



TABLE 1
SUMMARY OF SUBSOIL CONDITIONS AND RECOMMENDED TREATMENT

SWAMP NO.	FILL HEIGHT⁽¹⁾ (m)	DEPTH TO COMPETENT SOIL⁽²⁾ (m)	SOIL BELOW EXCAVATION BASE	DEPTH TO PROBABLE BEDROCK (m)	EXCAVATION PROCEDURE	RECOMMENDED TREATMENT
601 Sta. 10+000 to 10+300 Township of Cox	-3.5 (cut) – 2.5 (NBL) -2.0 (cut) – 6.5 (SBL)	0.0 – 11.6	Loose to very dense sand or probable bedrock	0.0 – 14.5 (El. 181.4 – 204.9)	Earth excavation	Full excavation of compressible soils (to el. 191 at the median – Sta. 10+130 to 10+220)
602 Sta. 11+000 to 11+400 Township of Cox	-2.0 (cut) – 4.5 (NBL) -3.0 (cut) – 4.0 (SBL)	0.0 – 7.4	Compact sandy soils or probable bedrock	0.0 – 9.9 (El. 195.2 – 210.3)	Earth excavation	Preloading without removal of compressible soils
603 Sta. 12+500 to 12+610 Township of Cox	1.5 – 5.5 (NBL) -1.0 (cut) – 0.5 (SBL)	0.0 – 7.2	Compact sand or probable bedrock	0.0 – 9.4 (El. 188.1 – 203.3)	Earth excavation	Preloading without removal of compressible soils
604 Sta. 13+160 to 13+240 Township of Cox	6.0 – 8.0 (NBL) 2.5 – 3.5 (SBL)	0.0 – 5.0	Compact sandy soils or probable bedrock	0.0 – 8.8 (El. 183.2 – 194.7)	Earth excavation	Preloading without removal of compressible soils
605 Sta. 15+240 to 15+320 Township of Cox	4.0 – 11.0 (NBL) 2.5 – 3.5 (SBL)	0.0 – 5.2	Compact sandy soils or probable bedrock	0.0 – >12.5 (El. <189.5 – 204.3)	Earth excavation	Preloading without removal of compressible soils
606 Sta. 15+870 to 16+300 Township of Cox	-5.0 (cut) – 5.0 (NBL) 0.5 – 4.5 (SBL)	0.0 – 11.7	Loose to compact sand or probable bedrock	0.0 – 11.7 (El. 196.6 – 216.2)	Earth excavation	Full excavation of compressible soils
607 Sta. 10+480 to 10+630 Township of Servos	-4.0 (cut) – 5.0 (NBL) -3.5 (cut) – 6.0 (SBL)	0.0 – 9.1	Very loose to very dense sand or probable bedrock	0.0 – 13.9 (El. 191.1 – 211.1)	Earth excavation	Full excavation of compressible soils

- NOTES: 1. Fill height is based on revised profile received on August 4, 2009.
2. Depth to competent soil and probable bedrock is based on both borehole and dynamic cone penetration test data.
3. Removal of peat and other organic soils is a prerequisite for swamp treatment.



TABLE 2
LIST OF STANDARD SPECIFICATIONS REFERENCED IN REPORT

DOCUMENT	TITLE
OPSD-201.010	Rock Grading-Undivided Rural
OPSD-201.020	Rock Grading-Divided Rural
OPSD-202.010	Slope Flattening Using Excess Material on Earth or Rock Embankment
OPSD-203.010	Embankments Over Swamp – New Construction
OPSD-203.020	Embankments Over Swamp – Existing Slope Excavated to 1H:1V
OPSS 120	General Specification for the Use of Explosives
SP 206S03	Construction Specification for Grading
SP 299F03	Rock Excavation (Machine Scaling)
SP 299F06	Rock Excavation (Controlled Blasting)
NRE 98-200	Northeastern Region Directive - Platform Widening

TABLE 3
SUMMARY OF DEPTH TO COMPETENT SOIL

SWAMP No.	TEST HOLE No.	LOCATION OF EXCAVATION TO COMPETENT SOIL	COMPETENT SOIL AT	
			DEPTH (m)	ELEVATION
601	601-2	Sta. 10+000, o/s 27.0 m Rt. CL Median	>1.0	<195.2
	601-5	Sta. 10+025, o/s 39.0 m Rt. CL Median	5.3	188.3
	601-7	Sta. 10+050, o/s 24.4 m Rt. CL Median	>0.7	<195.4
	601-11	Sta. 10+100, o/s 12.0 m Rt. CL Median	5.8	189.7
	601-15	Sta. 10+125, o/s 38.0 m Rt. CL Median	6.2	187.9
	601-16	Sta. 10+150, o/s 19.0 m Lt. CL Median	5.3	188.5
	601-17	Sta. 10+150, o/s 26.0 m Rt. CL Median	2.3	193.8
	601-17A	Sta. 10+165, o/s 6.0 m Rt. CL Median	11.6	184.4
	601-18	Sta. 10+175, o/s 34.1 m Lt. CL Median	6.6	187.2
	601-19 (*)	Sta. 10+175, o/s 4.9 m Lt. CL Median	5.0	188.8
	601-20 (*)	Sta. 10+175, CL Median	4.9	189.1
	601-22	Sta. 10+200, o/s 19.0 m Lt. CL Median	5.9	187.8
	601-23	Sta. 10+200, o/s 18.8 m Rt. CL Median	>1.5	<196.0
	601-24	Sta. 10+225, o/s 35.4 m Lt. CL Median	5.5	188.2
	601-25 (*)	Sta. 10+225, o/s 14.0 m Lt. CL Median	4.0	189.6
	601-27	Sta. 10+250, o/s 19.0 m Lt. CL Median	0.8	193.0
	601-29	Sta. 10+275, o/s 36.6 m Lt. CL Median	2.1	191.8
	601-30	Sta. 10+275, o/s 2.4 m Lt. CL Median	>0.9	<198.9
	601-32	Sta. 10+300, o/s 30.0 m Lt. CL Median	0.9	193.0
	N1-2	Sta. 10+082, o/s 45.2 m Rt. CL Median	3.8	190.8
	N1-3	Sta. 10+228, o/s 38.2 m Lt. CL Median	6.1	187.9
602	602-7	Sta. 11+050, o/s 19.0 m Rt. CL Median	3.0	202.1
	602-12	Sta. 11+100, o/s 19.0 m Rt. CL Median	1.5	203.6
	602-17	Sta. 11+150, o/s 19.0 m Rt. CL Median	7.4	197.7
	602-33	Sta. 11+310, o/s 33.0 m Lt. CL Median	0.4	207.9
	602-38	Sta. 11+350, o/s 33.0 m Lt. CL Median	0.2	210.4

TABLE 3
SUMMARY OF DEPTH TO COMPETENT SOIL

SWAMP No.	TEST HOLE No.	LOCATION OF EXCAVATION TO COMPETENT SOIL	COMPETENT SOIL AT	
			DEPTH (m)	ELEVATION
602	602-39	Sta. 11+350, CL Median	0.2	208.6
	602-44	Sta. 11+390, CL Median	0.2	205.7
	602-47	Sta. 11+400, o/s 19.0 m Rt. CL Median	1.5	204.4
603	603-2	Sta. 12+500, o/s 19.0 m Rt. CL Median	0.0	202.1
	603-5	Sta. 12+512.5, o/s 35.0 m Rt. CL Median	1.9	199.9
	603-7	Sta. 12+525, o/s 19.0 m Rt. CL Median	0.0	201.5
	603-9	Sta. 12+537.5, CL Median	0.8	198.2
	603-14	Sta. 12+562.5, CL Median	5.0	192.7
	603-17	Sta. 12+575, o/s 19.0 m Rt. CL Median	4.8	192.3
	603-19	Sta. 12+587.5, CL Median	7.2	190.3
	603-21	Sta. 12+590, o/s 11.1 m Lt. CL Median	>2.3	<199.2
	603-22	Sta. 12+600, o/s 19.0 m Rt. CL Median	2.1	195.0
	603-25	Sta. 12+610, o/s 40.0 m Rt. CL Median	0.3	198.1
604	604-4	Sta. 13+175, o/s 18.7 m Lt. CL Median	>1.7	<195.5
	604-5	Sta. 13+175, o/s 19.0 m Rt. CL Median	4.5	187.5
	604-6	Sta. 13+187.5, o/s 45.0 m Lt. CL Median	0.8	190.3
	604-7	Sta. 13+187.5, CL Median	5.0	187.0
	604-8	Sta. 13+187.5, o/s 40.0 m Rt. CL Median	3.7	188.3
	604-9	Sta. 13+209, o/s 20.0 m Lt. CL Median	>3.8	<192.6
	604-10	Sta. 13+200, o/s 19.0 m Rt. CL Median	4.8	187.2
	604-11	Sta. 13+212, o/s 32.0 m Lt. CL Median	>1.8	<195.4
	604-12	Sta. 13+212.5, CL Median	3.6	188.4
	604-13	Sta. 13+212.5, o/s 40.0 m Rt. CL Median	2.0	190.0
	604-15	Sta. 13+225, o/s 19.0 m Rt. CL Median	0.9	191.1
	604-14	Sta. 13+225, o/s 17.3 m Lt. CL Median	>0.5	<195.0
	604-18	Sta. 13+240, o/s 36.0 m Rt. Median	0.6	192.4

TABLE 3
SUMMARY OF DEPTH TO COMPETENT SOIL

SWAMP No.	TEST HOLE No.	LOCATION OF EXCAVATION TO COMPETENT SOIL	COMPETENT SOIL AT	
			DEPTH (m)	ELEVATION
605	605-3	Sta. 15+240, o/s 37.3 m Rt. CL Median	4.6	193.3
	605-6	Sta. 15+262.5, o/s 41.0 m Lt. CL Median	0.2	202.5
	605-8	Sta. 15+262.5, o/s 41.0 m Rt. CL Median	>0.7	<197.0
	605-10	Sta. 15+275, o/s 18.8 m Rt. CL Median	0.0	197.4
	605-12	Sta. 15+287.5, o/s 40.0 m Rt. CL Median	0.6	203.3
	605-13	Sta. 15+290, o/s 4.0 m Rt. CL Median	0.2	197.1
	605-14	Sta. 15+300, o/s 10.0 m Lt. CL Median	>0.4	<204.9
	605-15	Sta. 15+300, o/s 18.8 m Rt. CL Median	1.5	200.0
	605-16	Sta. 15+312.5, o/s 42.5 m Lt. CL Median	>0.0	<200.7
	605-17	Sta. 15+312.5, CL Median	5.2	196.8
	605-18	Sta. 15+312.5, o/s 38.8 m Rt. CL Median	0.2	208.5
	605-19	Sta. 15+320, o/s 17.7 m Lt. CL Median	>0.9	<204.8
606	606-2	Sta. 15+870, o/s 18.8 m Rt. CL Median	0.4	207.9
	606-4	Sta. 15+875, CL Median	4.9	201.0
	606-5	Sta. 15+875, o/s 31.0 m Rt. CL Median	0.4	211.6
	606-6	Sta. 15+900, o/s 18.8 m Lt. CL Median	7.3	199.1
	606-8	Sta. 15+925, o/s 40.5 m Lt. CL Median	5.0	201.2
	606-10	Sta. 15+925, o/s 36.0 m Rt. CL Median	0.4	210.9
	606-14	Sta. 15+975, CL Median	1.5	205.8
	606-23	Sta. 16+050, o/s 25.0 m Lt. CL Median	>0.6	<209.0
	606-32	Sta. 16+100, o/s 33.0 m Rt. CL Median	4.3	208.9
	606-34	Sta. 16+125, o/s 38.5 m Lt. CL Median	3.3	204.2
	606-38	Sta. 16+150, o/s 24.0 m Lt. CL Median	3.6 (BR)	207.2
	606-39	Sta. 16+160, o/s 18.8 m Rt. CL Median	0.2	213.2
	606-40	Sta. 16+175, o/s 41.5 m Lt. CL Median	5.5	202.0
	606-42	Sta. 16+180, o/s 7.0 m Rt. CL Median	0.4	213.2

TABLE 3
SUMMARY OF DEPTH TO COMPETENT SOIL

SWAMP No.	TEST HOLE No.	LOCATION OF EXCAVATION TO COMPETENT SOIL	COMPETENT SOIL AT	
			DEPTH (m)	ELEVATION
606	606-46	Sta. 16+225, o/s 45.0 m Lt. CL Median	1.8	205.7
	606-48	Sta. 16+225, o/s 36.5 m Rt. CL Median	4.0	208.2
	606-54	Sta. 16+300, o/s 14.0 m Lt. CL Median	2.7	210.2
	N9-3	Sta. 16+195.6, o/s 60.8 m Lt. CL Median	4.1	201.8
607	607-1 (*)	Sta. 10+480, o/s 11.1 m Lt. CL Median	5.0	200.0
	607-2	Sta. 10+480, o/s 26.4 m Rt. CL Median	5.0	201.7
	607-6 (*)	Sta. 10+500, o/s 10.8 m Lt. CL Median	9.0	196.2
	607-8 (*)	Sta. 10+512.5, o/s 27.8 m Lt. CL Median	7.1	199.1
	607-9	Sta. 10+512.5, o/s 8.2 m Rt. CL Median	8.8	196.6
	607-12	Sta. 10+525, o/s 27.1 m Rt. CL Median	9.1	195.9
	607-15	Sta. 10+537.5, o/s 27.6 m Rt. CL Median	8.7	196.1
	607-23	Sta. 10+575, o/s 28.3 m Rt. CL Median	2.7	202.2
	607-28	Sta. 10+600, o/s 28.5 m Rt. CL Median	0.2	207.5
	607-29	Sta. 10+612.5, o/s 24.6 m Lt. CL Median	0.0	210.2
	607-32	Sta. 10+625, o/s 8.7 m Lt. CL Median	0.3	210.7
	607-34	Sta. 10+630, o/s 19.8 m Lt. CL Median	0.0	211.1
	607-35	Sta. 10+630, o/s 10.2 m Rt. CL Median	>7.0	<204.0
	607-36	Sta. 10+630, o/s 38.7 m Rt. CL Median	0.2	208.5
	N10-2	Sta. 10+531, o/s 2.5 m Rt. CL Median	3.0	201.8

NOTES: (*) Shallow/partial excavation will be required to maintain stability of existing Highway 69 embankment.

1. Competent soil is either bedrock or probable bedrock for all other test hole locations.
2. Swamp excavation is to primarily remove peat/topsoil and cohesive soils.
3. Allowance for additional 100 to 300 mm penetration of rockfill below the levels indicated should be made depending on the relative density of underlying soils.
4. Under existing Highway 69 / New NBL/SBL, cohesive soils need not be excavated for road grade raises less than 0.5 m.



TABLE 4

TEMPORARY BACKSLOPE INCLINATION FOR SWAMP EXCAVATION

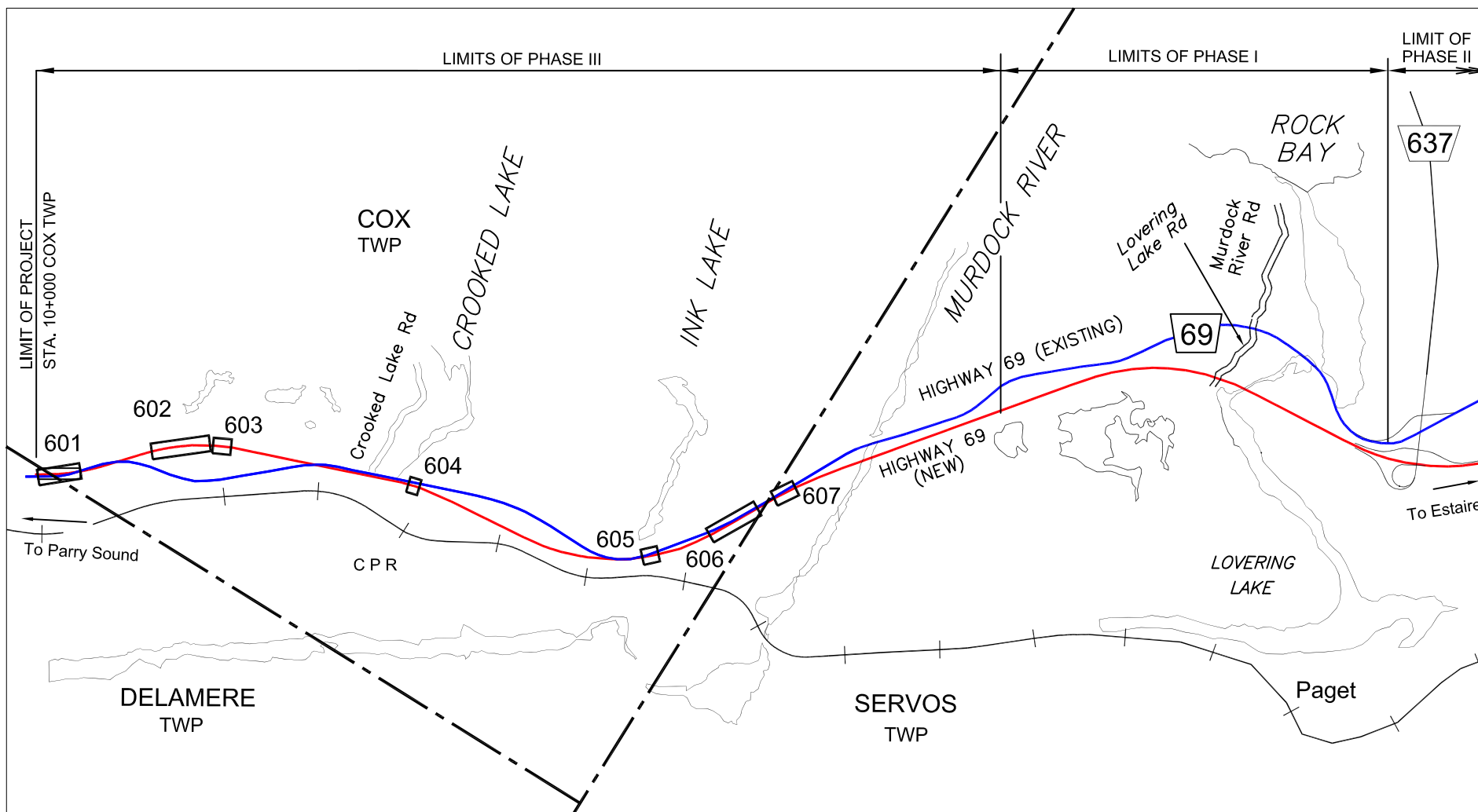
SWAMP No.	LOCATION	TEMPORARY BACKSLOPE FOR SWAMP EXCAVATION (H:V)
601	Sta. 10+000 to 10+300 Township of Cox	Sta. 10+175 to 10+230 (SBL) – 2:1
		Other locations – 1:1
602	Sta. 11+000 to 11+400 Township of Cox	1:1
603	Sta. 12+500 to 12+610 Township of Cox	1:1
604	Sta. 13+160 to 13+240 Township of Cox	1:1
605	Sta. 15+240 to 15+320 Township of Cox	1:1
606	Sta. 15+870 to 16+300 Township of Cox	1:1
607	Sta. 10+480 to 10+630 Township of Servos	1:1

NOTE: Recommended embankment sideslope inclinations for new embankment construction are 1.25H:1V for rockfill and 2H:1V for earth fill.



TABLE 5
SETTLEMENT OF EMBANKMENT SURFACE

SWAMP NO.	RECOMMENDED TREATMENT	MAXIMUM FILL HEIGHT (m)	ESTIMATED SETTLEMENT (mm)	SURCHARGE PERIOD (months)	SETTLEMENT (mm)	
					DURING 1 st YEAR FOLLOWING FILL PLACEMENT	REMAINING
601	Full excavation of compressible soils (partially to elev. 191 at the median – Sta. 10+130 to 10+220)	6.5	0 – 260	12	150	0 – 110
602	Preloading without removal of compressible soils	4.5	0 – 245	–	175	0 – 70
603	Preloading without removal of compressible soils	5.5	0 – 240	–	175	0 – 65
604	Preloading without removal of compressible soils	8.0	15 – 140	–	70	0 – 70
605	Preloading without removal of compressible soils	11.0	15 – 155	–	80	0 – 75
606	Full excavation of compressible soils	5.0	0 – 255	12	150	0 – 105
607	Full excavation of compressible soils	6.0	0 – 210	12	120	0 – 90

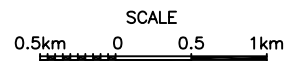


KEY PLAN LEGEND:

- HWY 69 (EXISTING)
- HWY 69 (NEW)
- 607 SWAMP LOCATION

KEY PLAN

HIGHWAY 69 FOUR-LANING (Phase III)
 From 4.5 km North of Highway 64 to
 8.7 km North of Highway 637
 District 54, Sudbury



METRIC



PRIME CONSULTANT

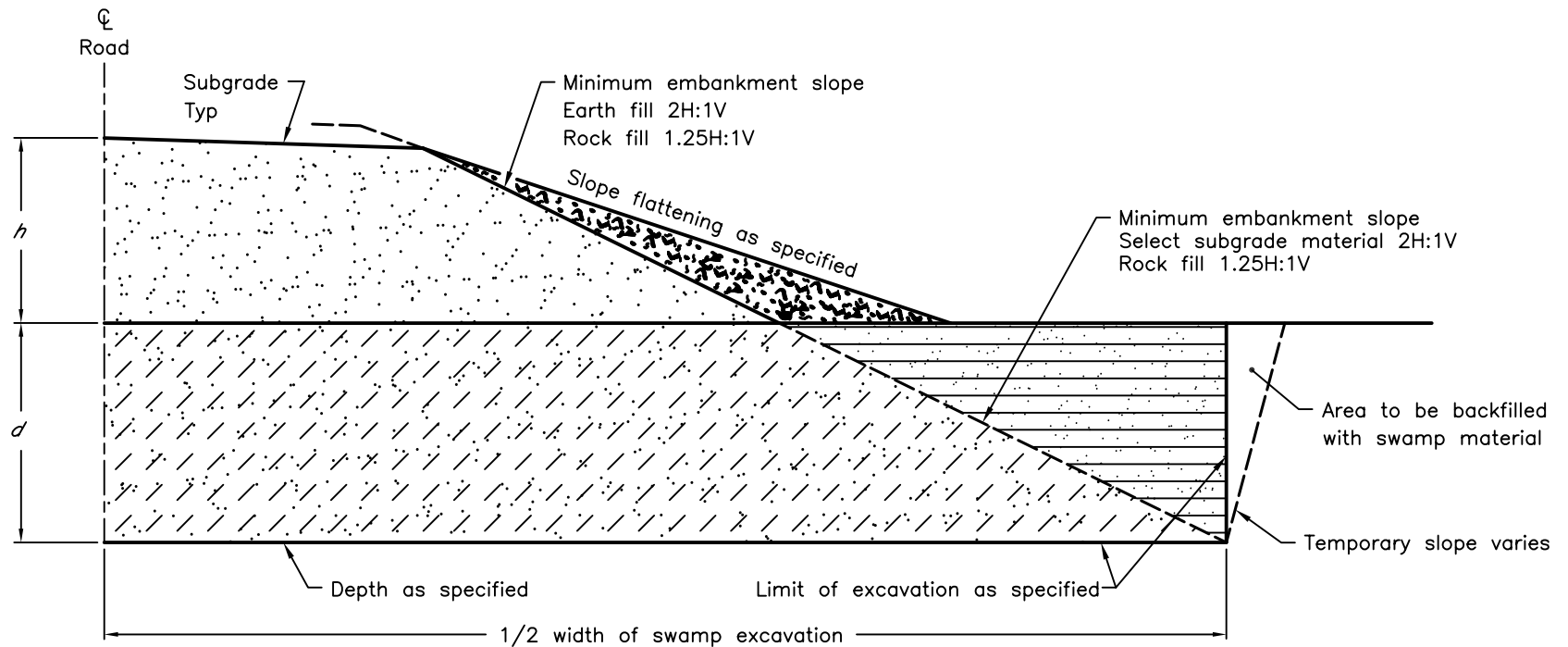
TSH

TOTTEN SIMS HUBICKI ASSOCIATES

GWP 5217-06-00



DRAWING
1



NOTES:

- A For this OPSD, h must be $\leq 4.5\text{m}$ and d must be $\leq 6.0\text{m}$.
- B Height of fill is the vertical difference between top of subgrade and top of swamp elevation measured at new road centreline.
- C For divided roads with median $< 10\text{m}$, excavate swamp material full width.
- D For divided roads with median $\geq 10\text{m}$, excavate swamp material to limits as specified.
- E All dimensions are in millimetres unless otherwise shown.

LEGEND:

	Embankment materials as specified
	Excavated swamp material
	Excavate and backfill as specified
	Excavate and backfill with swamp material

h - Height of fill
 d - Depth of sub-excavation

ONTARIO PROVINCIAL STANDARD DRAWING

Nov 2005

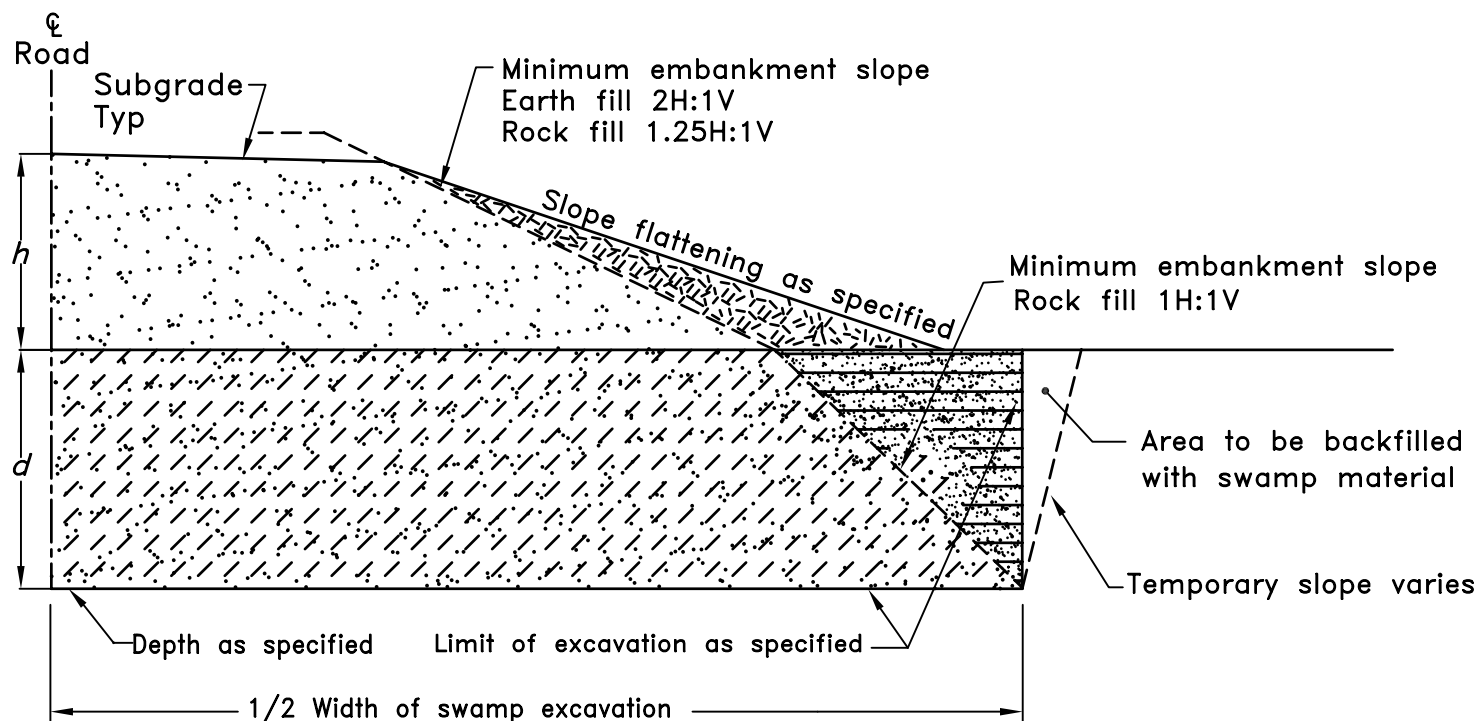
Rev 2

EMBANKMENTS OVER SWAMP

NEW CONSTRUCTION

OPSD - 203.010





NOTES:

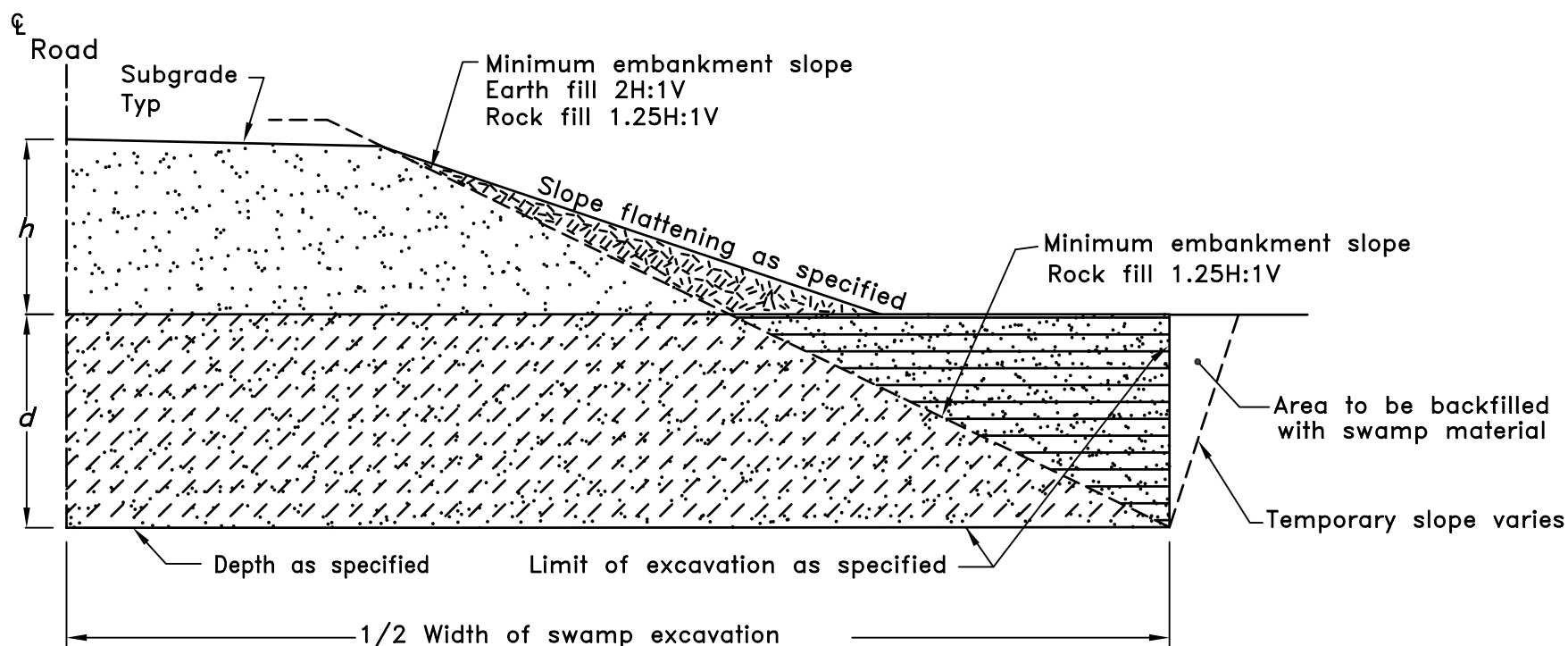
- A For this detail, h must be $\leq 3.0\text{m}$ and d must be $> 6.0\text{m}$.
- B Height of fill is the vertical difference between top of subgrade and top of swamp elevation measured at new road centreline.
- C For divided roads with median $< 10\text{m}$, excavate swamp material full width.
- D For divided roads with median $\geq 10\text{m}$, excavate swamp material to limits as specified.
- E All dimensions are in millimetres unless otherwise shown.

h - Height of fill
 d - Depth of sub-excavation

LEGEND:

	Embankment materials as specified
	Excavated swamp material
	Excavate and backfill with rockfill
	Excavate and backfill with swamp material

NOTE: THIS FIGURE IS BASED ON OPSD - 203.010 REVISION 2, DATED NOVEMBER 2005


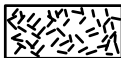
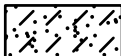
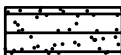


NOTES:

- A For this detail, h must be $>3.0\text{m}$ and d must be $>6.0\text{m}$.
- B Height of fill is the vertical difference between top of subgrade and top of swamp elevation measured at new road centreline.
- C For divided roads with median $<10\text{m}$, excavate swamp material full width.
- D For divided roads with median $\geq 10\text{m}$, excavate swamp material to limits as specified.
- E All dimensions are in millimetres unless otherwise shown.

h - Height of fill
 d - Depth of sub-excavation

LEGEND:

-  Embankment materials as specified
-  Excavated swamp material
-  Excavate and backfill with rockfill
-  Excavate and backfill with swamp material

NOTE: THIS FIGURE IS BASED ON OPSD - 203.010 REVISION 2, DATED NOVEMBER 2005



APPENDIX A

Slope Stability Analyses Diagrams

SLOPE STABILITY ANALYSES DIAGRAMS

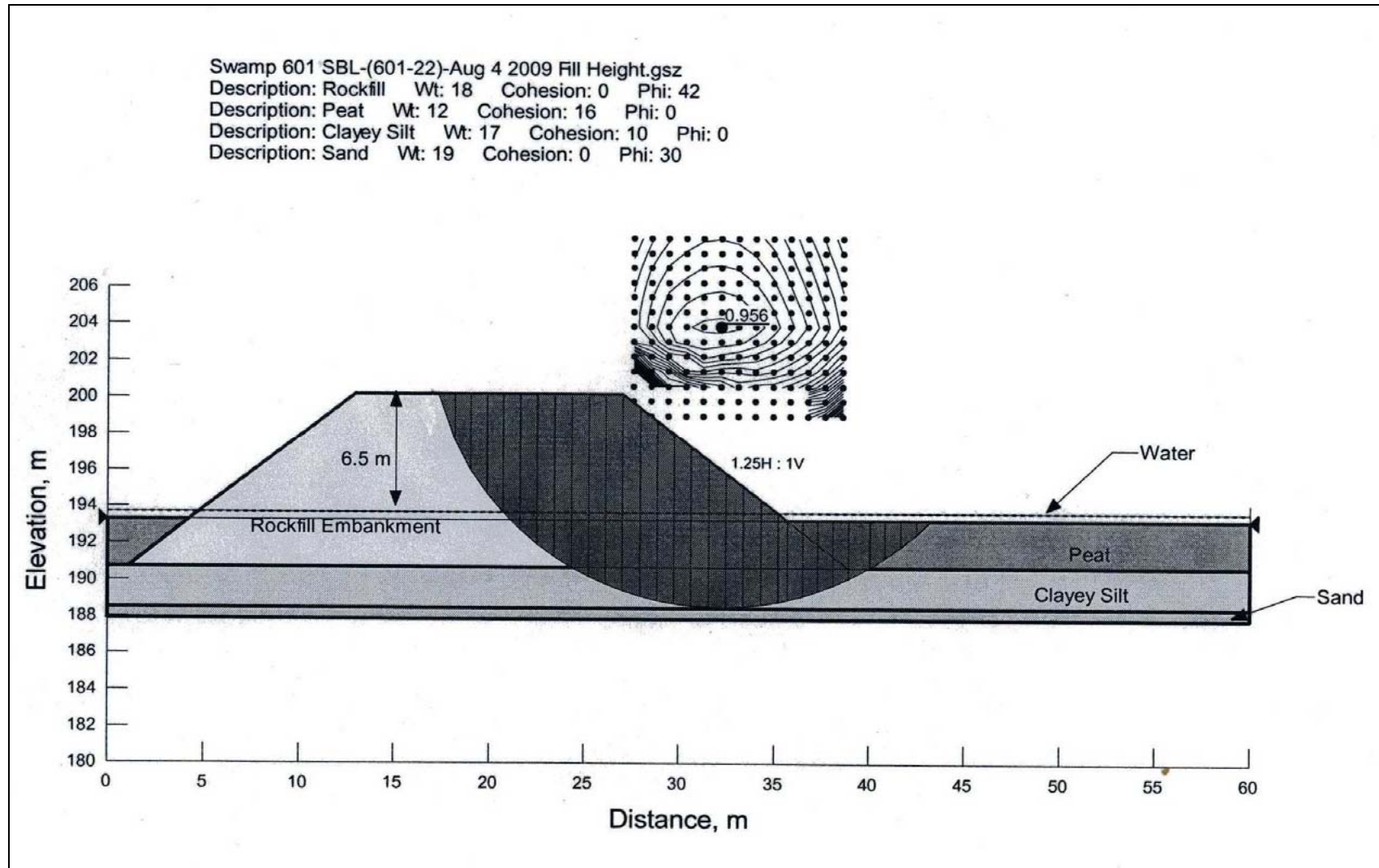


FIGURE A-1

SLOPE STABILITY ANALYSES DIAGRAMS

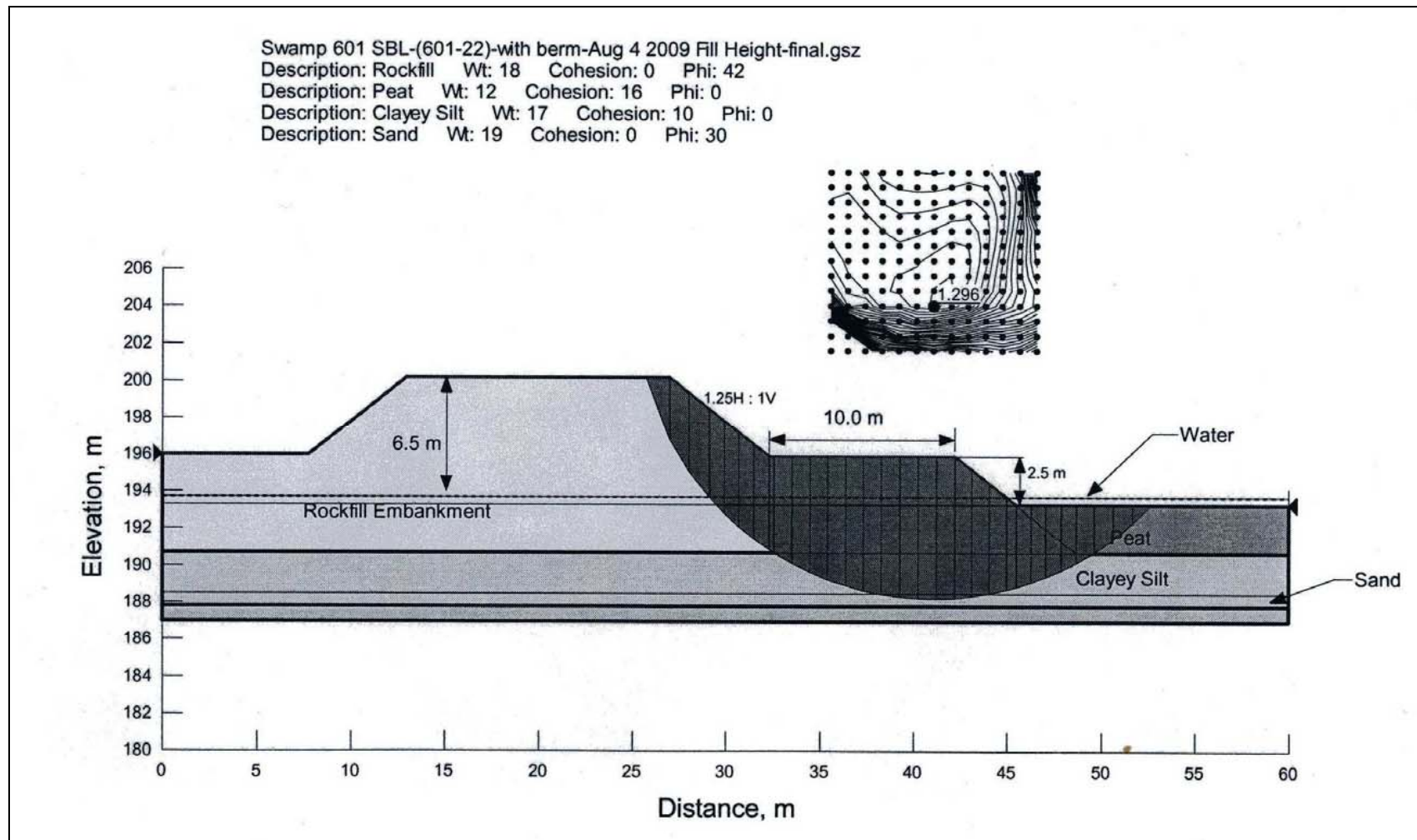


FIGURE A-2

SLOPE STABILITY ANALYSES DIAGRAMS

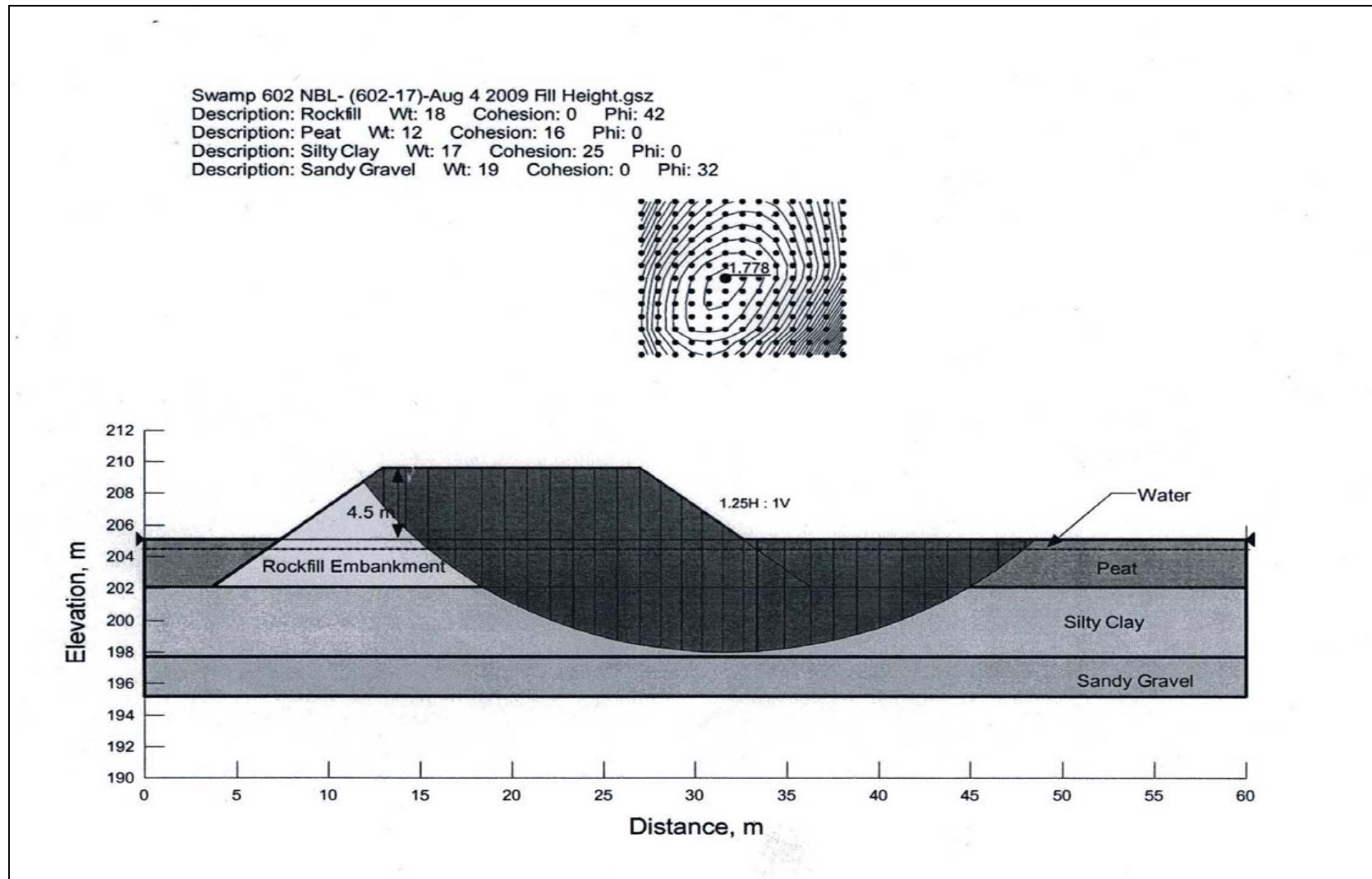


FIGURE A-3

SLOPE STABILITY ANALYSES DIAGRAMS

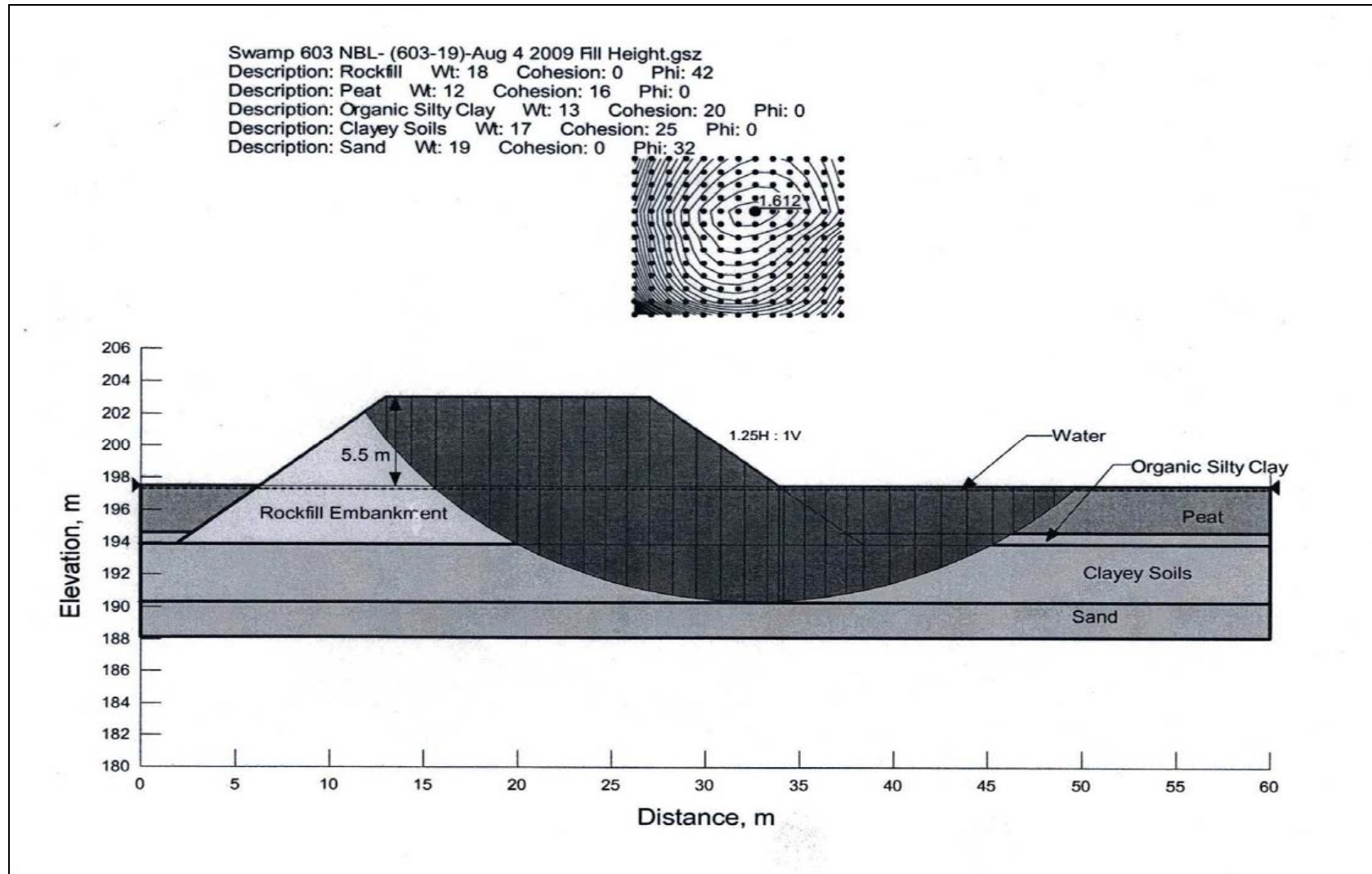


FIGURE A-4

SLOPE STABILITY ANALYSES DIAGRAMS

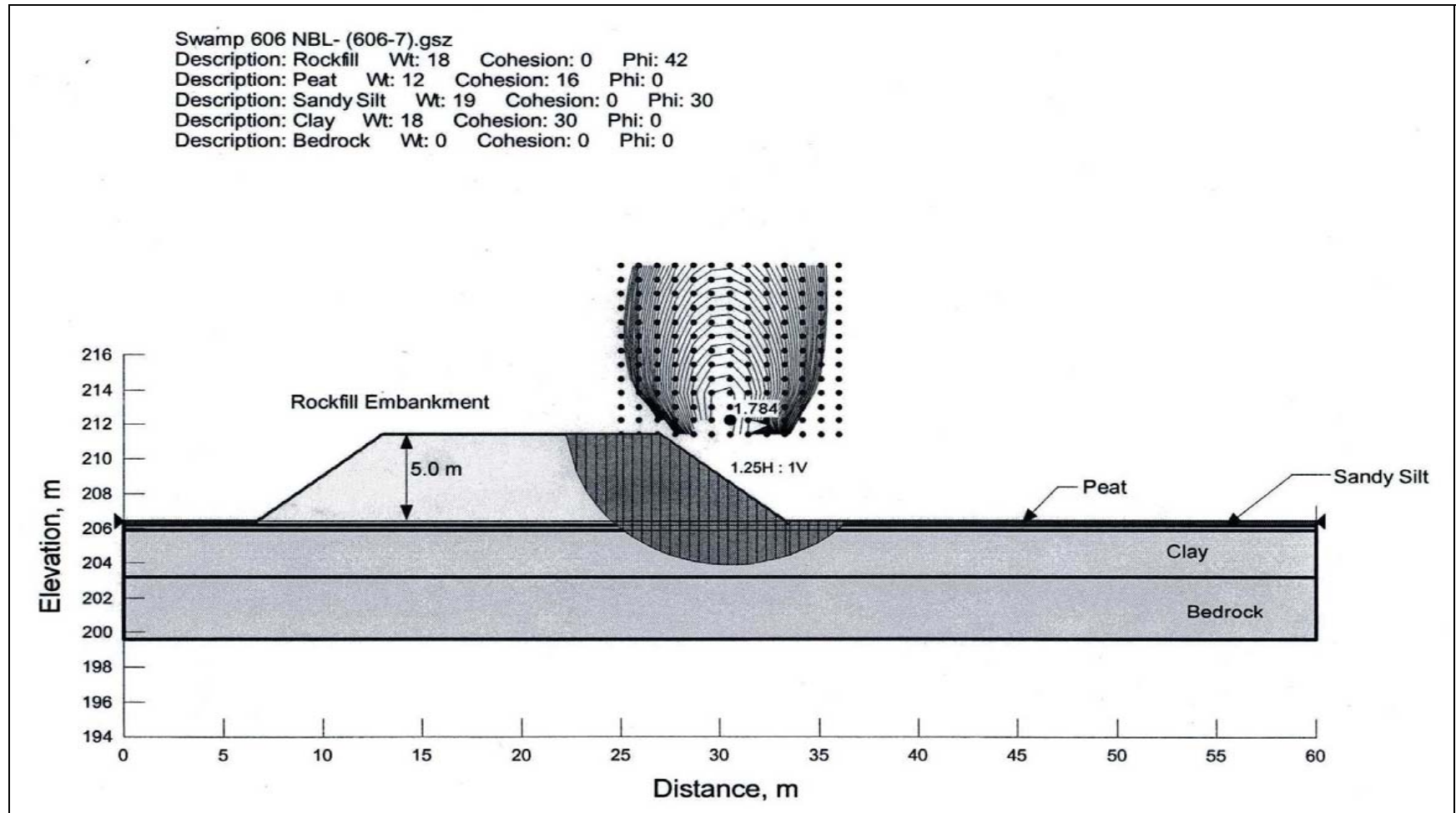


FIGURE A-5

SLOPE STABILITY ANALYSES DIAGRAMS

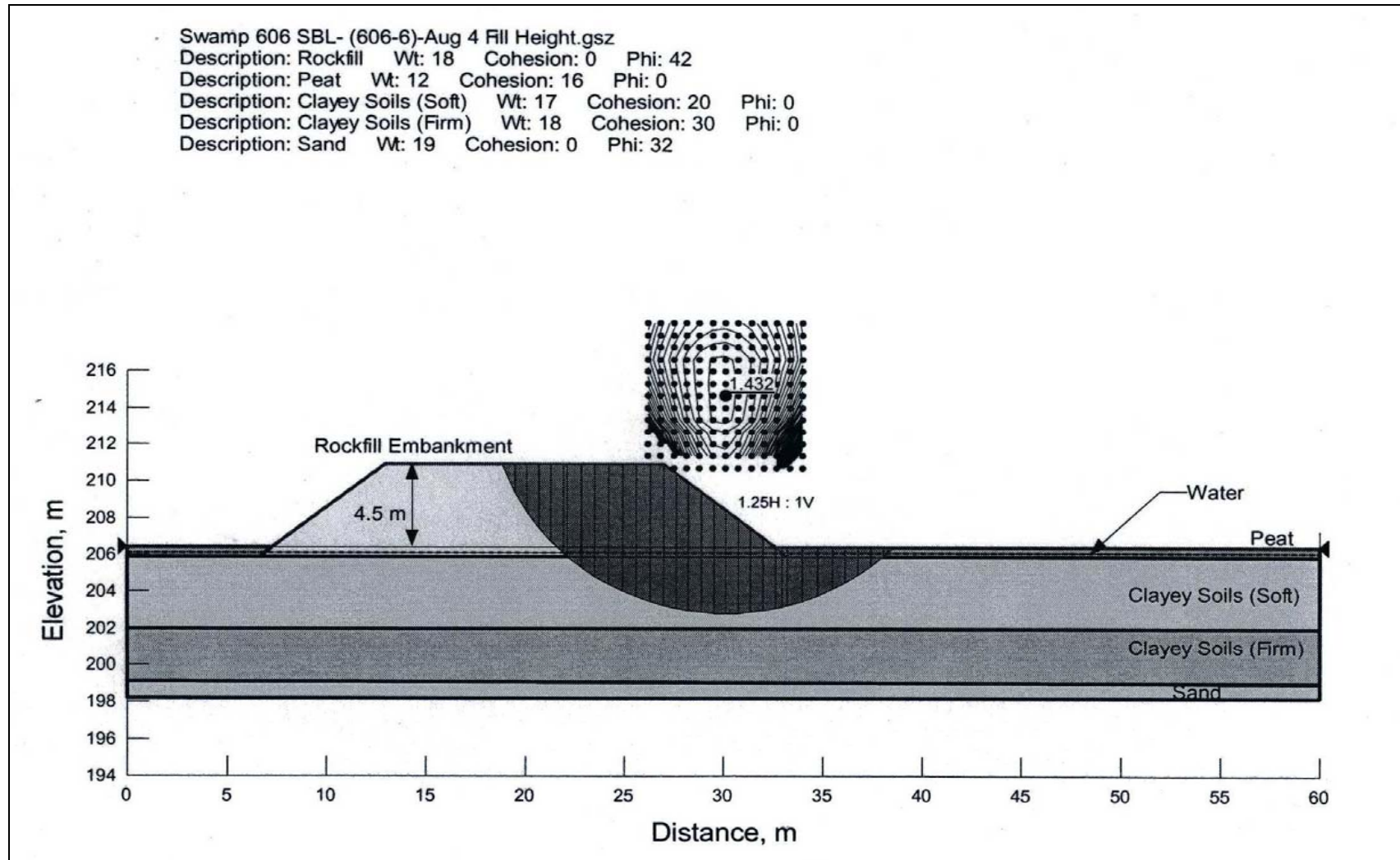


FIGURE A-6

SLOPE STABILITY ANALYSES DIAGRAMS

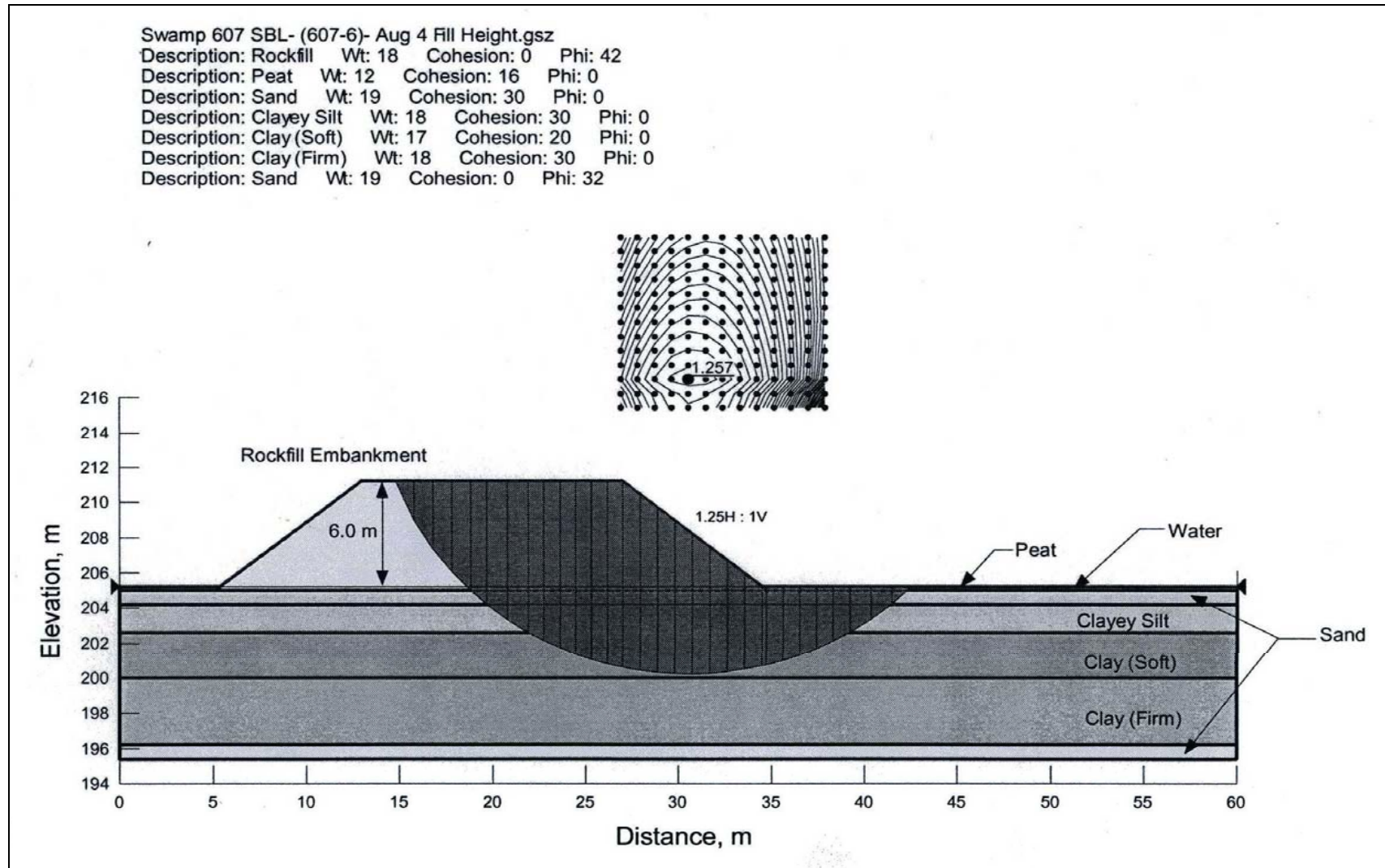


FIGURE A-7

SLOPE STABILITY ANALYSES DIAGRAMS

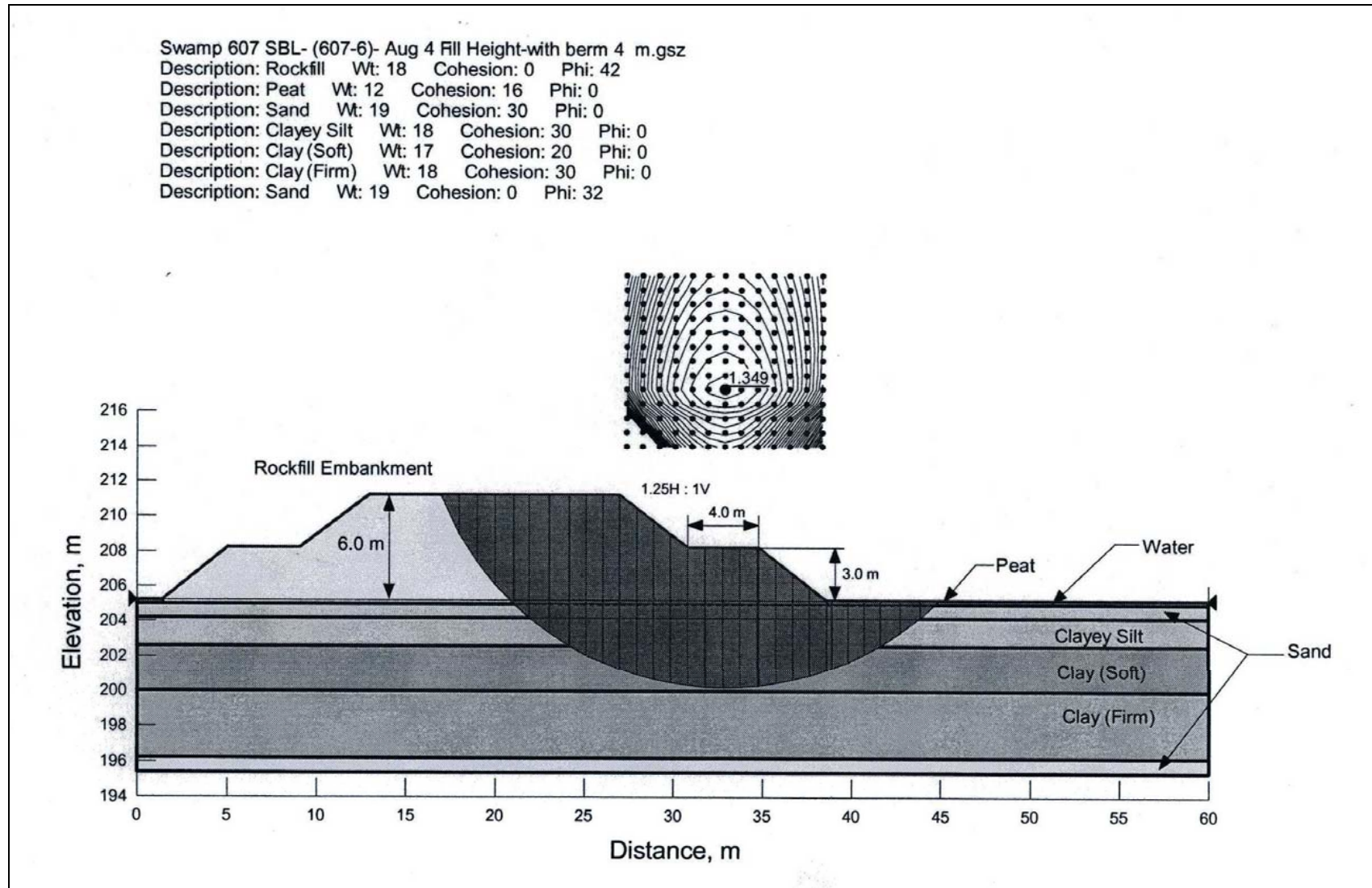


FIGURE A-8