

Attachment 4 - Closure and Post-Closure Plan

SECTION 4 – CLOSURE PLAN

4.1 GENERAL

Closure of the NVL will occur in Stages that proceed from the northern-most corner of the landfill and progress counterclockwise to the southeast following the same direction as the development of the cells. Drawing 7 (Appendix A) show the general location of the closure Stages for the landfill.

The landfill is intended to be closed sequentially beginning with Stage A and proceeding in alphabetical order to Stage O. The following Sections discuss the closure of the landfill under intermediate conditions (any point in time before total design capacity) and for the designed closure at full capacity.

4.2 IMMEDIATE CLOSURE

Although unlikely, it may become necessary or advantageous to close the NVL short of the final design capacity. Reasons for premature closure range from residential pressures, political pressures, alternate waste disposal options, to regulatory pressures.

Immediate closure would be closure of the landfill at any point short of ultimate design capacity. During that period of time, waste would need to be deposited and sloped in a manner to create a positively sloped final cover. Design, regulatory approval, and construction of a final cover system would need to be completed over the entire area where MSW has been deposited.

4.3 STAGED CLOSURE

The most probable scenario for the NVL is one of Staged Closure. Staged Closure would consist of closing the landfill under the following plan, in accordance with Rules R315-302-2 and 3. Drawing7 (Appendix A) shows the planned contours of the final cover.

4.3.1 Closure Sequencing

The closure of the NVL will be completed in at least 15 Stages. The lateral extent of final cover completed and predicted duration of each of the Phases is as follows:

4.3.1.1 Landfill Closure Stages A-F

The closure of the NVL will be completed in a number of closure construction projects over the life of the landfill. These closure construction projects (Stages) are intended to break up the capital costs and to help manage the financial assurance costs associated with the NVL.

The closure Stages will follow the same general development pattern that will be utilized for the Cell development starting from the northern area of the landfill and continuing around the landfill footprint in a counterclockwise direction. Stages A through F represent the northern third of the NVL and have the following areas:

- Stage A: 6.29-acres
- Stage B: 6.68-acres
- Stage C: 7.00-acres
- Stage D: 7.02-acres
- Stage E: 6.68-acres
- Stage F: 4.40-acres

4.3.1.2 Landfill Closure Stages G-K

Landfill closure Phases G through K represent the next 5 cover construction projects and will cover the southern third of the NVL. Stages G through K have the approximate closure areas:

- Stage G: 6.83-acres
- Stage H: 10.50-acres
- Stage I: 13.94-acres
- Stage J: 12.66-acres
- Stage K: 13.92-acres

4.3.1.3 Landfill Closure Stages L-O

The last closure construction activities at NVL will be Stages L through O in the east central area of the landfill. Stages L through O will tie into the previous landfill closure Stages and will complete the closure at NVL. Stages L through O have approximate closure areas:

- Stage L: 9.62-acres
- Stage M: 10.36-acres
- Stage N: 6.74-acres
- Stage O: 10.64-acres

Financial assurance for the site will be based on the costs for the largest area of the landfill that is open, currently estimated at 806,000 square feet.

4.3.1.4 Total Capacity of the Site.

The approximate quantity of air space available at the NVL is 26,691,000 cubic yards (CY) including daily and intermediate cover. Removing daily, intermediate, and final cover soils volume leaves approximately 21,352,800 cubic yards for waste. A projection of landfill life is provided in Appendix Q. This analysis assumes a steady 2% population growth and indicates that the landfill will reach its design capacity in approximately 58 years from the time waste is first accepted.

4.3.2 Closure Procedures

Closure activities for each Stage of the landfill will take place in accordance with the following procedures:

4.3.2.1 Submittal of Plans, Specifications, and QA/QC Plan

Four months before the intended closure of each of the aforementioned Stages, a design package consisting of drawings, construction specifications, and a QA/QC plan will be submitted to the DWMRC. The DWMRC will have approximately 60 days to review and comment on the adequacy of the drawings, specifications and quality assurance/quality control measure envisioned for the construction. Comments from DWMRC will be incorporated into a final "bid" package for the cover installation.

4.3.2.2 Formal Notification

The Director of the DWMRC will be notified of the intent to implement the closure plan in whole or part, 60 days prior to the date projected for final receipt of waste.

4.3.2.3 Additional Closure Activities

Additional closure activities that may be required to close either the entire landfill or only one stage are as follows:

- Regrading of all side slopes where slopes are steeper than 4 horizontal to 1 vertical.
- Regrading of all the top of the landfill to slopes between 4 horizontal to 1 vertical, but not flatter than 5 percent.
- Finalization (including DWMRC comments) of the final cover design package. Final cover design package will include, at a minimum, plans, construction specifications, and QA/QC protocols to guide the construction of the final cover.
- Bidding and construction of final cover.
- Construction of a maintenance road over the cover.
- Construction of run-off control structures.
- Vegetation of the final cover soils.
- Preparation of As-Built drawings.
- Inspection of final cover construction by Owner (City of Logan), Engineer (engineer of record) and DWMRC personnel.
- Preparation of Certificate of Closure by a Utah registered Professional Engineer.
- Submittal of required documents to the State DWMRC and to the Cache County Recorder's office.

4.4 CLOSURE COSTS

4.4.1 Immediate Closure

The closure of the landfill may occur before the final design capacity is reached. If the development of the NVL continues as planned, the largest area to be open will be the initial phase of the landfill that includes Cell 1, Cell 2, and Cell 3. The area of waste exposed once Cell 3 is constructed will be approximately 806,000 square feet. As the landfill development continues and the first three cells are filled, the first Stage of cover construction can take place. The costs associated with the closure of the largest area open will entail the final grading of that area, engineering of final cover, preparation of plans, specifications, and

QA/QC plan as well as the final cover installation. The cost of closure for the largest area of the landfill to be open is \$2.5 million. Details of this estimate are provided in Appendix R.

4.4.2 Planned Closure in Stages

If the landfilling operations continues as anticipated by this permit application, the landfill will be closed in 15 Stages described in Section 4.3.1, following this plan will spread out the total costs of closure over the life of the landfill and reduce the amount of landfill requiring final closure at any one time. It is possible that unforeseen circumstances dictate closure of larger areas. In addition to the activities and costs associated with the planned cover stages, closure activities will involve additional flattening of 3:1 intermediate slopes to 4:1 (or flatter) as required for perimeter slopes and placement of final cover over all areas that have only been treated with daily or intermediate cover.

Details of the closure cost estimates are provided in Appendix R.

4.4.3 Final Inspection

The DWMRC will be invited to inspect the final grading of the landfill. After approval of the final grading, a schedule will be established for vegetation. Agency personnel will then be invited to return to inspect the success of the erosion control system after one year.

SECTION 5 – POST-CLOSURE PLAN

5.1 GENERAL

Post-closure financial assurance will provide for continued monitoring of ground water, surface water, leachate, gas, and maintenance of the cover as described in the post-closure plan below. The total cost of post-closure care is currently estimated at \$1.6M. A detailed analysis of post-closure costs is provided in Appendix R.

5.2 POST-CLOSURE PLAN

In accordance with rules R315-302-2 and R315-303 post-closure activities at the landfill will continue for 30 years, or as long as the Director of the DWMRC deems necessary for the NVL to be stabilized and to protect human health and the environment. The post-closure activities will include the following work:

5.2.1 Changes to Record of Title

A Plat Map and Statement of Fact concerning the location of the landfill shall be recorded with the Cache County Recorder not later than 60 days after certification of closure. The recorded document will restrict future land use. Compatible land uses will be identified in the Cache County comprehensive planning documents.

5.2.2 Monitoring Plan

Post-closure activities will commence immediately upon closure of the total facility.

The monitoring frequencies for the different media are shown in the following table. Post-closure monitoring will be conducted as follows:

Post-Closure Monitoring Schedule

Type	Frequency	Apparatus
Ground Water	Semi-Annual	Refer to Ground Water Monitoring Plan
Surface Water	Semi-Annual	Refer to Operations Plan
Leachate	Quarterly	Sump at southwest corner of Landfill
Gas and Ambient Air	Quarterly	Refer to Operations Plan
Settlement	Annual	Site survey

5.2.2.1 Ground Water

Wells have been installed at the site in order to collect samples and background water quality information from locations up and down-gradient of the landfill. Additional wells will be installed in the future and sampled during post-closure.

5.2.2.2 Surface Water

Surface water will be monitored in accordance with procedures provided in the UPDES Permit. The UPDES information is provided in Appendix G.

5.2.2.3 Leachate

The presence of leachate will be monitored in the leachate collection pond located east of the landfill footprint (Appendix A, Drawing 3). Accumulations of leachate in excess of 3 feet will be removed and transported the Logan City Wastewater plant for treatment.

5.2.2.4 Gas Monitoring

All structures (if any) associated with periodic site monitoring or landfill gas collection system will be monitored quarterly.

5.2.2.5 Settlement

At final closure, the boundary markers used to designate closed areas of the landfill will be used to measure settlement of refuse materials. Additional survey markers will be placed as

necessary to monitor areas of suspected movement. Ground elevation will be measured at the base of each boundary marker.

5.2.3 Inspection and Maintenance

Monitoring facilities, fences, roads, buildings, cover, and run-on and run-off systems will be inspected in accordance with the schedule presented in the post-closure cost estimate (Appendix R).

Facilities will be inspected for damage, deterioration, and impaired function with regard to the listed standards and original design. Deficiencies will be corrected promptly. Deficiencies, repairs, and restoration of function will be documented in the landfill record.

SECTION 6 – POST-CLOSURE LAND USE

Logan City will design a post-closure land use plan to be implemented at the landfill within 5 years prior to the end of the landfill's life. Logan City will select an end use for the landfill consistent with good landfiling practices. The final land use selected for the landfill will be based upon maintaining a functional landfill cover. Land use activities will be approved by Logan City prior to implementation. Typical end uses may range from green waste processing and composting to recreational activities or open space. Since the closure of the site may be over 70 years away and with the potential development options that could occur in this area, it is not currently possible to establish a land use plan that will be consistent with surrounding land uses and the needs of area residents or Cache County.

NVL - CLOSURE COSTS (IMMEDIATE CLOSURE)

Section 1.0 - Engineering

CLOSURE NOW

ESTIMATED DATE OF CLOSURE = NOW
APPROXIMATE CLOSURE AREA = 806,000

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS	\$2,500	1	\$2,500
1.2	Boundary Survey for Closure	NA			
1.3	Site Evaluation	LS	\$1,000	1	\$1,000
1.4	Development of Plans	LS	\$7,500	1	\$7,500
1.5	QA/QC Plan	LS	\$5,000	1	\$5,000
Engineering Subtotal					\$16,000

Section 2.0 - Construction

CLOSURE NOW

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Final Cover System				
2.1.1	<i>Site Preparation/ Site Regrading</i>	ACRE	\$1,500	18.5	\$27,755
2.1.2	<i>Gas Collection Layer/Pipes</i>	NA			\$0
2.1.3	<i>Base Layer (1-foot thick soil base)</i>				
a	Soil Purchase	NA			\$0
b	Soil Processing (load)	CY	\$1.00	29,852	\$29,852
c	Soil Transportation	CY	\$1.50	29,852	\$44,778
d	Soil Placement	CY	\$1.00	29,852	\$29,852
2.1.4	<i>Low permeability Layer (Synthetic - If Applicable)</i>				
a	GCL	SF	\$0.70	806,000	\$564,200
b	Geomembrane (HDPE,PVC,LLDPE,etc...)	SF	\$0.80	806,000	\$644,800
c	Geocomposite	SF	\$0.77	806,000	\$620,620
2.1.5	<i>Drainage Layer (Soil - If Applicable)</i>				
a	Geotextile	NA			\$0
b	Sand/Gravel	NA			\$0
2.1.6	<i>Drainage Layer (Synthetic - If Applicable)</i>				
a	Geotextile	NA			\$0
b	Geonet/Geocomposite	NA			\$0
2.1.7	<i>Erosion Protection Soil Layer</i>				
a	Soil Purchase	NA			\$0
b	Soil Processing (load)	CY	\$1.00	44,778	\$44,778
c	Soil Transportation	CY	\$1.50	44,778	\$67,167
d	Soil Placement	CY	\$2.25	44,778	\$100,750
e	Soil Amendment (compact)	CY			\$0
2.1.8	<i>Topsoil Layer</i>				
a	Soil Purchase	NA			\$0
b	Soil Processing (load)	CY	\$1.00	14,926	\$14,926
c	Soil Transportation	CY	\$1.50	14,926	\$22,389
d	Soil Placement	CY	\$2.25	14,926	\$33,583
e	Soil Amendment	NA			\$0
2.1.9	<i>Revegetation</i>				
a	Seeding	ACRE	\$1,200	18.5	\$22,204
b	Fertilizing	ACRE	\$500	18.5	\$9,252
c	Mulch	ACRE	\$200	18.5	\$3,701
d	Tacifier	ACRE	\$200	18.5	\$3,701
2.2	Stormwater Protection Structures				
a	Culverts	EA			\$0
b	Pipes	NA			\$0
c	Ditches/Berms	FT			\$0
d	Detention Basins	NA			\$0
2.3	Gas Collection System				
a	Design	NA			\$0
b	Additional Equipment / Installation	NA			\$0
2.4	Leachate Collection System				
a	Design	NA			\$0
b	Additional Equipment / Installation	NA			\$0
2.5	Groundwater Monitoring System				
a	Monitor Well Installation	NA			\$0
b	Monitor Well Abandonment	NA			\$0
2.6	Site Security				
a	Lighting, signs, etc...	NA			\$0
b	Fencing and Gates	NA			\$0
2.7	Miscellaneous				
a	Performance Bonds	NA			\$0
b	Contract/Legal fees	NA			\$0
Construction Subtotal					\$2,284,306

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

Total \$2,300,306
10% Contingency \$230,031
Subtotal Closure Cost \$2,530,336

NVL - POST-CLOSURE COSTS (30 YEARS)

(Facility is new, no gas collection systems has been installed)

Section 1.0 - Engineering

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Post-Closure Plan Update	Hour	\$90	1	\$90
1.2	Annual Report (including results from gas, leachate, and ground water sampling - details of maintenance performed)				
a	Site Visits	Hour	\$90	4	\$360
b	Report Preparation	Hour	\$90	10	\$900
c	Plan Update	Hour	\$90	2	\$180
Engineering Subtotal					\$1,530

Section 2.0 - Gas Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Sample Collection	LS	\$0	0	\$0
2.2	Sample Analysis	NA	\$0	0	\$0
2.3	Report (Part of Annual Report)				
Gas Collection System - Sampling Subtotal					\$0

Section 3.0 - Leachate Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Sample Collection	NA	\$0	0	\$0
2.2	Sample Analysis	NA	\$0	0	\$0
2.3	Report (Part of Annual Report)				
Leachate Collection System - Sampling Subtotal					\$0

Section 4.0 - Ground Water Monitoring System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
3.1	Sample Collection	LS	\$960	2	\$1,920
3.2	Sample Analysis	LS	\$7,000	2	\$14,000
3.3	Report (Part of Annual Report)	Hour	\$90	2	\$180
Ground Water Collection System - Sampling Subtotal					\$16,100

Section 5.0 - Facility Operations and Maintenance

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
4.1	Cover				
a	Soil Replacement	LS	\$5,000	1	\$5,000
b	Vegetation/Reseeding	LS	\$5,000	1	\$5,000
4.2	Storm Water Protection Structures				
a	Ditch and Culvert Maintenance	LS	\$5,000	1	\$5,000
b	Berm and Basin Maintenance	LS	\$5,000	1	\$5,000
4.3	Gas Collection System				
a	System Operation	NA	\$0	0	\$0
b	System Repair	LS	\$0	0	\$0
4.4	Leachate Collection System				
a	System Operation	NA	\$0	0	\$0
b	System Repair	NA	\$0	0	\$0
4.5	Ground Water Monitoring System				
a	System Operation	NA			\$0
b	System Repair	LS	\$100	1	\$100
4.6	Site Security				
a	Lighting, signs, etc...	LS	\$500	1	\$500
b	Fencing and Gates	LS	\$500	1	\$500
4.7	Miscellaneous				
a					
b					
Facility Operations and Maintenance Subtotal					\$21,100

Total = \$38,730

Total Post-Closure Cost (30 years at 1.02% inflation) = \$1,670,596



290 North 100 West
Logan, Utah 84321
(435) 716-9000

CONSULTANTS



2702 South 1030 West, Suite 10
Salt Lake City, Utah 84119
(801)270-9400 Fax: (801)270-9401

- PROPERTY BOUNDARY
- UNDEVELOPED PROPERTY
- CLOSURE STAGE
- PROPOSED GROUND (10' CONTOUR)

CLOSURE STAGE AREAS (ACRES)

- A- 6.29 B- 6.68
- C- 7.00 D- 7.02
- E- 6.68 F- 4.40
- G- 6.83 H- 10.50
- I- 13.94 J- 12.66
- K- 13.92 L- 9.62
- M- 10.36 N- 10.64
- O- 6.74

TOTAL- 133.8

MARK	DATE	DESCRIPTION
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	7/28/22	DRAFT

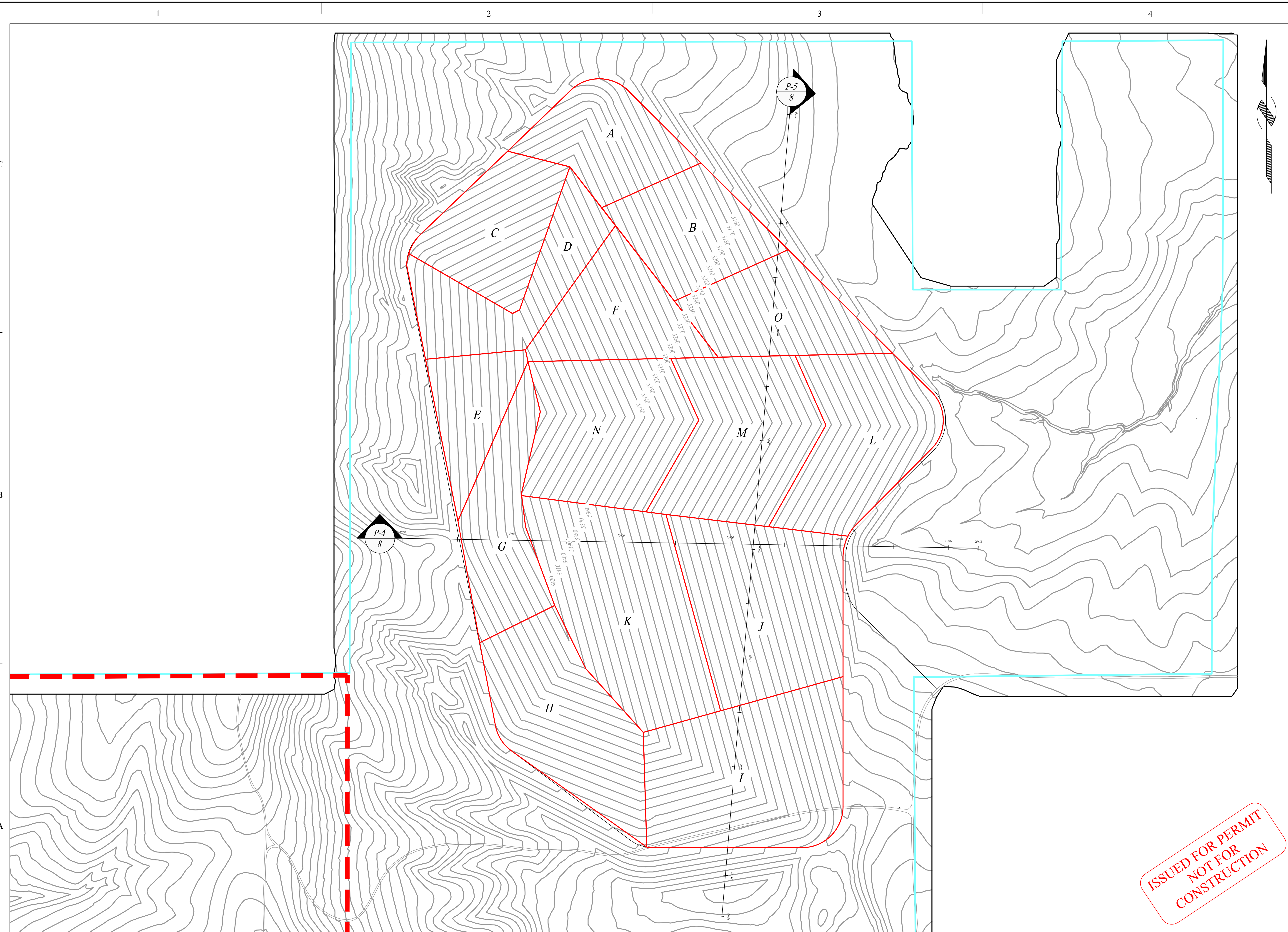
ISSUE:

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SHEET TITLE

NORTH VALLEY LANDFILL
CLOSURE STAGES

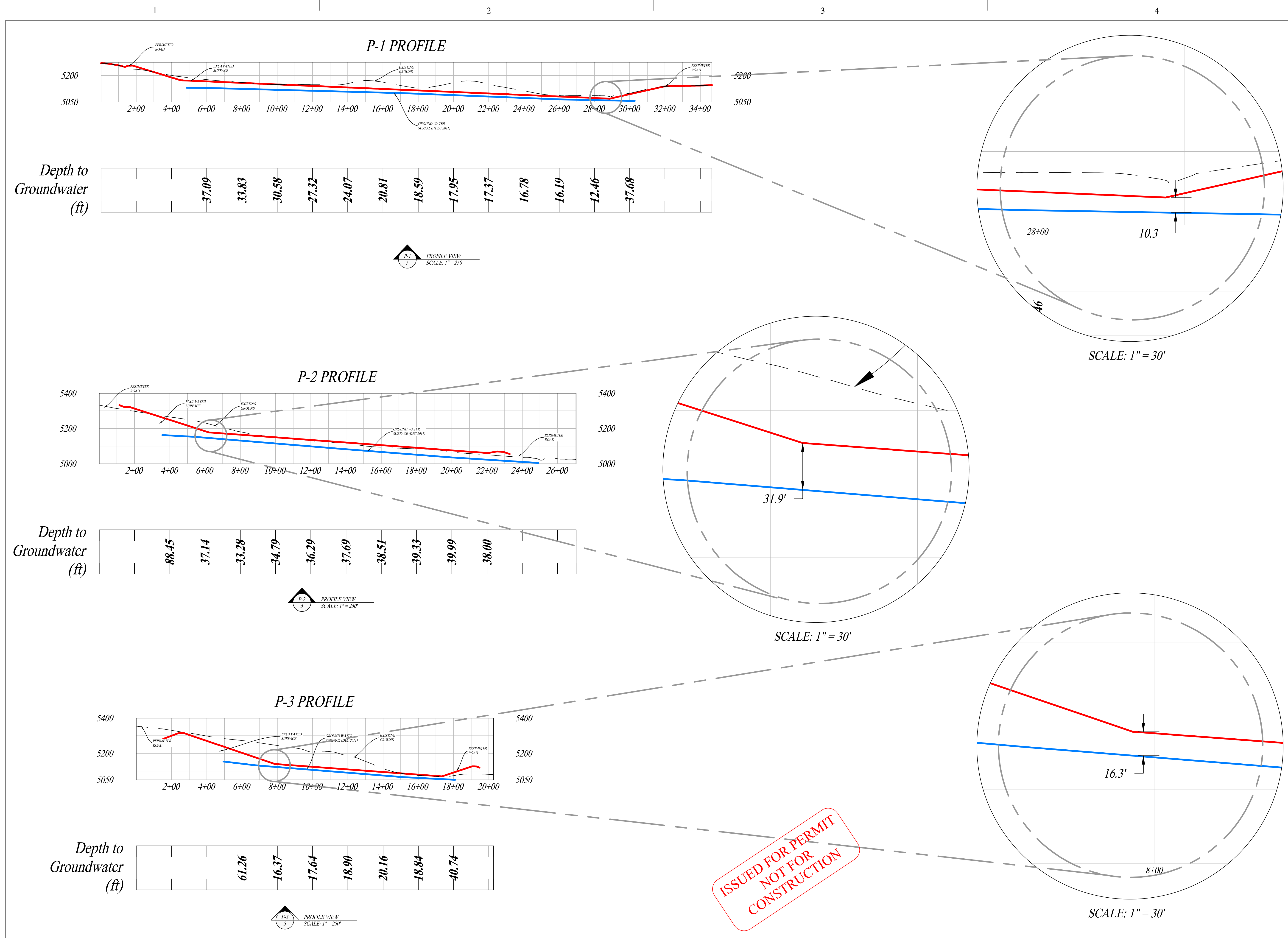
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2702 South 1030 West, Suite 10
Salt Lake City, Utah 84119
(801)270-9400 Fax: (801)270-9401



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SHEET TITLE
 NORTH VALLEY LANDFILL
 GROUNDWATER
 ELEV. VIEW