CBI
5/1/83

CONFIDENTIAL 92-CV-204-WDS

149486

VILLAGE OF SAUGET, ILLINOIS

STORM SEWER STUDY

CERRO/DEAD CREEK ALTERNATE

PROJECT NO. 7313-81-2

Prepared by:

P. H. WEIS & ASSOCIATES, INC.
ENGINEERS/ARCHITECTS/PLANNERS
9811 West Florissant
St. Louis, Mo. 63136
Phone: 314/524-4893

CER 009032

MAY, 1983

0 0119

INTRODUCTION

At the request of the Village of Sauget, our office has performed an engineering study, revising the basic design of the Village Storm Sewer Improvements, by relocating the stormwater retention pond to the north end of Dead Creek at the rear of Cerro Copper, adjacent to the Alton and Southern Railroad tracks. We have completed our study, and are herewith enclosing our findings and recommendations.

HYDROLOGY

The original stormwater improvement project generally was to provide flooding protection for the Village residential areas (see enclosed Site Plans, Drainage Areas 1 through 7) by trapping the stormwater runoff, piping the flow to a central pump station, and lifting the water to a retention pond. The retention pond stored the differential runoff created by the difference between total runoff caused by the design storm, and discharge capacity, of the Village's existing combined sewers downstream. The project, as originally designed, served to relieve the main trunk lines downstream by storing the residential runoff upstream. The retention pond was originally located at the east end of the Village park. The total drainage area included in the original project comprised approximately 92 acres.

Representatives from our office met with officials from Cerro Copper to determine the effect of the relocation of the retention

pond on their operations, and to determine existing runoff conditions within the plant. From our discussions and subsequent meetings with the Cerro engineers, drainage areas were added, and the entire scope of the project was expanded to include a major portion of Cerro's property (see enclosed Site Plans, Drainage Areas 8, 9, 10). The additional areas comprise a total of approximately 44 acres and are generally 100% impervious to stormwater infiltration.

We also made a survey of the proposed retention area to determine existing topography (see enclosed Dead Creek Topographical Survey), and calculate quantities of earthwork required for the installation of the retention pond. Boundaries for the pond, as requested by the Cerro officials, were restricted to the railroad spur on the east, the Alton and Southern tracks to the north, and the fence adjacent to Cerro Copper's service road to the west.

While analyzing existing drainage conditions, we determined there to be several different piping and lift station design configurations, which were feasible to trap the stormwater run-off, pipe the flow, and collect the water in the retention pond. After reviewing several different options, we basically reduced our investigation to three viable alternatives. Each alternative has advantages and disadvantages compared to the others, and these will be discussed below. A separate Site Plan and estimate (see enclosed) has been prepared for each alternate.

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

ALTERNATE #1

Alternate #1 basically consists of using area and curb inlets to trap the stormwater runoff, and pipe the water by gravity through concrete pipes set at low percentage grades. The last sections of pipe become fairly deep due to the lengthy run of piping and would possibly require dewatering for their installation (see Preliminary Cost Estimate. Alternate #1). Stormwater runoff from the Cerro plant, and overflow water from existing lift stations from existing piping at Dead Creek, is also collected with new piping and directed into the retention pond at Dead Creek.

The pond in this design alternate is set below the pipe inflow elevations and required storage is utilized between elevations 384 and 396 (see Design Schematic, Alternate #1). The water is discharged out of the pond into the existing trunk lines inside the Monsanto plant by a lift station with an inflow elevation set downstream of the flowline of the pond.

A major advantage of this alternate is that the lift station need only be sized for 25 CFS which is the discharge capacity of the existing 24" and 36" pipes inside Monsanto. This is based upon the assumption that these lines are available for stormwater discharge provided by the installation of a new 42" trunk line which services Monsanto's flows. A new force main would also be installed beneath the Alton and Southern tracks from the lift station to a new junction box over the existing 24" line. Although the initial installation expense

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

for Alternate #1 is considerably higher than the other two alternates, there will be considerably less expense to operate and maintain a 25 CFS capacity lift station, compared to a 200 CFS capacity lift station, as well as lower original construction expenses.

One advantage which Alternate #1 has over Alternate #3 is that because the sewer piping is relatively deep, piping can be extended to provide service to other areas, particularly Falling Springs Road. Present drainage conditions on the road are poor, and any proposed drainage improvements could be tied into this project under Alternate #1.

A large portion of the initial installation expense (see Preliminary Cost Estimate, Alternate #1) is required for the installation of the pond. The base of the pond is at 384; however, the excavation must go even deeper as a 4' clay liner and 6" concrete liner must be installed at the base. These elevations are all below normal water table elevations, and therefore, dewatering of a large area would be required for the entire pond installation. The liners serve to make the pond impervious to the ground water table and ballast the pond should a condition exist with high ground water table and low water elevation in the pond. Pressure relief valves have been included in the pond installation expense to protect the liners from damage which could occur as a result of an extreme pressure differential condition.

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

ALTERNATE #2

The method of collecting stormwater runoff is basically the same for Alternate #2 as for Alternate #1. The significant differences between the two are that the lift station is located upstream of the retention pond, and the elevation of the pond is set higher, generally above normal ground water elevations. Again the water is collected from the Village and Cerro plant drainage areas and carried to the lift station (see enclosed Site Plan, Alternate #2) in pipes laid at small grade percentages. The piping becomes relatively deep as the two runs approach the lift station, and could require dewatering for the installation of the last sections. This alternate has the same advantage over Alternate #3 with regard to the deep piping being accessible to piping from drainage improvements along Falling Springs Road. The lift station will be designed to lift the entire stormwater runoff into the retention pond (200 CFS).

Storage in the retention pond will be available between elevations 398 and 408. The advantage here is that the pond could possibly be installed without dewatering. However, a disadvantage is the operation expense and energy consumption to lift all the runoff into the pond.

CER 009037

Also, raising the pond level to 408 would cause backup problems in the Monsanto plant, particularly in the powerhouse basement which is at approximate elevation of 406. The problem can be corrected by one of two methods. The first would be to install terminal manholes upstream of the crossover which would prevent

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

the backup. This is only possible if the new 42" proposed Monsanto trunk line is installed. We have included the cost of these manholes in our estimate for Alternate #2. The other method to prevent this backup would be to lower the upper elevation of the pond. However, lowering the upper elevation reduces our storage capacity and it would then be necessary to utilize more surface area, increasing the pond acreage to obtain the required storage capacity.

Discharge from the pond under Alternate #2 would be through the existing 36" crossover pipe between the 24" line and Dead Creek. Discharge from the pond would proceed at the discharge capacity rate available from the existing 24" and 36" trunk lines within Monsanto.

ALTERNATE #3

Alternate #3 is similar to Alternate #2 with regard to the pond elevation and discharge conditions from the pond (see Site Plan, Alternate #2). The essential difference between the two is that there are two lift stations for this alternate, located away from the retention pond. One station will pump the Village run-off, and the other, the Cerro plant runoff. Flows from the lift stations will be piped in lock joint pressure rated concrete pipe laid just below the existing ground elevation. A disadvantage of this alternate is that the gravity piping would not be easily accessed by any drainage improvements which would occur along Falling Springs Road.

The main advantage of this alternate is that all the piping is relatively shallow and will require no dewatering. However, constructing two lift stations will be more expensive than constructing the one larger lift station which would be required under Alternate #2 (see Preliminary Cost Estimates, Alternates #1 and #2). This alternate has the same disadvantage as Alternate #2 with regard to lifting all the runoff and higher operational expenses than Alternate #1. Also, the same precautionary measures must be taken to prevent backup in the Monsanto plant as discussed in Alternate #2.

CONCLUSION

Summarizing the above discussions, the storm sewer project has been expanded to include a considerably larger area and portion of the Village of Sauget. The retention pond has been relocated behind the Cerro Copper plant in the existing northern portion of Dead Creek. Three design concept alternates were analyzed as a basis for the project.

The first alternate includes gravity piping to a low retention pond lined with concrete, a small lift station located downstream of the pond, and new force main which discharges into existing trunk lines in the Monsanto plant. Advantages of the alternate include a small lift station, low operation and maintenance expenses, reclamation of considerably more land space behind the Cerro plant, and accessibility for drainage improvements along Falling Springs Road. Disadvantages include high original

construction expense, and extensive dewatering required for the pond installation.

The second alternate includes gravity piping from the Village and Cerro drainage areas to a central lift station sized to handle the peak flows and discharge into a high retention pond which discharges by gravity into the existing trunk lines in Monsanto. Advantages of this alternate include low installation expense, accessibility to Falling Springs Road drainage improvements, and ease of pond installation. Disadvantages include high operation and maintenance expenses for the new large lift station, required installation of new 42" trunk line for Monsanto flows to avail existing 36" & 24" lines for discharge from pond.

The third alternate is similar to the second except the large lift station has been replaced by two intermediate lift stations located away from the retention pond. Advantages include ease of pond and piping installation. Disadvantages include the required 42" Monsanto trunk line installation and non-accessibility to drainage improvements from Falling Springs Road.

All of the alternates as discussed in this report will provide flooding relief to the residential areas of the Village. Also, the expansion of the project has served to further relieve the undercapacity problem which exists with the two trunk lines which run from Dead Creek to Route 3. As discussed, much of the project is associated with and has an effect upon proposed sewer improvements within the Monsanto plant and existing discharge conditions within the plant.

The alternate which is least dependent upon proposed improvements and existing discharge conditions within Monsanto is Alternate #1. Discharge from the lift station downstream of the pond can be controlled with the sizing of the pumps and force main. Under Alternates #2 and #3, storage from the pond discharges by gravity through the existing 36" pipe beneath the Alton and Southern tracks. Rate of discharge from the pond is dependent upon the rate of flow in the exisitng 24" and 36" trunk lines and subsequent availability for discharge. Also, under Alternates #2 and #3, hydrostatic levels within the Monsanto plant will be affected by the pond elevation, although precautions can be taken to prevent backup in the plant.

Although the initial installation expense for Alternate #1 is higher than #2 and #3, we recommend proceeding with #1 because of the lower operating expenses, small lift station, and virtual independence of the operations of the system from discharge conditions within the Monsanto plant.

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

VILLAGE OF SAUGET, ILLINOIS

SAUGET STORM SEWER PROJECT

PRELIMINARY COST ESTIMATE

CERRO/DEAD CREEK RETENTION POND

ALTERNATE #1

STRUCTURES

6 Double Curb Inlets @ $4,000 each	$ 24,000.00
3 Area Inlets @ $3,000 each	$ 9,000.00
14 Manholes @ $2,500 each	$ 35,000.00
1 Grated Inlet in Lake	$ 5,000.00
Total Inlet Structures	$ 73,000.00
New Box Over Existing Line Inside Monsanto's Plant	$ 20,000.00
New Lift Station	$200,000.00
TOTAL STRUCTURES	$293,000.00

PIPING

1,250 L.F. 60" RCP @ $160/L.F.	$200,000.00
1,370 L.F. 54" RCP @ $135/L.F.	$185,000.00
620 L.F. 48" RCP @ $ 95/L.F.	$ 59,000.00
75 L.F. 42" RCP @ $ 85/L.F.	$ 6,000.00
308 L.F. 36" RCP @ $ 70/L.F.	$ 21,000.00
398 L.F. 30" RCP @ $ 65/L.F.	$ 26,000.00
147 L.F. 24" RCP @ $ 50/L.F.	$ 7,000.00
470 L.F. 18" RCP @ $ 40/L.F.	$ 19,000.00
185 L.F. 12" RCP @ $ 35/L.F.	$ 6,000.00
250 L.F. 18" Diameter Force Main Beneath Tracks @ $80/L.F.	$ 20,000.00
Dewatering ($20,000 Installation + 2 wks. O. & M. @ $12,000/wk.)	$ 44,000.00
TOTAL PIPING	$593,000.00

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

RETENTION POND INSTALLATION
(Storage between 396 and 384)

Earthwork (cut for lake) 45,000 Yd.^{3} @ $3.00/Yd.^{3}	$135,000.00
Clay Liner (4' thick) 10,000 Yd.^{3} @ $9.00/Yd.^{3}	$ 90,000.00
Concrete Liner (6" thick) 1,300 Yd.^{3} @ $300.00/Yd.^{3}	$390,000.00
Dewatering ($30,000 Installation + 8 wks. O. & M. @ $20,000/wk.)	$190,000.00
TOTAL RETENTION POND INSTALLATION	$805,000.00

MISCELLANEOUS

Asphalt Replacement - Base & Surface Course - 100 Tons @ $50.00/Ton	$ 5,000.00
Close Off Existing Structures	$ 10,000.00
Finish Grading	$ 20,000.00
Pressure Relief Valves	$ 10,000.00
Seeding and Landscaping	$ 10,000.00
TOTAL MISCELLANEOUS	$ 55,000.00

TOTAL ALTERNATE #1	$1,746,000.00

CER 009043

VILLAGE OF SAUGET, ILLINOIS

SAUGET STORM SEWER PROJECT

PRELIMINARY COST ESTIMATE

CERRO/DEAD CREEK RETENTION POND

ALTERNATE #2

STRUCTURES

6 Double Curb Inlets @ $4,000 each	$ 24,000.00
3 Area Inlets @ $3,000 each	$ 9,000.00
14 Manholes @ $2,500 each	$ 35,000.00
2 Terminal Boxes Over Existing Lines Inside Monsanto's Plant @ $15,000 each	$ 30,000.00
Total Inlet Structures	$ 98,000.00
New Lift Station	$400,000.00
TOTAL STRUCTURES	$498,000.00

PIPING

1,150 L.F. 60" RCP @ $160/L.F.	$184,000.00
1,370 L.F. 54" RCP @ $135/L.F.	$185,000.00
825 L.F. 48" RCP @ $ 95/L.F.	$ 79,000.00
290 L.F. 42" RCP @ $ 85/L.F.	$ 25,000.00
308 L.F. 36" RCP @ $ 70/L.F.	$ 22,000.00
323 L.F. 30" RCP @ $ 65/L.F.	$ 21,000.00
147 L.F. 24" RCP @ $ 50/L.F.	$ 7,000.00
470 L.F. 18" RCP @ $ 40/L.F.	$ 19,000.00
185 L.F. 12" RCP @ $ 35/L.F.	$ 7,000,00
Dewatering ($20,000 Installation + 2 wks. O. & M. @ $12,000/wk.)	$ 44,000.00
TOTAL PIPING	$593,000.00

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

RETENTION POND INSTALLATION
(Storage between 398 and 408)

Earthwork (cut for lake) 20,000 Yd.^{3} @ $3.00/Yd.^{3}	$ 60,000.00
Clay Liner (4' thick) 10,000 Yd.^{3} @ $9.00 Yd.^{3}	$ 90,000.00
Dewatering ($30,000 Installation + 3 wks. O. & M. @ $20,000/wk.)	$ 90,000.00
TOTAL RETENTION POND INSTALLATION	$240,000.00

MISCELLANEOUS

Asphalt Replacement - Base & Surface Course - 100 Tons @ $50.00/Ton	$ 5,000.00
Close Off Existing Structures	$ 10,000.00
Finish Grading	$ 20,000.00
Seeding and Landscaping	$ 10,000.00
TOTAL MISCELLANEOUS	$ 45,000.00

TOTAL ALTERNATE #2 $1,376,000.00

VILLAGE OF SAUGET, ILLINOIS

SAUGET STORM SEWER PROJECT

PRELIMINARY COST ESTIMATE

CERRO/DEAD CREEK RETENTION POND

ALTERNATE #3

STRUCTURES

6 Double Curb Inlets @ $4,000 each	$ 24,000.00
3 Area Inlets @ $3,000 each	$ 9,000.00
11 Manholes @ $2,500 each	$ 28,000.00
2 Terminal Boxes Over Existing Lines Inside Monsanto's Plant @ $15,000 each	$ 30,000.00
Total Inlet Structures	$ 91,000.00
2 New Lift Stations @ $270,000 each	$540,000.00
TOTAL STRUCTURES	$631,000.00

PIPING

1,600 L.F. 60" LCP (Prestressed Lined Cylinder Pipe) @ $240/L.F.	$384,000.00
550 L.F. 48" LCP (Prestressed Lined Cylinder Pipe) @ $150/L.F.	$ 83,000.00
960 L.F. 54" RCP @ $135/L.F.	$130,000.00
50 L.F. 48" RCP @ $ 95/L.F.	$ 5,000.00
75 L.F. 42" RCP @ $ 85/L.F.	$ 6,000.00
308 L.F. 36" RCP @ $ 70/L.F.	$ 22,000.00
323 L.F. 30" RCP @ $ 65/L.F.	$ 21,000.00
147 L.F. 24" RCP @ $ 50/L.F.	$ 7,000.00
470 L.F. 18" RCP @ $ 40/L.F.	$ 19,000.00
185 L.F. 12" RCP @ $ 35/L.F.	$ 6,000.00
TOTAL PIPING	$683,000.00

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

CONFIDENTIAL 92-CV-204-WDS

RETENTION POND INSTALLATION
(Storage between 398 and 408)

Earthwork (cut for lake) 20,000 Yd.^{3} @ $3.00/Yd.^{3}	$ 60,000.00
Clay Liner (4' thick) 10,000 Yd.^{3} @ $9.00/Yd.^{3}	$ 90,000.00
Dewatering ($30,000 Installation + 3 wks. O. & M. @ $20,000/wk.)	$ 90,000.00
TOTAL RETENTION POND INSTALLATION	$240,000.00

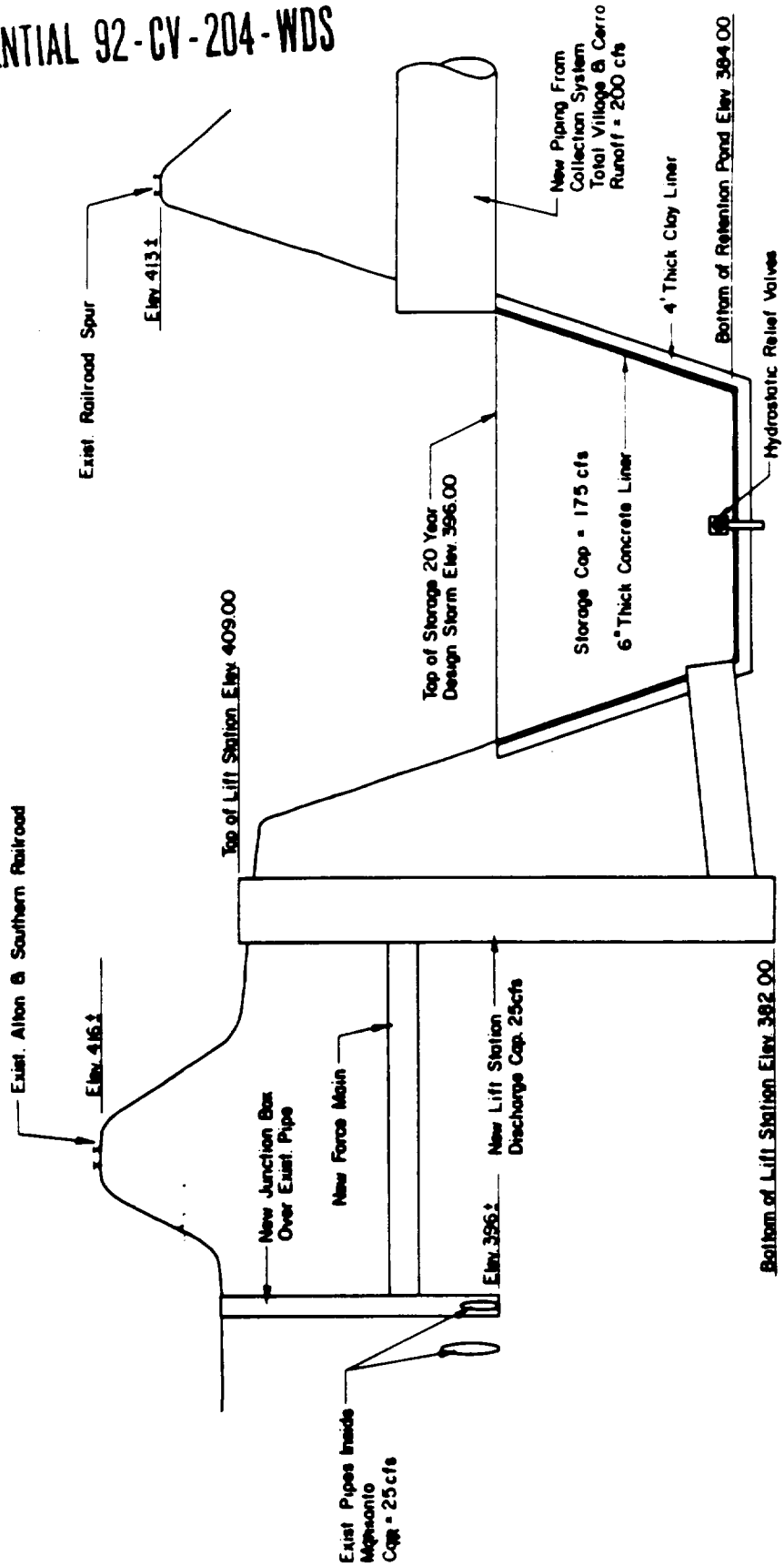
MISCELLANEOUS

Asphalt Replacement - Base & Surface Course - 100 Tons @ $50.00/Ton	$ 5,000.00
Close Off Existing Structures	$ 10,000.00
Finish Grading	$ 20,000.00
Seeding and Landscaping	$ 10,000.00
TOTAL MISCELLANEOUS	$ 45,000.00

TOTAL ALTERNATE #3 $1,599,000.00

EPA/CEPRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE

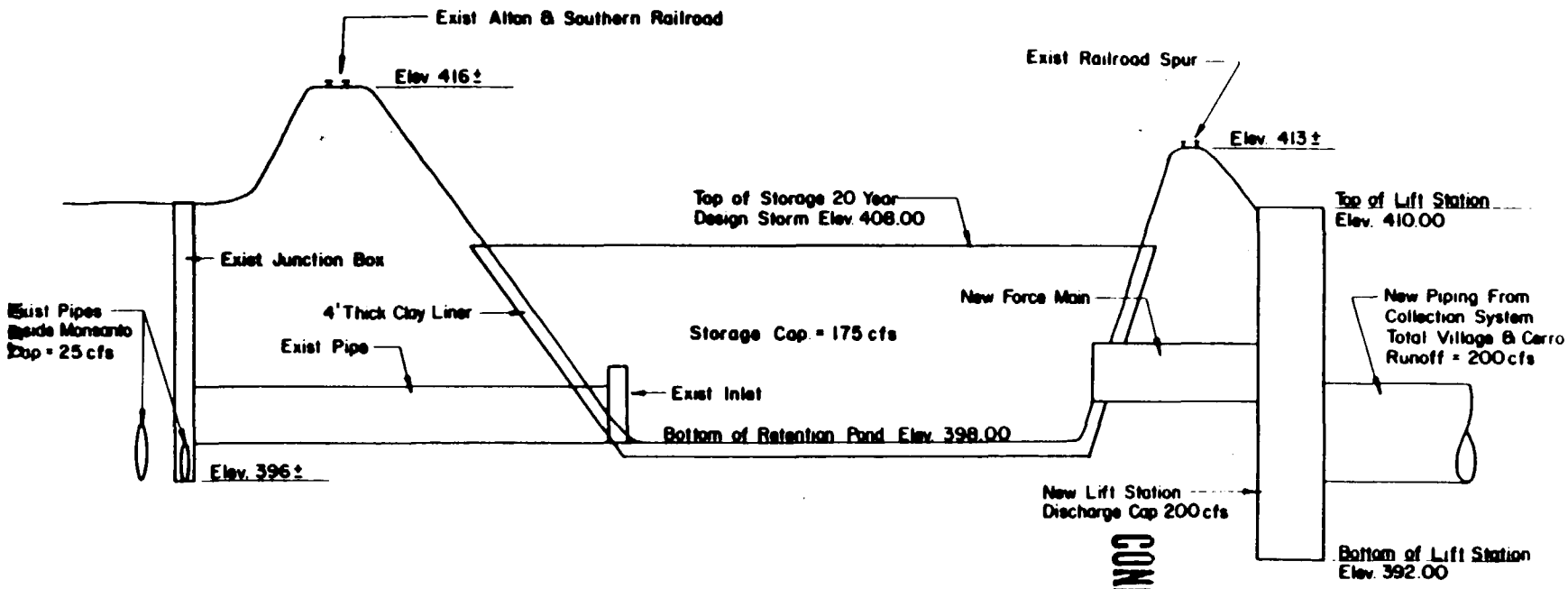
CONFIDENTIAL 92-CV-204-WDS



DESIGN SCHEMATIC
CERRO ALTERNATE # 1

CER 009048

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE



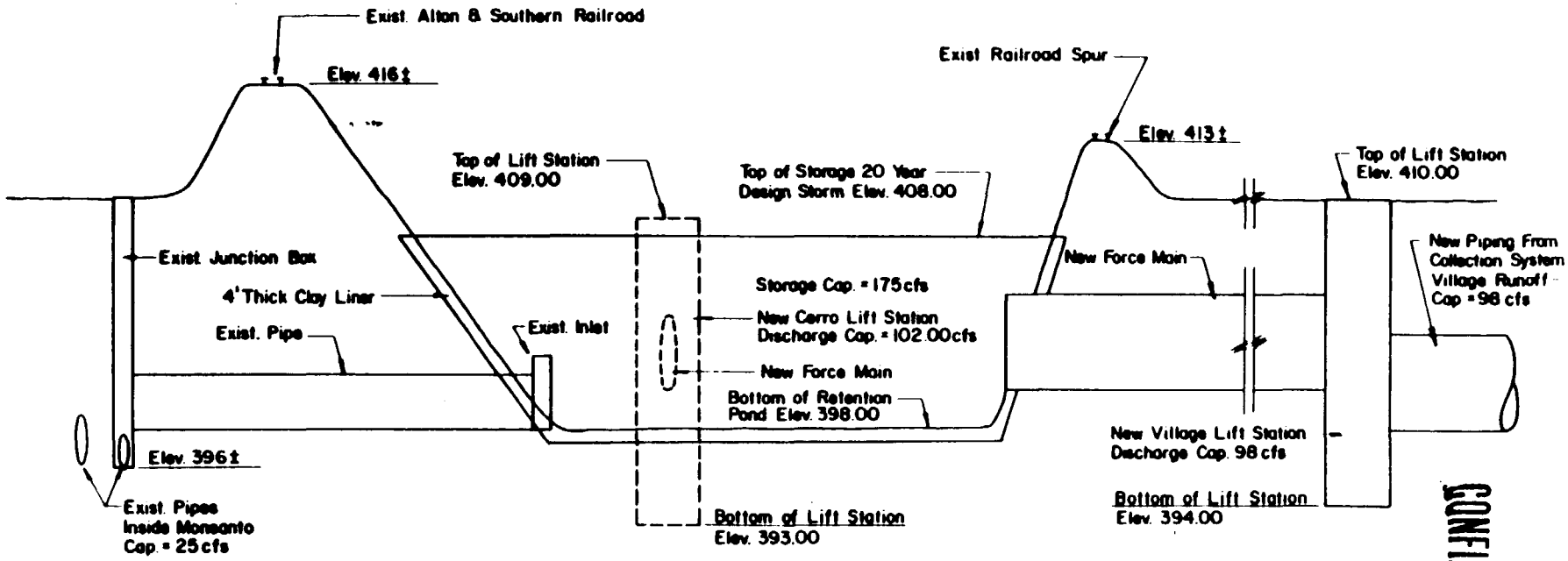
DESIGN SCHEMATIC
CERRO ALTERNATE # 2

CONFIDENTIAL 92-CV-204-WDS

CER 009049

001736

EPA/CERRO COPPER/EIL/PCB ATTORNEY WORK PRODUCT / ATTORNEY CLIENT PRIVILEGE



DESIGN SCHEMATIC
CERRO ALTERNATE # 3

CER 009050

CONFIDENTIAL 92-CV-204-WDS

5	4.12	11.52
6	7.55	5.29
7	26.40	34.96 (Future)
8	12.64	34.89 (Future)
9	6.24	9.03
10	24.55	67.76

CONFIDENTIAL 92-CV-204-WDS

CER 009051

ALTERNATE # 3

[redacted]

CER 009052

ALTERNATE # 2

[redacted]

CER 009053

ALTERNATE # 1