



TABLE 1
SUMMARY OF ADVANTAGES, DISADVANTAGES AND RECOMMENDED FOUNDATIONS

FOUNDATION TYPE	ADVANTAGES	DISADVANTAGES	RECOMMENDED FOUNDATION TYPE
SOUTH ABUTMENT			
Spread footings on rock	<ul style="list-style-type: none">• Ease of construction• High bearing resistance relative to footings on engineered fill• Minimal requirement for rock excavation• No requirement to provide erosion protection	<ul style="list-style-type: none">• Need to place mass concrete to provide a level surface	Driven piles
Spread footings on engineered fill pad	<ul style="list-style-type: none">• Ease of construction• No requirement for rock excavation	<ul style="list-style-type: none">• Difficulty placing engineered fill on undulating / sloping rock surface• Lower bearing resistance than for other alternatives• Need to provide erosion protection	
Driven piles	<ul style="list-style-type: none">• High capacity• Permits construction of integral abutments	<ul style="list-style-type: none">• High cost relative to footings	
Caissons	<ul style="list-style-type: none">• High capacity	<ul style="list-style-type: none">• Need to advance through boulders• Special construction methods on sloping bedrock• High cost relative to other alternatives	
SOUTH AND NORTH PIERS			
Spread footings on rock	<ul style="list-style-type: none">• Ease of construction relative to caissons• High bearing resistance• Low cost relative to caissons	<ul style="list-style-type: none">• Need to place mass concrete to provide a level surface	Spread footings on rock
Spread footings on engineered fill pad	Not appropriate		
Driven piles	Not appropriate		
Caissons	<ul style="list-style-type: none">• High capacity	<ul style="list-style-type: none">• High cost relative to footings• Need to advance through boulders	



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FOUNDATION TYPE	ADVANTAGES		DISADVANTAGES	RECOMMENDED FOUNDATION TYPE
CENTRE PIER				
Spread footings on rock	Not applicable			Driven piles
Spread footings on engineered fill pad	Not applicable			
Driven piles	<ul style="list-style-type: none">• High capacity• Low cost relative to caissons	<ul style="list-style-type: none">• Difficult access		
Caissons	<ul style="list-style-type: none">• High capacity	<ul style="list-style-type: none">• Need to advance through boulders• Need to extend liner into rock• Need to employ tremie techniques to place concrete• High cost relative to driven piles		
NORTH ABUTMENT				
Spread footings on rock	<ul style="list-style-type: none">• Ease of construction• High bearing resistance relative to footings on engineered fill• Minimal requirement for rock excavation• No requirement to provide erosion protection	<ul style="list-style-type: none">• Need to place mass concrete to provide a level surface		Spread footings on rock
Spread footings on engineered fill pad	<ul style="list-style-type: none">• Ease of construction• No requirement for rock excavation	<ul style="list-style-type: none">• Difficulty placing engineered fill on undulating / sloping rock surface• Lower bearing resistance than for other alternatives• Need to provide erosion protection		
Driven piles	<ul style="list-style-type: none">• High capacity• Permits construction of integral abutments	<ul style="list-style-type: none">• Short piles• Need to excavate rock to provide sufficient length for integral abutments• High cost relative to footings		
Caissons	<ul style="list-style-type: none">• High capacity	<ul style="list-style-type: none">• Need to advance through boulders• Special construction methods on sloping bedrock• High cost relative to other alternatives		



TABLE 2
LIST OF STANDARD SPECIFICATIONS REFERENCED IN REPORT

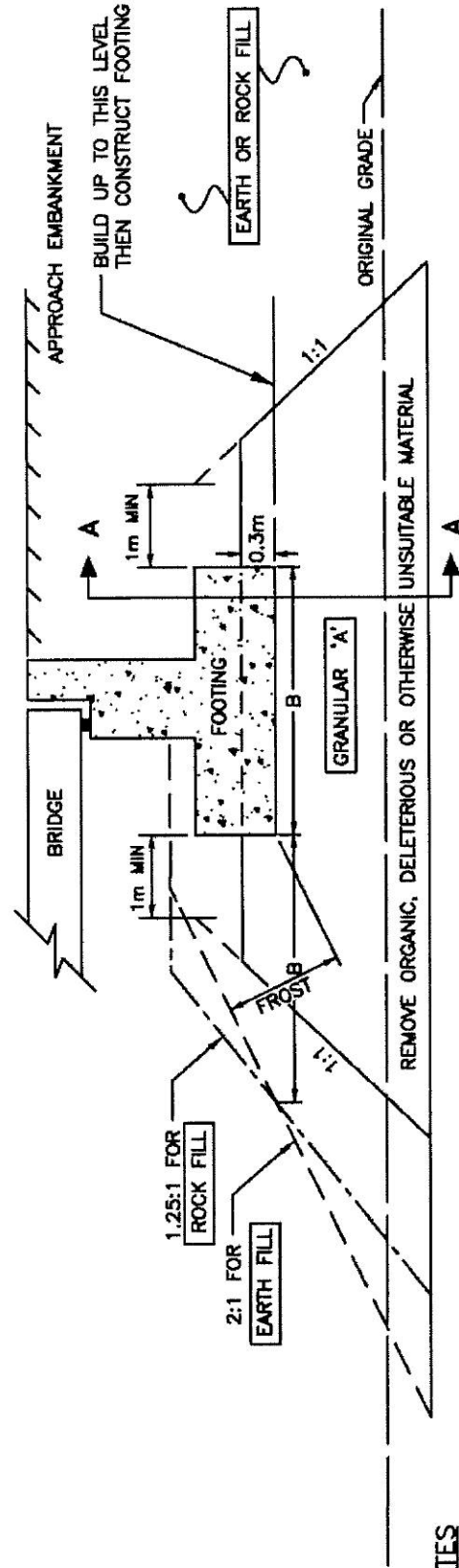
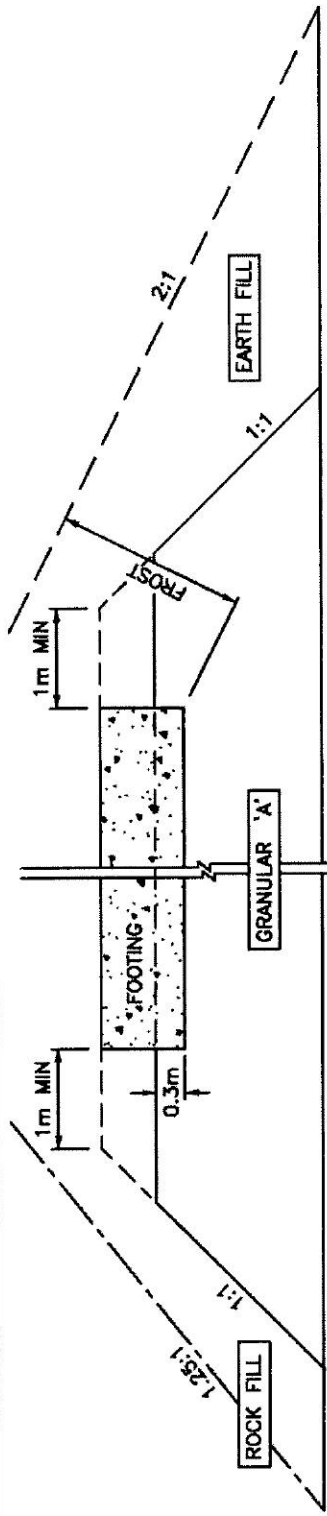
DOCUMENT	TITLE
OPSS 120	General Specification for the Use of Explosives
OPSS 501	Construction Specification for Compacting
OPSS 571	Construction Specification for Sodding
OPSS 572	Construction Specification for Seed and Cover
SP 105S10	Construction Specification for Compaction
SP 206S03	Construction Specification for Grading
SP 299F03	Rock Excavation (Machine Scaling)
SP 299F04	Rock Excavation (Trim Blasting)
SP 299F06	Rock Excavation (Controlled Blasting)
SP 405F03	Construction Specification for Pipe Subdrains
SP 599S22	Requirements for The Design, Supply and Construction of Retaining Soil Systems (RSS)
SP 902S01	Excavation and Backfilling of Structures
SP 903S01	Construction Specification for Piling
SP 999S26	Requirements for Design, Installation and Testing of Temporary and Permanent Pre-Stressed Anchors in Soil and Rock
OPSD 201.020	Rock Grading-Divided Rural
OPSD 202.010	Slope Flattening Using Excess Material on Earth or Rock Embankment
OPSD 202.020	Drainage Gap for Slope Flattening on Rock or Granular Embankment
OPSD 208.010	Benching of Earth Slopes
OPSD 3101.150	Minimum Granular Backfill Requirements - Abutments
OPSD 3190.100	Retaining Wall and Abutment Wall Drain Detail
OPSD 3304	Oslo Points for HP310 H Piles
NRE 98-200	Northeastern Region Directive - Platform Widening



TABLE 3

**Gradation Specification for Sand Fill in
Pre-Augered Holes at Integral Abutments**

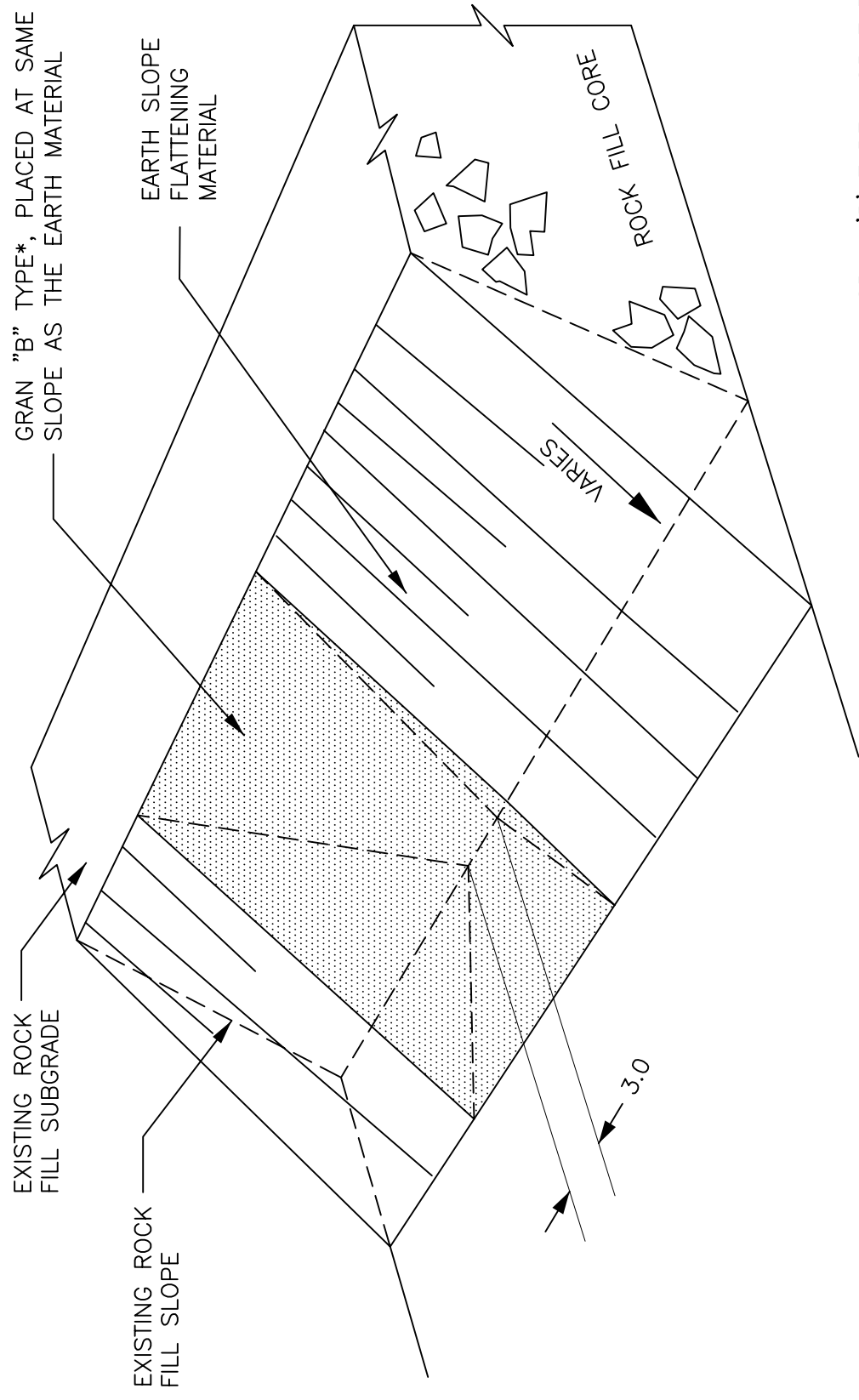
MTO SIEVE DESIGNATION		PERCENTAGE PASSING BY MASS
2 mm	#10	100
600 µm	#30	80 – 100
425 µm	#40	40 – 80
250 µm	#60	5 – 25
150 µm	#100	0 – 6



NOTES

1. CONCEPT SHOWN DOES NOT INCLUDE A MIDHEIGHT BERM.
2. LIMITS OF GRANULAR 'A' CORE TO BE DEFINED BY A SITE SPECIFIC SURVEY.
3. REMOVE ORGANIC, DELETERIOUS OR OTHERWISE UNSUITABLE MATERIAL UNDER AREA OF COMPACTED GRANULAR 'A' AND EARTH OR ROCK FILL AS NOTED IN TEXT OF REPORT.
4. PLACE GRANULAR 'A' AND EARTH OR ROCK FILL ON APPROVED SUBGRADE TO BOTTOM OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT M.T.O. STANDARDS.
5. CONSTRUCT CONCRETE FOOTING.
6. PLACE REMAINDER OF GRANULAR 'A' AND EARTH OR ROCK FILL INCLUDING MIDHEIGHT BENCHES, AS REQUIRED.
7. REFER TO TEXT OF REPORT FOR FROST DEPTH.

FIGURE 1: ABUTMENT ON COMPACTED FILL SHOWING GRANULAR A CORE



* GRAN 'B' TYPE I OR TYPE II AS
RECOMMENDED FOR PROJECT.

FIGURE 2: ROCK FILL DRAINAGE IN SLOPE FLATTENED AREAS

NOT TO SCALE