
**Aero Business Center
Scappoose, Oregon**

STORMWATER MANAGEMENT PLAN

Prepared for
Sierra Pacific
PO Box 1754
Lake Oswego, OR 97035

Prepared by
Otak, Incorporated
17355 SW Boones Ferry Road
Lake Oswego, OR 97035
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Otak Project Number 12880
April 26, 2006
Revised July 17, 2006

Stormwater Management Report

Site Location

The subject property, located at 52970 West Lane Road, consists of approximately 18.99 acres; Columbia County Assessors Tax Account Number 3106-000-00802, Parcel One of Partition Plat 2005-26. The subject property is a portion of a larger parcel that was partitioned under Columbia County Land Use Permits MP 04-19 and MP 05-17. The subject property was annexed into the City of Scappoose in May 2005 (ANX 1-05/ZC 1-05). The site is zoned LI, Light Industrial. A vicinity map for the site has been included in Figure #1 for reference.

Existing Conditions

The property is an undeveloped lot consisting of open space with grassland, brush cover, a few trees, and surrounded by an existing fence. Existing drainage for the site flows from the northwest to the southeast at slopes ranging from 1 percent to 2 percent and discharges to the airport property. No structures, wells, utilities, or impervious surfaces are present onsite. An existing conditions map has been provided within Figure #2 that shows topographic information and vegetation for the site.

The property is outside the 500-year flood plain as defined by Flood Insurance Map (FIRM) number 41009C0463. The National Wetland Inventory Map does not indicate the presence of wetlands within the property lines.

The existing soils present onsite are classified as Sifton loam (51) based on the SCS Soil Survey for Columbia County. Sifton loam is a hydrologic type "B" soil. A soil survey map is included in Figure #3.

Approximately 50 acres of land has been identified as an upstream basin to the site and has been accounted for in this stormwater report.

Proposed Development

The proposed development is a subdivision comprised of six lots that will be used for the future development of an airport-related industrial park which will serve clients who require airport access for the manufacture, sales, and distribution of aircraft products and services.

Section 3—Stormwater Management Report

Continued

One public street is proposed for the site that enters the subdivision from Westlane Road and travels east. Due to the location of the airport east of the site, this public street dead-ends and no extension is planned for the future.

Storm laterals are being provided to each lot to drain parking lots and taxiways that are expected to cover the majority of each lot in the future. See Figure #4a for a plan view of the overall site storm system and drainage basin map.

Pollution Reduction Facilities (Water Quality Treatment)

Stormwater runoff from the proposed public streets will be collected in catch basins and piped via a hard line to the public disposal site located near Crown Zellerbach. Each catch basin within the site will be equipped with a “snout” to provide initial water quality treatment. Enough fall will be provided at the end of the stormwater drainage line to allow for the installation of a water quality facility in the future, if one is required.

Flow Reduction Facilities (Detention)

The proposed site is located near the City of Scappoose disposal point and, thus, no stormwater detention is needed for the site.

Stormwater Conveyance System

The proposed stormwater pipe network and proposed 25-year flows were sized using Hydraflow Hydrographs 2004 and Storm Sewer 2005 by IntelliSolve. This software uses both the rational method and the Santa-Barbara Unit Hydrograph method to determine the appropriate pipe sizes within the network. Peak runoff from each lot was calculated in Hydrographs 2004 and added as known flow into the appropriate node of the Storm Sewers 2005 model. Future development to the north was allotted 6.37 cfs peak flow, and flows for Parcel 2 were taken from the stormwater study for the proposed Oregon Aero Center. These flows are summarized in Figure #5, “Hydrograph Summary,” and “Summary.” The system model was run for a 25-year storm event (City of Scappoose standard). The pipes were sized with the purpose of leaving at least one foot of freeboard at all locations within the system (see Figure #5, “Summary,” and Exhibits A and B). One location, in the vicinity of SD MH #B4, will require additional cover.

Section 3—Stormwater Management Report

Continued

Inlets are placed at an average distance of 300 feet throughout the site. At this spacing, the inlets provide enough capacity to capture the stormwater and comply with the City standard of limiting gutter spread to three feet.

Figure # 1





VICINITY MAP

1" = 1000'

Figure #2



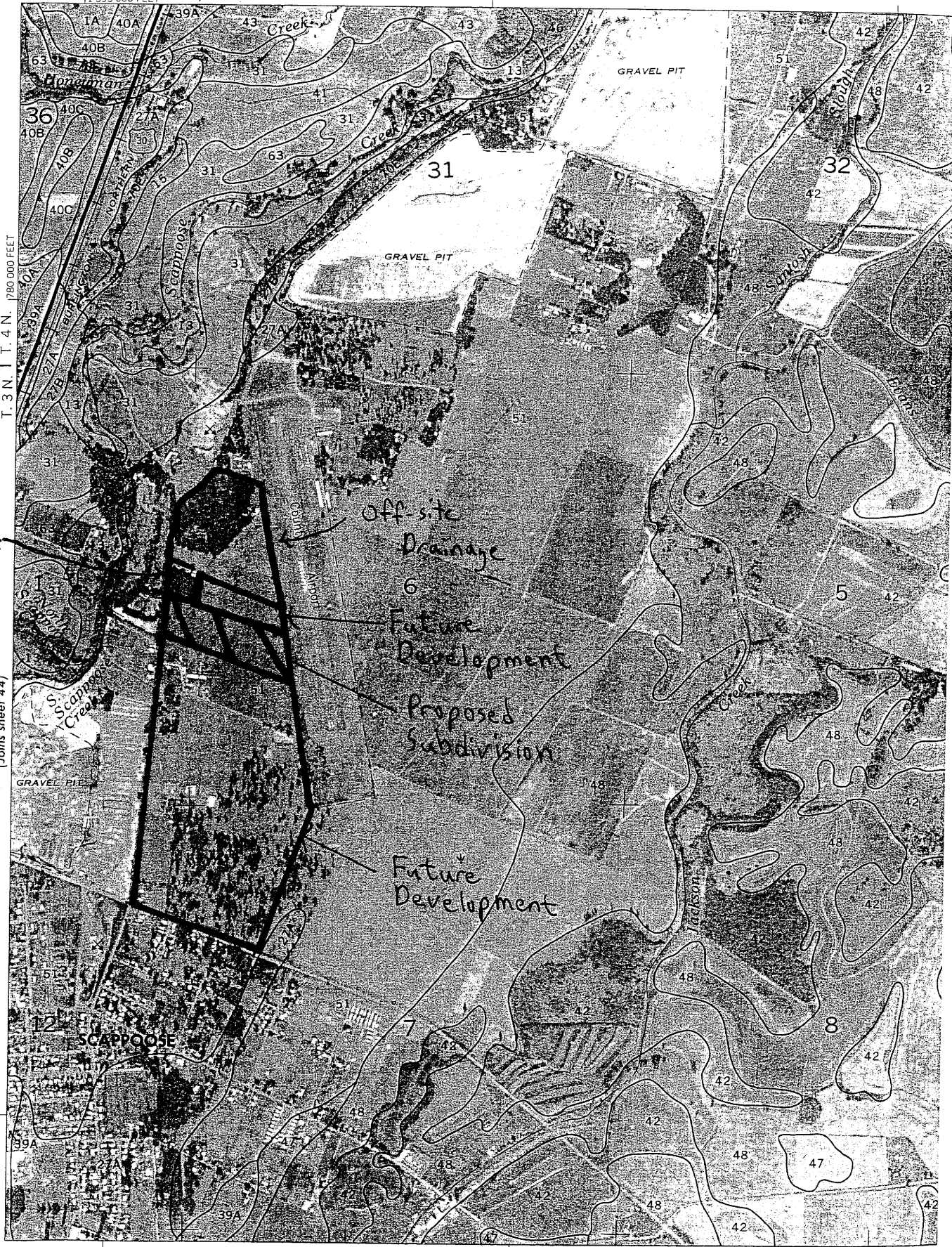
Figure #3



R. 2 W. | R. 1 W.

11 395 000 FEET

T. 3 N. | T. 4 N. 780 000 FEET

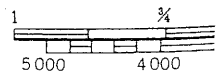


Future Development

Off site
Drainage
6
Future
Development
Proposed
Subdivision

Future
Development

(Joins sheet 44)



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
 Maps are prepared by the Department of Agriculture, Geological Survey, from 1975 and 1979 aerial photography.
 Division of Soil Conservation, showing climate, drainage, and soil types.
 U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.

TABLE 14.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth** Ft	Kind	Months
45*: Rock outcrop. Xerumbrepts.							
46----- Sauvie	D	Frequent-----	Long-----	Dec-Jun	0-1.0	Apparent	May-Jun
47, 48----- Sauvie	B	Rare-----	---	---	>6.0	---	---
49E*, 50E*: Scaponia-----	B	None-----	---	---	>6.0	---	---
Braun-----	C	None-----	---	---	>6.0	---	---
51----- Sifton	B	None-----	---	---	>6.0	---	---
52----- Sifton	B	Occasional-----	Brief-----	Dec-Jun	>6.0	---	---
53D, 54E, 55E----- Tolany	B	None-----	---	---	>6.0	---	---
56D----- Tolke	B	None-----	---	---	>6.0	---	---
57D*: Tolke-----	B	None-----	---	---	>6.0	---	---
Alstony-----	B	None-----	---	---	>6.0	---	---
58----- Treharne	C	None-----	---	---	2.0-3.0	Apparent	Dec-Apr
59*: Udifuvents. Dystrochrepts.							
60, 61. Udipsamments							
62D----- Vernonia	B	None-----	---	---	>6.0	---	---
63----- Wapato	D	Frequent-----	Brief-----	Dec-Feb	+ .5-1.0	Apparent	Dec-Apr
64E----- Wauld	C	None-----	---	---	>6.0	---	---
65D*: Wauld-----	C	None-----	---	---	>6.0	---	---
Rock outcrop.							
66----- Wauna	C	Rare-----	---	---	2.0-5.0	Apparent	Dec-Jul
67*: Wauna-----	D	Frequent-----	Brief-----	May-Jun	1.0-2.0	Apparent	Nov-Jun
Locoda-----	D	Frequent-----	Long-----	Jan-Dec	+1-1.0	Apparent	Nov-Jun

See footnotes at end of table.

increase seedling mortality. Reforestation can be accomplished by planting Douglas-fir seedlings.

If this unit is used for recreational development, the main limitation is steepness of slope. Slope limits the use of areas of this unit mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover or the mat of organic material.

This map unit is in capability subclass VIe.

51—Sifton loam. This deep, somewhat excessively drained soil is on terraces along the Columbia River. It formed in gravelly alluvium and volcanic ash. Slope is 0 to 3 percent. The vegetation in areas not cultivated is mainly Douglas-fir, Oregon white oak, common snowberry, rose, tall Oregon-grape, grasses, and forbs. Elevation is 30 to 100 feet. The average annual precipitation is about 40 to 50 inches, the average annual air temperature is 52 to 54 degrees F, and the average frost-free period is 170 to 210 days.

Typically, the surface layer is black loam about 24 inches thick. The upper 27 inches of the underlying material is dark brown extremely cobbly sand and extremely gravelly sand, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are small areas of Quafeno and Sauvie soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Sifton soil is moderate to a depth of 24 inches and very rapid below this depth. Available water capacity is about 4 to 6 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for crops, homesite development, and wildlife habitat. It is also used for recreational development.

If this unit is used for crops, the main limitation is droughtiness. In summer, irrigation is required for maximum production of most crops. Sprinkler irrigation is a suitable method of applying water. Applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs to avoid overirrigating and leaching of plant nutrients.

Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Grain and grasses respond to nitrogen; legumes respond to phosphorus, boron, sulfur, and lime; and vegetables and berries respond to nitrogen, phosphorus, and potassium.

This unit has few limitations for homesite development except for the very rapid permeability, which may allow untreated effluent to contaminate ground water. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed by cutting and filling. Removal of gravel and cobbles in disturbed areas is required for best results when landscaping, particularly in areas used for lawns. In summer, irrigation is required for lawn grasses, shrubs, vines, shade trees, and ornamental trees.

If this unit is used for recreational development, it has few limitations. Cuts and fills should be seeded or mulched. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining adequate plant cover. Plant cover can be maintained by controlling traffic.

This map unit is in capability subclass IIIs.

52—Sifton gravelly loam, occasionally flooded.

This deep, somewhat excessively drained soil is on flood plains of the Columbia River. It formed in gravelly alluvium and volcanic ash derived from mixed sources. Slope is 0 to 3 percent. The native vegetation is mainly Oregon white oak, common snowberry, rose, forbs, and grasses. Elevation is 10 to 25 feet. The average annual precipitation is 45 inches, the average annual air temperature is 53 degrees F, and the average frost-free period is 165 to 210 days.

Typically, the surface layer is black loam about 24 inches thick. The upper 27 inches of the substratum is dark brown extremely cobbly sand, and the lower part to a depth of 60 inches or more is dark yellowish brown extremely cobbly loam.

Included in this unit are small areas of Sauvie soils. Included areas make up about 10 percent of the total acreage.

Permeability of this Sifton soil is moderate to a depth of 24 inches and very rapid below this depth. Available water capacity is about 4 to 6 inches. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to occasional periods of flooding in May and June.

This unit is used for pasture and wildlife habitat.

If this unit is used for pasture, the main limitations are the hazard of flooding and droughtiness. Use of proper stocking rates, pasture rotation, and restricted grazing during moist periods helps to keep the pasture in good condition and reduces soil compaction. Livestock grazing should be managed to protect the unit from erosion.

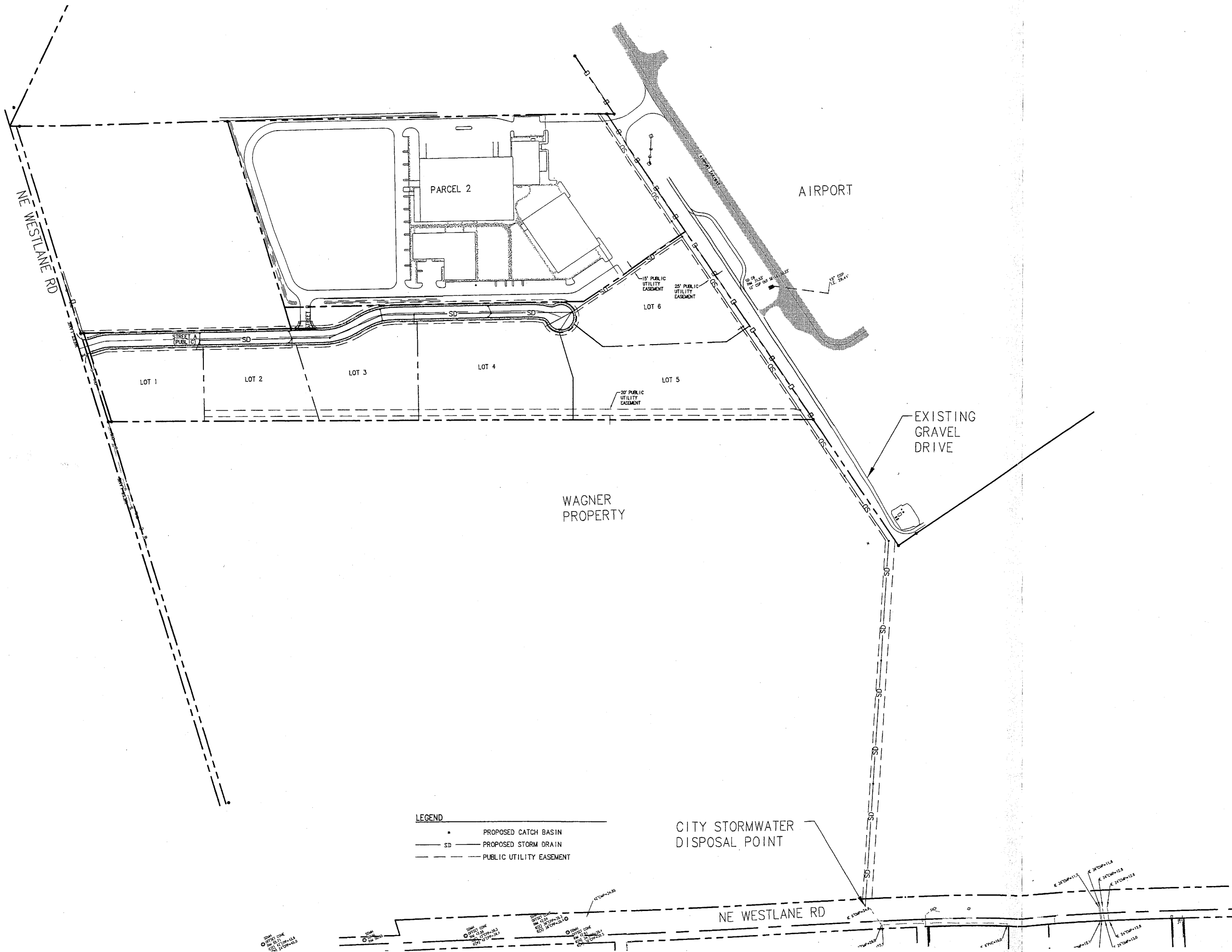
This map unit is in capability subclass IIIw.

53D—Tolany loam, 3 to 30 percent slopes. This deep, well drained soil is on convex, broad ridgetops and side slopes of mountains. It formed in silty colluvium derived from mixed sources. The native vegetation is mainly Douglas-fir, western hemlock, western redcedar,

Figure #4



LKC: BRANT 04/26/2006 2:10pm --> R:\REPORTS\STORM_STUDY\FIG4A.DWG



AERO BUSINESS CENTER
 STORMWATER REPORT
 PROPOSED STORM SYSTEM

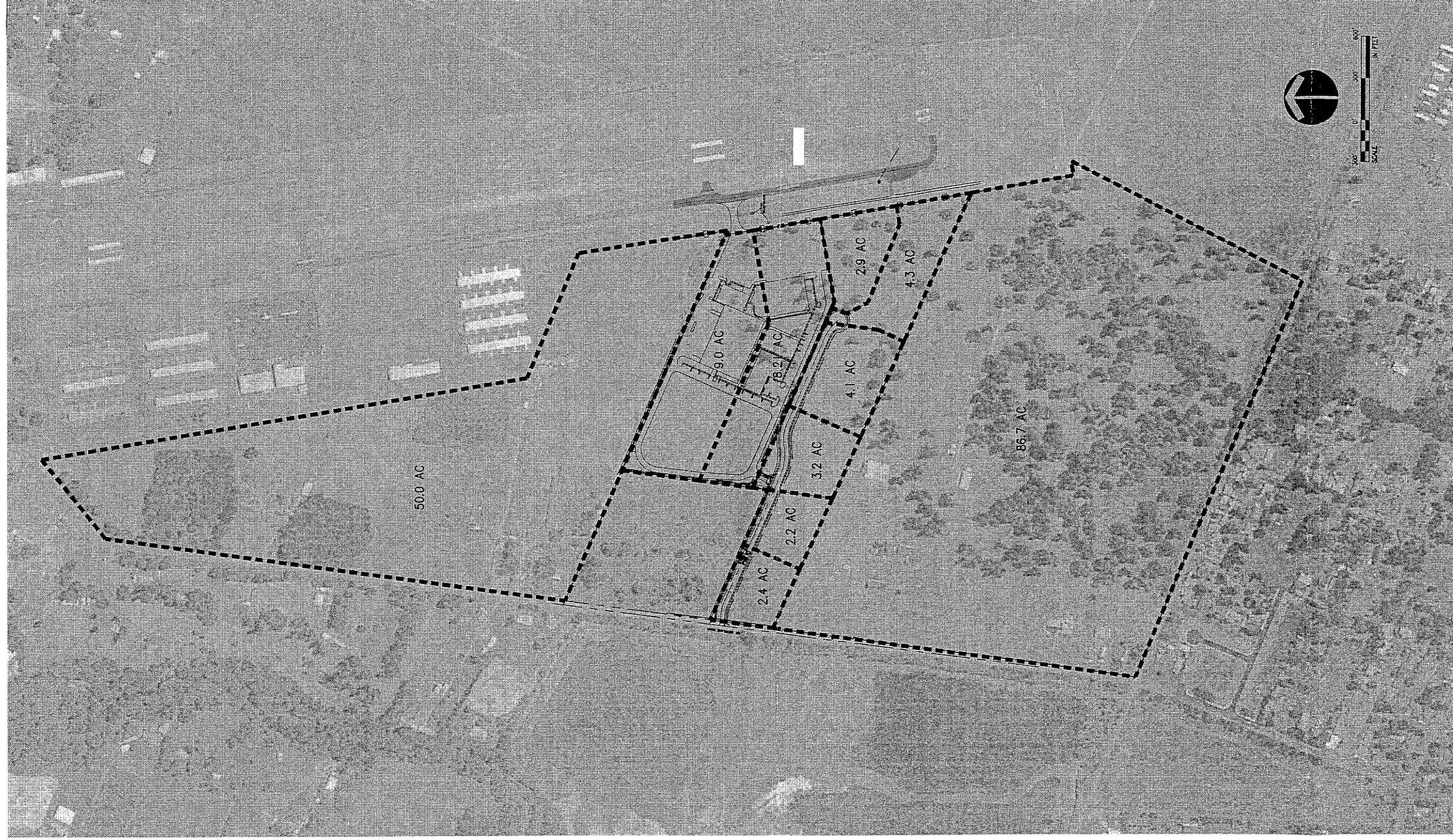


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12880 FIG#4
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FIG #4A
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MAP			
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STORMWATER REPORT
PROPOSED BASIN MAP



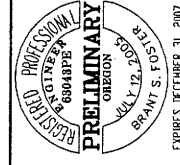
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BASIN

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Figure #5



Hydrograph Summary Report

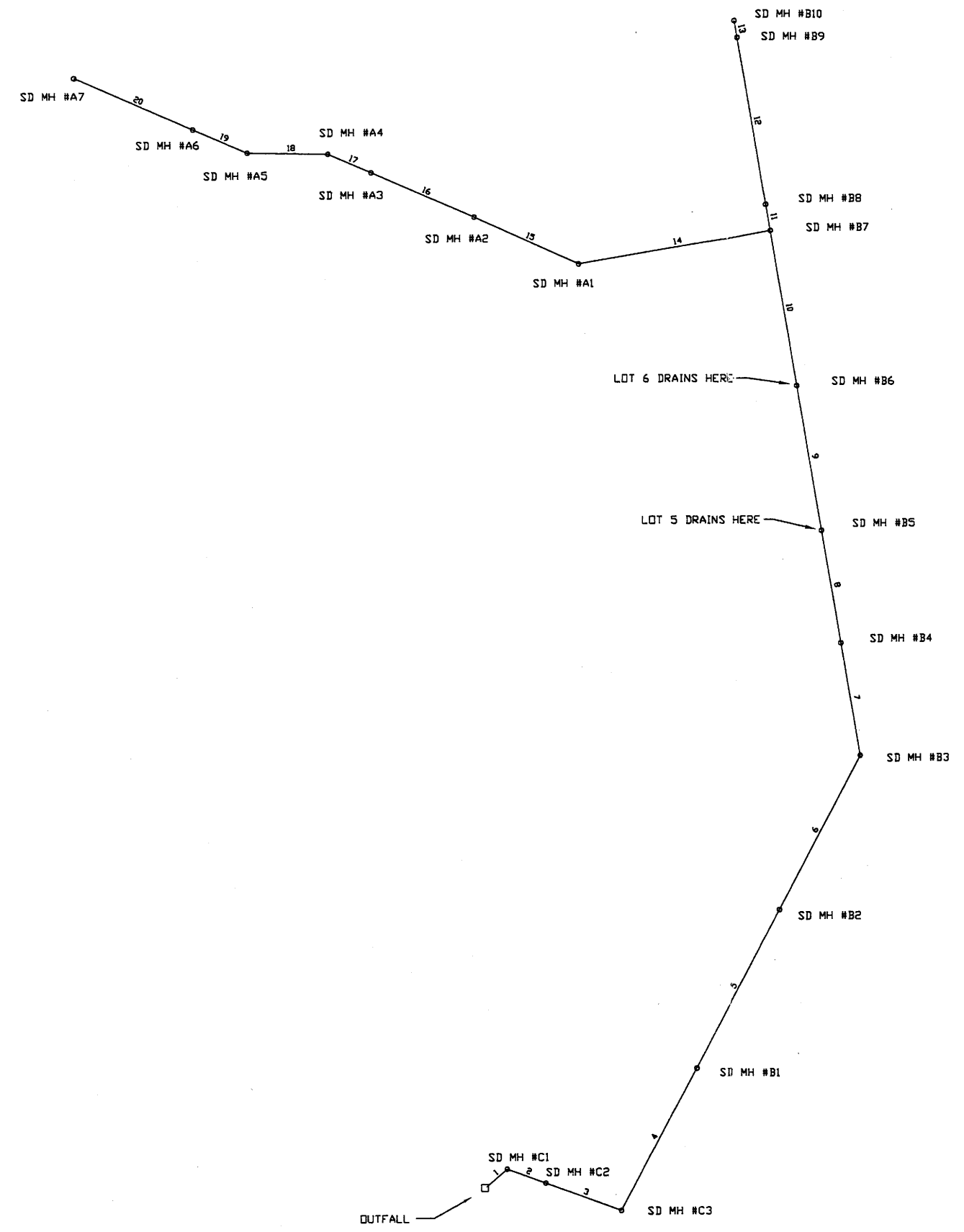
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description	
1	SBUH Runoff	1.99	6	474	29,252	---	----	----	Lot 1_IMP	
2	SBUH Runoff	0.05	6	480	745	---	----	----	Lot 1_PER	
3	Combine	2.03	6	474	29,996	1, 2	----	----	Lot 1_TOT	
4	SBUH Runoff	1.88	6	474	27,698	---	----	----	Lot 2_IMP	
5	SBUH Runoff	0.05	6	480	745	---	----	----	Lot 2_PER	
6	Combine	1.93	6	474	28,443	4, 5	----	----	Lot 2_TOT	
7	SBUH Runoff	2.68	6	474	39,477	---	----	----	Lot 3_IMP	
8	SBUH Runoff	0.07	6	480	1,076	---	----	----	Lot 3_PER	
9	Combine	2.75	6	474	40,553	7, 8	----	----	Lot 3_TOT	
10	SBUH Runoff	3.61	6	474	53,067	---	----	----	Lot 4_IMP	
11	SBUH Runoff	0.09	6	480	1,490	---	----	----	Lot 4_PER	
12	Combine	3.69	6	474	54,557	10, 11	----	----	Lot 4_TOT	
13	SBUH Runoff	3.45	6	474	50,737	---	----	----	Lot 5_IMP	
14	SBUH Runoff	0.10	6	480	1,738	---	----	----	Lot 5_PER	
15	Combine	3.54	6	474	52,475	13, 14	----	----	Lot 5_TOT	
16	SBUH Runoff	2.43	6	474	35,723	---	----	----	Lot 6_IMP	
17	SBUH Runoff	0.07	6	480	1,159	---	----	----	Lot 6_PER	
18	Combine	2.49	6	474	36,882	16, 17	----	----	Lot 6_TOT	
19	SBUH Runoff	4.07	6	486	90,004	---	----	----	New Parcel	
AeroInd.gpw					Return Period: 25 Year			Monday, Jul 17 2006, 5:41 PM		

Line No.	DnStm Ln No	Inlet ID	Line Length (ft)	Line Size (in)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Crit Depth (ft)	Invert Dn (ft)	HGL Dn (ft)	Gnd/Rim El Dn (ft)	Invert Up (ft)	HGL Up (ft)	Gnd/Rim El Up (ft)	Line Slope (%)	Vel Ave (ft/s)
1	Outfall	SD MH #C1	60.92	36	0.00	39.26	36.25	2.00	12.00	15.00	12.27	12.18	15.46 i	26.36	0.30	5.55
2	1	SD MH #C2	92.40	36	0.00	39.26	120.17	2.00	12.38	15.46	26.36	15.38	17.38	26.00	3.25	6.71
3	2	SD MH #C3	259.64	36	0.00	39.26	36.56	2.00	15.58	18.35	26.00	16.36	19.72 i	23.76	0.30	5.76
4	3	SD MH #B1	339.58	36	0.00	39.26	36.73	2.00	16.55	19.72	23.76	17.58	20.90	24.30	0.30	5.55
5	4	SD MH #B2	360.00	36	0.00	39.26	36.53	2.00	17.78	20.97	24.30	18.86	22.22	26.80	0.30	5.55
6	5	SD MH #B3	358.62	36	0.00	39.26	36.60	2.00	19.06	22.29	26.80	20.14	23.53	25.90	0.30	5.55
7	6	SD MH #B4	360.67	30	0.00	39.26	25.46	2.09	20.64	23.85	25.90	22.03	27.15	27.50	0.39	8.00
8	7	SD MH #B5	255.44	30	3.54	39.26	40.98	2.09	22.23	27.30	27.50	24.78	29.65	30.70	1.00	8.00
9	8	SD MH #B6	328.81	30	2.49	35.72	41.02	2.00	24.98	29.97	30.70	28.27	32.46	35.00	1.00	7.28
10	9	SD MH #B7	351.96	30	0.00	33.23	41.01	1.93	28.47	32.69	35.00	31.99	35.48 i	38.40	1.00	6.77
11	10	SD MH #B8	59.27	24	6.38	21.06	22.57	1.63	32.49	35.48	38.42	33.08	36.20 i	39.10	1.00	6.70
12	11	SD MH #B9	379.81	24	8.31	14.68	22.62	1.36	33.58	36.20	39.10	37.38	38.74	42.00	1.00	5.57
13	12	SD MH #B10	38.32	18	6.37	6.37	10.46	0.96	37.88	39.19	42.00	38.26	39.23	41.90	0.99	4.60
14	10	SD MH #A1	434.65	18	3.69	12.17	10.51	1.32	32.99	35.48	38.42	37.34	41.32	43.77	1.00	6.89
15	14	SD MH #A2	258.12	18	0.00	8.48	10.40	1.11	37.54	42.14	43.77	40.07	43.83	46.37	0.98	4.80
16	15	SD MH #A3	250.70	18	2.74	8.48	10.51	1.11	40.27	43.88	46.37	42.78	45.52	48.87	1.00	4.80
17	16	SD MH #A4	104.58	15	0.00	5.74	6.47	0.96	43.28	45.59	48.87	44.33	46.42	50.03	1.00	4.68
18	17	SD MH #A5	180.71	15	0.00	5.74	6.46	0.96	44.53	46.57	50.03	46.34	48.04 i	51.70	1.00	4.68
19	18	SD MH #A6	132.04	15	1.93	5.74	6.46	0.96	46.54	48.04	51.70	47.86	49.66 i	52.95	1.00	4.81
20	19	SD MH #A7	288.40	15	3.81	3.81	4.48	0.78	48.06	49.66	52.95	49.45	50.73 i	55.20	0.48	3.18

Project File: aero_business.042706.stm
 Number of lines: 20
 Date: 07-17-2006


NOTES: i Inlet control; ** Critical depth

XREF LIST
 Ltscale: 1
 resolved
 880X002
 LAN



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AERO BUSINESS CENTER
 Storm Sewer Model Plan View


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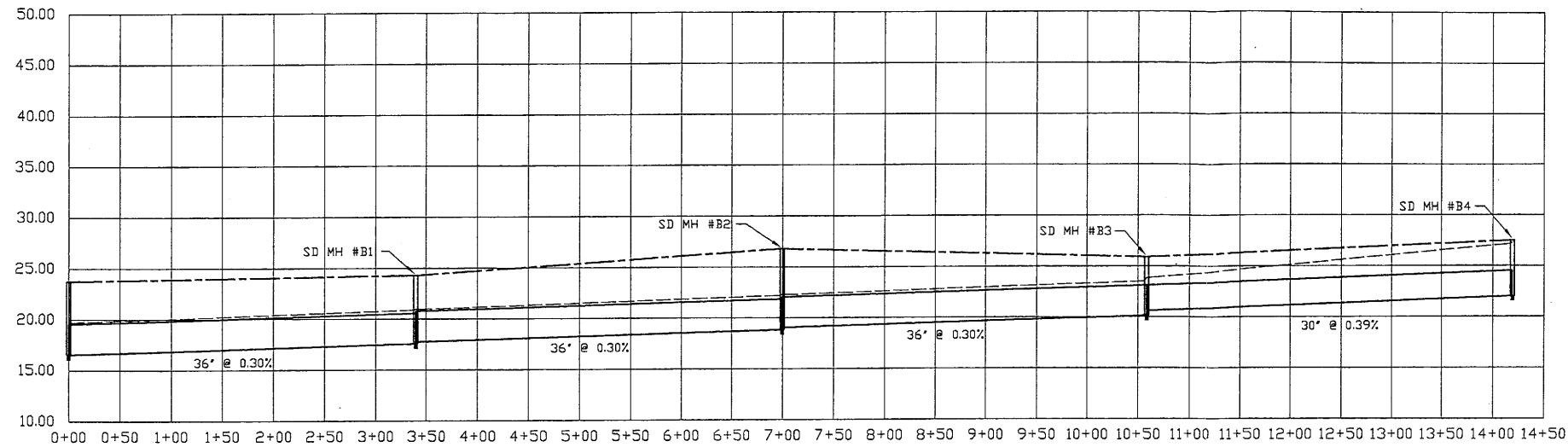
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REF LIST
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 PROF5

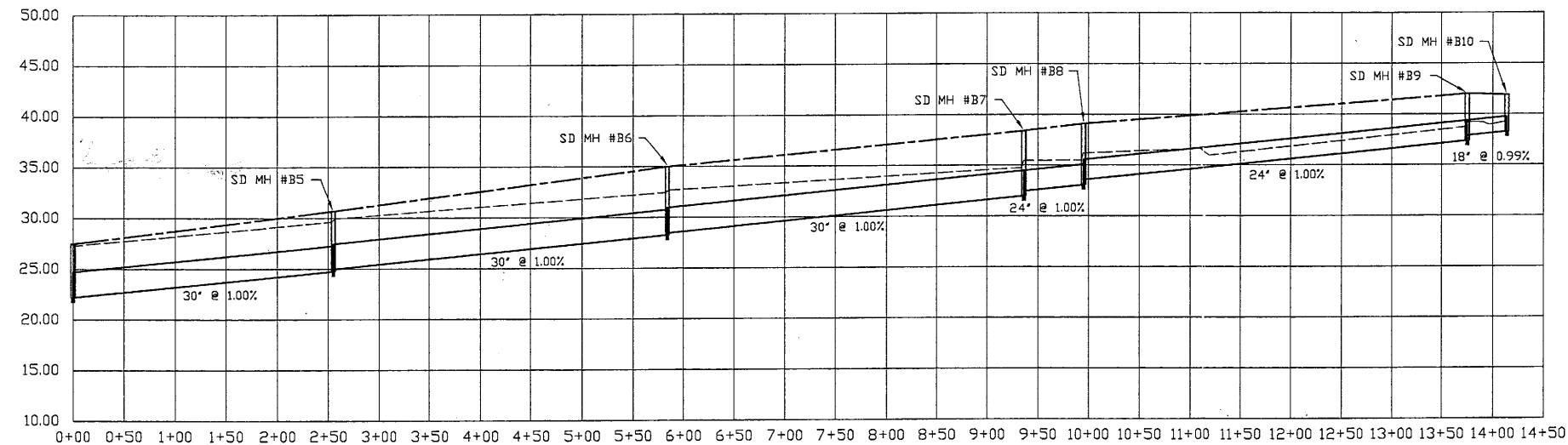
LINE 'B' - PIPES 4-7



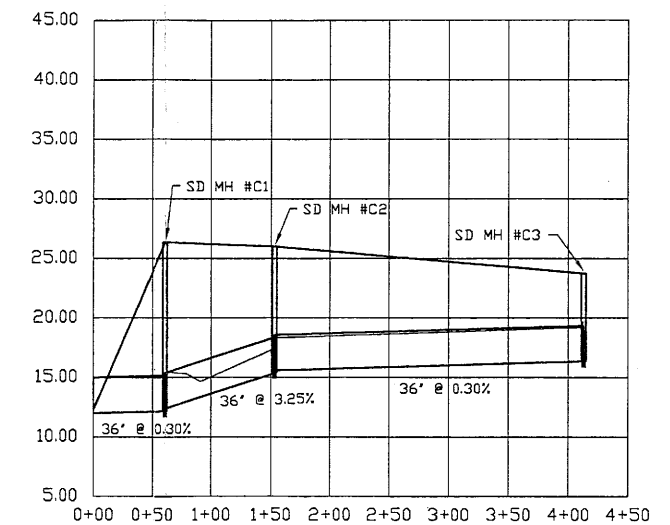
LEGEND

- GROUND SURFACE ELEVATION
- HYDRAULIC GRADE LINE

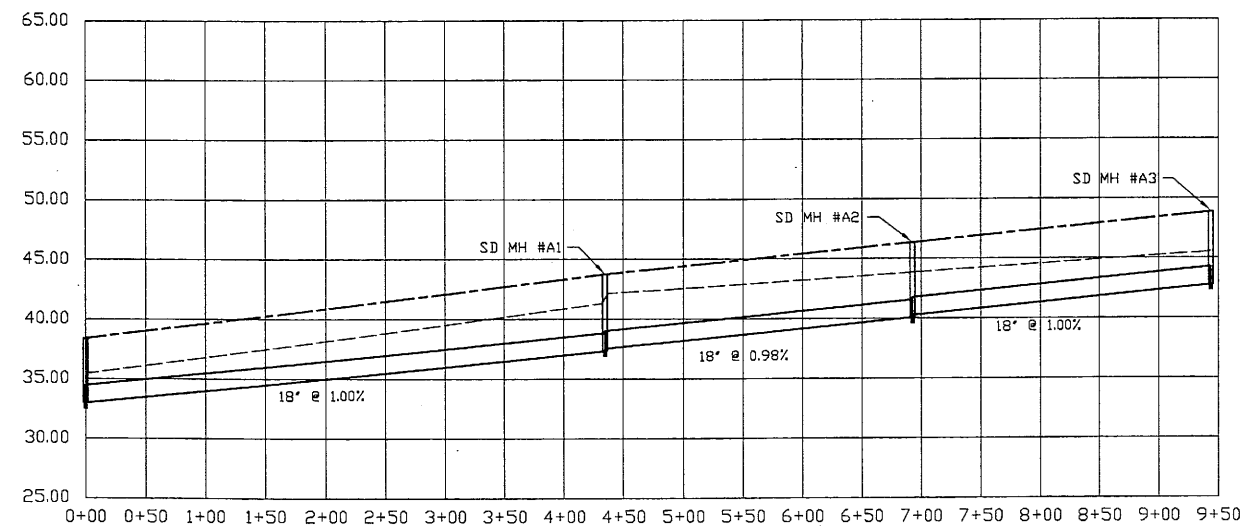
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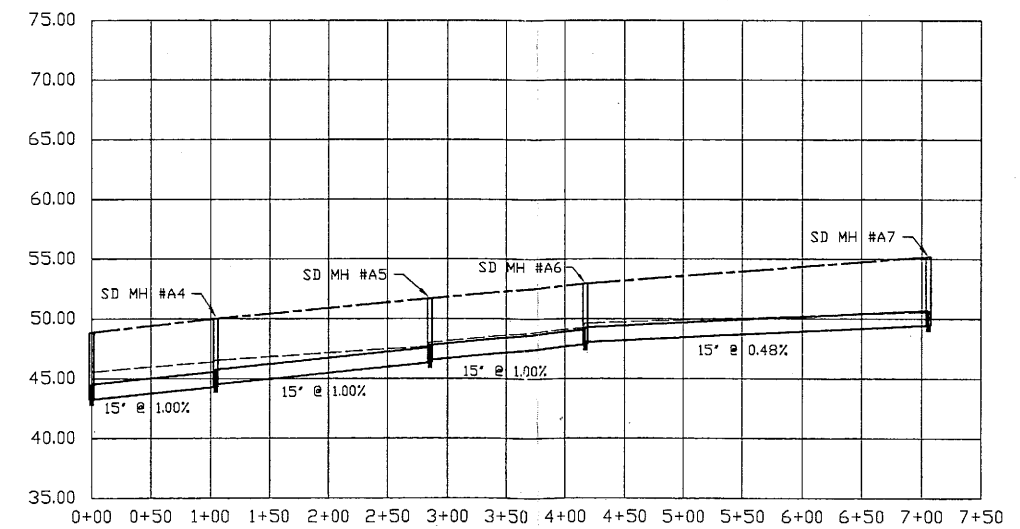
LINE 'C' - PIPES 1-3



LINE 'A' - PIPES 14-16



LINE 'A' - PIPES 17-20



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AERO BUSINESS CENTER

Hydraulic Grade Line Profiles



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