



Appendix N

Design Capacity and Material Balance Calculations

Purpose:

To determine the design capacity for the proposed Dane County Landfill Site No. 3, including the combined volume of waste, daily cover, and intermediate cover.

Methodology:

The proposed liner base grades and top of waste grades from the Feasibility Report were created as surfaces using AutoCAD Civil 3D. The two surfaces were compared using AutoCAD Civil 3D to determine the volume between the surfaces. The volume of the leachate collection layer (1-ft thick) was subtracted from this volume to calculate the design capacity of the proposed landfill.

Calculation:

AutoCAD Civil 3D Volume Output: 12,513,775 cy

Leachate Collection Layer Volume: $3,441,707 \text{ sf} \times 1 \text{ ft (thick)} / 27 \text{ cf/cy} = 127,471 \text{ cy}$.

Design Capacity: $12,513,775 \text{ cy} - 127,471 \text{ cy} = 12,386,304 \text{ cy}$

Results:

The proposed landfill design capacity is approximately 12,386,304 cubic yards.

See calculation sheets 2 and 3 for AutoCAD Civil 3D surface and output information.

Surface Report**Client: Dane County****Project Name:**I:\25222268.00\Drawings\Civil\Volumes\100%
Grades.dwg**Project Description: Dane County Landfill #3 Volume Calcs.****Report Date:** 2/1/2024 9:02:00 AM**Prepared by:** KP

Linear Units: USSurveyFoot	Area Units: squareFoot	Volume Units: cubicYard
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Surface: Vol - Total Airspace

Description: 90% FR airspace volume from base grades to waste grades (subtract drainage layer for final vol)

Area 2D: 3589225.822

Area 3D: 3758852.577

Elevation Max: 228.753

Elevation Min: 0.000

Number of Points: 8527

Number of Triangles: 16883

Volume Surface: Vol - Total Airspace

Description: 90% FR airspace volume from base grades to waste grades (subtract drainage layer for final vol)

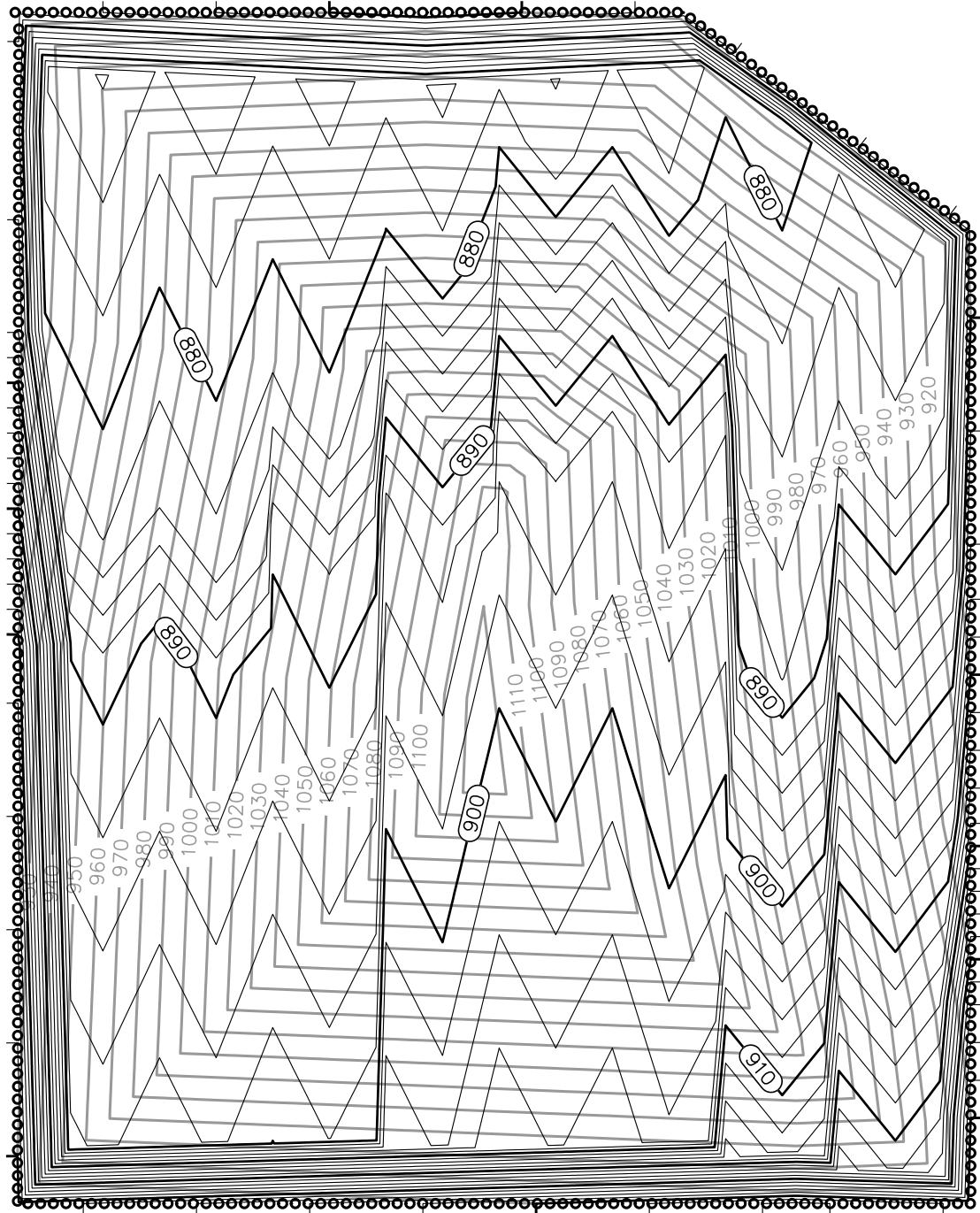
Volume Cut: 0.000

Volume Fill: 12513775.460

Volume Total: 12513775.460

Compare Surface: Pr-Waste Grades (100%)

Base Surface: Pr-Base Grades (100%)



AIRSPACE VOLUME

BASE SURFACE: PR-BASE GRADES (100%)
 COMPARISON SURFACE: PR-WASTE GRADES (100%)

CUT VOLUME: 0.00 CU. YD.
 FILL VOLUME: 12513775.46 CU. YD.
 NET VOLUME: 12513775.46 CU. YD.<FILL>

Job No. 25222268

Job: Landfill Site No. 3

By RPR Date 02/01/24

Client: Dane County

Subject: Material Balance Calculation

Chk'd MRH Date 02/08/24

Purpose:

To determine the volume of cut and fill required to achieve subbase and perimeter grades for the proposed landfill.

Methodology:

The existing ground surface and the proposed liner subbase/perimeter grades from the Feasibility Report were created as surfaces using AutoCAD Civil 3D. The two surfaces were compared using AutoCAD Civil 3D to determine the volume between the surfaces. Corrections for shrink/swell were not included in this calculation.

Calculation:

AutoCAD Civil 3D Volume Output:	1,271,388	cy (Cut)
	575,086	cy (Fill)
	696,302	cy (Net Cut)

Results:

The net cut for development of the proposed landfill is approximately 696,302 cubic yards.

See calculation sheets 2 and 3 for AutoCAD Civil 3D surface and output information.

Surface Report**Client: Dane County****Project Name:**I:\25222268.00\Drawings\Civil\Volumes\100%
Grades.dwg**Project Description: Dane County Landfill #3 Volume Calcs.****Report Date:** 2/1/2024 9:02:00 AM**Prepared by:** KP

Linear Units: USSurveyFoot	Area Units: squareFoot	Volume Units: cubicYard
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Surface: Vol - Earthwork to Subbase

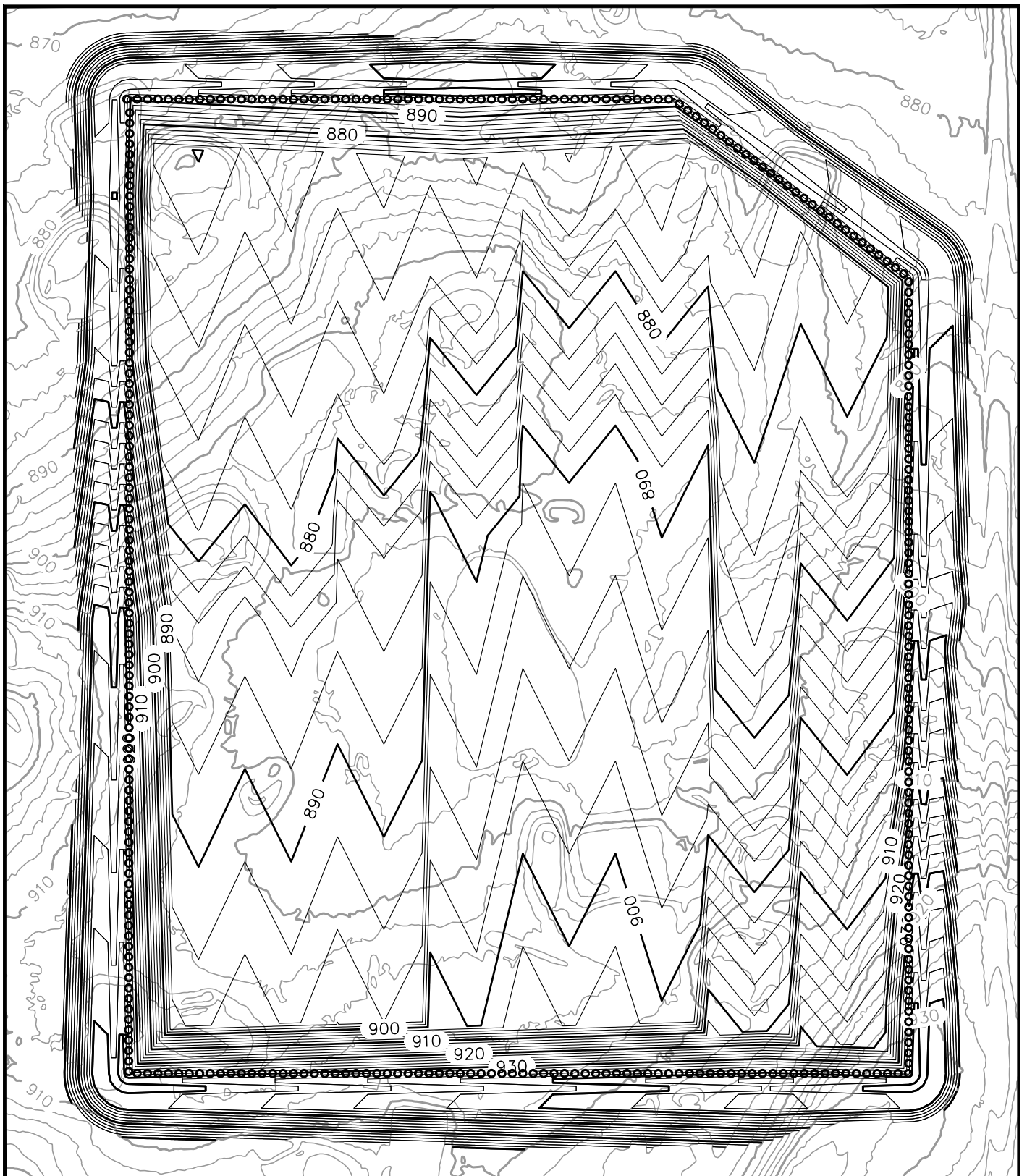
Description: volume to reach subbase and perimeter grades from 2017 existing grades

Area 2D: 4440537.970	Area 3D: 4509746.253
Elevation Max: 32.824	Elevation Min: -31.395
Number of Points: 199999	Number of Triangles: 396801

Volume Surface: Vol - Earthwork to Subbase

Description: volume to reach subbase and perimeter grades from 2017 existing grades

Volume Cut: 1271388.496	Volume Fill: 575086.658	Volume Total: -696301.838
Compare Surface: Pr-Subbase and Perimeter		
Base Surface: Existing (2017)		



EARTHWORK VOLUME

BASE SURFACE: EXISTING (2017)
 COMPARISON SURFACE: PR-SUBBASE AND PERIMETER (100% GRADES)

CUT VOLUME: 1271388.50 CU. YD.
 FILL VOLUME: 575086.66 CU. YD.
 NET VOLUME: 696301.84 CU. YD.<CUT>