CITY OF SALINA MSW LANDFILL FACILITY

SALINA, KANSAS

PERMIT NO. 144

LANDFILL MASTER PLAN

JUNE 2011

REVISED SEPTMEMBER 2012

PREPARED BY

AQUATERRA

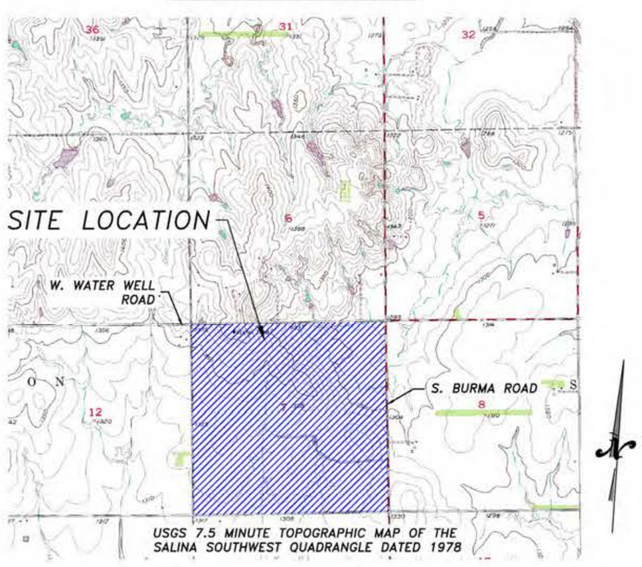
ENVIRONMENTAL SOLUTIONS, INC.

7311 WEST 130th STREET, SUITE 100

OVERLAND PARK, KANSAS 66213

(913) 681-0030 FAX (913) 681-0012

PROJECT LOCATION



USGS 7.5 MINUTE TOPOGRAPHIC MAP OF THE SALINA SOUTHWEST QUADRANGLE DATED 1978

Sheet List	
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0	Coversheet
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LEGEND

- 2' EXISTING CONTOUR
- 1350 10' EXISTING CONTOUR
- 2' GROUNDWATER CONTOUR
- 1350 10' GROUNDWATER CONTOUR
- EDGE OF EXISTING ROAD
- EDGE OF PROPOSED ROAD
- EXISTING CELL/PHASE BOUNDARY
- PROPOSED CELL/PHASE BOUNDARY
- PL PROPERTY LINE
- WTR WTR EXISTING WATER LINE
- OE OE EXISTING OVERHEAD ELECTRIC
- E EXISTING FENCE
- 2' TOP OF CLAY CONTOUR
- 1350 10' TOP OF CLAY CONTOUR
- 2' FINAL COVER CONTOUR
- 1350 10' FINAL COVER CONTOUR
- FINAL COVER LIMITS
- 2' OUTER GRADING CONTOUR
- 1350 10' OUTER GRADING CONTOUR
- LCP PROPOSED LEACHATE COLLECTION PIPE
- GM GM PROPOSED LEACHATE GRAVITY MAIN
- FM FM PROPOSED LEACHATE FORCEMAIN
- FM FM EXISTING LEACHATE FORCEMAIN
- EDGE OF BUFFER
- GP-08 EXISTING GAS PROBE
- P-05 EXISTING GROUNDWATER MONITORING WELL OR PIEZOMETER
- BML1 EXISTING BENCHMARK
- VEGETATION
- PROPOSED CULVERT
- EXISTING CULVERT
- EXISTING BUILDING

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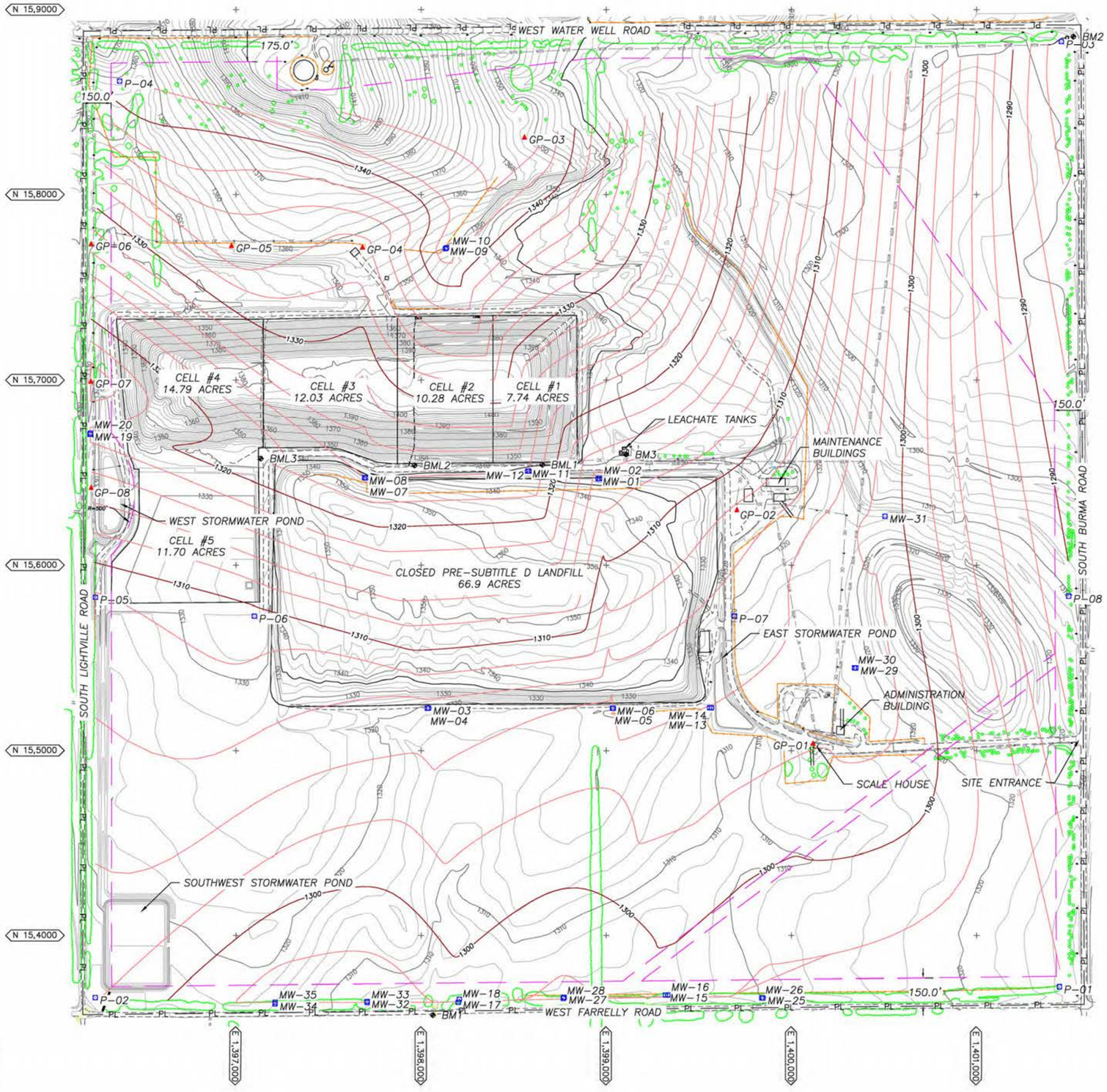

Elevations Used to Model Groundwater

Well #	Elevation	Event
MW-01	1313.20	6/26/1995
MW-02	1313.33	6/26/1995
MW-03	1305.29	6/26/1995
MW-04	1305.33	6/26/1995
MW-05	1304.64	6/26/1995
MW-06	1303.39	6/26/1995
MW-07	1324.00	6/26/1995
MW-08	1323.91	6/26/1995
MW-09	1343.22	6/26/1995
MW-10	1343.30	6/26/1995
MW-11	1324.13	6/26/1995
MW-12	1324.00	6/26/1995
MW-13	1303.97	6/26/1995
MW-14	1303.99	6/26/1995
MW-15	1299.07	6/26/1995
MW-16	1299.13	6/26/1995
MW-17	1298.69	6/26/1995
MW-18	1299.18	6/26/1995
MW-19	1318.53	5/19/2009
MW-20	1318.40	5/19/2009
MW-25	1297.39	5/19/2009
MW-26	1297.48	5/19/2009
MW-27	1297.49	5/19/2009
MW-28	1297.36	5/19/2009
MW-29	1304.11	5/19/2009
MW-30	1303.08	5/19/2009
MW-31	1301.12	5/19/2009
MW-32	1296.09	11/16/2009
MW-33	1296.09	11/16/2009
MW-34	1296.83	11/16/2009
MW-35	1296.80	11/16/2009
P-01	1296.26	6/26/1995
P-02	1302.16	6/26/1995
P-03	1284.48	6/26/1995
P-04	1341.87	6/26/1995
P-05	1307.66	6/26/1995
P-06	1309.18	6/26/1995
P-07	1305.18	6/26/1995
P-08	1290.38	6/26/1995
GP-03	1345.78	10/1/2010
GP-04	1333.10	10/1/2010
GP-05	1335.68	10/1/2010
GP-06	1326.77	10/1/2010
GP-07	1314.46	10/1/2010

NOTES:

1. TOPOGRAPHIC CONTOURS WITHIN ACTIVE WASTE DISPOSAL AREAS PROVIDED BY CITY OF SALINA, APRIL 20, 2010. OTHER SURVEY DATA OBTAINED FROM 2003 CITY OF SALINA AERIAL PHOTO, GPS SURVEY PERFORMED BY CITY OF SALINA DATED JULY 1, 2008, AND GPS SURVEY PERFORMED BY CITY OF SALINA DATED MAY 4, 2009.
2. GROUNDWATER CONTOURS DEVELOPED FROM OBSERVED HISTORICALLY HIGH GROUNDWATER ELEVATIONS. GROUNDWATER ELEVATIONS IN GAS PROBES WERE USED TO REFINE THE GROUNDWATER CONTOURS IN THE NORTHERN AREA OF THE SITE.

Benchmark	Northing	Easting	Elevation (feet msl)
BM1	153573.1	1398063	1306.82
BM2	158853.9	1401523	1287.43
BM3	156596.7	1399107	1334.74
BML1	156542	1398654	1338.7
BML2	156537.5	1397965	1342.11
BML3	156574.9	1397134	1343.44

300 0 300 600
SCALE FEET

PERMIT PLANS
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CONSTRUCTION

AMASTASIA JOST WELCH
LICENSED
18409
4-12-2012
KANSAS
PROFESSIONAL ENGINEER

REV.	DATE	BY	DESCRIPTION
R6	-	-	-
R5	-	6BY	-
R4	-	5BY	-
R3	-	4BY	-
R2	-	3BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments. Add buffer

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ENVIRONMENTAL SOLUTIONS, INC.
7311 West 130th Street, Suite 100
Overland Park, Kansas 66213

CLIENT:
CITY OF SALINA
CITY OF SALINA MSW LANDFILL FACILITY
SALINA, KANSAS

DRAWN BY: EMO | DESIGNED BY: EMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: GROUNDWATER.DWG | DATE: 9/12/2012

EXISTING SITE LAYOUT AND GROUNDWATER CONTOURS
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 1 | PROJECT NUMBER: 3512.10 | SHT. 1 OF 25

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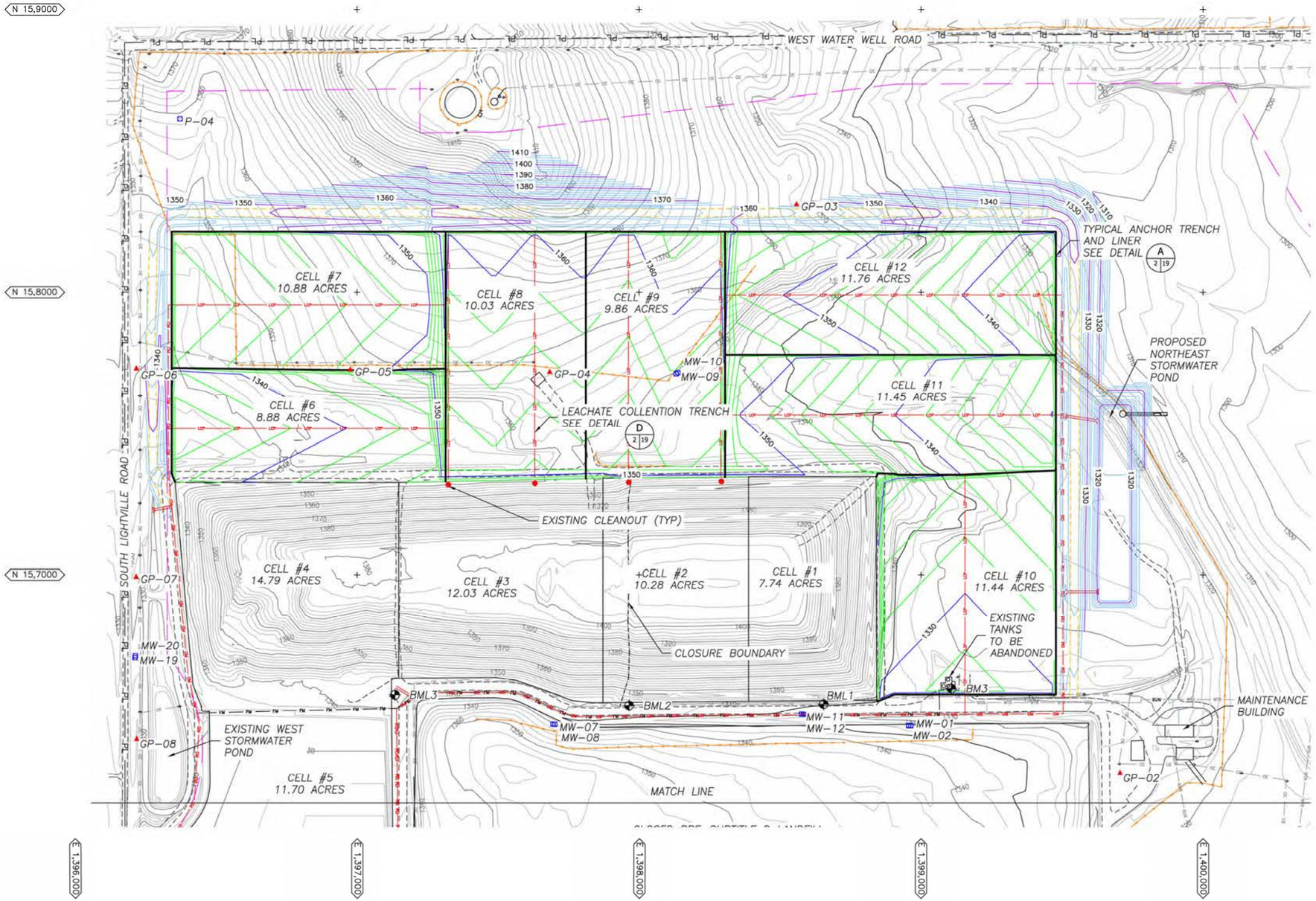

NOTES:

1. PRIOR TO CONSTRUCTION OF CELLS 11 & 12, THE FLOOR ELEVATIONS OF THESE CELLS AND ASSOCIATED GROUNDWATER ELEVATIONS SHOULD BE ASSESSED TO DETERMINE THE CHANGE IN GROUNDWATER ELEVATIONS AND IF A MODIFICATION TO THE BASE GRADES SHOULD BE PURSUED.

Waste Limit Boundaries

Cell No.	Description	Northing	Easting	Acres
Cell 6	NW	157731.1	1396342.6	8.88
	NE	157728.7	1397313.7	
	SE	157330.8	1397313.7	
	SW	157328.7	1396354.6	
	N(1)	157725.9	1396737.8	
	N(2)	157723.9	1396931.9	
	N(3)	157722.3	1397125.5	
	N(4)	157726.3	1397177.4	
	S(1)	157327.3	1396400.1	
	S(2)	157327.6	1396500.3	
	S(3)	157327.5	1396600.3	
	S(4)	157327.4	1396700.3	
	S(5)	157327.3	1396800.3	
	S(6)	157326.5	1397000.3	
	S(7)	157327.4	1397147.4	
	W	157358.4	1396342.7	
Cell 7	NW	158214.4	1396342.6	10.88
	NE	158214.4	1397313.7	
	SE	157728.7	1397313.7	
	SW	157731.1	1396342.6	
	S(1)	157725.9	1396737.8	
	S(2)	157723.9	1396931.9	
	S(3)	157722.3	1397125.5	
	S(4)	157722.3	1397178.1	
Cell 8	NW	158214.4	1397313.7	10.03
	NE	158214.4	1397811.3	
	SE	157340.6	1397811.3	
	SW	157330.8	1397313.7	
Cell 9	NW	158214.4	1397811.3	9.86
	NE	158214.4	1398304.7	
	SE	157346.2	1398304.7	
	SW	157340.6	1397811.3	
	S(1)	157342.2	1397871.9	
Cell 10	NW	157347.6	1398841.0	11.44
	NE	157368.5	1399478.1	
	SE	156575.2	1399478.1	
	SW	156556.7	1398842.7	
	N(1)	157358.1	1398846.0	
	N(2)	157356.9	1398905.8	
	N(3)	157356.9	1398919.8	
	N(4)	157353.5	1399141.5	
	S(1)	156552.4	1398846.0	
	S(2)	156575.7	1398904.5	
Cell 11	NW	157778.0	1398304.7	11.45
	NE	157777.8	1399478.1	
	SE	157368.5	1399478.1	
	SW	157346.2	1398304.7	
	S(1)	157347.0	1398388.0	
	S(2)	157347.5	1398840.3	
	S(3)	157358.1	1398846.0	
	S(4)	157358.1	1398905.8	
	S(5)	157353.5	1398919.8	
	S(6)	157353.5	1399140.7	
Cell 12	NW	158214.4	1398304.7	11.76
	NE	158214.4	1399478.1	
	SE	157777.8	1399478.1	
	SW	157778.0	1398304.7	

Note: Each point is a vertex in the waste limit boundary of the given cell. Cells with more than four points have irregular sides or are non-rectangular in shape.

SCALE 200 0 200 400 FEET

PERMIT PLANS
NOT FOR
CONSTRUCTION

REV.	DATE	BY	DESCRIPTION
R6	-	6BY	-
R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

AQUATERRA
ENVIRONMENTAL SOLUTIONS, INC.
7311 West 130th Street, Suite 100
Overland Park, Kansas 66213

CLIENT: CITY OF SALINA
CITY OF SALINA MSW LANDFILL FACILITY
SALINA, KANSAS

DRAWN BY: EMO | DESIGNED BY: EMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: BASE_GRADES.DWG | DATE: 9/12/2012

NORTH TOP OF LINER GRADING PLAN
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 2 | PROJECT NUMBER: 3512.10 | SHT. 2 OF 25

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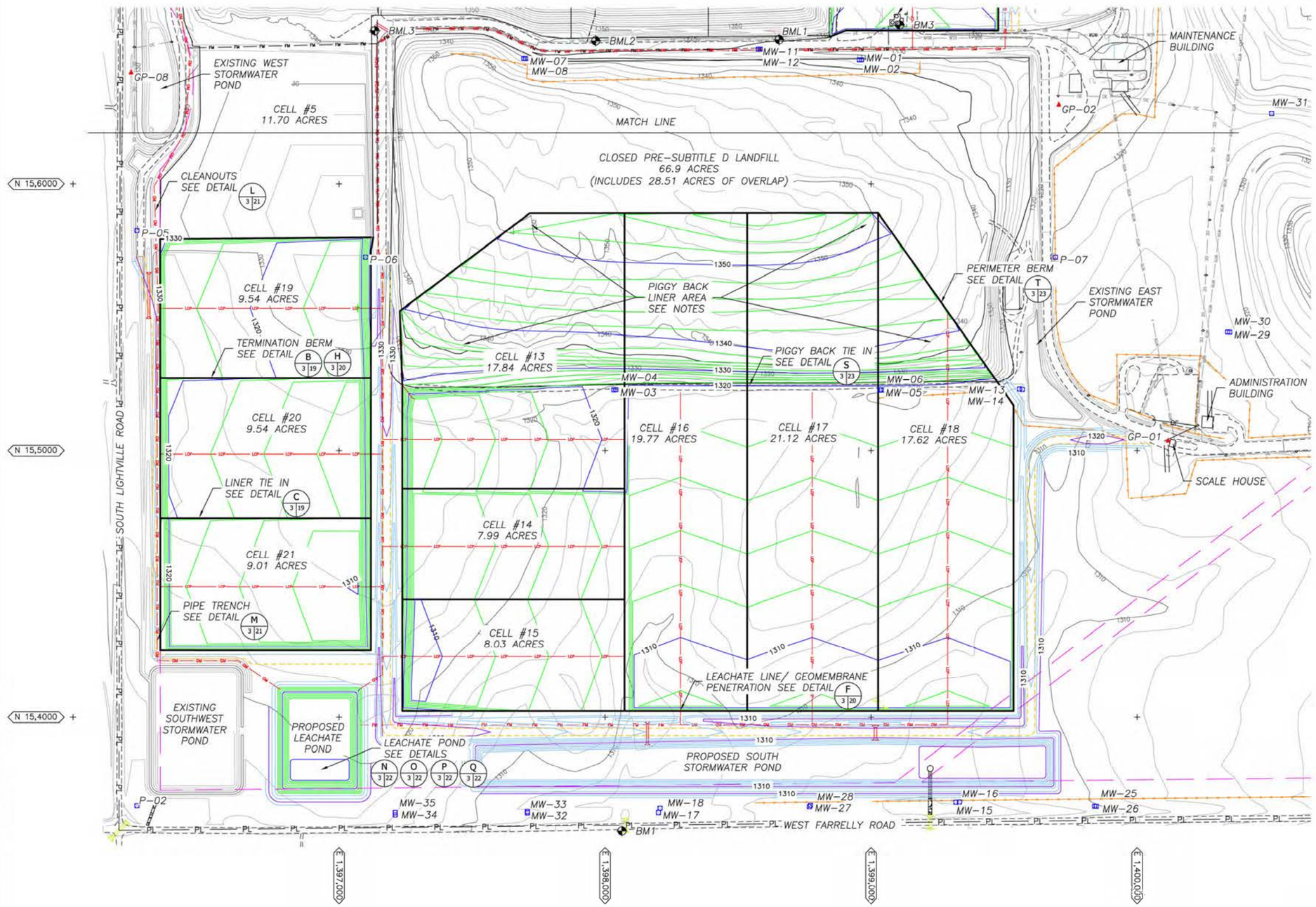

NOTES:

1. A MINIMUM OF ONE YEAR PRIOR TO CONSTRUCTING ANY PORTION OF THE PIGGY BACK LINER, A DEMONSTRATION MUST BE MADE TO AND APPROVED BY KDHE–BWM REGARDING COMPLIANCE WITH K.A.R. 28–29–104(e) AND (f). SEE SECTION 2.3 OF THE DESIGN REPORT FOR MORE INFORMATION.

Waste Limit Boundaries

Cell 13	NE	155890.3	1398072.9	17.84
	SE	154858.0	1398072.9	
	SW	154858.0	1397237.8	
	NW(1)	155523.4	1397228.4	
	NW(2)	155890.0	1397716.8	
	W	155232.1	1397237.8	
Cell 14	NW	154858.0	1397237.8	7.99
	NE	154858.0	1398072.9	
	SE	154441.4	1398072.9	
	SW	154441.4	1397237.8	
Cell 15	NW	154441.4	1397237.8	8.03
	NE	154441.4	1398072.9	
	SE	154022.9	1398072.9	
	SW	154022.9	1397237.8	
Cell 16	NW	155890.3	1398072.9	19.77
	NE	155890.8	1398534.0	
	SE	154022.9	1398534.0	
	SW	154022.9	1398072.9	
Cell 17	NW	155890.8	1398534.0	21.12
	NE	155891.2	1399026.4	
	SE	154022.9	1399026.4	
	SW	154022.9	1398534.0	
Cell 18	NW	155891.2	1399026.4	17.62
	NE	155170.9	1399535.2	
	SE	154022.9	1399535.2	
	SW	154022.9	1399026.4	
Cell 19	NW	155793.1	1396327.3	9.54
	NE	155799.8	1397119.8	
	SE	155271.6	1397119.8	
	SW	155271.7	1396327.6	
Cell 20	NW	155271.7	1396327.6	9.54
	NE	155271.6	1397119.8	
	SE	154746.9	1397119.8	
	SW	154747.0	1396327.9	
Cell 21	NW	154747.0	1396327.9	9.01
	NE	154746.9	1397119.8	
	SE	154251.1	1397119.8	
	SW	154251.5	1396328.2	

Note: Each point is a vertex in the waste limit boundary of the given cell. Cells with more than four points have irregular sides or are non-rectangular in shape.

PERMIT PLANS NOT FOR CONSTRUCTION

REV.	DATE	BY	DESCRIPTION
R6	–	6BY	–
R5	–	5BY	–
R4	–	4BY	–
R3	–	3BY	–
R2	–	2BY	–
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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SALINA, KANSAS

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ELECTRONIC FILE NAME: BASE_GRADES.DWG | DATE: 9/13/2012

SOUTH TOP OF LINER GRADING PLAN
LANDFILL MASTER PLAN

REV: 1 | DRAWING NUMBER: 3 | PROJECT NUMBER: 3512.10 | SHT. 3 OF 25

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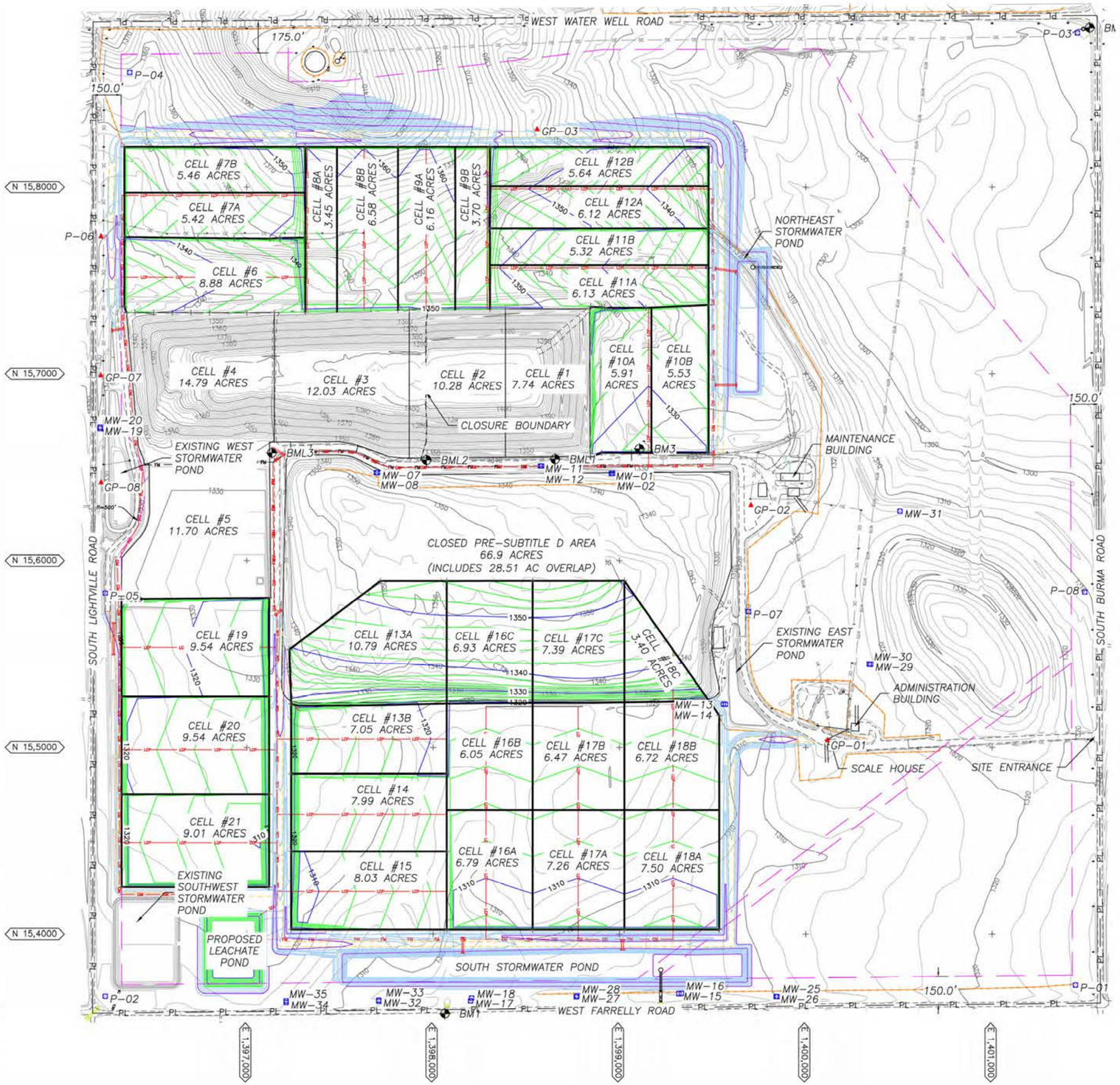

Minimum Cell Elevations (TOC)

Cell No.	Northing	Easting	Minimum TOC Elev. (ft)	GW Elev. (ft)	Δ Elev. (ft)
Cell 6	157517.6	1396361.2	1333.82	1324.86	8.96
Cell 7	157954.5	1396361.2	1339.82	1331.77	8.05
Cell 8	157344.2	1397630.0	1351.33*	1330.62	20.71
Cell 9	157345.8	1397962.6	1351.03*	1335.77	15.26
Cell 10	156592.1	1399156.1	1326.49	1314.35	12.14
Cell 11	157565.7	1399465.1	1329.95	1322.95	7.00
Cell 12	157990.3	1399465.1	1332.91	1325.27	7.64
Cell 13	155042.8	1397278.6	1312.84	1305.29	7.55
Cell 14	154641.4	1397289.4	1310.10	1302.97	7.13
Cell 15	154227.8	1397280.3	1308.85	1300.40	8.45
Cell 16	154042.7	1398283.7	1307.39	1300.11	7.28
Cell 17	154042.7	1398778.6	1307.39	1299.10	8.29
Cell 18	154042.7	1399287.8	1307.39	1300.03	7.36
Cell 19	155534.0	1397071.2	1315.81	1308.33	7.48
Cell 20	154987.3	1397075.1	1312.55	1305.55	7.00
Cell 21	154489.5	1397070.0	1309.82	1302.82	7.00

*ELEVATION WAS FIELD-VERIFIED. TIE INTO EXISTING CLEANOUT. ELEVATION MAY BE TOP OF PIPE. VERIFY BEFORE CONSTRUCTION.

NOTES:

1) ALL ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL.

2) TOC = TOP OF CLAY

PERMIT PLANS
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REV.	DATE	BY	DESCRIPTION
R6	-	6BY	-
R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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ENVIRONMENTAL SOLUTIONS, INC.
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Overland Park, Kansas 66213

CLIENT: CITY OF SALINA
CITY OF SALINA MSW LANDFILL FACILITY
SALINA, KANSAS

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ELECTRONIC FILE NAME: PHASING.DWG | DATE: 9/12/2012

PROPOSED CONSTRUCTION PHASING LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 4 | PROJECT NUMBER: 3512.10 | SHT. 4 OF 25

AUSTASIA JOST WILCH
LICENSED
18409
9-12-2012
KANSAS
PROFESSIONAL ENGINEER

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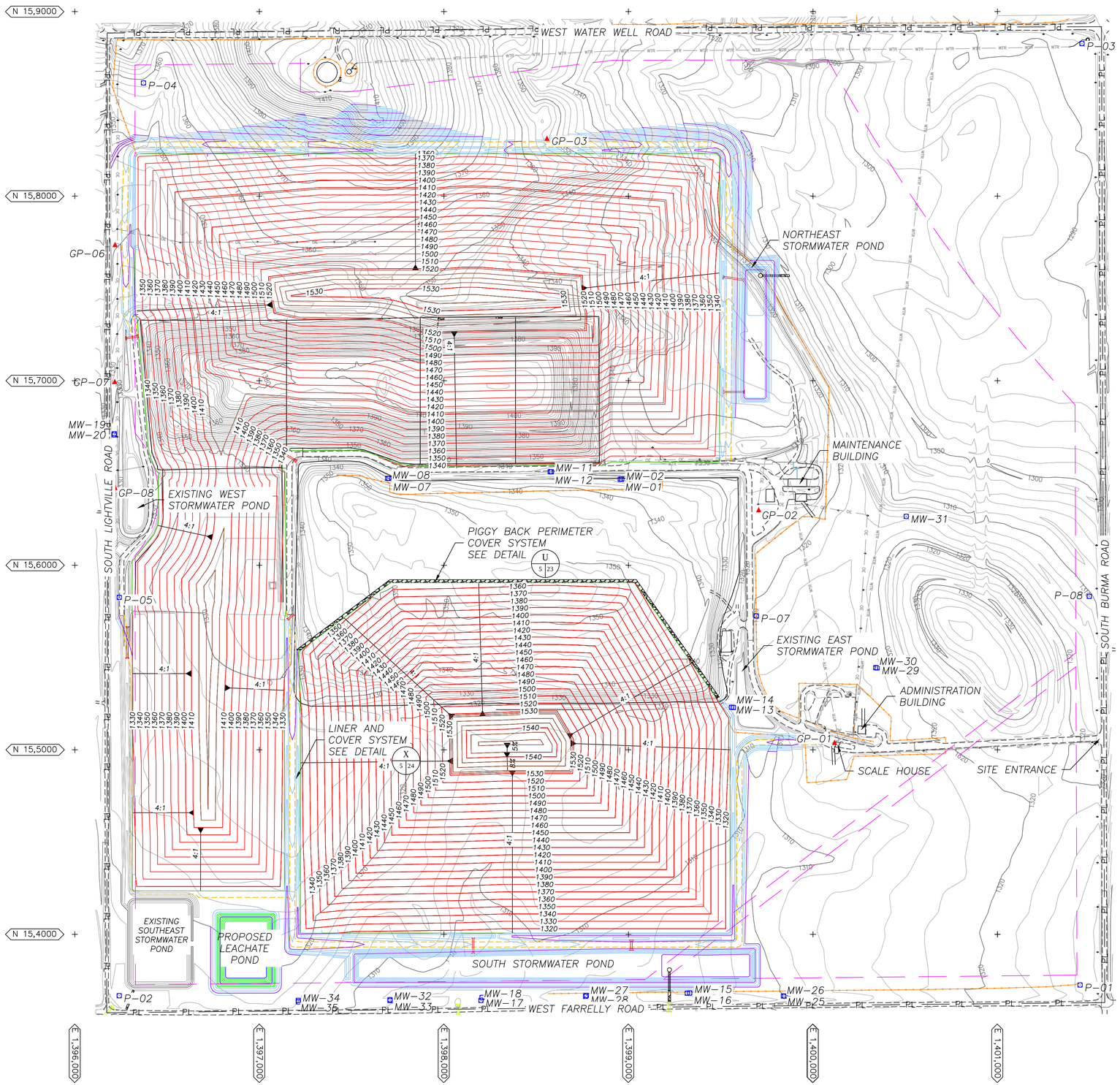

300 0 300 600
SCALE FEET

PERMIT PLANS
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REV.	DATE	BY	DESCRIPTION
R6	–	6BY	–
R5	–	5BY	–
R4	–	4BY	–
R3	–	3BY	–
R2	–	2BY	–
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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SALINA, KANSAS

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ELECTRONIC FILE NAME: FINAL_COVER.DWG | DATE: 9/12/2012

FINAL COVER GRADING PLAN
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 5 | PROJECT NUMBER: 3512.10 | SHT. 5 OF 25

NATASHA JOST WELCH
LICENSED
18409
9-12-2012
KANSAS
PROFESSIONAL ENGINEER

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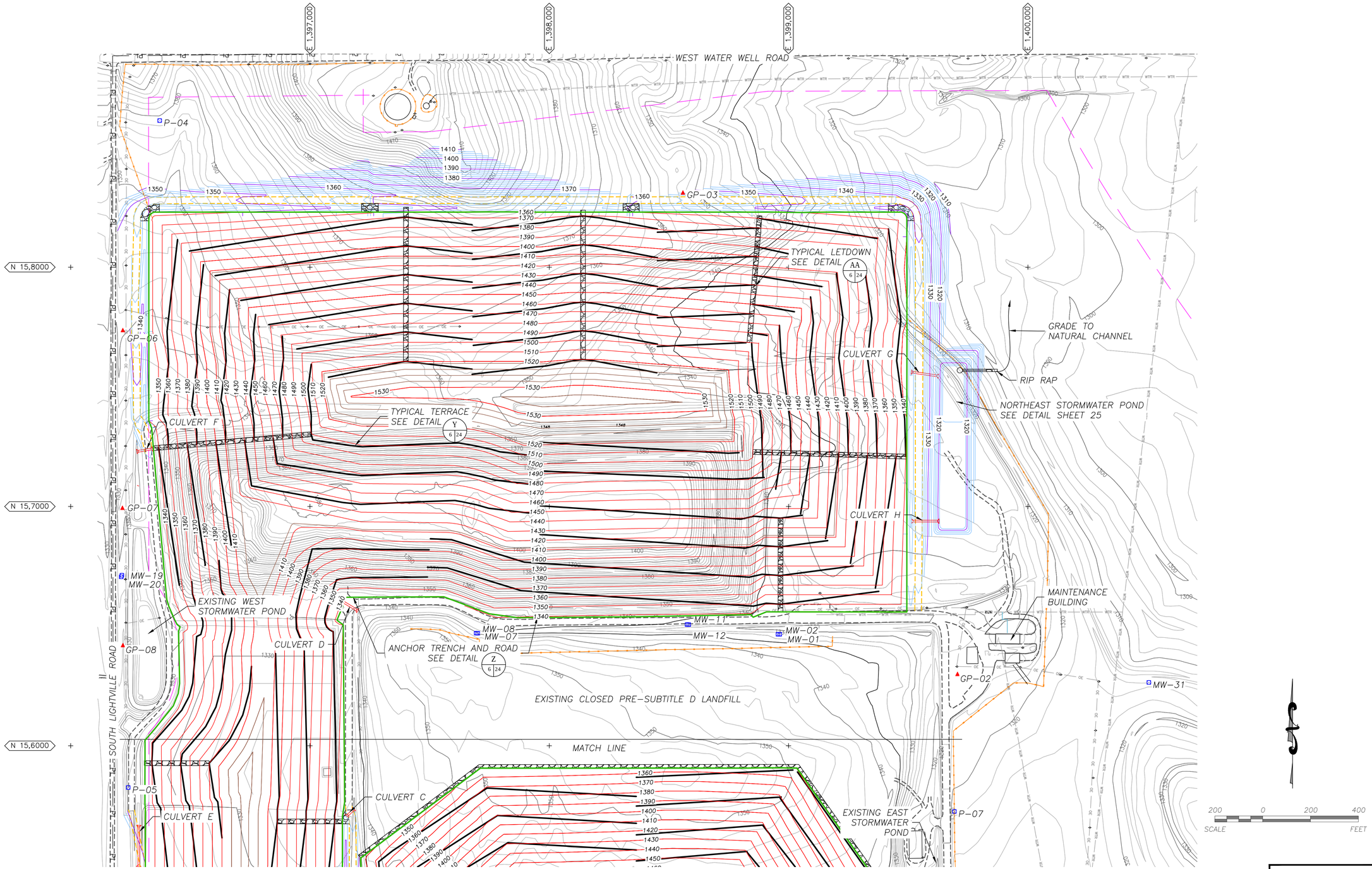

Culvert Schedule

	Culvert A	Culvert B	Culvert C	Culvert D	Culvert E	Culvert F	Culvert G
Type	RCP	RCP	RCP	RCP	RCP	Light Duty Span Bridge	RCP
Size (in.)	36	36	24	12	24		36
Length (ft)	70	90	40	85	85		110
Invert Elev Up	1308.0	1312.0	1330.0	1338.6	1327.5		1332.0
Invert Elev Down	1307.3	1310.2	1329.6	1338.0	1327.1		1326.0
Number of Barrels	4	4	1	2	3		3

PERMIT PLANS
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NATASHA JOST WELCH
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18409
9-12-2012
KANSAS
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REV.	DATE	BY	DESCRIPTION
R6	–	6BY	–
R5	–	5BY	–
R4	–	4BY	–
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R2	–	2BY	–
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DRAWN BY: EMO | DESIGNED BY: EMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: DRAINAGE_PLAN.DWG | DATE: 9/12/2012

NORTH STORMWATER MANAGEMENT PLAN
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 6 | PROJECT NUMBER: 3512.10 | SHT. 6 OF 25

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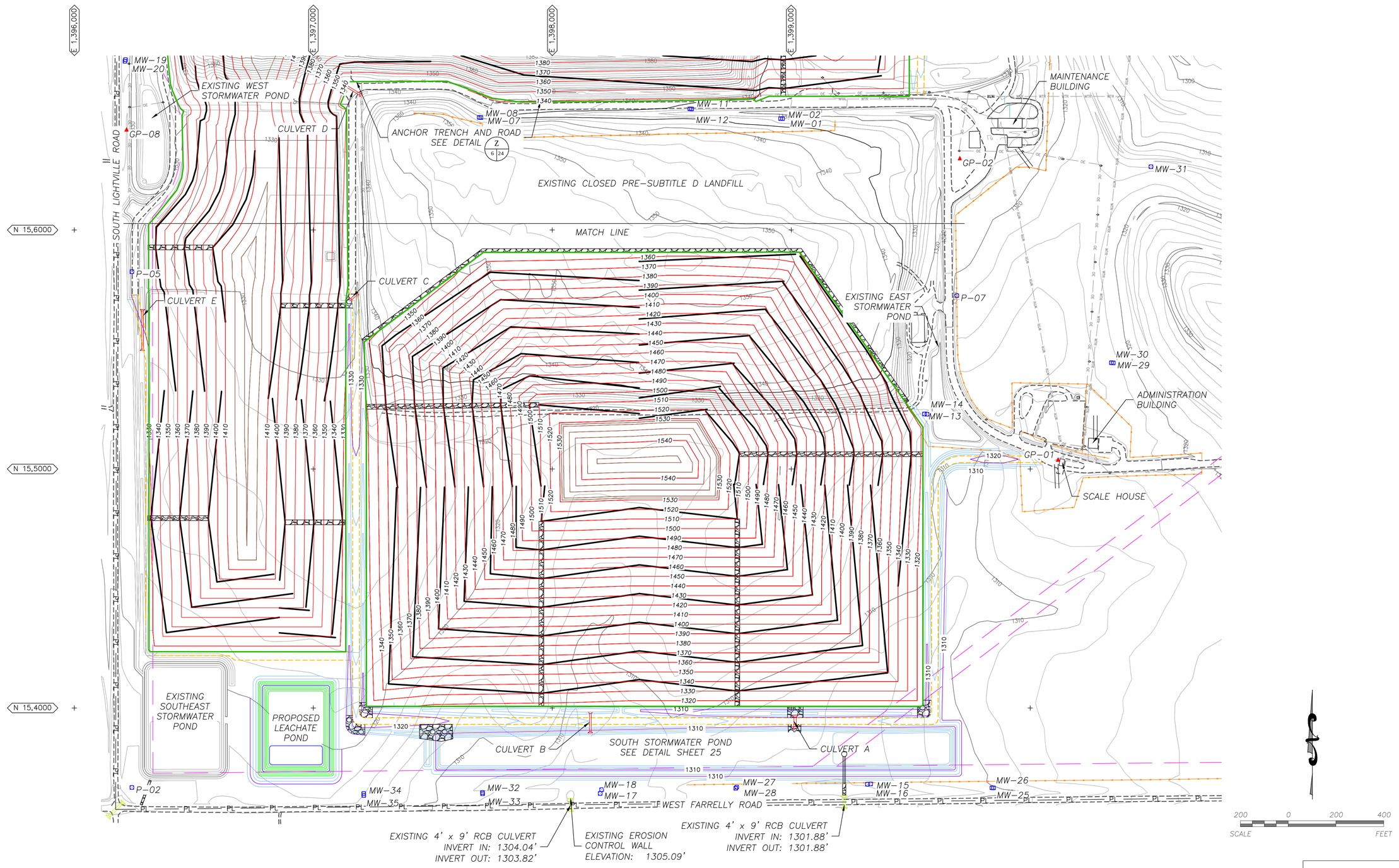

PERMIT PLANS NOT FOR CONSTRUCTION

REV.	DATE	BY	DESCRIPTION
R6	–	6BY	–
R5	–	5BY	–
R4	–	4BY	–
R3	–	3BY	–
R2	–	2BY	–
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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CITY OF SALINA MSW LANDFILL FACILITY
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DRAWN BY: BMO | DESIGNED BY: BMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: DRAINAGE PLAN.DWG | DATE: 9/12/2012

SOUTH STORMWATER MANAGEMENT PLAN
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 7 | PROJECT NUMBER: 3512.10 | SHT. 7 OF 25

ANASTASIA JOST WELCH
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18409
9-12-2012
KANSAS
PROFESSIONAL ENGINEER

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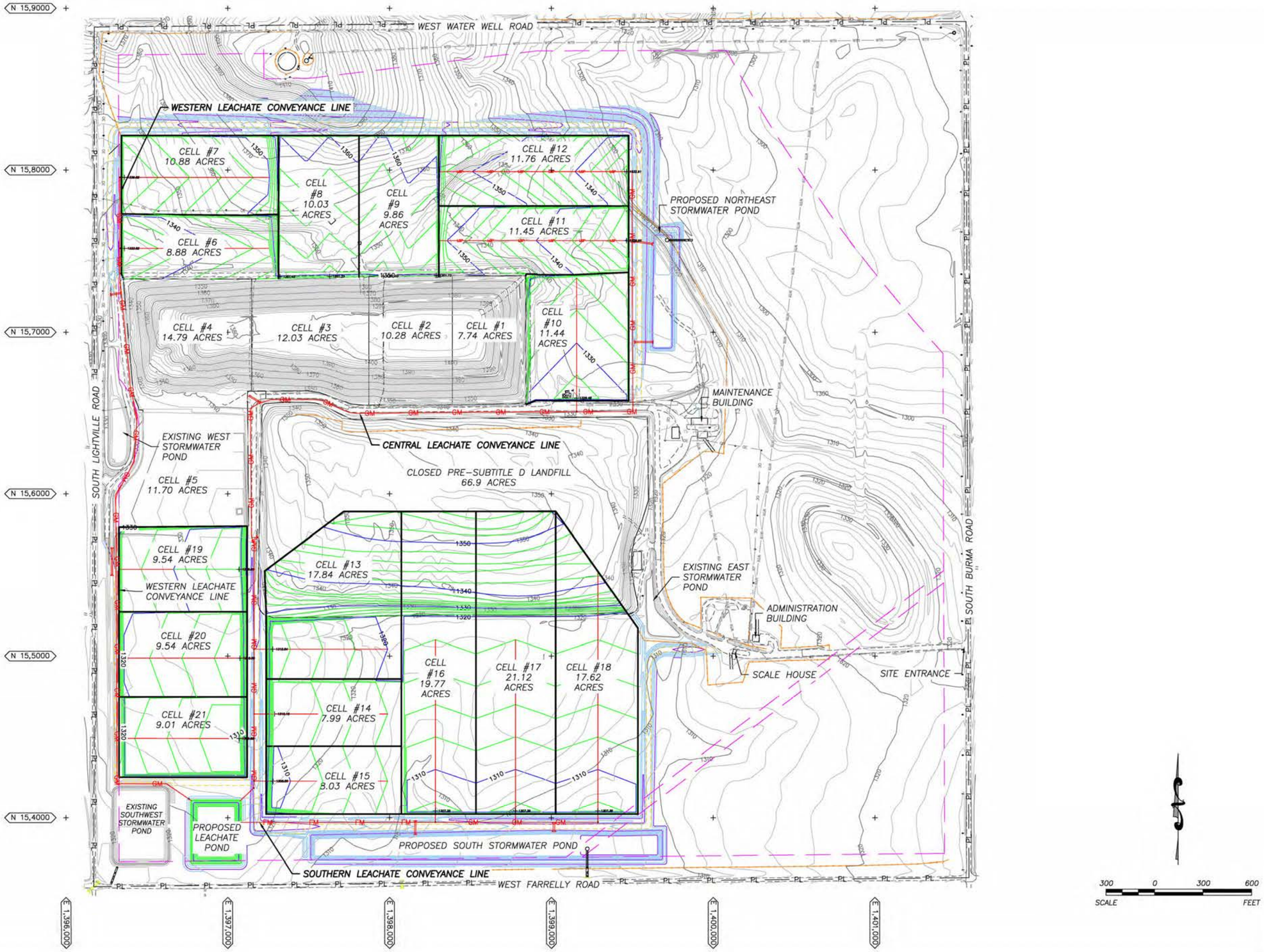

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R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

AQUATERRA
ENVIRONMENTAL SOLUTIONS, INC.
7311 West 130th Street, Suite 100
Overland Park, Kansas 66213

CLIENT: CITY OF SALINA
CITY OF SALINA MSW LANDFILL FACILITY
SALINA, KANSAS

DRAWN BY: BMO DESIGNED BY: BMO PROJECT MGR: AJW
ELECTRONIC FILE NAME: LEACHATE LINE PROFILE AND ALIGNMENTS.DWG DATE: 9/12/2012

LEACHATE COLLECTION SYSTEM LAYOUT
LANDFILL MASTER PLAN

REV.: 1 DRAWING NUMBER: 8 PROJECT NUMBER: 3512.10 SHT. 8 OF 25

ANASTASIA JOST WELCH LICENSED 18409 9-12-2012 KANSAS PROFESSIONAL ENGINEER

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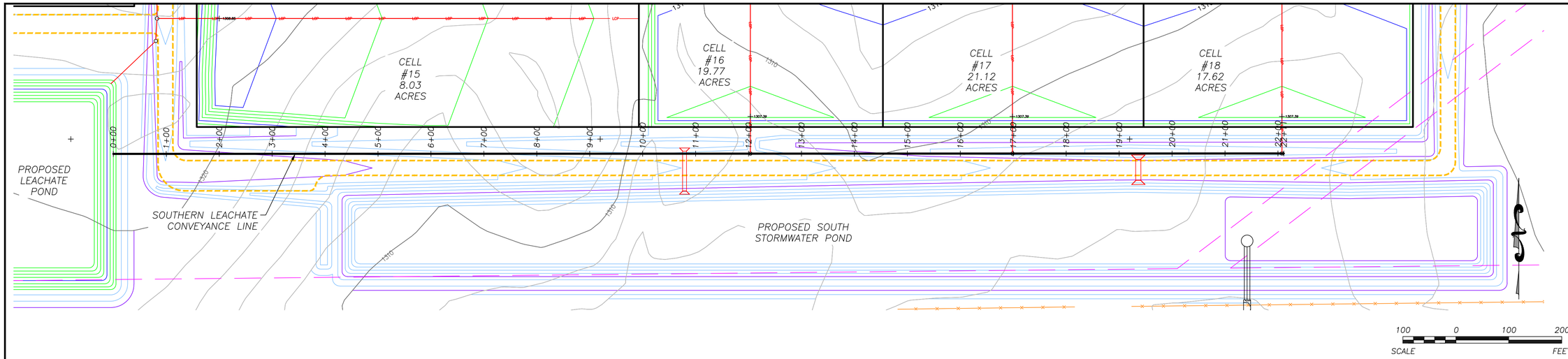
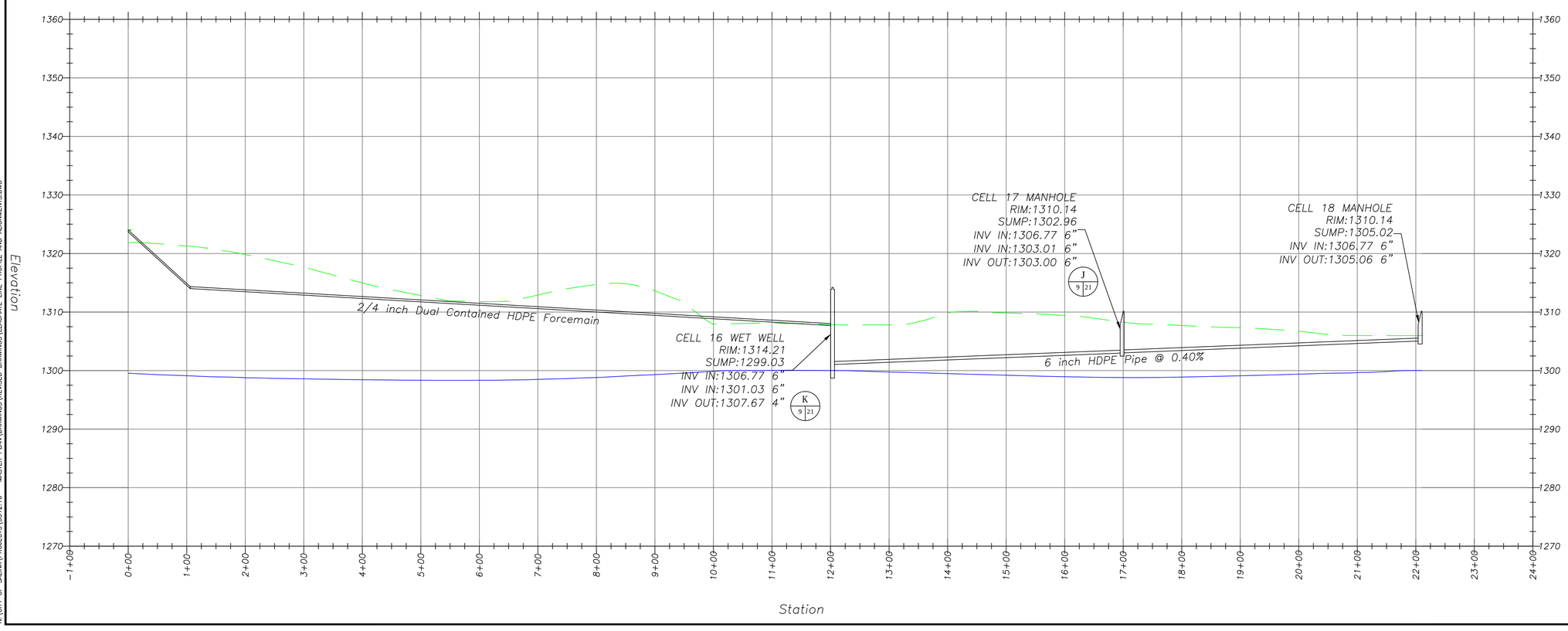


PROFILE LEGEND

- EXISTING GRADE
- GROUNDWATER
- PROPOSED GRADING

SCALE IN FEET

SOUTHERN LEACHATE CONVEYANCE LINE PROFILE



REV.	DATE	BY	DESCRIPTION
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R5	–	5BY	–
R4	–	4BY	–
R3	–	3BY	–
R2	–	2BY	–
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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DRAWN BY: BMO | DESIGNED BY: BMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: LEACHATE LINE PROFILE AND ALIGNMENTS.DWG | DATE: 4/12/2012

SOUTHERN CONVEYANCE
PLAN AND PROFILE
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 9 | PROJECT NUMBER: 3512.10 | SHT. 9 OF 25

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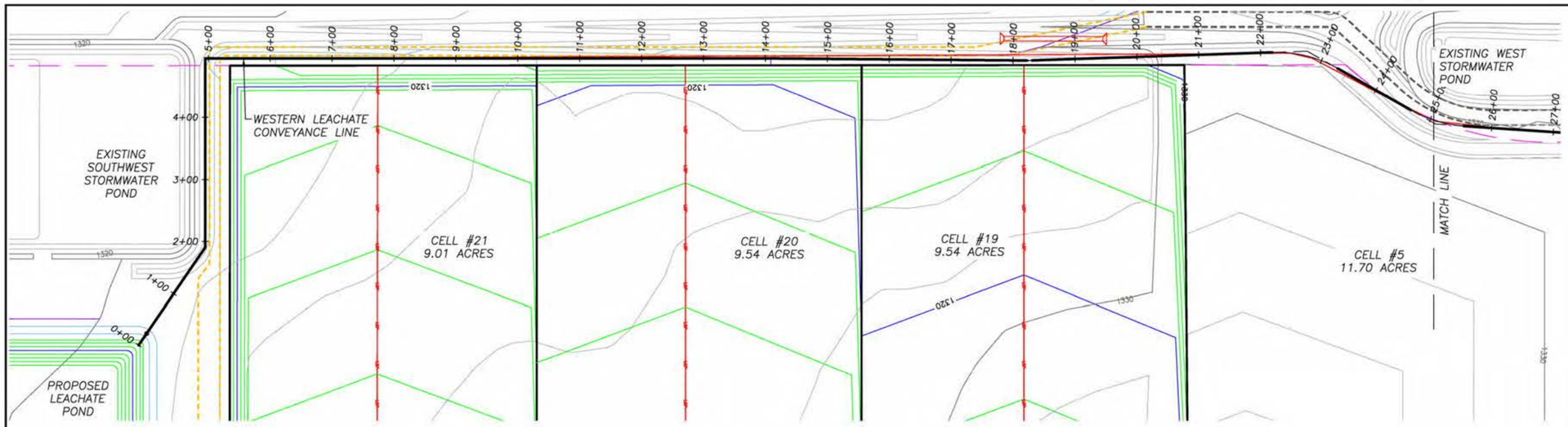


NOTES:

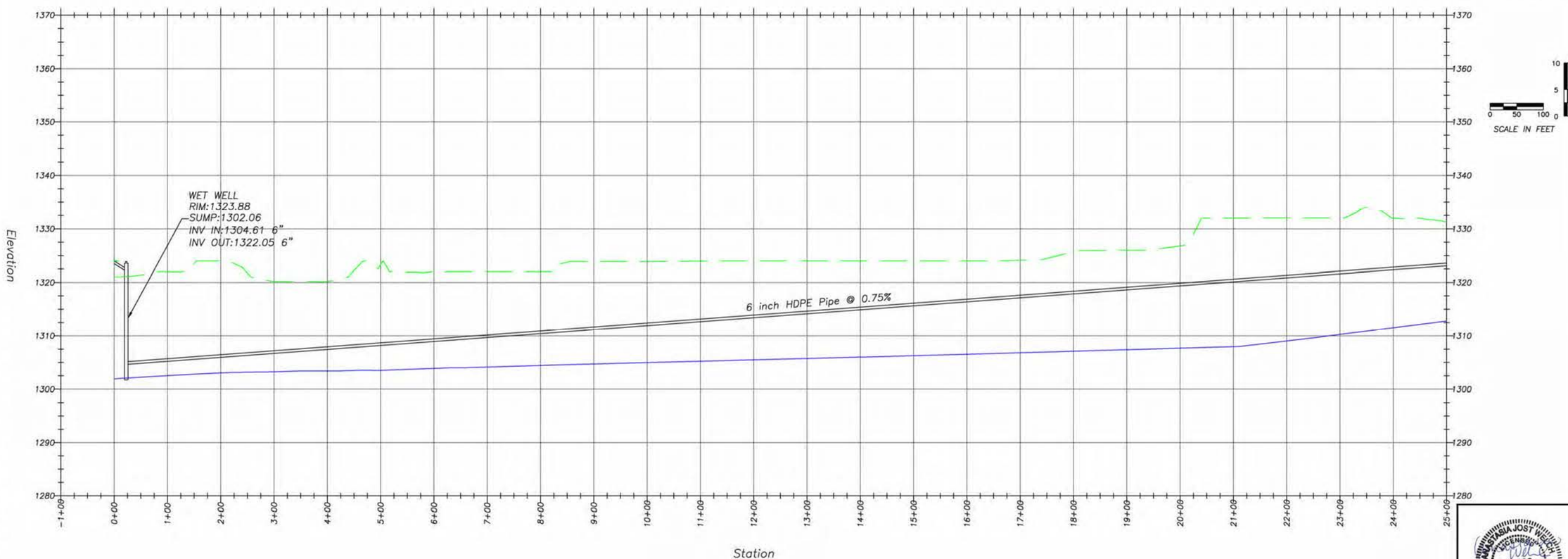
1. EXISTING CELL 4 FORCE MAIN THAT RUNS BETWEEN CELL 4 AND CELL 5 TO BE ABANDONED AFTER CELLS 9 OR 10 LEACHATE CONVEYANCE LINE IS INSTALLED. CELL 4 SHALL THEN BE PUMPED INTO WESTERN LEACHATE CONVEYANCE LINE.

100 0 100 200
SCALE FEET

WESTERN LEACHATE CONVEYANCE LINE PROFILE

PROFILE LEGEND

- EXISTING GRADE
- GROUNDWATER
- PROPOSED GRADING



0 50 100
SCALE IN FEET

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REV.	DATE	BY	DESCRIPTION
R6	-	6BY	-
R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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WESTERN CONVEYANCE PLAN AND PROFILE
LANDFILL MASTER PLAN

REV.: 1 DRAWING NUMBER: 10 PROJECT NUMBER: 3512.10 SHT. 10 OF 25

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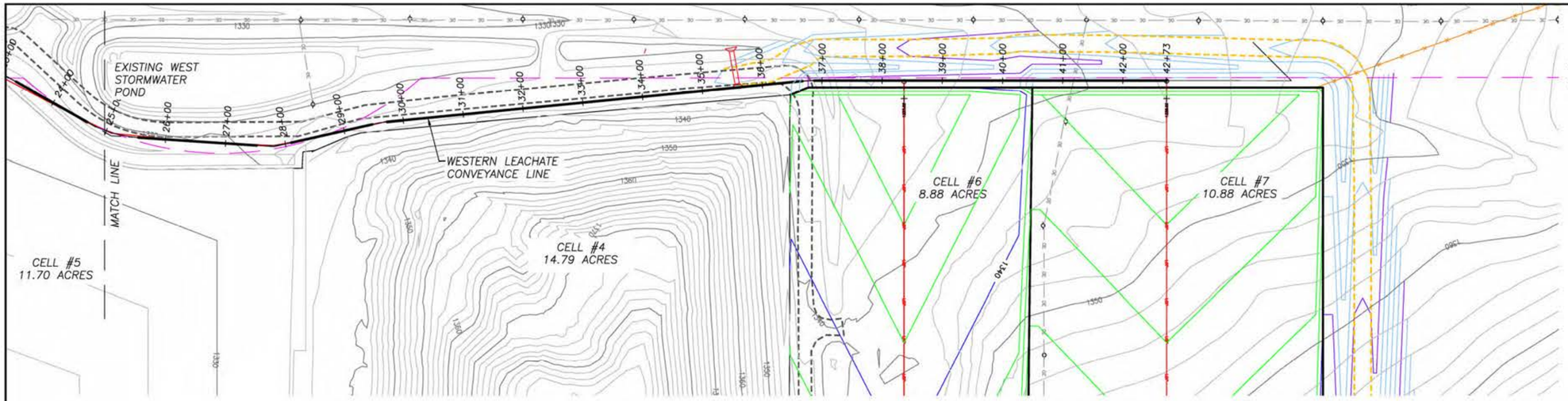
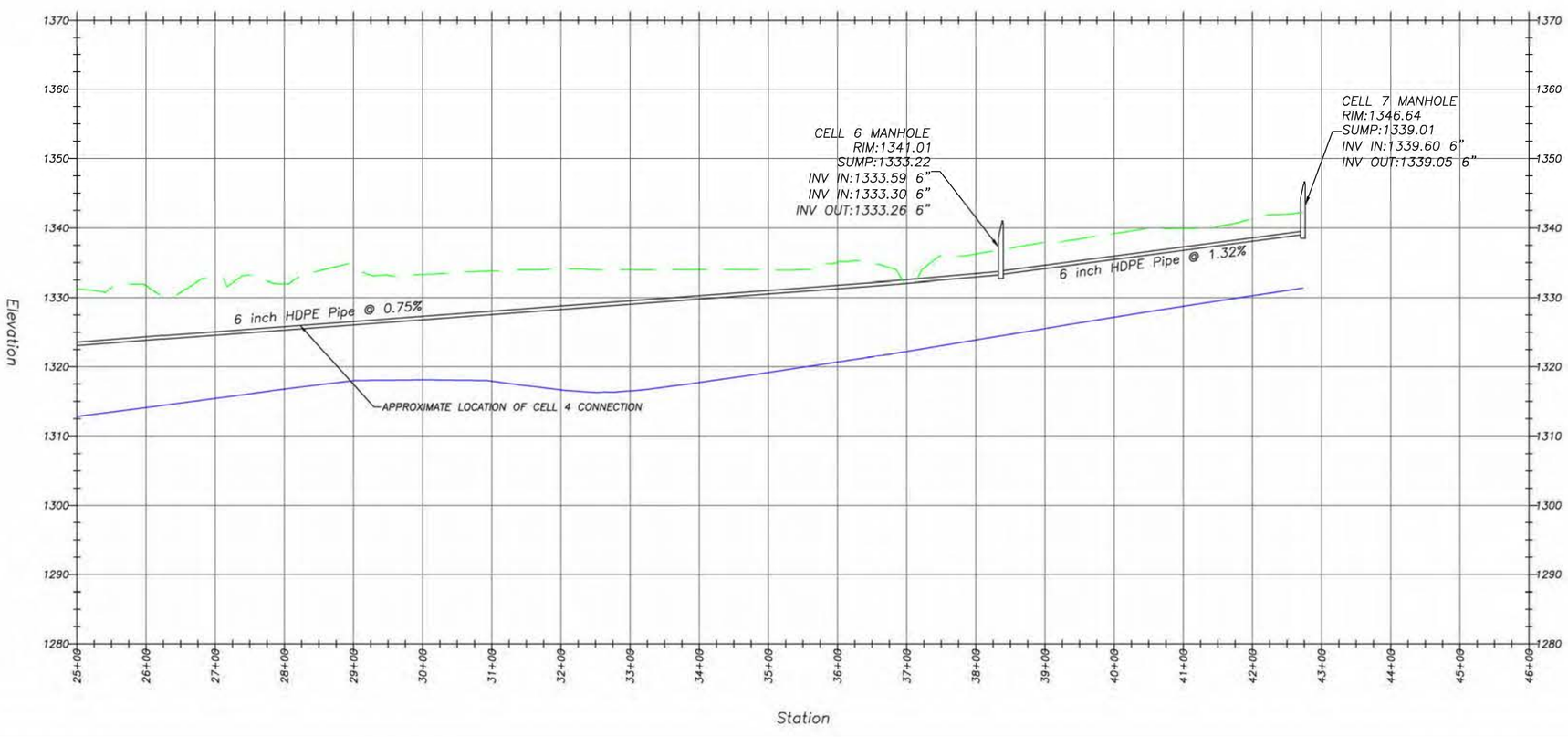


NOTES:

1. EXISTING CELL 4 FORCE MAIN THAT RUNS BETWEEN CELL 4 AND CELL 5 TO BE ABANDONED AFTER CELLS 9 OR 10 LEACHATE CONVEYANCE LINE IS INSTALLED. CELL 4 SHALL THEN BE PUMPED INTO WESTERN LEACHATE CONVEYANCE LINE.

WESTERN LEACHATE CONVEYANCE LINE PROFILE



PROFILE LEGEND

- EXISTING GRADE
- GROUNDWATER
- PROPOSED GRADING

0 50 100 — 0 5 10
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION
R6	-	6BY	-
R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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SALINA, KANSAS

DRAWN BY: BMO | DESIGNED BY: BMO | PROJECT MGR: AJW
ELECTRONIC FILE NAME: LEACHATE LINE PROFILE AND ALIGNMENTS.DWG | DATE: 4/12/2012

WESTERN CONVEYANCE PLAN AND PROFILE
LANDFILL MASTER PLAN

REV.: 1 | DRAWING NUMBER: 11 | PROJECT NUMBER: 3512.10 | SHT. 11 OF 25

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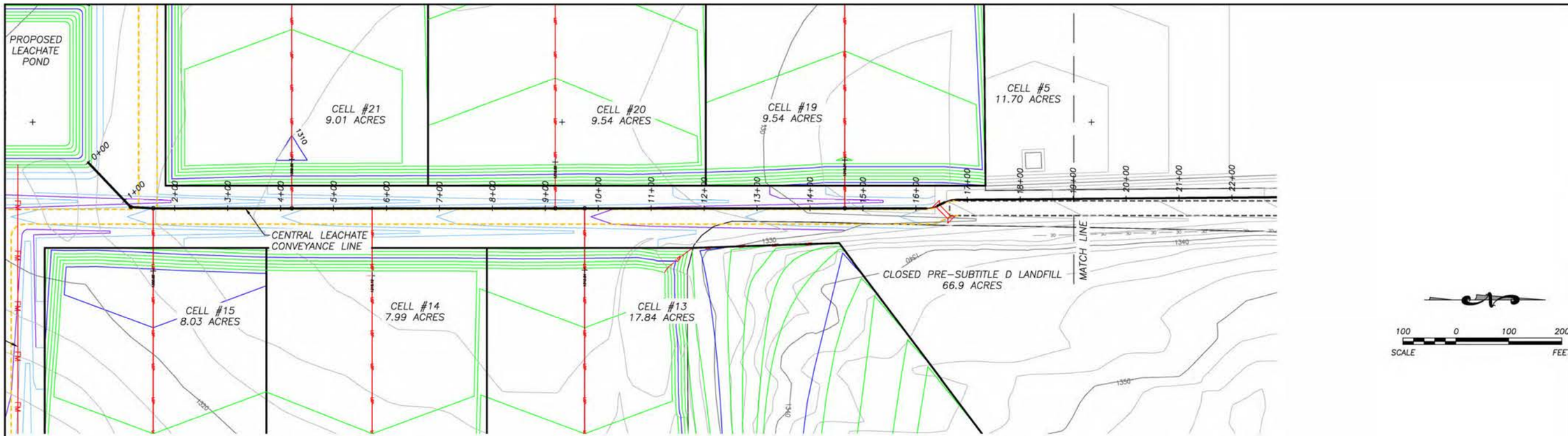
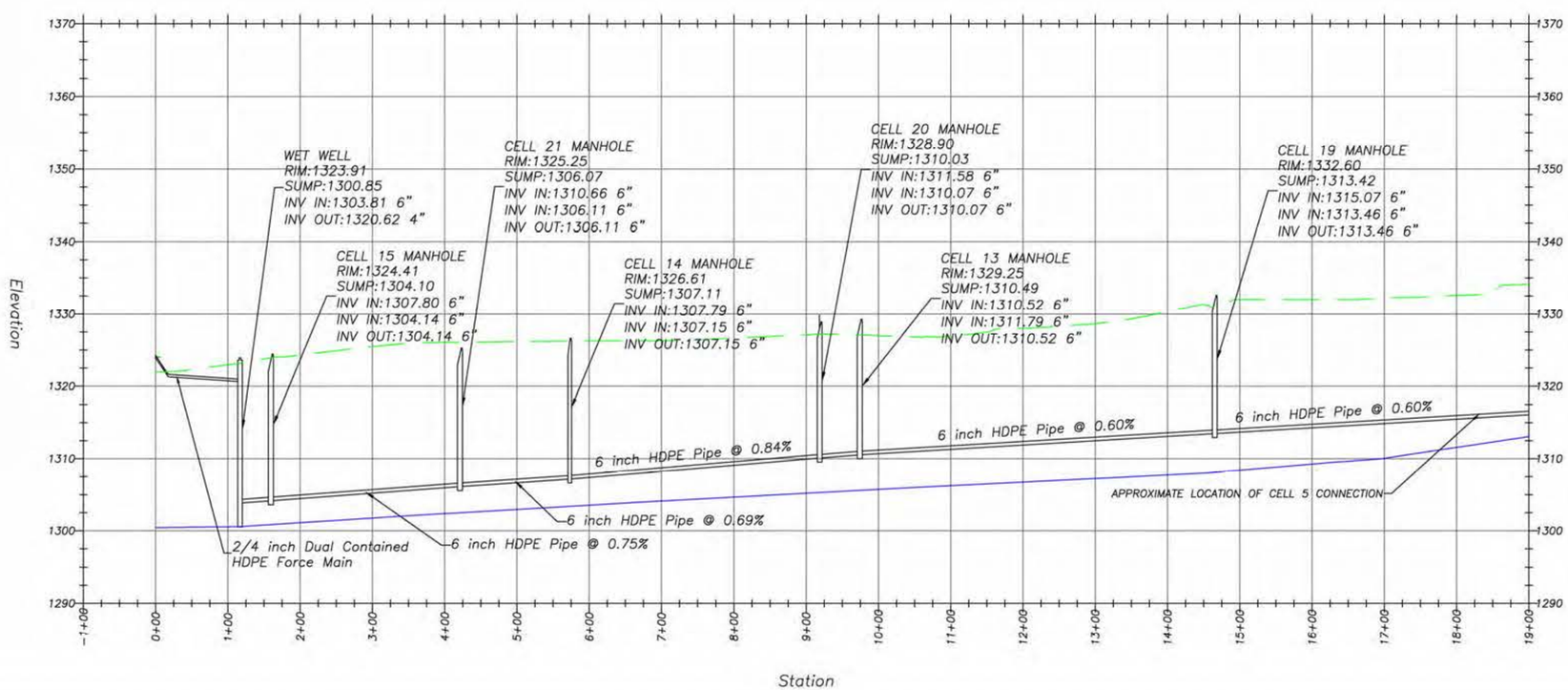


CENTRAL LEACHATE CONVEYANCE LINE PROFILE



PROFILE LEGEND

EXISTING GRADE

GROUNDWATER

PROPOSED GRADING

SCALE IN FEET

REV.	DATE	BY	DESCRIPTION
R6	-	6BY	-
R5	-	5BY	-
R4	-	4BY	-
R3	-	3BY	-
R2	-	2BY	-
R1	8/12	NVB	Address 3/12/12 KDHE Comments.

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DRAWN BY: BMO DESIGNED BY: BMO PROJECT MGR: AJW
ELECTRONIC FILE NAME: LEACHATE LINE PROFILE AND ALIGNMENTS.DWG DATE: 9/12/2012

CENTRAL CONVEYANCE PLAN AND PROFILE
LANDFILL MASTER PLAN

REV.: 1 DRAWING NUMBER: 12 PROJECT NUMBER: 3512.10 SHT. 12 OF 25

ANASTASIA JOST WELCH LICENSED 18409 9-12-2012 KANSAS PROFESSIONAL ENGINEER

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