

# Civil 3D Site Volumes & Introduction to DirtDemon 4

*A 3<sup>rd</sup> Party Application for AutoCAD Civil 3D 2014*

# Objective #1 – Cut Fill Volumes

- ▶ Start with “Unadjusted” Surfaces – Existing (Base) and Proposed (Comparison)
- ▶ Create “Adjusted” surfaces for “Stripping” and “Pregrade” using Subsite depth adjustments
- ▶ Create a “CUTFILL” TIN Volume Surface using the “Adjusted” Base and Comparison Surfaces
- ▶ Perform a “bounded” volumes calculation using the CUTFILL TIN Volume Surface
- ▶ Export the Volumes data to Excel, AutoCAD Table and Block Attributes

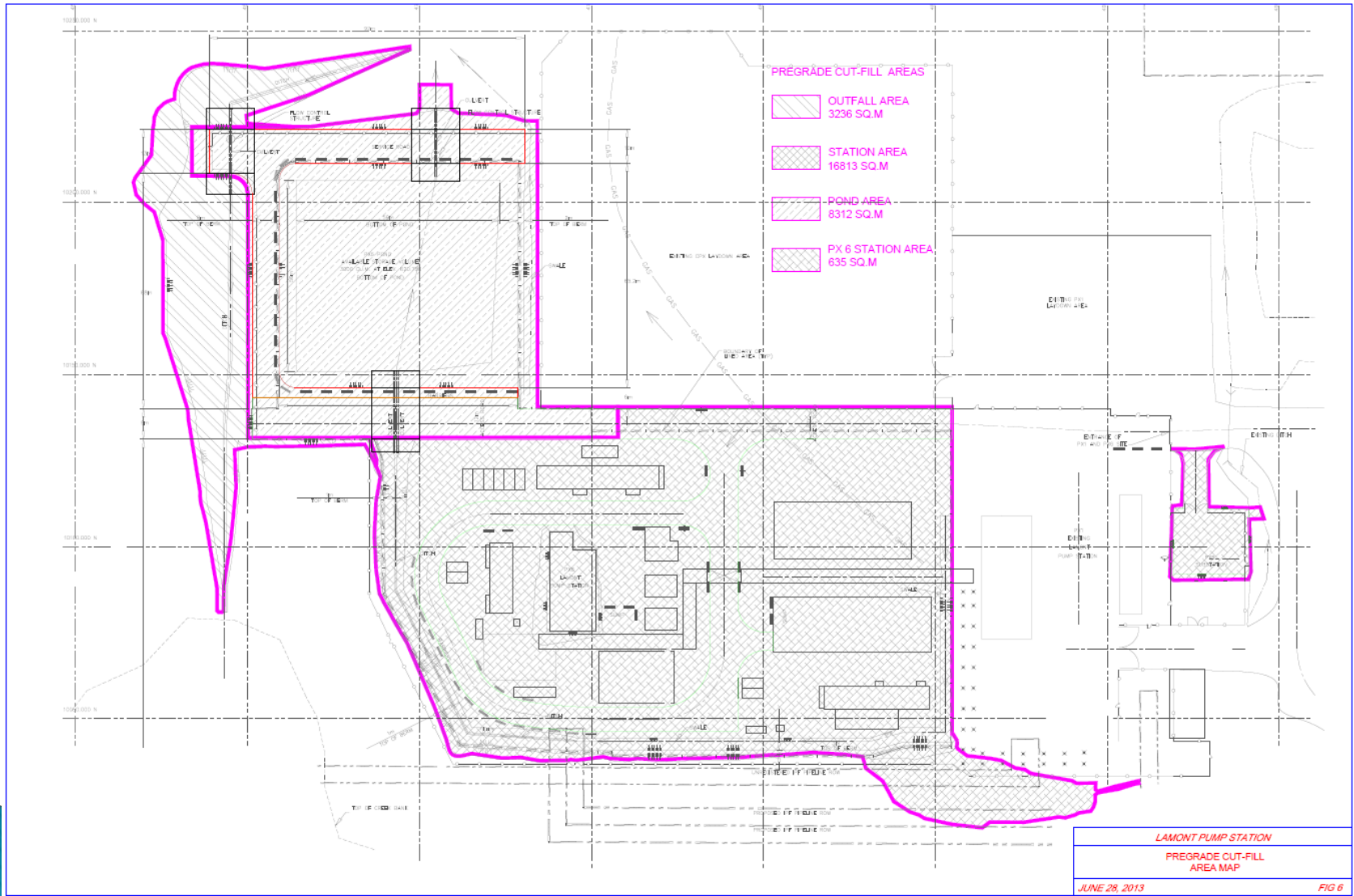
# Objective #2 – Material Quantities

- ▶ Define a “Material List” using layered materials (volume and area)
- ▶ Apply “Material List” to Subsite area
- ▶ Calculate and Export both Material Volumes and Areas to Excel
- ▶ Summarize the Materials by Group, by Type and by Subsite Name

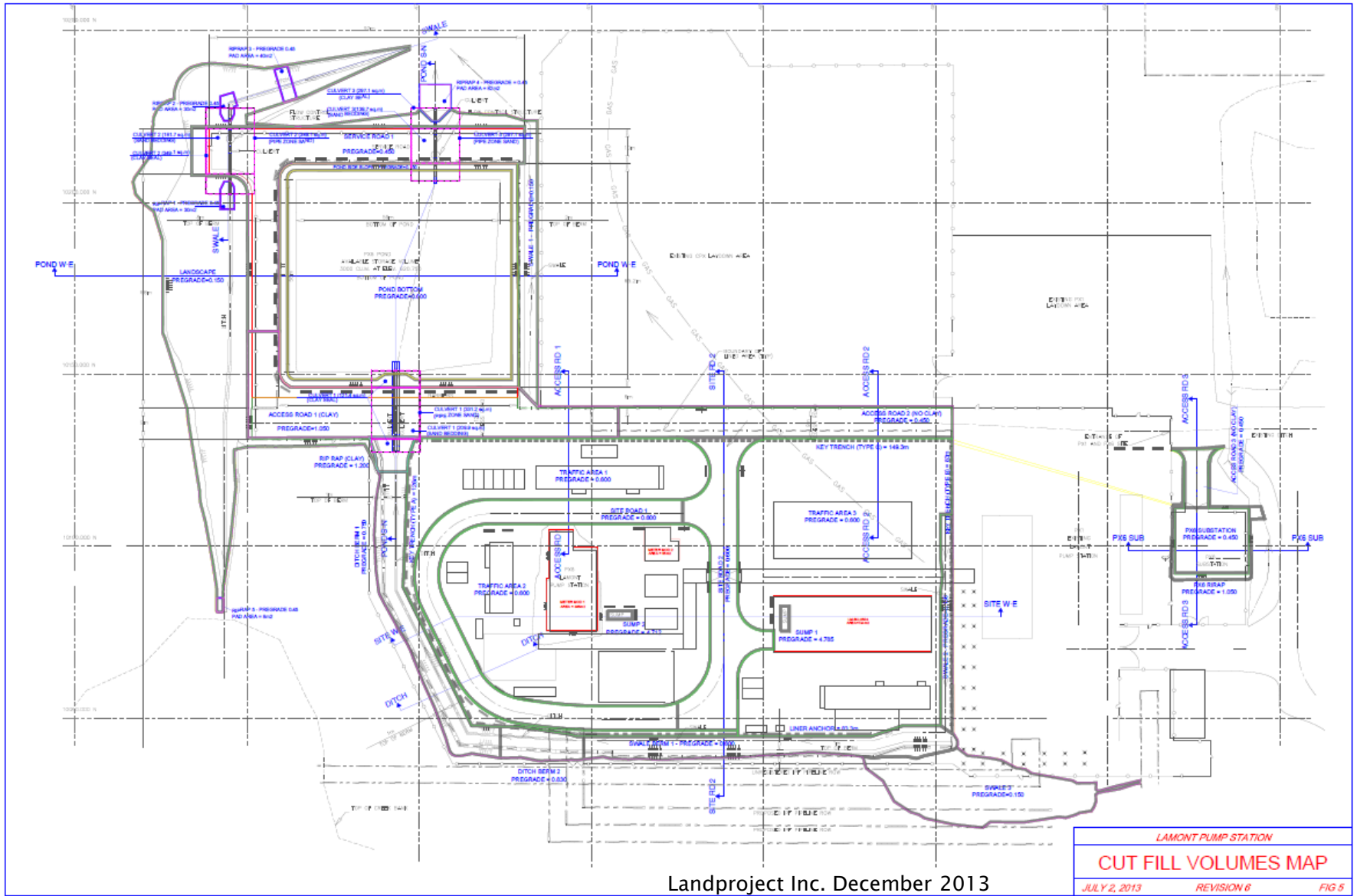
# Site Plan Project Summary

- ▶ **Project Type:**
  - Site Plan with 27 Subsites, 4 Major Groups
- ▶ **Existing Datasets**
  - ASCII Survey
  - PDF Contours
- ▶ **Proposed Datasets**
  - PDF Grading Points
  - PDF Grading Contours
- ▶ **Material Lists**
  - From PDF Sections, assigned to Subsites
- ▶ **Stripping and Pregrade Depths**
  - Determined using Sections and verified by Project Manager

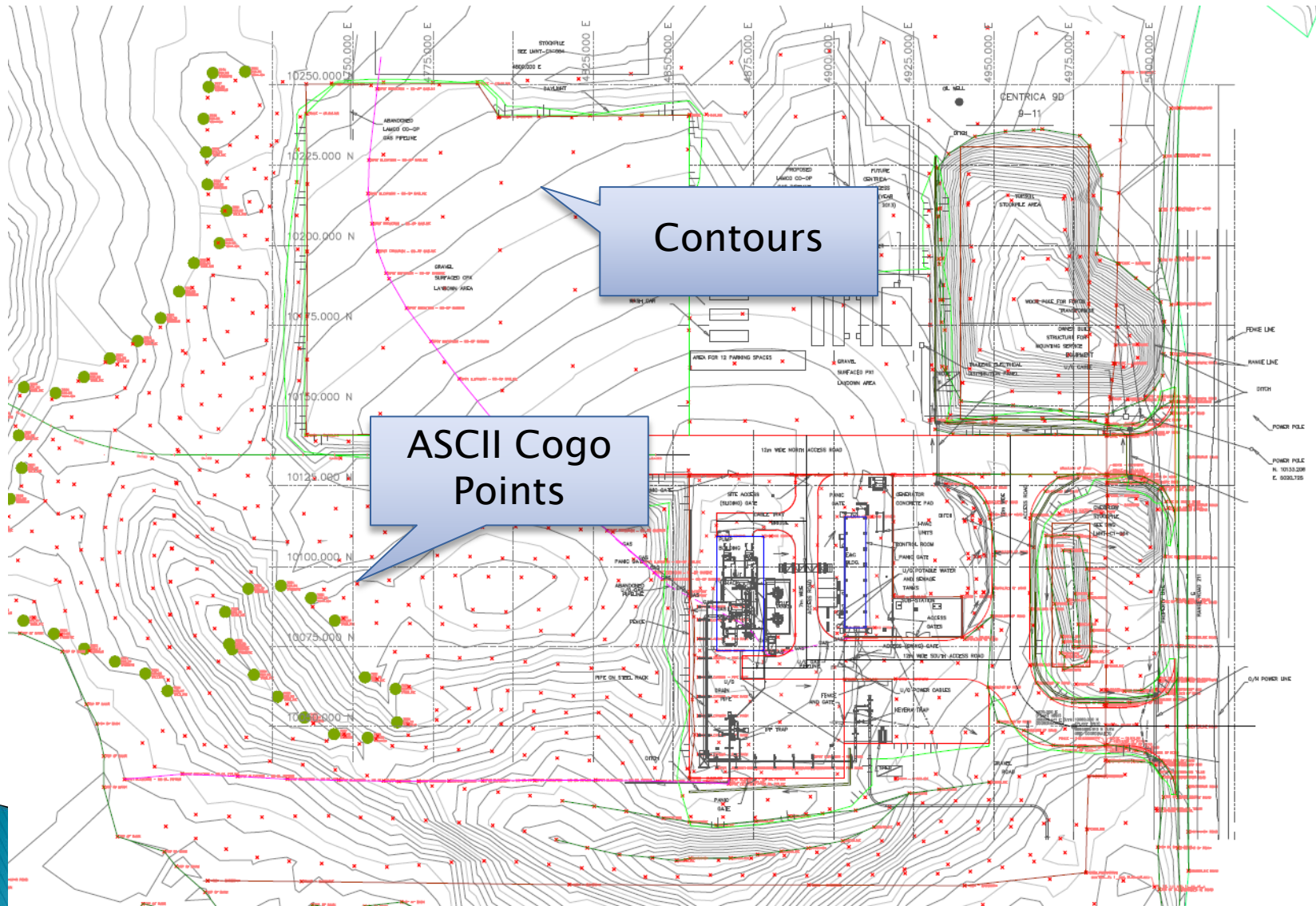
# Project Sample - 4 Groups



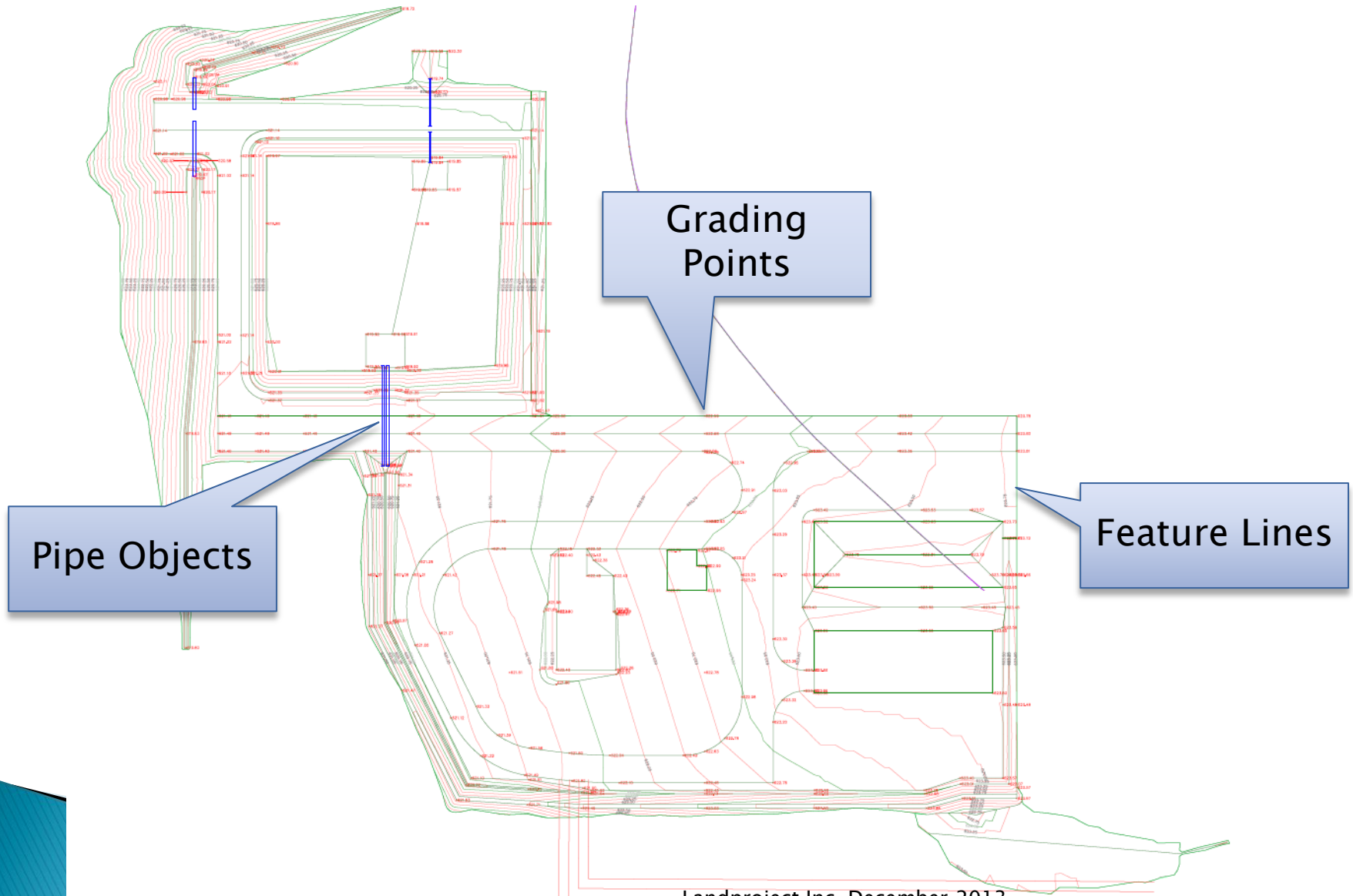
# 27 Subsites Created (closed polylines)



# Existing Surface from Survey ASCII/PDF



# Proposed Surface/Pipes from PDF Design





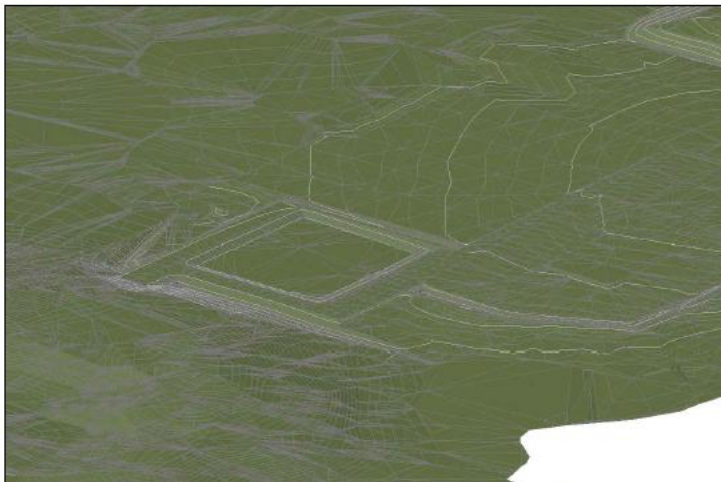
# Resulting Surface Model(s)



LOOKING NORTH AT POND



LOOKING NORTH WEST AT SWALE



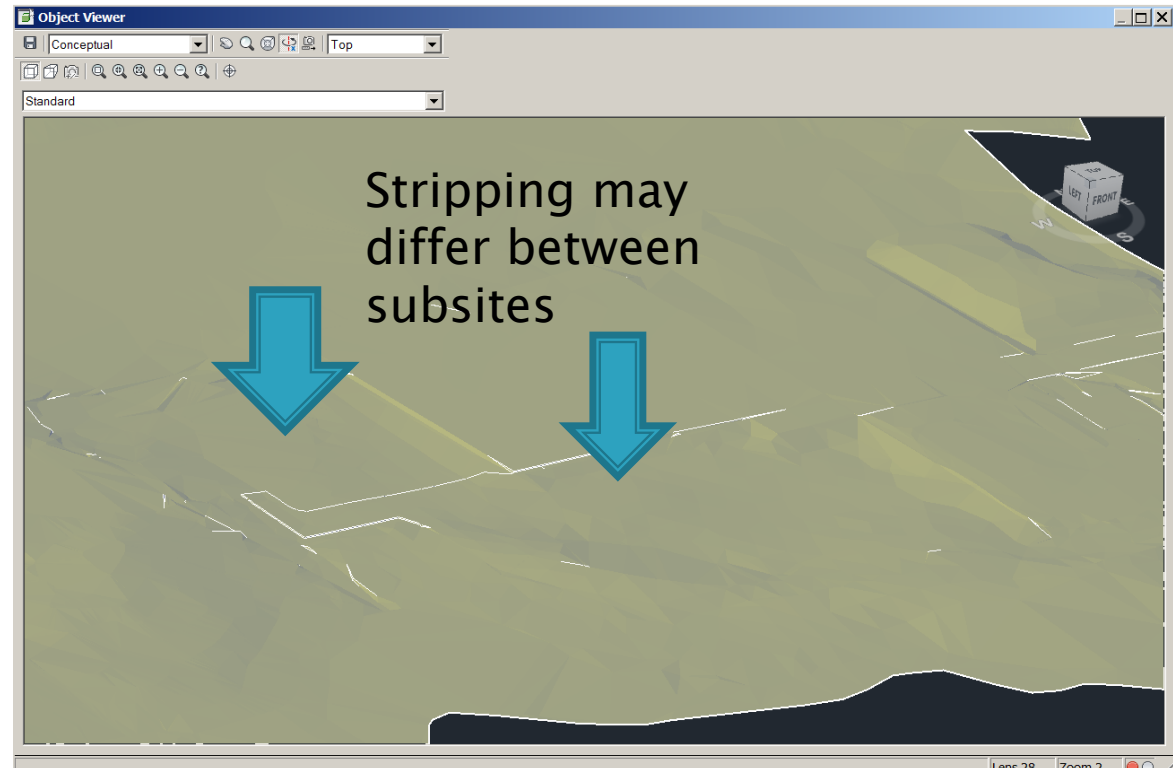
LOOKING NORTH EAST AT DITCH



Landproject 1001113  
LOOKING SOUTH WEST AT SWALE

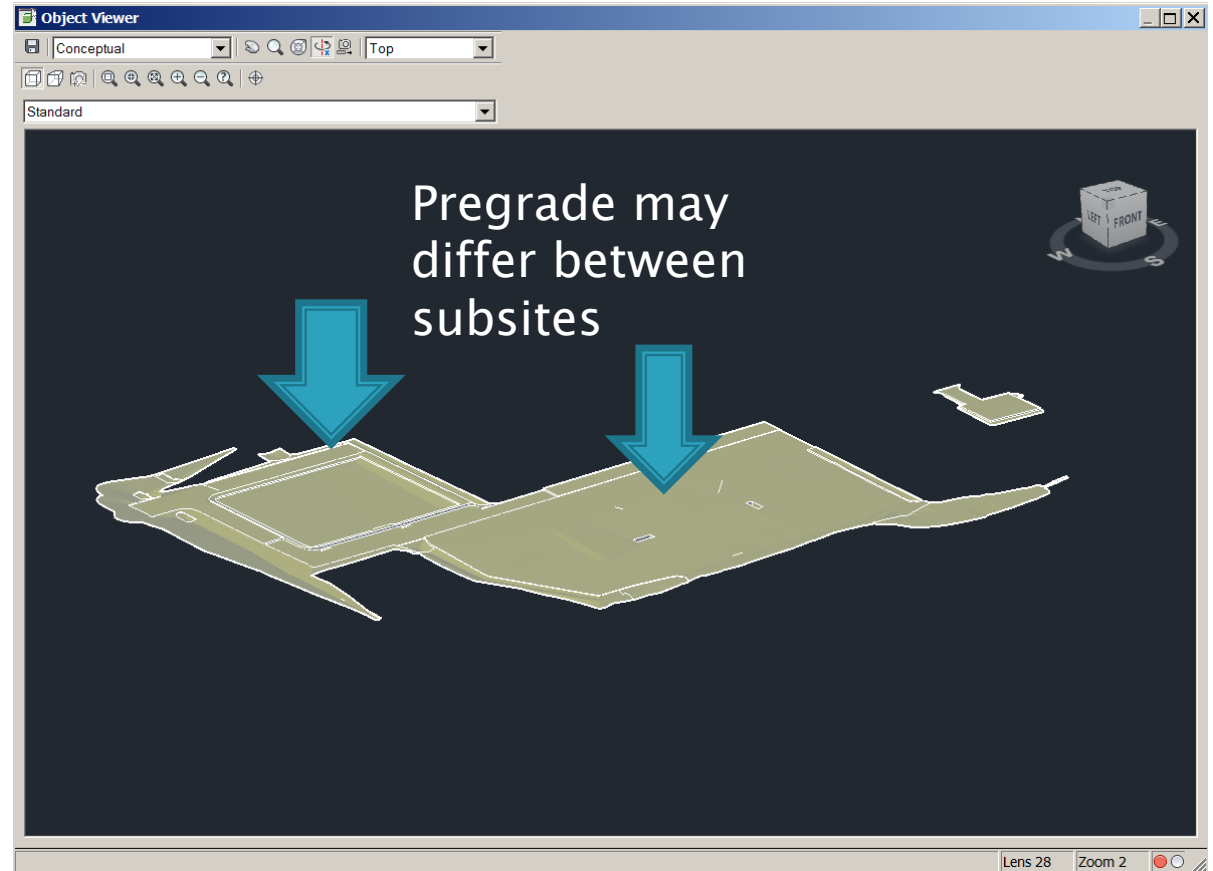
# Create Stripping Surface

- ▶ Existing Surface is “Lowered” within the Subsite Area by it’s “Stripping” Depth
- ▶ Lowerings Vary depending on conditions

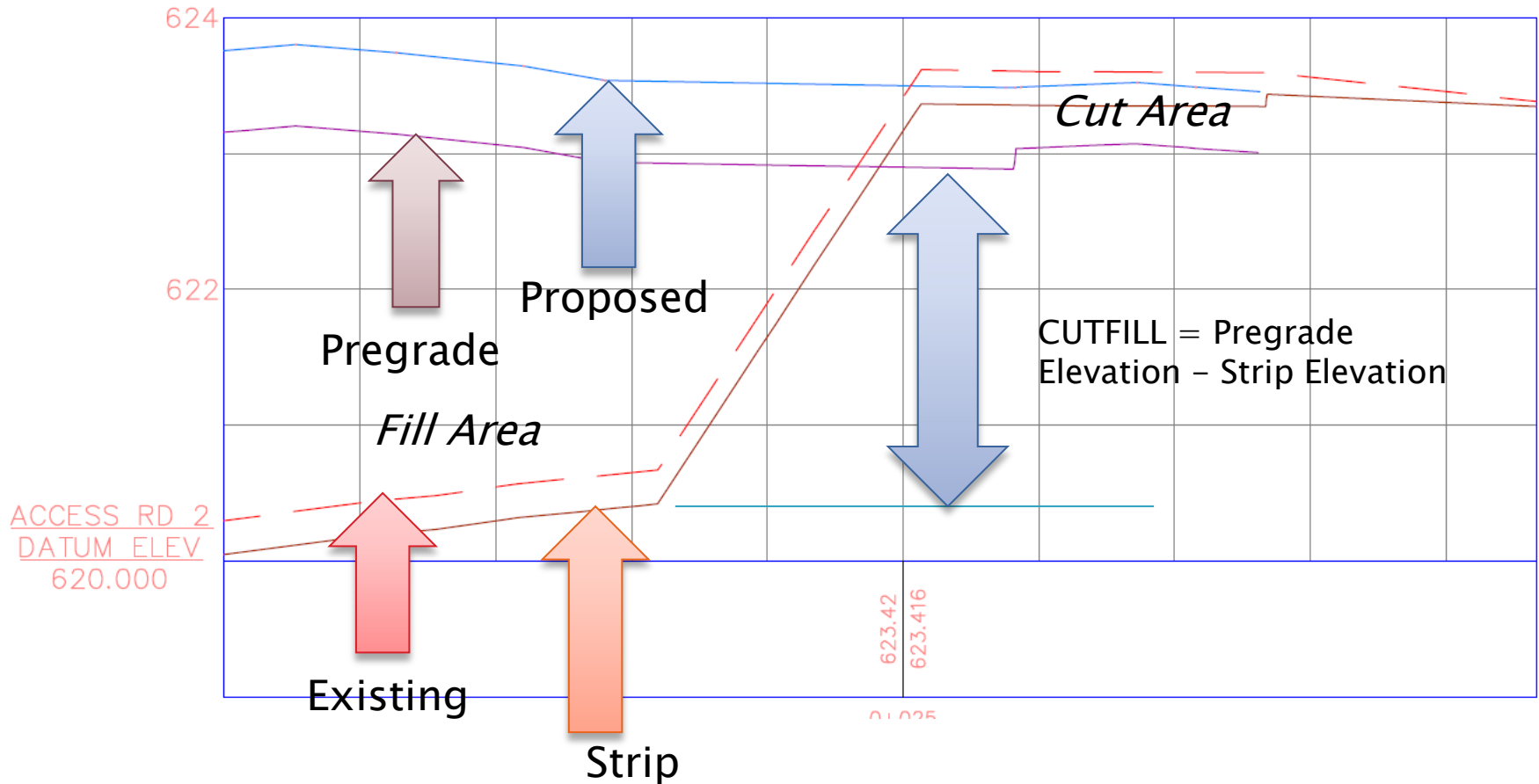


# Create Pregrade Surface

- ▶ Proposed Surface is “Lowered” within the Subsite Area by it’s “Pregrade” Depth
- ▶ Lowerings Vary depending on imported material depth and cut-fill balance requirements

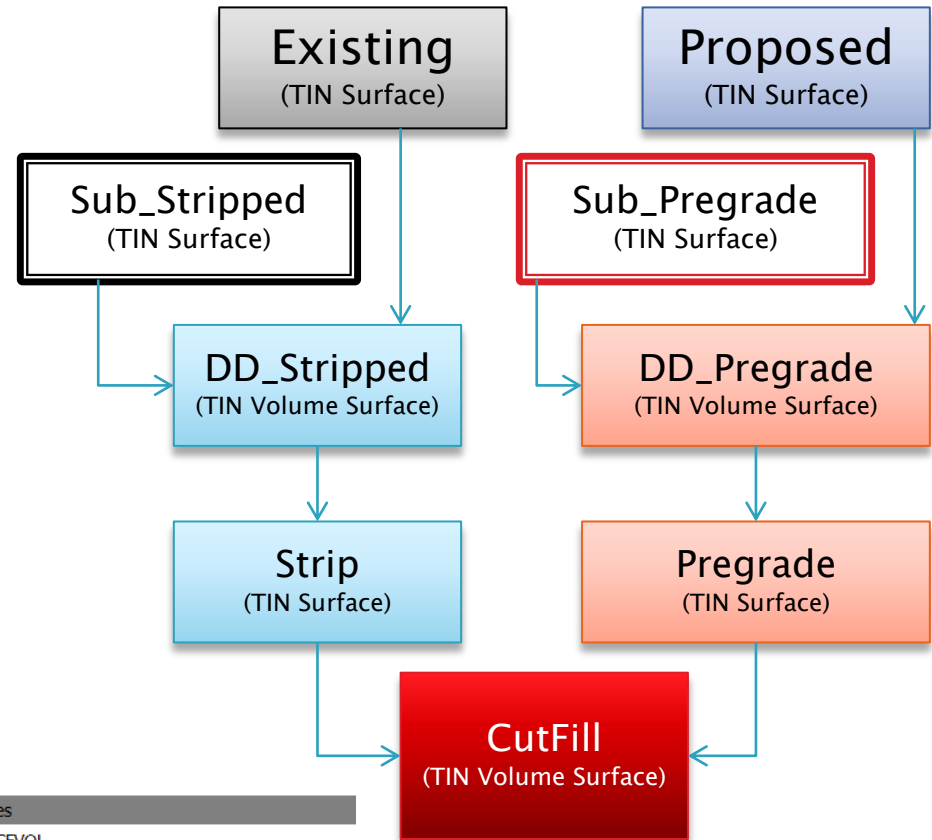


# Check using Dynamic Cross Sections

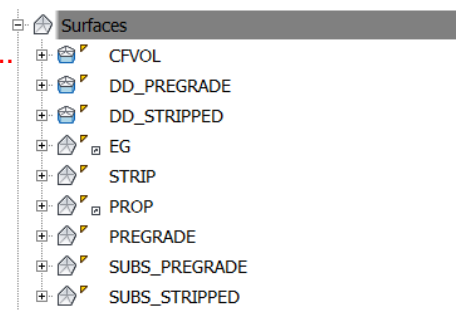


# Civil 3D Surfaces Created in Process

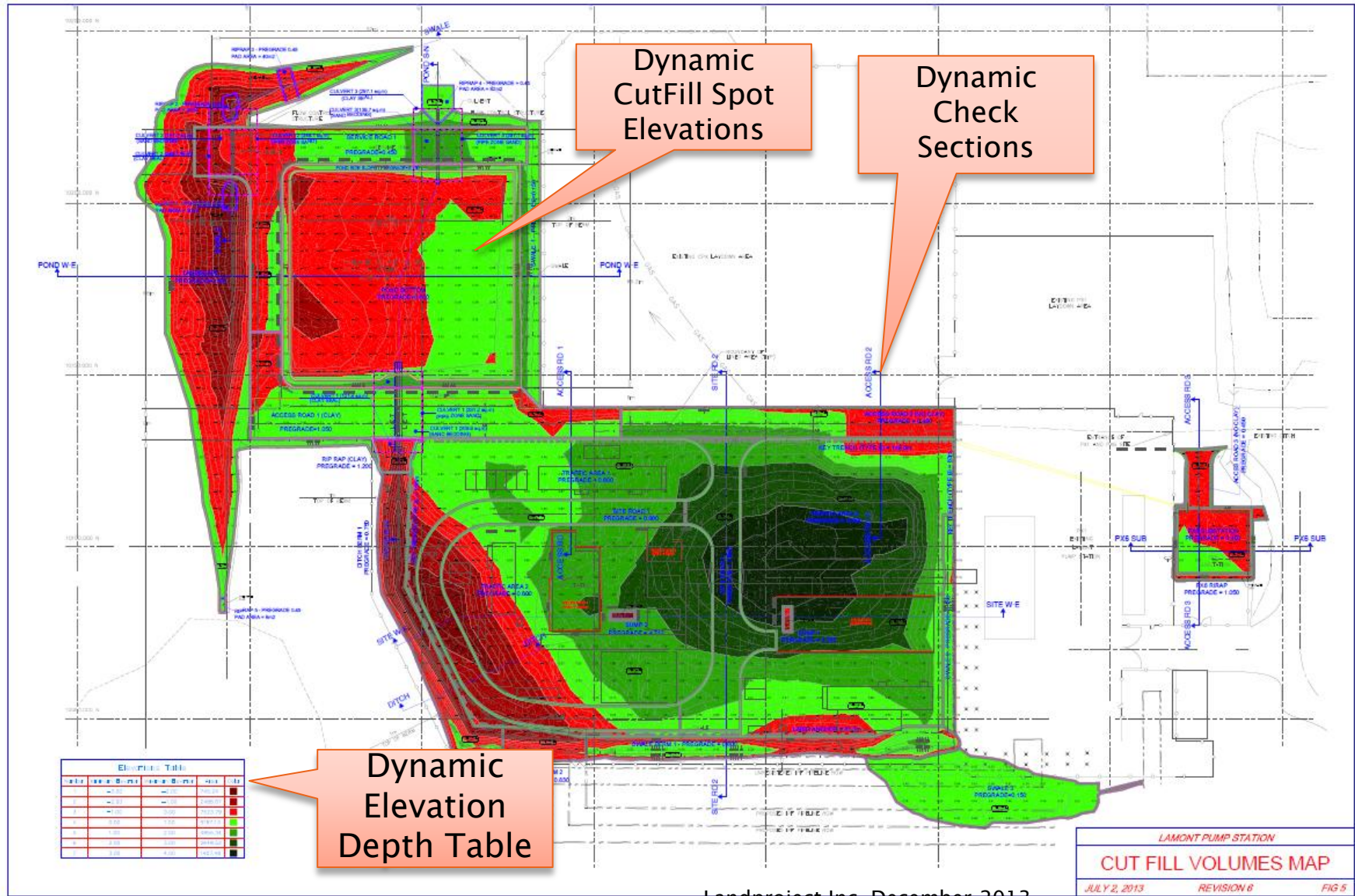
1. Existing and Proposed are data shortcutted from survey and design drawings
2. Sub\_Pregrade and Sub\_Stripped are created using subsites (inner offset 0.1 m, elevation=depth, segmented 3m)
3. DD\_Pregrade and DD\_Stripped are Dynamic Differential TIN Volume Surfaces used to create lowered surfaces
4. Pregrade and Strip are standard TIN Surfaces created from DD TIN Volume surfaces (required...)
5. CutFill is the resulting TIN Volume Surface (Strip vs Pregrade) required for bounded subsite volumes



**Important Note:** ALL Surfaces are dynamic and connected to original survey and design surfaces...



# Resulting CUTFILL Volume Surface



# Manual Export CutFill Volumes Table

	A	B	C	D	E	F	G	H
1	CUT FILL VOLUMES - Pregrade Areas						<i>Dated:</i>	<i>02-Jul-13</i>
2							<i>Revision:</i>	<i>6</i>
3	Station Area							
4	SUBSITE NAME	STRIP DEPTH	PREGRADE	AREA	TOPSOIL	CUT	FILL	NET
5	RIP RAP 6 (CLAY)	0.25	1.200	104.27	26.07	86.67	0.01	-86.66
6	SWALE 1	0.25	0.150	589.99	147.50	0.02	460.45	460.43
7	SWALE 2	0.25	0.150	209.44	52.36	0.75	70.18	69.43
8	SWALE 3	0.25	0.150	992.6	248.15	0.05	340.85	340.8
9	DITCH BERM 1	0.25	0.750	724.6	181.15	881.53	2.4	-879.13
10	DITCH BERM 2	0.25	0.830	201.27	50.32	156.43	0	-156.43
11	SWALE BERM 1	0.25	0.600	678.93	169.73	109.45	115.49	6.04
12	ACCESS ROAD 2	0.25	0.450	864.16	216.04	83.67	422.95	339.28
13	ACCESS ROAD 3	0.25	0.450	121.29	30.32	19.81	0	-19.81
14	TRAFFIC AREA 1	0.25	0.600	1958.86	489.72	438.47	1743.06	1304.59
15	TRAFFIC AREA 2	0.25	0.600	<del>3698.97</del>	924.74	1013.36	4452.82	3439.46
16	TRAFFIC AREA 3	0.25	0.600	<del>5009.89</del>	1,252.47	109.66	9760.69	9651.03
17	SITE ROAD 1	0.25	0.600	1270.32	317.58	987.5	653.62	-333.88
18	SITE ROAD 2	0.25	0.600	1003.53	250.88	0	2151.58	2151.58
19	<b>Sub-Totals</b>			<b>17,428.12</b>	<b>4,357.03</b>	<b>3,887.37</b>	<b>20,174.10</b>	<b>16,286.73</b>
20								
21	Pond Area							
22	SUBSITE NAME	STRIP DEPTH	PREGRADE	AREA	TOPSOIL	CUT	FILL	NET
23	ACCESS ROAD 1	0.60	1.050	1570.42	942.25	153.04	446.25	293.21
24	SERVICE ROAD1	0.60	0.450	1545.93	927.56	423.62	586.5	162.88
25	POND SLOPE	0.60	0.150	<del>575.67</del>	345.40	16.43	507.89	491.46
26	POND BOTTOM	0.60	0.600	3937.16	2,362.30	1461.08	340.73	-1120.35
27	RIPRAP 4	0.60	0.450	82.91	49.75	0	27.81	27.81
28	<b>Sub-Totals</b>			<b>7,712.09</b>	<b>4,627.25</b>	<b>2,054.17</b>	<b>1,909.18</b>	<b>- 144.99</b>
29								
30	OutFall Ditch Area							
31	SUBSITE NAME	STRIP DEPTH	PREGRADE	AREA	TOPSOIL	CUT	FILL	NET
32	LANDSCAPE 1	0.60	0.250	<del>3120.64</del>	<del>1,672.38</del>	<del>2,259.22</del>	<del>206.77</del>	<del>-2052.45</del>
33	RIPRAP 1	0.60	0.450	30.11	18.07	77.11	0	-77.11
34	RIPRAP 2	0.60	0.450	30.35	18.21	55.6	0	-55.6
35	RIPRAP 3	0.60	0.450	38.35	23.01	19.81	0.12	-19.69
36	RIPRAP 5	0.60	0.450	7.3	4.38	0	1.62	1.62
37	<b>Sub-Totals</b>			<b>3,226.75</b>	<b>1,936.05</b>	<b>2,411.74</b>	<b>208.51</b>	<b>- 2,203.23</b>
38								

# Manual Export Material Volumes Table

	A	B	C	D	E	F
1	<b>MATERIAL VOLUMES - Grading Areas</b>				<i>Dated:</i>	<i>02-Jul-13</i>
2					<i>Revision:</i>	<i>6.1</i>
3	<b>Swale and Ditch Area</b>					
4	<b>SUBSITE NAME</b>	<b>AREA</b>	<b>MATERIAL NAME</b>	<b>MATERIAL DEPTH</b>	<b>QUANTITY</b>	<b>Units</b>
5	RIP RAP 6 (CLAY)	104.2				
6			RIPRAP	0.450	46.9	cu.m.
7			LP10 GEO		104.2	sq.m.
8			CLAY	0.600	62.5	cu.m.
9	SWALE 1	589.99				
10			TOP COURSE - 40mm MINUS	0.150	88.5	cu.m.
11	SWALE 2	209.4				
12			TOP COURSE - 40mm MINUS	0.150	31.4	cu.m.
13	SWALE 3	992.6				
14			TOP COURSE - 40mm MINUS	0.150	148.9	
15	SWALE 3 PERIMETER	54.36	TOP COURSE - 40mm MINUS	0.150	8.2	
16	181.2m TRENCH LENGTH x 300mm WIDTH			(BELOW SWALE 3)		
17						
18	DITCH BERM 1	724.6				
19			TOP COURSE - 40mm MINUS	0.150	108.7	
20			LP 10 GEO		724.6	
21			CLAY	0.600	434.8	
22	DITCH BERM 2	201.27				
23			TOP COURSE - 40mm MINUS	0.230	46.3	
24			LP 10 GEO		201.3	
25			CLAY	0.600	120.8	
26	SWALE BERM 1	678.93				
27			TOP COURSE - 40mm MINUS	0.150	101.8	
28			BASE COURSE - 80mm MINUS	0.450	305.5	
29			LP 10 GEO		678.9	
30						
31	<b>Station Area</b>					
32	<b>SUBSITE NAME</b>	<b>AREA</b>	<b>MATERIAL NAME</b>	<b>MATERIAL DEPTH</b>	<b>QUANTITY</b>	
33						
34	ACCESS ROAD 2	864.16				
35			TOP COURSE - 25mm MINUS	0.150	129.6	
36			BASE COURSE - 80mm MINUS	0.300	259.2	
37			LP10 GEO		864.2	
38	ACCESS ROAD 3	121.29				
39			TOP COURSE - 25mm MINUS	0.150	18.2	
40			BASE COURSE - 80mm MINUS	0.300	36.4	
41			LP10 GEO		121.3	
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<b>Summary Totals - Swale and Ditch Area</b>	
<b>MATERIAL TOTALS - VOLUMES (CU.M)</b>	
RIPRAP	46.9
CLAY	618.0
TOP COURSE - 40mm MINUS	533.8
BASE COURSE - 80mm MINUS	305.5
<b>MATERIAL QUANTITY - AREA (SQ.M)</b>	
LP10 GEO	1709.0

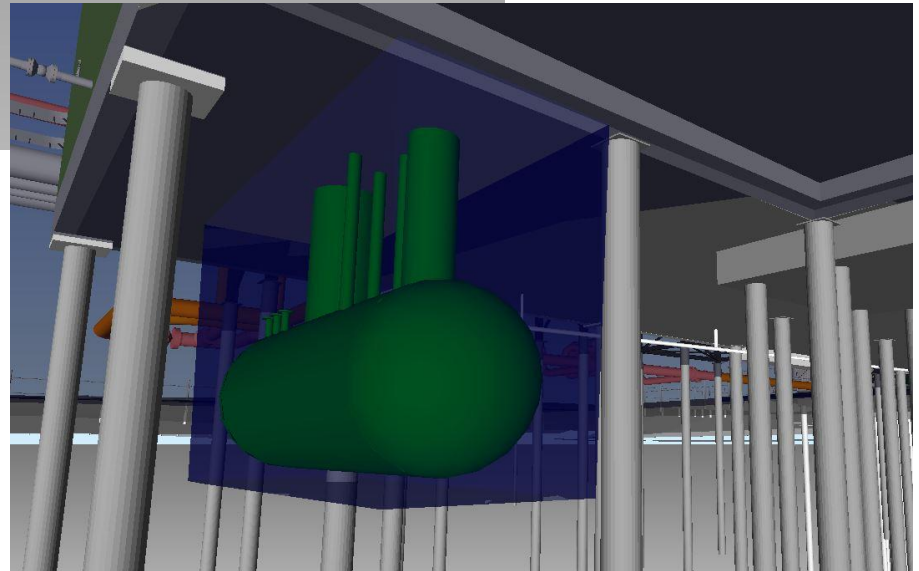
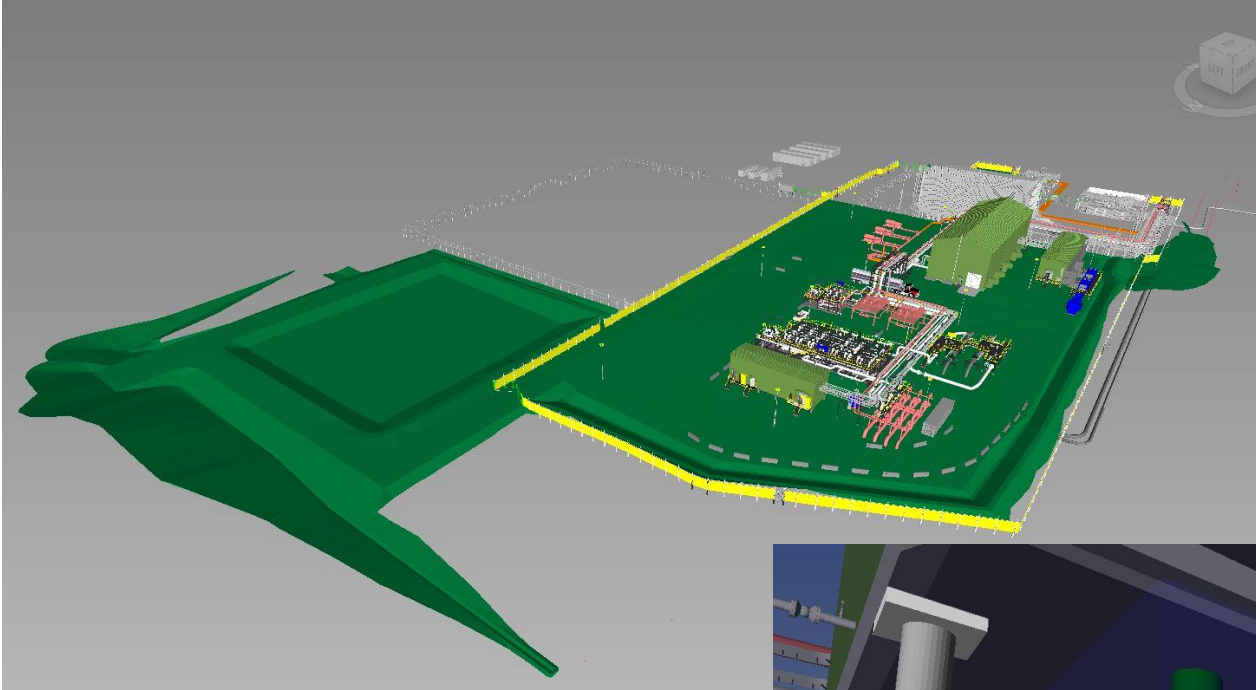
<b>Summary Totals - Station Area</b>	
<b>MATERIAL TOTALS - VOLUMES (CU.M)</b>	
CLAY	96.8
TOP COURSE - 25mm MINUS	1906.9
BASE COURSE - 80mm MINUS	3959.5
SAND	1941.2
CONCRETE PAD 0.3M	364.3
DRY BENTONITE	22.7
<b>MATERIAL QUANTITY - AREA (SQ.M)</b>	
LP10 GEO	27222.4
ENVIRO	11197.5

<b>Summary Totals - Pond Area</b>	
<b>MATERIAL TOTALS - VOLUMES (CU.M)</b>	
RIPRAP	37.3
CLAY (INCL CULVERTS)	2718.8
TOP COURSE - 25mm MINUS	467.5
BASE COURSE - 80mm MINUS	623.3



# Export to Navisworks (3D Faces)



# Using DirtDemon 4 Automation

- ▶ Manages Subsite Properties:
  - Group
  - Material List
  - Strip depth
  - Pregrade depth
  - Cut and Fill Factors
- ▶ Generates Material Volume and Area Reports
- ▶ Processes “out of Box” Civil 3D Surfaces and CutFill Surfaces using Subsite Parameters
- ▶ Generates CutFill Volume Reports

# Subsite Manager Interface

DirtDemon 4 <C:\Development\SolidCAD\DirtDemon4\\_Docs\Site EW Volumes.dwg>

Sub Site Manager | Cut Fill Volumes

Define SubSites

Property	Default
Start Counter	1
Name	SUB
Group	SUBSITE
Material List	Site
Cut Factor	1.00
Fill Factor	1.00
Topsoil Depth	-0.300

Material List

Select on The Screen  
 Select by Layer

0

Append to Sub Site List

Select SubSites

SubSites Listing

Zoom to Selected S

Name	Area	Group	Material List	Cut Factor	Fill Factor	Stripping	Pregrade
ACCESSRD_2	1576.57	POND	<Not Assign...>	1.00	1.00	-0.300	-0.850
CHANNEL_4	103.69	POND	<Not Assign...>	1.00	1.00	-0.300	-1.100
LANDSCAPE_1	3199.01	POND	<Not Assign...>	1.00	1.00	-0.300	-0.250
PONDBOTTOM_1	3940.44	POND	<Not Assign...>	1.00	1.00	-0.300	-0.600
PONDSIDESLOPE_1	273.68	POND	<Not Assign...>	1.00	1.00	-0.300	-0.300
PONDSIDESLOPE_2	298.67	POND	<Not Assign...>	1.00	1.00	-0.300	-0.300
RIPRAP_1	34.08	POND	<Not Assign...>	1.00	1.00	-0.300	-0.450
RIPRAP_2	15.23	POND	<Not Assign...>	1.00	1.00	-0.300	-0.450
RIPRAP_3	83.18	POND	<Not Assign...>	1.00	1.00	-0.300	-0.450
SERVICERD_1	1536.39	POND	<Not Assign...>	1.00	1.00	-0.300	-0.600
SWALE_1	590.76	POND	<Not Assign...>	1.00	1.00	-0.300	-0.150
ACCESSRD_1	874.76	SITE	<Not Assign...>	1.00	1.00	-0.300	-0.650
CHANNEL_1	677.19	SITE	<Not Assign...>	1.00	1.00	-0.300	-0.450
CHANNEL_2	725.53	SITE	<Not Assign...>	1.00	1.00	-0.300	-0.600
CHANNEL_3	201.71	SITE	<Not Assign...>	1.00	1.00	-0.300	-0.800
SITEAREA_1	2387.15	SITE	<Not Assign...>	1.00	1.00	-0.300	-0.600

Number of Subsites = 26

# Assign Material List

**Material List Editor**

Select Material List Layers

Remove Layer Move Up Move Down

Name	Units	Thickness
Top Course - 25mm MINUS	sq.m	150
GeoGrid	sq.m	0
Base Course - 80mm MINUS	sq.m	200
LP10 Geo Fabric	sq.m	0
Clay	cu.m	700

**Sub Sites Manager** | Cut Fill Volumes

Define SubSites

Property	Default
Name	SUB
Group	SUBSITE
Material List	Site
Cut Factor	1.00
Fill Factor	1.00
Topsoil Depth	-0.300
Pregrade Depth	0.750

SubSites Listing

Zoom to Selected Subsites

Name	Area	Group	Material List	Cut Factor	Fill Factor	Stripping	Quantity
CHANNEL_4	103.69	POND	Access Road - Clay	1.00	1.00	-0.300	1.050
LANDSCAPE_1	3199.01	POND	RipRap - Clay	1.00	1.00	-0.300	1.050
PONDBOTTO...	3940.44	POND	Landscape	1.00	1.00	-0.300	0.250
PONDSIDESL...	273.68	POND	POND	1.00	1.00	-0.300	0.600
PONDSIDESL...	298.67	POND	Pond Sideslope	1.00	1.00	-0.300	0.150
RIPRAP_1	34.08	POND	Pond Sideslope	1.00	1.00	-0.300	0.150
RIPRAP_2	15.23	POND	RipRap	1.00	1.00	-0.300	0.450
RIPRAP_3	83.18	POND	RipRap	1.00	1.00	-0.300	0.450
SERVICERD_1	1536.39	POND	Service Road	1.00	1.00	-0.300	1.050
SWALE_1	590.87	POND	Swale	1.00	1.00	-0.300	0.150
ACCESSRD_1	874.76	SITE	Access Road - No Clay	1.00	1.00	-0.300	0.450
CHANNEL_1	677.19	SITE	Ditch Berm	1.00	1.00	-0.300	0.750
CHANNEL_2	725.53	SITE	Ditch Berm	1.00	1.00	-0.300	0.750
CHANNEL_3	201.71	SITE	Ditch Berm	1.00	1.00	-0.300	0.750
SITEAREA_1	2387.15	SITE	Traffic Area	1.00	1.00	-0.300	0.600
SITEAREA_2	1323.38	SITE	Traffic Area	1.00	1.00	-0.300	0.600
SITEAREA_3	3118.59	SITE	Traffic Area	1.00	1.00	-0.300	0.600
SITEAREA_4	1912.73	SITE	Traffic Area	1.00	1.00	-0.300	0.600
SITEAREA_5	1982.97	SITE	Traffic Area	1.00	1.00	-0.300	0.600
SITERD_1	1270.32	SITE	Site Road	1.00	1.00	-0.300	0.600
SITERD_2	1003.53	SITE	Site Road	1.00	1.00	-0.300	0.600
SUMP_1	18.58	SITE	<Not Assigned>	1.00	1.00	-0.300	-4.700
SUMP_2	18.58	SITE	<Not Assigned>	1.00	1.00	-0.300	-4.700

Number of Subsites = 26

# CutFill Volumes Process

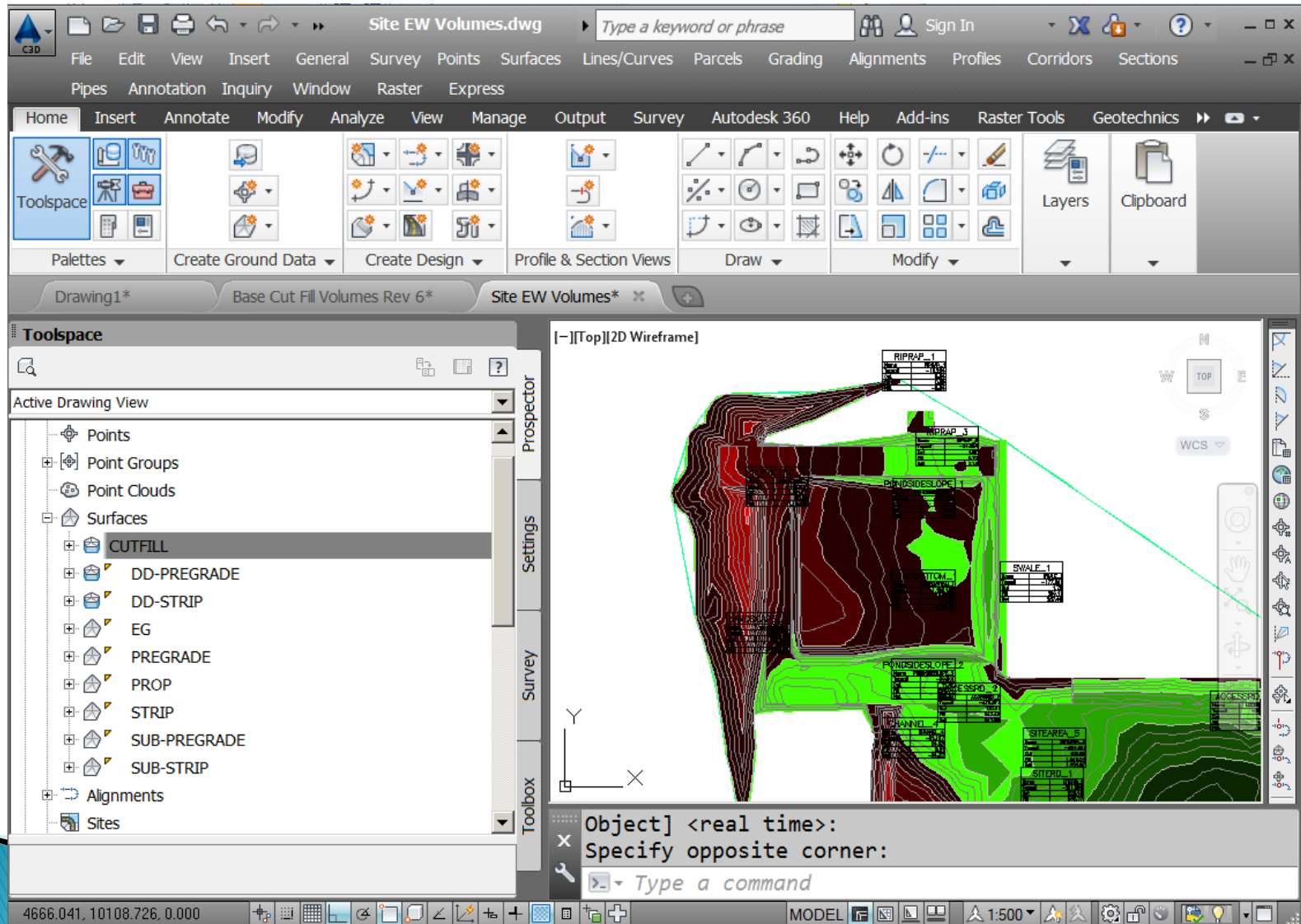
DirtDemon 4 <C:\Development\SolidCAD\DirtDemon4\\_Docs\Site EW Volumes.dwg>

Sub Site Manager | Cut Fill Volumes

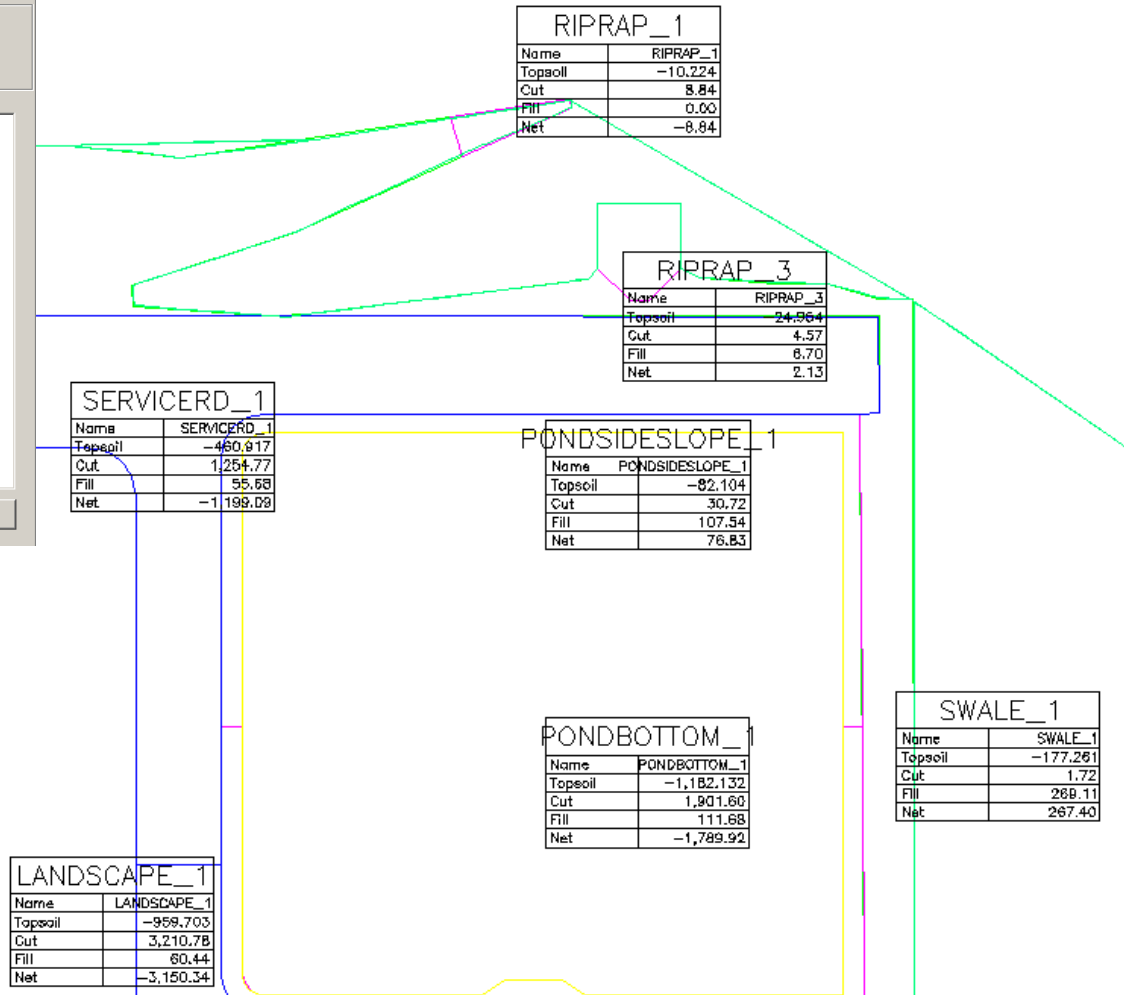
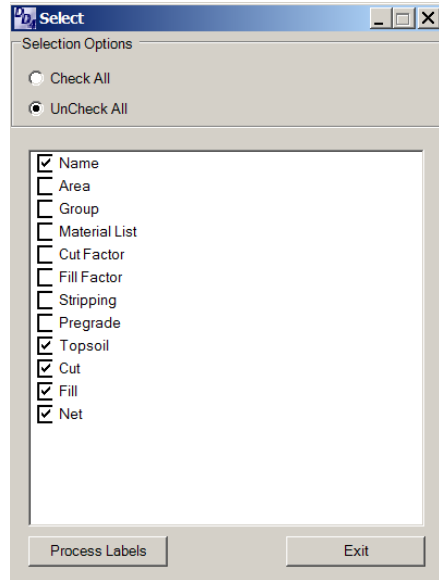
Name	Area	Group	Material List	Cut Factor	Fill Factor	Stripping	Pregrade	Topsoil	Cut	Fill	Net
ACCESSRD_2	1576.57	POND	Access Road ...	1	1	-0.300	1.05	-472.971	130.81	642.43	511.63
CHANNEL_4	103.69	POND	RipRap - Clay	1	1	-0.300	1.05	-31.107	64.53	0.21	-64.32
LANDSCAPE_1	3199.01	POND	Landscape	1	1	-0.300	0.25	-959.703	3,210.78	60.44	-3,150.34
PONDBOTT...	3940.44	POND	POND	1	1	-0.300	0.6	-1,182.132	1,901.60	111.68	-1,789.92
PONDSIDES...	273.68	POND	Pond Sideslope	1	1	-0.300	0.15	-82.104	30.72	107.54	76.83
PONDSIDES...	298.67	POND	Pond Sideslope	1	1	-0.300	0.15	-89.601	11.42	233.94	222.53
RIPRAP_1	34.08	POND	RipRap	1	1	-0.300	0.45	-10.224	8.84	0.00	-8.84
RIPRAP_2	15.23	POND	RipRap	1	1	-0.300	0.45	-4.569	1.16	0.00	-1.16
RIPRAP_3	83.18	POND	RipRap	1	1	-0.300	0.45	-24.954	4.57	6.70	2.13
SERVICERD_1	1536.39	POND	Service Road	1	1	-0.300	1.05	-460.917	1,254.77	55.68	-1,199.09
SWALE_1	590.87	POND	Swale	1	1	-0.300	0.15	-177.261	1.72	269.11	267.40
ACCESSRD_1	874.76	SITE	Access Road ...	1	1	-0.300	0.45	-262.428	65.50	444.14	378.63
CHANNEL_1	677.19	SITE	Ditch Berm	1	1	-0.300	0.75	-203.157	138.17	83.49	-54.68
CHANNEL_2	725.53	SITE	Ditch Berm	1	1	-0.300	0.75	-217.659	813.06	4.02	-809.04
CHANNEL_3	201.71	SITE	Ditch Berm	1	1	-0.300	0.75	-60.513	126.90	1.00	-125.90
SITEAREA_1	2387.15	SITE	Traffic Area	1	1	-0.300	0.6	-716.145	962.60	1,846.48	883.88
SITEAREA_2	1323.38	SITE	Traffic Area	1	1	-0.300	0.6	-397.014	0.00	2,712.67	2,712.67
SITEAREA_3	3118.59	SITE	Traffic Area	1	1	-0.300	0.6	-935.577	48.62	7,498.97	7,450.35
SITEAREA_4	1912.73	SITE	Traffic Area	1	1	-0.300	0.6	-573.819	42.20	2,521.33	2,479.12
SITEAREA_5	1982.97	SITE	Traffic Area	1	1	-0.300	0.6	-594.891	405.88	1,810.54	1,404.67
SITERD_1	1270.32	SITE	Site Road	1	1	-0.300	0.6	-381.096	928.15	662.77	-265.38
SITERD_2	1003.53	SITE	Site Road	1	1	-0.300	0.6	-301.059	0.00	2,150.31	2,150.31
SUMP_1	18.58	SITE	<Not Assigne...	1	1	-0.300	-4.700	-5.574	3.83	9.83	6.00
SUMP_2	18.58	SITE	<Not Assigne...	1	1	-0.300	-4.700	-5.574	15.26	2.38	-12.89
DITCH_1	1001.76	SITE	Ditch Berm	1	1	-0.300	0.75	-300.528	211.33	10.21	-201.13
SWALE_2	214.37	SITE	Swale	1	1	-0.300	0.15	-64.311	0.55	67.29	66.73

Number of Subsites = 26

# Civil 3D Surfaces (Automatic)



# Volume Labels (Blocks w Attributes)



# AutoCAD Table Output

SUBSITE VOLUMES												SUBSITE GROUP VOLUMES SUMMARY					
Group	Name	Area	Material List	Cut Factor	Fill Factor	Stripping	Pregrade	Topsoil	Cut	Fill	Net	Group	Area	Topsoil	Cut	Fill	Net
POND												POND	11,651.81	-3,495.543	6,620.89	1,487.76	-5,133.15
	ACCESSRD_2	1,576.57	Access Road - Clay	1.00	1.00	-0.3000	1.050	-472.971	130.81	642.43	511.63	SITE	16,731.15	-5,019.345	3,762.07	19,825.43	16,063.36
	CHANNEL_4	103.69	RipRap - Clay	1.00	1.00	-0.3000	1.050	-31.107	64.53	0.21	-64.32	Total	28,382.96	-8,514.888	10,382.96	21,313.17	10,930.21
	LANDSCAPE_1	3,199.01	Landscape	1.00	1.00	-0.3000	0.250	-959.703	3,210.78	60.44	-3,150.34						
	POND BOTTOM_1	3,940.44	POND	1.00	1.00	-0.3000	0.600	-1,182.132	1,901.60	111.68	-1,789.92						
	PONDSIDESLOPE_1	273.68	Pond Side Slope	1.00	1.00	-0.3000	0.150	-82.104	30.72	107.94	76.83						
	PONDSIDESLOPE_2	298.67	Pond Side Slope	1.00	1.00	-0.3000	0.150	-89.601	11.42	233.94	222.53						
	RIPRAP_1	34.08	RipRap	1.00	1.00	-0.3000	0.450	-10.224	8.34	0.00	-8.84						
	RIPRAP_2	15.23	RipRap	1.00	1.00	-0.3000	0.450	-4.569	1.16	0.00	-1.16						
	RIPRAP_3	83.18	RipRap	1.00	1.00	-0.3000	0.450	-24.954	4.57	6.70	2.13						
	SERVICERD_1	1,536.39	Service Road	1.00	1.00	-0.3000	1.050	-460.917	1,254.77	55.68	-1,199.09						
	SWALE_1	590.87	Swale	1.00	1.00	-0.3000	0.150	-177.261	1.72	269.11	267.40						
	SubTotal	11,651.81		11.00	11.00	-3.3000	5.800	-3,495.543	6,620.89	1,487.76	-5,133.15						
SITE																	
	ACCESSRD_1	874.76	Access Road - No Clay	1.00	1.00	-0.3000	0.450	-262.428	65.50	444.14	378.63						
	CHANNEL_1	677.19	Ditch Berm	1.00	1.00	-0.3000	0.750	-203.157	136.17	83.49	-94.68						
	CHANNEL_2	725.53	Ditch Berm	1.00	1.00	-0.3000	0.750	-217.659	813.06	4.02	-809.04						
	CHANNEL_3	201.71	Ditch Berm	1.00	1.00	-0.3000	0.750	-60.513	126.90	1.00	-125.90						
	DITCH_1	1,001.76	Ditch Berm	1.00	1.00	-0.3000	0.750	-300.528	211.33	10.21	-201.13						
	SITEAREA_1	2,387.15	Traffic Area	1.00	1.00	-0.3000	0.600	-716.145	962.60	1,846.48	883.68						
	SITEAREA_2	1,323.38	Traffic Area	1.00	1.00	-0.3000	0.600	-397.014	0.00	2,712.67	2,712.67						
	SITEAREA_3	3,118.59	Traffic Area	1.00	1.00	-0.3000	0.600	-935.577	48.62	7,498.97	7,450.35						
	SITEAREA_4	1,912.73	Traffic Area	1.00	1.00	-0.3000	0.600	-573.819	42.20	2,521.33	2,479.12						
	SITEAREA_5	1,962.97	Traffic Area	1.00	1.00	-0.3000	0.600	-594.891	405.38	1,810.54	1,404.67						
	SITERD_1	1,270.32	Site Road	1.00	1.00	-0.3000	0.600	-381.096	928.15	662.77	-265.38						
	SITERD_2	1,003.53	Site Road	1.00	1.00	-0.3000	0.600	-301.059	0.00	2,150.31	2,150.31						
	SUM_P_1	18.58	<Not Assigned>	1.00	1.00	-0.3000	-4.700	-5.574	3.83	9.63	6.00						
	SUM_P_2	18.58	<Not Assigned>	1.00	1.00	-0.3000	-4.700	-5.574	15.26	2.38	-12.89						
	SWALE_2	214.37	Swale	1.00	1.00	-0.3000	0.150	-64.311	0.55	67.29	66.73						
	SubTotal	16,731.15		15.00	15.00	-4.5000	-1.600	-5,019.345	3,762.07	19,825.43	16,063.36						



# Auto Export of Material Volumes

Material Totals for Entire Site	
<b>Volumes Summary</b>	
Material Name	Volumes (cu.m)
Base Course - 80mm MINUS	4,784.62
Clay	3,805.00
Cobblestone	85.85
Pitrun Gravel - 80mm	1,773.20
RipRap	106.28
Sand	2,540.87
Top Course - 25mm MINUS	2,547.96
Top Course - 40mm MINUS	511.70
Topsoil	799.75
<b>Area Summary</b>	
Material Name	Area (sq.m)
E Grid	5.72
Enviro Fabric	129.99
Enviro Fabric Double	5.72
GeoGrid	31.13
LP10 Geo Fabric	328.27
LP16 Geo Fabric	50.85

Material Totals by Group		
<b>Volumes Summary</b>		
Group Name	Material Name	Volume (cu.m)
POND		
	Base Course - 80mm MINUS	622.59
	Clay	2,241.29
	Cobblestone	85.85
	Pitrun Gravel - 80mm	1,773.20
	RipRap	106.28
	Sand	591.07
	Top Course - 25mm MINUS	466.94
	Top Course - 40mm MINUS	88.61
	Topsoil	799.75
SITE		
	Base Course - 80mm MINUS	4,162.03
	Clay	1,563.71
	Sand	1,949.80
	Top Course - 25mm MINUS	2,081.01
	Top Course - 40mm MINUS	423.08
<b>Area Summary</b>		
Group Name	Material Name	Area (sq.m)
POND		
	E Grid	5.72
	Enviro Fabric Double	5.72
	GeoGrid	31.13
	LP10 Geo Fabric	33.49
	LP16 Geo Fabric	50.85

Material Totals by Subsite						
<b>Volumes and Areas Summary</b>						
Group Name	Subsite Name	Subsite Area	Material Name	Depth	Units	Total
POND						
	ACCESSRD_2	1,576.57	POND			
			Top Course - 25mm MINUS	0.15	sq.m	236.49
			GeoGrid	0.00	sq.m	1,576.57
			Base Course - 80mm MINUS	0.20	sq.m	315.31
			LP10 Geo Fabric	0.00	sq.m	1,576.57
			Clay	0.70	cu.m	1,103.60
	CHANNEL_4	103.69	POND			
			RipRap	0.45	cu.m	46.66
			LP10 Geo Fabric	0.00	sq.m	103.69
			Clay	0.60	cu.m	62.21
	LANDSCAPE_1	3,199.01	POND			
			Topsoil	0.25	cu.m	799.75
	PONDBOTTOM_1	3,940.44	POND			
			Pitrun Gravel - 80mm	0.45	cu.m	1,773.20
			LP16 Geo Fabric	0.00	sq.m	3,940.44
			Sand	0.15	cu.m	591.07

# Auto Export of Cut Fill Volumes

	A	B	C	D	E	F
1	Group	Area	Topsoil	Cut	Fill	Net
2	POND	11,651.81	-3,495.543	6,620.89	1,487.75	-5,133.15
3	SITE	16,731.15	-5,019.345	3,762.07	19,825.43	16,063.36
4	Total	28,382.96	-8,514.888	10,382.96	21,313.17	10,930.21

	A	B	C	D	E	F	G	H	I	J	K	L
1	Group	Name	Area	Material Li	Cut Factor	Fill Factor	Stripping	Pregrade	Topsoil	Cut	Fill	Net
2	POND											
3		ACCESSRD_2	1,576.57	Access Road	1.00	1.00	-0.3000	1.050	-472.971	130.81	642.43	511.63
4		CHANNEL_4	103.69	RipRap - Clay	1.00	1.00	-0.3000	1.050	-31.107	64.53	0.21	-64.32
5		LANDSCAPE_1	3,199.01	Landscape	1.00	1.00	-0.3000	0.250	-959.703	3,210.78	60.44	-3,150.34
6		PONDBOTTOM_1	3,940.44	POND	1.00	1.00	-0.3000	0.600	-1,182.132	1,901.60	111.68	-1,789.92
7		PONDSIDESLOPE_1	273.68	Pond Sideslop	1.00	1.00	-0.3000	0.150	-82.104	30.72	107.54	76.83
8		PONDSIDESLOPE_2	298.67	Pond Sideslop	1.00	1.00	-0.3000	0.150	-89.601	11.42	233.94	222.53
9		RIPRAP_1	34.08	RipRap	1.00	1.00	-0.3000	0.450	-10.224	8.84	0.00	-8.84
10		RIPRAP_2	15.23	RipRap	1.00	1.00	-0.3000	0.450	-4.569	1.16	0.00	-1.16
11		RIPRAP_3	83.18	RipRap	1.00	1.00	-0.3000	0.450	-24.954	4.57	6.70	2.13
12		SERVICERD_1	1,536.39	Service Road	1.00	1.00	-0.3000	1.050	-460.917	1,254.77	55.68	-1,199.09
13		SWALE_1	590.87	Swale	1.00	1.00	-0.3000	0.150	-177.261	1.72	269.11	267.40
14	SubTotal		11,651.81		11.00	11.00	-3.3000	5.800	-3,495.543	6,620.89	1,487.75	-5,133.15
15												
16	SITE											
17		ACCESSRD_1	874.76	Access Road	1.00	1.00	-0.3000	0.450	-262.428	65.50	444.14	378.63
18		CHANNEL_1	677.19	Ditch Berm	1.00	1.00	-0.3000	0.750	-203.157	138.17	83.49	-54.68
19		CHANNEL_2	725.53	Ditch Berm	1.00	1.00	-0.3000	0.750	-217.659	813.06	4.02	-809.04
20		CHANNEL_3	201.71	Ditch Berm	1.00	1.00	-0.3000	0.750	-60.513	126.90	1.00	-125.90
21		DITCH_1	1,001.76	Ditch Berm	1.00	1.00	-0.3000	0.750	-300.528	211.33	10.21	-201.13
22		SITEAREA_1	2,387.15	Traffic Area	1.00	1.00	-0.3000	0.600	-716.145	962.60	1,846.48	883.88
23		SITEAREA_2	1,323.38	Traffic Area	1.00	1.00	-0.3000	0.600	-397.014	0.00	2,712.67	2,712.67
24		SITEAREA_3	3,118.59	Traffic Area	1.00	1.00	-0.3000	0.600	-935.577	48.62	7,498.97	7,450.35
25		SITEAREA_4	1,912.73	Traffic Area	1.00	1.00	-0.3000	0.600	-573.819	42.20	2,521.33	2,479.12
26		SITEAREA_5	1,982.97	Traffic Area	1.00	1.00	-0.3000	0.600	-594.891	405.88	1,810.54	1,404.67
27		SITERD_1	1,270.32	Site Road	1.00	1.00	-0.3000	0.600	-381.096	928.15	662.77	-265.38
28		SITERD_2	1,003.53	Site Road	1.00	1.00	-0.3000	0.600	-301.059	0.00	2,150.31	2,150.31
29		SUMP_1	18.58	<Not Assigned	1.00	1.00	-0.3000	-4.700	-5.574	3.83	9.83	6.00
30		SUMP_2	18.58	<Not Assigned	1.00	1.00	-0.3000	-4.700	-5.574	15.26	2.38	-12.89
31		SWALE_2	214.37	Swale	1.00	1.00	-0.3000	0.150	-64.311	0.55	67.29	66.73
32	SubTotal		16,731.15		15.00	15.00	-4.5000	-1.600	-5,019.345	3,762.07	19,825.43	16,063.36

# Proposed Training Outline

- ▶ Session 1 –
  - Civil 3D Environment & Project Setup
  - From Survey to Surface – Existing Ground
  - Site Design to Surface – Proposed Grades
  - Surface Styles and Presentation for Checking Input
  - Data Shortcut to Earthworks Calculation Drawing
- ▶ Session 2 –
  - Creation of Subsites using 2D Closed Polygons
  - Volume Surfaces Creation – Manual “Out of Box” Method
  - Bounded Volume Calculation using Volumes Dashboard
  - Automatic Volume Surface and Calculation using Dirt Demon
  - Check Sections using Alignments and Surface Profiles
  - CutFill Surface Styles, Annotation and Table Output
  - LandXML for Automated Machine Grading