

Terrace Airport Pit Aggregate Resource Assessment Technical Summary Provincial Pit Number 5235



Ministry of Transportation and Infrastructure
213, 1011-4th Avenue, Prince George, BC, V2L 3H9

McElhanney Consulting Services Ltd.
www.mcelhanney.com

Emily Davidson PEng, Geotechnical Engineer
250 847 4040 | edavidson@mcelhanney.com

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MCSL File: 2331-20100-0 Task 2001



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1 INTRODUCTION

McElhanney Consulting Services Ltd. (MCSL) is pleased to submit this technical summary report of the aggregate resource assessment conducted at Terrace Airport Pit for Ministry of Transportation and Infrastructure (MoTI). The purpose of the assessment was to complete two days of test pitting at the site and assess the potential aggregate resource volume, quality and suitability.

2 LOCATION AND LEGAL LAND DESCRIPTION

Pit Name: Terrace Airport Pit

Provincial Pit Number: #5235

Location: The assessed portion of Terrace Airport Pit is located on the west side of Highway 37, approximately 9 km south of Terrace, BC (Figure 1).

Legal Land Description: The site is currently a Section 16 Map Reserve (LF#6405917) held by the British Columbia Ministry of Transportation and Infrastructure. The legal description of the map reserve is “Those parts of District Lot 4003, Block A of District Lot 1741 and Block A of District Lot 423, Range 5, Coast District, containing 12.576 Hectares, more or less.” The layout boundary is shown in the Pit Plan (Figure 2).

3 2012 ASSESSMENT

A test pitting program was conducted by MCSL on December 3 and 4, 2012. The site was covered with a 0.5 m layer of snow and had thick vegetative cover in some places. Twelve test pits (TP12-01, 02, 04, and 06 to 12) were excavated to depths ranging between 4.5 m and 5.8 m with a Hitachi EX200LC. Two additional test pits were excavated in the existing pit face (TP12-03 and 05). The excavator was provided by Ron King Trucking of Terrace, BC. The test pits were logged and sampled by MCSL. The test pit locations are shown on the Pit Plan (Figure 2). A Test Pit Log Summary is attached in Appendix A. Soils were described according to the MoTI Unified Soil Classification (USC) Legend attached in Appendix A.

A list of samples collected were sent to MoTI and samples were selected for further laboratory testing based on discussions between MoTI and MCSL. The following laboratory tests were performed:

- Wash Sieve Analysis (ASTM C136 and C117) on 12 samples
- Sand Equivalent Value (ASTM D2419) on 3 samples
- Micro Deval on Coarse Aggregates (ASTM D6928-03) on 3 samples

- Relative Density and Absorption of Coarse and Fine Aggregate (ASTM C127 and C128) on 3 samples

Laboratory reports for the individual samples are attached in Appendix A and summarized in the Test Pit Log Summary. Note that sieve analyses were conducted on material passing the 75 mm screen only. Portion and size of oversize material was visually estimated in the field and are listed in the test pit log summary.

Test pit locations and prominent features such as natural embankments, slope breaks, depressions and/or draws, roads and other manmade features were mapped using a Global Positioning System (GPS) unit (Model Trimble GeoXH). The GPS data was differentially post-processed by MCSL. A list of the processed test pit UTM coordinates are provided on the Figure 2 drawing. Figure 2 also shows the test pit locations and prominent features.

Photographs were taken at each test pit location. Select photographs are shown in the attached Photo Plate.

For the purpose of this project, granular material was defined as any soil with less than 15% fines (particles with a diameter < 0.075 mm) by mass. If granular material was encountered, the test pit was advanced to the full reach of the excavator unless significant sloughing prevented advancement of the test pit.

Based on the results of the 2012 assessment, two granular areas were defined and have been shown on the Pit Development Plan (Figure 3). Area B is the existing pit floor of Terrace Airport Pit that has been previously mined. Area A is the remaining area outside of Area B to within five meters of the pit boundary.

4 MATERIAL GRADATIONS

MCSL conducted a washed sieve analysis on each of the test pit samples collected in the field, with the exception of TP-02. Sieve analysis reports for each sample are located in Appendix A. Material gradation curves not including oversize are shown on Chart 1 (Appendix A). Material gradation curves including the oversize percentage estimated in the field are shown on Chart 2 (Appendix A).

Table 1 shows the gradation test results as a percentage by weight of the fines (silts and clays), sand and gravel components. The USC for each of the laboratory tested samples from Terrace Airport Pit are also listed.

Table 1. Laboratory Gradations for Terrace Airport Pit

Test Pit ID	Depth (m)		Fines (%)	Sand (%)	Gravel (%)		USC
	From	To			Fine (4.75-25mm)	Coarse (25-75mm)	
TP12-01	0.8	4.5	4.1	40.8	30.5	24.6	GP
TP12-03	0.5	8.5	3.7	36.4	34.2	25.7	GW
TP12-04	0.0	5.0	6.1	30.6	37.6	25.7	GW-GM
TP12-05	0.6	7.5	4.6	32.0	38.2	25.2	GW
TP12-06	0.7	5.4	3.7	29.5	36.1	30.7	GW
TP12-07	1.0	5.8	4.4	37.8	36.9	20.9	GP
TP12-08	0.8	5.2	4.3	32.9	33.9	28.9	GP
TP12-09	1.3	5.0	2.5	34.3	36.4	26.8	GP
TP12-10	0.7	5.6	1.6	27.9	50.8	19.7	GW
TP12-11	1.1	5.1	2.0	32.1	39.6	26.3	GW
TP12-12	0.9	5.3	3.5	20.3	43.7	32.5	GW
TP12-14	0.9	5.0	4.3	36.9	36.9	21.9	GW
Average			3.7	32.6	37.9	25.7	

A summary of the gradations corrected to include the estimated oversize are provided in Table 2.

Table 2. Summary of Gradations Including Oversize Material

Test Pit	Fines (%)	Sand (%)	Gravel (%)		Estimated Oversize (%)		Max Diameter (mm)
			Fine (4.75-25mm)	Coarse (25-75mm)	Small Boulders (75-300mm)	Large Boulders (>300 mm)	
TP12-01	3.7	36.7	27.5	22.1	10	-	300
TP12-03	3.5	34.6	32.5	24.4	5	-	300
TP12-04	5.5	27.5	33.8	23.1	10	-	300
TP12-05	4.2	29.4	35.1	23.2	8	-	300
TP12-06	3.3	26.0	31.8	27.0	10	2	400
TP12-07	4.0	34.8	33.9	19.2	6	2	400
TP12-08	3.8	29.0	29.8	25.4	8	4	400
TP12-09	2.2	30.5	32.4	23.9	8	3	400
TP12-10	1.5	25.4	46.2	17.9	7	2	400
TP12-11	1.9	30.5	37.6	25.0	5	-	300
TP12-12	3.2	18.5	39.8	29.6	6	3	400
TP12-14	4.1	35.4	35.4	21.0	4	-	300
Average	3.4	29.9	34.7	23.5	7.3	1.3	-

5 MATERIAL DURABILITY

Table 3 shows the results of the durability tests as well as the specifications as required in the Standard Specifications for Highway Construction.

Table 3. Durability Test Results

	Terrace Airport Pit					
	Area A					Area B
	TP12-06, Sample 6	TP12-07, Sample 7	TP12-09, Sample 9	TP12-11, Sample 11	TP12-14, Sample 14	TP12-04, Sample 4
Micro-Deval, % (Coarse)		5.03	6.32			6.36
Sand Equivalent		47.0	74.2			27.8
Absorption % (Coarse/Fine)	<i>1.07 / 2.44</i>			<i>1.18 / 3.48</i>	<i>1.15 / 2.73</i>	
Bulk Relative Density (Coarse/Fine)	<i>2.64 / 2.56</i>			<i>2.64 / 2.50</i>	<i>2.64 / 2.54</i>	
BC MoTI Specifications						
Micro Deval	≤30 for granular select sub-base (coarse) and bridge end fill aggregates ≤25 for surfacing and base course aggregates ≤20 for Class 2 pavement asphalt mix aggregates ≤18 for Class 1 pavement asphalt mix aggregates					
Sand Equivalent	≥20 for sub-base, bridge end fill and surfacing aggregates ≥40 for fine asphalt mix and base course aggregates					
Absorption	≤ 2% for coarse paving aggregates ≤ 1% for coarse graded aggregate seals ≤ 1.5% for fine graded aggregate seals					
Relative Density	~2.65 for all aggregate products					

Note: Values in *italics* do not meet some of the BC MoTI Specification for aggregate products.

6 MATERIAL SUITABILITY

Based on the 2012 assessment results, the material in Terrace Airport Pit is likely to be suitable for the following purposes:

Table 4. Material Suitability

	Pit Run	Crush	Comments
Area A	Bridge End Fill (BEF) Select Granular Subbase (SGSB)	Base Course and Asphalt Paving Products	Screening of oversize required for pit run products
Area B	Bridge End Fill (BEF) Select Granular Subbase (SGSB)	High Fines Surfacing Aggregate	Fines content 6.1% & Sand Equivalent 27.8 in TP12-04. Screening of oversize required for pit run products

The samples tested from the Terrace Airport Pit meet the MoTI durability specifications for BEF and SGSB. However, one of the four sand equivalent tests measured below the minimum requirement of 40 required for base course aggregates and asphalt mix aggregates. Results below 40 indicate a possible presence of plastic fines and further testing may be warranted. The source of the sample that did not meet the minimum sand equivalent requirement was from TP12-04 located on the pit floor (Area B) indicating material in this area may not be suitable for use in fine asphalt mix and base course aggregates. The fines content in TP12-04 also reported at 6.1%, which is above the MoTI specified range of 0-5% for BEF and SGSB. However this material is suitable to produce HFSA. It is possible that this area of the pit floor has been infiltrated with fines from previous mining activities and thus further exploration of Area B and testing may be warranted if asphalt aggregate and base course materials are required. The absorption for coarse aggregates tested below the maximum requirement for coarse paving aggregates and fine aggregate seals, but did not meet the specification for coarse graded aggregate seal.

The average relative density of the coarse aggregate is 2.64. The average relative density of the fine aggregate is 2.53.

Note that crushing of oversize materials may improve the durability characteristics of the crushed products (sand equivalent result may increase in TP12-04). Also, oversize should be crushed to maximize the use of the potential aggregate volume within the reserve.

7 VOLUME ESTIMATES

The volume estimates in Table 5 are based on the measured depths encountered during the subsurface test pit assessment. The potential volumes of granular material were calculated by averaging the total thickness of granular materials encountered in the test pits and multiplying by the estimated surface area. All of the test pits terminated in gravel and therefore the gravel volumes could be higher than what was calculated. No water table was encountered during the test pitting activities. However it should be noted that the water table could vary considerably during other times of the year (for example during freshet) and should be considered during the development of Terrace Airport Pit.

The total developable area of Terrace Airport Pit is approximately 11.7 hectares. The pit floor (Area B) has an area of approximately 2.1 ha, and has been previously mined as an aggregate source. The remaining 9.6 ha portion (Area A) outside of the pit floor has not been previously mined. A significant portion of the southwest corner of Area A has been recently deforested however; a significant portion will require timber harvesting (Figure 2).

Table 5. Volume Estimates

		Overburden	GW
Area A (9.6 Ha)	Average Layer Thickness (m)	1.0	4.7
	Volume (m ³)	92,000	450,000
Area B (2.1 Ha)	Average Layer Thickness (m)	0	5.0
	Volume (m ³)	0	104,000

There are three existing stockpiles of granular material located within Area B (Figure 2). The stockpiles appear to be screened 25mm minus granular material. The combined volume of material in the three stockpiles is visually estimated to be in the range of 1,000 to 1,500 cubic meters.

8 PIT DEVELOPMENT NOTES

- All pit development must be carried out in accordance with the Health, Safety, and Reclamation Code for Mines in British Columbia, BC Ministry of Energy and Mines (2008, or later edition), the Standard Specifications for Highway Construction, BC Ministry of Transportation and Infrastructure (2009, or later edition) and the Aggregate Operators Best Management Practices Handbook for BC.

- Although groundwater was not encountered in the 2012 assessment, note that the water table could vary considerably during other times of the year and therefore considerably less volume of aggregate may be available if the water table levels rise (for example during freshet). Water management may be required during pit development.
- The pit is accessed from Hwy 37 and is considered suitable. Overburden should be removed and placed along the inside of the reserve boundaries as shown in Figure 3.
- Significant portions of Terrace Airport Pit will require logging, clearing and grubbing before any gravel extraction can occur. Trees appear to be second growth but of young to medium age and may be merchantable. Further investigation should be undertaken before making any monetary estimates of timber value. Overburden stockpile areas will also require removal. Along Hwy 37, a 5 m treed buffer must be maintained at all times.
- The average thickness of the overburden is 1.0 m, however ranges in thickness from 0.5 m to 2.3 m and will require stripping and placing in the designated stockpile areas as shown in Figure 3. Note the soil is organic rich on the surface and becomes a mixture of sand and silt at depth, however there are significant root layers throughout and is therefore logged as overburden (OB).
- All trees, vegetation and overburden are to be removed within 2 m of the top of the pit face.
- Topsoil, overburden and aggregate cannot be removed within 5 m of the reserve boundary.
- Extraction of aggregates in Area A of Terrace Airport Pit may begin at the existing pit faces, and work towards the outer allowable development limits as shown in Figure 3. Extraction of aggregates in Area B may begin following exhaustion of resources in Area A. Note that Area B may extend below Area A and further test pit exploration is recommended once Area A has been mined.
- In Terrace Airport Pit, the oversize rock content in the granular areas is estimated to be on average about 8%. Therefore, crushing of the oversize is required to maximize the use of the resource.
- No dumping of debris or petroleum products will be permitted and the site must be left in a clean and safe condition.
- At the completion of the pit development operations, but prior to the depletion of the pit, the sides of the pit faces, waste piles and overburden stockpiles must be trimmed to a 1.5H :1V slope. Active pit faces must be reshaped with native granular materials.
- Upon depletion of the pit, all disturbed areas must be reclaimed. The minimum reclamation procedure should include re-sloping of the pit-faces and waste piles to a 2H:1V slope, contouring the area for appropriate drainage, spreading of the overburden followed by the topsoil and seeding.

9 CLOSURE

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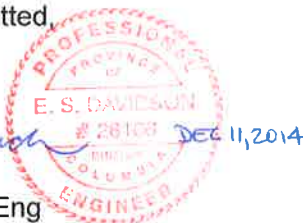
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Please do not hesitate to contact the undersigned should you have any questions or comments.

Respectfully submitted,



Emily Davidson, PEng
Branch Manager/Geotechnical Engineer
Smithers, BC

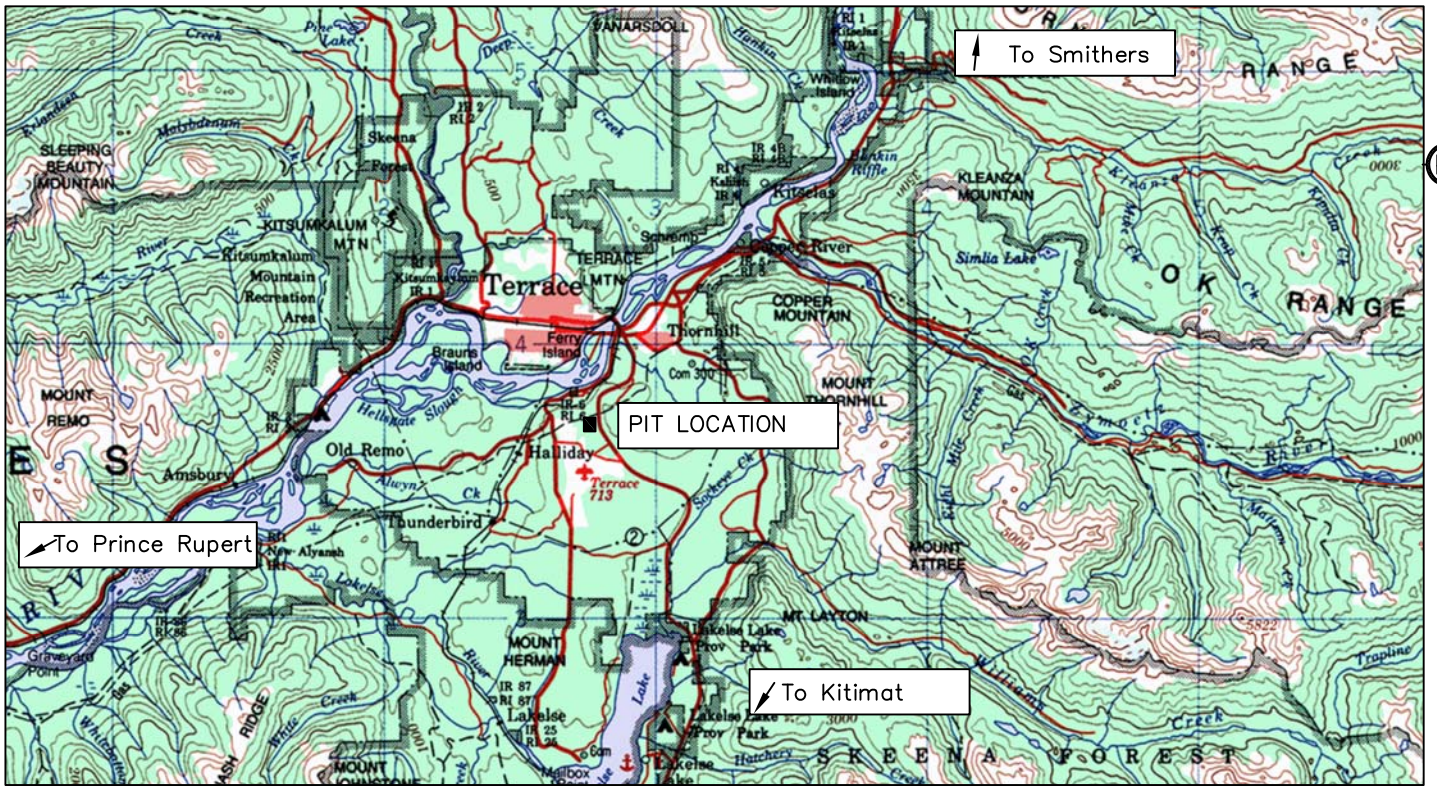


Reviewed By:



Shiloh Carlson, PEng
Geotechnical Engineer
Prince George, BC

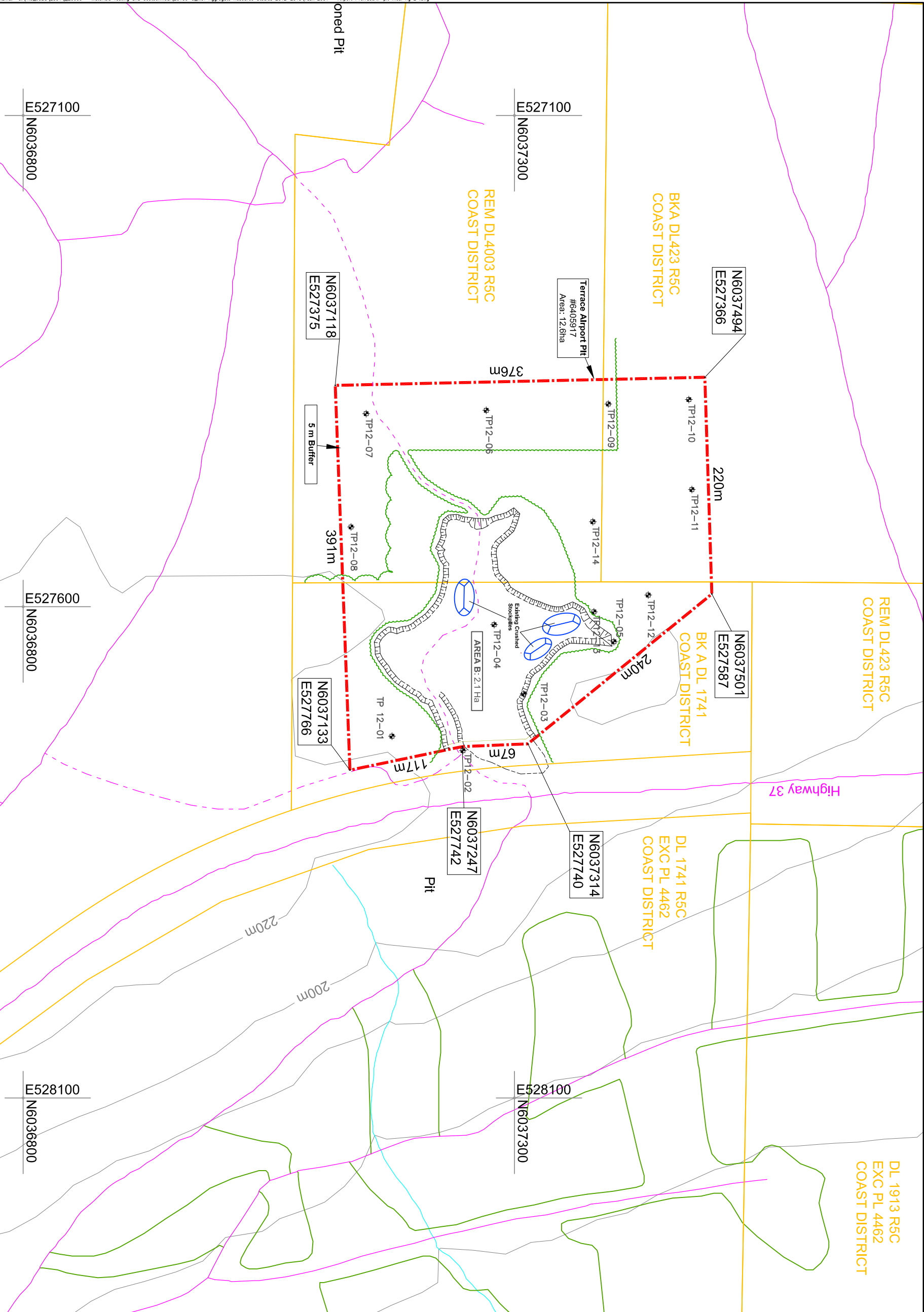
DRAWINGS



KEY MAP
SCALE 1:300,000
BCGS MAP 1031

GOOGLE EARTH IMAGE
SCALE 1:20,000
IMAGE DATED 2010





McElhannay
 McElhannay Consulting Services Ltd.
 P.O. BOX 787 3907 - 4th AVENUE
 SMITHERS B.C. CANADA V0J 2N0
 PH (250) 847-4400
 FAX (250) 847-1800

Rev	Date	REVISIONS

BRITISH COLUMBIA
 Ministry of Transportation and Infrastructure
 Geotechnical & Materials Engineering

DESIGNED: DATE:
 QUALITY CONTROL: DATE:
 DRAWN: DATE:

SKEENA - HIGHWAY DISTRICT
TERRACE AIRPORT PIT
 FIGURE 2
 PIT PLAN

FILE NO. PROJECT NO. REG. DRAWING NO.
 TASK 2001 2331-20100-0 20100-1-002

DESC	NORTHING	EASTING
TP12-01	6037175	527731
TP12-02	6037247	527746
TP12-03	6037324	527692
TP12-04	6037279	527618
TP12-05	6037404	527637
TP12-06	6037271	527400
TP12-07	6037149	527403
TP12-08	6037133	527518
TP12-09	6037395	527393
TP12-10	6037477	527389
TP12-11	6037480	527480
TP12-12	6037436	527588
TP12-13	6037380	527604
TP12-14	6037379	527513

PIT LEGEND

- NATURAL EMBANKMENT
- PIT FACE
- TEST PIT
- TEST HOLE
- PAVED ROAD
- GRAVEL ROAD
- TRAIL
- TREELINE
- DISTRICT LOT LINE
- MONUMENT
- IRON PIN
- POWER POLE
- STOCK PILE
- DEVELOPMENT DIRECTION
- FUTURE AGGREGATE POTENTIAL
- WELL
- STAND PIPE
- PIEZOMETER OR WELL
- PROPOSED NEW AGGREGATE SOURCE
- SWAMP
- CREEK
- BUILDING (symbolic)
- FENCE
- SIGN POST
- UTILITY POLE
- GRAVEL RESERVE BOUNDARY
- Contour Line (100m interval)
- Contour Line (20m interval)
- GPS COORDINATE (UTM NAD 83)
- CRUSHER SETUP
- STOCKPILE (CRUSH)
- STOCKPILE (TOPSOIL)
- STOCKPILE (OVERBURDEN)

TR.L.M. NOTES:
 1. 20m CONTOUR INTERVALS
 2. BASE MAP DERIVED FROM T.R.L.M. DIGITAL MAP DATA:
 -MAP NO.: 1030034
 -DATUM: NAD 83, UTM ZONE 9

LEGAL NOTE
 1. 20m CONTOUR INTERVAL
 2. DISTRICT LOT LINES ARE DERIVED FROM DIGITAL CROWN CADASTRAL REFERENCE MAPPING SUPPLIED BY CROWN LAND REGISTRY, VICTORIA

TEST PITS

N6037494
E527366

N6037501
E527587

N6037314
E527740

N6037247
E527742

N6037118
E527375

N6037133
E527766

B R5C
DISTRICT

BK A DL 1741
COAST DISTRICT

DL 1741 R5C
EXC PL 446
COAST DISTRICT

AREA A: 9.6 Ha

AREA B: 2.1 Ha

Terrace Airport Pit
#6405917
Area: 12.6ha

DESC	NORTHING	EASTING
TP12-01	6037175	527731
TP12-02	6037247	527746
TP12-03	6037324	527692
TP12-04	6037279	527618
TP12-05	6037404	527637
TP12-06	6037271	527400
TP12-07	6037149	527403
TP12-08	6037133	527518
TP12-09	6037395	527393
TP12-10	6037477	527389
TP12-11	6037480	527480
TP12-12	6037436	527588
TP12-13	6037380	527604
TP12-14	6037379	527513

376m

5 m Buffer

391m

SCALE: 0 1:1000 50

McElhanney
McElhanney Consulting Services Ltd.
P.O. BOX 787, 3907 - 4th AVENUE SMITHERS B.C. CANADA V0J 2N0
PH (250) 847-4040 FAX (250) 847-4160

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DESIGNED: DG DATE: MAR 2013
QUALITY CONTROL: ED DATE: MAR 2013
DRAWN: DG DATE: MAR 2013

SENIOR DESIGNER: _____ DATE: _____

SKEENA - HIGHWAY DISTRICT
TERRACE AIRPORT PIT
FIGURE 3
PIT DEVELOPMENT PLAN

FILE No.	PROJECT No.	REG.	DRAWING No.
TASK 2001	2331-20100-0		20100-1-003

PIT LEGEND

	NATURAL EMBANKMENT		SWAMP
	PIT FACE		CREEK
	TEST PIT		BUILDING (symbolic)
	TEST HOLE		FENCE
	PAVED ROAD		SIGN POST
	GRAVEL ROAD		UTILITY POLE
	TRAIL		GRAVEL RESERVE BOUNDARY
	TREELINE		Contour Line (100m interval)
	DISTRICT LOT LINE		Contour Line (20m interval)
	MONUMENT		GPS COORDINATE (UTM NAD 83)
	IRON PIN		CRUSHER SETUP
	POWER POLE		STOCKPILE (CRUSH)
	STOCK PILE		STOCKPILE (TOPSOIL)
	DEVELOPMENT DIRECTION		STOCKPILE (OVERBURDEN)
	FUTURE AGGREGATE POTENTIAL		WELL
	STAND PIPE		PROPOSED NEW AGGREGATE SOURCE
	PIEZOMETER OR WELL		

NOTES:

- TEST PITS SURVEYED WITH A SINGLE FREQUENCY TRIMBLE GEOXH, AND POST PROCESSED. PRECISION IS FUNCTION OF SATELLITES DISTRIBUTION AND DISTANCE TO THE POSTPROCESSING BASE.
- PLAN FEATURES PARTLY SURVEYED WITH GPS AND ALSO TAKEN FROM AVAILABLE DIGITAL MAPS.

TEST PIT DETAIL:

TP09-01

 TEST PIT NUMBER
 0.1m TS DENOTES THICKNESS OF OVERBURDEN
 1.1m ML DENOTES THICKNESS OF PRIMARY GRANULAR MATERIAL
 3.8m GP DENOTES VISUAL FIELD ESTIMATE OF OVERSIZE ONSITE MATERIAL
 2% Cobbles

NOTE:

- TEST PIT SUMMARY LOGS SHOULD BE READ IN CONJUNCTION WITH MAP FOR DEPTH OF OVERBURDEN OR OTHER OVERLYING SOILS.

PIT DEVELOPMENT NOTES:

- PIT DEVELOPMENT MUST BE CARRIED OUT IN ACCORDANCE WITH THE HEALTH, SAFETY, AND RECLAMATION CODE FOR MINES IN BC, THE CURRENT STANDARDS SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, AND THE AGGREGATE OPERATORS BEST MANAGEMENT PRACTICES HANDBOOK FOR BC.
- THE DEVELOPMENT AREA WILL NEED TO BE STRIPPED OF OVERBURDEN. EXISTING BOULDER STOCKPILES AND OTHER STOCKPILES WOULD NEED TO BE MOVED PRIOR TO MINING THOSE AREAS.
- DEVELOP AREA A AND USE AREA B FOR CRUSHER SETUP AND MATERIAL STOCKPILES AS REQUIRED.
- DEVELOP AREA B AFTER AREA A HAS BEEN EXHAUSTED.
- PIT EXCAVATION MUST NOT TAKE PLACE TO WITHIN A MINIMUM DISTANCE OF 2m FROM THE EDGE OF CLEARED & STRIPPED AREAS.
- WHEN THE CONTRACTOR DISCONTINUES OPERATIONS IN THE PIT, ALL WORKING PIT FACES AND STOCKPILES MUST BE TRIMMED TO 1.5H TO 1V SLOPE. WORKING PIT FACES MUST BE RESHAPED WITH NATIVE GRANULAR MATERIALS. ALL OTHER PERMANENT SLOPES MUST BE RE-SLOPED TO NO STEEPER THAN 2H TO 1V.
- NO DUMPING OF DEBRIS PETROLEUM PRODUCTS IS PERMITTED. THE PIT MUST BE LEFT IN A CLEAN SAFE CONDITION.

December 10, 2014 1:52:51
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SELECT TEST PIT PHOTOGRAPHS





Photo 1. TP12-01.



Photo 2. TP12-10.



Photo 3. TP12-04



Photo 4. TP12-09



Photo 5. TP12-05



Photo 6. TP12-12



McElhanney

**Terrace Airport Pit
Select Test Pit Photographs**

DATE PREPARED: MAR 2013

SCALE: NTS

PREPARED BY: DG

PROJECT No: 2331-20100-0 Task 2001

PHOTO PLATE

Select Test Pit Photographs

TAKEN: December 2012

APPENDIX A – TEST PIT SUMMARY LOGS
SOILS CLASSIFICATION LEGEND
SIEVE ANALYSIS REPORTS
MATERIAL GRADATION CHARTS
PHYSICAL PROPERTY TEST RESULTS

TEST PIT SUMMARY

PROJECT #:		2331-20100-0 Task 2001											EXCAVATOR:		Hitachi Ex 200														
DESCRIPTION:		Airport Pit Test Pits (Terrace)											DATE:		December 3 and 4, 2012		LOGGED BY:		Gary Maltin										
TEST PIT NUMBER	SAMPLE NUMBER	DEPTH (m)		LAYER THICKNESS (m)	FIELD VISUAL IDENTIFICATION										LABORATORY TEST RESULTS										Comments				
		From	To		Soil Classification	Fines < 0.075 mm (%)	Sand < 4.75 mm (%)	Gravel <75 mm (%)	ADDITIONAL OVERSIZE				Water Table (m)	Sand Size (F,M,C)	Soil Classification	Fines < 0.075 mm (%)	Sand < 4.75 mm (%)	GRAVEL		Sand Equivalent	Micro-Deval % coarse/ % fines	Degrade	MgSO ₄ %coarse / % fines	Bulk Relative Density % coarse / % fines		Absorption % coarse / % fines			
									75 - 150 mm (%)	150-300 mm (%)	> 300 mm (%)	Max Size (mm)						< 25 mm (%)	25 - 75 mm (%)										
TP12-13		0.0	2.3	2.3	GM	20	30	50	5			150	-	M															Appeared to be previous stripping/fill
TP12-13	13	2.3	5.3	3.0	GW	5	35	60	2	2	-	300	-	M														2.3 - 5.3 native	
TP12-14		0.0	0.9	0.9	OB																							Peat, roots, rootlets. Silty tr sand (fine)	
TP12-14	14	0.9	5.0	4.1	GW	3	32	65	2	2	-	300	-	M	GW	4.3	36.9	36.9	21.9						2.64 / 2.54	1.15 / 2.73	Gravel appeared more grey/brown		

Note: Soil classifications are based on Ministry of Transportation and Infrastructure Unified Soil Classification System

MATERIALS CLASSIFICATION LEGEND

MAJOR DIVISIONS		SYMBOL	SOIL TYPE						
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, < 5% FINES						
		GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, < 5% FINES						
		GM*	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES						
		GC*	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES						
	SAND AND SANDY SOILS	SW	WELL-GRADED SANDS OR GRAVELLY SANDS, < 5% FINES						
		SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, < 5% FINES						
		SM*	SILTY SANDS SAND-SILT MIXTURES						
		SC*	CLAYEY SANDS SAND-CLAY MIXTURES						
FINE GRAINED SOILS	SILTS AND CLAYS $w_L < 50$	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY						
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS						
		OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY						
	SILTS AND CLAYS $w_L > 50$	MH	INORGANIC SILTS, MICACEOUS OR DIATOM-ACEOUS FINE SANDY OR SILTY SOILS, PLASTIC SILTS						
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS						
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS						
ORGANIC SOILS	Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS							
TOPSOIL	TS	TOPSOIL WITH ROOTS, ETC.							
COBBLES	SB	ROCK FRAGMENTS AND COBBLES, PARTICLE SIZE 75mm TO 300mm							
LARGE BOULDERS	LB	BOULDERS, PARTICLE SIZE OVER 300mm							
BEDROCK	BR	BEDROCK							
<p>FOR SOILS HAVING 5 - 12% PASSING .075 SIEVE, USE DUAL SYMBOL</p> <table style="width: 100%; border: none;"> <tr> <td style="border: none;">*GM1; GC1; SM1; SC1; 12 - 20%</td> <td rowspan="4" style="border: none; font-size: 4em; vertical-align: middle;">}</td> <td rowspan="4" style="border: none; vertical-align: middle;">PASSING .075mm SIEVE</td> </tr> <tr> <td style="border: none;">GM2; GC2; SM2; SC2; 20 - 30%</td> </tr> <tr> <td style="border: none;">GM3; GC3; SM3; SC3; 30 - 40%</td> </tr> <tr> <td style="border: none;">GM4; GC4; SM4; SC4; 40 - 50%</td> </tr> </table>				*GM1; GC1; SM1; SC1; 12 - 20%	}	PASSING .075mm SIEVE	GM2; GC2; SM2; SC2; 20 - 30%	GM3; GC3; SM3; SC3; 30 - 40%	GM4; GC4; SM4; SC4; 40 - 50%
*GM1; GC1; SM1; SC1; 12 - 20%	}	PASSING .075mm SIEVE							
GM2; GC2; SM2; SC2; 20 - 30%									
GM3; GC3; SM3; SC3; 30 - 40%									
GM4; GC4; SM4; SC4; 40 - 50%									

REV. 90-04-26



PROVINCE of BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION & HIGHWAYS
Geotechnical & Materials Engineering

UNIFIED SOIL CLASSIFICATION LEGEND

Drawn: LU	Date: JULY'97	Scale:
File No.:	ACAD File: ACADSTDS 830205\SOIL-APP	

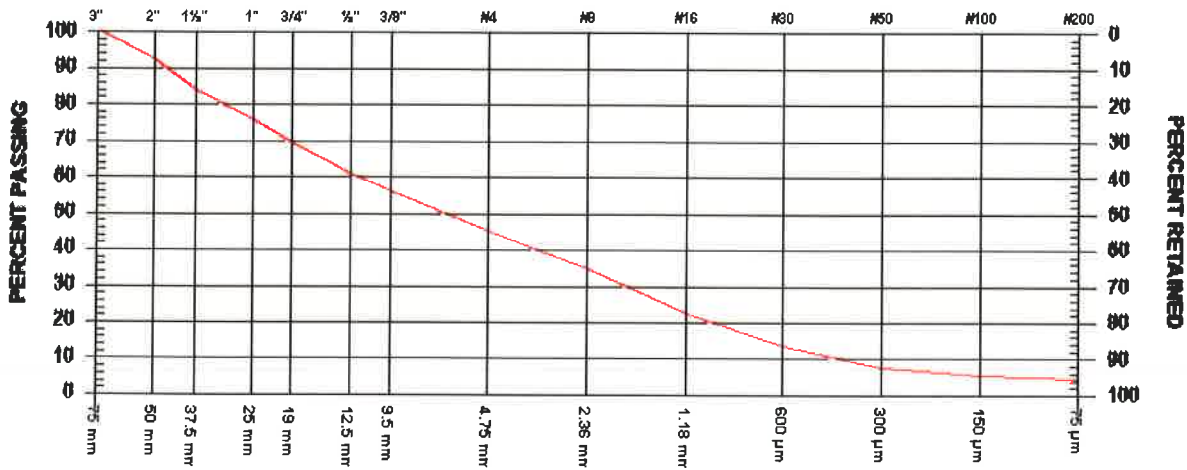
PROJECT NO. SMI-20100-1
CLIENT Ministry of Transportation
C.C.

TO
Ministry of Transportation
#213 - 1011 4th Avenue
Prince George, BC
V2L 3H9

PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 8 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.26 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-01 SA-01, 0.8 - 4.5 m SAMPLED BY G.Maltin
SPECIFICATION TESTED BY S.Connell
MATERIAL TYPE PitRun TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	92.0	
1 1/2" 37.5 mm	83.5	
1" 25 mm	75.4	
3/4" 19 mm	68.9	
1/2" 12.5 mm	60.4	
3/8" 9.5 mm	55.9	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	44.9	
No. 8 2.36 mm	34.3	
No. 16 1.18 mm	22.1	
No. 30 600 µm	13.2	
No. 50 300 µm	7.3	
No. 100 150 µm	5.1	
No. 200 75 µm	4.1	

COMMENTS
Material 75 mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1
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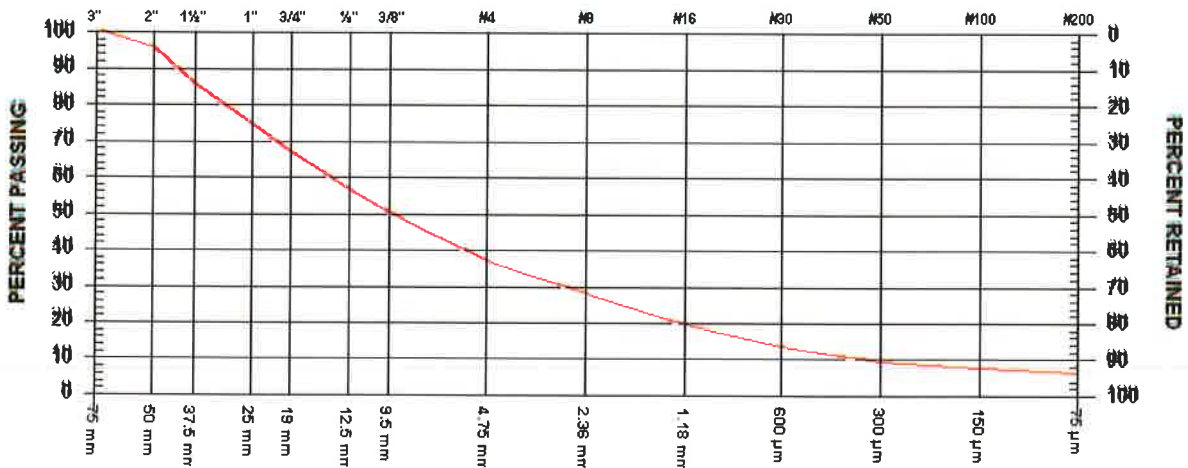
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V2L 3H9

PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 7 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.26 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-04 SA-04, 0 - 5.0 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G. Maltin
TESTED BY S. Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	95.5	
1 1/2" 37.5 mm	85.3	
1" 25 mm	74.3	
3/4" 19 mm	66.6	
1/2" 12.5 mm	56.0	
3/8" 9.5 mm	50.0	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	36.7	
No. 8 2.36 mm	27.7	
No. 16 1.18 mm	19.2	
No. 30 600 µm	13.4	
No. 50 300 µm	9.0	
No. 100 150 µm	7.1	
No. 200 75 µm	6.1	

COMMENTS

Material 75 mm and larger not included in laboratory analysis.

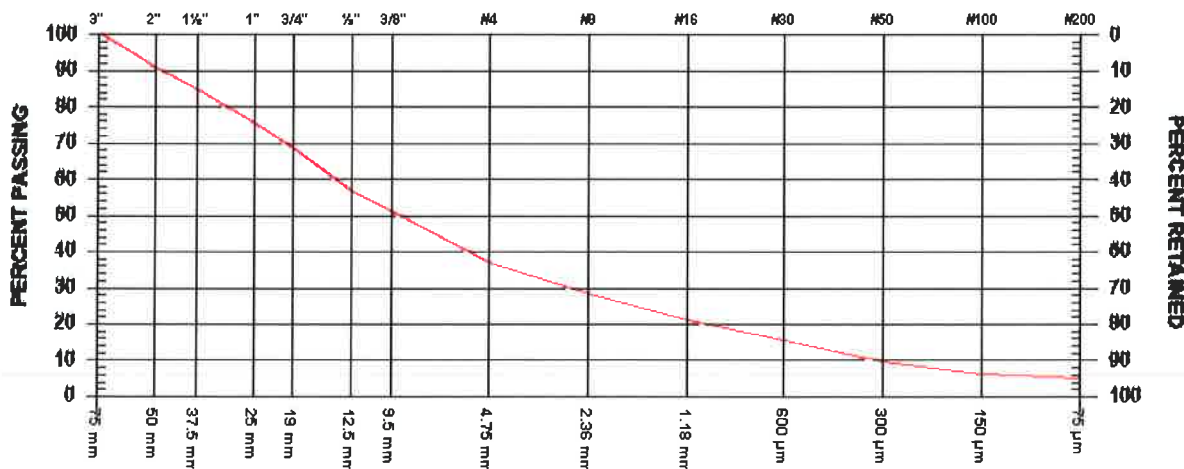
PROJECT NO. SMI-20100-1
CLIENT Ministry of Transportation
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 11 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.27 DATE SAMPLED 2012.Dec.03

SUPPLIER TP12-05 SA-05, 0.6 - 7.5 m SAMPLED BY S. Connell
SOURCE TP12-05 SA-05, 0.6 - 7.5 m TESTED BY D. Gerein
SPECIFICATION TEST METHOD WASHED
MATERIAL TYPE Pit Run



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	90.1	
1 1/2" 37.5 mm	84.3	
1" 25 mm	74.8	
3/4" 19 mm	68.2	
1/2" 12.5 mm	56.1	
3/8" 9.5 mm	50.6	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	36.6	
No. 8 2.36 mm	27.9	
No. 16 1.18 mm	20.9	
No. 30 600 µm	15.2	
No. 50 300 µm	9.3	
No. 100 150 µm	6.1	
No. 200 75 µm	4.6	

COMMENTS
Materials 75 mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1
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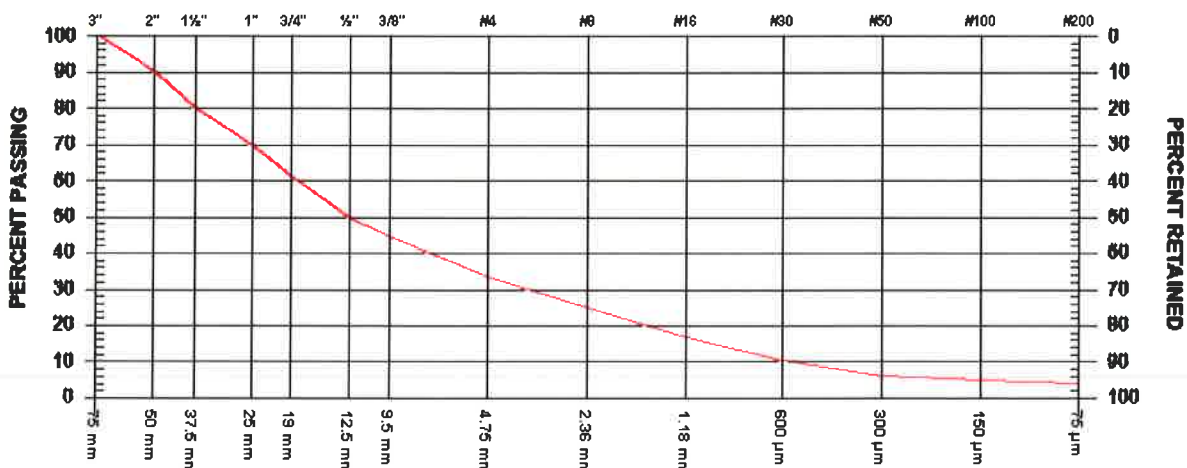
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 1 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.20 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-06, SA-06, 0.7 - 5.4 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G. Maltin
TESTED BY S. Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	90.0	
1 1/2" 37.5 mm	79.5	
1" 25 mm	69.3	
3/4" 19 mm	60.9	
1/2" 12.5 mm	49.6	
3/8" 9.5 mm	44.1	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	33.2	
No. 8 2.36 mm	24.7	
No. 16 1.18 mm	16.4	
No. 30 600 µm	10.2	
No. 50 300 µm	5.8	
No. 100 150 µm	4.5	
No. 200 75 µm	3.7	

COMMENTS

Material 75 mm and larger not included in laboratory analysis.

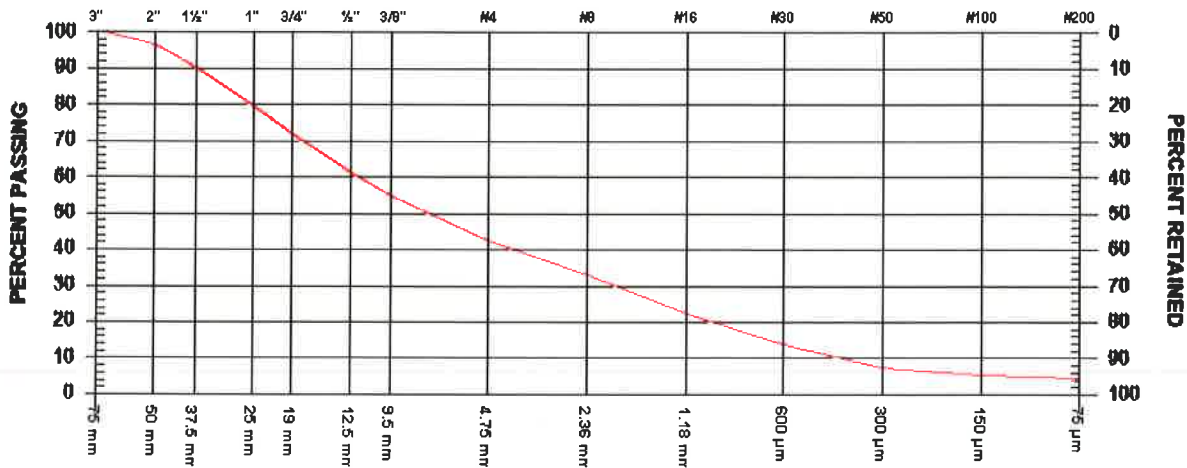
PROJECT NO. SMI-20100-1
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 3 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.21 DATE SAMPLED 2012.Dec.03

SUPPLIER TP12-07, SA-07, 1.0 - 5.8 m SAMPLED BY G. Maltin
SOURCE TP12-07, SA-07, 1.0 - 5.8 m TESTED BY D. Gerein
SPECIFICATION TEST METHOD WASHED
MATERIAL TYPE Pit Run



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	96.4	
1 1/2" 37.5 mm	90.0	
1" 25 mm	79.1	
3/4" 19 mm	71.6	
1/2" 12.5 mm	60.7	
3/8" 9.5 mm	54.3	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	42.2	
No. 8 2.36 mm	32.6	
No. 16 1.18 mm	22.3	
No. 30 600 µm	13.5	
No. 50 300 µm	7.3	
No. 100 150 µm	5.3	
No. 200 75 µm	4.4	

COMMENTS

Materials 75 mm and larger are not included in laboratory analysis.

PROJECT NO. SMI-20100-1

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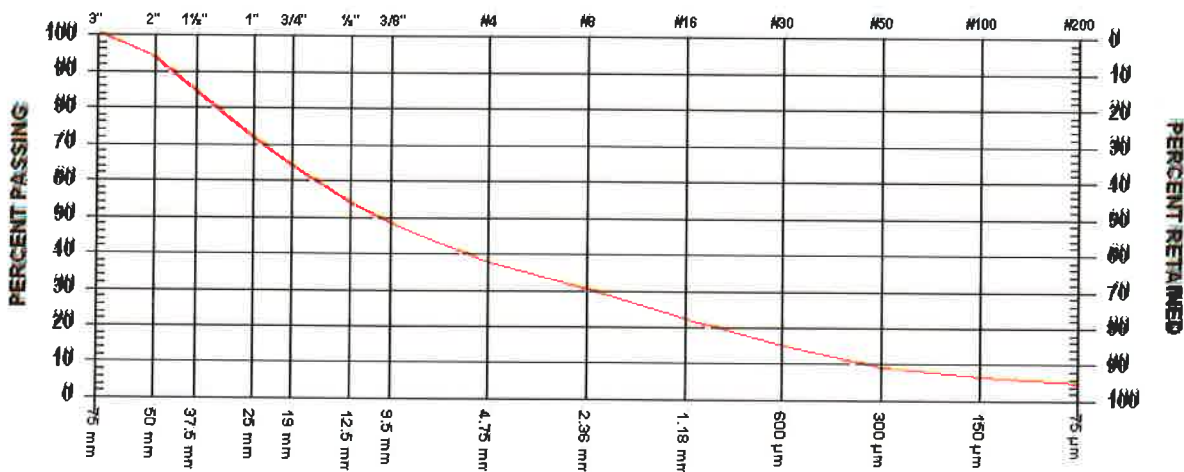
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V2L 3H9

PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 9 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.26 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-08 SA-08, 0.8 - 5.2 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G. Maltin
TESTED BY S. Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	93.4	
1 1/2" 37.5 mm	83.7	
1" 25 mm	71.1	
3/4" 19 mm	63.5	
1/2" 12.5 mm	53.2	
3/8" 9.5 mm	47.9	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	37.2	
No. 8 2.36 mm	29.7	
No. 16 1.18 mm	21.7	
No. 30 600 µm	14.6	
No. 50 300 µm	8.6	
No. 100 150 µm	5.8	
No. 200 75 µm	4.3	

COMMENTS

Material 75 mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1

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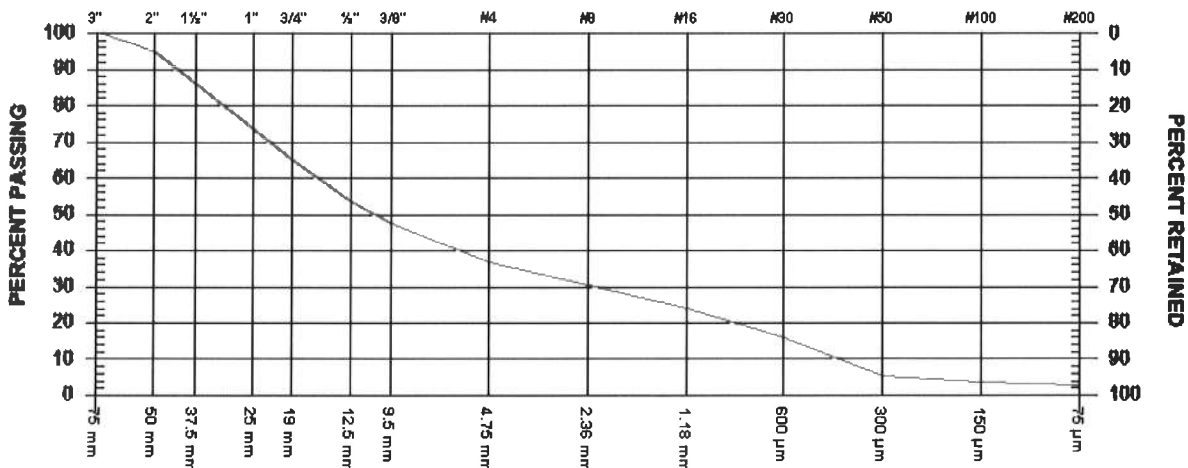
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 2 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.19 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-09, SA-09, 1.2 - 5.0 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G.Maltin
TESTED BY S.Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	94.4	
1 1/2" 37.5 mm	85.4	
1" 25 mm	73.2	
3/4" 19 mm	64.6	
1/2" 12.5 mm	53.1	
3/8" 9.5 mm	47.4	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	36.8	
No. 8 2.36 mm	30.1	
No. 16 1.18 mm	24.0	
No. 30 600 µm	15.6	
No. 50 300 µm	5.1	
No. 100 150 µm	3.2	
No. 200 75 µm	2.5	

COMMENTS

Material 75 mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1

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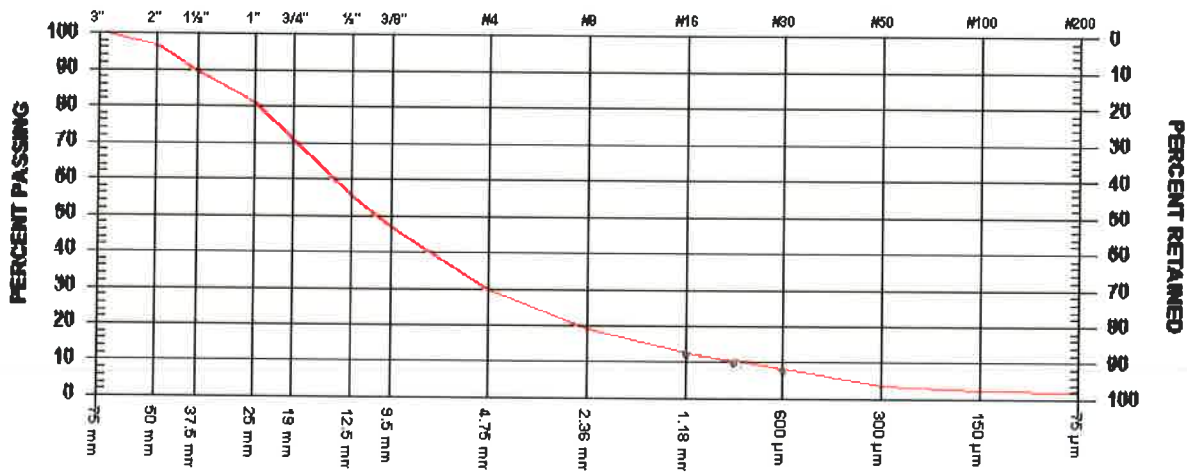
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 5 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.22 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP 12-10, SA-10, 0.7-5.6m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G Maltin
TESTED BY D Gerein
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	96.2	
1 1/2" 37.5 mm	89.0	
1" 25 mm	80.3	
3/4" 19 mm	70.2	
1/2" 12.5 mm	54.9	
3/8" 9.5 mm	46.2	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	29.5	
No. 8 2.36 mm	18.8	
No. 16 1.18 mm	12.2	
No. 30 600 µm	7.9	
No. 50 300 µm	3.5	
No. 100 150 µm	2.1	
No. 200 75 µm	1.6	

COMMENTS

Material 75mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1

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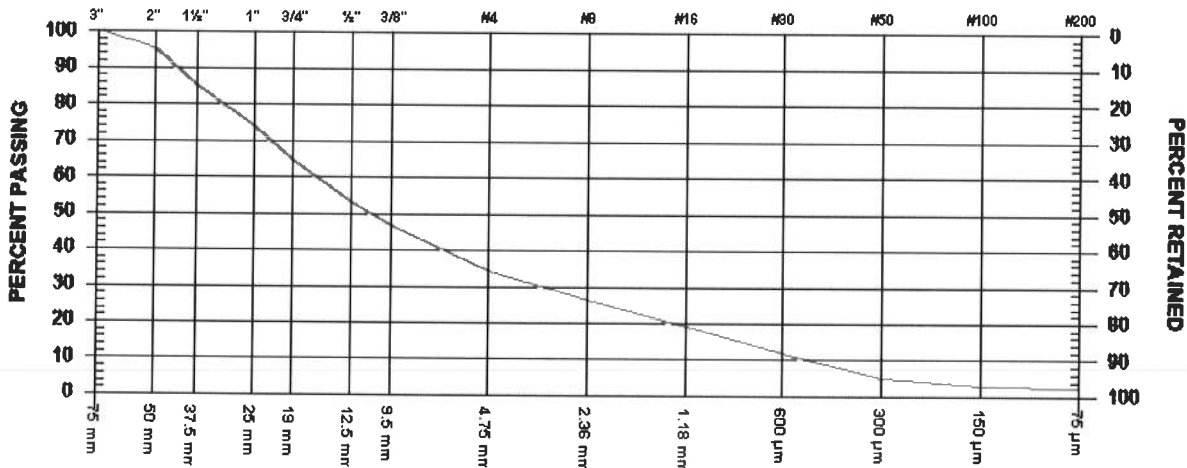
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 4 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.21 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-11, SA-11, 1.1 - 5.1 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G. Maltin
TESTED BY S. Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	94.8	
1 1/2" 37.5 mm	84.6	
1" 25 mm	73.7	
3/4" 19 mm	64.5	
1/2" 12.5 mm	52.9	
3/8" 9.5 mm	46.5	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	34.1	
No. 8 2.36 mm	26.0	
No. 16 1.18 mm	18.6	
No. 30 600 µm	11.3	
No. 50 300 µm	4.8	
No. 100 150 µm	2.7	
No. 200 75 µm	2.0	

COMMENTS

Material 75 mm and larger not included in laboratory analysis.

PROJECT NO. SMI-20100-1
CLIENT Ministry of Transportation
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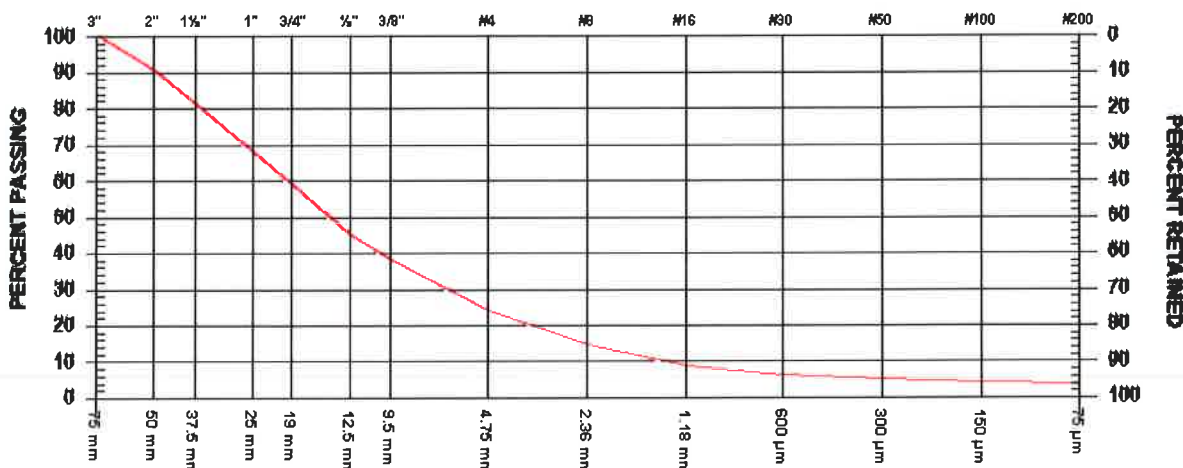
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 12 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.27 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-12 SA-12, 0.9 - 5.3 m
SPECIFICATION
MATERIAL TYPE Pit Run

SAMPLED BY G. Maltin
TESTED BY S. Connell
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0
2"	50 mm	90.3
1 1/2"	37.5 mm	80.9
1"	25 mm	67.5
3/4"	19 mm	58.9
1/2"	12.5 mm	44.5
3/8"	9.5 mm	37.8

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	23.8
No. 8	2.36 mm	14.5
No. 16	1.18 mm	8.7
No. 30	600 µm	6.1
No. 50	300 µm	4.6
No. 100	150 µm	4.0
No. 200	75 µm	3.5

COMMENTS

Materials 75 mm and larger not included in laboratory analysis.

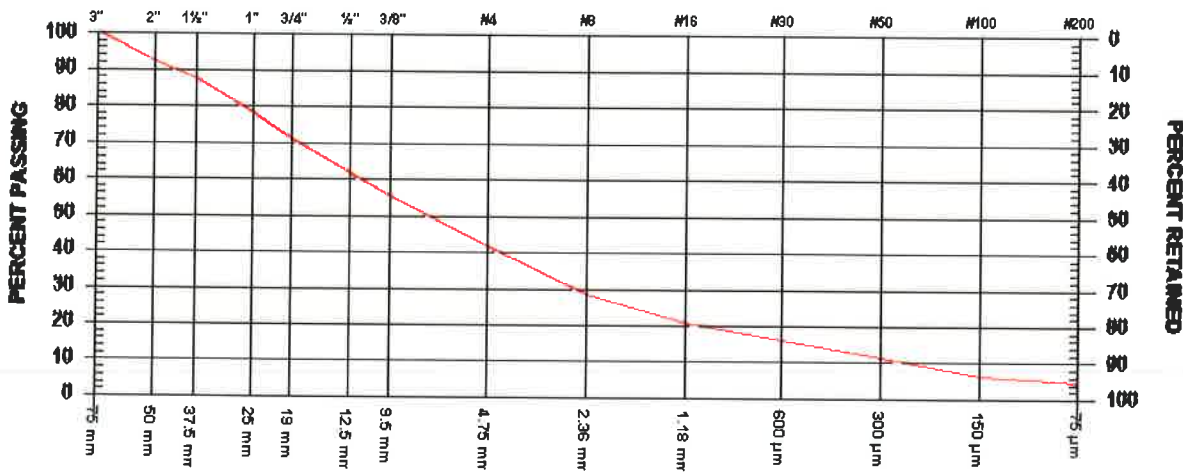
PROJECT NO. SMI-20100-1
CLIENT Ministry of Transportation
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PROJECT 2012-13 MoTI Aggregate Resource Studies Various
Airport Pit - Task 2001
CONTRACTOR McElhanney

SIEVE TEST NO. 6 DATE RECEIVED 2012.Dec.07 DATE TESTED 2013.Feb.25 DATE SAMPLED 2012.Dec.03

SUPPLIER
SOURCE TP12-14 SA-14, 0.9 - 5.0 m
SPECIFICATION
MATERIAL TYPE Pit Run
SAMPLED BY G. Maltin
TESTED BY D. Gerein
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
3" 75 mm	100.0	
2" 50 mm	92.1	
1 1/2" 37.5 mm	87.3	
1" 25 mm	78.1	
3/4" 19 mm	70.7	
1/2" 12.5 mm	61.4	
3/8" 9.5 mm	54.9	

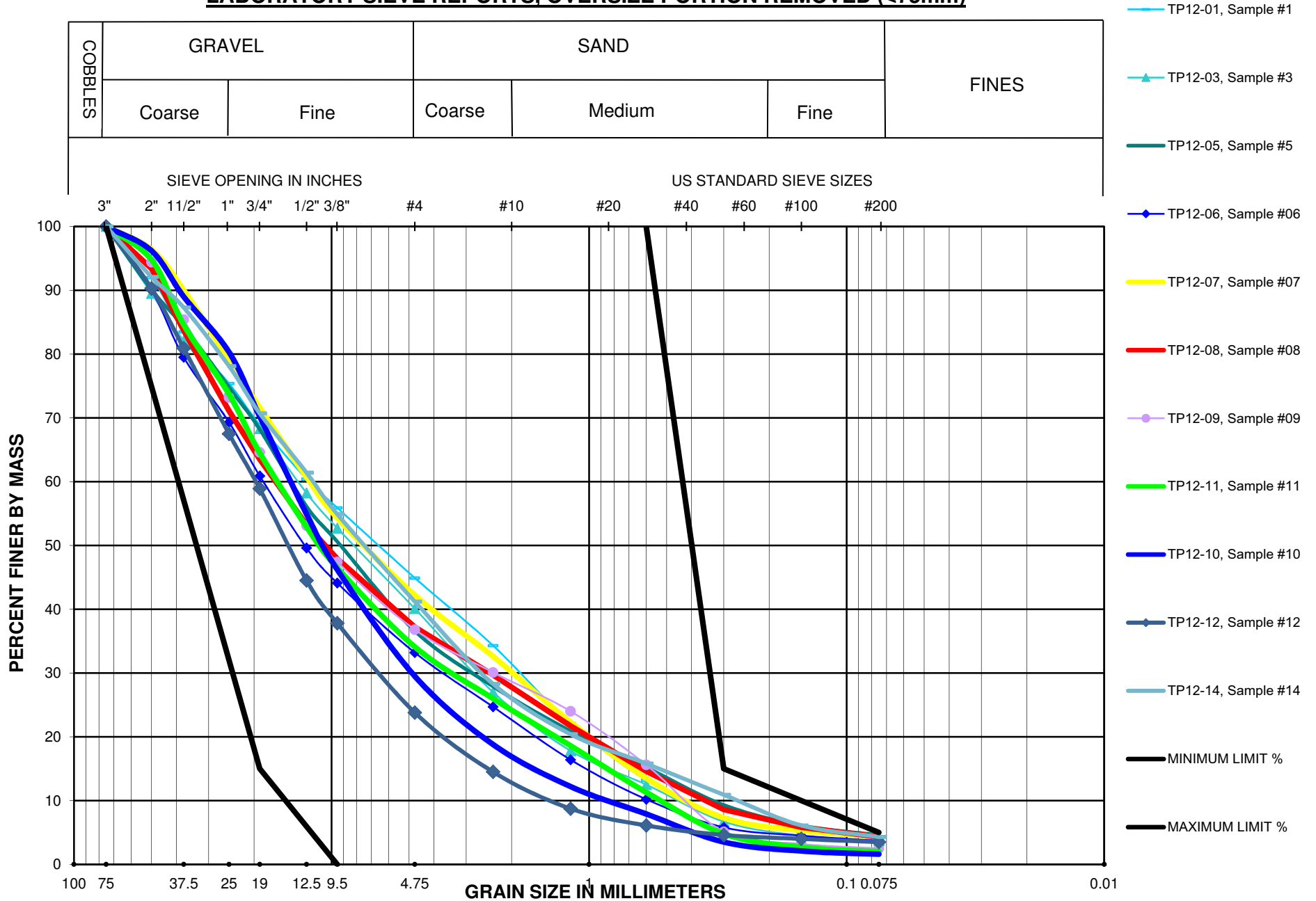
SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
No. 4 4.75 mm	41.2	
No. 8 2.36 mm	28.3	
No. 16 1.18 mm	20.4	
No. 30 600 µm	15.8	
No. 50 300 µm	10.9	
No. 100 150 µm	6.1	
No. 200 75 µm	4.3	

COMMENTS

Material 75 mm and larger not included in sieve analysis.

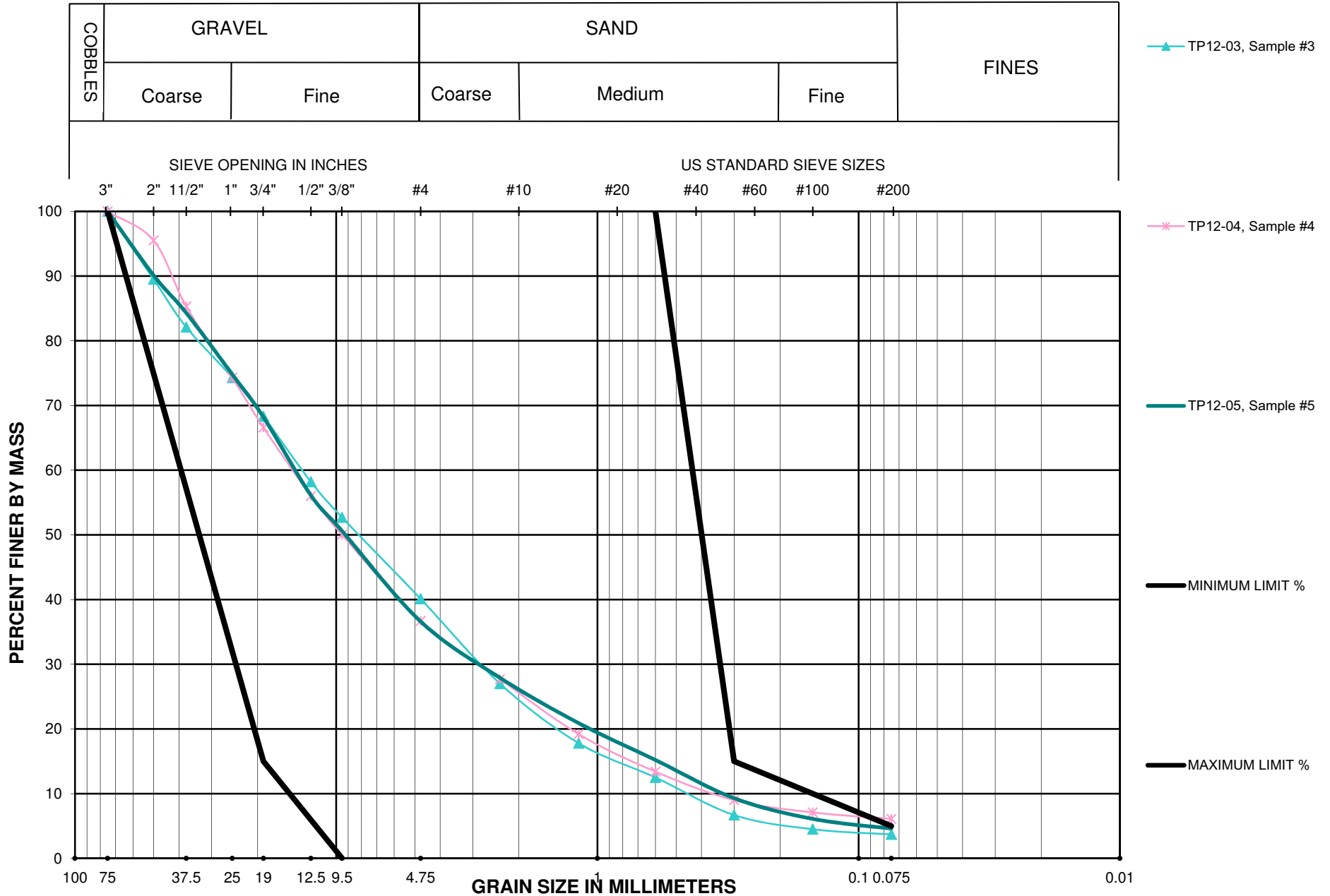
AIRPORT PIT - 2331-20100-0 Task 2001
CHART 3 - GRADATION CURVES - AREA A
MoT TABLE 202-C SELECT GRANULAR SUB-BASE SPECIFICATIONS
LABORATORY SIEVE REPORTS, OVERSIZE PORTION REMOVED (<75mm)

AIRPORT PIT - 2331-20100-0 Task 2001



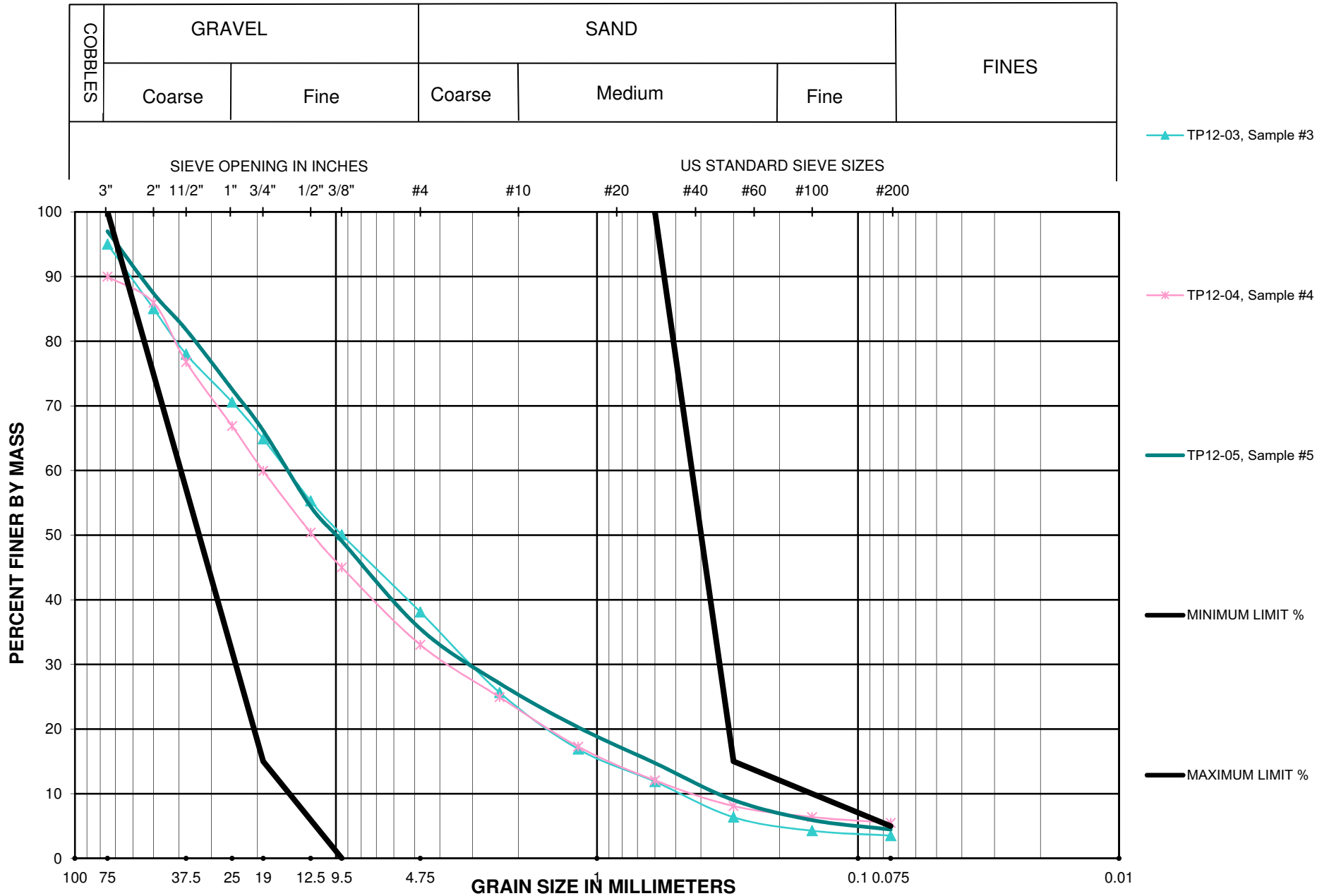
AIRPORT PIT - 2331-20100-0 Task 2001
CHART 4 - GRADATION CURVES - AREA B
MoT TABLE 202-C SELECT GRANULAR SUB-BASE SPECIFICATIONS
LABORATORY SIEVE REPORTS, OVERSIZE PORTION REMOVED (<75mm)

AIRPORT PIT - 2331-20100-0 Task 2001



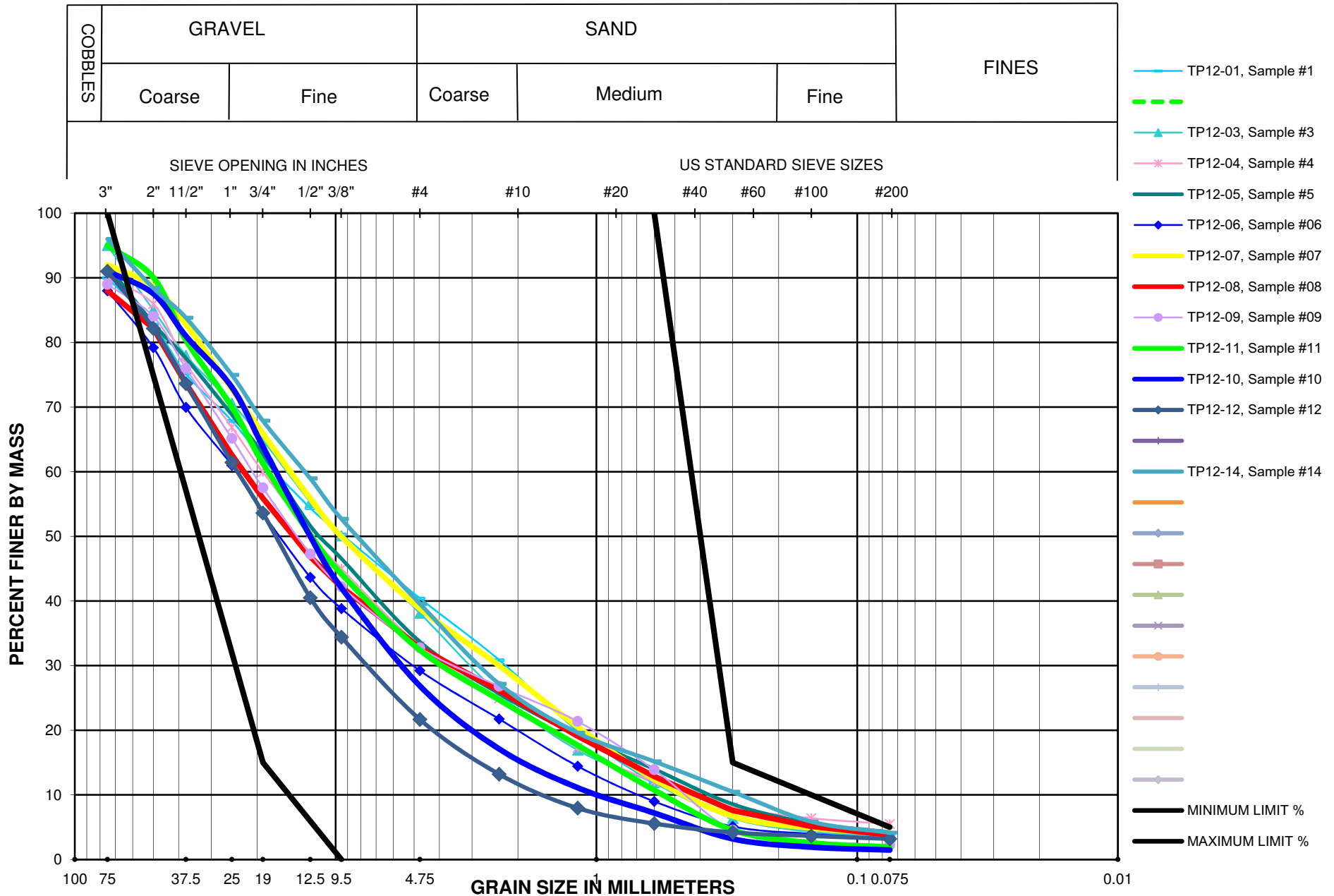
AIRPORT PIT - 2331-20100-0 Task 2001
CHART 6 - GRADATION CURVES - AREA B
MoT TABLE 202-C SELECT GRANULAR SUB-BASE SPECIFICATIONS
OVERSIZE PORTION INCLUDED (>75mm)

AIRPORT PIT - 2331-20100-0 Task 2001



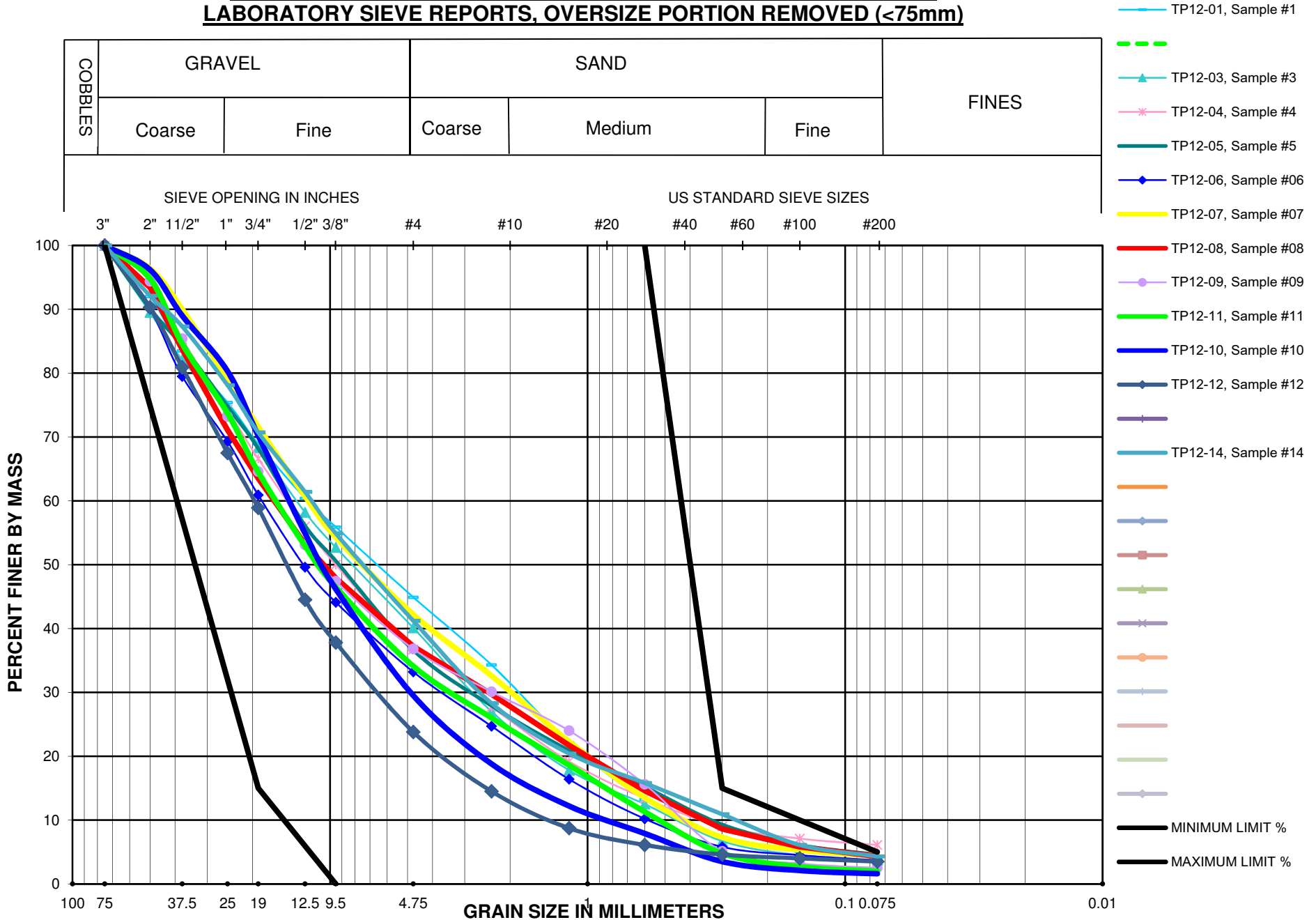
AIRPORT PIT - 2331-20100-0 Task 2001
CHART 2 - GRADATION CURVES
MoT TABLE 202-C SELECT GRANULAR SUB-BASE SPECIFICATIONS
OVERSIZE PORTION INCLUDED (>75mm)

AIRPORT PIT - 2331-20100-0 Task 2001



AIRPORT PIT - 2331-20100-0 Task 2001

AIRPORT PIT - 2331-20100-0 Task 2001
CHART 1 - GRADATION CURVES
MoT TABLE 202-C SELECT GRANULAR SUB-BASE SPECIFICATIONS
LABORATORY SIEVE REPORTS, OVERSIZE PORTION REMOVED (<75mm)





MICRO-DEVAL

Project #: 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P.: 12-4 Sample #: 4
Tech: S. Connell

Client: MoTI
Date Sampled: December 3, 2012
Date Rec'd: December 7, 2012
Date Tested: February 26-27, 2013

Passing		Retained		"A" Grading (3/4"-)		"B" Grading (1/2"-)		"C" Grading (3/8"-)	
mm	Inches	mm	Inches	Required	Actual	Required	Actual	Required	Actual
19.0	3/4	16.0	5/8	375 g	374.4				
16.0	5/8	12.5	1.2	375 g	376.2				
12.5	1/2	9.5	3/8	750 g	750.9	750 g			
9.5	3/8	6.7	0.265			375 g	0.0		
6.7	0.265	4.75	# 4			375 g	0.0	750 g	0.0
Total					1501.5		0.0		0.0

Max Size Aggregate Used 19mm

Intital Sample Weight (A) 1501.5

Final Sample Weight (C) 1406.0

Pan Weight (B) 0.0

Percent Loss 6.36%



MICRO-DEVAL

Project #: 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P.: 12-7 Sample #: 7
Tech: D. Gerein

Client: MoTI
Date Sampled: December 3, 2012
Date Rec'd: December 7, 2012
Date Tested: February 21, 2013

Passing		Retained		"A" Grading (3/4"-)		"B" Grading (1/2"-)		"C" Grading (3/8"-)	
mm	Inches	mm	Inches	Required	Actual	Required	Actual	Required	Actual
19.0	3/4	16.0	5/8	375 g	375.6				
16.0	5/8	12.5	1.2	375 g	375.8				
12.5	1/2	9.5	3/8	750 g	748.7	750 g			
9.5	3/8	6.7	0.265			375 g	0.0		
6.7	0.265	4.75	# 4			375 g	0.0	750 g	0.0
Total					1500.1		0.0		0.0

Max Size Aggregate Used 19mm
Intital Sample Weight (A) 1500.1
Final Sample Weight (C) 1424.6
Pan Weight (B) 0.0
Percent Loss 5.03%



MICRO-DEVAL

Project #: 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P.: 12-09 Sample #: 9
Tech: S. Connell

Client: MoTI
Date Sampled: December 3, 2012
Date Rec'd: December 7, 2012
Date Tested: February 21, 2013

Passing		Retained		"A" Grading (3/4"-)		"B" Grading (1/2"-)		"C" Grading (3/8"-)	
mm	Inches	mm	Inches	Required	Actual	Required	Actual	Required	Actual
19.0	3/4	16.0	5/8	375 g	374.8				
16.0	5/8	12.5	1.2	375 g	377.3				
12.5	1/2	9.5	3/8	750 g	749.6	750 g			
9.5	3/8	6.7	0.265			375 g	0.0	750 g	0.0
6.7	0.265	4.75	# 4			375 g	0.0	750 g	0.0
Total					1501.7		0.0		0.0

Max Size Aggregate Used 19mm

Intital Sample Weight (A) 1501.7
Final Sample Weight (C) 1406.8
Pan Weight (B) 0.0
Percent Loss 6.32%



Project No. 2331-20100-0 Task 2001
 Pit: Airport Pit
 Product: Pit Run
 T.P. 12-4 Sample #: 4

Client: MoTI
 Date Sampled: December 3, 2012
 Date Rec'd: December 7, 2012
 Date Tested: March 4, 2013

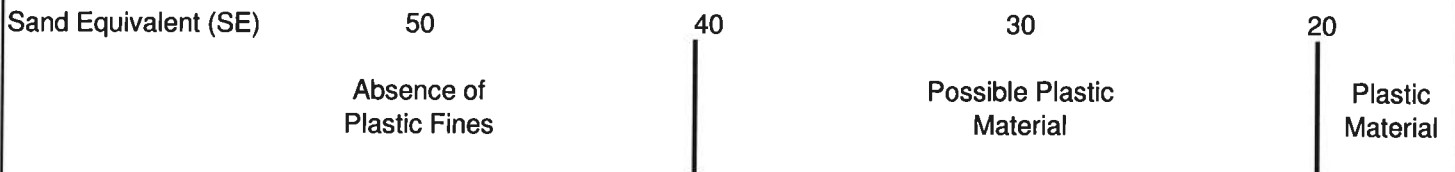
SAND EQUIVALENT TEST A.S.T.M. D-2419

Trial #	1	2	3	4	Average
Clay Height (mm):	221.0	246.4	228.6	238.8	
Sediment Period:	20 min.	20 min.	20 min.	20 min.	
Sand Height (mm):	73.7	73.7	73.7	71.1	
Sand Equivalent (SE):	33.3	29.9	32.2	29.8	31.3

Calculations:

$$\text{Sand Equivalent (SE)} = (\text{Sand Height} / \text{Clay Height}) \times 100$$

INTERPRETATION OF RESULTS



REMARKS



Project No. 2331-20100-0 Task 2001

Pit: Airport Pit

Product: Pit Run

T.P. 12-07 Sample #: 7

Client: MoTI

Date Sampled: December 3, 2012

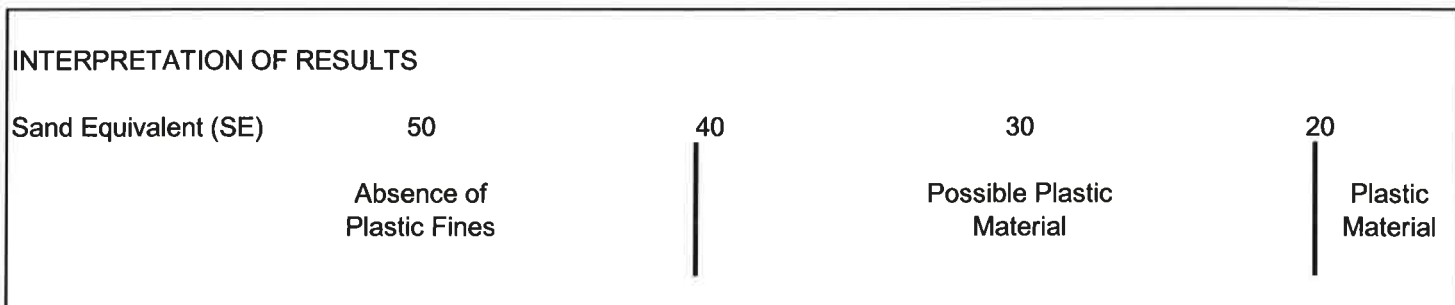
Date Rec'd: December 7, 2012

Date Tested: February 28, 2013

SAND EQUIVALENT TEST A.S.T.M. D-2419

Trial #	1	2	3	4	Average
Clay Height (mm):	<u>175.3</u>	<u>180.3</u>	<u>162.6</u>	<u>205.7</u>	
Sediment Period:	<u>20 min.</u>	<u>20 min.</u>	<u>20 min.</u>	<u>20 min.</u>	
Sand Height (mm):	<u>88.9</u>	<u>83.8</u>	<u>81.3</u>	<u>83.8</u>	
Sand Equivalent (SE):	<u>50.7</u>	<u>46.5</u>	<u>50.0</u>	<u>40.7</u>	<u>47.0</u>

Calculations:
$$\text{Sand Equivalent (SE)} = (\text{Sand Height} / \text{Clay Height}) \times 100$$



REMARKS _____



Project No. 2331-20100-0 Task 2001
 Pit: Airport Pit
 Product: Pit Run
 T.P. TP12-9 Sample #: 9

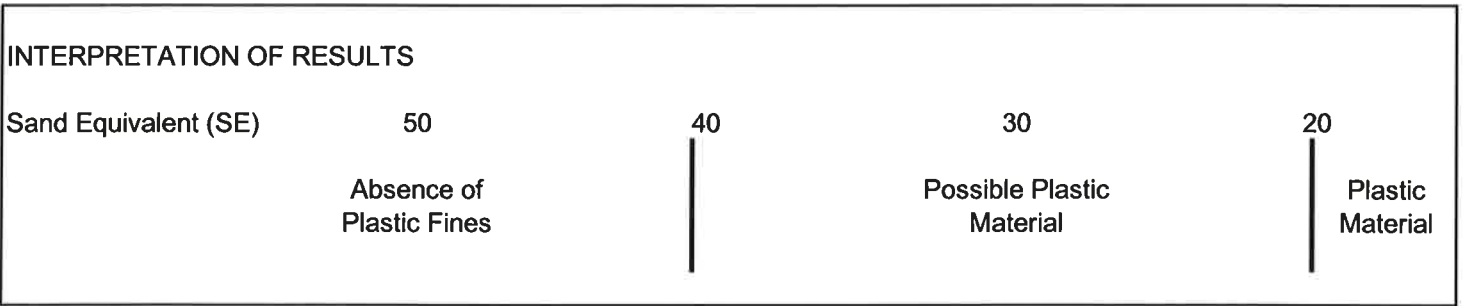
Client: MoTI
 Date Sampled: December 3, 2012
 Date Rec'd: December 7, 2012
 Date Tested: February 25, 2013

SAND EQUIVALENT TEST A.S.T.M. D-2419

Trial #	1	2	3	4	Average
Clay Height (mm):	116.8	109.2	124.5	119.4	
Sediment Period:	20 min.	20 min.	20 min.	20 min.	
Sand Height (mm):	88.9	86.4	86.4	86.4	
Sand Equivalent (SE):	76.1	79.1	69.4	72.3	74.2

Calculations:

$$\text{Sand Equivalent (SE)} = (\text{Sand Height} / \text{Clay Height}) \times 100$$



REMARKS _____



Project No. 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P. 12-06 Sample #: 6

Client: MoTI
Date Sampled: December 3, 2012
Date Rec'd: December 7, 2012
Date Tested: February 21, 2013

BULK RELATIVE DENSITY OF AGGREGATE

COARSE AGGREGATE

BULK RELATIVE DENSITY 2.643
PERCENT WATER ABSORPTION 1.07

FINE AGGREGATE

BULK RELATIVE DENSITY 2.562
PERCENT WATER ABSORPTION 2.44



Project No. 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P. 12-11 Sample #: 11

Client: MoTI
Date Sampled: December 3, 2013
Date Rec'd: December 7, 2013
Date Tested: February 26, 2013

BULK RELATIVE DENSITY OF AGGREGATE

COARSE AGGREGATE

BULK RELATIVE DENSITY 2.637
PERCENT WATER ABSORPTION 1.18

FINE AGGREGATE

BULK RELATIVE DENSITY 2.495
PERCENT WATER ABSORPTION 3.48



Project No. 2331-20100-0 Task 2001
Pit: Airport Pit
Product: Pit Run
T.P. 12-14 Sample #: 14

Client: MoTI
Date Sampled: December 3, 2012
Date Rec'd: December 7, 2012
Date Tested: February 26, 2013

BULK RELATIVE DENSITY OF AGGREGATE

COARSE AGGREGATE

BULK RELATIVE DENSITY 2.644
PERCENT WATER ABSORPTION 1.15

FINE AGGREGATE

BULK RELATIVE DENSITY 2.535
PERCENT WATER ABSORPTION 2.73