SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

PERMIT MODIFICATION

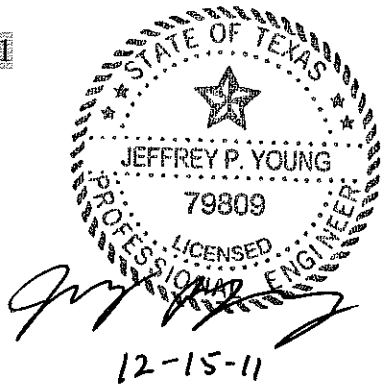
ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTION

Prepared for

Southwest Landfill TX, LP

March 2011
Revised May 2011

Revised December 2011



Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

WEAVER
BOOS
CONSULTANTS
LLC
SOUTHWEST

6420 SOUTHWEST BLVD, SUITE 206
FORT WORTH, TEXAS 76109
PHONE: 817.735.9770
FAX: 817.735.9775
www.weaverboos.com

Chicago, IL
Naperville, IL
Springfield, IL
South Bend, IN
St. Louis, MO
Columbus, OH
Denver, CO
Fort Worth, TX
Clermont, FL
Grand Rapids, MI
Portland, OR

December 15, 2011
Project No. 0120-94-11-80-02

Mr. Frank Zeng, P.E.
MC-124
Municipal Solid Waste Permits Section
Waste Permits Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Response to Comments
Above Grade Class 1 Waste Disposal Option
Southwest Landfill, Permit No. MSW-1663B
Randall County
Tracking No. 14710522; RN102064151 / CN 601436355

Dear Mr. Zeng:

On behalf of Southwest Landfill TX, LP, please find enclosed a copy of the updated pages for the referenced permit modification. The revised pages have been updated to incorporate your comments included in the June 28, 2011, Texas Commission on Environmental Quality (TCEQ) letter.

This response letter contains each item identified in the TCEQ comment letter (in bold) and a response to each item in the same order listed within the TCEQ's NOD letter.

A detailed response to each of the TCEQ comments follows.

1. **(Regarding the response to Comment No. 2 of the April 14, 2011 NOD letter). Please revise the SOP to include provisions to either prevent the individuals, who deliver/unload non-Class 1 waste in the mixed disposal areas, from contacting the Class 1 wastes or provide protections to these individuals as required by §330.173(d).**

Response:

A new subsection titled "Class 1 Waste Disposal Area Unloading Procedures" has been added to Section 4.20.2 of the SOP to address this comment. Additional text has also been added to Section 4.2.3 to discuss unloading position spacing at the working face.

2. **(Regarding the responses to Comment Nos. 3, 4, and 5 of the April 14, 2011 NOD letter). In addition to the proposed replacement pages, please include a**

complete copy of the currently approved SOP (please note that it is the permittee's responsibility to comply with all applicable regulatory site operating requirements as the permit conditions). The SOP copy located in the MSW Permits Section seems to be different from the SOP described by the application.

Response:

A complete copy of the currently permitted SOP is included with this NOD response.

3. **(Comment Nos. 3, 4, 5, and 6 of this NOD letter are related to the response to Comment No. 7 of the April 14, 2011 NOD letter). To be consistent with current rules on Class 1 waste disposal at a Type I MSW landfill, please revise the application to include design and construction provisions to install a final cover system meeting the final cover requirements of §330.457(a) and (b) for designated Class 1 cells over all sectors where Class 1 waste is disposed of, no matter the deposited waste is only Class 1 waste or Class 1 waste mixed MSW and other non-Class 1 waste. The 4-foot clay layer installed as part of the final cover may be counted as part of the containment dike system. The liner including the leachate collection system in any sectors where Class 1 waste is deposited shall meet the requirements of §330.331(e).**

Response:

The final cover design has been updated to include a final cover design in compliance with §330.457(a) and (b). Attachment 6B.3 is a new drawing added to Attachment 6 which includes a summary of the final cover requirements for the three Class 1 waste disposal options meeting the requirements of §330.457(a) and (b). This is also shown on Figure 7 of the Permit Modification Narrative. In addition, other applicable portions of the application have also been revised to incorporate the updated final cover requirements (e.g., Attachment 1 and Attachment 12). All Class 1 waste will be deposited in sectors constructed with a liner and leachate collection system in compliance with §330.331(e) as noted in the text of Section 3.1 of Attachment 1M and Attachments 6B.4, 6B.5, and 6B.7 (Note 3 on all figures).

4. **A vertical layer of 4-foot clay shall be installed to separate the MSW sector and the sector where Class 1 waste is deposited (the vertical layer must be sloped such that to prevent Class 1 waste leachate from getting into the MSW sector). Please revise the relevant drawings and text of this application per this comment.**

Response:

The application has been revised to update both the below and above grade Class 1 waste disposal options to incorporate the guidance received from TCEQ on a similar project. Each Class 1 waste disposal option is discussed in Attachment 1M – Class 1 Waste Disposal Area Design.

5. **Please design and install a levee at ground level to protect the sectors where Class 1 waste is deposited (an existing or planned/approved feature may, if justified, satisfy this requirement; it was noticed that the revised page 39 of the SOP refers to a compacted perimeter berm).**

Response:

If Class 1 waste is placed above grade, a compacted perimeter berm will be constructed at ground level. The initial containment dike will be constructed over the liner system and will tie to the compacted perimeter berm. Attachments 6B.4 and 6B.5 in Attachment 6 have been updated to show the compacted perimeter berm/containment dike intersection. For the undeveloped areas, the compacted perimeter berm will be constructed in accordance with soil liner specifications outlined in Section 2.3 of the SLQCP (Attachment 10) except no permeability tests will be required for this material. This will meet or exceed the containment dike requirements of §335.590(24)(F). The updated details on Attachments 6B.4 and 6B.5 show the required separation to prevent washout of Class 1 waste placed above grade. Compliance with §335.590(24)(F) is specifically addressed in Table 1M-1 in Attachment 1M.

Please note that the liner system anchor trench on Drawing 1M-7 and Drawing 1M-8 in Attachment 1 was updated to match the currently permitted anchor trench design shown on Attachment 6B.1 in Attachment 6 (i.e., the drawings now show a 3 ft x 3 ft anchor trench).

6. **Please revise the application to explicitly prohibit disposal of Class 1 waste (except the Class 1 waste that is Class 1 only due to its containing regulated asbestos) in sectors not specifically designed and constructed for disposal of Class 1 waste. Please also revise the application to specify that leachate generated from the Class 1 waste sectors may only be re-circulated into the waste in the Class 1 waste sectors, provided that the current permit authorizes leachate re-circulation.**

Response:

The application has been revised to update Class 1 waste disposal options to incorporate the guidance received from TCEQ on a similar project. Section 3 of

Attachment 1M was updated to indicate which sectors allow the disposal of Class 1 waste. In addition, text has also been added to this section to prohibit the disposal of Class 1 waste in areas not specifically designed and constructed for disposal of Class 1 waste.

In addition, as discussed with TCEQ, the application has been updated to be consistent with the waste recirculation options allowed per §330.177 and the guidance received from TCEQ regarding this issue.

7. **(Regarding the responses to Comment Nos. 8, 9, 10, and 11 of the April 14, 2011 NOD letter). Please refer to Comment Nos. 3, 4, 5, and 6 of this letter and revise the application accordingly.**

Response:

Please refer to Comment Response Nos. 3, 4, 5, and 6.

8. **(Regarding the response to Comment No. 13 of the April 14, 2011 NOD letter). Please refer to Comment Nos. 3, 4, 5, and 6 of this letter and revise the application accordingly.**

Response:

Please refer to Comment Response Nos. 3, 4, 5, and 6.

9. **(Regarding the response to Comment No. 14 of the April 14, 2011 NOD letter and in consideration of relevant comments of this NOD letter). Please revise the application to remove Containment Dike Options 2 and 3 (as the entire cell is designed as designated Class 1 waste cell, the containment dike should be continuous from the sides to the top). Please discuss the slope stability issues related to a final cover constructed to meet requirements of §330.457(a) and (b) for designated Class 1 waste cell.**

Response:

The application has been revised to remove containment dike Options 2 and 3. In addition, the application has been revised to update the below-grade and above-grade Class 1 waste disposal options to incorporate the guidance received from TCEQ on a similar project. Each Class 1 waste disposal option is discussed in Attachment 1, Attachment 1M.

In addition, the above-grade Class 1 containment dike stability analysis included in Attachment 1M has been revised to address the two above-grade Class 1 options discussed in Attachment 1, Attachment 1M, Section 3. As demonstrated

in Attachment 1M, the containment dike configuration results in a factor of safety that is above 1.5 for each option and condition analyzed.

10. **(Regarding the response to Comment No. 15 of the April 14, 2011 NOD letter). Please review comments of this letter and make necessary revisions to all pertinent portions of the permit to accommodate the revisions proposed in this application (for example, but not be limited to, the closure and post-closure care cost estimates).**

Response:

All pertinent portions of the permit have been updated to accommodate the revisions proposed in this application, including the closure and post-closure care cost estimates. Please note that closure and post-closure care cost estimates have also been updated to include Sector 15A, which was constructed in 2011, and the corrected final cover infiltration and erosion layers' thicknesses, which were reported incorrectly in the October 2007 permit modification. Also, the monitoring well system has been updated per the 600-foot spacing mod.

11. **(Regarding the response to Comment No. 16 of the April 14, 2011 NOD letter). If applicable, please revise the Permit Modification Narrative and the table on page A-1 of the original application to accommodate the possible changes made in response to the comments of this NOD letter.**

Response:

The Permit Modification Narrative (including figures) and the table on page A-1 have been updated to reflect changes made in response to the comments of this NOD letter.

12. **The revised Drawing 1M-6 shows that the interface between the Class 1 waste limit and the adjacent MSW waste is sloped towards the Class 1 waste sector, and the proposed containment dike does not cover the entire Class 1 area. Please revise the design to have the containment dike completely covers the Class 1 waste limit (determined from the sector/cell limit on the sector bottom). If the Class 1 waste (regardless of being mixed or not) limit at the top stops on the side slope, please extend the containment dike to cover part of the top slope.**

Response:

As discussed, the application has been revised to remove containment dike Options 2 and 3. In addition, the application has been revised to update both the below grade and the above grade Class 1 waste disposal options to incorporate the

guidance received from TCEQ on a similar project. Each Class 1 waste disposal option is discussed in Attachment 1, Attachment 1M.

13. **Please revise page 39 of Part IV by inserting "(not including Class 1 waste)" after "20 percent of the total waste" in the fourth sentence of the third paragraph on page 39.**

Response:

Section 4.20.2 in Part IV has been updated as requested.

14. **Please take necessary measures to ensure that the landfill complies with all applicable regulatory requirements and authorization conditions after this modification, if approved.**

Response:

Southwest Landfill TX, LP understands that after this modification is approved it will be incorporated into the current SDP and SOP. In addition, the site will take necessary measures to ensure that the landfill complies with all applicable regulatory requirements and authorization conditions after this modification is approved.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,
Weaver Boos Consultants, LLC–Southwest

Jeffrey P. Young, P.E.
Senior Engineer

Attachments: TCEQ Part I Form
Permit Modification Replacement Pages (1 original and 1 copy)

cc: TCEQ Region 1 Office
Michael Stewart, Southwest Landfill TX, LP
Alex Alcantar, Southwest Landfill TX, LP

CONTENTS

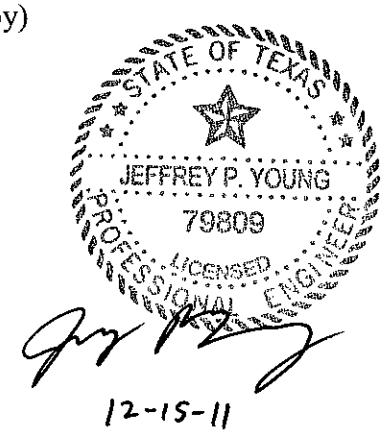
PERMIT MODIFICATION NARRATIVE 1
Introduction 1
Class 1 Waste History at the Site 1
Proposed Additional Class 1 Waste Disposal Options 2
SDP Replacement Pages 3
Permit Modification Justification 3

APPENDIX A
SDP Replacement Pages (Redline/Strikeout Copy)

APPENDIX B
SDP Replacement Pages (Clean Copy)

APPENDIX C
Adjacent Landowners List and Map

APPENDIX D
TCEQ Permit Application Part I Form



PERMIT MODIFICATION NARRATIVE

Introduction

The purpose of this permit modification is to provide the Southwest Landfill with an additional Class 1 nonhazardous industrial solid waste (Class 1 waste) disposal option that will allow the site to dispose of Class 1 waste above existing grade. Containment dikes will be constructed along the exterior slopes of the above grade Class 1 fill area in accordance with Title 30 Texas Administrative Code (TAC) §330.179(b). The following sections detail the Class 1 permitting history at the site, the proposed above grade Class 1 fill disposal option, a Site Development Plan replacement page summary, and permit modification justification.

Class 1 Waste History at the Site

The Class 1 nonhazardous industrial waste disposal area was approved by TCEQ in April 2002. This modification detailed the configuration of the Class 1 waste area, liner design, and chimney drain design. Also included in the April 2002 permit modification was the previously approved Class 1 Non-Hazardous Industrial Solid Waste Area Acceptance Plan dated January 1998.

The following figures detail the existing permitted Class 1 disposal design.

- Figure 1 – Excavation Plan with Class 1 Disposal Area. This figure provides a general site plan and also shows the areas that have been or will be constructed with a composite liner that includes a 3-foot-thick compacted clay liner.
- Figure 2 – Top of Class 1 Barrier Layer. This plan shows the currently permitted below grade disposal area. Note that the Top of Class 1 Barrier Layer configuration was modified in August 2003 to reduce the configuration of the Class 1 area in Sectors 7 and 12. However, both Sectors 7 and 12 have been constructed with a composite liner that includes a 3-foot-thick clay liner.
- Figures 3 and 4 – Sector Cross Sections. These two sections illustrate the existing permitted below grade fill area.

As noted above, the facility is currently permitted to accept and place Class 1 waste in designated below grade cells in accordance with the previous TCEQ regulations which limited the disposal of the Class 1 waste to below grade areas. The previous TCEQ regulations were replaced with updated regulations that were effective in March 2006. The currently approved "designated cell" option will remain in the Site Development Plan. This option is maintained for event type disposal requirements or as otherwise

required for landfill operations. However, this modification includes changes to the Site Development Plan to allow MSW, Class 2 and 3 industrial waste, and other approved wastes to be comingled within the below grade fill area. In addition, the configuration of the barrier layer termination within the interior portion of the landfill is proposed to be modified with this application. The proposed configuration is shown on Figure 7.

Proposed Additional Class 1 Waste Disposal Options

The additional Class 1 waste disposal options involves the disposal of Class 1 waste above existing grade and adjacent to containment dikes that will be constructed along the external slopes. The above grade Class 1 disposal area design is highlighted on Figures 5 through 8.

As shown on Figures 5 through 8, ~~with this option~~ the above grade Class 1 waste ~~will~~ may be mixed with other wastes accepted at the facility in areas which have a liner system constructed in accordance with Title 30 TAC §330.331(e). This includes Sectors ~~7A, 7B, 10A, 10B, and 11 through 16~~ 15A, 15B, 16, and a portion of Sectors 13 and 14. Containment dikes will be constructed along the exterior above grade slopes to the maximum above grade elevation of Class 1 waste disposal.

In accordance with 30 TAC §335.590(24)(F)(i), the containment dikes are designed to:

- prevent washout, release, or exposure of waste;
- be physically stable against slope failure, with a minimum safety factor of 1.5;
- prevent washout from hydrostatic and hydrodynamic forces from storms and floods;
- prevent storm water run-on from reaching the waste;
- prevent the release of leachate; and
- minimize long term maintenance.

The containment dikes:

- will be constructed along exterior slopes as part of site operations from clay rich soils;
- will be approximately 10-foot high with a minimum crest width of 17 feet (equivalent to 4 feet of cover perpendicular to the fill slope);
- will be located over the lined area at the perimeter of the waste footprint; and
- will be certified by a Texas licensed Professional Engineer after construction.

As shown on Figure ~~7~~ 8, Class 1 waste will only be placed after a containment dike has been constructed. In addition, each lift of Class 1 waste, which ~~will~~ may be comingled with other wastes accepted at the site in accordance with 30 TAC

§330.173(e), will be placed below the elevation of each containment dike and will slope toward the interior of the landfill.

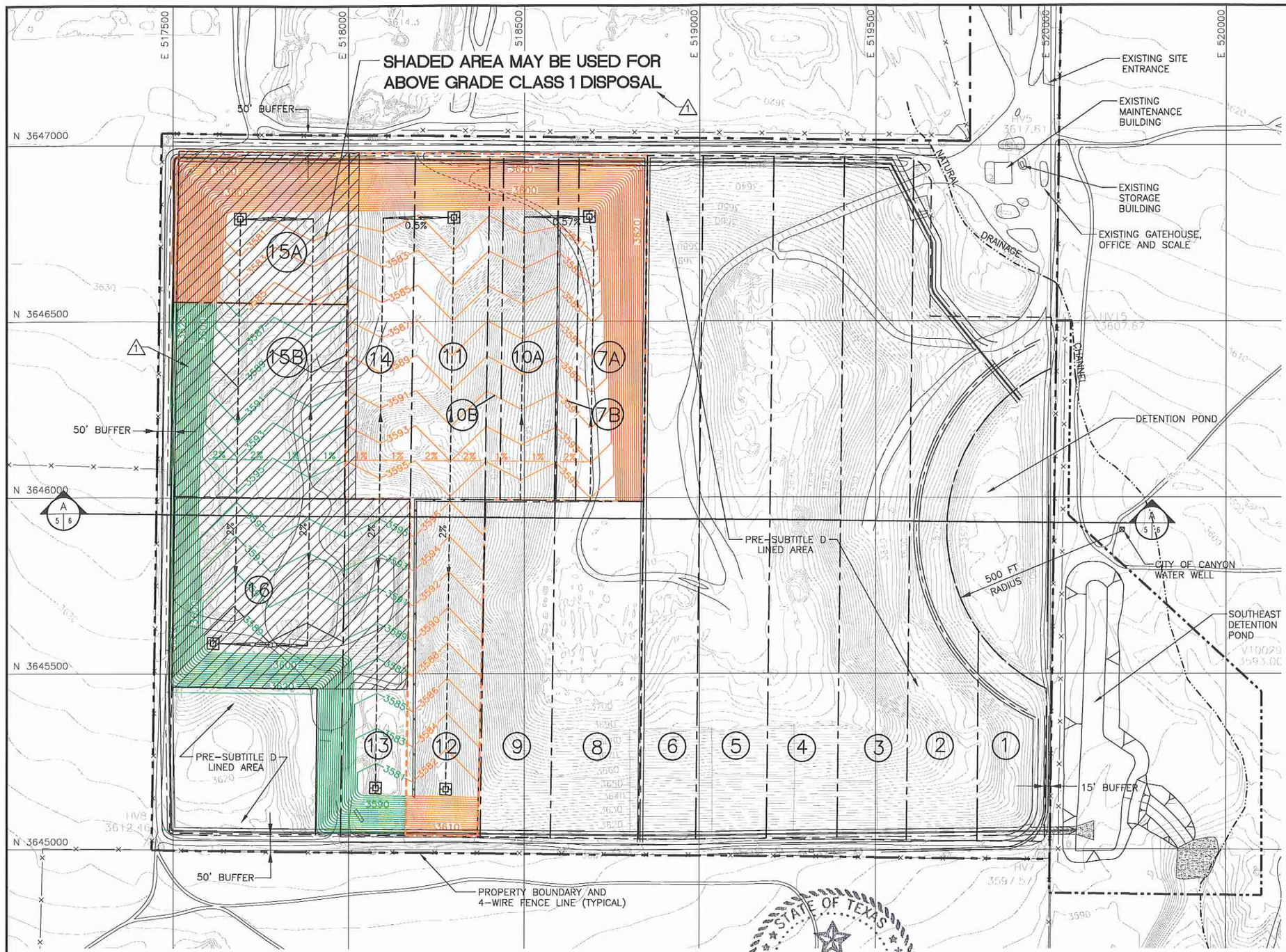
As indicated in the slope stability analysis, included in the Site Development Plan, Attachment 1M, Appendix 1M-D, the proposed placement of Class 1 waste is acceptable with respect to slope stability with a factor of safety of at least 1.5 in accordance with 30 TAC §335.590(24)(F)(i)(II). The stability analysis includes an analysis of the individual containment dike as well as analysis of the entire sideslope, which includes the containment dikes located along the bottom of the final cover. A dike certification, prepared in accordance with §335.590(24(F)(vi), will be included as part of the site operating record following the procedure specified in Attachment 1M of the Site Development Plan. The final cover system will be constructed over the containment dike once the final waste elevations have been achieved, as shown on Figure 8.

SDP Replacement Pages

Consistent with Title 30 TAC §305.70(e)(3), applicable drawings and text within the currently permitted SDP that are affected by the changes in this modification are included in Appendix A (redline/strikeout version) and Appendix B (clean version). The summary table included in Appendices A and B notes the list of replacement pages.

Permit Modification Justification

It is requested that this permit modification be processed per Title 30 TAC §305.70(l) since this type of permit modification is not specifically identified in §305.70. The additional Class 1 disposal option has been developed consistent with §305.70(l), given that the proposed changes meet the provisions of §305.70(d) and (e). Additionally, the proposed Class 1 waste disposal option meets the requirements of §330.179(b) and §335.590(F)(24)(i) and (vii). This modification requires notice in accordance with Title 30 TAC §305.70(k). A Property Owners Map and list have been included in Appendix C.



0 150 300
SCALE IN FEET

LEGEND

- EXISTING PERMIT BOUNDARY
- DRAINAGE EASEMENT
- N 3646000 — STATE PLANE COORDINATE
- 3587 — CONSTRUCTED CLASS 1 DISPOSAL CELL EXCAVATION CONTOUR
- 3585 — UNDEVELOPED PERMITTED CLASS 1 DISPOSAL EXCAVATION CONTOUR
- 3660 — EXISTING CONTOUR
- BUFFER LINE
- FLOW LINE
- SUMP
- (5) — SECTOR DESIGNATION
- (1) — OPTIONAL CLASS 1 ABOVE GRADE DISPOSAL AREA
- (1) — INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5-4-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. THE PERMITTED EXCAVATION CONTOURS REPRODUCED FROM DRAWING 1 OF APPENDIX B OF THE PERMIT MODIFICATION TITLED "REVISED CLASS 1 NON HAZARDOUS INDUSTRIAL WASTE DISPOSAL AREA CONFIGURATION" DEVELOPED BY WEAVER BOOS CONSULTANTS, LLC-SOUTHWEST AND APPROVED BY TCEQ ON AUGUST 8, 2003.

LIST OF REVISIONS:

1. UPDATED SECTORS WHERE ABOVE GRADE CLASS 1 DISPOSAL OPTIONS MAY BE USED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
PROFESSIONAL ENGINEER
LICENSED
12-15-11

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 03/2011
FILE: 0120-94-11
CAD: 1-EXCAVATION PLAN.DWG
DRAWN BY: JDW
DESIGN BY: DOL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

PERMIT MODIFICATION ABOVE GRADE CLASS 1 DISPOSAL AREA

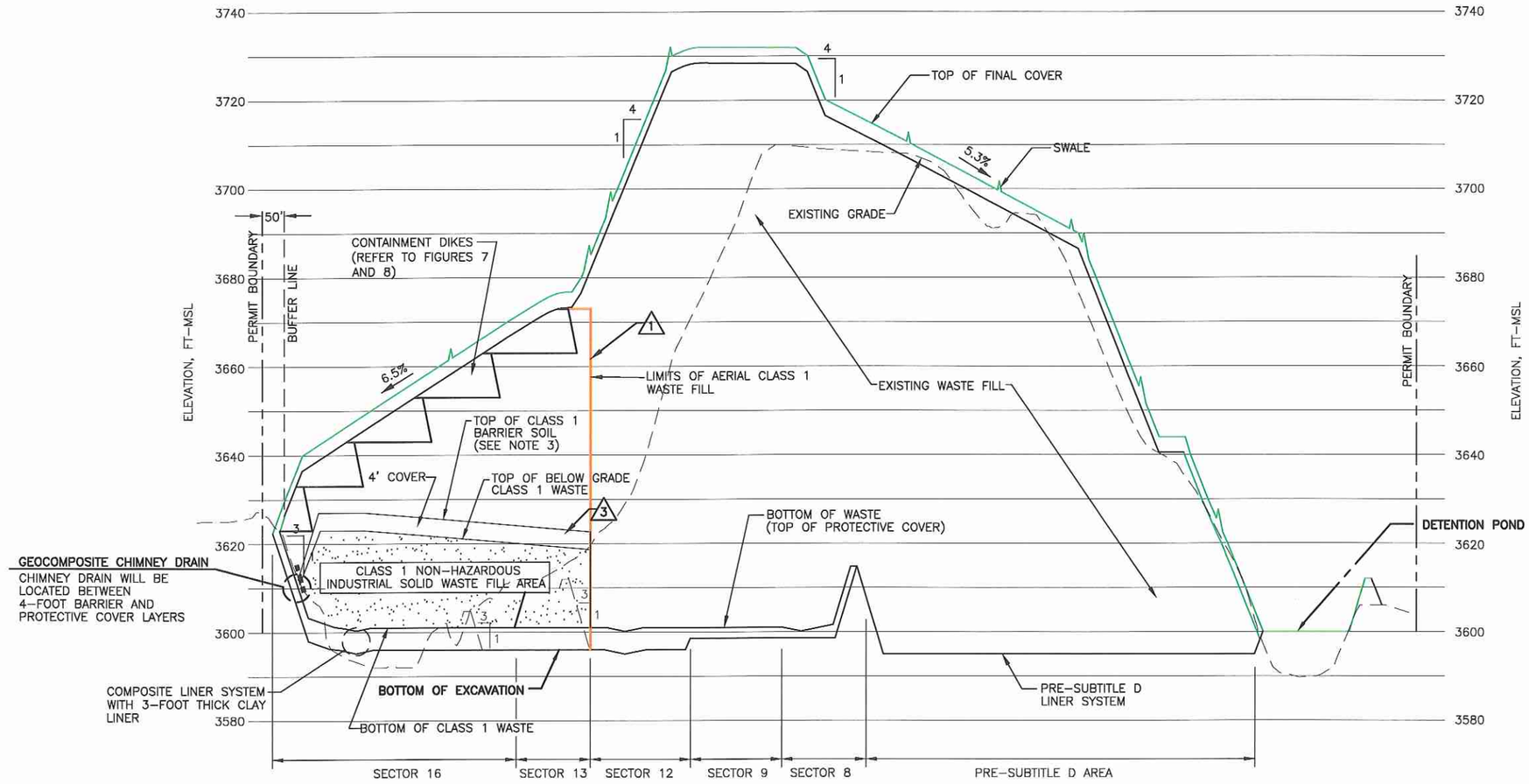
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE 5

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

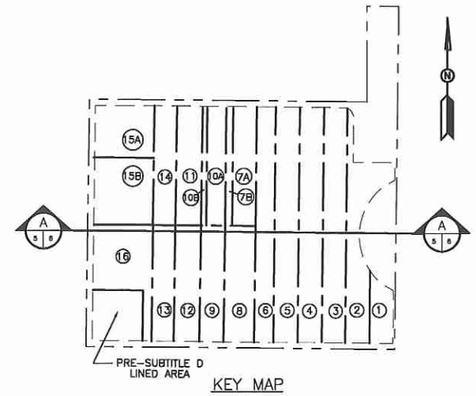
O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\FIG 5-ABOVE GRADE.dwg, jwilson



SECTION A (5 | 6)

0 150 300
HORIZONTAL SCALE IN FEET

0 15 30
VERTICAL SCALE IN FEET



KEY MAP
NTS

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5–4–2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. REFER TO THE PERMIT MODIFICATION PREPARED BY WEAVER BOOS CONSULTANTS (AUGUST 2003) FOR GEOCOMPOSITE CHIMNEY DRAIN AND LINER SYSTEM DETAILS.
3. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF ONE OF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED.
4. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY.

2 — see note 4

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REVISED LIMITS OF AERIAL CLASS 1 FILL.
2. UPDATED NOTE 4 TO INDICATE THAT ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH OTHER WASTES.
3. REVISED TOP OF CLASS 1 BARRIER LAYER.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
PROFESSIONAL LICENSED ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 03/2011
FILE: 0120-94-11
CAD: FIG 6-CROSS SECTION.DWG
DRAWN BY: SRF
DESIGN BY: DOL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	05/2011	NOD RESPONSE
2	12/2011	SEE LIST OF REVISIONS

SECTOR CROSS SECTION

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

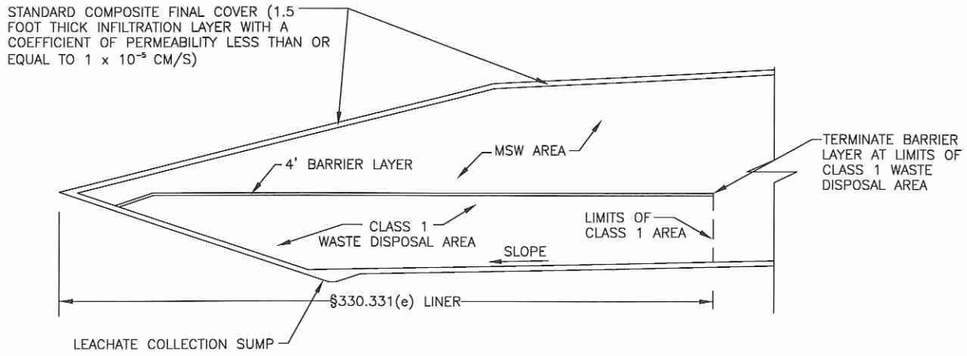
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

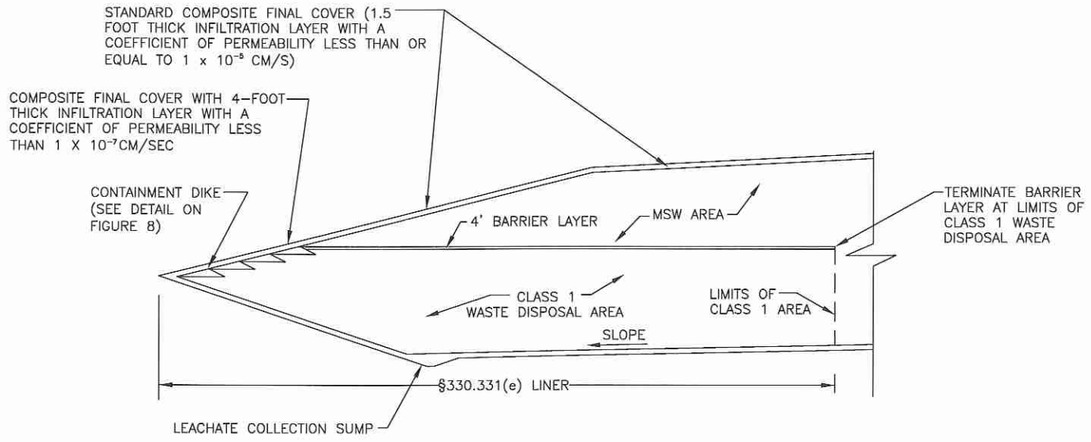
FIGURE 6

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

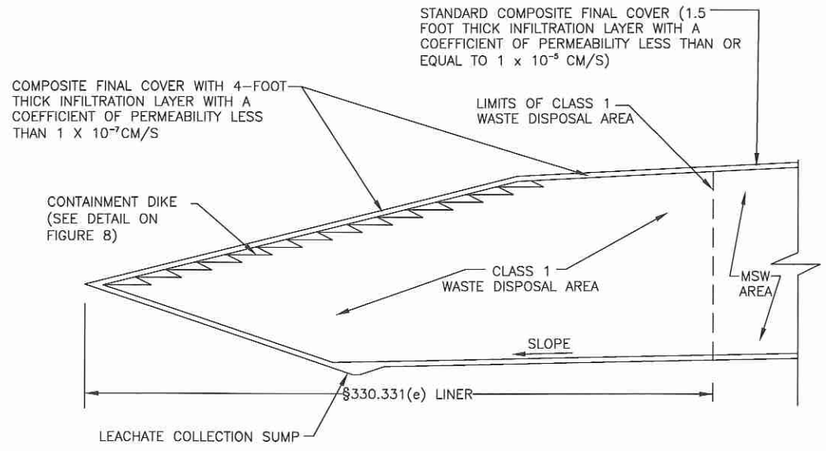
G:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\FIG 6-CROSS SECTION.dwg, jwilson



OPTION 1 – BELOW GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 2 – ABOVE GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 3 – ABOVE GRADE CLASS 1 DISPOSAL AREA

△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REPLACED FIGURE TO SHOW CLASS 1 WASTE DISPOSAL AREA OPTIONS.

NOTE:

CLASS 1 WASTE AND CLASS 1 NON–HAZARDOUS INDUSTRIAL WASTE ARE USED INTERCHANGEABLY.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

△1

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 03/2011
FILE: 0120–81–11
CAD: FIG 2–DETAILS.DWG
DRAWN BY: JDW
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 WASTE DISPOSAL AREA OPTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
EVANSVILLE, IN
RIVERSIDE, MO
GRAND RAPIDS, MI
SOUTH BEND, IN
SPRINGFIELD, IL
CLEARMONT, FL

FIGURE 7

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

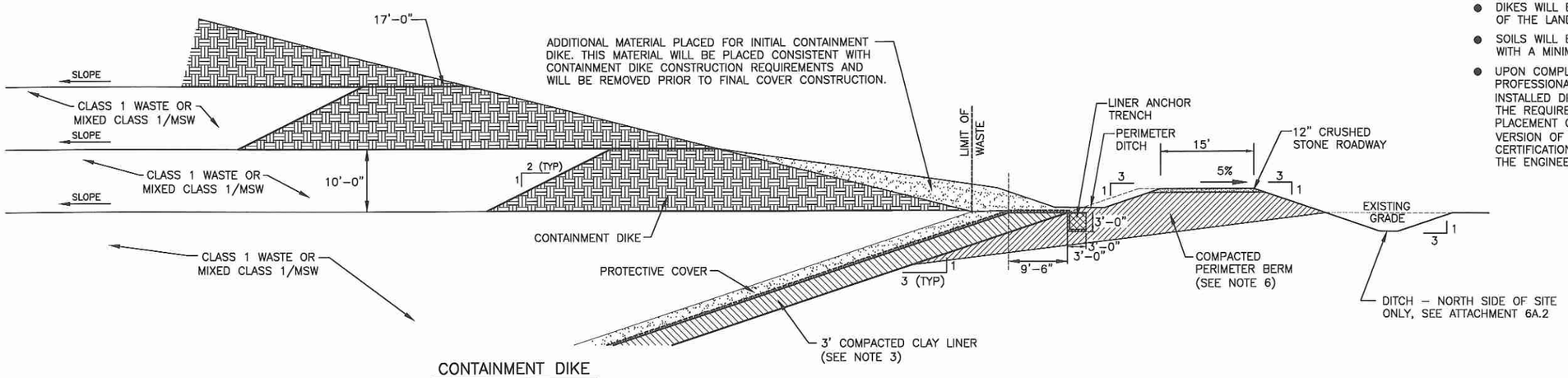
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\FIG 7-INTERIM FILL CONDITION.dwg, jwilson

CONTAINMENT DIKE CONSTRUCTION REQUIREMENTS

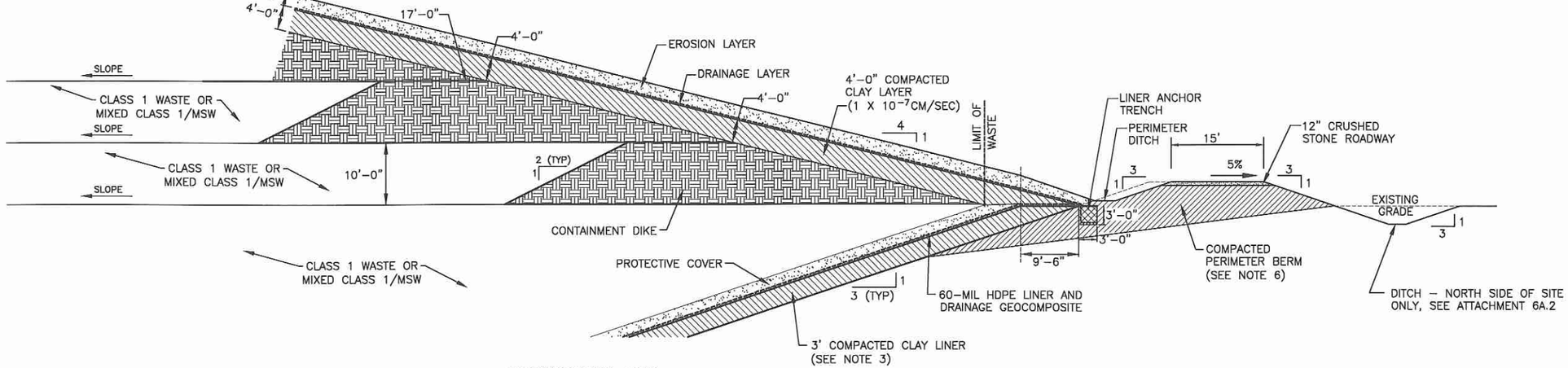
(REFER TO ATTACHMENT 1M, SECTION 3 OF THE SITE DEVELOPMENT PLAN)

- DIKES WILL BE CONSTRUCTED OF CLAY-RICH SOILS UNDER THE DIRECTION OF THE LANDFILL MANAGER OR HIS DESIGNEE.
- SOILS WILL BE PLACED IN MAXIMUM 9-INCH THICK LIFTS AND COMPACTED WITH A MINIMUM OF FOUR PASSES WITH A DOZER OR SIMILAR EQUIPMENT.
- UPON COMPLETION OF EACH DIKE, A THIRD PARTY INDEPENDENT PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN TEXAS WILL CERTIFY THE INSTALLED DIKE IN ACCORDANCE WITH TITLE 30 TAC §335.590(24)(F)(vi) AND THE REQUIREMENTS INCLUDED IN ATTACHMENT 1M OF THE SDP PRIOR TO PLACEMENT OF WASTE. THE LICENSED ENGINEER WILL UTILIZE THE CURRENT VERSION OF THE STANDARD FORM INCLUDED IN §335.590(24)(F)(vi) FOR THE CERTIFICATION OF THE DIKE. THE CERTIFICATION PREPARED AND SIGNED BY THE ENGINEER WILL BE PLACED IN THE SITE OPERATING RECORD.



CONTAINMENT DIKE

SCALE IN FEET 0 10 20



CONTAINMENT DIKE

SCALE IN FEET 0 10 20

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC §330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH §330.331(e) AND
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON FIGURE 5.
6. FOR THE UNDEVELOPED AREAS, THE PERIMETER BERM WILL BE CONSTRUCTED IN ACCORDANCE WITH SOIL LINER SPECIFICATIONS OUTLINED IN SECTION 2.3 OF THE SLQCP (ATTACHMENT 10) EXCEPT NO PERMEABILITY TESTS WILL BE REQUIRED FOR THIS MATERIAL.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

⚠1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REPLACED FIGURE TO SHOW CLASS 1 WASTE CONTAINMENT DIKE DETAILS.

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 03/2011 | DRAWN BY: VRS
FILE: 0120-94-11 | DESIGN BY: MDM
CAD: 6B.4-DETAILS.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	05/2011	NOD RESPONSE
2	12/2011	SEE LIST OF REVISIONS

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER
12-15-11

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

FIGURE 8

G:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\FIG 8-CLOSED CONDITION.dwg, jwilson

APPENDIX A

SDP REPLACEMENT PAGES

(REDLINE/STRIKEOUT COPY)

INTRODUCTION

The following replacement pages have been developed to replace applicable sections of the current Site Development Plan and Site Operating Plan. The following table summarizes the proposed replacement pages for the currently approved plans.

Site Development Plan and Site Operating Plan Replacement Pages

Replacement or Additional Page Number	Explanation
Part III – SDP, Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Part III – SDP, Page III-6	Text has been updated to include Class 1 waste and references to previous modifications.
Attachment 1 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 1G – Sector Cross Sections	Updated to add containment dikes.
~~Attachment 1H – Sector Cross Sections~~	~~Updated to add containment dikes.~~
Attachment 1M – Class 1 Waste Disposal Area Design	New attachment included to detail the design, construction, and maintenance of the Class 1 containment dikes.
Attachment 2 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 2A – Typical Fill Cross Sections	Updated to add containment dikes.
~~Attachment 2B – Typical Fill Cross Sections~~	~~Updated to add containment dikes.~~
Attachment 6 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 6B.3 – Class 1 Waste Disposal Area Options	New figure added to detail Class 1 options.
Attachment 6B.4 – Class 1 Waste Containment Dike Details	New figure added to detail Class 1 options.
Attachment 6B.5 – Class 1 Waste Containment Dike Details	New figure added to detail Class 1 containment dikes with final cover.
Attachment 6B.6 – Above Grade Class 1 Final Cover Details	New figure added to detail above grade Class 1 final cover.

Site Development Plan and Site Operating Plan
Replacement Pages (Continued)

Replacement or Additional Page Number	Explanation
Attachment 6B.7 – Class 1 Waste Containment Dike/Final Cover Tie-In Detail	New figure added to show Class 1 containment dikes/ final cover tie-in detail.
Attachment 6B.8 – Class 1 Final Cover Tie-in Details	New figure added to detail final cover tie-ins.
Attachment 6B.9 – Above Grade Class 1 Liner System Detail	New figure added to detail above grade Class 1 liner system.
Attachment 7 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 7C – Typical Fill Cross Sections	Updated to add containment dikes.
~~Attachment 7D – Typical Fill Cross Sections~~	~~Updated to add containment dikes.~~
Attachment 8 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 8 – Pages 2 through 6	Updated to include cost estimates for above grade Class 1 waste disposal area.
Attachment 8 – Figure 1	Updated to include cost estimates for above grade Class 1 waste disposal area.
Attachment 12 – Cover Page and Table of Contents	Pages have been signed and sealed for updated SDP.
Attachment 12 – Pages 12-5 and 12-6	Pages updated to include text regarding infiltration layer construction over containment dikes.
Part IV – Cover Page and Table of Contents	Pages have been signed and sealed for updated SOP.
Part IV – Page 13	Text added regarding MSW and Class 1 working face.
Part IV – Pages 14 and 15	Text added regarding MSW and Class 1 unloading procedures.
Part IV – Page ~~39~~ 34	Text added to include information about Class 1 containment dikes.
Part IV – Page 34a	Page added to include new text regarding Class 1 disposal area unloading procedures.
Part IV – Page 42	Text added to include information about Class 1 containment dikes.
Part IV – Page 62	Table 9-1 updated to include Containment Dike Certification Report and recordkeeping requirements for lateral extent of Class 1 waste placement.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

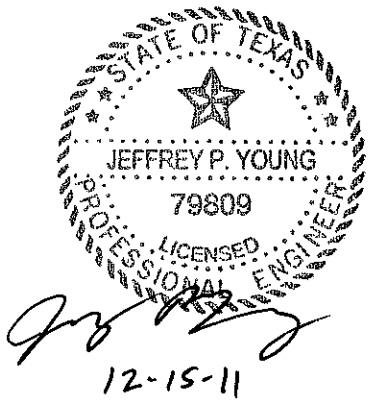
UPGRADING AND VERTICAL EXPANSION
SITE DEVELOPMENT PLAN PART III
SITE DEVELOPMENT PLAN NARRATIVE

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



Revision Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

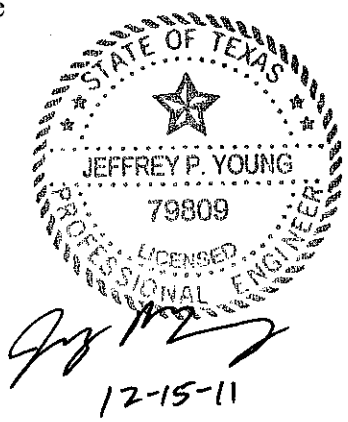
Project No. 0120-94-11-74-01

CONTENTS

1	**INTRODUCTION**	**III-1**
2	**SOLID WASTE DATA**	**III-3**
	2.1 Volume of Waste	III-3
	2.2 Properties and Characteristics of Waste	III-3
3	**DESIGN DATA**	**III-6**
	3.1 Landfilling Methods	III-6
	3.2 Wet-Weather Operation	III-6
	3.3 Access Control	III-6
	3.3.1 Access From Highway	III-6
	3.3.2 Vehicle Access	III-7
	3.3.3 All-Weather Access	III-7
	3.3.4 Site Fencing	III-7
	3.4 Site Life Projection	III-7
	3.5 Drinking Water Protection	III-8
	3.5.1 Status of Area Water Wells	III-8
	3.5.2 Groundwater Protection	III-8
	3.6 Surface Water Protection	III-9
	3.6.1 General	III-9
	3.6.2 Surface Runoff – Perimeter Drainage System	III-9
	3.6.3 Surface Runoff – Below Grade	III-10
	3.6.4 Surface Runoff – Aerial Fill Controls	III-10
	3.6.5 Erosion and Sedimentation Control	III-11
	3.6.6 Storm Water Detention	III-11
	3.6.7 Wetlands	III-12
	3.7 Control of Contaminated Surface Water	III-12
	3.8 MSW Bioremediation Facility	III-12
	3.9 Flood Control	III-12
	3.10 Final Cover Design	III-13
	3.11 Protection of Endangered Species	III-13
	3.12 Landfill Markers and Benchmark	III-13a

APPENDIX IIIA
Site Life Calculations

APPENDIX IIIB
NPDES Group Permit Application



3 DESIGN DATA

3.1 Landfilling Methods

The proposed landfill method for the 119-acre site is a combination of area-excavation fill followed by aerial fill to the proposed landfill completion grades.

The excavation side slopes will be approximately 3H:1V, the aerial fill side slopes will be approximately 5H:1V, and the aerial fill top slope will be approximately 6 percent. The landfill will be divided into 16 sectors. Upon reaching final elevations, each completed sector will be topped with a final cover and graded so that drainage will flow away from the adjacent sectors. All sectors will be closed in accordance with Attachment 15 - Final Closure Plan.

Disposal of Class 1 nonhazardous industrial solid waste (Class 1 waste) may occur in Sectors ~~7A, 7B, 10A, 10B, and 11 through 16~~ 15A, 15B, 16, and a portion of Sectors 13 and 14. Requirements for below and above grade disposal options are included in Attachment 1M – Class 1 Waste Disposal Area Design.

3.2 Wet-Weather Operation

An interior road constructed of all-weather material will provide access from the all weather entrance road to the fill area. The interior road will be passable under inclement weather conditions and a wet-weather area will be maintained near the access road. The wet-weather area will move as operations progress. Additional details of wet-weather operations are provided in SDP Part IV - Site Operating Plan (SOP) of this permit amendment. Details on access roads are provided in plan view on Attachment 1C and cross-sections on Attachment 6A.4.

3.3 Access Control

3.3.1 Access From Highway

The primary access road to the site is Buffalo Stadium Road, a 24-foot, two-lane asphalt-paved county road, located north of Canyon. Buffalo Stadium Road intersects FM 2590 approximately 1 mile east of the site. The existing access road from Buffalo Stadium Road to the site entrance is a private 30-foot wide all weather road that lies within a 60-feet wide easement, as described in Part Section 13.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

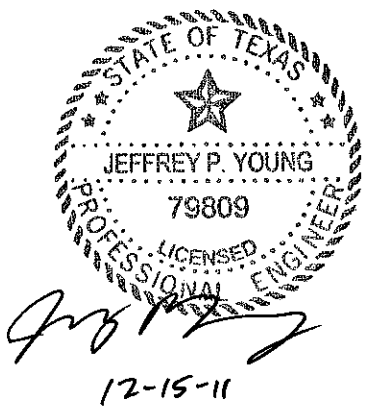
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 1
SITE LAYOUT PLAN

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



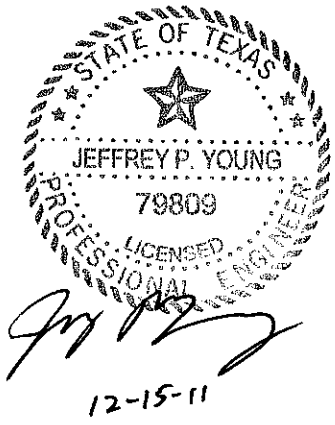
Revision Prepared by

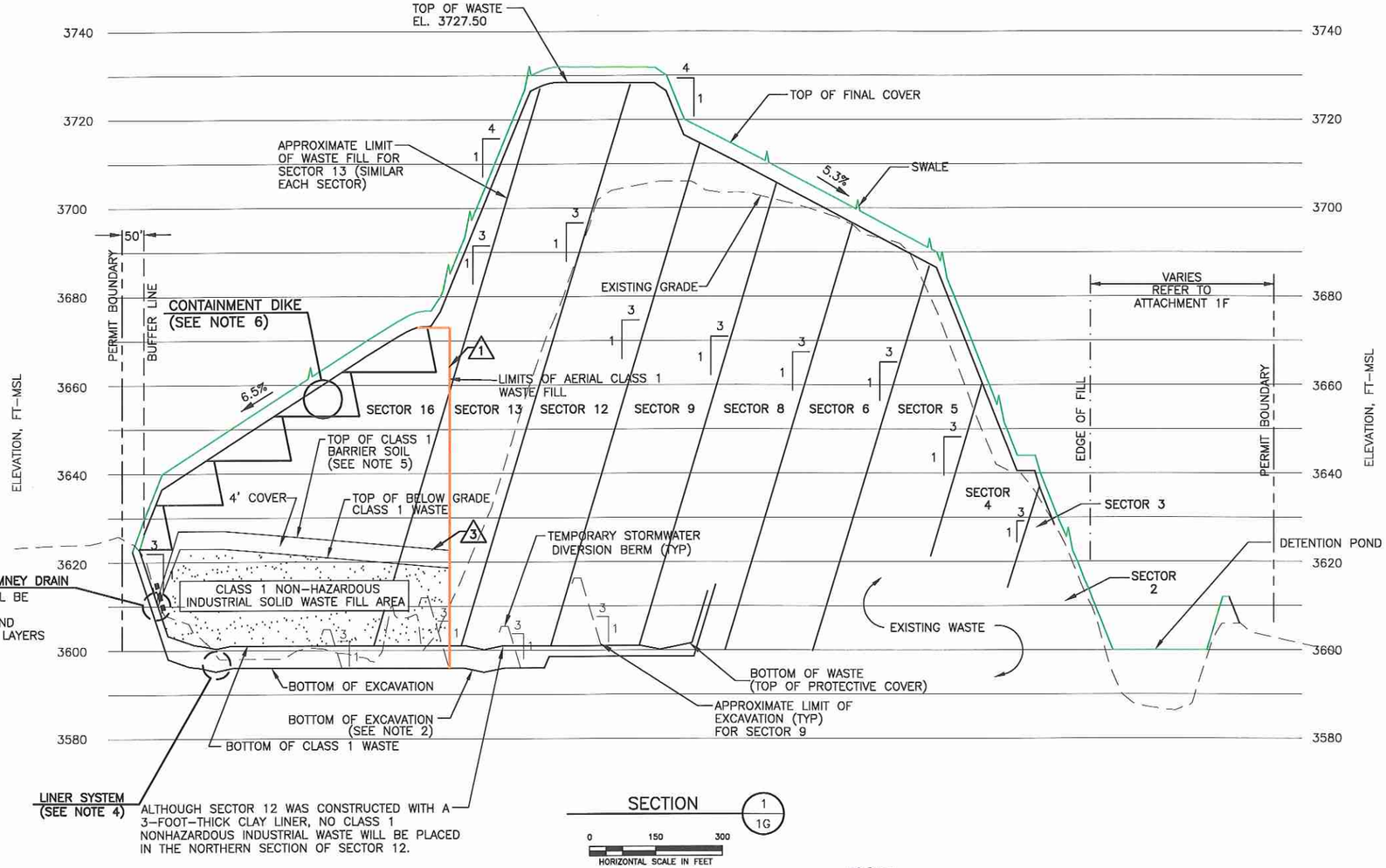
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-94-11-74-01

CONTENTS

1A Site Plan Layout
1B Perimeter Roadway Plan with Berm and Drainage Ditch
1C Site Entrance Plan
1D Excavation Plan (with LCS and Sumps)
1E Final Grading Plan
1F Sector Plan
1G Sector Cross Sections
1H Sector Cross Sections
1I Sector Cross Sections
1J Sector Development Plan – Beginning Development Stages
1K Sector Development Plan – Intermediate Development Stages
1L Sector Development Plan – Final Development Stages
1M Class 1 Waste Disposal Area Design

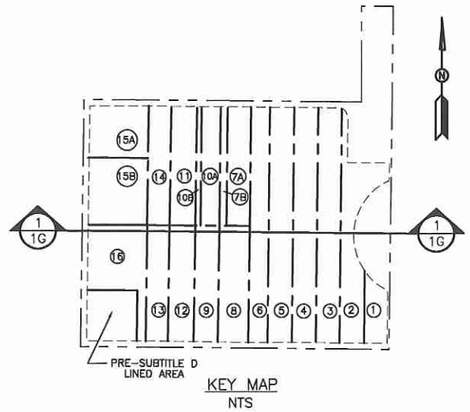




SECTION 1 / 1G

0 150 300
HORIZONTAL SCALE IN FEET

0 15 30
VERTICAL SCALE IN FEET



KEY MAP
NTS

NOTES:

1. SECTOR DESIGNATIONS INDICATE PROGRESSION OF LANDFILL OPERATIONS. AS INDICATED IN THE FINAL CLOSURE PLAN, ALLIED WILL CONDUCT ON-GOING CLOSURE OF THE LANDFILL THROUGHOUT THE ACTIVE LIFE OF THE LANDFILL.
2. BOTTOM OF EXCAVATION WILL VARY DEPENDING UPON THE THICKNESS OF THE LINER USED. BOTTOM LINER DEPICTED IS A 3-FOOT THICK CLAY LINER.
3. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 3-29-2007. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
4. REFER TO THE PERMIT MODIFICATION PREPARED BY WEAVER BOOS CONSULTANTS (AUGUST 2003) FOR GEOCOMPOSITE CHIMNEY DRAIN AND LINER SYSTEM DETAILS.
5. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED.
6. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY. REFER TO ATTACHMENT 1M (DRAWINGS 1M-7 AND 1M-8) FOR ADDITIONAL INFORMATION.

△2

△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. UPDATED LIMITS OF AERIAL CLASS 1 FILL.
2. UPDATED NOTE 6 TO INDICATE THAT ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH OTHER WASTES.
3. REVISED TOP OF CLASS 1 BARRIER LAYER.

GENERAL NOTES:

1. REFER TO ATTACHMENT 1F FOR SECTOR PLAN.
2. REFER TO ATTACHMENT 1E FOR FINAL GRADING PLAN.
3. VERTICAL SCALE IS EXAGGERATED 10:1.
4. SECTIONS ARE CUT ON ATTACHMENT 1E AND 1F.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND LINER DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE-IN.
6. BERM LOCATIONS TAKEN FROM ATTACHMENT 7B, FINAL DRAINAGE PLAN.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001 | DRAWN BY: SRF
FILE: 0120-94-11 | DESIGN BY: DOL
CAD: 1G-CROSS SECTION.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	12/2011	SEE LIST OF REVISIONS

SECTOR CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN SOUTH BEND, IN SPRINGFIELD, IL ST. LOUIS, MO

ATTACHMENT 1G

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\ATT 1\1G-CROSS SECTION.dwg, jwilson

Attachment 1H has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

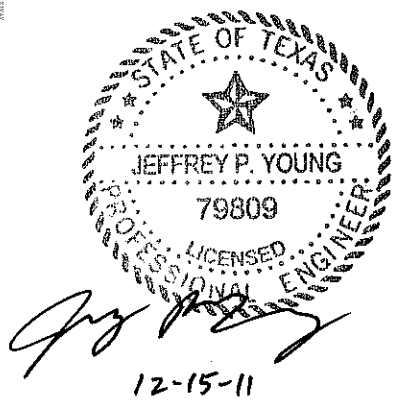
ATTACHMENT 1M

CLASS 1 WASTE DISPOSAL AREA DESIGN

Prepared for

Southwest Landfill TX, LP

December 2011



Prepared by

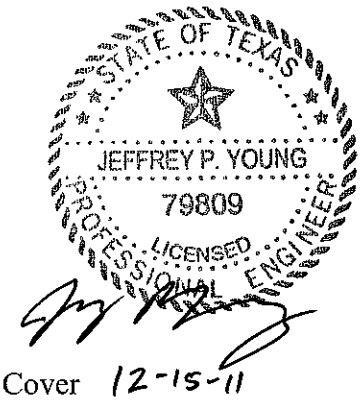
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

1	**PURPOSE**		**1M-1**
2	**CLASS 1 WASTE HISTORY AT THE SITE AND THE BELOW GRADE DISPOSAL OPTION**		**1M-2**
3	**CLASS 1 WASTE DISPOSAL OPTIONS**		**1M-4**
	3.1	Disposal Options Description	1M-4
	3.2	Class 1 Containment Dike Construction and Certification Requirements	1M-5
	3.3	Class 1 Containment Dike Maintenance	1M-6
	3.4	Compliance with Title 30 TAC §330.179(b) and 335.590(24)(F)	1M-6

APPENDIX 1M-A
Drawings
1M-1 – Excavation Plan with Class 1 Disposal Area
1M-2 – Top of Class 1 Barrier Soil Plan
1M-3 – Sector Cross Section
1M-4 – Sector Cross Section
1M-5 – Above Grade Class 1 Disposal Area
1M-6 – Sector Cross Section
1M-7 – Class 1 Waste Containment Dike Details
1M-8 – Class 1 Waste Containment Dike Details with Final Cover



APPENDIX 1M-B
Class 1 Waste TCEQ Approval Letters

APPENDIX 1M-C
Below Grade Class 1 Waste Disposal Option Drawings (Reproduced from June 2003 Permit Modification)

APPENDIX 1M-D
Class 1 Waste Containment Dike Slope Stability Analysis

APPENDIX 1M-E
Class 1 Waste Containment Dike Construction Record

APPENDIX 1M-F
Containment Dike Certification Form

3 ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS

3.1 Disposal Options Description

The above grade Class 1 waste disposal options involves the disposal of Class 1 waste above existing grade and adjacent to containment dikes that will be constructed along the external slopes. The two above grade Class 1 disposal area ~~design is~~ options are highlighted on Drawings ~~1M-5 through 1M-8~~ 1M-7 in Appendix 1M-A and are detailed below ~~(this area is also shown in the Attachments 1, 2, and 7 drawings)~~.

- Above Grade Class 1 Waste Disposal Area with 4-foot-thick Separation Layer. This option allows for the disposal of Class 1 wastes above existing grade if containment dikes are constructed along the exterior slope of the Class 1 waste disposal area. This option also includes the placement of a 4-foot-thick compacted clay rich barrier layer that will be placed over the Class 1 waste as a separation layer between the Class 1 waste and the municipal solid waste (and other non-Class 1 waste material) to be placed above. With this option, the 4-foot-thick separation or barrier layer will be sloped toward the interior of the landfill.
- Above Grade Class 1 Waste Disposal Area. This option includes the construction of containment dikes along the exterior sideslope of the Class 1 disposal area to extend the limits of the Class 1 waste disposal area. No separation layer is required for this option; however, the thickness of the composite final cover system's infiltration layer will be increased from 1.5 feet to 4.0 feet with a maximum hydraulic conductivity of $1x10^{-7}$ cm/s.

As shown on Drawings 1M-5 through 1M-8, with this option the above grade Class 1 waste ~~will~~ may be mixed with other wastes accepted at the facility in areas which have a liner system constructed in accordance with Title 30 TAC §330.331(e). This includes Sectors ~~7A, 7B, 10A, 10B, and 11 through 16~~ 15A, 15B, 16, and a portion of Sectors 13 and 14. Class 1 waste (except the Class 1 waste that is Class 1 only due to its containing regulated asbestos) will not be placed in sectors not specifically designed and constructed for disposal of Class 1 waste. Containment dikes will be constructed along the exterior above grade slopes to the maximum above grade elevation of Class 1 waste disposal. ~~As shown on the cross-sections in Attachments 1, 2, and 7, the interface between mixed Class 1/MSW and MSW only will be sloped toward the mixed Class 1/MSW area.~~

In accordance with 30 TAC §335.590(24)(F)(i), the containment dikes are designed to:

- prevent washout, release, or exposure of waste;
- be physically stable;
- prevent washout from hydrostatic and hydrodynamic forces from storms and floods;
- prevent storm water run-on from reaching the waste;
- prevent the release of leachate; and
- minimize long term maintenance.

The containment dikes:

- will be constructed along exterior slopes as part of site operations from clay rich soils;
- will be approximately 10-foot high with a minimum crest width of 17 feet (equivalent to 4 feet of cover perpendicular to the fill slope);
- will be located over the lined area at the perimeter of the waste footprint; and
- will be certified by a Texas licensed Professional Engineer after construction.

As shown on Drawing 1M-7, Class 1 waste will only be placed after a containment dike has been constructed. In addition, each lift of Class 1 waste, which ~~will~~ may be comingled with other wastes accepted at the site in accordance with Title 30 TAC §330.173(e), will be placed below the elevation of each containment dike and will slope toward the interior of the landfill.

3.2 Class 1 Containment Dike Construction and Certification Requirements

The containment dike construction requirements are listed below (and also summarized on Drawing 1M-7 in Appendix 1M-A).

1. Dikes will be constructed of clay-rich soils under the direction of the landfill manager or his designee.
2. Soils will be placed in maximum 9-inch-thick lifts and compacted with a minimum of four passes with a dozer or similar equipment.
3. The Landfill Manager or his designee will verify that the completed containment dike has the following dimensions.
   - 17-foot top width
   - Height of 10 feet
   - 4H:1V outside slope and 2H:1V inside slope
4. The Landfill manager or his designee will complete the Class 1 Waste Containment Dike Construction Record form included in Appendix 1M-E after each construction event.
5. A third party independent professional engineer licensed to practice in Texas will certify the installed containment dike in accordance with Title 30 TAC §335.590(24)(F)(vi) (see below for certification procedure).

This construction technique is designed to meet the requirements of Title 30 TAC §335.590(24)(F)(i)(II), which states, "waste placed above grade shall be laterally contained by dikes that are constructed to be physically stable against slope failure, with a minimum safety factor of 1.5". The stability analysis included in Appendix 1M-D demonstrates that the above listed construction technique will meet this requirement.

As listed above, the Landfill Manager or his designee will oversee the construction of the containment dike. Once construction has been completed, a Class 1 Waste Containment Dike Construction Record form, included in Appendix 1M-E, will be completed. This form will be provided to the certifying professional engineer. The professional engineer will then complete the following steps.

1. Review the current permit documents that address the containment dike (including Attachment 1M).
2. Visit the site after containment dike construction has been completed to inspect the containment dike to be certified.
3. Visit the site after containment dike construction has been completed to inspect the containment dike to be certified.
4. Interview the Landfill Manager or his designee to determine the construction technique and verify that the technique used is consistent with the permit requirements. The professional engineer will also obtain a copy of the completed Class 1 Waste Containment Dike Construction Record.
5. Complete the Containment Dike Certification Form. The latest form included in Title 30 TAC §335.590(24)(F)(vi) shall be used (refer to Appendix 1M-F).
6. The complete Containment Dike Certification Form will be placed in the Site Operating Record.

After the above procedure has been completed, the site may begin filling in the area behind the containment dike.

3.3 Class 1 Containment Dike Maintenance

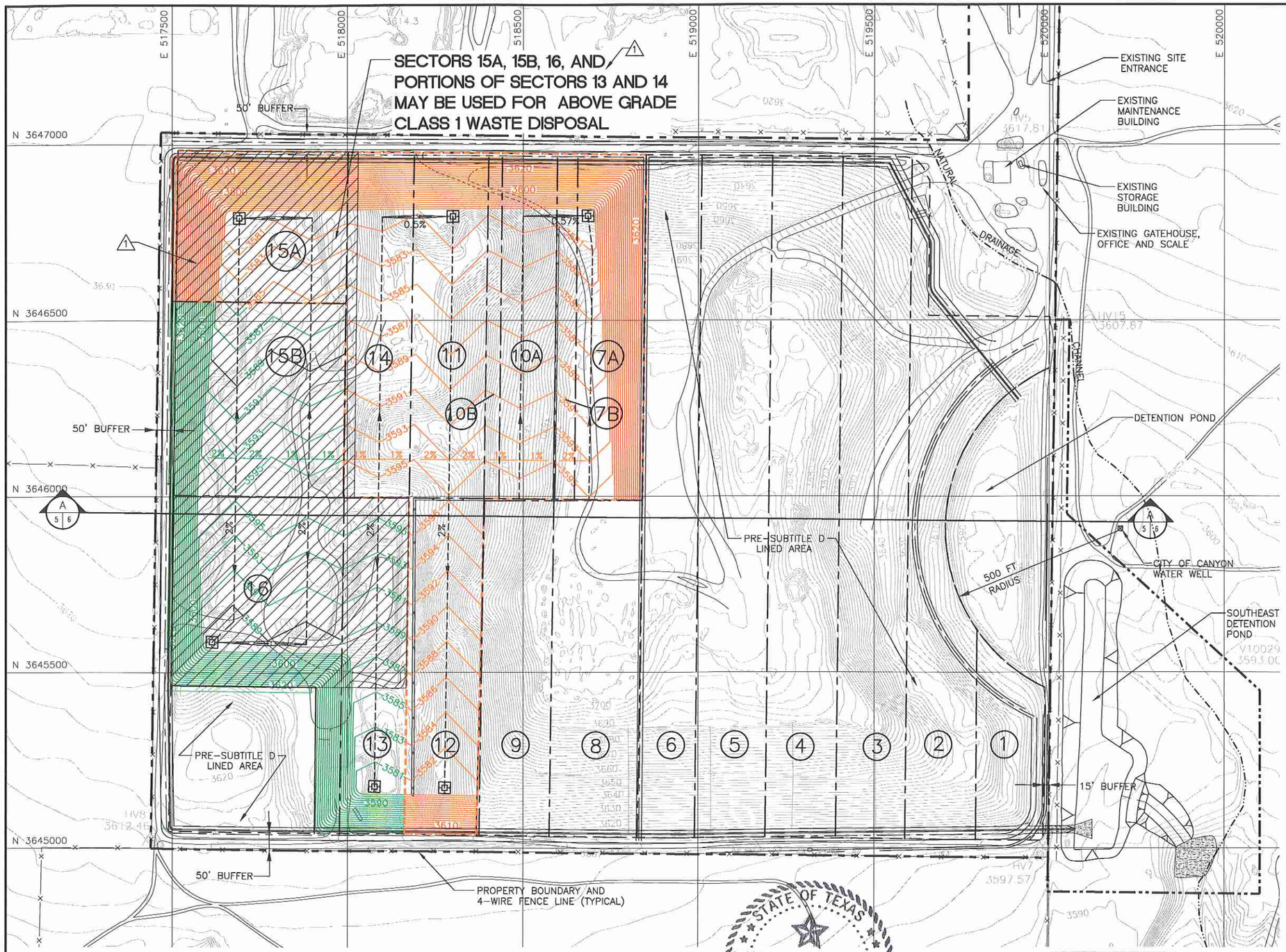
The installed containment dikes will be inspected in accordance with the inspection procedures and frequency included in Section 4.23 of the SOP to ensure that the installed dike surfaces are not eroded. Soil management practices outlined in Section 4.18 of the SOP (refer to Section 4.18.3) will be followed to ensure the integrity of the dike is maintained.

3.4 Compliance with Title 30 TAC §330.179(b) and §335.590(24)(F)

§330.179(b) allows for disposal of Class 1 waste above natural grade provided that the conditions in §335.590(24)(F)(i) – (vi) are met. As shown in Table 1M-1, the above grade Class 1 waste fill area has been designed to meet each of the requirements listed in §335.590(24)(F)(i). In accordance with §335.590(24)(F)(vii), since the requirements of §335.590(24)(F)(i) will be met, the additional requirements listed in §335.590(24)(F)(ii) through (v) are not applicable. The information provided in this attachment demonstrates that §335.590(24)(F)(i) requirements are met (see Table 1M-1).

APPENDIX 1M-A

DRAWINGS



0 150 300
SCALE IN FEET

LEGEND

- EXISTING PERMIT BOUNDARY
- DRAINAGE EASEMENT
- N 3646000 — STATE PLANE COORDINATE
- 3587 — CONSTRUCTED CLASS 1 DISPOSAL CELL EXCAVATION CONTOUR
- 3585 — UNDEVELOPED PERMITTED CLASS 1 DISPOSAL EXCAVATION CONTOUR
- 3660 — EXISTING CONTOUR
- BUFFER LINE
- FLOW LINE
- SUMP
- (5) — SECTOR DESIGNATION
- OPTIONAL CLASS 1 ABOVE GRADE DISPOSAL AREA
- △1 — INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5-4-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. THE PERMITTED EXCAVATION CONTOURS REPRODUCED FROM DRAWING 1 OF APPENDIX B OF THE PERMIT MODIFICATION TITLED "REVISED CLASS 1 NON HAZARDOUS INDUSTRIAL WASTE DISPOSAL AREA CONFIGURATION" DEVELOPED BY WEAVER BOOS CONSULTANTS, LLC-SOUTHWEST AND APPROVED BY TCEQ ON AUGUST 8, 2003.

LIST OF REVISIONS:

1. UPDATED SECTORS WHERE ABOVE GRADE CLASS 1 DISPOSAL OPTIONS MAY BE USED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
PROFESSIONAL ENGINEER
LICENSED
12-15-11

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 1-EXCAVATION PLAN.DWG
DRAWN BY: JDW
DESIGN BY: DOL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

ABOVE GRADE CLASS 1 DISPOSAL AREA

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

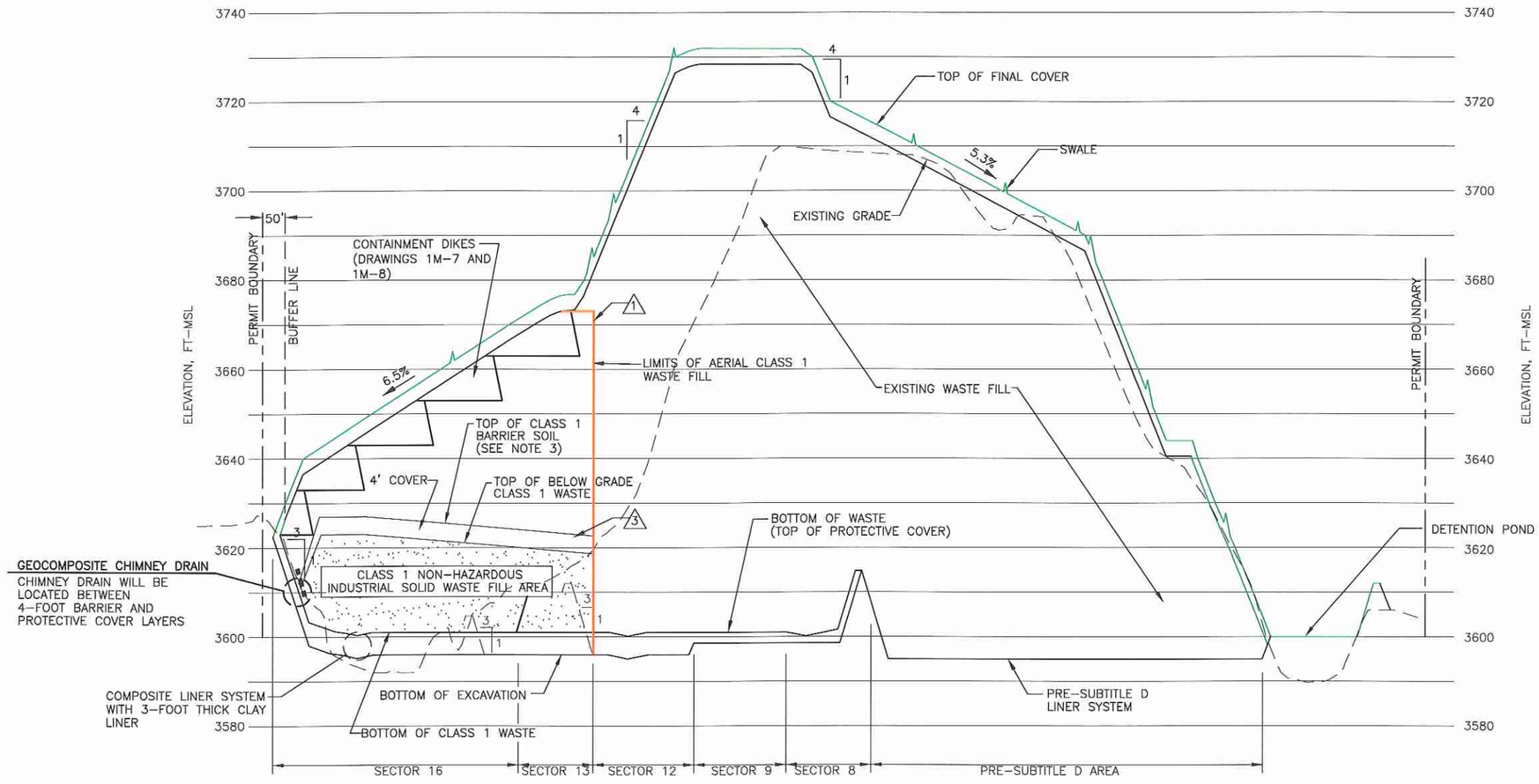
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

DRAWING 1M-5

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

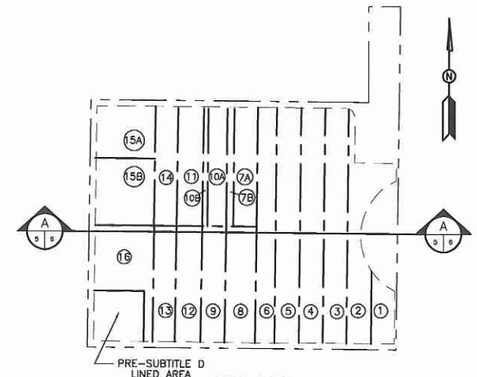
O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\ATT 1M\1M-5 ABOVE GRADE.dwg, jwilson



SECTION A (5 | 6)

0 150 300
HORIZONTAL SCALE IN FEET

0 15 30
VERTICAL SCALE IN FEET



KEY MAP
NTS

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5–4–2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. REFER TO THE PERMIT MODIFICATION PREPARED BY WEAVER BOOS CONSULTANTS (AUGUST 2003) FOR GEOCOMPOSITE CHIMNEY DRAIN AND LINER SYSTEM DETAILS.
3. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED.
4. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY. REFER TO ATTACHMENT 1M (DRAWINGS 1M–7 AND 1M–8) FOR ADDITIONAL INFORMATION.

△2

△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. UPDATED LIMITS OF AERIAL CLASS 1 FILL.
2. UPDATED NOTE 4 TO INDICATE THAT ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH OTHER WASTES.
3. REVISED TOP OF CLASS 1 BARRIER LAYER.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120–94–11
CAD: FIG 6–CROSS SECTION.DWG

DRAWN BY: SRF
DESIGN BY: DOL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

SECTOR CROSS SECTION

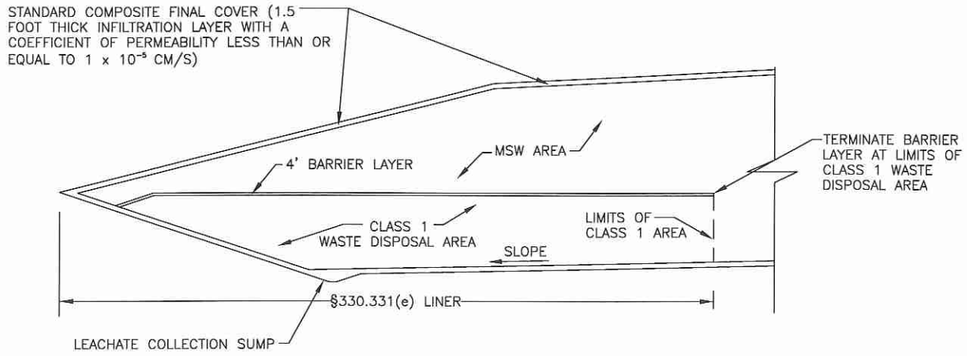
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735–9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

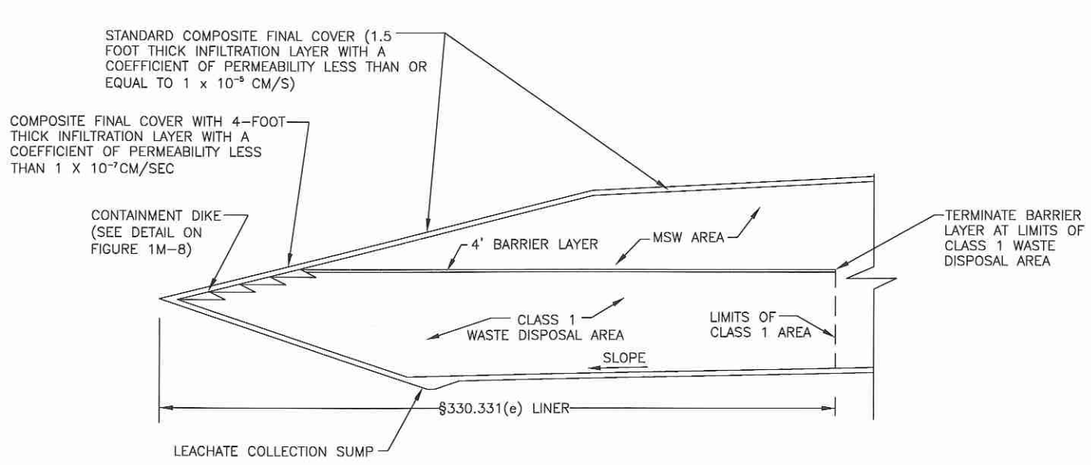
DRAWING 1M–6

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

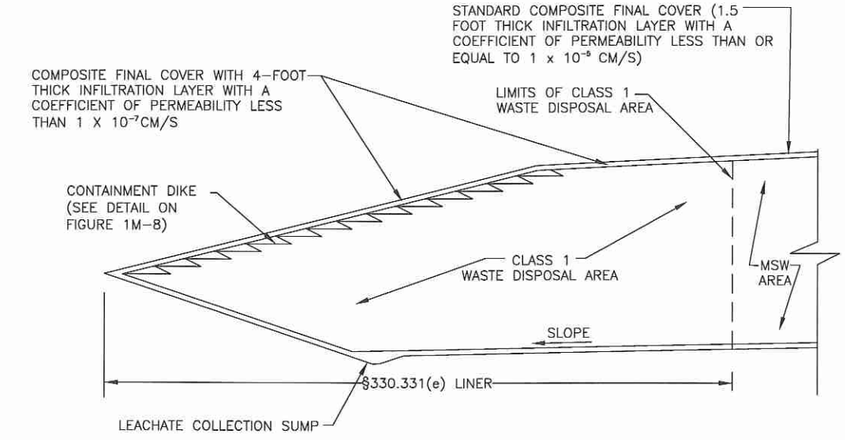
O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 1M\1M-6-CROSS SECTION.dwg, rsellers



OPTION 1 – BELOW GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 2 – ABOVE GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 3 – ABOVE GRADE CLASS 1 DISPOSAL AREA

⚠1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REPLACED FIGURE TO SHOW CLASS 1 WASTE DISPOSAL AREA OPTIONS.

NOTES:

1. CLASS 1 WASTE AND CLASS 1 NON–HAZARDOUS INDUSTRIAL WASTE ARE USED INTERCHANGEABLY.
2. REFER TO DRAWING 1M–5 FOR ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 03/2011
FILE: 0120–94–11
CAD: FIG 2–DETAILS.DWG
DRAWN BY: JDW
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 WASTE DISPOSAL AREA OPTIONS
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

DRAWING 1M-7

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

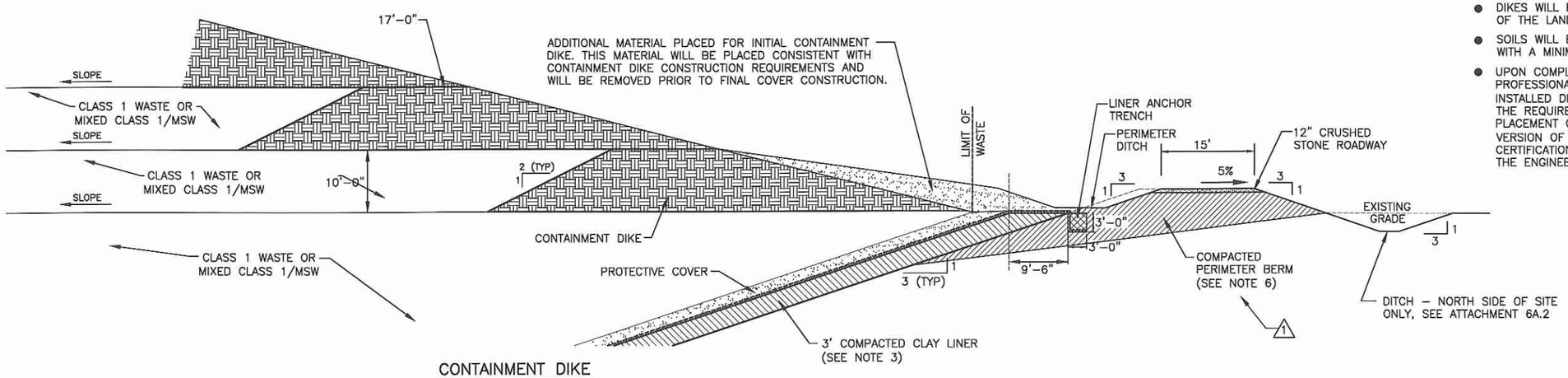
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\ATT 1M\1M-7-INTERIM FILL CONDITION.dwg, jwilson

CONTAINMENT DIKE CONSTRUCTION REQUIREMENTS

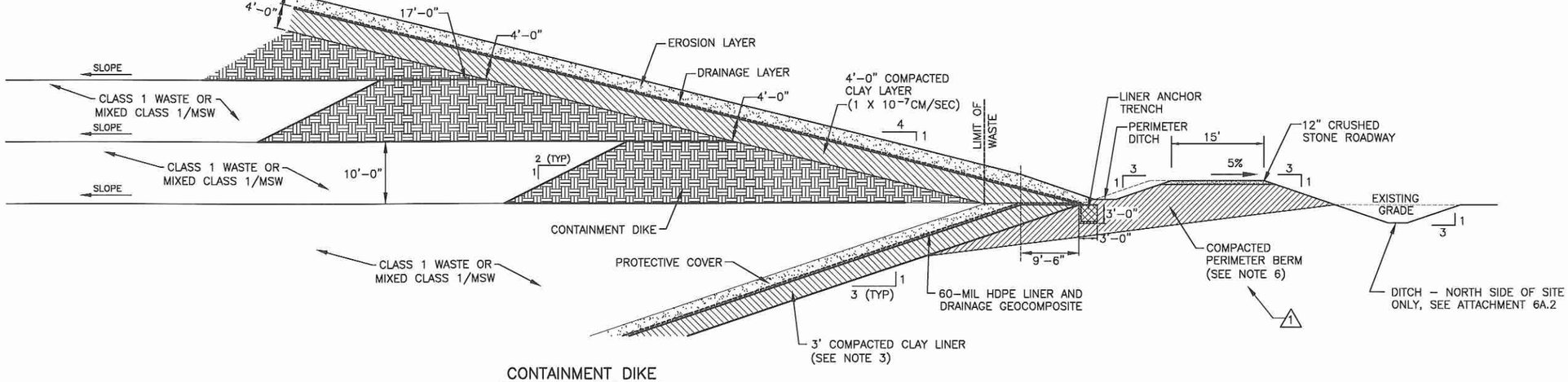
(REFER TO ATTACHMENT 1M, SECTION 3 OF THE SITE DEVELOPMENT PLAN)

- DIKES WILL BE CONSTRUCTED OF CLAY-RICH SOILS UNDER THE DIRECTION OF THE LANDFILL MANAGER OR HIS DESIGNEE.
- SOILS WILL BE PLACED IN MAXIMUM 9-INCH THICK LIFTS AND COMPACTED WITH A MINIMUM OF FOUR PASSES WITH A DOZER OR SIMILAR EQUIPMENT.
- UPON COMPLETION OF EACH DIKE, A THIRD PARTY INDEPENDENT PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN TEXAS WILL CERTIFY THE INSTALLED DIKE IN ACCORDANCE WITH TITLE 30 TAC §335.590(24)(F)(vi) AND THE REQUIREMENTS INCLUDED IN ATTACHMENT 1M OF THE SDP PRIOR TO PLACEMENT OF WASTE. THE LICENSED ENGINEER WILL UTILIZE THE CURRENT VERSION OF THE STANDARD FORM INCLUDED IN §335.590(24)(F)(vi) FOR THE CERTIFICATION OF THE DIKE. THE CERTIFICATION PREPARED AND SIGNED BY THE ENGINEER WILL BE PLACED IN THE SITE OPERATING RECORD.



CONTAINMENT DIKE

SCALE 0 10 20 IN FEET



CONTAINMENT DIKE

SCALE 0 10 20 IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC §330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH §330.331(e) AND
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.
6. FOR THE UNDEVELOPED AREAS, THE PERIMETER BERM WILL BE CONSTRUCTED IN ACCORDANCE WITH SOIL LINER SPECIFICATIONS OUTLINED IN SECTION 2.3 OF THE SLQCP (ATTACHMENT 10) EXCEPT NO PERMEABILITY TESTS WILL BE REQUIRED FOR THIS MATERIAL.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REPLACED FIGURE TO SHOW CLASS 1 WASTE CONTAINMENT DIKE DETAILS AND SHOW PERIMETER BERM DETAILS.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011 | DRAWN BY: VRS
FILE: 0120-94-11 | DESIGN BY: MDM
CAD: IM-8.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE IDEAS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

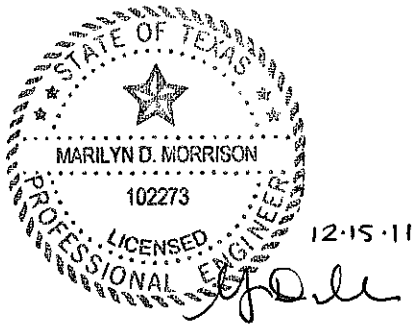
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

DRAWING 1M-8

G:\0120\94\AERIAL CLASS 1 MOD (12-2010)\VOL 2\ATT 1M\1M-8-CLOSED CONDITION.dwg, jwilson

APPENDIX 1M-D

CLASS 1 WASTE CONTAINMENT DIKE SLOPE STABILITY ANALYSIS



Includes pages 1M-D-1 through 1M-D-~~53~~44

which corresponds to the arrangement of particles, is mainly a function of the clay mineral content and clay mineralogy of the composition. Section 4 (Table 4.2) of reference 3 provides discussion on soil strength parameters for lightly compacted soils. As indicated, C=250 psf represents the lowest value of cohesion for total stress conditions. Therefore, placement of soil dikes using dozer or similar landfill equipment will provide stable slopes with a minimum factor of safety of 1.5 as demonstrated in the slope stability analyses provided in the appendix. The stability of outer slopes of landfills with 4H:1V vertical sideslopes is evidenced by the fact that almost all the landfills in Texas developed with 4H:1V sideslopes are geotechnically stable.

Final Condition Sideslope Stability Analysis

This stability analysis focuses on the stability of the entire sideslope of the containment dike area. The ~~three~~ two configurations of containment dike placement are considered (refer to Drawings 1M-7 ~~and 1M-8~~ for the ~~three~~ two options). The same strength parameters for the containment dike discussed above are used for this demonstration.

The output for the stability analyses are presented on the following pages.

Purpose: The purpose of this calculation is to demonstrate that the construction technique specified in Section 3.2 of Attachment 1M will result in a containment dike that will be physically stable against slope failure with a minimum factor of safety of 1.5.

Method: The containment dike stability analysis has been completed using XSTABL 5.206, a computer program developed to model general slope stability. Circular failure surfaces using the Simplified Bishop method have been generated to analyze the slopes for the configurations given below.

A. Individual Containment Dike - 4H:1V outer slopes and 2H:1V inner slopes (see Figure D-1). XSTABL output is presented on pages 1M-D-5 through 1M-D-23.
B. Final Condition Sideslope - 4H:1V sideslope with containment dikes configured based on the ~~three~~ two placement options (see Figure D-3). XSTABL output is presented on pages 1M-D-24 through 1M-D-~~5344~~.

Procedure:
1. Input containment dike configuration.
2. Select strength parameters.
3. Run program to calculate factor of safety.

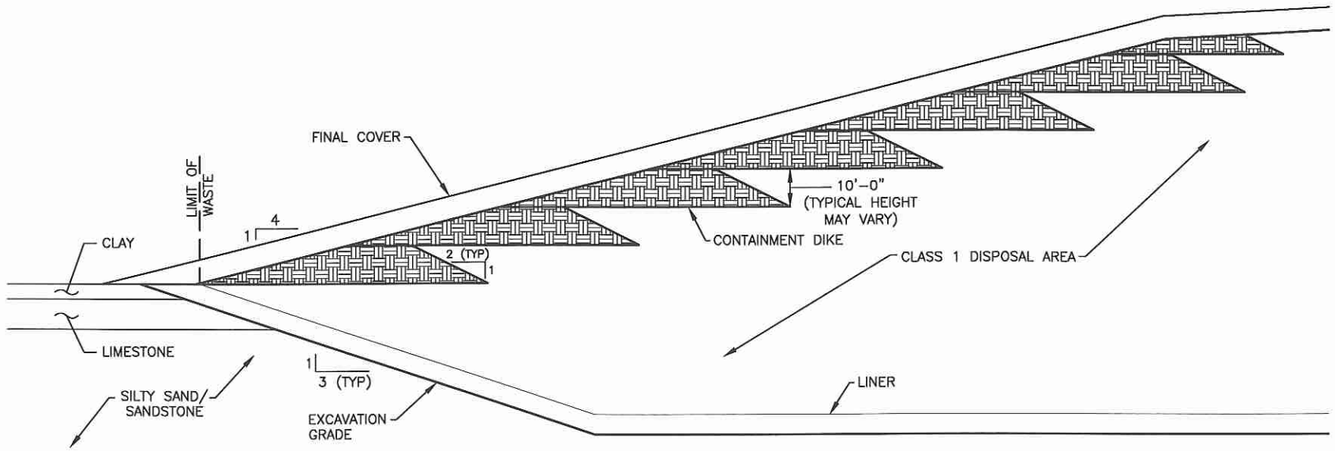
References:

1. Duncan, J. Michael and Stephen G. Wright., *Soil Strength and Slope Stability*, John Wiley & Sons, Inc. Hoboken, NJ, 2005
2. Terzaghi, Karl, Peck, Ralph B., and Mesri, Gholamreza, *Soil Mechanics in Engineering Practice, Third Ed.*, John Wiley & Sons, Inc. New York, NY, 1996
3. Day, Robert W., *Geotechnical Engineer's Portable Handbook*, McGraw-Hill Companies, Inc. New York, NY, 2000
4. Abramson, Lee W., Lee, Thomas S., Sharma, Sunil, Boyce, Glenn M., *Slope Stability and Stabilization Methods, 2nd Ed.*, John Wiley & Sons, Inc., New York.

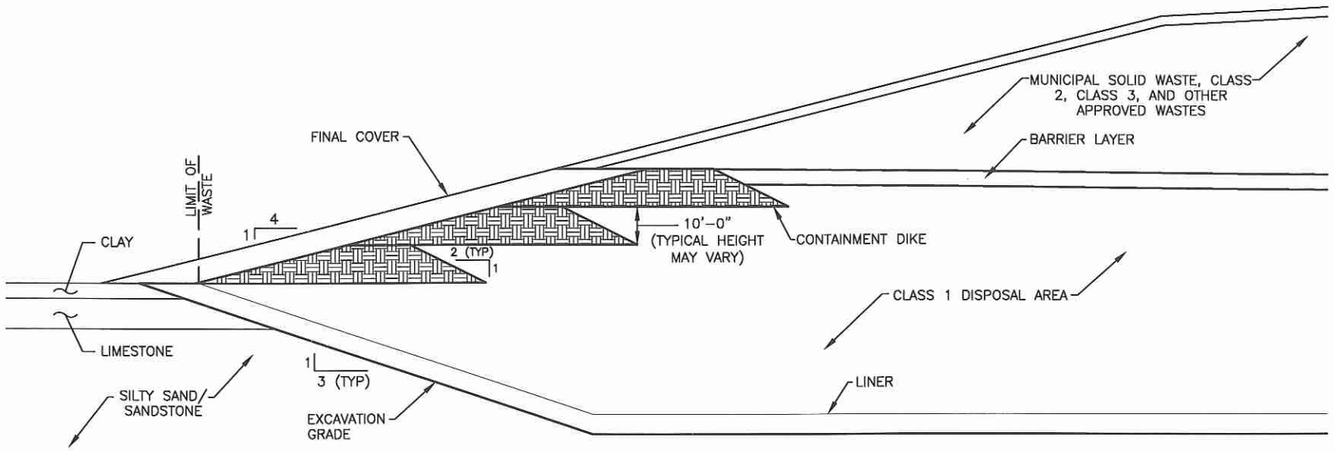
3. Run Program to Calculate Factor of Safety.

The calculated factors of safety are shown below and summarized on Figure D-4. As noted, all the calculated factors of safety, using conservatively selected strength parameters, are above 1.5. Therefore, the proposed design meets §335.590(24)(F)(i)(II) which requires the containment dike to" be physically stable against slope failure, with a minimum safety factor of 1.5."

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated	Recommended Minimum Factor of Safety	Acceptable Factor of Safety
Option 1	Bishop-Circular- Effective	~~1.76~~ 1.75	1.5	YES
Option 2	Bishop-Circular - Effective	~~1.74~~ 2.00	1.5	YES
~~Option 3~~	~~Bishop-Circular- Effective~~	~~1.83~~	~~1.5~~	~~YES~~
Option 1	Bishop-Circular - Total	~~1.57~~ 1.63	1.5	YES
Option 2	Bishop-Circular- Total	~~1.68~~ 1.92	1.5	YES
~~Option 3~~	~~Bishop-Circular - Total~~	~~1.77~~	~~1.5~~	~~YES~~



CONTAINMENT DIKE OPTION 1



CONTAINMENT DIKE OPTION 2

STATE OF TEXAS
MARILYN D. MORRISON
102273
LICENSED PROFESSIONAL ENGINEER
12-15-11

⚠1 INDICATES REVISION
(SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REVISED ABOVE GRADE CLASS 1 WASTE OPTIONS.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: D-3 CONT DIKE W/FC.DWG

DRAWN BY: SRF
DESIGN BY: JAE
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CONTAINMENT DIKE CONFIGURATION WITH FINAL COVER

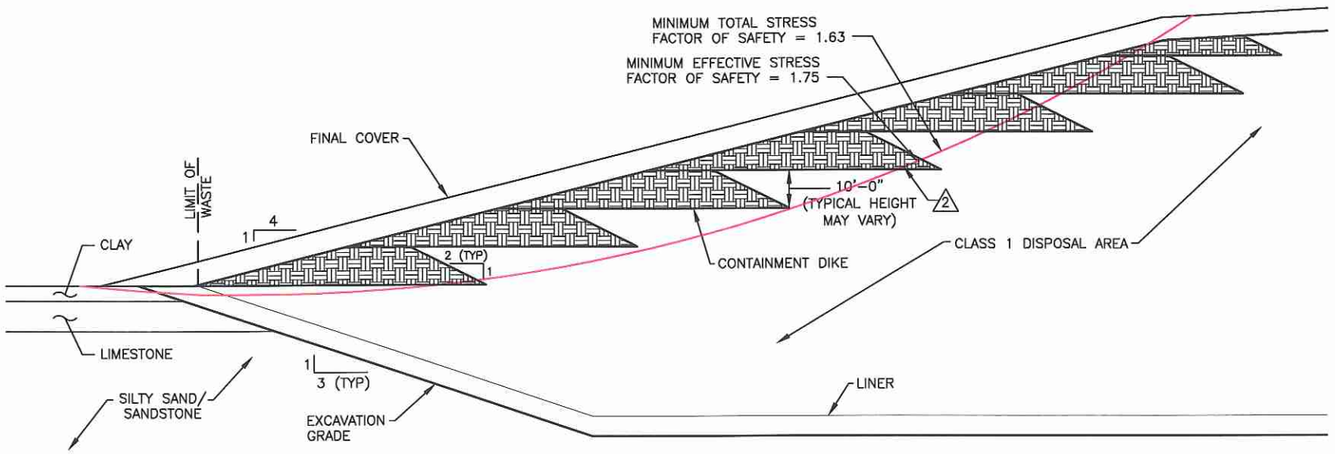
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE D-3

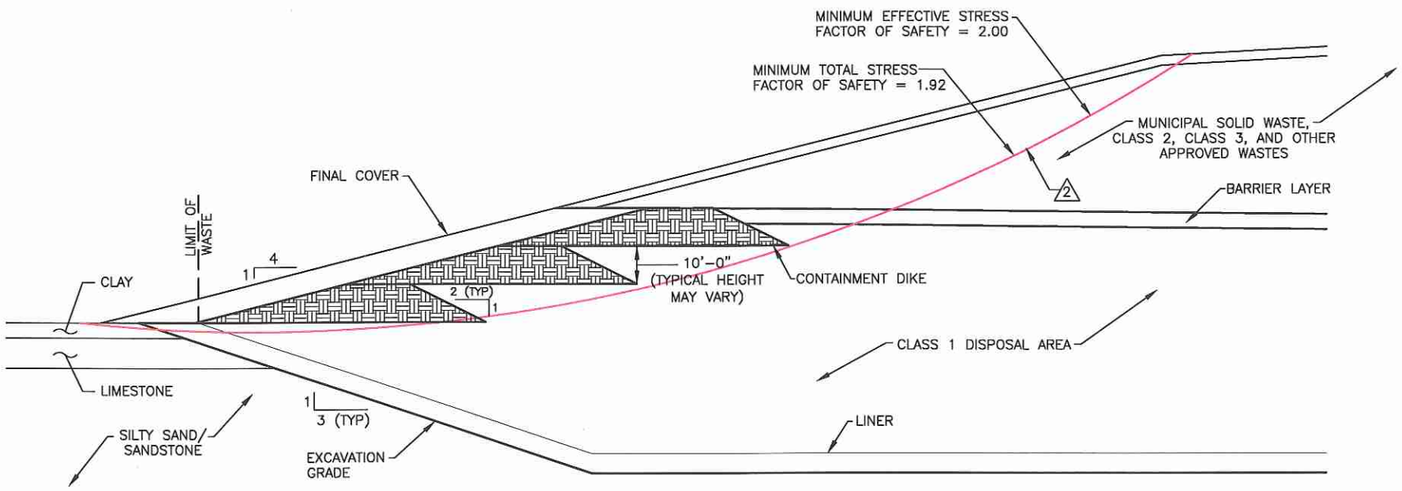
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 1M\D-3_CONT DIKE CONFIG WITH FINAL COVER.dwg, jwilson



CONTAINMENT DIKE OPTION 1

△1



CONTAINMENT DIKE OPTION 2

△1

STATE OF TEXAS
MARILYN D. MORRISON
102273
LICENSED
PROFESSIONAL ENGINEER
12.15.11

△1 INDICATES REVISION
(SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REVISED ABOVE GRADE CLASS 1 WASTE OPTIONS.
2. UPDATED FAILURE SURFACES TO REFLECT NEW FACTORS OF SAFETY.

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: D-4 CONT DIKE W/FC.DWG
DRAWN BY: SRF
DESIGN BY: JAE
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CONTAINMENT DIKE CONFIGURATION WITH FINAL COVER FACTORS OF SAFETY

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

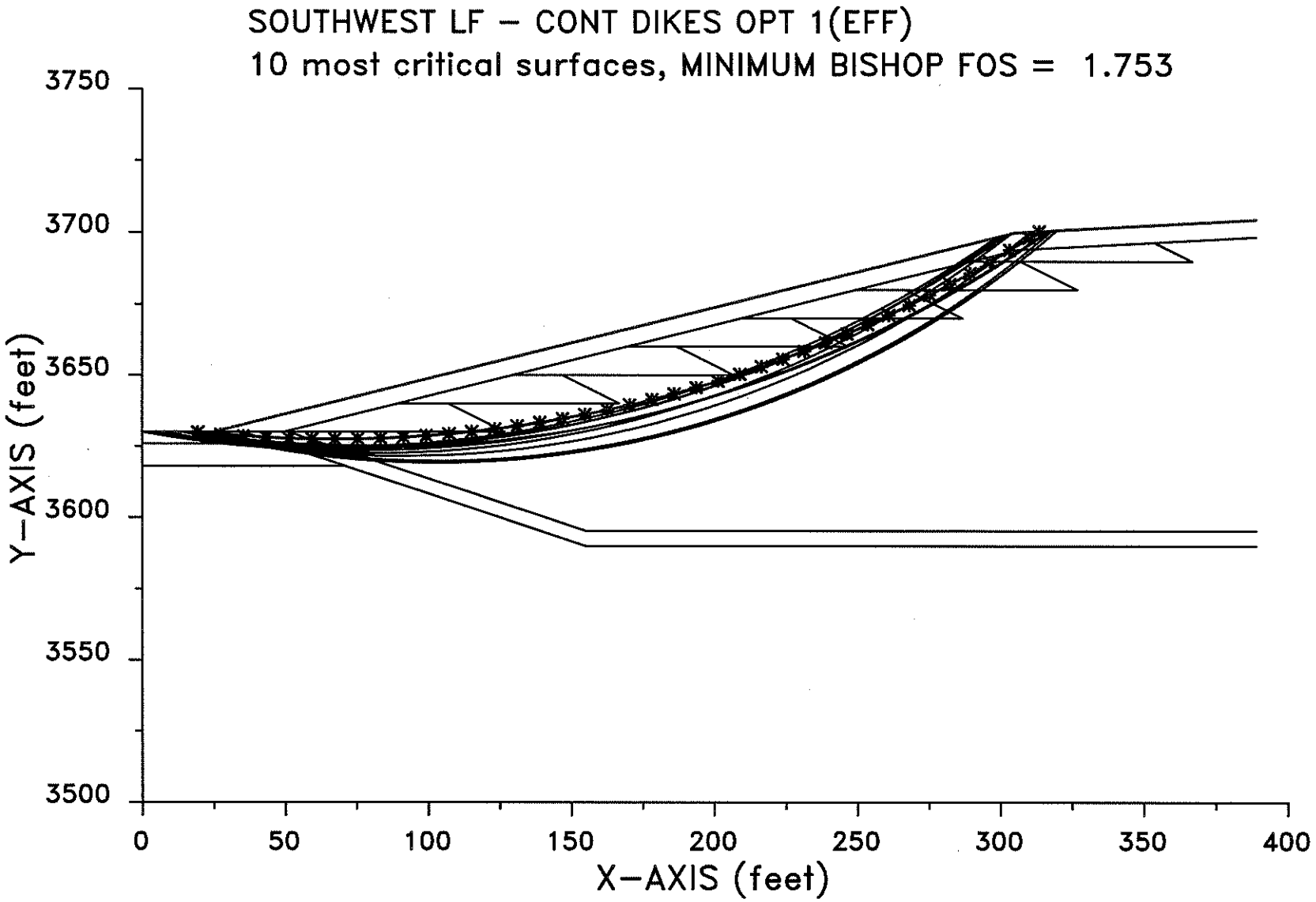
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE D-4

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 1M\D-4_FACTORS OF SAFETY.dwg, jwilson

D-1E 12-06-11 15:37



XSTABL File: D-1E 12-06-11 15:37

```
*****************************************
*              X S T A B L              *
*                                       *
*       Slope Stability Analysis        *
*              using the                *
*           Method of Slices            *
*                                       *
*       Copyright (C) 1992 - 2008       *
*   Interactive Software Designs, Inc.  *
*       Moscow, ID 83843, U.S.A.        *
*                                       *
*         All Rights Reserved           *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(EFF)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

40 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	25.0	3630.0	35.0	3630.0	1
2	35.0	3630.0	49.7	3630.0	3
3	49.7	3630.0	89.7	3640.0	4
4	89.7	3640.0	129.7	3650.0	4
5	129.7	3650.0	169.7	3660.0	4
6	169.7	3660.0	209.7	3670.0	4
7	209.7	3670.0	249.7	3680.0	4
8	249.7	3680.0	289.7	3690.0	4
9	289.7	3690.0	305.9	3694.0	5
10	305.9	3694.0	353.5	3696.6	4
11	353.5	3696.6	388.9	3698.5	5
12	353.5	3696.6	366.7	3690.0	4
13	289.7	3690.0	306.7	3690.0	4
14	306.7	3690.0	366.7	3690.0	5

15	306.7	3690.0	326.7	3680.0	4
16	249.7	3680.0	266.7	3680.0	4
17	266.7	3680.0	326.7	3680.0	5
18	266.7	3680.0	286.7	3670.0	4
19	209.7	3670.0	226.7	3670.0	4
20	226.7	3670.0	286.0	3670.0	5
21	226.7	3670.0	246.7	3660.0	4
22	169.7	3660.0	186.7	3660.0	4
23	186.7	3660.0	246.7	3660.0	5
24	186.7	3660.0	206.7	3650.0	4
25	129.7	3650.0	146.7	3650.0	4
26	146.7	3650.0	206.7	3650.0	5
27	146.7	3650.0	166.7	3640.0	4
28	89.7	3640.0	106.7	3640.0	4
29	106.7	3640.0	166.7	3640.0	5
30	106.7	3640.0	126.7	3630.0	4
31	49.7	3630.0	50.8	3630.0	3
32	50.8	3630.0	126.6	3630.0	5
33	50.8	3630.0	155.0	3595.3	3
34	155.0	3595.3	388.9	3595.3	3
35	35.0	3630.0	47.0	3626.0	1
36	47.0	3626.0	71.0	3618.0	6
37	71.0	3618.0	155.0	3590.0	7
38	155.0	3590.0	388.9	3590.0	7
39	.0	3626.0	47.0	3626.0	6
40	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters

---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	100.0	15.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft

and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05

14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.753 ****

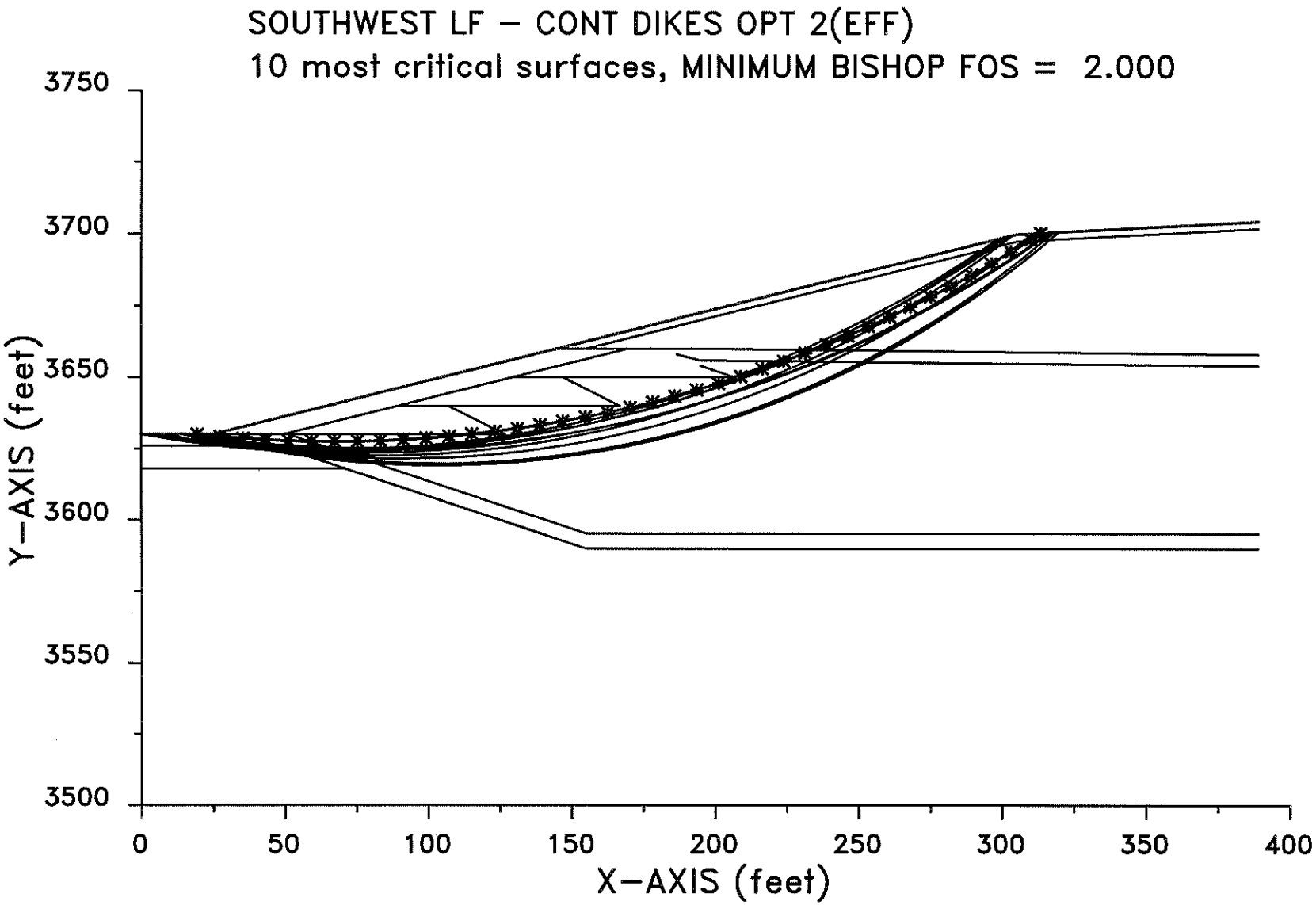
The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(EFF)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.753	67.14	4080.04	452.56	19.44	313.41	1.032E+08
2.	1.781	76.50	4001.50	376.28	16.67	299.86	8.723E+07
3.	1.807	80.52	4029.76	405.27	13.89	316.99	1.083E+08
4.	1.817	67.03	4025.97	401.15	2.78	298.52	9.320E+07
5.	1.846	68.79	4023.22	399.19	.00	301.96	9.852E+07
6.	1.853	81.39	3980.47	358.00	8.33	303.35	9.523E+07
7.	1.859	90.48	3967.67	346.25	13.89	310.39	9.986E+07
8.	1.866	74.14	4042.22	418.84	.00	316.45	1.172E+08
9.	1.875	103.21	3944.69	324.94	22.22	317.84	1.026E+08
10.	1.891	103.25	3946.40	327.31	19.44	319.55	1.065E+08

* * * END OF FILE * * *

D-2E 12-06-11 15:47



XSTABL File: D-2E 12-06-11 15:47

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(EFF)

SEGMENT BOUNDARY COORDINATES
---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

30 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	145.0	3660.0	155.3	3660.0	2
2	155.3	3660.0	305.4	3697.5	5
3	305.4	3697.5	388.9	3702.0	5
4	155.3	3660.0	169.7	3660.0	2
5	25.0	3630.0	35.0	3630.0	1
6	35.0	3630.0	49.7	3630.0	3
7	49.7	3630.0	89.7	3640.0	4
8	89.7	3640.0	129.7	3650.0	4
9	129.7	3650.0	169.7	3660.0	4
10	169.7	3660.0	186.7	3660.0	4
11	186.7	3660.0	388.9	3658.0	4
12	186.7	3658.0	194.9	3655.9	4
13	194.9	3655.9	388.9	3654.0	5
14	194.9	3654.0	206.7	3650.0	4

15	129.7	3650.0	146.7	3650.0	4
16	146.7	3650.0	206.7	3650.0	5
17	146.7	3650.0	166.7	3640.0	4
18	89.7	3640.0	106.7	3640.0	4
19	106.7	3640.0	166.7	3640.0	5
20	106.7	3640.0	126.7	3630.0	4
21	49.7	3630.0	50.8	3630.0	3
22	50.8	3630.0	126.6	3630.0	5
23	50.8	3630.0	155.0	3595.3	3
24	155.0	3595.3	388.9	3595.3	3
25	35.0	3630.0	47.0	3626.0	1
26	47.0	3626.0	71.0	3618.0	6
27	71.0	3618.0	155.0	3590.0	7
28	155.0	3590.0	388.9	3590.0	7
29	.0	3626.0	47.0	3626.0	6
30	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters
---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	100.0	15.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54

24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 2.000 ****

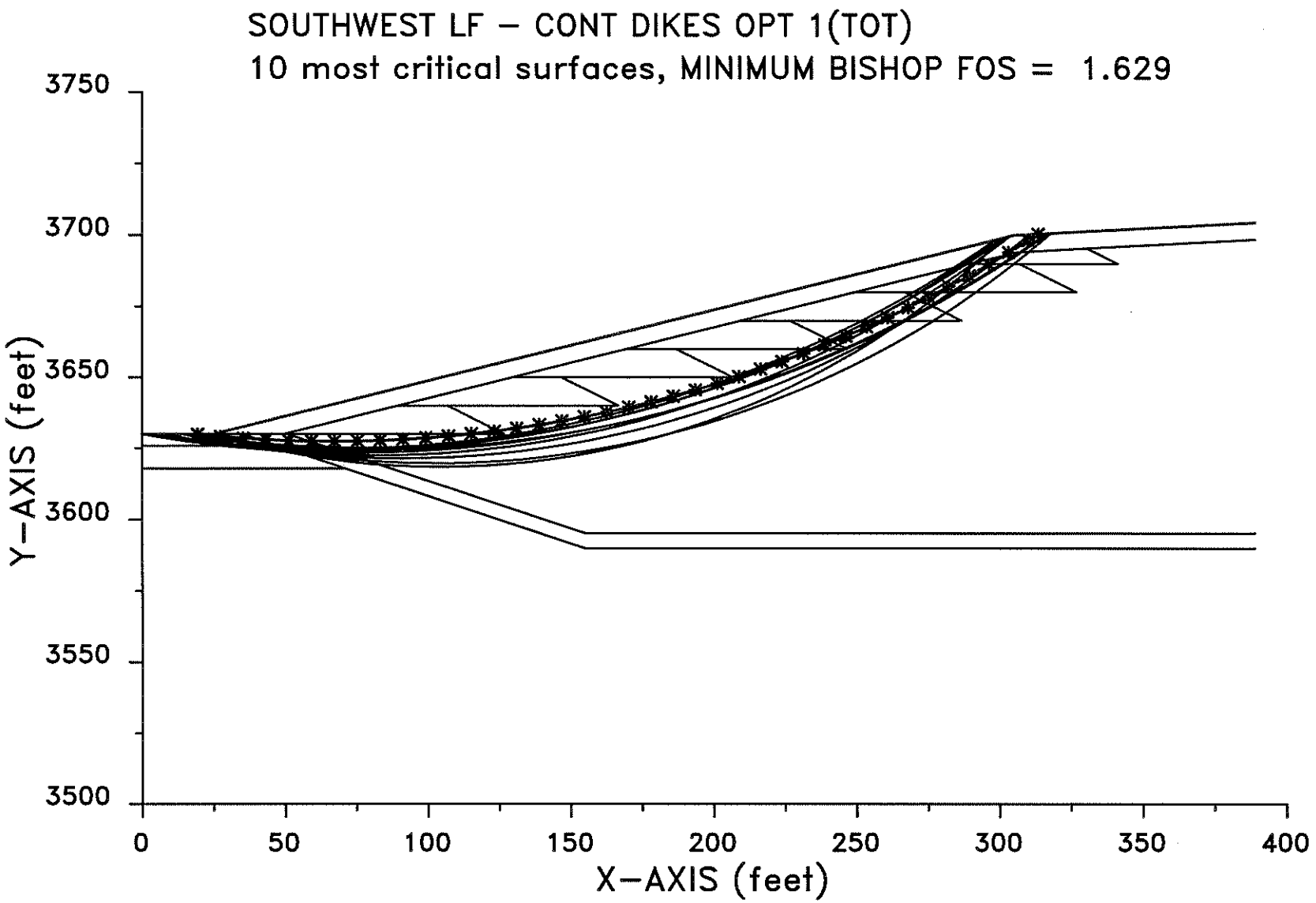
The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(EFF)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	2.000	67.14	4080.04	452.56	19.44	313.41	9.412E+07
2.	2.034	76.50	4001.50	376.28	16.67	299.86	8.068E+07
3.	2.050	80.52	4029.76	405.27	13.89	316.99	9.860E+07
4.	2.072	67.03	4025.97	401.15	2.78	298.52	8.670E+07
5.	2.108	68.79	4023.22	399.19	.00	301.96	9.149E+07
6.	2.117	81.39	3980.47	358.00	8.33	303.35	8.811E+07
7.	2.119	74.14	4042.22	418.84	.00	316.45	1.072E+08
8.	2.120	90.48	3967.67	346.25	13.89	310.39	9.175E+07
9.	2.138	103.21	3944.69	324.94	22.22	317.84	9.406E+07
10.	2.157	103.25	3946.40	327.31	19.44	319.55	9.777E+07

* * * END OF FILE * * *

D-1T 12-06-11 14:53



XSTABL File: D-1T 12-06-11 14:53

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(TOT)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

40 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	25.0	3630.0	35.0	3630.0	1
2	35.0	3630.0	49.7	3630.0	3
3	49.7	3630.0	89.7	3640.0	4
4	89.7	3640.0	129.7	3650.0	4
5	129.7	3650.0	169.7	3660.0	4
6	169.7	3660.0	209.7	3670.0	4
7	209.7	3670.0	249.7	3680.0	4
8	249.7	3680.0	289.7	3690.0	4
9	289.7	3690.0	305.9	3694.0	5
10	305.9	3694.0	330.4	3695.4	4
11	330.4	3695.4	388.9	3698.5	5
12	330.4	3695.4	341.1	3690.0	4
13	289.7	3690.0	306.7	3690.0	4
14	306.7	3690.0	341.1	3690.0	5

15	306.7	3690.0	326.7	3680.0	4
16	249.7	3680.0	266.7	3680.0	4
17	266.7	3680.0	326.7	3680.0	5
18	266.7	3680.0	286.7	3670.0	4
19	209.7	3670.0	226.7	3670.0	4
20	226.7	3670.0	286.0	3670.0	5
21	226.7	3670.0	246.7	3660.0	4
22	169.7	3660.0	186.7	3660.0	4
23	186.7	3660.0	246.7	3660.0	5
24	186.7	3660.0	206.7	3650.0	4
25	129.7	3650.0	146.7	3650.0	4
26	146.7	3650.0	206.7	3650.0	5
27	146.7	3650.0	166.7	3640.0	4
28	89.7	3640.0	106.7	3640.0	4
29	106.7	3640.0	166.7	3640.0	5
30	106.7	3640.0	126.7	3630.0	4
31	49.7	3630.0	50.8	3630.0	3
32	50.8	3630.0	126.6	3630.0	5
33	50.8	3630.0	155.0	3595.3	3
34	155.0	3595.3	388.9	3595.3	3
35	35.0	3630.0	47.0	3626.0	1
36	47.0	3626.0	71.0	3618.0	6
37	71.0	3618.0	155.0	3590.0	7
38	155.0	3590.0	388.9	3590.0	7
39	.0	3626.0	47.0	3626.0	6
40	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters

---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	250.0	.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

UNDRAINED STRENGTHS as a function of effective vertical stress have been specified for 1 Soil Unit(s)

Soil Unit #	Parameter a	Parameter Psi
4.	250.0	.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00

2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.629 ****

The following is a summary of the TEN most critical surfaces

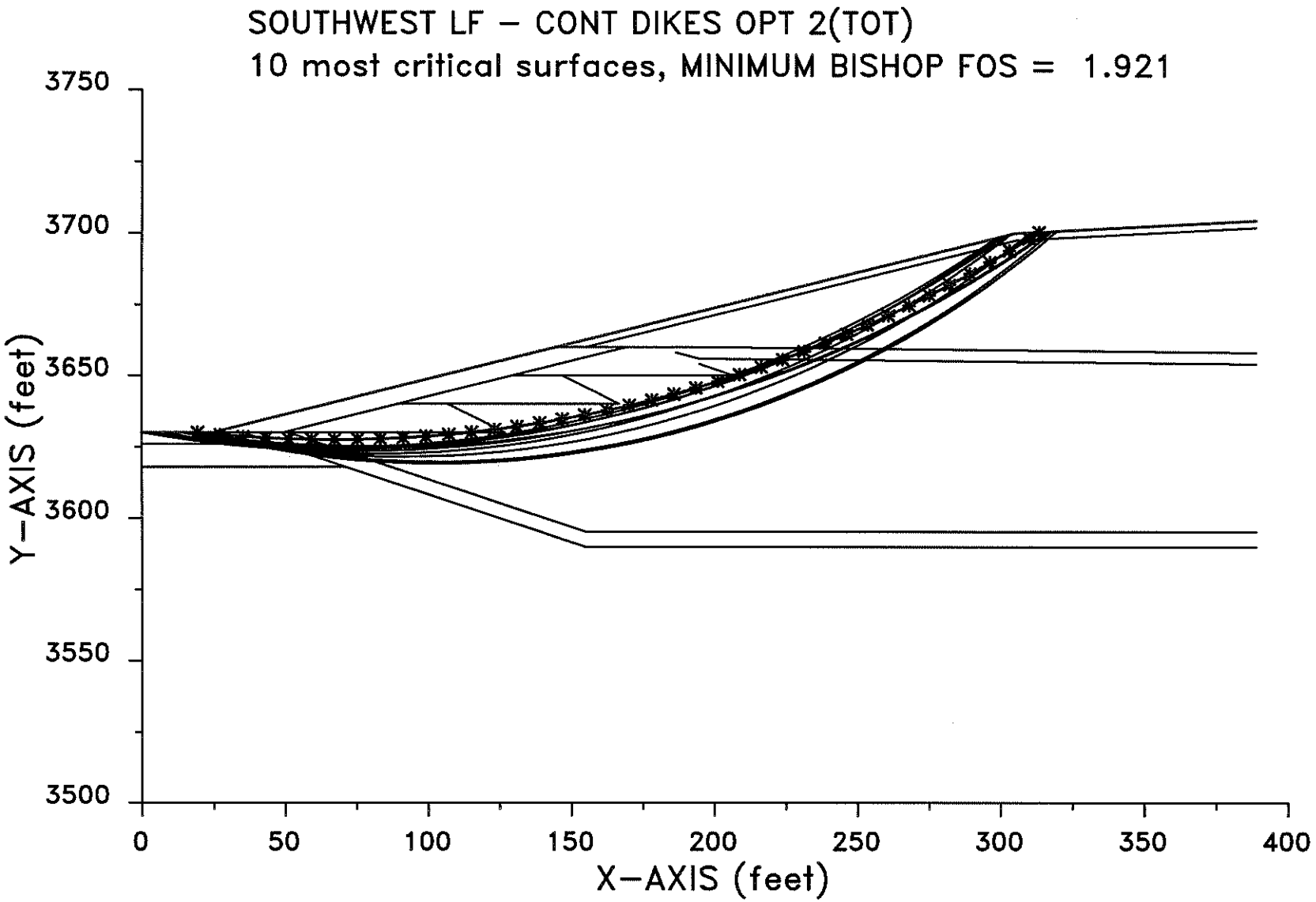
Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(TOT)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.629	67.14	4080.04	452.56	19.44	313.41	9.589E+07
2.	1.707	76.50	4001.50	376.28	16.67	299.86	8.361E+07

3.	1.737	67.03	4025.97	401.15	2.78	298.52	8.910E+07
4.	1.754	80.52	4029.76	405.27	13.89	316.99	1.052E+08
5.	1.772	68.79	4023.22	399.19	.00	301.96	9.456E+07
6.	1.796	81.39	3980.47	358.00	8.33	303.35	9.229E+07
7.	1.811	74.14	4042.22	418.84	.00	316.45	1.138E+08
8.	1.816	90.48	3967.67	346.25	13.89	310.39	9.755E+07
9.	1.840	103.21	3944.69	324.94	22.22	317.84	1.007E+08
10.	1.856	104.51	3898.79	280.31	25.00	301.17	8.169E+07

* * * END OF FILE * * *

D-2T 12-06-11 15:42



XSTABL File: D-2T 12-06-11 15:42

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(TOT)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

30 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	145.0	3660.0	155.3	3660.0	2
2	155.3	3660.0	305.4	3697.5	5
3	305.4	3697.5	388.9	3702.0	5
4	155.3	3660.0	169.7	3660.0	2
5	25.0	3630.0	35.0	3630.0	1
6	35.0	3630.0	49.7	3630.0	3
7	49.7	3630.0	89.7	3640.0	4
8	89.7	3640.0	129.7	3650.0	4
9	129.7	3650.0	169.7	3660.0	4
10	169.7	3660.0	186.7	3660.0	4
11	186.7	3660.0	388.9	3658.0	4
12	186.7	3658.0	194.9	3655.9	4
13	194.9	3655.9	388.9	3654.0	5
14	194.9	3654.0	206.7	3650.0	4

15	129.7	3650.0	146.7	3650.0	4
16	146.7	3650.0	206.7	3650.0	5
17	146.7	3650.0	166.7	3640.0	4
18	89.7	3640.0	106.7	3640.0	4
19	106.7	3640.0	166.7	3640.0	5
20	106.7	3640.0	126.7	3630.0	4
21	49.7	3630.0	50.8	3630.0	3
22	50.8	3630.0	126.6	3630.0	5
23	50.8	3630.0	155.0	3595.3	3
24	155.0	3595.3	388.9	3595.3	3
25	35.0	3630.0	47.0	3626.0	1
26	47.0	3626.0	71.0	3618.0	6
27	71.0	3618.0	155.0	3590.0	7
28	155.0	3590.0	388.9	3590.0	7
29	.0	3626.0	47.0	3626.0	6
30	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters

---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	250.0	.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

UNDRAINED STRENGTHS as a function of effective vertical stress have been specified for 1 Soil Unit(s)

Soil Unit #	Parameter a	Parameter Psi
4.	250.0	.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced
along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation
at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined
within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63

12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.921 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(TOT)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.921	67.14	4080.04	452.56	19.44	313.41	9.042E+07
2.	2.006	76.50	4001.50	376.28	16.67	299.86	7.953E+07
3.	2.019	80.52	4029.76	405.27	13.89	316.99	9.713E+07
4.	2.044	67.03	4025.97	401.15	2.78	298.52	8.551E+07
5.	2.079	68.79	4023.22	399.19	.00	301.96	9.027E+07
6.	2.089	74.14	4042.22	418.84	.00	316.45	1.057E+08
7.	2.090	81.39	3980.47	358.00	8.33	303.35	8.699E+07
8.	2.093	90.48	3967.67	346.25	13.89	310.39	9.058E+07
9.	2.111	103.21	3944.69	324.94	22.22	317.84	9.289E+07
10.	2.131	103.25	3946.40	327.31	19.44	319.55	9.657E+07

* * * END OF FILE * * *

[Pages 1M-D-45 through 1M-D-53 have been removed from the application.]

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

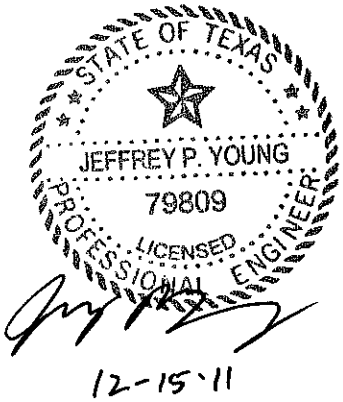
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 2
TYPICAL FILL CROSS SECTIONS

Prepared for

Southwest Landfill TX, LP

August 2005
Revised October 2007

Revised December 2011



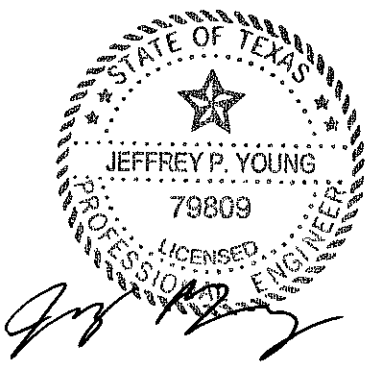
Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

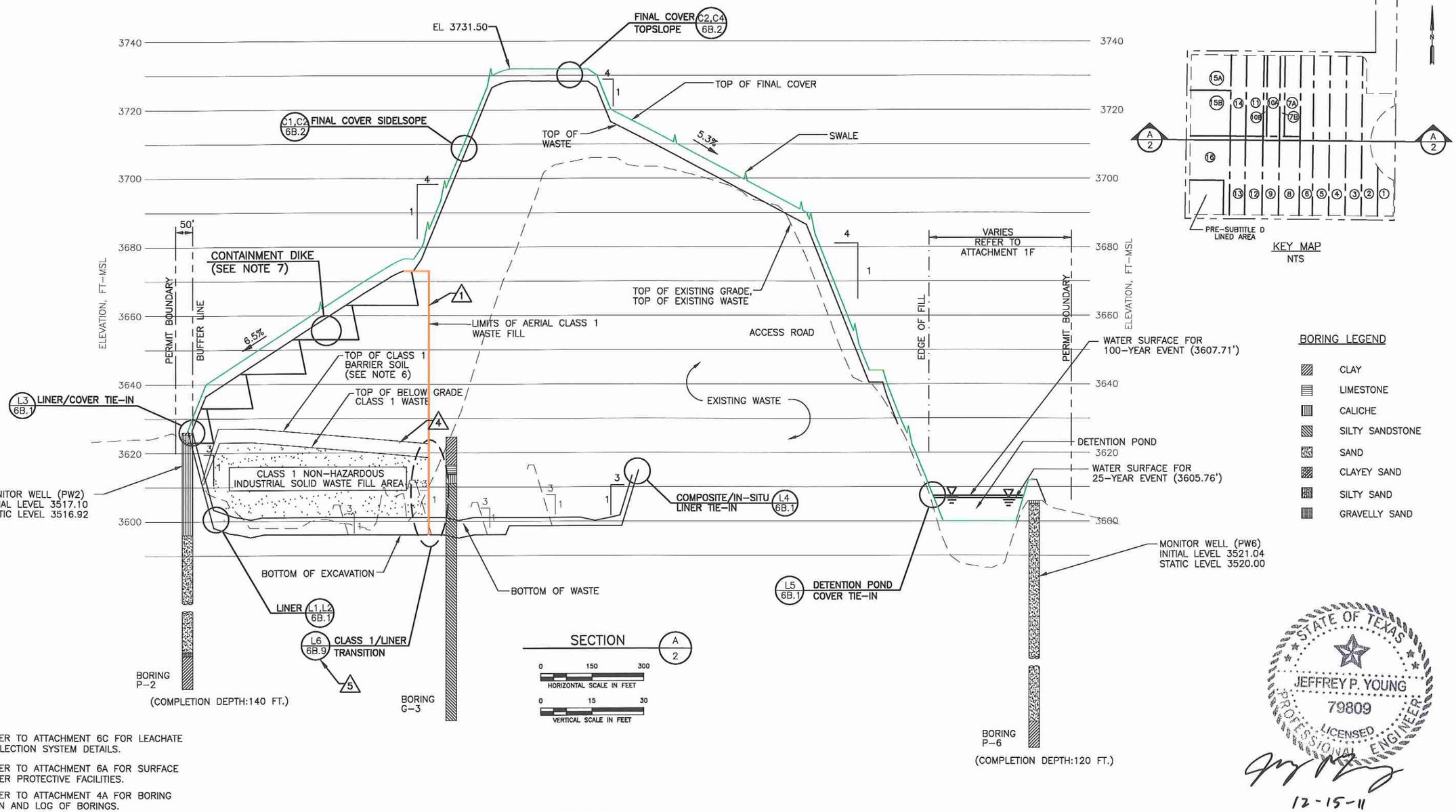
WBC Project No. 0120-94-11-74-01

CONTENTS

2 Typical Fill Cross Sections – Final Contour Plan
2A Typical Fill Cross Sections
2B Typical Fill Cross Sections
2C Typical Fill Cross Sections



12-15-11



KEY MAP
NTS

BORING LEGEND

- CLAY
- LIMESTONE
- CALICHE
- SILTY SANDSTONE
- SAND
- CLAYEY SAND
- SILTY SAND
- GRAVELLY SAND

NOTES:

1. REFER TO ATTACHMENT 6C FOR LEACHATE COLLECTION SYSTEM DETAILS.
2. REFER TO ATTACHMENT 6A FOR SURFACE WATER PROTECTIVE FACILITIES.
3. REFER TO ATTACHMENT 4A FOR BORING PLAN AND LOG OF BORINGS.
4. REFER TO ATTACHMENT 1E FOR LOCATION OF GAS VENTS.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE-IN.
6. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. REFER TO ATTACHMENT 1M FOR THE ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
7. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY.

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REVISED LIMITS OF AERIAL CLASS 1 FILL.
2. UPDATED NOTE 6 TO REFER TO ATTACHMENT 1M FOR ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
3. UPDATED NOTE 7 TO INDICATE THAT ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH OTHER WASTES.
4. REVISED TOP OF CLASS 1 BARRIER LAYER.
5. ADDED DETAIL L6 CALLOUT.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
PROFESSIONAL ENGINEER
LICENSED
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001
FILE: 0120-94-11
CAD: 2A-CROSS SECTION.DWG
DRAWN BY: SRF
DESIGN BY: DDL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	12/2011	SEE LIST OF REVISIONS

TYPICAL FILL CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

ATTACHMENT 2A

COPYRIGHT © 2007 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 2\2A-CROSS SECTION.dwg, jwilson

Attachment 2B has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

PERMIT MODIFICATION

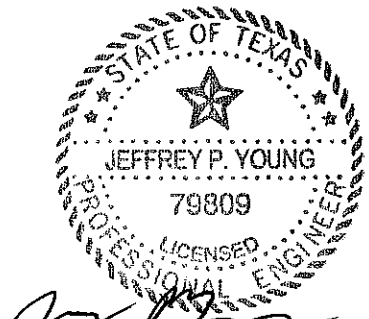
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 6
GROUNDWATER AND SURFACE WATER PROTECTION PLAN

Prepared for

Southwest Landfill TX, LP

Technically Complete May 23, 1995
Revised November 2005
Revised January 2007

Revised December 2011



12-15-11

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

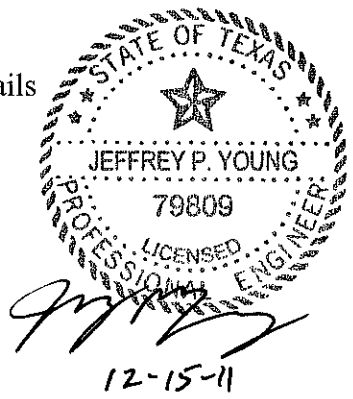
Project No. 0120-94-11-32-01

CONTENTS

6A Drainage Study
- 6A.1 Surface Water Protection Facilities – Plan
- 6A.1a Floodplain Map
- 6A.2b Final Drainage Plan
- 6A.1c North Perimeter Ditch – Profile
- 6A.1d South Perimeter Ditch – Profile
- 6A.2 Surface Water Protection Facilities – Ditch – Plan and Profile
- 6A.3 Surface Water Protection Facilities – Drainage Details
- 6A.4 Surface Water Protection Facilities – Drainage Details
- 6A.5 Surface Water Protection Facilities – Detention Pond Details
- 6A.6 Post Development Drainage Area Map

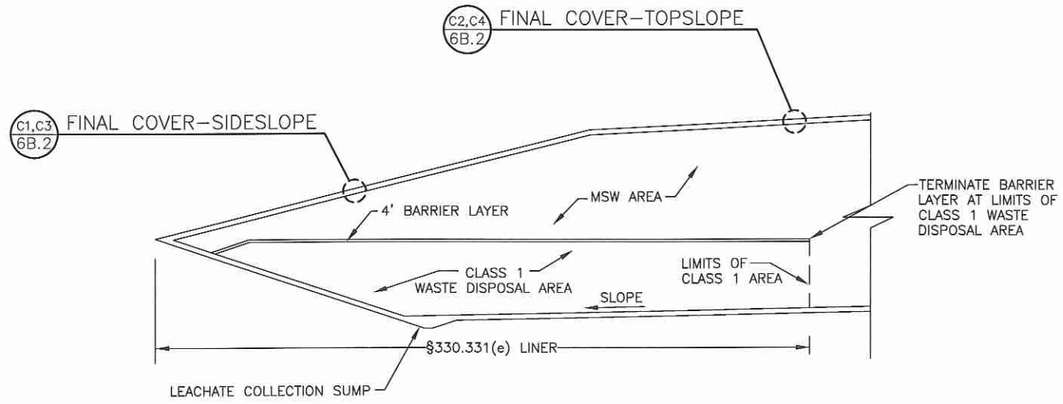
6B Liner and Cover Details
- 6B.1 Liner Details
- 6B.2 Cover Details – Subtitle D Composite Final Cover Option
- 6B.2a Cover Details – ET Monolithic Soil Final Cover Option
- 6B.3 Class 1 Waste Disposal Area Options
- 6B.4 Class 1 Waste Containment Dike Details
- 6B.5 Class 1 Waste Containment Dike Details
- 6B.6 Above Grade Class 1 Final Cover Details
- 6B.7 Class 1 Waste Containment Dike/Final Cover Tie-in Detail
- 6B.8 Class 1 Final Cover Tie-in Details
- 6B.9 Above Grade Class 1 Liner System Detail

6C Leachate Collection System Details

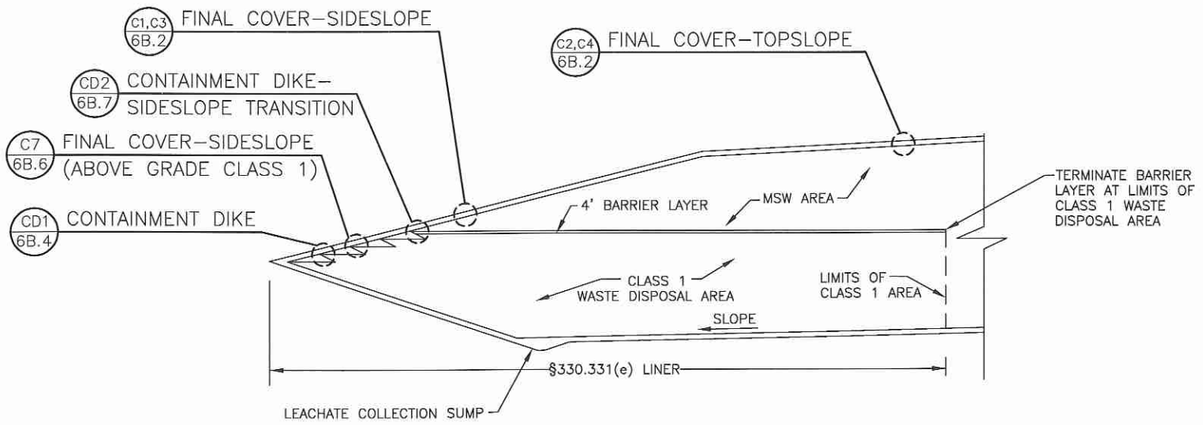


ATTACHMENT 6B

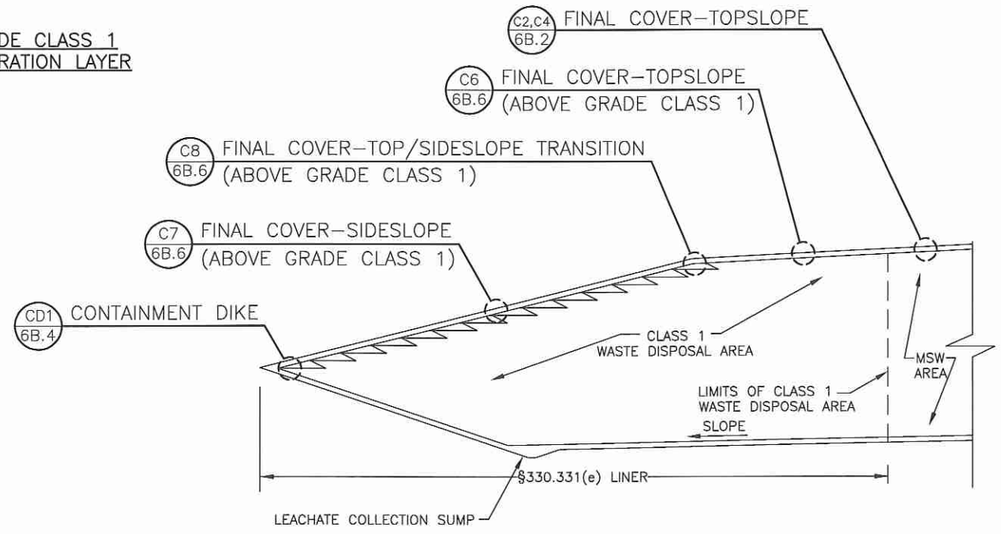
LINER AND COVER DETAILS



OPTION 1 – BELOW GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 2 – ABOVE GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 3 – ABOVE GRADE CLASS 1 DISPOSAL AREA

NOTE:

1. CLASS 1 WASTE AND CLASS 1 NON–HAZARDOUS INDUSTRIAL WASTE ARE USED INTERCHANGEABLY.
2. REFER TO DRAWING 1M–5 FOR ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS.
3. REFER TO ATTACHMENT 6B.7 AND 6B.8 FOR FINAL COVER TIE–IN DETAILS.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER
12-15-11

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120–94–11
CAD: 6B.3–DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR

SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 WASTE DISPOSAL AREA OPTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

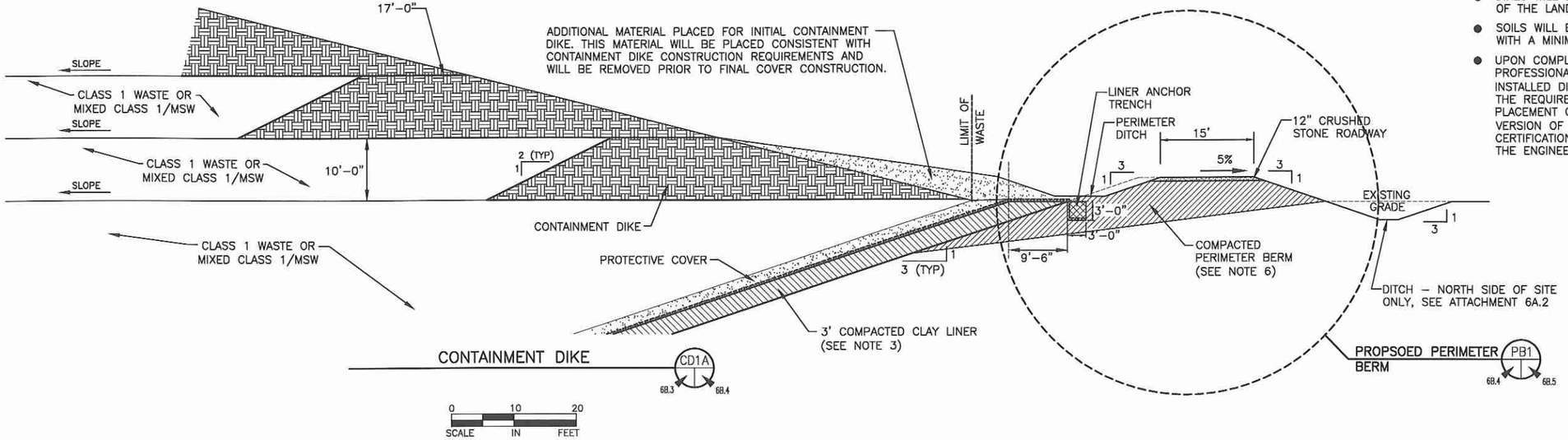
Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

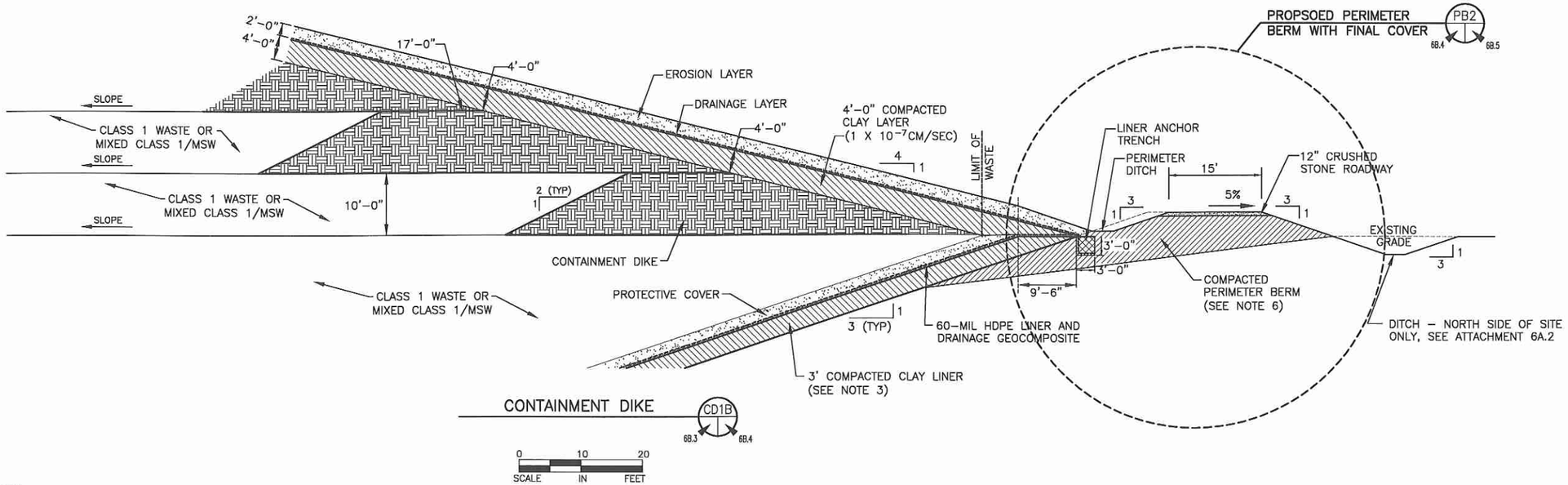
CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO
FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO
GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.3

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 6B\6B.3-CONTAINMENT DIKE DETAIL.dwg, jwilson





CONTAINMENT DIKE CONSTRUCTION REQUIREMENTS

(REFER TO ATTACHMENT 1M, SECTION 3 OF THE SITE DEVELOPMENT PLAN)

- DIKES WILL BE CONSTRUCTED OF CLAY-RICH SOILS UNDER THE DIRECTION OF THE LANDFILL MANAGER OR HIS DESIGNEE.
- SOILS WILL BE PLACED IN MAXIMUM 9-INCH THICK LIFTS AND COMPACTED WITH A MINIMUM OF FOUR PASSES WITH A DOZER OR SIMILAR EQUIPMENT.
- UPON COMPLETION OF EACH DIKE, A THIRD PARTY INDEPENDENT PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN TEXAS WILL CERTIFY THE INSTALLED DIKE IN ACCORDANCE WITH TITLE 30 TAC §335.590(24)(F)(vi) AND THE REQUIREMENTS INCLUDED IN ATTACHMENT 1M OF THE SDP PRIOR TO PLACEMENT OF WASTE. THE LICENSED ENGINEER WILL UTILIZE THE CURRENT VERSION OF THE STANDARD FORM INCLUDED IN §335.590(24)(F)(vi) FOR THE CERTIFICATION OF THE DIKE. THE CERTIFICATION PREPARED AND SIGNED BY THE ENGINEER WILL BE PLACED IN THE SITE OPERATING RECORD.

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC §330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH §330.331(e) AND
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.
6. FOR THE UNDEVELOPED AREAS, THE PERIMETER BERM WILL BE CONSTRUCTED IN ACCORDANCE WITH SOIL LINER SPECIFICATIONS OUTLINED IN SECTION 2.3 OF THE SLQCP (ATTACHMENT 10) EXCEPT NO PERMEABILITY TESTS WILL BE REQUIRED FOR THIS MATERIAL.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

- ☐ FOR INFORMATIONAL PURPOSES ONLY
- ☒ FOR PERMITTING PURPOSES ONLY
- ☐ ISSUED FOR CONSTRUCTION
- ☐ CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.4-DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR

SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

△1

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants

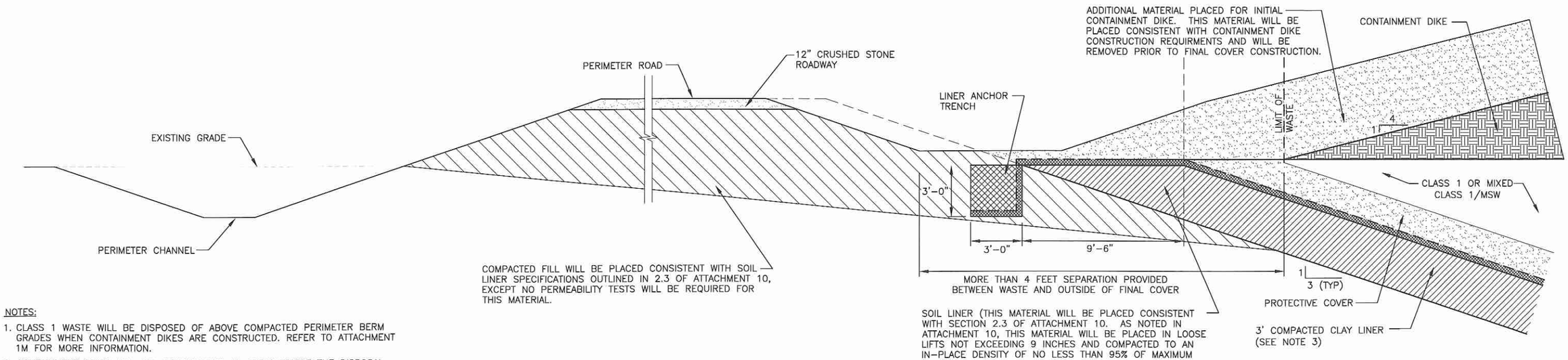
TBPE REGISTRATION NO. F-3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.4

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\ATT 6B\6B.4-CONTAINMENT DIKE DETAIL.dwg, jwilson

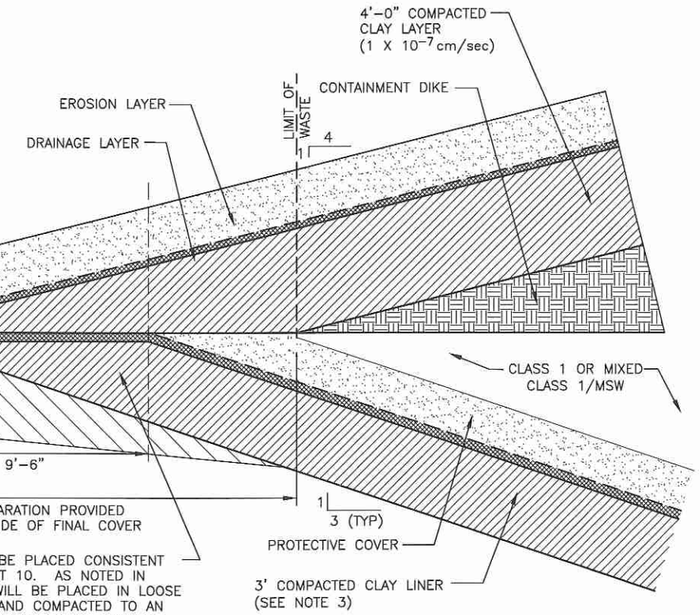


PROPOSED PERIMETER BERM PB1 (68.4 | 68.5)

SCALE 0 3 6 IN FEET

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES MAY EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF THE WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC § 330.331(e).
4. REFER TO ATTACHMENT 1M, SECTION 3.2 FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH TAC §330.331(e).
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.



PROPOSED PERIMETER BERM WITH FINAL COVER PB2 (68.4 | 68.5)

SCALE 0 3 6 IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.5-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

△1

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

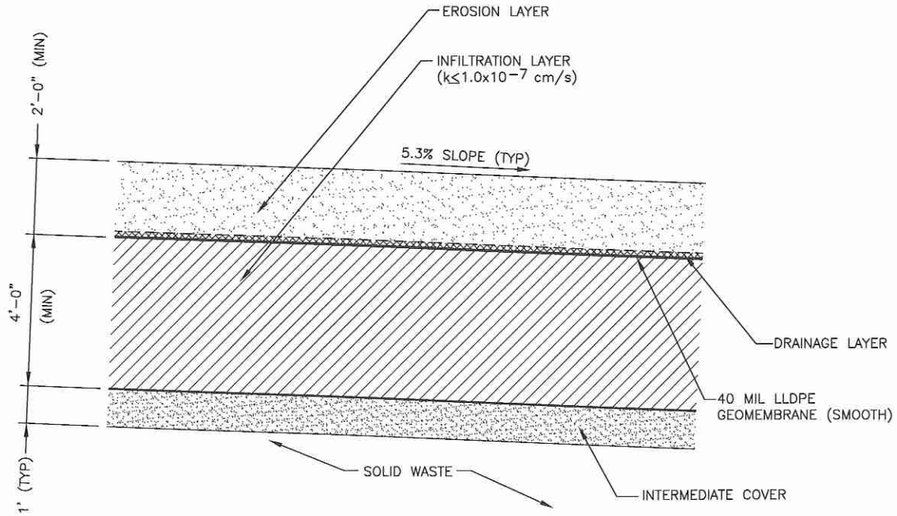
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.5

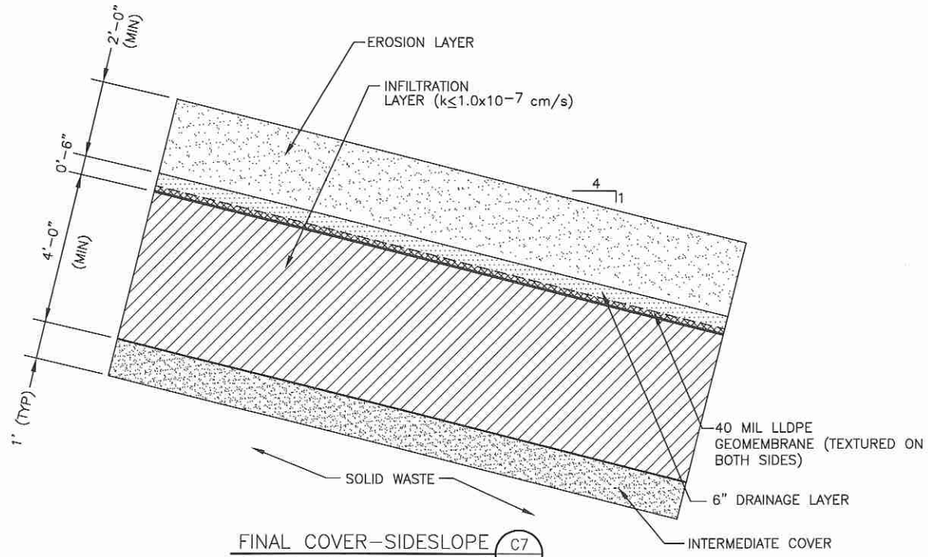
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\ATT 6B\6B.5-CONTAINMENT DIKE DETAILS.dwg, jwilson



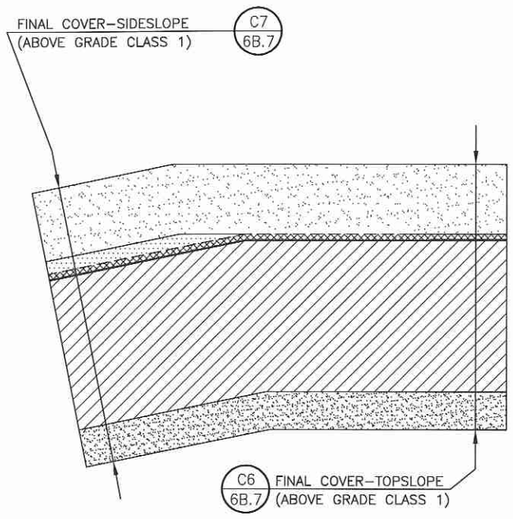
FINAL COVER–TOPSLOPE (C6) (6B.3)
(ABOVE GRADE CLASS 1)

SCALE 0 1 2 4 IN FEET



FINAL COVER–SIDESLOPE (C7) (6B.3)
(ABOVE GRADE CLASS 1)

SCALE 0 1 2 4 IN FEET



FINAL COVER–
TOP/SIDESLOPE TRANSITION (C8) (6B.3)
(ABOVE GRADE CLASS 1)

SCALE 0 1 2 4 IN FEET

NOTES:

1. WHERE EROSION LAYER DOES NOT MEET FILTER CRITERIA FOR DRAINAGE LAYER, THE LAYERS WILL BE SEPERATED BY A GEOTEXTILE FILTER.



△1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

△1

- ☐ FOR INFORMATIONAL PURPOSES ONLY
- ☒ FOR PERMITTING PURPOSES ONLY
- ☐ ISSUED FOR CONSTRUCTION
- ☐ CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.6-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

ABOVE GRADE CLASS 1 FINAL COVER DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

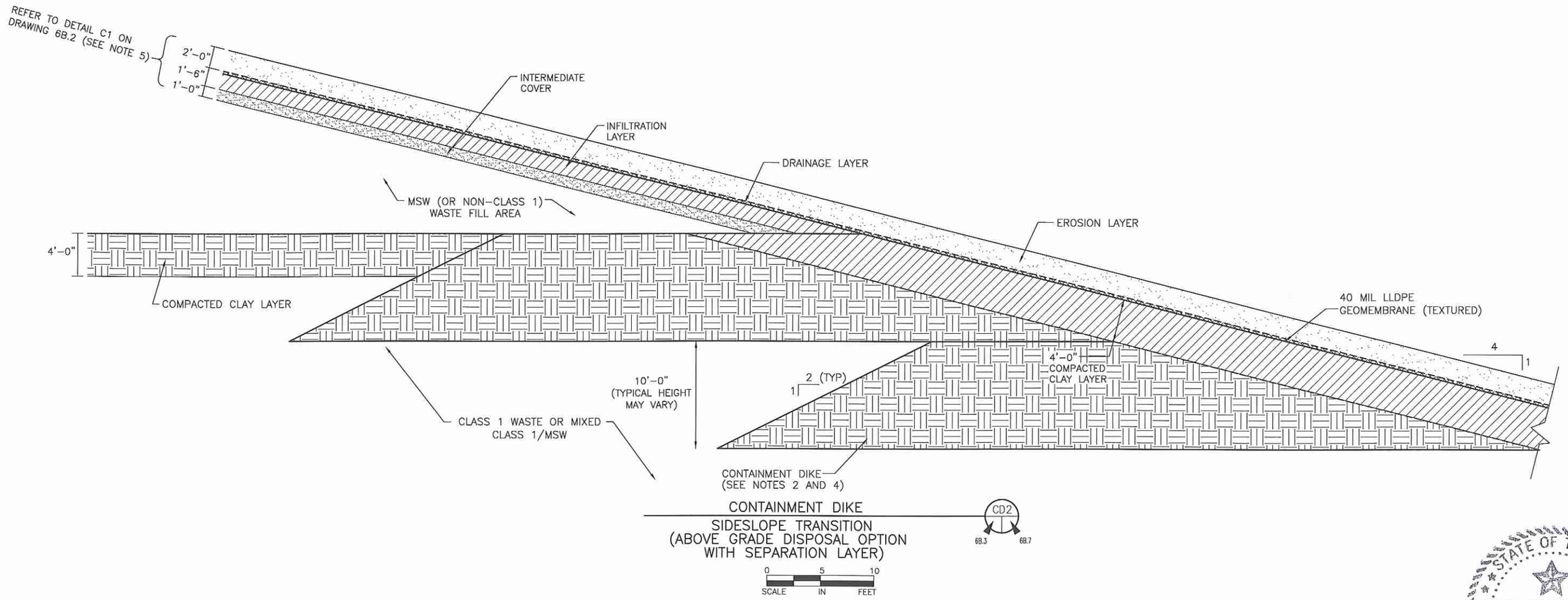
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.6

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 6B\6B.6-FINAL COVER DETAILS.dwg, jwilson



CONTAINMENT DIKE
SIDESLOPE TRANSITION
(ABOVE GRADE DISPOSAL OPTION
WITH SEPARATION LAYER)

CD2
6B.3 6B.7

SCALE 0 5 10 IN FEET

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS I WASTE IN A DEDICATED CELL OR MIXED WITH OTHER WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC § 330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. THE ALTERNATIVE FINAL COVER MAY BE USED. SEE DETAIL C3 ON DRAWING 6B.2.

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.7-DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 WASTE CONTAINMENT DIKE/ FINAL COVER TIE-IN DETAIL

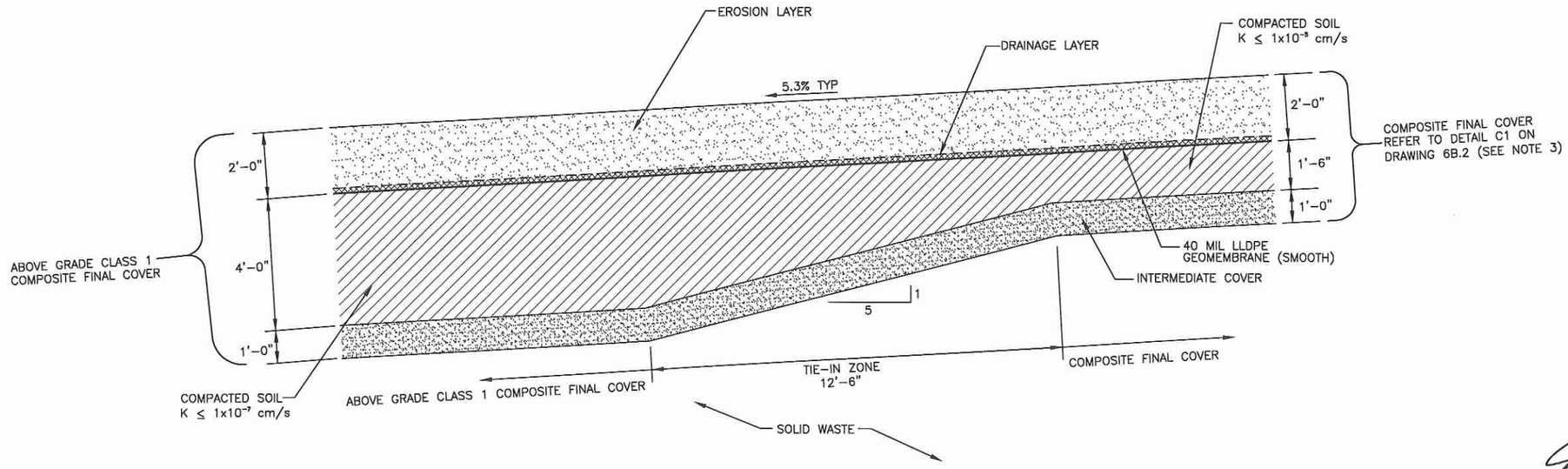
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

ATTACHMENT 6B.7

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

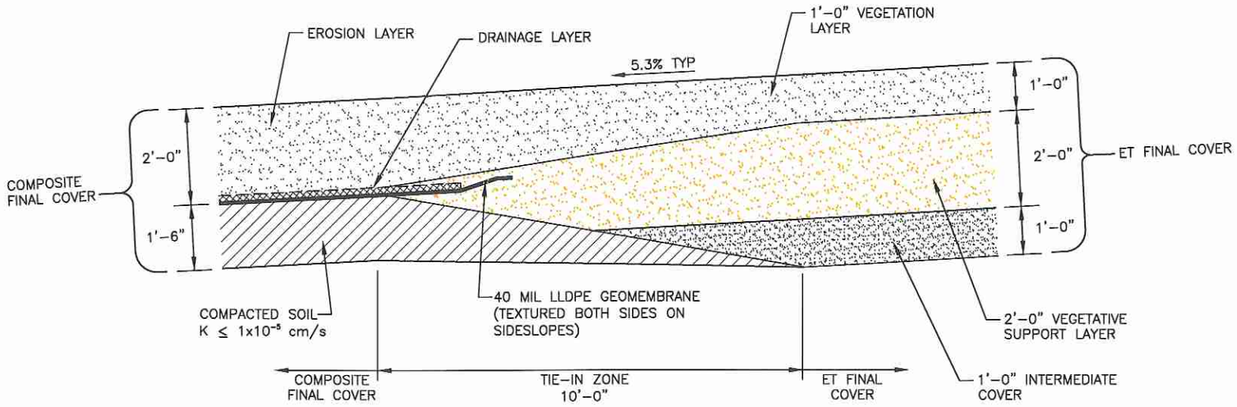
O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 6B\6B.7-CONTAINMENT DIKE DETAIL.dwg, jwilson



ABOVE GRADE CLASS 1 COMPOSITE/
COMPOSITE FINAL COVER TIE–IN – TOPSLOPE (C9 / 6B.3)

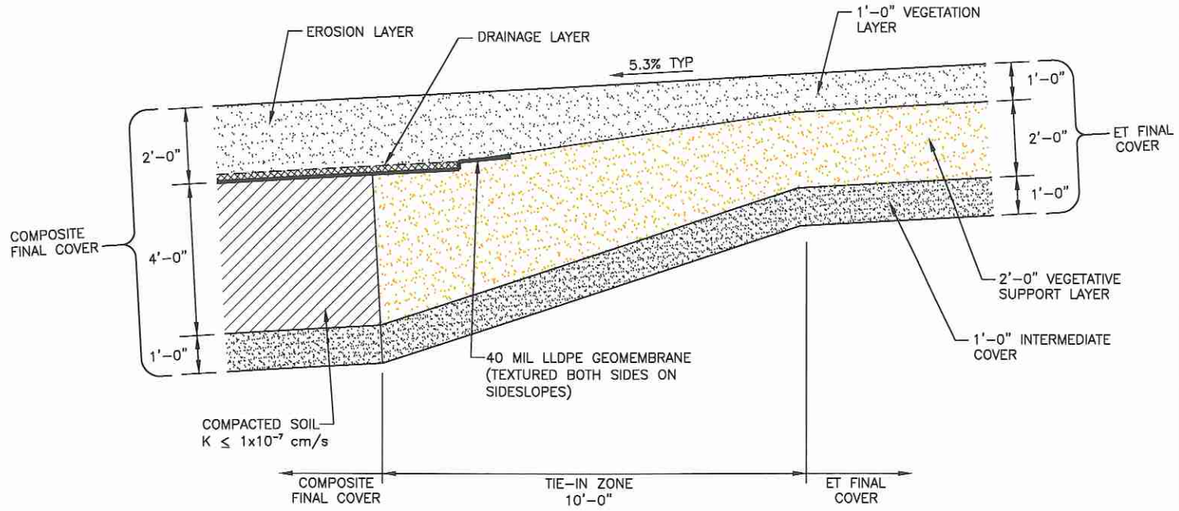
SCALE 0 1 2 4 IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11



COMPOSITE/ET FINAL COVER
TIE–IN – TOPSLOPE (C10 / 6B.3)

NTS



ABOVE GRADE CLASS 1
COMPOSITE/ET FINAL COVER (C11 / 6B.3)
TIE–IN – TOPSLOPE

NTS

NOTES:

1. FINAL COVER SYSTEM WILL BE CONSTRUCTED IN ACCORDANCE WITH ATTACHMENT 12 FINAL CLOSURE PLAN.
2. ET FINAL COVER SYSTEM DESIGN AND DEMONSTRATIONS ARE INCLUDED IN APPENDIX 12D ET MONOLITHIC SOIL FINAL COVER DESIGN.
3. THE ALTERNATIVE FINAL COVER MAY BE USED. SEE DETAIL C3 ON DRAWING 6B.2.

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.8-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

CLASS 1 FINAL COVER TIE–IN DETAILS

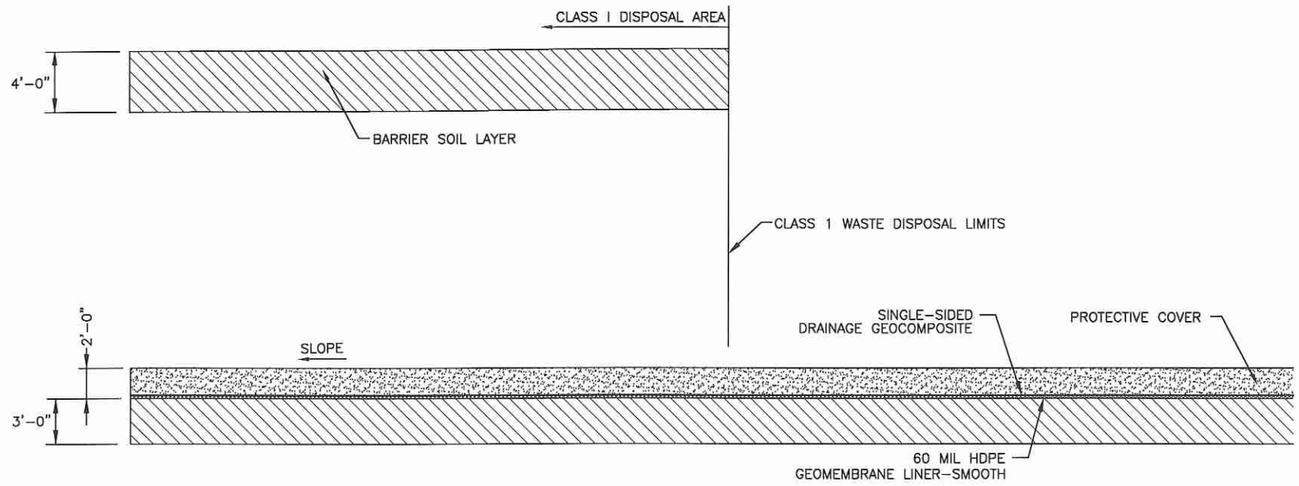
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

ATTACHMENT 6B.8

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\SOD 2\ATT 6B\6B.8-FINAL COVER DETAILS.dwg, jwilson



CLASS 1/LINER TRANSITION L6 6B.9 2A,7C

0 5 10
SCALE IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

△1 INDICATES REVISION
(SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:
1. NEW DRAWING ADDED.

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.9-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	SEE LIST OF REVISIONS

△1

ABOVE GRADE CLASS 1 LINER SYSTEM DETAIL

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

ATTACHMENT 6B.9

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\ATT 6B\6B.9-FINAL COVER DETAILS.dwg, jwilson

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

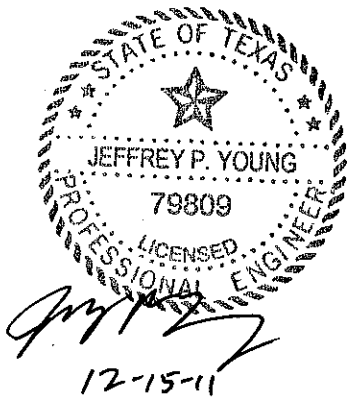
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 7
FINAL CONTOUR MAP

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



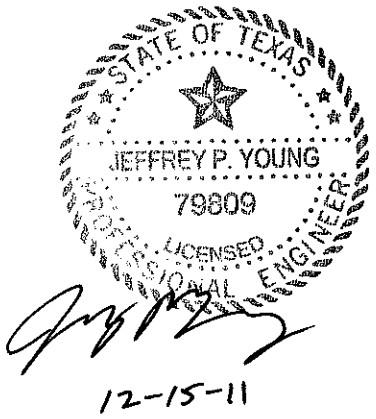
Revision Prepared by

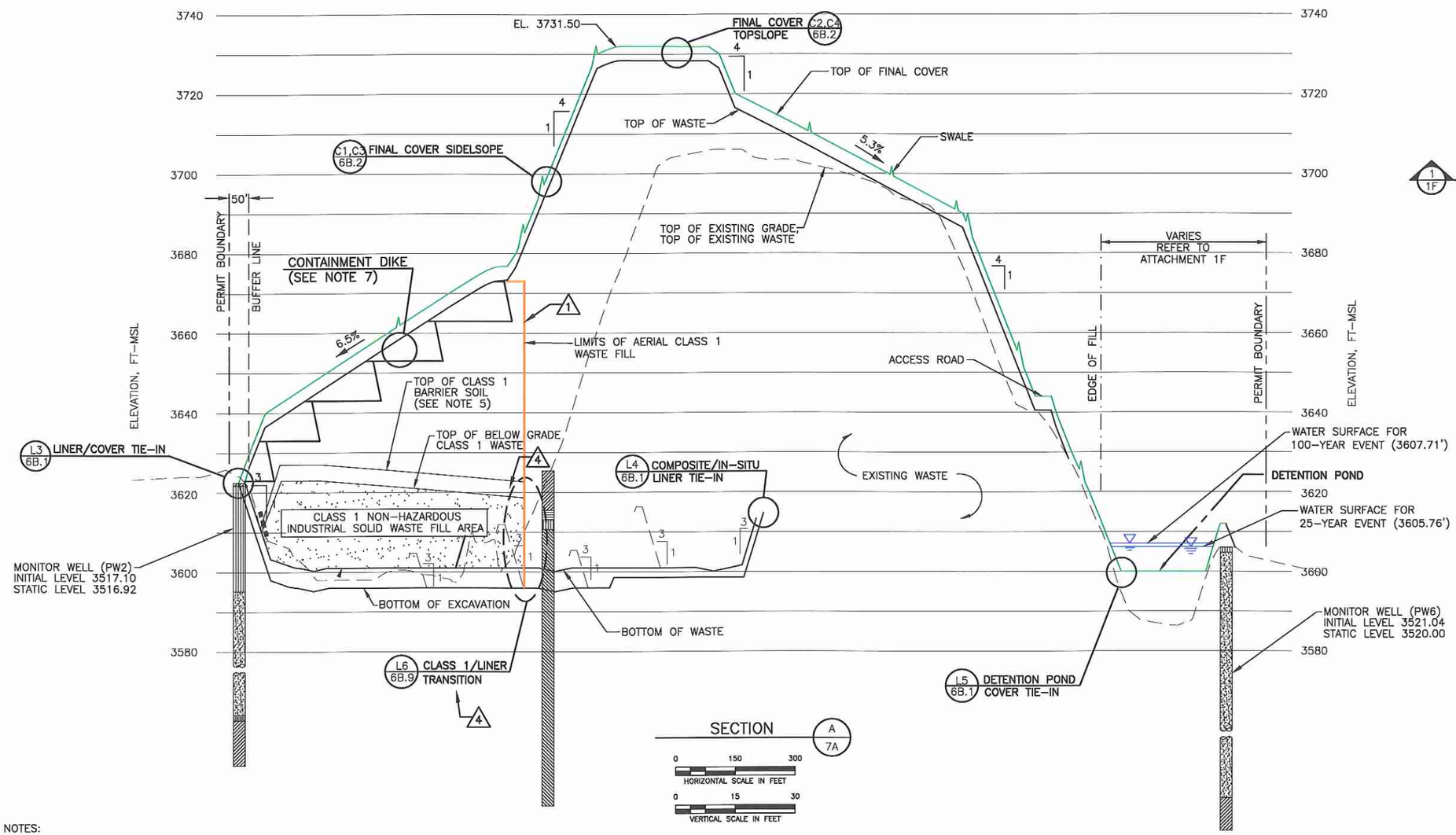
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

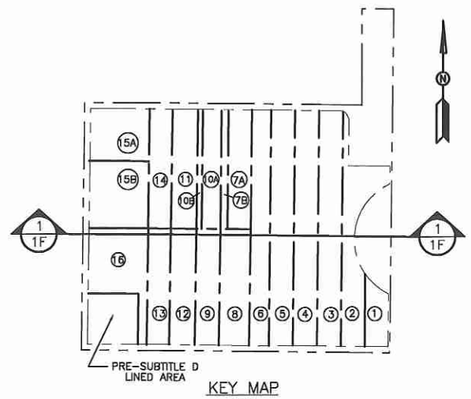
WBC Project No. 0120-94-11-74-01

CONTENTS

7A Final Contour Plan
7B Final Drainage Plan
7C Typical Fill Cross Sections
7D Typical Fill Cross Sections
7E Typical Fill Cross Sections







KEY MAP
NTS

BORING LEGEND

- CLAY
- LIMESTONE
- CALICHE
- SILTY SANDSTONE
- SAND
- CLAYEY SAND
- SILTY SAND
- GRAVELLY SAND

NOTES:

1. REFER TO ATTACHMENT 6C FOR LEACHATE COLLECTION SYSTEM DETAILS.
2. REFER TO ATTACHMENT 6A FOR SURFACE WATER PROTECTIVE FACILITIES.
3. REFER TO ATTACHMENT 4A FOR BORING PLAN AND LOG OF BORINGS.
4. REFER TO ATTACHMENT 1E FOR LOCATION OF GAS VENTS.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE-IN.
6. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. REFER TO ATTACHMENT 1M FOR THE ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
7. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY.

1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

LIST OF REVISIONS:

1. REVISED LIMITS OF AERIAL CLASS 1 FILL.
2. UPDATED NOTE 6 TO REFER TO ATTACHMENT 1M FOR ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
3. UPDATED NOTE 7 TO INDICATE THAT ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH OTHER WASTES.
4. REVISED TOP OF CLASS 1 BARRIER LAYER.
5. ADDED DETAIL L6 CALLOUT.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001 | DRAWN BY: SRF
FILE: 0120-94-11 | DESIGN BY: DOL
CAD: 7C-CROSS SECTION.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	05/2011	PERMIT MODIFICATION
7	12/2011	SEE LIST OF REVISIONS

TYPICAL FILL CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

ATTACHMENT 7C

COPYRIGHT © 2007 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\XOD 2\ATT 7\7C-CROSS SECTION.dwg, jwilson

Attachment 7D has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

PERMIT MODIFICATION

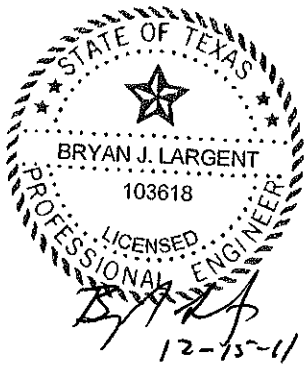
ATTACHMENT 8
COST ESTIMATE FOR CLOSURE AND POSTCLOSURE CARE

Prepared for

Southwest Landfill TX, LP

November 2005
Revised October 2007

Revised December 2011



Revision Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-94-11-49-12

CONTENTS

1	**INTRODUCTION**	**1**
2	**CLOSURE COST ESTIMATE**	**2**
	2.1 Engineering Costs	2
	2.2 Construction Costs	2
3	**POSTCLOSURE CARE COST ESTIMATE**	**5**
4	**COST ESTIMATE ADJUSTMENTS**	**7**



2 CLOSURE COST ESTIMATE

This cost estimate shows the cost of hiring a third party to close the largest area ever requiring closure at any time during the active life of the landfill. The closure cost estimate includes: 1) engineering costs required to administratively close the facility; 2) construction costs involved with the construction of the final cover system, the landfill gas system, and other activities required to close the facility, and 3) contingencies and other administrative costs that may be incurred during closure activities. A summary of closure cost estimate is presented on Table 1. The costs will be adjusted annually as indicated in Section 4. An assessment will be completed each year to verify that the Closure Cost Estimate shown in Table 1 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the closure costs are based on the current active area and that all other permit conditions are addressed by the Closure Cost Estimate (e.g., the number of groundwater monitor wells and landfill gas probes in the estimate match the wells and probes that are either in-place or need to be installed to match the number of wells and probes listed in the permit for the current phase of development). The estimates will be updated, as needed, consistent with the procedures noted in Section 4. Additional information regarding the closure cost estimate is summarized below.

2.1 Engineering Costs

The existing costs are based on closing the largest area scheduled to receive final cover, which is ~~81.9~~ 86.7 acres. A boundary survey will be required for the filing of the affidavit of closure, deed recording of any area of the site that has received waste, and publishing the public notice of closure activities. A topographic survey will be required to determine the existing height and top slope of the landfill so that permit compliance can be evaluated and the final closure system, drainage system, and final grading can be engineered. An inspection of the site is included to identify any disposal areas requiring closure, drainage and erosion protection improvements, and identify any potential regulatory deficiencies. The engineering costs include the cost to develop construction plans and closure schedules, closure testing and inspections, and permit document preparation. In addition, administration costs (i.e. for construction contracts) have also been included.

2.2 Construction Costs

As shown on Figure 1, construction costs include construction of the final cover system drainage improvements, and LFG system improvements for the ~~81.9~~ 86.7-acre area. The final cover system consists of an 18-inch-thick infiltration layer (clay cap), a flexible membrane cover, a 12-inch-thick drainage layer, and an erosion layer consisting of

24 inches of earthen material capable of sustaining plant growth. The 18-inch-thick infiltration layer becomes a 4-foot-thick infiltration layer in sectors receiving above grade Class 1 waste. The construction costs include site grading and drainage including the final grading of the site, drainage improvements, and erosion and sedimentation controls for proper closure of the site. Since the landfill gas extraction system has been installed in portions of the ~~81.9~~ 86.7-acre area, the construction costs for the LFG extraction system are based on extending the currently constructed gas wells above the top of final cover and constructing additional wells.

TABLE 1
SOUTHWEST LANDFILL - CLOSURE COST

Area Requiring Final Cover	86.7 ~~81.9~~	ac	~~Vegetation Support Layer~~	~~2.0~~	~~ft~~
Permit Boundary Area	124.29	ac	~~Vegetation Layer Thickness~~	~~1.0~~	~~ft~~
Above Grade Class 1 Disposal Area	4.8	ac	Infiltration Layer Thickness	1.5	ft (Composite Final Cover)
			Infiltration Layer Thickness	4.0	ft (Above Grade Class 1 Final Cover)
			Erosion Layer Thickness	2.0	ft

Description	Quantity	Unit[1]	Unit[2] Cost	2004 Total Cost	Inflation Factor[3]	2011 Total Cost
1.0 ENGINEERING						
1.1 Topographic Survey	86.7 ~~81.9~~	AC	$ 80	$ 7,000	~~1.085~~ 1.163	$ 8,000
1.2 Boundary Survey for Affidavit	124.29	AC	$ 35	$ 4,000	~~1.085~~ 1.163	$ 5,000
1.3 Site Evaluation	86.7 ~~81.9~~	AC	$ 410	$ 36,000	~~1.085~~ 1.163	$ 42,000
1.4 Development of Plans	86.7 ~~81.9~~	AC	$ 375	$ 33,000	~~1.085~~ 1.163	$ 38,000
Subtotal				$ 80,000		$ 93,000
1.5 Contract Administration		5%		$ 4,000		$ 4,650
1.6 Admin. Cost for Certification of Final Cover and Affidavit to the Public		5%		$ 4,000		$ 4,650
1.7 Closure Inspection	86.7 ~~81.9~~	AC	$ 1,175	$ 102,000	~~1.085~~ 1.163	$ 119,000
1.8 Permits	1	LS	$12,000	$ 12,000	~~1.085~~ 1.163	$ 14,000
SUBTOTAL				$ 202,000		$ 235,300
CONTINGENCY		10%		$ 20,200		$ 23,530
ENGINEERING TOTAL				$ 222,200		$ 258,830
2.0 CONSTRUCTION						
2.1 Final Cover System						
2.1.1 Infiltration Layer	198,198 ~~264,264~~	CY	$ 4.09	$ 811,000	~~1.085~~ 1.163	$ 943,193
2.1.1a Above Grade Class I Disposal Area Infiltration Layer[6]	30,976	CY	$ 4.09	$ 127,000	1.163	$ 147,701
2.1.2 Flexible Membrane Cover	3,776,652 ~~3,567,564~~	SF	$ 0.41	$ 1,548,000	~~1.085~~ 1.163	$ 1,800,324
2.1.3 Drainage Layer	3,776,652 ~~3,567,564~~	SF	$ 0.18	$ 663,000	~~1.085~~ 1.163	$ 771,069
2.1.4 Erosion Layer	279,752 ~~264,264~~	CY	$ 2.34	$ 655,000	~~1.085~~ 1.163	$ 761,765
2.2 Completion of Gas Extraction System[4]	45	WELL	$ 500	$ 23,000	~~1.085~~ 1.163	$ 27,000
2.3 Vegetation with Irrigation	86.7 ~~81.9~~	AC	$ 3,520	$ 305,000	~~1.085~~ 1.163	$ 355,000
2.4 Site Grading and Drainage	86.7 ~~81.9~~	AC	$ 1,175	$ 102,000	~~1.085~~ 1.163	$ 119,000
2.5 Removal of Onsite Storage Tanks	1	LS	$12,000	$ 12,000	~~1.085~~ 1.163	$ 14,000
2.6 LFG Wells Construction[5]	5	WELL	$15,000	$ 75,000	~~1.085~~ 1.163	$ 87,000
SUBTOTAL				$ 4,321,000		$ 5,026,052
CONTINGENCY		10%		$ 432,100		$ 502,605
CONSTRUCTION TOTAL				$ 4,753,100		$ 5,528,657
ENGINEERING AND CONSTRUCTION SUBTOTAL				$ 4,975,300		$ 5,787,487
TCEQ ADMINISTRATION OF CONTRACTS		5%		$ 248,765		$ 289,374
TOTAL CLOSURE COST				$ 5,224,065		$ 6,076,862

[1]LS = Lump Sum, AC = acres, CY = cubic yards, SF = square feet.
[2]The original 1995 unit cost for each item has been adjusted for inflation to reflect the 2004 unit cost.
[3]Inflation factor is the product of the inflation factors for each year between 2004 and 2011.
[4]Landfill gas extraction wells to be extended above final cover.
[5]Additional gas extraction wells are required for coverage.
[6]Above grade Class 1 disposal area was assumed to include all of Sector 15A. Therefore, the infiltration layer of the final cover system in this area is 4 feet thick.





LEGEND

- PERMIT BOUNDARY
- 12.2 ACRE DETENTION POND AREA
- N 3646000 STATE PLANE COORDINATE
- 3660 EXISTING CONTOUR
- PERMITTED LIMITS OF WASTE
- ACTIVE AREA REQUIRING CLOSURE
- ACCESS ROADS
- MW-6 GROUNDWATER MONITORING WELL
- GMP-14 GAS PROBE
- EXISTING LFG EXTRACTION WELL
- EXISTING LFG PIPING
- △1 INDICATES REVISION (SEE LIST OF REVISIONS BELOW)

NOTE:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN 3-29-2007. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. REFER TO ATTACHMENT 1A AND ATTACHMENT 7A FOR EXTENT OF PROPOSED PERMIT BOUNDARY.

LIST OF REVISIONS:

1. ACTIVE AREA UPDATED TO INCLUDE SECTOR 15A.
2. UPDATED MONITORING WELL SYSTEM PER 600-FOOT SPACING MOD.

STATE OF TEXAS
BRYAN J. LARGENT
103618
LICENSED
PROFESSIONAL ENGINEER
12-15-11

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 08/2005
FILE: 0120-94-11
CAD: FIGURE 1-SITE PLAN.DWG
DRAWN BY: VRS
DESIGN BY: BJL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	09/2006	REVISED PERMIT BOUNDARY AND RELOCATED ENTRANCE FACILITIES
2	10/2007	ADDED SOUTHEAST DETENTION POND AND DETENTION POND AREA BOUNDARY. UPDATED ACTIVE AREA.
3	12/2011	SEE LIST OF REVISIONS

PERMIT MODIFICATION SITE PLAN

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN SOUTH BEND, IN SPRINGFIELD, IL ST. LOUIS, MO

FIGURE 1

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\ATT B\FIGURE 1-SITE PLAN.dwg, jwilson

3 POSTCLOSURE CARE COST ESTIMATE

The postclosure care period has been established by TCEQ regulations to be 30 years. This detailed cost estimate shows the cost of hiring a third party to conduct routine maintenance and monitoring during the postclosure period. During this period, continuous maintenance must be ongoing to assure the integrity and effectiveness of the final cover system, monitoring systems, leachate collection system, drainage system, and landfill gas system. A summary of postclosure cost estimate is presented on Table 2. An assessment will be completed each year to verify that the Postclosure Cost Estimate shown in Table 2 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the postclosure costs are based on the current active area and that all other permit conditions are addressed by the Postclosure Cost Estimate (e.g., verify the LFG O&M cost estimate is updated to match the number of wells that will need to be maintained during the postclosure period). The costs will be adjusted annually as indicated in Section 4.

Engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. The estimates are based on the largest area with waste in place to be closed which is ~~81.9~~ 86.7 acres. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified during the site inspections. Gas monitoring and groundwater sampling and analysis will be performed as outlined in the postclosure plan.

Postclosure construction/maintenance estimates include the costs to correct problems determined by the engineering site inspections and as specified by the engineer's correctional plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the postclosure period. These costs include cover and drainage maintenance and annual seeding and mowing costs. The leachate disposal costs include trucking, treatment and disposal costs from areas contributing to leachate generation (approximately ~~38.2~~ 43.0 acres). Postclosure landfill gas control system O&M costs includes regular calibration and maintenance of regulatory equipment, such as valves and flow meters, associated system components of the active collection system and condensate disposal for the completely developed site.

TABLE 2
SOUTHWEST LANDFILL - POSTCLOSURE CARE COST

Postclosure Waste Footprint	86.7 ~~81.9~~ ac	Post Closure Care Period	30 yrs
Area with leachate collection system	43.0 ~~38.2~~ ac	LFG Extraction Wells	50 wells
Groundwater Monitoring Wells	21 ~~16~~ wells	Gas Montoring Events	4 /yr
Permit Boundary Area	124.29 ac	GW Monitoring Events	2 /yr
		Leachate Generation	591 gal/ac/yr

Description		Unit[1]	Unit[2] Cost	Annual Cost	2004 Total Cost	Inflation Factor[3]	2011 Total Cost
1.0 ENGINEERING							
1.1 Postclosure Care Plan		N/A					
1.2 Site Inspection and Recordkeeping (annual)	124.29	ACRE	$ 24	$ 2,920	$ 87,600	~~1.085~~ 1.163	$ 101,900
1.3 Correctional Plans and Specifications (annual)	86.7 ~~81.9~~	ACRE	$ 35	$ 3,010	$ 90,300	~~1.085~~ 1.163	$ 105,000
1.4 Site Monitoring							
1.4.1 Groundwater Monitoring (semiannual)	21	WELLS	$ 1,755	$ 73,710	$ 2,211,300	~~1.085~~ 1.163	$ 2,571,700
1.4.2 Gas Monitoring (quarterly)	4	YR	$ 1,170	$ 4,680	$ 140,400	~~1.085~~ 1.163	$ 163,300
1.5 Detention Pond Inspection\Maintenance[5]	1	YR	$ 3,000	$ 3,000	$ 90,000	1.072	$ 96,500
2.0 CONSTRUCTION / MAINTENANCE	86.7 ~~81.9~~	AC	$ 234	$ 20,288	$ 608,600	~~1.085~~ 1.163	$ 707,800
3.0 LEACHATE DISPOSAL/MAINTENANCE	25,413 ~~22,576~~	GAL	$ 0.12	$ 2,970	$ 89,100	~~1.085~~ 1.163	$ 103,600
4.0 LFG SYSTEM OPERATION & MAINTENANCE[4]				See Graph Below	$ 1,357,500	~~1.085~~ 1.163	$ 1,578,800
SUBTOTAL					$ 4,674,800		$ 5,428,600
CONTINGENCY		10%			$ 467,480		$ 542,860
SUBTOTAL					$ 5,142,280		$ 5,971,460
TCEQ CONTRACT ADMINISTRATION		10%			$ 514,228		$ 597,146
TOTAL POSTCLOSURE CARE COST					$ 5,656,508		$ 6,568,606

[1]AC = acres, YR = Year, GAL = Gallons.

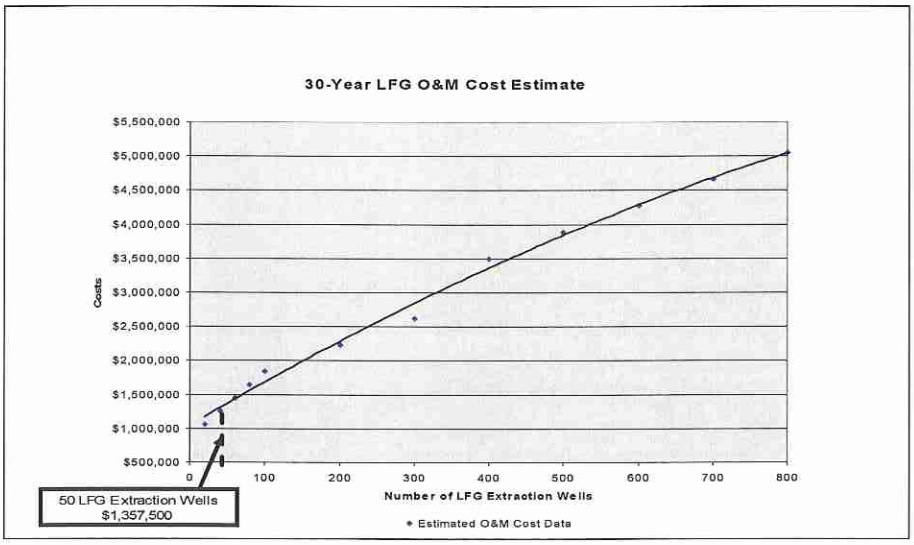
[2]Unit cost for each item has been adjusted to reflect 2004 unit cost.

[3]Inflation factor is the product of the inflation factors for each year between 2004 and 2011.

[4]Refer to the Figure shown below for additional information regarding how the LFG System Maintenance costs are estimated.

[5]This line item is ~~not~~ inflated from ~~2004~~ 2007 dollars because it ~~is~~ was added as a new line item in October 2007 as part of the Drainage Improvements/Landfill Completion Plan Revisions Permit Modification developed by Weaver Boos Consultants, LLC - Southwest.

[6]This estimate was reproduced from the Alternative Final Cover Design Permit Modification prepared by WBC in November 2005 and approved by the TCEQ March 21, 2006. This estimate was based on 77.5 acres.





SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

UPGRADING AND VERTICAL EXPANSION

SITE DEVELOPMENT PLAN PART III
ATTACHMENT 12
FINAL CLOSURE PLAN

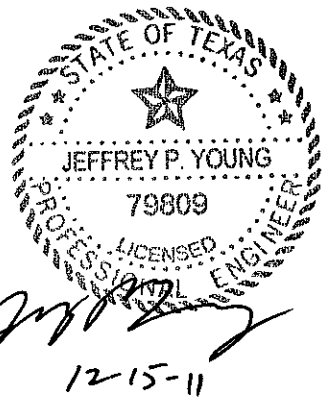
Prepared for

Southwest Landfill TX, LP

Technically Complete May 23, 1995

Revised November 2005

Revised December 2011



Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

TABLES AND ILLUSTRATIONS **12-iv**

1 LANDFILL BACKGROUND **12-1**
1.1 Facility Description 12-1
1.2 Landfill Completion Plan 12-2

2 REGULATIONS **12-3**

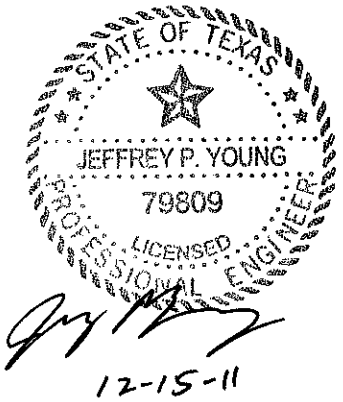
3 LANDFILL FINAL COVER SYSTEM **12-4**
3.1 Regulatory Requirements 12-4
3.2 Final Cover System Design 12-4
3.3 Installation Methods and Procedures 12-5
3.3.1 Construction Procedures 12-5
3.3.2 Final Cover Testing Procedures 12-6

4 CLOSURE PROCEDURES **12-7**
4.1 BFI Standard Closure Procedures 12-7
4.2 Closure At Any Time During Active Life 12-7
4.3 Estimate of Largest Area Ever Requiring Final Cover 12-8
4.4 Estimate of Maximum Waste On Site 12-8

5 CLOSURE SCHEDULE **12-9**
5.1 TNRCC Requirements 12-9
5.2 Provisions for Extending Closure Period 12-10

6 CLOSURE COST ESTIMATE **12-13**

7 CLOSURE PLAN UPDATED **12-14**



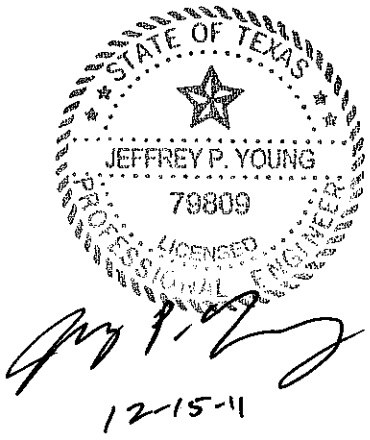
CONTENTS (continued)

APPENDIX 12A
Affidavit to the Public

APPENDIX 12B
Landfill Completion Plan

APPENDIX 12C
Largest Area Ever Requiring Final Cover

APPENDIX 12D
ET Monolithic Soil Final Cover Design



The erosion layer will consist of a minimum of 24 inches of earthen material that is capable of sustaining native plant growth and will be seeded or sodded as soon as practical following the application of the final cover in order to minimize erosion. A demonstration that the erosion layer thickness is sufficient is provided in Attachment 6, Appendix 6A-A. Details of the final cover system alternatives are shown on Attachment 6B.2 and 6B.2a – Cover Details.

3.3 Installation Methods and Procedures

3.3.1 Construction Procedures

The final cover system will be constructed in accordance with TNRCC MSWMR 30 TAC §330.253(b)(1) or (2), as applicable, and (b)(3). Details of the final cover alternatives design sections are shown on Attachment 6B.2 – Cover Details. In general, appropriate field survey controls will be implemented to control the final lift of solid waste as well as the successive soil layers of the final cover system (see Part IV – Site Operating Plan). The infiltration layer will consist of relatively homogeneous clayey soil, placed and compacted under controlled, moisture-density conditions with appropriate compaction equipment. The lift thickness will be controlled so that there is penetration through the loose lift under compaction into the top of the previously compacted lift. The finished surface of the infiltration layer will be a hard and uniform surface.

If the Class 1 aerial fill containment dikes are utilized, the ~~18-inch-thick~~ clay infiltration layer ~~can be constructed by (1) removing and recompacting the top 18-inch-thick layer of soil from the containment dikes or (2) constructing the 18-inch infiltration layer on top of the containment dike~~ will be increased to 4 feet thickness for the area of the above-grade Class 1 waste disposal. The coefficient of permeability for the compacted clay layer will be less than or equal to ~~$1x10^{-5}$~~ $1x10^{-7}$ cm/sec in the area of the containment dikes (refer to Attachment 1M for additional information).

In implementing the alternative final cover design, the 18 inches of soil beneath the GCL will be placed and compacted under controlled moisture-density conditions with appropriate compaction equipment. The lift thickness and the total thickness will be controlled, resulting in a hard and uniform surface, upon which the GCL will be laid. Installation of the GCL will be in accordance with procedures described in Attachment 10 – Soil and Liner Quality Control Plan.

A flexible membrane liner (FML) will be installed over the infiltration layer. On side slopes, a drainage layer will be required under the surficial erosion layer to enhance stability. The drainage layer will be granular material. If the erosion layer does not satisfy the filter criteria for the drainage layer, a geotextile filter will be placed between the erosion layer and drainage layer.

The erosion layer will consist 24 inches of soil suitable for plant growth and will be placed directly on the FML or drainage layer (where applicable). The surface of the erosion layer will be seeded with mature grasses and mulched to establish a vegetation cover. The site will be irrigated until the native vegetation is established.

Construction activities will be conducted in accordance with the project construction drawings and specifications. Details of the Subtitle D composite final cover are shown on Attachment 6B.2 – Cover Details – Subtitle D Composite Final Cover Option. Details of the ET monolithic soil final cover are shown on Attachment 6B.2a – Cover Details – ET Monolithic Final Cover Option. Details of the above grade Class 1 final cover are shown on Attachment 6B.6 –Above Grade Class 1 Final Cover Details.

3.3.2 Final Cover Testing Procedures

Testing and evaluation of the final cover system during construction and reporting of results will be in accordance with MSWMR 30 TAC §330.253(f). The 18 inches of compacted infiltration material will be tested for coefficient of permeability at a frequency of at least one test per surface acre of final cover. Other testing (e.g., standard Proctor, Atterberg limits, moisture content and density) will be conducted, as appropriate, to provide control and verification during construction of the final cover.

Construction specifications and testing frequencies of the FML and GCL components of the final cover will be as prescribed in Attachment 10 – Soil and Liner Quality Control Plan. Construction specifications for the ET Monolithic Soil Cover are found in Attachment 12D-4 FCSQCP.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

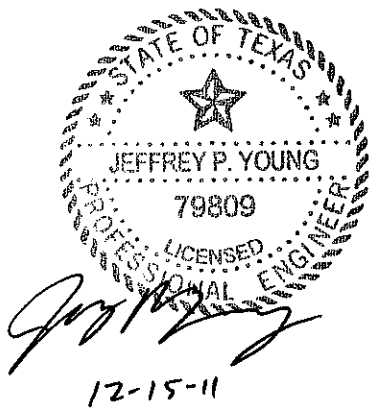
SITE OPERATING PLAN

Prepared for

Southwest Landfill TX, LP

September 2006
Revised January 2007
Revised January 2008

Revised December 2011



Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

LIST OF TABLES AND FIGURES vi

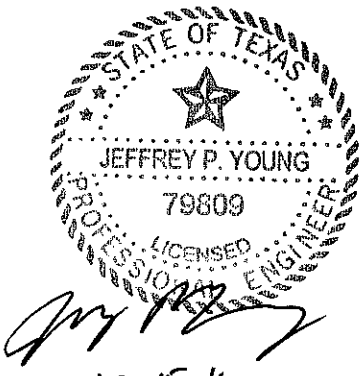
LIST OF ACRONYMS vii

1 INTRODUCTION 1

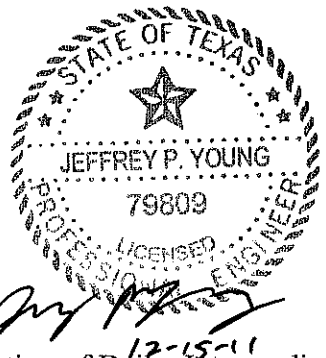
2 PERSONNEL AND TRAINING 2
- 2.1 Personnel 2
  - 2.1.1 Southwest Landfill Management Team 2
  - 2.1.2 Landfill Manager 2
  - 2.1.3 Scale Operator 3
  - 2.1.4 Equipment Operators 4
  - 2.1.5 Spotters and Laborers 5
  - 2.1.6 Mechanics 5
  - 2.1.7 Other Site Personnel 5
  - 2.1.8 Other Corporate Resources 5
- 2.2 Training 6

3 EQUIPMENT 9

4 OPERATIONAL PROCEDURES 12
- 4.1 Access Control 12
  - 4.1.1 Site Security 12
  - 4.1.2 Traffic Control 13
- 4.2 Unloading Wastes 13
  - 4.2.1 Unloading Areas 13
  - 4.2.2 Waste Excluded from Disposal at the Site 14
  - 4.2.3 Waste Unloading Procedures 14
  - 4.2.4 Maximum Size of the Unloading Area 15
  - 4.2.5 Prohibited Wastes 16
- 4.3 Hours of Operation 17
- 4.4 Site Signs 18
- 4.5 Control of Windblown Wastes and Litter 18
- 4.6 Easements and Buffer Zones 20
  - 4.6.1 Easements 20
  - 4.6.2 Buffer Zones 20
- 4.7 Landfill Markers and Benchmark 20
- 4.8 Control of Waste Spilled on Route to the Site 21
- 4.9 Disposal of Large Items 22



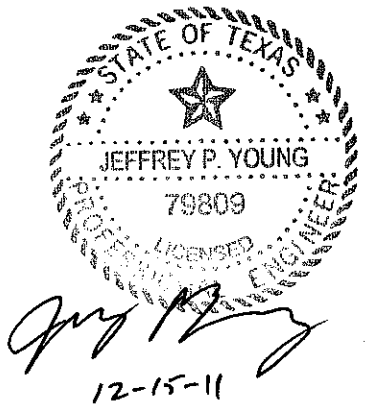
CONTENTS (Continued)



4.10	Air Quality and Odor Management Plan		22
4.11	Disease Vector Control		24
4.12	Maintenance of Site Access		25
4.13	Salvaging and Scavenging		25
4.14	Endangered Species		25
4.15	Control of Landfill Gas		26
4.16	Treatment of Oil, Gas, and Water Wells		27
4.17	Compaction of Solid Waste		27
4.18	Soil Management, Placement, and Compaction of Daily, Intermediate, and Final Cover		28
	4.18.1 Soil Management		28
	4.18.2 Daily Cover		28
	4.18.3 Intermediate Cover		30
	4.18.4 Final Cover		31
	4.18.5 Cover Application Log		32
4.19	Prevention of Ponded Water		32
4.20	Disposal of Special Wastes		33
	4.20.1 Wastewater Treatment Plant Sludge and Nonhazardous Bulk Liquids		33
	4.20.2 Industrial Waste		33
4.21	Prevention of Discharge of Contaminated Water		~~3934~~a
4.22	Leachate and Contaminated Water Plan		~~4034~~a
4.23	Site Inspection and Maintenance List		41
4.24	Visual Screening of Daily Operations		42
5	**SEQUENCE OF DEVELOPMENT**		**43**
6	**DETECTION AND PREVENTION OF DISPOSAL OF PROHIBITED WASTES**		**44**
6.1	General		44
6.2	Load Inspection Procedure		44
6.3	Recordkeeping		47
6.4	Training		47
6.5	Managing Prohibited Wastes		48
6.6	Managing Mishandled or Undeclared Special Waste		48
7	**FIRE PROTECTION PLAN**		**49**
7.1	Fire Protection Training		49
7.2	Fire Protection Standards		50

CONTENTS (Continued)

	7.2.1	Posted Information	50
	7.2.2	Fire Safety Rules	50
	7.2.3	Burning Waste Loads (Hot Loads)	50
7.3		Accidental Fires	51
7.4		Preventive Procedures	51
7.5		Vehicle or Equipment Fire	52
7.6		Structure Fire	52
7.7		Working Face(s) Fire Protection Plan	52
	7.7.1	Working Face Fire Protection Requirements (§330.115)	52
	7.7.2	Working Face Fire Fighting Plan	53
	7.7.3	Water Trucks or Storage Tank Requirements	54
	7.7.4	Soil Stockpile Requirements	54
7.8		RACM Area Fire	57
7.9		Liquid Waste Bulking Facility Fire	57
7.10		Contacting Fire Department and TCEQ	57
8	**SAFETY**		**58**
8.1		General Site Safety	58
8.2		Preparedness and Prevention Measures	59
	8.2.1	General	59
	8.2.2	Scale House	59
	8.2.3	Landfill Access Road	60
9	**RECORDKEEPING REQUIREMENTS**		**61**



CONTENTS (Continued)

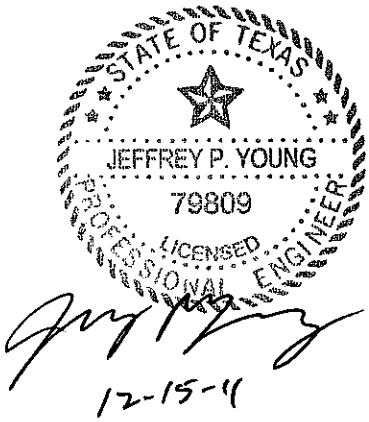
APPPENDIX A
Quality Control and Operational Plan for the Disposal of Special Wastes

APPENDIX B
Quality Control and Operational Plan for the Stabilization of Nonhazardous Bulk Liquids

APPENDIX C
Example of Load Inspection Report

APPENDIX D
Alternate Daily Cover Information

APPENDIX E
Class I Nonhazardous Industrial Waste Acceptance Plan



4.2.2 Waste Excluded from Disposal at the Site

The following wastes are specifically excluded from disposal at the site:

- Regulated hazardous wastes (refer to Section 6 for more information)
- Liquid wastes that do not pass the paint filter test, except as allowed under Section 4.20.1 of this SOP
- Waste classified as hazardous by the TCEQ (refer to Section 6 for more information)
- Grease trap wastes, except as allowed under Section 4.20.1 of this SOP
- Waste prohibited by the TCEQ (see 30 TAC §330.5(e))

4.2.3 Waste Unloading Procedures

Scale Operators, Equipment Operators, Laborers, and Spotters will monitor the incoming waste and direct vehicles to the appropriate disposal area. If a Spotter is not present at an unloading area, then the Equipment Operators at the unloading area will assume the Spotter's duties. Equipment Operators will visually inspect the waste material as it is being unloaded and processed from the cab of the equipment they are in (typically a compactor). Scale Operators control site access and monitor incoming vehicles for unauthorized wastes by (1) receiving manifests and other shipping documents, (2) recording incoming waste loads, (3) completing a visual inspection of the vehicle (including a video camera inspection of the top of the vehicle's contents), and (4) interviewing the driver, as necessary. Any nonconforming issues will be reported to the Landfill Manager. The Landfill Manager will work with the Scale Operators and other company resources (e.g., Special Waste Liaison/Compliance Coordinator or the Environmental Manager) to resolve any non-conforming issues. If the non-conforming issues involve Special or Industrial wastes, the Landfill Manager and Scale Operators will review Sections 4.20 and 6.2 of the SOP to verify that all requirements for acceptance of Special and Industrial waste have been met before the material is accepted for disposal. The procedures for handling prohibited waste that is not discovered until after it is unloaded are discussed in Section 6.2.

Laborers, Spotters, Equipment Operators, or other field personnel will be present at the working face at all times to monitor incoming loads of waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility and will be trained to identify prohibited wastes before being assigned to this task (refer to Section 2.2 for training procedures). The personnel will also be trained and have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. Site personnel will establish unloading positions at the working face. The unloading positions are basically equally spaced lanes that each collection vehicle uses to unload waste material from the collection vehicle to the working face. Typically, each lane is about 20 feet wide to allow sufficient space between vehicles to allow the safe unloading of waste at the working face

(refer to Section 4.20 for additional information pertaining to when Class 1 waste and MSW are disposed of at the same working face in the Class 1 disposal area).

The Scale Operators, Laborers, Spotters, and Equipment Operators have the authority and responsibility to reject unauthorized loads, have unauthorized material removed by the transporter, and/or assess surcharges, and have the unauthorized material removed by on-site personnel or otherwise properly managed by the facility. In the event an unauthorized load is discovered at an unloading area, the Spotter, Laborer, or Equipment Operator (i.e., working face staff) will notify the Landfill Manager or the General Manager immediately. The Landfill Manager or General Manager will verify that the appropriate action is taken. In addition, if the unauthorized load is discovered at the site entrance, the Scale Operator will notify the Landfill Manager or the General Manager immediately to verify that the appropriate action is taken. A record of each unauthorized material removal event will be maintained in the Site Operating Record.

Solid waste unloading will be controlled to prevent disposal in locations other than those specified by site management. For example, random load inspections will be conducted as outlined in Section 6.2 of this SOP. Any allowable waste deposited in an unauthorized area will be immediately removed and disposed of properly at the current working face. The Laborers, Spotters, and Equipment Operators (or other site personnel) will actively investigate any approved waste haul vehicles that do not dispose of their waste in an authorized area. In the event that an authorized load of waste has been deposited in an unauthorized area, the Laborer, Spotter, or Equipment Operator will notify the Landfill Manager and the waste load will be promptly relocated to the authorized working face area.

4.2.4 Maximum Size of the Unloading Area

As discussed previously, the following four unloading areas exist at the Southwest Landfill.

- MSW Unloading Area or Working Face
- Class I Nonhazardous Industrial Solid Waste Unloading Area and Working Face
- RACM Unloading and Disposal Area
- Bulk Liquid Processing Area

The MSW and Class I unloading and working face areas are discussed below. The RACM unloading and disposal area is discussed in Appendix A (maximum size 50 feet by 50 feet). The bulk liquid processing area is discussed in Appendix B (maximum size 100 feet x 200 feet).

Control(s) will also be used to confine the working face to as small an area as practical consistent with the rate of incoming waste and safe and efficient working face operations. The maximum size of the working face will be limited to the area listed on the next page for a range of waste accepted at the facility.

steel, iron scrap, plastics, styrofoam, rope, twine, uncontaminated rubber, uncontaminated wooden materials, equipment belts, wiring, uncontaminated cloth, metal buildings, empty containers with a holding capacity of five gallons or less, uncontaminated floor sweepings, or food packaging, that are produced as a result of plant production.

- Class III Industrial Solid Waste - any inert and essentially insoluble industrial solid waste, including materials such as rock, brick, glass, dirt, and certain plastics and rubber, etc. that are not readily decomposable as defined in §335.507 (relating to Class III waste determination).
- Class I Industrial Solid Waste that is defined as Class I only because of its asbestos content will be accepted and handled in accordance with the procedures listed in Section 4.20.5. Other Class I waste will be accepted consistent with the procedures outlined in Appendix E (the Class I Nonhazardous Industrial Waste Acceptance Plan).

Class 1 waste may be placed below existing grades in designated disposal sectors shown on Attachment 1M in Part III. When a "dedicated" sector below existing grade has been filled to the grades referenced above, a barrier soil layer of at least four feet of compacted clay-rich soil must be placed on top of the Class 1 waste and on any exposed side slopes. Municipal solid waste may then be placed above the barrier soil layer to the final design grade.

With the above grade Class 1 waste disposal options, Class 1 waste only or Class 1 waste mixed with other wastes may be placed either below or above the compacted perimeter berm elevation~~, respectively~~ in areas with liners constructed in accordance with §330.331(e). The two above grade Class 1 disposal options are shown on Drawing 1M-7 in Part III, Attachment 1 and summarized below. ~~When the Class 1 waste areas are above the compacted perimeter berm elevation, Class 1 waste will be mixed with other wastes and construction of containment dikes along the exterior sideslope of the landfill is required. No dike containment is required for the below compacted perimeter berm placement.~~

- Above Grade Class 1 Waste Disposal Area with 4-foot-thick Separation Layer. This option allows for the disposal of Class 1 wastes above existing grade if containment dikes are constructed along the exterior slope of the Class 1 waste disposal area. This option also includes the placement of a 4-foot-thick compacted clay rich barrier layer that will be placed over the Class 1 waste as a separation layer between the Class 1 waste and the municipal solid waste (and other non-Class 1 waste material) to be placed above. With this option, the 4-foot-thick separation or barrier layer will be sloped toward the interior of the landfill.
- Above Grade Class 1 Waste Disposal Area. This option includes the construction of containment dikes along the exterior sideslope of the Class 1 disposal area to extend the limits of the Class 1 waste disposal area. No separation layer is required for this option; however, the thickness of the composite final cover system's infiltration layer will be increased from 1.5 feet to 4.0 feet with a maximum hydraulic conductivity of $1x10^{-7}$ cm/s.

Consistent with §330.173(e), the amount of Class 1 waste to be accepted will be limited to a maximum of 20 percent of the total waste, not including Class 1 waste, accepted during the current or previous year. The amount of waste may be determined by volume or by weight, but the same unit of measure must be used for each year. ~~The four-foot clay cover (separation layer) will not be required in the areas where the Class 1 waste has been mixed with other wastes. Final cover for all waste areas will be provided and constructed in accordance with the Closure Plan included in Part III, Attachment 12. Final cover for areas containing above grade Class 1 waste mixed with other wastes will consist of the standard composite final cover as indicated in Part III, Attachment 12.~~ As noted in Section 9 (Table 9-1), the lateral extent of Class 1 waste placement will be documented in the Site Operating Record. Details of the landfill perimeter containment dike construction are included in the cross-sections in Part III, Attachments 1, 2, and 7, and described in detail in Attachment 1M.

Class 1 Waste Disposal Area Unloading Procedures

In areas where Class 1 and MSW will be comingled, the unloading procedures for the combined working face will be consistent with the waste unloading procedures specified in Section 4.2.3 (Waste Unloading

Procedures). For example, Spotters, Equipment Operators, or other field personnel will be present at the combined working face at all times to monitor incoming loads of waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility and will be trained to identify prohibited wastes before being assigned to this task (refer to Section 2.2 for training procedures). The personnel will also be trained in and have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. As discussed in Section 4.2.3, site personnel will establish unloading positions at the working face. The unloading positions are basically equally spaced lanes that each collection vehicle uses to unload waste material from the collection vehicle to the working face. Typically, each lane is about 20 feet wide. When the Class 1 and MSW working face are combined, if warranted, the distance between the unloading positions utilized by Class 1 waste collection vehicles and MSW collection vehicles may be increased. This additional distance will provide a buffer between Class 1 unloading positions and the non-Class 1 unloading positions, which may be used by individual citizens. The Spotters and Equipment Operators will monitor the working face to verify that adequate spacing is maintained between vehicles, dust is minimized, and waste is being offloaded to the working face area in a safe manner (refer to Section 8 for additional safety information).

The Spotters and Equipment Operators will police the working face to verify that Class 1 waste is safely offloaded to the working face. If special handling procedures are required for Class 1 waste, then the working face personnel will be notified prior to the arrival of the waste haul vehicle at the working face so that the Spotters and Equipment Operators can take appropriate action (e.g., special handling procedures could include verifying that daily cover is placed over waste to minimize exposure to the atmosphere and/or establish a separate area at the working face to ensure that no other hauler is within a specified distance of the specific unloading position for the Class 1 waste that requires special handling).

4.21 Prevention of Discharge of Contaminated Water

The Landfill Manager or his designee shall implement necessary steps to control and prevent the discharge of contaminated water from the facility. No discharge of contaminated water shall occur without obtaining specific written authorization from the TCEQ prior to the discharge. All water coming in contact with waste or contaminated soils will be treated as contaminated water. Runon and runoff for the 25-year, 24-hour storm event will be controlled following the procedures set forth in the Surface Water Protection Plan and the Leachate and Contaminated Water Plan. The landfill will be operated consistent with §330.55(b)(1)(A)-(D) regarding discharge of solid wastes or pollutants into waters of the United States.

4.22 Leachate and Contaminated Water Plan

Leachate and contaminated water will be controlled at the Southwest Landfill as specified in the Leachate and Contaminated Water Plan.

Disposal of leachate generated from both Class 1 and non-Class 1 areas will be disposed of by the following methods.

- Transported to an off-site permitted disposal facility (e.g., POTW or commercial treatment facility)
- Recirculated over the areas underlain by a Subtitle D liner system, consistent with Title §330.177.

Leachate from both MSW and Class 1 waste disposal areas will be comingled in the leachate storage tanks. Leachate will be distributed from a water truck or other comparable equipment using a spray bar or hose to distribute leachate back to the working face (i.e., within the active waste fill area that is contained by the containment berm).

APPENDIX B

SDP REPLACEMENT PAGES (CLEAN COPY)

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

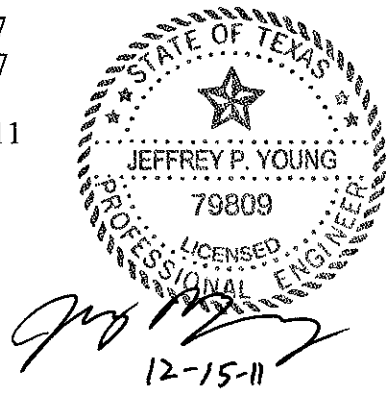
UPGRADING AND VERTICAL EXPANSION
SITE DEVELOPMENT PLAN PART III
SITE DEVELOPMENT PLAN NARRATIVE

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



Revision Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

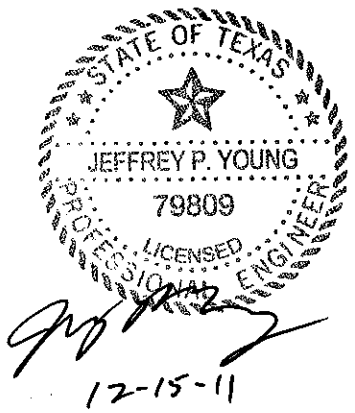
Project No. 0120-94-11-74-01

CONTENTS

1	**INTRODUCTION**	**III-1**
2	**SOLID WASTE DATA**	**III-3**
2.1	Volume of Waste	III-3
2.2	Properties and Characteristics of Waste	III-3
3	**DESIGN DATA**	**III-6**
3.1	Landfilling Methods	III-6
3.2	Wet-Weather Operation	III-6
3.3	Access Control	III-6
3.3.1	Access From Highway	III-6
3.3.2	Vehicle Access	III-7
3.3.3	All-Weather Access	III-7
3.3.4	Site Fencing	III-7
3.4	Site Life Projection	III-7
3.5	Drinking Water Protection	III-8
3.5.1	Status of Area Water Wells	III-8
3.5.2	Groundwater Protection	III-8
3.6	Surface Water Protection	III-9
3.6.1	General	III-9
3.6.2	Surface Runoff – Perimeter Drainage System	III-9
3.6.3	Surface Runoff – Below Grade	III-10
3.6.4	Surface Runoff – Aerial Fill Controls	III-10
3.6.5	Erosion and Sedimentation Control	III-11
3.6.6	Storm Water Detention	III-11
3.6.7	Wetlands	III-12
3.7	Control of Contaminated Surface Water	III-12
3.8	MSW Bioremediation Facility	III-12
3.9	Flood Control	III-12
3.10	Final Cover Design	III-13
3.11	Protection of Endangered Species	III-13
3.12	Landfill Markers and Benchmark	III-13a

APPENDIX IIIA
Site Life Calculations

APPENDIX IIIB
NPDES Group Permit Application



3 DESIGN DATA

3.1 Landfilling Methods

The proposed landfill method for the 119-acre site is a combination of area-excavation fill followed by aerial fill to the proposed landfill completion grades.

The excavation side slopes will be approximately 3H:1V, the aerial fill side slopes will be approximately 5H:1V, and the aerial fill top slope will be approximately 6 percent. The landfill will be divided into 16 sectors. Upon reaching final elevations, each completed sector will be topped with a final cover and graded so that drainage will flow away from the adjacent sectors. All sectors will be closed in accordance with Attachment 15 - Final Closure Plan.

Disposal of Class 1 nonhazardous industrial solid waste (Class 1 waste) may occur in Sectors 15A, 15B, 16, and a portion of Sectors 13 and 14. Requirements for below and above grade disposal options are included in Attachment 1M – Class 1 Waste Disposal Area Design.

3.2 Wet-Weather Operation

An interior road constructed of all-weather material will provide access from the all weather entrance road to the fill area. The interior road will be passable under inclement weather conditions and a wet-weather area will be maintained near the access road. The wet-weather area will move as operations progress. Additional details of wet-weather operations are provided in SDP Part IV - Site Operating Plan (SOP) of this permit amendment. Details on access roads are provided in plan view on Attachment 1C and cross-sections on Attachment 6A.4.

3.3 Access Control

3.3.1 Access From Highway

The primary access road to the site is Buffalo Stadium Road, a 24-foot, two-lane asphalt-paved county road, located north of Canyon. Buffalo Stadium Road intersects FM 2590 approximately 1 mile east of the site. The existing access road from Buffalo Stadium Road to the site entrance is a private 30-foot wide all weather road that lies within a 60-feet wide easement, as described in Part Section 13.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

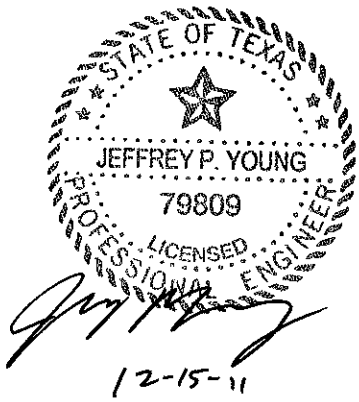
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 1
SITE LAYOUT PLAN

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



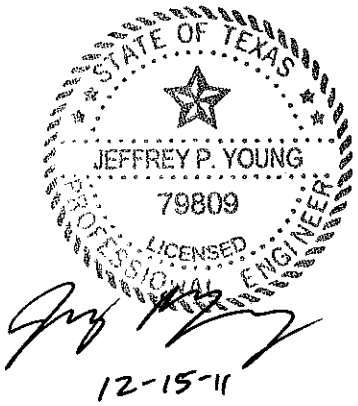
Revision Prepared by

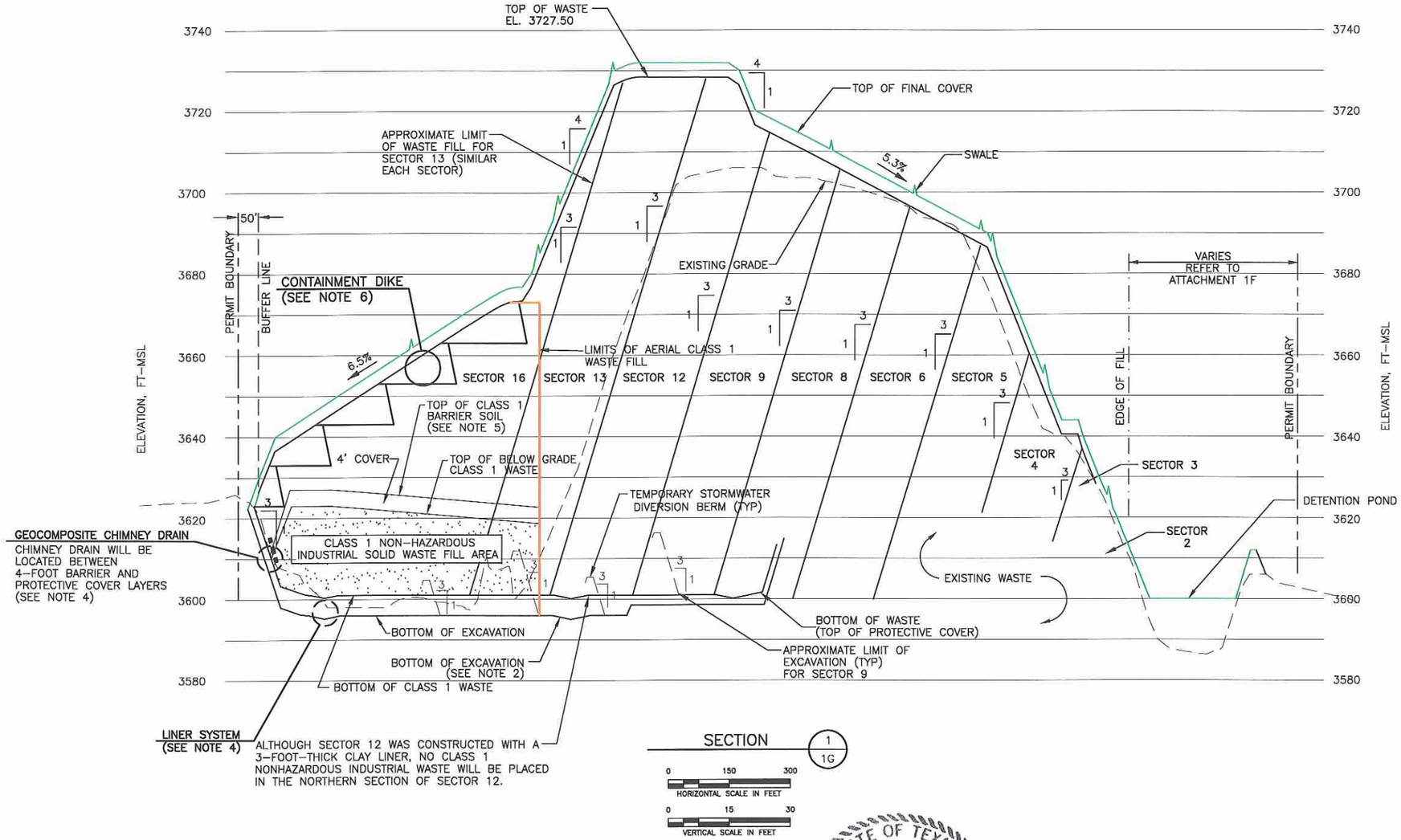
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-94-11-74-01

CONTENTS

1A Site Plan Layout
1B Perimeter Roadway Plan with Berm and Drainage Ditch
1C Site Entrance Plan
1D Excavation Plan (with LCS and Sumps)
1E Final Grading Plan
1F Sector Plan
1G Sector Cross Sections
1H Sector Cross Sections
1I Sector Cross Sections
1J Sector Development Plan – Beginning Development Stages
1K Sector Development Plan – Intermediate Development Stages
1L Sector Development Plan – Final Development Stages
1M Class 1 Waste Disposal Area Design

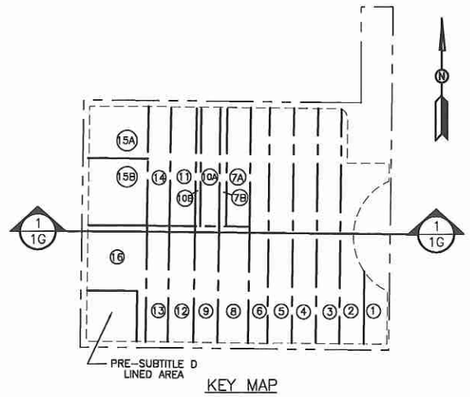




SECTION 1/1G

0 150 300
HORIZONTAL SCALE IN FEET

0 15 30
VERTICAL SCALE IN FEET



KEY MAP
NTS

NOTES:

1. SECTOR DESIGNATIONS INDICATE PROGRESSION OF LANDFILL OPERATIONS. AS INDICATED IN THE FINAL CLOSURE PLAN, ALLIED WILL CONDUCT ON-GOING CLOSURE OF THE LANDFILL THROUGHOUT THE ACTIVE LIFE OF THE LANDFILL.
2. BOTTOM OF EXCAVATION WILL VARY DEPENDING UPON THE THICKNESS OF THE LINER USED. BOTTOM LINER DEPICTED IS A 3-FOOT THICK CLAY LINER.
3. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 3-29-2007. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
4. REFER TO THE PERMIT MODIFICATION PREPARED BY WEAVER BOOS CONSULTANTS (AUGUST 2003) FOR GEOCOMPOSITE CHIMNEY DRAIN AND LINER SYSTEM DETAILS.
5. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED.
6. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY. REFER TO ATTACHMENT 1M (DRAWINGS 1M-7 AND 1M-8) FOR ADDITIONAL INFORMATION.

GENERAL NOTES:

1. REFER TO ATTACHMENT 1F FOR SECTOR PLAN.
2. REFER TO ATTACHMENT 1E FOR FINAL GRADING PLAN.
3. VERTICAL SCALE IS EXAGGERATED 10:1.
4. SECTIONS ARE CUT ON ATTACHMENT 1E AND 1F.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND LINER DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE-IN.
6. BERM LOCATIONS TAKEN FROM ATTACHMENT 7B, FINAL DRAINAGE PLAN.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001 | DRAWN BY: SRF
FILE: 0120-94-11 | DESIGN BY: DOL
CAD: 1G-CROSS SECTION.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE IDEAS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC -- SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC -- SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	12/2011	PERMIT MODIFICATION

SECTOR CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

ATTACHMENT 1G

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 1\1G-CROSS SECTION.dwg, jwilson

Attachment 1H has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

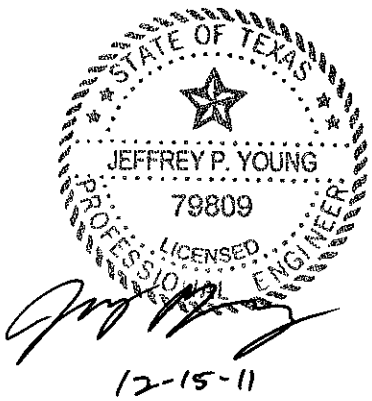
ATTACHMENT 1M

CLASS 1 WASTE DISPOSAL AREA DESIGN

Prepared for

Southwest Landfill TX, LP

December 2011



Prepared by

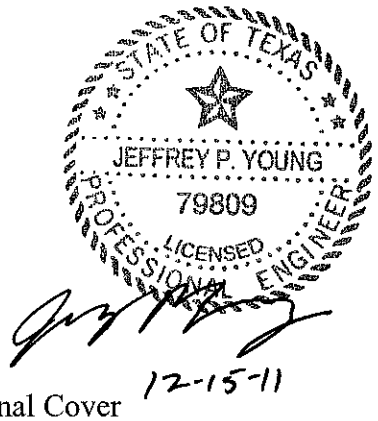
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

1	**PURPOSE**		**1M-1**
2	**CLASS 1 WASTE HISTORY AT THE SITE AND THE BELOW GRADE DISPOSAL OPTION**		**1M-2**
3	**CLASS 1 WASTE DISPOSAL OPTIONS**		**1M-4**
	3.1	Disposal Options Description	1M-4
	3.2	Class 1 Containment Dike Construction and Certification Requirements	1M-5
	3.3	Class 1 Containment Dike Maintenance	1M-6
	3.4	Compliance with Title 30 TAC §330.179(b) and 335.590(24)(F)	1M-6

APPENDIX 1M-A
Drawings
- 1M-1 – Excavation Plan with Class 1 Disposal Area
- 1M-2 – Top of Class 1 Barrier Soil Plan
- 1M-3 – Sector Cross Section
- 1M-4 – Sector Cross Section
- 1M-5 – Above Grade Class 1 Disposal Area
- 1M-6 – Sector Cross Section
- 1M-7 – Class 1 Waste Containment Dike Details
- 1M-8 – Class 1 Waste Containment Dike Details with Final Cover



APPENDIX 1M-B
Class 1 Waste TCEQ Approval Letters

APPENDIX 1M-C
Below Grade Class 1 Waste Disposal Option Drawings (Reproduced from June 2003 Permit Modification)

APPENDIX 1M-D
Class 1 Waste Containment Dike Slope Stability Analysis

APPENDIX 1M-E
Class 1 Waste Containment Dike Construction Record

APPENDIX 1M-F
Containment Dike Certification Form

3 ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS

3.1 Disposal Options Description

The above grade Class 1 waste disposal options involve the disposal of Class 1 waste above existing grade and adjacent to containment dikes that will be constructed along the external slopes. The two above grade Class 1 disposal area options are highlighted on Drawing.

- Above Grade Class 1 Waste Disposal Area with 4-foot-thick Separation Layer. This option allows for the disposal of Class 1 wastes above existing grade if containment dikes are constructed along the exterior slope of the Class 1 waste disposal area. This option also includes the placement of a 4-foot-thick compacted clay rich barrier layer that will be placed over the Class 1 waste as a separation layer between the Class 1 waste and the municipal solid waste (and other non-Class 1 waste material) to be placed above. With this option, the 4-foot-thick separation or barrier layer will be sloped toward the interior of the landfill.
- Above Grade Class 1 Waste Disposal Area. This option includes the construction of containment dikes along the exterior sideslope of the Class 1 disposal area to extend the limits of the Class 1 waste disposal area. No separation layer is required for this option; however, the thickness of the composite final cover system's infiltration layer will be increased from 1.5 feet to 4.0 feet with a maximum hydraulic conductivity of $1x10^{-7}$ cm/s.

As shown on Drawings 1M-5 through 1M-8, with this option the above grade Class 1 waste may be mixed with other wastes accepted at the facility in areas which have a liner system constructed in accordance with Title 30 TAC §330.331(e). This includes Sectors 15A, 15B, 16, and a portion of Sectors 13 and 14. Class 1 waste (except the Class 1 waste that is Class 1 only due to its containing regulated asbestos) will not be placed in sectors not specifically designed and constructed for disposal of Class 1 waste. Containment dikes will be constructed along the exterior above grade slopes to the maximum above grade elevation of Class 1 waste disposal.

In accordance with 30 TAC §335.590(24)(F)(i), the containment dikes are designed to:

- prevent washout, release, or exposure of waste;
- be physically stable;
- prevent washout from hydrostatic and hydrodynamic forces from storms and floods;
- prevent storm water run-on from reaching the waste;
- prevent the release of leachate; and
- minimize long term maintenance.

The containment dikes:

- will be constructed along exterior slopes as part of site operations from clay rich soils;
- will be approximately 10-foot high with a minimum crest width of 17 feet (equivalent to 4 feet of cover perpendicular to the fill slope);
- will be located over the lined area at the perimeter of the waste footprint; and
- will be certified by a Texas licensed Professional Engineer after construction.

As shown on Drawing 1M-7, Class 1 waste will only be placed after a containment dike has been constructed. In addition, each lift of Class 1 waste, which may be comingled with other wastes accepted at the site in accordance with Title 30 TAC §330.173(e), will be placed below the elevation of each containment dike and will slope toward the interior of the landfill.

3.2 Class 1 Containment Dike Construction and Certification Requirements

The containment dike construction requirements are listed below (and also summarized on Drawing 1M-7 in Appendix 1M-A).

1. Dikes will be constructed of clay-rich soils under the direction of the landfill manager or his designee.
2. Soils will be placed in maximum 9-inch-thick lifts and compacted with a minimum of four passes with a dozer or similar equipment.
3. The Landfill Manager or his designee will verify that the completed containment dike has the following dimensions.
   - 17-foot top width
   - Height of 10 feet
   - 4H:1V outside slope and 2H:1V inside slope
4. The Landfill manager or his designee will complete the Class 1 Waste Containment Dike Construction Record form included in Appendix 1M-E after each construction event.
5. A third party independent professional engineer licensed to practice in Texas will certify the installed containment dike in accordance with Title 30 TAC §335.590(24)(F)(vi) (see below for certification procedure).

This construction technique is designed to meet the requirements of Title 30 TAC §335.590(24)(F)(i)(II), which states, "waste placed above grade shall be laterally contained by dikes that are constructed to be physically stable against slope failure, with a minimum safety factor of 1.5". The stability analysis included in Appendix 1M-D demonstrates that the above listed construction technique will meet this requirement.

As listed above, the Landfill Manager or his designee will oversee the construction of the containment dike. Once construction has been completed, a Class 1 Waste Containment Dike Construction Record form, included in Appendix 1M-E, will be completed. This form will be provided to the certifying professional engineer. The professional engineer will then complete the following steps.

1. Review the current permit documents that address the containment dike (including Attachment 1M).
2. Visit the site after containment dike construction has been completed to inspect the containment dike to be certified.
3. Visit the site after containment dike construction has been completed to inspect the containment dike to be certified.
4. Interview the Landfill Manager or his designee to determine the construction technique and verify that the technique used is consistent with the permit requirements. The professional engineer will also obtain a copy of the completed Class 1 Waste Containment Dike Construction Record.
5. Complete the Containment Dike Certification Form. The latest form included in Title 30 TAC §335.590(24)(F)(vi) shall be used (refer to Appendix 1M-F).
6. The complete Containment Dike Certification Form will be placed in the Site Operating Record.

After the above procedure has been completed, the site may begin filling in the area behind the containment dike.

3.3 Class 1 Containment Dike Maintenance

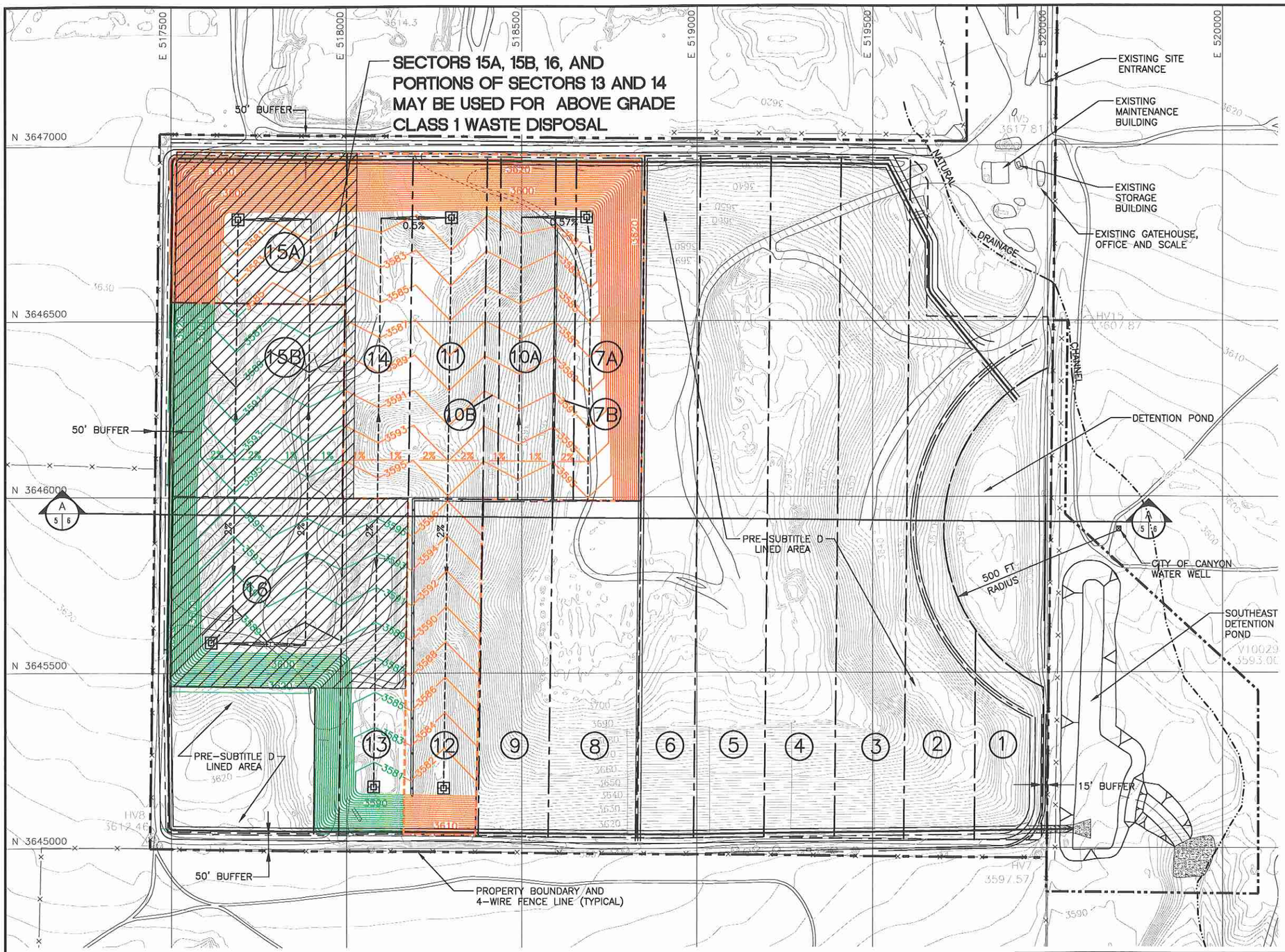
The installed containment dikes will be inspected in accordance with the inspection procedures and frequency included in Section 4.23 of the SOP to ensure that the installed dike surfaces are not eroded. Soil management practices outlined in Section 4.18 of the SOP (refer to Section 4.18.3) will be followed to ensure the integrity of the dike is maintained.

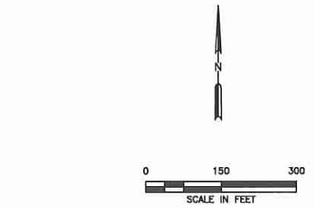
3.4 Compliance with Title 30 TAC §330.179(b) and §335.590(24)(F)

§330.179(b) allows for disposal of Class 1 waste above natural grade provided that the conditions in §335.590(24)(F)(i) – (vi) are met. As shown in Table 1M-1, the above grade Class 1 waste fill area has been designed to meet each of the requirements listed in §335.590(24)(F)(i). In accordance with §335.590(24)(F)(vii), since the requirements of §335.590(24)(F)(i) will be met, the additional requirements listed in §335.590(24)(F)(ii) through (v) are not applicable. The information provided in this attachment demonstrates that §335.590(24)(F)(i) requirements are met (see Table 1M-1).

APPENDIX 1M-A

DRAWINGS





LEGEND

- EXISTING PERMIT BOUNDARY
- DRAINAGE EASEMENT
- N 3646000 — STATE PLANE COORDINATE
- 3587 — CONSTRUCTED CLASS 1 DISPOSAL CELL EXCAVATION CONTOUR
- 3585 — UNDEVELOPED PERMITTED CLASS 1 DISPOSAL EXCAVATION CONTOUR
- 3560 — EXISTING CONTOUR
- BUFFER LINE
- FLOW LINE
- SUMP
- (5) — SECTOR DESIGNATION
- OPTIONAL CLASS 1 ABOVE GRADE DISPOSAL AREA

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5-4-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. THE PERMITTED EXCAVATION CONTOURS REPRODUCED FROM DRAWING 1 OF APPENDIX B OF THE PERMIT MODIFICATION TITLED "REVISED CLASS 1 NON HAZARDOUS INDUSTRIAL WASTE DISPOSAL AREA CONFIGURATION" DEVELOPED BY WEAVER BOOS CONSULTANTS, LLC-SOUTHWEST AND APPROVED BY TCEQ ON AUGUST 8, 2003.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
PROFESSIONAL LICENSED ENGINEER

12-15-11

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 1-EXCAVATION PLAN.DWG

DRAWN BY: JDW
DESIGN BY: DOL
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

ABOVE GRADE CLASS 1 DISPOSAL AREA

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

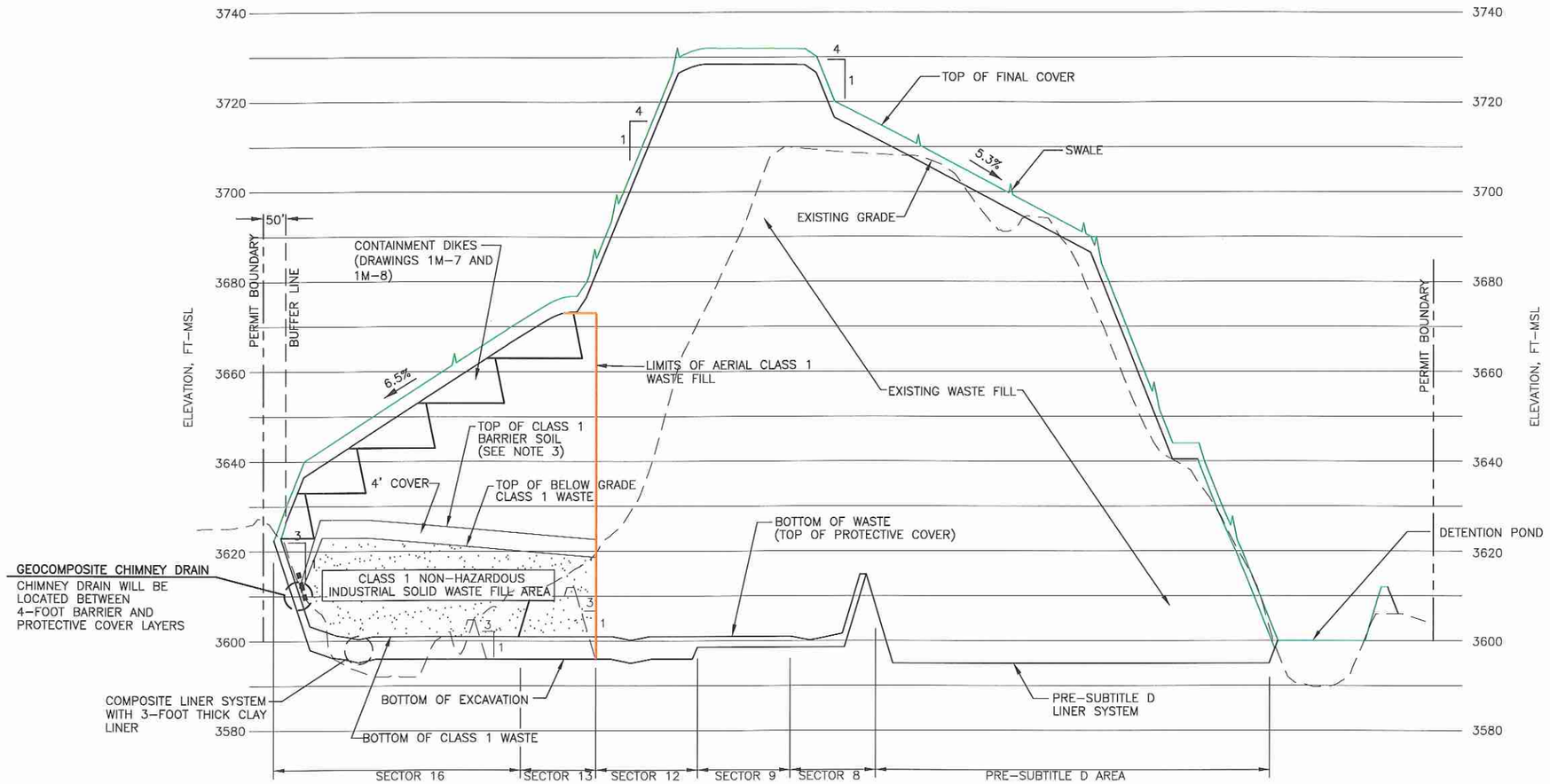
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

DRAWING 1M-5

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

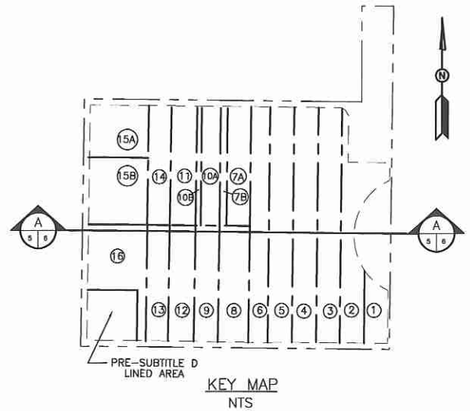
G:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 1M\1M-5 ABOVE GRADE.dwg, jwilson



SECTION A (5 | 6)

0 150 300
HORIZONTAL SCALE IN FEET

0 15 30
VERTICAL SCALE IN FEET



KEY MAP
NTS

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY BASE MAPPING FROM AERIAL PHOTOGRAPHY FLOWN 5-4-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. REFER TO THE PERMIT MODIFICATION PREPARED BY WEAVER BOOS CONSULTANTS (AUGUST 2003) FOR GEOCOMPOSITE CHIMNEY DRAIN AND LINER SYSTEM DETAILS.
3. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED.
4. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY. REFER TO ATTACHMENT 1M (DRAWINGS 1M-7 AND 1M-8) FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: FIG 6-CROSS SECTION.DWG
DRAWN BY: SRF
DESIGN BY: DOL
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

SECTOR CROSS SECTION

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

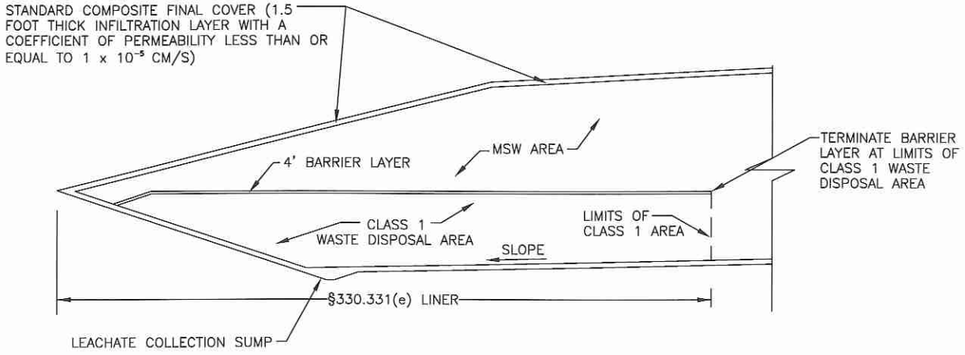
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

DRAWING 1M-6

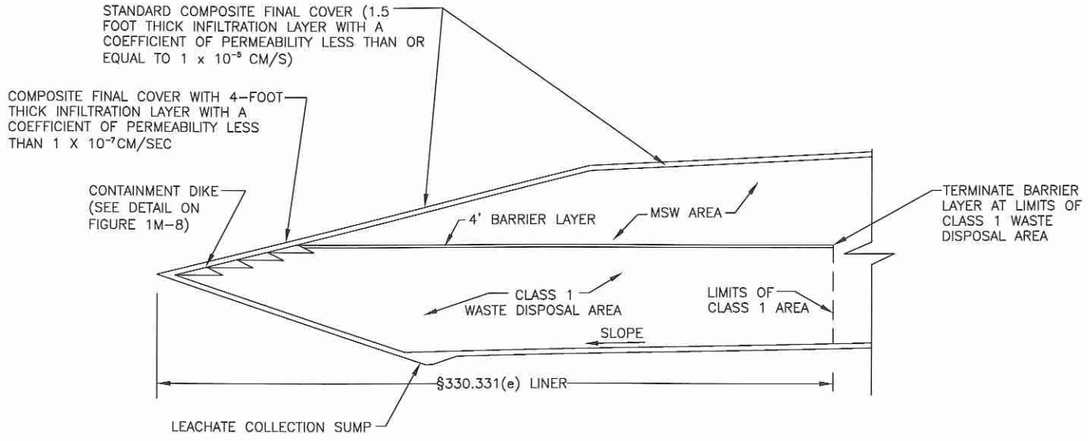
REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

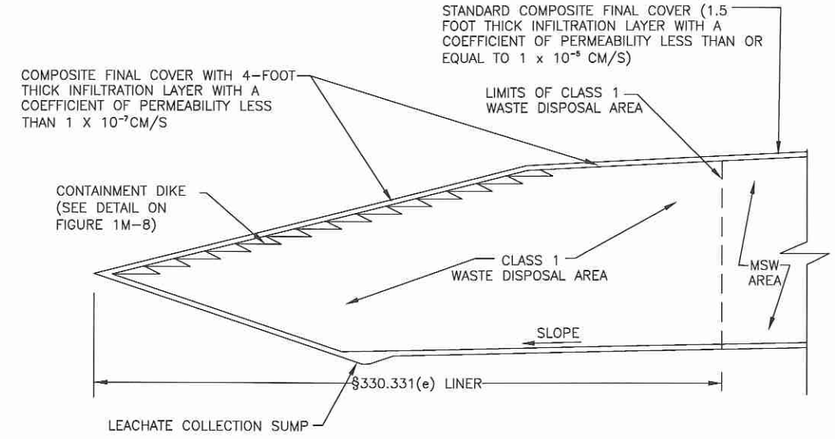
O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\CLEAN\ATT 1M\1M-6-CROSS SECTION.dwg, rsellers



OPTION 1 – BELOW GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 2 – ABOVE GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 3 – ABOVE GRADE CLASS 1 DISPOSAL AREA

NOTES:

1. CLASS 1 WASTE AND CLASS 1 NON–HAZARDOUS INDUSTRIAL WASTE ARE USED INTERCHANGEABLY.
2. REFER TO DRAWING 1M–5 FOR ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER

12-15-11

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 03/2011
FILE: 0120–94–11
CAD: FIG 2–DETAILS.DWG

DRAWN BY: JDW
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE DISPOSAL AREA OPTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727
CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

DRAWING 1M–7

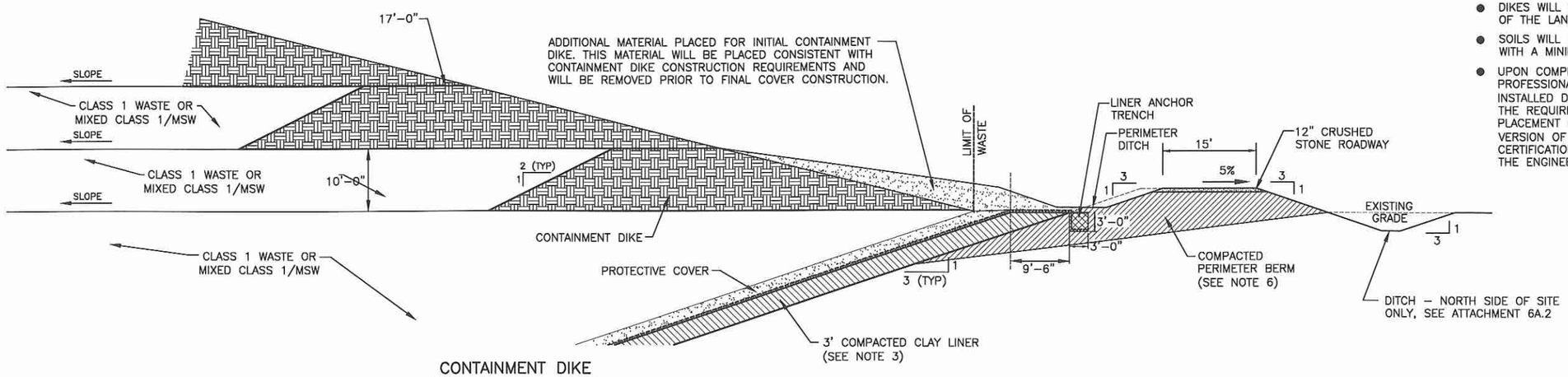
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12–2010)\MOD 2\CLEAN\ATT 1M\1M–7–INTERIM FILL CONDITION.dwg, jwilson

CONTAINMENT DIKE CONSTRUCTION REQUIREMENTS

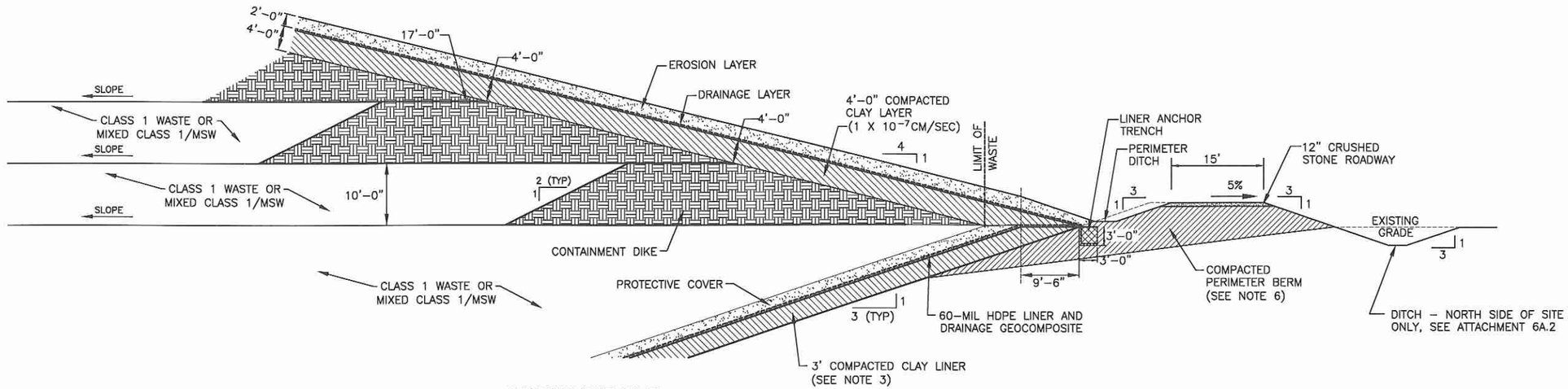
(REFER TO ATTACHMENT 1M, SECTION 3 OF THE SITE DEVELOPMENT PLAN)

- DIKES WILL BE CONSTRUCTED OF CLAY-RICH SOILS UNDER THE DIRECTION OF THE LANDFILL MANAGER OR HIS DESIGNEE.
- SOILS WILL BE PLACED IN MAXIMUM 9-INCH THICK LIFTS AND COMPACTED WITH A MINIMUM OF FOUR PASSES WITH A DOZER OR SIMILAR EQUIPMENT.
- UPON COMPLETION OF EACH DIKE, A THIRD PARTY INDEPENDENT PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN TEXAS WILL CERTIFY THE INSTALLED DIKE IN ACCORDANCE WITH TITLE 30 TAC §335.590(24)(F)(vi) AND THE REQUIREMENTS INCLUDED IN ATTACHMENT 1M OF THE SDP PRIOR TO PLACEMENT OF WASTE. THE LICENSED ENGINEER WILL UTILIZE THE CURRENT VERSION OF THE STANDARD FORM INCLUDED IN §335.590(24)(F)(vi) FOR THE CERTIFICATION OF THE DIKE. THE CERTIFICATION PREPARED AND SIGNED BY THE ENGINEER WILL BE PLACED IN THE SITE OPERATING RECORD.



CONTAINMENT DIKE

0 10 20
SCALE IN FEET



CONTAINMENT DIKE

0 10 20
SCALE IN FEET

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC §330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH §330.331(e) AND
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.
6. FOR THE UNDEVELOPED AREAS, THE PERIMETER BERM WILL BE CONSTRUCTED IN ACCORDANCE WITH SOIL LINER SPECIFICATIONS OUTLINED IN SECTION 2.3 OF THE SLQCP (ATTACHMENT 10) EXCEPT NO PERMEABILITY TESTS WILL BE REQUIRED FOR THIS MATERIAL.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: IM-8.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

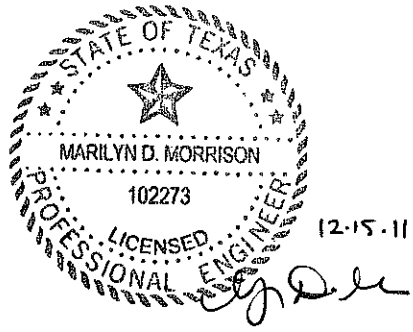
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO
GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

DRAWING 1M-8

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\CLEAN\ATT 1M\1M-8-CLOSED CONDITION.dwg, jwilson

APPENDIX 1M-D

CLASS 1 WASTE CONTAINMENT DIKE SLOPE STABILITY ANALYSIS



Includes pages 1M-D-1 through 1M-D-44

which corresponds to the arrangement of particles, is mainly a function of the clay mineral content and clay mineralogy of the composition. Section 4 (Table 4.2) of reference 3 provides discussion on soil strength parameters for lightly compacted soils. As indicated, C=250 psf represents the lowest value of cohesion for total stress conditions. Therefore, placement of soil dikes using dozer or similar landfill equipment will provide stable slopes with a minimum factor of safety of 1.5 as demonstrated in the slope stability analyses provided in the appendix. The stability of outer slopes of landfills with 4H:1V vertical sideslopes is evidenced by the fact that almost all the landfills in Texas developed with 4H:1V sideslopes are geotechnically stable.

Final Condition Sideslope Stability Analysis

This stability analysis focuses on the stability of the entire sideslope of the containment dike area. The two configurations of containment dike placement are considered (refer to Drawing 1M-7 for the two options). The same strength parameters for the containment dike discussed above are used for this demonstration.

The output for the stability analyses are presented on the following pages.

Purpose: The purpose of this calculation is to demonstrate that the construction technique specified in Section 3.2 of Attachment 1M will result in a containment dike that will be physically stable against slope failure with a minimum factor of safety of 1.5.

Method: The containment dike stability analysis has been completed using XSTABL 5.206, a computer program developed to model general slope stability. Circular failure surfaces using the Simplified Bishop method have been generated to analyze the slopes for the configurations given below.

A. Individual Containment Dike - 4H:1V outer slopes and 2H:1V inner slopes (see Figure D-1). XSTABL output is presented on pages 1M-D-5 through 1M-D-23.
B. Final Condition Sideslope - 4H:1V sideslope with containment dikes configured based on the two placement options (see Figure D-3). XSTABL output is presented on pages 1M-D-24 through 1M-D-44.

Procedure:

1. Input containment dike configuration.
2. Select strength parameters.
3. Run program to calculate factor of safety.

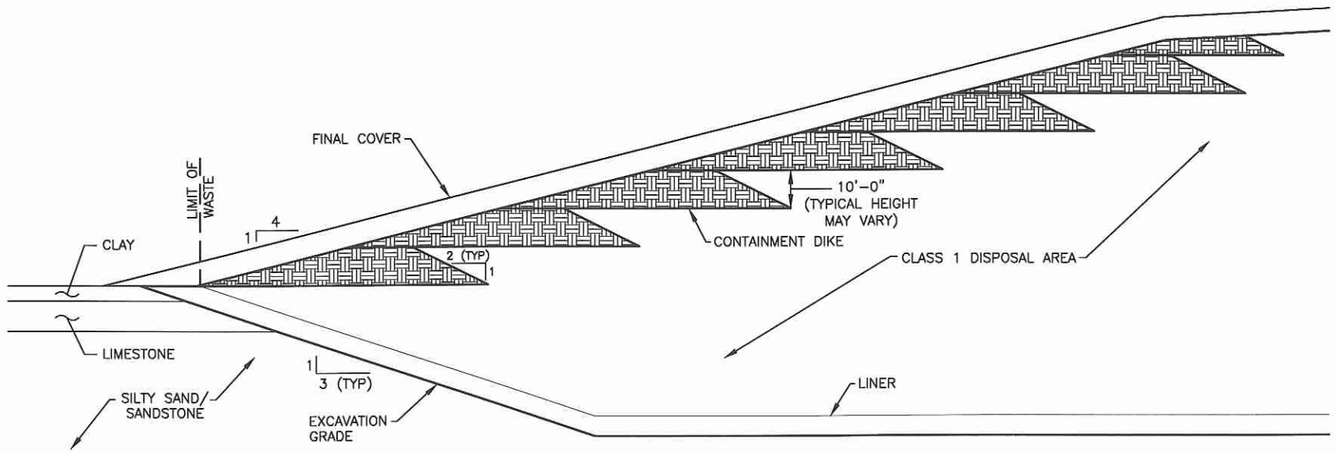
References:

1. Duncan, J. Michael and Stephen G. Wright., *Soil Strength and Slope Stability*, John Wiley & Sons, Inc. Hoboken, NJ, 2005
2. Terzaghi, Karl, Peck, Ralph B., and Mesri, Gholamreza, *Soil Mechanics in Engineering Practice, Third Ed.*, John Wiley & Sons, Inc. New York, NY, 1996
3. Day, Robert W., *Geotechnical Engineer's Portable Handbook*, McGraw-Hill Companies, Inc. New York, NY, 2000
4. Abramson, Lee W., Lee, Thomas S., Sharma, Sunil, Boyce, Glenn M., *Slope Stability and Stabilization Methods, 2nd Ed.*, John Wiley & Sons, Inc., New York.

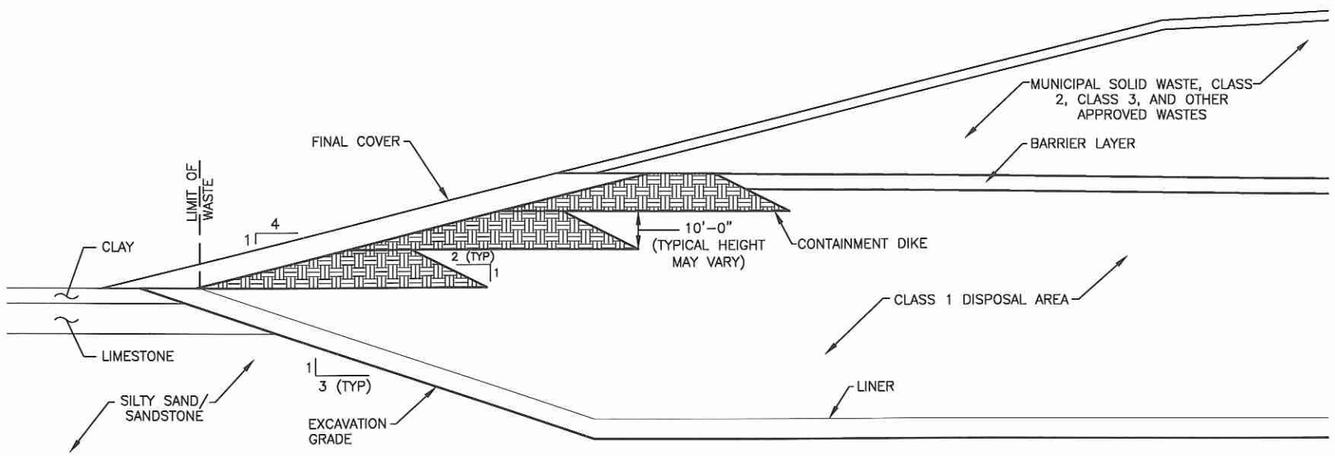
3. Run Program to Calculate Factor of Safety.

The calculated factors of safety are shown below and summarized on Figure D-4. As noted, all the calculated factors of safety, using conservatively selected strength parameters, are above 1.5. Therefore, the proposed design meets §335.590(24)(F)(i)(II) which requires the containment dike to" be physically stable against slope failure, with a minimum safety factor of 1.5."

Slope Designation	Method of Analysis	Minimum Factor of Safety Generated	Recommended Minimum Factor of Safety	Acceptable Factor of Safety
Option 1	Bishop-Circular- Effective	1.75	1.5	YES
Option 2	Bishop-Circular - Effective	2.00	1.5	YES
Option 1	Bishop-Circular - Total	1.63	1.5	YES
Option 2	Bishop-Circular- Total	1.92	1.5	YES



CONTAINMENT DIKE OPTION 1



CONTAINMENT DIKE OPTION 2

STATE OF TEXAS
MARILYN D. MORRISON
102273
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: D-3 CONT DIKE W/FC.DWG

DRAWN BY: SRF
DESIGN BY: JAE
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CONTAINMENT DIKE CONFIGURATION WITH FINAL COVER

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

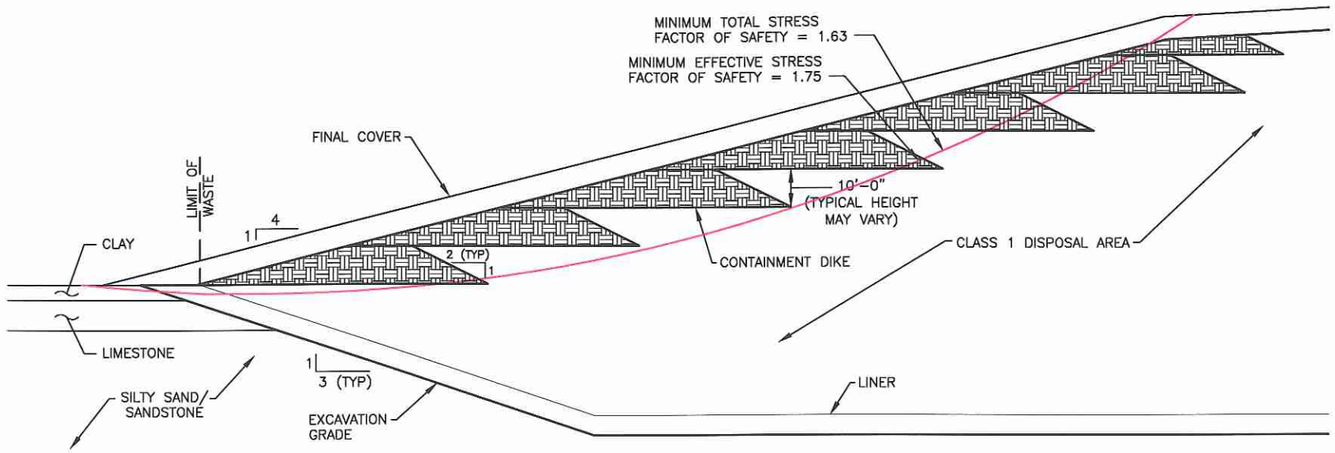
REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

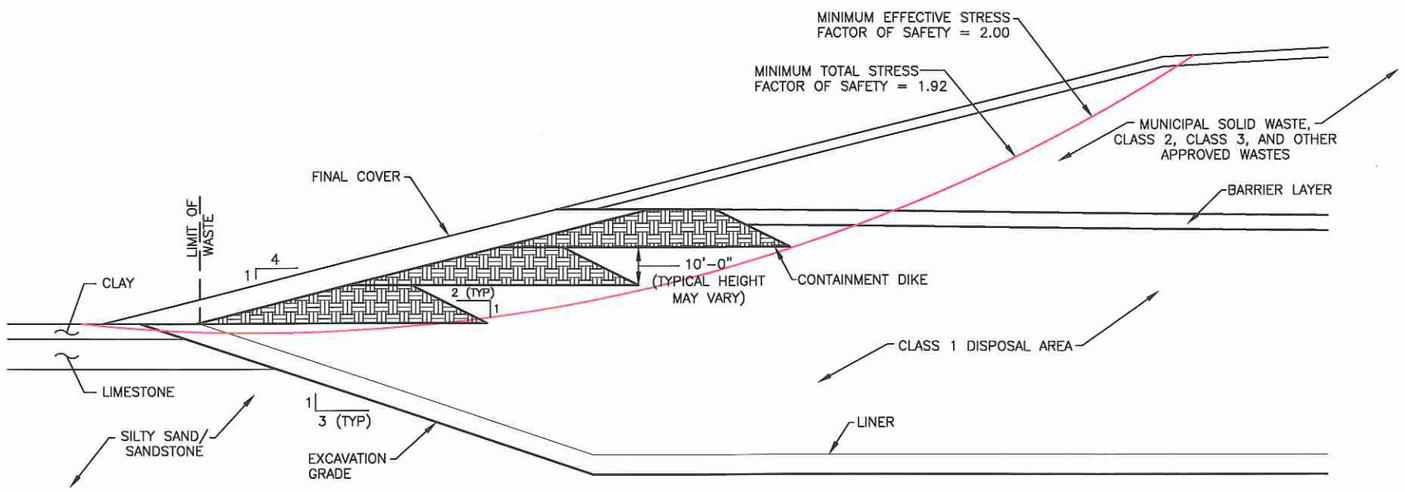
FIGURE D-3

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\CLEAN\ATT 1M\D-3_CONT DIKE CONFIG WITH FINAL COVER.dwg, jwilson



CONTAINMENT DIKE OPTION 1



CONTAINMENT DIKE OPTION 2

STATE OF TEXAS
MARILYN D. MORRISON
102273
LICENSED
PROFESSIONAL ENGINEER
12.15.11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: D-4 CONT DIKE W/FC.DWG

DRAWN BY: SRF
DESIGN BY: JAE
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CONTAINMENT DIKE CONFIGURATION WITH FINAL COVER FACTORS OF SAFETY

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

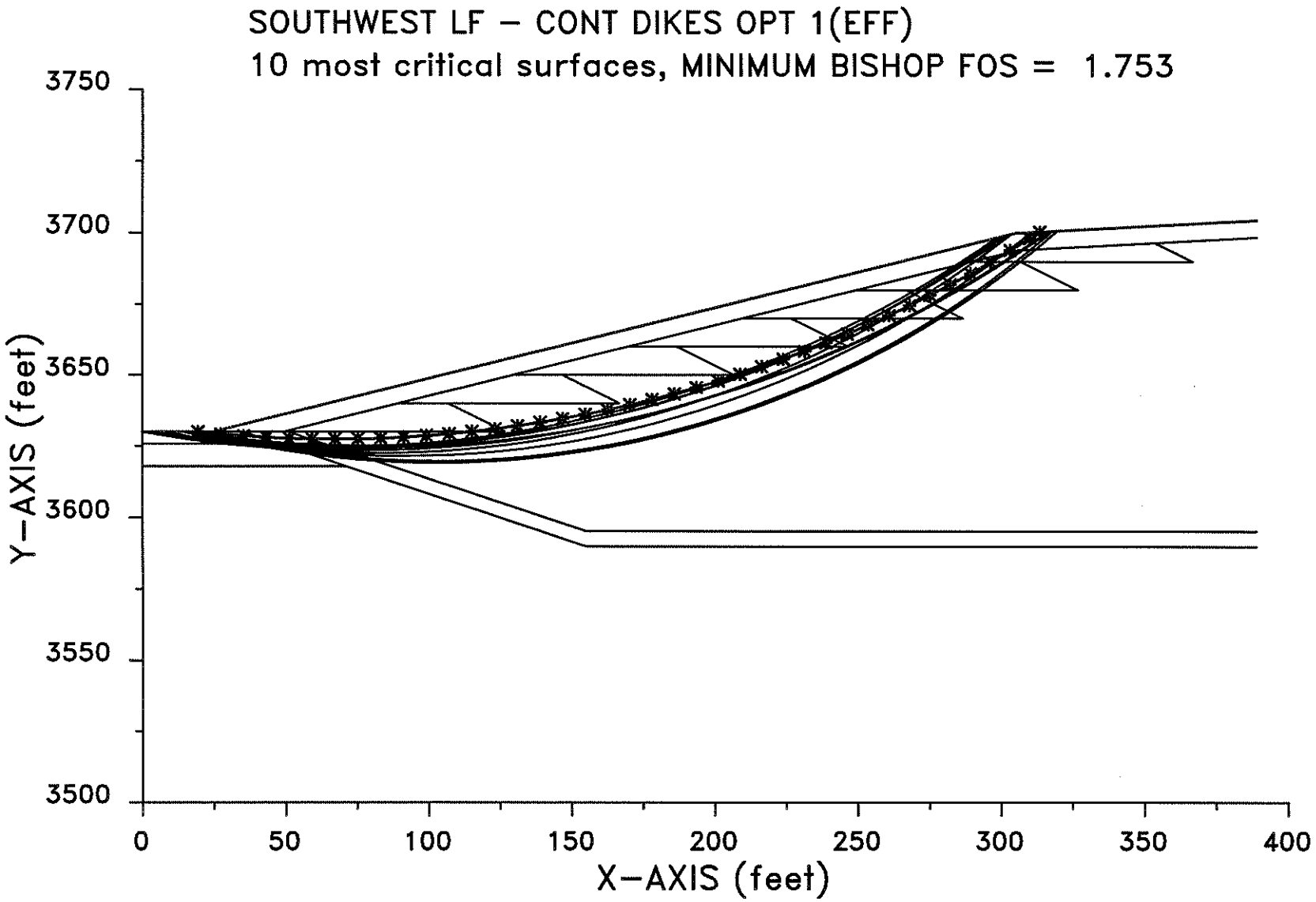
Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
(817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE D-4

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

G:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 1M\D-4_FACTORS OF SAFETY.dwg, jwilson

D-1E 12-06-11 15:37



XSTABL File: D-1E 12-06-11 15:37

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*                using the              *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                96 - 2046  *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(EFF)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

40 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	25.0	3630.0	35.0	3630.0	1
2	35.0	3630.0	49.7	3630.0	3
3	49.7	3630.0	89.7	3640.0	4
4	89.7	3640.0	129.7	3650.0	4
5	129.7	3650.0	169.7	3660.0	4
6	169.7	3660.0	209.7	3670.0	4
7	209.7	3670.0	249.7	3680.0	4
8	249.7	3680.0	289.7	3690.0	4
9	289.7	3690.0	305.9	3694.0	5
10	305.9	3694.0	353.5	3696.6	4
11	353.5	3696.6	388.9	3698.5	5
12	353.5	3696.6	366.7	3690.0	4
13	289.7	3690.0	306.7	3690.0	4
14	306.7	3690.0	366.7	3690.0	5

15	306.7	3690.0	326.7	3680.0	4
16	249.7	3680.0	266.7	3680.0	4
17	266.7	3680.0	326.7	3680.0	5
18	266.7	3680.0	286.7	3670.0	4
19	209.7	3670.0	226.7	3670.0	4
20	226.7	3670.0	286.0	3670.0	5
21	226.7	3670.0	246.7	3660.0	4
22	169.7	3660.0	186.7	3660.0	4
23	186.7	3660.0	246.7	3660.0	5
24	186.7	3660.0	206.7	3650.0	4
25	129.7	3650.0	146.7	3650.0	4
26	146.7	3650.0	206.7	3650.0	5
27	146.7	3650.0	166.7	3640.0	4
28	89.7	3640.0	106.7	3640.0	4
29	106.7	3640.0	166.7	3640.0	5
30	106.7	3640.0	126.7	3630.0	4
31	49.7	3630.0	50.8	3630.0	3
32	50.8	3630.0	126.6	3630.0	5
33	50.8	3630.0	155.0	3595.3	3
34	155.0	3595.3	388.9	3595.3	3
35	35.0	3630.0	47.0	3626.0	1
36	47.0	3626.0	71.0	3618.0	6
37	71.0	3618.0	155.0	3590.0	7
38	155.0	3590.0	388.9	3590.0	7
39	.0	3626.0	47.0	3626.0	6
40	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters
---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	100.0	15.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft

and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05

14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.753 ****

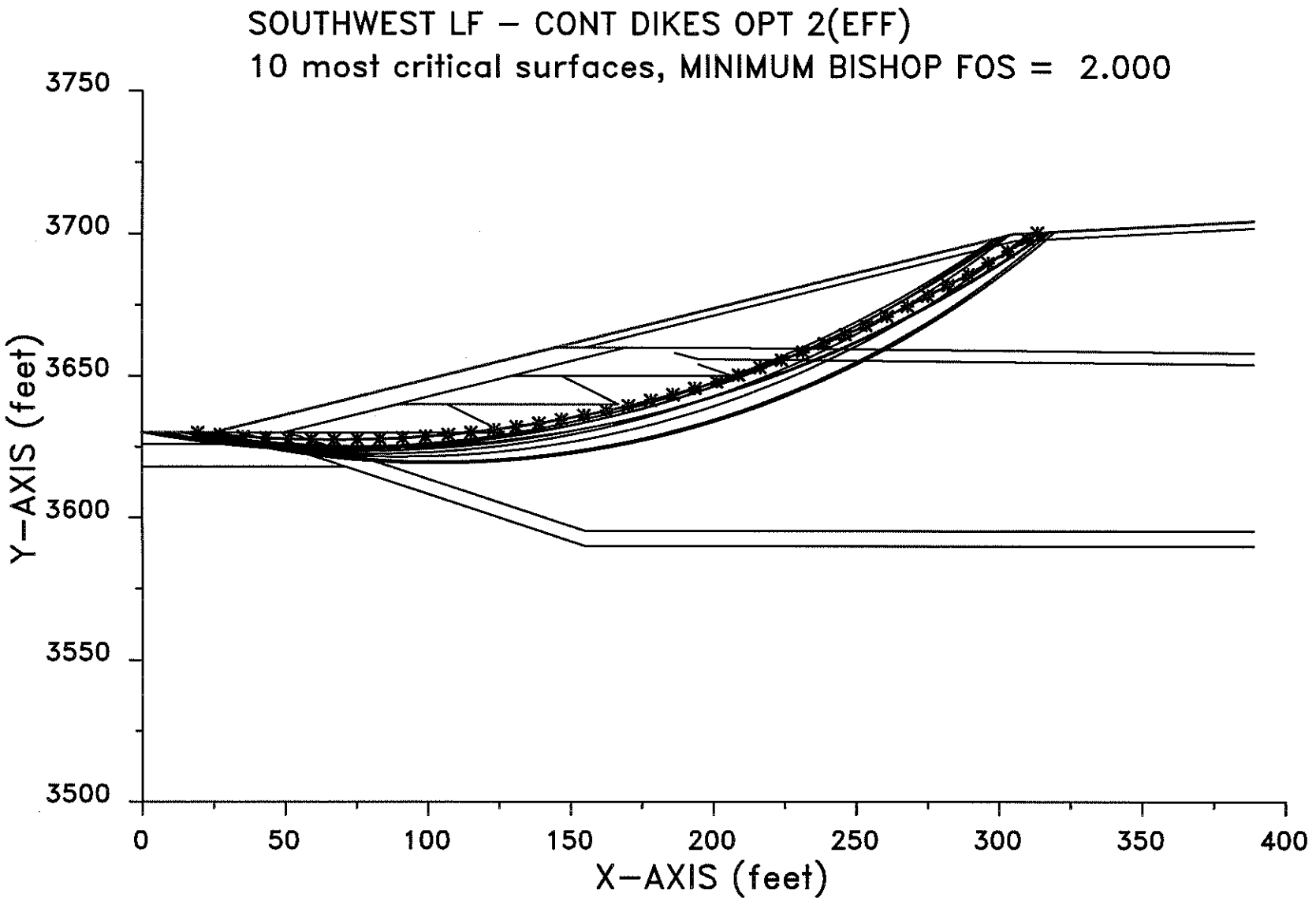
The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(EFF)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.753	67.14	4080.04	452.56	19.44	313.41	1.032E+08
2.	1.781	76.50	4001.50	376.28	16.67	299.86	8.723E+07
3.	1.807	80.52	4029.76	405.27	13.89	316.99	1.083E+08
4.	1.817	67.03	4025.97	401.15	2.78	298.52	9.320E+07
5.	1.846	68.79	4023.22	399.19	.00	301.96	9.852E+07
6.	1.853	81.39	3980.47	358.00	8.33	303.35	9.523E+07
7.	1.859	90.48	3967.67	346.25	13.89	310.39	9.986E+07
8.	1.866	74.14	4042.22	418.84	.00	316.45	1.172E+08
9.	1.875	103.21	3944.69	324.94	22.22	317.84	1.026E+08
10.	1.891	103.25	3946.40	327.31	19.44	319.55	1.065E+08

* * * END OF FILE * * *

D-2E 12-06-11 15:47



XSTABL File: D-2E 12-06-11 15:47

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*           Method of Slices            *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(EFF)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

30 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	145.0	3660.0	155.3	3660.0	2
2	155.3	3660.0	305.4	3697.5	5
3	305.4	3697.5	388.9	3702.0	5
4	155.3	3660.0	169.7	3660.0	2
5	25.0	3630.0	35.0	3630.0	1
6	35.0	3630.0	49.7	3630.0	3
7	49.7	3630.0	89.7	3640.0	4
8	89.7	3640.0	129.7	3650.0	4
9	129.7	3650.0	169.7	3660.0	4
10	169.7	3660.0	186.7	3660.0	4
11	186.7	3660.0	388.9	3658.0	4
12	186.7	3658.0	194.9	3655.9	4
13	194.9	3655.9	388.9	3654.0	5
14	194.9	3654.0	206.7	3650.0	4

15	129.7	3650.0	146.7	3650.0	4
16	146.7	3650.0	206.7	3650.0	5
17	146.7	3650.0	166.7	3640.0	4
18	89.7	3640.0	106.7	3640.0	4
19	106.7	3640.0	166.7	3640.0	5
20	106.7	3640.0	126.7	3630.0	4
21	49.7	3630.0	50.8	3630.0	3
22	50.8	3630.0	126.6	3630.0	5
23	50.8	3630.0	155.0	3595.3	3
24	155.0	3595.3	388.9	3595.3	3
25	35.0	3630.0	47.0	3626.0	1
26	47.0	3626.0	71.0	3618.0	6
27	71.0	3618.0	155.0	3590.0	7
28	155.0	3590.0	388.9	3590.0	7
29	.0	3626.0	47.0	3626.0	6
30	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters
---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	100.0	15.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54

24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 2.000 ****

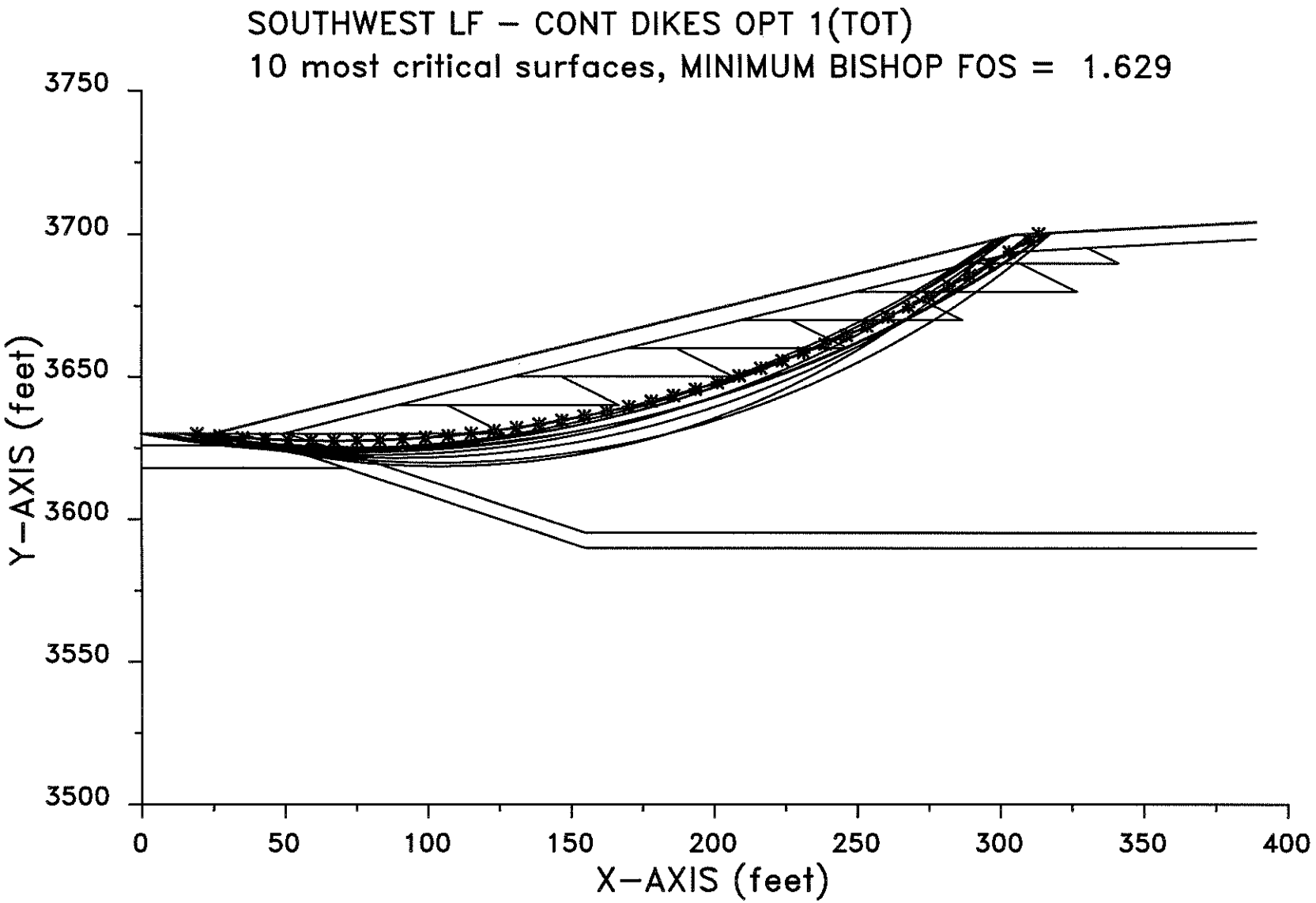
The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(EFF)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	2.000	67.14	4080.04	452.56	19.44	313.41	9.412E+07
2.	2.034	76.50	4001.50	376.28	16.67	299.86	8.068E+07
3.	2.050	80.52	4029.76	405.27	13.89	316.99	9.860E+07
4.	2.072	67.03	4025.97	401.15	2.78	298.52	8.670E+07
5.	2.108	68.79	4023.22	399.19	.00	301.96	9.149E+07
6.	2.117	81.39	3980.47	358.00	8.33	303.35	8.811E+07
7.	2.119	74.14	4042.22	418.84	.00	316.45	1.072E+08
8.	2.120	90.48	3967.67	346.25	13.89	310.39	9.175E+07
9.	2.138	103.21	3944.69	324.94	22.22	317.84	9.406E+07
10.	2.157	103.25	3946.40	327.31	19.44	319.55	9.777E+07

* * * END OF FILE * * *

D-1T 12-06-11 14:53



XSTABL File: D-1T 12-06-11 14:53

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(TOT)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

40 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	25.0	3630.0	35.0	3630.0	1
2	35.0	3630.0	49.7	3630.0	3
3	49.7	3630.0	89.7	3640.0	4
4	89.7	3640.0	129.7	3650.0	4
5	129.7	3650.0	169.7	3660.0	4
6	169.7	3660.0	209.7	3670.0	4
7	209.7	3670.0	249.7	3680.0	4
8	249.7	3680.0	289.7	3690.0	4
9	289.7	3690.0	305.9	3694.0	5
10	305.9	3694.0	330.4	3695.4	4
11	330.4	3695.4	388.9	3698.5	5
12	330.4	3695.4	341.1	3690.0	4
13	289.7	3690.0	306.7	3690.0	4
14	306.7	3690.0	341.1	3690.0	5

15	306.7	3690.0	326.7	3680.0	4
16	249.7	3680.0	266.7	3680.0	4
17	266.7	3680.0	326.7	3680.0	5
18	266.7	3680.0	286.7	3670.0	4
19	209.7	3670.0	226.7	3670.0	4
20	226.7	3670.0	286.0	3670.0	5
21	226.7	3670.0	246.7	3660.0	4
22	169.7	3660.0	186.7	3660.0	4
23	186.7	3660.0	246.7	3660.0	5
24	186.7	3660.0	206.7	3650.0	4
25	129.7	3650.0	146.7	3650.0	4
26	146.7	3650.0	206.7	3650.0	5
27	146.7	3650.0	166.7	3640.0	4
28	89.7	3640.0	106.7	3640.0	4
29	106.7	3640.0	166.7	3640.0	5
30	106.7	3640.0	126.7	3630.0	4
31	49.7	3630.0	50.8	3630.0	3
32	50.8	3630.0	126.6	3630.0	5
33	50.8	3630.0	155.0	3595.3	3
34	155.0	3595.3	388.9	3595.3	3
35	35.0	3630.0	47.0	3626.0	1
36	47.0	3626.0	71.0	3618.0	6
37	71.0	3618.0	155.0	3590.0	7
38	155.0	3590.0	388.9	3590.0	7
39	.0	3626.0	47.0	3626.0	6
40	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters

---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	250.0	.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

UNDRAINED STRENGTHS as a function of effective vertical stress have been specified for 1 Soil Unit(s)

Soil Unit #	Parameter a	Parameter Psi
4.	250.0	.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00

2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63
12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.629 ****

The following is a summary of the TEN most critical surfaces

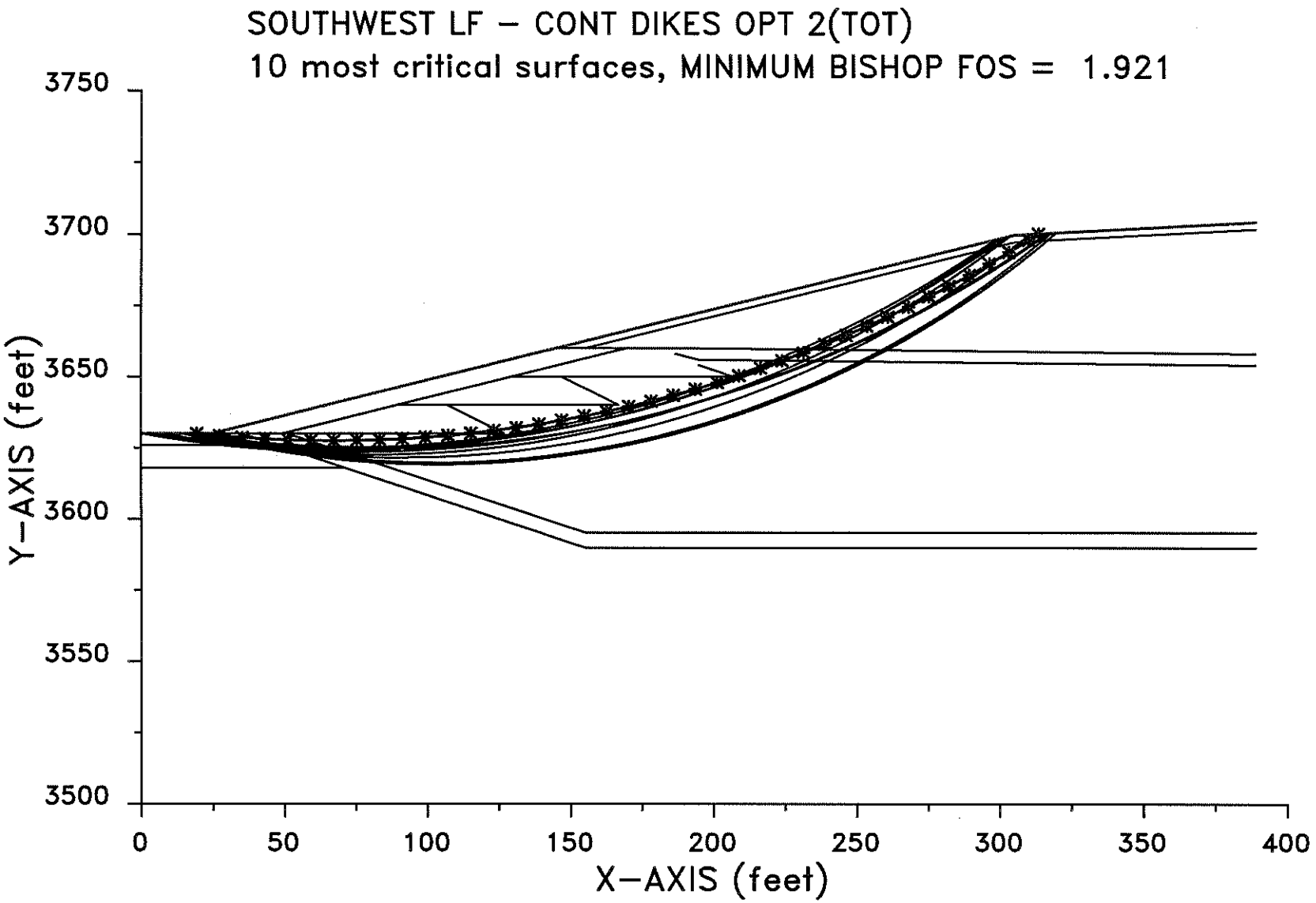
Problem Description : SOUTHWEST LF - CONT DIKES OPT 1(TOT)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.629	67.14	4080.04	452.56	19.44	313.41	9.589E+07
2.	1.707	76.50	4001.50	376.28	16.67	299.86	8.361E+07

3.	1.737	67.03	4025.97	401.15	2.78	298.52	8.910E+07
4.	1.754	80.52	4029.76	405.27	13.89	316.99	1.052E+08
5.	1.772	68.79	4023.22	399.19	.00	301.96	9.456E+07
6.	1.796	81.39	3980.47	358.00	8.33	303.35	9.229E+07
7.	1.811	74.14	4042.22	418.84	.00	316.45	1.138E+08
8.	1.816	90.48	3967.67	346.25	13.89	310.39	9.755E+07
9.	1.840	103.21	3944.69	324.94	22.22	317.84	1.007E+08
10.	1.856	104.51	3898.79	280.31	25.00	301.17	8.169E+07

* * * END OF FILE * * *

D-2T 12-06-11 15:42



XSTABL File: D-2T 12-06-11 15:42

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 2046 *
*****************************************
```

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(TOT)

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	3630.0	25.0	3630.0	1
2	25.0	3630.0	305.0	3700.0	2
3	305.0	3700.0	388.9	3704.5	2

30 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	145.0	3660.0	155.3	3660.0	2
2	155.3	3660.0	305.4	3697.5	5
3	305.4	3697.5	388.9	3702.0	5
4	155.3	3660.0	169.7	3660.0	2
5	25.0	3630.0	35.0	3630.0	1
6	35.0	3630.0	49.7	3630.0	3
7	49.7	3630.0	89.7	3640.0	4
8	89.7	3640.0	129.7	3650.0	4
9	129.7	3650.0	169.7	3660.0	4
10	169.7	3660.0	186.7	3660.0	4
11	186.7	3660.0	388.9	3658.0	4
12	186.7	3658.0	194.9	3655.9	4
13	194.9	3655.9	388.9	3654.0	5
14	194.9	3654.0	206.7	3650.0	4

15	129.7	3650.0	146.7	3650.0	4
16	146.7	3650.0	206.7	3650.0	5
17	146.7	3650.0	166.7	3640.0	4
18	89.7	3640.0	106.7	3640.0	4
19	106.7	3640.0	166.7	3640.0	5
20	106.7	3640.0	126.7	3630.0	4
21	49.7	3630.0	50.8	3630.0	3
22	50.8	3630.0	126.6	3630.0	5
23	50.8	3630.0	155.0	3595.3	3
24	155.0	3595.3	388.9	3595.3	3
25	35.0	3630.0	47.0	3626.0	1
26	47.0	3626.0	71.0	3618.0	6
27	71.0	3618.0	155.0	3590.0	7
28	155.0	3590.0	388.9	3590.0	7
29	.0	3626.0	47.0	3626.0	6
30	.0	3618.0	71.0	3618.0	7

ISOTROPIC Soil Parameters

---

7 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	122.7	122.7	.0	26.60	.000	.0	0
2	116.0	120.0	100.0	16.00	.000	.0	0
3	116.0	120.0	100.0	16.00	.000	.0	0
4	116.0	120.0	250.0	.00	.000	.0	0
5	66.0	66.0	100.0	21.00	.000	.0	0
6	125.0	125.0	500.0	15.00	.000	.0	0
7	120.4	120.4	1620.0	40.90	.000	.0	0

UNDRAINED STRENGTHS as a function of effective vertical stress have been specified for 1 Soil Unit(s)

Soil Unit #	Parameter a	Parameter Psi
4.	250.0	.00

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

100 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 10 points equally spaced
along the ground surface between x = .0 ft
and x = 25.0 ft

Each surface terminates between x = 295.0 ft
and x = 320.0 ft

Unless further limitations were imposed, the minimum elevation
at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

8.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined
within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := -5.0 degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface
is specified by 40 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	19.44	3630.00
2	27.41	3629.23
3	35.38	3628.60
4	43.37	3628.10
5	51.36	3627.76
6	59.36	3627.55
7	67.36	3627.48
8	75.36	3627.56
9	83.35	3627.77
10	91.35	3628.13
11	99.33	3628.63

12	107.30	3629.27
13	115.27	3630.05
14	123.21	3630.97
15	131.14	3632.04
16	139.05	3633.24
17	146.94	3634.58
18	154.80	3636.06
19	162.63	3637.68
20	170.44	3639.44
21	178.21	3641.34
22	185.95	3643.37
23	193.65	3645.54
24	201.31	3647.85
25	208.93	3650.29
26	216.50	3652.87
27	224.03	3655.57
28	231.50	3658.42
29	238.93	3661.39
30	246.30	3664.49
31	253.62	3667.73
32	260.88	3671.09
33	268.08	3674.58
34	275.21	3678.20
35	282.28	3681.95
36	289.29	3685.81
37	296.22	3689.81
38	303.08	3693.92
39	309.87	3698.15
40	313.41	3700.45

**** Simplified BISHOP FOS = 1.921 ****

The following is a summary of the TEN most critical surfaces

Problem Description : SOUTHWEST LF - CONT DIKES OPT 2(TOT)

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.921	67.14	4080.04	452.56	19.44	313.41	9.042E+07
2.	2.006	76.50	4001.50	376.28	16.67	299.86	7.953E+07
3.	2.019	80.52	4029.76	405.27	13.89	316.99	9.713E+07
4.	2.044	67.03	4025.97	401.15	2.78	298.52	8.551E+07
5.	2.079	68.79	4023.22	399.19	.00	301.96	9.027E+07
6.	2.089	74.14	4042.22	418.84	.00	316.45	1.057E+08
7.	2.090	81.39	3980.47	358.00	8.33	303.35	8.699E+07
8.	2.093	90.48	3967.67	346.25	13.89	310.39	9.058E+07
9.	2.111	103.21	3944.69	324.94	22.22	317.84	9.289E+07
10.	2.131	103.25	3946.40	327.31	19.44	319.55	9.657E+07

* * * END OF FILE * * *

[Pages 1M-D-45 through 1M-D-53 have been removed from the application.]

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

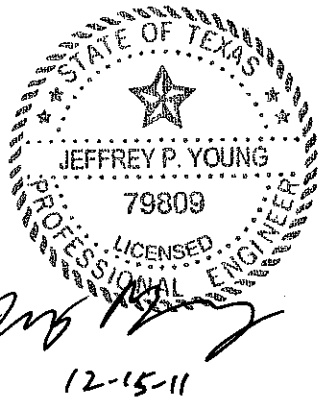
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 2
TYPICAL FILL CROSS SECTIONS

Prepared for

Southwest Landfill TX, LP

August 2005
Revised October 2007

Revised December 2011



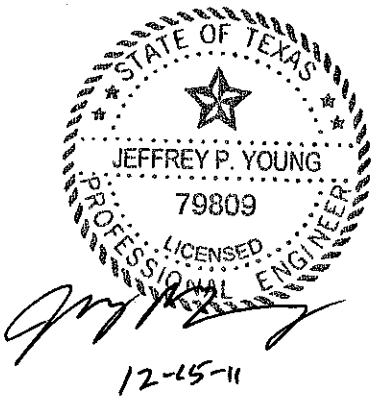
Prepared by

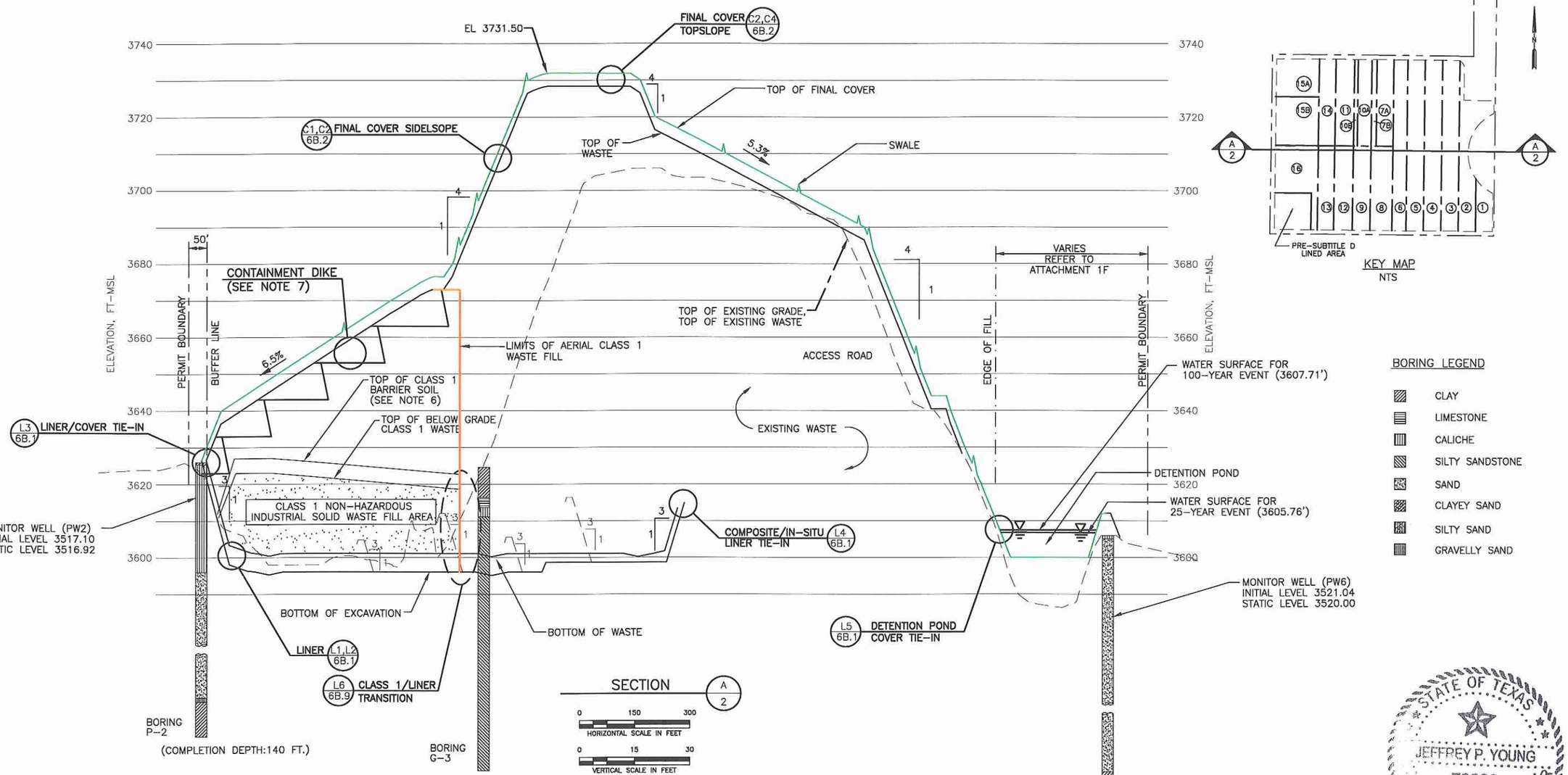
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

2 Typical Fill Cross Sections – Final Contour Plan
2A Typical Fill Cross Sections
2B Typical Fill Cross Sections
2C Typical Fill Cross Sections





KEY MAP
NTS

BORING LEGEND

- CLAY
- LIMESTONE
- CALICHE
- SILTY SANDSTONE
- SAND
- CLAYEY SAND
- SILTY SAND
- GRAVELLY SAND

NOTES:

1. REFER TO ATTACHMENT 6C FOR LEACHATE COLLECTION SYSTEM DETAILS.
2. REFER TO ATTACHMENT 6A FOR SURFACE WATER PROTECTIVE FACILITIES.
3. REFER TO ATTACHMENT 4A FOR BORING PLAN AND LOG OF BORINGS.
4. REFER TO ATTACHMENT 1E FOR LOCATION OF GAS VENTS.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE-IN.
6. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. REFER TO ATTACHMENT 1M FOR THE ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
7. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY.

COPYRIGHT © 2007 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001 | DRAWN BY: SRF
FILE: 0120-94-11 | DESIGN BY: DOL
CAD: 2A-CROSS SECTION.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	12/2011	PERMIT MODIFICATION

TYPICAL FILL CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

ATTACHMENT 2A

0:\0120\94\AERIAL CLASS 1 MOD (12-2010)\NOD 2\CLEAN\ATT 2\2A-CROSS SECTION.dwg, jwilson

Attachment 2B has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

PERMIT MODIFICATION

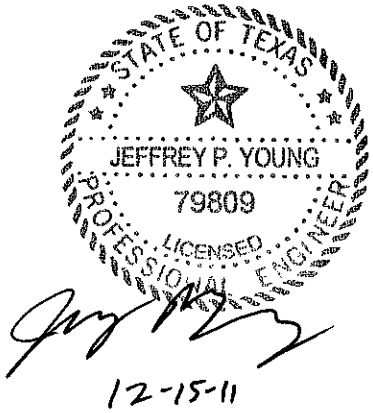
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 6
GROUNDWATER AND SURFACE WATER PROTECTION PLAN

Prepared for

Southwest Landfill TX, LP

Technically Complete May 23, 1995
Revised November 2005
Revised January 2007

Revised December 2011



Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

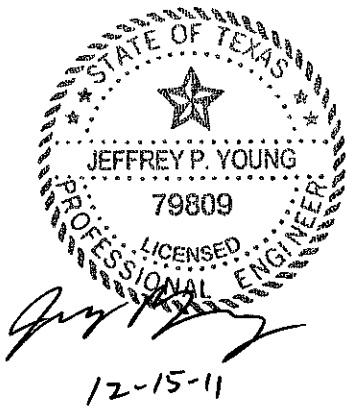
Project No. 0120-94-11-32-01

CONTENTS

6A Drainage Study
- 6A.1 Surface Water Protection Facilities – Plan
- 6A.1a Floodplain Map
- 6A.2b Final Drainage Plan
- 6A.1c North Perimeter Ditch – Profile
- 6A.1d South Perimeter Ditch – Profile
- 6A.2 Surface Water Protection Facilities – Ditch – Plan and Profile
- 6A.3 Surface Water Protection Facilities – Drainage Details
- 6A.4 Surface Water Protection Facilities – Drainage Details
- 6A.5 Surface Water Protection Facilities – Detention Pond Details
- 6A.6 Post Development Drainage Area Map

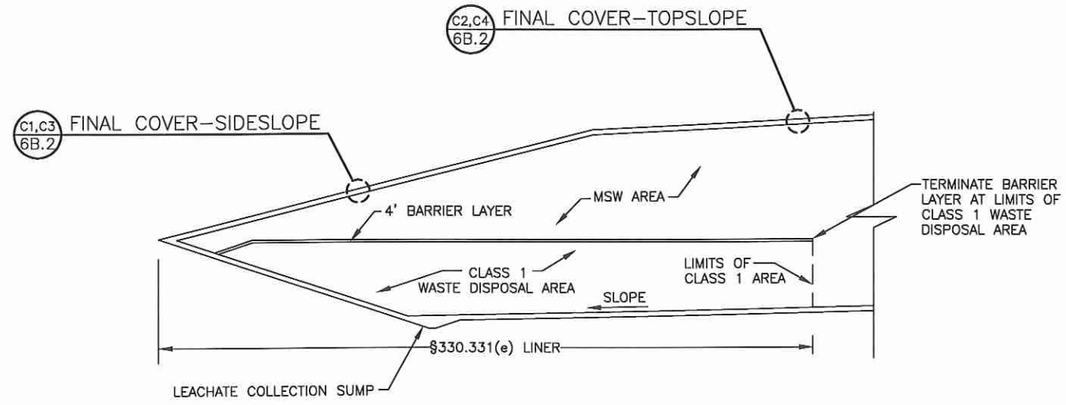
6B Liner and Cover Details
- 6B.1 Liner Details
- 6B.2 Cover Details – Subtitle D Composite Final Cover Option
- 6B.2a Cover Details – ET Monolithic Soil Final Cover Option
- 6B.3 Class 1 Waste Disposal Area Options
- 6B.4 Class 1 Waste Containment Dike Details
- 6B.5 Class 1 Waste Containment Dike Details
- 6B.6 Above Grade Class 1 Final Cover Details
- 6B.7 Class 1 Waste Containment Dike/Final Cover Tie-In Detail
- 6B.8 Class 1 Final Cover Tie-in Details
- 6B.9 Above Grade Class 1 Liner System Detail

6C Leachate Collection System Details

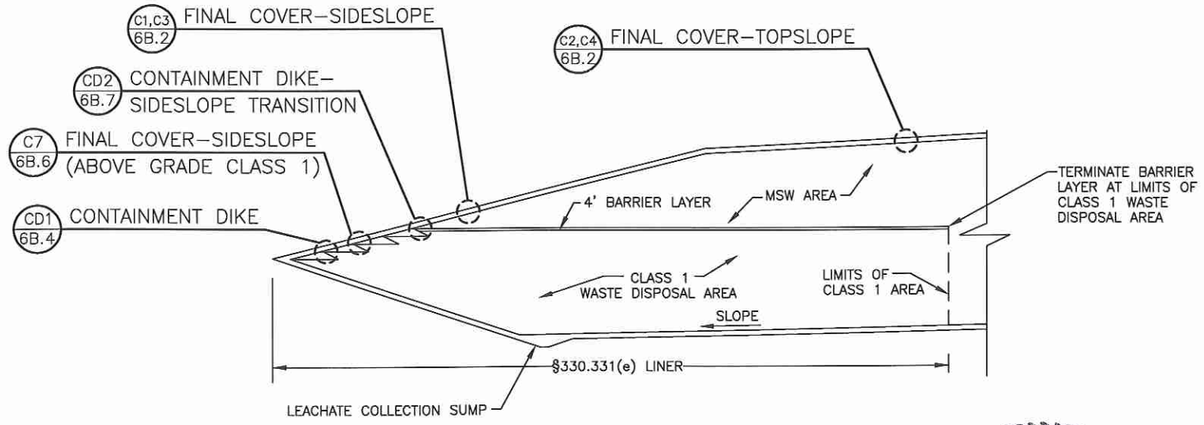


ATTACHMENT 6B

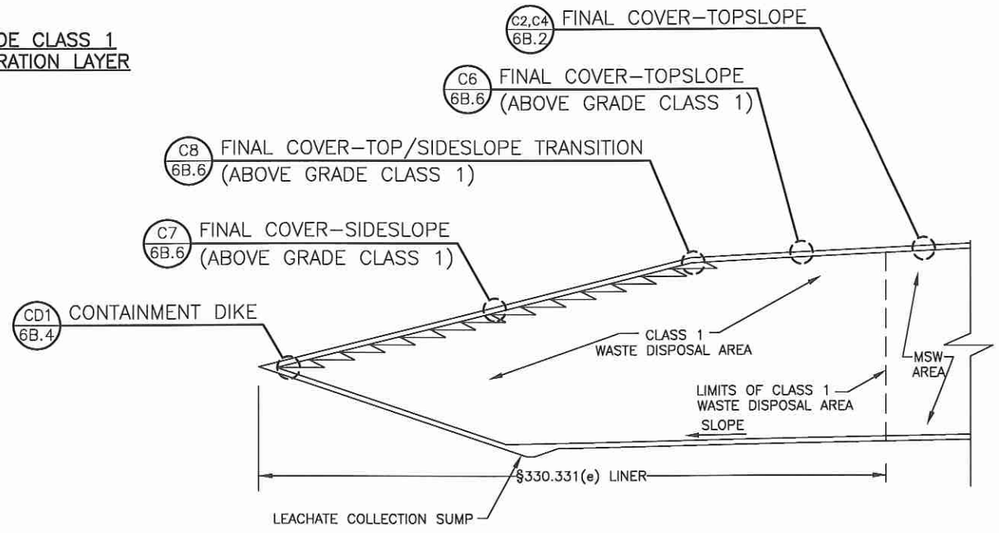
LINER AND COVER DETAILS



OPTION 1 – BELOW GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 2 – ABOVE GRADE CLASS 1 DISPOSAL AREA WITH SEPARATION LAYER



OPTION 3 – ABOVE GRADE CLASS 1 DISPOSAL AREA

NOTE:

1. CLASS 1 WASTE AND CLASS 1 NON–HAZARDOUS INDUSTRIAL WASTE ARE USED INTERCHANGEABLY.
2. REFER TO DRAWING 1M–5 FOR ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS.
3. REFER TO ATTACHMENT 6B.7 AND 6B.8 FOR FINAL COVER TIE–IN DETAILS.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120–94–11
CAD: 6B.3–DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS

THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE DISPOSAL AREA OPTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727
CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.3

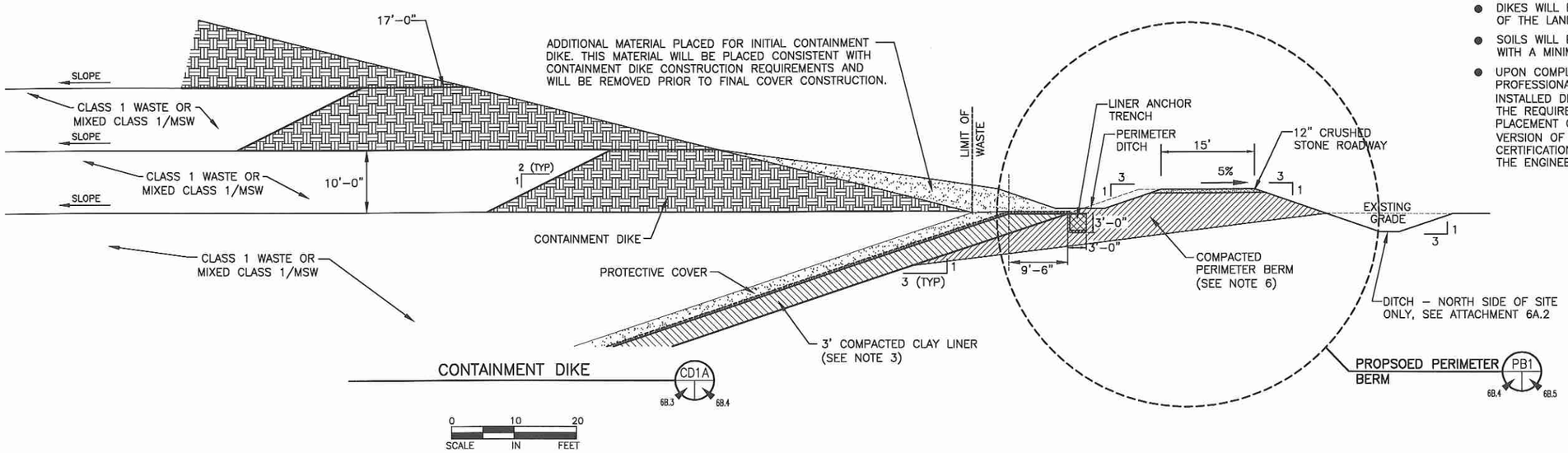
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

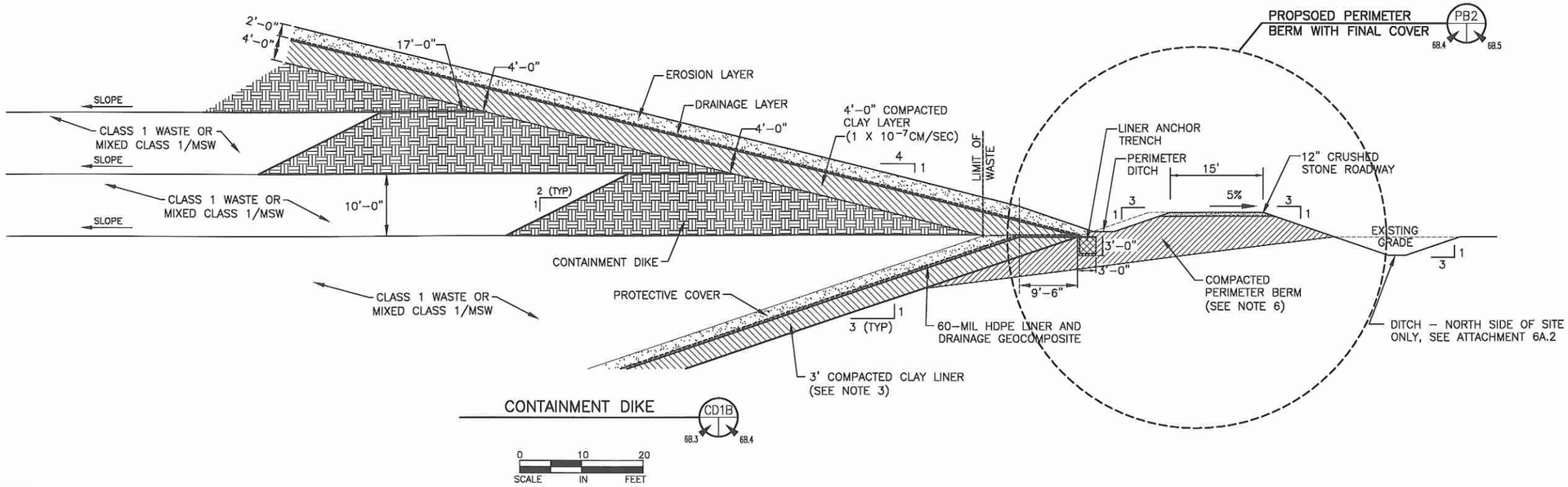
O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.3-CONTAINMENT DIKE DETAIL.dwg, jwilson

CONTAINMENT DIKE CONSTRUCTION REQUIREMENTS

(REFER TO ATTACHMENT 1M, SECTION 3 OF THE SITE DEVELOPMENT PLAN)

- DIKES WILL BE CONSTRUCTED OF CLAY-RICH SOILS UNDER THE DIRECTION OF THE LANDFILL MANAGER OR HIS DESIGNEE.
- SOILS WILL BE PLACED IN MAXIMUM 9-INCH THICK LIFTS AND COMPACTED WITH A MINIMUM OF FOUR PASSES WITH A DOZER OR SIMILAR EQUIPMENT.
- UPON COMPLETION OF EACH DIKE, A THIRD PARTY INDEPENDENT PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN TEXAS WILL CERTIFY THE INSTALLED DIKE IN ACCORDANCE WITH TITLE 30 TAC §335.590(24)(F)(vi) AND THE REQUIREMENTS INCLUDED IN ATTACHMENT 1M OF THE SDP PRIOR TO PLACEMENT OF WASTE. THE LICENSED ENGINEER WILL UTILIZE THE CURRENT VERSION OF THE STANDARD FORM INCLUDED IN §335.590(24)(F)(vi) FOR THE CERTIFICATION OF THE DIKE. THE CERTIFICATION PREPARED AND SIGNED BY THE ENGINEER WILL BE PLACED IN THE SITE OPERATING RECORD.





NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC §330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH §330.331(e) AND
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.
6. FOR THE UNDEVELOPED AREAS, THE PERIMETER BERM WILL BE CONSTRUCTED IN ACCORDANCE WITH SOIL LINER SPECIFICATIONS OUTLINED IN SECTION 2.3 OF THE SLQCP (ATTACHMENT 10) EXCEPT NO PERMEABILITY TESTS WILL BE REQUIRED FOR THIS MATERIAL.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.4-DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

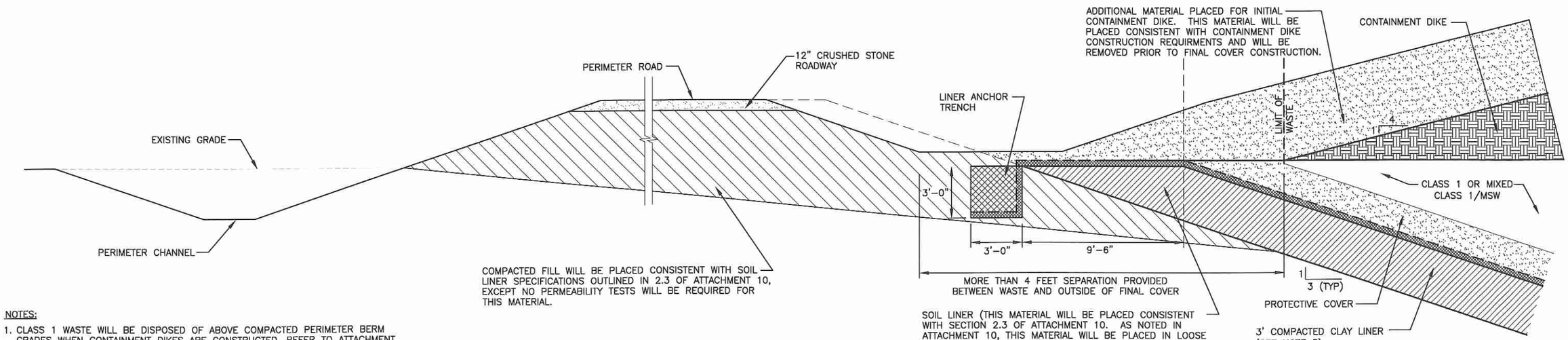
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.4

G:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.4-CONTAINMENT DIKE DETAIL.dwg, jwilson

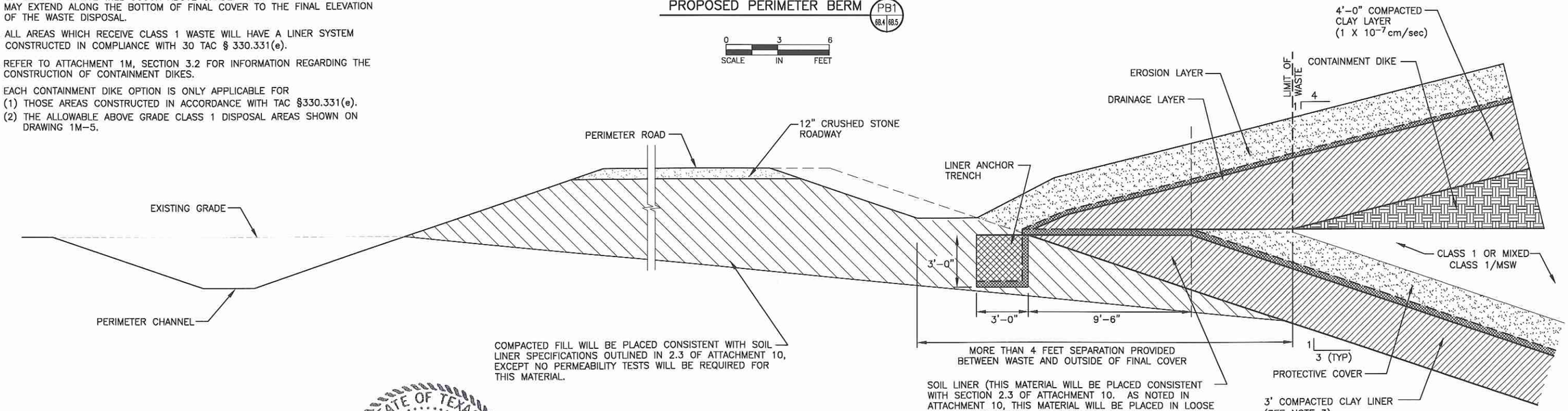


NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES MAY EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF THE WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS 1 WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC § 330.331(e).
4. REFER TO ATTACHMENT 1M, SECTION 3.2 FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. EACH CONTAINMENT DIKE OPTION IS ONLY APPLICABLE FOR
   (1) THOSE AREAS CONSTRUCTED IN ACCORDANCE WITH TAC §330.331(e).
   (2) THE ALLOWABLE ABOVE GRADE CLASS 1 DISPOSAL AREAS SHOWN ON DRAWING 1M-5.

PROPOSED PERIMETER BERM (PB1 68.4 | 68.5)

SCALE 0 3 6 IN FEET



PROPOSED PERIMETER BERM WITH FINAL COVER (PB2 68.4 | 68.5)

SCALE 0 3 6 IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011 | DRAWN BY: VRS
FILE: 0120-94-11 | DESIGN BY: MDM
CAD: 6B.5-DETAILS.DWG | REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE CONTAINMENT DIKE DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

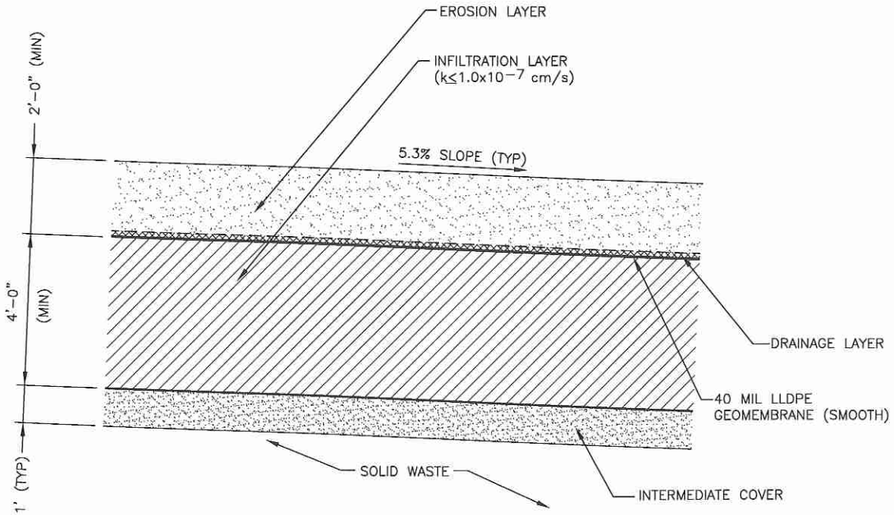
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO | FORT WORTH, TX EVANSVILLE, IN RIVERSIDE, MO | GRAND RAPIDS, MI SOUTH BEND, IN SPRINGFIELD, IL CLEARMONT, FL

ATTACHMENT 6B.5

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

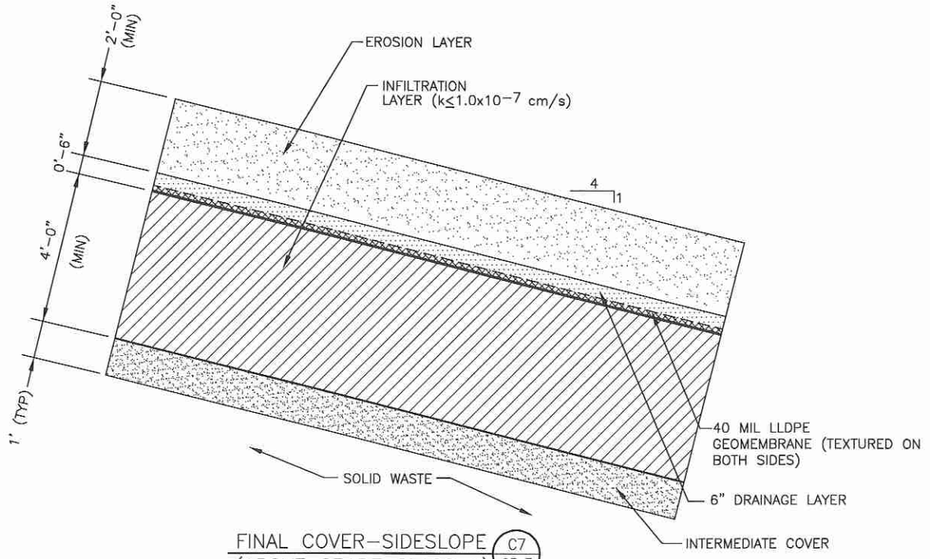
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

G:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.5-CONTAINMENT DIKE DETAILS.dwg, jwilson



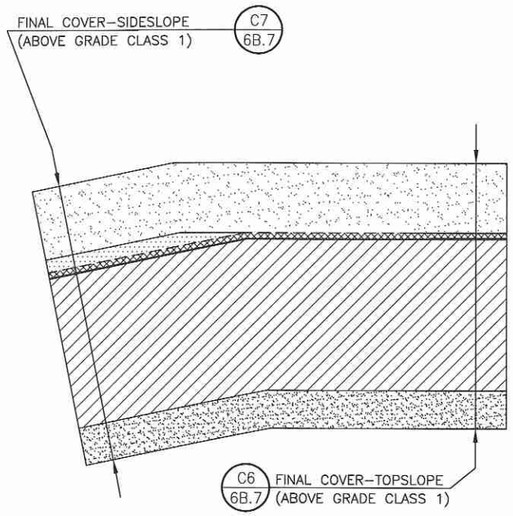
FINAL COVER–TOPSLOPE (ABOVE GRADE CLASS 1) C6 / 6B.3

SCALE 0 1 2 4 IN FEET



FINAL COVER–SIDESLOPE (ABOVE GRADE CLASS 1) C7 / 6B.3

SCALE 0 1 2 4 IN FEET



FINAL COVER– TOP/SIDESLOPE TRANSITION (ABOVE GRADE CLASS 1) C8 / 6B.3

SCALE 0 1 2 4 IN FEET

NOTES:

1. WHERE EROSION LAYER DOES NOT MEET FILTER CRITERIA FOR DRAINAGE LAYER, THE LAYERS WILL BE SEPERATED BY A GEOTEXTILE FILTER.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

☐ FOR INFORMATIONAL PURPOSES ONLY
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION
☐ CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.6-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

ABOVE GRADE CLASS 1
FINAL COVER DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

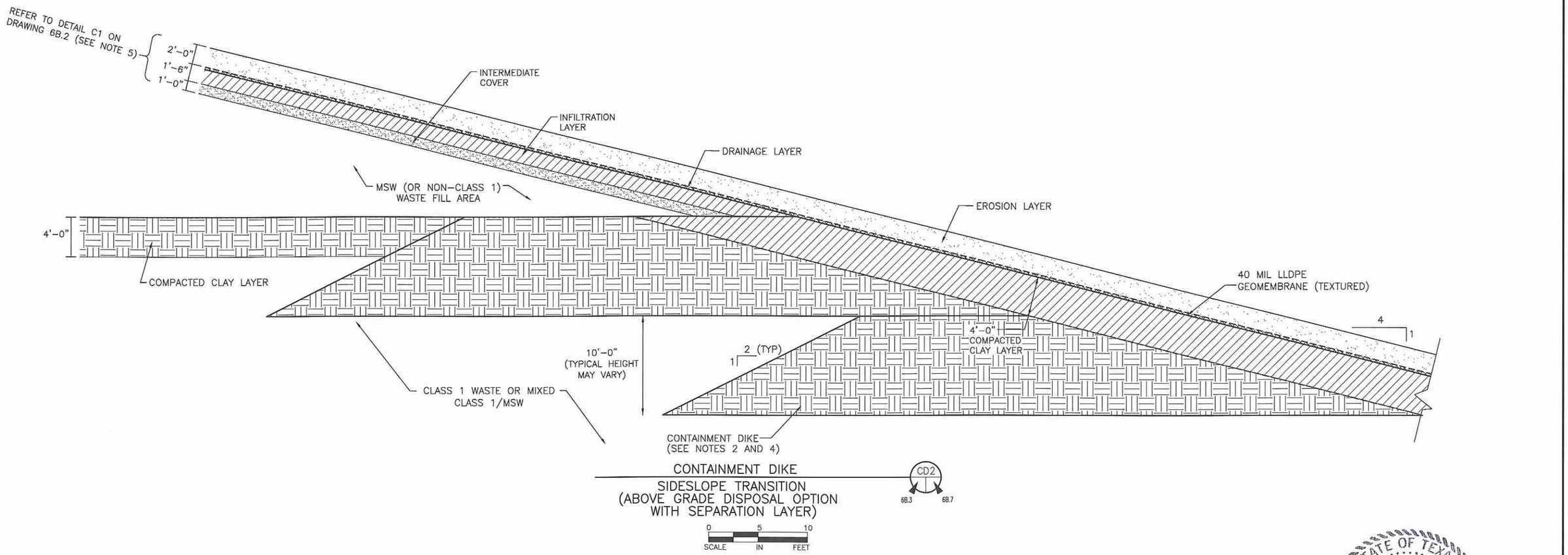
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
EVANSVILLE, IN
RIVERSIDE, MO
GRAND RAPIDS, MI
SOUTH BEND, IN
SPRINGFIELD, IL
CLEARMONT, FL

ATTACHMENT 6B.6

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.6-FINAL COVER DETAILS.dwg, jwilson



CONTAINMENT DIKE
SIDESLOPE TRANSITION
(ABOVE GRADE DISPOSAL OPTION
WITH SEPARATION LAYER)

CD2
6B.3 6B.7

0 5 10
SCALE IN FEET

NOTES:

1. CLASS 1 WASTE WILL BE DISPOSED OF ABOVE COMPACTED PERIMETER BERM GRADES WHEN CONTAINMENT DIKES ARE CONSTRUCTED. REFER TO ATTACHMENT 1M FOR MORE INFORMATION.
2. CONTAINMENT DIKES WILL BE CONSTRUCTED IN AREAS WHERE THE DISPOSAL OF CLASS 1 WASTE WILL OCCUR ABOVE GRADE. THE CONTAINMENT DIKES WILL EXTEND ALONG THE BOTTOM OF FINAL COVER TO THE FINAL ELEVATION OF WASTE DISPOSAL.
3. ALL AREAS WHICH RECEIVE CLASS I WASTE IN A DEDICATED CELL OR MIXED WITH OTHER WASTE WILL HAVE A LINER SYSTEM CONSTRUCTED IN COMPLIANCE WITH 30 TAC § 330.331(e).
4. REFER TO ATTACHMENT 1M FOR INFORMATION REGARDING THE CONSTRUCTION OF CONTAINMENT DIKES.
5. THE ALTERNATIVE FINAL COVER MAY BE USED. SEE DETAIL C3 ON DRAWING 6B.2.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.7-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 WASTE CONTAINMENT DIKE/ FINAL COVER TIE-IN DETAIL

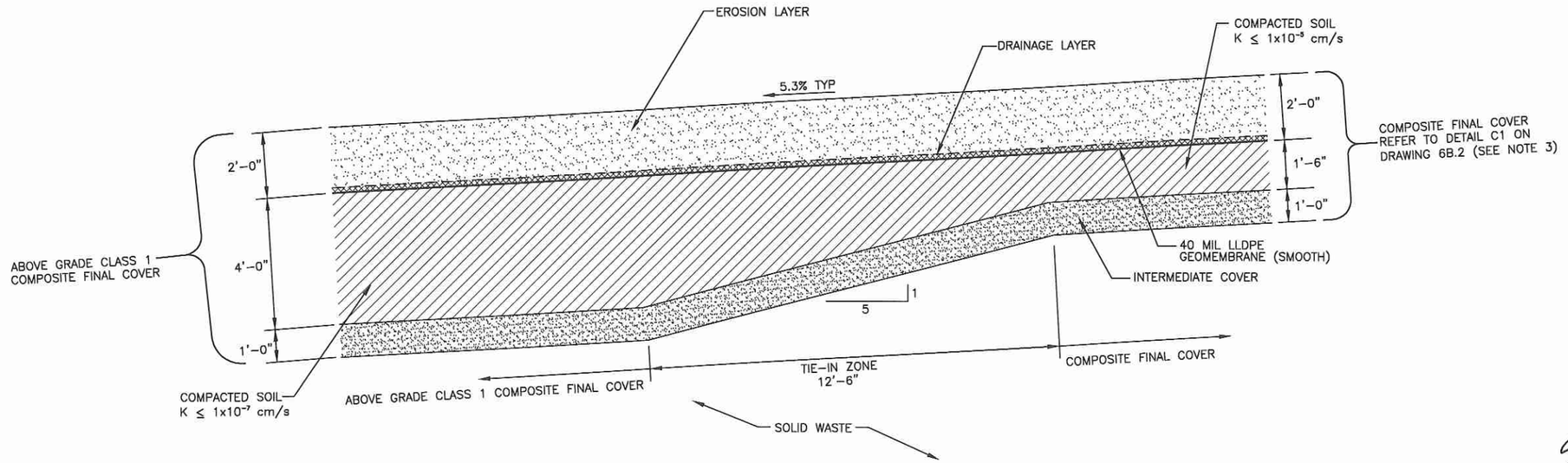
SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727
CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX
EVANSVILLE, IN
RIVERSIDE, MO
GRAND RAPIDS, MI
SOUTH BEND, IN
SPRINGFIELD, IL
CLEARMONT, FL

ATTACHMENT 6B.7

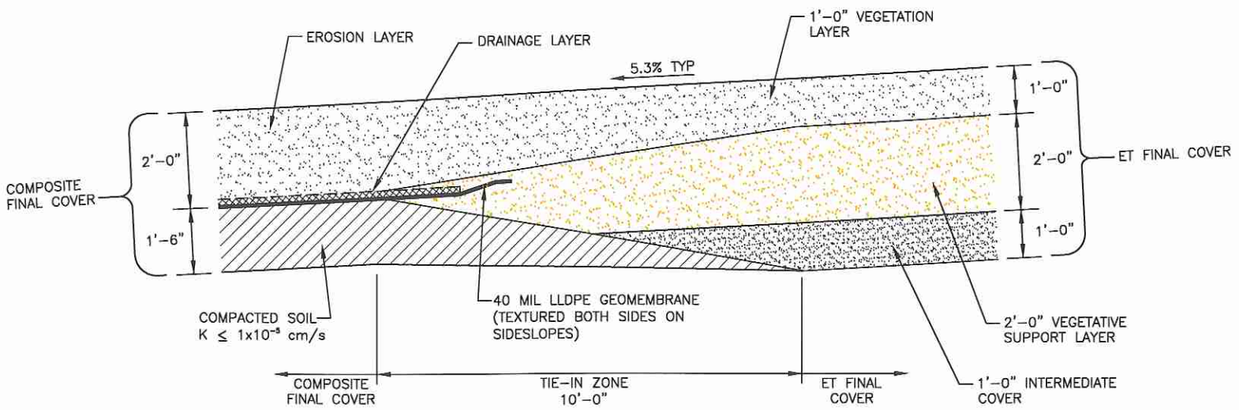
COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.7-CONTAINMENT DIKE DETAIL.dwg, jwilson



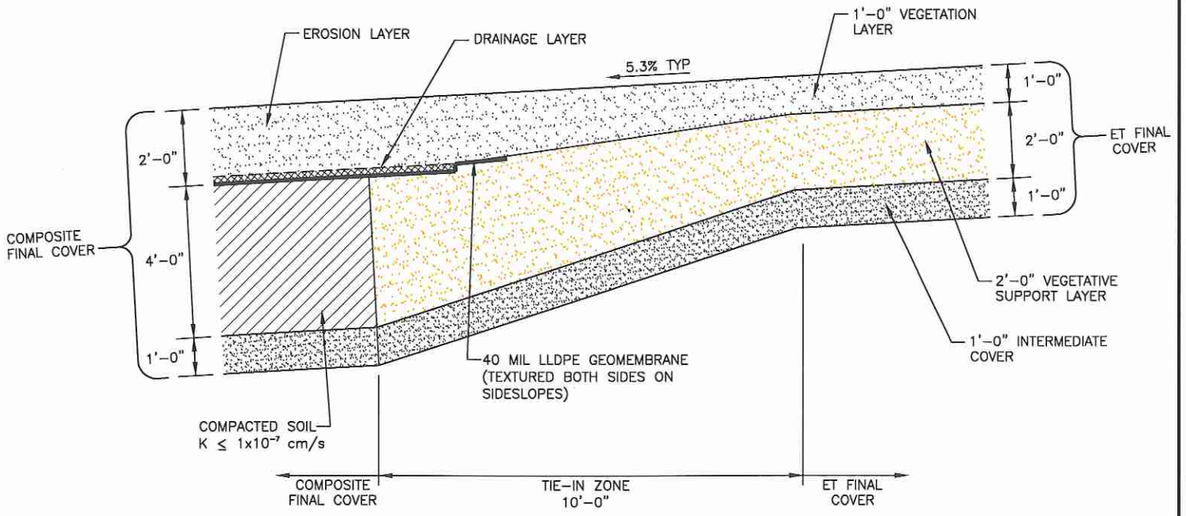
ABOVE GRADE CLASS 1 COMPOSITE/
COMPOSITE FINAL COVER TIE–IN – TOPSLOPE (C9 / 6B.3)

SCALE: 0 1 2 4 IN FEET



COMPOSITE/ET FINAL COVER
TIE–IN – TOPSLOPE (C10 / 6B.3)

NTS



ABOVE GRADE CLASS 1
COMPOSITE/ET FINAL COVER
TIE–IN – TOPSLOPE (C11 / 6B.3)

NTS

NOTES:

1. FINAL COVER SYSTEM WILL BE CONSTRUCTED IN ACCORDANCE WITH ATTACHMENT 12 FINAL CLOSURE PLAN.
2. ET FINAL COVER SYSTEM DESIGN AND DEMONSTRATIONS ARE INCLUDED IN APPENDIX 12D ET MONOLITHIC SOIL FINAL COVER DESIGN.
3. THE ALTERNATIVE FINAL COVER MAY BE USED. SEE DETAIL C3 ON DRAWING 6B.2.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120–94–11
CAD: 6B.8–DETAILS.DWG
DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

CLASS 1 FINAL COVER TIE–IN DETAILS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

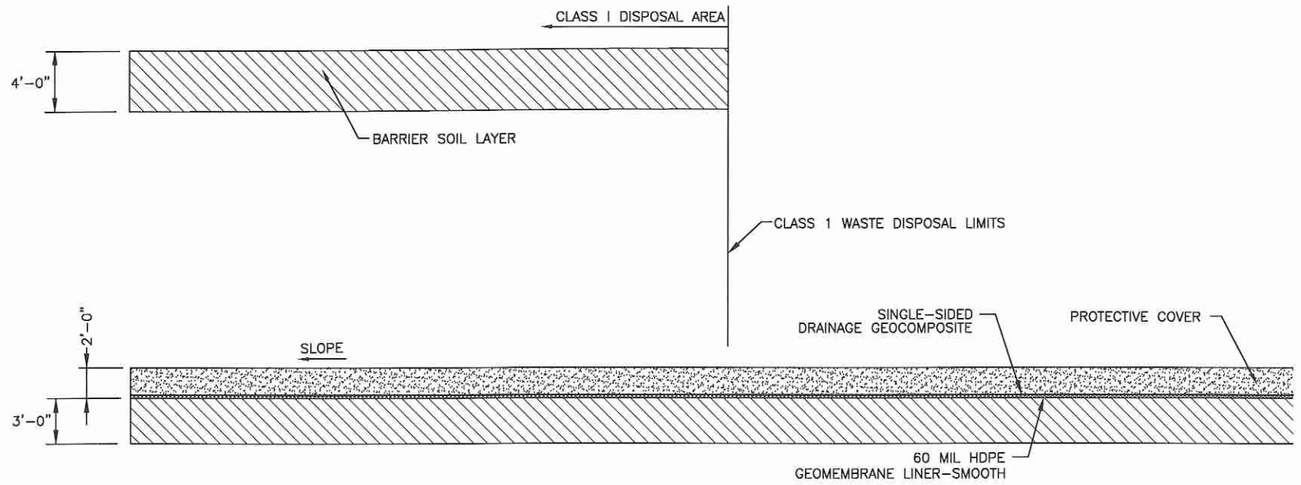
Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.8

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12–2010)\MOD 2\CLEAN\ATT 6B\6B.8–FINAL COVER DETAILS.dwg, jwilson



CLASS 1/LINER TRANSITION L6 6B.9 2A,7C

0 5 10
SCALE IN FEET

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER

12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 12/2011
FILE: 0120-94-11
CAD: 6B.9-DETAILS.DWG

DRAWN BY: VRS
DESIGN BY: MDM
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	12/2011	PERMIT MODIFICATION

ABOVE GRADE CLASS 1 LINER SYSTEM DETAIL

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F-3727

CHICAGO, IL · NAPERVILLE, IL · COLUMBUS, OH · DENVER, CO · FORT WORTH, TX · EVANSVILLE, IN · RIVERSIDE, MO · GRAND RAPIDS, MI · SOUTH BEND, IN · SPRINGFIELD, IL · CLEARMONT, FL

ATTACHMENT 6B.9

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

G:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 6B\6B.9-FINAL COVER DETAILS.dwg, jwilson

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

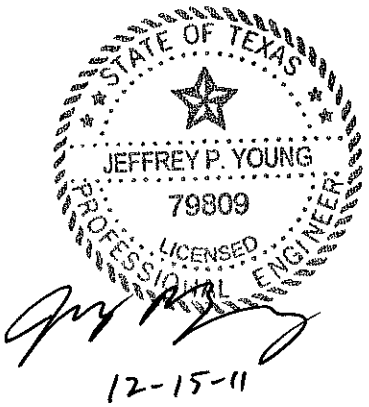
SITE DEVELOPMENT PLAN PART III
ATTACHMENT 7
FINAL CONTOUR MAP

Prepared for

Southwest Landfill TX, LP

August 2005
Revised January 2007
Revised October 2007

Revised December 2011



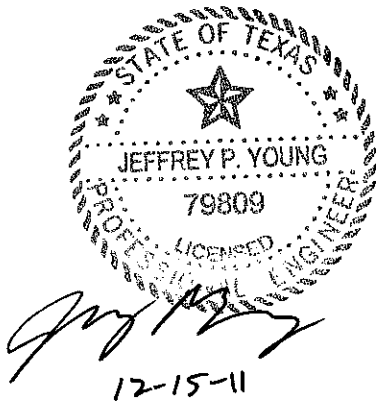
Revision Prepared by

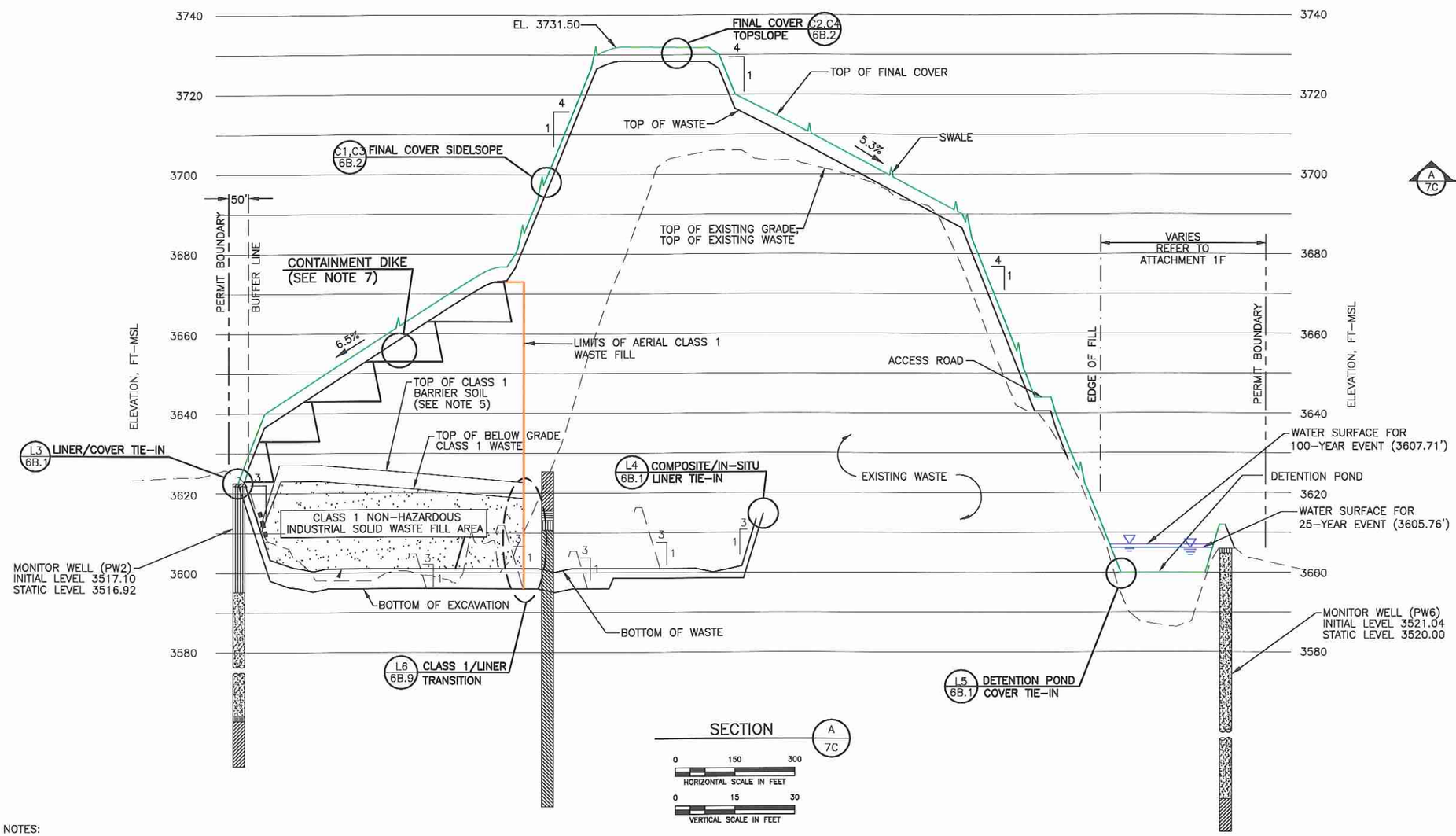
Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

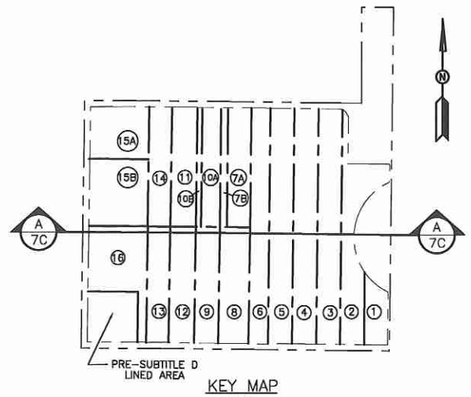
WBC Project No. 0120-94-11-74-01

CONTENTS

7A Final Contour Plan
7B Final Drainage Plan
7C Typical Fill Cross Sections
7D Typical Fill Cross Sections
7E Typical Fill Cross Sections







BORING LEGEND

- CLAY
- LIMESTONE
- CALICHE
- SILTY SANDSTONE
- SAND
- CLAYEY SAND
- SILTY SAND
- GRAVELLY SAND

NOTES:

1. REFER TO ATTACHMENT 6C FOR LEACHATE COLLECTION SYSTEM DETAILS.
2. REFER TO ATTACHMENT 6A FOR SURFACE WATER PROTECTIVE FACILITIES.
3. REFER TO ATTACHMENT 4A FOR BORING PLAN AND LOG OF BORINGS.
4. REFER TO ATTACHMENT 1E FOR LOCATION OF GAS VENTS.
5. REFER TO ATTACHMENT 6A.5 FOR DETENTION POND DETAILS AND ATTACHMENT 6B.1 FOR DETENTION POND COVER TIE–IN.
6. THE BARRIER SOIL LAYER WILL NOT BE PLACED IN THIS LOCATION IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. REFER TO ATTACHMENT 1M FOR THE ABOVE GRADE CLASS 1 WASTE DISPOSAL OPTIONS.
7. CONTAINMENT DIKES WILL ONLY BE CONSTRUCTED IF THE ABOVE GRADE CLASS 1 OPTION IS UTILIZED. ABOVE GRADE CLASS 1 WASTE MAY BE MIXED WITH MUNICIPAL SOLID WASTE AND OTHER WASTE TYPES ACCEPTED AT THE FACILITY.

STATE OF TEXAS
JEFFREY P. YOUNG
79809
LICENSED
PROFESSIONAL ENGINEER
12-15-11

- [ ] FOR INFORMATIONAL PURPOSES ONLY
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 11/2001 | DRAWN BY: SRF
FILE: 0120–94–11 | DESIGN BY: DOL
CAD: 7C–CROSS SECTION.DWG | REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2001	PERMIT MODIFICATION
2	05/2003	PERMIT MODIFICATION
3	08/2005	REVISED FINAL CONTOURS
4	09/2006	REVISED PERMIT BOUNDARY
5	10/2007	REVISED FINAL CONTOURS
6	05/2011	PERMIT MODIFICATION
7	12/2011	PERMIT MODIFICATION

TYPICAL FILL CROSS SECTIONS

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants
TBPE REGISTRATION NO. F–3727
CHICAGO, IL NAPERVILLE, IL COLUMBUS, OH DENVER, CO
FORT WORTH, TX (817) 735–9770
GRIFFITH, IN SOUTH BEND, IN SPRINGFIELD, IL ST. LOUIS, MO

ATTACHMENT 7C

COPYRIGHT © 2007 WEAVER BOOS CONSULTANTS, LLC – SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS 1 MOD (12–2010)\MOD 2\CLEAN\ATT 7\7C–CROSS SECTION.dwg, jwilson

Attachment 7D has been removed from this permit modification.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

PERMIT MODIFICATION

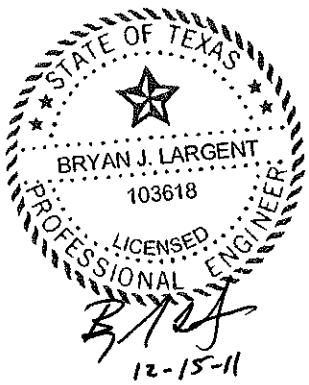
ATTACHMENT 8
COST ESTIMATE FOR CLOSURE AND POSTCLOSURE CARE

Prepared for

Southwest Landfill TX, LP

November 2005
Revised October 2007

Revised December 2011



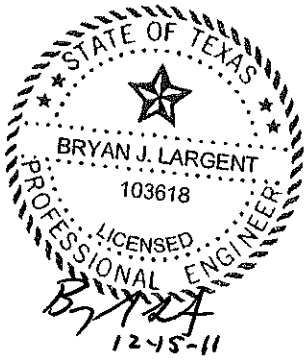
Revision Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-94-11-49-12

CONTENTS

1	**INTRODUCTION**	**1**
2	**CLOSURE COST ESTIMATE**	**2**
	2.1 Engineering Costs	2
	2.2 Construction Costs	2
3	**POSTCLOSURE CARE COST ESTIMATE**	**5**
4	**COST ESTIMATE ADJUSTMENTS**	**7**



2 CLOSURE COST ESTIMATE

This cost estimate shows the cost of hiring a third party to close the largest area ever requiring closure at any time during the active life of the landfill. The closure cost estimate includes: 1) engineering costs required to administratively close the facility; 2) construction costs involved with the construction of the final cover system, the landfill gas system, and other activities required to close the facility, and 3) contingencies and other administrative costs that may be incurred during closure activities. A summary of closure cost estimate is presented on Table 1. The costs will be adjusted annually as indicated in Section 4. An assessment will be completed each year to verify that the Closure Cost Estimate shown in Table 1 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the closure costs are based on the current active area and that all other permit conditions are addressed by the Closure Cost Estimate (e.g., the number of groundwater monitor wells and landfill gas probes in the estimate match the wells and probes that are either in-place or need to be installed to match the number of wells and probes listed in the permit for the current phase of development). The estimates will be updated, as needed, consistent with the procedures noted in Section 4. Additional information regarding the closure cost estimate is summarized below.

2.1 Engineering Costs

The existing costs are based on closing the largest area scheduled to receive final cover, which is 86.7 acres. A boundary survey will be required for the filing of the affidavit of closure, deed recording of any area of the site that has received waste, and publishing the public notice of closure activities. A topographic survey will be required to determine the existing height and top slope of the landfill so that permit compliance can be evaluated and the final closure system, drainage system, and final grading can be engineered. An inspection of the site is included to identify any disposal areas requiring closure, drainage and erosion protection improvements, and identify any potential regulatory deficiencies. The engineering costs include the cost to develop construction plans and closure schedules, closure testing and inspections, and permit document preparation. In addition, administration costs (i.e. for construction contracts) have also been included.

2.2 Construction Costs

As shown on Figure 1, construction costs include construction of the final cover system drainage improvements, and LFG system improvements for the 86.7-acre area. The final cover system consists of an 18-inch-thick infiltration layer (clay cap), a flexible membrane cover, a 12-inch-thick drainage layer, and an erosion layer consisting of

24 inches of earthen material capable of sustaining plant growth. The 18-inch-thick infiltration layer becomes a 4-foot-thick infiltration layer in sectors receiving above grade Class 1 waste. The construction costs include site grading and drainage including the final grading of the site, drainage improvements, and erosion and sedimentation controls for proper closure of the site. Since the landfill gas extraction system has been installed in portions of the 86.7-acre area, the construction costs for the LFG extraction system are based on extending the currently constructed gas wells above the top of final cover and constructing additional wells.

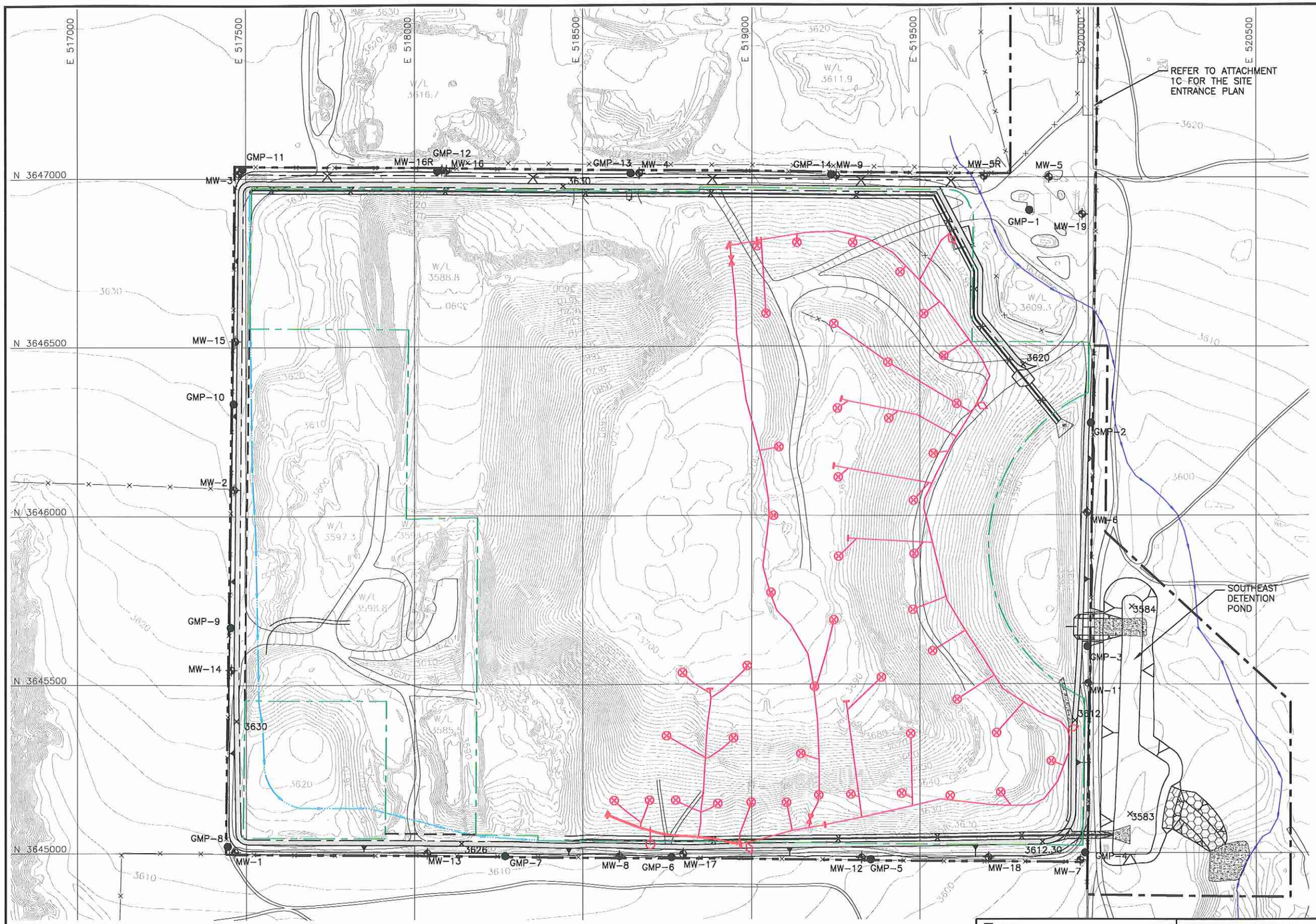
TABLE 1
SOUTHWEST LANDFILL - CLOSURE COST

Area Requiring Final Cover	86.7	ac	Infiltration Layer Thickness	1.5	ft (Composite Final Cover)
Permit Boundary Area	124.29	ac	Infiltration Layer Thickness	4.0	ft (Above Grade Class 1 Final Cover)
Above Grade Class 1 Disposal Area	4.8	ac	Erosion Layer Thickness	2.0	ft

Description	Quantity	Unit[1]	Unit[2] Cost	2004 Total Cost	Inflation Factor[3]	2011 Total Cost
1.0 ENGINEERING						
1.1 Topographic Survey	86.7	AC	$ 80	$ 7,000	1.163	**$ 8,000**
1.2 Boundary Survey for Affidavit	124.29	AC	$ 35	$ 4,000	1.163	**$ 5,000**
1.3 Site Evaluation	86.7	AC	$ 410	$ 36,000	1.163	**$ 42,000**
1.4 Development of Plans	86.7	AC	$ 375	$ 33,000	1.163	**$ 38,000**
Subtotal				$ 80,000		**$ 93,000**
1.5 Contract Administration		5%		$ 4,000		**$ 4,650**
1.6 Admin. Cost for Certification of Final Cover and Affidavit to the Public		5%		$ 4,000		**$ 4,650**
1.7 Closure Inspection	86.7	AC	$ 1,175	$ 102,000	1.163	**$ 119,000**
1.8 Permits	1	LS	$12,000	$ 12,000	1.163	**$ 14,000**
SUBTOTAL				$ 202,000		**$ 235,300**
CONTINGENCY		10%		$ 20,200		**$ 23,530**
ENGINEERING TOTAL				$ 222,200		**$ 258,830**
2.0 CONSTRUCTION						
2.1 Final Cover System						
2.1.1 Infiltration Layer	198,198	CY	$ 4.09	$ 811,000	1.163	**$ 943,193**
2.1.1a Above Grade Class I Disposal Area Infiltration Layer[6]	30,976	CY	$ 4.09	$ 127,000	1.163	**$ 147,701**
2.1.2 Flexible Membrane Cover	3,776,652	SF	$ 0.41	$ 1,548,000	1.163	**$ 1,800,324**
2.1.3 Drainage Layer	3,776,652	SF	$ 0.18	$ 663,000	1.163	**$ 771,069**
2.1.4 Erosion Layer	279,752	CY	$ 2.34	$ 655,000	1.163	**$ 761,765**
2.2 Completion of Gas Extraction System[4]	45	WELL	$ 500	$ 23,000	1.163	**$ 27,000**
2.3 Vegetation with Irrigation	86.7	AC	$ 3,520	$ 305,000	1.163	**$ 355,000**
2.4 Site Grading and Drainage	86.7	AC	$ 1,175	$ 102,000	1.163	**$ 119,000**
2.5 Removal of Onsite Storage Tanks	1	LS	$12,000	$ 12,000	1.163	**$ 14,000**
2.6 LFG Wells Construction[5]	5	WELL	$15,000	$ 75,000	1.163	**$ 87,000**
SUBTOTAL				$ 4,321,000		**$ 5,026,052**
CONTINGENCY		10%		$ 432,100		**$ 502,605**
CONSTRUCTION TOTAL				$ 4,753,100		**$ 5,528,657**
ENGINEERING AND CONSTRUCTION SUBTOTAL				$ 4,975,300		**$ 5,787,487**
TCEQ ADMINISTRATION OF CONTRACTS		5%		$ 248,765		**$ 289,374**
TOTAL CLOSURE COST				$ 5,224,065		**$ 6,076,862**

[1]LS = Lump Sum, AC = acres, CY = cubic yards, SF = square feet.
[2]The original 1995 unit cost for each item has been adjusted for inflation to reflect the 2004 unit cost.
[3]Inflation factor is the product of the inflation factors for each year between 2004 and 2011.
[4]Landfill gas extraction wells to be extended above final cover.
[5]Additional gas extraction wells are required for coverage.
[6]Above grade Class 1 disposal area was assumed to include all of Sector 15A. Therefore, the infiltration layer of the final cover system in this area is 4 feet thick.





N

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- 12.2 ACRE DETENTION POND AREA
- N 3646000 STATE PLANE COORDINATE
- 3660 EXISTING CONTOUR
- PERMITTED LIMITS OF WASTE
- ACTIVE AREA REQUIRING CLOSURE
- ACCESS ROADS
- MW-6 GROUNDWATER MONITORING WELL
- GMP-14 GAS PROBE
- EXISTING LFG EXTRACTION WELL
- EXISTING LFG PIPING

NOTE:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY METROPOLITAN AERIAL SURVEYS, INC. FROM AERIAL PHOTOGRAPHY FLOWN 3-29-2007. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD 83.
2. REFER TO ATTACHMENT 1A AND ATTACHMENT 7A FOR EXTENT OF PROPOSED PERMIT BOUNDARY.

STATE OF TEXAS
BRYAN J. LARGENT
103618
LICENSED PROFESSIONAL ENGINEER
12-15-11

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION
- [ ] CLIENT APPROVAL BY: _____

DATE: 08/2005
FILE: 0120-94-11
CAD: FIGURE 1-SITE PLAN.DWG

DRAWN BY: VRS
DESIGN BY: BJL
REVIEWED BY: JPY

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST AND IS NOT TO BE USED IN WHOLE OR IN PART, WITHOUT THE WRITTEN AUTHORIZATION OF WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST.

PREPARED FOR
SOUTHWEST LANDFILL TX, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	09/2006	REVISED PERMIT BOUNDARY AND RELOCATED ENTRANCE FACILITIES
2	10/2007	ADDED SOUTHEAST DETENTION POND AND DETENTION POND AREA BOUNDARY. UPDATED ACTIVE AREA.
3	12/2011	PERMIT MODIFICATION

PERMIT MODIFICATION SITE PLAN

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS

Weaver Boos Consultants

CHICAGO, IL
NAPERVILLE, IL
COLUMBUS, OH
DENVER, CO
FORT WORTH, TX (817) 735-9770
GRIFFITH, IN
SOUTH BEND, IN
SPRINGFIELD, IL
ST. LOUIS, MO

FIGURE 1

COPYRIGHT © 2011 WEAVER BOOS CONSULTANTS, LLC - SOUTHWEST. ALL RIGHTS RESERVED.

O:\0120\94\AERIAL CLASS I MOD (12-2010)\MOD 2\CLEAN\ATT 6\FIGURE 1-SITE PLAN.dwg, jwilson

3 POSTCLOSURE CARE COST ESTIMATE

The postclosure care period has been established by TCEQ regulations to be 30 years. This detailed cost estimate shows the cost of hiring a third party to conduct routine maintenance and monitoring during the postclosure period. During this period, continuous maintenance must be ongoing to assure the integrity and effectiveness of the final cover system, monitoring systems, leachate collection system, drainage system, and landfill gas system. A summary of postclosure cost estimate is presented on Table 2. An assessment will be completed each year to verify that the Postclosure Cost Estimate shown in Table 2 is consistent with the current permit conditions and the projected permit conditions for the upcoming 12-month period. The assessment will verify that the postclosure costs are based on the current active area and that all other permit conditions are addressed by the Postclosure Cost Estimate (e.g., verify the LFG O&M cost estimate is updated to match the number of wells that will need to be maintained during the postclosure period). The costs will be adjusted annually as indicated in Section 4.

Engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. The estimates are based on the largest area with waste in place to be closed which is 86.7 acres. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified during the site inspections. Gas monitoring and groundwater sampling and analysis will be performed as outlined in the postclosure plan.

Postclosure construction/maintenance estimates include the costs to correct problems determined by the engineering site inspections and as specified by the engineer's correctional plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the postclosure period. These costs include cover and drainage maintenance and annual seeding and mowing costs. The leachate disposal costs include trucking, treatment and disposal costs from areas contributing to leachate generation (approximately 43.0 acres). Postclosure landfill gas control system O&M costs includes regular calibration and maintenance of regulatory equipment, such as valves and flow meters, associated system components of the active collection system and condensate disposal for the completely developed site.

TABLE 2
SOUTHWEST LANDFILL - POSTCLOSURE CARE COST

Postclosure Waste Footprint	86.7	ac	Post Closure Care Period	30	yrs
Area with leachate collection system	43.0	ac	LFG Extraction Wells	50	wells
Groundwater Monitoring Wells	21	wells	Gas Montoring Events	4	/yr
Permit Boundary Area	124.29	ac	GW Monitoring Events	2	/yr
			Leachate Generation	591	gal/ac/yr

Description		Unit[1]	Unit[2] Cost	Annual Cost	2004 Total Cost	Inflation Factor[3]	2011 Total Cost
1.0 ENGINEERING							
1.1 Postclosure Care Plan		N/A					
1.2 Site Inspection and Recordkeeping (annual)	124.29	ACRE	$ 24	$ 2,920	$ 87,600	1.163	**$ 101,900**
1.3 Correctional Plans and Specifications (annual)	86.7	ACRE	$ 35	$ 3,010	$ 90,300	1.163	**$ 105,000**
1.4 Site Monitoring							
1.4.1 Groundwater Monitoring (semiannual)	21	WELLS	$ 1,755	$ 73,710	$ 2,211,300	1.163	**$ 2,571,700**
1.4.2 Gas Monitoring (quarterly)	4	YR	$ 1,170	$ 4,680	$ 140,400	1.163	**$ 163,300**
1.5 Detention Pond Inspection\Maintenance[5]	1	YR	$ 3,000	$ 3,000	$ 90,000	1.072	**$ 96,500**
2.0 CONSTRUCTION / MAINTENANCE	86.7	AC	$ 234	$ 20,288	$ 608,600	1.163	**$ 707,800**
3.0 LEACHATE DISPOSAL/MAINTENANCE	25,413	GAL	$ 0.12	$ 2,970	$ 89,100	1.163	**$ 103,600**
4.0 LFG SYSTEM OPERATION & MAINTENANCE[4]			**See Graph Below**		$ 1,357,500	1.163	**$ 1,578,800**
SUBTOTAL					$ 4,674,800		**$ 5,428,600**
CONTINGENCY		10%			$ 467,480		**$ 542,860**
SUBTOTAL					$ 5,142,280		**$ 5,971,460**
TCEQ CONTRACT ADMINISTRATION		10%			$ 514,228		**$ 597,146**
TOTAL POSTCLOSURE CARE COST					$ 5,656,508		**$ 6,568,606**

[1]AC = acres, YR = Year, GAL = Gallons.

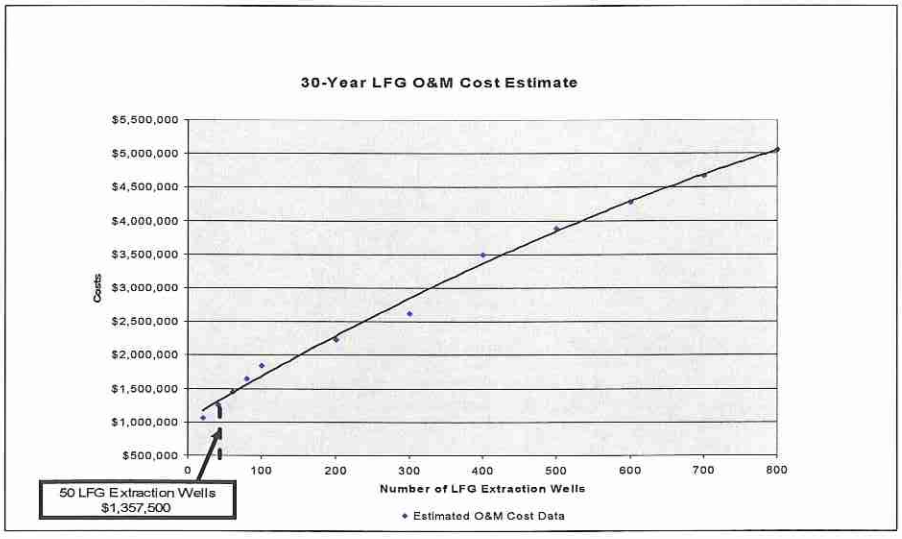
[2]Unit cost for each item has been adjusted to reflect 2004 unit cost.

[3]Inflation factor is the product of the inflation factors for each year between 2004 and 2011.

[4]Refer to the Figure shown below for additional information regarding how the LFG System Maintenance costs are estimated.

[5]This line item is inflated from 2007 dollars because it was added as a new line item in October 2007 as part of the Drainage Improvements/Landfill Completion Plan Revisions Permit Modification developed by Weaver Boos Consultants, LLC - Southwest.

[6]This estimate was reproduced from the Alternative Final Cover Design Permit Modification prepared by WBC in November 2005 and approved by the TCEQ March 21, 2006. This estimate was based on 77.5 acres.





SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

UPGRADING AND VERTICAL EXPANSION

SITE DEVELOPMENT PLAN PART III
ATTACHMENT 12
FINAL CLOSURE PLAN

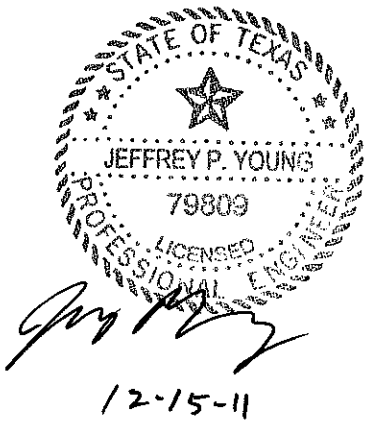
Prepared for

Southwest Landfill TX, LP

Technically Complete May 23, 1995

Revised November 2005

Revised December 2011



12-15-11

Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

TABLES AND ILLUSTRATIONS **12-iv**

1 LANDFILL BACKGROUND **12-1**
1.1 Facility Description 12-1
1.2 Landfill Completion Plan 12-2

2 REGULATIONS **12-3**

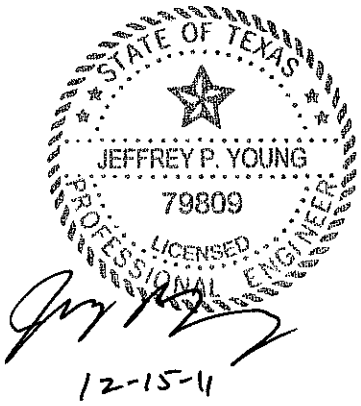
3 LANDFILL FINAL COVER SYSTEM **12-4**
3.1 Regulatory Requirements 12-4
3.2 Final Cover System Design 12-4
3.3 Installation Methods and Procedures 12-5
3.3.1 Construction Procedures 12-5
3.3.2 Final Cover Testing Procedures 12-6

4 CLOSURE PROCEDURES **12-7**
4.1 BFI Standard Closure Procedures 12-7
4.2 Closure At Any Time During Active Life 12-7
4.3 Estimate of Largest Area Ever Requiring Final Cover 12-8
4.4 Estimate of Maximum Waste On Site 12-8

5 CLOSURE SCHEDULE **12-9**
5.1 TNRCC Requirements 12-9
5.2 Provisions for Extending Closure Period 12-10

6 CLOSURE COST ESTIMATE **12-13**

7 CLOSURE PLAN UPDATED **12-14**



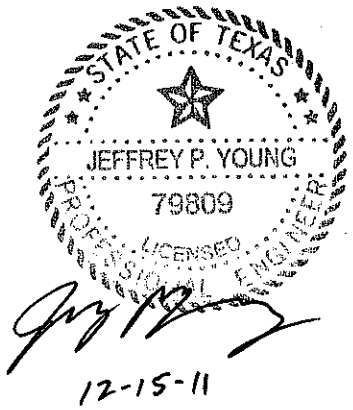
CONTENTS (continued)

APPENDIX 12A
Affidavit to the Public

APPENDIX 12B
Landfill Completion Plan

APPENDIX 12C
Largest Area Ever Requiring Final Cover

APPENDIX 12D
ET Monolithic Soil Final Cover Design



The erosion layer will consist of a minimum of 24 inches of earthen material that is capable of sustaining native plant growth and will be seeded or sodded as soon as practical following the application of the final cover in order to minimize erosion. A demonstration that the erosion layer thickness is sufficient is provided in Attachment 6, Appendix 6A-A. Details of the final cover system alternatives are shown on Attachment 6B.2 and 6B.2a – Cover Details.

3.3 Installation Methods and Procedures

3.3.1 Construction Procedures

The final cover system will be constructed in accordance with TNRCC MSWMR 30 TAC §330.253(b)(1) or (2), as applicable, and (b)(3). Details of the final cover alternatives design sections are shown on Attachment 6B.2 – Cover Details. In general, appropriate field survey controls will be implemented to control the final lift of solid waste as well as the successive soil layers of the final cover system (see Part IV – Site Operating Plan). The infiltration layer will consist of relatively homogeneous clayey soil, placed and compacted under controlled, moisture-density conditions with appropriate compaction equipment. The lift thickness will be controlled so that there is penetration through the loose lift under compaction into the top of the previously compacted lift. The finished surface of the infiltration layer will be a hard and uniform surface.

If the Class 1 aerial fill containment dikes are utilized, the clay infiltration layer will be increased to 4 feet thickness for the area of the above-grade Class 1 waste disposal. The coefficient of permeability for the compacted clay layer will be less than or equal to $1x10^{-7}$ cm/sec in the area of the containment dikes (refer to Attachment 1M for additional information).

In implementing the alternative final cover design, the 18 inches of soil beneath the GCL will be placed and compacted under controlled moisture-density conditions with appropriate compaction equipment. The lift thickness and the total thickness will be controlled, resulting in a hard and uniform surface, upon which the GCL will be laid. Installation of the GCL will be in accordance with procedures described in Attachment 10 – Soil and Liner Quality Control Plan.

A flexible membrane liner (FML) will be installed over the infiltration layer. On side slopes, a drainage layer will be required under the surficial erosion layer to enhance stability. The drainage layer will be granular material. If the erosion layer does not satisfy the filter criteria for the drainage layer, a geotextile filter will be placed between the erosion layer and drainage layer.

The erosion layer will consist 24 inches of soil suitable for plant growth and will be placed directly on the FML or drainage layer (where applicable). The surface of the erosion layer will be seeded with mature grasses and mulched to establish a vegetation cover. The site will be irrigated until the native vegetation is established.

Construction activities will be conducted in accordance with the project construction drawings and specifications. Details of the Subtitle D composite final cover are shown on Attachment 6B.2 – Cover Details – Subtitle D Composite Final Cover Option. Details of the ET monolithic soil final cover are shown on Attachment 6B.2a – Cover Details – ET Monolithic Final Cover Option. Details of the above grade Class 1 final cover are shown on Attachment 6B.6 –Above Grade Class 1 Final Cover Details.

3.3.2 Final Cover Testing Procedures

Testing and evaluation of the final cover system during construction and reporting of results will be in accordance with MSWMR 30 TAC §330.253(f). The 18 inches of compacted infiltration material will be tested for coefficient of permeability at a frequency of at least one test per surface acre of final cover. Other testing (e.g., standard Proctor, Atterberg limits, moisture content and density) will be conducted, as appropriate, to provide control and verification during construction of the final cover.

Construction specifications and testing frequencies of the FML and GCL components of the final cover will be as prescribed in Attachment 10 – Soil and Liner Quality Control Plan. Construction specifications for the ET Monolithic Soil Cover are found in Attachment 12D-4 FCSQCP.

SOUTHWEST LANDFILL
RANDALL COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1663B

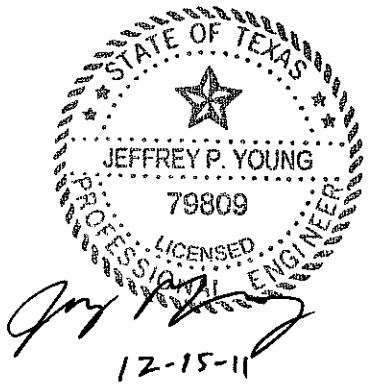
SITE OPERATING PLAN

Prepared for

Southwest Landfill TX, LP

September 2006
Revised January 2007
Revised January 2008

Revised December 2011



Prepared by

Weaver Boos Consultants, LLC–Southwest
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 0120-94-11-74-01

CONTENTS

LIST OF TABLES AND FIGURES vi

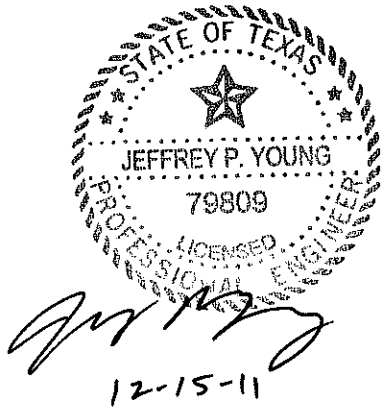
LIST OF ACRONYMS vii

1 INTRODUCTION 1

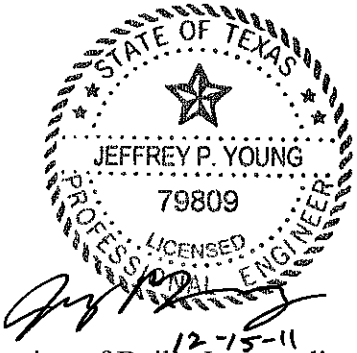
2 PERSONNEL AND TRAINING 2
- 2.1 Personnel 2
  - 2.1.1 Southwest Landfill Management Team 2
  - 2.1.2 Landfill Manager 2
  - 2.1.3 Scale Operator 3
  - 2.1.4 Equipment Operators 4
  - 2.1.5 Spotters and Laborers 5
  - 2.1.6 Mechanics 5
  - 2.1.7 Other Site Personnel 5
  - 2.1.8 Other Corporate Resources 5
- 2.2 Training 6

3 EQUIPMENT 9

4 OPERATIONAL PROCEDURES 12
- 4.1 Access Control 12
  - 4.1.1 Site Security 12
  - 4.1.2 Traffic Control 13
- 4.2 Unloading Wastes 13
  - 4.2.1 Unloading Areas 13
  - 4.2.2 Waste Excluded from Disposal at the Site 14
  - 4.2.3 Waste Unloading Procedures 14
  - 4.2.4 Maximum Size of the Unloading Area 15
  - 4.2.5 Prohibited Wastes 16
- 4.3 Hours of Operation 17
- 4.4 Site Signs 18
- 4.5 Control of Windblown Wastes and Litter 18
- 4.6 Easements and Buffer Zones 20
  - 4.6.1 Easements 20
  - 4.6.2 Buffer Zones 20
- 4.7 Landfill Markers and Benchmark 20
- 4.8 Control of Waste Spilled on Route to the Site 21
- 4.9 Disposal of Large Items 22



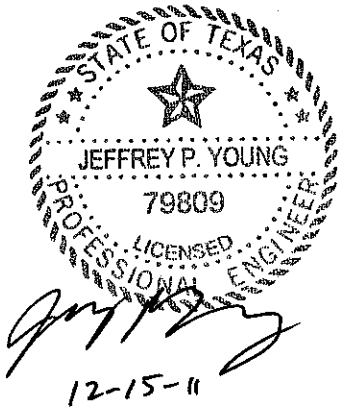
CONTENTS (Continued)



	4.10	Air Quality and Odor Management Plan	22
	4.11	Disease Vector Control	24
	4.12	Maintenance of Site Access	25
	4.13	Salvaging and Scavenging	25
	4.14	Endangered Species	25
	4.15	Control of Landfill Gas	26
	4.16	Treatment of Oil, Gas, and Water Wells	27
	4.17	Compaction of Solid Waste	27
	4.18	Soil Management, Placement, and Compaction of Daily, Intermediate, and Final Cover	28
		4.18.1 Soil Management	28
		4.18.2 Daily Cover	28
		4.18.3 Intermediate Cover	30
		4.18.4 Final Cover	31
		4.18.5 Cover Application Log	32
	4.19	Prevention of Ponded Water	32
	4.20	Disposal of Special Wastes	33
		4.20.1 Wastewater Treatment Plant Sludge and Nonhazardous Bulk Liquids	33
		4.20.2 Industrial Waste	33
	4.21	Prevention of Discharge of Contaminated Water	34a
	4.22	Leachate and Contaminated Water Plan	34a
	4.23	Site Inspection and Maintenance List	41
	4.24	Visual Screening of Daily Operations	42
5	**SEQUENCE OF DEVELOPMENT**		**43**
6	**DETECTION AND PREVENTION OF DISPOSAL OF PROHIBITED WASTES**		**44**
	6.1	General	44
	6.2	Load Inspection Procedure	44
	6.3	Recordkeeping	47
	6.4	Training	47
	6.5	Managing Prohibited Wastes	48
	6.6	Managing Mishandled or Undeclared Special Waste	48
7	**FIRE PROTECTION PLAN**		**49**
	7.1	Fire Protection Training	49
	7.2	Fire Protection Standards	50

CONTENTS (Continued)

	7.2.1	Posted Information	50
	7.2.2	Fire Safety Rules	50
	7.2.3	Burning Waste Loads (Hot Loads)	50
7.3		Accidental Fires	51
7.4		Preventive Procedures	51
7.5		Vehicle or Equipment Fire	52
7.6		Structure Fire	52
7.7		Working Face(s) Fire Protection Plan	52
	7.7.1	Working Face Fire Protection Requirements (§330.115)	52
	7.7.2	Working Face Fire Fighting Plan	53
	7.7.3	Water Trucks or Storage Tank Requirements	54
	7.7.4	Soil Stockpile Requirements	54
7.8		RACM Area Fire	57
7.9		Liquid Waste Bulking Facility Fire	57
7.10		Contacting Fire Department and TCEQ	57
8	**SAFETY**		**58**
8.1		General Site Safety	58
8.2		Preparedness and Prevention Measures	59
	8.2.1	General	59
	8.2.2	Scale House	59
	8.2.3	Landfill Access Road	60
9	**RECORDKEEPING REQUIREMENTS**		**61**



CONTENTS (Continued)

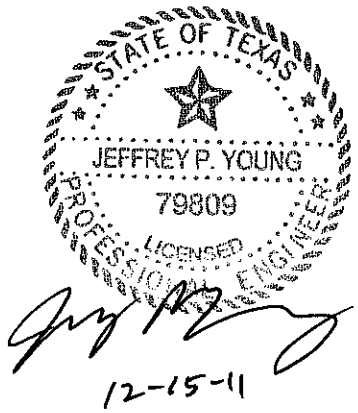
APPPENDIX A
Quality Control and Operational Plan for the Disposal of Special Wastes

APPENDIX B
Quality Control and Operational Plan for the Stabilization of Nonhazardous Bulk Liquids

APPENDIX C
Example of Load Inspection Report

APPENDIX D
Alternate Daily Cover Information

APPENDIX E
Class I Nonhazardous Industrial Waste Acceptance Plan



4.2.2 Waste Excluded from Disposal at the Site

The following wastes are specifically excluded from disposal at the site:

- Regulated hazardous wastes (refer to Section 6 for more information)
- Liquid wastes that do not pass the paint filter test, except as allowed under Section 4.20.1 of this SOP
- Waste classified as hazardous by the TCEQ (refer to Section 6 for more information)
- Grease trap wastes, except as allowed under Section 4.20.1 of this SOP
- Waste prohibited by the TCEQ (see 30 TAC §330.5(e))

4.2.3 Waste Unloading Procedures

Scale Operators, Equipment Operators, Laborers, and Spotters will monitor the incoming waste and direct vehicles to the appropriate disposal area. If a Spotter is not present at an unloading area, then the Equipment Operators at the unloading area will assume the Spotter's duties. Equipment Operators will visually inspect the waste material as it is being unloaded and processed from the cab of the equipment they are in (typically a compactor). Scale Operators control site access and monitor incoming vehicles for unauthorized wastes by (1) receiving manifests and other shipping documents, (2) recording incoming waste loads, (3) completing a visual inspection of the vehicle (including a video camera inspection of the top of the vehicle's contents), and (4) interviewing the driver, as necessary. Any nonconforming issues will be reported to the Landfill Manager. The Landfill Manager will work with the Scale Operators and other company resources (e.g., Special Waste Liaison/Compliance Coordinator or the Environmental Manager) to resolve any non-conforming issues. If the non-conforming issues involve Special or Industrial wastes, the Landfill Manager and Scale Operators will review Sections 4.20 and 6.2 of the SOP to verify that all requirements for acceptance of Special and Industrial waste have been met before the material is accepted for disposal. The procedures for handling prohibited waste that is not discovered until after it is unloaded are discussed in Section 6.2.

Laborers, Spotters, Equipment Operators, or other field personnel will be present at the working face at all times to monitor incoming loads of waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility and will be trained to identify prohibited wastes before being assigned to this task (refer to Section 2.2 for training procedures). The personnel will also be trained and have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. Site personnel will establish unloading positions at the working face. The unloading positions are basically equally spaced lanes that each collection vehicle uses to unload waste material from the collection vehicle to the working face. Typically, each lane is about 20 feet wide to allow sufficient space between vehicles to allow the safe unloading of waste at the working face

(refer to Section 4.20 for additional information pertaining to when Class 1 waste and MSW are disposed of at the same working face in the Class 1 disposal area).

The Scale Operators, Laborers, Spotters, and Equipment Operators have the authority and responsibility to reject unauthorized loads, have unauthorized material removed by the transporter, and/or assess surcharges, and have the unauthorized material removed by on-site personnel or otherwise properly managed by the facility. In the event an unauthorized load is discovered at an unloading area, the Spotter, Laborer, or Equipment Operator (i.e., working face staff) will notify the Landfill Manager or the General Manager immediately. The Landfill Manager or General Manager will verify that the appropriate action is taken. In addition, if the unauthorized load is discovered at the site entrance, the Scale Operator will notify the Landfill Manager or the General Manager immediately to verify that the appropriate action is taken. A record of each unauthorized material removal event will be maintained in the Site Operating Record.

Solid waste unloading will be controlled to prevent disposal in locations other than those specified by site management. For example, random load inspections will be conducted as outlined in Section 6.2 of this SOP. Any allowable waste deposited in an unauthorized area will be immediately removed and disposed of properly at the current working face. The Laborers, Spotters, and Equipment Operators (or other site personnel) will actively investigate any approved waste haul vehicles that do not dispose of their waste in an authorized area. In the event that an authorized load of waste has been deposited in an unauthorized area, the Laborer, Spotter, or Equipment Operator will notify the Landfill Manager and the waste load will be promptly relocated to the authorized working face area.

4.2.4 Maximum Size of the Unloading Area

As discussed previously, the following four unloading areas exist at the Southwest Landfill.

- MSW Unloading Area or Working Face
- Class I Nonhazardous Industrial Solid Waste Unloading Area and Working Face
- RACM Unloading and Disposal Area
- Bulk Liquid Processing Area

The MSW and Class I unloading and working face areas are discussed below. The RACM unloading and disposal area is discussed in Appendix A (maximum size 50 feet by 50 feet). The bulk liquid processing area is discussed in Appendix B (maximum size 100 feet x 200 feet).

Control(s) will also be used to confine the working face to as small an area as practical consistent with the rate of incoming waste and safe and efficient working face operations. The maximum size of the working face will be limited to the area listed on the next page for a range of waste accepted at the facility.

steel, iron scrap, plastics, styrofoam, rope, twine, uncontaminated rubber, uncontaminated wooden materials, equipment belts, wiring, uncontaminated cloth, metal buildings, empty containers with a holding capacity of five gallons or less, uncontaminated floor sweepings, or food packaging, that are produced as a result of plant production.

- Class III Industrial Solid Waste - any inert and essentially insoluble industrial solid waste, including materials such as rock, brick, glass, dirt, and certain plastics and rubber, etc. that are not readily decomposable as defined in §335.507 (relating to Class III waste determination).
- Class I Industrial Solid Waste that is defined as Class I only because of its asbestos content will be accepted and handled in accordance with the procedures listed in Section 4.20.5. Other Class I waste will be accepted consistent with the procedures outlined in Appendix E (the Class I Nonhazardous Industrial Waste Acceptance Plan).

Class 1 waste may be placed below existing grades in designated disposal sectors shown on Attachment 1M in Part III. When a "dedicated" sector below existing grade has been filled to the grades referenced above, a barrier soil layer of at least four feet of compacted clay-rich soil must be placed on top of the Class 1 waste and on any exposed side slopes. Municipal solid waste may then be placed above the barrier soil layer to the final design grade.

With the above grade Class 1 waste disposal options, Class 1 waste only or Class 1 waste mixed with other wastes may be placed either below or above the compacted perimeter berm elevation in areas with liners constructed in accordance with §330.331(e). The two above grade Class 1 disposal options are shown on Drawing 1M-7 in Part III, Attachment 1 and summarized below.

- Above Grade Class 1 Waste Disposal Area with 4-foot-thick Separation Layer. This option allows for the disposal of Class 1 wastes above existing grade if containment dikes are constructed along the exterior slope of the Class 1 waste disposal area. This option also includes the placement of a 4-foot-thick compacted clay rich barrier layer that will be placed over the Class 1 waste as a separation layer between the Class 1 waste and the municipal solid waste (and other non-Class 1 waste material) to be placed above. With this option, the 4-foot-thick separation or barrier layer will be sloped toward the interior of the landfill.
- Above Grade Class 1 Waste Disposal Area. This option includes the construction of containment dikes along the exterior sideslope of the Class 1 disposal area to extend the limits of the Class 1 waste disposal area. No separation layer is required for this option; however, the thickness of the composite final cover system's infiltration layer will be increased from 1.5 feet to 4.0 feet with a maximum hydraulic conductivity of $1x10^{-7}$ cm/s.

Consistent with §330.173(e), the amount of Class 1 waste to be accepted will be limited to a maximum of 20 percent of the total waste, not including Class 1 waste, accepted during the current or previous year. The amount of waste may be determined by volume or by weight, but the same unit of measure must be used for each year. As noted in Section 9 (Table 9-1), the lateral extent of Class 1 waste placement will be documented in the Site Operating Record. Details of the landfill perimeter containment dike construction are included in the cross-sections in Part III, Attachments 1, 2, and 7, and described in detail in Attachment 1M.

Class 1 Waste Disposal Area Unloading Procedures

In areas where Class 1 and MSW will be comingled, the unloading procedures for the combined working face will be consistent with the waste unloading procedures specified in Section 4.2.3 (Waste Unloading Procedures). For example, Spotters, Equipment Operators, or other field personnel will be present at the combined working face at all times to monitor incoming loads of waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility and will be trained to identify prohibited wastes before being assigned to this task (refer to Section 2.2 for training procedures). The personnel will also be trained in and have a basic understanding of both industrial and hazardous waste and their transportation and disposal requirements. As discussed in Section 4.2.3, site personnel will establish unloading positions at the working face. The unloading

positions are basically equally spaced lanes that each collection vehicle uses to unload waste material from the collection vehicle to the working face. Typically, each lane is about 20 feet wide. When the Class 1 and MSW working face are combined, if warranted, the distance between the unloading positions utilized by Class 1 waste collection vehicles and MSW collection vehicles may be increased. This additional distance will provide a buffer between Class 1 unloading positions and the non-Class 1 unloading positions, which may be used by individual citizens. The Spotters and Equipment Operators will monitor the working face to verify that adequate spacing is maintained between vehicles, dust is minimized, and waste is being offloaded to the working face area in a safe manner (refer to Section 8 for additional safety information).

The Spotters and Equipment Operators will police the working face to verify that Class 1 waste is safely offloaded to the working face. If special handling procedures are required for Class 1 waste, then the working face personnel will be notified prior to the arrival of the waste haul vehicle at the working face so that the Spotters and Equipment Operators can take appropriate action (e.g., special handling procedures could include verifying that daily cover is placed over waste to minimize exposure to the atmosphere and/or establish a separate area at the working face to ensure that no other hauler is within a specified distance of the specific unloading position for the Class 1 waste that requires special handling).

4.21 Prevention of Discharge of Contaminated Water

The Landfill Manager or his designee shall implement necessary steps to control and prevent the discharge of contaminated water from the facility. No discharge of contaminated water shall occur without obtaining specific written authorization from the TCEQ prior to the discharge. All water coming in contact with waste or contaminated soils will be treated as contaminated water. Runon and runoff for the 25-year, 24-hour storm event will be controlled following the procedures set forth in the Surface Water Protection Plan and the Leachate and Contaminated Water Plan. The landfill will be operated consistent with §330.55(b)(1)(A)-(D) regarding discharge of solid wastes or pollutants into waters of the United States.

4.22 Leachate and Contaminated Water Plan

Leachate and contaminated water will be controlled at the Southwest Landfill as specified in the Leachate and Contaminated Water Plan.

Disposal of leachate generated from both Class 1 and non-Class 1 areas will be disposed of by the following methods.

- Transported to an off-site permitted disposal facility (e.g., POTW or commercial treatment facility)
- Recirculated over the areas underlain by a Subtitle D liner system, consistent with Title §330.177.

Leachate from both MSW and Class 1 waste disposal areas will be comingled in the leachate storage tanks. Leachate will be distributed from a water truck or other comparable equipment using a spray bar or hose to distribute leachate back to the working face (i.e., within the active waste fill area that is contained by the containment berm).

APPENDIX D

TCEQ PERMIT APPLICATION PART I FORM

Signature Page

I, Michael Stewart (Operator) Area Environmental Manager (Title)

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: Michael Stewart Date: 12/16/2011

TO BE COMPLETED BY THE OPERATOR IF THE APPLICATION IS SIGNED BY AN AUTHORIZED REPRESENTATIVE FOR THE OPERATOR

I, _____ (Print or Type Operator Name), hereby designate _____ (Print or Type Representative Name)

as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

_____
Printed or Typed Name of Operator or Principal Executive Officer

_____
Signature

SUBSCRIBED AND SWORN to before me by the said Michael Stewart

On this 16th day of December, 2011

My commission expires on the 21st day of July, 2013

RHONDA C. PILCHER
My Commission Expires
July 21, 2013

Rhonda C. Pilcher
Notary Public in and for

Hays County, Texas

(Note: Application Must Bear Signature & Seal of Notary Public)