Appendix D
Capacity Survey Results

SYCAMORE LANDFILL

LANDFILL CAPACITY SURVEY RESULTS

Through 2-28-2011

Prepared 3-18-2011

Volume used from Stage III area

STRATUM 1

Computer file name:	sycamore lf 2009 base StageIIIA.dwg
Surface 1:	2009 TOPO
Surface 2:	2010 TOPO (3-19-2010)
Calculation Method:	GRID
Compaction Factor:	1
Expansion Factor:	1
Cut Volume:	46 cubic yard
Fill Volume:	957,344 cubic yard
Volume Used:	957,344 cubic yard

Volume used from Stage I area

STRATUM 2

Computer file name:	2-2-05 topo sycamore.dwg
Surface 1:	2005 part
Surface 2:	2010 topo (3-19-2010)
Calculation Method:	Composite
Compaction Factor:	1
Expansion Factor:	1
Cut Volume:	358,392 cubic yard
Fill Volume:	5,262,170 cubic yard
Volume Used:	5,262,170 cubic yard

Refuse Used Volume from 2-2-2005 to 3-19-2010

957,344 + 5,262,170 = 6,219,514 cubic yard

Average Airspace Utilization Factor (AUF)

Reported Buried Tonnage from 2-1-2005 to 12-31-2005 = 818,164

Reported Buried Tonnage for year 2006 = 867,245

Reported Buried Tonnage for year 2007 = 987,183

Reported Buried Tonnage for year 2008 = 888,770

Reported Buried Tonnage for year 2009 = 826,069

Reported Buried Tonnage for year 2010:

Reported Buried Tonnage for January 2010 = 69,899

Reported Buried Tonnage for February 2010 = 70,856

<u>Prorate March 2010 tonnage</u>

Reported Buried Tonnage for March 2010 = 70,856

79,027 tons in 27 days = 2927/day

The Tonnage disposed 3-1-2010 to Last 3-18-2010 = 16 working days

2927/day x 16 = 46,832 tons

Reported Buried Tonnage from 1-1-2010 to 3-18-2010 = 69,899 + 70,856 + 46,832 = 187,587

<u>Reported Buried Tonnage from 2-1-2005 to 3-19-2010</u>

818,164 + 867,245 + 987,183 + 888,770 + 826,069 + 187,587 = 4,575,018 tons

<u>AUF = 4,575,018 tons / 6,219,514 cy = 0.736 ton/cy</u>

Refuse Used Volume from 3-19-2010 to 2-26-2011

The Tonnage disposed 3-19-2010 to 2-26-2011 as reported by Sycamore landfill:

Prorating March 2010 tonnage:

March 2010 79,027 in 27 days = 2,927 tons/day

The Tonnage disposed 3-19-2010 to 3-31-2010 = 11 working days

2927/day x 11 = 32,197

Month	Tonnage
March (2010)	32,197
April	77,391
May	73,572
June	76,717
July	76,728
August	76,262
September	72,107
October	70,930
November	71,720
December	71,271
January (2011)	74,449
February	61,358
Total tonnage	834,702

AUF: 1 cubic yard = 0.736 ton/cy (1471 lbs/cy)

Refuse Used Volume from 3-19-2010 to 2-26-2011

834,702 tons / 0.736 ton/cy = 1,134,106 cy

Refuse Used Volume from 2-2-2005 to 2-26-2011

6,219,514 + 1,134,106 = 7,353,620 cy

Refuse Volume Used as of 2-28-2011

Refuse Volume Used as of 2-2-2005 = 21,633,000 cy (from 2006 A-Mehr Capacity Survey)

21,633,000 + 7,353,620 = 28,986,620 cy

Remaining Airspace Capacity

Permitted site capacity = 71,233,171 cy

Refuse Used Volume = 28,986,620 cy

Operations layer and final cover:

The site will have 152.7 acres of lined area and 136.3 acres of unlined area. Total final cover area is 289 acres.

Operations layer volume (2 feet) over the liner = (152.7x 43560) sf x 2 = 13,303,224 cf = 492,712 cy

Final cover volume (3 feet over daily cover) = (289x43560) sf x 3= 37,766,520 cf = 1,398,760 cy

Remaining Airspace Capacity

71,233,171 – 28,986,620 = 42,246,551 cy (with operations layer and final cover quantities)

71,233,171 – 28,986,620 – 492,712 – 1,398,760 = 40,355,079 cy (without operations and final cover quantities)

Annual Volume Usage

362 days x 3,965 ton/day = 1,435,330 tons

AUF = 1 cubic yard = 0.736 ton (1,471 lbs/cy)

1,435,330 / 0.736 = 1,950,177 cy

Estimated Closure Date

40,355,079 cy / 1,950,177 cy/yr = 20.69 years (20 years and 8 months)

2-28-2011 + 20 years and 8 months = October 2031

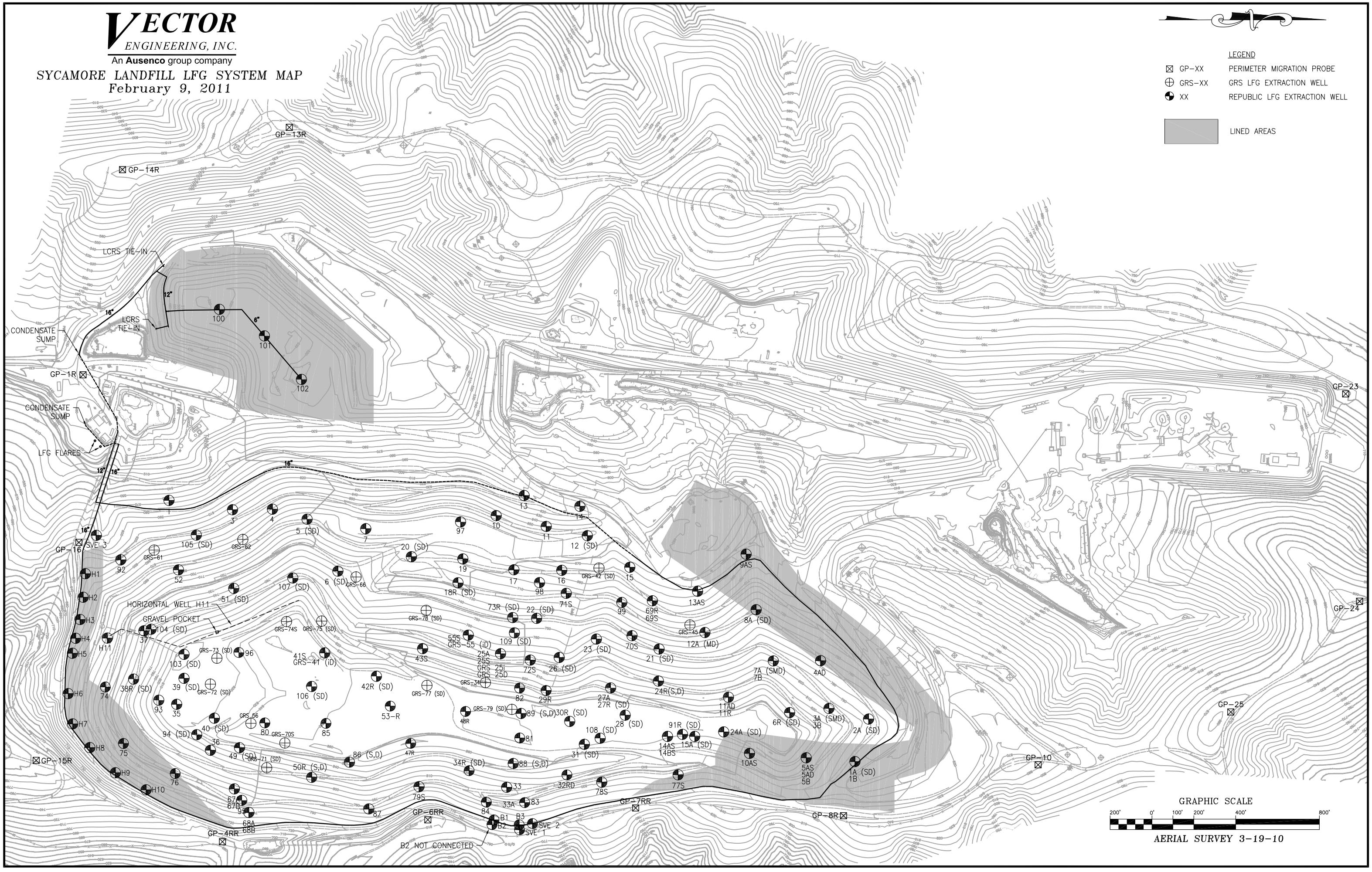
Appendix E
Landfill Gas Management Figures

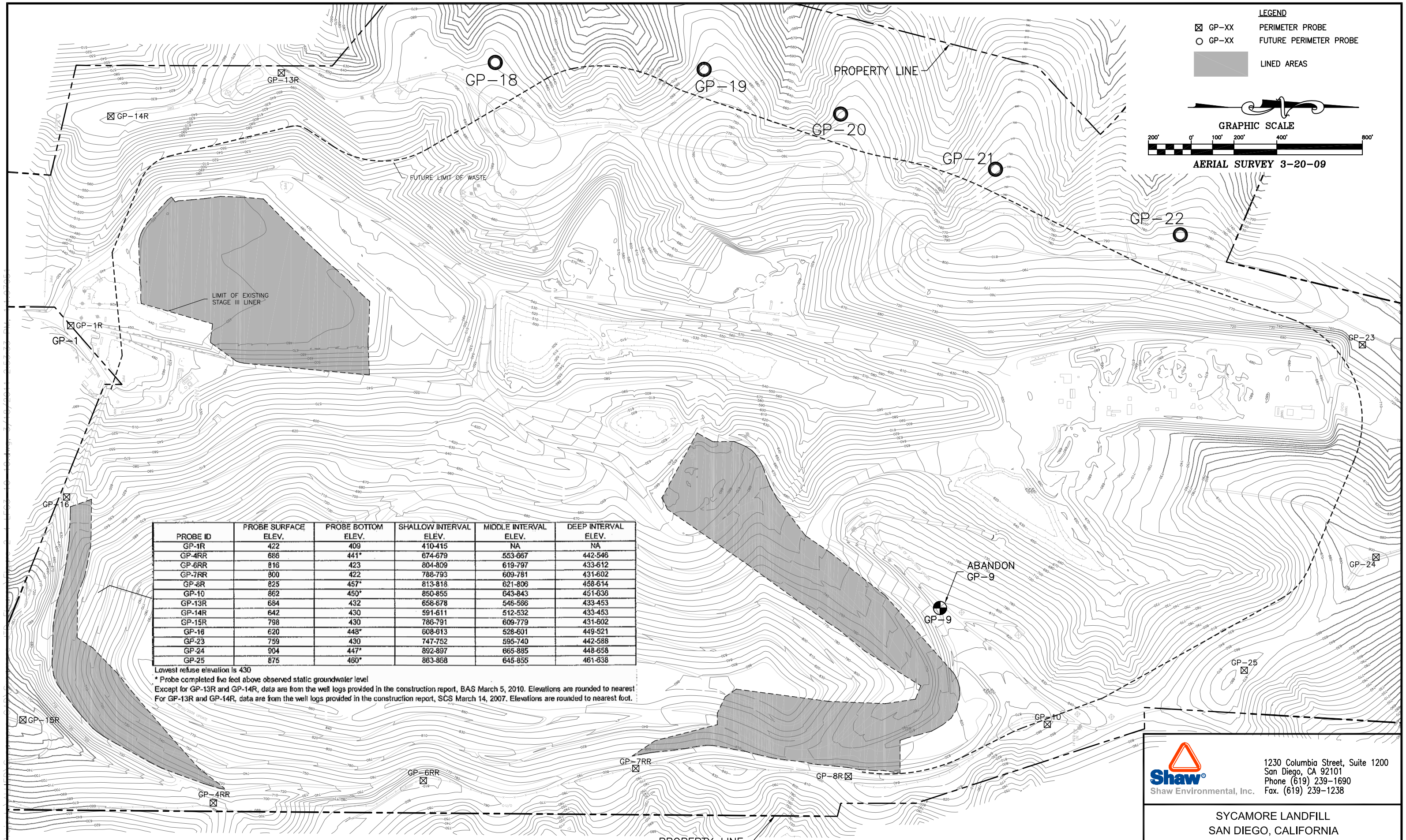
Sycamore Landfill LFG System Map

Existing and Proposed LFG Perimeter Probe Locations

VECTOR ENGINEERING, INC.
An Ausenco group company

SYCAMORE LANDFILL LFG SYSTEM MAP
February 9, 2011





PROBE ID	PROBE SURFACE ELEV.	PROBE BOTTOM ELEV.	SHALLOW INTERVAL ELEV.	MIDDLE INTERVAL ELEV.	DEEP INTERVAL ELEV.
GP-1R	422	409	410-415	NA	NA
GP-4RR	686	441*	674-679	553-667	442-546
GP-6RR	816	423	804-809	619-797	433-612
GP-7RR	800	422	788-793	609-781	431-602
GP-8R	825	457*	813-818	621-806	458-614
GP-10	862	450*	850-855	643-843	451-636
GP-13R	684	432	658-678	546-566	433-453
GP-14R	642	430	591-611	512-532	433-453
GP-15R	798	430	786-791	609-779	431-602
GP-16	620	448*	608-613	528-601	449-521
GP-23	759	430	747-752	595-740	442-588
GP-24	904	447*	892-897	665-885	448-658
GP-25	875	460*	863-868	645-855	461-638

Lowest refuse elevation is 430

* Probe completed five feet above observed static groundwater level

Except for GP-13R and GP-14R, data are from the well logs provided in the construction report, BAS March 5, 2010. Elevations are rounded to nearest

For GP-13R and GP-14R, data are from the well logs provided in the construction report, SCS March 14, 2007. Elevations are rounded to nearest foot.

Shaw®
Shaw Environmental, Inc.
1230 Columbia Street, Suite 1200
San Diego, CA 92101
Phone (619) 239-1690
Fax. (619) 239-1238

SYCAMORE LANDFILL
SAN DIEGO, CALIFORNIA
REPORT OF DISPOSAL SITE INFORMATION
EXISTING AND PROPOSED LFG MONITORING PROBE LOCATIONS

Appendix F
Drainage Study and Calculations

SYCAMORE LANDFILL
2002 DRAINAGE MODIFICATIONS

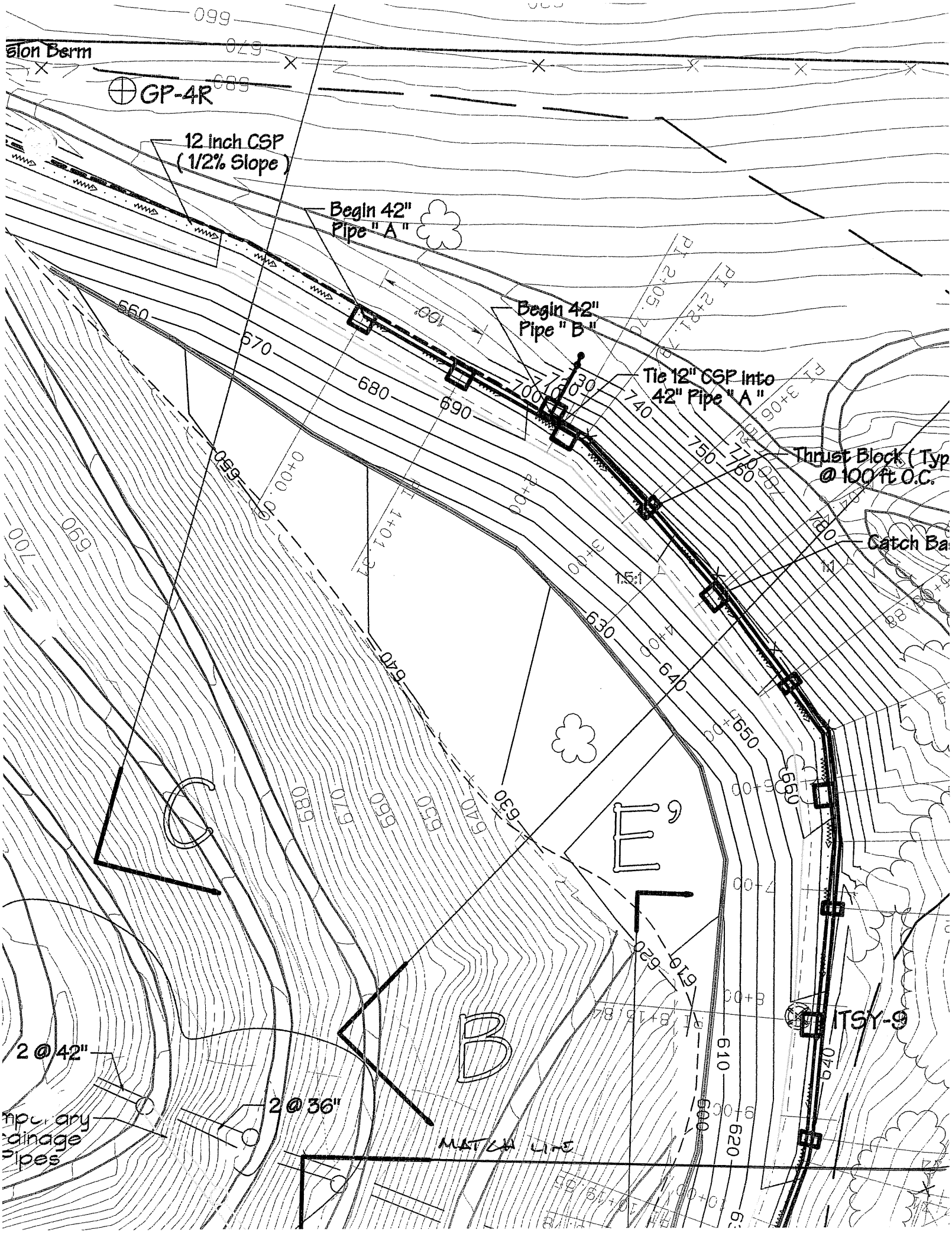
Construction of the Sycamore Landfill South Cell disposal area in 2002 included significant revisions to the perimeter drainage system in the southeast area of Stage I. Revisions included:

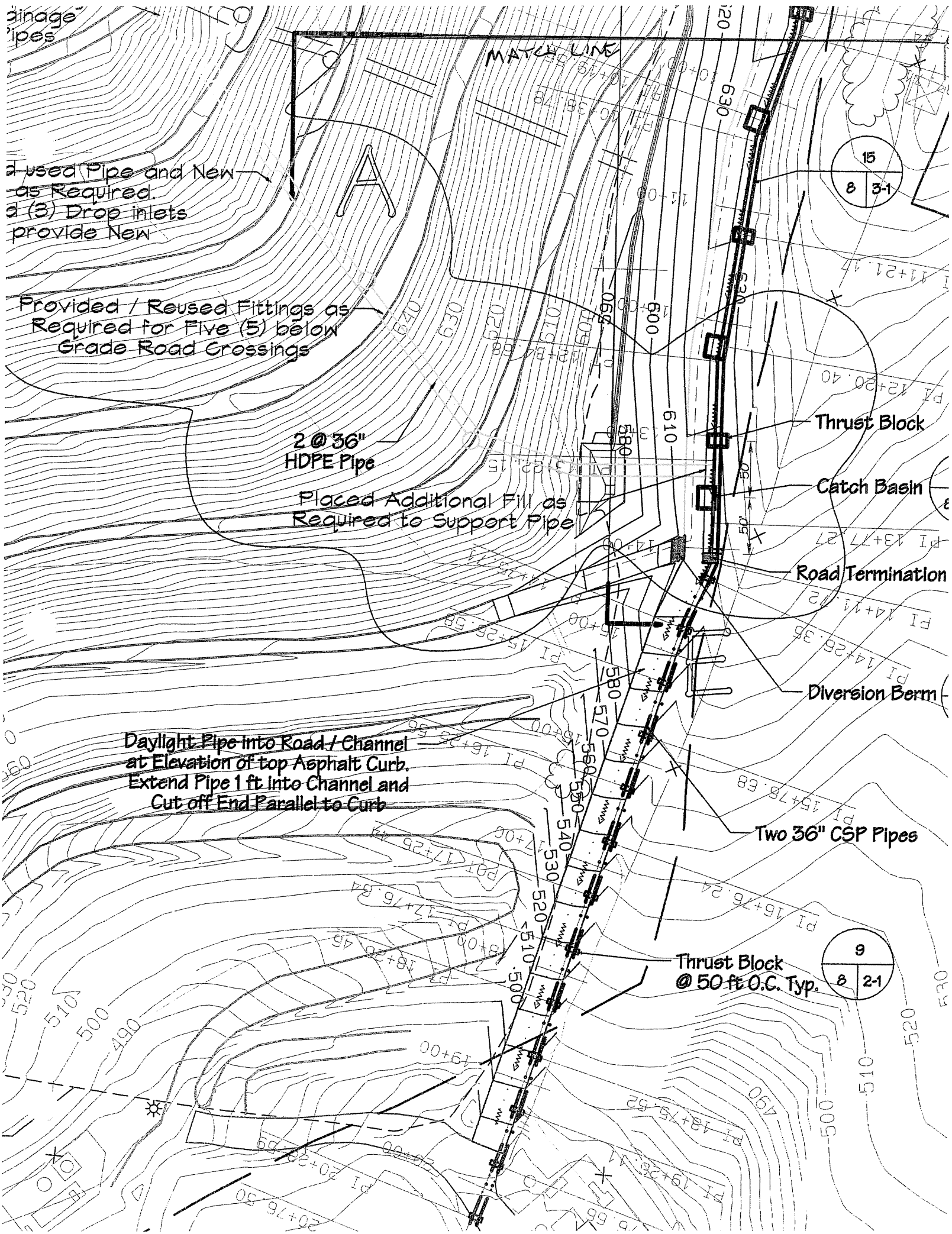
- Demolition of the existing intermediate basin and channel in the south landfill upper area (see Emcon report, March 1998).

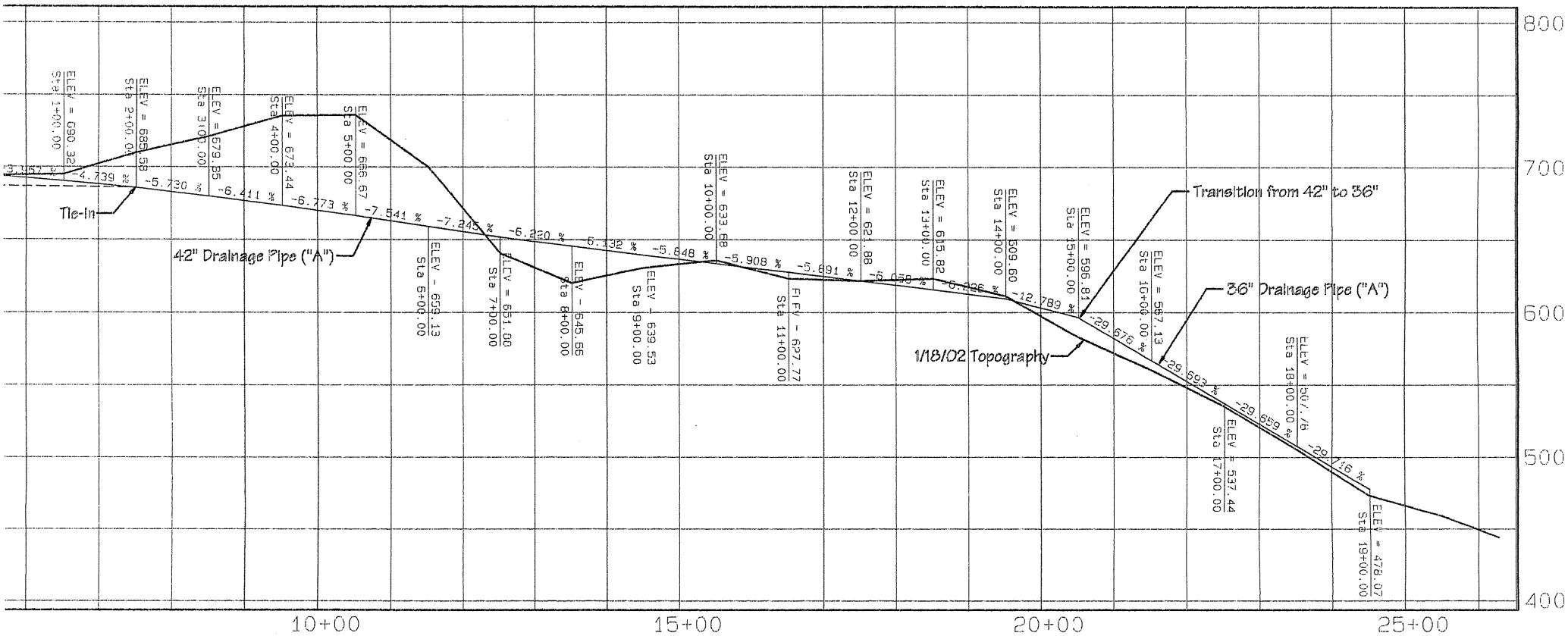
- Construction of a paved drainage road/channel along the south half of the east landfill perimeter and south perimeter, leading to the main south sedimentation basin

- Installation of two 42-inch diameter smooth-walled HDPE pipes below the paved road/channel, with grated catch basin inlets to divert water from the channel into the pipes. The grade at the pipe entry sections is about 3%, and is predominantly at 7% along the south landfill perimeter until it reaches a 3:1 drop into the basin. At this point the 42-inch pipes transition to buried 36-inch corrugated steep pipes that convey runoff down the steep slope to the existing sedimentation basin.

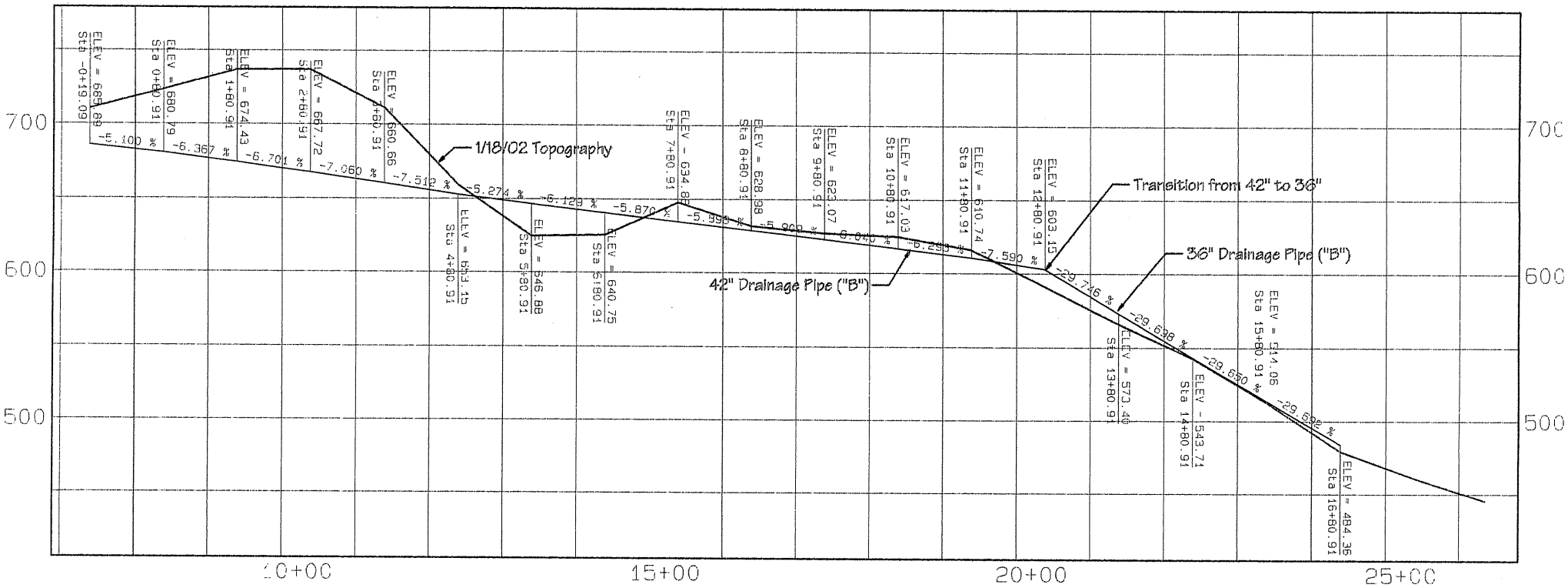
As indicated in the attached computations, the channel and pipe system is designed to manage the peak runoff from a 100-year, 24-hour duration storm on a tributary area of approximately 140 acres of a potential future master plan development at Sycamore Landfill. Under existing conditions the 2002 perimeter drainage system handles runoff from approximately 90 acres.


sion Berm
GP-4R
12 inch CSP
(1/2% Slope)
Begin 42"
Pipe " A "
Begin 42"
Pipe " B "
Tie 12" CSP into
42" Pipe " A "
Thrust Block (Typ
@ 100 ft O.C.
Catch Ba
1.5:1
C
E
B
ITSY-9
2 @ 42"
2 @ 36"
mporary
rainage
Pipes
MATCH LINE


MATCH LINE
A
d used Pipe and New
as Required.
d (3) Drop inlets
provide New
Provided / Reused Fittings as
Required for Five (5) below
Grade Road Crossings
2 @ 36"
HDPE Pipe
Placed Additional Fill as
Required to Support Pipe
Thrust Block
Catch Basin
Road Termination
Diversion Berm
Daylight Pipe into Road / Channel
at Elevation of top Asphalt Curb.
Extend Pipe 1 ft into Channel and
Cut off End Parallel to Curb
Two 36" CSP Pipes
Thrust Block
@ 50 ft O.C. Typ.
15
8
3-1
9
8
2-1



Drainage Pipe "A" Profile



Drainage Pipe "B" Profile

SYCAMORE SOUTH CELL DRAINAGE PIPES

TRIBUTARY AREA FOR PIPES : SEE PLT 1

A < 50% AREA OF STAGE I = 138 × 0.5 = 69 A

ADDITIONAL AREA OUTSIDE FOOTPRINT - say 20 A

89 ≈ 90 A

PEAK RUNOFF : IT 1992 PEAK RUNOFF FROM 24 HR STORM (100 YEAR) IS 778 CFS FROM 375 A.

ASSUME SIMILAR RUNOFF FROM 90-ACRE AREA TRIBUTARY TO NEW CHANNEL / PIPES :

$$Q_{max} = 778 \times \frac{90}{375} = 186 \text{ CFS}$$

say 190 CFS PEAK (STAGE 2)

DESIGN : 2 PIPES @ 42" DIAMETER

CAPACITY - EACH ≥ 150 CFS @ { 2% SLOPE, 36" DEEP; 3% SLOPE, 36" DEEP; 5.5% SLOPE, 24" DEEP }

MIN. SLOPE = 3%
AVERAGE = 7%

} 2 @ 42" PIPES IS ADEQUATE

PLATE

A-MEHR, INC. SYCAMORE SOUTH CELL DRAINAGE

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
					3/2/00

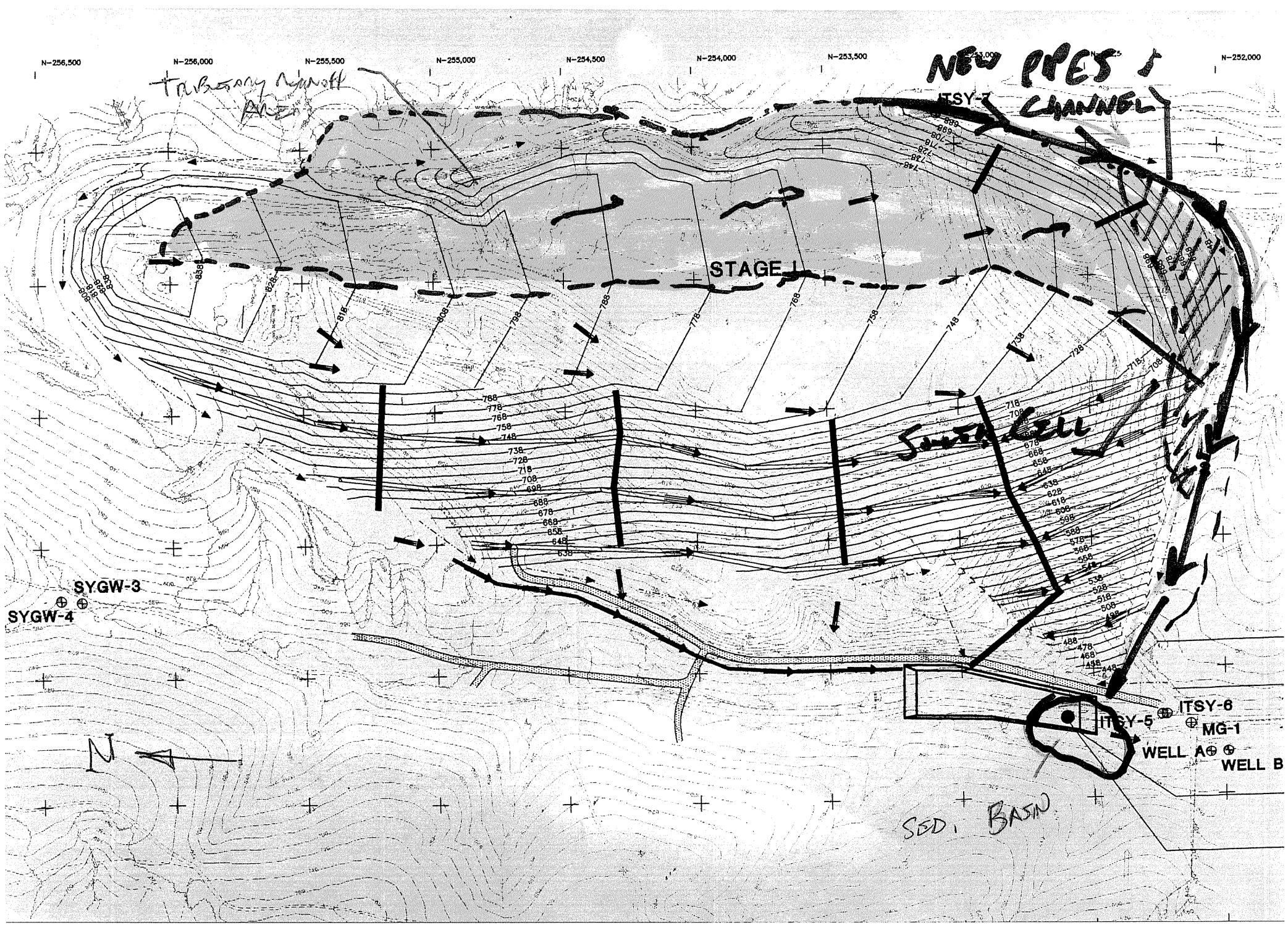


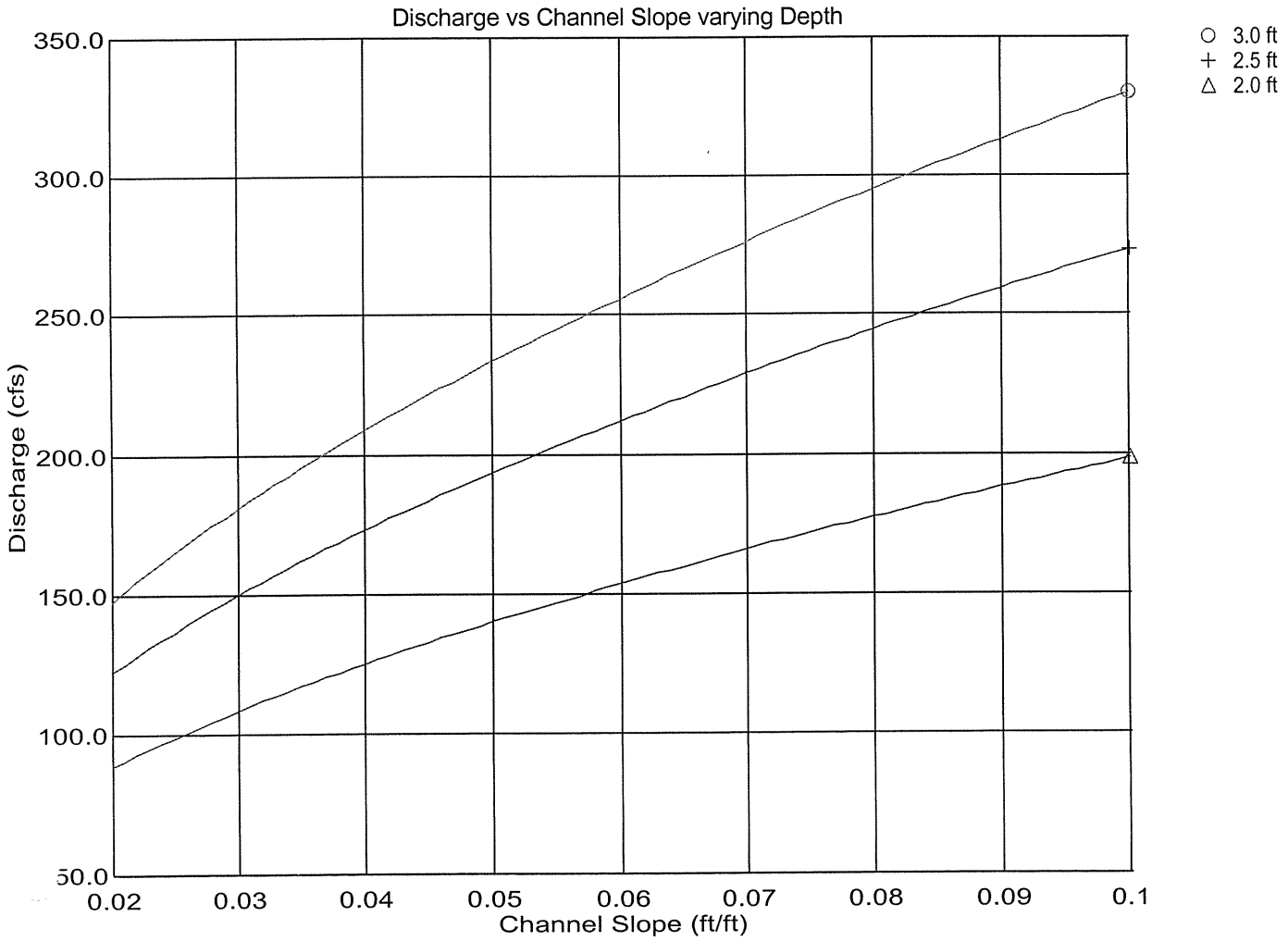
FIG 1 FINAL GRADING - IT CORP 1992

Curve
Plotted Curves for Circular Channel

Project Description	
Project File	c:\docume~1\owner\my documents\technical references\haestad\fmw\sycamore.fm2
Worksheet	Sycamore South Cell Pipes
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Mannings Coefficient	0.013
Diameter	42.00 in

Input Data			
	Minimum	Maximum	Increment
Channel Slope	0.020000	0.100000	0.001000 ft/ft
Depth	2.00	3.00	0.50 ft



SYCAMORE LANDFILL

1998 DRAINAGE SYSTEM REVISIONS

SAN DIEGO, CALIFORNIA

Prepared for

Sycamore Landfill, Inc.

March 27, 1998

Prepared by

EMCON
Sorrento Tower
5355 Mira Sorrento Tower Place, Suite 100
San Diego, California 92121

Project 22771-400.001

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2 NORTH AREA 2-1

3 SOUTH LANDFILL UPPER AREA 3-1

4 SOUTH SEDIMENT/DETENTION BASIN 4-1

APPENDICES

APPENDIX A - IT Hydrology Study for the Sycamore Landfill-Stage 1 Development Plan, December 1993

APPENDIX B - Hydrology and Hydraulic Calculations for the 1998 Drainage System Improvements

APPENDIX C - Design Drawings

PROJECT DESCRIPTION

The 1998 modifications to the Sycamore Landfill drainage system occured in three areas of the landfill:

NORTH AREA:
Add a new sediment/detention basin and replace the west landfill downdrain system on the west side of the landfill.

SOUTH LANDFILL UPPER-AREA:
Add an channel erosion check system into existing channel. Replace the top deck inlet and downdrain system. Redesign the upper inlet basin and outlet pipe.

SOUTH SEDIMENT/DETENTION BASIN
Expand the basin and replace the primary downdrain system.
Each of these areas are described in more detail on the following pages. All drainage devices are designed to accommodate the 100 year 24 hour storm based on the San Diego County Hydrology Manual. All improvements are shown on the accompanying drainings. The improvements incorporated the Best Management Practices identified in the Stormwater Pollution Prevention Plan, Revision 1, July 1997.

NORTH AREA

The new North Basin receives flows for the borrow area, north landfill area, and part of the landfill top deck area. The borrow area drains via a graded triangular swale and discharges into the North Basin. A 24" diameter corrugated HDPE pipe intercepts flow from the north part of the landfill on the east side of the access road. A portion of the top deck drains to the west downdrain inlet. The west downdrain inlet is a 48" CSP tapered inlet, joined to a 42" ADS N-12 corrugated HDPE pipe (ID of 48" CSP inlets fits OD of 42" ADS) inlet/transition to 36" corrugated HDPE pipe. Flows are intercepted at the top deck and are channeled along the top deck berm to the inlet. Intermediate bench flows are intercepted via a 24" diameter riser pipe. The top deck and bench flows are transported via the 36" diameter corrugated HDPE pipe downdrain downslope and under the access road to the North Basin.

A 36" diameter corrugated steel pipe riser with 2" x 8" slots cut within the riser serves to allow sediments to deposit within the basin. The top of the riser is open (with protective cage) to allow full interception of the basin peak design on the flow, should the slots become plugged. A 36" diameter corrugated high density polyethylene (HDPE) (smooth interior wall) pipe transports flows from the basin downslope to an energy dissipator where velocities are dissipated and flows are discharged to Sycamore Canyon.

A grouted cobble emergency overflow spillway is located at the south side of the Basin, in the unlikely event both the slots and the "open top" riser plug.

SOUTH LANDFILL UPPER AREA

The significant structures within the South Landfill Upper Area are a rock erosion check, an intermediate basin with rock erosion check outlet, the top deck inlets with two 36" corrugated HDPE downdrains and the upper inlet basin.

Flows from the top deck area flow southerly at a 3% gradient to the south top deck berm. The berm directs flows to the 36" corrugated HDPE pipe downdrains which transport flows downslope to the energy dissipator outlets located within the upper inlet basin.

Flows originating from the east side of the landfill and the southeast cut slope area are transported over land to the south. The south erosion check system serves to slow flow velocities and to intercept silt. The rock erosion check and intermediate basin with rock erosion check outlet function as a two stage erosion control device. The rock erosion check slows flow velocities and intercepts silt. Run-off will flow through or over the check berm to the intermediate basin. The intermediate basin with slopes at 1.5% will allow deposition of sediment load within the 180' long basin. Flows are also slowed or checked by the basin rock erosion check structure. The intermediate basin also functions as a detention basin, with a reduction between peak inflow and outflow by almost two-thirds. After outletting from the intermediate basin, flows travel via the graded road/existing cobble stabilized road-bed ± 600 feet to the upper inlet basin.

The combined flows from the two 36" downdrains (from the top deck area) and the flow from the intermediate basin are desilted within the upper inlet basin.

Flows exit the basin via two 42" diameter CSP slotted riser inlets (with caged top openings), and a single 42" corrugated smooth interior walled HDPE pipe. The pipe is below grade within native soil and flows westerly to a 42" crossing under the road, outletting into the South Sediment/Detention Basin, where flow velocities are reduced by a rock Rip-Rap dissipator.

SOUTH SEDIMENT/DETENTION BASIN

The capacity of the South Sediment/Detention Basin was doubled. A grouted rock inlet channel was designed, at the northwest corner of the basin. This allows run-off tributary to the east side of the landfill access road to enter the basin. Water leaves the basin via a new 48" diameter CSP Slotted Riser Inlet. A second new riser was added for redundancy in the event slots are plugged. The new risers connect to the existing 48" CSP discharge pipe. Water flows to the west under the access road and the Sycamore Canyon lower access road to a headwall with rock rip-rap dissipator and discharges in Sycamore Canyon.

DRAINAGE SYSTEM CALCULATIONS
STAGED DEVELOPMENT PLAN
SYCAMORE LANDFILL

Project No. 245139

PREPARED FOR

County of San Diego
Department of Public Works
5555 Overland Avenue
San Diego, California 92123

PREPARED BY

IT Corporation
1425 South Victoria Court, Suite "A"
San Bernardino, California 92408

December 1993

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Flow Profile for South Channel . . . . . Appendix C
Energy Dissapators . . . . . Appendix D
Weir Structure and Pipe Analysis . . . . . Appendix E
Sedimentation Basin Analysis . . . . . Appendix F

100-Year 24-hour Flood Analysis for Sycamore

Objective: Calculate 100-year 24-hour flood Peak flow & Propose Preminilinary drainage system

Method: Rational method is used

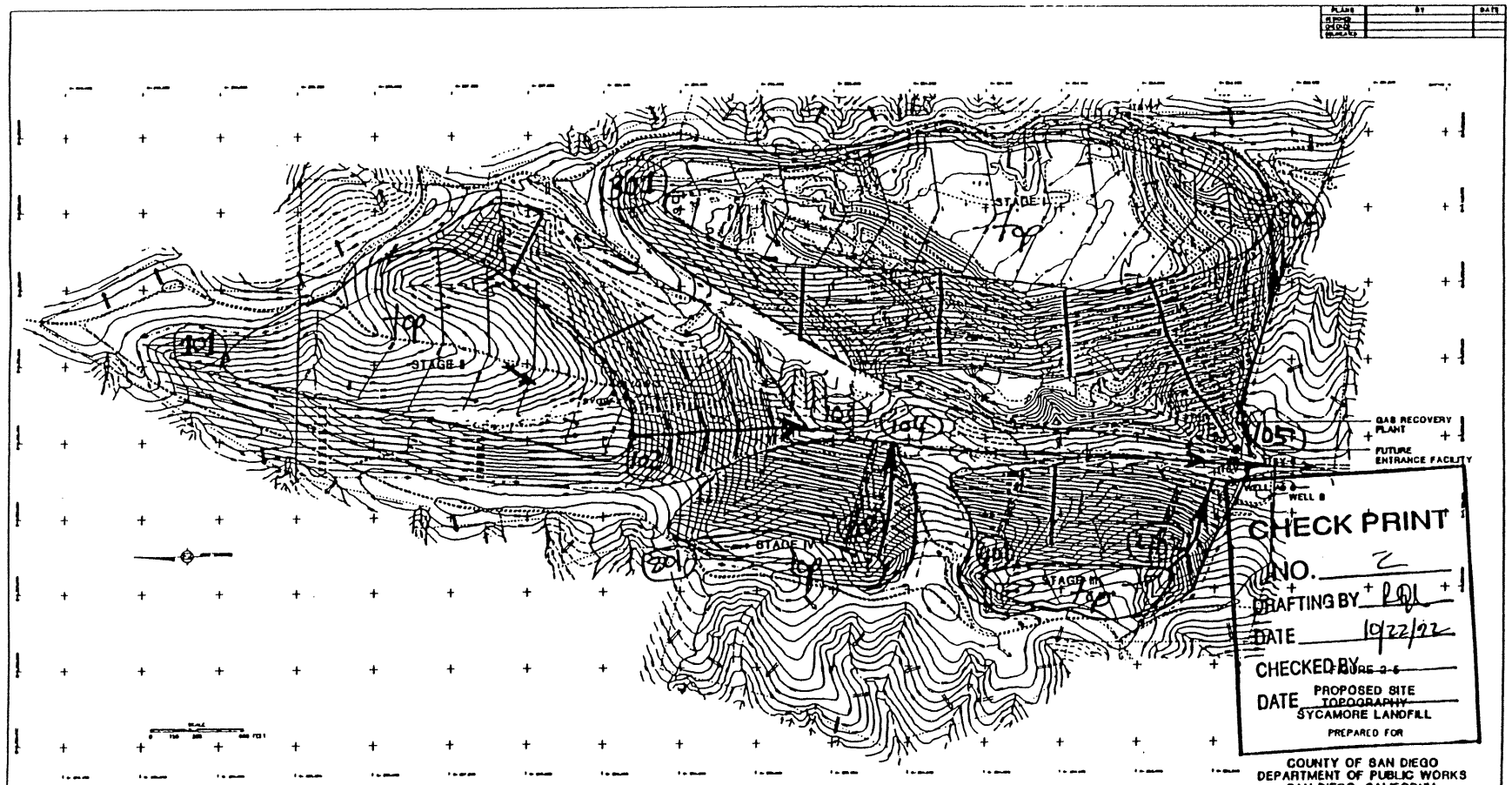
$$Q_{peak} = C I A$$

C = Coefficient of runoff
On the top deck 0.9

A = area (acres)

I = rainfall intensity (inch/hr
2.6 inch/hour for Sycamore a
(100-year 24-hour flood)

The AES model RATSD (for County of San Diego) is used. The Computer Printout is attached.


STAGE I
STAGE II
STAGE III
STAGE IV
GAS RECOVERY PLANT
FUTURE ENTRANCE FACILITY
WELL 8
CHECK PRINT
NO. 2
DRAFTING BY RDL
DATE 10/22/92
CHECKED BY
DATE
PROPOSED SITE TOPOGRAPHY
SYCAMORE LANDFILL
PREPARED FOR
COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
SAN DIEGO, CALIFORNIA
INTERNATIONAL TECHNOLOGY CORPORATION
REFERENCE:
EXISTING CONTOURS FROM
ANALYTIC PHOTOGRAMMETRIC SURVEYS, INC.
847 N. MAIN ST., SUITE 1-A
RIVERSIDE, CA. 92501
DATE OF PHOTOGRAPHY: 11-22-91
NOTES
EXPLANATION
DRAINAGE
BENCH DRAIN
PERIMETER DRAIN
PROPERTY LINE
BENCH
EXISTING CONTOURS (11-22-91)
PROPOSED FINAL CONTOURS
BORINGS
MONITORING WELL
COUNTY OF SAN DIEGO
DEPARTMENT OF PUBLIC WORKS
GRANVILLE M. BOWMAN, DIRECTOR
5555 OVERLAND AVENUE, SAN DIEGO, CA 92123-1295
RECOMMENDED BY
APPROVED BY
REVISIONS
BY
APPROVED
DATE
SYCAMORE RDSI
in The Vicinity of Santee
PROPOSED SITE TOPOGRAPHY

4/13

```
****************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                     1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-90 Advanced Engineering Software (aes)
           Ver. 5.8A  Release Date: 8/28/90  Serial # 8653

                     Analysis prepared by:

                INTERNATIONAL TECHNOLOGY CORPORATION
                 1425 SOUTH VICTORIA COURT, SUITE A
               SAN BERNARDINO, CALIFORNIA 92408-2923
               (714) 799-6869   FAX (714) 799-7604

----------------------------------------------------------------------------
 FILE NAME: A:\RATSD\SYCAMORE\FINAL.DAT
 TIME/DATE OF STUDY: 15:29  10/22/1992
----------------------------------------------------------------------------
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------

 1985 SAN DIEGO MANUAL CRITERIA

 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 6-HOUR DURATION PRECIPITATION (INCHES) =   2.600

 SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95

 SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED
 NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED


****************************************************************************
 FLOW PROCESS FROM NODE   101.00 TO NODE   102.00 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  25.87(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  3150.00
   UPSTREAM ELEVATION =    880.00
   DOWNSTREAM ELEVATION =    800.00
   ELEVATION DIFFERENCE =     80.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.373
 SUBAREA RUNOFF(CFS) =    117.47
 TOTAL AREA(ACRES) =     55.00   TOTAL RUNOFF(CFS) =    117.47


****************************************************************************
 FLOW PROCESS FROM NODE   102.00 TO NODE   103.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    800.00
```

Node 102

```
DOWNSTREAM NODE ELEVATION =    550.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1260.00
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    117.47
FLOW VELOCITY(FEET/SEC) =  28.51   FLOW DEPTH(FEET) =    .65
TRAVEL TIME(MIN.) =    .74   TC(MIN.) =  26.60

****************************************************************************
FLOW PROCESS FROM NODE   103.00 TO NODE   103.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  26.60
RAINFALL INTENSITY(INCH/HR) =   2.33
TOTAL STREAM AREA(ACRES) =   55.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    117.47

****************************************************************************
FLOW PROCESS FROM NODE   101.00 TO NODE   103.00 IS CODE =   2
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
  WITH 10-MINUTES ADDED =  24.31(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  4620.00
  UPSTREAM ELEVATION =    880.00
  DOWNSTREAM ELEVATION =    550.00
  ELEVATION DIFFERENCE =    330.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.470
SUBAREA RUNOFF(CFS) =    122.27
TOTAL AREA(ACRES) =     55.00   TOTAL RUNOFF(CFS) =    122.27

****************************************************************************
FLOW PROCESS FROM NODE   103.00 TO NODE   103.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  24.31
RAINFALL INTENSITY(INCH/HR) =   2.47
TOTAL STREAM AREA(ACRES) =   55.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    122.27

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF      TIME     INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1      233.10    24.31      2.470
```

6/13

```
    2      232.83    26.60      2.331

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    233.10   Tc(MIN.) =   24.31
 TOTAL AREA(ACRES) =    110.00
```

Node 103

```
****************************************************************************
 FLOW PROCESS FROM NODE   103.00 TO NODE   104.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    550.00
 DOWNSTREAM NODE ELEVATION =    510.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   560.00
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    233.10
 FLOW VELOCITY(FEET/SEC) =  24.56   FLOW DEPTH(FEET) =   1.26
 TRAVEL TIME(MIN.) =    .38   TC(MIN.) =  24.69


****************************************************************************
 FLOW PROCESS FROM NODE   104.00 TO NODE   104.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  24.69
 RAINFALL INTENSITY(INCH/HR) =   2.45
 TOTAL STREAM AREA(ACRES) =  110.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    233.10


****************************************************************************
 FLOW PROCESS FROM NODE   201.00 TO NODE   202.00 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  21.84(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1540.00
   UPSTREAM ELEVATION =    770.00
   DOWNSTREAM ELEVATION =    750.00
   ELEVATION DIFFERENCE =     20.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.647
 SUBAREA RUNOFF(CFS) =     13.34
 TOTAL AREA(ACRES) =      5.60   TOTAL RUNOFF(CFS) =     13.34


****************************************************************************
 FLOW PROCESS FROM NODE   202.00 TO NODE   104.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
UPSTREAM NODE ELEVATION =    750.00
DOWNSTREAM NODE ELEVATION =    510.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   770.00
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =     13.34
FLOW VELOCITY(FEET/SEC) =  15.36   FLOW DEPTH(FEET) =    .16
TRAVEL TIME(MIN.) =    .84   TC(MIN.) =  22.68

****************************************************************************
FLOW PROCESS FROM NODE   104.00 TO NODE   104.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  22.68
RAINFALL INTENSITY(INCH/HR) =   2.58
TOTAL STREAM AREA(ACRES) =    5.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.34

****************************************************************************
FLOW PROCESS FROM NODE   201.00 TO NODE   104.00 IS CODE =   2
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
  WITH 10-MINUTES ADDED =  15.11(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1750.00
  UPSTREAM ELEVATION =    770.00
  DOWNSTREAM ELEVATION =    510.00
  ELEVATION DIFFERENCE =    260.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.356
SUBAREA RUNOFF(CFS) =     69.48
TOTAL AREA(ACRES) =     23.00   TOTAL RUNOFF(CFS) =     69.48

****************************************************************************
FLOW PROCESS FROM NODE   104.00 TO NODE   104.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MIN.) =  15.11
RAINFALL INTENSITY(INCH/HR) =   3.36
TOTAL STREAM AREA(ACRES) =   23.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =     69.48

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  3 STREAMS.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF      TIME     INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
```

```
    1      249.58    15.11      3.356
    2      287.46    22.68      2.584
    3      296.35    24.69      2.445

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    296.35   Tc(MIN.) =  24.69
 TOTAL AREA(ACRES) =    138.60
```

* Node 104

```
****************************************************************************
 FLOW PROCESS FROM NODE   104.00 TO NODE   105.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    510.00
 DOWNSTREAM NODE ELEVATION =    440.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2250.00
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    296.35
 FLOW VELOCITY(FEET/SEC) =  19.44   FLOW DEPTH(FEET) =   1.78
 TRAVEL TIME(MIN.) =   1.93   TC(MIN.) =  26.62


****************************************************************************
 FLOW PROCESS FROM NODE   105.00 TO NODE   105.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  26.62
 RAINFALL INTENSITY(INCH/HR) =   2.33
 TOTAL STREAM AREA(ACRES) =  138.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    296.35


****************************************************************************
 FLOW PROCESS FROM NODE   301.00 TO NODE   302.00 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  28.87(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  3500.00
   UPSTREAM ELEVATION =    810.00
   DOWNSTREAM ELEVATION =    740.00
   ELEVATION DIFFERENCE =     70.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.211
 SUBAREA RUNOFF(CFS) =    123.38
 TOTAL AREA(ACRES) =     62.00   TOTAL RUNOFF(CFS) =    123.38


****************************************************************************
 FLOW PROCESS FROM NODE   302.00 TO NODE   105.00 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
```

```
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
UPSTREAM NODE ELEVATION =    740.00
DOWNSTREAM NODE ELEVATION =    440.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00
CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
CHANNEL FLOW THRU SUBAREA(CFS) =    123.38
FLOW VELOCITY(FEET/SEC) =  29.63   FLOW DEPTH(FEET) =    .66
TRAVEL TIME(MIN.) =    .79   TC(MIN.) =  29.65


**************************************************************************
FLOW PROCESS FROM NODE   105.00 TO NODE   105.00 IS CODE =   1
--------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
TOTAL NUMBER OF STREAMS =  5
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  29.65
RAINFALL INTENSITY(INCH/HR) =   2.17
TOTAL STREAM AREA(ACRES) =   62.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    123.38


**************************************************************************
FLOW PROCESS FROM NODE   301.00 TO NODE   105.00 IS CODE =   2
--------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
*USER SPECIFIED(SUBAREA):
RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
  WITH 10-MINUTES ADDED =  24.66(MINUTES)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  4900.00
  UPSTREAM ELEVATION =    810.00
  DOWNSTREAM ELEVATION =    440.00
  ELEVATION DIFFERENCE =    370.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.448
SUBAREA RUNOFF(CFS) =    264.34
TOTAL AREA(ACRES) =    120.00   TOTAL RUNOFF(CFS) =    264.34


**************************************************************************
FLOW PROCESS FROM NODE   105.00 TO NODE   105.00 IS CODE =   1
--------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
TOTAL NUMBER OF STREAMS =  5
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MIN.) =  24.66
RAINFALL INTENSITY(INCH/HR) =   2.45
TOTAL STREAM AREA(ACRES) =  120.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    264.34


**************************************************************************
FLOW PROCESS FROM NODE   401.00 TO NODE   402.00 IS CODE =   2
--------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

SIGN HERE

```
==============================================================================
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  17.01(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  1120.00
   UPSTREAM ELEVATION =    690.00
   DOWNSTREAM ELEVATION =    660.00
   ELEVATION DIFFERENCE =     30.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.110
 SUBAREA RUNOFF(CFS) =     26.87
 TOTAL AREA(ACRES) =      9.60   TOTAL RUNOFF(CFS) =     26.87


******************************************************************************
 FLOW PROCESS FROM NODE   402.00 TO NODE   105.00 IS CODE =   5
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 UPSTREAM NODE ELEVATION =    660.00
 DOWNSTREAM NODE ELEVATION =    440.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
 MANNING'S FACTOR =  .015   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     26.87
 FLOW VELOCITY(FEET/SEC) =  19.00   FLOW DEPTH(FEET) =    .26
 TRAVEL TIME(MIN.) =    .75   TC(MIN.) =  17.76


******************************************************************************
 FLOW PROCESS FROM NODE   105.00 TO NODE   105.00 IS CODE =   1
------------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
 TIME OF CONCENTRATION(MIN.) =  17.76
 RAINFALL INTENSITY(INCH/HR) =   3.02
 TOTAL STREAM AREA(ACRES) =    9.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.87


******************************************************************************
 FLOW PROCESS FROM NODE   401.00 TO NODE   105.00 IS CODE =   2
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 RURAL DEVELOPMENT RUNOFF COEFFICIENT = .9000
   NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION
   WITH 10-MINUTES ADDED =  17.65(MINUTES)
   INITIAL SUBAREA FLOW-LENGTH(FEET) =  2450.00
   UPSTREAM ELEVATION =    690.00
   DOWNSTREAM ELEVATION =    440.00
   ELEVATION DIFFERENCE =    250.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.036
 SUBAREA RUNOFF(CFS) =    122.96
 TOTAL AREA(ACRES) =     45.00   TOTAL RUNOFF(CFS) =    122.96
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   105.00 TO NODE   105.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  5
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  5 ARE:
 TIME OF CONCENTRATION(MIN.) =  17.65
 RAINFALL INTENSITY(INCH/HR) =   3.04
 TOTAL STREAM AREA(ACRES) =   45.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    122.96

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  5 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF      TIME     INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1       678.51    17.65      3.036
    2       680.13    17.76      3.025
    3       776.80    24.66      2.448
    4       778.07    26.62      2.330
    5       741.79    29.65      2.173

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    778.07   Tc(MIN.) =   26.62
 TOTAL AREA(ACRES) =    375.20
============================================================================
 END OF STUDY SUMMARY:
 PEAK FLOW RATE(CFS) =    778.07   Tc(MIN.) =   26.62
 TOTAL AREA(ARCES) =    375.20
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

* Node 105

Schematic Output
(from every first node)


```
+-#  101.00( 880.00)-+
     |  INITIAL  SUBAREA  |
     |....................|
     |     RURAL LOTS     |
     |   USER SPECIFIED   |
     | RUNOFF COEF. =  .90|
     |  LENGTH = 3150. FT |
     |  AREA =   55.0 AC  |
    +-#  102.00( 800.00)-+
              |
              v
    +-#  102.00( 800.00)-+  +-#  101.00( 880.00)-+
    |    OPEN  CHANNEL   |  |  INITIAL  SUBAREA  |
    |....................|  |....................|
    | BASE WIDTH =  5.FT |  |     RURAL LOTS     |
    | SIDE SLOPE(Z)= 2.0 |  |   USER SPECIFIED   |
    | MAX. DEPTH =  5.FT |  | RUNOFF COEF. =  .90|
    | LENGTH = 1260.0 FT |  |  LENGTH = 4620. FT |
    | MANNING'S n = .015 |  |  AREA =   55.0 AC  |
    +-#  103.00( 550.00)-+  +-#  103.00( 550.00)-+
              |                       |
              v                       v
    +-----#  103.00------+  +-----#  103.00------+
    |     CONFLUENCE     |  |     CONFLUENCE     |
    |      ANALYSIS      |<=|      ANALYSIS      |
    |....................|  |....................|
    |     STREAM #  1    |  |     STREAM #  2    |
    +-----#  103.00------+  +-----#  103.00------+
=============================================> CONFLUENCE OF  2 STREAMS <=============================================
              |

              |
              |            +-#  201.00( 770.00)-+
              |            |  INITIAL  SUBAREA  |
              |            |....................|
              |            |     RURAL LOTS     |
              |            |   USER SPECIFIED   |
              |            | RUNOFF COEF. =  .90|
              |            |  LENGTH = 1540. FT |
              |            |  AREA =    5.6 AC  |
              |            +-#  202.00( 750.00)-+
              |                       |
              v                       v
    +-#  103.00( 550.00)-+  +-#  202.00( 750.00)-+  +-#  201.00( 770.00)-+
    |    OPEN  CHANNEL   |  |    OPEN  CHANNEL   |  |  INITIAL  SUBAREA  |
    |....................|  |....................|  |....................|
    | BASE WIDTH =  5.FT |  | BASE WIDTH =  5.FT |  |     RURAL LOTS     |
    | SIDE SLOPE(Z)= 2.0 |  | SIDE SLOPE(Z)= 2.0 |  |   USER SPECIFIED   |
    | MAX. DEPTH =  5.FT |  | MAX. DEPTH =  5.FT |  | RUNOFF COEF. =  .90|
    | LENGTH =  560.0 FT |  | LENGTH =  770.0 FT |  |  LENGTH = 1750. FT |
    | MANNING'S n = .015 |  | MANNING'S n = .015 |  |  AREA =   23.0 AC  |
    +-#  104.00( 510.00)-+  +-#  104.00( 510.00)-+  +-#  104.00( 510.00)-+
              |                       |                       |
              v                       v                       v
    +-----#  104.00------+  +-----#  104.00------+  +-----#  104.00------+
    |     CONFLUENCE     |  |     CONFLUENCE     |  |     CONFLUENCE     |
    |      ANALYSIS      |<=|      ANALYSIS      |<=|      ANALYSIS      |
    |....................|  |....................|  |....................|
    |     STREAM #  1    |  |     STREAM #  2    |  |     STREAM #  3    |
    +-----#  104.00------+  +-----#  104.00------+  +-----#  104.00------+
```

```
==========================================> CONFLUENCE OF  3 STREAMS <==========================================
          |
          |
          |                +-#  301.00( 810.00)-+                          +-#  401.00( 690.00)-+
          |                | INITIAL  SUBAREA  |                          | INITIAL  SUBAREA  |
          |                |...................|                          |...................|
          |                |     RURAL LOTS    |                          |     RURAL LOTS    |
          |                |  USER SPECIFIED   |                          |  USER SPECIFIED   |
          |                | RUNOFF COEF. =  .90|                         | RUNOFF COEF. =  .90|
          |                | LENGTH = 3500. FT |                          | LENGTH = 1120. FT |
          |                | AREA =   62.0 AC  |                          | AREA =    9.6 AC  |
          |                +-#  302.00( 740.00)-+                          +-#  402.00( 660.00)-+
          |                         |                                          |
          V                         V                                          V
+-#  104.00( 510.00)-+  +-#  302.00( 740.00)-+  +-#  301.00( 810.00)-+  +-#  402.00( 660.00)-+  +-#  401.00( 690.00)-+
|    OPEN  CHANNEL   |  |    OPEN  CHANNEL   |  | INITIAL  SUBAREA  |  |    OPEN  CHANNEL   |  | INITIAL  SUBAREA  |
|....................|  |....................|  |...................|  |....................|  |...................|
| BASE WIDTH =  5.FT |  | BASE WIDTH =  5.FT |  |     RURAL LOTS    |  | BASE WIDTH =  5.FT |  |     RURAL LOTS    |
| SIDE SLOPE(Z)= 2.0 |  | SIDE SLOPE(Z)= 2.0 |  |  USER SPECIFIED   |  | SIDE SLOPE(Z)= 2.0 |  |  USER SPECIFIED   |
| MAX. DEPTH =  5.FT |  | MAX. DEPTH =  5.FT |  | RUNOFF COEF. =  .90|  | MAX. DEPTH =  5.FT |  | RUNOFF COEF. =  .90|
| LENGTH = 2250.0 FT |  | LENGTH = 1400.0 FT |  | LENGTH = 4900. FT |  | LENGTH =  850.0 FT |  | LENGTH = 2450. FT |
| MANNING'S n = .015 |  | MANNING'S n = .015 |  | AREA =  120.0 AC  |  | MANNING'S n = .015 |  | AREA =   45.0 AC  |
+-#  105.00( 440.00)-+  +-#  105.00( 440.00)-+  +-#  105.00( 440.00)-+  +-#  105.00( 440.00)-+  +-#  105.00( 440.00)-+
          |                         |                         |                         |                         |
          V                         V                         V                         V                         V
+-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+
|     CONFLUENCE     |  |     CONFLUENCE     |  |     CONFLUENCE     |  |     CONFLUENCE     |  |     CONFLUENCE     |
|      ANALYSIS      |<=|      ANALYSIS      |<=|      ANALYSIS      |<=|      ANALYSIS      |<=|      ANALYSIS      |
|....................|  |....................|  |....................|  |....................|  |....................|
|     STREAM #  1    |  |     STREAM #  2    |  |     STREAM #  3    |  |     STREAM #  4    |  |     STREAM #  5    |
+-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+  +-----#  105.00------+
==========================================> CONFLUENCE OF  5 STREAMS <==========================================
          |
          V
+--------------------+
|  END OF RATIONAL   |
|   METHOD  STUDY    |
+--------------------+
```

- **Desiltation Basin Calculations**

Preliminary Design of Siltation Basin
Sycamore Sanitary Landfill
(Project # 245139)

Purpose: The siltation basin is to intercept sediment laden runoff and reduce the amount of sediment leaving the site, in order to protect drainage ways, properties and right-of-ways below the sediment basin.

Design: Settle out medium silt particle from the storm water runoff.

Methodology:

1. Use the Rational Method to estimate the design flow.
2. Use the City of San Diego Design Manual to determine minimum capacity for the siltation basin.
3. Determine sediment volume based on the Universal Soil Loss Equation (USLE).
4. Size basin and emergency spillway.
5. Evaluate basin dewatering with 3-day detention time.

References:

1. The Rational Method Q = CIA
2. City of San Diego Design Manual. (Document No. 768917 April) (Partial, Enclosure A)
3. Erosion & Sediment Control Handbook by Steven J. Goldman, Katharine Jackson, and Taras A. Bursztynsky, 1986. (McGraw Hill)
4. T.R. Mills and M.L. LLAR, Erosion and Sediment Control, Surface Mining in the Eastern U.S. U.S. Environmental Protection Agency, Washington, D.C., 1976.
5. 1983 Maryland Standards and Specifications for Soil Erosion and Sediment Control, Department of Environment, April 1983.
6. U.S. Soil Conservation Service Tech. Paper 40

1) <u>Design Flows</u>

The total drainage area of the site is approximately 400 acres with average top deck slope of 3% and side slope of 33%. The peak 100 year 24-hour storm flow calculated to be of 778 cfs. (Refer site drainage analysis).

*Peak flow design will be for 800 cfs

Precipitation (REF 2 & 6)

100 year, 24 hour storm = 4.5"
100 year, 6 hour storm = 2.4"
10 year, 24 hour storm = 2.9"
2 year, 24 hour storm = 2.2" (est.)
10 year, 6 hour storm = 1.8"

Average Flow

The average flow is determined by dividing the total runoff by the duration or using the rational method (REF 1) and the average rainfall intensity.

Average rainfall Intensity (I)

100 year 24 hours = 4.5/24 = 0.19"/hr.
100 year 6 hours = 2.4/6 = 0.40"/hr.
10 year 24 hours = 2.9/24 = 0.12"/hr.
10 year 6 hours = 1.8/6 = 0.30"/hr
2 year 24 hours = 2.2/24 = 0.09"/hr.

The 10 year 6 hour precipitation is used to calculate the average rainfall Intensity.

Q = CIA

For maximum runoff assume C = .9 for an impervious cover (Clay or FML)

Average rainfall intensity = 0.30"/hr

Total drainage area = 400 acres

Q_{av} = (.9) (0.30) (400)
Q_{av} = 108 cfs (say 110 cfs)

The in-flow design will be for (average) flow of 110 cfs.

2) <u>Basin Capacity</u>

From the City of San Diego design manual basin capacity table (Ref. 2, Standard No. DS-3) see Enclosure A, the basin capacity for 400 (2 X 200) acres with an average slope less than 8% is interpolated to 14,800 (2 X 7,400) cubic yards.

- Siltation Velocity

  The trapping efficiency of a basin is a function of the particle size. The basin will be designed to capture the 0.02 mm size particle or larger (medium silt by the AASHTO soil classification system). The settling velocity is 0.00096 ft/sec. The smallest particle to be captured will fall to the storage zone just before or as it reaches the outlet zone.

3) <u>Sediment Volume</u>

Assume annual maintenance, with a 5 year clean out program (restoration)

The following is based on the universal soil erosion equation (refer soil loss calculations)

- Soil Losses:

  For side slopes: 3.16 tons/acre/year

  For top deck: 3.31 tons/acre/year

  Out of 400 acres assume 2/3 of it is top deck and 1/3 of it is side slope

  (400)(.67)(3.31) + (400)(.33)(3.16) = 1,305 tons/year

  Assuming 120 lb/cubic feet of soil density

  Sediment volume equals to

  $$(1{,}305^{\text{tons}})(2000\ ^{\text{lb}}/\text{ton})/120\ \text{lb/cubic feet} = 21{,}750\ \text{cubic feet}$$
  $$21{,}750/27 = 805\ \text{cubic yards}$$

For 5 year 4,025 (5 X 805) cubic yard of storage volume is needed. Design will be for 4,500 cubic yards.

4) <u>Basin Capacity</u>

14,800 cy capacity + 4,500 cy storage = 19,300 cy

Design sediment basin for a minimum of 20,000 cubic yards of holding capacity.

- <u>Basin Surface Area</u>

  U.S. Environmental Protection Agency Publication on Erosion Control for Surface Mining (REF. 4).

  Surface area of the basin is designed using the following equation:

  $A = 1.2\ Q/V_s$
  where Q is flow rate, V_s is settling velocity, 1.2 adjustment factor.

According to data from the U.S. Bureau of Reclamation, 25 percent of the total rainfall in a 6 hour storm falls in a ½ hour period. The surface area will be designed for average flow instead of peak flow. The basin efficiency would not be significantly decreased during most of the storm. At peak runoff particles of coarse silt size or greater will settle out.

The basin surface area with adjustment factor of 1.2 would be

$A = (1.2)(Q^{av})/V_s$

$A = (1.2)(110)/0.00096 = 137{,}500$ square feet

A length to width ratio greater than 2:1 is recommended for good particle settlement (Ref. 5)

2:1 (minimum)	3:1	4:1
L = 2W	L = 3W	L = 4W
137,500 sf = (2W)(W)	137,500 sf = 3W(W)	137,500 sf = (4)(W)(W)
width = 262 ft	width = 214 ft	width = 185 ft
length = 524 ft	length = 642 ft	length = 741 ft

(Best fit for terrain is 200 ft x 750 ft)

- Basin Depth

Settling volume = 14,800 cy = 14,800 x 27 cf/cy = 399,600 cf

Storage volume = 4,500 cy = 4,500 x 27 cf/cy = 121,500 cf

Settling Depth = Settling Volume/Surface Area	= 399,600/137,500 = 2.9 ft.
Design Settling Depth	3.0 ft.
Storage Depth = Storage Volume/Surface Area	= 121,500/137,500 = 0.88 ft.
Design Storage Depth	1.0 ft.
Riser chest to spillway	1.5 ft.
free board spillway to top of berm	2 ft
Total depth =	7.5 ft.

Final size of the siltation basin will have a surface area including channel approach of 137,500 sf with a maximum depth of 8'. A wide channel approach will be used to settle large particles and reduce inlet velocity.

- Check Basin Capacity

137,500 x (3.0+1)/27 = 25,463 cf. > 20,000 cf. OK.

- Riser Pipe Design (Glory Hole)

Four 36-inch corrugated metal pipe will be used as a riser. The discharge capacity will be under weir flow condition.

$Q = CLH^{3/2}$

Q = 110 cfs (average flow)
C = Weir coefficients = 3.33
H = Head water
L = Length of weir = 2.57 x diameter = 2.57 x 3 = 7.71 ft.

$110 = (3.33)(7.71)\ H^{3/2}$

H = 2.6 ft.

H < 1.5'(riser to spillway crest) + 2' (free board) = 3.5 ft. OK.

- Emergency spillway Design

  - assume no flow into drain riser pipes.
  - assume weir flow condition at the spillway

$Q = CLH^{3/2}$

Q = Peak flow = 800 cfs
H = Head water = 2' free board height
C = Weir coefficients = 3.67
L = Length of crest

$800 = 3.67\ (L)\ 2^{3/2}$

Length = 77 ft.

Design length of spillway crest = 80 ft.

5) Dewatering

The longer the dewatering period of the settling zone the greater the efficiency of the basin to trap sediment during light as well as heavy storms. To prevent a potential mosquito breeding ground and safety hazard the basin will be designed to be dewatered in 3 days.

Dewatering Holes Size

Design unobstructed orifices at the bottom of the settling zone

Max Head water depth = 4 ft (settling depth + storage depth)

Orifice flow equation $Q = C_d \times A \times (2gh)^{1/2}$

Q	= Flow	= 110 cfs
C_d	= Coefficient of contraction	= .6 (sharp edged)
A_o	= Area of orifice	= unknown
g	= Gravity	= 32.2 ft/sec^2
h	= Head water	= 2 ft.

Design dewatering holes to drain the basin in 3 days.

T = Time = 3 days = 3 x 24 = 72 hours

Resulting equation

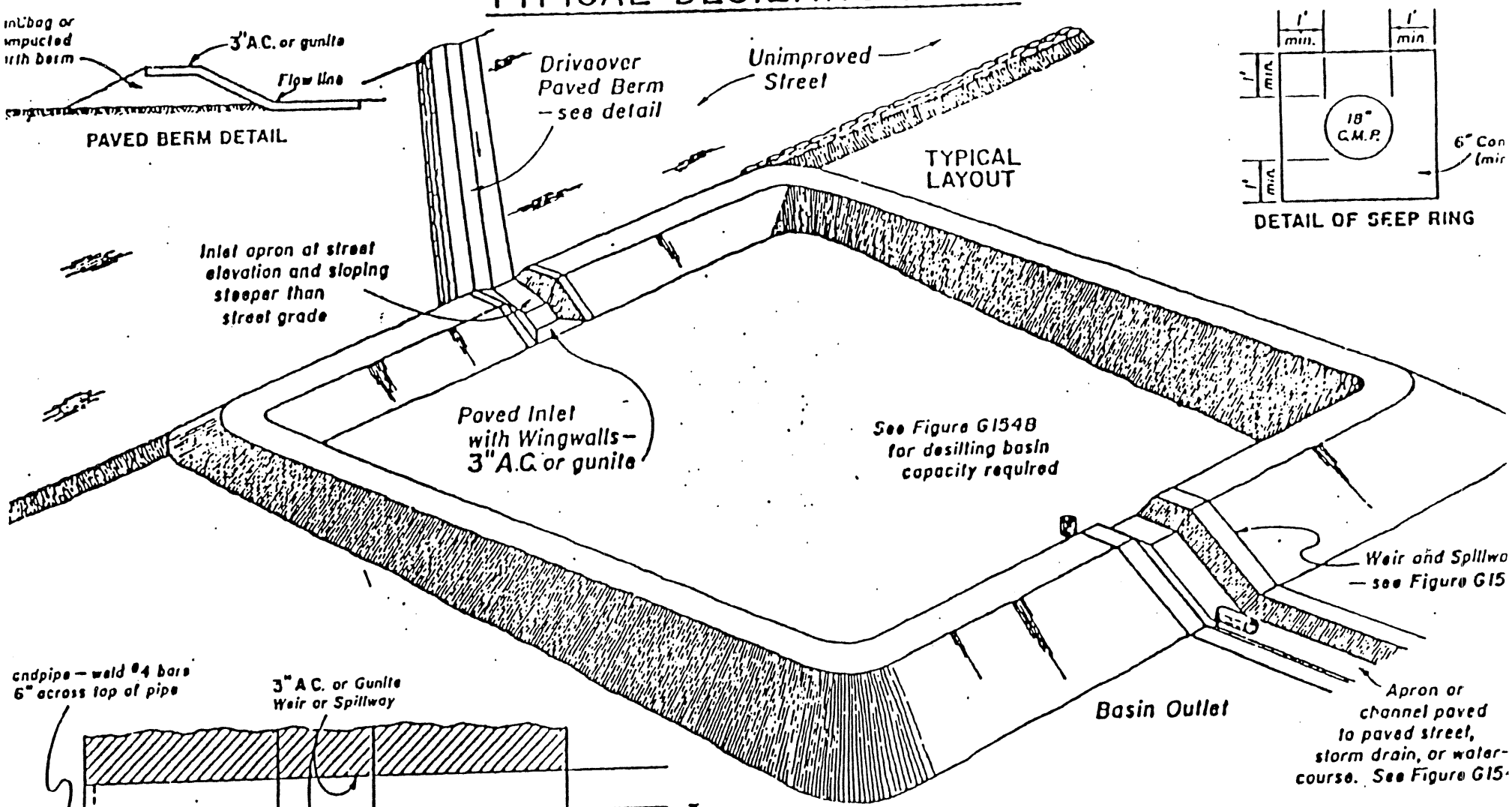
$$A_o = \frac{A_s\ (2h)^{1/2}}{(3600)(T)(C_d)(g)^{1/2}}$$

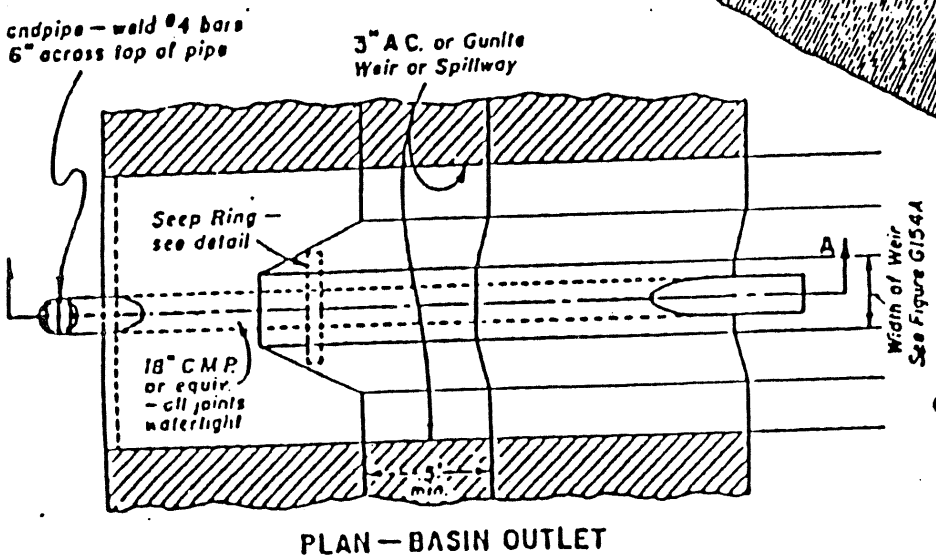
$$A_o = \frac{(137{,}500)[2*(1+3)]^{1/2}}{(3600)(72)(.6)(32.2)^{1/2}} = \frac{362{,}500}{294{,}166}$$

A_o = 0.44 sf total, or 63.36 in^2

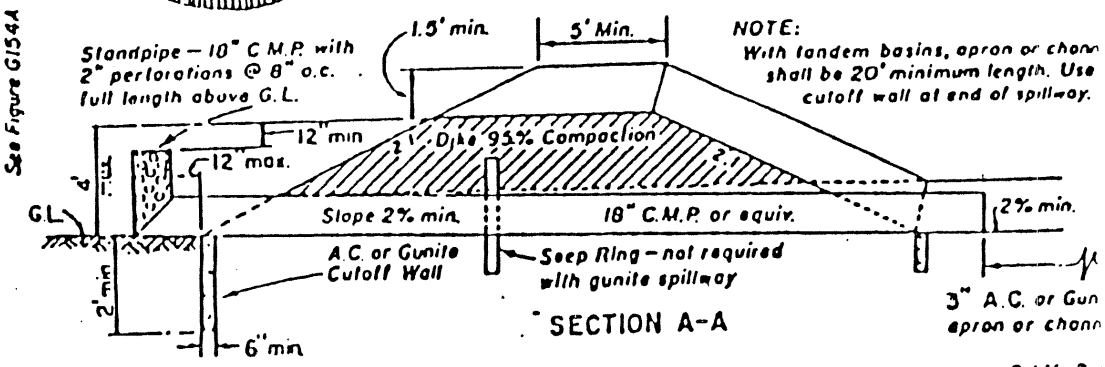
use 14 holes of 2.5 inch diameter.

TYPICAL DESILTING BASIN





PLAN — BASIN OUTLET

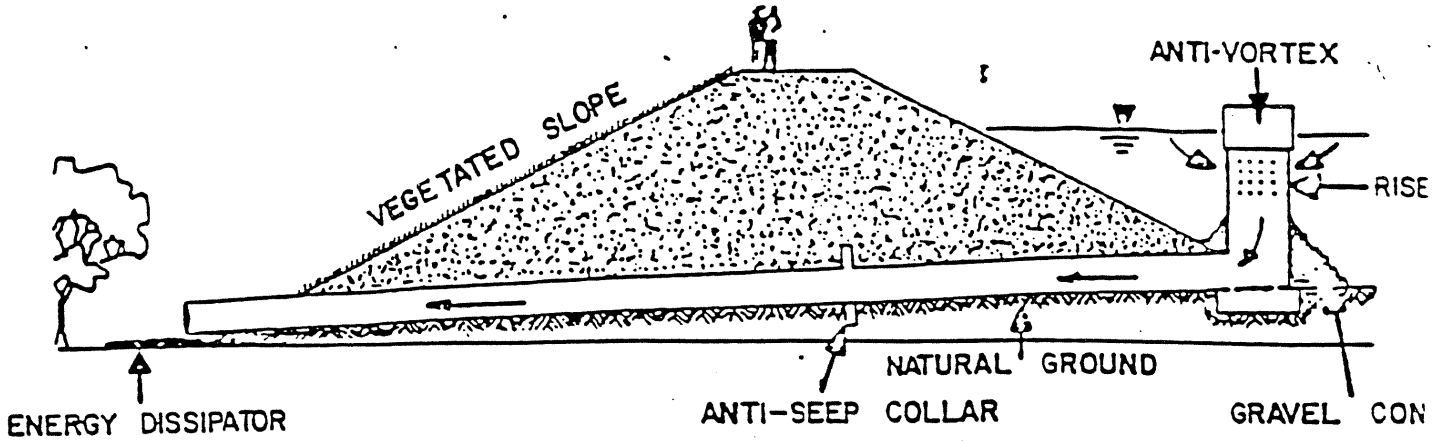


SECTION A-A

Note: Desilting basins built on lots adjacent to dwellings shall be completely lined with 3" A.C. or gunite.

Rev. 1973

P.J.M. 2-



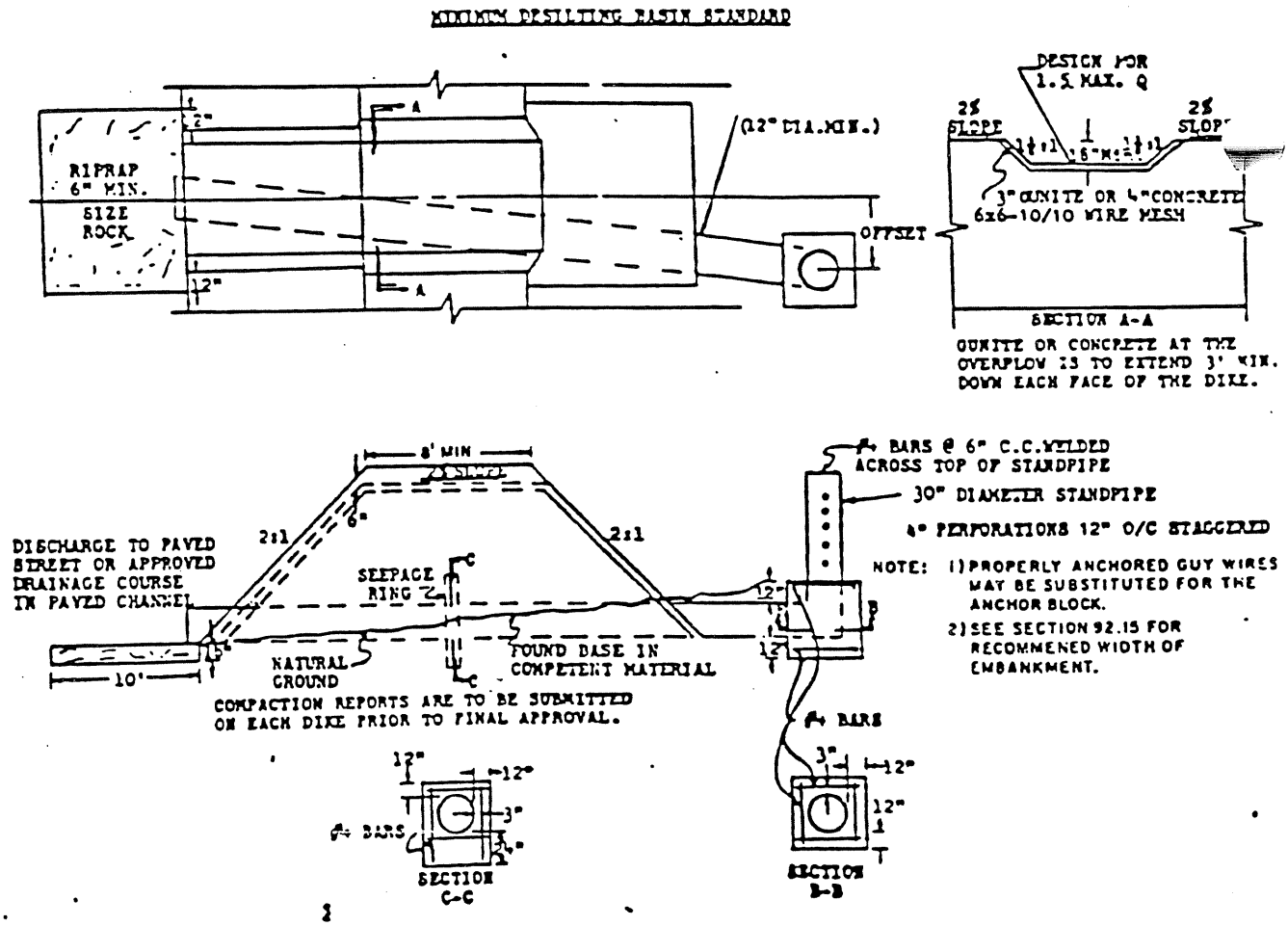
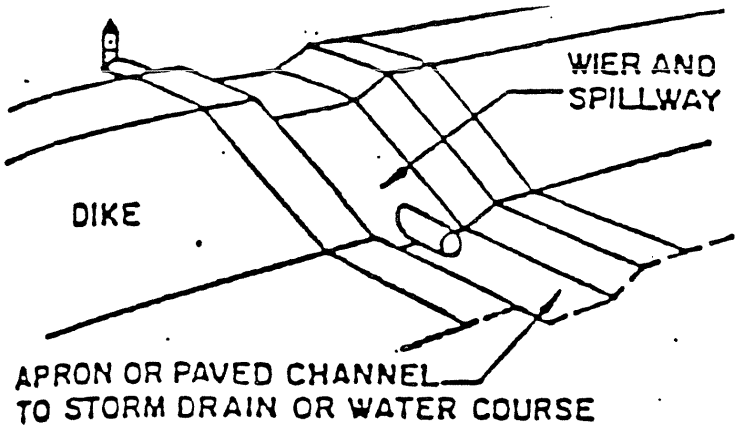


Figure 36. Schematic Design of Sediment Detention Basins. [20] [56]

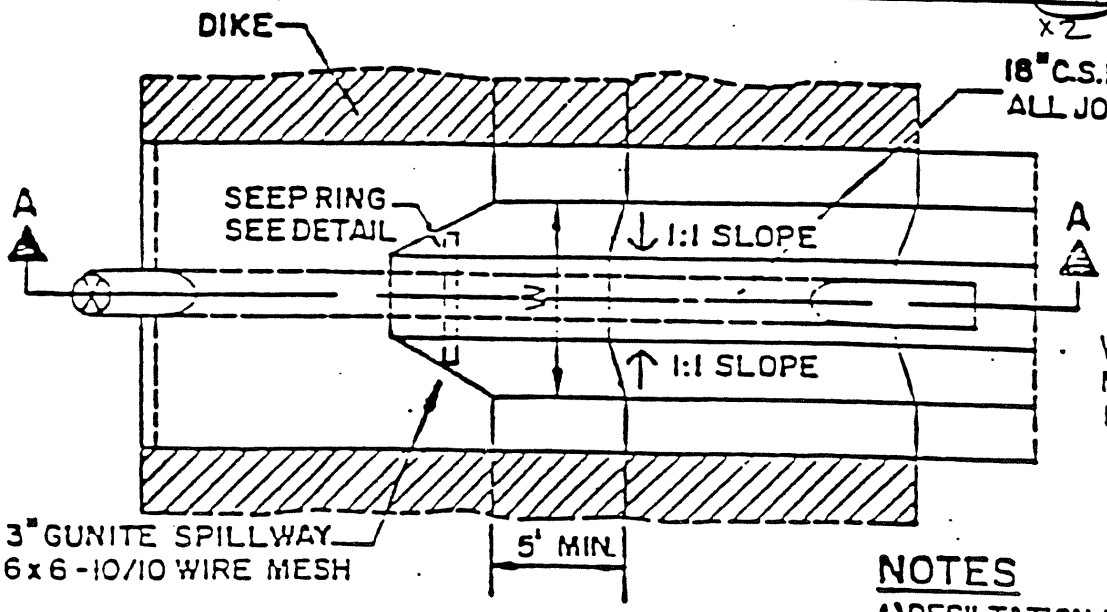


OBLIQUE VIEW

BASIN CAPACITY TABLE
(IN CUBIC YARDS)

TRACT AREA (ACRES)	AVERAGE SLOPES					
	2%	5%	8%	10%	12%	15%
10	270	350	370	400	450	50
15	400	420	460	600	675	75
20	540	700	740	800	900	100
40	1080	1400	1480	1600	1800	200
80	2160	2800	2960	3200	3600	400
100	2700	3500	3700	4000	4500	500
150	4000	4200	4600	6000	6750	750
200	5400	7000	7400	8000	9000	1000

x2



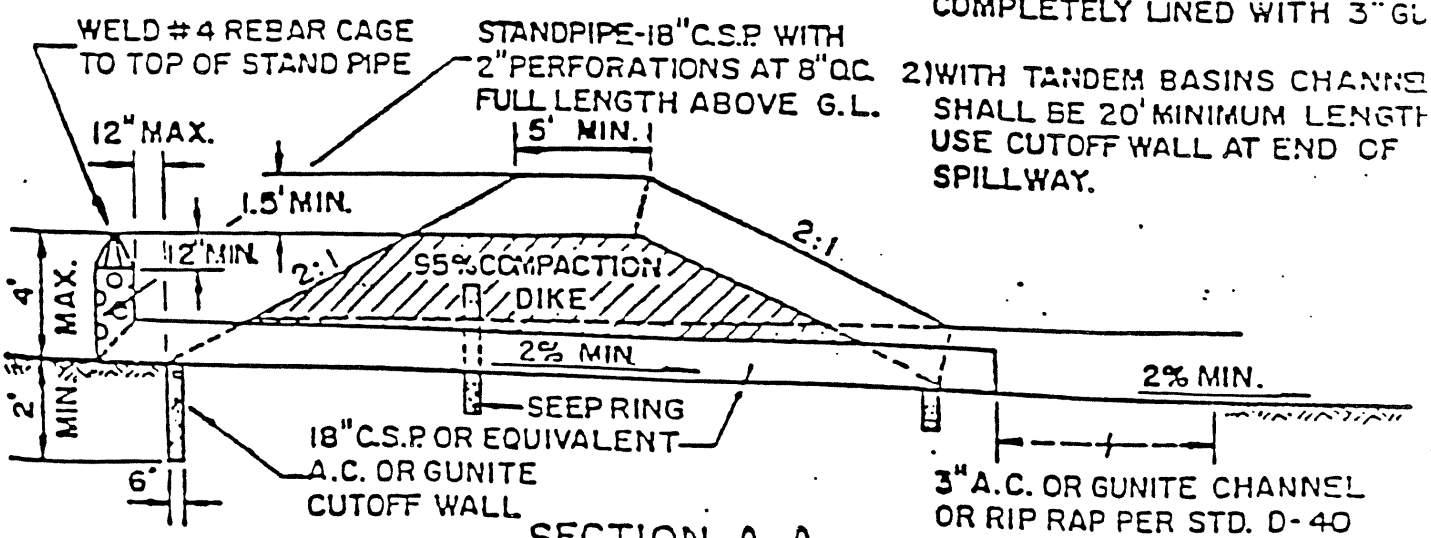
W= WIDTH AS DETE
MINED BY ENGINEE
BE SHOWN ON PLA

PLAN

NOTES

1) DESILTATION BASINS BUILT ON L
ADJACENT TO DWELLINGS SHA
COMPLETELY LINED WITH 3" GU

2) WITH TANDEM BASINS CHANNE
SHALL BE 20' MINIMUM LENGTH
USE CUTOFF WALL AT END OF
SPILLWAY.



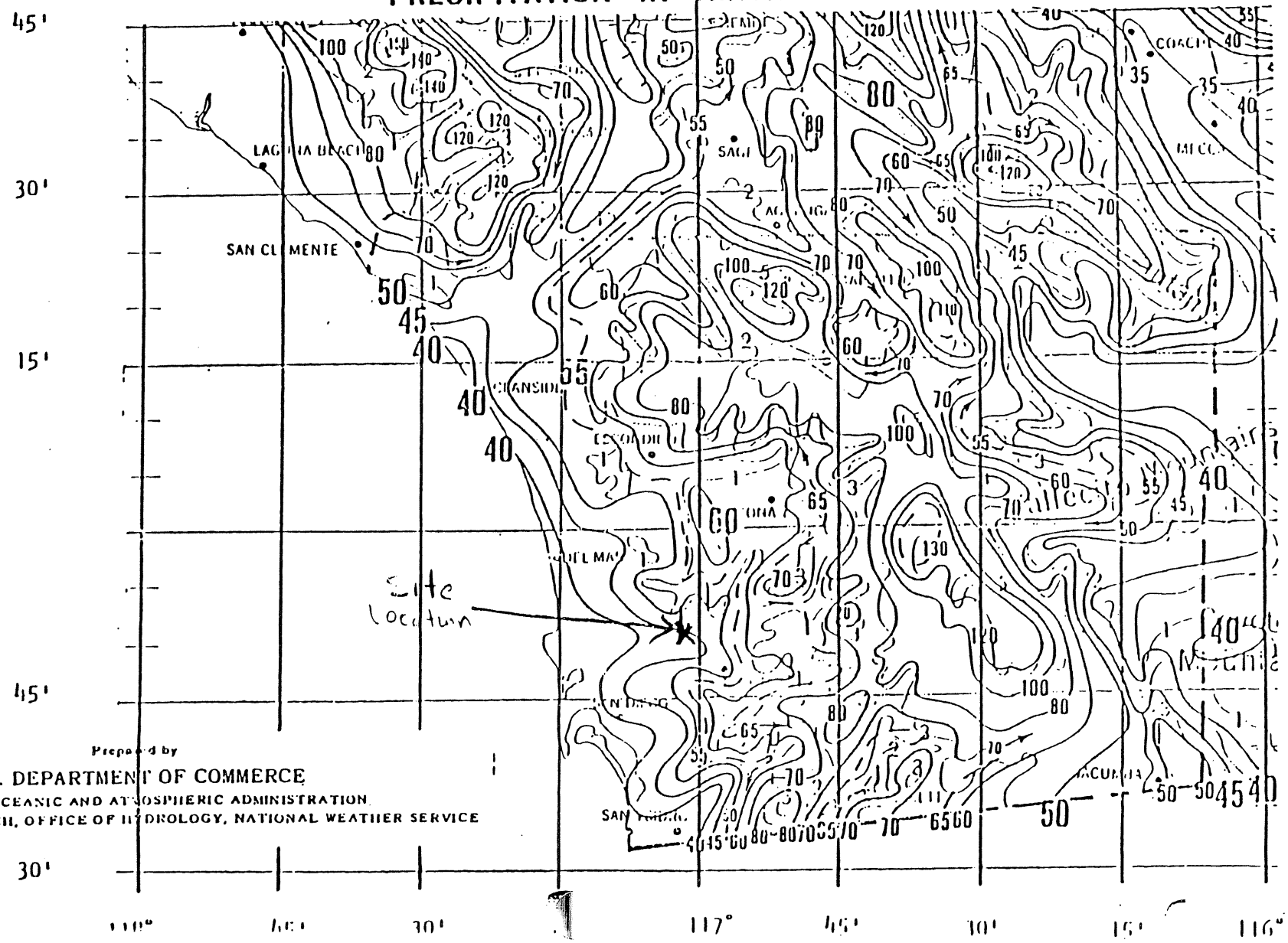
SECTION A-A

REV.	APPROVED	DATE	CITY OF CARLSBAD	
			DESILTATION BASIN OUTLET AND CAPACITY TABLE	L. Evans 10. CITY ENGINEER
				SUPPLEMENTAL STANDARD NO. D9

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 24-HOUR PRECIPITATION

20 ISOPLUVIALS OF 100-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH



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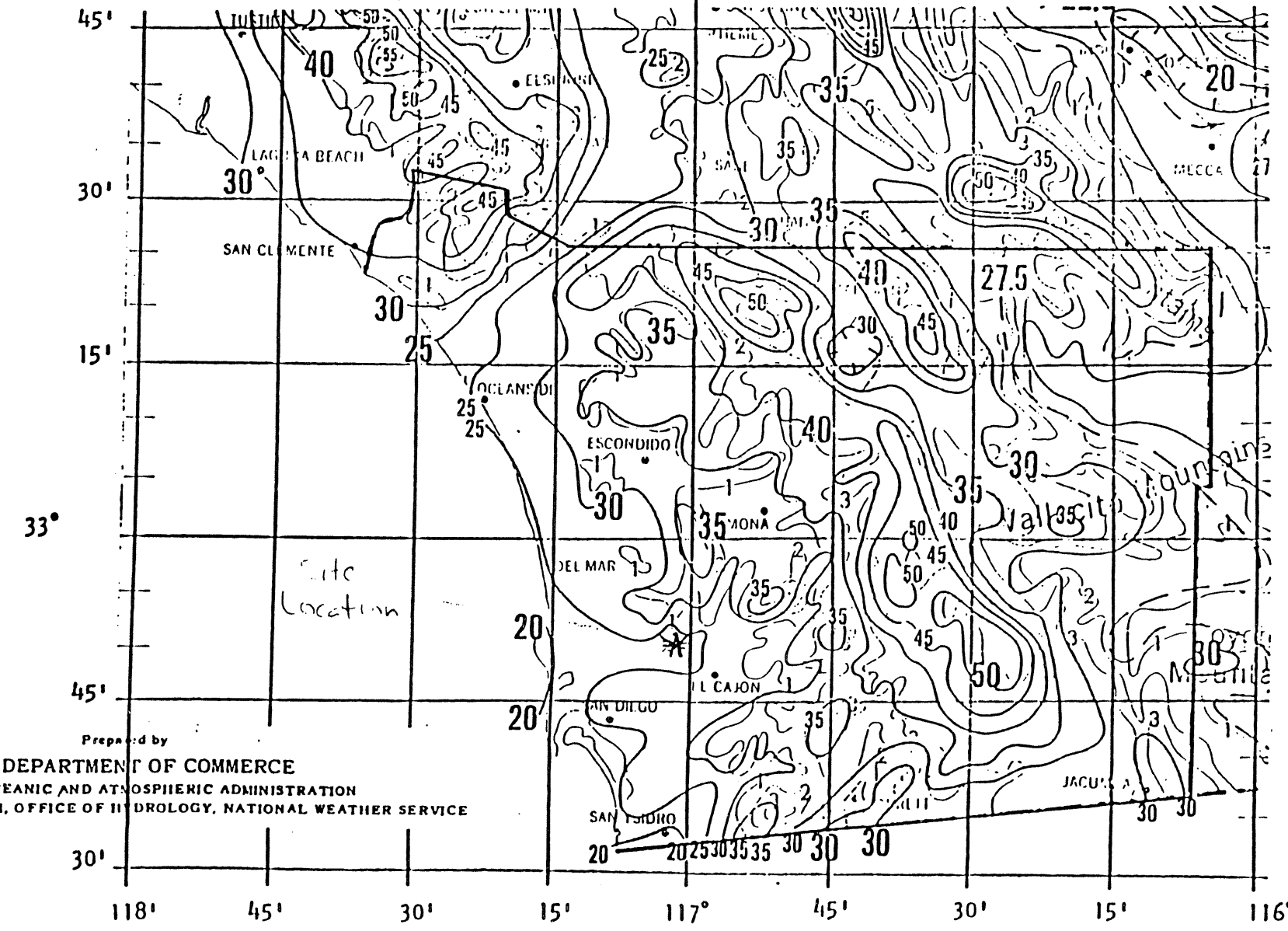
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, NATIONAL WEATHER SERVICE

COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

100-YEAR 6-HOUR PRECIPITATION

~20~ ISOPLUVIALS OF 100-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH



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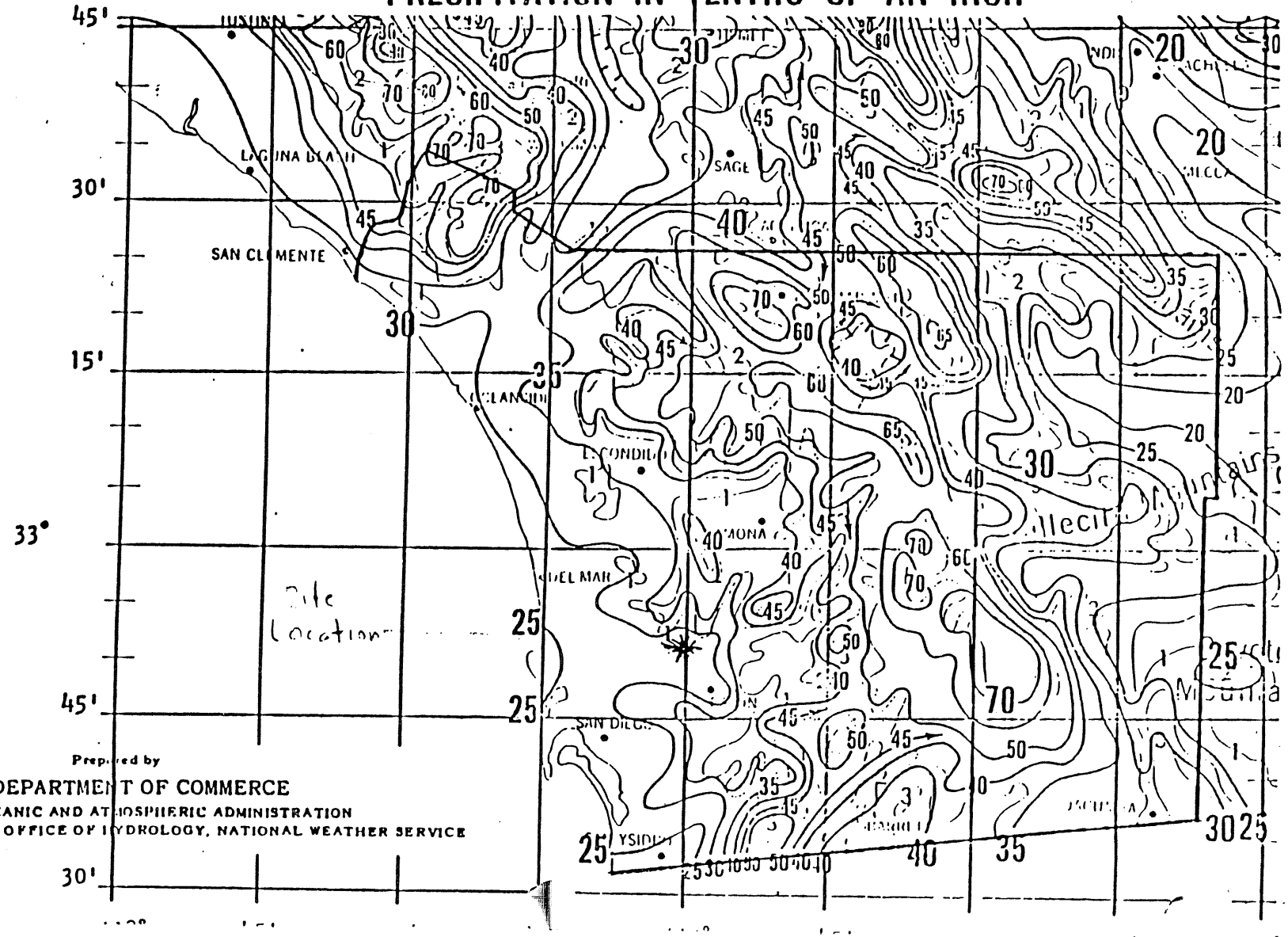
COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

10-YEAR 24-HOUR PRECIPITATION

~20~ ISOPLUVIALS OF 10-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH



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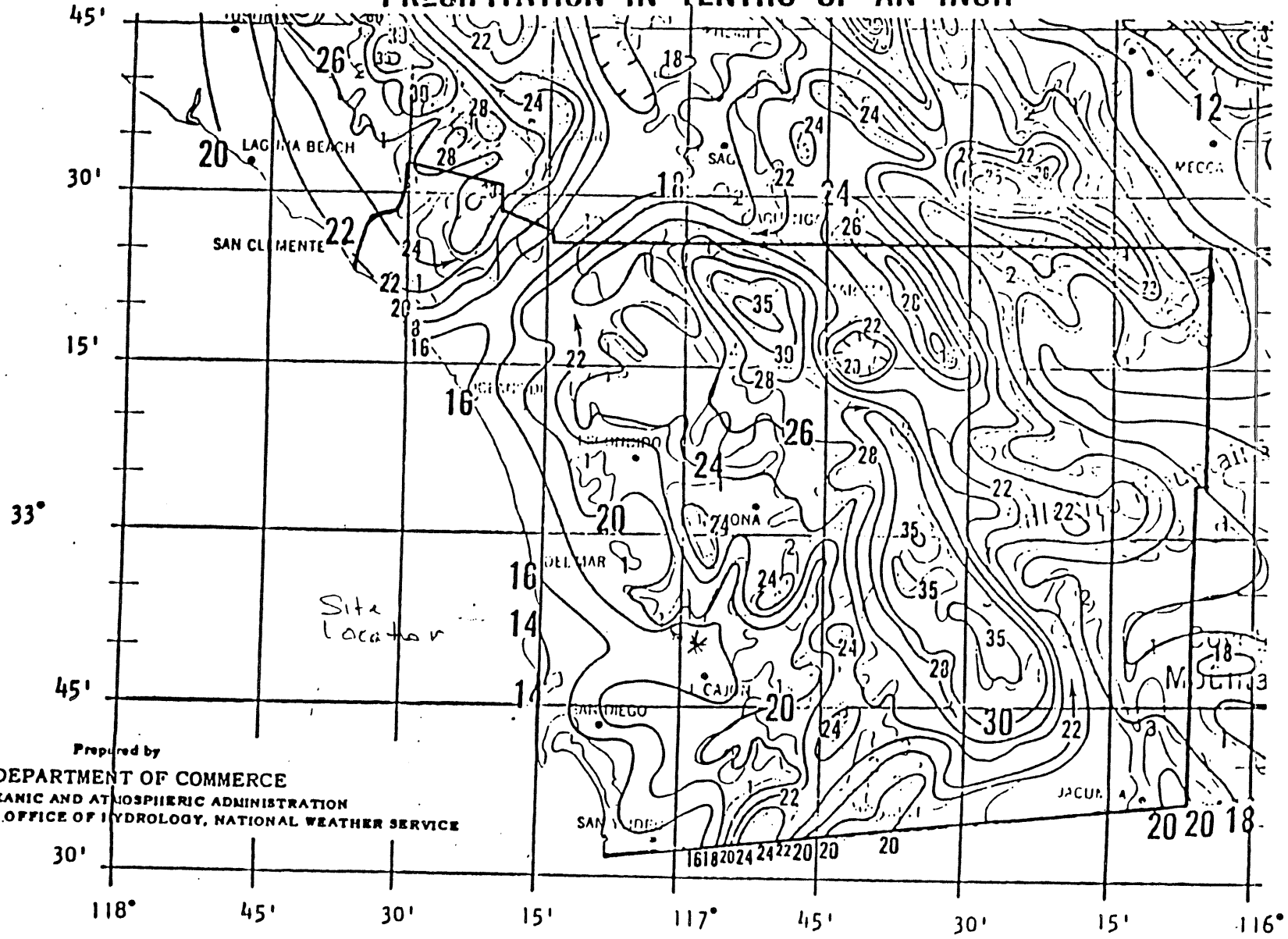
COUNTY OF SAN DIEGO
DEPARTMENT OF SANITATION &
FLOOD CONTROL

10-YEAR 6-HOUR PRECIPITATION

—16— ISOPLUVIALS OF 10-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH



Prepared by
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
SPECIAL STUDIES BRANCH, OFFICE OF HYDROLOGY, NATIONAL WEATHER SERVICE

Appendix G
Odor Management Plan

SYCAMORE LANDFILL
ODOR MANAGEMENT PLAN

Sycamore Landfill, Inc.
8514 Mast Blvd.
Santee, CA 92071

April 2011

Sycamore Landfill
Odor Management Plan
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2. WEATHER MONITORING AND RECORDING 1

3. ODOR CONTROL FOR MUNICIPAL SOLID WASTE OPERATIONS 2

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Attachment 2 – ODOR COMPLAINT AND INVESTIGATION LOG

Sycamore Landfill
Odor Management Plan

1. INTRODUCTION

Sycamore Landfill, Inc. (SLI) receives and disposes of approximately 3,965 tons of municipal solid waste daily. It also receives, processes, and uses 400 to 500 tons of green waste daily as a service to various San Diego County cities that have established green waste recycling programs as part of their AB 939 waste reduction compliance activities.

This Odor Management Plan has been prepared at the request of the City of San Diego Local Enforcement Agency. It documents measures taken to date by SLI to reduce and control odors, and describes the ongoing program by which SLI will achieve and maintain compliance with applicable regulations related to odors and public nuisance.

The Sycamore Landfill odor management program is composed of the following major elements, each addressing a different level of odor control:

- Monitoring and recording weather conditions
- Management of odors from municipal solid waste operations
- Reduction of odor potential in green waste before it is received at the site
- Operational procedures to minimize odor generation at the site
- Chemical odor control system
- Community outreach and monitoring
- Ongoing research and evaluation

Each of these components is described below.

2. WEATHER MONITORING AND RECORDING

Weather conditions during green waste management can impact the potential generation of odors. The Sycamore Landfill monitors on-site weather conditions, or obtain weather information from a local weather service. The weather conditions that are monitored include:

- Wind speed and direction
- Relative humidity
- General weather conditions (i.e. sunny, partly cloudy, rain, etc.)
- Relative cloud ceiling height
- Atmospheric pressure
- Precipitation
- Ambient temperature

The weather records are utilized as necessary to correlate with operational activities and/or odor complaints as described in Section 6 of this Plan.

3. ODOR CONTROL FOR MUNICIPAL SOLID WASTE OPERATIONS

The landfill is located in an area surrounded by open space which provides a natural buffer to protect the public from landfill odors. On-site odor control measures address the principal potential sources of landfill odors, including uncovered waste, landfill gas and landfill liquids (leachate and condensate).

Odors from uncovered waste are prevented by:

- compacting waste soon after its arrival at the working face;
- placing daily and intermediate cover material over compacted waste;
- limiting the size of the working face so that the area of waste exposed to the atmosphere is minimized;
- implementing special handling procedures for any unusually odorous waste loads (i.e. immediate burial); and
- suspending use of fabric tarps as alternate daily cover if strong odors are present at the working face at the end of the day, and covering the entire working face with soil.

Odorous landfill gas (LFG) emissions are monitored and controlled by activities of programs implemented pursuant to air quality regulations. These measures include:

- extracting and destroying LFG using the LFG collection and recovery system;
- maintaining soil cover to prevent surface cracks or fissures that could allow LFG to be emitted to the atmosphere; and
- implementing the site's LFG monitoring program.

If a gas-related odor problem should be identified at the site, additional control measures will be developed and implemented, such as applying additional cover or more frequent cover material, increased cover maintenance, or making improvements or adjustments to the landfill gas collection system.

Odors from landfill liquids are prevented by keeping leachate and condensate from being exposed to the atmosphere. The liquids are kept in enclosed pipes and tanks while being extracted, treated and disposed.

4. ODOR CONTROL FOR GREEN WASTE OPERATIONS

Green waste received at the Sycamore Landfill is shredded in a tub grinder. It is then transported to the active disposal area and spread as alternative daily cover, or used for erosion control. Odors are controlled during green waste operations by the source odor reduction and operational measures described below.

4.1 Odor Source Reduction

Problems related to green waste odors are strongly correlated with wet material. Moisture accelerates the rate at which vegetative material begins to decompose, which leads to malodors from piles in which anaerobic conditions exist. SLI has contacted each of the major customers bringing green waste to the site to request their cooperation in keeping material as dry as possible. However, much of the problem is beyond the control of the collection or transfer companies who deliver the material to the landfill. Odor problems often originate when wet material is placed in a sealed bag or covered container for a period of time before collection, allowing the decomposition process to begin well before the green waste is delivered to the landfill.

Recognizing these limitations, SLI will continue to make green waste customers aware of problems associated with wet or odorous green waste, requesting them to take any of the following measures that may be feasible:

- Handle green waste transfer operations under roofs or canopies
- Keep loads tarped if not being delivered in an enclosed truck
- Minimize time between waste generation and delivery to the landfill

4.2 Operational Controls

The most effective means of managing odors once materials are received at the site is by operating in a manner that minimizes the generation of odors, and maximizes the atmospheric dilution of odorous emissions that cannot be avoided. These controls are described in the following sections.

4.2.1 Facility Drainage Controls

Although SLI has little control over the condition of green waste received for processing, it can take steps to minimize the amount of moisture added to material once it is received at the site. The green waste processing area is located at the landfill. The green waste area should have an adequate slope to drain surface water. In addition, frequent maintenance, including regrading as necessary, will be conducted to prevent incidental rainfall from ponding, and promote effective runoff.

4.2.2 Rapid Throughput

Because odor generation is related to anaerobic green waste decomposition, it is important to minimize the length of time green waste is held in stockpiles. Therefore, SLI will make every effort to process and use green waste as soon as possible after receipt.

4.2.3 Stockpile Management

If green waste stockpiles are needed, Sycamore Landfill will utilize relatively low and long stockpiles (otherwise known as "windrows"). Windrows will minimize compaction of the stockpiled material and improve air flow to more of the stockpiled materials. If stockpiling is required for extended periods, the stockpiles will be monitored for oxygen content, moisture content, and temperature. The piles may be divided into sectors for better tracking of monitoring data, and to separate portions of windrows which may be indicating signs of accelerated composting. These materials may be classified as objectionable materials (see section 4.2.6 of this plan) or other actions such as increasing the wood chip content, adding drier materials, and other actions which slow the composting process.

4.2.4 Processing

The Sycamore Landfill will use a processing device that will grind the wood materials into chips and not sawdust. The wood chips generated from this process will greatly assist in increasing the overall porosity of the processed materials. Grass clippings and leaves will be mixed in equal portions with the wood chips to further assist in managing the post-processed green materials. Sycamore Landfill will make every effort to avoid processing or grinding leaves and grass clippings.

4.2.5 Scheduling of Operations

SLI will schedule operations to take advantage of atmospheric conditions most conducive to natural dispersion of odorous emissions, as well as to avoid times when nearby residents are most likely to be sensitive to odors. The following guidelines will be followed:

- Processing and application of green waste will generally occur during the afternoon hours, when wind speeds and good atmospheric mixing will disperse odors and minimize impact on downwind residents.

- Green waste processing or use will not be done during holidays, the times when most residents are likely to be home and engaged in outdoor activities, and thus most likely to be exposed and sensitive to objectionable odors.

4.2.6 Disposal of Objectionable Material

Occasionally, particularly during the rainy season, green waste may be received in an odorous state of decomposition, or unavoidable circumstances at the site such as heavy rainfall or equipment problems, may result in a significant quantity of material becoming exceptionally malodorous. In such circumstances, SLI operational management may direct that such material, whether processed or not, be immediately transferred to the

active waste disposal area, incorporated with other solid waste and covered with daily cover soil.

5. CHEMICAL CONTROL SYSTEM

SLI may utilize a spray system to apply a chemical odor control agent to treat odorous emissions. The chemical spray system is used as needed to mitigate odors when unusually strong or objectionable odors are present and meteorological conditions facilitate transport to an occupied area. The system will be evaluated on an ongoing basis, and upgraded as appropriate to improve its performance and enhance the overall effectiveness of the odor management program. Attachment 1 contains material safety data on the agent currently being used, although other products may be evaluated and used in the future if found to be more effective.

6. COMMUNITY OUTREACH AND MONITORING

SLI responds to each odor complaint by interviewing the complainant and obtaining as much detail as possible regarding the nature and relative intensity (quantified on a 1 to 5 scale with 5 being the strongest) of the odor, in order to better understand the circumstances under which objectionable odors are perceived by landfill neighbors. Whenever the complaint is received while the odor is still present, landfill personnel are dispatched to the complainant's location to personally observe the odor, and survey the area to determine how widespread and intense it may be. At the same time, on-site conditions will be surveyed in order to identify any specific cause for the odor incident. Attachment 2 is a sample form for recording information associated with each complaint.

SLI also sends each complainant a follow-up letter describing the site's operations and landfill odor control program, in order to promote as positive and cooperative a relationship as possible between the site and its neighbors.

In addition to complaint response, SLI will conduct periodic proactive monitoring of the neighborhood during periods when odors are most likely to occur. The results of these inspections will be incorporated into the ongoing review, evaluation and improvement of the odor management program.

ATTACHMENT 1

ODOR CONTROL AGENT
MATERIAL SAFETY
DATA SHEET

MATERIAL SAFETY DATA SHEET

ENVIROCHEM, INC
425 Whitehead Avenue
South River, NJ 08882
Phone 732-238-6700

N.A.=Not Applicable
Not Est.=Not Established

Prepared by: Regulatory Affairs Department

Date: 02/01/2000

SECTION 1- GENERAL PRODUCT DATA

Product Name: SL-4000 Cherry Odor Eliminator
Product Code: CRCXX
HMIS Legend: 4-Extreme 3-High 2-Moderate 1-Slight 0-Insignificant
HMIS Hazard Code: Health:1 Flammability:0 Reactivity:0
Chemical Family: Odor Control
D.O.T. Shipping Name: Compound, Cleaning Liquid

CHEM-TEL, INC.
24 Hour Emergency Contact 1-800-255-3924
Chemical Strength: Neutral
Formula: Proprietary

Hazard Class: N/A

SECTION 2 - HAZARDOUS INGREDIENTS

CHEMICAL NAME	CAS NO.	OSHA PEL	ACGIH	TLV	%

Unidentified ingredients are not considered hazardous under the Federal Hazard Communications Standard (29 CFR 1910. 1200)

SECTION 3 - PHYSICAL DATA

Boiling Point (^{O}F): 214
Vapor Pressure (mm Hg): = N/A
Appearance: Red, medium viscosity liquid
Specific Gravity: 1.012
Percent Volatile By Volume: N/A
Evaporation Rate: = N/A
Odor: Characteristic **pH:** 7.1 (Concentrate)

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point (F): None
Flammable Limits: N/A
Unusual Fire & Explosion Hazards: Not considered combustible
Special Fire Fighting Procedures: This product is not normally considered combustible and will not burn or sustain combustion

SECTION 5 - HEALTH HAZARD DATA

Route(s) of Entry: Inhalation: No Skin: Yes Ingestion: Yes **Threshold Limit Value:** N/A
Effects of Overexposure: Contact with eyes may cause irritation or burns. May cause irritation and defatting of the skin.
Emergency & First Aid Procedures:
For Skin: Wash with cool running water. Seek medical attention if irritation develops.
For Eyes: Rinse with cool running water for 15 minutes. Seek medical attention if irritation develops.
If Ingested: If swallowed, give several cups of water to dilute. Do not induce vomiting. Seek medical attention. Never give anything by mouth to an unconsious person.

Carcinogen: Not considered carcinogenic by OSHA, NTP, or IARC

SECTION 6 - REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Spills and careless handling
Incompatibility: Strong oxidizing agents
Hazardous Decomposition Products: None anticipated
Hazardous Polymerization: Will not occur

SECTION 7 - SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:
Spills may be slippery. Stop flow of product. Collect large spills for proper disposal. Wash spill area with plenty of water.
Waste disposal method: Dispose of in accordance with all applicable federal, state and local regulations. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

SECTION 8 - SUGGESTED PROTECTIVE EQUIPMENT

Respiratory Protection: None usually required
Ventilation: Adequate general ventilation
Protective Gloves: Rubber or latex gloves
Eye Protection: Safety glasses recommended
Other Protective Equipment: None usually required

SECTION 9 - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage:
Store at room temperature. Keep from freezing. Keep container closed when not in use. Use with adequate ventilation. Avoid contact with eyes.
Other Precautions: Do not take internally. Avoid contamination of food. For industrial use only. Keep out of reach of children. Do not mix with anything but water. Avoid strong oxidizing agents.

SECTION 313 SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372:

This information must be included in all MSDS's that are copied and distributed for this material.

NOTICE

The information contained in this MSDS was obtained from current and reliable sources, however the data is provided without any warrantv, expressed or Implied, regarding its correctness or accuracy,including the implied warranties of merchantability or fitness for a particular use or method of application. Since the conditions or handling, storage and disposal of this product are beyond the control of this company, it is not responsible for loss, injury and expense arising out of the products improper use.

MATERIAL SAFETY DATA SHEET

ENVIROCHEM, INC
425 Whitehead Avenue
South River, NJ 08882
Phone 732-238-6700

N.A.=Not Applicable
Not Est.=Not Established

Prepared by: Regulatory Affairs Department

Date: 02/01/2000

SECTION 1- GENERAL PRODUCT DATA

Product Name: SL-4000 Rain Forest Odor Eliminator
Product Code: RFOCXX
HMIS Legend: 4-Extreme 3-High 2-Moderate 1-Slight 0-Insignificant
HMIS Hazard Code: Health:1 Flammability:0 Reactivity:0
Chemical Family: Odor Control
D.O.T. Shipping Name: Compound, Cleaning Liquid

CHEM-TEL, INC.
24 Hour Emergency Contact 1-800-255-3924
Chemical Strength: Neutral
Formula: Proprietary

Hazard Class: N/A

SECTION 2 - HAZARDOUS INGREDIENTS

CHEMICAL NAME	CAS NO.	OSHA PEL	ACGIH	TLV	%

Unidentified ingredients are not considered hazardous under the Federal Hazard Communications Standard (29 CFR 1910. 1200)

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Vapor Pressure (mm Hg): = N/A
Appearance: Red, medium viscosity liquid
Specific Gravity: 1.012
Percent Volatile By Volume: N/A
Evaporation Rate: = N/A
Odor: Characteristic **pH:** 7.1 (Concentrate)

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point (F): None
Flammable Limits: N/A
Unusual Fire & Explosion Hazards: Not considered combustible
Special Fire Fighting Procedures: This product is not normally considered combustible and will not burn or sustain combustion

SECTION 5 - HEALTH HAZARD DATA

Route(s) of Entry: Inhalation: No Skin: Yes Ingestion: Yes **Threshold Limit Value:** N/A
Effects of Overexposure: Contact with eyes may cause irritation or burns. May cause irritation and defatting of the skin.
Emergency & First Aid Procedures:
For Skin: Wash with cool running water. Seek medical attention if irritation develops.
For Eyes: Rinse with cool running water for 15 minutes. Seek medical attention if irritation develops.
If Ingested: If swallowed, give several cups of water to dilute. Do not induce vomiting. Seek medical attention. Never give anything by mouth to an unconsious person.

Carcinogen: Not considered carcinogenic by OSHA, NTP, or IARC

SECTION 6 - REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Spills and careless handling
Incompatibility: Strong oxidizing agents
Hazardous Decomposition Products: None anticipated
Hazardous Polymerization: Will not occur

SECTION 7 - SPILL OR LEAK PROCEDURES

Steps to be taken if material is released or spilled:
Spills may be slippery. Stop flow of product. Collect large spills for proper disposal. Wash spill area with plenty of water.
Waste disposal method: Dispose of in accordance with all applicable federal, state and local regulations. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

SECTION 8 - SUGGESTED PROTECTIVE EQUIPMENT

Respiratory Protection: None usually required
Ventilation: Adequate general ventilation
Protective Gloves: Rubber or latex gloves
Eye Protection: Safety glasses recommended
Other Protective Equipment: None usually required

SECTION 9 - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage:
Store at room temperature. Keep from freezing. Keep container closed when not in use. Use with adequate ventilation. Avoid contact with eyes.
Other Precautions: Do not take internally. Avoid contamination of food. For industrial use only. Keep out of reach of children. Do not mix with anything but water. Avoid strong oxidizing agents.

SECTION 313 SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372:

This information must be included in all MSDS's that are copied and distributed for this material.

NOTICE

The information contained in this MSDS was obtained from current and reliable sources, however the data is provided without any warrantv, expressed or Implied, regarding its correctness or accuracy,including the implied warranties of merchantability or fitness for a particular use or method of application. Since the conditions or handling, storage and disposal of this product are beyond the control of this company, it is not responsible for loss, injury and expense arising out of the products improper use.

ATTACHMENT 2

ODOR COMPLAINT & INVESTIGATION LOG

SYCAMORE LANDFILL ODOR COMPLAINT & INVESTIGATION LOG

INFORMATION FROM COMPLAINANT					FOLLOW-UP INVESTIGATION	
Date	Time	Name	Address	Time, Place and Nature of Odor	Weather Conditions at Time Odor Occurred (Wind, Temperature, Rainfall, etc.)	On-Site Activity or Conditions at Time Odor Occurred

SAMPLE