spiral wound polyamid membranes, which separate the pressurized feed water stream into two streams, namely permeate and concentrate. The permeate passes through the semipermeable membranes and is characterized by very low TDS concentrations, as the RO membranes reject dissolved solids at rates of 95-99%. The balance of the feed water passes across the outer surface of the membrane and becomes the concentrate, which contains the constituents that have been rejected by the membranes.

The RO permeate is chlorinated using on-site produced sodium hypochlorite. Water analyses performed by JVWCD have shown that Sulfate Plume Water from the deep wells has no organic contamination and therefore chlorination is only required to provide the residual chlorine needed to avoid microbiological growth in the distribution system. The permeate is blended with filtered feed water to achieve the desired product water TDS. The resulting product water is degasified to remove radon and carbon dioxide and lower the corrosivity. The pH is raised, if necessary, by injecting a small amount of sodium hydroxide for corrosivity control.

The membrane wash system consists of tanks for alkaline and acidic wash solutions, the wash pump, and a bag filter to remove suspended solids from the circulating wash solution. Depending on the type of foulant, either alkaline or acidic wash solutions will be prepared in their respective tanks and heated to 40°C. The skid that requires washing will be taken off line and flushed with RO permeate. Then the spool pieces that guarantee the separation of wash water and wash permeate from product water will be installed. Subsequently, the wash solution will be circulated through the membranes for several hours. An alkaline wash may be followed by an acidic wash or vice versa. Permeate flushes will be performed between and after washes. For this purpose, the plant water tank is used to store RO permeate for washing and flushing.

3.2.1 Feed Water Blending

Water from deep wells B2G1193 (K60) and BFG1200 (K109) will be delivered to the feed water tank at the RO Plant by well pump pressure. Water from the sulfate extraction well LTG1147 will be conveyed from the sulfate well pipeline to the plant by pumps installed in the Sulfate Well Booster Pump Station. The intention is to maintain TDS concentration in the feed water to the Zone A Plant below 3,000 ppm by blending the waters from these wells. Table 2 shows a potential blending scenario with recent water chemistries for these wells. Wells K60 and K109 are expected to increase in TDS over time as the acid plume moves towards these wells. The blending ratio of the various feed waters will have to be adjusted accordingly.

Feed lines from B2G1193 (K60), BFG1200 (K109), and LTG1147, will be equipped with flow meters. Flow control to maintain the proper blending ratio of the various feed waters resulting in

the desired feed water composition is achieved by controlling the speed of the variable speed drives of the pumps. Blending will be controlled to a predetermined conductivity set point. The turbidity of the inflow to the feed water tank will be monitored. Before entering the feed water tank, the water passes through a UV disinfection reactor in order to minimize the potential for biological fouling in the RO Plant. Another possibility for controlling biological fouling is the injection of sodium bisulfite into the feed stream to prefiltration.

The feed water tank provides a reservoir of water, which is being used to automatically purge concentrate from the membrane skids and flush the membranes in case of an automatic shutdown or a power outage. Electric valves powered by an uninterruptible power system open the feed water supply to the skids for flushing. The resulting flush water will be dumped into the trench inside the building, from where it is discharged by sump pump to Kennecott's meteoric water collection system.

3.2.2 Prefiltration

Two centrifugal pumps deliver water from the feed water tank to the first process step, the two-stage prefiltration. The first stage consists of polypropylene filter bags (rating: nominal one micron; 7" diameter; 32" length; typical flow capacity 100 gpm per bag). This stage is designed to protect the more expensive second stage prefilters from sudden bursts of suspended solids, which can occur when well pumps are being started and stopped repeatedly or when pipe scale breaks loose. The second stage prefiltration uses polypropylene cartridges (rating: 2 or 4.5 micron absolute; 6" diameter, 40" length; typical flow capacity 350 gpm per cartridge).
Prefiltration filters will be exchanged at a maximum pressure drop of 20 psi for bag filters and 35 psi for cartridge filters. These filters have typical run times of 1 – 2 months.
A slip stream of prefiltered feed water (200 – 500 gpm) will be blended with the RO permeate for TDS adjustment (ref. Table 2). It is also possible to use separately prefiltered water from LTG1147 for blending.

3.2.3 Antiscalant Addition

The concentrations of dissolved calcium sulfate and silica in Sulfate Plume Water approach saturation. As this water becomes more concentrated in the membrane filtration process, gypsum saturation is exceeded up to 700%. Silica saturation will also be exceeded. To avoid membrane fouling due to precipitation of these compounds in the feed spacer of the membranes, antiscalants are being added to the membrane feed. A chemical dosing pump injects antiscalant from a 275 gal tote bin into the feed water upstream of the high-pressure pump. The addition rate is monitored by flow meter. The antiscalants to be used are certified under ANSI/NSF Standard 60 for drinking water production. They are compatible with the membranes and have been tested extensively at Kennecott's demonstration plant and in Phases 1 and 2 of this project.

3.2.4 RO System

The RO System consists of two high-pressure feed pumps and the two membrane skids (Racks # 3 & 4). The high-pressure feed pumps (one per skid) are vertical turbine pumps of all stainless

steel construction. Totally enclosed fan cooled (TEFC) motors with variable-frequency drives (VFD) are used for these pumps.

The Zone A RO Plant houses two membrane skids of nominal 1,500 gpm feed rate. The skids use two-stage arrays, with 36 pressure vessels in the first stage and 18 pressure vessels in the second stage (ref. Figure 1: Membrane Array). The pressure vessels have the ASME Section X Code Stamp. The first stage consists of six rows of six vessels each. The second stage has three rows of six vessels each. The lower number of vessels in the second stage results in increased cross-flow in order to minimize membrane fouling. The permeate from both stages is collected in one common header. The structure to support vessels and piping is made of epoxy coated carbon steel. The rack contains feed and discharge piping required for membrane washing. Appropriate means to guarantee the isolation of wash solution and wash permeate from product water are installed, i.e. removable spool pieces. Pipe connections are made by easily removable couplings. All feed water and concentrate piping on the rack is stainless steel. The piping materials for permeate pipes are PVC and stainless steel.

In the first RO skid (Rack 3) pressure vessels from the shut down nanofiltration skid were used. These vessels have a diameter of 8 inches and house six membranes, providing 2,400 square feet of membrane area per vessel. In the second RO skid (Rack 4) pressure vessels housing seven membranes each are used. The total membrane area per vessel is 2,800 square feet. These vessels were not available at the time the nanofiltration skid was built. The seven-membrane units provide a larger membrane surface area at only slightly higher capital cost, thereby giving increased operating flexibility.

The membrane skids are equipped with the required instrumentation for fully-automated operation, such as flow and pressure transmitters for feed, permeate, and concentrate, conductivity meters for feed and permeate, and a concentrate flow control valve.
Membrane integrity will be confirmed using the standard method in the industry, namely on-line measurement of permeate conductivity. Periodic checks of the permeate conductivity of the individual vessels will also be carried out. A Total Organic Carbon Analyzer will be tested for this purpose as well.

3.2.5 Chlorination

Product water disinfection will be achieved by chlorination. Water analyses performed by JVWCD have shown that Sulfate Plume Water from the deep wells has no biological contamination and therefore chlorination is only required to provide the residual chlorine of 0.2 to 0.3 ppm to avoid microbiological growth in the distribution system. A ClorTec (Severn Trent) on-site generation system will be used to produce sodium hypochlorite for disinfection. The expected average operating capacity of this system is twelve pounds of chlorine equivalent per day to chlorinate the flow of 2,411 gpm of product water to a level of 0.4 ppm. The system capacity is 72 pounds of chlorine equivalent per day to treat the full production flow to 2.4 ppm for shock chlorination. Disinfection byproducts (DBP) are not a concern due to the lack of organics in the feed water.

The principle of operation of the on-site sodium hypochlorite generation system is the electrolytic conversion of sodium chloride to sodium hypochlorite. This technology has the advantage over the traditional use of chlorine gas that no hazardous materials are involved. The only chemical

stored on site is salt, which is stored on site in 50 lb bags on pallets. The concentration of the produced sodium hypochlorite solution is < 1.0%. The system consists of a brine tank and proportioning pump, the electrolytic cells, the hypochlorite storage tank, and the metering pumps. A small amount of hydrogen that is a byproduct of the process is being vented to the outside of the building. The metering pumps inject the sodium hypochlorite solution into the product water line and the residual chlorine is measured with a respective meter. In case a component failure occurs in the chlorination system and cannot be resolved within a day, commercial sodium hypochlorite solution can be purchased, diluted 15:1, and fed into the system.

3.2.6 Total Dissolved Solids Adjustment

Due to the fact that RO permeate has very low TDS, a slip stream of prefiltered feed water is blended with the permeate on the way to the degasifiers to achieve the desired TDS concentration in the final product water. Table 3 presents one possible blending scenario.

3.2.7 Degasification

The degasifier serves two purposes:

1) Removal of excess carbon dioxide from the permeate product water; thereby, reducing the amount of sodium hydroxide needed to bring the product into compliance for release to JVWCD, and
2) Removal of radon to a level that meets drinking water standards.

Carbon Dioxide Removal

Since the membranes are permeable to gases, excess carbon dioxide, dissolved in the well water as carbonic acid, passes through to the permeate product. Pilot testing has shown that this excess carbon dioxide can be purged from the permeate by passing water through a packed degasification tower counter current to an air stream.

Radon Removal

Analyses of water samples from the deep wells B2G1193 and BFG1200 indicated radon concentrations of 700 to 840 pico Curies per liter (pCi/L). The operation of the Phase 1 Degasifier showed 97% removal of radon. The radon concentration in the degasified permeate was below 20 pCi/L radon, which is the method detection limit. These results show that degasification will be effective in the removal of carbon dioxide and radon.

A forced draft degasifier is being used to remove carbon dioxide and radon from the RO permeate. In the degasifier, the inflow is distributed over packing material. While the water flows in a thin film over the packing material surface, a centrifugal fan (7.5 HP; 6,200 cfm) blows air into the sump below the packing. The air intake to the fan is filtered with high efficiency particulate arrestance (HEPA) filters. Carbon dioxide and radon are released and vented through the top of the degasifier. The degasified water flows by gravity from the clear well of the degasifier to corrosion control.

The two degasifiers have clear wells with a capacity of approximately 3,400 gallons each. The product water flows by gravity from the clear wells to the connection point with the JVWCD distribution system located to the east of the Copperton cemetery.

3.2.8 Corrosion Control

Based on testing performed at the Demonstration Plant, a small amount of sodium hydroxide may be required to neutralize corrosive characteristics of the final product water. A chemical dosing pump injects NaOH from a 55 gal drum into the blended product water. The addition rate is monitored by pH. The Rothberg, Tamburini & Winsor Model for Water Process & Corrosion Chemistry is used to assess corrosion and scaling parameters.

3.2.9 Membrane Wash System

Membrane washes will be initiated in compliance with the membrane manufacturer's guidelines when the differential pressure over a stage or the system has increased by 10-15%. Based on the operating experience with the Zone A sulfate plume water membrane washes will be required 6 to 12 times per year per RO skid.

The membrane wash system consists of tanks for alkaline and acidic wash solutions (3,500 gal each, FRP), the wash pump (flow rate up to 1,000 gpm; stainless steel), a bag filter (10 bag unit; rating: nominal one micron; 7" diameter; 32" length; typical flow capacity 100 gpm per bag) to remove suspended solids from the circulating wash solution, and PVC wash piping. Depending on the type of foulant, either alkaline or acidic wash solutions will be prepared in their respective tanks and heated up to 40°C. After taking the skid that requires washing off line, the spool pieces that guarantee the separation of wash water and wash permeate from product water will be installed. Then the skid will be flushed with RO permeate. Subsequently, the wash solution will be circulated through the membranes vessels. The first stage can be divided into two sections (18 vessels each), which will be washed separately. The second stage will also be washed separately. An alkaline wash may be followed by an acidic wash or vice versa. Permeate flushes will be performed between and after washes. For this purpose, the existing plant water tank is used in order to store RO permeate for washing and flushing. Spent wash solutions will be discharged to Kennecott's Collection System where they will be mixed with meteoric leach water and pumped to the tailings pipeline. The amount of wash chemicals is minute in comparison to the tailings stream and no impact on the tailings line is expected as result of this process.

During the operation of the Demonstration Plant and of Phases 1 and 2 of the Zone A RO Plant, various membrane cleaning regimes have been tested. The effectiveness of foulant removal is high as long as washes are carried out as required by increases in differential pressure. Temperature, flow rate, and reagent concentration of the wash solutions are in compliance with the membrane manufacturer's recommendations and Utah Division of Drinking Water Rule R309-535-8.

3.2.10 Control System and Instrumentation

An SLC 500 Allen-Bradley Programmable Logic Controller (PLC) with color graphics operator interface is used to operate the plant with all its equipment and functions. The plant is equipped with the appropriate instrumentation to permit fully automated operation with minimum

requirements for operator interference. The PLC will also be instrumented with a modem to allow remote control of the operation. In case the alarm condition is not taken care of and the plant operation deviates farther from its set points, the plant can be shut down and put through an automatic flush, after which the equipment will be parked in a stand-by mode until further instructions from the operator are received. This approach allows remote operation and protects the whole plant in case of unusual circumstances.
Treatment plant monitoring will be carried out in compliance with applicable sections of the Utah DDW Rule R309-215. On-line instrumentation will monitor key parameters of the finished water, such as conductivity, pH, turbidity, particle count, and residual chlorine. These data will be trended and stored in the process control computer system.
The Zone A RO Plant is a relatively small contributor to the distribution system of the Jordan Valley Water Conservancy District. Backup power is only provided to the process control system for a few hours by an uninterruptible power supply. This enables an automatic flush of the membrane skids in case of a power outage, thereby avoiding potential scale formation in the membranes as RO concentrate is stationary in them.

3.2.11 Piping System

Water from wells B2G1193 (K60), BFG1200 (K109) will be delivered to the plant by pressure from the well booster pumps. Water from the sulfate extraction well LTG1147 will be delivered to the plant via the Sulfate Well Booster Pump Station. In Phase 1, a new 20" HDPE feed line was installed from the existing B2G1193 (K60), BFG1200 (K109) pipeline to the feed tank at the plant (5,280 linear feet). The pipeline from LTG1147 will be extended to the feed tank in the next few months.

Until the JVWCD pipeline has become operational, existing piping will be used to convey the produced RO permeate to the Copperton Concentrator for use as process water. In Phase 3, the permeate pipeline was completed to supply the Zone A RO Plant product water to the JVWCD delivery point. Existing piping will be used for conveyance of the RO concentrate to the tailings pipeline.

4 Time Schedule

The Zone A RO Plant was constructed in three phases. Their scopes are listed below:

Phase 1:

- installation of feed water pipeline and feed water tank;
- installation of antiscalant injection system;
- modification of existing prefiltration units (bag and cartridge filters);
- installation of prefiltration feed pump and high-pressure RO feed pump;
- installation of the first 1,500 gpm RO Skid (Rack 3) in the existing Membrane Filtration Plant, using existing pressure vessels and instrumentation;
- installation of permeate degasifier for carbon dioxide and radon removal;
- modification of the membrane wash system to meet the requirement of guaranteed separation of wash medium and wash permeate from RO feed and permeate.

Phase 1 has been in operation since September 2003.

Phase 2:

- construction of the shell of the Zone A Plant building;
- relocation of feed water tank and degasifier 1;
- installation of antiscalant injection system;
- construction of prefiltration system (bag and cartridge filters);
- installation of prefiltration feed pump and high-pressure RO feed pump;
- installation of the second 1,500 gpm RO skid (Rack 4) in the new building.

Phase 2 construction began in the 3rd quarter 2004. The start-up occurred in June of 2005.

Phase 3:

- installation of permeate degasifier 2;
- relocation of Rack 3 to the new building;
- installation of chlorination system;
- completion of the product water pipeline to the JVWCD connection point.

Start-up of Phase 3 occurred in august of 2005. The delivery of municipal quality product water will begin as soon as JVWCD has completed the pipeline to their distribution system.

Table 2: Feed Water Blending

	pH	Cond.	Temp.	TDS	Alk	Cl	SO4	Ca	Mg	K	Na	Flow	Volume	Ratio
	su	uS/cm	°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	gpm	acft/yr	
B2G1193 (K60)	7.0	3,217	15.8	2,707	213	163	1,757	549	164	4.2	81	1,585	2,173	50%
BFG1200 (K109)	7.3	2,333	16.3	1,923	194	142	1,121	366	100	3.6	71	1,585	2,173	50%
Feed Mix	7.1	2,775	16.1	2,315	203	152	1,439	458	132	3.9	76	3,170	4,346	100%

Stream Factor 85%

Table 3: Blending of RO Permeate with Filtered Feed Water to achieve 250 ppm TDS

	pH	Cond	Temp	TDS	Alk	Cl	SO4	Ca	Mg	K	Na	Flow	Volume	Ratio	
	su	uS/cm	° C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	gpm	acft/yr		
RO Permeate	6.8	30	16.0	20	15	3	3	5	2	0.3	5	2,300	3,153	90%	9.0
Feed Mix	7.1	2,775	15.8	2,315	203	152	1,439	458	132	3.9	76	256	351	10%	1.0
Product Water	6.8	305	16.0	250	34	18	147	50	15	0.7	12	2,556	3,504	100%	

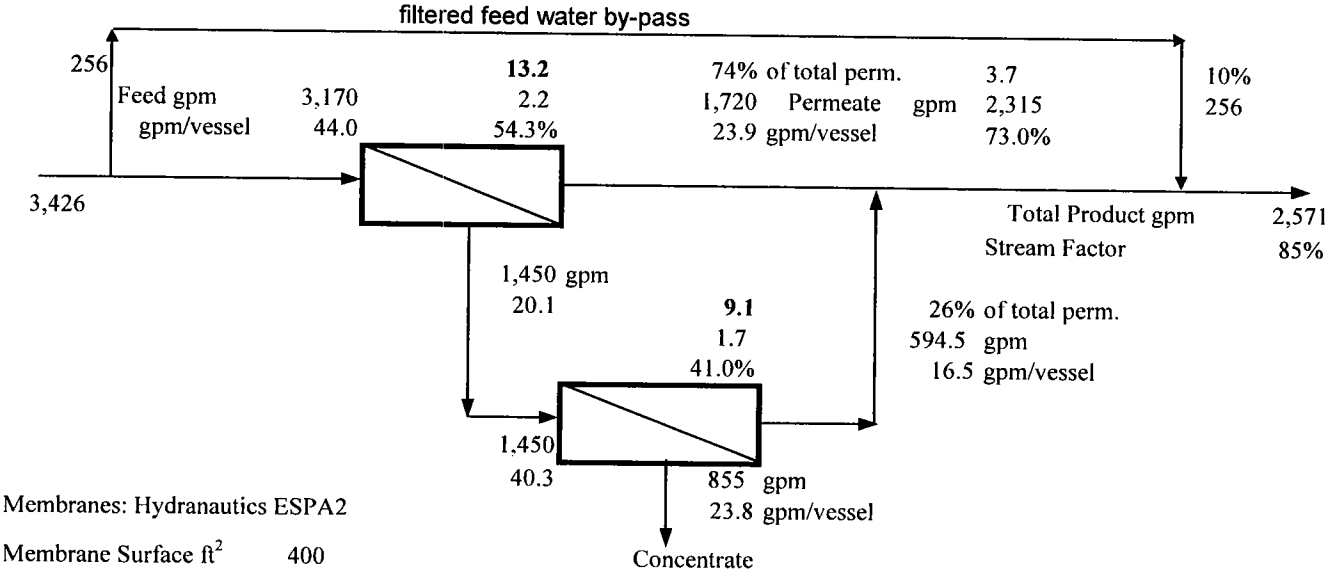
Stream Factor 85%

A typical composition of RO permeate is used in this table. The actual composition will change over the life of the membranes as their salt rejection changes.

Zone A Reverse Osmosis Plant

Figure 1: Membrane Array

CONFIDENTIAL INFORMATION



Annual Production acft / yr

3,524

75% overall yield

Membranes: Hydranautics ESPA2

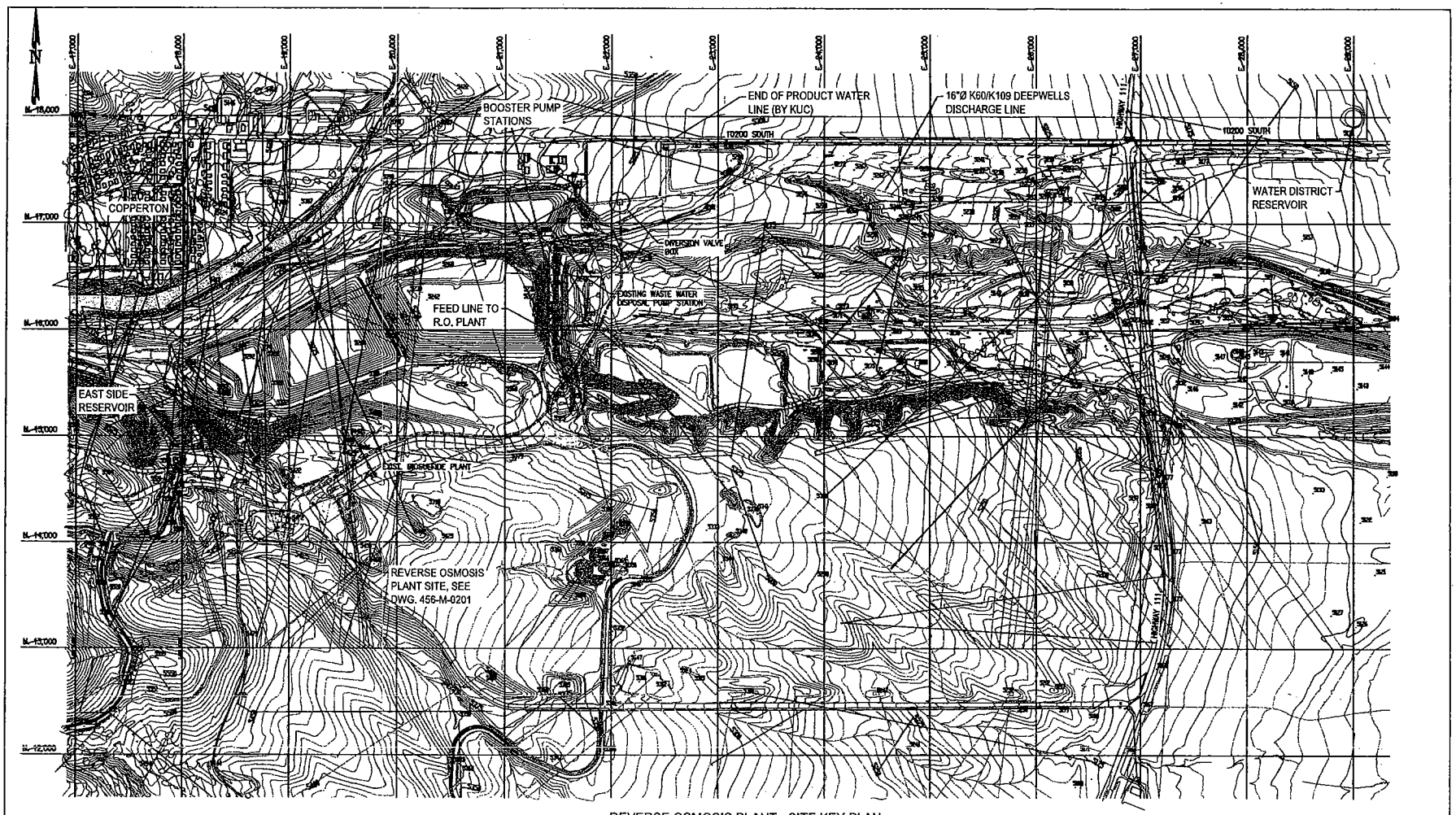
Membrane Surface ft^2 400

	Vessels	Membr. / vessel	Membranes	Membrane Area ft^2	Permeate Recovery	Concentration Factor	**Permeate Flux gfd**
Stage 1	72	6 / 7	468	187,200	54.3%	2.2	**13.2**
Stage 2	36	6 / 7	234	93,600	41.0%	1.7	**9.1**
Total	108		702	280,800	73.0%	3.7	**11.9**

APPENDIX E

Reverse Osmosis Treatment Plant

Construction Drawings



REVERSE OSMOSIS PLANT - SITE KEY PLAN

NO.	DATE	REVISION	BY	CHK	APP
NO.	DATE	REVISION	BY	CHK	APP

REFERENCE DRAWINGS NUMBER

REFERENCE DRAWINGS NUMBER

HBC International

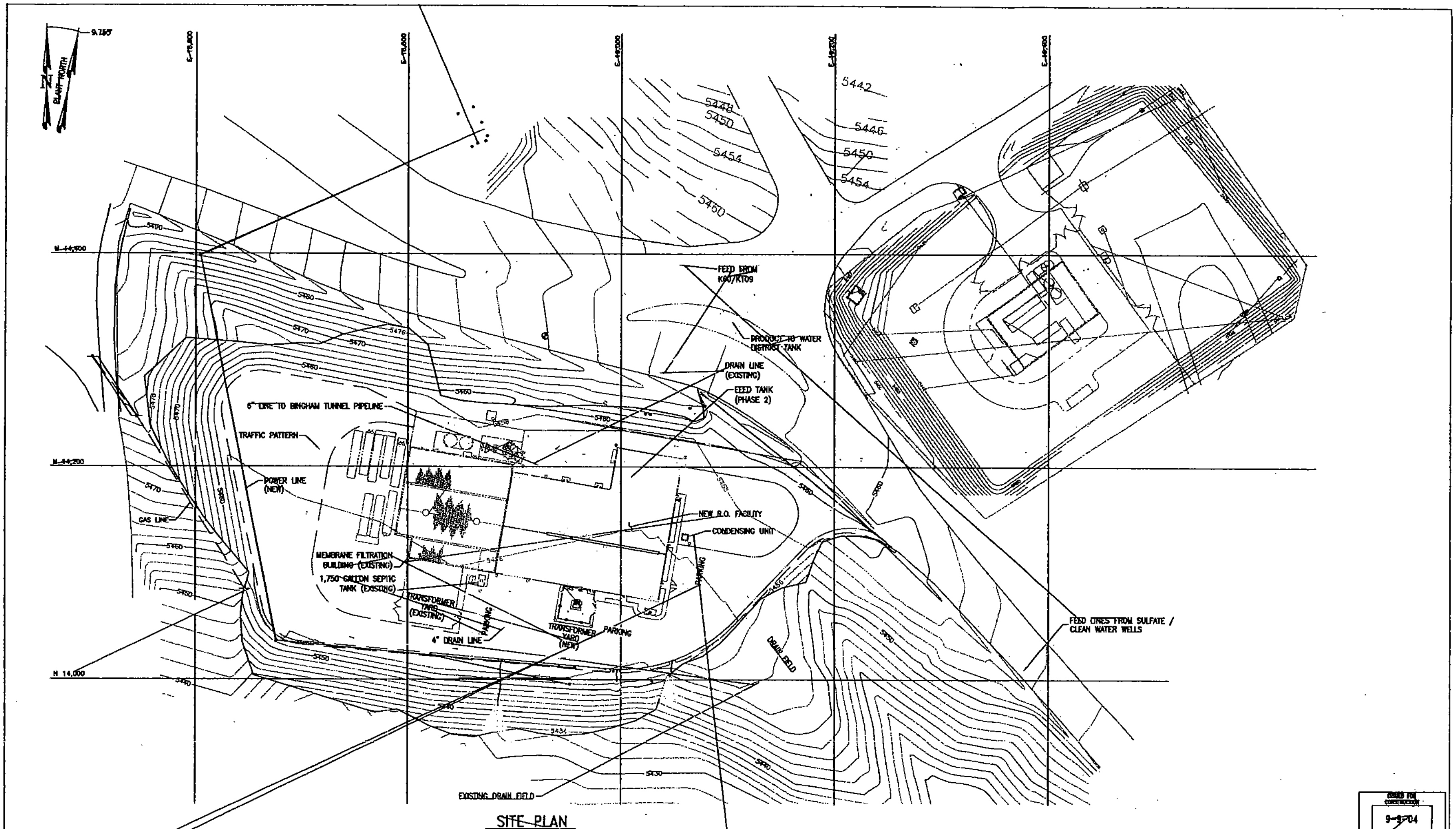
APPROVAL DATE SCALE: 1"=400'

DESIGNED	LRT	11-5-96
DRAWN	LRT	11-5-96
CHECKED	HBC	12-6-96
APPROVED	LRT	12-6-96
DATE	HB	12-6-96

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
GENERAL ARRANGEMENT
SITE KEY PLAN

Job No. 10-00713C Dwg. No. 456-M-0200 REV 0



SITE PLAN

NO.	DATE	REVISION	BY	CHK	APP
2	9-9-04	ISSUED FOR CONSTRUCTION	GSK		LRT
1	1/21/04	ISSUED FOR PERMIT	BBB		LRT
0	11-7-03	ISSUED FOR PERMIT	GSK		LRT

REFERENCE DRAWINGS	NUMBER
ELECTRICAL – SITE PLAN	456-E-0304
ASPHALT PAVING – SITE PLAN	456-C-0204
SANITARY DISCHARGE – SITE PLAN	456-C-0202
SITE GRADING AND DRAINAGE PLAN	456-C-0201
GENERAL ARRANGEMENT BLDG. ELEVATIONS	456-M-0203
GENERAL ARRANGEMENT – PLAN	456-M-0202
SITE KEY PLAN	456-M-0200

ISSUED FOR CONSTRUCTION 9-9-04 HBC INTERNATIONAL

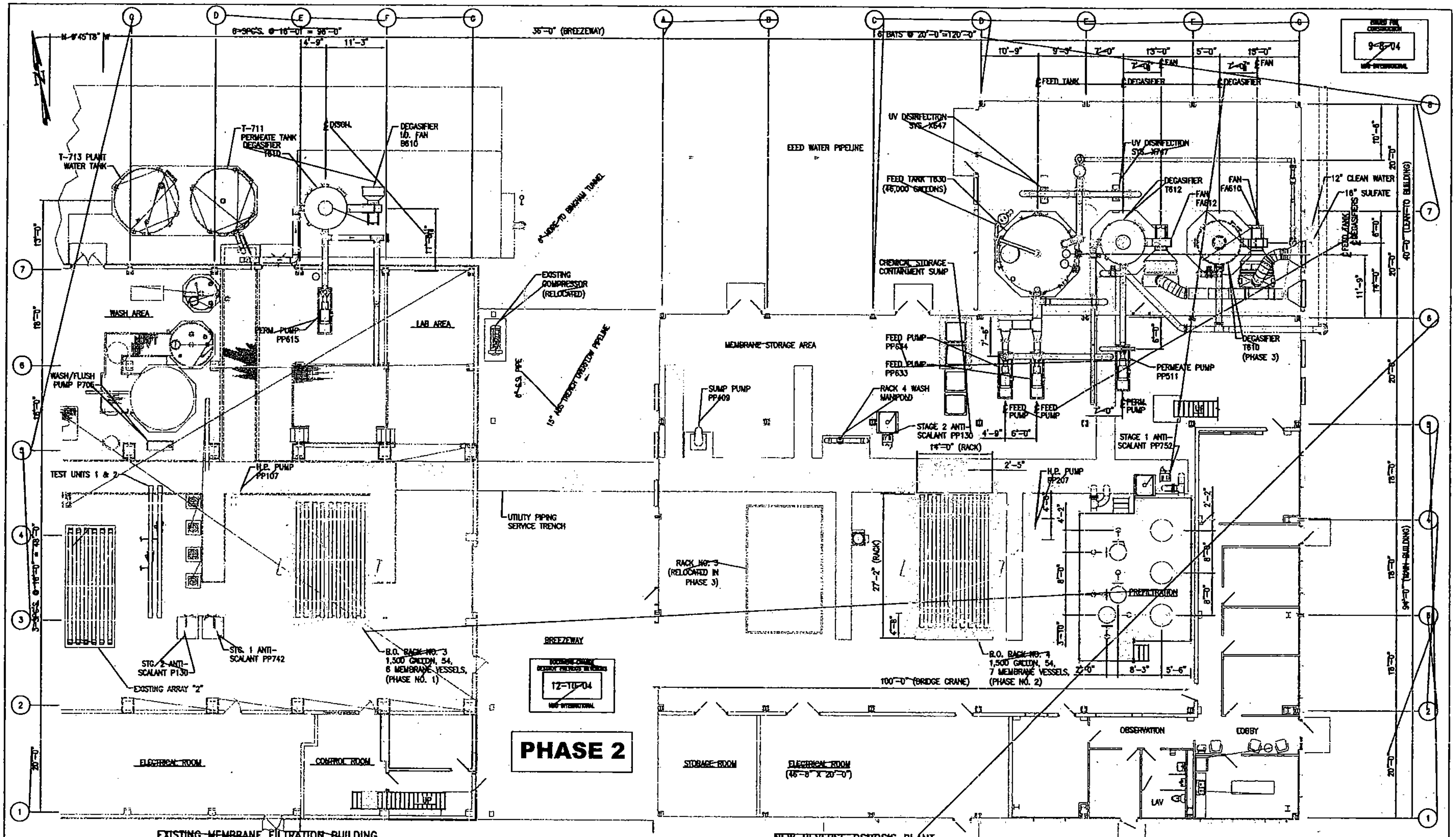
HBC International

APPROVAL | DATE | SCALE: 1"=40'

LRT / LRT / HBC / LRT / HB

KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
GENERAL ARRANGEMENT
SITE PLAN

Job No. 10-00713C | Dwg. No. 456-M-0201 | REV 2



6-SPC'S. @ 16'-0" = 96'-0"
36'-0" (BREEZEWAY)
6 BAYS @ 20'-0"=120'-0"
T-713 PLANT WATER TANK
T-711 PERMEATE TANK
DEGASIFIER T610
DEGASIFIER I.D. FAN B610
WASH AREA
LAB AREA
PERM. PUMP PP615
WASH/FLUSH PUMP P706
TEST UNITS 1 & 2
H.P. PUMP PP107
STG. 2 ANTI-SCALANT P130
STG. 1 ANTI-SCALANT PP742
EXISTING ARRAY "2"
R.O. RACK NO. 3 1,500 GALLON, 54, 6 MEMBRANE VESSELS, (PHASE NO. 1)
EXISTING COMPRESSOR (RELOCATED)
UTILITY PIPING SERVICE TRENCH
BREEZEWAY
12-10-04
PHASE 2
ELECTRICAL ROOM
CONTROL ROOM
EXISTING MEMBRANE FILTRATION BUILDING
FEED WATER PIPELINE
MEMBRANE STORAGE AREA
SUMP PUMP PP409
RACK NO. 3 (RELOCATED IN PHASE 3)
STORAGE ROOM
ELECTRICAL ROOM (46'-8" X 20'-0")
NEW REVERSE OSMOSIS PLANT
UV DISINFECTION SYS. X647
UV DISINFECTION SYS. X747
FEED TANK T630 (46,000 GALLONS)
CHEMICAL STORAGE CONTAINMENT SUMP
DEGASIFIER T612
FAN FA612
FAN FA610
12" CLEAN WATER
16" SULFATE
DEGASIFIER T610 (PHASE 3)
FEED PUMP PP634
FEED PUMP PP633
RACK 4 WASH MANIFOLD
STAGE 2 ANTI-SCALANT PP130
PERMEATE PUMP PP511
STAGE 1 ANTI-SCALANT PP752
H.P. PUMP PP207
PREFILTRATION
R.O. RACK NO. 4 1,500 GALLON, 54, 7 MEMBRANE VESSELS, (PHASE NO. 2)
100'-0" (BRIDGE CRANE)
OBSERVATION
LOBBY
LAV
9-8-04

EXISTING MEMBRANE FILTRATION BUILDING

NEW REVERSE OSMOSIS PLANT

NO.	DATE	REVISION	BY	CHK	APP
4	12-10-04	DRAWING UP-DATE	GSK	LRT	
3	9-8-04	ISSUED FOR CONSTRUCTION	GSK	LRT	
2	8-2-04	REVISED PREFILTRATION AREA	LRT		
1	1/28/04	ISSUED FOR PERMIT	BBB	LRT	
0	1/14/04	ISSUED FOR PERMIT	GSK	LRT	

HBC International

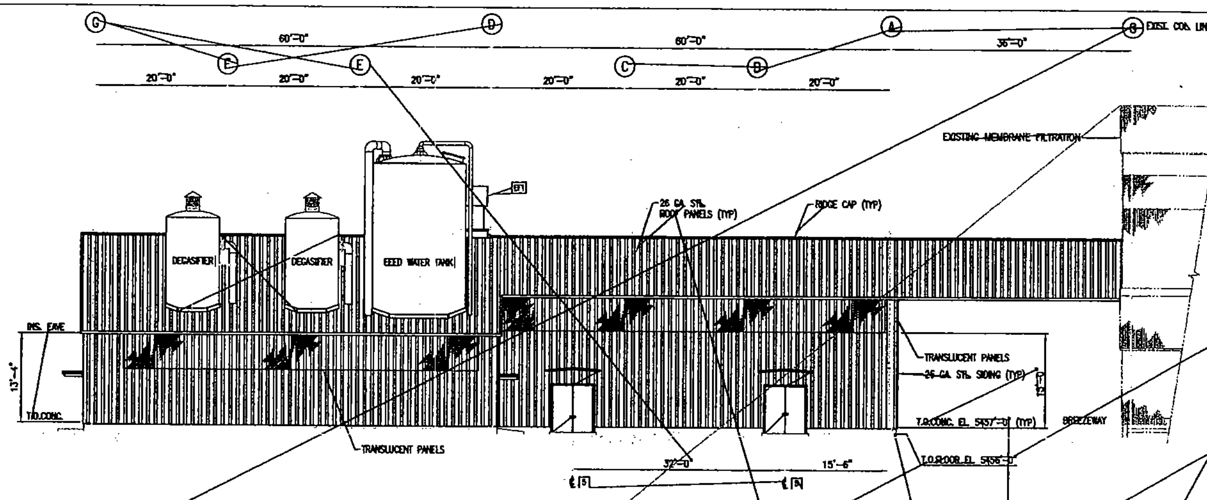
KENNECOTT UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
GENERAL ARRANGEMENT
PLAN

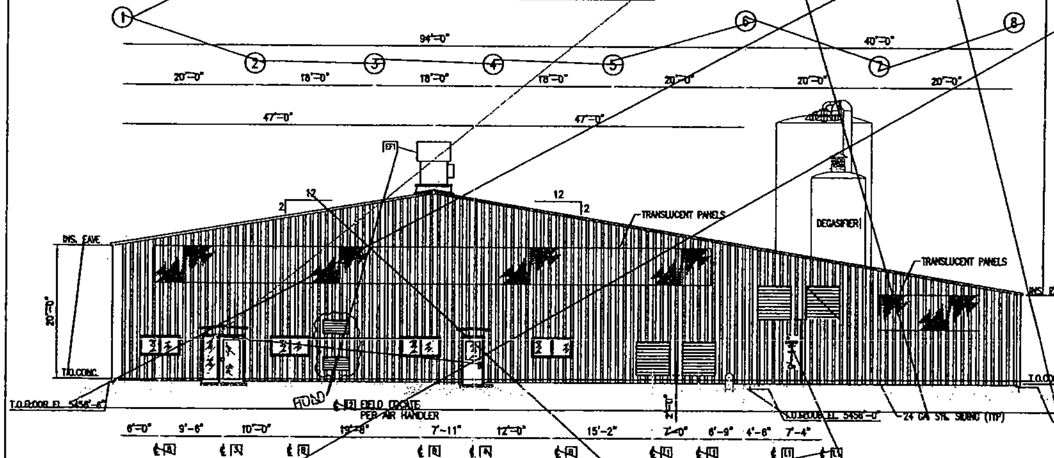
SCALE: 1/8" = 1'-0"

LRT / LRT / HBC / LRT / HB

JOB No. 10-00713C DWG. No. 456-M-0202-2 REV 4



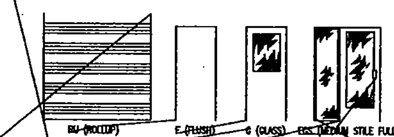
NORTH ELEVATION



EAST ELEVATION

GENERAL BUILDING REQUIREMENTS:

1. ALL SIDING TO BE "MBCI" 26 GA. PR (1 1/4" DP) SIGNATURE 200 SADDLE TAN
2. ALL ROOF PANELING TO BE "MBCI" 26 GA. PR (1 1/4" DP) SIGNATURE 200 SADDLE TAN
3. ALL TRANSLUCENT PANELS TO BE "MBCI" AND MATCH PR TYPE
4. WALL INSULATION TO BE R-13 MINIMUM: 0015" WHITE POLYPROPYLENE FILM
   FIBERGLASS SCRIM REINFORCEMENT
   11# KRAFT FIBERGLASS BLANKET
5. ROOF INSULATION TO BE R-19 MINIMUM: 0015" WHITE POLYPROPYLENE FILM
   FIBERGLASS SCRIM REINFORCEMENT
   11# KRAFT FIBERGLASS BLANKET
6. CONTRACTOR TO SUPPLY ALL ROOFING, SIDING, SILL ANGLES, RAKE ANGLES, CLOSURE STRIPS, SEAL STRIPS, CAULKING, CORNER TRIM, ETC. REQUIRED FOR BUILDING ERECTION
7. BUILDING DESIGN TO MEET ALL IBC 2003 CODES.
   BUILDING LOADS: WIND 90 MPH, 3s GUST, EXP. C, I_w=1.0
   SNOW 50 PSF, I_s=1.0
   SEISMIC S_s=109.1, S_1=35.1, I_E=1.0, USE GROUP I
8. FOR GENERAL NOTES SEE DRAWING 456-C-0100



EXTERIOR DOOR SCHEDULE

MARK	TYPE	FRAME	SIZE	HARDWARE GROUP	GLASS	HAND	FINISH	REMARKS
1	RU	CB	8'-0"x8'-0"	–	–	–	–	STEEL ROLL-UP DOOR
2	RU	CTO	12'-0"x14'-0"	–	–	–	–	STEEL ROLL-UP DOOR
3	FGS	H.M.	3'-0"x7'-0"x1 3/4"	1	TEMPERED SAFETY GLASS AAMA CERT. VINYL FRAME, THERMAL PANE	RHR	PAINTED	2'-6"x7'-0" SIDELIGHT
4	G	H.M.	3'-0"x7'-0"x1 3/4"	2	TEMPERED SAFETY GLASS AAMA CERT. VINYL FRAME, THERMAL PANE	LHR	PAINTED	–
5	F	H.M.	6'-0"x7'-0"x1 3/4"	2	–	–	PAINTED	DOUBLE DOORS
6	F	H.M.	3'-0"x7'-0"x1 3/4"	2	–	LHR	PAINTED	–
7	F	H.M.	3'-0"x7'-0"x1 3/4"	3	–	RHR	PAINTED	–

GROUP 1 (EXTERIOR PANIC)

ITEM	QUANTITY	MANUFACTURER	MODEL	FINISH
CLOSER	1	NORTON	1605	ALUM.
KICK PLATE	1	TRIDENT	8"x34"	SATIN STL.
THRESHOLD	1	McMASTER/CARR	1056A61	–
PANIC BAR AND LEVER	1	McMASTER/CARR	1318A25 (R.H.)	DULL CHROME

GROUP 2 (EXTERIOR PANIC)

ITEM	QUANTITY	MANUFACTURER	MODEL	FINISH
CLOSER	1	NORTON	1605	ALUM.
KICK PLATE	1	TRIDENT	8"x34"	SATIN STL.
THRESHOLD	1	McMASTER/CARR	1056A61	–
PANIC BAR AND LEVER	1	McMASTER/CARR	1318A25 (L.H.)	DULL CHROME

GROUP 3 (EXTERIOR PANIC)

ITEM	QUANTITY	MANUFACTURER	MODEL	FINISH
CLOSER	1	NORTON	1605	ALUM.
KICK PLATE	1	TRIDENT	8"x34"	SATIN STL.
THRESHOLD	1	McMASTER/CARR	1056A61	–
PANIC BAR AND LEVER	1	McMASTER/CARR	1318A25 (R.H.)	DULL CHROME

ISSUED FOR CONSTRUCTION 12-23-04 HBC INTERNATIONAL

NO.	DATE	REVISION	BY	CHK	APP
		ISSUED FOR CONSTRUCTION	CSK		LRT
		ISSUED FOR PERMIT	BBB		LRT
		ADDED VENT	BBB		LRT
		ISSUED FOR VENDOR REFERENCE	BBB		LRT
		ISSUED FOR PERMIT	BBB		LRT

REFERENCE DRAWINGS	NUMBER
FLOOR SLAB PLAN	456-A-0208
FOUNDATION AND FOOTING PLAN	456-A-0205
ARCH. ELEVATIONS	456-A-0201
ARCH. ROOF PLAN	456-A-0202
ARCH. SECTIONS AND DETAILS	456-A-0203
GENERAL ARRANGEMENT – PLAN	456-M-0202

HBC International

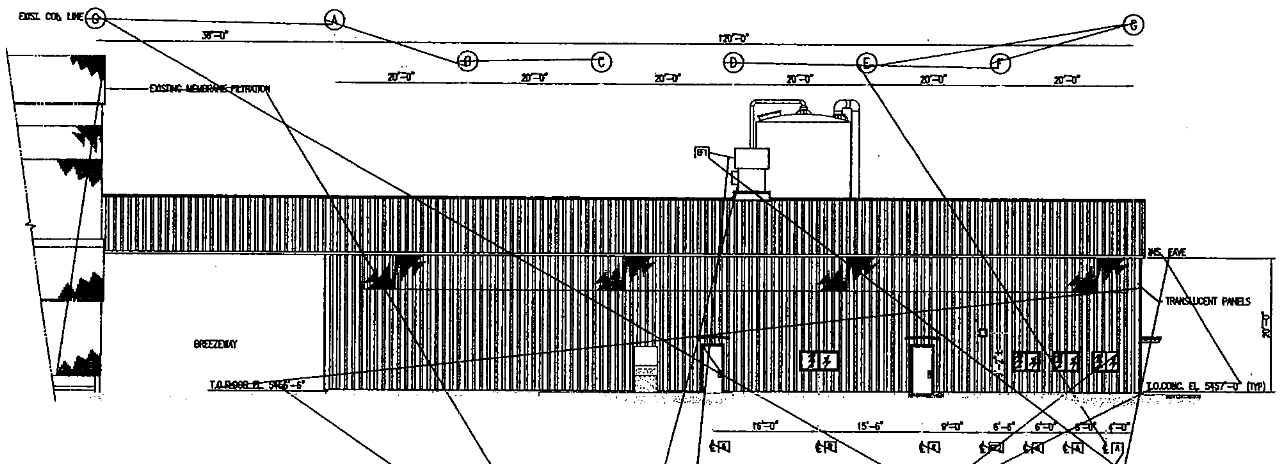
SCALE 1/8"=1'-0"

LRT, BBB, HBC, LRT, HB

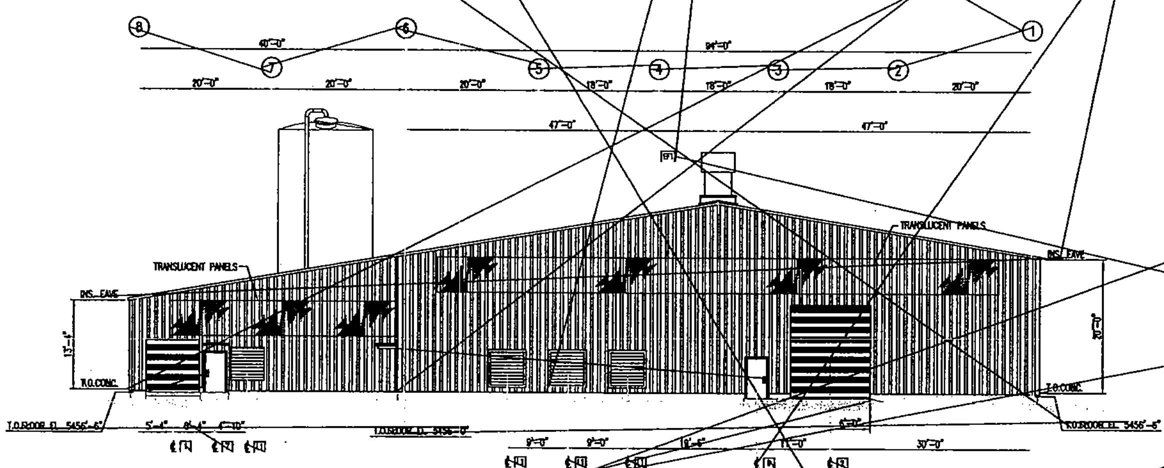
KENNECOTT UTAH COPPER

BINGHAM CANYON WATER MANGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
PHASE 2 ARCHITECTURAL
NORTH AND EAST ELEVATIONS

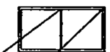
Job No. 10-00713C Dwg. No. 456-A-0200 REV 4



SOUTH ELEVATION



WEST ELEVATION



SLIDING GLASS

EXTERIOR WINDOW SCHEDULE					
MARK	TYPE	FRAME	SIZE	MULLION	REMARKS
A	SLIDING	VINYL	4'-0"x3'-0" NOM.	–	TEMPERED OR PROTECTED DUAL PANE SAFETY GLASS, AAMA CERTIFIED
B	SLIDING	VINYL	6'-0"x3'-0" NOM.		TEMPERED OR PROTECTED DUAL PANE SAFETY GLASS, AAMA CERTIFIED

EXTERIOR VENTING SCHEDULE					
MARK	TYPE	FRAME	SIZE	MODEL	REMARKS
L1	INTAKE	STL.	5'-0"x5'-0"	AMERICAN WARMING AND SIDING VENTILATING #LE-31A LOUVER	MANUALLY OPERATED SHUTTERS WITH SCREEN AND DUST FILTER COLOR TO MATCH SIDING
L2	INTAKE RELIEF	STL.	4'-0"x2'-0"	AMERICAN WARMING AND SIDING VENTILATING #LE-31 LOUVER	FIXED SHUTTERS WITH SCREEN AND DUST FILTER COLOR TO MATCH SIDING
EF1	EXHAUST	STL.	[illegible]	[illegible] SF-S00	48,100 CFM FAN
EF2	EXHAUST	[illegible]	6"		DAMPER WITH BACK DRAFT
WORK THIS SCHEDULE WITH HVAC DRAWINGS 456-M-0216, -0217 AND -0218					

ISSUED FOR CONSTRUCTION
12-23-04
HBC INTERNATIONAL

NO.	DATE	REVISION	BY	CHK	APP
5	[illegible]	ISSUED FOR CONSTRUCTION	GSK		LRT
4	[illegible]	ADDED 2 ADDITIONAL LOUVERS	LRT		LRT
3	[illegible]	ISSUED FOR PERMIT	BBB		LRT
2	[illegible]	REMOVED 2 VENTS	BBB		LRT
1	12/12/[illegible]	ISSUED FOR VENDOR REFERENCE	BBB		LRT
0	11/[illegible]	ISSUED FOR PERMIT	BBB		LRT

REFERENCE DRAWINGS	NUMBER
ARCH. ELEVATIONS	456-A-0200
ARCH. ROOF PLAN	456-A-0202
ARCH. SECTIONS AND DETAILS	456-A-0203
GENERAL ARRANGEMENT – PLAN	456-M-0202
PLANT SITE PLAN	456-M-0201
SITE KEY PLAN	456-M-0200

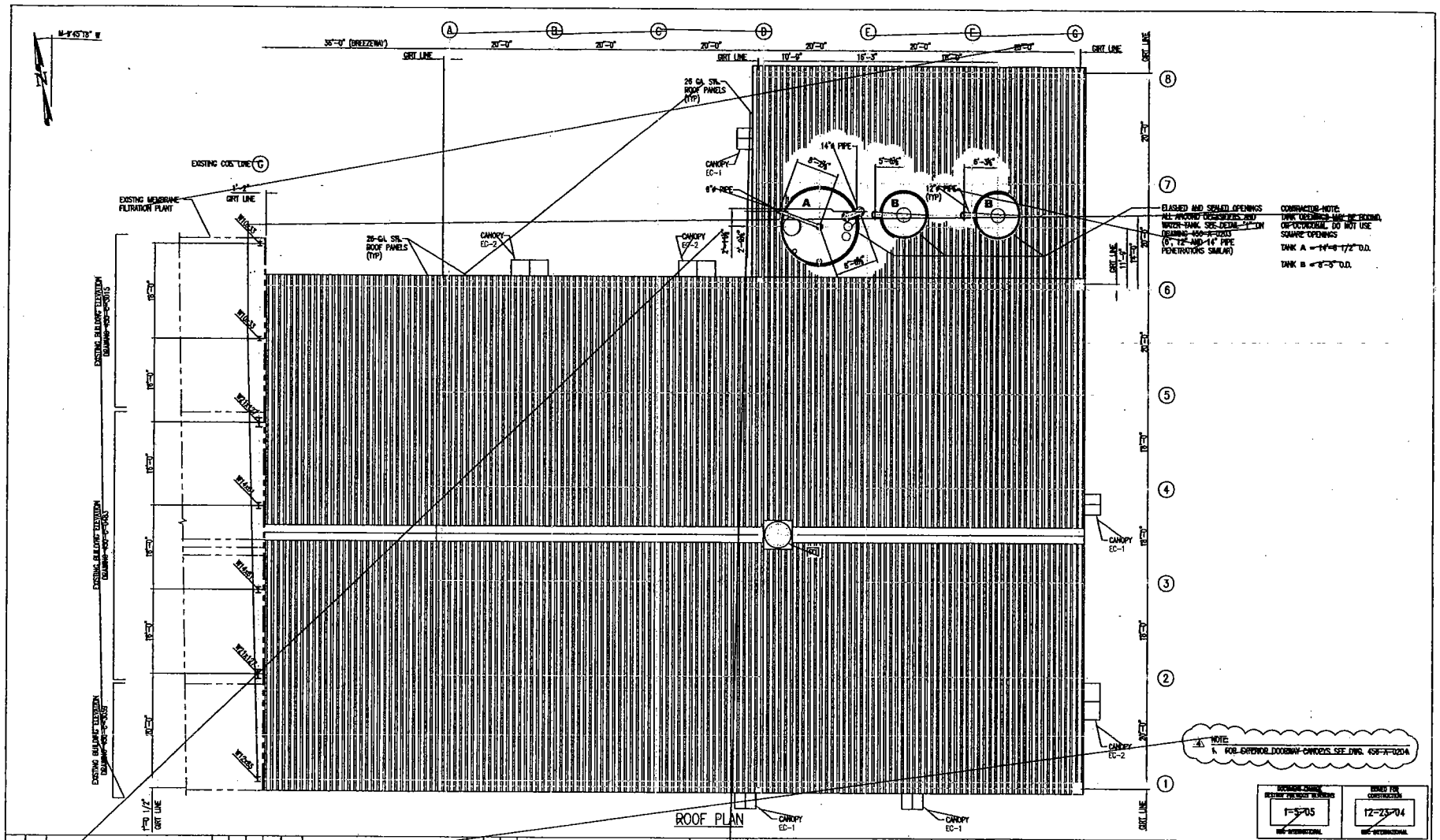
HBC International

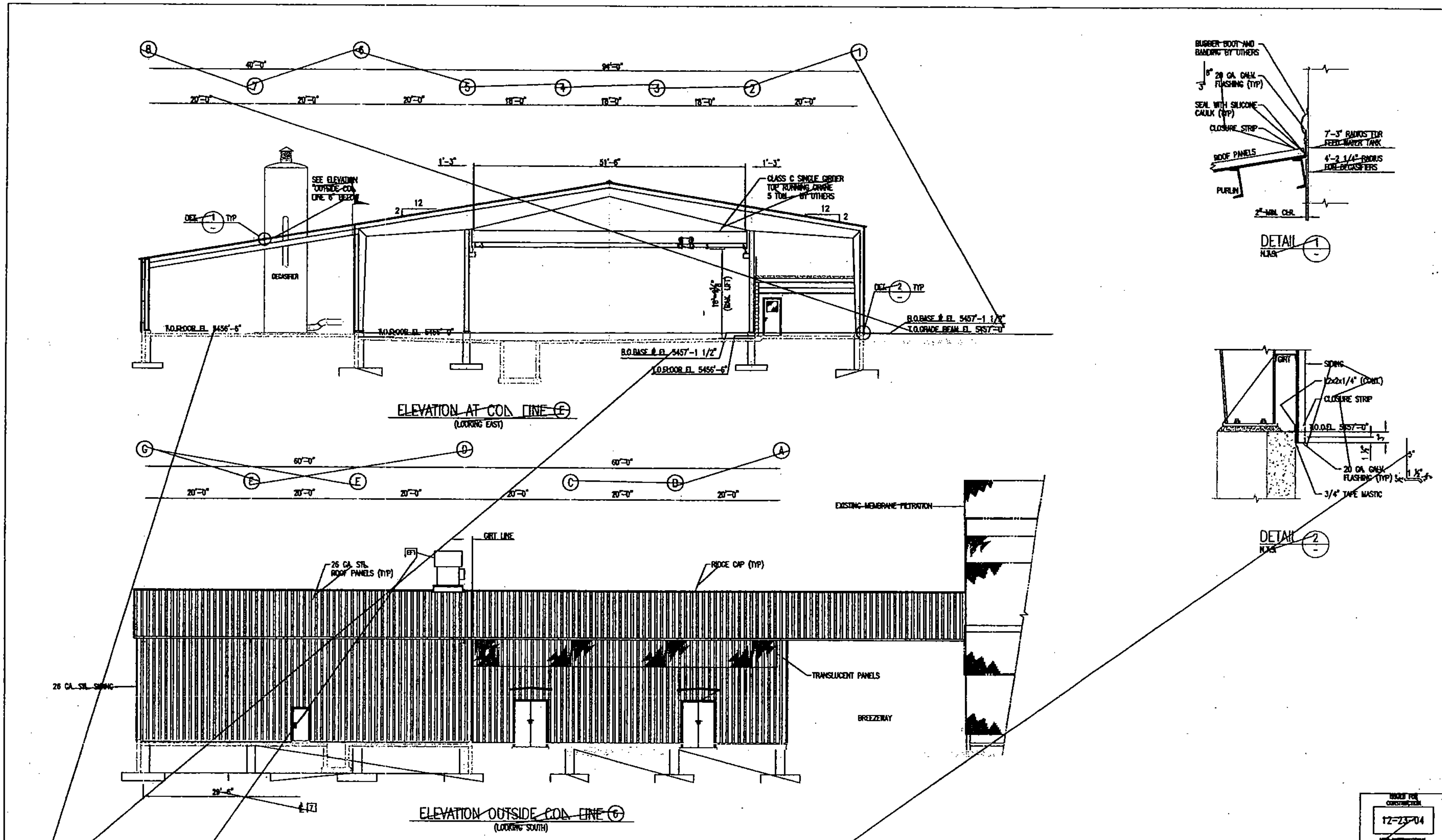
APPROVAL | DATE | SCALE: 1/8" = 1'-0"

LRT / BBB / HBC / LRT / HB

KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
PHASE 2 ARCHITECTURAL
SOUTH AND WEST ELEVATIONS

Job No. 10-00713C | Dwg. No. 456-A-0201 | REV 5


ROOF PLAN
EXISTING MEMBRANE FILTRATION PLANT
EXISTING COS LINE
GRT LINE
26 GA STL ROOF PANELS (TYP)
CANOPY EC-1
CANOPY EC-2
14"ϕ PIPE
12"ϕ PIPE (TYP)
SLEEVED AND SEALED OPENINGS ALL PIPING PENETRATIONS INTO WATER TANK. SEE DETAIL 1 ON DRAWING 456-A-0203 (6", 12" AND 14" PIPE PENETRATIONS SIMILAR)
CONTRACTOR NOTE: TANK DIAGONALS MAY BE ROUND, OR OCTAGONAL. DO NOT USE SQUARE OPENINGS
TANK A = 14'-6 1/2" O.D.
TANK B = 8'-3" O.D.
TANK A
TANK B
EXISTING BUILDING ELEVATION DRAWING 456-A-0205
EXISTING BUILDING ELEVATION DRAWING 456-A-0206
EXISTING BUILDING ELEVATION DRAWING 456-A-0207
NOTE: 1. FOR EXTERIOR DOORWAY CANOPYS SEE DWG. 456-A-0204
HBC International
KENNECOTT UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT ZONE "A" REVERSE OSMOSIS PLANT PHASE 2 ARCHITECTURAL ROOF PLAN
Job No. 10-00713C
Dwg. No. 456-A-0202
REV 4


ELEVATION AT COL. LINE F
(LOOKING EAST)
SEE ELEVATION OUTSIDE COL. LINE 6 BELOW
DEGASIFIER
CLASS C SINGLE GIRDER TOP RUNNING CRANE 5 TON - BY OTHERS
T.O.FLOOR EL. 5456'-6"
B.O.BASE PL EL. 5457'-1 1/2"
T.O.GRADE BEAM EL. 5457'-0"
ELEVATION OUTSIDE COL. LINE 6
(LOOKING SOUTH)
26 GA. STL. ROOF PANELS (TYP)
GIRT LINE
RIDGE CAP (TYP)
EXISTING MEMBRANE FILTRATION
TRANSLUCENT PANELS
26 GA. STL. SIDING
BREEZEWAY
RUBBER BOOT AND BANDING BY OTHERS
20 GA. GALV. FLASHING (TYP)
SEAL WITH SILICONE CAULK (TYP)
CLOSURE STRIP
ROOF PANELS
PURLIN
7'-3" RADIUS FOR FEED WATER TANK
4'-2 1/4" RADIUS FOR DEGASIFIERS
DETAIL 1
N.T.S.
GIRT
SIDING
2x2x1/4" (CONT.)
CLOSURE STRIP
T.O.G.EL. 5457'-0"
20 GA. GALV. FLASHING (TYP)
3/4" TAPE MASTIC
DETAIL 2
N.T.S.
ISSUED FOR CONSTRUCTION
12-23-04
HBC INTERNATIONAL

NO.	DATE	REVISION	BY	CHK	APP
4		ISSUED FOR CONSTRUCTION	CSK		LRT
3		ISSUED FOR PERMIT	BBB		LRT
2		CHNGD BOT OF BASE PLATE EL	BBB		LRT
1		ISSUED FOR VENDOR REFERENCE	BBB		LRT
0		ISSUED FOR PERMIT	BBB		LRT

REFERENCE DRAWINGS	NUMBER
ARCH. ELEVATIONS	456-A-0200
ARCH. ELEVATIONS	456-A-0201
ARCH. ROOF PLAN	456-A-0202
GENERAL ARRANGEMENT - PLAN	456-M-0202
PLANT SITE PLAN	456-M-0201
SITE KEY PLAN	456-M-0200

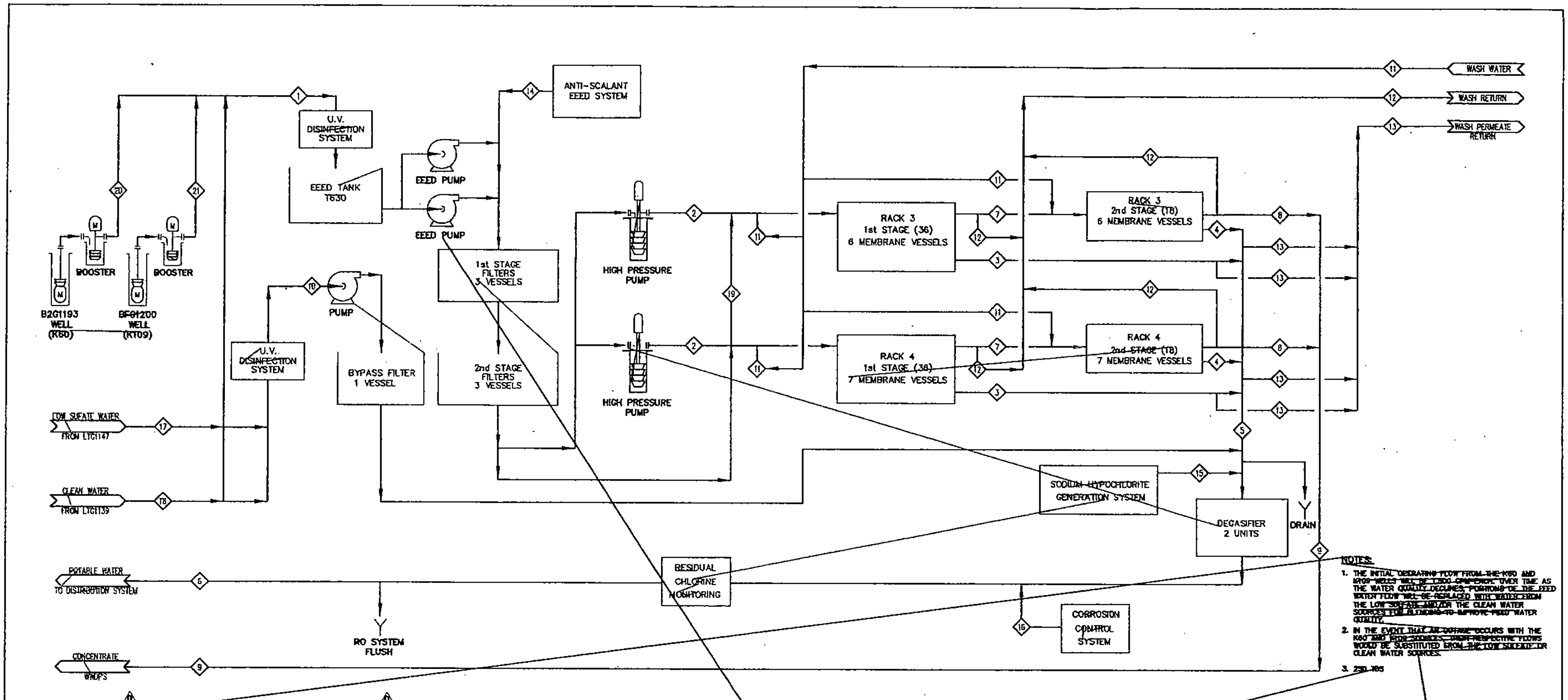
HBC International

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANGEMENT
ZONE "A" REVERSE OSMOSIS PLANT
PHASE 2 ARCHITECTURAL
SECTIONS AND DETAILS

SCALE 1/8" = 1'-0"
LRT
BBB
HBC
LRT
HB

Job No. 10-00713C Dwg. No. 456-A-0203 REV 4


WASH WATER
WASH RETURN
WASH PERMEATE RETURN
ANTI-SCALANT FEED SYSTEM
U.V. DISINFECTION SYSTEM
FEED TANK T630
FEED PUMP
FEED PUMP
1st STAGE FILTERS 3 VESSELS
2nd STAGE FILTERS 3 VESSELS
HIGH PRESSURE PUMP
HIGH PRESSURE PUMP
RACK 3 1st STAGE (36) 6 MEMBRANE VESSELS
RACK 3 2nd STAGE (18) 6 MEMBRANE VESSELS
RACK 4 1st STAGE (36) 7 MEMBRANE VESSELS
RACK 4 2nd STAGE (18) 7 MEMBRANE VESSELS
BOOSTER
BOOSTER
B2G1193 WELL (K60)
BF01200 WELL (K109)
PUMP
U.V. DISINFECTION SYSTEM
BYPASS FILTER 1 VESSEL
LOW SULFATE WATER FROM LTG1147
CLEAN WATER FROM LTG1139
SODIUM HYPOCHLORITE GENERATION SYSTEM
DEGASIFIER 2 UNITS
DRAIN
POTABLE WATER TO DISTRIBUTION SYSTEM
RESIDUAL CHLORINE MONITORING
RO SYSTEM FLUSH
CORROSION CONTROL SYSTEM
CONCENTRATE WMOPS
NOTES:
1. THE INITIAL OPERATING FLOW FROM THE K60 AND K109 WELLS WILL BE 1,800 GPM EACH. OVER TIME AS THE WATER QUALITY DECLINES, PORTIONS OF THE FEED WATER FLOW WILL BE REPLACED WITH WATER FROM THE LOW SULFATE AND/OR THE CLEAN WATER SOURCES FOR BLENDING TO IMPROVE FEED WATER QUALITY.
2. IN THE EVENT THAT AN OUTAGE OCCURS WITH THE K60 AND K109 SOURCES, THEIR RESPECTIVE FLOWS WOULD BE SUBSTITUTED FROM THE LOW SULFATE OR CLEAN WATER SOURCES.
3. 230 TDS

STREAM		FEED WATER (SEE NOTE NO. 1)			STAGE 1 FEED			STAGE 1 PERMEATE			STAGE 2 PERMEATE			PLANT PERMEATE			PRODUCT WATER		
NUMBER		1			2			3			4			5			6		
	UOM	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX
FLOW	GPM	500	3,770	3,800	500	1,585	1,800	150	860	1,060	88	298	396	238	2,380	2,962	238	2,546	3,302
PRESSURE	PSIG	60	80	100	150	220	400	8	12	16	8	12	16	8	12	16	8	12	16
TEMPERATURE	F	50	55	65	50	56	65	50	58	65	50	58	65	50	58	65	50	58	65
CONDUCTIVITY	mS/cm	2.0	2.6	2.8	2.0	2.6	2.8	0.01	0.15	0.35	0.05	0.4	0.6	0.02	0.2	0.6	0.2	0.5	0.6
pH	--	6.0	7.0	7.5	6.0	7.0	7.5	5.8	6.5	6.8	5.8	6.5	6.8	5.8	6.5	6.6	6.5	7.5	8.5
STREAM FACTOR	%							30%	54%	60%	25%	40%	53%		73%			75%	
FLOW	gpm/v																		
MISC.																		NOTE 3	

STREAM		STAGE 1 CONCENTRATE			STAGE 2 CONCENTRATE			PLANT CONCENTRATE			FILTERED BYPASS			WASH FEED			WASH RETURN			WASH PERMEATE		
NUMBER		7			8			9			10			11			12			13		
	UOM	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX
FLOW	GPM	350	725	720	263	438	324	525	870	2,000	0	250	350	600	800	1,000	600	800	1,000	20	50	150
PRESSURE	PSIG	130	200	580	130	180	580	130	180	560	60	80	100	25	50	60	25	50	60	8	12	16
TEMPERATURE	F	50	58	65	50	58	65	50	58	65	50	58	65	50	100	104	50	100	104	50	100	104
CONDUCTIVITY	mS/cm	4.0	5.0	6.0	5.0	8.5	10.0	5.0	8.5	10.0	2.0	2.6	4.0									
pH	--	6.0	7.0	7.5	6.0	7.0	7.5	6.0	7.0	7.5	6.0	7.0	7.5	2.0		10.2	2.0		10.2	2.0		10.2
STREAM FACTOR	%																					
FLOW	gpm/v	19.9	40.3	40.0	14.6	24.2	18.0							33.0	44.0	56.0						
MISC.																						

STREAM		ANTISCALANT			HYPOCHLORITE			CORROSION CONTROL			LOW SULFATE FEED WATER			CLEAN WATER			FLUSH WATER			K60 WATER			K109 WATER		
NUMBER		14			15			16			17			18			19			20			21		
	UOM	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX	MIN	OPER	MAX
FLOW	GPM	0.006	0.018	0.030	0.06	0.13	1.34	0	0.002	0.02	0	1,000	1,100	0	1,000	1,100	324	540	1,080	500	1,585	1,800	500	1,585	1,800
PRESSURE	PSIG	65	85	105	30	40	50													60	80	100	60	80	100
TEMPERATURE	F	50	60	80	60	60	60													50	58	65	50	58	65
CONDUCTIVITY	mS/cm																			2.0	2.8	4.0	2.0	2.6	4.0
pH	--																			6.0	7.0	7.5	6.0	7.0	7.5
STREAM FACTOR	%																								
FLOW	gpm/v																								
MISC.																									

NO.	DATE	REVISION	BY	CHK	APP	NO.	DATE	REVISION	BY	CHK	APP	REFERENCE DRAWINGS	NUMBER	REFERENCE DRAWINGS	NUMBER
A		ISSUED FOR APPROVAL	LRT												

ENGINEERING SERVICES

APPROVAL | DATE | SCALE: NONE | DATE

LRT
LRT
HGB

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER TREATMENT
ZONE "A" REVERSE OSMOSIS PLANT
TWO RACK SYSTEM
PROCESS FLOW DIAGRAM

Job No. 10-00713C | Dwg. No. 456-F-0101 | REV 0

APPENDIX F

Acid Wells

Geologic and Construction Drawings

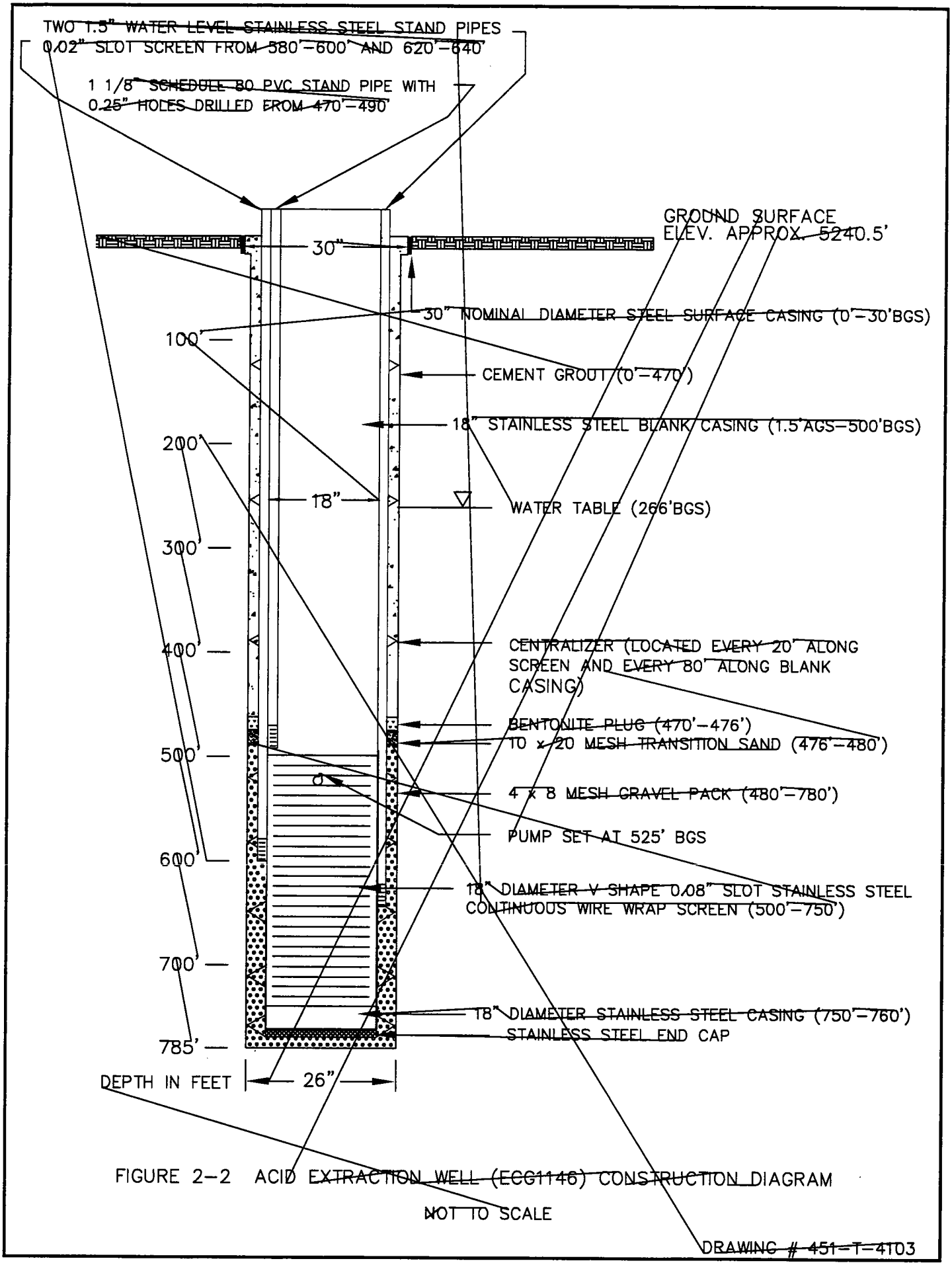
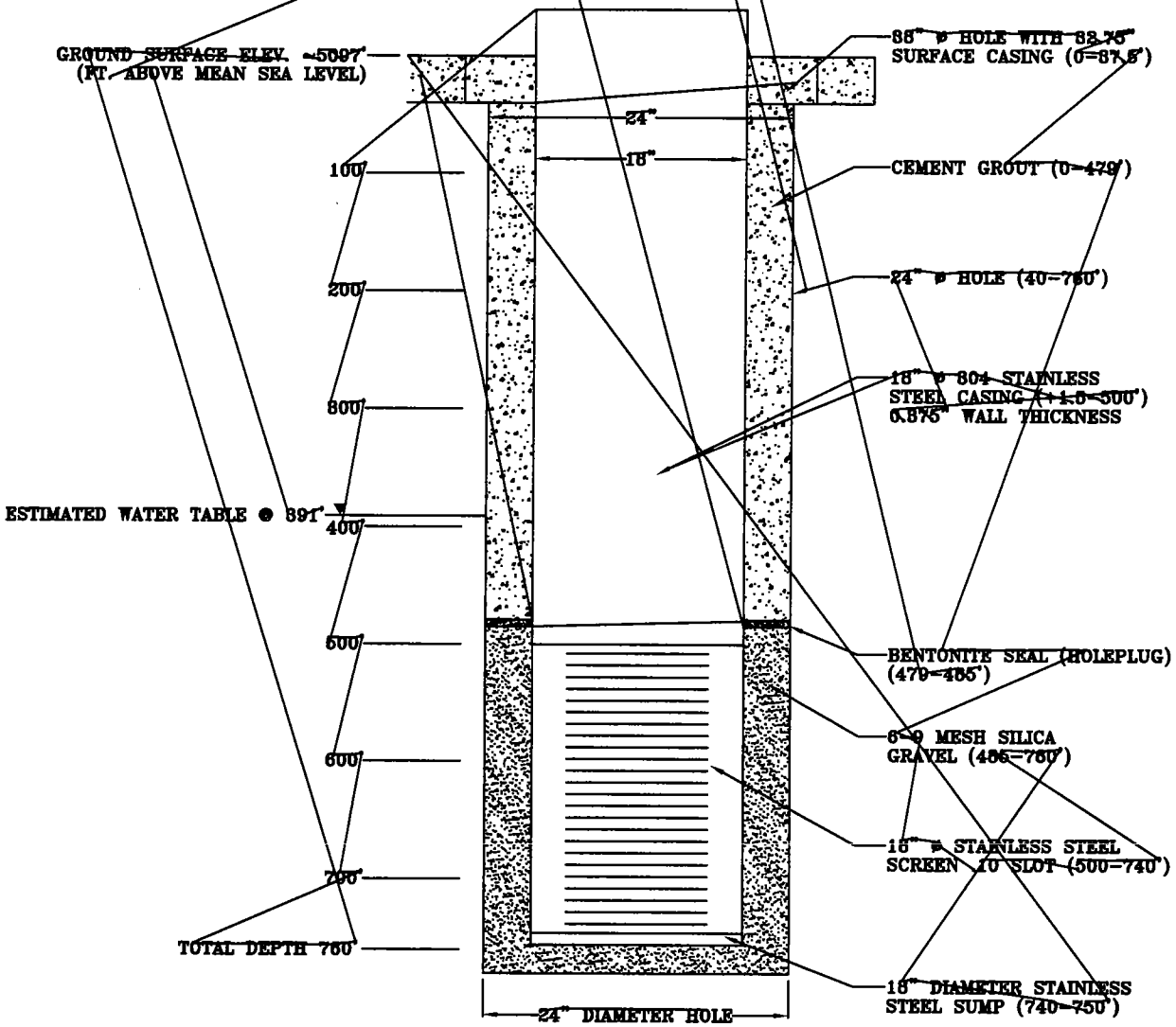


FIGURE 2-2 ACID EXTRACTION WELL (ECG1146) CONSTRUCTION DIAGRAM

NOT TO SCALE

BSG1201
Acid Well #2
As Built



Drawing Location: M:\Documents\451\451F0017

Kennecott Strategic Resources	Date: March, 2003 Scale: NTS	Figure 5 Acid Well #2 BSG1201 As Built Diagram

WELL ID: ECG1146 Acid Extraction Well

LOCATION:

GENERAL LOCATION: Plume

KENNECOTT GRID:

NORTHING: 13467.18
EASTING: 25673.22

U.S.G.S: 994 ft. north, 1407 ft. west from southeast corner of Section 16, T3S, R2W, SLBM

U.S. PUBLIC LAND SURVEY GRID: NE1/4, SW1/4, SE1/4, of Section 16, T3S, R2W, SLBM

CADASTRAL COORDINATES: (C32) 16 dca SLBM

ELEVATIONS: (KENNECOTT)

NATURAL GROUND: 5241.48
TOP OF STEEL CASING: N/A
TOP OF SOUNDING TUBES: A) 5240.95 B) 5240.70 C) 5243.47

TOTAL DEPTH OF COMPLETED WELL: 762' TOP

START DATE: 12-2-95 COMPLETION DATE: 12-9-95

DRILLING COMPANY: Longyear Exploration Drilling

DRILLING METHOD, BIT DIAMETER/TYPE (BOREHOLE DIAMETER), AND DRILLING FLUID:

0-30': Dry Auger, 34".
30-785': Dual Wall Flooded Reverse, 26" tricone, mud.

SURFACE CASING:

TYPE: Steel DIAMETER: 30" DEPTH: 0 - 30' bgl

CASING:

TYPE: Stainless Steel DIAMETER: 18" DEPTH: 2' agl - 500' bgl and 750' bgl - 760' bgl

SCREEN:

TYPE: Johnson Continuous-Wire-Wrap, V-Slot, Stainless-Steel, 0.080" slots
DIAMETER: 18" DEPTH: 500' bgl- 750' bgl

WATER LEVEL SOUNDING TUBES:

A (SW) TYPE: Stainless Steel DIAMETER: 1.25" DEPTH: 0' - 600' with 0.02" slots from 580' - 600'

B* (SE) TYPE: Stainless Steel DIAMETER: 1.25" DEPTH: 0' - 640' with 0.02" slots from 620' - 640'

C** TYPE: Sch. 80 PVC DIAMETER: 1" DEPTH: +3' - 490' with 0.25" hand drilled holes from 0' - 10' and from 470' - 490'

* Separated, nonfunctional

** Installed inside 18" well casing in March 1996 to replace the A sounder tube which was equipped with a water level device and wired into the pump's electronics

WELL ID: ECG1146 Acid Extraction Well

COMPLETION MATERIALS:
- 4x8 MESH SILICA SAND: 480' - 775' bgl
- 10x12 MESH SILICA SAND: 476' - 480' bgl
- BENSEAL: 470' - 476'
- CEMENT: 0' - 470'

STATIC WATER LEVEL IN OPEN BOREHOLE: Unknown due to drilling with mud.
STATIC WATER LEVEL AFTER WELL COMPLETION: 265.27' TOP DATE: 1-9-96

WATER QUALITY AFTER WELL DEVELOPMENT:

DATE	pH	COND. (µmho/cm)	SO_4^{2-} (mg/L)	Cl^- (mg/L)	T.D.S. (mg/L)	Cu (mg/L)
3-21-97	3.46	23100	34700	193	48600	162

BOREHOLE LITHOLOGY:
- 0' - 262': SILTY QUARTZITIC GRAVEL
- 262' - 284': SILTY VOLCANIC GRAVEL
- 284' - 321': SILTY QUARTZITIC GRAVEL
- 321' - 359': SILTY VOLCANIC GRAVEL
- 359' - 476': SILTY QUARTZITIC GRAVEL
- 476' - 524': SILTY CLAYEY QUARTZITIC GRAVEL
- 524' - 534': SILTY VOLCANIC GRAVEL
- 534' - 575': SILTY CLAYEY QUARTZITIC GRAVEL
- 575' - 586': CLAYEY VOLCANIC GRAVEL
- 586' - 654': SILTY CLAYEY QUARTZITIC GRAVEL
- 654' - 696': CLAYEY QUARTZITIC GRAVEL
- 696' - 706': CLAYEY VOLCANIC GRAVEL
- 706' - 753': CLAYEY QUARTZITIC GRAVEL
- 753' - 785': CLAYEY QUARTZITIC AND VOLCANIC GRAVEL

WELL ID: BSG1201 (Acid Well #2)

LOCATION:
GENERAL LOCATION: Eastern front of low pH Plume

KENNECOTT GRID:
NORTHING: ~13,810
EASTING: ~30,232

U.S.G.S: ~1348 ft. north, 2127 ft. west from southeast corner of Section 15, T3S, R2W, SLBM A

U.S. PUBLIC LAND SURVEY GRID: SW1/4, NW1/4, SE1/4 of Section 15, T3S, R2W, SLBM

CADASTRAL COORDINATES: (C32) 15 dbc SLBM

ELEVATIONS (KENNECOTT):
NATURAL GROUND (BOLT IN CEMENT PAD):
TOP OF STEEL CASING: ~5098
TOP OF WELL CASING:

TOTAL DEPTH OF COMPLETED WELL: 760' bgl

START DATE: 03-12-2003 COMPLETION DATE: 04-04-2003

DRILLING COMPANY: Boart Longyear

DRILLING METHOD, BIT DIAMETER/TYPE (BOREHOLE DIAMETER), AND DRILLING FLUID:
0-40': Mud Rotary, 38" tricone, Bentonite mud.
40-760': Dual Wall Reverse Circulation 24" tricone, Bentonite mud

SURFACE CASING:
TYPE: Steel. 0.250" DIAMETER: 0" DEPTH: 0' agl - 38' bgl

CASING:
TYPE: Stainless Steel. 0.375" DIAMETER: 18.0" DEPTH: 2.0' agl - 512' bgl
Stainless Steel 0.375" DIAMETER: 18.0" DEPTH: 752' bgl –760' bgl

SCREEN:
TYPE: Stainless Steel, 0.08" slot, Johnson wire wrap
DIAMETER: 18.0" DEPTH: 512' bgl - 752' bgl

COMPLETION MATERIALS:
PORTLAND CEMENT: 0' bgl - 485' bgl
BENTONITE HOLE PLUG: 485' bgl - 488' bgl
6X9 MESH SILICA SAND: 488' bgl - 760' bgl

STATIC WATER LEVEL IN OPEN BOREHOLE: Unknown due to drilling with mud.
STATIC WATER LEVEL AFTER WELL COMPLETION: 398.00' TOP DATE: 03-31-2003

WELL ID: BSG1201

WATER QUALITY AFTER WELL DEVELOPMENT:

WELL	DATE	pH	Cond. (µmho/cm)	SO_4^{2-} (mg/L)	Cl (mg/L)	T.D.S. (mg/L)	Cu (mg/L)
BSG1201	4-2-03	3.66	12,500	15,000	145	20,700	24.5

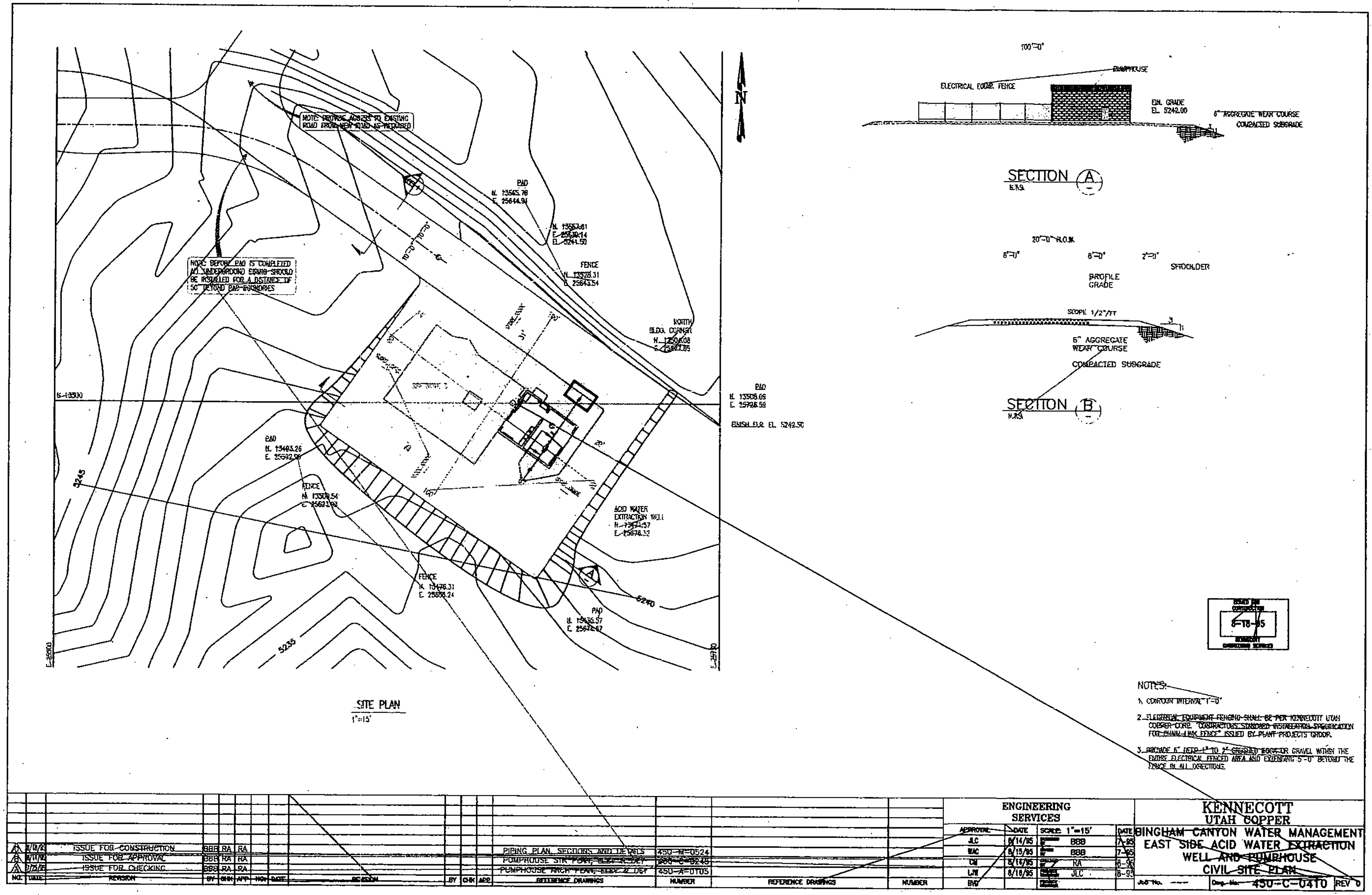
BOREHOLE LITHOLOGY:

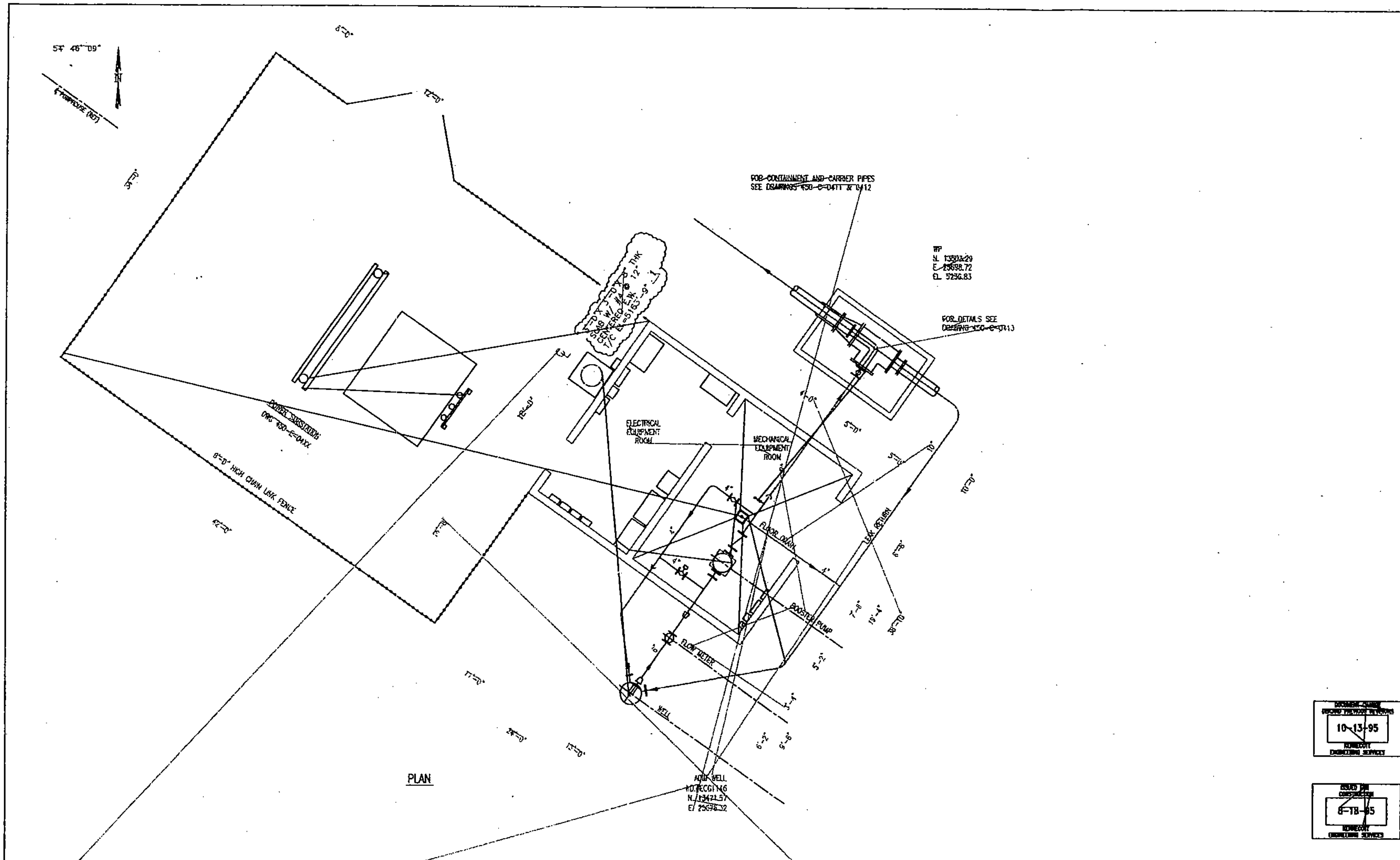
0' - 17': CLAYEY WITH QUARTZITIC GRAVEL
17' - 150': QUARTIZITIC GRAVEL WITH < 10% SILT
150' - 745': QUARTZITIC GRAVEL
745' - 760': SILTY QUARTZITIC GRAVEL

APPENDIX G

Acid Wells

Well House Construction Drawings


SECTION A
ELECTRICAL EQUIP. FENCE
PUMPHOUSE
6" AGGREGATE WEAR COURSE
COMPACTED SUBGRADE
SECTION B
SHOULDER
PROFILE GRADE
6" AGGREGATE WEAR COURSE
COMPACTED SUBGRADE
SITE PLAN
1"=15'
ACID WATER EXTRACTION WELL
FENCE
PAD
NORTH BLDG. CORNER
5245
5240
5235
8-18-95
NOTES:
1. CONTOUR INTERVAL 1'-0"
ISSUE FOR CONSTRUCTION
ISSUE FOR APPROVAL
ISSUE FOR CHECKING
PIPING PLAN, SECTIONS AND DETAILS
REFERENCE DRAWINGS
ENGINEERING SERVICES
SCALE: 1"=15'
KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
WELL AND PUMPHOUSE
CIVIL SITE PLAN
450-C-0410
REV 0



NO.	DATE	REVISION	BY	CHK	APP
1	10/13/95	ADDED CONCRETE PAD	RA	RA	RA
	8/18/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA
	8/11/95	ISSUE FOR APPROVAL	BBB	RA	RA
	7/31/95	ISSUE FOR CHECKING	BBB	RA	RA

REFERENCE DRAWINGS	NUMBER
PUMPHOUSE PIPING PLAN, SEC & DET	450-M-0524
PUMPHOUSE ARCH PLAN, ELEV & DET	450-A-0105
PUMPHOUSE STR PLAN, ELEV & DET	450-C-0245
DETAILS AT PUMPHOUSE (ACID PIPELINE)	450-C-0413
PIPELINE PLAN AND PROFILE SHEET 2	450-C-0412
PIPELINE PLAN AND PROFILE SHEET 1	450-C-0411
WELL AND PUMPHOUSE CIVIL SITE PLAN	450-C-0410
PROD. WELLS & WATER TR'TMT GEN. PLAN	450-C-0401

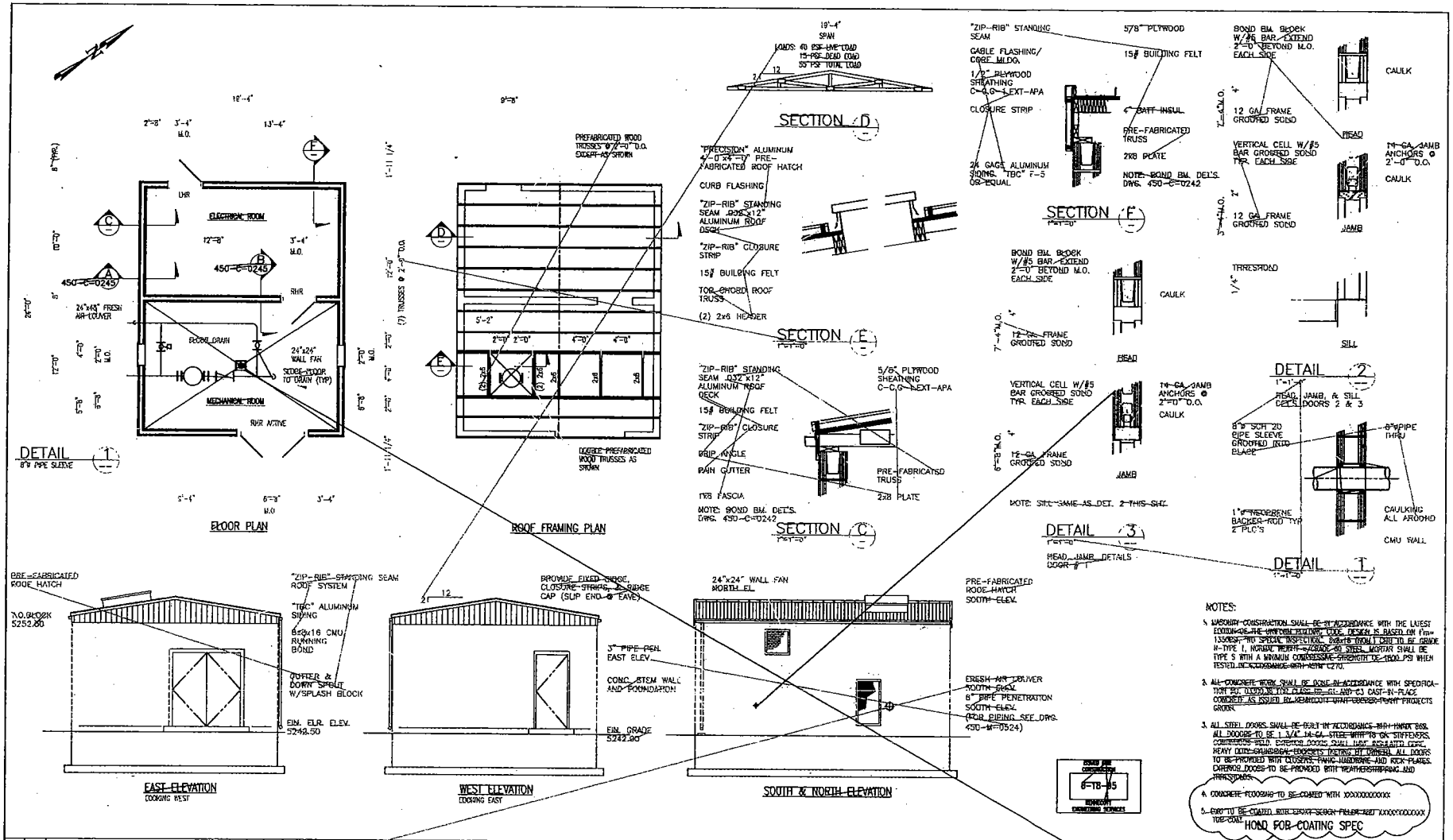
ENGINEERING SERVICES

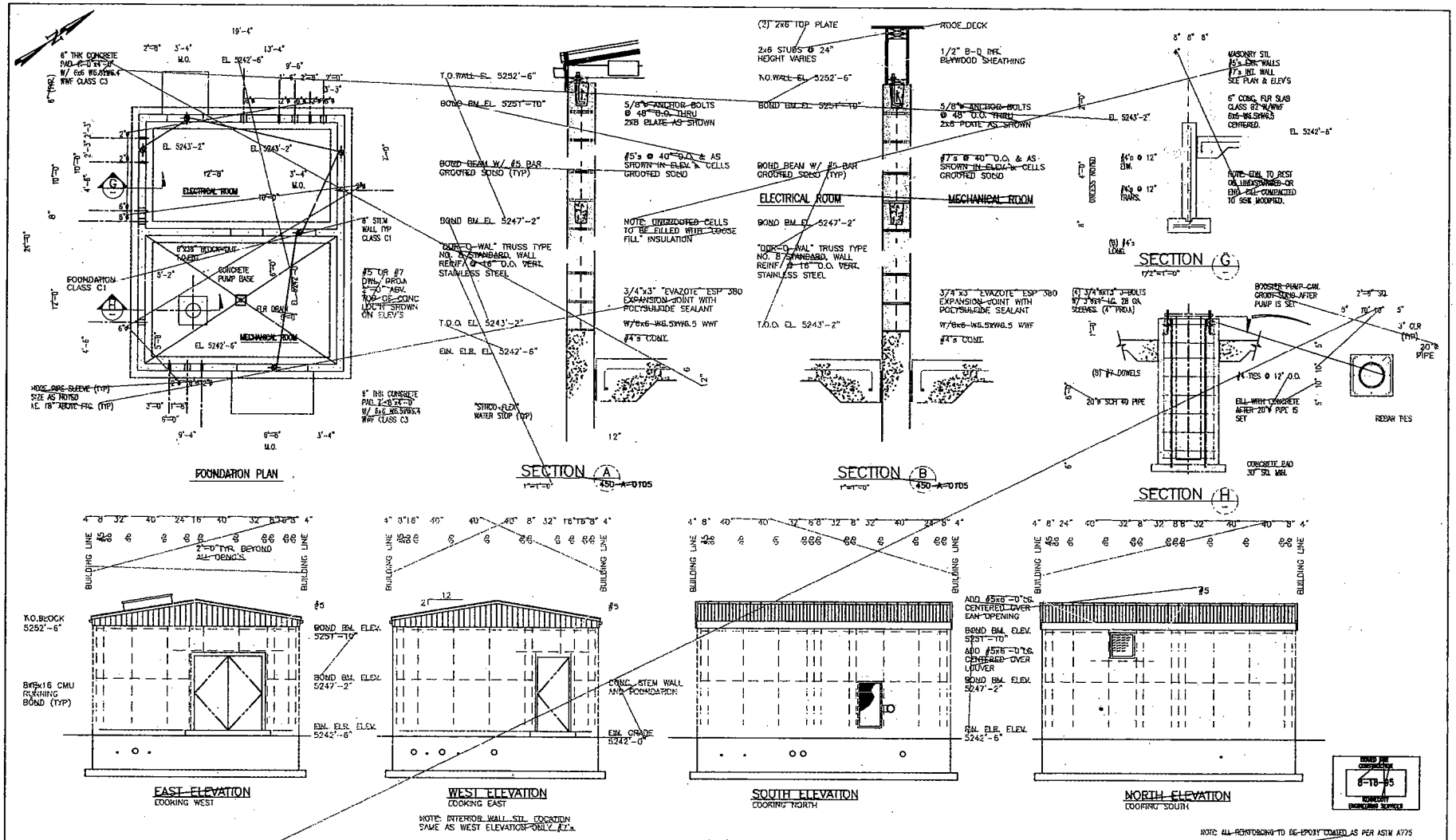
APPROVAL	DATE	SCALE: 1/4"=1'-0"	DATE
JLC	8/14/95	RA	8-95
WAC	8/15/95	BBB	8-95
CM	8/14/95	RA	8-95
LW	8/18/95	JLC	8-95
BVD			

KENNECOTT UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
WELL AND PUMPHOUSE
GENERAL ARRANGEMENT

Job No. --- Dwg. No. 450-M-0227 REV 1


FLOOR PLAN
ROOF FRAMING PLAN
SECTION D
SECTION E
SECTION C
SECTION F
DETAIL 1
DETAIL 2
DETAIL 3
EAST ELEVATION
WEST ELEVATION
SOUTH & NORTH ELEVATION
NOTES:
HOLD FOR COATING SPEC
ENGINEERING SERVICES
KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
PUMPHOUSE
ARCHITECTURAL PLAN, ELEV & DET.
450-A-0105



NO.	DATE	REVISION	BY	CHK	APP
3	8/16/85	ISSUE FOR CONSTRUCTION	BBB	RA	RA
2	8/15/85	ISSUE FOR APPROVAL	BBB	RA	RA
1	7/26/85	ISSUE FOR CHECKING	BBB	RA	RA

REFERENCE DRAWINGS	NUMBER
WELL & PUMPHOUSE CIVIL SITE PLAN	450-C-0470
PUMPHOUSE ARCH PLAN, ELEV & DET	450-A-0705
PUMPHOUSE PIPING PLAN AND DETAILS	450-M-0524

ENGINEERING SERVICES

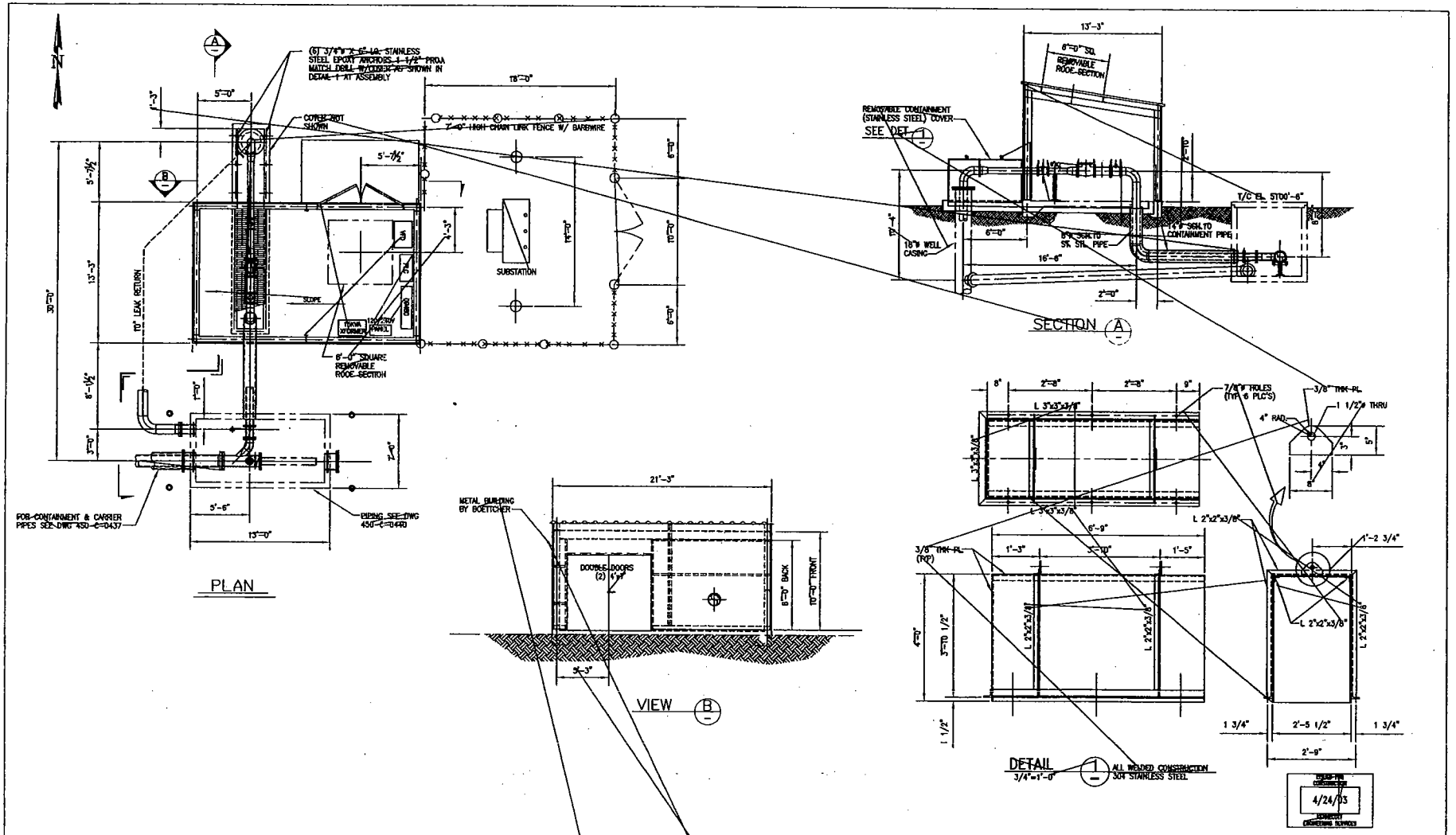
APPROVAL	DATE
JLC	8/14/85
WAC	8/15/85
GA	8/14/85
JLC	8/16/85
BAD	

SCALE: 1/4"=1'-0" U.N.O.

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION PUMPHOUSE
STRUCTURAL PLAN, ELEV & DETAILS

Job No. —— Dwg. No. 450-C-0245 REV 0



NO.	DATE	REVISION	BY	CHK	APP
1	4/24/03	ISSUED FOR CONSTRUCTION	DAH		

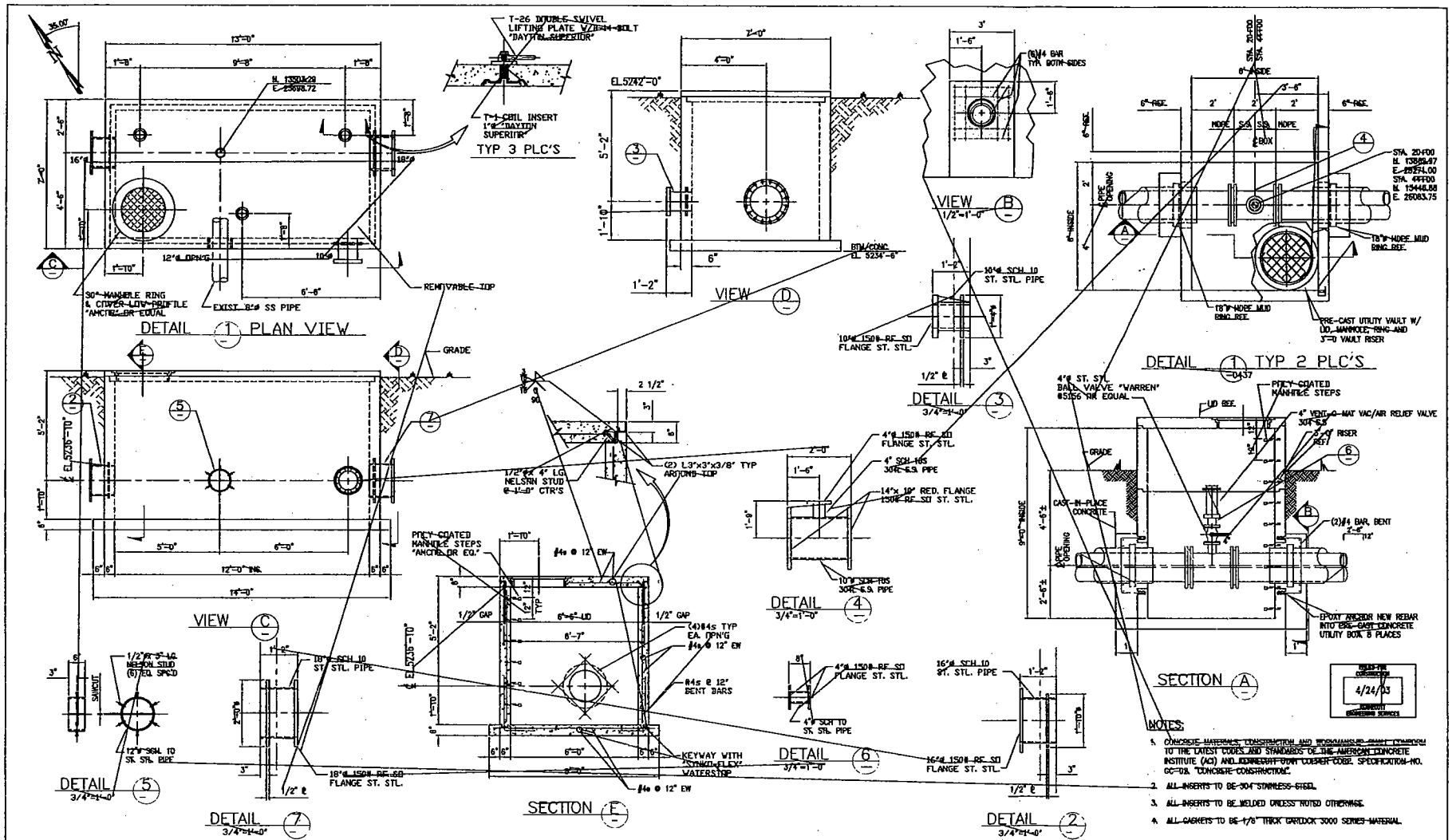
REFERENCE DRAWINGS	NUMBER
WELL & PUMPHOUSE CONCRETE DETAILS	450-C-0444
AW #2 PIPING PLAN AND DETAILS	450-C-0443
AW #2 WELL & PUMPHOUSE ARRGT	450-C-0442
CONCRETE BOX DETAILS	450-C-0441
DISCH. PIPING ARRGT & DET'S	450-C-0440

ENGINEERING SERVICES	APPROVAL	DATE	SCALE: 1/4"=1'-0"	DATE
			DRFT DRFT	3/03
			DES DAH	3/03
			CHK TLH	3/03
			APP RCB	3/03
			DRWG NO.	

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
ACID WATER EXTRACTION WELL #2
WELL AND PUMPHOUSE
GENERAL ARRANGEMENT

JOB NO. 10-00255 | Dwg. No. 450-C-0442 | REV. 0



NO.	DATE	REVISION	BY	CHK	APP
A	07/01/03	ISSUED FOR CONSTRUCTION	DAH		

REFERENCE DRAWINGS	NUMBER
WELL #2 PIPING BOX CONC. DETS.	450-C-0441
WELL #2 DISCHL. PIPING ARRG'T	450-C-0440
WELL #1 DISCHL. PIPING ARRG'T	450-C-0438
WELL #2 PIPING PLAN & PROFILE	450-C-0437

REFERENCE DRAWINGS	NUMBER

ENGINEERING SERVICES

APPROVAL	DATE	SCALE 1/2"=1'-0"	DATE
		DES. DAH	07/03
		DRN. DAH	07/03
		CHK. TLH	07/03
		APP. RCB	07/03
		PROJ. MGR. HEWD	07/03

KENNECOTT UTAH COPPER

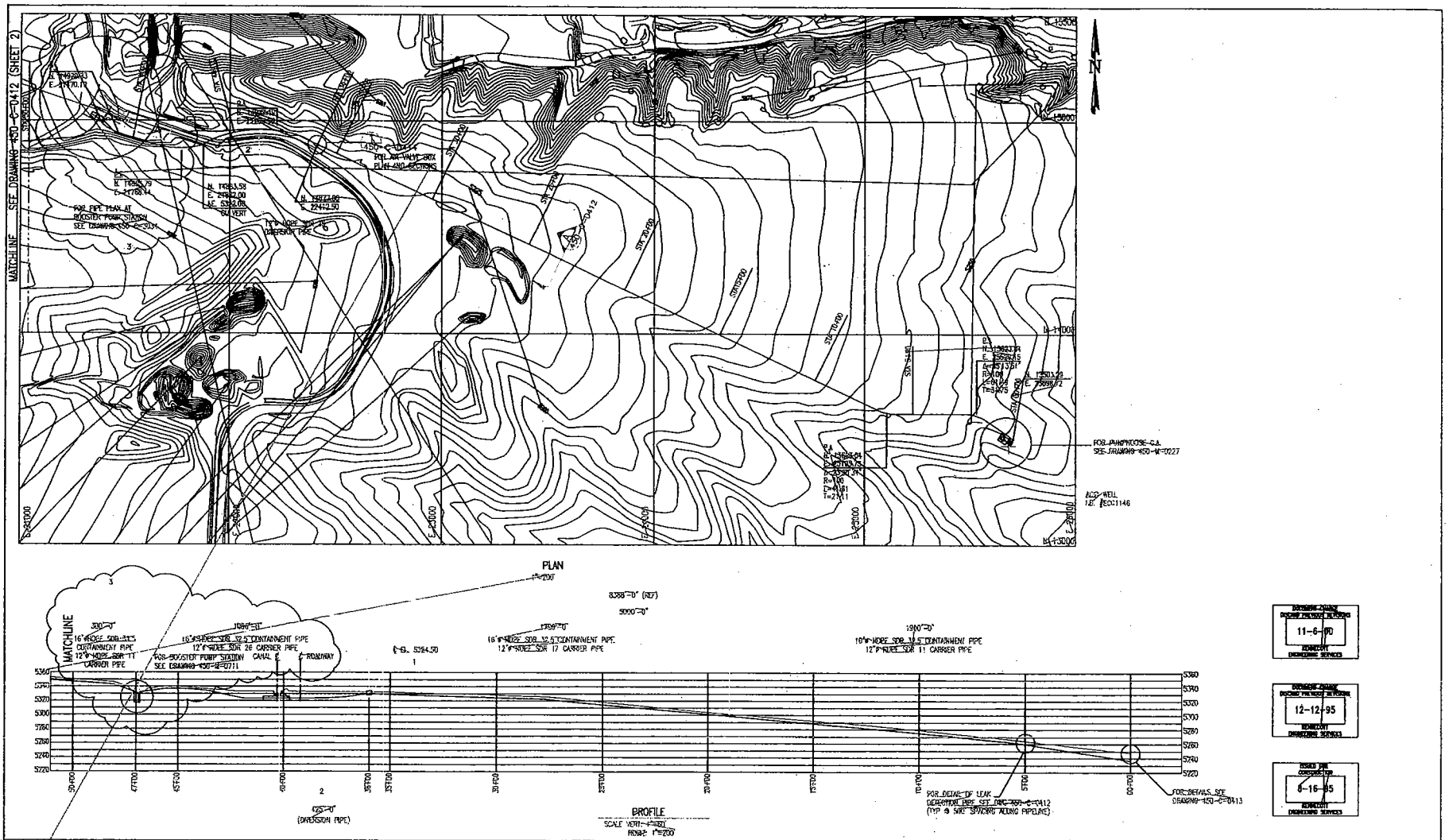
BINGHAM CANYON WATER MANAGEMENT
ACID WATER EXTRACTION WELL #1
PIPING BOX CONCRETE DETAILS & AIR VAC. RELIEF VALVE BOX DETAILS

Job No. 10-00255 Dwg. No. 450-C-0439 REV 0

APPENDIX H

Acid Wells

Pipeline Construction Drawings



NO.	DATE	REVISION	BY	CHK	APP.	NOT. DATE
4	11/6/95	ADDED BOOSTER PUMP STATION	LRT			
3	9/27/95	ADDED PIPE TO CANAL & REV AIR BOX	BBB	RA	RA	
2	8/21/95	ADDED AIR VALVE BOX	BBB	RA	RA	
1	8/16/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA	
0	7/26/95	ISSUE FOR COORD AND APPROVAL	BBB	RA	RA	
Δ	7/21/95	ISSUE FOR CHECKING	BBB	RA	RA	

REFERENCE DRAWINGS	NUMBER
PUMPHOUSE GENERAL ARRANGEMENT	450-M-0227
DETAILS AT PUMPHOUSE	450-C-0413
PIPELINE PLAN AND PROFILE (SHEET 2)	450-C-0412

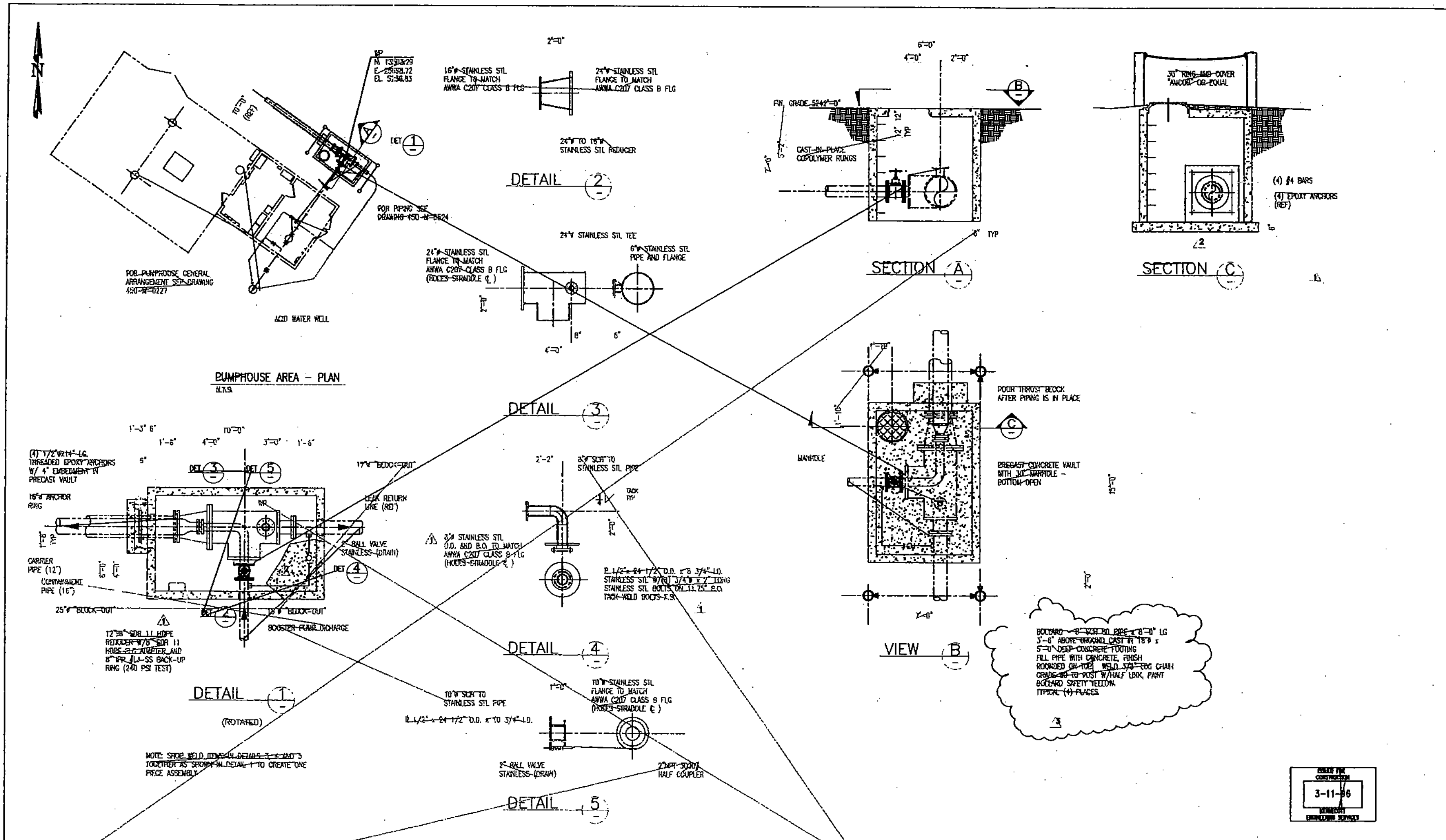
ENGINEERING SERVICES

	APPROVAL	DATE	SCALE 1"=200'	DATE
DESIGN	JLC	2/28/95	BBB	6-95
DRAWN	JH	6/3/95	BBB	6-95
CHECKED	CM	6/4/95	RA	7-95
PROJ. ENGR.	LJW	6/19/95	JLC	7-95
PROJ. MGR.	BND			

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
WELL PIPELINE
PLAN & PROFILE (SHEET 1)

Job No. ---- Dwg. No. 450-C-0411 REV 3



NO.	DATE	REVISION	BY	CHK	APP
3	3/11/96	ADDED BOLLARDS & CHAIN	RA	RA	RA
2	11/2/95	ADDED BOX BOTTOM & DRAIN VALVES	RA	RA	RA
1	8/27/95	CHG'D FLG SIZE, BOLT SIZE & ADDED BED., SEC "C"	BBB	RA	RA
0	8/16/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA
B	7/26/95	ISSUE FOR COORD AND APPROVAL	BBB	RA	RA
A	7/21/95	ISSUE FOR CHECKING	BBB	RA	RA

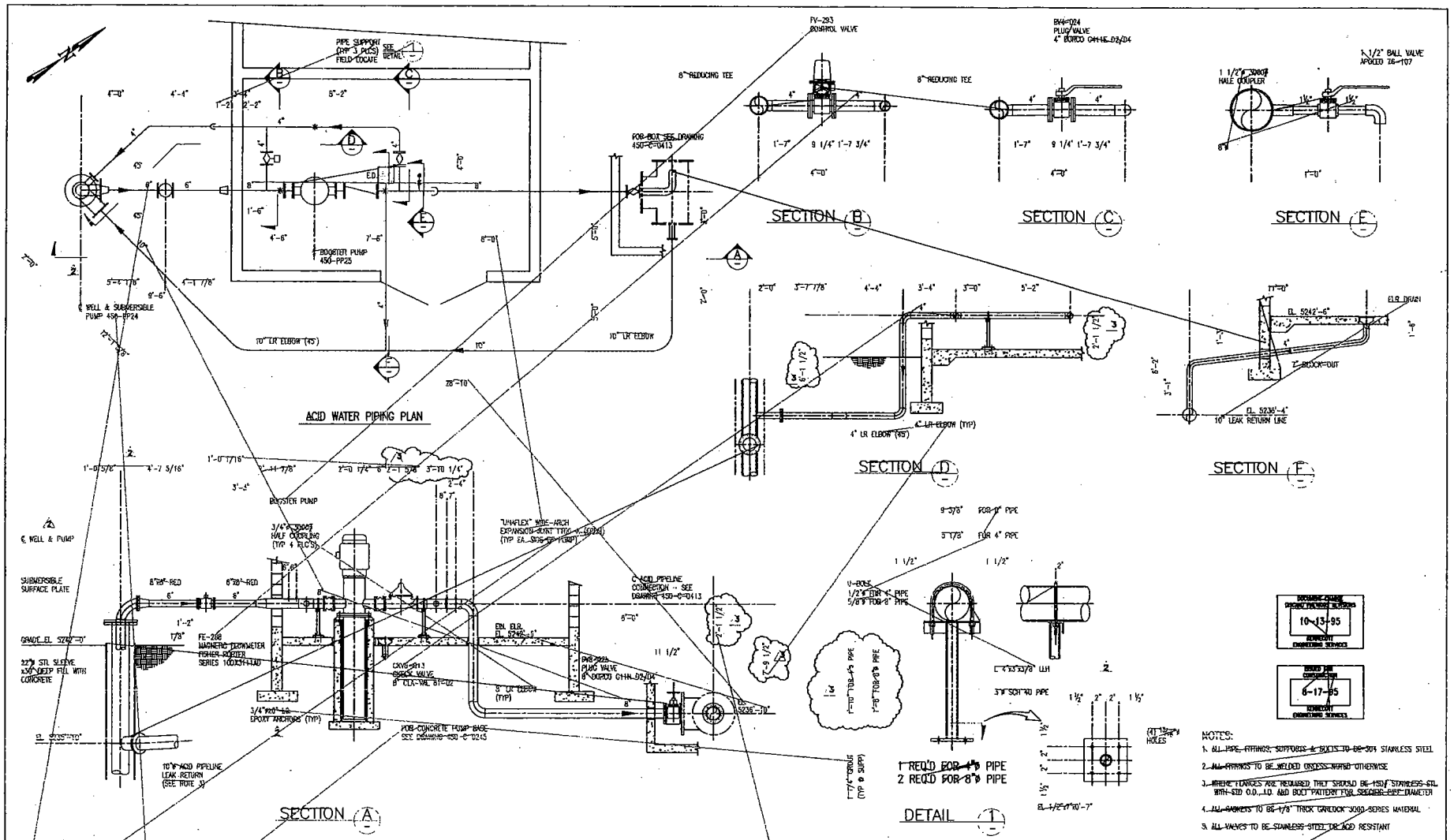
REFERENCE DRAWINGS	NUMBER
PUMPHOUSE GENERAL ARRANGEMENT	450-M-0227
DETAILS AT EAST SIDE RESERVOIR	450-C-0415
DETAILS AT BIOSULFIDE PLANT	450-C-0414
PIPING PLAN, SECTIONS AND DETAILS	450-M-0524
PIPELINE PLAN AND PROFILE	450-C-0412
PIPELINE PLAN AND PROFILE	450-C-0411

ENGINEERING SERVICES

APPROVAL	DATE	SCALE 1/8"=1'-0" U.N.	DATE
JLC	7/20/95	BBB	6-95
JH	8/3/95	BBB	6-95
CM	8/4/95	BA	6-95
LJW	8/10/95	JLC	6-95
BVD			

KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
WELL PIPELINE
DETAILS AT PUMPHOUSE

Job No. —— Dwg. No. 450-C-0413 REV 3



NO.	DATE	REVISION	BY	CHK	APP
1	8/7/95	GENERAL REV.	RA	RA	RA
2	8/7/95	REV. ELBOW PER VENDOR/PIPE & PL	BBB	RA	RA
3	8/7/95	REMOVED ROAD/ADD'L DIMENSIONS	BBB	RA	RA
4	8/7/95	ISSUE FOR CONSTRUCTION	BBB	RA	RA
5	8/7/95	ISSUE FOR COORD AND APPROVAL	BBB	RA	RA
6	8/7/95	ISSUE FOR CHECKING	BBB	RA	RA

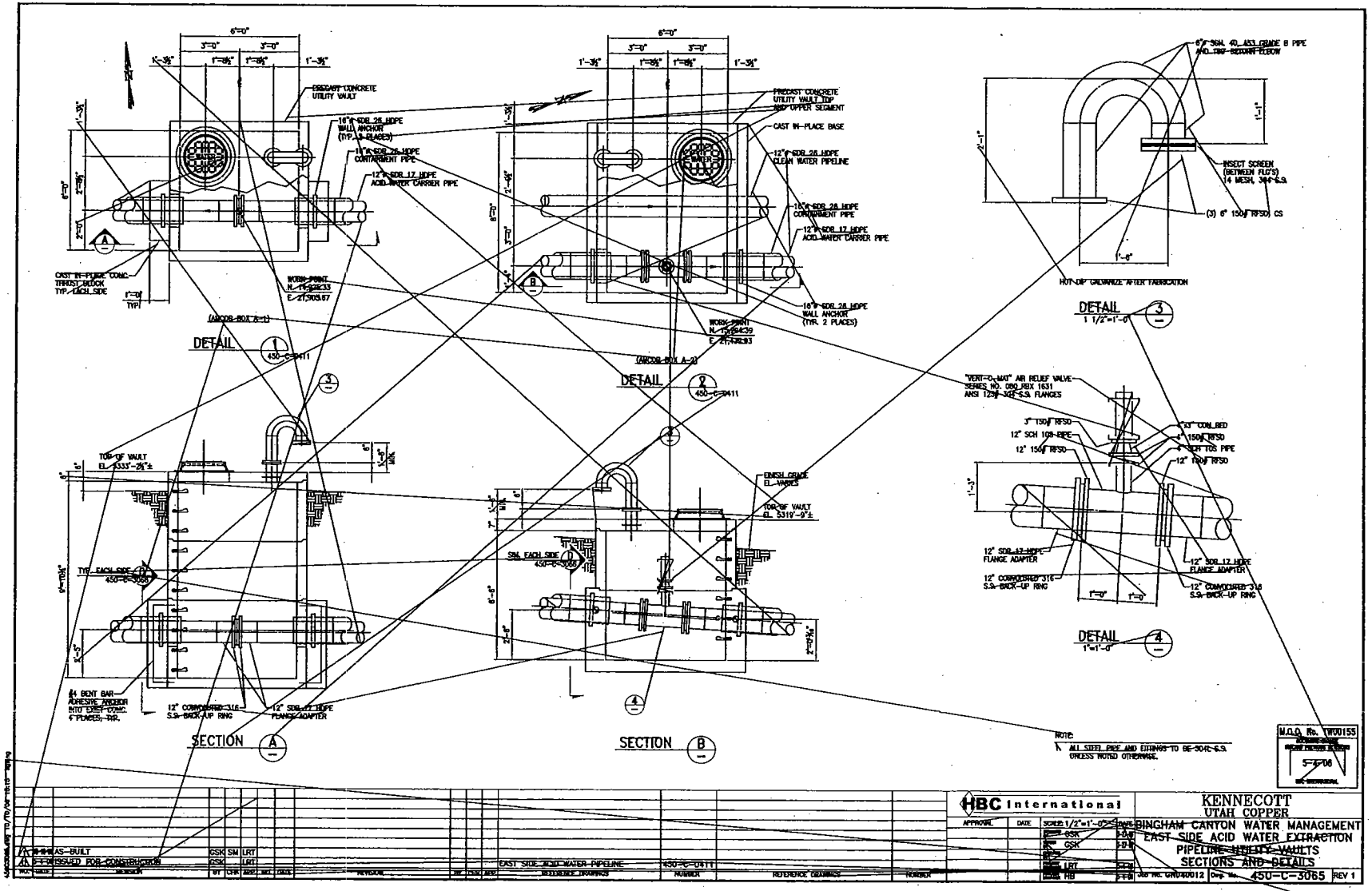
NO.	REFERENCE DRAWINGS	NUMBER
	PUMPHOUSE ARCH. PLAN, ELEV & DET.	450-A-0105
	PUMPHOUSE STR. PLAN, ELEV & DET.	450-C-0245
	PUMPHOUSE GENERAL ARRANGEMENT	450-M-0227

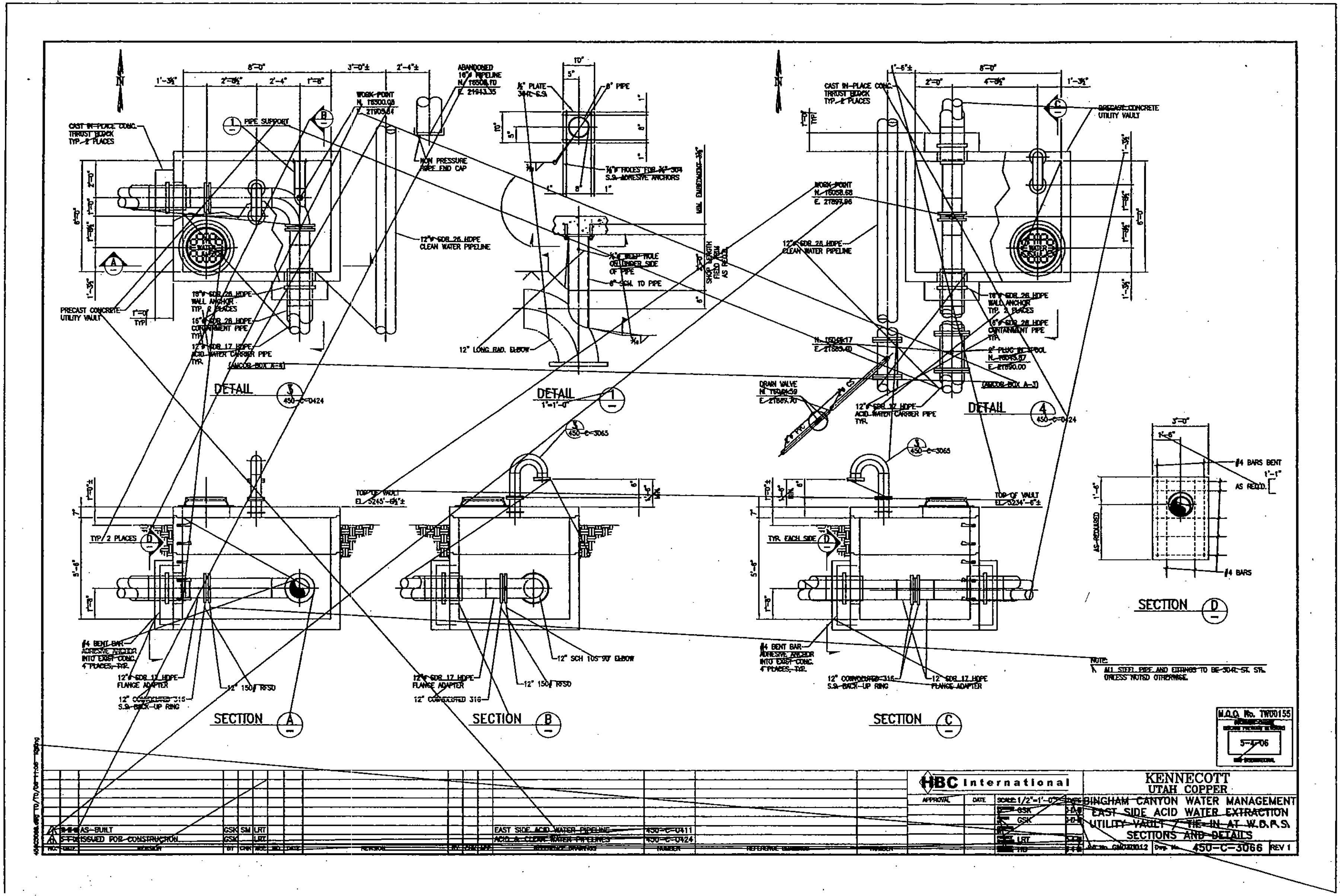
ENGINEERING SERVICES		
APPROVAL	DATE	SCALE: N.T.S. (22")
JCC	8/7/95	RA/GR
CM	8/7/95	BBB
LJW	8/7/95	RA
BVD		JCC

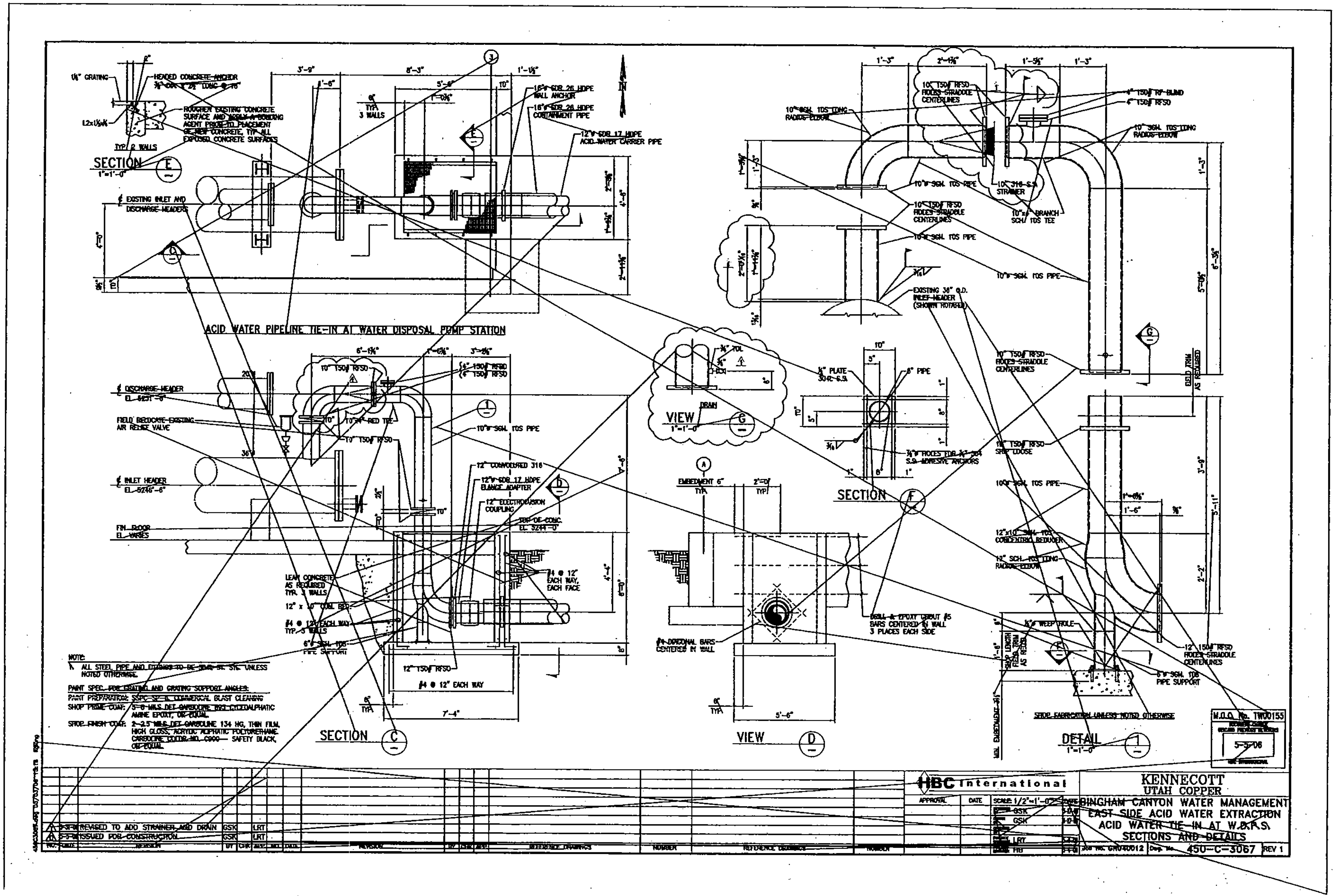
KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
WELL AND PUMPHOUSE
PIPING PLAN, SECTIONS & DETAILS

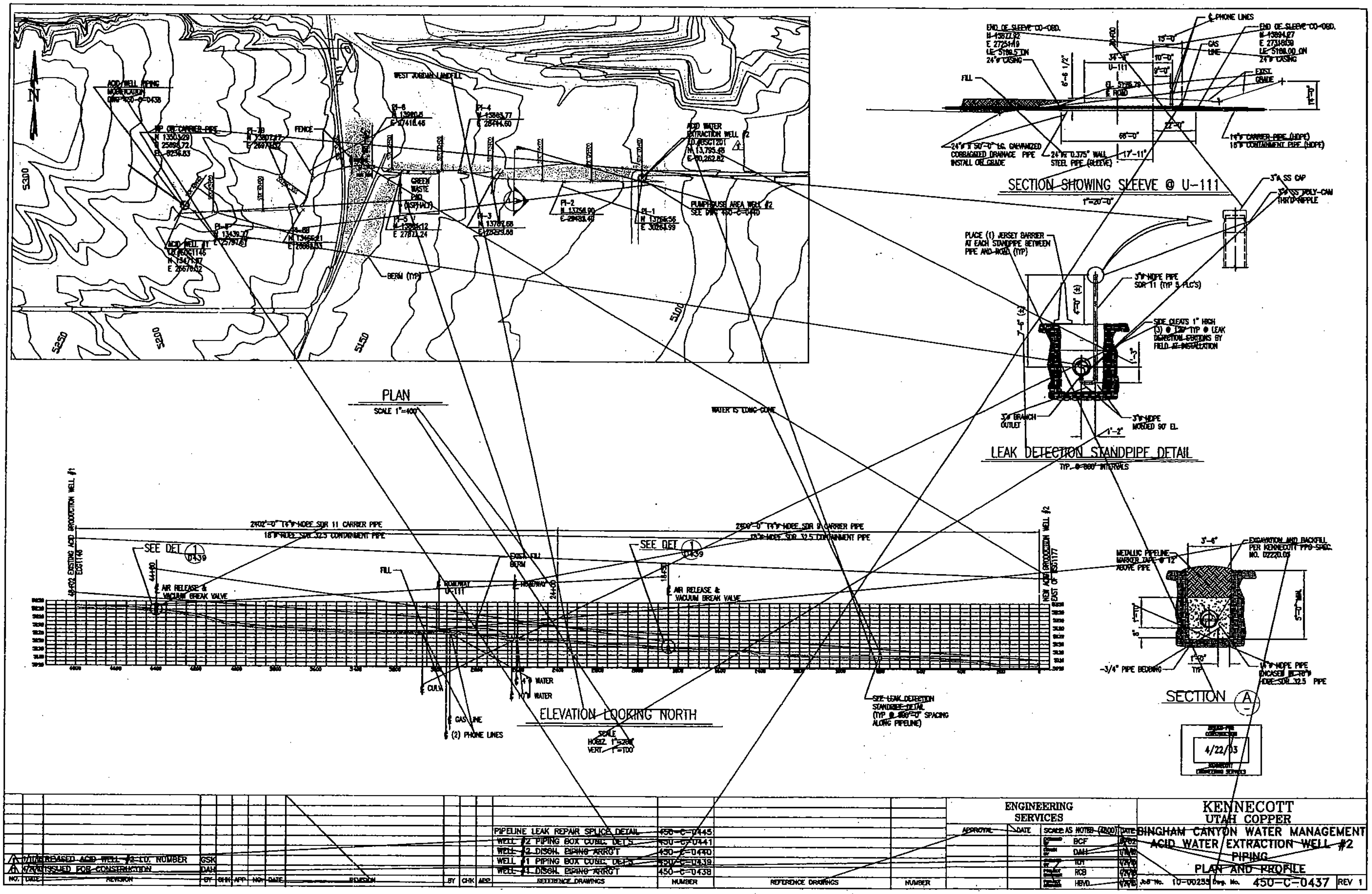
A-E No. ---- Dwg. No. 450-M-0524 REV 3


PRECAST CONCRETE UTILITY VAULT
16"ø SDR 26 HDPE WALL ANCHOR (TYP. 3 PLACES)
12"ø SDR 26 HDPE CONTAINMENT PIPE
12"ø SDR 17 HDPE ACID WATER CARRIER PIPE
CAST IN-PLACE CONC. THRUST BLOCK TYP. EACH SIDE
DETAIL 1 450-C-3411
SECTION A
PRECAST CONCRETE UTILITY VAULT TOP AND UPPER SEGMENT
CAST IN-PLACE BASE
12"ø SDR 26 HDPE CLEAN WATER PIPELINE
16"ø SDR 26 HDPE CONTAINMENT PIPE
12"ø SDR 17 HDPE ACID WATER CARRIER PIPE
16"ø SDR 26 HDPE WALL ANCHOR (TYP. 2 PLACES)
DETAIL 2 450-C-3411
SECTION B
6" SCH. 40, A53 GRADE B PIPE AND 180° RETURN ELBOW
INSECT SCREEN (BETWEEN FLG'S) 14 MESH, 304 S.S.
(3) 6" 150# RFSO CS
HOT-DIP GALVANIZE AFTER FABRICATION
DETAIL 3 1 1/2"=1'-0"
"VERT-O-MAT" AIR RELIEF VALVE SERIES NO. 050_RSX 1631 ANSI 125# 304 S.S. FLANGES
3" 150# RFSO
12" SCH 10S PIPE
12" 150# RFSO
4" CON. RED
4" 150# RFSO
4" SCH 10S PIPE
12" 150# RFSO
12" SDR 17 HDPE FLANGE ADAPTER
12" CORROSHIELD 316 S.S. BACK-UP RING
DETAIL 4 1"=1'-0"
TOP OF VAULT EL. 5333'-2½"±
TYP. EACH SIDE
#4 BENT BAR ADHESIVE ANCHOR INTO EXIST. CONC. 4" PEMBED. DIA.
12" CORROSHIELD 316 S.S. BACK-UP RING
12" SDR 17 HDPE FLANGE ADAPTER
FINISH GRADE EL. VARIES
TOP OF VAULT EL. 5319'-9"±
SIM. EACH SIDE
Note:
1. ALL STEEL PIPE AND FITTINGS TO BE 304L S.S. UNLESS NOTED OTHERWISE.
W.O.O. No. WO0155
5-6-06
HBC International
KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
PIPELINE UTILITY VAULTS
SECTIONS AND DETAILS
450-C-3065
REV 1
AS-BUILT
ISSUED FOR CONSTRUCTION
EAST SIDE ACID WATER PIPELINE

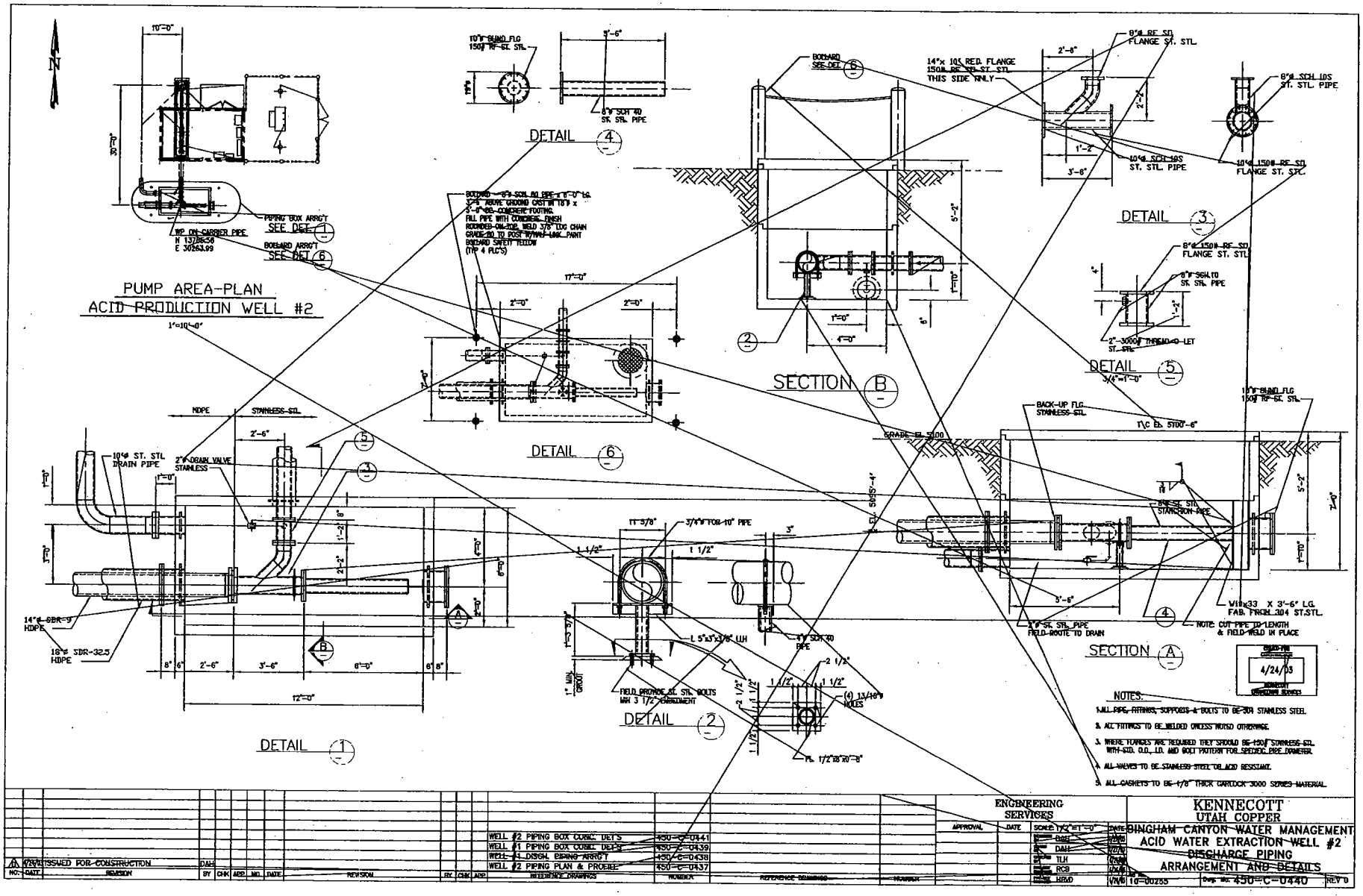

DETAIL 3 450-C-0424
DETAIL 1 1"=1'-0"
DETAIL 4 450-C-0424
SECTION A
SECTION B
SECTION C
SECTION D
CAST IN-PLACE CONC. THRUST BLOCK TYP. 2 PLACES
PRECAST CONCRETE UTILITY VAULT
PIPE SUPPORT
12"Ø SDR 26 HDPE CLEAN WATER PIPELINE
12" LONG RAD. ELBOW
DRAIN VALVE
TOP OF VAULT
#4 BARS BENT
AS REQ'D.
#4 BARS
AS REQUIRED
12" SCH 10S 90° ELBOW
12" 150# RFSO
NOTE:
1. ALL STEEL PIPE AND FITTINGS TO BE 304L ST. STL. UNLESS NOTED OTHERWISE.
HBC International
KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
UTILITY VAULT / TIE-IN AT W.D.R.S.
SECTIONS AND DETAILS
450-C-3066
REV 1
AS-BUILT
ISSUED FOR CONSTRUCTION
EAST SIDE ACID WATER PIPELINE 450-C-0411
ACID & CLEAN WATER PIPELINES 450-C-0424
SCALE 1/2"=1'-0"
5-4-06

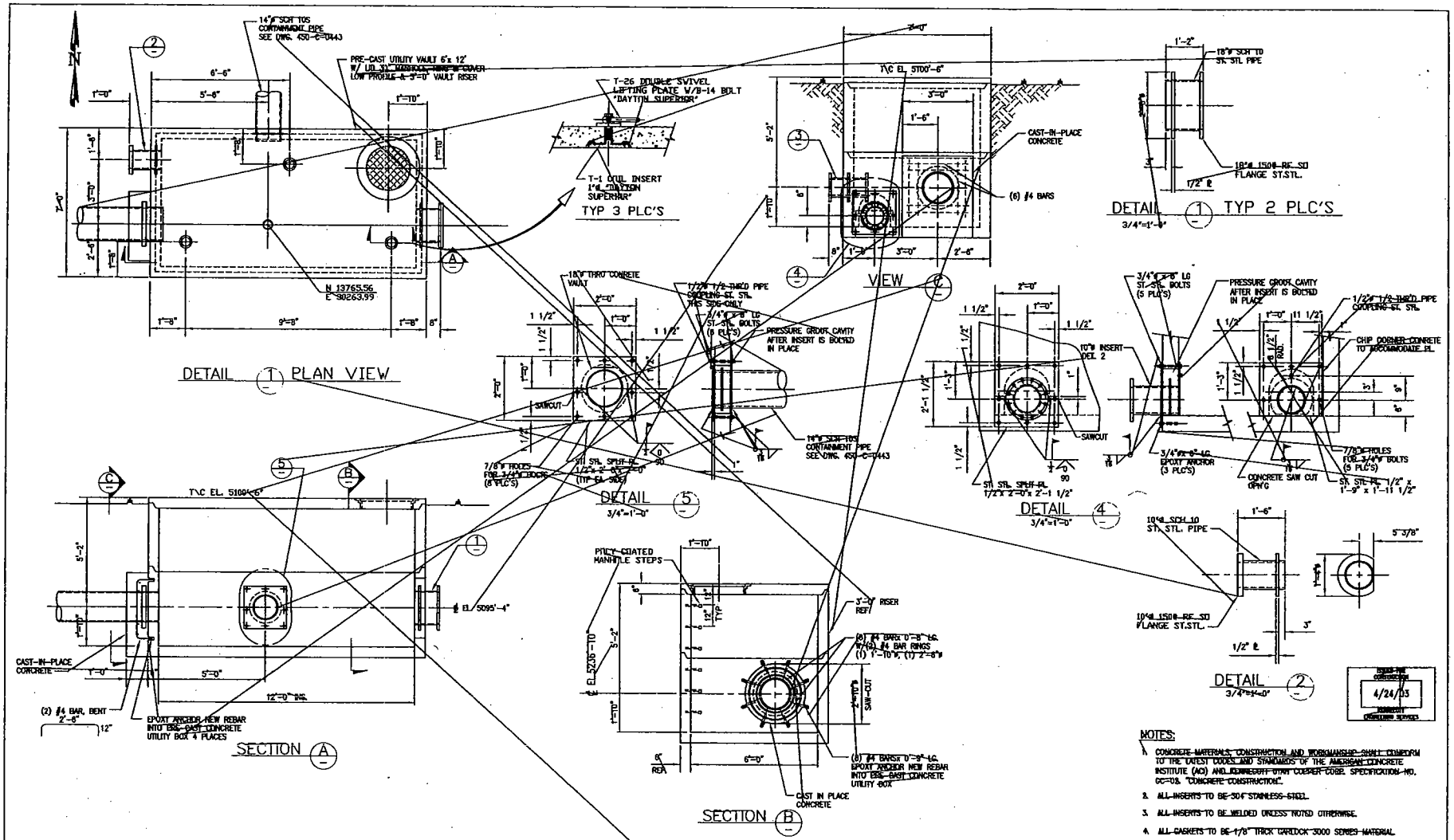


SECTION E 1"=1'-0"
ACID WATER PIPELINE TIE-IN AT WATER DISPOSAL PUMP STATION
VIEW G 1"=1'-0"
SECTION F
SECTION C
VIEW D
DETAIL 1 1"=1'-0"
SHOP FABRICATION UNLESS NOTED OTHERWISE
12" x 10" CONC RED.
#4 @ 12" EACH WAY
6" TYP
7'-4"
5'-6"
10" SCH. 10S PIPE
10" SCH. 10S LONG RADIUS ELBOW
10" 150# RFSO
4" 150# RF BLIND
4" 150# RFSO
EXISTING 36" O.D. INLET HEADER (SHOWN ROTATED)
12"x10" SCH. 10S CONCENTRIC REDUCER
3/4" WEEP HOLE
M.O.C. No. TW00155
5-5-06
HBC International
KENNECOTT
UTAH COPPER
APPROVAL
DATE
SCALE 1/2"=1'-0"
GSK
GSK
LRT
HB
BINGHAM CANYON WATER MANAGEMENT
EAST SIDE ACID WATER EXTRACTION
ACID WATER TIE-IN AT W.D.P.S.
SECTIONS AND DETAILS
Job No. GR040012
Dwg. No. 450-C-3067
REV 1
REVISED TO ADD STRAINER AND DRAIN
ISSUED FOR CONSTRUCTION



PLAN
SCALE 1"=400'
SECTION SHOWING SLEEVE @ U-111
LEAK DETECTION STANDPIPE DETAIL
ELEVATION LOOKING NORTH
SECTION A
WEST JORDAN LANDFILL
ACID WATER EXTRACTION WELL #2
PUMPHOUSE AREA WELL #2
GREEN WASTE END (ASPHALT)
BERM (TYP)
FENCE
AIR RELEASE & VACUUM BREAK VALVE
SEE DET 1 0439
4/22/03
KENNECOTT
UTAH COPPER
ENGINEERING SERVICES
BINGHAM CANYON WATER MANAGEMENT
ACID WATER EXTRACTION WELL #2
PIPING
PLAN AND PROFILE
PIPELINE LEAK REPAIR SPLICE DETAIL 450-C-0445
WELL #2 PIPING BOX CONN. DETS 450-C-0441
WELL #2 DISCH. PIPING ARRG'T 450-C-0440
WELL #1 PIPING BOX CONN. DETS 450-C-0439
WELL #1 DISCH. PIPING ARRG'T 450-C-0438
REVISED ACID WELL #2 I.D. NUMBER GSK
ISSUED FOR CONSTRUCTION DAH
SCALE AS NOTED
BCF
DAH
RCB
Job No. 10-00235
Dwg. No. 450-C-0437
REV 1


PUMP AREA-PLAN
ACID PRODUCTION WELL #2
1"=10'-0"
DETAIL 1
DETAIL 2
DETAIL 3
DETAIL 4
DETAIL 5
DETAIL 6
SECTION A
SECTION B
NOTES:
1. ALL PIPE, FITTINGS, SUPPORTS & BOLTS TO BE 304 STAINLESS STEEL.
2. ALL FITTINGS TO BE WELDED UNLESS NOTED OTHERWISE.
3. WHERE FLANGES ARE REQUIRED THEY SHOULD BE 150# STAINLESS STL. WITH STD. O.D., I.D. AND BOLT PATTERN FOR SPECIFIC PIPE DIAMETER.
4. ALL VALVES TO BE STAINLESS STEEL OR ACID RESISTANT.
5. ALL GASKETS TO BE 1/8" THICK GARLOCK 3000 SERIES MATERIAL.
ENGINEERING SERVICES
KENNECOTT
UTAH COPPER
BINGHAM CANYON WATER MANAGEMENT
ACID WATER EXTRACTION WELL #2
DISCHARGE PIPING
ARRANGEMENT AND DETAILS
450-C-0440
REV 0



NOTES:

1. CONCRETE MATERIALS, CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE LATEST CODES AND STANDARDS OF THE AMERICAN CONCRETE INSTITUTE (ACI) AND KENNECOTT UTAH COPPER CORP. SPECIFICATION NO. CC-03, "CONCRETE CONSTRUCTION".
2. ALL INSERTS TO BE 304 STAINLESS STEEL.
3. ALL INSERTS TO BE WELDED UNLESS NOTED OTHERWISE.
4. ALL GASKETS TO BE 1/8" THICK GARLOCK 3000 SERIES MATERIAL.

NO.	DATE	REVISION	BY	CHK	APP	MD.	DATE
A	4/24/03	ISSUED FOR CONSTRUCTION	DAH				

REFERENCE DRAWINGS	NUMBER
WELL #2 DISCH. PIPING ARRG'T	450-C-0440
WELL #1 PIPING BOX CONC. DETS.	450-C-0439
WELL #1 DISCH. PIPING ARRG'T	450-C-0438
WELL #2 PIPING PLAN & PROFILE	450-C-0437

REFERENCE DRAWINGS	NUMBER

ENGINEERING SERVICES

APPROVAL | DATE | SCALE 1/2"=1'-0" | DATE

DES. DAH 4/24/03
DR. DAH 4/24/03
CH. TLH 4/24/03
PROJ. MGR. RSB 4/24/03
ENGR. HSVD 4/24/03

KENNECOTT
UTAH COPPER

BINGHAM CANYON WATER MANAGEMENT
ACID WATER EXTRACTION WELL #2
WELL PIPELINE
CONCRETE BOX DETAILS

Proj. No. 10-00255
Dwg. No. 450-C-0441
REV 0