Dry Stack Tailings Facility Expansion

Final As-Built Report for

Diversion Channels

State of Alaska Waste Management Permit Number: 2011DB0012

Plan of Operations Amendment Approval: F20129500

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1 Introduction

This report serves as the Final As-Built Report for the Construction Quality Assurance for the Dry Stack Tailings Facility (DSTF) Expansion Diversion Channels at the Pogo Mine (State of Alaska Waste Management Permit (WMP) Number 2011DB0012 and Plan of Operations Amendment Approval F20129500). The DSTF Diversion Channels are also referred to as the DSTF Diversion Ditches. Construction for the project ended September 17, 2013. This report provides the following:

1. Professional Engineer-stamped final as-built drawings (**Appendix 1**), in conformance with the WMP;
2. Details of project resources;
3. Scope of construction work performed;
4. Design modifications made during construction;
5. As-built channel capacities;
6. Quality Assurance/Quality Control (QA/QC) procedures, in conformance with the WMP;
7. Summary of recommendations; and
8. Reference to Operating Plans revised as a result of modifications during construction, in conformance with the WMP.

2 As-Built Drawings

Final as-built details are provided on the following As-Built Drawings (**Appendix 1**):

1. Drawing 1 – Engineering Drawings for the Dry Stack Tailings Facility (DSTF) Expansion Construction – Diversion Channels, Pogo Mine, Alaska, USA
2. Drawing 2 – Mine Site Plan
3. Drawing 3 – Expanded DSTF General Arrangement
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The Final As-Built Drawings have been stamped by Daniel P. Neuffer, Alaska Professional Engineer, No. CE12770.

3 Supporting Documentation

This report contains the following supporting documentation, located in the appendices:

1. Appendix 1 – As-Built Engineering Drawings
2. Appendix 2 – As-Built Survey Drawings
3. Appendix 3 – As-Built Channel Calculations
4. Appendix 4 – Construction Photos
5. Appendix 5 – Road Surfacing Material Test Results
6. Appendix 6 – Miscellaneous Sieve Test Results
7. Appendix 7 – Shotcrete Compressive Strength Test Results and AAP QC Shotcrete Testing
8. Appendix 8 – Concrete Compressive Strength Test Results and AAP QC Concrete Testing

9. Appendix 9 – AAP QC HDPE Pipe Fusion Welding Forms
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11. Appendix 11 – Inlet 3 Test Pit and Borehole Data
12. Appendix 12 – AAP Product Submittals
13. Appendix 13 – Gradation Records
14. Appendix 14 – Compaction Test Fill Memos
15. Appendix 15 – August 27, 2013 Technical Memorandum: Diversion Channel Shotcrete Cracks

4 Project Resources

Alaska Aggregate Products (AAP) was the Contractor responsible for earthworks, shotcrete placement, reinforced concrete construction, piping, High Density Polyethylene (HDPE) geomembrane installation, QC shotcrete and concrete testing, and QC survey data. AAP also worked with Pogo to design and construct the new Haul Road.

Delta Concrete (DC) was the subcontractor that AAP utilized for batching and hauling shotcrete and concrete.

Mappa Testlab, Inc. (Mappa) provided QC testing of shotcrete and concrete, and QA testing of road surfacing materials.

McClintock Land Associates (MLA) provided QA and as-built surveys for the project.

SRK Consulting (U.S.), Inc. (SRK) provided design services and permitting assistance, engineering oversight and QA during construction of the new Diversion Channels, and prepared this as-built report.

Sumitomo Metal Mining Pogo LLC (Pogo) is the project owner. Pogo also supplied non-mineralized waste rock for use as rip-rap and feed to AAP's crushing plant for road surfacing material. In addition, Pogo provided QA for construction of the new Haul Road.

5 Scope of Work

The scope of construction work consisted of the following tasks, each of which is described in more detail hereunder:

North Diversion

1. Felling of Trees;
2. Pioneering;

3. Removal of Timber and Slash Material;
4. Removal of Topsoil and Organic Material;
5. Cut to Fill;
6. Fill Placement and Compaction;
7. Channel Excavation and Road Subgrade Preparation;
8. Final Slope and Channel Grading;
9. Placement of Road Surfacing Material;
10. Shotcrete Placement; and
11. Concrete Placement.

North Diversion – Drainage Inlet 1

1. Excavation of Inlet Apron Subgrade;
2. Shotcrete Placement;
3. Snow Removal;
4. Shotcrete Apron Ice Removal;
5. Placement of Geotextile, Drain Pipes, and Drain Gravel;
6. Placement of D_{50} 3-inch (3-inch) Rip-Rap;
7. Placement of D_{50} 9-inch (9-inch) Rip-Rap; and
8. Repair of Shotcrete Cracks.

North Diversion – Drainage Inlet 2

1. Snow Removal;
2. Excavation of Inlet Apron Subgrade;
3. Excavation of Anchor Trench;
4. Placement of Insulation;
5. Placement of HDPE Geomembrane;
6. Placement of Geotextile, Drain Pipes, and Drain Gravel;
7. Placement of 3-inch Rip-Rap;

8. Placement of 9-inch Rip-Rap;
9. Placement of French Drain Pipe in Channel Side; and
10. Shotcrete Placement.

North Diversion – Drainage Inlet 3N

1. Excavation of Inlet Apron Subgrade;
2. Excavation of Anchor Trench;
3. Placement of French Drain Pipe in Channel Side;
4. Placement of HDPE Geomembrane;
5. Placement of Geotextile;
6. Placement of One-inch Gravel;
7. Placement of 9-inch Rip-Rap;
8. Shotcrete Placement; and
9. Reclamation Work.

South Diversion

1. Felling of Trees;
2. Pioneering;
3. Removal of Timber, Talus, Slash, Topsoil, and Organic Material;
4. Drilling and Blasting;
5. Cut to Fill;
6. Fill Placement and Compaction;
7. Channel Excavation and Road Subgrade Preparation;
8. Final Slope and Channel Grading;
9. Placement of Road Surfacing Material;
10. Shotcrete Placement; and
11. Concrete Placement.

South Diversion – Drainage Inlet 3S

1. Excavation of French Drain Trench;
2. Placement of French Drain Pipe in Channel Side;
3. Placement of 9-inch Rip-Rap; and
4. Shotcrete Placement.

South Diversion – Drainage Inlet 4

1. Excavation of Inlet Apron Subgrade;
2. Excavation of Anchor Trench;
3. Placement of French Drain Pipe in Channel Side;
4. Placement of HDPE Geomembrane;
5. Placement of Geotextile;
6. Placement of One-inch Gravel;
7. Placement of 9-inch Rip-Rap; and
8. Shotcrete Placement.

South Diversion – Flume Intake Structure and Upper Thrust Block

1. Subgrade Preparation;
2. Flume Intake Structure and Upper Thrust Block Construction;
3. Placement of One-inch Gravel and Backfill;
4. Shotcrete Placement; and
5. Safety Railing and Ladder Installation.

South Diversion – HDPE Pipe

1. Fusion of HDPE Pipe;
2. Placement of HDPE Pipe; and
3. Placement of One-inch Gravel and Backfill.

South Diversion – Lower Thrust Blocks and Channel Plug

1. Ramp and Subgrade Preparation;
2. Lower Thrust Blocks Construction;

3. Channel Plug Construction; and
4. Placement of One-inch Gravel and Backfill.

South Diversion – Stilling Basin

1. Subgrade Preparation;
2. Placement of Geotextile;
3. Placement of 20-inch Rip-Rap;
4. Placement of 9-inch Rip-Rap; and
5. Placement of Large Boulders.

Vegetation removal and pioneering for the project began in April 2012 (before bird nesting season) and earthwork began in May 2012. Shotcrete was placed in September and October 2012, and also in July, August, and September 2013. Concrete pours occurred in August and September 2013. Construction for the 2012 season ended in mid-October 2012, and construction for the project was completed in mid-September 2013. Photographs documenting construction work and QA/QC are provided in **Appendix 4**.

North Diversion

Reference Drawings 8-11, and 15

1. Felling of Trees – AAP hand-cleared trees using chainsaws in April 2012.
2. Pioneering – AAP excavated the pioneer road using an excavator and a dozer from Station (STA) 0+00 to 58+00.
3. Removal of Timber and Slash Material – AAP removed merchantable timber and slash material as the pioneer road progressed. Merchantable timber was hauled to the airport stockpile and slash material was hauled to the temporary stockpile above the existing Haul Road. The slash material in the temporary stockpile was eventually moved to two stockpiles near the Recycled Tailings Pond (RTP). Beginning in late June 2012, at Pogo's directive, AAP began pushing slash material past the toe of the fill slope, from approximately STA 42+00 to STA 58+00 (as approved by Alaska Division of Forestry).
4. Removal of Topsoil and Organic Material – AAP removed topsoil and organic material as the pioneer road progressed. Topsoil, organic soil, and organic material, or "unsuitable" materials, were hauled to the airport stockpile. Beginning in late June 2012, at Pogo's directive, AAP began pushing topsoil, organic soil, and organic material past the toe of the fill slope, from approximately STA 42+00 to STA 58+00.

5. Cut to Fill – AAP constructed the diversion channel and road from STA 0+00 to 58+00 primarily by cut to fill methods. Excavators and dozers were used to excavate cut slopes. Dozers and articulated haul trucks were used to move and place material. Native materials from the North Diversion cut were used for fill, except for STA 13+00 to 19+00 and 22+00 to 26+00, where materials from the new Haul Road cut were used for North Diversion fill. Survey stakes were placed on both the cut and fill slopes, allowing equipment operators to either excavate or place fill to achieve design slopes. Prior to placement of Type 2 General Fill within traffic limits, the subgrade was leveled with a dozer or grader and compacted by track-walking with a dozer or rolling with a 15-ton vibratory compactor.

6. Fill Placement and Compaction – Throughout construction and in conjunction with cut to fill methods, AAP spread Type 2 General Fill in 18-inch-thick lifts with a dozer and compacted the fill with a 15-ton vibratory roller compactor. Additionally, AAP compacted most areas containing Type 1 General Fill, not including berms. Compaction test fills were performed on different material types to estimate the optimum number of compaction passes for material placed as Type 2 General Fill. In general, six to eight passes of the 15-ton vibratory roller were required for optimum compaction of Type 2 General Fill; field test results for compaction test fills are included in **Appendix 14**.

7. Channel Excavation and Road Subgrade Preparation – AAP excavated the diversion channel from STA 0+00 to 58+00 with an excavator and a dozer, after the channel and road surface were compacted and built to final grade. The road surface was then excavated 1 foot (ft) down to subgrade with an excavator, graded with an excavator, and compacted with a 15-ton vibratory roller before road surfacing material was placed. Excess material from the channel and road excavations was used for berm construction and maintenance.

8. Final Slope and Channel Grading – AAP completed final grading of the cut and fill slopes from STA 0+00 to 58+00. Final grading of the cut slopes and diversion channel were performed with an excavator. Compaction of the channel side slopes were performed with a 15-ton roller or excavator bucket, depending on access. Laborers manually removed large rocks from the channel invert to prepare the surface for shotcrete.

9. Placement of Road Surfacing Material – AAP set up a crusher plant near the airport to crush non-mineralized waste rock from Pogo to manufacture one-inch gravel road surfacing material. The material was stockpiled near the crusher by a loader and articulated haul trucks hauled the gravel up to the permanent stockpile located on Shell 2 of the DSTF. Moisture conditioning was generally performed on the stockpile by adding water to the pile from a water truck and mixing material with an excavator. The rear bed of an articulated haul truck was modified to dump the gravel on the road surface in a windrow and a dozer spread the material in 6-inch-thick lifts. A 15-

ton vibratory roller was used to compact the road surfacing material from STA 0+00 to 58+00.

10. Shotcrete Placement – AAP subcontracted with DC to produce shotcrete on-site. DC set up a batch plant on Shell 2 and used mixer trucks to haul shotcrete up to the diversion channels. AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man labor crew, utilized a pump, air compressor, and hose to spray shotcrete approximately 3 inches thick in the diversion channel from STA 0+00 to 58+00. BASF Acryl 60 was applied to cured shotcrete prior to placement of overlapping new shotcrete. Shotcrete was covered with blankets for approximately three days when average low temperatures were expected to drop below 37°F. AAP performed QC testing during shotcrete placement, which is discussed in Section 8.

    Significant cracking and undermining was observed in the shotcrete placed on the cut slope side of the channel from STA 34+20 to 35+00. AAP used a saw to cut the undermined shotcrete and removed the damaged shotcrete with an excavator. AAP replaced the shotcrete using the methods described in the above paragraph. Additional information and recommendations regarding shotcrete cracking are provided in **Appendix 15**.

11. Concrete Placement – AAP subcontracted with DC to produce concrete on-site. DC set up a batch plant on Shell 2 and used mixer trucks to haul concrete to the old North Diversion. AAP constructed the rebar cage and forms for the old North Diversion Channel Plug. Eight,1.5-ft-long, 2-inch diameter holes were drilled into the old diversion ditch shotcrete and subgrade, and eight, approximately 3-ft-long, #6 rebar dowels were inserted and grouted in place to anchor the structure. Prior to the concrete pour, AAP hand-applied A300 AtcoMastic asphalt mastic to the top of the old diversion channel shotcrete, within the plug footprint. AAP poured concrete in the channel plug with the mixer truck's chute. AAP utilized a vibrator to provide consolidation during concrete pours. AAP used wooden 2x4 studs, trowels, and brushes to finish the concrete surfaces. AAP removed the forms after the concrete had cured for at least three days. AAP performed QC testing during concrete placement, which is discussed in Section 8.

Winter construction on parts of Drainage Inlets 1 and 2 occurred during March 2013. The general weather conditions were mostly clear and sunny with a light breeze, with a few overcast and cloudy days near the end of construction. Several inches of snow fell after the construction of Drainage Inlet 1 and prior to the construction of Drainage Inlet 2. The minimum temperature recorded on-site was -28° F and the maximum temperature recorded on-site was 40° F, but temperatures were generally between -15° F and 20° F. Snow covered a majority of the slopes, roads and inlet areas prior to snow removal at the inlets. The ground was generally dry and frozen, with snow melt beginning to occur on south-facing slopes and roads. Water was observed seeping from the stream and excavation at Drainage Inlet 2 almost continuously during site visits, with a steady ice buildup.

North Diversion – Drainage Inlet 1

Reference Drawings 8 and 12

1. Excavation of Inlet Apron Subgrade – AAP excavated the apron subgrade with an excavator in late September 2012, and constructed the apron 10 feet into the cut slope, where permafrost was encountered along most of the apron.

2. Shotcrete Placement – In late September 2012, AAP placed three inches of shotcrete on the apron and diversion channel. However, thawing of the exposed permafrost caused some water to run over the apron during shotcrete placement, so an additional three inches of shotcrete was applied to the apron. For shotcrete placement methods, refer to the North Diversion Shotcrete Placement text (Section 5, Task 10). As of September 2013, the shotcrete apron was covered with drain gravel, drain pipes, geotextile, and rip-rap, and is conveying water into the North Diversion Channel as designed.

3. Snow Removal – In early March 2013, AAP removed snow from the inlet with an excavator.

4. Shotcrete Apron Ice Removal – AAP heated the shotcrete apron with a portable heating unit prior to removing ice from the apron. Ice was removed manually with a broom to prevent damage to the shotcrete.

5. Placement of Geotextile, Drain Pipes, and Drain Gravel – AAP placed 12-oz, non-woven geotextile fabric over the shotcrete apron by hand. AAP installed 4-inch-diameter, perforated, corrugated, HDPE drain pipes (drain pipes) at 5 feet on center across the apron by hand, followed by approximately 1 foot of drain gravel placed with an excavator. AAP obtained the drain gravel from an off-site quarry. The geotextile was then wrapped around the sides and top of the drain pipes and gravel, with geotextile panels overlapping at least 18 inches.

6. Placement of 3-inch Rip-Rap – AAP placed multiple lifts of 3-inch rip-rap over the drain gravel blanket with an excavator. Each lift was no more than 18 inches thick and compacted with the excavator bucket until no further settlement was observed. The rip-rap was placed to about 18 inches below the adjacent natural ground surface. AAP obtained the rip-rap from the new Haul Road cut.

7. Placement of 9-inch Rip-Rap – AAP placed approximately 18 inches of 9-inch rip-rap over the 3-inch rip-rap with an excavator. The rip-rap was placed to generally meet the natural ground surface and form a broad swale. AAP obtained the rip-rap from the new Haul Road cut.

8. Repair of Shotcrete Cracks – Two ¼-inch-wide cracks, approximately 15 feet in length, were observed in the shotcrete near the channel invert in August 2013. In mid-September 2013, AAP applied Alaskrete to approximately the middle 10 feet of the crack above the channel invert and Sakrete Hydraulic Cement to the crack in the

channel invert and approximately the last 2.5 feet on either side of the crack above the channel invert.

North Diversion – Drainage Inlet 2

Reference Drawings 9 and 17

1. Snow Removal – AAP removed snow from the inlet with an excavator.

2. Excavation of Inlet Apron Subgrade – AAP excavated the apron subgrade with an excavator. A heater was placed on the frozen ground and ice for several days before the excavator was able to remove the snow, ice, and frozen soil.

3. Excavation of Anchor Trench – AAP excavated the anchor trench with an excavator after the apron subgrade was slightly thawed by the heater. Immediately prior to placement of insulation, AAP removed most of the water, ice, rocks, and soil that had fallen into the trench overnight by hand using a shovel. The excavator then cleared all water, snow, ice, and rocks from the apron subgrade.

4. Placement of Insulation – AAP placed three layers of 2-inch-thick InsulFoam 60 insulation foam board over the apron subgrade by hand. The joints of each layer were staggered during placement. The foam boards were cut to fit the apron subgrade along the sides and front of the apron.

5. Placement of HDPE Geomembrane – AAP used a double wedge welder to seam the two 60-mil HDPE geomembrane panels in a tent near the airstrip. AAP transported the geomembrane panels by pick-up truck and excavator. AAP placed the HDPE geomembrane by hand over the insulation and down into the anchor trench. The edges of the HDPE geomembrane were cut to fit the apron along the sides. AAP performed QC on the geomembrane, as discussed in Section 8.

6. Placement of Geotextile, Drain Pipes, and Drain Gravel – AAP placed 12-oz, non-woven geotextile fabric over the HDPE geomembrane by hand, including the geomembrane in the anchor trench. Drain pipes were placed 5 feet on center across the apron by hand, including an additional drain pipe in the center of the apron, followed by approximately 1 foot of drain gravel placed with an excavator. Drain gravel was hand shoveled into the anchor trench. AAP obtained the drain gravel from an off-site quarry. The geotextile was then wrapped around the sides and top of the anchor trench, drain pipes and gravel, with geotextile panels overlapping at least 18 inches.

7. Placement of 3-inch Rip-Rap – AAP placed multiple lifts of 3-inch rip-rap over the drain gravel blanket with an excavator. Each lift was no more than 18 inches thick and compacted with the excavator bucket until no further settlement was observed. The rip-rap was placed to about 18 inches below the adjacent natural ground surface. AAP obtained the rip-rap from the new Haul Road cut.

8. Placement of 9-inch Rip-Rap – AAP placed approximately 18 inches of 9-inch rip-rap over the 3-inch rip-rap with an excavator. The rip-rap was placed to generally meet the natural ground surface and form a broad swale. AAP obtained the rip-rap from the new Haul Road cut.

9. Placement of French Drain Pipe in Channel Side – AAP completed the channel excavation adjacent to Drainage Inlet 2 with an excavator during July 2013. Subsequently, AAP excavated a 2-ft-wide by 2-ft-deep trench in the cut slope side of the channel. AAP placed reinforced plastic sheeting on the downstream side of the trench, followed by 12-oz. non-woven geotextile fabric. A drain pipe was placed in the trench over the geotextile. Drain gravel was then placed by an excavator and hand around the drain pipe. The geotextile was wrapped around the drain pipe and drain gravel, leaving one end of the pipe exposed for drainage, and the French drain area was backfilled with Type 2 General Fill and compacted with an excavator bucket. During August 2013, a small seep in the cut slope side of the shotcrete, below the French drain pipe, was observed. AAP drilled three, ½-inch-diameter holes, spaced 1 foot on center, in the shotcrete near the seep to provide drainage and lower pore pressure behind the shotcrete. No new seeps were observed in the shotcrete during September 2013.

10. Shotcrete Placement – In August 2013, AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man crew, sprayed shotcrete 3 inches thick in the drainage inlet floor and diversion channel. For shotcrete placement methods, refer to the North Diversion Shotcrete Placement text (Section 5, North Diversion, Task 10).

North Diversion – Drainage Inlet 3N

Reference Drawing 18

1. Excavation of Inlet Apron Subgrade – AAP excavated the apron subgrade in the cut slope side of the channel in July 2013 with an excavator.

2. Excavation of Anchor Trench – AAP excavated the anchor trench with an excavator.

3. Placement of French Drain Pipe in Channel Side – AAP completed the channel excavation adjacent to Drainage Inlet 3N with an excavator during July 2013. Subsequently, AAP excavated a 2-ft-wide by 2-ft-deep trench in the cut slope side of the channel. AAP placed reinforced plastic sheeting on the downstream side of the trench, followed by 12-oz. non-woven geotextile fabric. A drain pipe was placed in the trench over the geotextile. Drain gravel was then placed by a loader and hand around the drain pipe. The geotextile was wrapped around the drain pipe and drain gravel, leaving one end of the pipe exposed for drainage, and the French drain area was backfilled with Type 2 General Fill and compacted with an excavator bucket.

4. Placement of HDPE Geomembrane – AAP transported the geomembrane panel by pick-up truck and excavator. AAP placed the 60-mil HDPE geomembrane by hand

over the subgrade and down into the anchor trench. The edges of the HDPE geomembrane were cut to fit the apron along the sides. AAP performed QC on the geomembrane, as discussed in Section 8.

5. Placement of Geotextile – AAP placed the 12-oz, non-woven geotextile over the HDPE geomembrane by hand, followed by placement of one-inch gravel, and then wrapped the geotextile over and around the one-inch gravel, with the sides overlapping at least 18 inches. AAP placed the geotextile up the cut slope with an excavator, and manually moved the geotextile into final position by hand.

6. Placement of One-inch Gravel – One-inch gravel was placed over the 12-oz, non-woven geotextile and in the anchor trench by loader and hand. AAP obtained the gravel from the stockpile on Shell 2 of the DSTF.

7. Placement of 9-inch Rip-Rap – AAP placed approximately 18 inches of 9-inch rip-rap over the geotextile with an excavator. The rip-rap was placed to generally meet the natural ground surface and form a broad swale. AAP obtained the rip-rap from the native rocky material at Inlet 3N.

8. Shotcrete Placement – AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man crew, sprayed shotcrete 3 inches thick in the drainage inlet floor and diversion channel. For shotcrete placement methods, refer to the North Diversion Shotcrete Placement text (Section 5, Task 10).

9. Reclamation Work – AAP reclaimed an area of disturbed ground adjacent to Drainage Inlet 3N with an excavator. AAP contoured the reclaimed area to meet the natural ground slope prior to disturbance and placed topsoil and slash material over the contoured surface with an excavator. AAP used topsoil and slash material located at the edge of the disturbance.

South Diversion

Reference Drawings 7, 10, 14, and 15

1. Felling of Trees – AAP cleared trees using an excavator and a dozer.

2. Pioneering – AAP excavated the pioneer road using an excavator and a dozer from STA 3+80 to 31+00.

3. Removal of Timber, Talus, Slash, Topsoil, and Organic Material – AAP removed timber, talus, slash, topsoil, organic soil, and organic material as the pioneer road progressed. Timber, talus, topsoil, organic soil, and slash material were dozed over the side of the pioneer road and pushed beyond the toe of the fill slope.

4. Drilling and Blasting – AAP drilled and blasted in areas of bedrock that could not be excavated or ripped with a dozer. AAP used a drill rig to drill 4-inch-diameter holes between 6- and 52-ft long. AAP loaded the holes with explosives provided by Pogo.

5. Cut to Fill – AAP constructed the diversion channel and road from STA 4+50 to 31+00 primarily by cut to fill methods. Excavators and dozers were used to excavate cut slopes. Dozers and articulated haul trucks were used to move and place material. Native materials from the South Diversion cut were used for fill. Survey stakes were placed on both the cut and fill slopes, allowing equipment operators to either excavate or place fill to achieve design slopes. Prior to placement of Type 2 General Fill within traffic limits, the subgrade was leveled with a dozer or grader and compacted by track-walking with a dozer or rolling with a 15-ton vibratory compactor.

   Fill materials used on July 21, 2013 were obtained from the new Haul Road excess material stockpile, near Drainage Inlet 1, and were hauled and dumped in a temporary stockpile along the South Diversion around STA 18+00. Materials from this temporary stockpile were then placed from STA 10+00 to 5+00 by the methods described above. The material gradation was similar to other blasted rock materials used during South Diversion construction, as discussed in Section 8.

   During construction, an alteration zone with an apparent thickness exposed on the road of approximately 50 ft and an apparent shallow dip to the west was encountered in the cut from STA 22+00 to 23+00. The material in the alteration zone was a dense to stiff, dry, low-medium plastic sandy gravel with clay to sandy clay, based on visual/manual methods using the Unified Soil Classification System (USCS). AAP excavated and substantially removed the altered material from the channel and road subgrade to a depth up to 6 ft below final grade with an excavator. The excavated area was backfilled with Type 2 General Fill sourced from blasting. The excavated material was disposed of beyond the edge of the Type 1 fill.

6. Fill Placement and Compaction – Throughout construction and in conjunction with cut to fill methods, AAP spread Type 2 General Fill in 18-inch-thick lifts with a dozer and compacted the fill with a 15-ton vibratory roller compactor. Additionally, AAP compacted most areas containing Type 1 General Fill, not including berms. Compaction test fills were performed on different material types to estimate the optimum number of compaction passes for material placed as Type 2 General Fill. In general, six to eight passes of the 15-ton vibratory roller were required for optimum compaction of Type 2 General Fill; field test results for compaction test fills are included in **Appendix 14**.

7. Channel Excavation and Road Subgrade Preparation – AAP excavated the diversion channel from STA 4+50 to 31+00 with an excavator and a dozer, after the channel and road surface were compacted and built to final grade. The road surface was then excavated 1 ft down to subgrade with an excavator, graded with an excavator, and compacted with a 15-ton vibratory roller before road surfacing material was placed. Excess material from the channel and road excavations was used for berm construction and maintenance.

8. Final Slope and Channel Grading – AAP completed final grading of the cut and fill slopes from STA 3+80 to 31+00. Final grading of the cut slopes and diversion channel were performed with an excavator. Compaction of the channel side slopes was performed with a 15-ton roller or excavator bucket, depending on access. Laborers manually removed large rocks from the channel invert to prepare the surface for shotcrete.

9. Placement of Road Surfacing Material – AAP set up a crusher plant near the airport to crush non-mineralized waste rock from Pogo to manufacture one-inch gravel road surfacing material. The material was stockpiled near the crusher by a loader and articulated haul trucks hauled the gravel up to the permanent stockpile located on Shell 2 of the DSTF. Moisture conditioning was generally performed on the stockpile by adding water to the pile from a water truck and mixing material with an excavator. The rear bed of an articulated haul truck was modified to dump the gravel on the road surface in a windrow and a dozer spread the material in 6-inch-thick lifts. A 15-ton vibratory roller was used to compact the road surfacing material from STA 3+80 to 31+00.

10. Shotcrete Placement – AAP subcontracted with DC to produce shotcrete on-site. DC set up a batch plant on Shell 2 and used mixer trucks to haul shotcrete up to the diversion channels. AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man labor crew, utilized a pump, air compressor, and hose to spray shotcrete approximately 3 inches thick in the diversion channel from STA 4+50 to 31+00. BASF Acryl 60 was applied to cured shotcrete prior to placement of overlapping new shotcrete. AAP performed QC testing during shotcrete placement, which is discussed in Section 8. Information and recommendations regarding shotcrete cracking are provided in **Appendix 15**.

11. Concrete Placement – AAP subcontracted with DC to produce concrete on-site. DC set up a batch plant on Shell 2 and used mixer trucks to haul concrete to locations of concrete pours. AAP constructed the rebar cages and forms, and poured concrete in the South Diversion flume intake structure, thrust blocks, and channel plug. AAP utilized a vibrator to provide consolidation during concrete pours. AAP used wooden 2x4 studs, trowels, and brushes to finish the concrete surfaces. AAP removed the forms after the concrete had cured for at least three days. AAP performed QC testing during concrete placement, which is discussed in Section 8.

South Diversion – Drainage Inlet 3S

Reference Drawings 18 and 19

1. Excavation of French Drain Trench – AAP completed the channel excavation at STA 31+00 with an excavator in August 2013. Subsequently, AAP excavated a 2-ft-wide by 2-ft-deep trench in the channel cut slope with an excavator from STA 30+70 to 29+30 during August 2013.

2. Placement of French Drain Pipe in Channel Side – AAP placed reinforced plastic sheeting on the downstream side of the trench, followed by 12-oz. non-woven geotextile fabric. A drain pipe was placed in the trench over the geotextile. Drain gravel was then placed by an excavator and hand around the drain pipe. The geotextile was wrapped around the drain pipe and drain gravel, leaving one end of the pipe exposed for drainage, and the French drain area was backfilled with Type 2 General Fill and compacted with an excavator bucket.

3. Placement of 9-inch Rip-Rap – In August and September 2013, AAP excavated the cut slope in three areas at the Drainage Inlet 3S area and placed approximately 18 inches of 9-inch rip-rap over native ground with an excavator. The rip-rap was placed to generally meet the natural ground surface. AAP obtained the rip-rap from the native rocky material at Inlet 3N and from a cut above Shell 2 on the DSTF.

4. Shotcrete Placement – AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man labor crew, sprayed shotcrete 3 inches thick in the diversion channel. For shotcrete placement methods, refer to the South Diversion Shotcrete Placement text (Section 5, Task 10).

South Diversion – Drainage Inlet 4

Reference Drawings 7 and 19

1. Excavation of Inlet Apron Subgrade – AAP excavated the apron subgrade in the cut slope side of the channel in July 2013 with an excavator.

2. Excavation of Anchor Trench – AAP excavated the anchor trench with an excavator.

3. Placement of French Drain Pipe in Channel Side – AAP completed the channel excavation adjacent to Drainage Inlet 4 with an excavator during July 2013. Subsequently, AAP excavated a 2-ft-wide by 2-ft-deep trench in the cut slope side of the channel. AAP placed reinforced plastic sheeting on the downstream side of the trench, followed by 12-oz. non-woven geotextile fabric. A drain pipe was placed in the trench over the geotextile. Drain gravel was then placed by a loader and hand around the drain pipe. The geotextile was wrapped around the drain pipe and drain gravel, leaving one end of the pipe exposed for drainage, and the French drain area was backfilled with Type 2 General Fill and compacted with an excavator bucket.

4. Placement of HDPE Geomembrane – AAP transported the geomembrane panel by pick-up truck and excavator. AAP placed the 60-mil HDPE geomembrane by hand over the subgrade and down into the anchor trench. The edges of the HDPE geomembrane were cut to fit the apron along the sides. AAP performed QC on the geomembrane, as discussed in Section 8.

5. Placement of Geotextile – AAP placed the 12-oz, non-woven geotextile over the HDPE geomembrane by hand, followed by placement of one-inch gravel, and then

wrapped the geotextile over and around the one-inch gravel, with the sides overlapping at least 18 inches. AAP placed the geotextile up the cut slope with an excavator, and manually moved the geotextile into final position by hand.

6. Placement of One-inch Gravel – One-inch gravel was placed over the 12-oz, non-woven geotextile and in the anchor trench by loader and hand. AAP obtained the gravel from the stockpile on Shell 2 of the DSTF.

7. Placement of 9-inch Rip-Rap – In August 2013, AAP placed approximately 18 inches of 9-inch rip-rap over the geotextile in the main stream channel with an excavator. AAP also placed approximately 18 inches of 9-inch rip-rap over native ground in the seep area. The rip-rap was placed to generally meet the natural ground surface in both areas. Some minor erosion was observed at the edge of the seep area rip-rap after placement (see South Diversion Photograph 95 in **Appendix 4**). SRK recommends visually monitoring the edges of rip-rap for erosion on a monthly basis (minimum) between freshet and winter freeze-up.

8. Shotcrete Placement – AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man crew, sprayed shotcrete 3 inches thick in the drainage inlet floor and diversion channel. For shotcrete placement methods, refer to the South Diversion Shotcrete Placement text (Section 5, Task 10).

South Diversion – Flume Intake Structure and Upper Thrust Block

Reference Drawings 13 and 14

1. Subgrade Preparation – The subgrade of the flume intake structure and upper thrust block was bedrock. After drilling and blasting and excavation, the subgrade was prepared by removing loose rocks and leveling the subgrade with an excavator. AAP placed one-inch gravel over the subgrade with an excavator and by hand and compacted the gravel. AAP obtained the gravel from the stockpile on Shell 2 on the DSTF.

2. Flume Intake Structure and Upper Thrust Block Construction – AAP constructed rebar cages and forms for the flume intake structure and upper thrust block. For the upper thrust block, six, 1.5-ft-long, 2-inch diameter holes were drilled into the subgrade and six, approximately 3-ft-long, #6 or #10 rebar dowels were inserted and grouted in place to anchor the structure. AAP poured concrete in the flume intake structure base with the mixer truck's chute. AAP poured concrete in the flume intake structure walls utilizing a portable concrete pump with hose and excavator to elevate and move the hose. AAP poured concrete in the upper thrust block with the mixer truck's chute. AAP utilized a vibrator to provide consolidation during concrete pours. AAP used wooden 2x4 studs, trowels, and brushes to finish the concrete surfaces. AAP removed the forms after the concrete had cured for three days. AAP performed QC testing during concrete placement, which is discussed in Section 8.

The concrete poured in the flume intake structure's floor did not meet the compressive strength requirements of the Specifications, as discussed in Section 6. To provide some additional hardness and durability to the concrete, AAP applied a coating, per manufacturer recommendations, of Dayton Superior Pentra-Hard Densifier.

3. Placement of One-inch Gravel and Backfill – AAP backfilled the area around the flume intake structure and upper thrust block with one-inch gravel. The gravel was placed by an excavator and by hand in 6- to 8-inch-thick lifts, and was compacted with a jumping jack and a vibratory plate compactor. Once the gravel was at least 1 ft above the top of the upper thrust block, AAP placed Type 2 General Fill over the gravel within traffic limits near the concrete structures and in the truck turnaround area. Type 2 General Fill was placed with an excavator and compacted with a 15-ton vibratory roller compactor.

4. Shotcrete Placement – AAP's ACI-certified shotcrete nozzleman, with the help of a 3-man labor crew, sprayed shotcrete 3 inches thick in the diversion channel and around the flume intake structure, as shown in Photograph 94 of **Appendix 4**. For shotcrete placement methods, refer to the South Diversion Shotcrete Placement text (Section 5, Task 10).

5. Safety Railing and Ladder Installation – AAP assembled and installed steel safety handrails around the top of the flume intake structure. AAP assembled and installed a vertical ladder inside the flume intake structure.

South Diversion – HDPE Pipe

Reference Drawings 7, 13, 14, and 16

1. Fusion of HDPE Pipe – AAP used a butt fusion machine to fuse all pipe segments together. AAP also fused electrofusion flex restraints to the HDPE pipe with an electrofusion machine. AAP performed QC during pipe fusion, which is discussed in Section 8.

2. Placement of HDPE Pipe – AAP pulled the HDPE pipe up the slope from the stilling basin area of the old South Diversion and into position near the flume intake structure on the new South Diversion with two excavators. AAP temporarily secured the pipe to a buried jersey barrier prior to moving the pipe into permanent position with an excavator. AAP attached the HDPE pipe to the segment of pipe in the flume intake structure and upper thrust block through a bolted flange connection.

3. Placement of One-inch Gravel and Backfill – Where buried, AAP backfilled the area within 1 ft of the HDPE pipe with one-inch gravel. The gravel was placed by an excavator and by hand in 6- to 8-inch-thick lifts, and compacted with a jumping jack and a vibratory plate compactor. AAP also used a shovel to manually fill and compact the gravel from the pipe bottom to the pipe springline.

South Diversion – Lower Thrust Blocks and Channel Plug

Reference Drawings 13, 14, and 19

1. Ramp and Subgrade Preparation – AAP constructed a ramp for Thrust Block 1 using Pogo's non-mineralized waste rock. AAP placed rock fill in 18-inch-thick lifts with an excavator, and compacted the ramp with 6 passes with a 15-ton vibratory roller compactor; see Section 8 for further discussion of QA. AAP placed approximately 6 and 18 inches of one-inch gravel for pads beneath Thrust Blocks 1 and 2, respectively. The gravel was placed with an excavator, spread by hand, and compacted with a vibratory plate compactor.

2. Lower Thrust Blocks Construction – AAP constructed rebar cages and forms for Thrust Blocks 1 and 2. For each of the lower thrust blocks, four, approximately 4.5-ft-long, #10 rebar dowels were driven 1.5 ft in to the subgrade and grouted in place to anchor the structure. AAP poured concrete in Thrust Block 1 by transporting concrete from the mixer truck's chute to the forms with an excavator bucket. AAP poured concrete in Thrust Block 2 with the mixer truck's chute. AAP utilized a vibrator to provide consolidation during concrete pours. AAP used wooden 2x4 studs, trowels, and brushes to finish the concrete surfaces. AAP removed the forms after the concrete had cured for three days. AAP performed QC testing during concrete placement, which is discussed in Section 8.

   The first batch of concrete poured in Thrust Block 1 did not meet the Specifications, as discussed in Section 6, resulting in significant honeycombing. AAP took several steps to mitigate the problem. AAP placed 3/16-inch-thick metal sheets around three sides of the thrust block (downstream face and both sides), drilled approximately twenty-two 1.5-inch-diameter holes in the metal sheets and concrete up to 4 ft long, and pressure grouted the thrust block until the holes did not take any more grout. AAP used twenty-four 50-lb bags of Sakrete non-shrink grout for the remedial grouting. AAP also hand troweled grout on the exterior of Thrust Block 1 to fill honeycombed areas that were not covered by the metal sheets.

3. Channel Plug Construction – AAP constructed a rebar cage and forms for the old South Diversion Channel Plug. AAP drilled eight, 1.5-ft-long, 2-inch diameter holes into the old diversion ditch subgrade and eight, approximately 3-ft-long, #6 rebar dowels were inserted and grouted in place to anchor the structure. AAP poured concrete in the channel plug with the mixer truck's chute. AAP utilized a vibrator to provide consolidation during concrete pours. AAP used wooden 2x4 studs, trowels, and brushes to finish the concrete surfaces. AAP removed the forms after the concrete had cured for three days.

   Concrete for the old South Diversion Channel Plug was batched at DC's batch plant in Delta Junction, AK, and 28 ounces per cubic yard of Delvo Stabilizer (made by BASF) was added to the batch as a retarder.

4. Placement of One-inch Gravel and Backfill – AAP backfilled the area within 12 inches (minimum) of Thrust Blocks 1 and 2 with one-inch gravel. The gravel was placed by an excavator in 6- to 8-inch-thick lifts, and compacted with a jumping jack and a vibratory plate compactor. AAP placed Type 2 General Fill around the gravel with an excavator and compacted the Type 2 General Fill with an excavator bucket or a vibratory roller compactor. AAP used an excavator to grade the fill material so it slopes into the DSTF.

South Diversion – Stilling Basin

Reference Drawings 13 and 16

1. Subgrade Preparation – AAP excavated to subgrade with an excavator.
2. Placement of Geotextile – AAP placed geotextile fabric with an excavator and manually moved the fabric into the final position. Geotextile panels overlapped at least 18 inches.
3. Placement of 20-inch Rip-Rap – AAP placed approximately 36 inches of 20-inch rip-rap over the geotextile in the stilling basin with an excavator. The rip-rap was placed to meet the pre-existing ground surface and form a broad swale. AAP placed approximately 42 inches of 20-inch rip-rap over the geotextile with an excavator for the last 36 inches of stilling basin length at the downstream end. AAP obtained the rip-rap from the old South Diversion berm and fill slope.
4. Placement of 9-inch Rip-Rap – AAP placed approximately 18 inches of 9-inch rip-rap over the geotextile above the HDPE pipe with an excavator. AAP obtained the rip-rap from the old South Diversion berm and fill slope.
5. Placement of Large Boulders – AAP placed two large boulders, each approximately 4 feet in diameter, in the stilling basin over the 20-inch rip-rap with an excavator. The first boulder was placed in the center of the basin, approximately 4 feet from the end of the HDPE pipe, and the second boulder was placed approximately 6 inches downstream from the first boulder.

6 Design Modifications

Modifications made to the Issued for Construction (IFC) design (SRK 2013a, b) during construction are discussed below:

1. The IFC design called for geotextile to wrap over the top and sides of the drain gravel on the apron at Drainage Inlets 1 and 2. However, AAP placed the geotextile on the apron surface during construction for simplicity, and wrapped the geotextile around the drain gravel so that the top, bottom, and sides are wrapped in geotextile, as shown in *Drawings 12 and 17*. This change provides additional protection for the

apron surface and is consistent with the design intent.

2. The IFC design called for Type 2 General Fill, or other material approved by the Engineer of Record (EOR), to be placed upon the drain gravel blanket and compacted at Drainage Inlets 1 and 2. At AAP's request, the EOR approved an alternative backfill material, referred to as 3-inch rip-rap, with the following gradation requirements:
    i. 100% passing 6 inches
    ii. No more than 85% passing 1 inch
    iii. No more than 50% passing ½ inch
    iv. No more than 15% passing the #4 sieve
    v. No more than 5% passing the #200 sieve

    The EOR also approved a compaction method using the excavator bucket to compact the alternative backfill. AAP compacted the 3-inch rip-rap with the excavator bucket until no further settlement was observed. This change is consistent with the design intent.

3. The IFC design called for geotextile to line the surface of the Type 2 General Fill as a filter beneath the 9-inch rip-rap at Drainage Inlets 1 and 2. However, due to the change to 3-inch rip-rap, the EOR advised Pogo that the geotextile overlying the 3-inch rip-rap was not necessary because the adjacent rip-rap layers meet filter compatibility criteria. This change is consistent with the design intent.

4. The IFC design called for 4-inch-diameter, dual wall, corrugated, perforated HDPE drain pipes to be placed within the drain gravel blanket at Drainage Inlets 1 and 2. AAP requested substitution of 4-inch-diameter, single wall, corrugated, perforated HDPE drain pipes meeting the requirements of AASHTO M 252 for the specified dual wall pipe. The EOR approved the single wall drain pipe meeting AASHTO M 252. This change is consistent with the design intent.

5. The IFC design called for a 3-inch-thick layer of drain gravel to be placed directly on the Drainage Inlet 2 apron subgrade prior to placement of insulation. The intent of the drain gravel layer was to provide a smooth surface to support the insulation. However, since AAP prepared a smooth and acceptable apron subgrade, the 3-inch-thick drain gravel layer was unnecessary and therefore not placed. This change is consistent with the design intent.

6. The IFC design called for an anchor trench along the back of the Drainage Inlet 2 apron and two anchor trenches along the sides of the apron. However, due to the coarse anchor trench backfill material, the two side anchor trenches were not constructed to avoid a potential flow path along the side anchor trenches. The rear

anchor trench was constructed to secure the geomembrane during construction. This change is consistent with the design intent.

7. The south side of the Drainage Inlet 2 apron slopes toward the center of the apron inlet at approximately 5%, exceeding the design requirements, but only slopes at 0.3% towards the diversion channel (see *Drawing 17*), which is less than the specified 1% outward slope. To promote drainage toward the diversion channel, an additional drain pipe was added to the center of the inlet, for a total of 7 pipes in the drainage blanket, as shown in *Drawing 17*. This change is consistent with the design intent.

8. The IFC design called for the rip-rap at Drainage Inlets 1 and 2 to tie in with the natural ground surface. Rip-rap was placed during winter construction in March 2013, and the rip-rap appeared to tie in with the natural ground surface. However, once the snow melted, some areas of the rip-rap had either settled or were not properly tied into the natural ground surface during winter construction; several gaps were observed between the natural ground surface and the rip-rap in the following locations:
    a. The northwest and southeast edges of rip-rap at Drainage Inlet 1 (see *Drawing 8*); and
    b. The southeast edge of rip-rap at Drainage Inlet 2 (see *Drawing 9*).

    This change is not consistent with the design intent, due to the increased potential for erosion between the natural ground surface and the rip-rap. Due to the difficulty in reaching this area without causing damage to the inlet, Pogo elected to assume the risk and monitor the areas for erosion. SRK recommends visually monitoring the edges of rip-rap for erosion on a monthly basis (minimum) between freshet and winter freeze-up.

9. Weep holes were drilled at Drainage Inlet 2, as shown in *Drawing 17*. In addition to weep holes, AAP installed French drain at Inlets 2, 3N, 3S, and 4, as shown in *Drawings 17, 18, and 19*. The French drains serve to capture shallow subsurface flow beneath the drainage inlet aprons and convey the water into the channel, instead of into the DSTF. This change increases the quantity of water diverted around the DSTF and is consistent with the design intent.

10. The IFC design called for stainless steel battens to secure the HDPE geomembrane to the shotcrete at Drainage Inlets 2, 3N, and 4. However, due to material availability, AAP secured the geomembrane to the shotcrete with an HDPE batten strip, as shown in *Drawing 17*. This change is consistent with the design intent.

11. The as-built gradations of the rip-rap at all the Drainage Inlets and the Stilling Basin vary slightly from the design gradations (see **Appendix 13**). Where the gradation

varies from the design, rip-rap is larger than specified, which increases the erosion resistance of the structures and satisfies the design intent.

12. The IFC design called for rip-rap to extend a minimum of 10 ft on either side of the Drainage Inlet 3N stream. AAP placed additional rip-rap in Drainage 3N to form a swale, as shown on *Drawing 18*. Also, during reclamation of construction disturbance immediately to the east of Drainage Inlet 3N, AAP created an approximately 3-ft-wide bench approximately 5 vertical feet below the cut slope crest to divert flows into the rip-rap swale. These changes provide additional erosion protection and are consistent with the design intent.

13. The IFC design called for the one-inch gravel and geotextile blanket to extend to the edge of the apron at Drainage Inlets 3N and 4. However, the gravel and geotextile blankets end approximately one foot from the downstream apron edges. As a result, AAP hand-placed rip-rap directly over the HDPE geomembrane. The purpose of the gravel and geotextile blanket is to prevent damage to the HDPE geomembrane, so the absence of geotextile along this part of the geomembrane may lead to future geomembrane damage. However, the downstream end of the apron geomembranes overlap with the channel shotcrete and are located directly above the French drains. Thus, potential damage to the geomembrane is not likely to result in significant quantities of water bypassing the diversion channel. This change may not result in optimal performance of the geomembrane, but the design intent of significantly reducing surface and shallow subsurface flow into the DSTF is maintained.

14. As discussed in Section 5, and shown in *Drawing 18* and South Diversion Photograph 50 (**Appendix 4**), AAP placed approximately 18 inches of 9-inch rip-rap in three areas at Drainage Inlet 3S where concentrated surface run-off or seepage was observed during construction. This change reduces the potential for erosion on Drainage Inlet 3S cut slopes and is consistent with the design intent.

15. The IFC design called for a 10-ft-deep bentonite slurry wall to be keyed into permafrost or bedrock at Inlet 3S to capture a portion of the subsurface flow for conveyance in the South Diversion Channel. In May 2013, at the request of SRK and Pogo, AAP excavated four test pits and drilled three boreholes at Inlet 3. Test pits were excavated to refusal with AAP's Caterpillar 318C excavator; test pits were logged in detail by SRK personnel. Boreholes were drilled to 40-50 ft below ground surface (bgs) with AAP's air rotary blast rig; boreholes were logged by SRK personnel based on cuttings and driller observations. Test pits and boreholes were backfilled with native materials. Locations and logs for the test pits and boreholes are in **Appendix 11**. SRK made the following general inferences about the Drainage Inlet 3 subsurface from the test pits and boreholes:

a. Subsurface material is primarily coarse-grained, e.g., sand, gravel, cobbles, and boulders;
b. Subsurface material was frozen from the surface down to 20-30 ft bgs;
c. Water was encountered from 20-30 ft bgs down to 40-50 ft bgs;
d. Borehole wall stability was poor from 20-30 ft bgs down to 40-50 ft bgs; and
e. Bedrock or hard permafrost was encountered at 40-50 ft bgs.

In summary, the subsurface investigation indicated a thawed, permeable zone between approximately 20 and 50 ft bgs at Drainage Inlet 3, which was not anticipated in the slurry wall design. SRK, AAP, and Pogo reviewed the results of the investigation and made the following conclusions:

a. A 10-ft-deep slurry wall would be ineffective at intercepting significant subsurface flow with a transmissive layer indicated at 20-50 ft bgs;
b. Constructing a slurry wall to the likely aquitard at 50 ft bgs was not practical with the available equipment, budget, or timeframe; and
c. Because groundwater capture at the Drainage Inlets was an elective measure to reduce seepage below the Diversion Channels, SRK, AAP, and Pogo elected not to construct the slurry wall at Drainage Inlet 3.

To capture a portion of the shallow subsurface flow at Drainage Inlet 3, drain systems were installed at Drainage Inlets 3N and 3S, as described in Section 5 and shown in *Drawings 18 and 19*. This change is consistent with the design intent.

16. The IFC design called for a 2% outward slope of the apron at Drainage Inlet 4. However, AAP constructed the apron with an outward slope of 0.5%, as shown in *Drawing 19*. While this change does not provide the optimal slope to convey water into the channel, the apron slope provides positive outward drainage in accordance with the design intent.

17. AAP installed a culvert in the old North Diversion Channel for temporary construction access to the new North Diversion Channel. After use of the old North Diversion Channel was discontinued, AAP removed the culvert except for approximately 150 feet of 36-inch corrugated metal pipe (CMP) culvert that runs alongside the cut slope side of the North Diversion Access Road, as shown in *Drawing 11*. Culvert bedding was compacted to a minimum of 95% of Maximum Dry Density per ASTM D698 (see **Appendix 6**). AAP crushed the ends of the culvert prior to burial in General Fill for the North Diversion Road. This change is consistent with the design intent.

18. The IFC design called for berms to be constructed to a height of at least two feet along the outside edges of the diversion channel roads. However, in some areas, mostly along the North Diversion, the berm height is less than two feet. The

minimum berm height is approximately 0.8 feet, located around STA 6+00 of the North Diversion. This change is not consistent with the design intent, as an under-sized berm reduces the effectiveness of a safety berm in keeping a vehicle from traveling off the edge of the roadway. Pogo's Safety Department reviewed safety requirements and determined that, because access to the diversion channel roads will be restricted to excavators, dozers, and pickup trucks, higher safety berms are not needed on diversion channel roads.

19. The South Diversion can be accessed via an approximately 150-ft-long road from the North Diversion, as shown in *Drawing 9*. During construction of the South Diversion Access Road in July-September 2013, Type 1 General Fill was used in place of Type 2 General Fill in some areas. Additionally, portions of the cut and fill slopes are up to 1.3H:1V, i.e., steeper than 1.5H:1V. These changes are not consistent with the design intent, due to increased potential for settlement of the road, and erosion and instability of the cut and fill slopes. Due to limited access to this area, Pogo elected to assume the risk and monitor the South Diversion Access Road for settlement, erosion, and slope stability. SRK recommends visual monitoring of the South Diversion Access Road and adjacent slopes on a monthly basis (minimum) between freshet and winter freeze-up. If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.

20. The IFC design called for the South Diversion alignment to begin at STA 30+80 and end at STA 4+00. However, AAP constructed the South Diversion to begin at STA 31+00 and end at STA 3+80, as shown on *Drawing 7*. This change increased the diversion channel and turnaround area lengths by 20 ft, respectively, and is consistent with the design intent.

21. During construction of the South Diversion Access Road, AAP constructed a rip-rap "finger" drain along the cut slope side of the road (not surveyed). Rip-rap was sourced from the Drainage Inlet 3 area. The purpose of the finger drain is to convey shallow groundwater into the South Diversion Channel. This change may provide additional drainage of the South Diversion Access Road area and does not significantly affect operation of the South Diversion Channel.

22. During construction of the South Diversion in June 2013, AAP allowed surface water to saturate a portion of the Type 1 General Fill near STA 14+50 to 15+00. Though this change is a deviation from the Specifications because saturated fill increases the probability of slope movement, SRK considers the risk of slope movement in the future due to initially saturated fill in this area to be low for the following reasons:
    a. The water source, i.e., surface water run-off, has been diverted into the South Diversion channel;

b. The volume of initially saturated fill was small, i.e., approximately 100 cubic yards, and limited to the Type 1 General Fill area outside traffic limits; and
c. The coarse-grained nature of the fill materials (see **Appendix 13**) should have allowed for dissipation of pore pressures during the construction period.

SRK recommends visual monitoring of the fill slope near STA 15+00 of the South Diversion on a quarterly basis (minimum) between freshet and winter freeze-up. If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.

23. During construction of the South Diversion in June 2013, AAP buried organic foundation soil within the lower 15 ft of the toe of the Type 1 General Fill from approximately STA 11+75 to 12+00. Organic soil from the cut slope near STA 12+00 was characterized as organic silt by visual/manual classification using the USCS. Adjacent to the buried organic silt, AAP removed approximately 6-12 inches of frozen organic silt from the toe of the Type 1 General Fill from approximately STA 11+00 to STA 11+75, exposing coarse colluvium in the fill foundation. The buried organic silt is not consistent with the IFC Specifications, as upon thawing, elevated pore pressures within the organic silt and high material compressibility may lead to slope movement or settlement. However, the potential risk of slope movement is limited by the small extent of the buried organic silt, i.e., approximately 15 ft x 25 ft.

    SRK recommends visual monitoring of the fill slope near STA 12+00 of the South Diversion on a monthly basis (minimum) between freshet and winter freeze-up. If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.

24. From approximately STA 23+00 to 29+00 on the South Diversion, AAP placed excess material from the South Diversion cut adjacent to the edge of the roadway (see *Drawing 7*). As the excess material is Type 1 General Fill, placed without compaction control, the excess material may slough or settle. This change does not affect the function of the South Diversion Channel. However, to minimize potential risk to operators and equipment, traffic should not be permitted on the excess material, i.e., outside the design traffic limits. In addition, SRK recommends visual monitoring of the excess fill area on the South Diversion on a quarterly basis (minimum) between freshet and winter freeze-up. If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.

25. The IFC design called for a catch bench to be constructed at the overburden-talus contact above the South Diversion. With the exception of a talus deposit at the top

of the cut slope from approximately STA 28+00 to 29+00, all of the talus was removed from the South Diversion cut slope during mass grading. SRK recommends a rockfall analysis be performed on the South Diversion cut slope from STA 28+00 to 29+00 to evaluate the risk of rocks from the talus reaching the South Diversion Road. SRK also recommends visual monitoring of the cut slope on a monthly basis (minimum) between freshet and winter freeze-up. If signs of rockfall are observed, a geotechnical engineer should evaluate the slope to determine if further courses of action are needed. Pogo has taken measures to restrict access to the South Diversion and expects only occasional use of the road.

26. The IFC design called for the South Diversion HDPE pipe to exit the flume intake structure and upper thrust block subhorizontally. However, to reduce the bend radius in the pipe for ease of construction, AAP constructed the HDPE pipe at a downward angle where the pipe exits the flume intake structure and upper thrust block (see *Drawing 14*). The pipe angle change also slightly altered the geometry of the lower thrust blocks, as shown in *Drawing 13*. This change is consistent with the design intent.

27. The IFC design called for the HDPE pipe in the South Diversion flume intake structure to be cut flush with the concrete wall. However, AAP constructed the flume intake structure such that the HDPE pipe protrudes into the flume intake structure approximately one inch. This change slightly decreases the hydraulic capacity of the flume intake structure and HDPE pipe; however, the flume intake structure is expected to convey the 200-year/24-hour storm event without overtopping (see **Appendix 3**), thus satisfying design intent.

28. The IFC design called for #4 rebar, spaced at 4 inches on center, at the upstream end of the South Diversion HDPE pipe to protect the pipe intake. In lieu of the rebar outside the pipe, AAP installed a vertical safety bar in the HDPE pipe entrance in the flume intake structure (see *Drawing 14*). The purpose of the safety bar is to prevent someone from inadvertently entering the pipe during maintenance activities. This change is consistent with the design intent.

29. The IFC design called for AAP to conduct QC slump and air entrainment tests for each batch of concrete poured. AAP did not conduct QC slump and air tests on the last batch of concrete poured, which was for the old South Diversion Channel Plug. This change is not consistent with the design intent, as concrete with an unknown slump and air was placed in the old South Diversion Channel Plug. If air content is inadequate, potential risks include decreased resistance of concrete to freeze-thaw cycles. Pogo has elected to assume the risk because:

    a. AAP collected three concrete cylinders for QC compressive strength tests, which met compressive strength requirements at 28 days;

b. The potential for prolonged water impoundment behind the plug is low due to upstream channel breaches; and
c. Damaged concrete can be repaired or replaced.

SRK recommends monitoring of the old South Diversion Channel Plug for concrete integrity on an annual basis (minimum) between freshet and winter freeze-up.

30. The old South Diversion Channel Plug was constructed to fit the geometry of the old South Diversion Channel at the design location; as a result, the geometry of the constructed Plug (see *Drawing 14*) varies from the IFC design geometry. This change is consistent with the design intent.

31. At the old South Diversion Channel Plug, the road side slope of the old South Diversion Channel is comprised of fill for the old South Diversion Channel Road; as such, asphalt mastic was not applied to the channel surface beneath the plug in accordance with the IFC design. The fill foundation and lack of seal may permit water to flow under the plug; however, due to the channel breach 100 ft upstream of the plug, minimal water is expected to reach the plug.

32. There are two deviations from the design intent in the old North Diversion Channel Plug reinforcement (see North Diversion Photograph 75 in **Appendix 4**):
    a. The bottom longitudinal bars are not continuous across the channel invert; and
    b. The reinforcement is inadequate in the upper cut slope side corner of the plug.

    This change is not consistent with the design intent due to the increased potential for cracking and deterioration of concrete in the under-reinforced areas. Pogo has elected to assume the risk because:
    a. The potential for prolonged water impoundment behind the plug is low due to upstream channel breaches; and
    b. Cracked concrete can be repaired or replaced.

    SRK recommends monitoring of the old North Diversion Channel Plug for concrete integrity on an annual basis (minimum) between freshet and winter freeze-up.

33. The test cylinders from concrete poured in the South Diversion flume intake structure floor had 28-day compressive strengths of 2,960 and 3,210 pounds per square inch (psi), as shown in **Appendix 8**, which is less than the 5,000 +/- 500 psi required by the IFC Specifications. The lower strength concrete increases the risk of concrete degradation. Pogo elected to assume the risk and, at SRK's recommendation, had AAP apply a coating of Dayton Superior Pentra-Hard Densifier to provide additional hardness and durability to the concrete. Although the

concrete life may be reduced, the flume intake floor fulfills the design intent. SRK recommends monitoring of the South Diversion Flume Intake Floor for concrete integrity on an annual basis (minimum) between freshet and winter freeze-up.

34. The first batch of concrete poured in Thrust Block 1 did not meet the Specifications:
    a. Aggregate particles with a diameter of 2 inches were observed in the mix, which is significantly larger than the maximum particle size of ¾ inch;
    b. The duration between batching and placement of the concrete was 3 hours, which significantly exceeds the specified maximum of 90 minutes;
    c. Unknown quantities of water and cement were added to the batch in the field; and
    d. Zones of the concrete were not consolidated, resulting in substantial honeycombing.

    As a result of the deficiencies, substantial honeycombing was present (see South Diversion Photograph 62 in **Appendix 4**). After consulting with Pogo and SRK, and as described in Section 5 above and shown in Photographs 79, 81, 84-87, 89-90 in **Appendix 4**, AAP took several steps to mitigate the deficiencies:

    a. AAP fastened 3/16-inch-thick metal sheets around three sides of the thrust block;
    b. AAP pressure-grouted the thrust block;
    c. AAP hand troweled grout on the exterior of the thrust block to fill honeycombed areas that were not covered by the metal sheets; and
    d. AAP buried the walls of the thrust block with compacted 1-inch gravel.

    The mitigation measures above reduce the risks of corrosion of reinforcing steel, concrete degradation, and pipe movement. Test cylinders from concrete poured in the first batch for Thrust Block 1 had a 28-day compressive strength of 5,520 psi, in excess of the 5,000 +/- 500 psi required by the IFC Specifications. Although the concrete placement deficiencies do not meet the Specifications, the mitigation measures discussed above, together with Thrust Block 2 and burial of the pipe from Thrust Block 1 to the stilling basin (see *Drawing 13* and South Diversion Photograph 91 of **Appendix 4**), fulfill the design intent of restraining the South Diversion flume pipe from STA 2+00 to 3+00.

35. The IFC Specifications called for ambient temperatures around the shotcrete to be maintained above 37°F for at least seven days. Instead, the definition of Cold Weather from the American Concrete Institute (ACI) was applied to determine when cold weather protection of the shotcrete was needed. The ACI defines Cold Weather as “a period when the average daily ambient temperature is below 40°F for more than three successive days” (ACI 2012). This change is consistent with the design intent.

7 Channel Capacities

This section provides as-built flow capacity characteristics for the North and South Diversion Channels, and the South Diversion Flume.

The North and South Diversion Channels were designed to convey water for the 200-year/24-hour storm event. The channels were designed with a channel side slope of 3H:1V and a cut slope of 1.5H:1V. The South Diversion Channel was designed with a channel invert slope of 2%, a channel depth of 3 feet with a maximum flow depth of 1.8 feet, and a maximum discharge of 24 cubic feet per second (cfs). The North Diversion Channel was designed similarly, but was designed in alignment segments based upon topography. The North Diversion Channel between STA 0+00 and 12+00 was designed with a channel invert slope of 12%, a channel depth of 3 feet with a maximum flow depth of 1.9 feet, and a maximum discharge of 69 cfs. The North Diversion Channel between STA 12+00 and 26+00 was designed with a channel invert slope of 10%, a channel depth of 3 feet with a maximum flow depth of 1.8 feet, and a maximum discharge of 55 cfs. The North Diversion Channel between STA 26+00 and 35+70 was designed with a channel invert slope of 2%, a channel depth of 3.5 feet with a maximum flow depth of 2.3 feet, and a maximum discharge of 45 cfs. The North Diversion Channel between STA 35+70 and 58+00 was designed with a channel invert slope of 2%, a channel depth of 3 feet with a maximum flow depth of 1.8 feet, and a maximum discharge of 26 cfs.

The Diversion Channels were constructed by the methods described in Section 5. AAP provided QC survey data and MLA provided QA survey data. SRK used AutoCAD Civil 3D to establish as-built channel parameters and AutoCAD HydraFlow Express to verify that the as-built channel conditions will meet or exceed the 200-year/24-hour storm event criterion.

As-built channel geometries and estimated flow depths are provided in *Drawing 10*. HydraFlow Express channel calculations are located in **Appendix 3**. Based upon the channel calculations, the North and South Diversion Channels will have a minimum of one foot of freeboard during a 200-year/24-hour storm event. The North and South Diversion Channels and South Diversion Flume capacity will meet the 200-year/24-hour storm event criterion.

8 Quality Assurance/Quality Control

At least one SRK QA representative was on-site full-time during earthworks. AAP performed all earthworks and SRK performed all field gradation tests. AAP assisted SRK with four field compaction test fills. Mappa performed one-inch gravel sieve and Standard Proctor laboratory testing, as well as in-situ field moisture and density testing with a nuclear density gage or sand cone. Further details of earthwork QA are discussed below.

Table 8.1 below provides a comparison of the frequency of actual testing performed as compared to the specified minimum frequencies for QA/QC testing of Type 2 General Fill

and one-inch gravel. Due to the coarse nature of the fill material, SRK followed the QA procedures in Section 7.2.7.8 of the Specifications (SRK 2013b) for Type 2 General Fill. Gradation records are included in **Appendix 13**. Moisture content, Standard Proctor, and in-situ density testing were not conducted for Type 2 General Fill, as compaction was specified on the basis of compaction test fills (SRK 2013b). Gradation, Standard Proctor, and in-situ density/moisture test results for one-inch gravel are included in **Appendix 5**. As shown in **Table 8.1**, the frequency of Standard Proctor tests (1 test per 10,600 ft^3) for one-inch gravel was slightly less than the specified frequency (1 test per 10,000 ft^3). The EOR does not consider this slight exceedance of the testing frequency to be of concern as the one-inch gravel was manufactured material with little variation: confirmatory Proctor tests from August 24, 2013 showed that maximum dry densities for the one-inch gravel were within the range of results of earlier Proctor tests (**Appendix 5**). **Appendix 6** contains gradations for culvert bedding material and drain gravel, as well as Standard Proctor and in-situ density test results for culvert bedding. Gradation records were collected for the rip-rap at Drainage Inlets 1, 2, 3N, and 4, and the stilling basin, and are included in **Appendix 13**.

Four compaction test fills were performed for Type 2 General Fill materials; three test fills were performed on the North Diversion and one test fill was performed on the South Diversion; results are contained in **Appendix 14**. Overburden material used as Type 2 General Fill on the South Diversion (see **Appendix 13**) was similar in gradation to the material tested on July 12, 2012 on the North Diversion; therefore, the compaction procedures established on July 12, 2012 were utilized for South Diversion Type 2 General Fill sourced from overburden. As discussed in Section 5, fill materials used on July 21, 2013 from STA 10+00 to 5+00 of the South Diversion were obtained from the new Haul Road excess material stockpile. The new Haul Road materials were observed by the EOR to be similar to blasted rock materials sourced from the South Diversion cut; therefore, the compaction procedures established on June 12, 2013 were used for South Diversion Type 2 General Fill sourced from the Haul Road.

Table 8.1: QA/QC Test Methods and Frequency for Earthwork.

Material Type	Gradation	Moisture Content	Standard Proctor	In-Situ Density
	ASTM D422	ASTM D2216	ASTM D698	ASTM D6938/D1556
General Fill within Traffic Limits	Required: 1/50,000 ft^3 Actual*: 1/23,000 ft^3	Required: 1/50,000 ft^3 Method spec. (test fill)	Required: 1/50,000 ft^3 Method spec. (test fill)	Required: 1/50,000 ft^3 Method spec. (test fill)
One-Inch Gravel	Required: 1/10,000 ft^3 Actual: 1/4,000 ft^3	Required: 1/10,000 ft^3 Actual: 1/2,650 ft^3	Required: 1/10,000 ft^3 Actual: 1/10,600 ft^3	Required: 1/5,000 ft^3 Actual: 1/2,650 ft^3

*Gradation performed per 7.2.7.8 of SRK (2013b)

At least one SRK QA representative was on-site full-time during shotcrete placement and concrete pours. AAP performed all shotcrete and reinforced concrete placement, as well as

all QC slump and air entrainment tests. Mappa performed QC compressive strength laboratory testing for all shotcrete cores, and all shotcrete and concrete cylinders. SRK reviewed all AAP QC slump and air field test results, as well as all QC compressive strength test results from Mappa. AAP's QC test results for shotcrete and concrete are included in **Appendices 7 and 8**, respectively.

Table 8.2 below provides a comparison of the frequency of actual testing performed as compared to the specified minimum frequencies for QC testing of shotcrete and concrete. Shotcrete core samples were cored from test panels selected by SRK. AAP used a hand probe to check shotcrete thickness at least every 10 ft on center. Some batches of shotcrete and concrete had slight variances from slump and air specifications (**Appendices 7 and 8**; SRK 2013b).

Table 8.2: QC Test Methods and Frequency for Shotcrete and Concrete.

Material Type	Slump	Air Content	Compressive Strength
	ASTM C143	ASTM C231	ASTM C39 & C42
Shotcrete	Required: 1/Batch Actual: 1/Batch	Required: 1/Batch Actual: 1/Batch	Required: 3/Day Actual: 3/Day
Concrete	Required: 1/Batch Actual: 1/Batch	Required: 1/Batch Actual: 1/Batch	Required: 1/Batch Actual: 1/Batch

At least one SRK QA representative was on-site full-time during HPDE pipe, HDPE geomembrane, and geotextile fabric work. AAP installed the 24-inch HDPE pipe for the South Diversion Flume; SRK reviewed pipe fusion QC documentation. AAP performed all HDPE geomembrane seams, repair welds, and QC testing. SRK reviewed all QC testing for HDPE liner, including peel, shear, and vacuum tests. AAP's pipe fusion QC records are included in **Appendix 9**. AAP's geomembrane QC records for seams and repairs are included in **Appendix 10**.

Based on field observations during construction, review of construction materials, observation of QC testing, and review of the QA/QC test results, SRK concludes that the construction of the DSTF Expansion Diversion Channels was completed in substantial conformance with the Plans (SRK 2013a) and Specifications (SRK 2013b) and in accordance with the intent of the design. Modifications to the design and deviations from the Plans and Specifications are documented in this report.

9 Recommendations

In this report, SRK has made several recommendations with respect to specific observations or design modifications; this section summarizes the recommendations, but is not intended to be a complete list of monitoring or maintenance activities for the diversion

channels. During the course of routine diversion channel inspections between freshet and winter freeze-up, SRK recommends the following:

1. Monitor and maintain channel shotcrete as discussed in **Appendix 15**.
2. Visually monitor edges of rip-rap at Drainage Inlets 1, 2, and 4 for erosion on a monthly basis (minimum).
3. Visually monitor the following slopes for movement on a quarterly basis (minimum):
    a. South Diversion Fill Slope from STA 29+00 to 23+00; and
    b. South Diversion Fill Slope from STA 15+00 to 14+50.

    If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.
4. Visually monitor the South Diversion Access Road and adjacent slopes for settlement, erosion, and movement on a monthly basis (minimum). If signs of slope movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.
5. Visually monitor the fill slope from approximately STA 11+75 to 12+00 of the South Diversion for movement on a monthly basis (minimum). If signs of movement are observed, a geotechnical engineer should evaluate the slope to determine further courses of action.
6. With respect to the South Diversion cut slope from approximately STA 28+00 to 29+00:
    a. SRK recommends a rockfall analysis be performed to evaluate the risk of rocks from the remaining talus reaching the South Diversion Road;
    b. SRK also recommends visual monitoring of the cut slope on a monthly basis (minimum). If signs of rockfall are observed, a geotechnical engineer should evaluate the slope to determine if further courses of action are needed.
7. Visually monitor the South Diversion Flume Intake Floor, old North Diversion Channel Plug, and old South Diversion Channel Plug for concrete integrity on an annual basis (minimum).

10 Changes to Operating Plans

Pogo revised the Recycle Tailings Pond (RTP) Operating and Maintenance Manual to reflect modifications to the RTP and DSTF systems made during construction of the DSTF Expansion and submitted it to ADNR on October 15, 2013. Pogo will modify the DSTF Construction and Maintenance Plan in 2014 to reflect modifications to the RTP and DSTF

systems made during construction of the DSTF Expansion. The revised DSTF Construction and Maintenance Plan will be submitted under separate cover.

11 References

American Concrete Institute. 2012. *Concrete Terminology: Cold Weather*. Downloaded from http://www.concrete.org/Tools/ConcreteTerminology.aspx on September 18, 2012.

SRK 2013a. *Engineering Drawings for the Dry Stack Tailings Facility (DSTF) Expansion Construction, Diversion Channels and Haul Road, Pogo Mine, Alaska, USA*. Revision 9, Issued for Construction, March 6, 2013, updated August 10, 2013.

SRK 2013b. *Technical Specifications for Pogo Dry Stack Tailings Facility Expansion, Diversion Channels and Haul Road – Revision 5 (Issued for Construction)*. Revision 5, March 6, 2013.

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Complete this form and include it as the final page for each copy of the report produced.

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Charlie Cobb	Alaska Department of Natural Resources	1	1/24/2014	Daniel P. Neuffer, PE
Tim Pilon	Alaska Department of Environmental Conservation	1	1/24/2014	Daniel P. Neuffer, PE

Approval Signature:

Appendix 1

As-Built Engineering Drawings

Engineering Drawings for the Dry Stack Tailings Facility (DSTF) Expansion Construction - Diversion Channels Pogo Mine, Alaska, USA

ACTIVE DRAWING STATUS

DWG NUMBER	DRAWING TITLE	REVISION	DATE	STATUS
1	Engineering Drawings for the Dry Stack Tailings Facility (DSTF) Expansion Construction - Diversion Channels, Pogo Mine, Alaska, USA	10	Jan. 24, 2014	As-Built
2	Mine Site Plan	5	Jan. 24, 2014	As-Built
3	Expanded DSTF General Arrangement	5	Jan. 24, 2014	As-Built
4	New Haul Road Plan View [See Haul Road As-Built Survey in Appendix 2]	-	-	Not Issued
5	New Haul Road Profile and Stakeout Tables [See Haul Road As-Built Survey in Appendix 2]	-	-	Not Issued
6	New Haul Road Sections [See Haul Road As-Built Survey in Appendix 2]	-	-	Not Issued
7	New South Diversion Channel Plan and Profile	9	Jan. 24, 2014	As-Built
8	New North Diversion Channel Plan and Profile Sheet 1 of 2	9	Jan. 24, 2014	As-Built
9	New North Diversion Channel Plan and Profile Sheet 2 of 2	9	Jan. 24, 2014	As-Built
10	Typical Diversion Channel Sections	7	Jan. 24, 2014	As-Built
11	Old Diversion Channel Sections and North Diversion Tie-In Detail	6	Jan. 24, 2014	As-Built
12	Drainage Inlet Plan and Sections	7	Jan. 24, 2014	As-Built
13	South Diversion Flume Plan and Profile	8	Jan. 24, 2014	As-Built
14	South Diversion Flume Intake Details	7	Jan. 24, 2014	As-Built
15	North and South Diversion Channel As-Built Alignment Tables	7	Jan. 24, 2014	As-Built
16	South Diversion Details	3	Jan. 24, 2014	As-Built
17	Drainage Inlet #2 Sections and Details	4	Jan. 24, 2014	As-Built
18	Drainage Inlet #3 Plan and Sections	3	Jan. 24, 2014	As-Built
19	Drainage Inlet and Thrust Block Sections	3	Jan. 24, 2014	As-Built

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

Sumitomo Metal Mining LLC (Pogo)

srk consulting

PROJECT NO: 147900.010
AS-BUILT
Revision 10
January 24, 2014
DRAWING 1

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NOTES

1. Coordinates are shown in Alaska Zone 5 State Plane Coordinate System with NAD 83 Datum.
2. All dimensions are in feet, unless specifically mentioned otherwise.
3. All drawings are scaled appropriately for 22"x34" construction drawings.
4. The As-Built Drawings are uncontrolled when printed unless stamped and signed with original ink and recorded on a document transmittal.
5. See Appendix 2 for Haul Road As-Built Survey.
6. As-Built topography from McClintock Land Associates September 2013 As-Built Survey.
7. Pre-Construction topography from McClintock Land Associates June 2012 Survey.
8. Deviations from the IFC Drawings and Technical Specifications are discussed in Section 6 of the accompanying Final As-Built Report.

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

0 325' 650' 975' 1300'
Scale in Feet
(1" = 650' on 22"x34" plot)

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
5	As-Built	DPN	JD	24Jan14
4	Issued for Construction	DPN	CCS	6Mar13
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: DPN/CAM	DRAWN: NV	REVIEWED: DPN
CHECKED: DPN	APPROVED: JD	DATE: Jan. 24, 2014

FILE NAME: 147900-010-Site Plan_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
Mine Site Plan

DRAWING NO. 2 | SHEET 2 OF 19 | REVISION NO. 5

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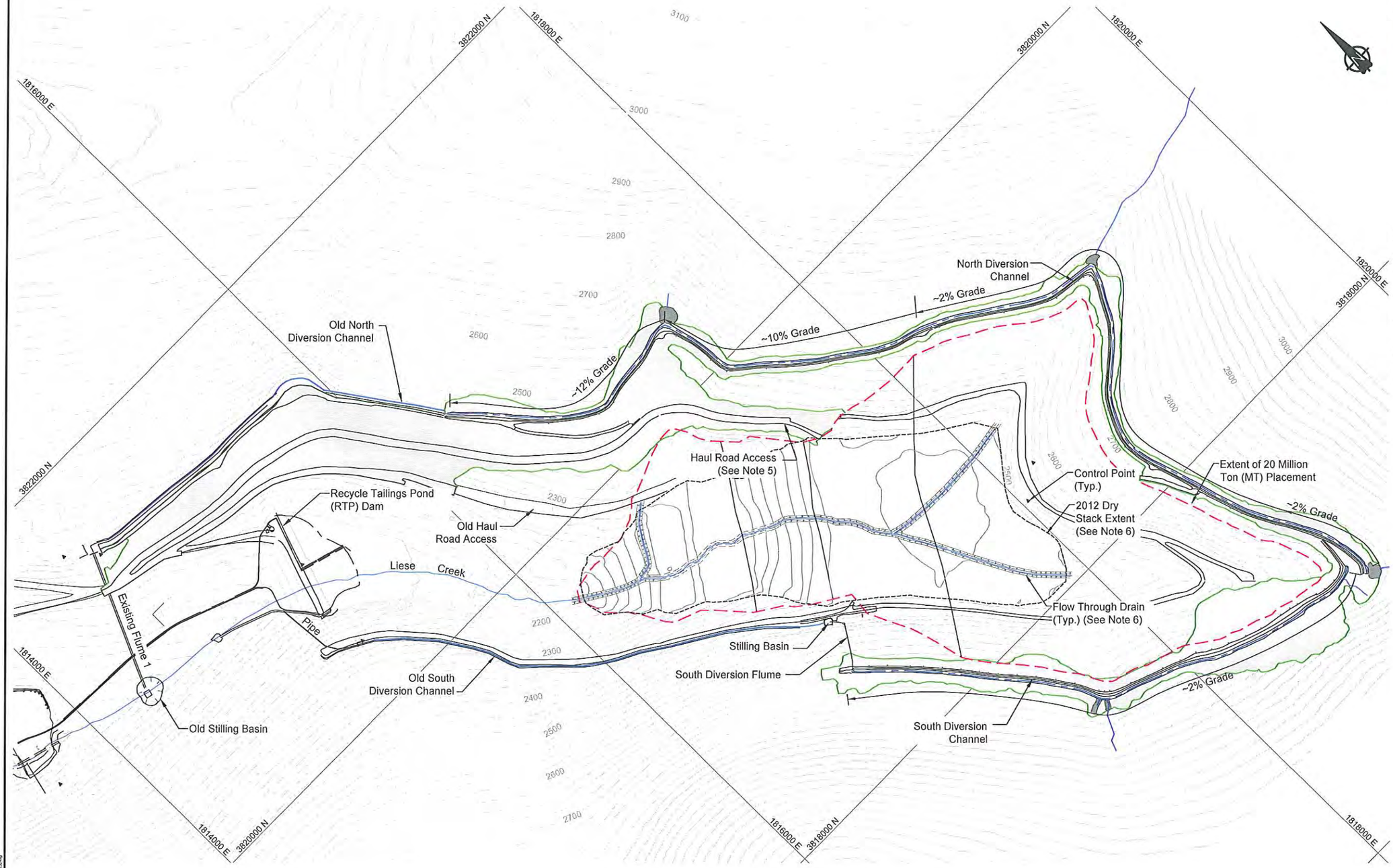

LEGEND

- Diversion Channel
- Extent of 20 MT Placement
- Expansion Grading Extent
- Cut/Fill Slope

NOTES

1. Contour interval is 20ft.
2. Contour data shown based on LIDAR survey (May 2010) supplied by Pogo.
3. DSTF tailings storage and ongoing operation is carried out by Pogo.
4. Pogo is responsible for constructing and extending the flow through drains for the DSTF expansion.
5. Haul Road designed by Pogo; see Appendix 2 for As-Built Survey.
6. 2012 As-Built Extent and Flow Through Drain data provided by Pogo.

STATE OF ALASKA
49TH
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0 125' 250' 375' 500'
Scale in Feet
(1" = 250' on 22"x34" plot)

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
5	As-Built	DPN	JD	24Jan14
4	Issued for Construction	DPN	CCS	6Mar13
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

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DESIGN: DPN/CAM | DRAWN: NV | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-GA_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 14700.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
Expanded DSTF General Arrangement

DRAWING NO. 3 | SHEET 3 OF 19 | REVISION NO. 5

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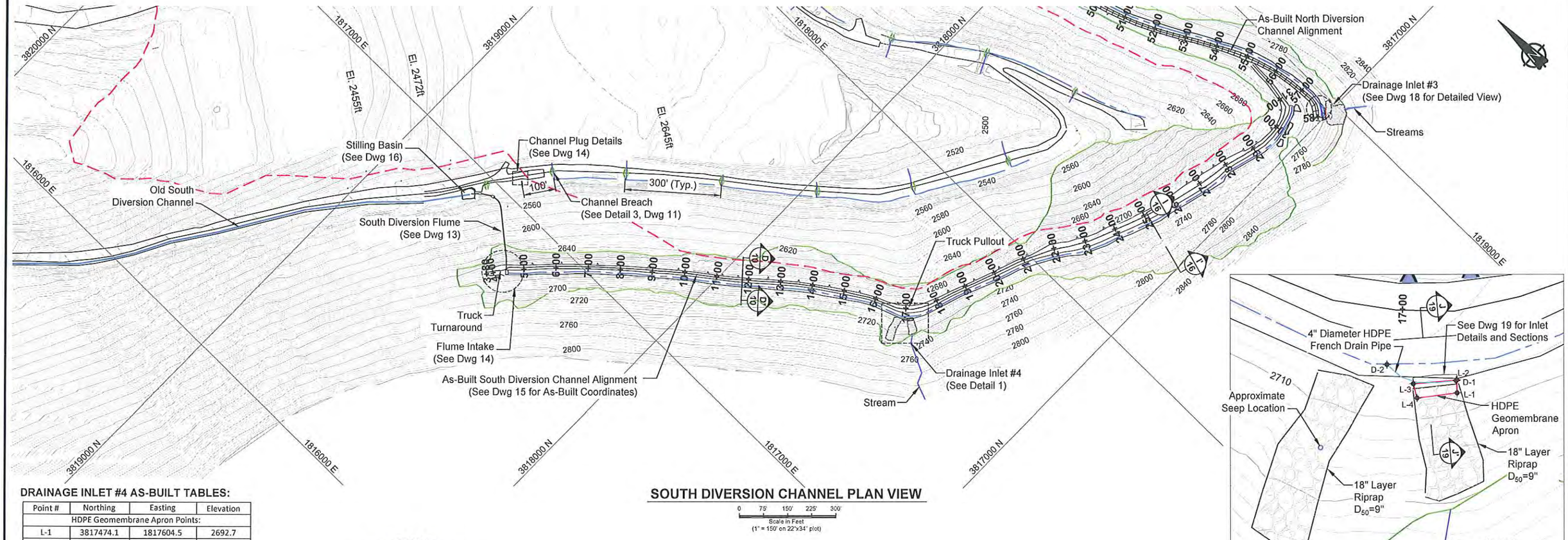
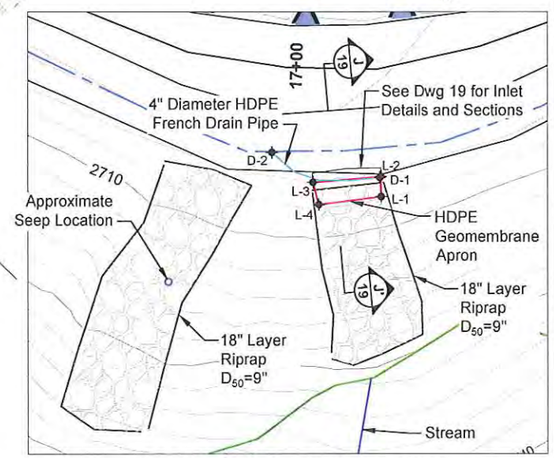


SOUTH DIVERSION CHANNEL PLAN VIEW

0 75' 150' 225' 300'
Scale in Feet
(1" = 150' on 22"x34" plot)



1 DRAINAGE INLET #4 DETAIL

0 10' 20' 30' 40'
Scale in Feet
(1" = 20' on 22"x34" plot)

DRAINAGE INLET #4 AS-BUILT TABLES:

Point #	Northing	Easting	Elevation
HDPE Geomembrane Apron Points:			
L-1	3817474.1	1817604.5	2692.7
L-2	3817478.0	1817608.2	2692.6
L-3	3817489.8	1817594.5	2692.2
L-4	3817484.5	1817591.3	2692.2
French Drain Pipe Top Points:			
D-1	3817478.0	1817607.8	2690.4
D-2	3817503.1	1817592.5	2690.3

STATE OF ALASKA
40TH
DANIEL PAUL NEUFFER
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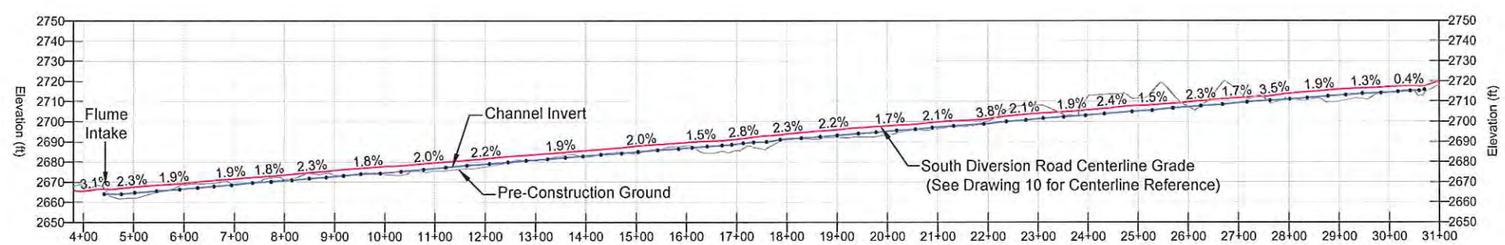
1/24/14

LEGEND

- Old Diversion Channel
- Extent of 20 MT Placement
- Extent of Expansion Grading
- Diversion Channel Centerline
- Breach of Old Channel
- Berm Slot for Drainage

NOTES

1. Old North and South Diversion Channels are breached and concrete plugs installed as indicated. Channel breaches are offset from channel plugs a minimum of 100' and are spaced approximately 300' apart.
2. Contour interval is 4ft.



SOUTH DIVERSION CHANNEL PROFILE

0 75' 150' 225' 300'
Horizontal Scale in Feet
Vertical Exaggeration X4
(1" = 150' on 22"x34" plot)

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
9	As-Built	DPN	JD	24Jan14
8	Issued for Construction	DPN	JD	15Jul13
7	Issued for Construction	DPN	CCS	6Mar13
6	S. Diversion Discharge Update	DPN	JD	30Nov12
5	Updated South Diversion Design	DPN	CCS	17Aug12
4	Issued for Construction	DPN	CCS	3May12
3	Issued for Tender	LEB	CCS	10Feb12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: CAM/DPN	DRAWN: NV	REVIEWED: DPN
CHECKED: DPN	APPROVED: JD	DATE: Jan. 24, 2014

FILE NAME: 147900-010-Diversions_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
New South Diversion Channel Plan and Profile

DRAWING NO.	SHEET	REVISION NO.
7	7 OF 19	9

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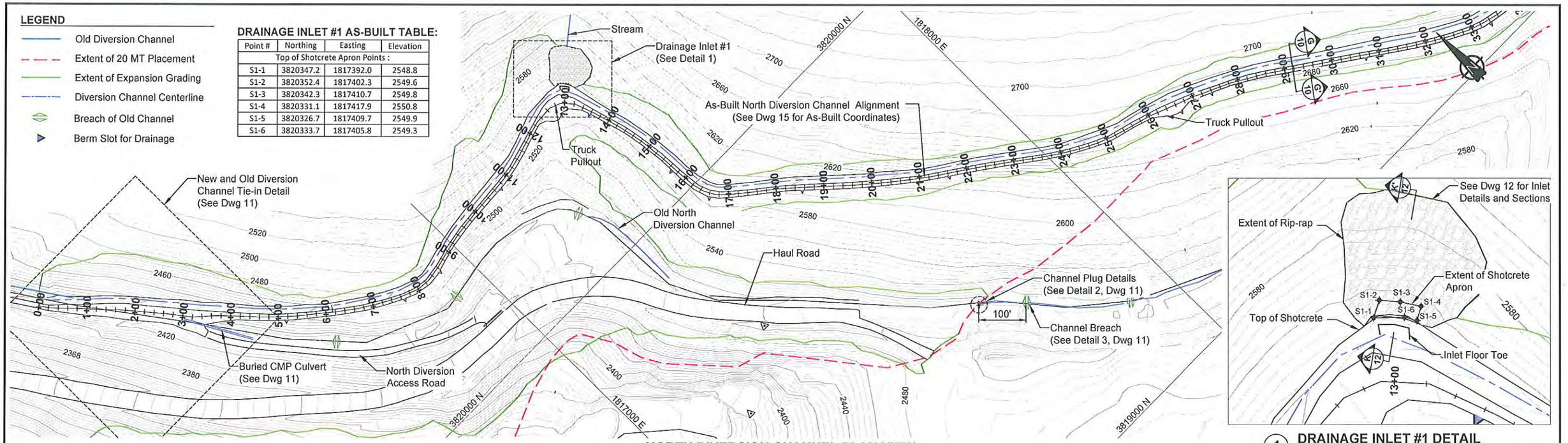
LEGEND

- Old Diversion Channel
- Extent of 20 MT Placement
- Extent of Expansion Grading
- Diversion Channel Centerline
- Breach of Old Channel
- Berm Slot for Drainage

DRAINAGE INLET #1 AS-BUILT TABLE:

Point #	Northing	Easting	Elevation
Top of Shotcrete Apron Points :			
S1-1	3820347.2	1817392.0	2548.8
S1-2	3820352.4	1817402.3	2549.6
S1-3	3820342.3	1817410.7	2549.8
S1-4	3820331.1	1817417.9	2550.8
S1-5	3820326.7	1817409.7	2549.9
S1-6	3820333.7	1817405.8	2549.3

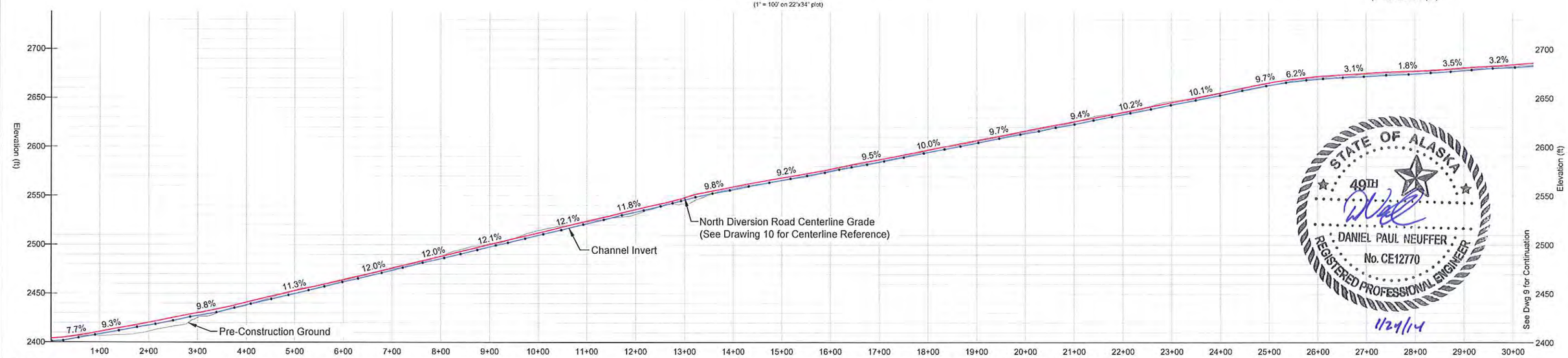


NORTH DIVERSION CHANNEL PLAN VIEW

0 50' 100' 150' 200'
Scale in Feet
(1" = 100' on 22"x34" plot)

1 DRAINAGE INLET #1 DETAIL

0 15' 30' 45' 60'
Scale in Feet
(1" = 30' on 22"x34" plot)



NORTH DIVERSION CHANNEL PROFILE

0 50' 100' 150' 200'
Horizontal Scale in Feet
Vertical Exaggeration X2
(1" = 100' on 22"x34" plot)

NOTES

1. Old North and South Diversion Channels are breached and concrete plugs installed as indicated. Channel breaches are offset from channel plugs a minimum of 100' and are spaced approximately 300' apart.
2. Contour interval is 4ft.
3. Buried CMP culvert length and location are approximate and are based on field observations.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
9	As-Built	DPN	JD	24Jan14
8	Issued for Construction	DPN	CCS	6Mar13
7	Issued for Review	DPN	JD	13Feb13
6	Updates to Drainage Inlets	DPN	JD	30Nov12
5	Updated North Ground Survey	DPN	CCS	17May12
4	Issued for Construction	DPN	CCS	3May12
3	Issued for Tender	LEB	CCS	10Feb12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11

REVISIONS

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FILE NAME: 147900-010-Diversions_Asbuilt.dwg

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POGO DSTF
Expansion As-Built

DRAWING TITLE:
New North Diversion Channel Plan and Profile
Sheet 1 of 2

DRAWING NO. 8 | SHEET 8 OF 19 | REVISION NO. 9

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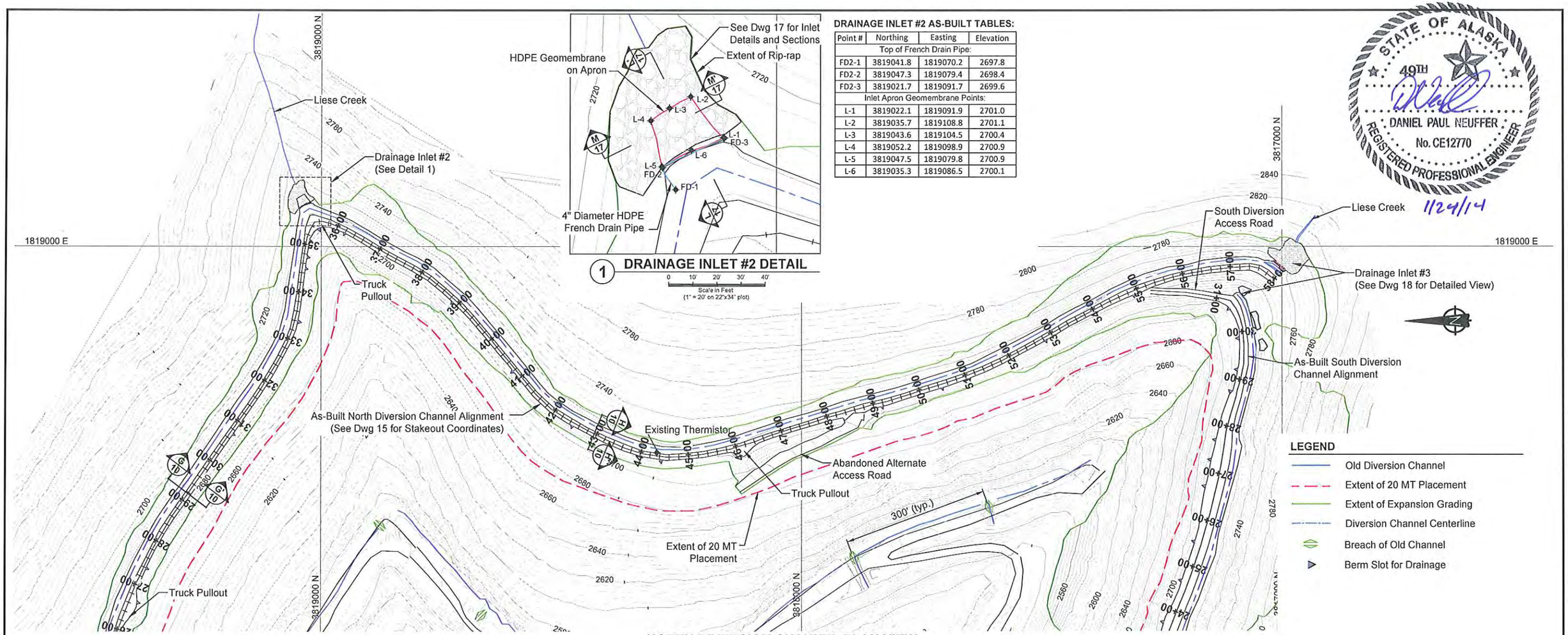


1 DRAINAGE INLET #2 DETAIL

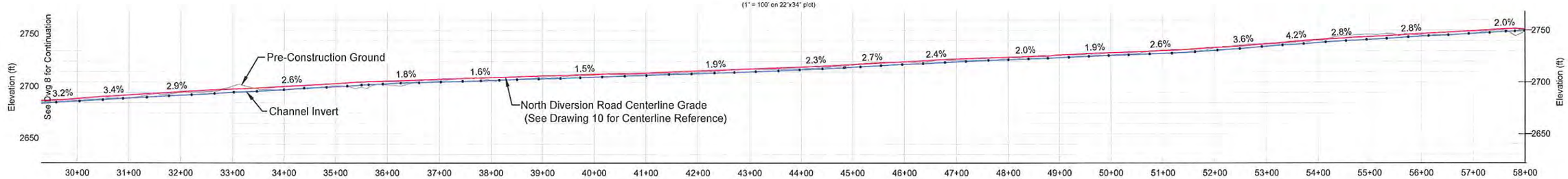
DRAINAGE INLET #2 AS-BUILT TABLES:

Point #	Northing	Easting	Elevation
Top of French Drain Pipe:			
FD2-1	3819041.8	1819070.2	2697.8
FD2-2	3819047.3	1819079.4	2698.4
FD2-3	3819021.7	1819091.7	2699.6
Inlet Apron Geomembrane Points:			
L-1	3819022.1	1819091.9	2701.0
L-2	3819035.7	1819108.8	2701.1
L-3	3819043.6	1819104.5	2700.4
L-4	3819052.2	1819098.9	2700.9
L-5	3819047.5	1819079.8	2700.9
L-6	3819035.3	1819086.5	2700.1

STATE OF ALASKA 49TH DANIEL PAUL NEUFFER No. CE12770 REGISTERED PROFESSIONAL ENGINEER 11/24/14

NORTH DIVERSION CHANNEL PLAN VIEW

0 50' 100' 150' 200'
Scale in Feet
(1" = 100' on 22"x34" plot)



NORTH DIVERSION CHANNEL PROFILE

0 50' 100' 150' 200'
Horizontal Scale in Feet
Vertical Exaggeration X2
(1" = 100' on 22"x34" plot)

NOTES

1. Old North and South Diversion Channels are breached and concrete plugs installed as indicated. Channel breaches are offset from channel plugs a minimum of 100' and are spaced approximately 300' apart.
2. Contour interval is 4ft.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS			

NO.	DESCRIPTION	CHK'D	APP'D	DATE
9	As-Built	DPN	JD	24Jan14
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7	Issued for Review	DPN	JD	13Feb13
6	Updates to Drainage Inlets	DPN	JD	30Nov12
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4	Issued for Construction	DPN	CCS	3May12
3	Issued for Tender	LEB	CCS	10Feb12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11

REVISIONS

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FILE NAME: 147900-010-Diversions_Asbuilt.dwg

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Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
New North Diversion Channel Plan and Profile
Sheet 2 of 2

DRAWING NO. 9 | SHEET 9 OF 19 | REVISION NO. 9

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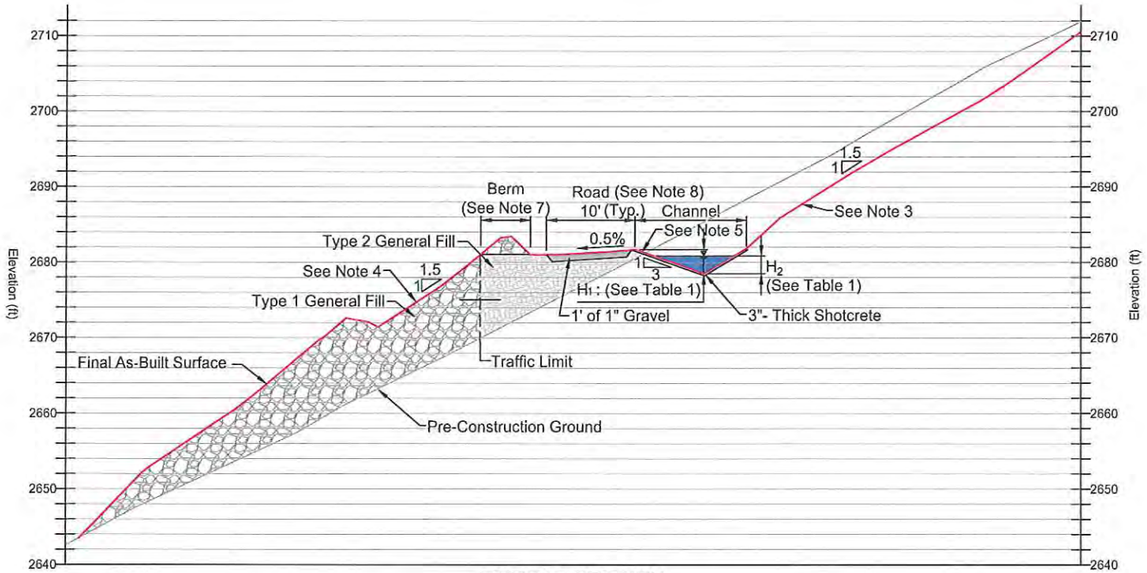
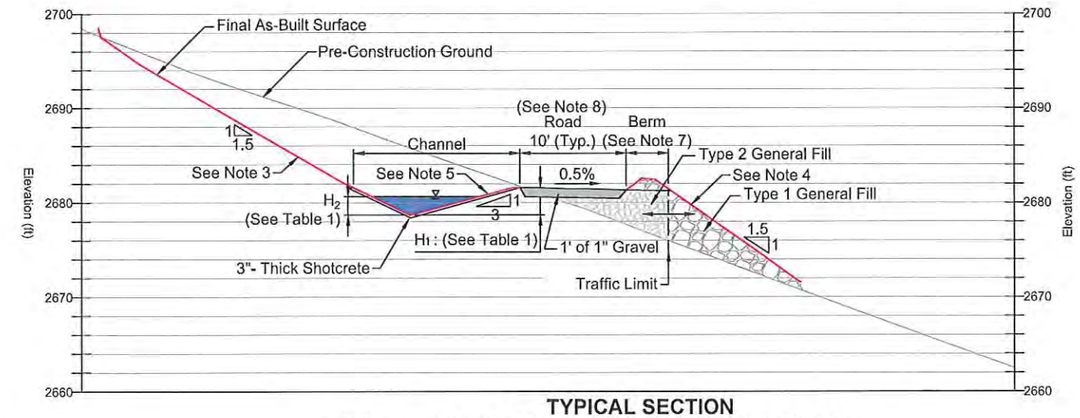


TYPICAL SECTION
SOUTH DIVERSION CHANNEL (Ch. 11+80)

D / 7

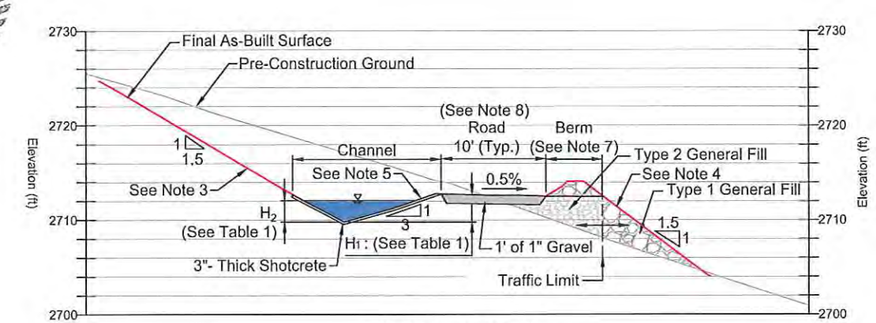
0 5' 10' 15' 20'
Scale in Feet
(1" = 10' on 22"x34" plot)



TYPICAL SECTION
NORTH DIVERSION CHANNEL (Ch. 29+30)

G / 8

0 4' 8' 12' 16'
Scale in Feet
(1" = 8' on 22"x34" plot)



TYPICAL SECTION
NORTH DIVERSION CHANNEL (Ch. 43+30)

H / 9

0 4' 8' 12' 16'
Scale in Feet
(1" = 8' on 22"x34" plot)

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

NOTES

1. Maintenance of General Fill slopes to be provided by Pogo.
2. Maintenance control of ice/aufeis to be provided by Pogo.
3. As-Built cut slope angle varies from 1.4H:1V to 1.9H:1V. See Drawing 16 for typical bedrock section.
4. As-Built fill slope angle varies from 1.4H:1V to 1.8H:1V.
5. Channel side slope varies from 2.6H:1V to 4.0H:1V.
6. Depth of flow varies due to channel configuration.
7. Berm height varies from 0.8 ft to 2.9 ft. Pogo should maintain berm height (2 ft) and berm slots (2 ft wide).
8. Road cross slope varies from 0.0% to 3%. Pogo should maintain outward cross slope of 0.5%.
9. As-Built channel depths.

LEGEND

- Road Surface Material
- Type 1 - General Fill
- Type 2 - General Fill

TABLE 1 - DIVERSION CHANNEL PARAMETERS

STATIONING	SLOPE	MAX Q_{PEAK}	TOTAL DEPTH (H_1) (See Note 9)	MAX. DEPTH OF FLOW (H_2) (See Note 6)*
South Ditch	(%)	(cfs)	(ft)	(ft)
0+00 to 30+79	2	24	2.7 to 3.6	1.3
North Ditch	(%)	(cfs)	(ft)	(ft)
0+00 to 12+00	12	69	2.4 to 3.3	1.3
12+00 to 26+00	10	55	2.4 to 3.9	1.1
26+00 to 35+70	2	45	2.8 to 3.6	1.3
35+70 to 58+02	2	26	2.6 to 3.4	1.2

* Note: Maximum depth of flow based on 200-year/24-hr storm event.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–			

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
7	As-Built	DPN	JD	24Jan14
6	Issued for Construction	DPN	CCS	6Mar13
5	Updated South Diversion Design	DPN	CCS	17Aug12
4	Updated North Ground Survey	DPN	CCS	17May12
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

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DESIGN: CAM/DPN | DRAWN: NV | REVIEWED: DPN
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FILE NAME: 147900-010-Diversions_Asbuilt.dwg

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Sumitomo Metal Mining LLC (Pogo)
SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built
DRAWING TITLE:
Typical Diversion Channel Sections
DRAWING NO. 10 | SHEET 10 OF 19 | REVISION NO. 7

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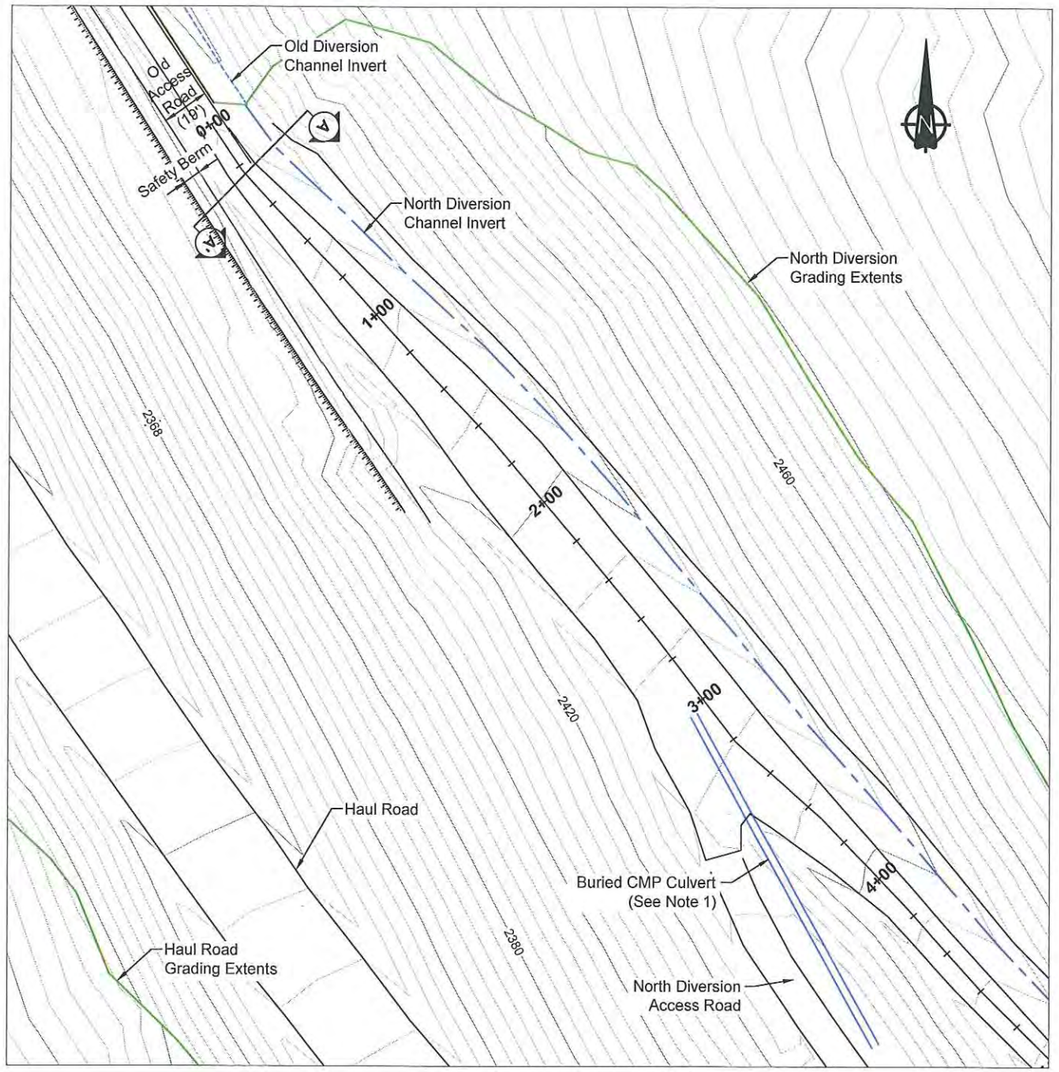
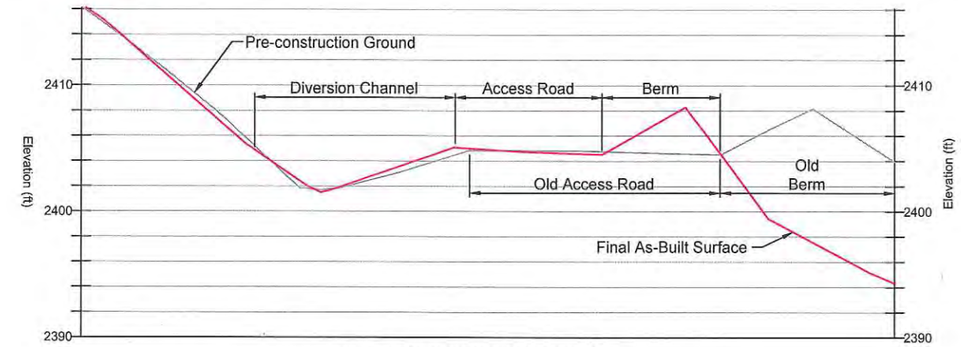


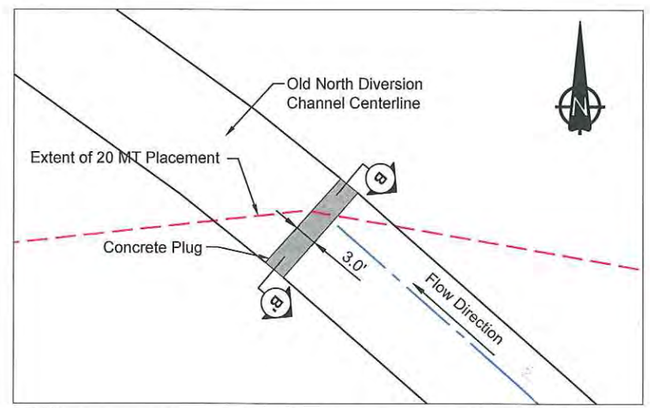
1/8 OLD DIVERSION CHANNEL / NEW NORTH DIVERSION CHANNEL TIE-IN DETAIL

0 15' 30' 45' 60'
Scale in Feet
(1" = 30' on 22"x34" plot)



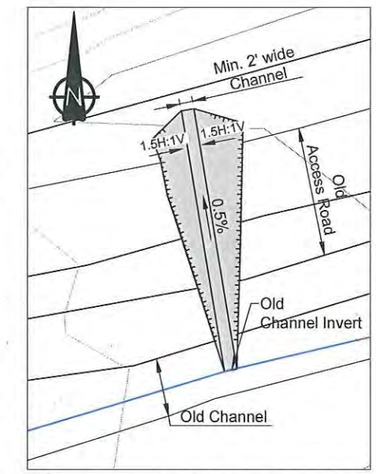
A OLD DIVERSION CHANNEL / NEW NORTH DIVERSION CHANNEL TIE-IN SECTION

0 3' 6' 9' 12'
Scale in Feet
(1" = 6' on 22"x34" plot)



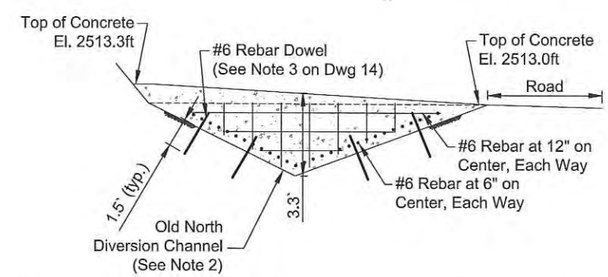
2/8 OLD NORTH DIVERSION CHANNEL PLUG DETAIL

0 5' 10' 15' 20'
Scale in Feet
(1" = 10' on 22"x34" plot)



3/8 CHANNEL BREACH DETAIL

0 6' 12' 18' 24'
Scale in Feet
(1" = 12' on 22"x34" plot)



B OLD NORTH DIVERSION CHANNEL PLUG SECTION

Not to Scale

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
11/24/14

NOTES

1. Approximately 150 feet of 36-inch CMP culvert is buried along the North Diversion Access Road. Location is approximate, based on field observations. Ends were crushed.
2. Edge contacts between the channel plug and the existing channel are coated with a brushable, non-fibrated asphalt to provide additional seal protection on the North Diversion.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–	–		

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
6	As-Built	DPN	JD	24Jan14
5	Issued for Construction	DPN	CCS	6Mar13
4	Updated North Ground Survey	DPN	CCS	17May12
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

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DESIGN: AT	DRAWN: NV	REVIEWED: DPN
CHECKED: DPN	APPROVED: JD	DATE: Jan. 24, 2014

FILE NAME: 147900-010-Diversions_Asbuilt.dwg

POGO MINE
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Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
Old Diversion Channel Sections and North Diversion Tie-In Detail

DRAWING NO.	SHEET	REVISION NO.
11	11 OF 19	6

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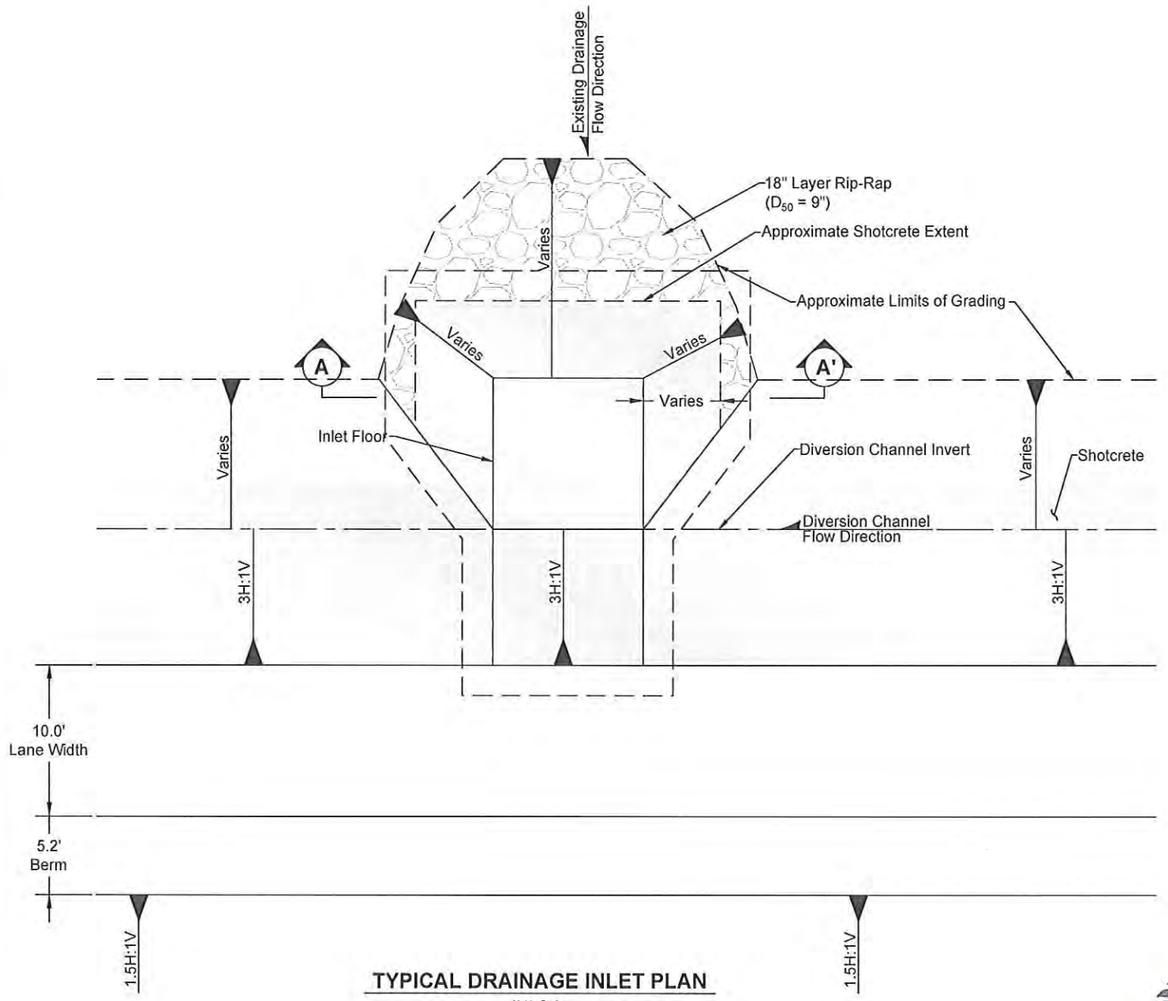
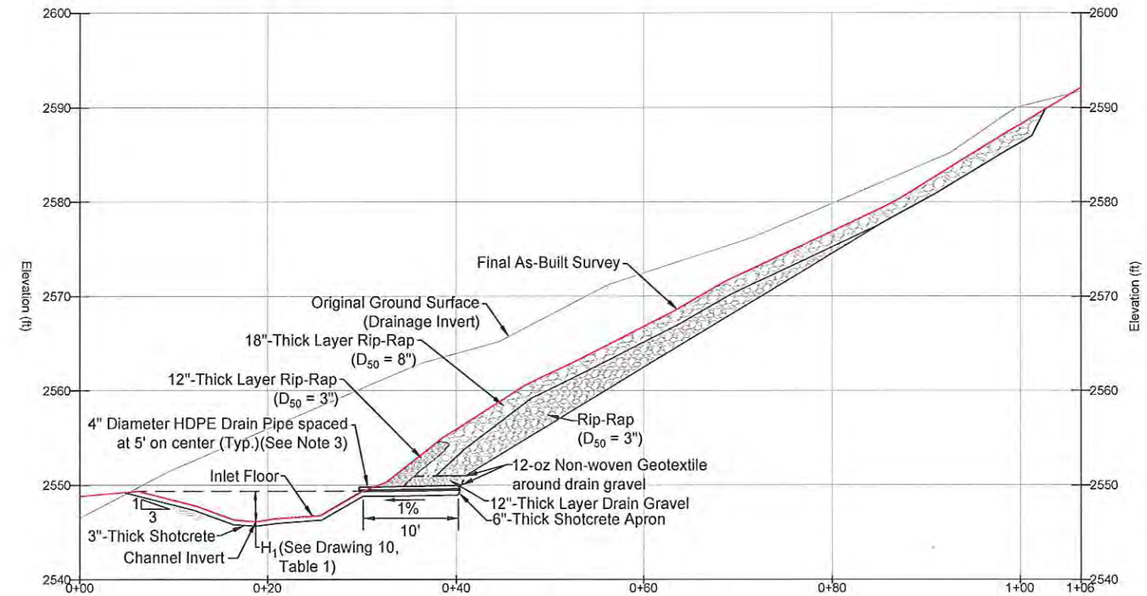


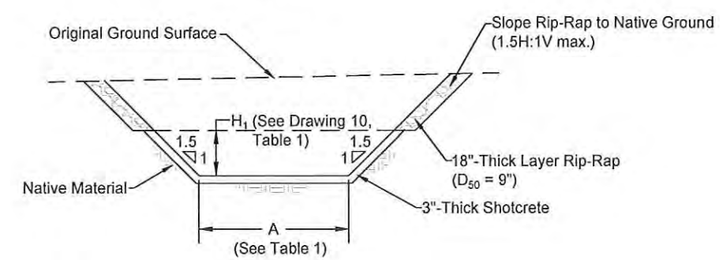
TYPICAL DRAINAGE INLET PLAN

Not to Scale



K/8 DRAINAGE INLET #1 SECTION

0 4' 8' 12' 16'
Scale in Feet
(1" = 8' on 22"x34" plot)



A TYPICAL DRAINAGE INLET IN CUT

Not to Scale

Table 1 - Drainage Inlet Dimensions

Drainage Inlet	A (ft)
1	16
2	26
3-N	27
4	18

LEGEND

- Rip Rap
- Shotcrete
- Drain Gravel

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

NOTES

1. Maintenance control of ice/aufeis to be provided by Pogo.
2. Drain gravel is durable, "non-mineralized" (as determined by Pogo), poorly-graded gravel with 100% passing the 1.5" sieve and no more than 5% passing the #200 sieve. The D_{85} of drain gravel is at least 1.4 times greater than the drain pipe's slot width.
3. Drain pipe is single wall, corrugated, perforated HDPE pipe (AASHTO M 252).
4. Rip-rap thicknesses are based on field observations.

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
7	As-Built	DPN	JD	24Jan14
6	Issued for Construction	DPN	CCS	6Mar13
5	Issued for Review	DPN	JD	13Feb13
4	Updates to Drainage Inlets	DPN	JD	30Nov12
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

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DESIGN: DPN/VM/CAM | DRAWN: SN/NV | REVIEWED: DPN
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FILE NAME: 147900-010-Inlet Alternatives1_Asbuilt.dwg

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POGO DSTF Expansion As-Built

DRAWING TITLE: Drainage Inlet Plan and Sections

DRAWING NO. 12 | SHEET 12 OF 19 | REVISION NO. 7

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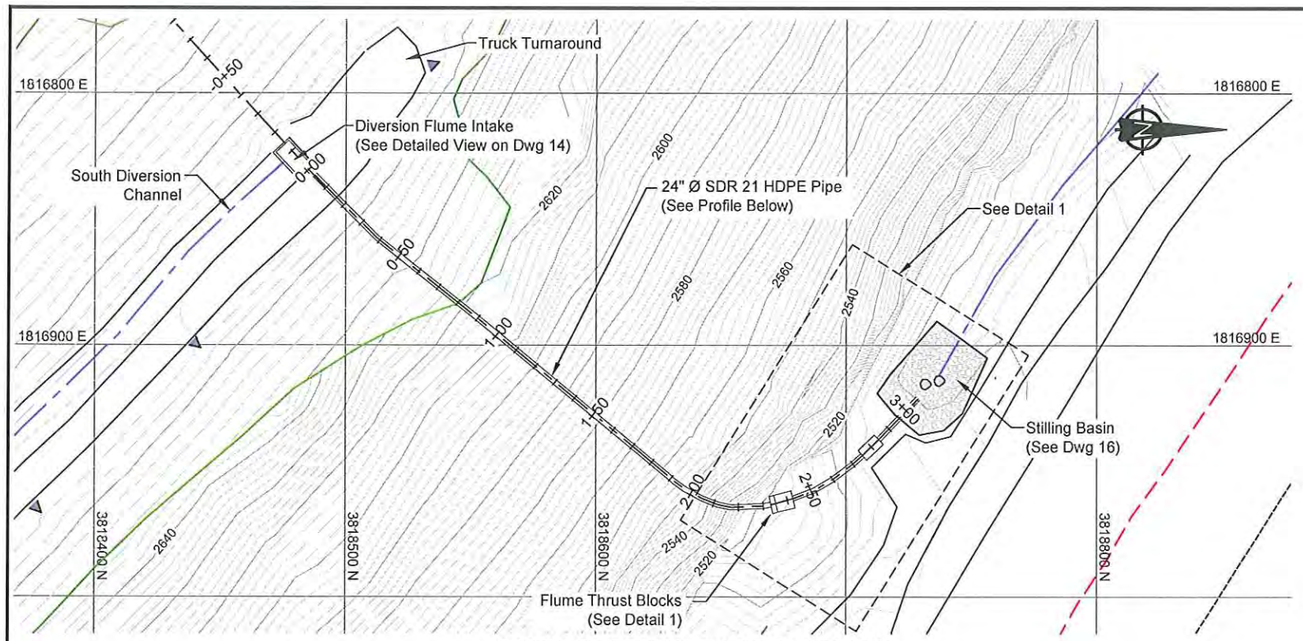

SOUTH DIVERSION FLUME PLAN VIEW

0 15' 30' 45' 60'
Scale in Feet
(1" = 30' on 22"x34" plot)

LEGEND

- Old Diversion Channel
- Extent of 20 MT Placement
- Extent of Diversion Grading
- Diversion Channel Centerline
- Breach of Old Channel
- As-Built Berm Slot

NOTE

1. A minimum of one foot of one-inch gravel was placed and compacted around concrete and HDPE pipe between thrust blocks. Type 2 General Fill was used for remainder of the fill shown on the South Diversion Flume Profile.

STATE OF ALASKA
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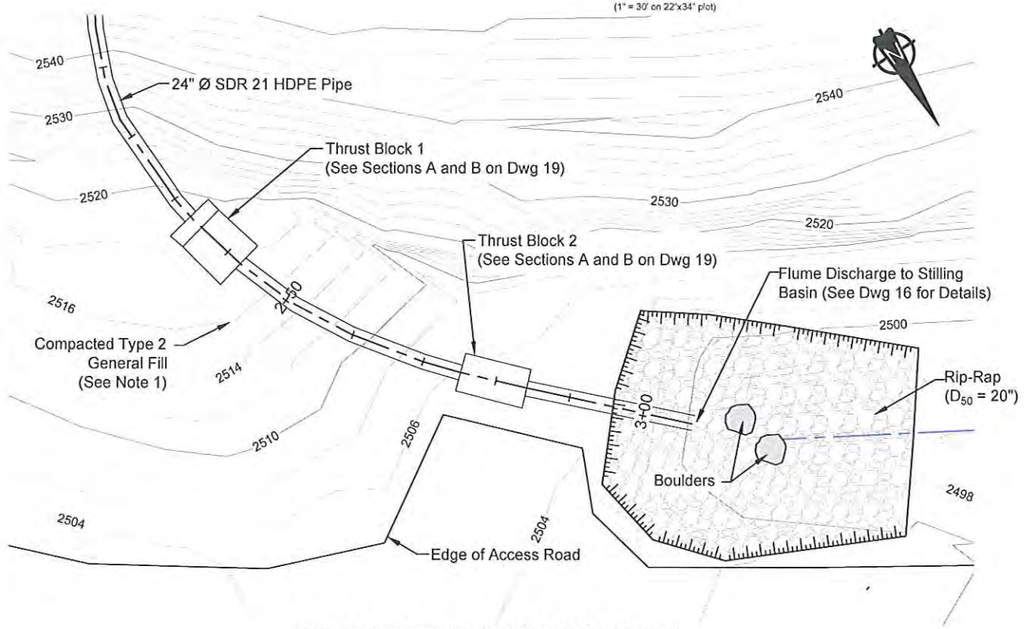
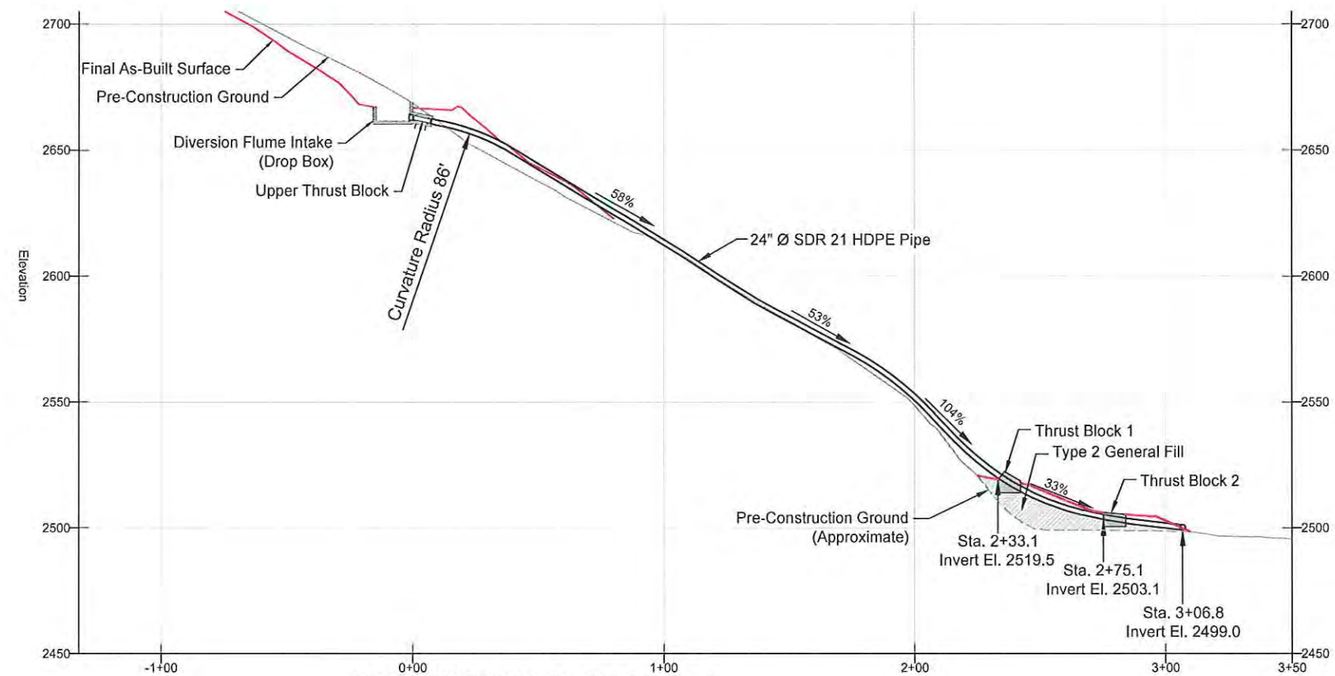
1/24/14



1 FLUME THRUST BLOCKS DETAIL

0 5' 10' 15' 20'
Scale in Feet
(1" = 10' on 22"x34" plot)



SOUTH DIVERSION FLUME PROFILE

0 15' 30' 45' 60'
Scale in Feet
(1" = 30' on 22"x34" plot)

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–	–		

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
8	As-Built	DPN	JD	24Jan14
7	Revised for Contractor	DPN	JD	10Aug13
6	Issued for Construction	DPN	JD	2Jul13
5	Issued for Construction	DPN	CCS	6Mar13
4	S. Diversion Discharge Update	DPN	JD	30Nov12
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

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DESIGN: AT/VM/IJC	DRAWN: NV/IJC	REVIEWED: DPN
CHECKED: DPN	APPROVED: JD	DATE: Jan. 24, 2014

FILE NAME: 147900-010-Flume1_Asbuilt.dwg

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MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
South Diversion Flume
Plan and Profile

DRAWING NO.	SHEET	REVISION NO.
13	13 OF 19	8

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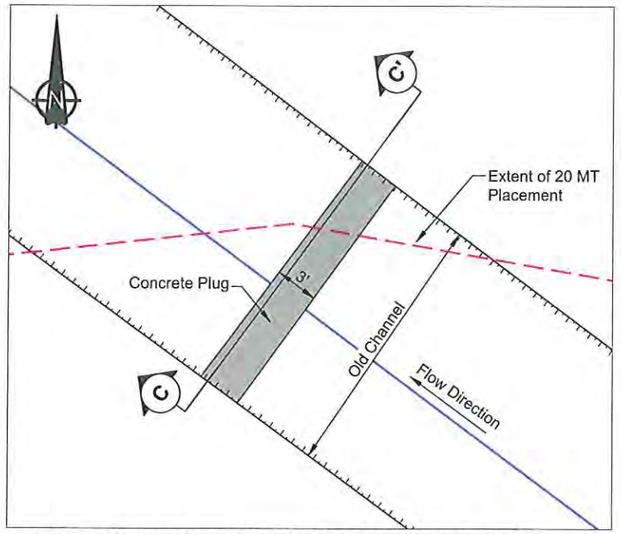
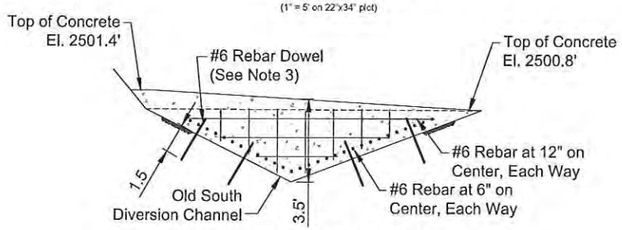


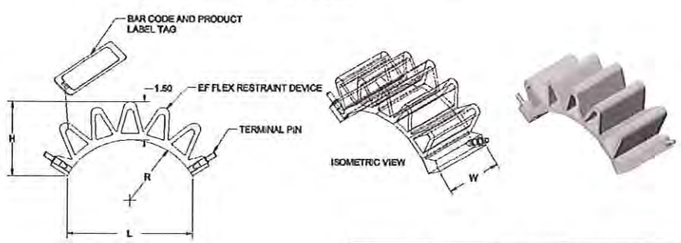
1 OLD SOUTH DIVERSION CHANNEL PLUG DETAIL

0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)



C OLD SOUTH DIVERSION CHANNEL PLUG SECTION

Not to Scale

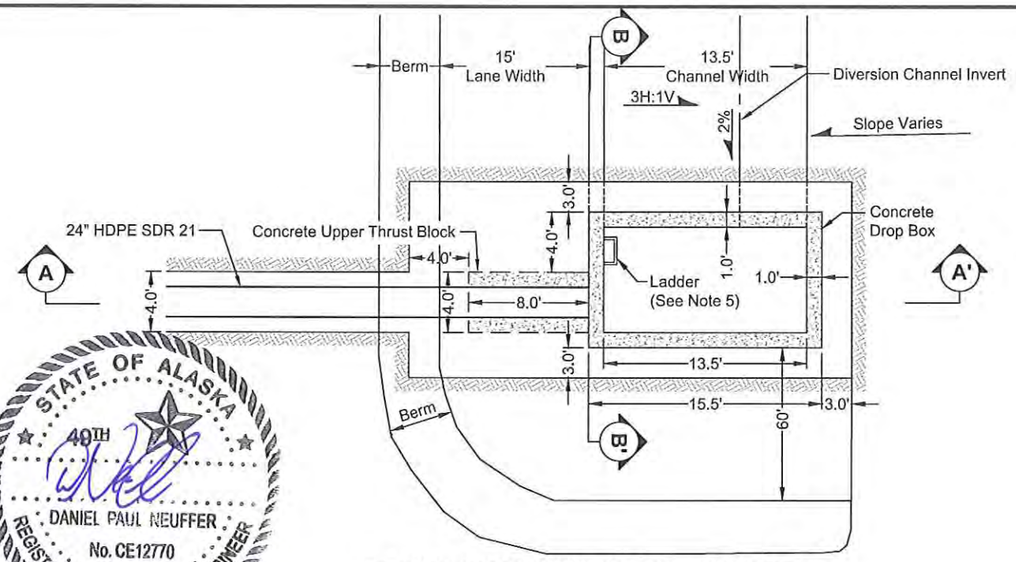


ELECTROFUSION FLEX RESTRAINT DIMENSIONS			
Nominal Base Size	H	W	L
6"-63"	2.91	2.56	4.92

(PE3408/PE4710) ELECTROFUSION FLEX RESTRAINTS							
Main Size	Axial Resistance	Description	Pin Type	Clamp Type	Part Number	Pack. Qty.	Wt.
6"-63"	9,000 lbs	Flexible Restraint	4 S	N	10004637	40	0.42

2 ELECTROFUSION FLEX RESTRAINER DETAIL

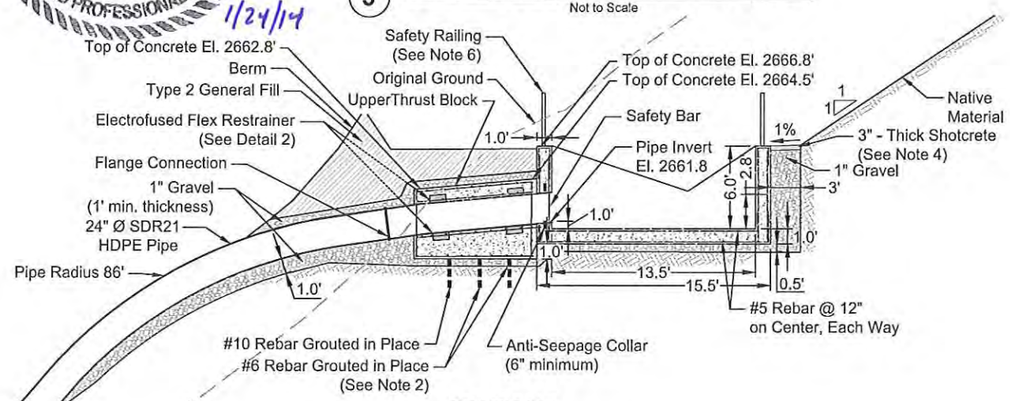
Not to Scale



3 DIVERSION FLUME INTAKE - PLAN VIEW

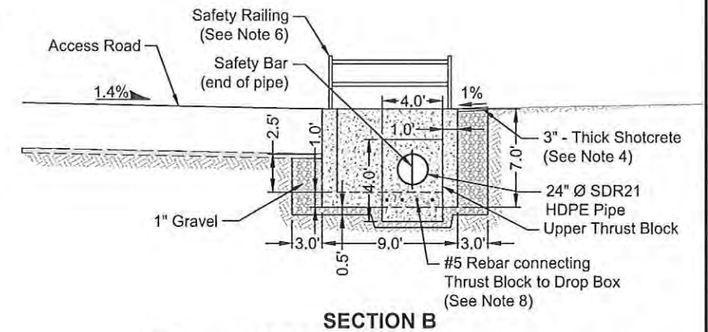
Not to Scale

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14



A SECTION A DIVERSION FLUME INTAKE

Not to Scale

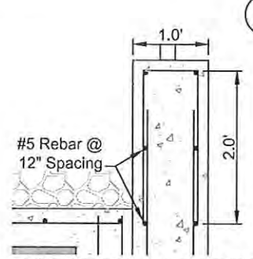


B SECTION B DIVERSION FLUME INTAKE

Not to Scale

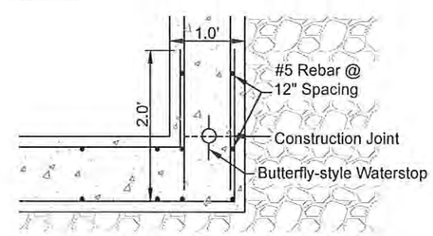
NOTES

1. Minimum of eight 6" long flex restrainers are electrofused to the pipe within each thrust block for anchorage.
2. Thrust blocks are embedded a minimum of 4' below surface. At least four #6 (minimum) rebar dowels are grouted in place 1.5' below bottom of each block. The rebar dowels extend 1.5' (min.) inside the blocks.
3. Eight #6 rebar dowels are grouted in place 1.5' below the existing ditch surface. The holes for the dowels are 2" in diameter. Rebar dowels extend 1.5' (min.) inside the plug.
4. Shotcrete laps onto concrete drop box walls a minimum of 6".
5. A drop box access ladder was installed by the Contractor per Pogo Safety requirements.
6. Safety railings were installed by the Contractor per Pogo Safety requirements. Safety railings are removable for clean out purposes.
7. Diversion flume intake will require seasonal maintenance during expected mine life.
8. Four #5 bars were cast in-place to connect flume intake to upper thrust block. Bars are 2' long, 1' apart, and 6" above bottom of flume intake.
9. Due to low compressive strength of the flume intake structure floor, AAP applied Dayton Superior Pentra-Hard Densifier to the concrete.



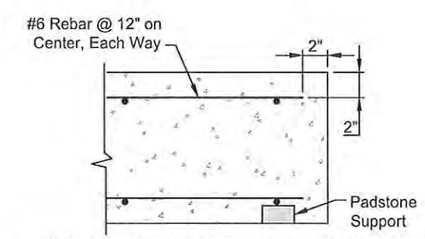
REBAR DETAILS AT TOP OF DIVERSION FLUME INTAKE WALL

Not to Scale



REBAR DETAILS AT BOTTOM OF DIVERSION FLUME INTAKE WALL

Not to Scale



TYPICAL CONCRETE REINFORCEMENT IN FLUME INTAKE AND THRUST BLOCKS

Not to Scale

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
7	As-Built	DPN	JD	24Jan14
6	Issued for Construction	DPN	CCS	6Mar13
5	S. Diversion Discharge Update	DPN	JD	30Nov12
4	Issued for Construction	DPN	CCS	3May12
3	Issued for Tender	LEB	CCS	10Feb12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: AT/PM/VM | DRAWN: NV | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-Flume2_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF Expansion As-Built

DRAWING TITLE: South Diversion Flume Intake Details

DRAWING NO. 14 | SHEET 14 OF 19 | REVISION NO. 7

C:\01_SITES\POGO\Detailed Design\147900-010-Flume2_Asbuilt.dwg

SOUTH DIVERSION CENTERLINE AS-BUILT ALIGNMENT TABLES:

Station	Northing	Easting	Elevation
3+80.0	3,818,524.6	1,816,781.2	2,665.6
3+94.3	3,818,515.4	1,816,792.1	2,665.4
4+10.1	3,818,507.2	1,816,805.6	2,665.7
4+26.8	3,818,495.7	1,816,817.7	2,666.4
4+38.6	3,818,488.8	1,816,827.4	2,666.6
4+52.7	3,818,486.0	1,816,841.1	2,666.3
4+98.3	3,818,452.7	1,816,872.3	2,667.5
5+41.3	3,818,423.5	1,816,903.9	2,668.3
5+82.8	3,818,395.4	1,816,934.4	2,669.0
6+21.2	3,818,367.7	1,816,961.0	2,669.8
6+55.5	3,818,343.4	1,816,985.2	2,670.8
6+92.0	3,818,316.5	1,817,009.8	2,671.4
7+31.5	3,818,287.6	1,817,036.8	2,672.3
7+71.1	3,818,258.0	1,817,063.1	2,672.9
8+09.2	3,818,229.6	1,817,088.4	2,673.7
8+45.9	3,818,201.8	1,817,112.4	2,674.6
8+81.2	3,818,175.2	1,817,135.7	2,675.3
9+17.7	3,818,146.5	1,817,158.2	2,676.2
9+51.3	3,818,121.2	1,817,180.4	2,676.9
9+90.5	3,818,090.8	1,817,205.1	2,677.5
10+32.9	3,818,057.5	1,817,231.3	2,678.1
10+77.3	3,818,021.8	1,817,257.8	2,679.1
11+19.8	3,817,987.6	1,817,282.9	2,679.9
11+60.7	3,817,956.1	1,817,309.0	2,680.7
12+01.7	3,817,924.6	1,817,335.2	2,681.6
12+40.0	3,817,895.3	1,817,360.1	2,682.6
12+78.0	3,817,867.0	1,817,385.3	2,683.2
13+15.9	3,817,837.7	1,817,409.4	2,683.9
13+53.3	3,817,809.1	1,817,433.5	2,684.6
13+84.3	3,817,784.1	1,817,451.8	2,685.4
14+24.4	3,817,751.4	1,817,475.0	2,686.0
14+67.5	3,817,715.1	1,817,498.3	2,687.0
15+04.6	3,817,685.0	1,817,519.8	2,687.9
15+42.2	3,817,652.9	1,817,539.4	2,688.6
15+80.1	3,817,620.9	1,817,559.8	2,689.2
16+05.5	3,817,597.7	1,817,570.2	2,689.7
16+37.8	3,817,568.2	1,817,583.2	2,690.2
16+71.1	3,817,537.4	1,817,596.0	2,690.5
16+97.3	3,817,516.1	1,817,611.2	2,691.1
17+21.3	3,817,498.6	1,817,627.7	2,691.8
17+49.4	3,817,483.3	1,817,651.2	2,692.7
17+79.2	3,817,470.2	1,817,678.0	2,693.2
18+17.9	3,817,457.3	1,817,714.5	2,694.2
18+55.8	3,817,445.6	1,817,750.4	2,695.1
18+94.0	3,817,432.2	1,817,786.3	2,695.7
19+31.4	3,817,417.6	1,817,820.7	2,696.7
19+68.6	3,817,404.8	1,817,855.6	2,697.3
20+06.5	3,817,391.2	1,817,891.0	2,698.0
20+45.5	3,817,377.7	1,817,927.5	2,698.5
20+81.0	3,817,365.8	1,817,961.0	2,699.3
21+20.2	3,817,349.4	1,817,996.6	2,700.1
21+49.6	3,817,336.8	1,818,023.2	2,700.5
21+88.7	3,817,319.6	1,818,058.4	2,700.9
22+26.5	3,817,299.1	1,818,090.1	2,702.4
22+46.3	3,817,287.3	1,818,106.0	2,702.9

Station	Northing	Easting	Elevation
22+70.3	3,817,275.6	1,818,126.9	2,703.5
23+10.5	3,817,254.6	1,818,161.2	2,704.2
23+43.5	3,817,241.4	1,818,191.5	2,704.7
23+83.5	3,817,226.6	1,818,228.6	2,705.4
24+16.4	3,817,214.8	1,818,259.4	2,706.1
24+46.5	3,817,203.2	1,818,287.1	2,706.7
24+80.2	3,817,191.4	1,818,318.7	2,707.7
25+11.7	3,817,181.2	1,818,348.5	2,708.0
25+48.1	3,817,169.8	1,818,383.0	2,708.6
25+81.2	3,817,160.6	1,818,414.8	2,709.2
26+16.8	3,817,150.3	1,818,448.9	2,710.0
26+55.7	3,817,141.3	1,818,486.8	2,711.0
26+91.7	3,817,132.7	1,818,521.7	2,711.5
27+25.9	3,817,126.3	1,818,555.4	2,712.1
27+57.0	3,817,121.5	1,818,586.0	2,712.5
27+88.6	3,817,117.2	1,818,617.4	2,713.6
28+23.5	3,817,107.9	1,818,651.0	2,714.5
28+64.9	3,817,096.1	1,818,690.6	2,715.2
28+74.0	3,817,094.7	1,818,699.6	2,715.4
28+99.6	3,817,087.2	1,818,724.1	2,715.9
29+34.4	3,817,080.0	1,818,758.2	2,716.4
29+70.7	3,817,079.8	1,818,794.5	2,716.7
30+07.9	3,817,082.4	1,818,831.6	2,717.3
30+30.7	3,817,088.3	1,818,853.7	2,717.5
30+49.2	3,817,095.6	1,818,870.6	2,717.6
30+61.5	3,817,102.7	1,818,880.7	2,717.5
30+70.2	3,817,107.5	1,818,887.9	2,717.6
30+93.8	3,817,130.3	1,818,893.9	2,719.4
31+00.0	3,817,136.4	1,818,894.9	2,720.4

NORTH DIVERSION CENTERLINE AS-BUILT ALIGNMENT TABLES:

Station	Northing	Easting	Elevation
0+00.0	3,820,796.3	1,816,304.8	2403.9
0+21.7	3,820,778.4	1,816,317.0	2404.6
0+43.2	3,820,762.3	1,816,331.4	2405.9
0+81.2	3,820,734.9	1,816,357.7	2409.0
1+25.9	3,820,701.7	1,816,387.6	2413.3
1+68.3	3,820,671.0	1,816,416.8	2417.1
2+22.4	3,820,629.5	1,816,451.6	2422.3
2+70.4	3,820,592.4	1,816,482.0	2427.4
3+21.2	3,820,552.0	1,816,512.8	2432.0
3+67.0	3,820,521.6	1,816,547.0	2436.9
4+12.4	3,820,488.8	1,816,578.4	2442.5
4+59.9	3,820,453.4	1,816,610.1	2448.1
4+97.1	3,820,427.0	1,816,636.4	2452.4
5+41.8	3,820,396.7	1,816,669.2	2457.3
5+88.0	3,820,367.6	1,816,705.2	2462.6
6+17.3	3,820,348.7	1,816,727.5	2466.1
6+66.6	3,820,318.7	1,816,766.6	2471.7
7+10.3	3,820,295.7	1,816,803.7	2477.2
7+54.2	3,820,274.2	1,816,842.0	2482.4
8+00.0	3,820,257.3	1,816,884.6	2487.9
8+28.6	3,820,255.0	1,816,913.1	2491.4
8+62.5	3,820,260.1	1,816,946.6	2495.5
8+97.0	3,820,268.7	1,816,980.0	2499.8
9+43.4	3,820,278.2	1,817,025.4	2505.3
9+77.5	3,820,281.5	1,817,059.4	2509.1
10+16.6	3,820,285.1	1,817,098.3	2513.7
10+65.2	3,820,288.5	1,817,146.8	2519.7
11+08.7	3,820,292.7	1,817,190.1	2524.8
11+45.6	3,820,300.6	1,817,226.1	2529.1
11+78.0	3,820,310.1	1,817,257.1	2533.2
12+28.0	3,820,323.7	1,817,305.2	2539.2
12+66.2	3,820,325.7	1,817,343.4	2543.4
12+91.6	3,820,316.3	1,817,367.0	2546.7
13+22.1	3,820,293.5	1,817,387.2	2551.5
13+68.8	3,820,249.4	1,817,402.8	2556.0
14+25.7	3,820,194.7	1,817,418.2	2561.7
14+80.0	3,820,141.5	1,817,429.3	2566.5
15+35.5	3,820,086.3	1,817,435.0	2571.3
15+86.0	3,820,035.9	1,817,437.0	2575.8
16+20.6	3,820,001.4	1,817,439.9	2579.5
16+46.8	3,819,975.9	1,817,446.0	2582.1
16+72.4	3,819,953.4	1,817,458.4	2584.6
16+95.9	3,819,936.3	1,817,474.4	2586.6
17+49.0	3,819,902.3	1,817,515.3	2591.6
18+01.7	3,819,869.7	1,817,556.6	2597.0
18+55.1	3,819,833.9	1,817,596.3	2602.3
19+08.6	3,819,797.4	1,817,635.4	2607.3
19+61.9	3,819,761.2	1,817,674.5	2612.4
20+16.9	3,819,725.1	1,817,716.0	2618.0
20+68.8	3,819,692.1	1,817,756.0	2622.8
21+24.4	3,819,658.2	1,817,800.1	2628.0
21+78.4	3,819,627.9	1,817,844.8	2633.1
22+31.3	3,819,597.5	1,817,888.1	2638.5
22+87.3	3,819,564.6	1,817,933.5	2644.0
23+39.8	3,819,533.0	1,817,975.4	2649.2

Station	Northing	Easting	Elevation
23+96.2	3,819,500.3	1,818,021.3	2654.9
24+40.1	3,819,477.4	1,818,058.7	2659.5
24+76.1	3,819,460.4	1,818,090.5	2663.2
25+11.0	3,819,446.9	1,818,122.6	2666.5
25+43.4	3,819,437.1	1,818,153.5	2668.8
26+01.2	3,819,421.0	1,818,209.0	2672.1
26+43.7	3,819,405.1	1,818,248.5	2673.5
26+76.9	3,819,392.7	1,818,279.2	2674.3
27+04.9	3,819,382.4	1,818,305.3	2675.6
27+15.2	3,819,377.6	1,818,314.4	2675.8
27+47.8	3,819,364.0	1,818,344.0	2676.7
27+84.2	3,819,348.0	1,818,376.7	2677.3
28+22.9	3,819,328.0	1,818,409.9	2678.1
28+57.0	3,819,310.8	1,818,439.3	2679.1
28+94.2	3,819,289.4	1,818,469.6	2680.6
29+31.5	3,819,267.8	1,818,500.1	2681.9
29+71.3	3,819,244.8	1,818,532.6	2682.8
30+11.8	3,819,222.1	1,818,566.1	2684.5
30+49.2	3,819,200.9	1,818,597.0	2685.9
30+86.9	3,819,179.2	1,818,627.8	2686.9
31+29.2	3,819,154.6	1,818,662.2	2688.4
31+74.1	3,819,129.2	1,818,699.2	2689.6
32+16.3	3,819,106.9	1,818,735.0	2691.1
32+55.2	3,819,087.1	1,818,768.6	2692.1
32+93.6	3,819,069.8	1,818,802.8	2693.0
33+23.1	3,819,059.8	1,818,830.6	2693.5
33+61.5	3,819,050.4	1,818,867.8	2694.5
34+02.0	3,819,045.2	1,818,907.9	2695.7
34+39.0	3,819,041.2	1,818,944.7	2696.7
34+77.4	3,819,036.1	1,818,982.8	2697.7
35+13.4	3,819,030.0	1,819,018.2	2698.8
35+33.0	3,819,022.7	1,819,036.5	2699.5
35+50.1	3,819,014.1	1,819,051.3	2700.0
35+55.9	3,819,008.4	1,819,051.2	2700.1
35+65.8	3,818,998.5	1,819,052.4	2700.4
35+85.3	3,818,979.7	1,819,047.3	2700.6
36+18.3	3,818,949.4	1,819,034.2	2701.1
36+56.6	3,818,915.9	1,819,015.6	2701.8
36+98.2	3,818,880.1	1,818,994.3	2702.8
37+39.4	3,818,844.0	1,818,974.6	2703.3
37+81.8	3,818,806.5	1,818,954.7	2703.9
38+19.7	3,818,774.4	1,818,934.7	2704.5
38+60.0	3,818,743.1	1,818,909.4	2705.3
38+99.3	3,818,714.2	1,818,882.6	2705.9
39+40.5	3,818,685.6	1,818,852.9	2706.4
39+85.9	3,818,656.3	1,818,818.4	2707.2
40+29.3	3,818,628.7	1,818,784.9	2708.0
40+65.7	3,818,605.2	1,818,757.0	2708.2
41+03.9	3,818,580.9	1,818,727.5	2708.8
41+46.5	3,818,553.6	1,818,694.8	2709.8
41+92.6	3,818,520.0	1,818,663.3	2710.8
42+35.2	3,818,483.9	1,818,640.7	2711.5
42+76.5	3,818,447.5	1,818,621.1	2712.3
43+20.7	3,818,408.1	1,818,601.3	2713.1
43+65.2	3,818,367.3	1,818,583.3	2713.9

Station	Northing	Easting	Elevation
44+03.9	3,818,330.4	1,818,571.5	2714.6
44+54.5	3,818,280.3	1,818,564.4	2715.8
44+92.2	3,818,242.7	1,818,565.9	2716.8
45+31.1	3,818,204.1	1,818,570.8	2717.8
45+70.9	3,818,165.0	1,818,578.5	2718.9
45+87.9	3,818,148.3	1,818,581.2	2719.2
46+12.5	3,818,124.8	1,818,588.7	2719.9
46+38.7	3,818,099.6	1,818,595.8	2720.6
46+75.5	3,818,065.4	1,818,609.4	2721.7
47+19.5	3,818,023.5	1,818,622.8	2722.6
47+61.4	3,817,983.3	1,818,634.5	2723.3
48+04.1	3,817,942.5	1,818,647.3	2723.9
48+31.9	3,817,915.7	1,818,654.6	2724.4
48+54.2	3,817,894.3	1,818,661.0	2724.8
48+78.2	3,817,871.2	1,818,667.1	2725.1
48+93.6	3,817,856.4	1,818,671.8	2725.9
49+29.3	3,817,821.7	1,818,679.9	2726.8
49+70.9	3,817,781.9	1,818,692.1	2727.8
50+09.2	3,817,745.5	1,818,704.0	2728.3
50+56.8	3,817,700.0	1,818,718.1	2729.2
50+97.1	3,817,661.9	1,818,731.1	2730.2
51+39.3	3,817,622.7	1,818,746.6	2731.3
51+81.4	3,817,584.2	1,818,763.7	2732.8
52+20.7	3,817,549.4	1,818,781.9	2733.8
52+58.1	3,817,516.3	1,818,799.4	2735.1
53+01.3	3,817,478.7	1,818,820.6	2737.0
53+43.5	3,817,442.0	1,818,841.6	2738.7
53+86.2	3,817,404.4	1,818,861.9	2740.5
54+34.4	3,817,361.9	1,818,884.5	2741.9
54+73.5	3,817,326.5	1,818,901.1	2743.3
55+05.5	3,817,296.9	1,818,913.3	2743.8
55+37.3	3,817,267.3	1,818,924.9	2744.7
55+78.6	3,817,227.7	1,818,936.7	2746.1
56+14.7	3,817,192.5	1,818,944.9	2747.1
56+56.1	3,817,151.7	1,818,951.5	2748.1
56+99.7	3,817,108.4	1,818,956.1	2749.3
57+41.0	3,817,067.1	1,818,958.9	2750.8
57+62.1	3,817,046.4	1,818,954.8	2751.3
57+80.1	3,817,031.7	1,818,944.5	2751.6
57+99.5	3,817,016.6	1,818,932.3	2751.0

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
7	As-Built	DPN	JD	24Jan14
6	Issued for Construction	DPN	CCS	6Mar13
5	Updated South Diversion Design	DPN	CCS	17Aug12
4	Updated North Ground Survey	DPN	CCS	17May12
3	Issued for Construction	DPN	CCS	3May12
2	Issued for Tender	LEB	CCS	20Dec11
1	Issued for Discussion	LEB	CCS	7Dec11
0	Issued for Construction	LEB	CCS	8Nov11

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: CAM/DPN	DRAWN: NV	REVIEWED: DPN
CHECKED: CCS	APPROVED: JD	DATE: Jan. 24, 2014

FILE NAME: 147900-010-Diversion SO Tables Asbuilt.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE:
North and South Diversion
As-Built Alignment Tables

DRAWING NO.	SHEET	REVISION NO.
15	15 OF 19	7

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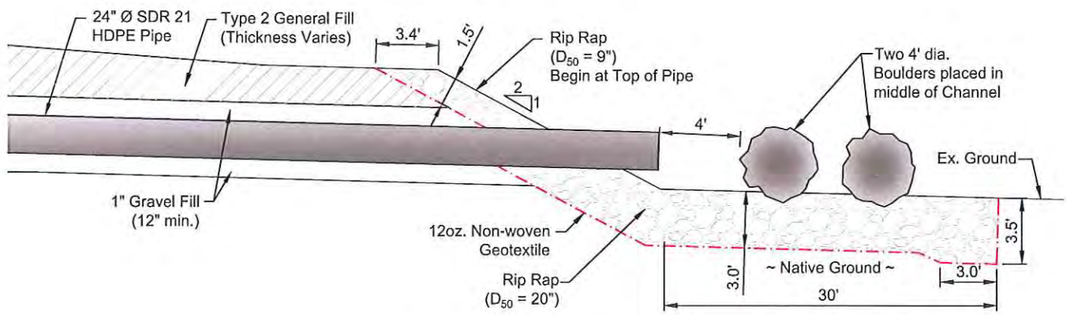
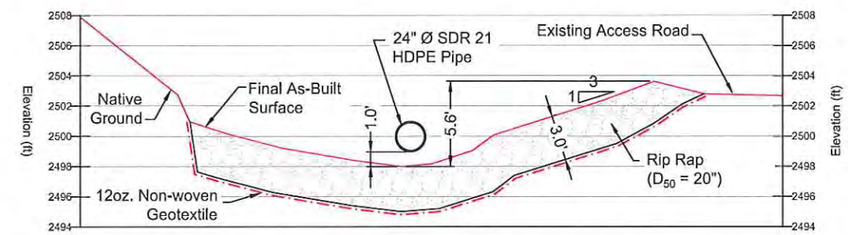


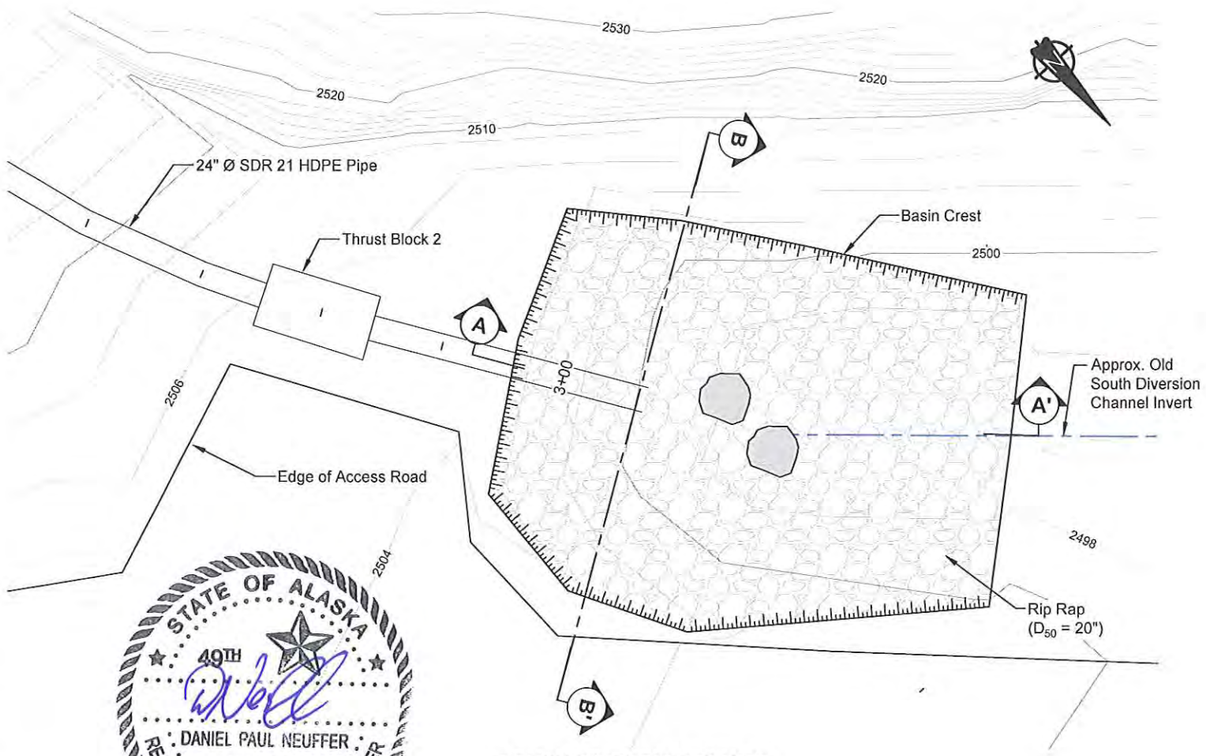
A STILLING BASIN PROFILE

Not to Scale



B STILLING BASIN SECTION

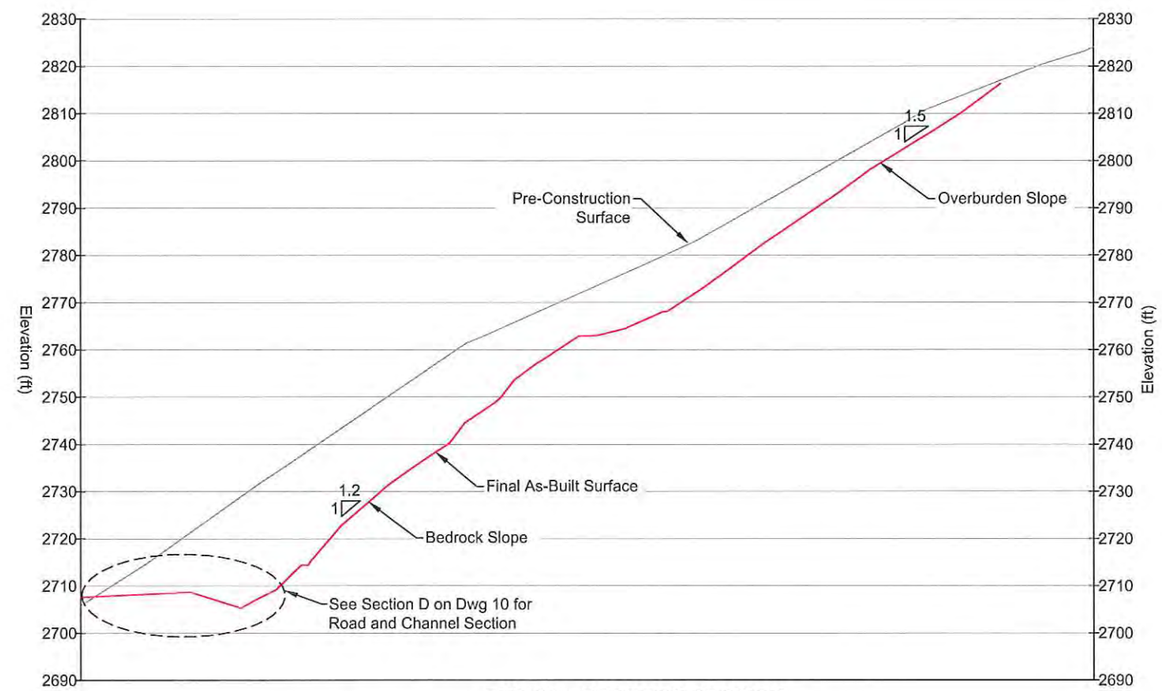
0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)



STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

SOUTH DIVERSION FLUME STILLING BASIN PLAN

0 3' 6' 9' 12'
Scale in Feet
(1" = 6' on 22"x34" plot)



TYPICAL BEDROCK SECTION SOUTH DIVERSION CHANNEL (Ch. 25+20)

I / 7

0 8' 16' 24' 32'
Scale in Feet
(1" = 16' on 22"x34" plot)

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–	–		

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
3	As-Built	DPN	JD	24Jan14
2	S. Diversion Discharge Update	DPN	JD	2Jul13
1	Updated South Diversion Design	DPN	CCS	17Aug12
0	Issued for Construction	DPN	CCS	3May12

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: CAM/DPN/IJC | DRAWN: NV/IJC | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-Flume1_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT
Sumitomo Metal Mining LLC (Pogo)
SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE: South Diversion Details

DRAWING NO. 16 | SHEET 16 OF 19 | REVISION NO. 3

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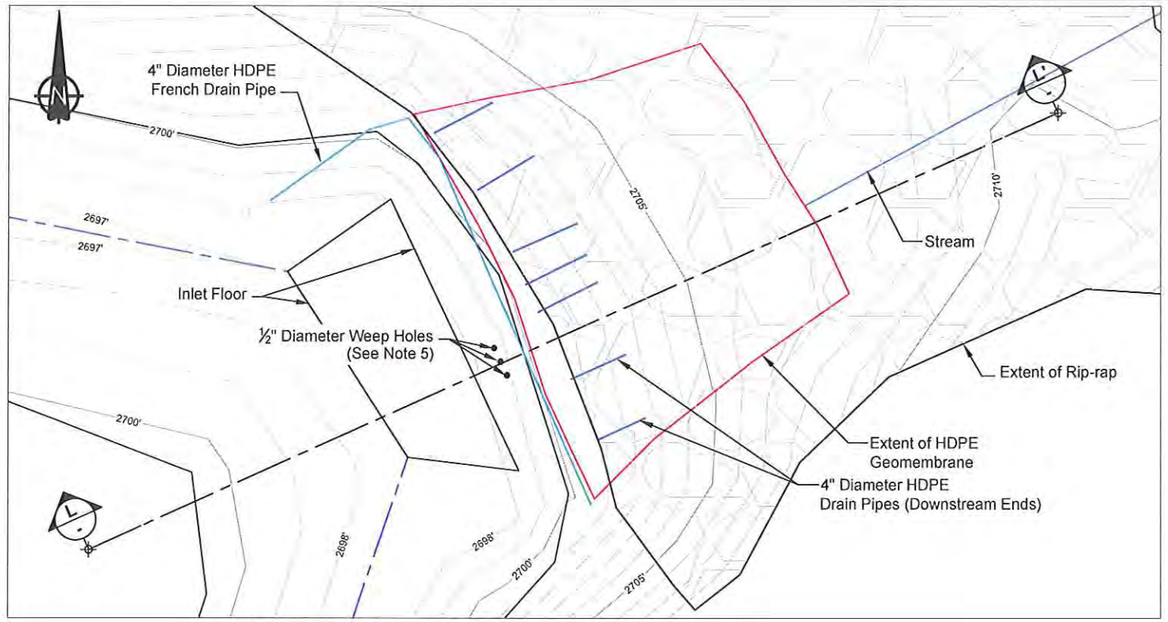
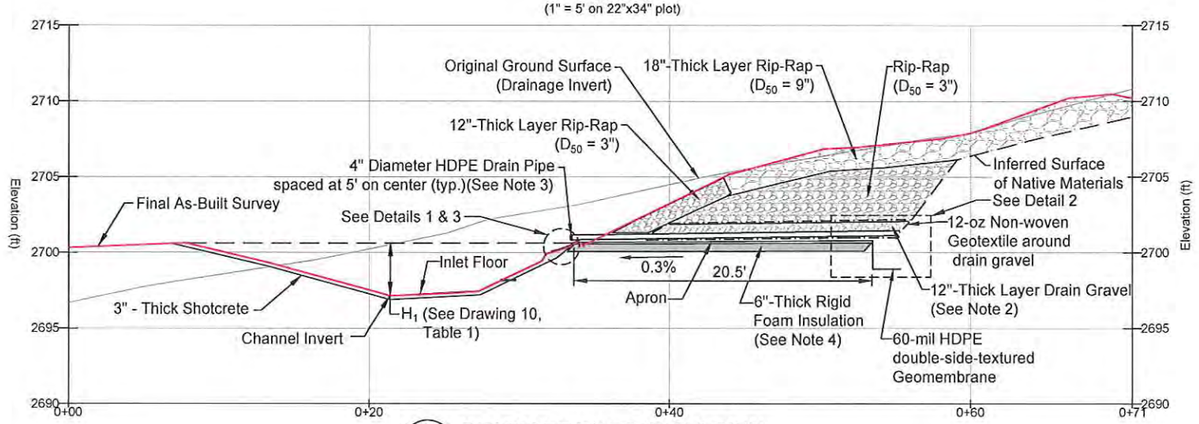


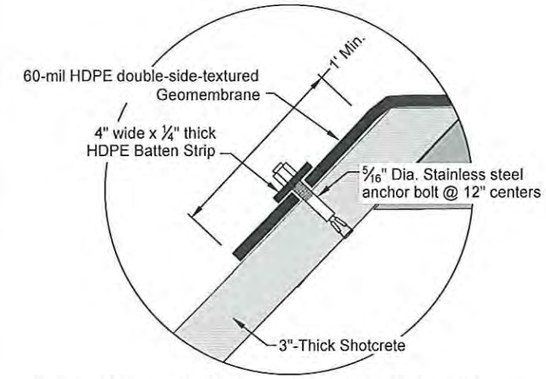
DRAINAGE INLET #2 PLAN VIEW

0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)



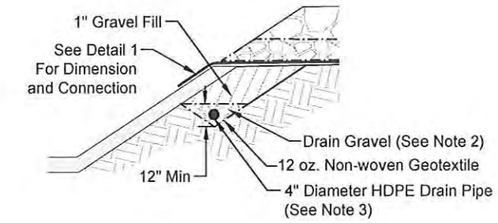
L/9 DRAINAGE INLET #2 SECTION

0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)



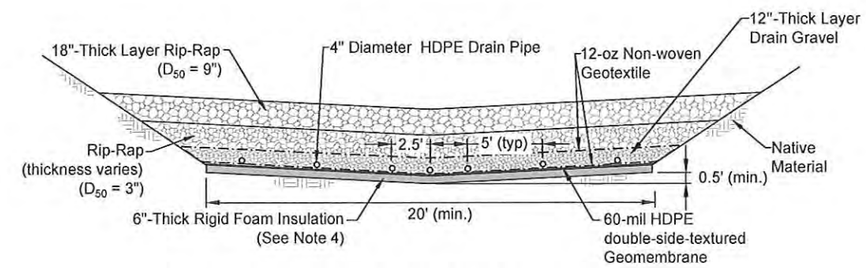
1 TYPICAL BATTEN & ANCHOR BOLT DETAIL

Not to Scale



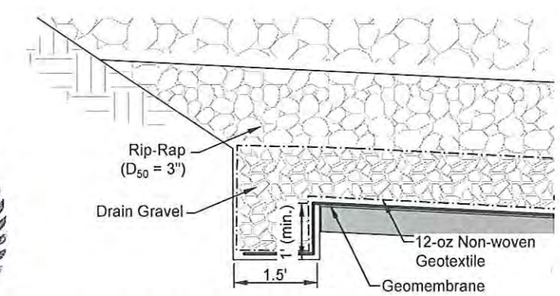
3 TYPICAL HDPE FRENCH DRAIN DETAIL

Not to Scale



M/9 DRAINAGE INLET #2 TYPICAL SECTION

Not to Scale



2 INLET #2 ANCHOR TRENCH DETAIL

Not to Scale

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

NOTES

1. Maintenance control of ice/aufeis to be provided by Pogo.
2. Drain gravel is durable, "non-mineralized" (as determined by Pogo), poorly-graded, angular-subangular gravel (GP per USCS) with 100% passing the 1.5" sieve and no more than 5% passing the #200 sieve. The D_{85} of drain gravel is at least 1.4 times greater than the drain pipe's slot width.
3. Drain pipe is single wall, corrugated, perforated HDPE pipe (AASHTO M 252).
4. Rigid Foam Insulation is InsulFoam 60. Joints of overlapping layers are staggered.
5. Location of Inlet 2 weep holes is approximate and based on field observations.
6. Rip-rap thicknesses are based on field observations.

LEGEND

- Rip Rap
- Shotcrete
- Drain Gravel

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
-	-		

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
4	As-Built	DPN	JD	24Jan14
3	Issued for Construction	DPN	JD	15Jul13
2	Issued for Construction	DPN	CCS	6Mar13
1	Issued for Review	DPN	JD	13Feb13
0	Updates to Drainage Inlets	DPN	JD	30Nov12

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: CAM/DPN | DRAWN: NV | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-Inlet Alternatives1_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT
Sumitomo Metal Mining LLC (Pogo)
SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE: Drainage Inlet #2 Sections and Details

DRAWING NO. 17 | SHEET 17 OF 19 | REVISION NO. 4

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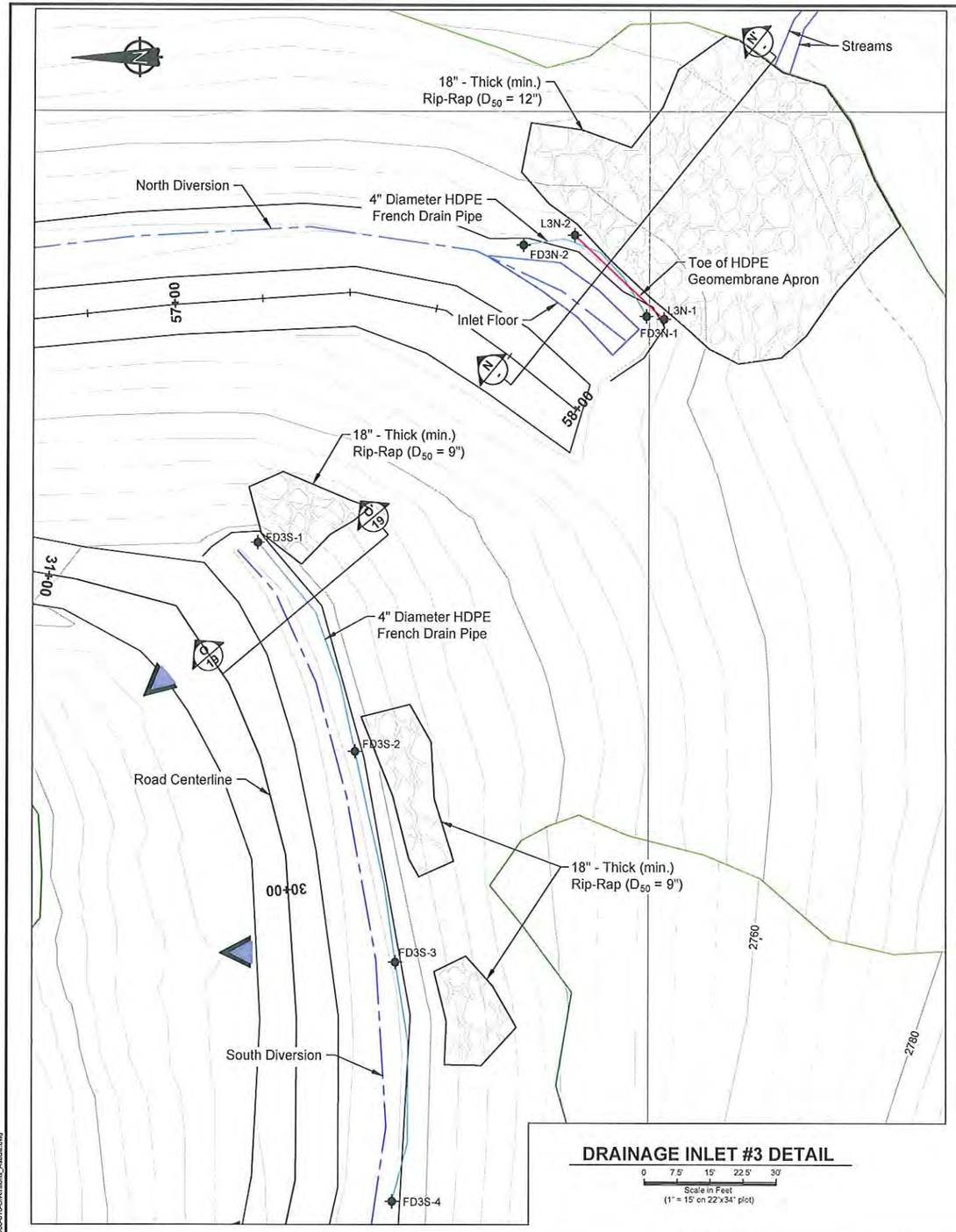


DRAINAGE INLET #3 DETAIL

0 7.5' 15' 22.5' 30'
Scale in Feet
(1" = 15' on 22"x34" plot)

LEGEND

- Extent of 20 MT Placement
- Extent of Expansion Grading
- Diversion Channel Centerline
- Breach of Old Channel
- Berm Slot for Drainage

NOTE

1. Rip-Rap locations at Inlet 3S are approximate due to snow cover on ground during survey.
2. Inlet 3N geomembrane length from field measurements.

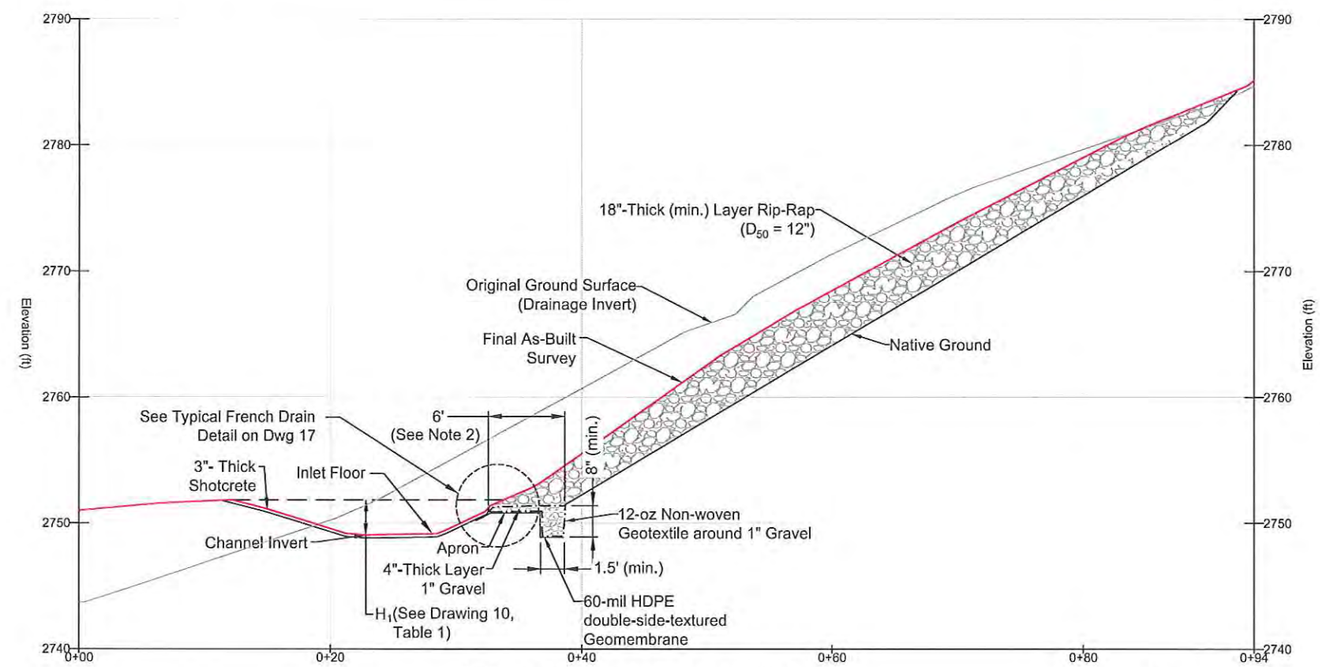
DRAINAGE INLET #3-N AS-BUILT TABLE:

Point #	Northing	Easting	Elevation
Toe of Geomembrane Apron:			
L3N-1	3816996.7	1818953.0	2752.8
L3N-2	3817017.0	1818972.0	2752.6
French Drain Pipe Top Points:			
FD3N-1	3817000.70	1818953.60	2750.0
FD3N-2	3817028.70	1818969.70	2749.6

DRAINAGE INLET #3-S AS-BUILT TABLE:

Point #	Northing	Easting	Elevation
French Drain Pipe Top Points:			
FD3S-1	3817089.00	1818902.30	2716.6
FD3S-2	3817066.70	1818855.10	2716.0
FD3S-3	3817057.50	1818807.40	2715.3
FD3S-4	3817058.20	1818753.20	2714.1

STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14



N

DRAINAGE INLET #3-N SECTION

0 3' 6' 9' 12'
Scale in Feet
(1" = 6' on 22"x34" plot)

SECTION LEGEND

- Rip Rap
- Shotcrete
- Drain Gravel

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DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
3	As-Built	DPN	JD	24Jan14
2	Issued for Construction	DPN	JD	15Jul13
1	Issued for Construction	DPN	CCS	6Mar13
0	Updates to Drainage Inlets	DPN	JD	30Nov12

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

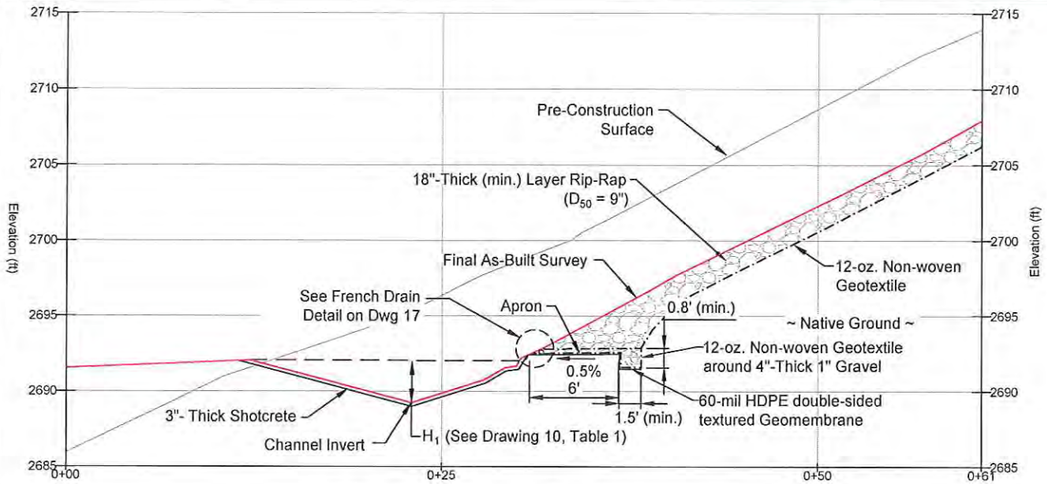
DESIGN: LW/VM/DPN | DRAWN: NV/IJC | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-Diversions_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT
Sumitomo Metal Mining LLC (Pogo)
SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

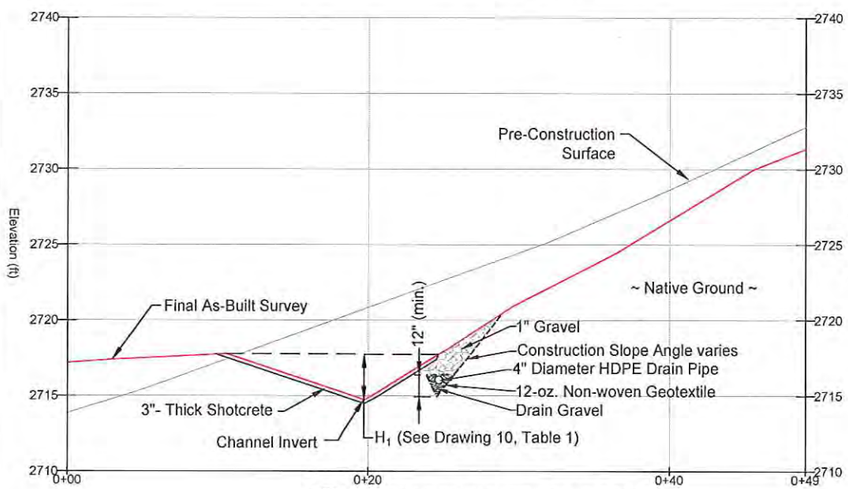
DRAWING TITLE:
Drainage Inlet # 3 Plan and Sections

DRAWING NO. 18 | SHEET 18 OF 19 | REVISION NO. 3



J/7 DRAINAGE INLET #4 SECTION

0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)



O/18 DRAINAGE INLET #3S SECTION

0 2.5' 5' 7.5' 10'
Scale in Feet
(1" = 5' on 22"x34" plot)

NOTES

1. Maintenance control of ice/aufeis to be provided by Pogo.
2. Drain gravel is durable, "non-mineralized" (as determined by Pogo), poorly-graded, angular-subangular gravel (GP per USCS) with 100% passing the 1.5" sieve and no more than 5% passing the #200 sieve. The D_{85} of drain gravel is at least 1.4 times greater than the drain pipe's slot width.
3. Drain pipe is single wall, corrugated, perforated HDPE pipe (AASHTO M 252).

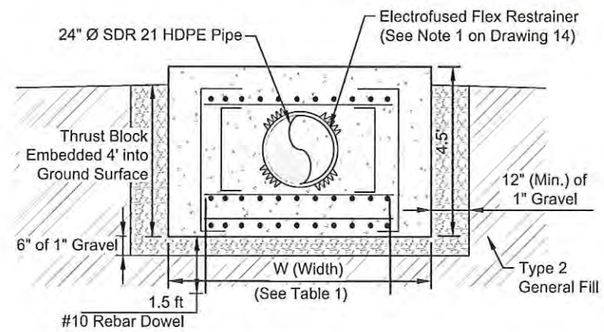
LEGEND

- Rip Rap
- Shotcrete
- Drain Gravel
- Concrete

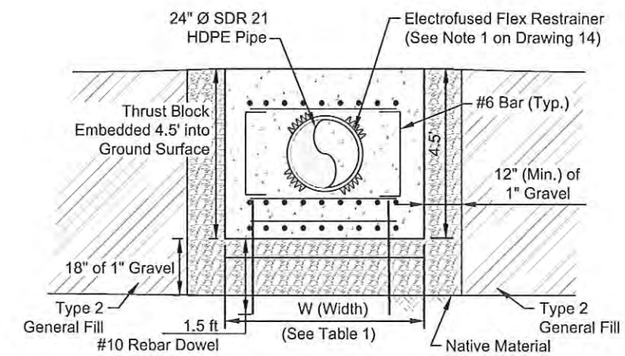
STATE OF ALASKA
49TH
DANIEL PAUL NEUFFER
No. CE12770
REGISTERED PROFESSIONAL ENGINEER
1/24/14

TABLE 1: THRUST BLOCK SIZE DEFINITION

	Thrust Block 1	Thrust Block 2
H_1	4.5'	4.5'
H_2	8.0'	6.0'
L	9.2'	9.0'
W	7.0'	5.3'

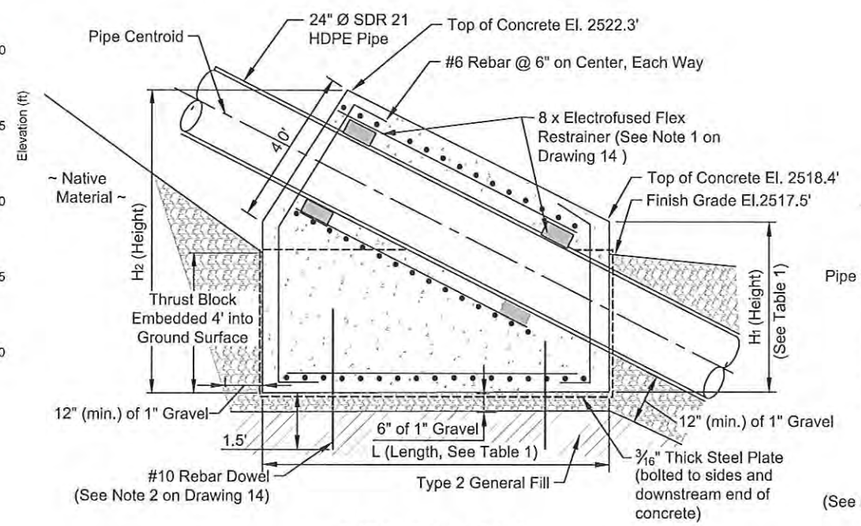


THRUST BLOCK 1

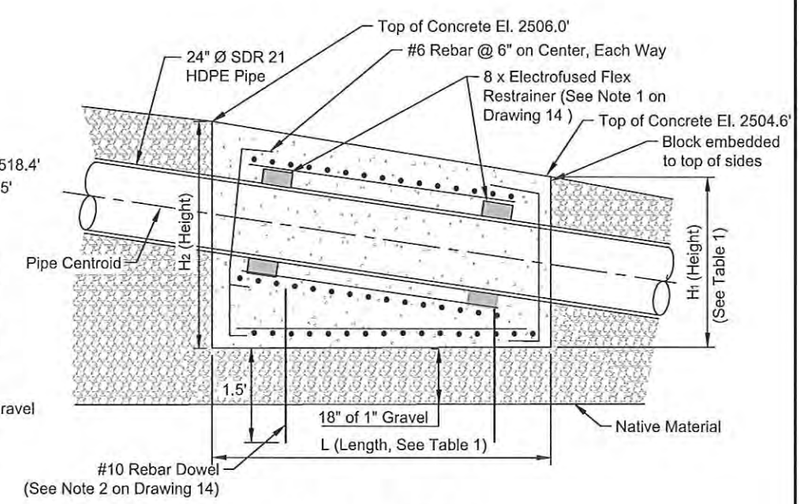


THRUST BLOCK 2

A THRUST BLOCK SECTIONS
Not to Scale



THRUST BLOCK 1



THRUST BLOCK 2

B THRUST BLOCK PROFILES
Not to Scale

NO.	DESCRIPTION	CHK'D	APP'D	DATE
3	As-Built	DPN	JD	24Jan14
2	Issued for Construction	DPN	CCS	6Mar13
1	Issued for Review	DPN	JD	13Feb13
0	Updates to Drainage Inlets	DPN	JD	30Nov12

REVISIONS

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–	–		

REFERENCE DRAWINGS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: CAM/DPN | DRAWN: NV | REVIEWED: DPN
CHECKED: DPN | APPROVED: JD | DATE: Jan. 24, 2014
FILE NAME: 147900-010-Inlet Alternatives1_Asbuilt.dwg

POGO MINE
MINING DONE RIGHT
Sumitomo Metal Mining LLC (Pogo)
SRK JOB NO.: 147900.010

POGO DSTF
Expansion As-Built

DRAWING TITLE: Drainage Inlet and Thrust Block Sections

DRAWING NO. 19 | SHEET 19 OF 19 | REVISION NO. 3

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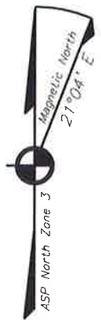
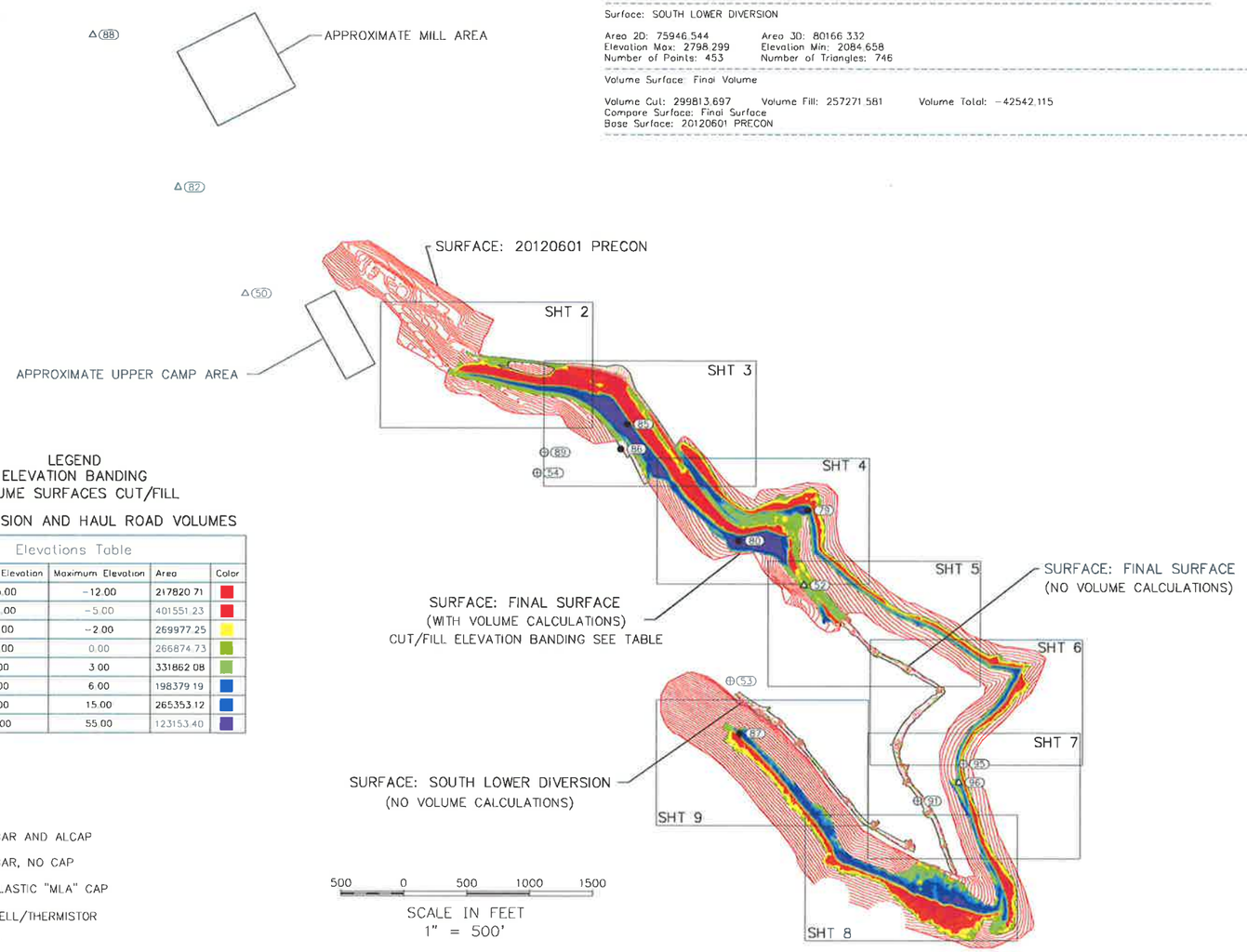
Appendix 2

As-Built Survey Drawings

POGO MINE
SURVEY CONTROL SHEET



NGDC
10/10/10



VOLUME SURFACES REPORT

Report Date: 10/3/2013 — Prepared by: TB

Linear Units: US Survey Foot — Area Units: squareFoot — Volume Units: cubicYard

Surface: 20120601 PRECON

Area 2D: 5302908.010 — Area 3D: 6024691.695
Elevation Max: 2998.409 — Elevation Min: 2032.960
Number of Points: 20027 — Number of Triangles: 38348

Surface: FINAL SURFACE

Area 2D: 2259645.431 — Area 3D: 2613147.387
Elevation Max: 2861.412 — Elevation Min: 2084.658
Number of Points: 20862 — Number of Triangles: 35815

Surface: FINAL VOLUME

Area 2D: 2074971.708 — Area 3D: 2250135.820
Fill Max: 50.427 — Cut Min: −32.759
Number of Points: 75298 — Number of Triangles: 35815

Surface: SOUTH LOWER DIVERSION

Area 2D: 75946.544 — Area 3D: 80166.332
Elevation Max: 2798.299 — Elevation Min: 2084.658
Number of Points: 453 — Number of Triangles: 746

Volume Surface: Final Volume

Volume Cut: 299813.697 — Volume Fill: 257271.581 — Volume Total: −42542.115
Compare Surface: Final Surface
Base Surface: 20120601 PRECON

SURVEY NOTES

1. THIS DRAWING IS BASED ON SURVEYS CONDUCTED BY McCLINTOCK LAND ASSOCIATES, INC (MLA), FOR SUMITOMO METAL MINING POGO, LLC, (SMMP) IN SEPTEMBER AND OCTOBER, 2013.
2. CONTROL POINT COORDINATES AND ELEVATIONS WERE PROVIDED BY SMMP ON A DRAWING ENTITLED POGO MINE UPPER CAMP AND DRY STACK ORTHOPHOTO DATED JULY 07, 2011. STATIC GPS OBSERVATIONS WERE CONDUCTED AT POINT NUMBERS 50, 52–54, 79–80, 82, 85–89, 91, 95, AND 96 WERE USED TO CONTROL THIS SURVEY IN A TIGHTLY CONTROLLED GPS NETWORK USING TOPCON HIPER GA RECEIVERS WITH MAGNET FIELD SOFTWARE V2.0 FOR RTK AND TOTAL STATION COMPUTATIONS AND MAGNET OFFICE FOR POST PROCESSING.
3. VOLUME COMPUTATIONS HEREON WERE COMPUTED USING AUTODESK CIVIL 3D 2013 USING TIN-BASED SURFACE MODELS BASED ON THE PRE-CONSTRUCTION SURVEY FINISHED IN MAY, 2012 (SURFACE 20120601 PRECON) AND THE FINAL SURFACE CREATED FROM SEPTEMBER, 2013, SURVEY DATA AUGMENTED WITH SURVEY DATA FROM THE AUGUST, 2013, SURVEY DEFINING UNCHANGED CONSTRUCTION LIMITS.
4. PORTIONS OF THE S. DIVERSION FLUME AREA AND PORTIONS OF THE N. DIVERSION FLUME AREA EXTENDED BEYOND THE LIMITS OF THE PRE-CONSTRUCTION SURVEY OF 2012. THE VOLUME COMPARISON SHOWN ONLY INCLUDES THAT AREA ENCOMPASSED BY THE PRE-CONSTRUCTION SURVEY.
5. DATA FOR THE CUT AND FILL SLOPES THAT WERE TO DANGEROUS TO ACCESS ON FOOT WERE COLLECTED USING A ROBOTIC TOTAL STATION WITH SCANNING CAPABILITIES ON A 10'–20' GRID.
6. SURFACE CONTOURS WERE CREATED AT 10' INTERVALS FOR THE PRECONSTRUCTION SURFACE AND 2' INTERVALS FOR ALL OTHER SURFACES.
7. VOLUME CALCULATIONS AND ELEVATION BANDING WAS ONLY DETERMINED IN THE AREA COMMON BETWEEN THE FINAL SURFACE AND THE PRECON SURFACE.

LEGEND
ELEVATION BANDING
VOLUME SURFACES CUT/FILL

UPPER DIVERSION AND HAUL ROAD VOLUMES

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	−35.00	−12.00	217820.71	
2	−12.00	−5.00	401551.23	
3	−5.00	−2.00	269977.25	
4	−2.00	0.00	266874.73	
5	0.00	3.00	331862.08	
6	3.00	6.00	198379.19	
7	6.00	15.00	265353.12	
8	15.00	55.00	123153.40	

SURVEY CONTROL POINT INFORMATION

PT	NORTHING	EASTING	ELEV	DESCRIPTION
52	3819688.798	1817335.669	2502.655	FRB
53	3818927.609	1816746.89	2473.512	FAC
54	3820582.952	1815212.147	2091.503	FACDAM
79	3820287.267	1817366.814	2551.513	SPC
80	3820043.211	1816815.808	2427.885	SPC
82	3822855.495	1812352.536	1885.315	FRB
85	3820972.261	1815926.686	2274.36	SPC
86	3820773.914	1815875.058	2219.164	SPC
87	3818508.629	1816825.748	2665.589	SPC
88	3824064.889	1811668.915	1887.487	FRB
89	3820747.267	1815268.372	2089.59	FACHV15
91	3817970.384	1818242.641	2552.564	FAC
95	3818265.689	1818604.173	2726.5	FAC
96	3818117.964	1818568.228	2718.595	FRB

LEGEND

- ⊕ FOUND REBAR AND ALCAP
- △ FOUND REBAR, NO CAP
- ● SET RED PLASTIC "MLA" CAP
- Ⓜ MONITOR WELL/THERMISTOR
- ⌐ BERM SLOT

STATE OF ALASKA 49TH MICHAEL E. MILLER LS 7222 11/8/13 REGISTERED PROFESSIONAL LAND SURVEYOR

SURVEYOR'S CERTIFICATE

I CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA, THAT THIS PLAT REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION, THAT THE MONUMENTS SHOWN EXIST AS DESCRIBED, AND THAT ALL DIMENSIONS AND OTHER DETAILS ARE CORRECT.

MICHAEL E. MILLER
REGISTERED LAND SURVEYOR
LS 7222

11/8/13
DATE

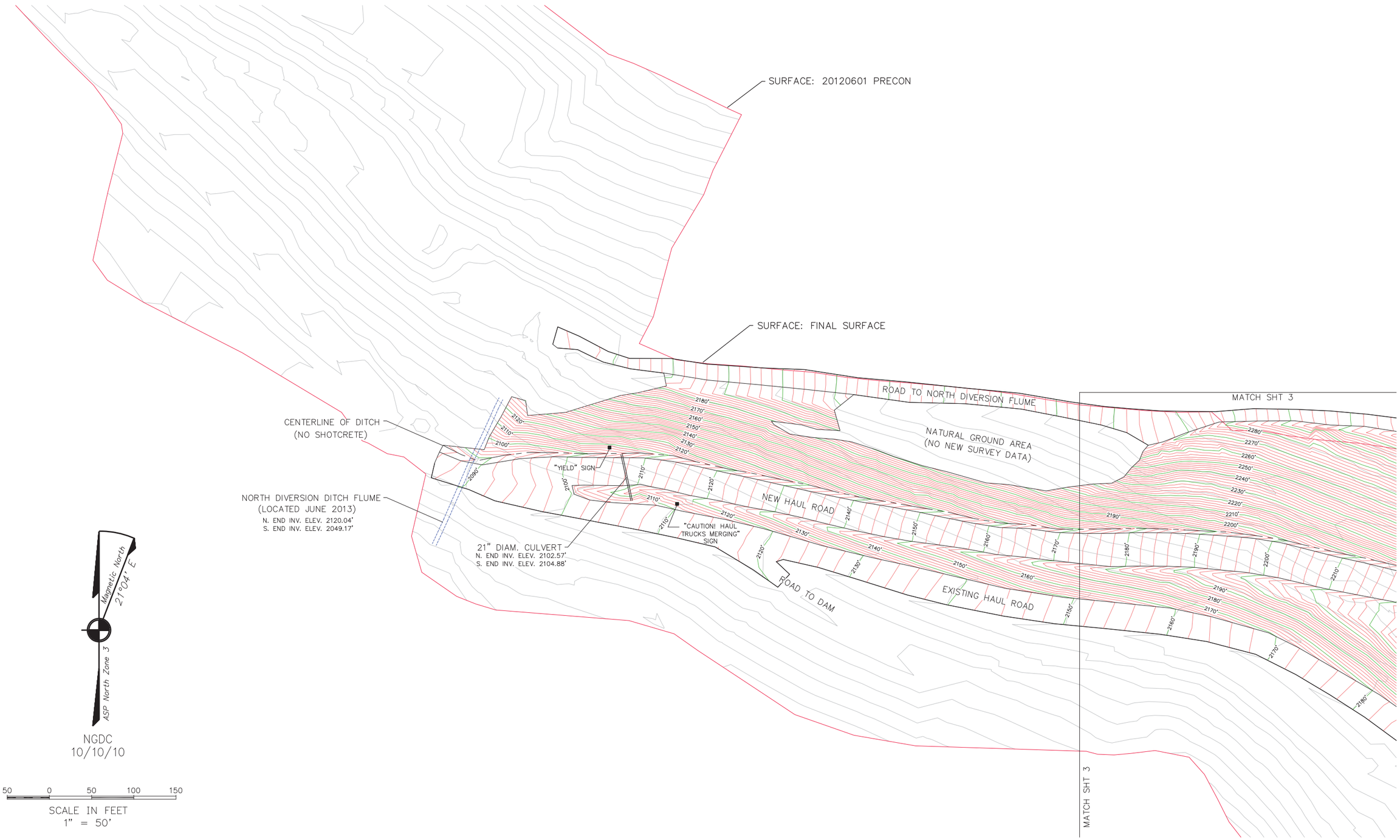
REV	DATE	DESCRIPTION

SCALE: 1"=500'
DRAWN: TB
DATE: 11/07/2013
F.B. 523

McCLINTOCK LAND ASSOC., INC.
16942 N. Eagle River Loop Rd.
Eagle River, AK 99577
907 694–4499
FAX 694–8965
www.mappingalaska.com

POGO MINE DIVERSION DITCH
AND HAUL ROAD CONSTRUCTION
FINAL SURVEY SEPTEMBER 18, 2013
PROJECT NO. 1US048.001

MLA PROJECT NUMBER: 13-122
STATUS: FOR INFORMATION
DRAWING: 13-122 POGO Final Topo (v2013).dwg



REV	DATE	DESCRIPTION

SCALE: 1"=50'
DRAWN: TB
DATE: 11/07/2013
F.B. 523

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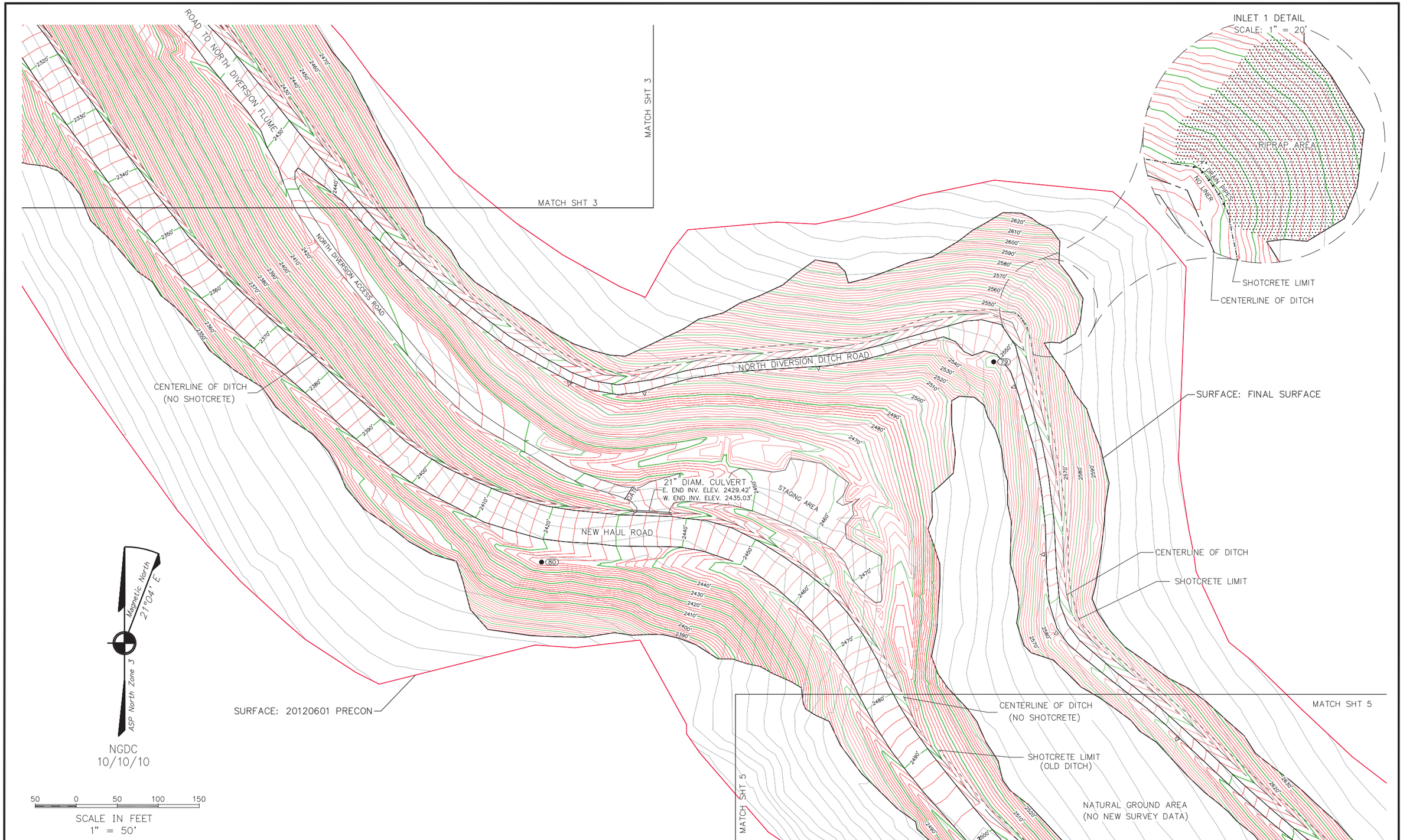

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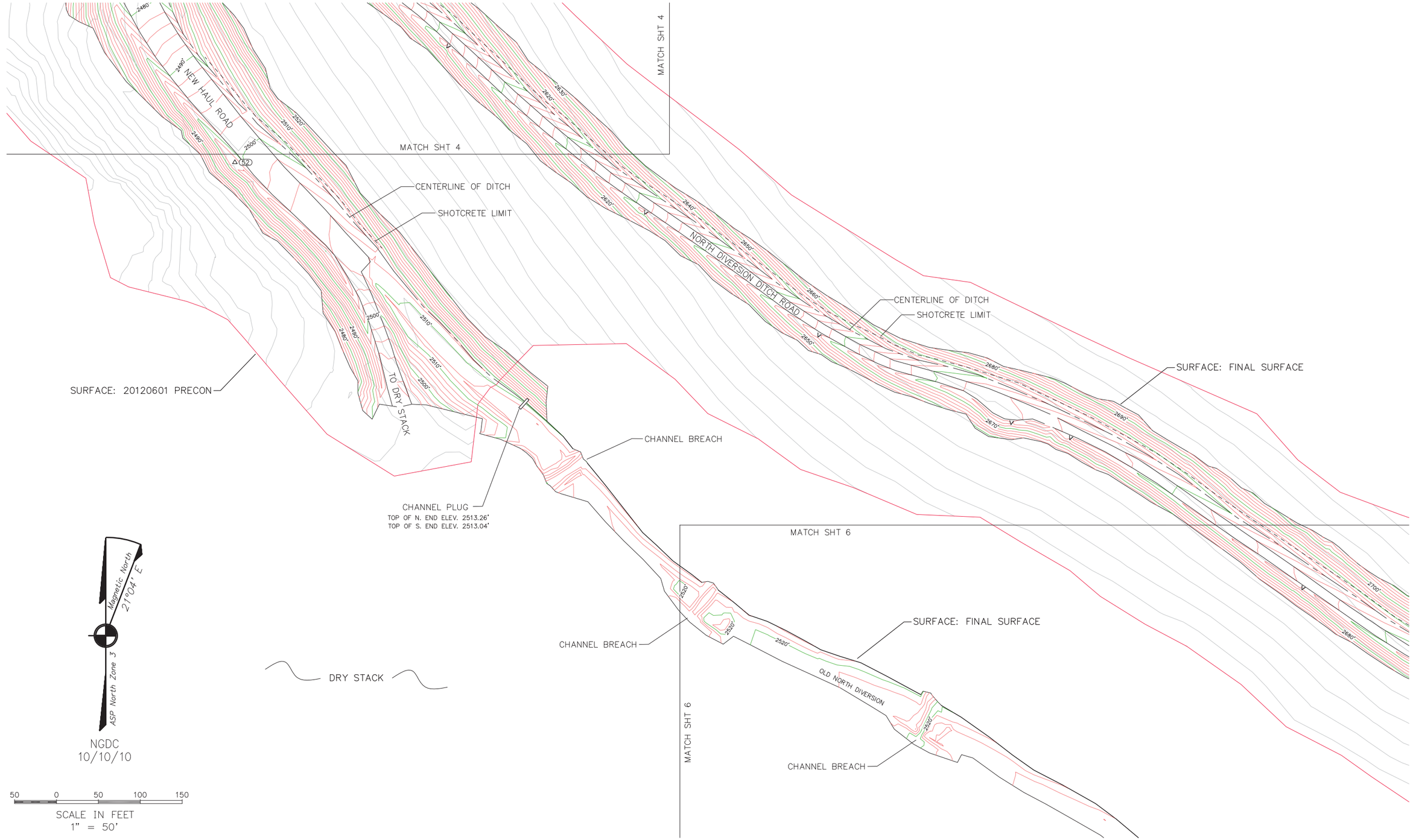

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SCALE: 1"=50'
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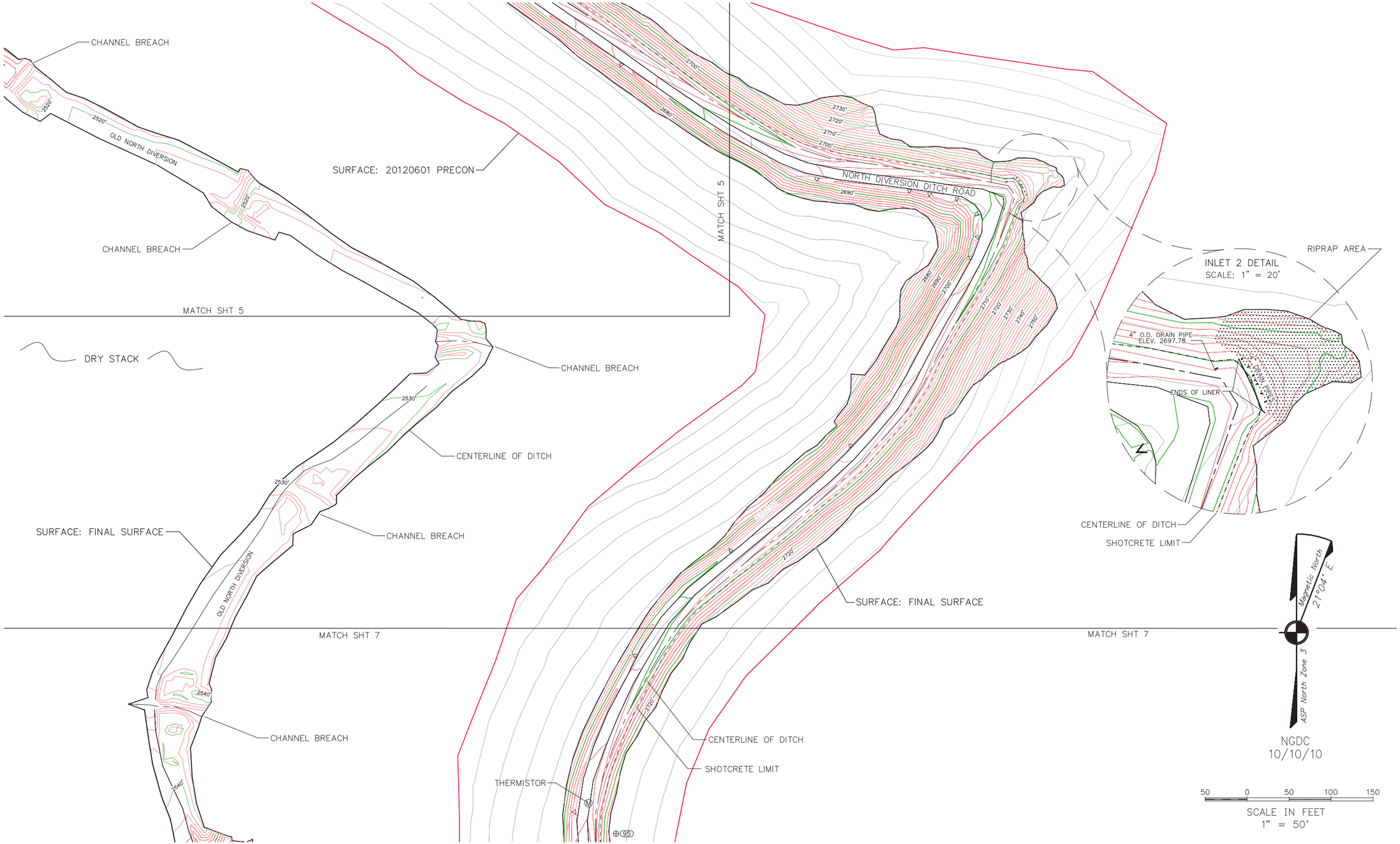

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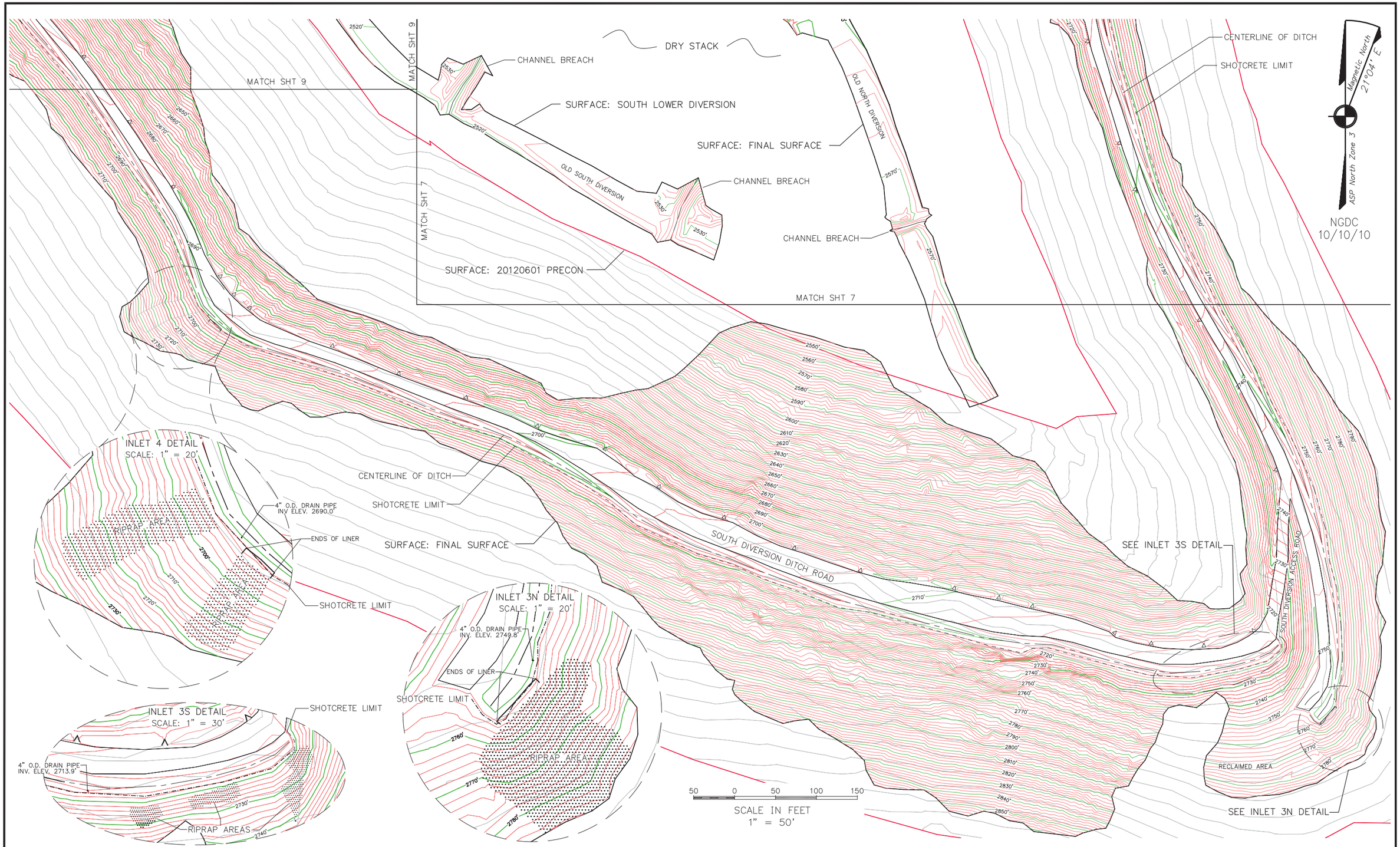

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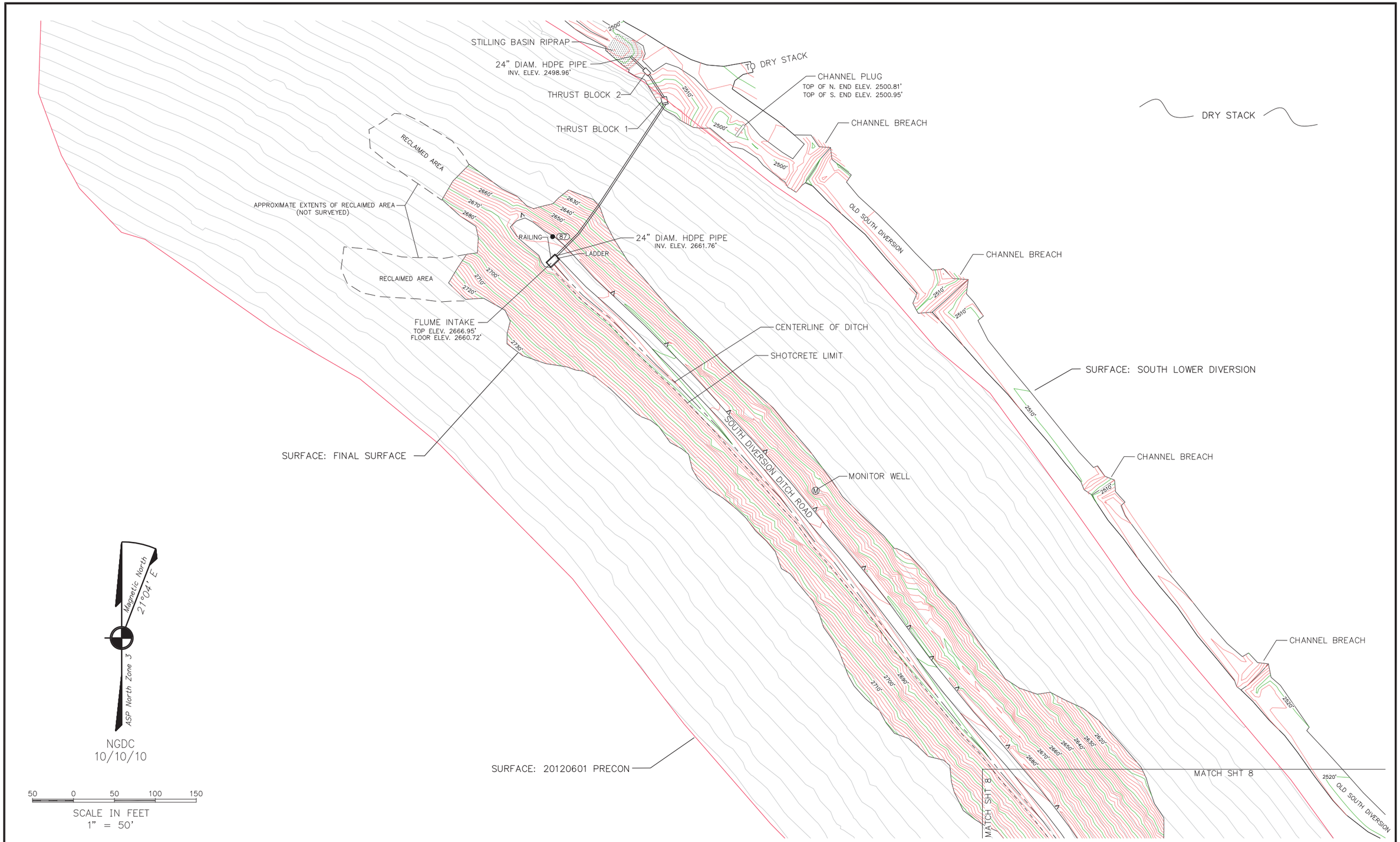

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Appendix 3

As-Built Channel Calculations

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

North Diversion STA 2+00

Triangular

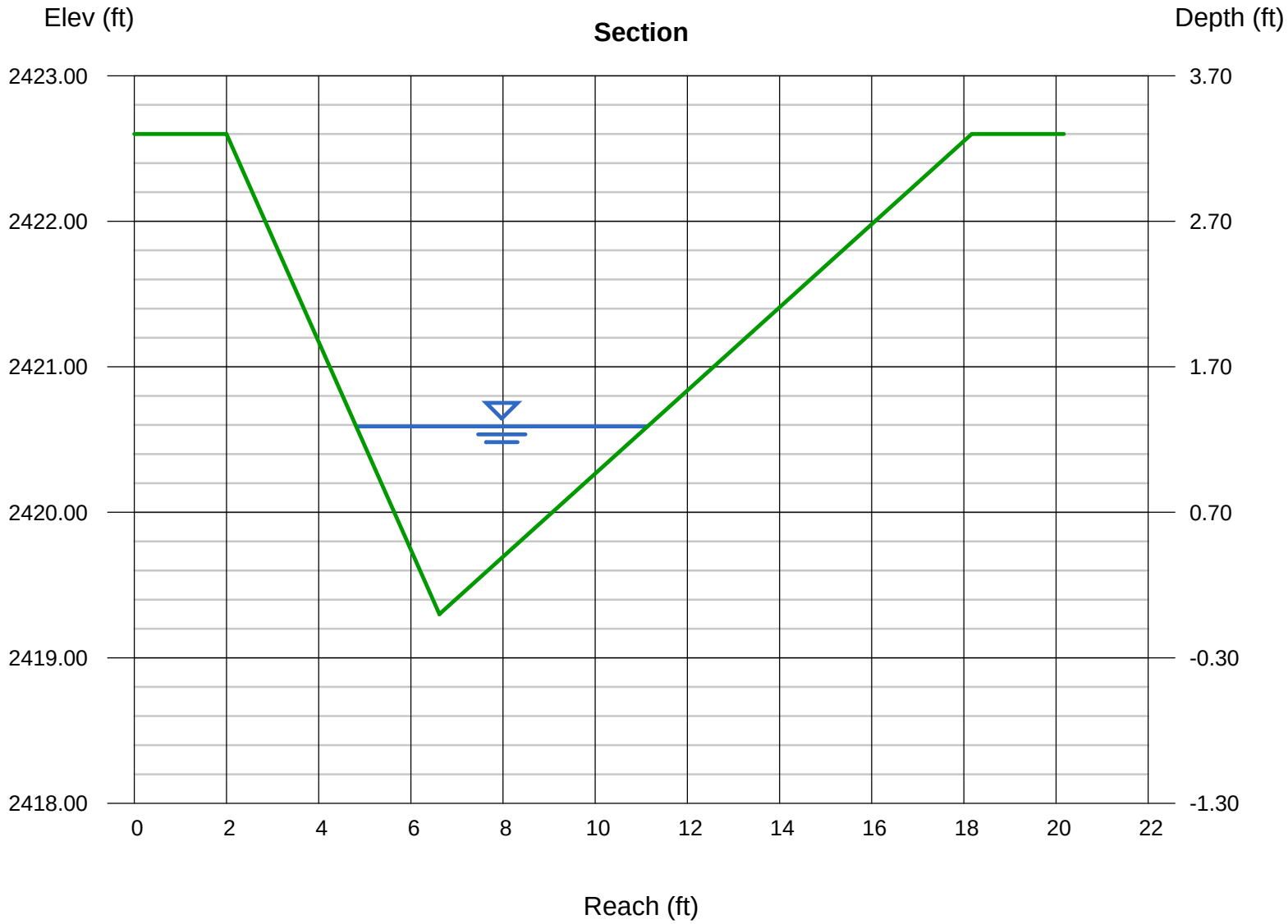
Side Slopes (z:1)	=	1.40, 3.50
Total Depth (ft)	=	3.30
Invert Elev (ft)	=	2419.30
Slope (%)	=	12.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	69.00

Highlighted

Depth (ft)	=	1.29
Q (cfs)	=	69.00
Area (sqft)	=	4.08
Velocity (ft/s)	=	16.92
Wetted Perim (ft)	=	6.92
Crit Depth, Yc (ft)	=	2.19
Top Width (ft)	=	6.32
EGL (ft)	=	5.74



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

North Diversion STA 6+00

Triangular

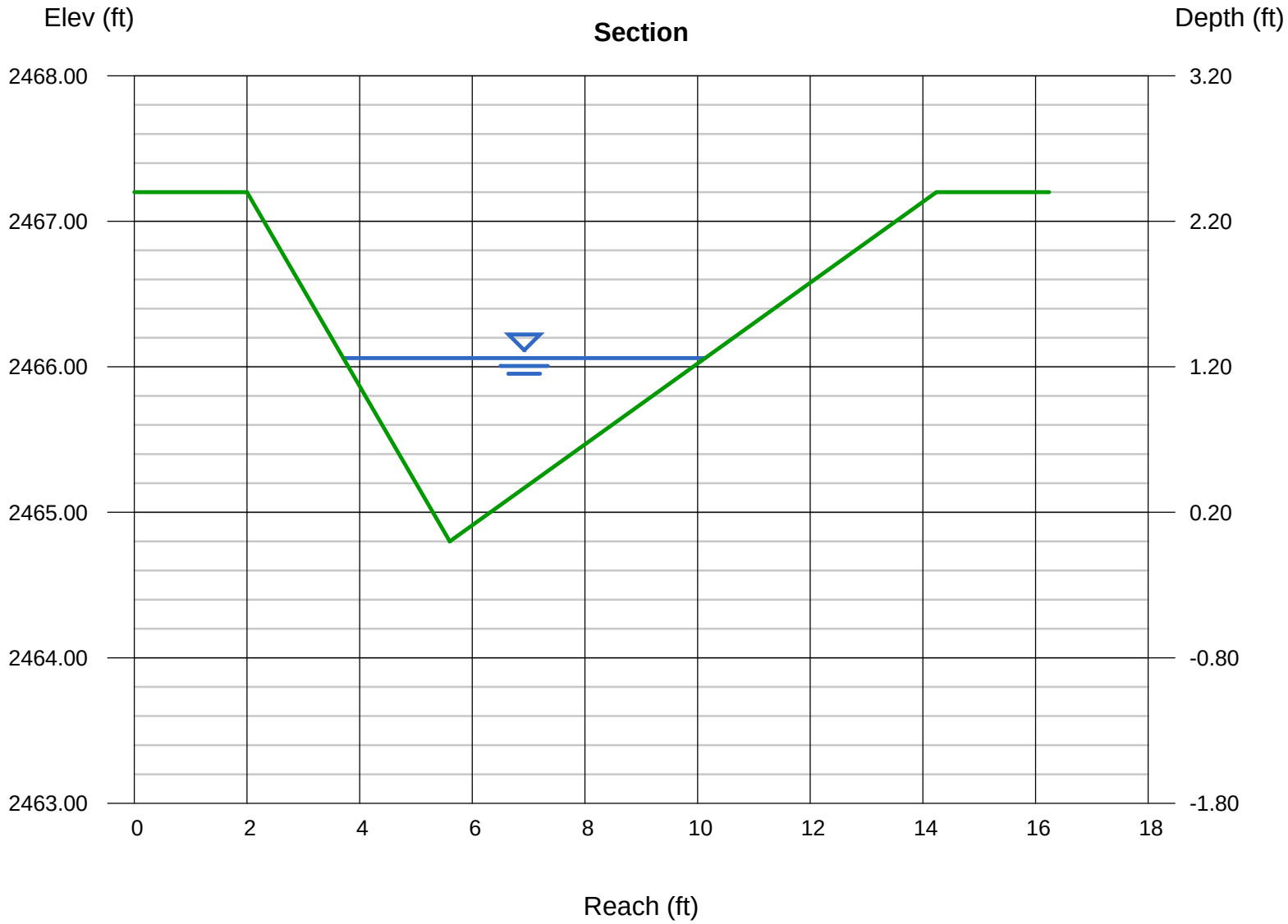
Side Slopes (z:1)	=	1.50, 3.60
Total Depth (ft)	=	2.40
Invert Elev (ft)	=	2464.80
Slope (%)	=	12.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	69.00

Highlighted

Depth (ft)	=	1.26
Q (cfs)	=	69.00
Area (sqft)	=	4.05
Velocity (ft/s)	=	17.04
Wetted Perim (ft)	=	6.98
Crit Depth, Yc (ft)	=	2.15
Top Width (ft)	=	6.43
EGL (ft)	=	5.78



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

North Diversion STA 10+00

Triangular

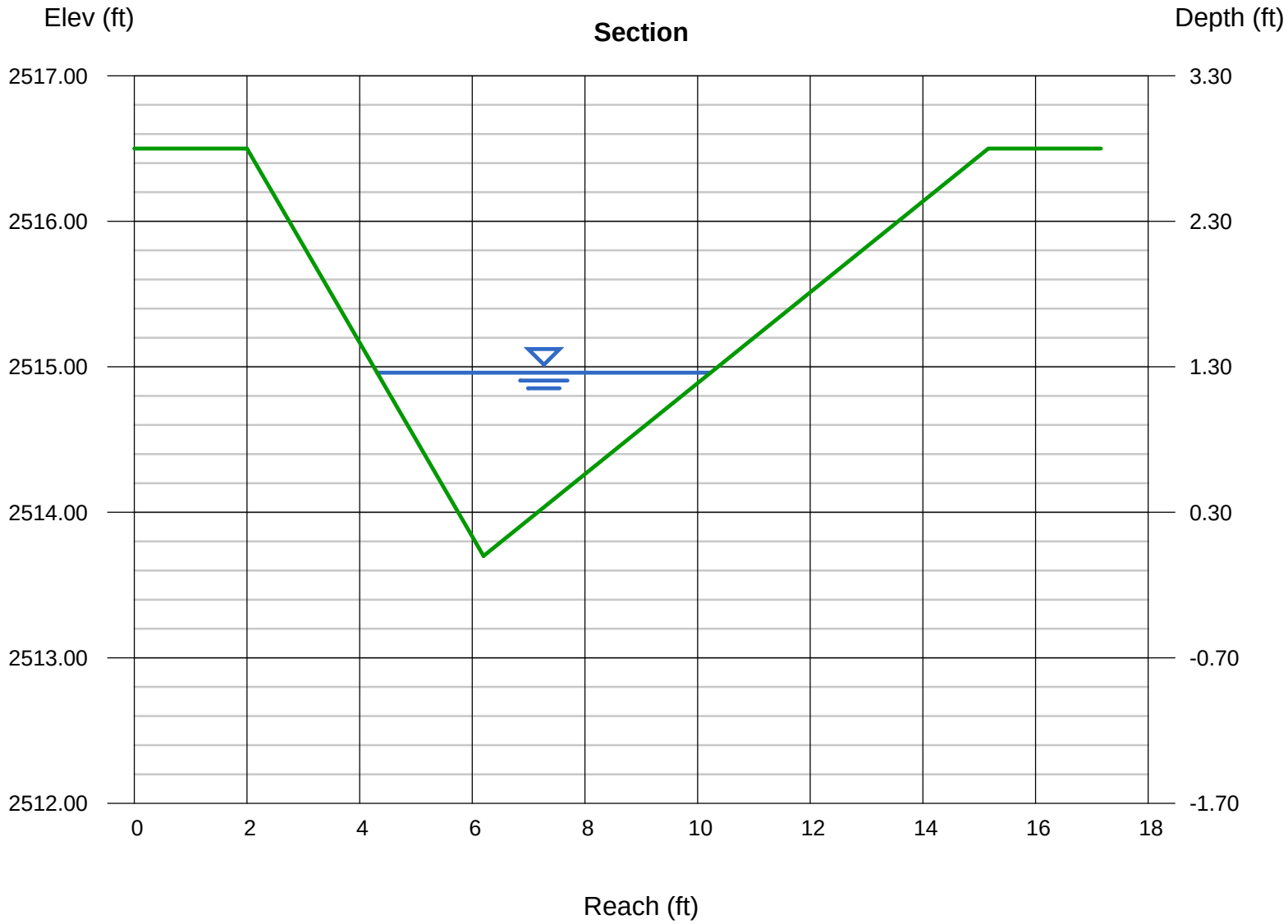
Side Slopes (z:1)	=	1.50, 3.20
Total Depth (ft)	=	2.80
Invert Elev (ft)	=	2513.70
Slope (%)	=	12.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	63.00

Highlighted

Depth (ft)	=	1.26
Q (cfs)	=	63.00
Area (sqft)	=	3.73
Velocity (ft/s)	=	16.89
Wetted Perim (ft)	=	6.50
Crit Depth, Yc (ft)	=	2.14
Top Width (ft)	=	5.92
EGL (ft)	=	5.69



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

North Diversion STA 22+00

Triangular

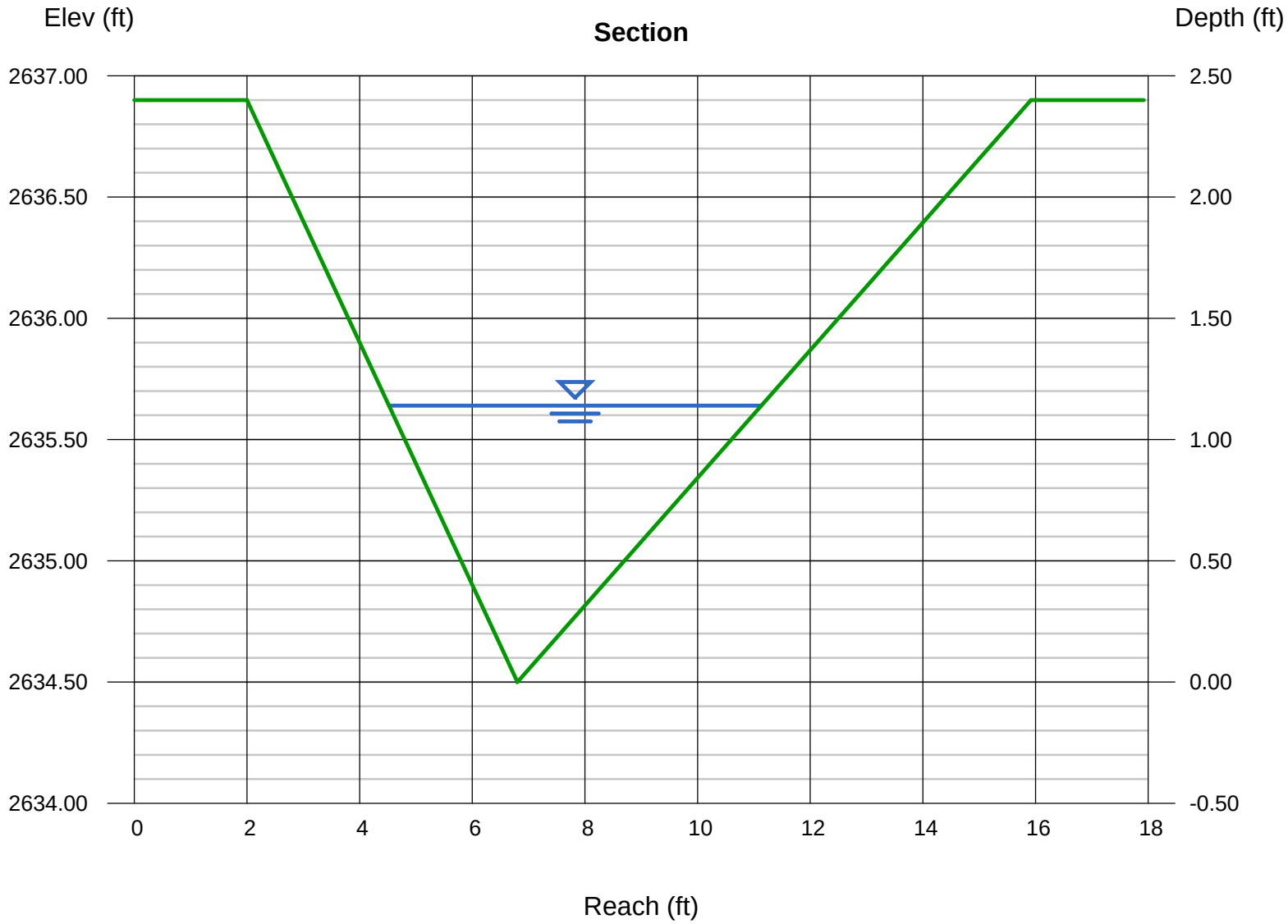
Side Slopes (z:1)	=	2.00, 3.80
Total Depth (ft)	=	2.40
Invert Elev (ft)	=	2634.50
Slope (%)	=	10.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	55.00

Highlighted

Depth (ft)	=	1.14
Q (cfs)	=	55.00
Area (sqft)	=	3.77
Velocity (ft/s)	=	14.59
Wetted Perim (ft)	=	7.03
Crit Depth, Yc (ft)	=	1.87
Top Width (ft)	=	6.61
EGL (ft)	=	4.45



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

North Diversion STA 34+00

Triangular

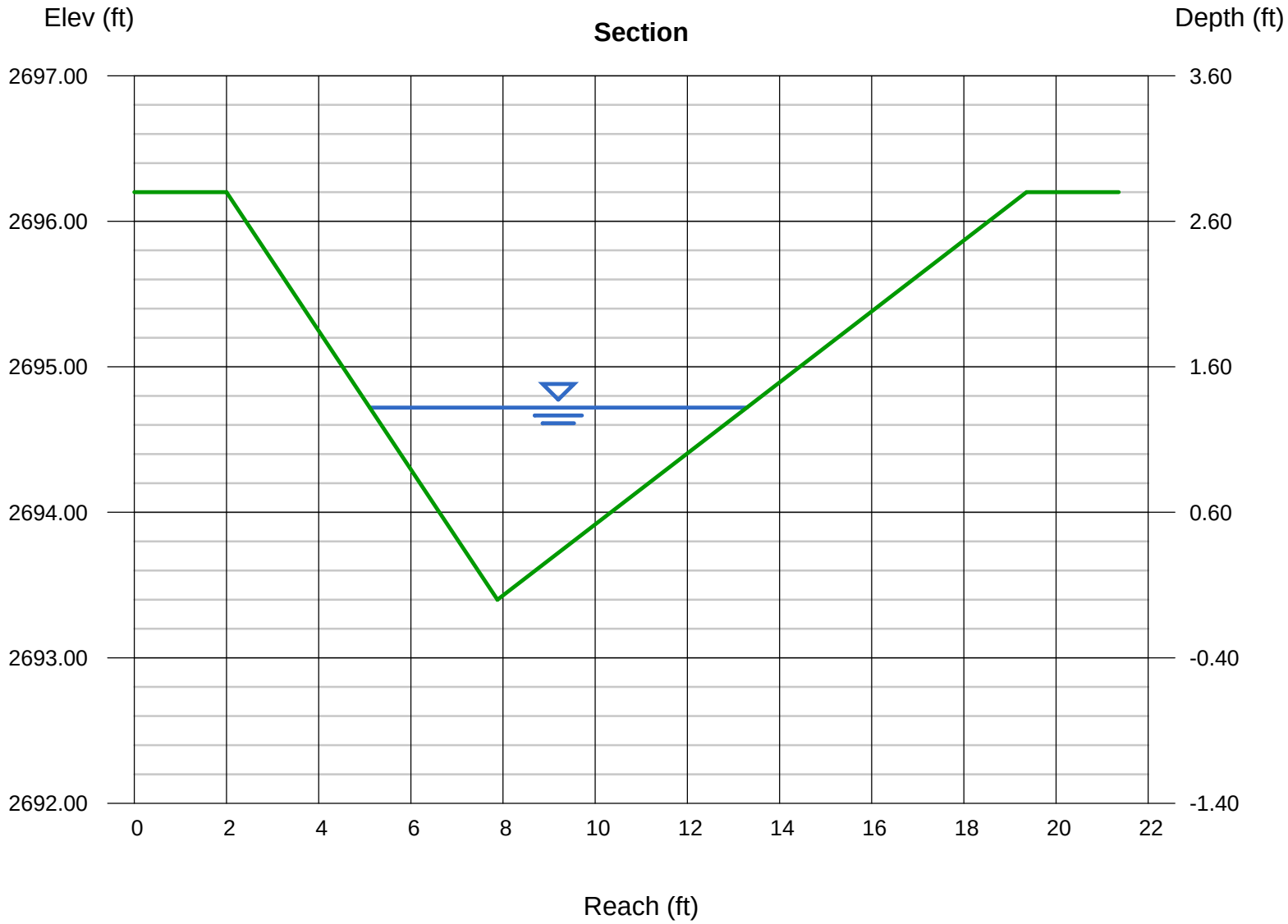
Side Slopes (z:1)	=	2.10, 4.10
Total Depth (ft)	=	2.80
Invert Elev (ft)	=	2693.40
Slope (%)	=	2.70
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	45.00

Highlighted

Depth (ft)	=	1.32
Q (cfs)	=	45.00
Area (sqft)	=	5.40
Velocity (ft/s)	=	8.33
Wetted Perim (ft)	=	8.64
Crit Depth, Yc (ft)	=	1.68
Top Width (ft)	=	8.18
EGL (ft)	=	2.40



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

North Diversion STA 46+00

Triangular

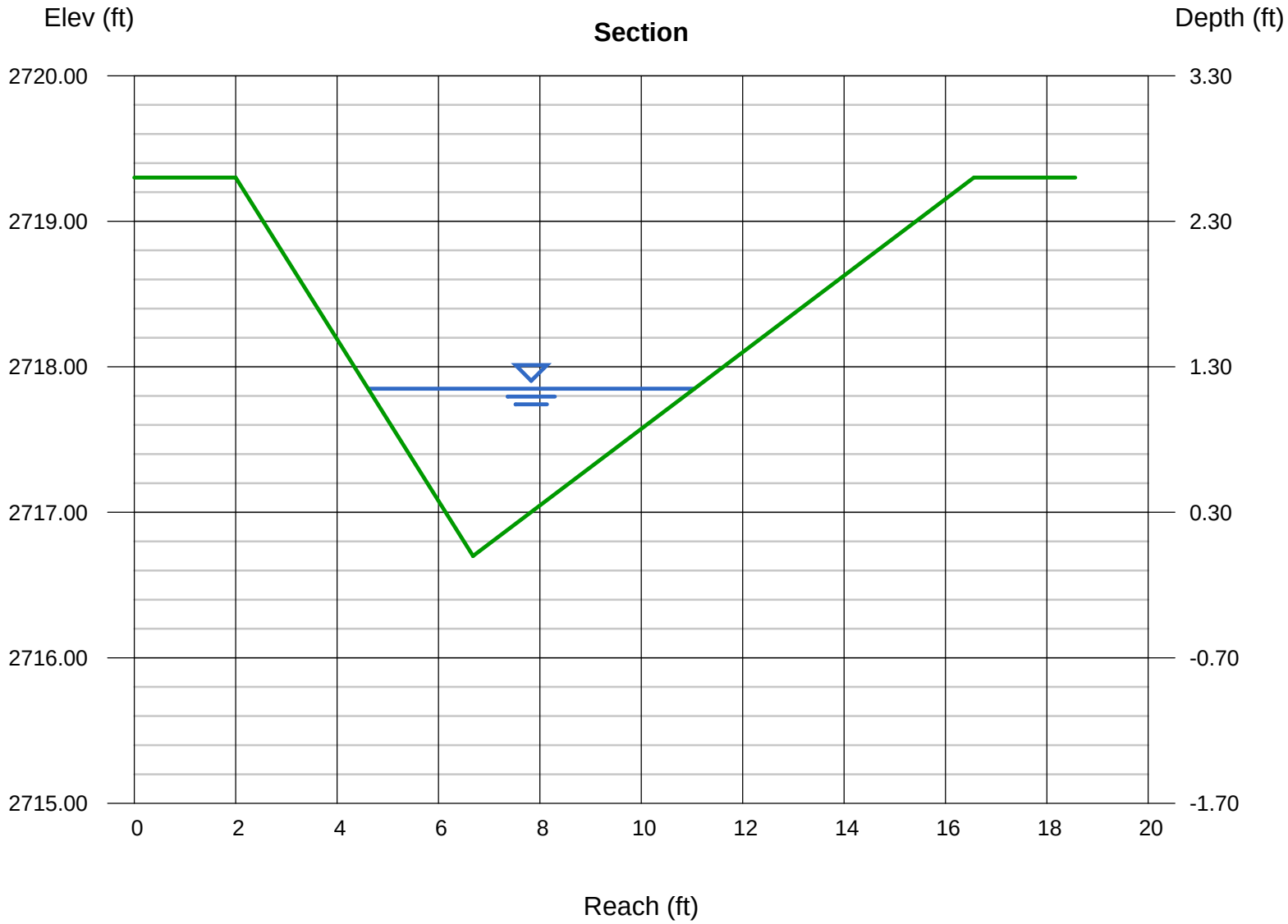
Side Slopes (z:1)	=	1.80, 3.80
Total Depth (ft)	=	2.60
Invert Elev (ft)	=	2716.70
Slope (%)	=	2.30
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	26.00

Highlighted

Depth (ft)	=	1.15
Q (cfs)	=	26.00
Area (sqft)	=	3.70
Velocity (ft/s)	=	7.02
Wetted Perim (ft)	=	6.89
Crit Depth, Yc (ft)	=	1.40
Top Width (ft)	=	6.44
EGL (ft)	=	1.92



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

North Diversion STA 56+00

Triangular

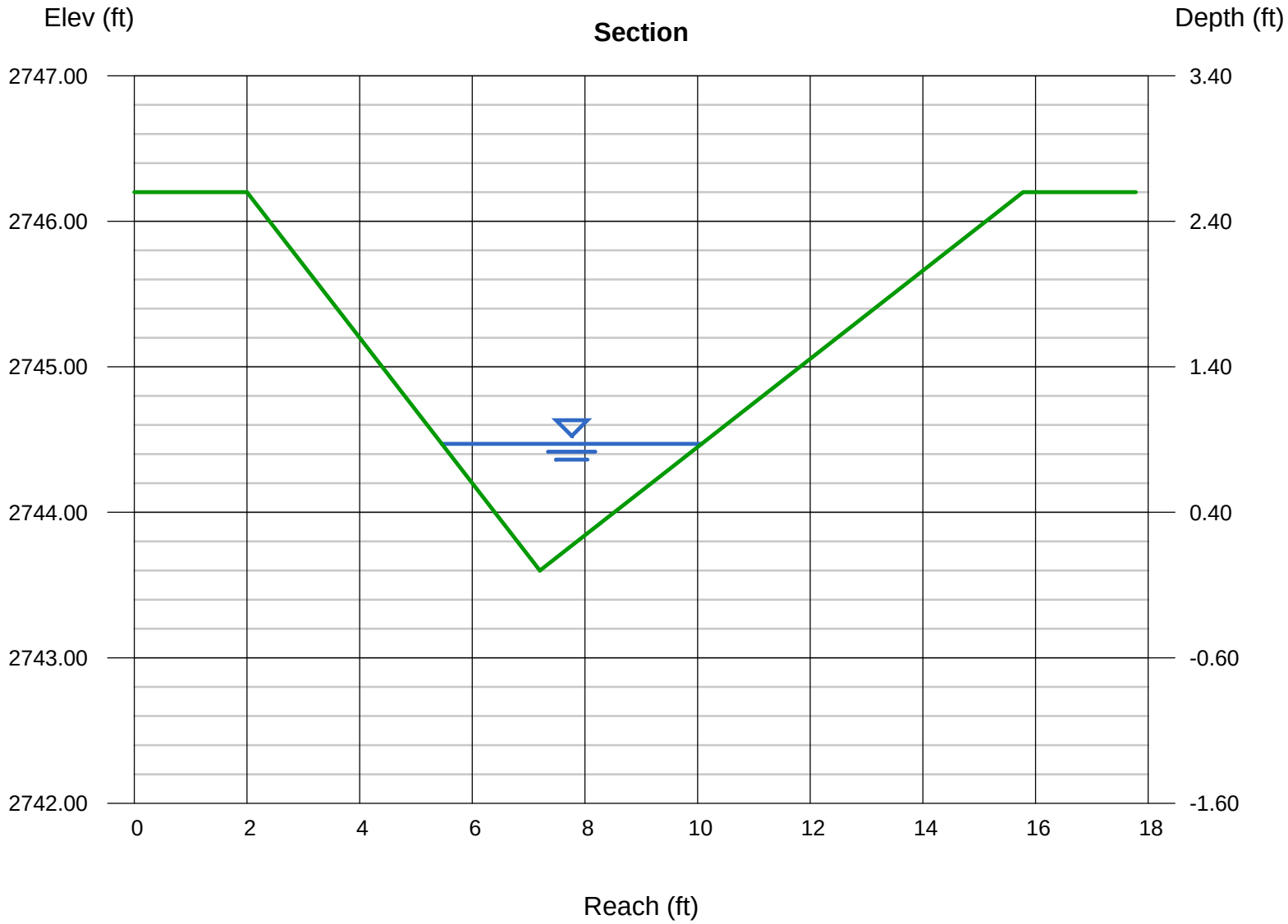
Side Slopes (z:1)	=	2.00, 3.30
Total Depth (ft)	=	2.60
Invert Elev (ft)	=	2743.60
Slope (%)	=	2.80
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	13.00

Highlighted

Depth (ft)	=	0.87
Q (cfs)	=	13.00
Area (sqft)	=	2.01
Velocity (ft/s)	=	6.48
Wetted Perim (ft)	=	4.95
Crit Depth, Yc (ft)	=	1.09
Top Width (ft)	=	4.61
EGL (ft)	=	1.52



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

South Diversion STA 6+00

Triangular

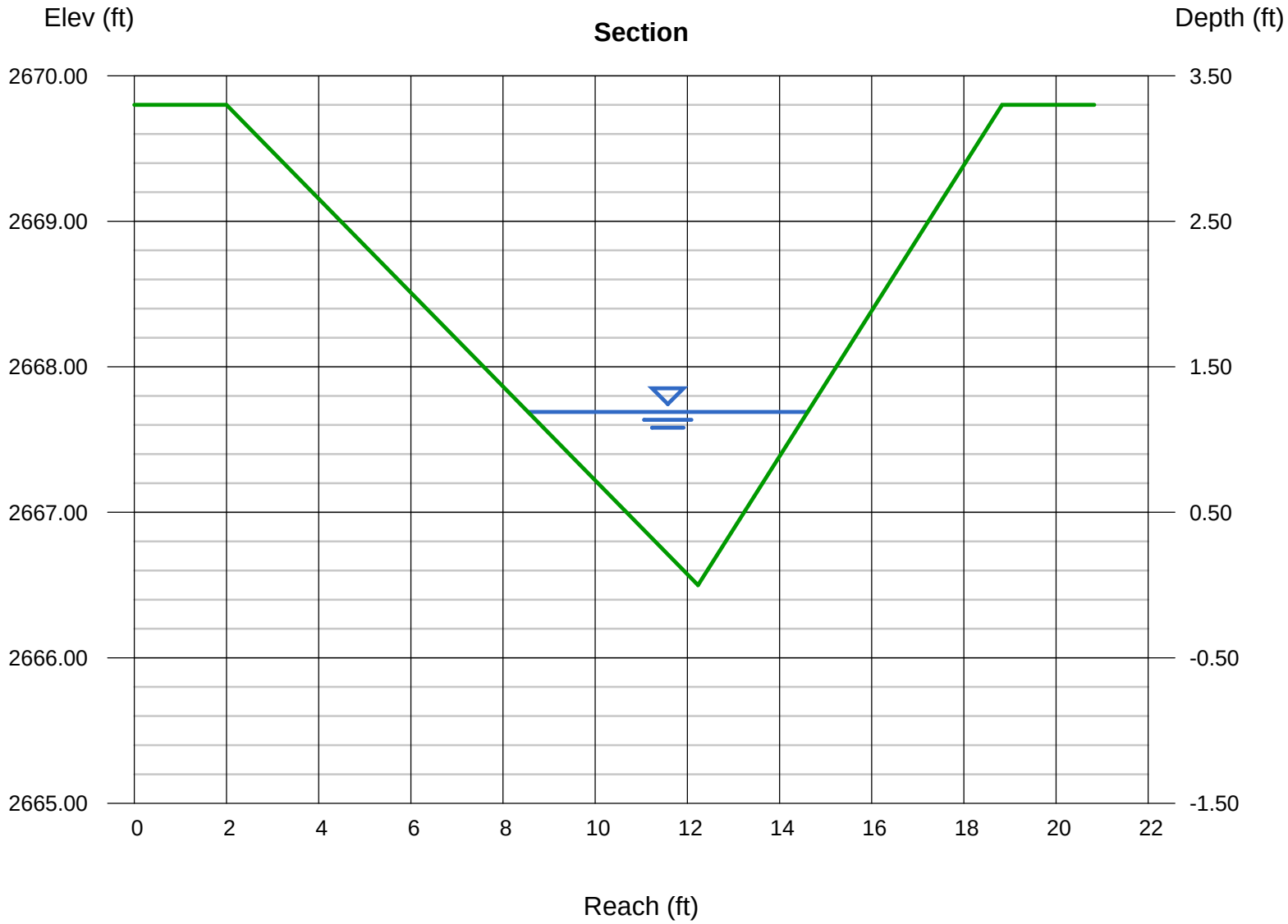
Side Slopes (z:1)	=	3.10, 2.00
Total Depth (ft)	=	3.30
Invert Elev (ft)	=	2666.50
Slope (%)	=	2.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	24.00

Highlighted

Depth (ft)	=	1.19
Q (cfs)	=	24.00
Area (sqft)	=	3.61
Velocity (ft/s)	=	6.65
Wetted Perim (ft)	=	6.54
Crit Depth, Yc (ft)	=	1.41
Top Width (ft)	=	6.07
EGL (ft)	=	1.88



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Monday, Oct 28 2013

South Diversion STA 10+00

Triangular

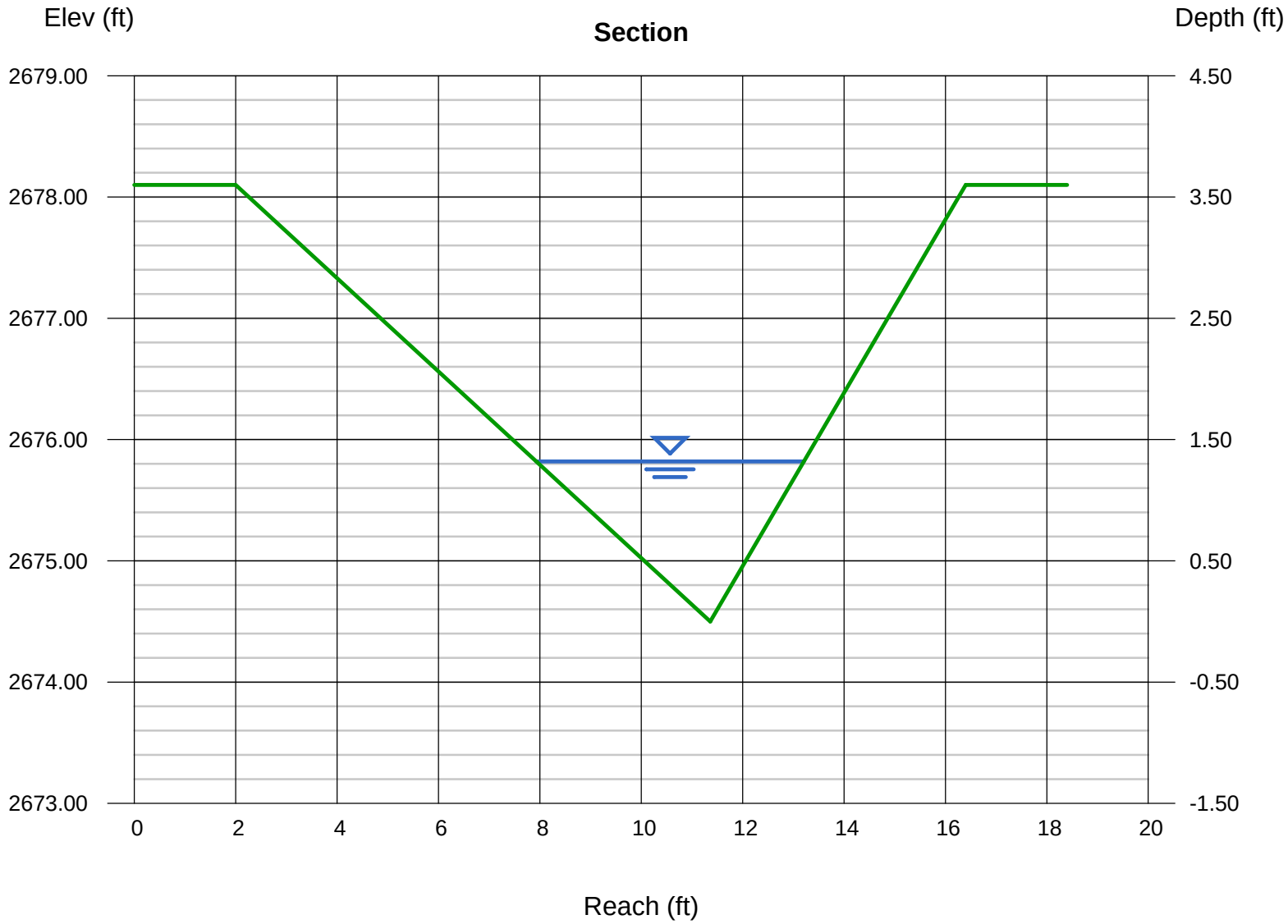
Side Slopes (z:1)	=	2.60, 1.40
Total Depth (ft)	=	3.60
Invert Elev (ft)	=	2674.50
Slope (%)	=	2.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	24.00

Highlighted

Depth (ft)	=	1.32
Q (cfs)	=	24.00
Area (sqft)	=	3.48
Velocity (ft/s)	=	6.89
Wetted Perim (ft)	=	5.95
Crit Depth, Yc (ft)	=	1.56
Top Width (ft)	=	5.28
EGL (ft)	=	2.06



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

South Diversion STA 17+00

Triangular

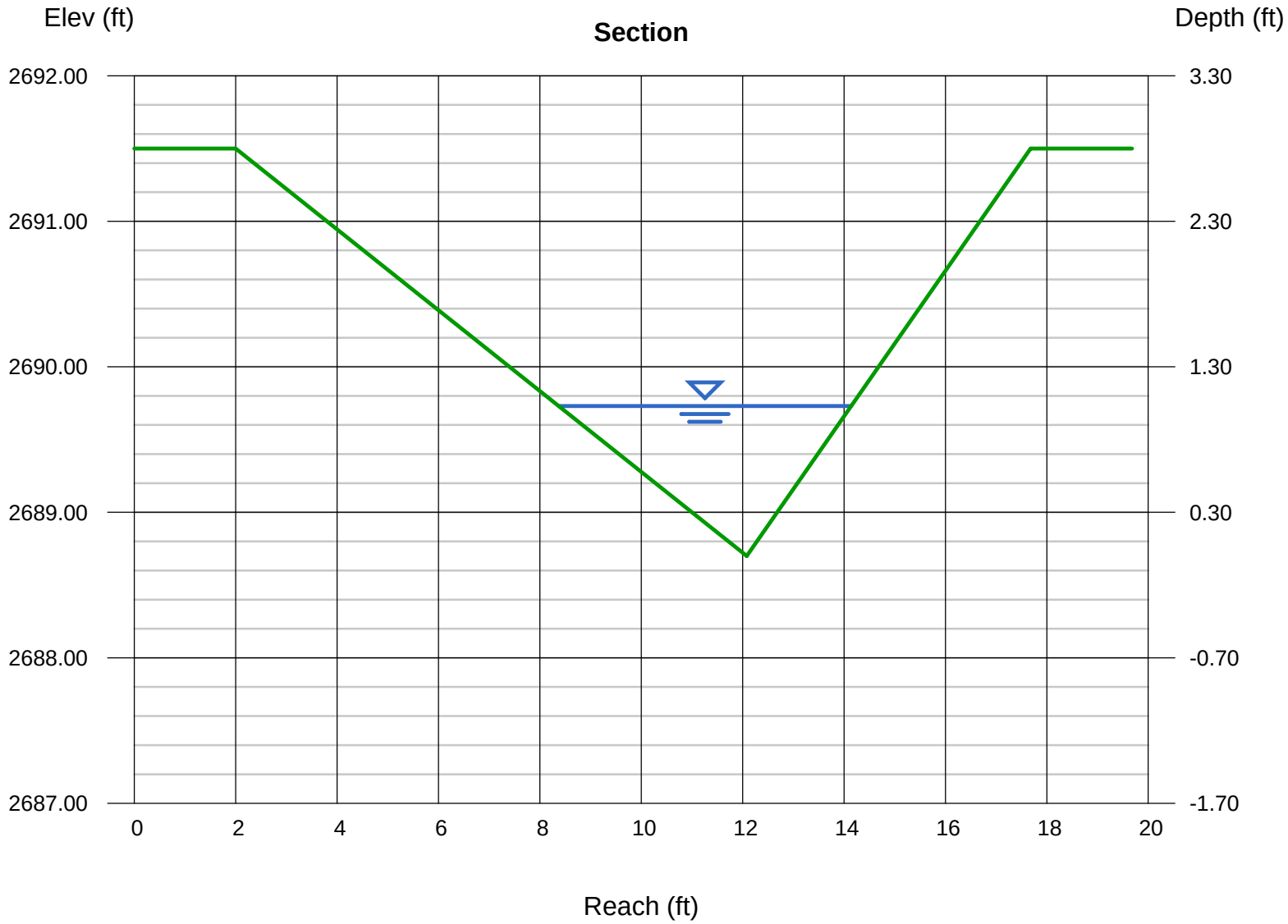
Side Slopes (z:1)	=	3.60, 2.00
Total Depth (ft)	=	2.80
Invert Elev (ft)	=	2688.70
Slope (%)	=	2.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	18.00

Highlighted

Depth (ft)	=	1.03
Q (cfs)	=	18.00
Area (sqft)	=	2.97
Velocity (ft/s)	=	6.06
Wetted Perim (ft)	=	6.15
Crit Depth, Yc (ft)	=	1.21
Top Width (ft)	=	5.77
EGL (ft)	=	1.60



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

South Diversion STA 22+00

Triangular

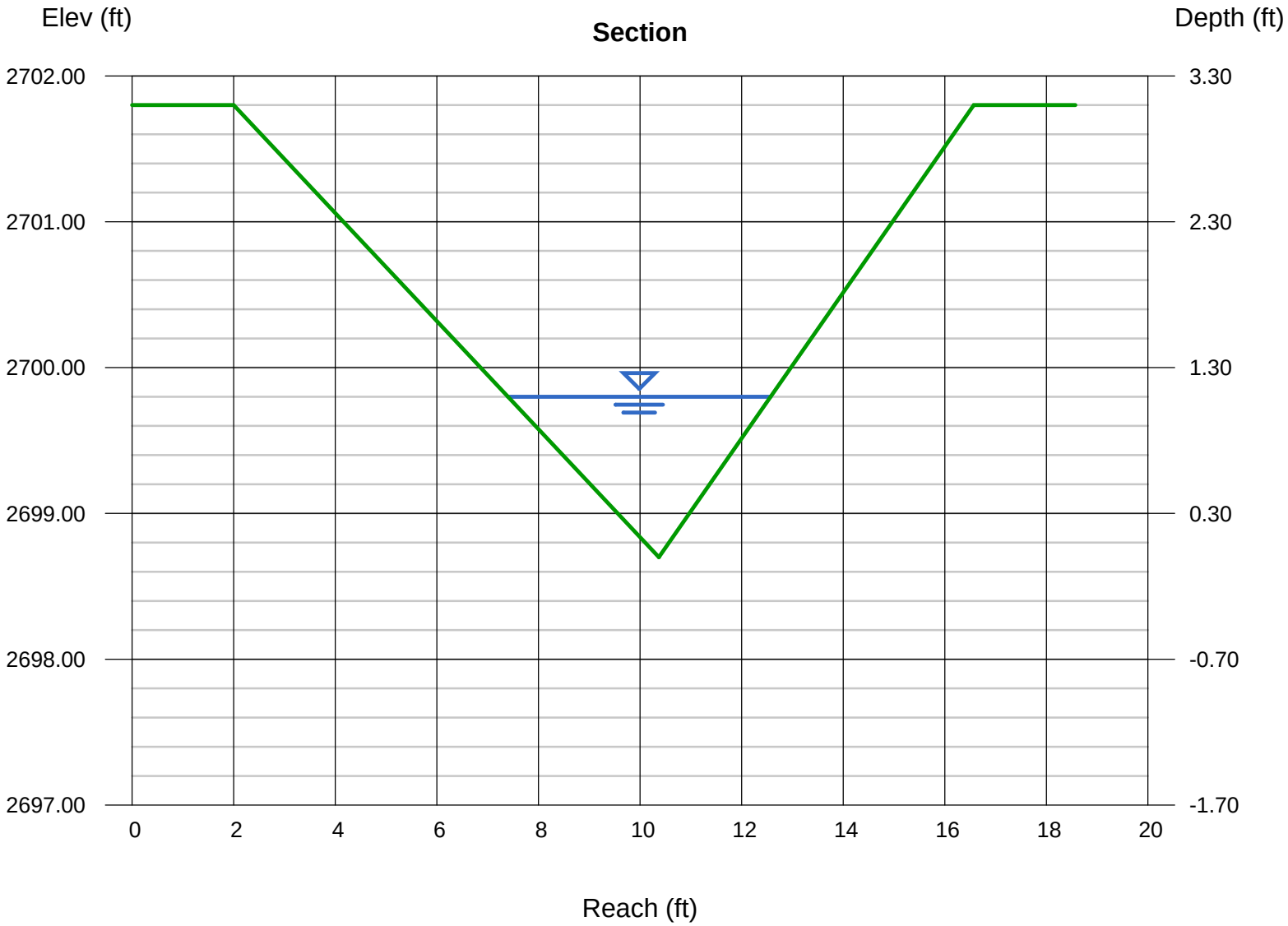
Side Slopes (z:1)	=	2.70, 2.00
Total Depth (ft)	=	3.10
Invert Elev (ft)	=	2698.70
Slope (%)	=	2.00
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	18.00

Highlighted

Depth (ft)	=	1.10
Q (cfs)	=	18.00
Area (sqft)	=	2.84
Velocity (ft/s)	=	6.33
Wetted Perim (ft)	=	5.63
Crit Depth, Yc (ft)	=	1.30
Top Width (ft)	=	5.17
EGL (ft)	=	1.72



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

South Diversion STA 28+00

Triangular

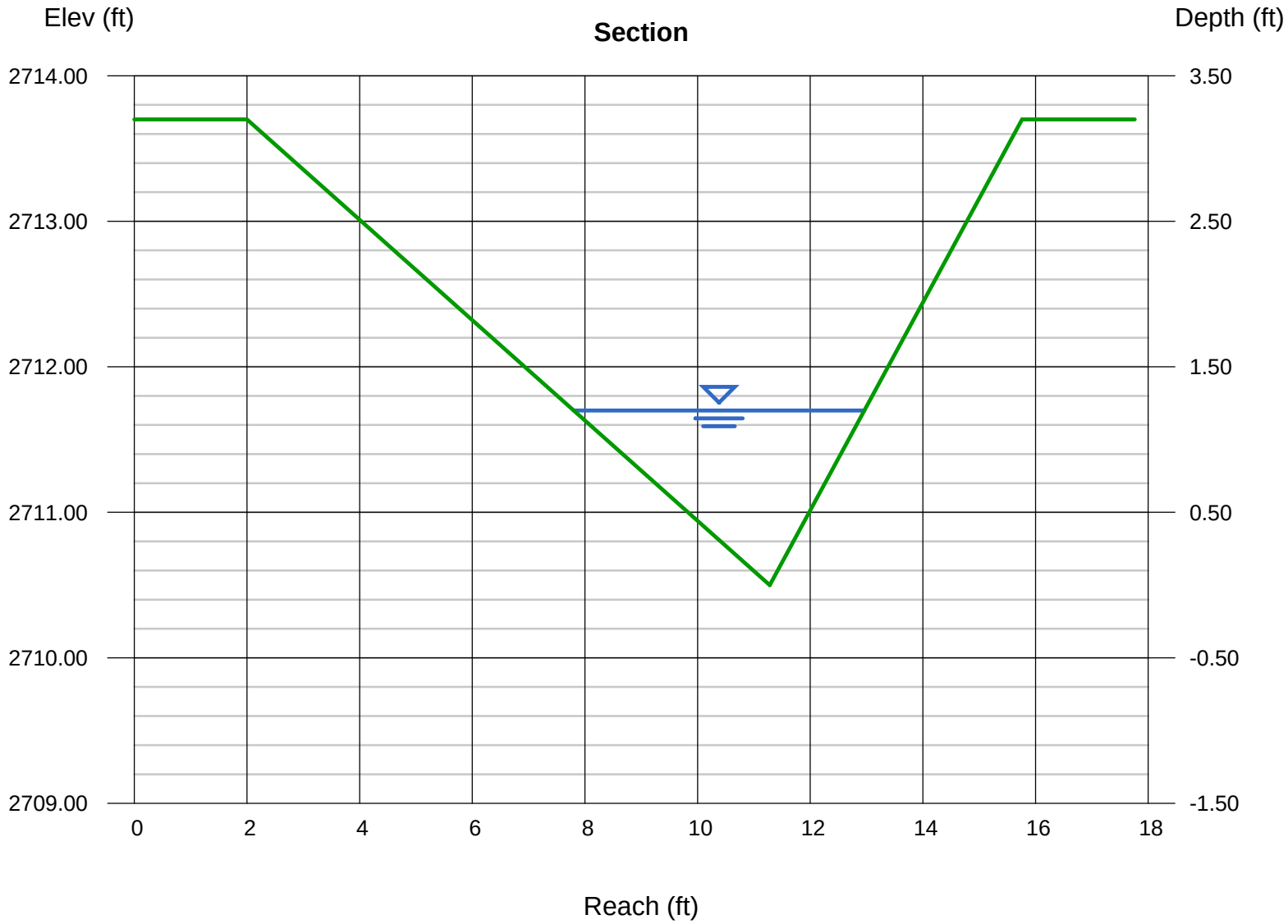
Side Slopes (z:1)	=	2.90, 1.40
Total Depth (ft)	=	3.20
Invert Elev (ft)	=	2710.50
Slope (%)	=	1.60
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	18.00

Highlighted

Depth (ft)	=	1.20
Q (cfs)	=	18.00
Area (sqft)	=	3.10
Velocity (ft/s)	=	5.81
Wetted Perim (ft)	=	5.75
Crit Depth, Yc (ft)	=	1.35
Top Width (ft)	=	5.16
EGL (ft)	=	1.73



Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc. Tuesday, Nov 5 2013

South Diversion STA 30+00

Triangular

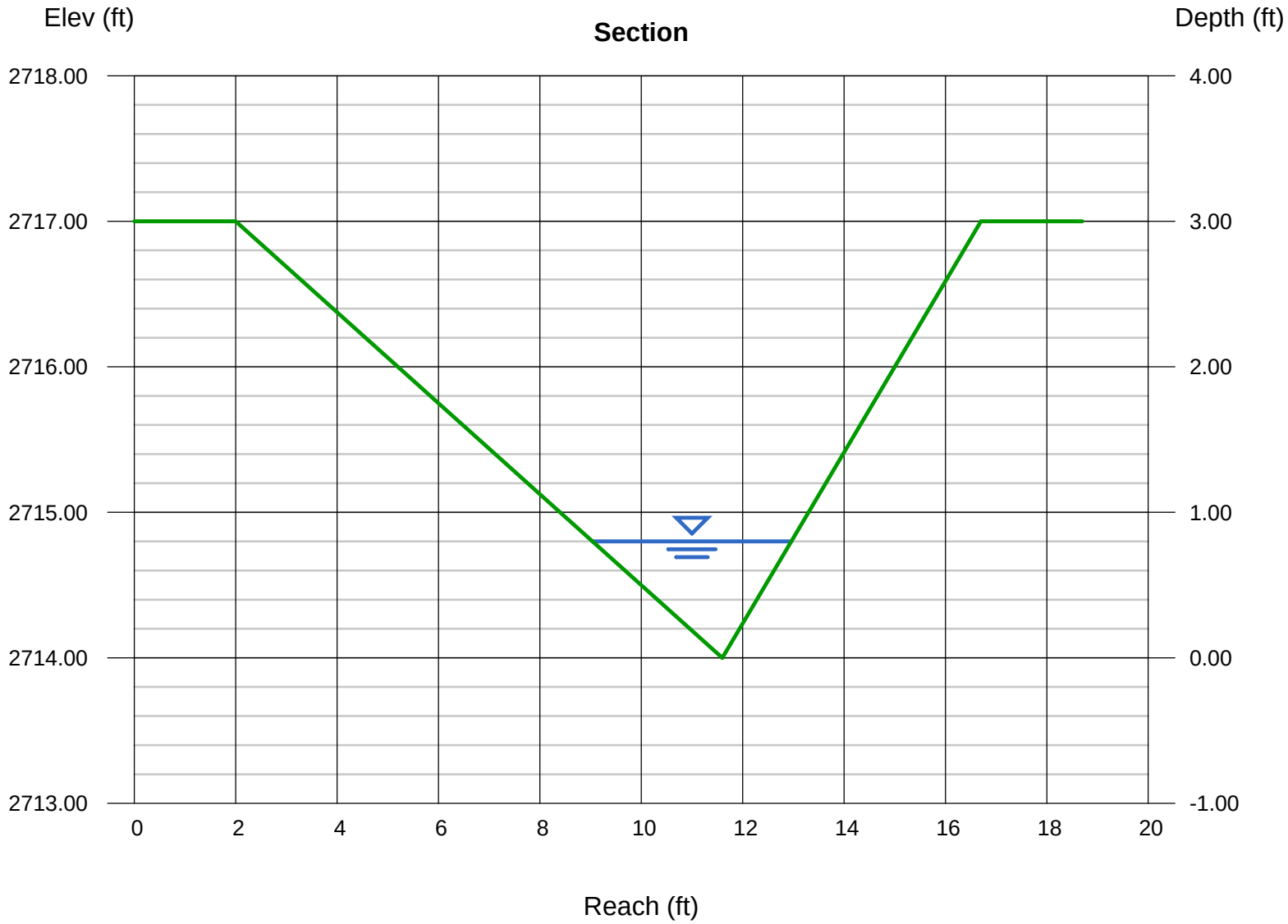
Side Slopes (z:1)	=	3.20, 1.70
Total Depth (ft)	=	3.00
Invert Elev (ft)	=	2714.00
Slope (%)	=	1.60
N-Value	=	0.021

Calculations

Compute by:		Known Q
Known Q (cfs)	=	7.00

Highlighted

Depth (ft)	=	0.80
Q (cfs)	=	7.000
Area (sqft)	=	1.57
Velocity (ft/s)	=	4.46
Wetted Perim (ft)	=	4.26
Crit Depth, Yc (ft)	=	0.88
Top Width (ft)	=	3.92
EGL (ft)	=	1.11



SRK Consulting (US) Inc.
Suite F-40
4710 Business Park Blvd
Anchorage, Alaska 99503

T: 907 677 3520
F: 907 677 3620

anchorage@srk.com
www.srk.com

Memo

To:	Makoto Umedera	**Date:**	October 31, 2013
Company:	Sumitomo Metal Mining Pogo LLC (Pogo)	**From:**	Ivan J. Clark, P.E.
Copy to:	Sally McLeod (Pogo); Dan Neuffer, Victor Munoz-Saavedra, Christine McCabe, John Duncan, Cam Scott (SRK)	**Project #:**	147900.010
Subject:	South Diversion Flume, As-Built Hydraulic Capacity		

Sumitomo Metal Mining Pogo LLC (Pogo) has requested SRK Consulting (U.S.), Inc. (SRK) prepare a hydrotechnical review of the South Diversion Flume, which is part of the *Pogo Dry Stack Tailings Facility Expansion, Diversion Channel and Haul Road Construction* project. Specifically, Pogo requested SRK estimate the as-built hydraulic capacity of the flume.

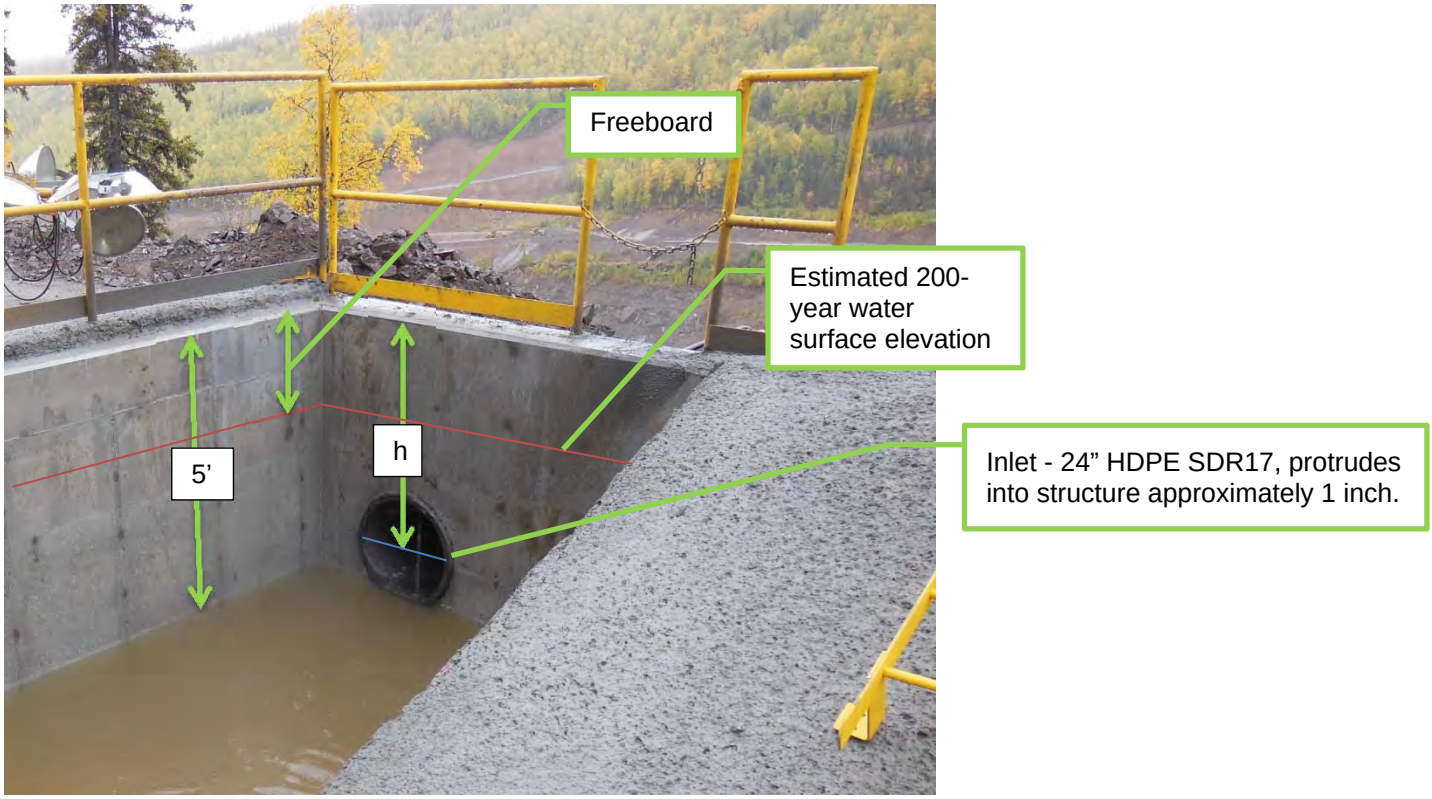
The South Diversion Flume conveys runoff from the new South Diversion Channel to the old South Diversion Channel, and is comprised of the following elements:

- Concrete drop box structure, i.e., flume intake;
- 24-inch SDR 17 high density polyethylene pipe (HDPE);
- Concrete thrust blocks; and
- A rip rap lined stilling basin.

The hydrology and hydraulics modeling program EPA SWMM (version 5.0), released by the U.S. Environmental Protection Agency, was used to perform the calculations to establish the system conveyance capacity. Input data included the as-built condition of the South Diversion Flume and an inflow runoff hydrograph. Output results from the SWMM model are provided in **Attachment 1**. The analysis confirms the HDPE alignment and slope deviation are not the controlling factor for capacity within the system.

The maximum capacity of the system is constrained by the inlet, or upstream end of the HDPE pipe within the drop structure depicted in **Figure 1**. The hydraulic design calculation for the drop structure assumed the pipe end would be cut flush with the concrete face. The as-built condition deviates slightly from the design calculation assumption; the inlet pipe protrudes into the structure approximately one inch. This condition was not accounted for in the design assumptions, but was considered an acceptable deviation at the time of construction. The changed condition may create a surcharge elevation (estimated 200-year water surface elevation) within the drop structure slightly higher than the design elevation, and also slightly decrease the conveyance capacity. The change in elevation and conveyance capacity is due to a slight increase in hydraulic losses associated with a protruding inlet configuration. The analysis below confirms the as-built condition meets the intended design requirements.

Figure 1 – As-Built South Diversion Flume Drop Box and HDPE Inlet



The inlet diameter of the pipe is the controlling factor for the capacity of the South Diversion Flume. The pipe penetration within the wall of the structure is considered an orifice for hydraulic calculation purposes. The Orifice Equation (below, Lindeburg, 2006) is used to calculate the capacity of a hydraulic element where water enters an opening. The equation calculates capacity based on available head above an orifice, a loss coefficient based on the orifice configuration, and lastly the size of the orifice. The orifice equation is used for a submerged condition, when the water level is above the top of the orifice. The equation is defined as:

$$Q = C_d A \sqrt{2gh}$$

- Q = Quantity
- C_d = Coefficient of loss
- A = Area of orifice
- g = Gravity constant
- h = Head

The conveyance capacity calculated during design assumed the pipe would be cut flush with the wall of the structure. The corresponding coefficient of discharge (C_d) used in the design calculations is 0.82 (Lindeburg,

2006). The as-built condition varies slightly from the design condition, whereas the pipe protrudes into the drop structure approximately one inch. Lindeburg, 2006 cites a C_d of 0.54 for conditions when an orifice protrudes into the direction of flow up to one half the diameter of the pipe. It is unlikely that the C_d would be reduced to 0.54 for the minor protrusion seen in the as-built condition. A cross reference for orifice flow (Rennels & Hudson, 2012), cites an expression which relates pipe thickness to orifice diameter for conditions where a pipe (or orifice) protrudes into the direction of flow. Applying the expression to the as-built condition results in a C_d of 0.64. The cross reference also indicates the C_d for a flush pipe may be as low as 0.64. The actual C_d is estimated to be between 0.64 and 0.82. **Table 1** and **Table 2** summarize the conveyance quantities associated with each coefficient.

Table 1 summarizes the as-designed capacity of the inlet relative to the water surface elevation in the drop structure. The area of the orifice opening is based on a 24-inch SDR 21 HDPE pipe diameter which is equal to 1.8 feet (or 21.6 inches) and a C_d of 0.82 for a flush pipe penetration.

Table 1 – South Diversion Flume Capacity As-Designed (Cd = 0.82)

Relative Water Surface Elevation	Head (ft)	Quantity (cfs)	Comment
0.0	0.0	0.0	Bottom of pipe
1.0	0.1	5.3	* Approximate Quantity
2.0	1.1	18	
3.0	2.1	24	200-year storm event quantity at the South Diversion Flume.
4.0	3.1	30	
5.0	4.1	34	**Top of concrete walls and estimated maximum capacity.**

*Flow rate is approximate due to partial flow condition.

Table 2 summarizes the assumed as-built capacity of the inlet relative to the water surface elevation in the drop structure. The area of the orifice opening is based on a 24-inch SDR 21 HDPE pipe diameter which is equal to 1.8 feet (or 21.6 inches) and a C_d of 0.64 for a protruding pipe penetration. See **Attachment 2** for calculation of C_d using the expression from Rennels & Hudson, 2012.

Table 2 – South Diversion Flume Capacity As-Built (Cd = 0.64)

Relative Water Surface Elevation	Head (ft)	Quantity (cfs)	Comment
0.0	0.0	0.0	Bottom of pipe
1.0	0.1	4.1	* Approximate Quantity
2.0	1.1	14	
3.0	2.1	19	
4.0	3.1	23	
4.4	3.5	24	200-year storm event quantity at the South Diversion Flume.
5.0	4.1	27	**Top of concrete walls and estimated maximum capacity.**

*Flow rate is approximate due to partial flow condition.

In conclusion, the structure as constructed meets the performance standard of conveying the 200 year flow. The as-built condition of the South Diversion Flume is estimated to convey the 200-year storm event with approximate freeboard depth between 0.6 and 2.0 feet. The estimated maximum capacity,(i.e., maximum flow with no freeboard) is expected to be between 27cfs and 34 cfs depending on the C_d used in the orifice equation. The actual flow rate and corresponding C_d can be determined by performing a field flow test;

however the inlet capacity is expected to be greater than the peak flow of 24cfs generated by the 200-year storm event.

We appreciate the opportunity to support Pogo on this critical project. If you have any questions or comments on this memo, please contact us at 907-677-3520.

Regards,

SRK Consulting (U.S.), Inc.

Ivan J. Clark, P.E.
Senior Consultant

Attachments:

1. EPA SWMM Output Data
2. Inlet Coefficient Calculation

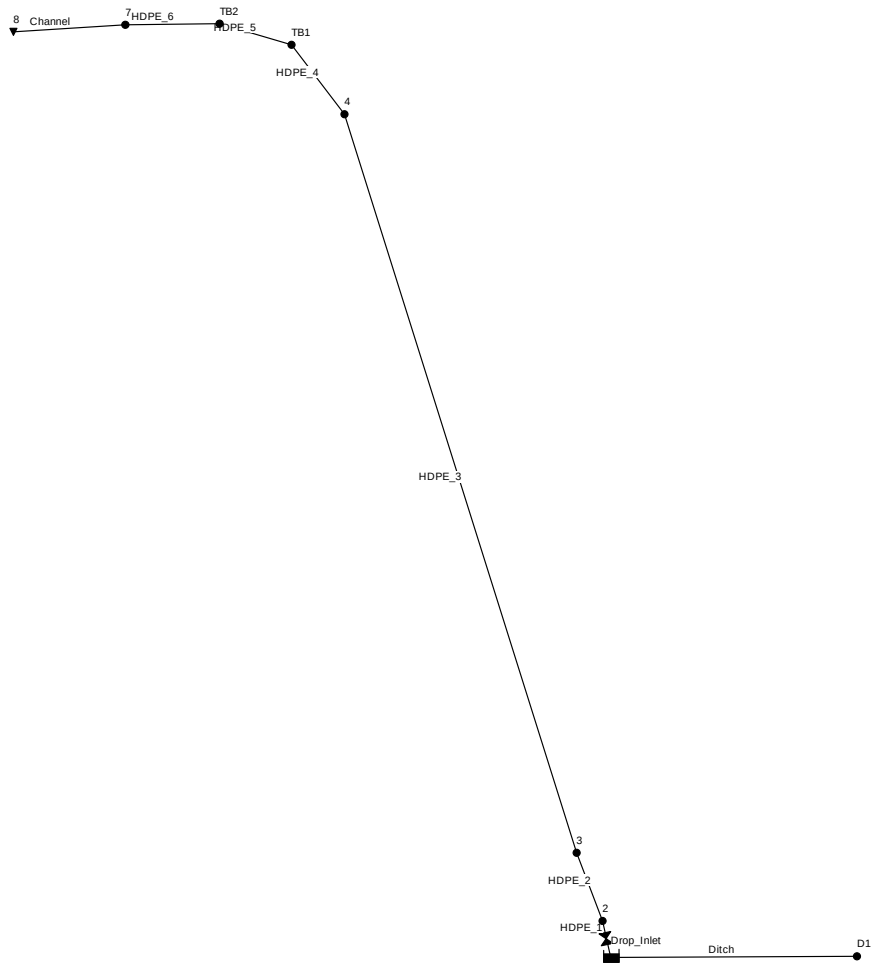
References:

3. Lindeburg, Michael R., Approximate Orifice Coefficients for Turbulent Water, *Civil Engineering Reference Manual*, 2006.
4. Rennels, Donald C. and Hudson, Hobart M., Entrances, *Pipe Flow: A practical and Comprehensive Guide*, First Edition, 2012.

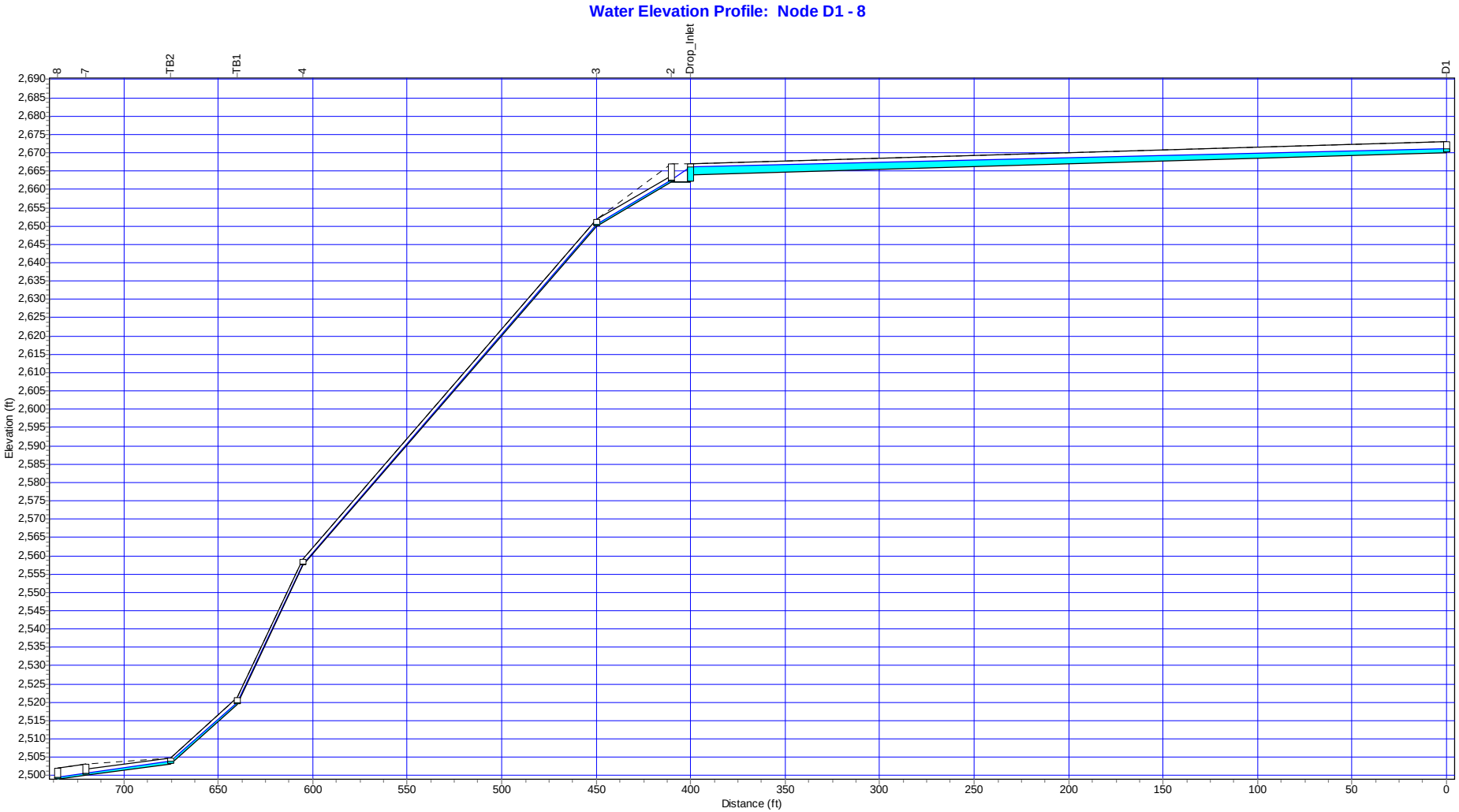
Attachment 1

Pogo - South Diversion Flume

01/01/2020 10:30:00



Pogo - South Diversion Flume As-Built - 0.64 Coefficient



Pogo - South Diversion Flume As-Built - 0.64 Coefficient

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
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Pogo - South Diversion Flume

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ JAN-01-2020 09:30:00
Ending Date .............. JAN-02-2020 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 1.00 sec


WARNING 08: elevation drop exceeds length for Conduit HDPE_4

WARNING 03: negative offset ignored for Link Ditch

**************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........        10.383          3.383
External Outflow .........        10.384          3.384
Internal Outflow .........         0.000          0.000
Storage Losses ...........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....        -0.009


*********************************
Highest Flow Instability Indexes
*********************************
Link HDPE_1 (6)
Link HDPE_4 (2)
Link HDPE_2 (1)
Link HDPE_3 (1)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     1.00 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


******************
Node Depth Summary
******************

----------------------------------------------------------------------
```

Pogo - South Diversion Flume As-Built - 0.64 Coefficient

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	
2	JUNCTION	0.20	0.60	2662.60	0	01:03
3	JUNCTION	0.17	0.51	2650.51	0	01:03
4	JUNCTION	0.14	0.42	2557.72	0	01:03
TB1	JUNCTION	0.17	0.51	2520.01	0	01:03
TB2	JUNCTION	0.30	0.93	2503.93	0	01:03
7	JUNCTION	0.18	0.60	2500.60	0	01:03
D1	JUNCTION	0.41	1.14	2671.14	0	00:57
8	OUTFALL	0.18	0.60	2499.60	0	01:03
Drop_Inlet	STORAGE	0.82	4.07	2666.07	0	01:03

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min		Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
2	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
3	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
4	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
TB1	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
TB2	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
7	JUNCTION	0.00	23.26	0	01:03	0.000	3.383
D1	JUNCTION	24.30	24.30	0	00:55	3.383	3.383
8	OUTFALL	0.00	23.26	0	01:03	0.000	3.383
Drop_Inlet	STORAGE	0.00	24.30	0	00:57	0.000	3.383

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min		Maximum Outflow CFS
Drop_Inlet	0.078	16	0	0.384	81	0	01:03	23.26

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
8	60.52	7.83	23.26	3.383
System	60.52	7.83	23.26	3.383

Pogo - South Diversion Flume As-Built - 0.64 Coefficient

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days	hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
HDPE_2	CONDUIT	23.26	0	01:03	34.90	0.22	0.31
HDPE_3	CONDUIT	23.26	0	01:03	44.72	0.15	0.26
HDPE_4	CONDUIT	23.26	0	01:03	44.78	0.12	0.26
HDPE_5	CONDUIT	23.26	0	01:03	24.68	0.17	0.40
Channel	CONDUIT	23.26	0	01:03	6.24	0.05	0.20
HDPE_6	CONDUIT	23.26	0	01:03	22.63	0.49	0.42
Ditch	CONDUIT	24.30	0	00:57	6.59	0.09	0.53
HDPE_1	ORIFICE	23.26	0	01:03			1.00

****
Flow Classification Summary
****

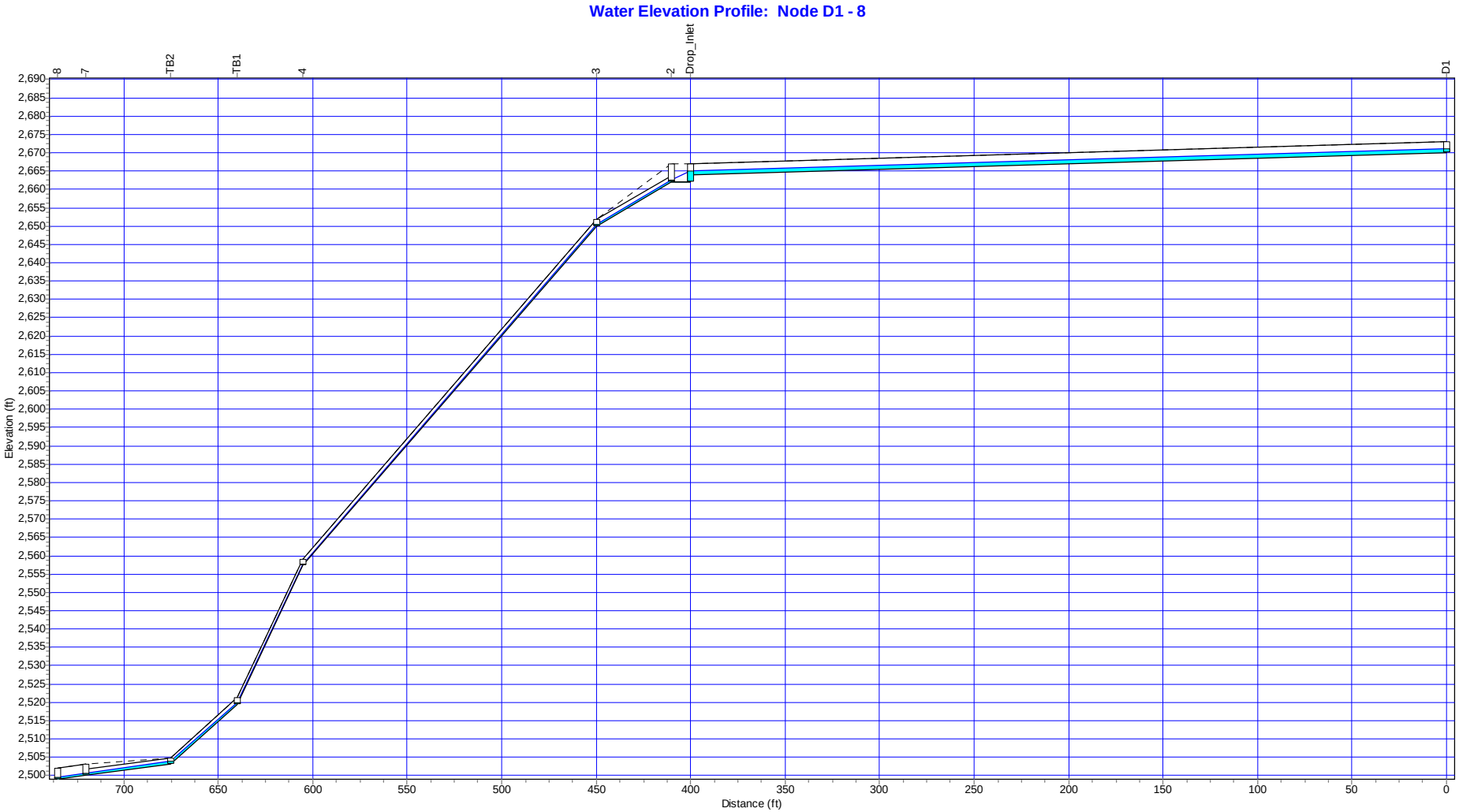
Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
HDPE_2	1.00	0.01	0.00	0.00	0.35	0.64	0.00	0.00	5.71	0.0000
HDPE_3	1.00	0.35	0.00	0.00	0.02	0.63	0.00	0.00	7.90	0.0000
HDPE_4	1.00	0.36	0.01	0.00	0.01	0.63	0.00	0.00	7.90	0.0000
HDPE_5	1.00	0.05	0.32	0.00	0.00	0.64	0.00	0.00	3.57	0.0000
Channel	1.00	0.24	0.00	0.00	0.18	0.57	0.00	0.00	0.91	0.0000
HDPE_6	1.00	0.01	0.03	0.00	0.29	0.66	0.00	0.00	3.43	0.0000
Ditch	1.00	0.01	0.00	0.00	0.02	0.01	0.00	0.97	0.92	0.0000

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Oct 10 10:17:08 2013
Analysis ended on: Thu Oct 10 10:17:09 2013
Total elapsed time: 00:00:01

Pogo - South Diversion Flume - 0.82 Coefficient



Pogo - South Diversion Flume - 0.82 Coefficient

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

Pogo - South Diversion Flume

*******************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*******************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Flow Routing Method ...... DYNWAVE
Starting Date ............ JAN-01-2020 09:30:00
Ending Date .............. JAN-02-2020 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Routing Time Step ........ 1.00 sec


WARNING 08: elevation drop exceeds length for Conduit HDPE_4

WARNING 03: negative offset ignored for Link Ditch

**************************        Volume         Volume
Flow Routing Continuity        acre-feet       10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......         0.000          0.000
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........        10.383          3.383
External Outflow .........        10.383          3.383
Internal Outflow .........         0.000          0.000
Storage Losses ...........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....        -0.001


*******************************
Highest Flow Instability Indexes
*******************************
Link HDPE_1 (6)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     1.00 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


******************
Node Depth Summary
******************

---------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max
                                  Depth    Depth      HGL   Occurrence
Node                 Type          Feet     Feet     Feet  days hr:min
```

2	JUNCTION	0.20	0.62	2662.62	0	00:57
3	JUNCTION	0.17	0.52	2650.52	0	00:57
4	JUNCTION	0.14	0.43	2557.73	0	00:57
TB1	JUNCTION	0.17	0.52	2520.02	0	00:57
TB2	JUNCTION	0.30	0.95	2503.95	0	00:57
7	JUNCTION	0.18	0.62	2500.62	0	00:57
D1	JUNCTION	0.41	1.14	2671.14	0	00:57
8	OUTFALL	0.18	0.62	2499.62	0	00:57
Drop_Inlet	STORAGE	0.69	3.00	2665.00	0	00:57

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal
2	JUNCTION	0.00	24.29	0 00:57	0.000	3.383
3	JUNCTION	0.00	24.29	0 00:57	0.000	3.383
4	JUNCTION	0.00	24.29	0 00:57	0.000	3.383
TB1	JUNCTION	0.00	24.29	0 00:57	0.000	3.383
TB2	JUNCTION	0.00	24.29	0 00:57	0.000	3.383
7	JUNCTION	0.00	24.30	0 00:57	0.000	3.383
D1	JUNCTION	24.30	24.30	0 00:55	3.383	3.383
8	OUTFALL	0.00	24.30	0 00:57	0.000	3.383
Drop_Inlet	STORAGE	0.00	24.30	0 00:57	0.000	3.383

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	E&I Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Drop_Inlet	0.065	14	0	0.284	60	0 00:57	24.29

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CFS	Max. Flow CFS	Total Volume 10^6 gal
8	60.49	7.84	24.30	3.383
System	60.49	7.84	24.30	3.383

****
Link Flow Summary

Pogo - South Diversion Flume - 0.82 Coefficient

****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
HDPE_2	CONDUIT	24.29	0 00:57	35.34	0.23	0.32
HDPE_3	CONDUIT	24.29	0 00:57	45.28	0.15	0.26
HDPE_4	CONDUIT	24.29	0 00:57	45.34	0.13	0.26
HDPE_5	CONDUIT	24.29	0 00:57	24.96	0.18	0.41
Channel	CONDUIT	24.30	0 00:57	6.32	0.05	0.21
HDPE_6	CONDUIT	24.30	0 00:57	22.88	0.51	0.43
Ditch	CONDUIT	24.30	0 00:57	6.93	0.09	0.38
HDPE_1	ORIFICE	24.29	0 00:57			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
HDPE_2	1.00	0.01	0.00	0.00	0.35	0.64	0.00	0.00	5.71	0.0000
HDPE_3	1.00	0.35	0.00	0.00	0.02	0.63	0.00	0.00	7.91	0.0000
HDPE_4	1.00	0.36	0.01	0.00	0.01	0.63	0.00	0.00	7.90	0.0000
HDPE_5	1.00	0.05	0.31	0.00	0.00	0.64	0.00	0.00	3.58	0.0000
Channel	1.00	0.21	0.00	0.00	0.22	0.57	0.00	0.00	0.93	0.0000
HDPE_6	1.00	0.01	0.04	0.00	0.28	0.67	0.00	0.00	3.44	0.0000
Ditch	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.94	0.0000

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Thu Oct 10 10:14:14 2013
Analysis ended on: Thu Oct 10 10:14:15 2013
Total elapsed time: 00:00:01

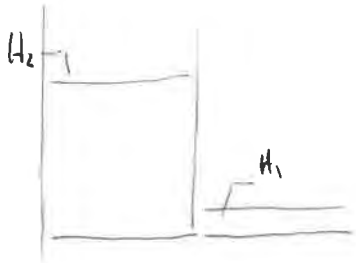
srk consulting

Project No. Pogo Site

Prepared by VNS Date

Approved by Date

Subject Orifice Coefficient Sheet 1 of 1



$$E_1 = E_2 + \Delta \text{loss}$$

$$H_2 = H_1 + \frac{v^2}{2g} + \underbrace{k_e \cdot \frac{v^2}{2g}}_{\text{entrance loss}}$$

$$\Delta H = (k_e + 1)\frac{v^2}{2g}$$

$$\left(\frac{1}{k_e+1}\right) A\sqrt{2g\Delta H} = Q$$

where $C_d = \frac{1}{k_e+1}$ from orifice flow eq $Q = C_d \cdot A\sqrt{2g\Delta H}$

Using parameters presented in diagram 9.1 (attached).

$D = 21.577''$ (24", DR21)

$t = 1.143''$ (24", DR21)

$l = 1''$

$l/D = 0.046 \wedge t/d = 0.053 \Rightarrow$ from figure 9.1 $\Rightarrow k_e = 0.57$

$$\Rightarrow C_d = \frac{1}{1+0.57} = 0.637$$

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Memo

To:	Makoto Umedera	**Date:**	June 14, 2013
Company:	Sumitomo Metal Mining Pogo, LLC	**From:**	Ivan Clark, & Victor Muñoz Saavedra
Copy to:	Sally McLeod, Pogo; Cam Scott, SRK; Dan Neuffer, SRK; John Duncan SRK	**Project #:**	147900-080
Subject:	DSTF Diversion Ditches Design Calculations		

Pogo requested the hydrology and hydraulics calculations for the diversion ditches associated with the expanded Dry Stack Tailings Facility. Below are a summary of the design and requested calculations.

Design Summary

The diversion ditches were designed under steady state conditions and included normal depth calculation made using Hydraflow for AutoCAD. The triangular diversion ditches were divided into three categories based on the longitudinal slopes expected - 2%, 10% and 12%, respectively-- these fixed slopes characterize the complete longitudinal design. Design calculations for the varying longitudinal slopes can be found in Attachment 1.

Initially, the conceptual design of the triangular ditches assumed three different slopes for the uphill sections of the ditches where the most conservative or steepest slope was 0.5/1 (H/V). The road side of the triangular ditch was initially designed with a 3/1 slope (H/V). The ditch design was then updated to have an uphill slope of 1.5:1 (H/V). The hydraulic analysis for the design of the ditches was not updated as the initial design was sufficiently conservative.

The triangular diversion ditches are designed to be protected with a shotcrete layer along the entire length and width of the channel and the design includes a minimum freeboard of 1 foot. The analysis performed for the original design contemplated rock cut jagged and irregular channels, which have a Manning's roughness of 0.040 (Chow, 1994). This assumed roughness coefficient produces slightly higher water elevations in the ditches comparing to the elevations which would result using a Mannings roughness for shotcrete.

The combination of the conservative triangular shape and higher Manning's roughness results in a tendency to produce more conservative values in the hydraulic analysis, particularly, calculated elevations tend to be slightly higher than the actual measured flow depths. The average velocities will tend to be higher due to the Manning's roughness coefficient for shotcrete being lower and shape of the channel; however, the ditches are completely protected with the shotcrete cover which can handle velocities up to the maximum expected of 17 fps for a 12% grade. The table below from Figure 1US048.001-006 (10/16; REV 9, IFC Construction drawings for the Diversion Ditches) presents a synthesis of the slope, peak flow and total depth expected in the diversion channels.

Table 1: Diversion Ditches Design Summary

STATIONING	SLOPE	Q_{PEAK}	TOTAL DEPTH (H_1)	MAX. DEPTH OF FLOW (H_2) *
South Ditch	(%)	(cfs)	(ft)	(ft)
0+00 to 30+79	2	24	3.0	1.8
North Ditch	(%)	(cfs)	(ft)	(ft)
0+00 to 12+00	12	69	3.0	1.9
12+00 to 26+00	10	55	3.0	1.8
26+00 to 35+70	2	45	3.5	2.3
35+70 to 58+02	2	26	3.0	1.8

* Note: Maximum depth of flow based on 200-year/24-hr storm event.

We appreciate the opportunity to assist Pogo with this critical project. Please contact us with questions or comments.

Regards

SRK Consulting (U.S.), Inc.

We appreciate the opportunity to assist Pogo with this critical project. Please contact us with questions or comments.

Prepared by:

Ivan J. Clark, P.E

Senior Consultant

STATE OF ALASKA
49TH
Ivan J. Clark
CE-12456
6-14-13
REGISTERED PROFESSIONAL ENGINEER

Reviewed by:

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John Duncan
Principal Consultant

References:
Chow 1994, "Open-Channel Hydraulic", McGraw-Hill.

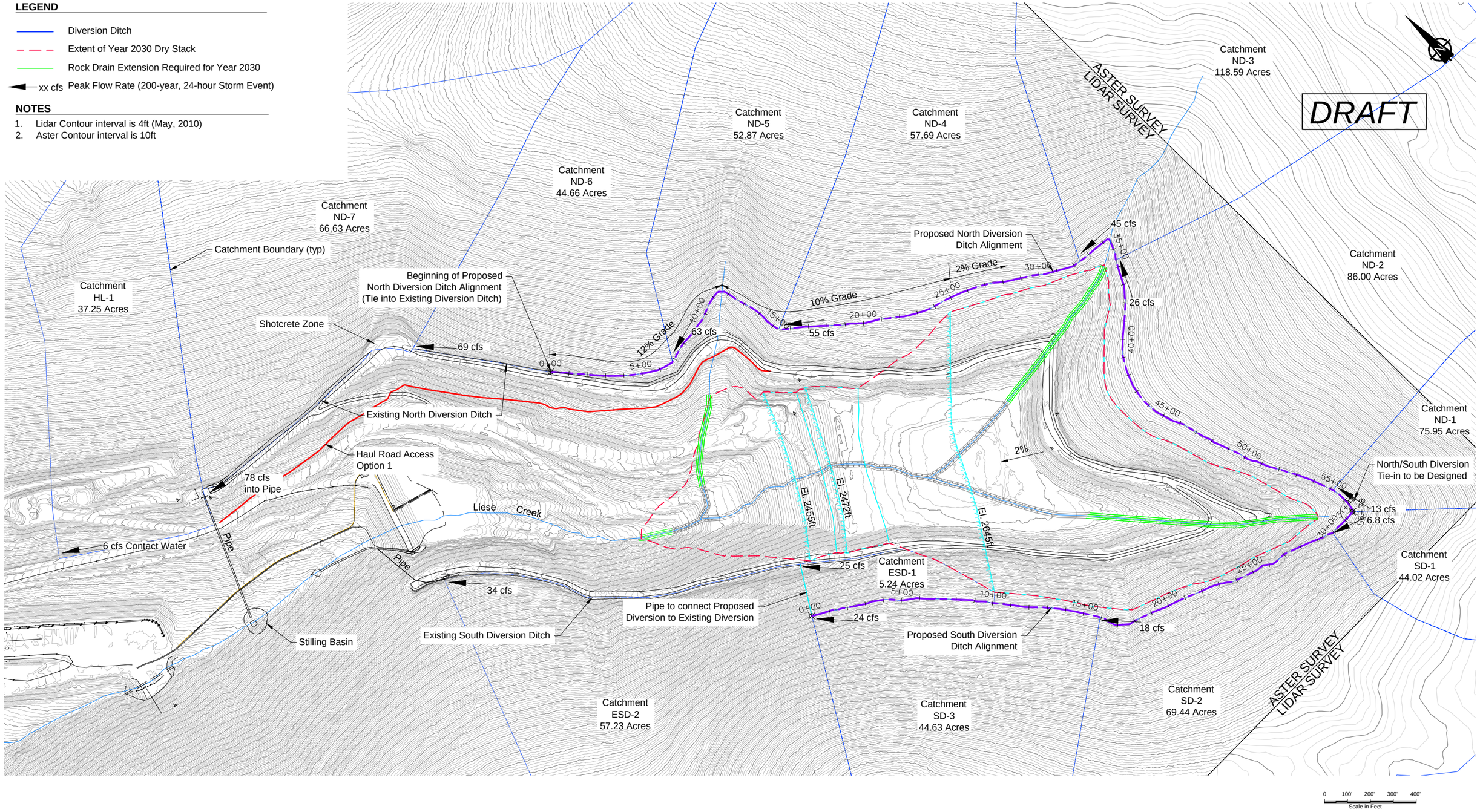
Attachments:
North and South Diversion Ditches Flow Calculations

LEGEND

- Diversion Ditch
- Extent of Year 2030 Dry Stack
- Rock Drain Extension Required for Year 2030
- xx cfs Peak Flow Rate (200-year, 24-hour Storm Event)

NOTES

1. Lidar Contour interval is 4ft (May, 2010)
2. Aster Contour interval is 10ft



DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
–	–		

REFERENCE DRAWINGS

NO.	DESCRIPTION	CHK'D	APP'D	DATE
–	–			

REVISIONS

PROFESSIONAL ENGINEERS STAMP

srk consulting

DESIGN: –	DRAWN: –	REVIEWED: –
CHECKED: –	APPROVED: –	DATE: 09/2013

FILE NAME: 1US048_001_DTSF_Diversion_Design_Option_1_smn_rev0.dwg

Pogo Mine

POGO MINE

SRK JOB NO.: 147900.010

Dry Stack Tailings Facility
Detailed Engineering Study

DRAWING TITLE: Diversion Channel Option 1 Conceptual Layout

DRAWING NO. FIGURE 1

SHEET 1 OF 1

REVISION NO. 1

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POGO-DSTF Diversion Channels IJC/VMS
Summary of HEC HMS Data 14-Jun-13

Catchment	Area (mi) (mi)	Volume (in)	SCS CN	Lag (min)	Peak Discharge (cfs)
ND-1	0.118679	0.79	55	17.4	13.2
J-ND-A	0.118679	0.79			13.2
R-ND-A-B	0.118679	0.79			13.2
ND-2	0.134377	0.79	55	21.9	13.3
J-ND-B	0.253056	0.79			26.4
R-ND-B-C	0.253056	0.79			26.4
ND-3	0.185303	0.79	55	16.9	20.9
J-ND-C	0.438359	0.79			45.4
R-ND-C-D	0.438359	0.79			45.4
ND-4	0.090314	0.79	55	19.9	9.4
J-ND-D	0.528673	0.79			54.5
R-ND-D-E	0.528673	0.79			54.5
ND-5	0.082604	0.79	55	16	9.6
J-ND-E	0.611277	0.79			62.5
R-ND-E-SINK	0.611277	0.79			62.5
ND-6	0.069775	0.79	55	15.4	8.3
SINK-ND	0.681052	0.79			69.1
SD-1	0.068782	0.79	55	21.6	6.8
J-SD-A	0.068782	0.79			6.8
R-SD-A-B	0.068782	0.79			6.8
SD-2	0.108495	0.79	55	19.4	11.4
J-SD-B	0.177277	0.79			17.6
R-SD-B-C	0.177277	0.79			17.6
SD-3	0.069734	0.79	55	20.5	7.1
J-SD-C	0.247011	0.79			24.3
ESD-1	0.008192	0.79	55	6.6	1.5
J-ESD-A	0.255203	0.79			24.9
R-ESD-A-SINK	0.255203	0.79			24.9
ESD-2	0.089429	0.79	55	20.4	9.1
SINK-SD	0.344632	0.79			33
HR-1	0.160799	0.79	55	21	16.2
SINK-HR	0.160799	0.79			16.2

Note: catchment areas vary slightly between as-designed and approved for construction layout. However, the total change in Q roughted to each channel is minimal. Given the channel design is conservative for the expected flows calculated in-design, the change in Q has a negligable affect to the capacity of the channels.

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Aug 24 2011

Diversion (3H:1V;0.5H:1V) 12% Slope

Triangular

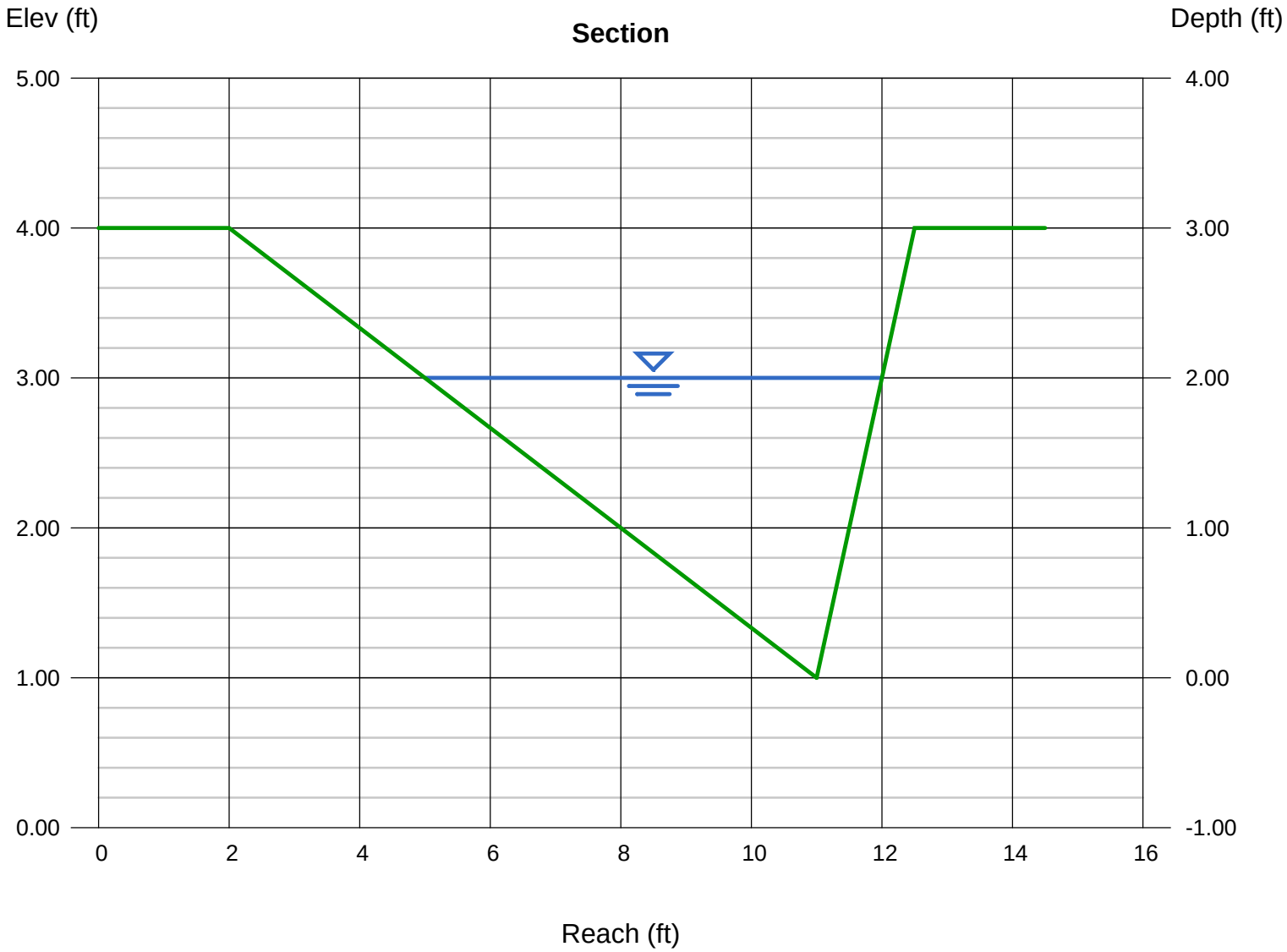
Side Slopes (z:1)	= 3.00, 0.50
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 12.00
N-Value	= 0.040

Calculations

Compute by:	Q vs Depth
No. Increments	= 30

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 78.77
Area (sqft)	= 7.00
Velocity (ft/s)	= 11.25
Wetted Perim (ft)	= 8.56
Crit Depth, Yc (ft)	= 2.50
Top Width (ft)	= 7.00
EGL (ft)	= 3.97



Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0.10	0.027	0.018	1.53	0.43
0.20	0.170	0.070	2.42	0.86
0.30	0.500	0.158	3.17	1.28
0.40	1.077	0.280	3.85	1.71
0.50	1.953	0.438	4.46	2.14
0.60	3.176	0.630	5.04	2.57
0.70	4.790	0.858	5.59	3.00
0.80	6.840	1.120	6.11	3.42
0.90	9.364	1.418	6.61	3.85
1.00	12.40	1.750	7.09	4.28
1.10	15.99	2.118	7.55	4.71
1.20	20.17	2.520	8.00	5.14
1.30	24.97	2.958	8.44	5.56
1.40	30.42	3.430	8.87	5.99
1.50	36.57	3.938	9.29	6.42
1.60	43.44	4.480	9.70	6.85
1.70	51.06	5.058	10.10	7.28
1.80	59.47	5.670	10.49	7.70
1.90	68.70	6.318	10.87	8.13
2.00	78.77	7.000	11.25	8.56
2.10	89.71	7.718	11.62	8.99
2.20	101.6	8.470	11.99	9.42

Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
2.30	114.3	9.258	12.35	9.84
2.40	128.1	10.08	12.71	10.27
2.50	142.8	10.94	13.06	10.70
2.60	158.6	11.83	13.40	11.13
2.70	175.4	12.76	13.75	11.56
2.80	193.2	13.72	14.08	11.98
2.90	212.2	14.72	14.42	12.41
3.00	232.3	15.75	14.75	12.84

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
0.01	0.35	0.14
0.11	0.70	0.29
0.23	1.05	0.46
0.35	1.40	0.63
0.48	1.75	0.81
0.60	2.10	1.00
0.73	2.45	1.19
0.86	2.80	1.38
0.99	3.15	1.58
1.13	3.50	1.78
1.26	3.85	1.99
1.40	4.20	2.20
1.53	4.55	2.41
1.67	4.90	2.62
1.80	5.25	2.84
1.94	5.60	3.06
2.08	5.95	3.28
2.22	6.30	3.51
2.36	6.65	3.74
2.50	7.00	3.97
2.64	7.35	4.20
2.78	7.70	4.44

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
2.92	8.05	4.67
3.00	8.40	4.91
3.00	8.75	5.15
3.00	9.10	5.39
3.00	9.45	5.64
3.00	9.80	5.88
3.00	10.15	6.13
3.00	10.50	6.38

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Aug 24 2011

Diversion (3H:1V;0.5H:1V) 10% Slope

Triangular

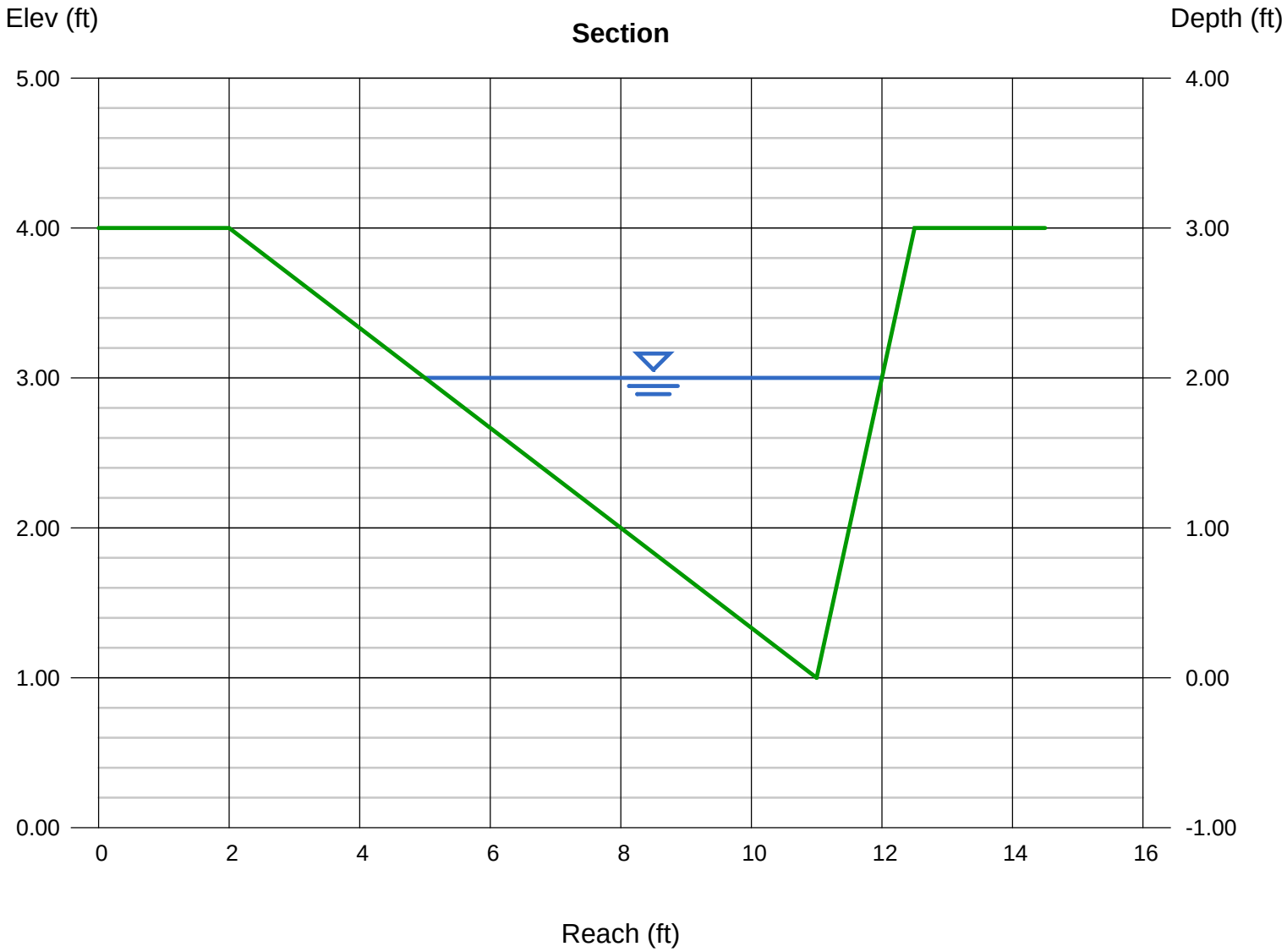
Side Slopes (z:1)	= 3.00, 0.50
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 10.00
N-Value	= 0.040

Calculations

Compute by:	Q vs Depth
No. Increments	= 30

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 71.90
Area (sqft)	= 7.00
Velocity (ft/s)	= 10.27
Wetted Perim (ft)	= 8.56
Crit Depth, Yc (ft)	= 2.41
Top Width (ft)	= 7.00
EGL (ft)	= 3.64



Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0.10	0.024	0.018	1.39	0.43
0.20	0.155	0.070	2.21	0.86
0.30	0.456	0.158	2.90	1.28
0.40	0.983	0.280	3.51	1.71
0.50	1.783	0.438	4.07	2.14
0.60	2.899	0.630	4.60	2.57
0.70	4.373	0.858	5.10	3.00
0.80	6.244	1.120	5.57	3.42
0.90	8.548	1.418	6.03	3.85
1.00	11.32	1.750	6.47	4.28
1.10	14.60	2.118	6.89	4.71
1.20	18.41	2.520	7.31	5.14
1.30	22.79	2.958	7.71	5.56
1.40	27.77	3.430	8.10	5.99
1.50	33.38	3.938	8.48	6.42
1.60	39.65	4.480	8.85	6.85
1.70	46.61	5.058	9.22	7.28
1.80	54.29	5.670	9.57	7.70
1.90	62.71	6.318	9.93	8.13
2.00	71.90	7.000	10.27	8.56
2.10	81.90	7.718	10.61	8.99
2.20	92.72	8.470	10.95	9.42

Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
2.30	104.4	9.258	11.28	9.84
2.40	116.9	10.08	11.60	10.27
2.50	130.4	10.94	11.92	10.70
2.60	144.8	11.83	12.24	11.13
2.70	160.1	12.76	12.55	11.56
2.80	176.4	13.72	12.86	11.98
2.90	193.7	14.72	13.16	12.41
3.00	212.0	15.75	13.46	12.84

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
0.01	0.35	0.13
0.11	0.70	0.28
0.22	1.05	0.43
0.34	1.40	0.59
0.46	1.75	0.76
0.58	2.10	0.93
0.71	2.45	1.10
0.83	2.80	1.28
0.96	3.15	1.47
1.09	3.50	1.65
1.22	3.85	1.84
1.35	4.20	2.03
1.48	4.55	2.22
1.61	4.90	2.42
1.74	5.25	2.62
1.87	5.60	2.82
2.00	5.95	3.02
2.14	6.30	3.23
2.27	6.65	3.43
2.41	7.00	3.64
2.54	7.35	3.85
2.68	7.70	4.06

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
2.81	8.05	4.28
2.95	8.40	4.49
3.00	8.75	4.71
3.00	9.10	4.93
3.00	9.45	5.15
3.00	9.80	5.37
3.00	10.15	5.59
3.00	10.50	5.82

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Wednesday, Aug 24 2011

Diversion (3H:1V;0.5H:1V) 2% Slope

Triangular

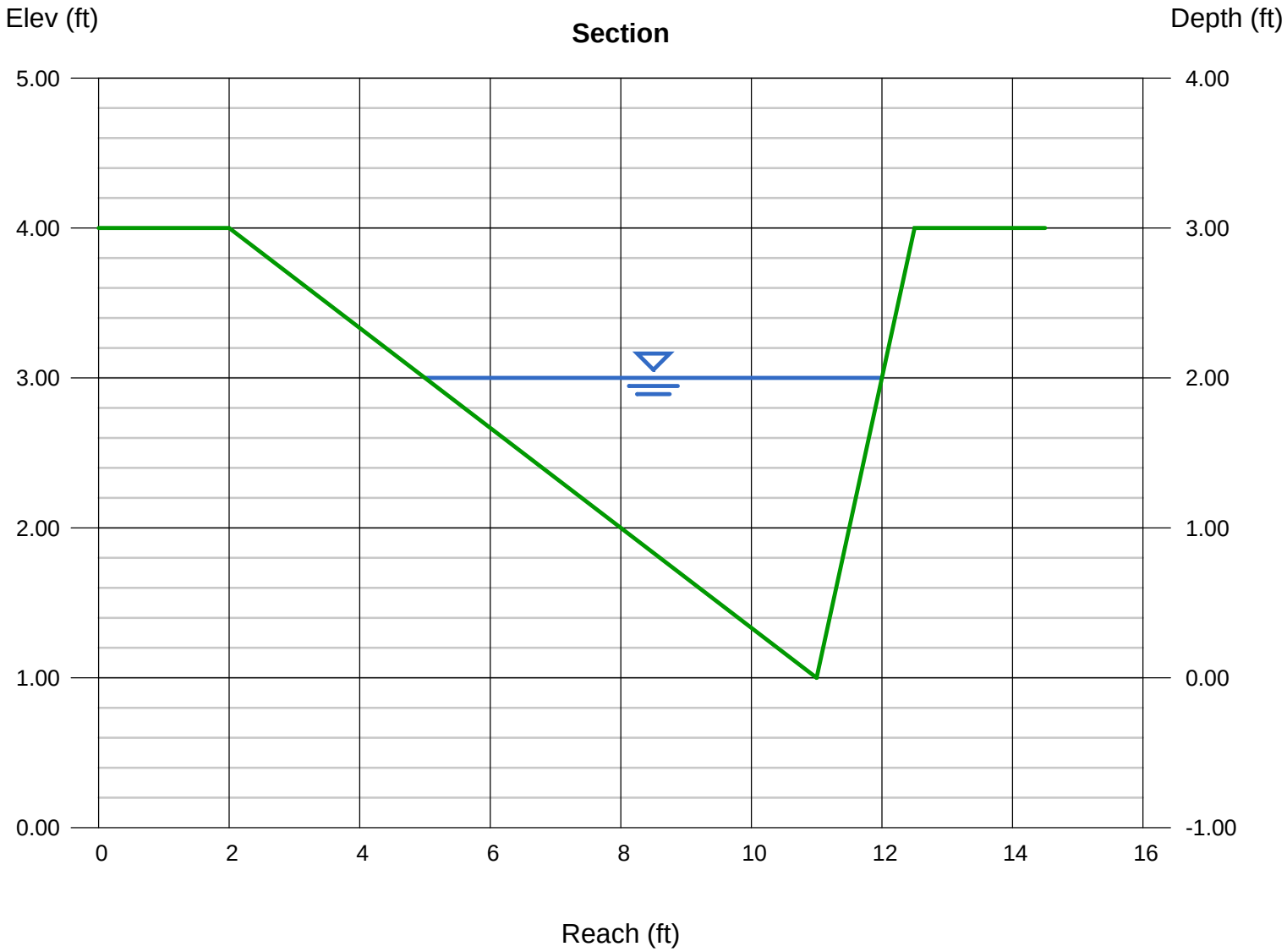
Side Slopes (z:1)	= 3.00, 0.50
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 2.00
N-Value	= 0.040

Calculations

Compute by:	Q vs Depth
No. Increments	= 30

Highlighted

Depth (ft)	= 2.00
Q (cfs)	= 32.16
Area (sqft)	= 7.00
Velocity (ft/s)	= 4.59
Wetted Perim (ft)	= 8.56
Crit Depth, Yc (ft)	= 1.75
Top Width (ft)	= 7.00
EGL (ft)	= 2.33



Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0.10	0.011	0.018	0.62	0.43
0.20	0.069	0.070	0.99	0.86
0.30	0.204	0.158	1.30	1.28
0.40	0.440	0.280	1.57	1.71
0.50	0.797	0.438	1.82	2.14
0.60	1.296	0.630	2.06	2.57
0.70	1.956	0.858	2.28	3.00
0.80	2.792	1.120	2.49	3.42
0.90	3.823	1.418	2.70	3.85
1.00	5.063	1.750	2.89	4.28
1.10	6.529	2.118	3.08	4.71
1.20	8.234	2.520	3.27	5.14
1.30	10.19	2.958	3.45	5.56
1.40	12.42	3.430	3.62	5.99
1.50	14.93	3.938	3.79	6.42
1.60	17.73	4.480	3.96	6.85
1.70	20.85	5.058	4.12	7.28
1.80	24.28	5.670	4.28	7.70
1.90	28.05	6.318	4.44	8.13
2.00	32.16	7.000	4.59	8.56
2.10	36.63	7.718	4.75	8.99
2.20	41.46	8.470	4.90	9.42

Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
2.30	46.68	9.258	5.04	9.84
2.40	52.29	10.08	5.19	10.27
2.50	58.31	10.94	5.33	10.70
2.60	64.74	11.83	5.47	11.13
2.70	71.59	12.76	5.61	11.56
2.80	78.88	13.72	5.75	11.98
2.90	86.62	14.72	5.89	12.41
3.00	94.82	15.75	6.02	12.84

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
0.01	0.35	0.11
0.08	0.70	0.22
0.16	1.05	0.33
0.25	1.40	0.44
0.34	1.75	0.55
0.42	2.10	0.67
0.51	2.45	0.78
0.60	2.80	0.90
0.70	3.15	1.01
0.79	3.50	1.13
0.88	3.85	1.25
0.98	4.20	1.37
1.07	4.55	1.48
1.17	4.90	1.60
1.26	5.25	1.72
1.36	5.60	1.84
1.45	5.95	1.96
1.55	6.30	2.09
1.65	6.65	2.21
1.75	7.00	2.33
1.84	7.35	2.45
1.94	7.70	2.57

Yc	TopWidth	Energy
(ft)	(ft)	(ft)
2.04	8.05	2.70
2.14	8.40	2.82
2.24	8.75	2.94
2.34	9.10	3.07
2.44	9.45	3.19
2.54	9.80	3.31
2.64	10.15	3.44
2.74	10.50	3.56

Appendix 4

Construction Photos

North Diversion

Photo 1: Loading logs from tree falling activities.

Photo 2: Pioneering around STA 31+00.

Photo 3: Loading slash material around STA 8+00.

Photo 4: Stripping and removing topsoil around STA 5+00.

Photo 5: Removing organic material around STA 13+00.

Photo 6: Dozing and excavating cut slope around STA 11+00.

Photo 7: Compaction test fill around STA 12+50.

Photo 8: Hauling away slash material, and dozing and compacting pioneer road.

Photo 9: Grubbing around STA 19+00.

Photo 10: Removing frozen organic material around STA 21+00.

Photo 11: Pioneering around STA 41+00.

Photo 12: Stormwater management at Inlet 2.

Photo 13: Grading and compacting road around STA 33+00.

Photo 14: Working around existing thermistor around STA 45+00.

Photo 15: Loading haul truck with excess fill at Inlet 2.

Photo 16: Dozing and placing Type 1 & 2 General Fill around STA 37+00.

Photo 17: Grading fill slope around STA 32+00.

Photo 18: Dozing and excavating channel around STA 44+00.

Photo 19: Grading channel around STA 22+00.

Photo 20: Excavating road to subgrade around STA 25+00.

Photo 21: Final relocation of existing thermistor around STA 45+00.

Photo 22: Grading cut slope around STA 40+00.

Photo 23: Dumping road surfacing material around STA 14+00.

Photo 24: Dozing and compacting road surfacing material around STA 15+00.

Photo 25: Shotcrete placement, thickness testing and test panel around STA 6+00.

Photo 26: Shotcrete protection around STA 16+00.

Photo 27: Excavating Inlet 1.

Photo 28: Inlet 1 subgrade.

Photo 29: Completed shotcrete apron at Inlet 1.

Photo 30: Test pit at Inlet 2.

Photo 31: Test pit at Inlet 3.

Photo 32: Test pit at Inlet 3.

Photo 33: Placing geotextile fabric at Inlet 1.

Photo 34: Placing drain pipes and drain gravel at Inlet 1.

Photo 35: Placing drain gravel over drain pipes at Inlet 1.

Photo 36: Final configuration of drain pipes and gravel blanket at Inlet 1.

Photo 37: Placing 3-inch rip-rap at Inlet 1.

Photo 38: Compacting 3-inch rip-rap at Inlet 1.

Photo 39: Placing 9-inch rip-rap at Inlet 1.

Photo 40: Shoveling out ice, water, and rocks from anchor trench at Inlet 2.

Photo 41: Removing snow and ice from Inlet 2 apron subgrade.

Photo 42: Placing insulation on apron subgrade at Inlet 2.

Photo 43: Test weld of HDPE liner in tent near airstrip.

Photo 44: Seaming of HDPE liner in tent near airstrip.

Photo 45: Placing HDPE geomembrane liner on insulation and in anchor trench at Inlet 2.

Photo 46: Placing geotextile fabric and drain pipes on liner at Inlet 2.

Photo 47: Placing drain gravel on geotextile and drain pipes at Inlet 2.

Photo 48: Wrapping drain gravel and drain pipes in geotextile at Inlet 2.

Photo 49: Placing and compacting 3-inch rip-rap on drain gravel blanket at Inlet 2.

Photo 50: Placing 9-inch rip-rap at Inlet 2.

Photo 51: End of winter construction view of Inlet 2.

Photo 52: Drilling blast holes around STA 55+00.

Photo 53: Cutting out undermined and cracked section of shotcrete around STA 34+50.

Photo 54: Thermistor cover after shotcrete placement around STA 45+00.

Photo 55: Placing road surfacing material around STA 53+00.

Photo 56: Excavating Inlet 3N.

Photo 57: Placing geotextile fabric and French drain pipe at Inlet 3N.

Photo 58: Placing drain gravel over drain pipe at Inlet 3N.

Photo 59: Backfilling French drain pipe with Type 2 General Fill at Inlet 3N.

Photo 60: View of HDPE liner installed at Inlet 3N.

Photo 61: Placing geotextile fabric over cut slope at Inlet 3N.

Photo 62: Placing 9-inch rip-rap over geotextile at Inlet 3N.

Photo 63: Surveying French drain pipe location at Inlet 2.

Photo 64: Placing drain gravel over drain pipe at Inlet 2.

Photo 65: Surveying and preparing inlet floor at Inlet 2.

Photo 66: Shotcrete operation around STA 47+00.

Photo 67: Crushed and buried CMP culvert along North Diversion Access Road.

Photo 68: View of Inlet 3N with shotcrete and reclaimed area next to Inlet 3N.

Photo 69: Drilling blast holes on old North Diversion for channel breaches.

Photo 70: Placing shotcrete at North Diversion Tie-In.

Photo 71: View of typical berm slot.

Photo 72: View of Inlet 1.

Photo 73: View of typical French drain pipe cut flush with shotcrete.

Photo 74: View of Inlet 3N.

Photo 75: Building forms for channel plug.

Photo 76: Pouring concrete in channel plug (photo courtesy of AAP).

Photo 77: View of finished concrete channel plug.

Photo 78: View of Inlet 2.

Photo 79: Excavating channel breach.

South Diversion

Photo 1: Grubbing and pioneering around STA 27+00.

Photo 2: Grubbing and pioneering around STA 22+00.

Photo 3: Removing talus around STA 25+00.

Photo 4: Dozing cut slope around STA 27+00.

Photo 5: Excavating cut slope around STA 23+00.

Photo 6: Dozing and excavating cut slope around STA 24+00.

Photo 7: Test pit at Inlet 4.

Photo 8: Drilling blast hole around STA 23+00.

Photo 9: Excavating cut slope around STA 25+00 and loading haul truck around STA 24+00.

Photo 10: Dumping and dozing Type 1 and 2 General Fill around STA 17+50.

Photo 11: Placing organic material beyond toe of fill slope around STA 15+00.

Photo 12: Compaction test fill around STA 18+00.

Photo 13: Grading cut slope around STA 28+00.

Photo 14: General construction activities.

Photo 15: Grading channel around STA 26+00.

Photo 16: Compacting traffic limits around STA 24+00.

Photo 17: Placing and compacting road surfacing material around STA 23+50.

Photo 18: Dozing Type 1 General Fill and building berms around STA 25+00.

Photo 19: Shotcrete placement, thickness testing, and test panel around STA 26+75.

Photo 20: Dozing and excavating channel around STA 14+00.

Photo 21: Building Thrust Block 1 ramp on the old South Diversion.

Photo 22: Building forms for flume intake structure base at STA 4+50.

Photo 23: Excavating Inlet 4.

Photo 24: Placing gravel over French drain pipe and geotextile fabric at Inlet 4.

Photo 25: Pouring concrete in flume intake structure floor at STA 4+50.

Photo 26: Finishing concrete in flume intake structure base at STA 4+50.

Photo 27: Welding HDPE pipes together on the old South Diversion.

Photo 28: Placing 9-inch rip-rap at Inlet 4 Seep.

Photo 29: Placing HDPE liner and geotextile fabric at Inlet 4.

Photo 30: View of 9-inch rip-rap placed at Inlet 4.

Photo 31: Building forms for flume intake structure walls at STA 4+50.

Photo 32: Placing shotcrete around STA 10+50.

Photo 33: Pouring and vibrating concrete in flume intake structure walls at STA 4+50.

Photo 34: Finishing concrete in flume intake structure walls at STA 4+50.

Photo 35: HDPE liner repair weld at Inlet 4.

Photo 36: View of Inlet 4.

Photo 37: Fusing electrofusion flex restraints to HDPE pipe.

Photo 38: Building forms for upper thrust block.

Photo 39: Pouring and vibrating concrete in upper thrust block.

Photo 40: Finishing concrete in upper thrust block.

Photo 41: Raising the HDPE pipe.

Photo 42: Raising the HDPE pipe.

Photo 43: View of flume intake structure and upper thrust block at STA 4+50.

Photo 44: Compacting gravel backfill around flume intake structure and upper thrust block.

Photo 45: View of French drain pipe wrapped in geotextile and gravel at Inlet 3S.

Photo 46: View of French drain pipe backfilled with gravel at Inlet 3S.

Photo 47: Building rebar cage for Thrust Block 2.

Photo 48: Grading road around STA 20+00.

Photo 49: View of battens securing HPDE liner to shotcrete at Inlet 4.

Photo 50: View of three areas of 9-inch rip-rap at Inlet 3S.

Photo 51: Building forms for Thrust Block 1.

Photo 52: View of rebar cage and forms for Thrust Block 1.

Photo 53: View of rebar cage and forms for Thrust Block 2.

Photo 54: Pouring concrete in Thrust Block 1.

Photo 55: Vibrating concrete in Thrust Block 1.

Photo 56: Finishing concrete in Thrust Block 1.

Photo 57: View of safety railing around flume intake structure at STA 4+50.

Photo 58: Pouring and vibrating concrete in Thrust Block 2 (photo courtesy of AAP).

Photo 59: Finishing concrete in Thrust Block 2.

Photo 60: Placing shotcrete around flume intake structure at STA 4+50.

Photo 61: Building forms for channel plug.

Photo 62: View of honeycombing and voids in concrete in Thrust Block 1.

Photo 63: Connecting HDPE pipe with flange to upper thrust block.

Photo 64: View of HDPE pipe connected to upper thrust block.

Photo 65: Compacting gravel backfill around HDPE pipe.

Photo 66: Pouring and vibrating concrete in channel plug.

Photo 67: Finishing concrete in channel plug.

Photo 68: Compacting gravel backfill around and over HDPE pipe and upper thrust block.

Photo 69: Compacting road surfacing material over upper thrust block at STA 4+50.

Photo 70: Placing road surfacing material around STA 4+25.

Photo 71: View of HDPE pipe on hillside.

Photo 72: View of HPDE pipe on hillside.

Photo 73: Placing gravel backfill around HDPE pipe by Thrust Block 2.

Photo 74: Shoveling gravel backfill around Thrust Block 2 and HDPE pipe.

Photo 75: Compacting gravel backfill around HPDE pipe near Thrust Block 2.

Photo 76: Placing gravel backfill around Thrust Block 2.

Photo 77: View of flume intake structure with ladder and safety bar in HDPE pipe.

Photo 78: Placing 20-inch rip-rap over geotextile fabric in stilling basin.

Photo 79: Drilling holes in concrete for pressure grouting Thrust Block 1.

Photo 80: Placing 9-inch rip-rap in stilling basin.

Photo 81: Troweling grout over honeycombed concrete above metal sheets on Thrust Block 1.

Photo 82: View of two large boulders in stilling basin.

Photo 83: View of stilling basin.

Photo 84: View of steel plates with welded pipe fittings for pressure grouting Thrust Block 1.

Photo 85: Pressure grouting voids in concrete in Thrust Block 1.

Photo 86: Pressure grouting voids in concrete in Thrust Block 1.

Photo 87: Compacting gravel backfill around Thrust Block 1.

Photo 88: Compacting gravel backfill around Thrust Block 2 and HDPE pipe.

Photo 89: Compacting gravel backfill around Thrust Block 1.

Photo 90: Placing and bucket compacting Type 2 General Fill around Thrust Block 1 and pipe.

Photo 91: View of graded and compacted backfill around Thrust Blocks 1 and 2.

Photo 92: View of Thrust Blocks 1 and 2 and stilling basin.

Photo 93: View of channel plug and channel breach.

Photo 94: View of flume intake structure.

Photo 95: View of erosion at Inlet 4 Seep.

Crusher and Shotcrete/Concrete Batch Plant

Photo 1: Loading crusher plant with green rock.

Photo 2: Crusher producing aggregate.

Photo 3: Crusher plant in operation.

Photo 4: Loader building gravel stockpile by crusher plant.

Photo 5: Loading haul truck with aggregate for transport to Shell 2.

Photo 6: Loading and dumping aggregate on Shell 2.

Photo 7: Excavator mixing water and gravel in stockpile on Shell 2.

Photo 8: Batch plant in operation on Shell 2.

Photo 9: Batch plant producing shotcrete on Shell 2.

Appendix 5

Road Surfacing Material Test Results

Testing Summary and Results

Table A.5.1: One-Inch Gravel Sample Test Results.

One-Inch Gravel Sample Test Results				
Date	Location	Proctor Max Dry Density (pcf)	Optimum Moisture (%)	Gradation Pass/Fail
15-Aug-12	Crusher	-	-	Fail*
16-Aug-12	Crusher	-	-	Pass
17-Aug-12	Crusher	-	-	Pass
18-Aug-12	Crusher	147.9	4.9	Pass
24-Aug-12	Crusher	-	-	Pass
31-Aug-12	N DIV STA 10+00	-	-	Pass
31-Aug-12	N DIV STA 19+50	-	-	Pass
31-Aug-12	N DIV STA 25+00	-	-	Pass
31-Aug-12	N DIV STA 33+50	-	-	Pass
02-Sep-12	Crusher	-	-	Pass
03-Sep-12	N DIV STA 42+00	-	-	Pass
13-Jul-13	Stockpile	-	-	Pass
22-Jul-13	Stockpile	145.9	6.1	Pass
03-Aug-13	S DIV STA 15+00	-	-	Pass
05-Aug-13	S DIV STA 28+00	-	-	Pass
24-Aug-13	Stockpile	146.2	5.1	Pass
24-Aug-13	Stockpile	147.3	5	Pass
24-Aug-13	Stockpile	147.3	6.2	Pass
24-Aug-13	Stockpile	146.8	5.2	Pass
24-Aug-13	Stockpile	146.8	5	Pass
24-Aug-13	Stockpile	147.9	4.4	Pass

*First day of crusher plant production. All subsequent gradation tests passed.

Table A.5.2: One-Inch Gravel Field Density Test Results.

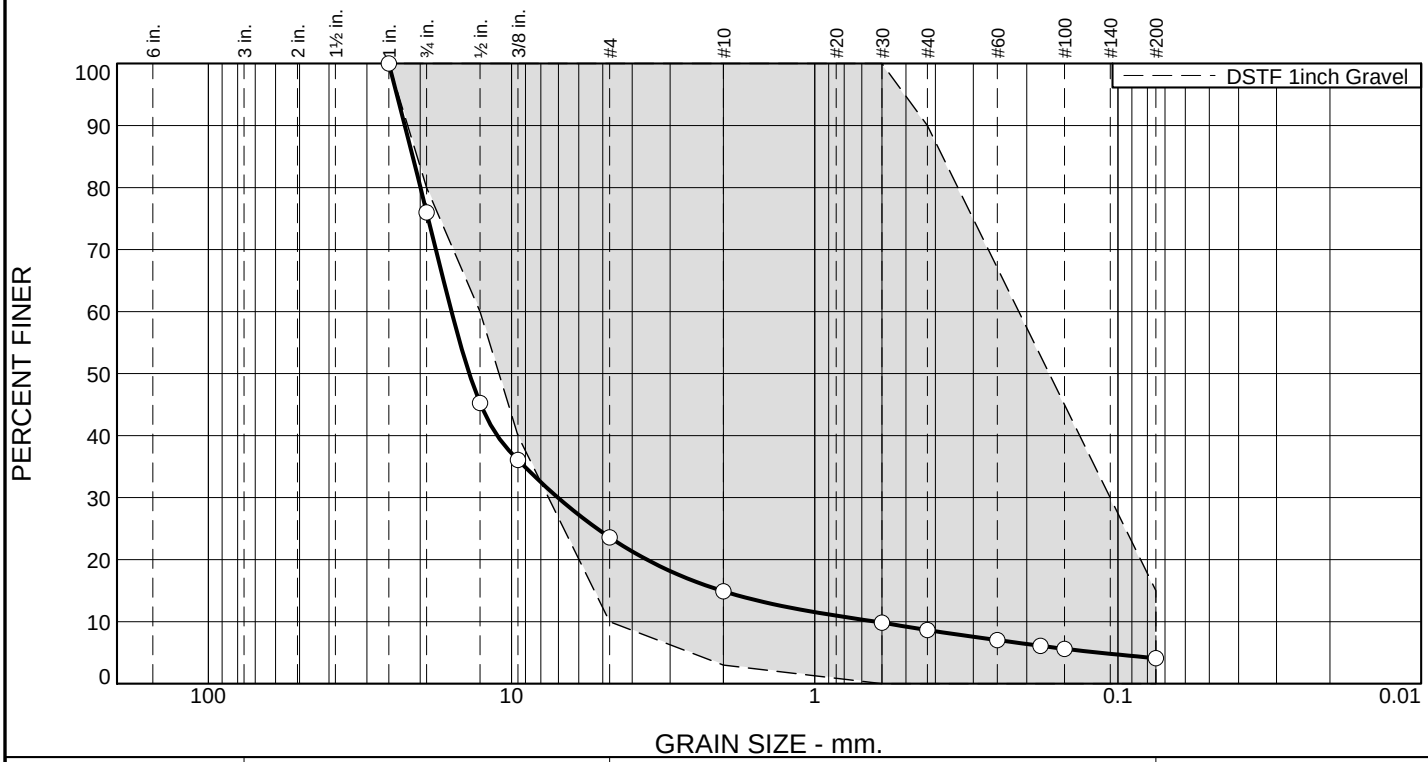
One-Inch Gravel Field Density Test Results				
Date	Location	% Compaction	Field Moisture (%)	Compaction Pass/Fail
24-Aug-12	N DIV STA 8+65	98.5	6.1	Pass
24-Aug-12	N DIV STA 8+00	97.0	5.8	Pass
24-Aug-12	N DIV STA 8+65	97.5	5.7	Pass
29-Aug-12	N DIV STA 23+50	96.9	5.8	Pass

29-Aug-12	N DIV STA 19+60	98.1	6.6	Pass
29-Aug-12	N DIV STA 15+00	96.0	5.9	Pass
29-Aug-12	N DIV STA 10+60	95.9	7.1	Pass
04-Sep-12	N DIV STA 27+75	99.1	4.9	Pass
04-Sep-12	N DIV STA 31+75	99.7	4.8	Pass
04-Sep-12	N DIV STA 33+90	97.0	4.7	Pass
04-Sep-12	N DIV STA 37+65	97.1	5.6	Pass
04-Sep-12	N DIV STA 41+50	98.4	5.5	Pass
04-Sep-12	N DIV STA 45+75	98.0	5.4	Pass
13-Jul-13	S DIV STA 18+40	99.3	4.9	Pass
13-Jul-13	S DIV STA 21+00	99.7	4.8	Pass
13-Jul-13	S DIV STA 27+65	95.0	4.9	Pass
13-Jul-13	S DIV STA 27+60	96.3	5.2	Pass
22-Jul-13	S DIV STA 18+40	94.5	7.7	Pass
22-Jul-13	N DIV STA 52+40	96.1	7	Pass
22-Jul-13	N DIV STA 49+90	95.0	8.6	Pass
22-Jul-13	N DIV STA 52+40	96.6	7.8	Pass
06-Aug-13	S DIV STA 5+75	99.7	4.6	Pass
06-Aug-13	S DIV STA 10+00	96.0	4.2	Pass
06-Aug-13	S DIV STA 15+00	97.6	5	Pass
12-Aug-13	S DIV STA 28+00	99.3	5.1	Pass
12-Aug-13	S DIV STA 16+50	99.6	5.9	Pass
12-Aug-13	N DIV STA 0+50	88.2	3.6	Fail*
12-Aug-13	N DIV STA 0+50	94.1	5.2	Fail*
12-Aug-13	N DIV STA 0+50	93.7	3.2	Fail*
12-Aug-13	N DIV STA 1+00	92.7	3.7	Fail*
12-Aug-13	N DIV STA 1+25	92.7	4	Fail*
12-Aug-13	N DIV STA 1+25	92.9	3.9	Fail*
16-Aug-13	N DIV STA 1+25	96.8	4.7	Pass
16-Aug-13	N DIV STA 1+75	95.6	4.6	Pass
16-Aug-13	N DIV STA 1+50	95.8	5.7	Pass
11-Sep-13	S DIV STA 4+55	98.1	7.5	Pass
11-Sep-13	S DIV STA 4+50	97.5	6.6	Pass
11-Sep-13	S DIV STA 4+45	96.8	7.1	Pass

*Failing tests were successfully retested after AAP wetted and recompacted the area over the course of several days.

Note: Field density test results were obtained from nuclear gauge (ASTM D6938) or sand cone (ASTM D1556) test methods.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	24	52	9	6	5	4

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	76	80 - 100	X
1/2	45	60 - 100	X
3/8	36	40 - 100	X
#4	24	10 - 100	
#10	15	3 - 100	
#30	10	0 - 100	
#40	9	0 - 90	
#60	7		
#80	6		
#100	6		
#200	4.1	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= GP **AASHTO (M 145)=**

Coefficients

D_{90}= 22.5004 D_{85}= 21.1890 D_{60}= 15.7770
D_{50}= 13.7768 D_{30}= 7.0276 D_{15}= 2.0300
D_{10}= 0.6323 C_u= 24.95 C_c= 4.95

Remarks

ASG 081512

Date Received: 8/16/12 **Date Tested:** 8/17/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

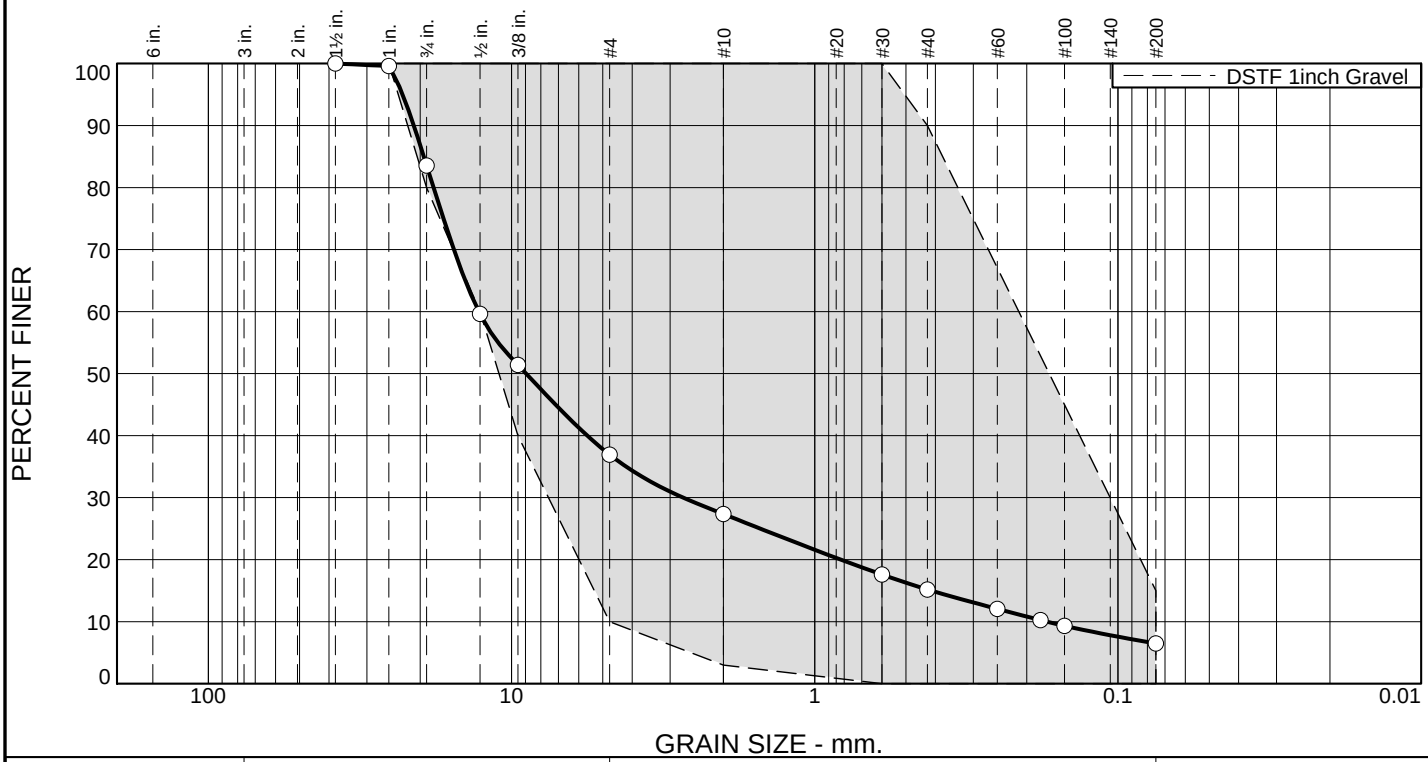
Source of Sample: Crusher
Sample Number: 12-1252

Date Sampled: 8/16/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	16	47	10	12	9	6

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100		
1	100	100	
3/4	84	80 - 100	
1/2	60	60 - 100	
3/8	51	40 - 100	
#4	37	10 - 100	
#10	27	3 - 100	
#30	18	0 - 100	
#40	15	0 - 90	
#60	12		
#80	10		
#100	9		
#200	6.5	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 21.0077 D_{85}= 19.4675 D_{60}= 12.8157
D_{50}= 8.9538 D_{30}= 2.7151 D_{15}= 0.4131
D_{10}= 0.1716 C_u= 74.68 C_c= 3.35

Remarks

ASG 081612

Date Received: 8/16/12 **Date Tested:** 8/17/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

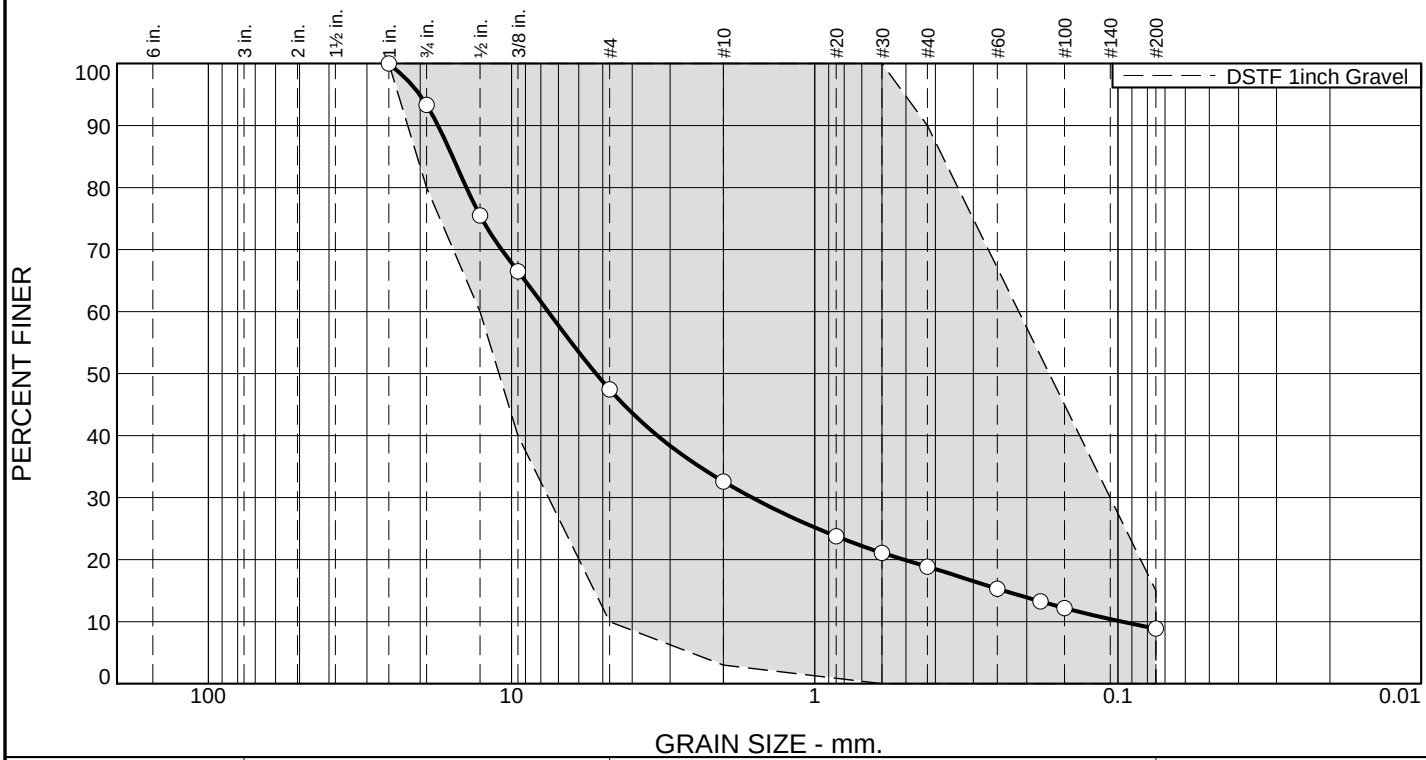
Source of Sample: Crusher
Sample Number: 12-1251

Date Sampled: 8/16/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	7	46	14	14	10	9

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	93	80 - 100	
1/2	76	60 - 100	
3/8	67	40 - 100	
#4	47	10 - 100	
#10	33	3 - 100	
#20	24		
#30	21	0 - 100	
#40	19	0 - 90	
#60	15		
#80	13		
#100	12		
#200	8.9	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.4810 D_{85}= 15.6589 D_{60}= 7.5723
D_{50}= 5.2673 D_{30}= 1.6087 D_{15}= 0.2381
D_{10}= 0.0970 C_u= 78.08 C_c= 3.52

Remarks

Date Received: 8/18/12 **Date Tested:** 8/21/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

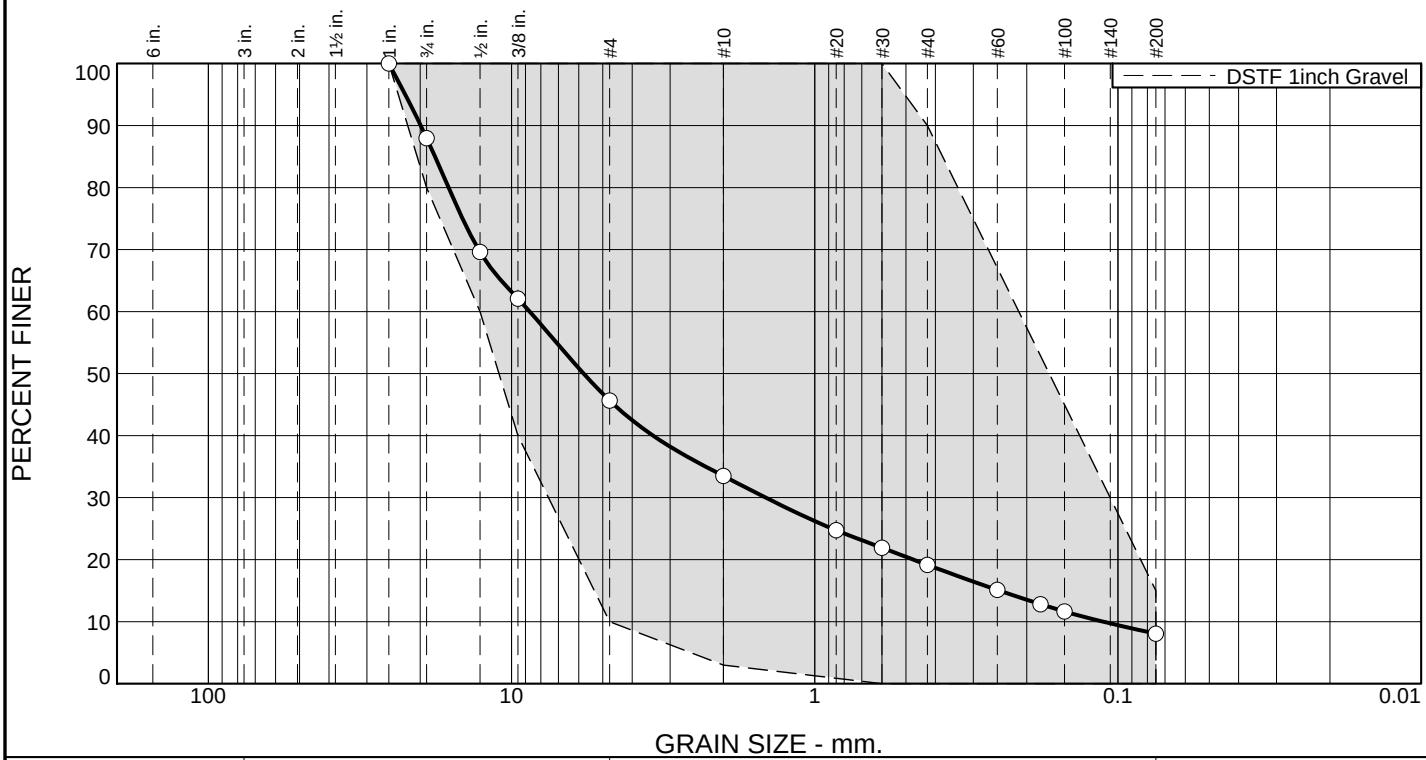
Source of Sample: Crusher
Sample Number: 12-1273

Date Sampled: 8/17/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	12	42	13	14	11	8

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	88	80 - 100	
1/2	70	60 - 100	
3/8	62	40 - 100	
#4	46	10 - 100	
#10	33	3 - 100	
#20	25		
#30	22	0 - 100	
#40	19	0 - 90	
#60	15		
#80	13		
#100	12		
#200	8.1	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel - well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GW-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 19.9287 D_{85}= 17.8872 D_{60}= 8.7139
D_{50}= 5.7850 D_{30}= 1.4508 D_{15}= 0.2459
D_{10}= 0.1120 C_u= 77.83 C_c= 2.16

Remarks

Max Dry Density = 147.9 pcf @ 4.9% moisture

Date Received: 8/18/12 **Date Tested:** 8/21/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

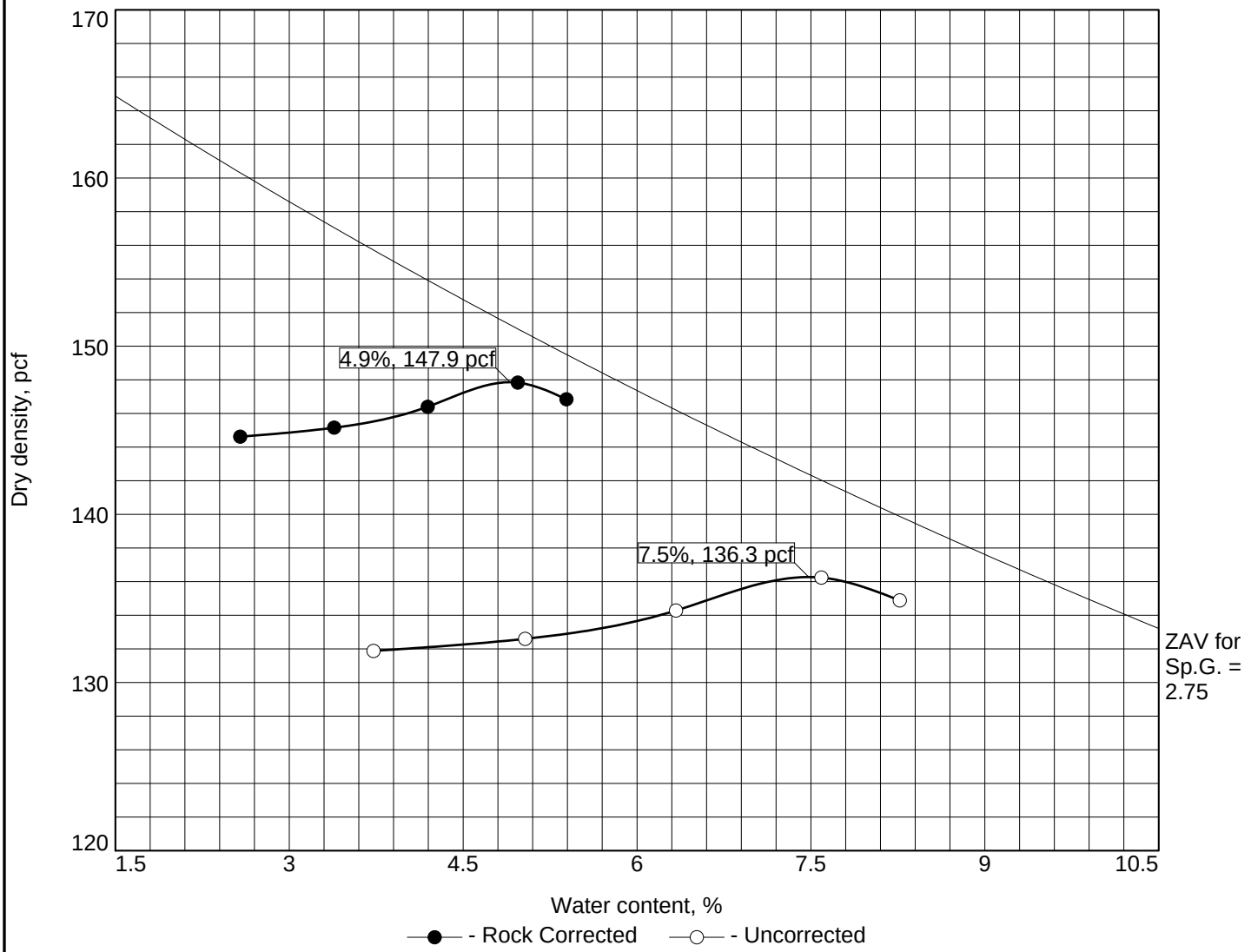
Location: Crusher Stockpile
Sample Number: 12-1274

Date Sampled: 8/18/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 12-1274



Test specification: ASTM D 698-07 Method B Standard
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	GW-GM	A-1-a		2.75	NV	NP	38	8.1

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 147.9 pcf	136.3 pcf	1" Gravel - well-graded gravel with silt and sand
Optimum moisture = 4.9 %	7.5 %	

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 08/22/2012
○ **Location:** Crusher Stockpile **Sample Number:** 12-1274

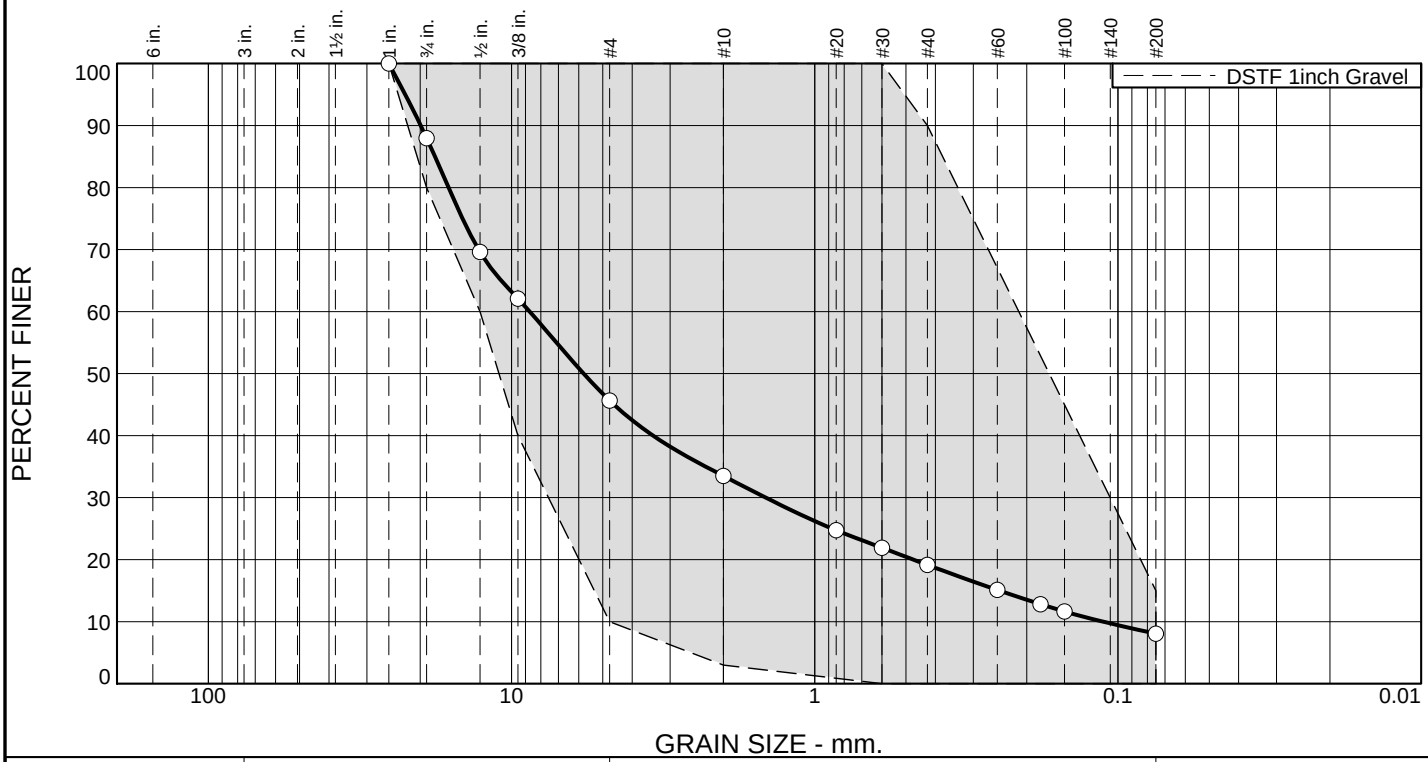
Remarks:
Specific Gravity Determined by ASTM C 127

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: Mika Mack **Checked By:** Stefan Mack, PE

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	12	42	13	14	11	8

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	88	80 - 100	
1/2	70	60 - 100	
3/8	62	40 - 100	
#4	46	10 - 100	
#10	33	3 - 100	
#20	25		
#30	22	0 - 100	
#40	19	0 - 90	
#60	15		
#80	13		
#100	12		
#200	8.1	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.9287 D_{85}= 17.8872 D_{60}= 8.7139
D_{50}= 5.7850 D_{30}= 1.4508 D_{15}= 0.2459
D_{10}= 0.1120 C_u= 77.83 C_c= 2.16

Remarks

Date Received: 8/18/12 **Date Tested:** 8/21/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

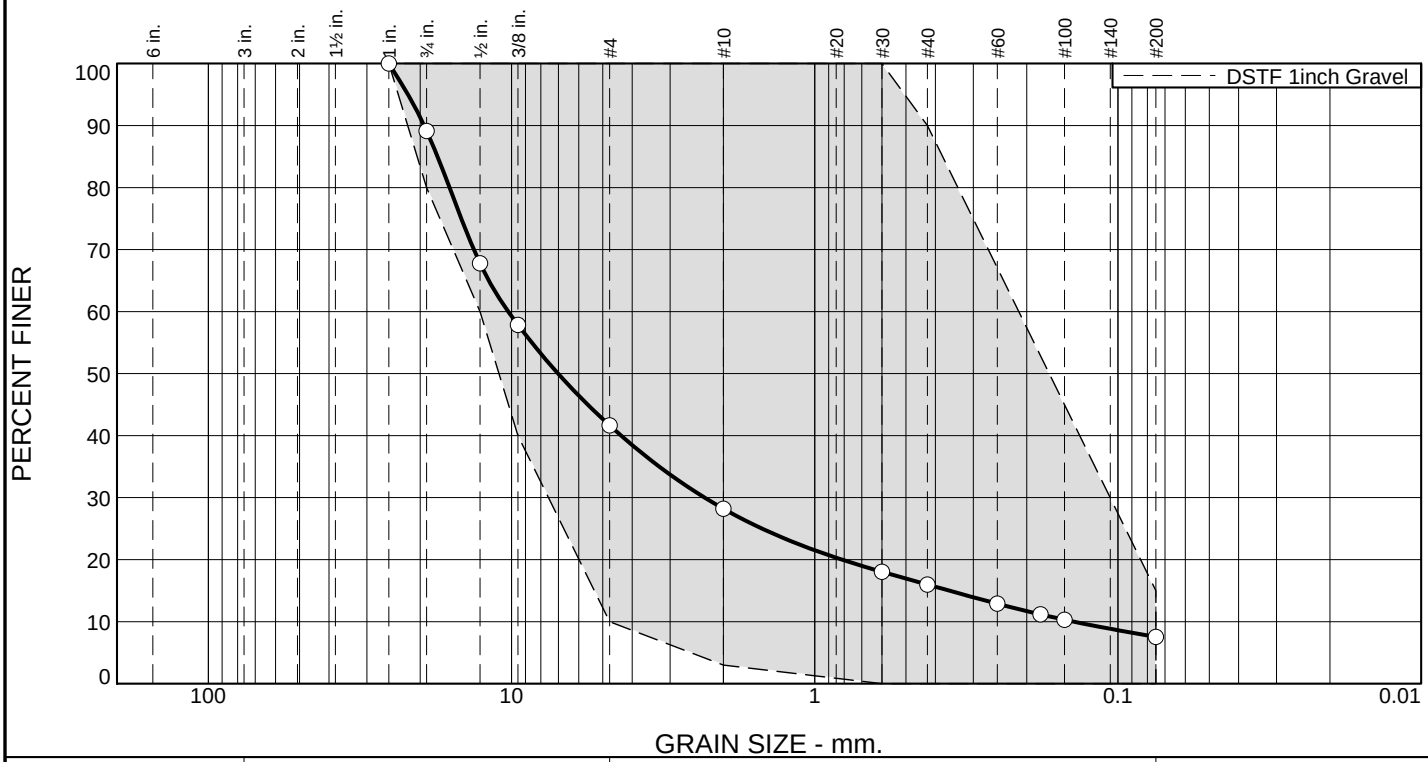
Source of Sample: Crusher
Sample Number: 12-1274

Date Sampled: 8/18/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	11	47	14	12	8	8

TEST RESULTS (ASTM D 422)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	89	80 - 100	
1/2	68	60 - 100	
3/8	58	40 - 100	
#4	42	10 - 100	
#10	28	3 - 100	
#30	18	0 - 100	
#40	16	0 - 90	
#60	13		
#80	11		
#100	10		
#200	7.5	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.4167 D_{85}= 17.5466 D_{60}= 10.2563
D_{50}= 7.0203 D_{30}= 2.3090 D_{15}= 0.3601
D_{10}= 0.1401 C_u= 73.18 C_c= 3.71

Remarks

Date Received: 8/24/12 **Date Tested:** 8/28/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

Source of Sample: Crusher
Sample Number: 12-1290

Date Sampled: 8/24/12

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Mappa Inc
1956 Richardson Hwy
North Pole, AK 99705
907-488-1266

1210 East 68th Ave Ste 102
Anchorage, AK 99518
907-336-6162

August 30, 2012

Sumitomo Metal Mining Pogo LLC
Pogo Mine, AK

Soil Source: DSTF
Sta 8+65 Rt CL

Tests: ASTM D1556 – *Density and Unit Wt of Soil in Place by Sand-Cone Method*

Date of Tests: **August 24, 2012**

Test Apparatus	J8		
Calibration Mass (lb)	2.810		
Silica Sand			
Density (pcf)	81.35		
Test Hole Vol (cf)	0.0766		
Water Content (%)	5.7		
Wet Density (pcf)	152.3		
Dry Density (pcf)	144.2		
Max Density (pcf)	147.9		
Compaction	97.5%		

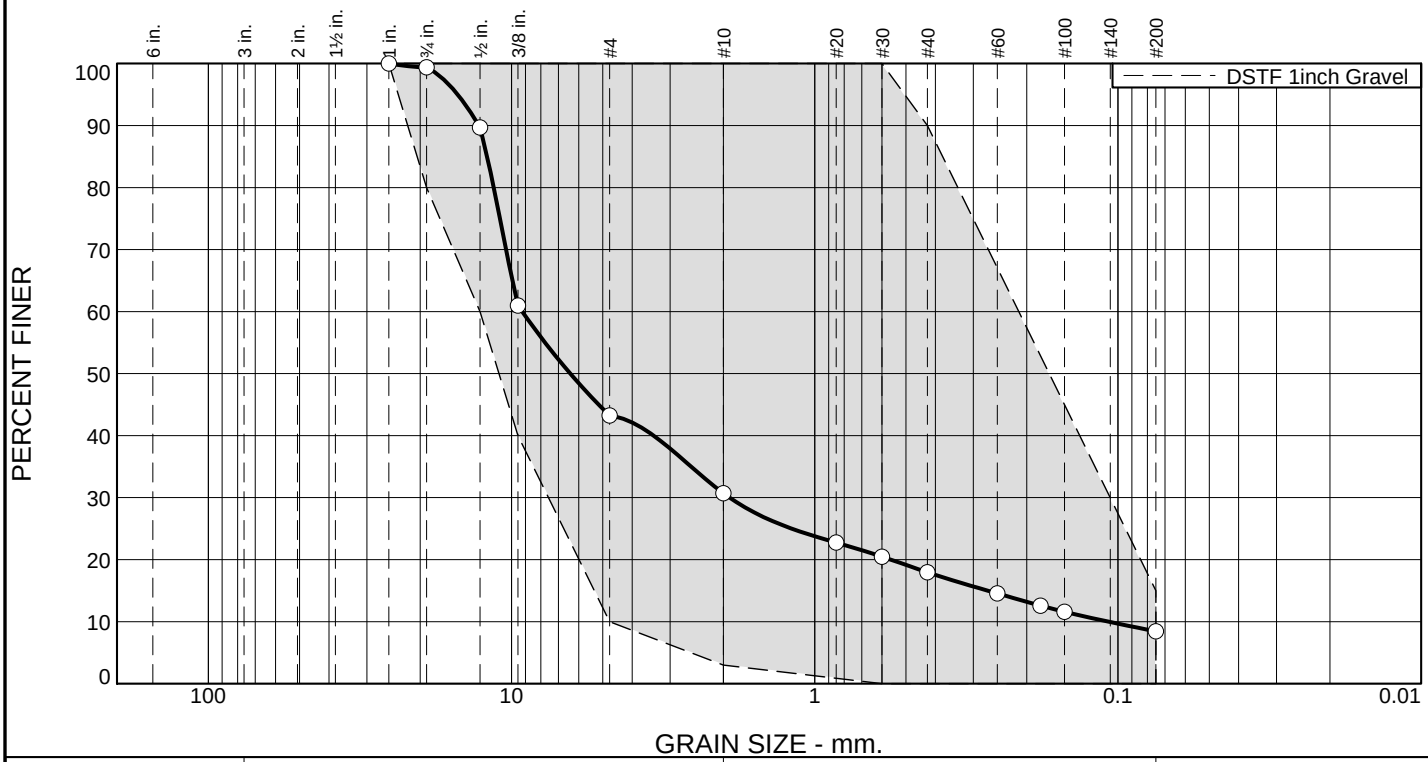
If there are any questions please call 488-1266.

Thank you,

Stefan Mack

Stefan Mack, PE
Mappa Inc

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	69	13	10	8

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	99	80 - 100	
1/2"	90	60 - 100	
3/8"	61	40 - 100	
#4	43	10 - 100	
#10	31	3 - 100	
#20	23		
#30	20	0 - 100	
#40	18	0 - 90	
#60	15		
#80	13		
#100	12		
#200	8.4	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 12.8124 D_{85}= 12.0266 D_{60}= 9.2255
D_{50}= 6.4000 D_{30}= 1.9096 D_{15}= 0.2688
D_{10}= 0.1077 C_u= 85.67 C_c= 3.67

Remarks

Date Received: 09/04/2012 **Date Tested:** 09/08/2012

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

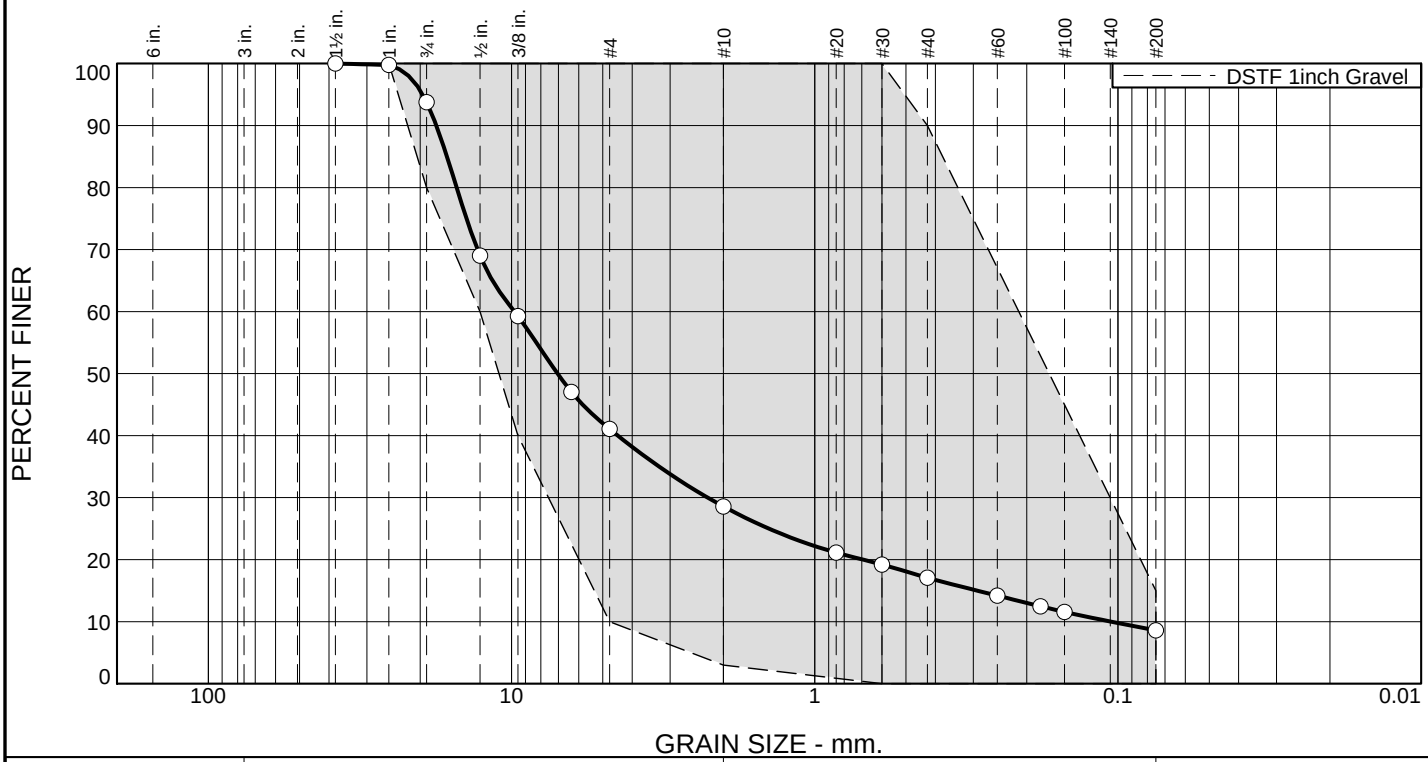
Location: N-1000-G-0831
Sample Number: 12-1366

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	71	12	8	9

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100		
1"	100	100	
3/4"	94	80 - 100	
1/2"	69	60 - 100	
3/8"	59	40 - 100	
1/4"	47		
#4	41	10 - 100	
#10	29	3 - 100	
#20	21		
#30	19	0 - 100	
#40	17	0 - 90	
#60	14		
#80	12		
#100	12		
#200	8.6	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.7022 D_{85}= 16.3370 D_{60}= 9.7800
D_{50}= 7.0543 D_{30}= 2.2547 D_{15}= 0.2910
D_{10}= 0.1055 C_u= 92.67 C_c= 4.93

Remarks

Date Received: 09/04/2012 **Date Tested:** 09/08/2012

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

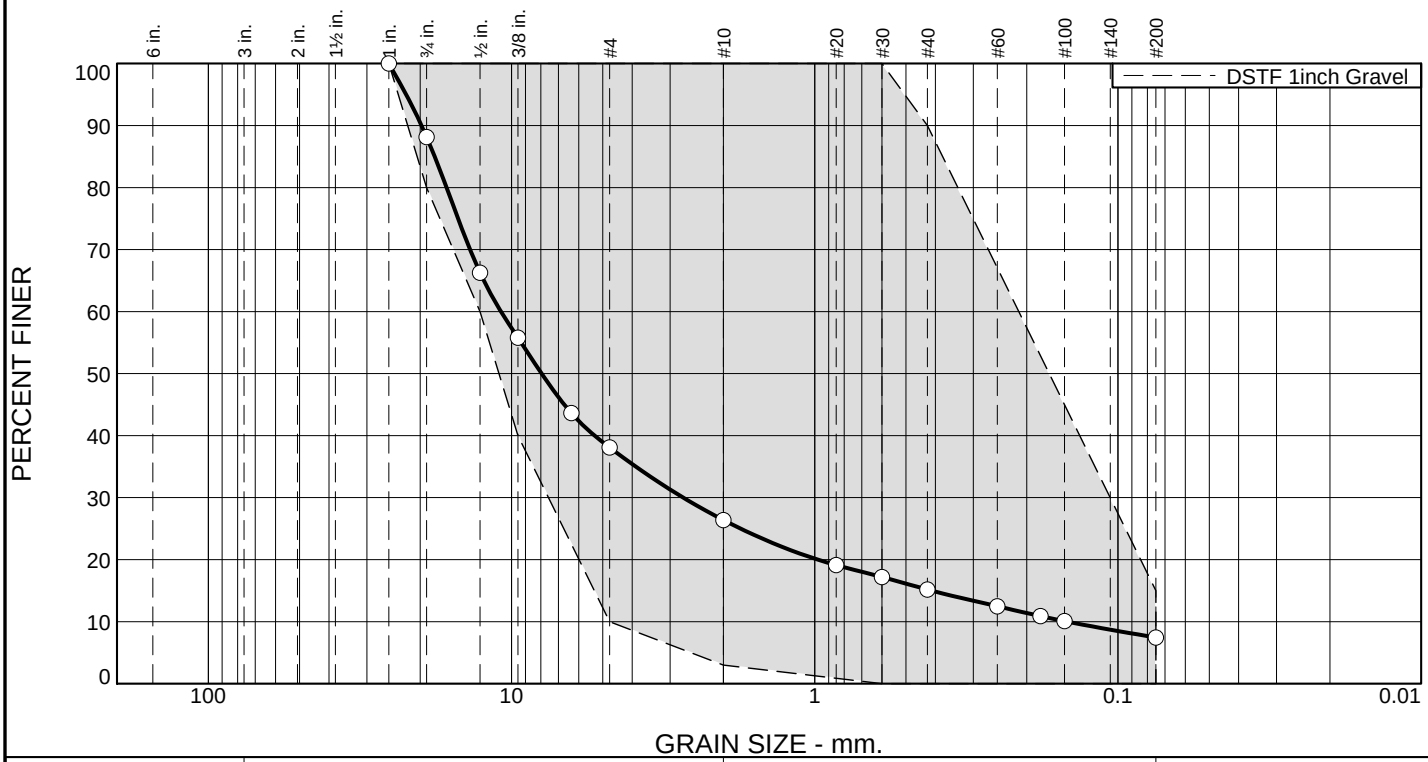
Location: N-1950-G-0831
Sample Number: 12-1367

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	74	11	8	7

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	88	80 - 100	
1/2"	66	60 - 100	
3/8"	56	40 - 100	
1/4"	44		
#4	38	10 - 100	
#10	26	3 - 100	
#20	19		
#30	17	0 - 100	
#40	15	0 - 90	
#60	12		
#80	11		
#100	10		
#200	7.4	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.8009 D_{85}= 17.9222 D_{60}= 10.8307
D_{50}= 7.9578 D_{30}= 2.7137 D_{15}= 0.4118
D_{10}= 0.1471 C_u= 73.61 C_c= 4.62

Remarks

Date Received: 09/04/2012 **Date Tested:** 9/6/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

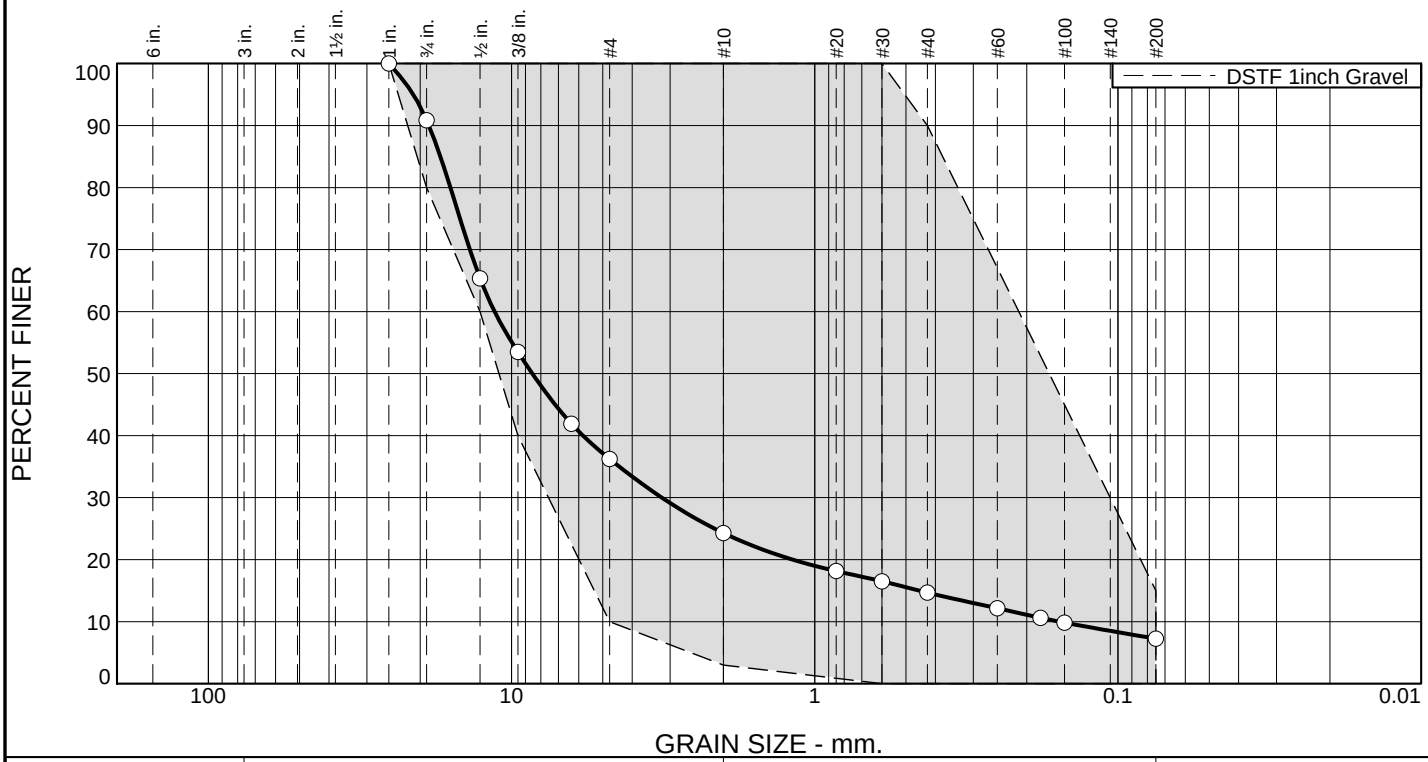
Location: N-2500-G-0831
Sample Number: 12-1368

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	76	9	8	7

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	91	80 - 100	
1/2"	65	60 - 100	
3/8"	54	40 - 100	
1/4"	42		
#4	36	10 - 100	
#10	24	3 - 100	
#20	18		
#30	17	0 - 100	
#40	15	0 - 90	
#60	12		
#80	11		
#100	10		
#200	7.3	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 18.7257 D_{85}= 17.1704 D_{60}= 11.3754
D_{50}= 8.5371 D_{30}= 3.1939 D_{15}= 0.4520
D_{10}= 0.1558 C_u= 73.00 C_c= 5.75

Remarks

Date Received: 09/04/2012 **Date Tested:** 9/6/12

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

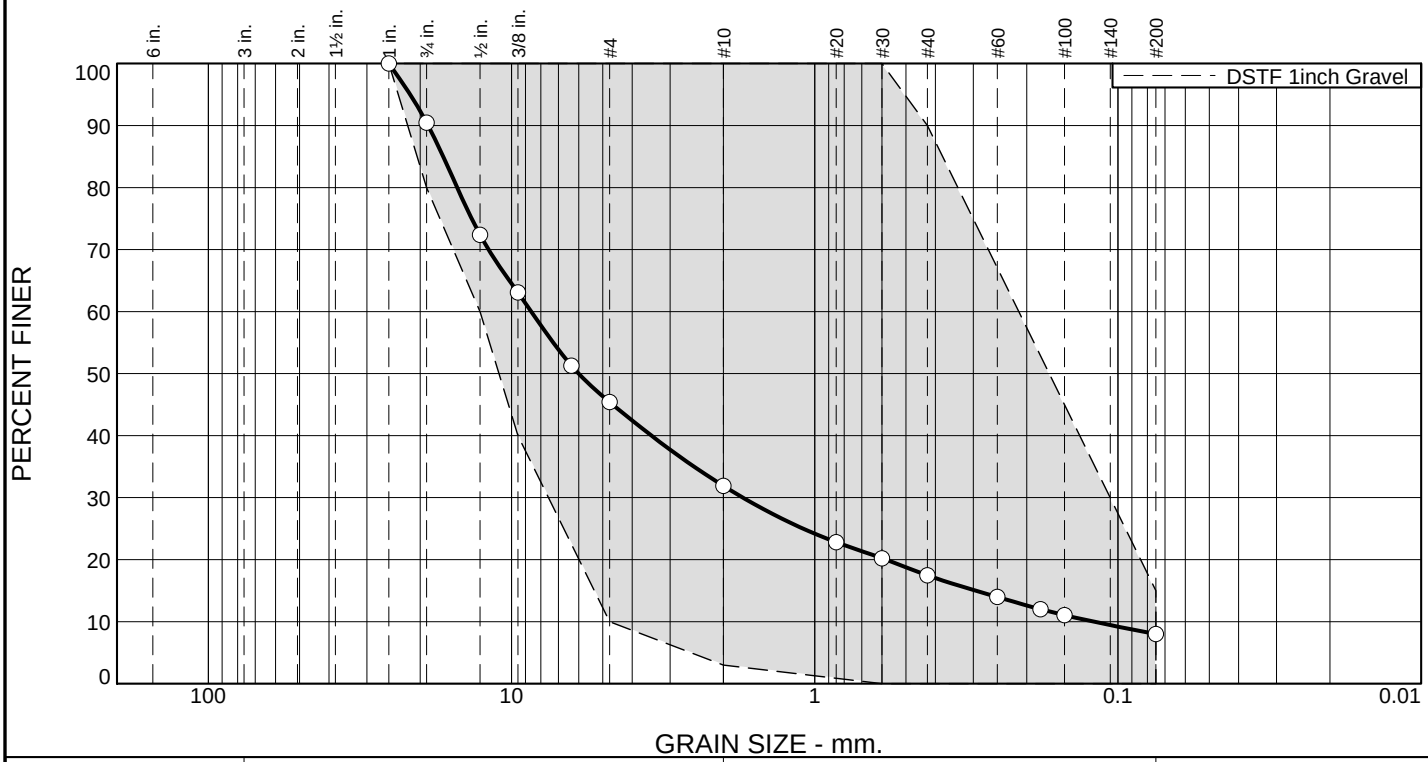
Location: N-3350-G-0831
Sample Number: 12-1369

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	68	15	9	8

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	90	80 - 100	
1/2"	72	60 - 100	
3/8"	63	40 - 100	
1/4"	51		
#4	45	10 - 100	
#10	32	3 - 100	
#20	23		
#30	20	0 - 100	
#40	17	0 - 90	
#60	14		
#80	12		
#100	11		
#200	8.0	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 18.8327 D_{85}= 16.8089 D_{60}= 8.6074
D_{50}= 6.0112 D_{30}= 1.7258 D_{15}= 0.2947
D_{10}= 0.1202 C_u= 71.60 C_c= 2.88

Remarks

Date Received: 09/04/2012 **Date Tested:** 09/08/2012

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

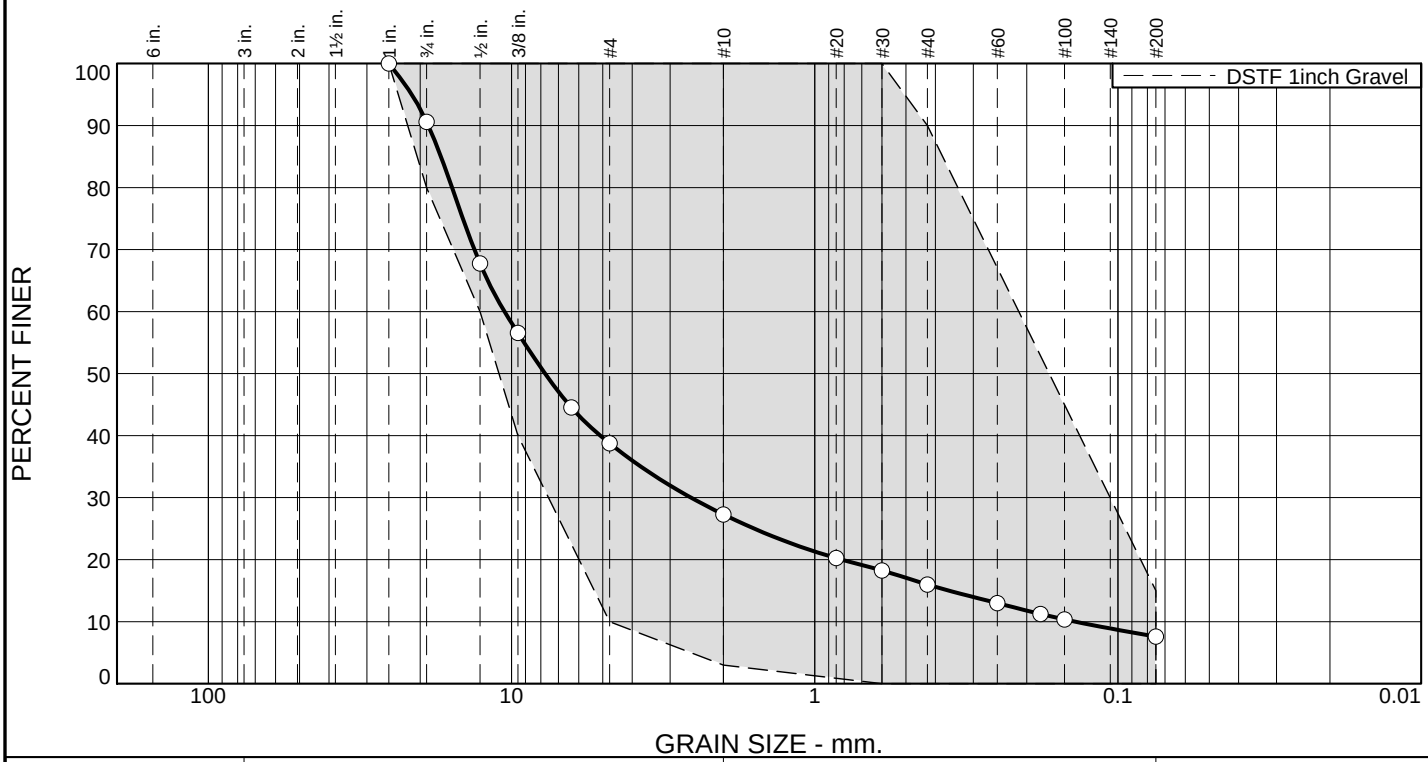
Location: A-S-G-090212
Sample Number: 12-1370

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	73	11	8	8

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	91	80 - 100	
1/2"	68	60 - 100	
3/8"	57	40 - 100	
1/4"	45		
#4	39	10 - 100	
#10	27	3 - 100	
#20	20		
#30	18	0 - 100	
#40	16	0 - 90	
#60	13		
#80	11		
#100	10		
#200	7.6	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 18.8135 D_{85}= 17.1047 D_{60}= 10.5465
D_{50}= 7.7541 D_{30}= 2.5597 D_{15}= 0.3611
D_{10}= 0.1385 C_u= 76.15 C_c= 4.49

Remarks

Date Received: 09/04/2012 **Date Tested:** 09/08/2012

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

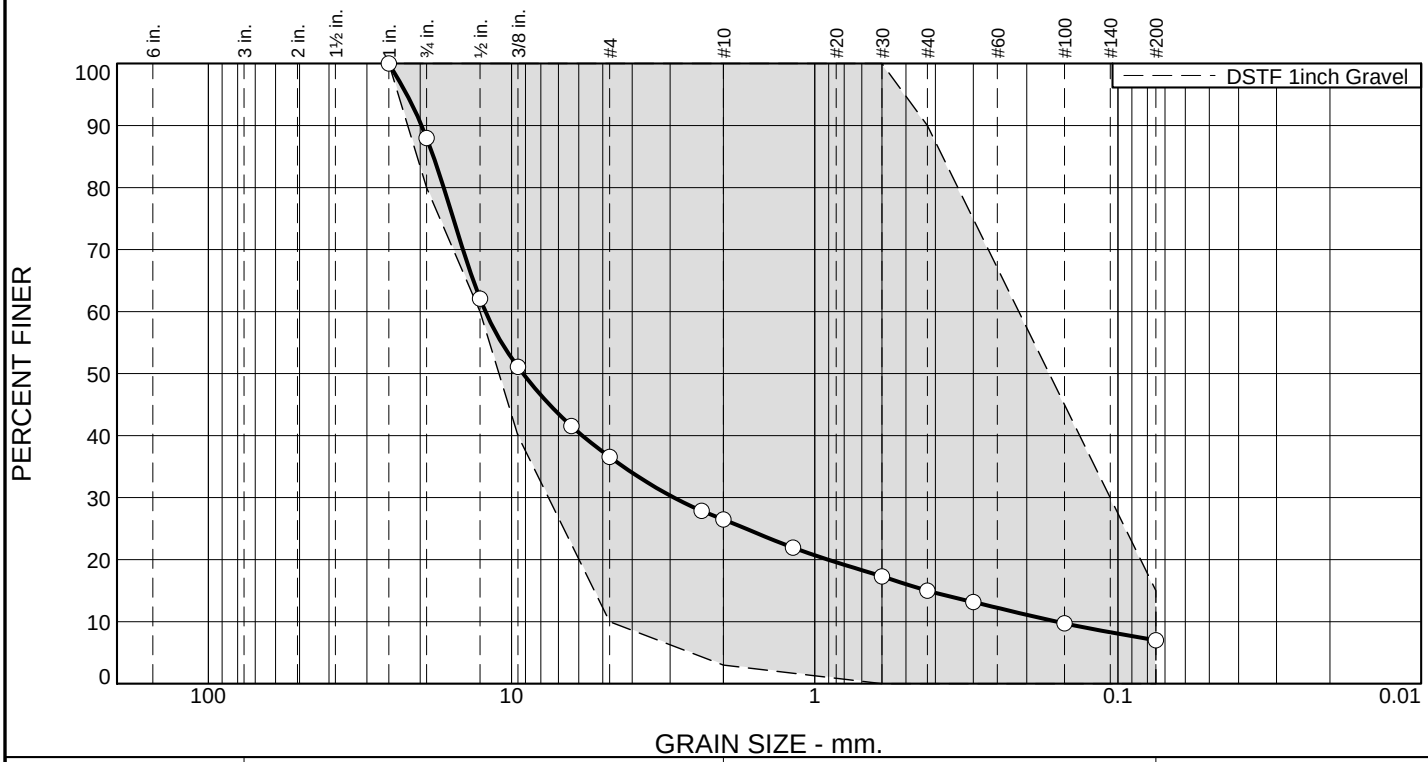
Location: N-4200-G-0903
Sample Number: 12-1371

Date Sampled: 09/04/2012

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	74	11	8	7

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100	100	
3/4"	88	80 - 100	
1/2"	62	60 - 100	
3/8"	51	40 - 100	
1/4"	42		
#4	37	10 - 100	
#8	28		
#10	26	3 - 100	
#16	22		
#30	17	0 - 100	
#40	15	0 - 90	
#50	13		
#100	10		
#200	7.0	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.7932 D_{85}= 18.0968 D_{60}= 12.1875
D_{50}= 9.1603 D_{30}= 2.9149 D_{15}= 0.4253
D_{10}= 0.1594 C_u= 76.44 C_c= 4.37

Remarks

Date Received: 071313 **Date Tested:** 071613

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

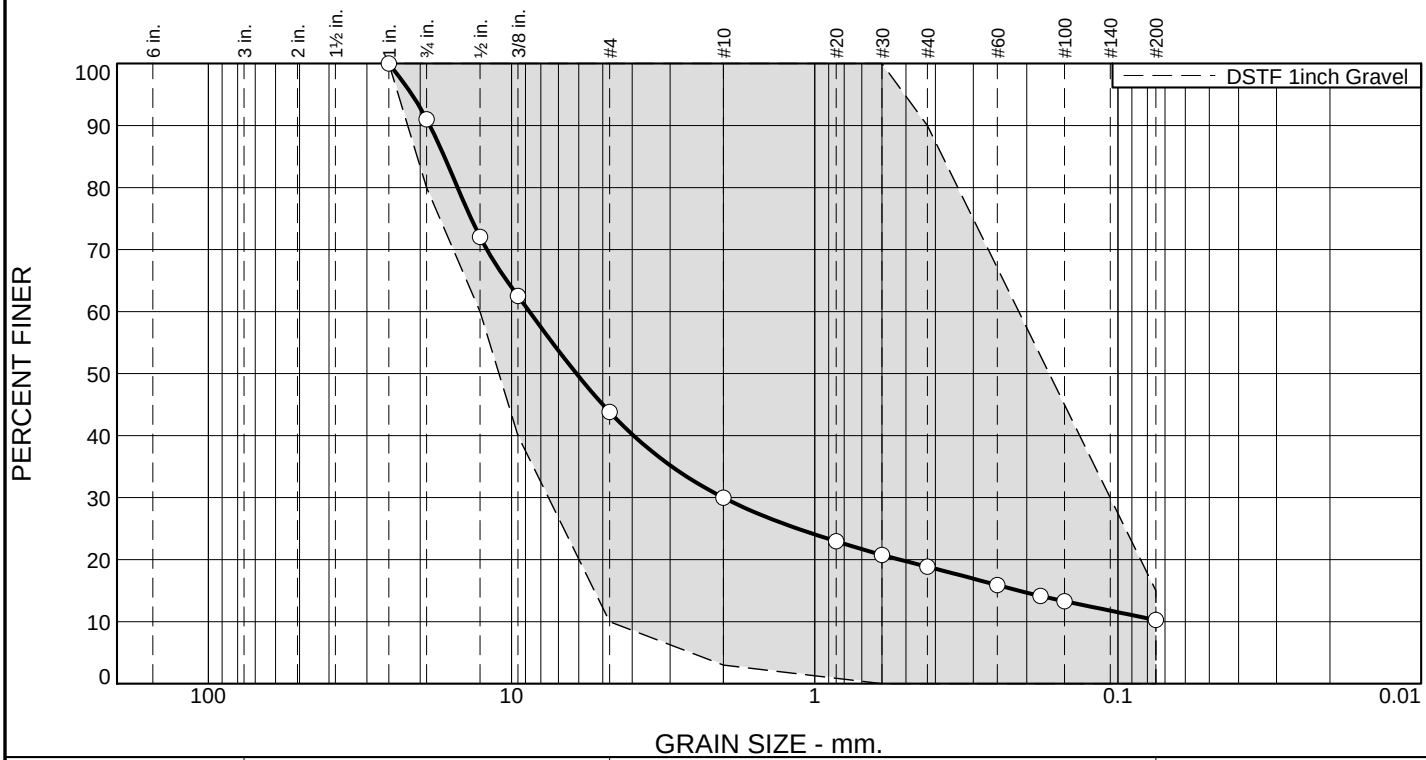
Location: Crusher Stockpile
Sample Number: 13-627

Date Sampled: 071313

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	9	47	14	11	9	10

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	91	80 - 100	
1/2	72	60 - 100	
3/8	63	40 - 100	
#4	44	10 - 100	
#10	30	3 - 100	
#20	23		
#30	21	0 - 100	
#40	19	0 - 90	
#60	16		
#80	14		
#100	13		
#200	10	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 18.5917 D_{85}= 16.6695 D_{60}= 8.7348
D_{50}= 6.1067 D_{30}= 2.0020 D_{15}= 0.2124
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 145.9 pcf @ 6.1% moisture

Date Received: 07/22/13 **Date Tested:** 08/01/13

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

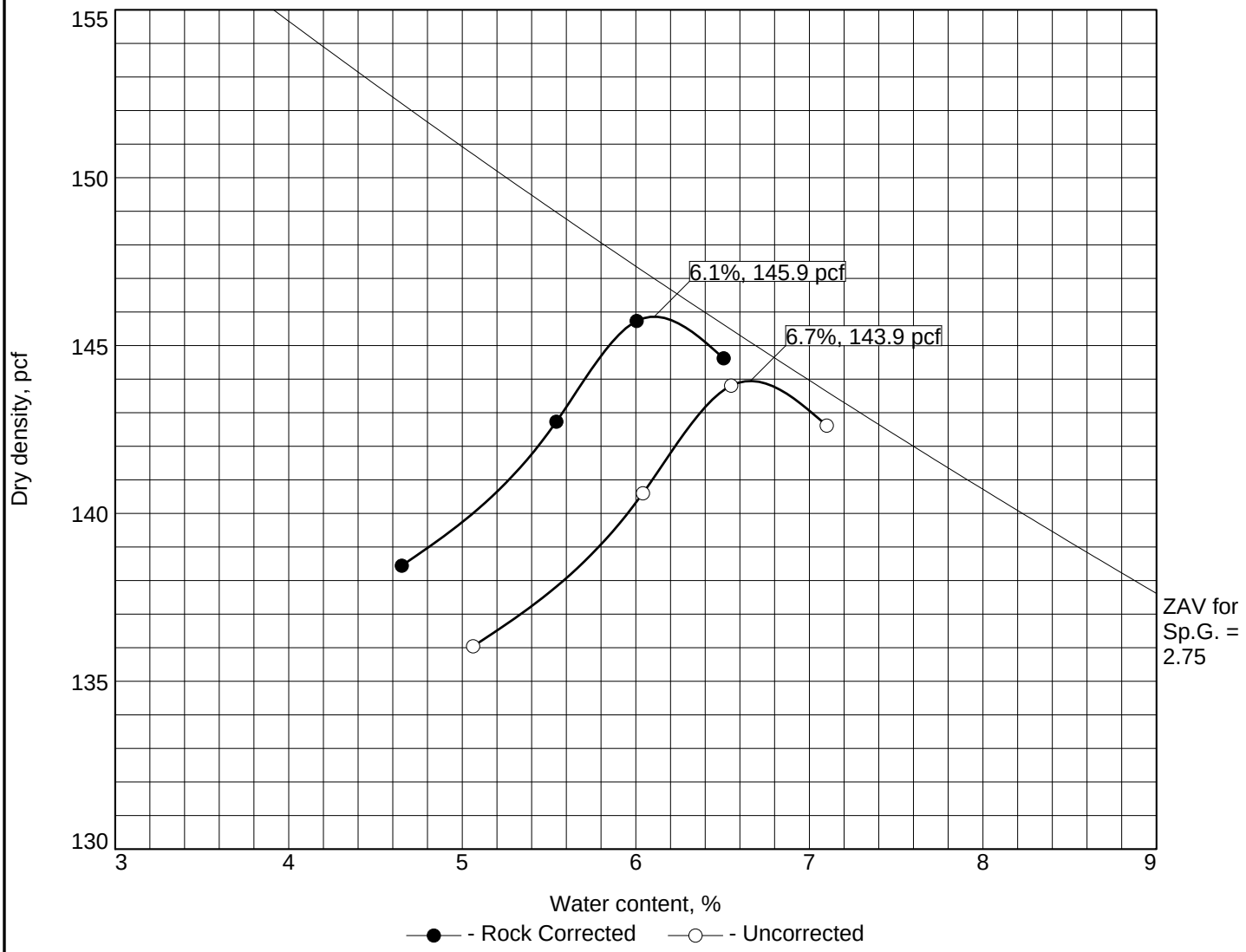
Location: B-Pile-G-072213
Sample Number: 13-740

Date Sampled: 07/22/13

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-740



Test specification: ASTM D 698-07 Method C Standard
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
				2.7			9	10

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 145.9 pcf	143.9 pcf	1" Minus
Optimum moisture = 6.1 %	6.7 %	

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 07/29/13
○ **Location:** B-Pile-G-072213 **Sample Number:** 13-740

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Remarks:
Specific Gravity Assumed

Figure

Tested By: Mika Mack **Checked By:** SM

Mappa Inc
1956 Richardson Hwy
North Pole, AK 99705
907-488-1266

1210 East 68th Ave Ste 102
Anchorage, AK 99518
907-336-6162

August 3, 2013

SRK Consulting
Pogo Mine, AK

Tests: ASTM D1556 – *Density and Unit Wt of Soil in Place by Sand-Cone Method*

Date of Tests: **July 22, 2013**

Location: **DSTF North Diversion Sta 52+40 Rt CL**
Soil: **1.5" Minus (Max Dry Density = 147.9 pcf SA#12-1274)**

Density Test #	2
Test Apparatus	J9
Calibration Mass (lb)	3.508
Silica Sand	
Density (pcf)	79.85
Test Hole Vol (cf)	0.079
Water Content (%)	7.8
Wet Density (pcf)	154.0
Dry Density (pcf)	142.9

Density = 96.6%

This sandcone test was coincides with nuclear densometer test #2 conducted on 7/22/13.

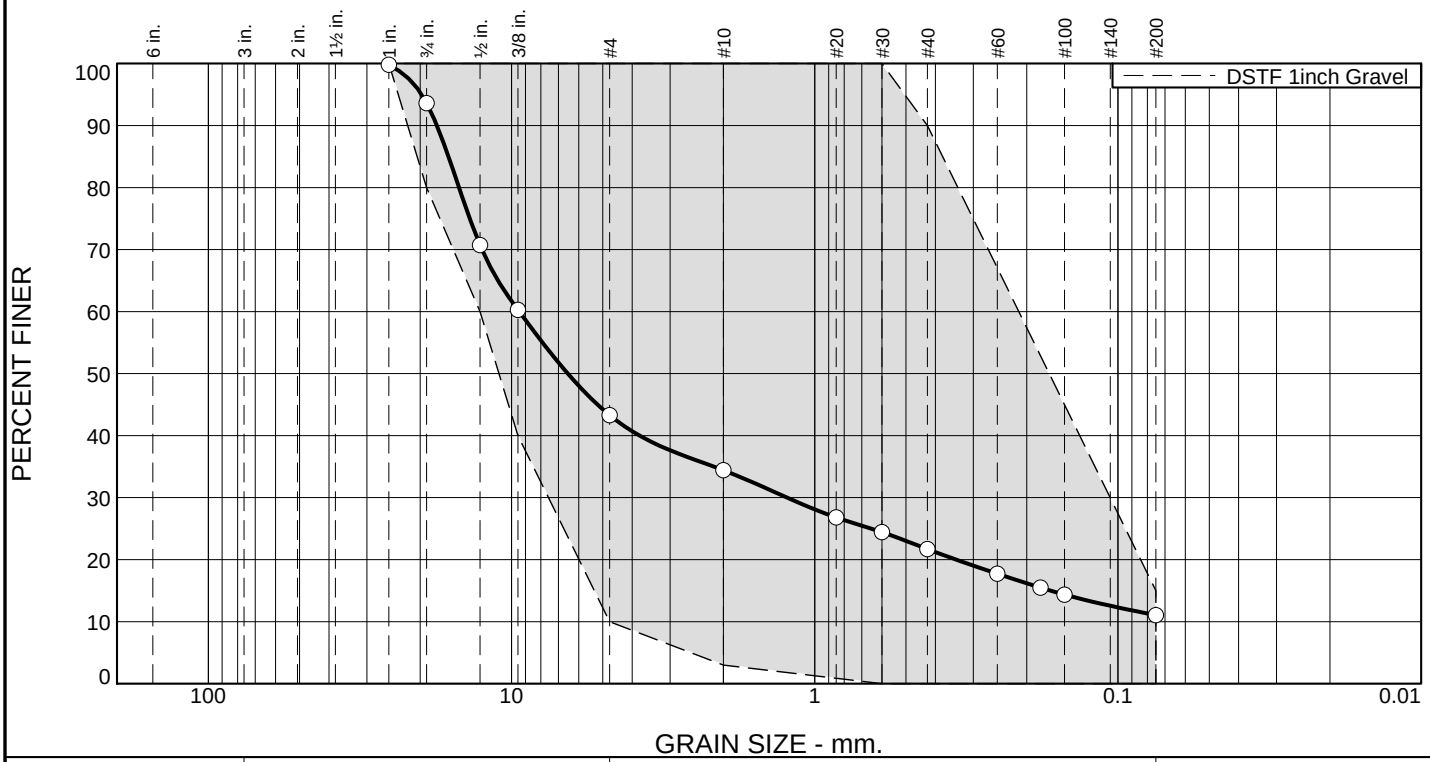
If there are any questions please call 488-1266.

Thank you,

Stefan Mack

Stefan Mack, PE
Mappa Inc

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
		51	9	12	11	11

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	94	80 - 100	
1/2	71	60 - 100	
3/8	60	40 - 100	
#4	43	10 - 100	
#10	34	3 - 100	
#20	27		
#30	24	0 - 100	
#40	22	0 - 90	
#60	18		
#80	15		
#100	14		
#200	11	0.0 - 15	

Sample is for South Diversion CAM

Material Description

1" Minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.6308 D_{85}= 16.1505 D_{60}= 9.4349
D_{50}= 6.5210 D_{30}= 1.2338 D_{15}= 0.1667
D_{10}= C_u= C_c=

Remarks

Date Received: 08/05/13 **Date Tested:** 08/10/13

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

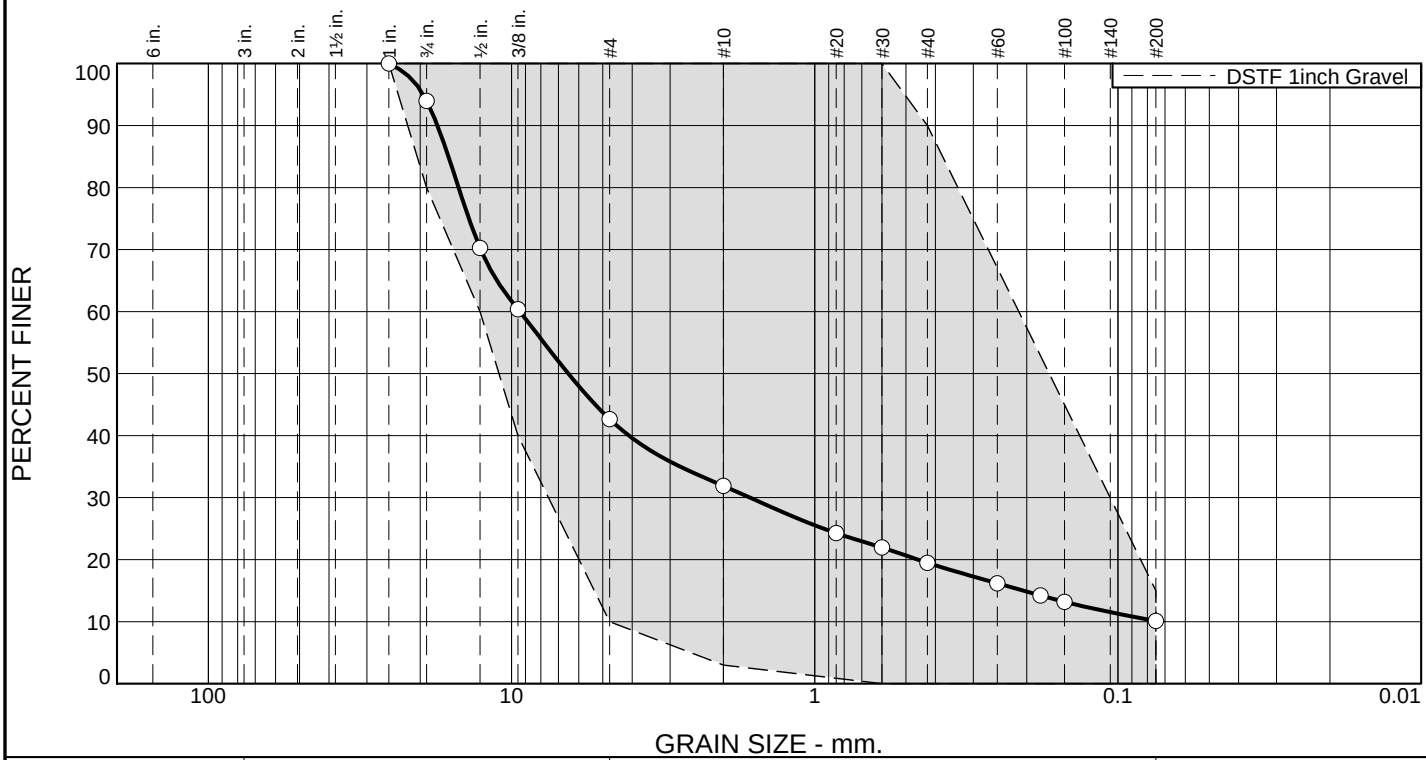
Location: North N1500-G-080313
Sample Number: 13-783

Date Sampled: 08/03/13

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	6	51	11	13	9	10

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	94	80 - 100	
1/2	70	60 - 100	
3/8	60	40 - 100	
#4	43	10 - 100	
#10	32	3 - 100	
#20	24		
#30	22	0 - 100	
#40	19	0 - 90	
#60	16		
#80	14		
#100	13		
#200	10	0.0 - 15	

* DSTF 1inch Gravel

Material Description

1" Minus

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.5583 D_{85}= 16.1535 D_{60}= 9.3909
D_{50}= 6.4965 D_{30}= 1.6350 D_{15}= 0.2055
D_{10}= C_u= C_c=

Remarks

Date Received: 08/05/13 **Date Tested:** 08/10/13

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

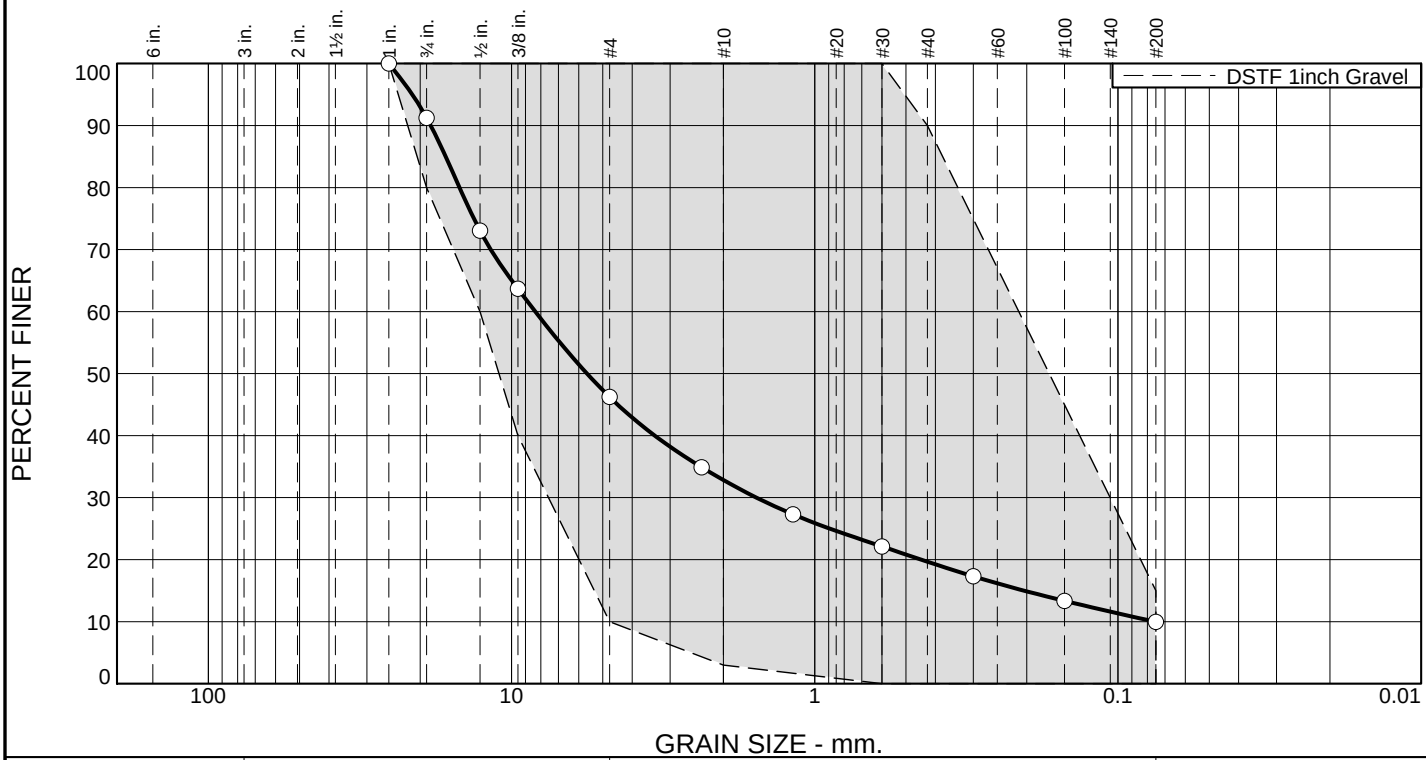
Location: S2800-G-080513
Sample Number: 13-784

Date Sampled: 08/05/13

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	9	45	13	13	10	10

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	91	80 - 100	
1/2	73	60 - 100	
3/8	64	40 - 100	
#4	46	10 - 100	
#8	35		
#16	27		
#30	22	0 - 100	
#50	17		
#100	13		
#200	10.0	0.0 - 15	

* DSTF 1inch Gravel

Material Description

D-1

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 18.4666 D_{85}= 16.4950 D_{60}= 8.3485
D_{50}= 5.6387 D_{30}= 1.5564 D_{15}= 0.2041
D_{10}= 0.0756 C_u= 110.43 C_c= 3.84

Remarks

Max Dry Density = 146.2 pcf @ 5.1% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

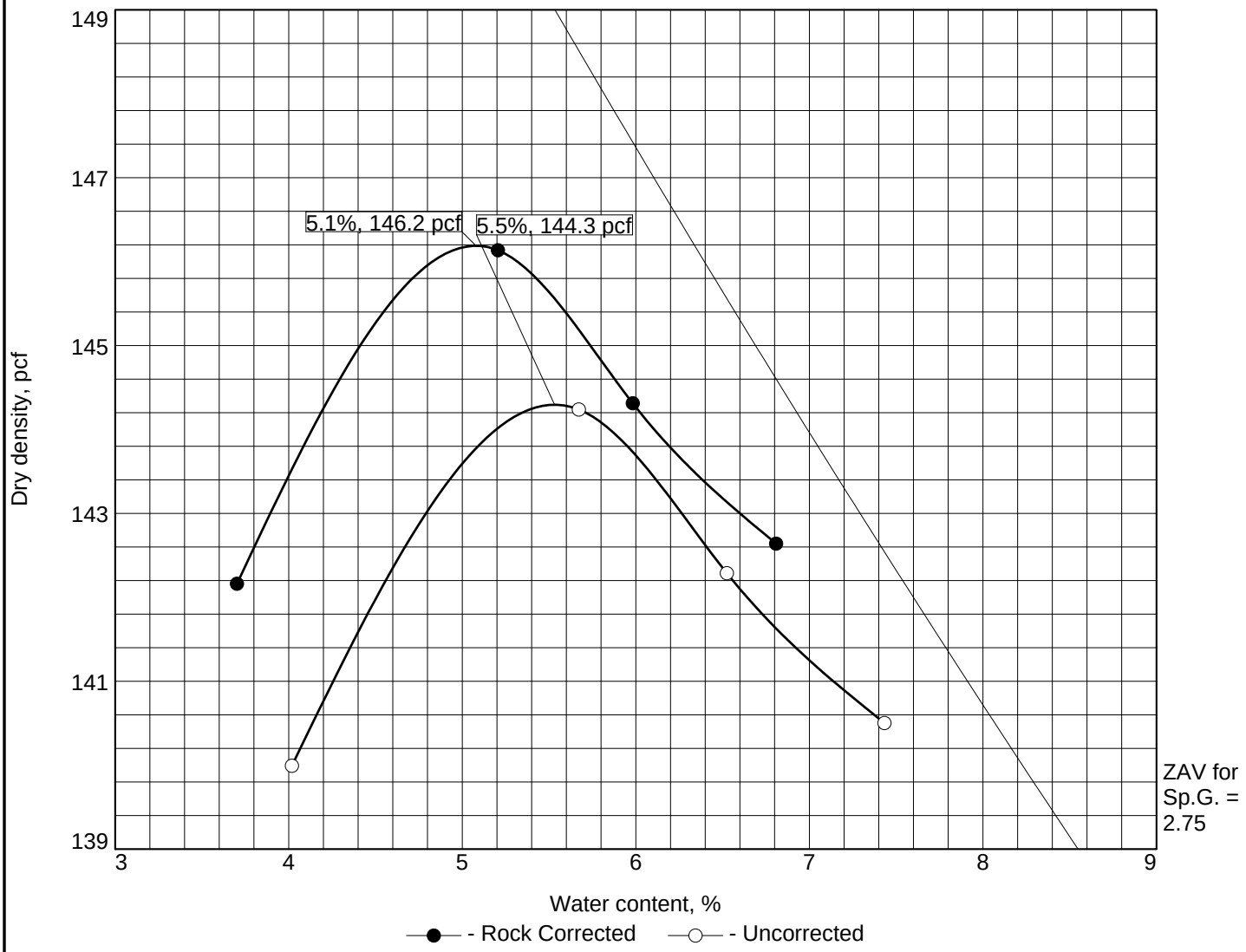
Location: Shell #2, South End of Stockpile
Sample Number: 13-916

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-916



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
	GP-GM	A-1-a		2.7	NV		9	10.0

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 146.2 pcf Optimum moisture = 5.1 %	D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 090313
○ **Location:** Shell #2, South End of Stockpile **Sample Number:** 13-916

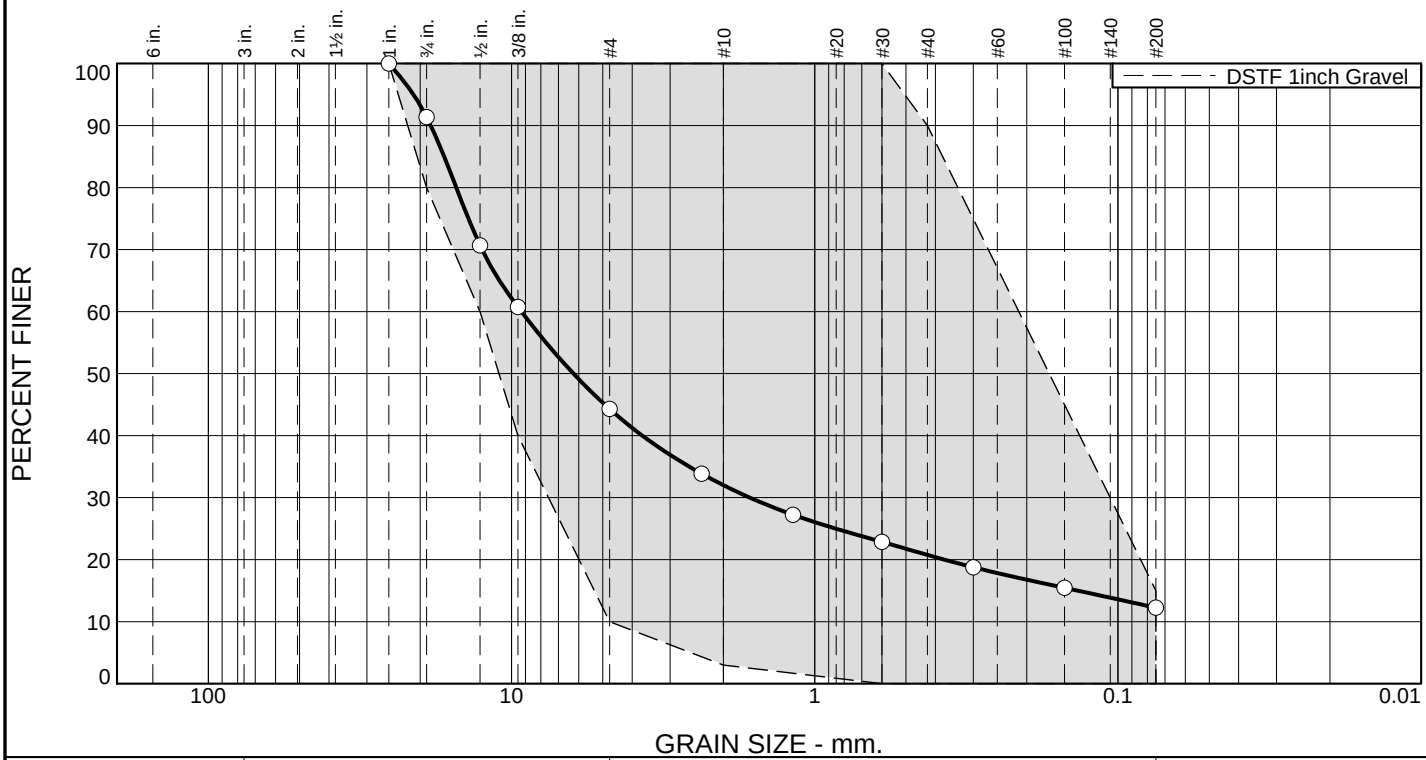
Remarks:
Specific Gravity Assumed

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: CM **Checked By:** SM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	9	47	12	11	9	12

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	91	80 - 100	
1/2	71	60 - 100	
3/8	61	40 - 100	
#4	44	10 - 100	
#8	34		
#16	27		
#30	23	0 - 100	
#50	19		
#100	15		
#200	12	0.0 - 15	

* DSTF 1inch Gravel

Material Description

D-1

Atterberg Limits (ASTM D 4318)

PL= np **LL=** nv **PI=**

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 18.4613 D_{85}= 16.6871 D_{60}= 9.2775
D_{50}= 6.2472 D_{30}= 1.6370 D_{15}= 0.1359
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 147.3 pcf @ 5.0% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

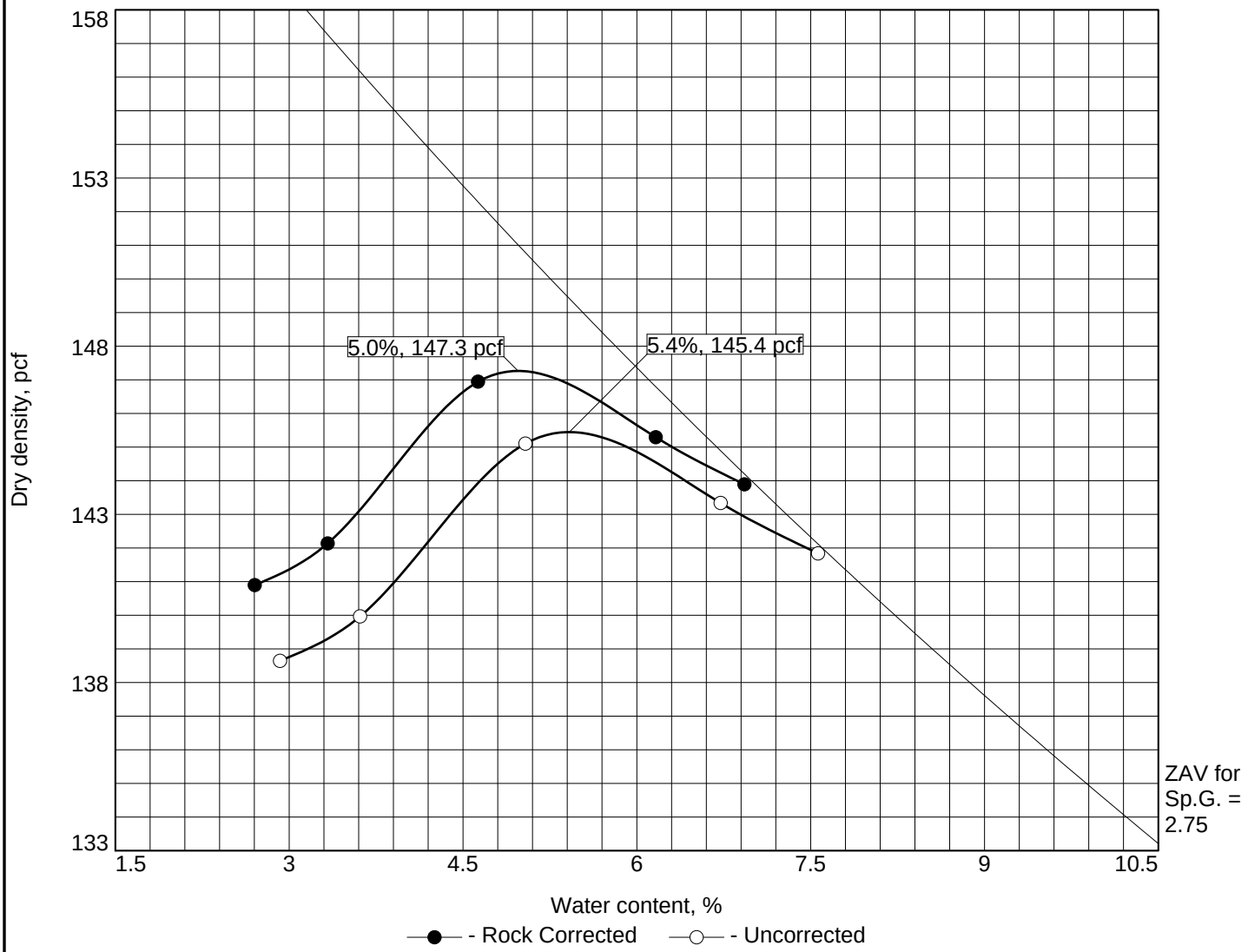
Location: Shell #2, North Side of Stockpile
Sample Number: 13-917

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-917



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
	GP-GM	A-1-a		2.7	nv		9	12

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 147.3 pcf Optimum moisture = 5.0 %	D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 090313
○ **Location:** Shell #2, North Side of Stockpile **Sample Number:** 13-917

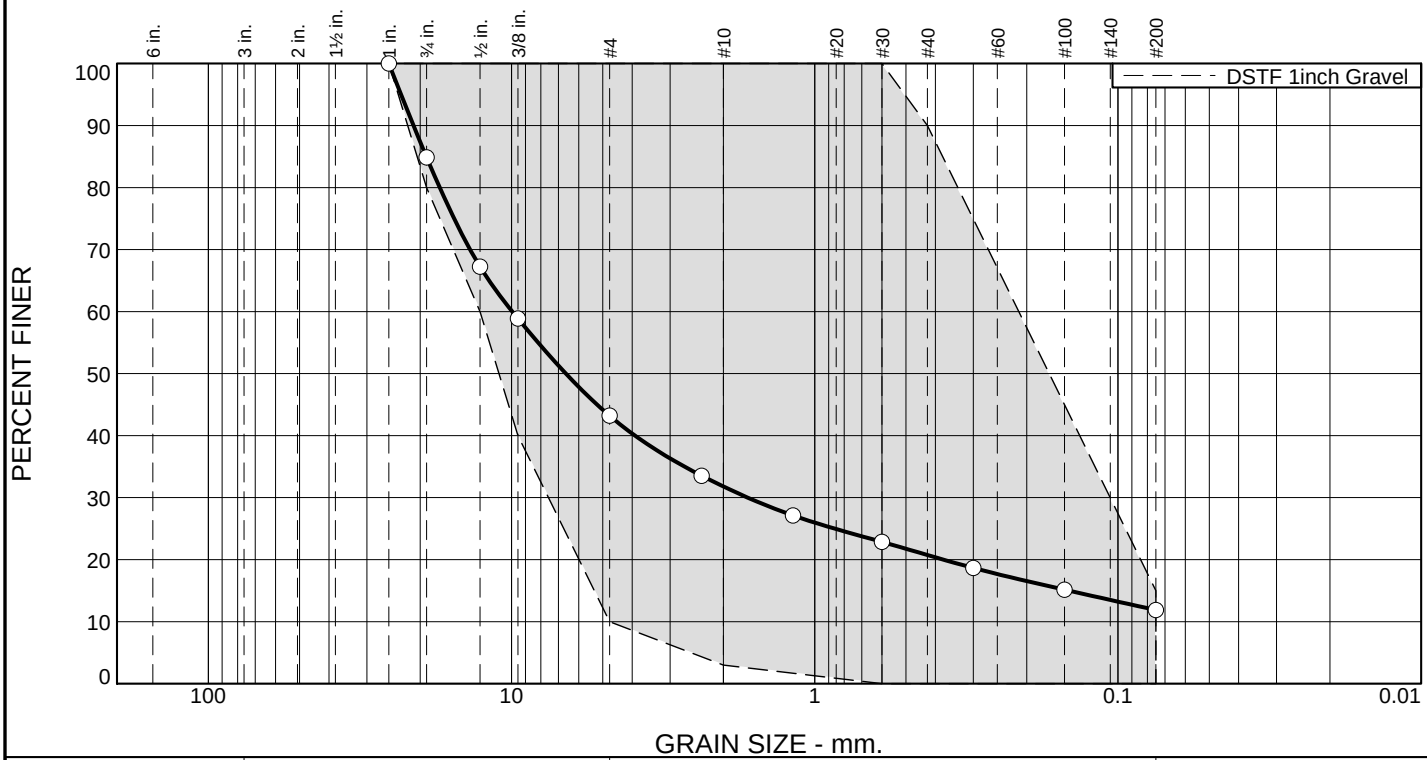
Remarks:
Specific Gravity Assumed

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: CM **Checked By:** SM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	15	42	11	11	9	12

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	85	80 - 100	
1/2	67	60 - 100	
3/8	59	40 - 100	
#4	43	10 - 100	
#8	34		
#16	27		
#30	23	0 - 100	
#50	19		
#100	15		
#200	12	0.0 - 15	

* DSTF 1inch Gravel

Material Description

D-1

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=**

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 21.0561 D_{85}= 19.1054 D_{60}= 9.9444
D_{50}= 6.6192 D_{30}= 1.6638 D_{15}= 0.1454
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 147.3 pcf @ 6.2% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

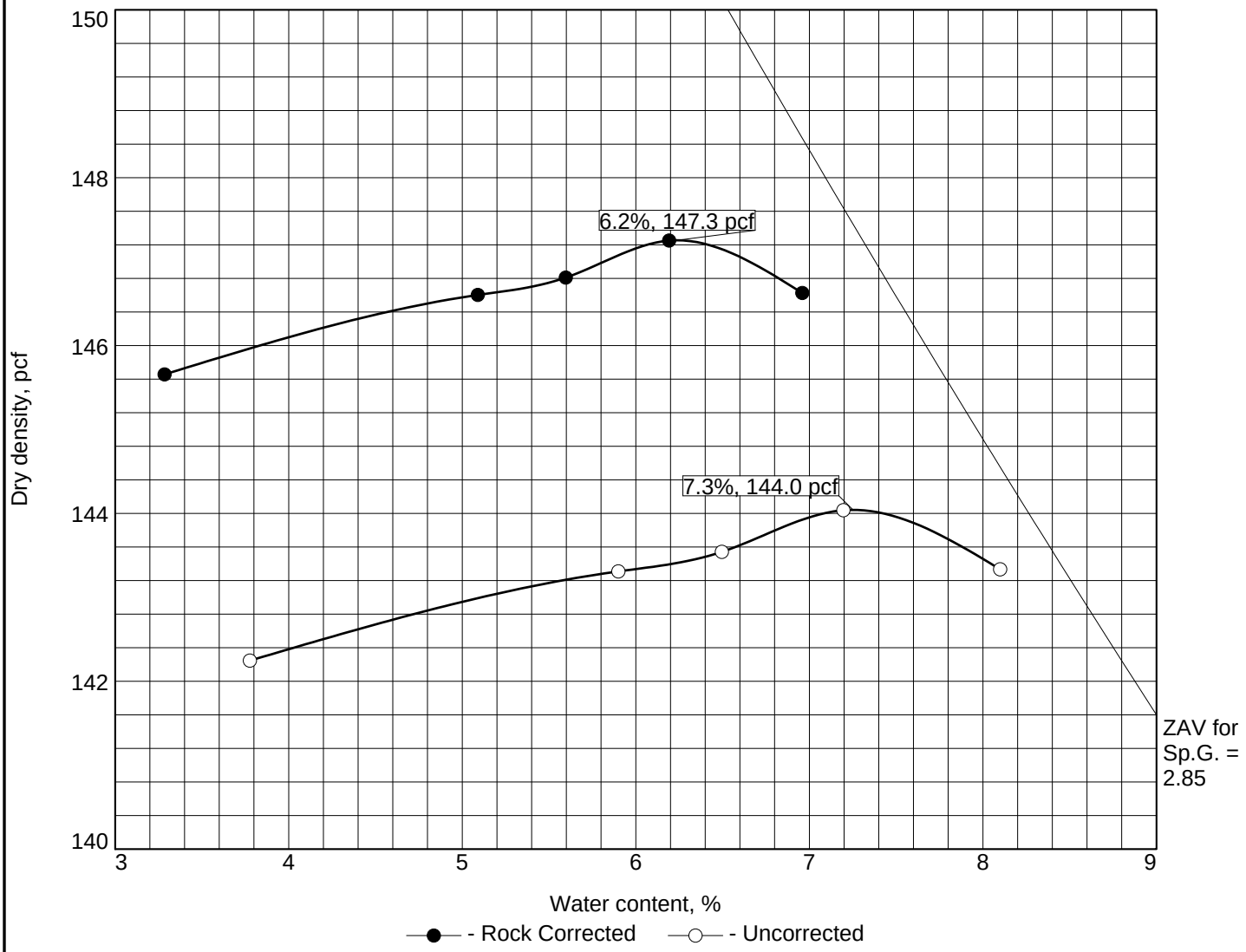
Location: Shell #2, South West Stockpile
Sample Number: 13-918

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-918



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
	GP-GM	A-1-a		2.7	NV	NP	15	12

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 147.3 pcf Optimum moisture = 6.2 %	D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 090413
○ **Location:** Shell #2, South West Stockpile **Sample Number:** 13-918

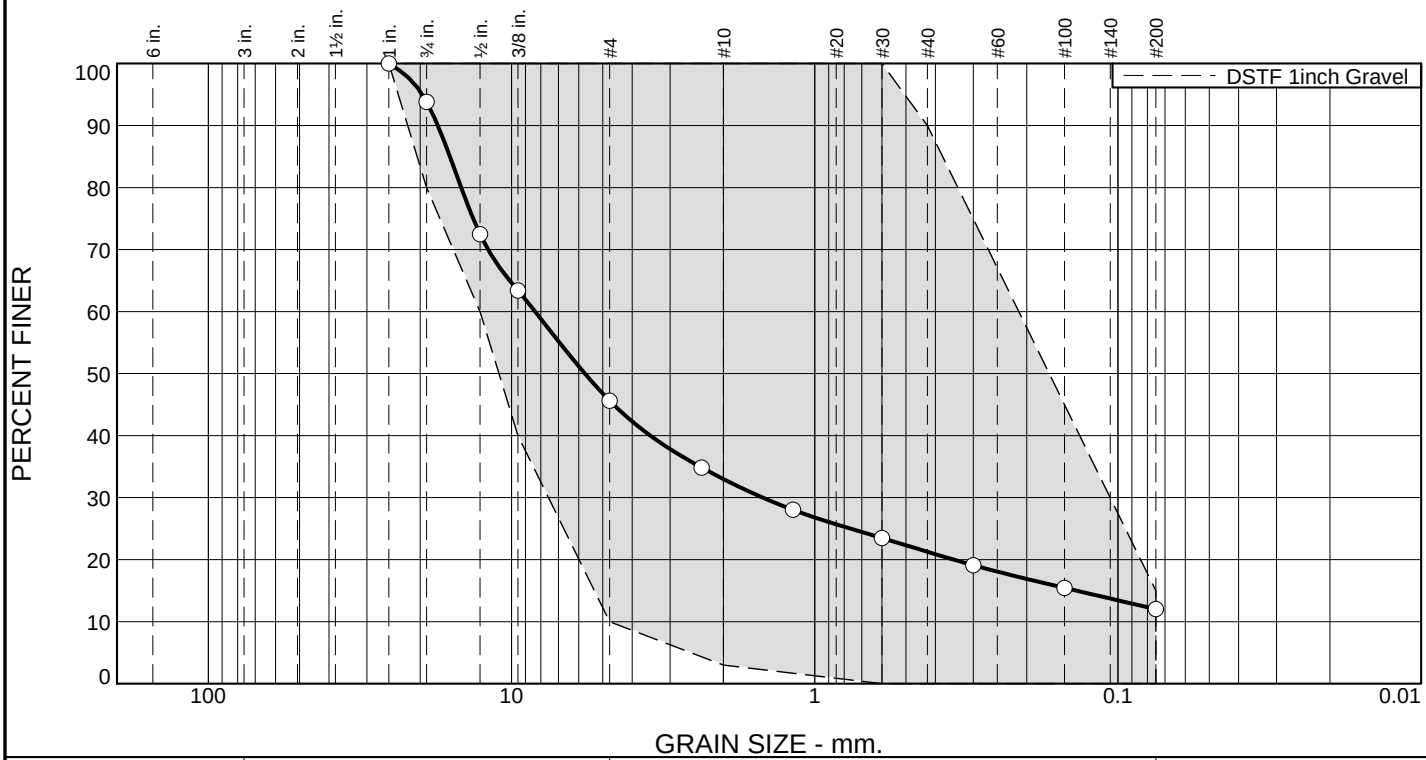
Remarks:
Specific Gravity Assumed

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: Mika Mack **Checked By:** SM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	6	48	13	12	9	12

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	94	80 - 100	
1/2	72	60 - 100	
3/8	63	40 - 100	
#4	46	10 - 100	
#8	35		
#16	28		
#30	23	0 - 100	
#50	19		
#100	15		
#200	12	0.0 - 15	

* DSTF 1inch Gravel

Material Description

State D-1

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.5047 D_{85}= 15.9704 D_{60}= 8.3662
D_{50}= 5.7290 D_{30}= 1.4836 D_{15}= 0.1372
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 146.8 pcf @ 5.0% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

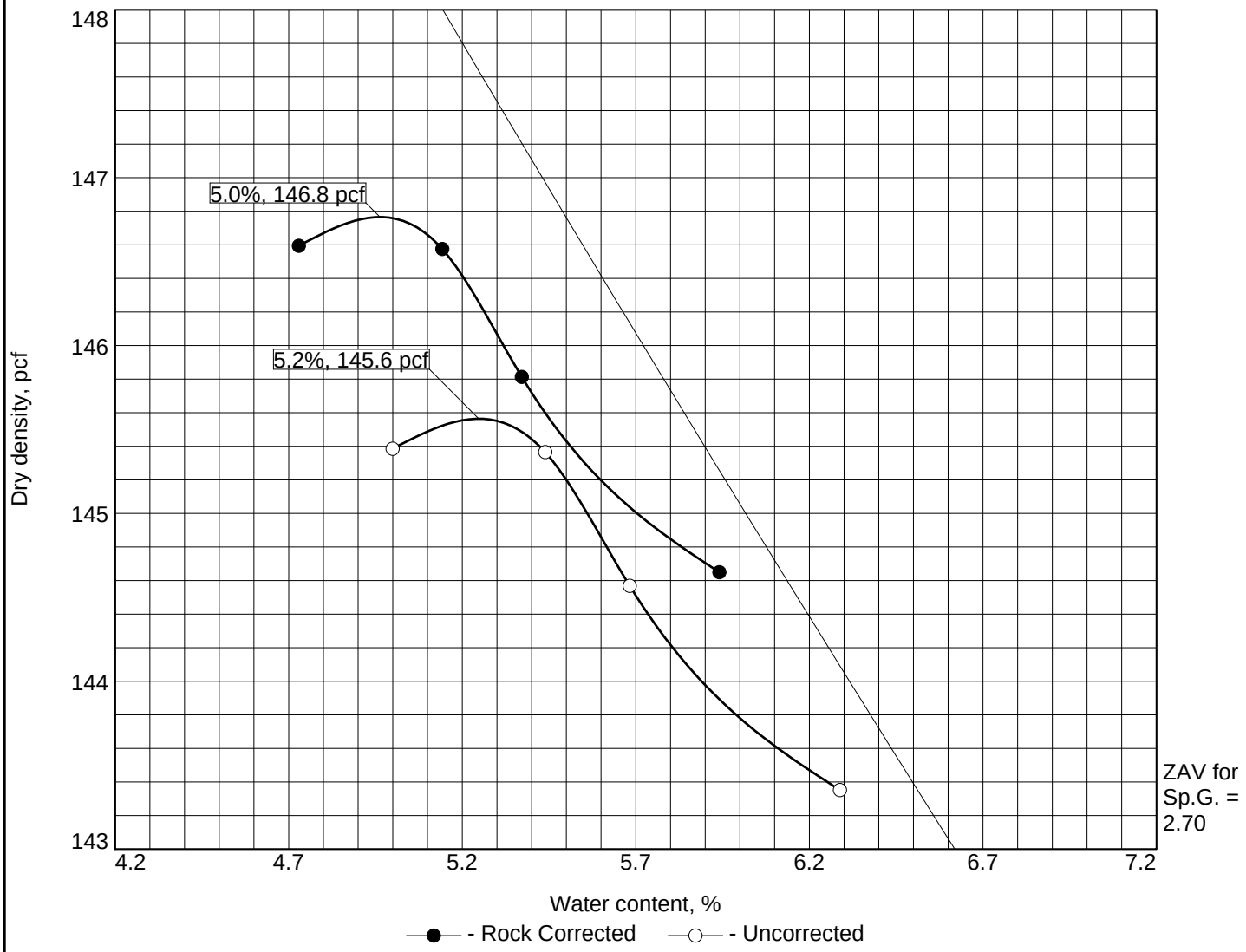
Location: Shell #2, North East Stockpile
Sample Number: 13-919

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-919



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
				2.7			6	12

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 146.8 pcf Optimum moisture = 5.0 %	State D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 10/5/13
○ **Location:** Shell #2, North East Stockpile **Sample Number:** 13-919

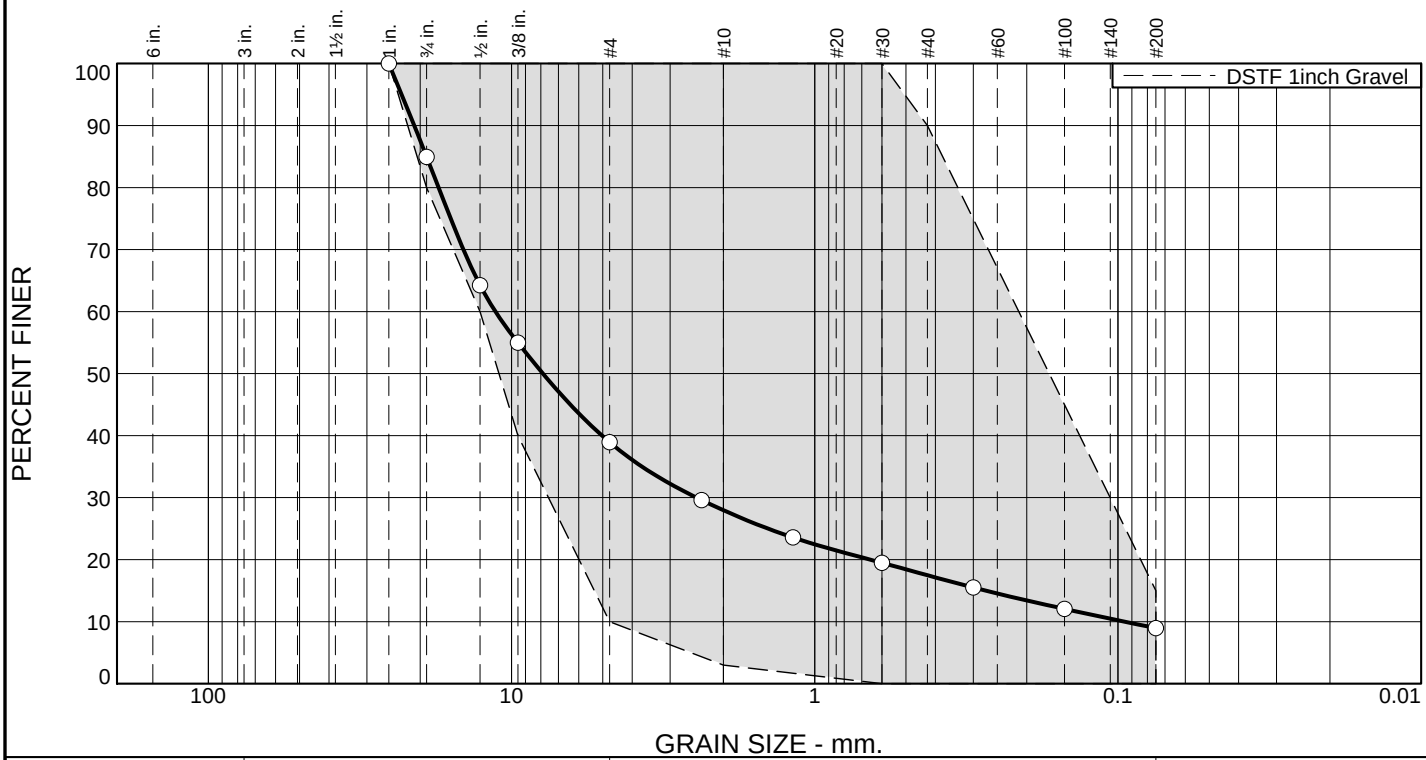
Remarks:
Specific Gravity Assumed

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: Chris Mack **Checked By:** SM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	15	46	11	11	8	9

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	85	80 - 100	
1/2	64	60 - 100	
3/8	55	40 - 100	
#4	39	10 - 100	
#8	30		
#16	24		
#30	19	0 - 100	
#50	16		
#100	12		
#200	8.9	0.0 - 15	

* DSTF 1inch Gravel

Material Description

D-1

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 20.9414 D_{85}= 19.0681 D_{60}= 11.3014
D_{50}= 7.8784 D_{30}= 2.4531 D_{15}= 0.2730
D_{10}= 0.0951 C_u= 118.80 C_c= 5.60

Remarks

Max Dry Density = 147.9 pcf @ 4.4% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

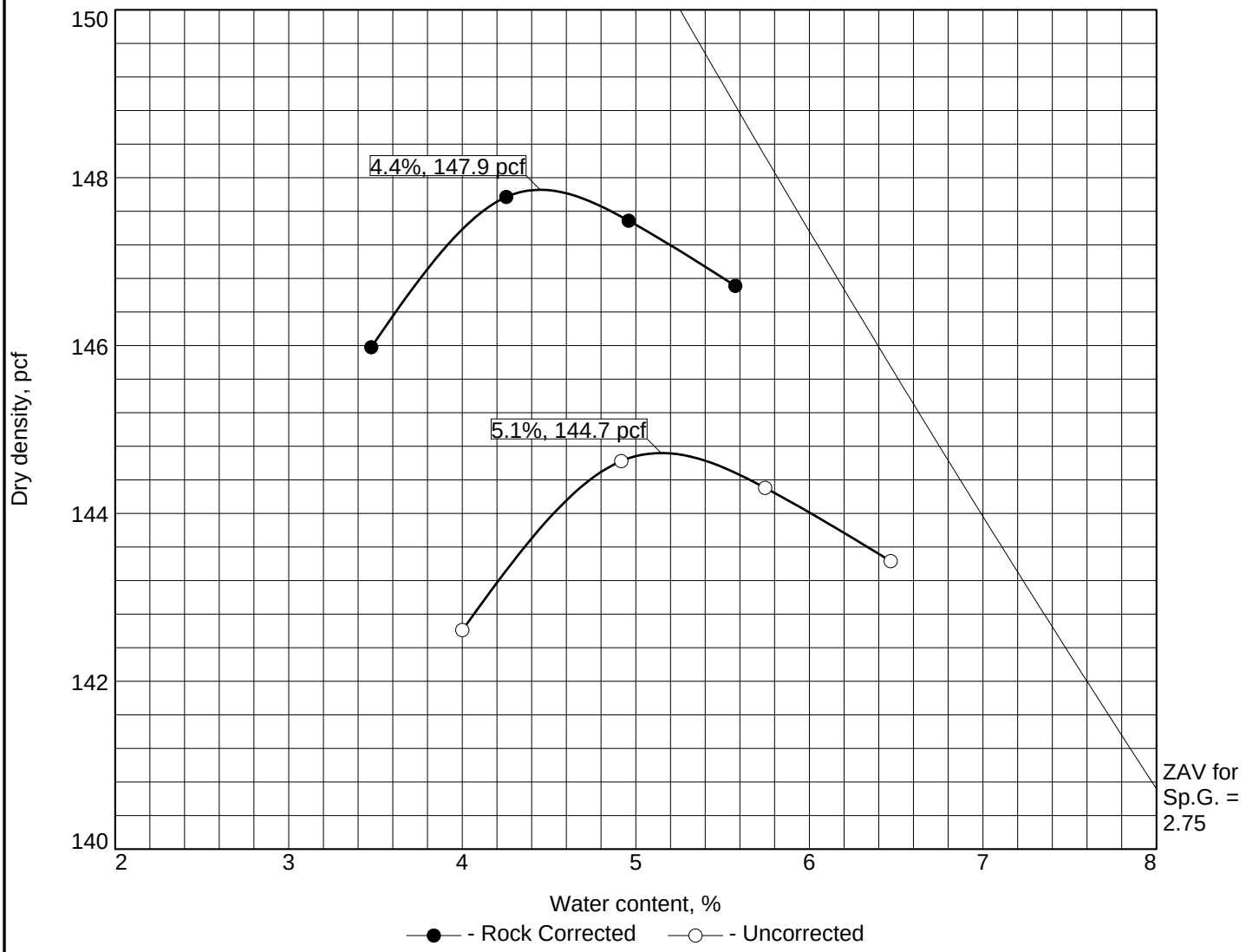
Location: Shell #2, North East Stockpile
Sample Number: 13-920

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-920



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
				2.7			15	8.9

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 147.9 pcf Optimum moisture = 4.4 %	State D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 10/3/13
○ **Location:** Shell #2, North East Stockpile **Sample Number:** 13-920

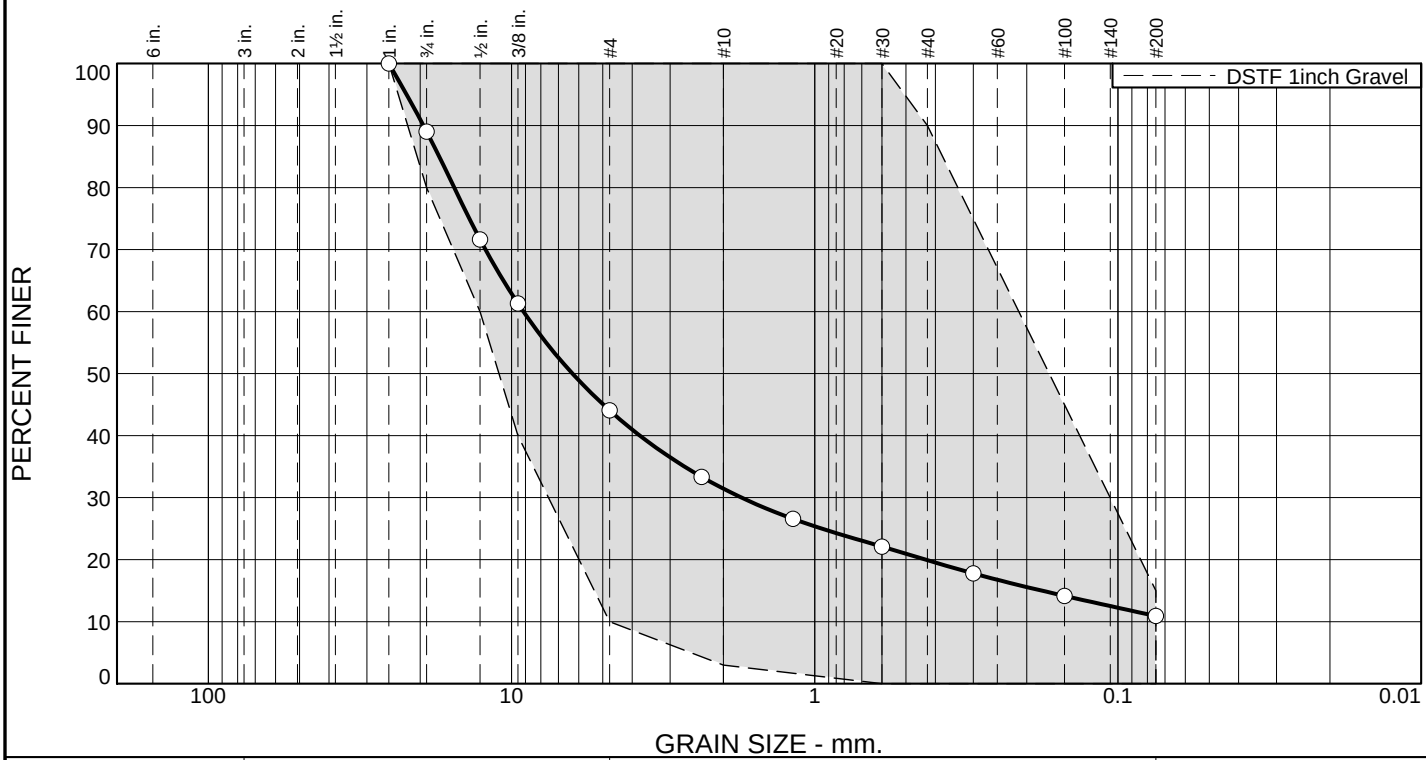
Remarks:
Specific Gravity Assumed

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Figure

Tested By: CM **Checked By:** SM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	11	45	13	11	9	11

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100	100	
3/4	89	80 - 100	
1/2	72	60 - 100	
3/8	61	40 - 100	
#4	44	10 - 100	
#8	33		
#16	27		
#30	22	0 - 100	
#50	18		
#100	14		
#200	11	0.0 - 15	

* DSTF 1inch Gravel

Material Description

State D-1

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 19.5198 D_{85}= 17.3264 D_{60}= 9.1377
D_{50}= 6.2949 D_{30}= 1.7424 D_{15}= 0.1783
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 146.8 pcf @ 5.2% moisture

Date Received: 082613 **Date Tested:** 082813

Tested By: Chris Mack

Checked By: Stefan Mack, PE

Title: Engineer

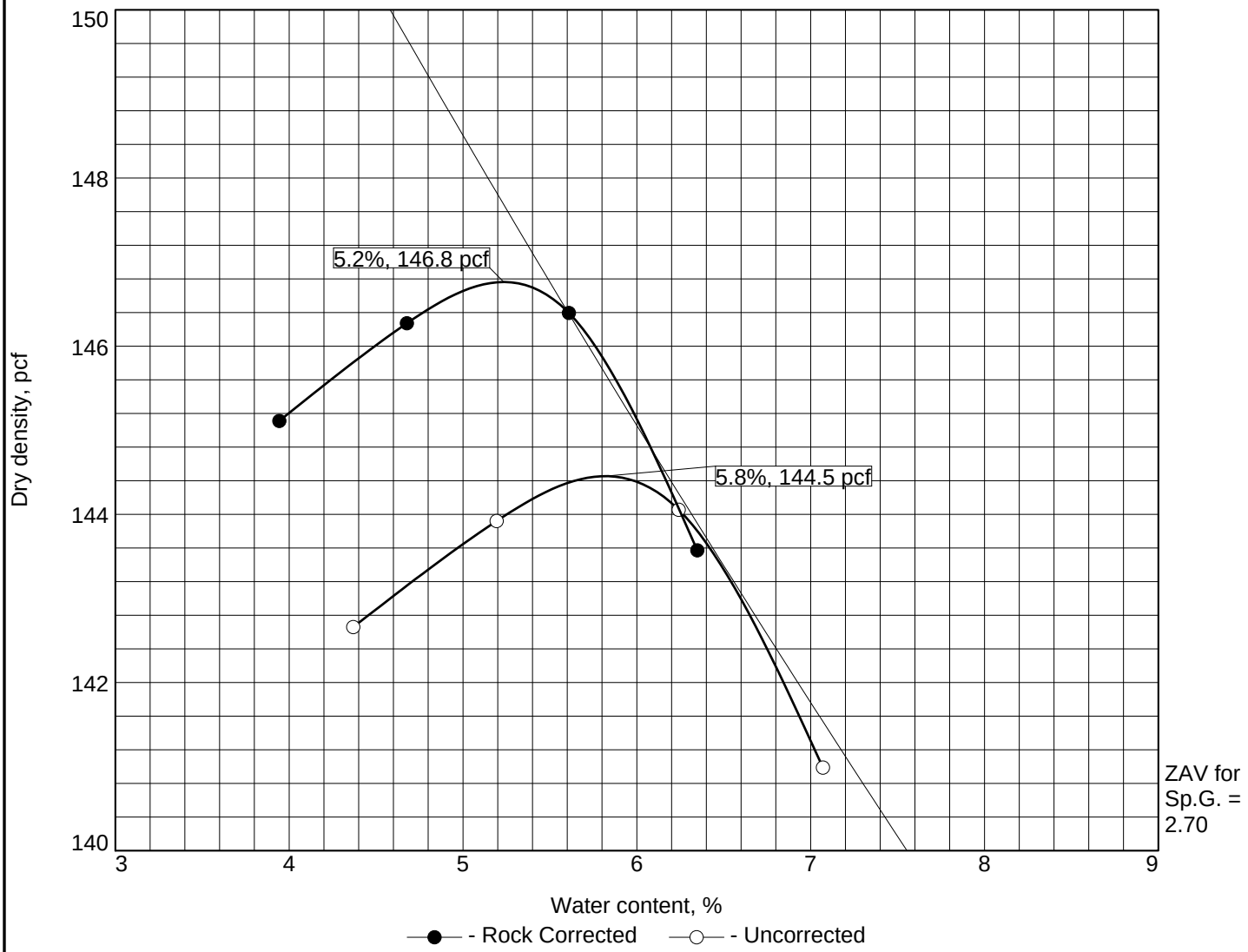
Location: Shell #2, North West Stockpile
Sample Number: 13-921

Date Sampled: 082413

MAPPA TESTLAB
1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 13-921



Test specification: ASTM D 1557-12 Method C Modified
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
				2.7			11	11

ROCK CORRECTED TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 146.8 pcf Optimum moisture = 5.2 %	State D-1

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 10/3/13
○ **Location:** Shell #2, North West Stockpile **Sample Number:** 13-921

Remarks:
Specfic Gravity Assumed

MAPPA TESTLAB
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North Pole, Alaska 99705

Figure

Tested By: CM **Checked By:** SM

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: **Dry Stack Diversion, PO #: 15379070C, Pogo Mine, Alaska**
Client: **Sumitomo**

Project #: **2011-052**
Date: **August 24, 2012**
Area Tested:

Material / Source:
On site crusher 1" minus **147.9** **12-1274**

Gauge: **Instrotek 3500** **Ser: #** **898**
Operator: **Mika Mack**

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	1"	10	1	Station 8+65, right of center line	154.6	6.1	145.7	147.9	98.5%	95%
2	1"	10	1	Station 8+00, center line	151.8	5.8	143.5	147.9	97.0%	95%

Approved By: ***Stefan Mack*** Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion, PO #: 15379070C, Pogo Mine, Alaska
Client: Sumitomo

Project #: 2011-052
Date: August 29, 2012
Area Tested: N Ditch & N Channel Access Roads

Material / Source:
Crusher stockpile ½" minus 139.2 12-1288
Crusher stockpile 1" minus 147.9 12-1274

Gauge: Troxler 3430 **Ser: #** 23606
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	Bedding	12	1 above pipe	North Ditch Road, station 5+60 36" CMP	137.3	6.9	128.4	139.2	92.3%	95%
2	Bedding	12	1 above pipe	North Ditch Road, station 5+60 36" CMP	139.1	6.6	130.5	139.2	93.7%	95%
3	Bedding	8	1 above pipe	North Ditch Road, station 4+50	144.3	6.7	135.2	139.2	97.2%	95%
4	Bedding	8	1 above pipe	North Ditch Road, station 4+00	137.1	6.5	128.7	139.2	92.5%	95%
5	Bedding	8	1 above pipe	Retest of #4	141.0	6.2	132.8	139.2	95.4%	95%
6	Bedding	8	1 above pipe	Retest of #1	141.0	6.6	132.3	139.2	95.0%	95%
7	Bedding	8	1 above pipe	Retest of #2	139.9	6.4	131.5	139.2	94.5%	95%
8	1" minus	12	FG	North Channel Access Road, station 23+50 right of center line	151.6	5.8	143.3	147.9	96.9%	95%
9	1" minus	6	6" BFG	North Channel Access Road, station 19+60 left of center line	154.6	6.6	145.0	147.9	98.1%	95%
10	1" minus	8	FG	North Channel Access Road, station 15+00 right of center line	150.3	5.9	141.9	147.9	96.0%	95%

Approved By: ***Stefan Mack*** Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion, PO #: 15379070C, Pogo Mine, Alaska
Client: Sumitomo

Project #: 2011-052
Date: August 29, 2012
Area Tested: N Ditch & N Channel Access Roads

Material / Source:

Crusher stockpile ½" minus	139.2	12-1288
Crusher stockpile 1" minus	147.9	12-1274

Gauge: Troxler 3430 **Ser: #** 23606
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
11	1" minus	12	FG	North Channel Access Road, station 10+60 left of center line	151.9	7.1	141.8	147.9	95.9%	95%

Approved By: ***Stefan Mack*** Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: **Dry Stack Diversion, PO #: 15379070C, Pogo Mine, Alaska**
Client: **Sumitomo**

Project #: **2011-052**
Date: **September 4, 2012**
Area Tested: **North Diversion**

Material / Source:
Crusher stockpile 1" minus **147.9** **12-1274**

Gauge: **Troxler 3440** **Ser: # 23606**
Operator: **Mika Mack**

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	1" minus	12	FG	North Diversion, station 27+75 left of center line	153.8	4.9	146.6	147.9	99.1%	95%
2	1" minus	6	6" below FG	North Diversion, station 31+75 right of center line	154.5	4.8	147.4	147.9	99.7%	95%
3	1" minus	6	BFG	North Diversion, station 33+90 center line	150.2	4.7	143.5	147.9	97.0%	95%
4	1" minus	6	BFG	North Diversion, station 37+65 left of center line	151.7	5.6	143.7	147.9	97.1%	95%
5	1" minus	6	BFG	North Diversion, station 41+50 right of center line	153.6	5.5	145.6	147.9	98.4%	95%
6	1" minus	6	BFG	North Diversion, station 45+75 left of center line	152.8	5.4	145.0	147.9	98.0%	95%

Approved By: ***Stefan Mack*** Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: DSTF Expansion
Pogo Mine, AK
Client: SRK Consulting

Project #: 2013-107
Date: July 13, 2013
Area Tested: South Diverson

Material / Source:
1" Gravel / Cruher Stockpile 147.9 12-1274

Gauge: Instrotek 3500 **Ser: # 1748**
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	1" gravel	10	grade	South Diversion 18+40 Right of Center Line	154.1	4.9	146.9	147.9	99.3%	95%
2	1" gravel	10	grade	South Diversion 21+00 Center Line	154.6	4.8	147.5	147.9	99.7%	95%
3	1" gravel	10	grade	South Diversion 27+65 Center Line	147.4	4.9	140.5	147.9	95.0%	95%
4	1" gravel	10	grade	South Diverson 27+60 Center Line	149.9	5.2	142.5	147.9	96.3%	95%

Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: DSTF Expansion
Pogo Mine, AK
Client: SRK Consulting

Project #: 2013-107
Date: July 22, 2013
Area Tested:

Material / Source:
1" Gravel / Cruher Stockpile 147.9 12-1274

Gauge: Instrotek 3500 **Ser: #** 1748
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	1" gravel	10	grade	18+40 Left of Center Line	150.5	7.7	139.7	147.9	94.5%	95%
2	1" gravel	10	grade	52+40 Right of Center Line	152.1	7.0	142.1	147.9	96.1%	95%
3	1" gravel	10	grade	Sta 49+90 Center Line	152.3	8.6	140.2	147.9	95%	95%

Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion
Pogo Mine, AK
Client: Sumitomo Pogo

Project #: 2013-137
Date: August 6, 2013
Area Tested:

Material / Source:
1" minus / Onsite 145.9 13-740

Gauge: Instrotek 3500 **Ser: #** 1095
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	CF	10	grade	Station 05+75 Right of Center Line	152.2	4.6	145.5	145.9	99.7%	95%
2	CF	10	grade	Station 10+00 Center Line	146.0	4.2	140.1	145.9	96.0%	95%
3	CF	10	grade	Station 15+00 Left of Center Line	149.5	5.0	142.4	145.9	97.6%	95%

Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

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Anchorage, AK 99518
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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion
Pogo Mine, AK
Client: Sumitomo Pogo

Project #: 2013-137
Date: August 12, 2013
Area Tested: North & South Diversions

Material / Source:
1" minus / Onsite 145.9 13-740

Gauge: Instrotek 3500 **Ser: #** 1352
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	CF	8	grade	South Diversion 28+00 Center Line	152.2	5.1	144.8	145.9	99.3%	95%
2	CF	8	grade	South Diversion 16+50 Left of Center Line	153.9	5.9	145.3	145.9	99.6%	95%
3	CF	8	grade	North Diversion Tie-In 0+50 Left of Center Line (shoulder)	133.3	3.6	128.7	145.9	88.2%	95%
4	CF	8	grade	North Diversion Tie-In 0+50 Center Line	144.5	5.2	137.4	145.9	94.1%	95%
5	CF	8	grade	North Diversion Tie-In 0+50 Right of Center Line	141.1	3.2	136.7	145.9	93.7%	95%
6	CF	8	grade	North Diverson Tie-In 1+00 Center Line	140.3	3.7	135.3	145.9	92.7%	95%
7	CF	8	grade	North Diversion Tie-In 1+25 Left of Center Line	140.6	4.0	135.2	145.9	92.7%	95%
8	CF	8	grade	North Diversion Tie-In 1+25 Right of Center Line	140.8	3.9	135.5	145.9	92.9%	95%

Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion
Pogo Mine, AK
Client: Sumitomo Pogo

Project #: 2013-137
Date: August 16, 2013
Area Tested: North Diversion Tie-In

Material / Source:
1" minus / Onsite 145.9 13-740

Gauge: Instrotek 3500 **Ser: #** 1748
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	CF	10	grade	North Diversion Tie-In Retest 1+25 Right of Center Line	147.9	4.7	141.3	145.9	96.8%	95%
2	CF	10	grade	North Diversion Tie-In Retest 1+75 Center Line	145.9	4.6	139.5	145.9	95.6%	95%
3	CF	10	grade	North Diversion Tie-In Retest 1+50 Left of Center Line	147.8	5.7	139.8	145.9	95.8%	95%

Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion
Pogo Mine, AK
Client: Sumitomo Pogo

Project #: 2013-137
Date: September 11, 2013
Area Tested: South Diverson

Material / Source:
1" minus / Onsite 145.9 13-740

Gauge: Instrotek 3500 **Ser: #** 1748
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	CF	12	1	South diverson station 4+55 left of center line	153.9	7.5	143.2	145.9	98.1%	95%
2	CF	12	1	South diverson station 4+50 center line	151.7	6.6	142.3	145.9	97.5%	95%
3	CF	12	1	South diverson station 4+45 right of center line	151.2	7.1	141.2	145.9	96.8%	95%

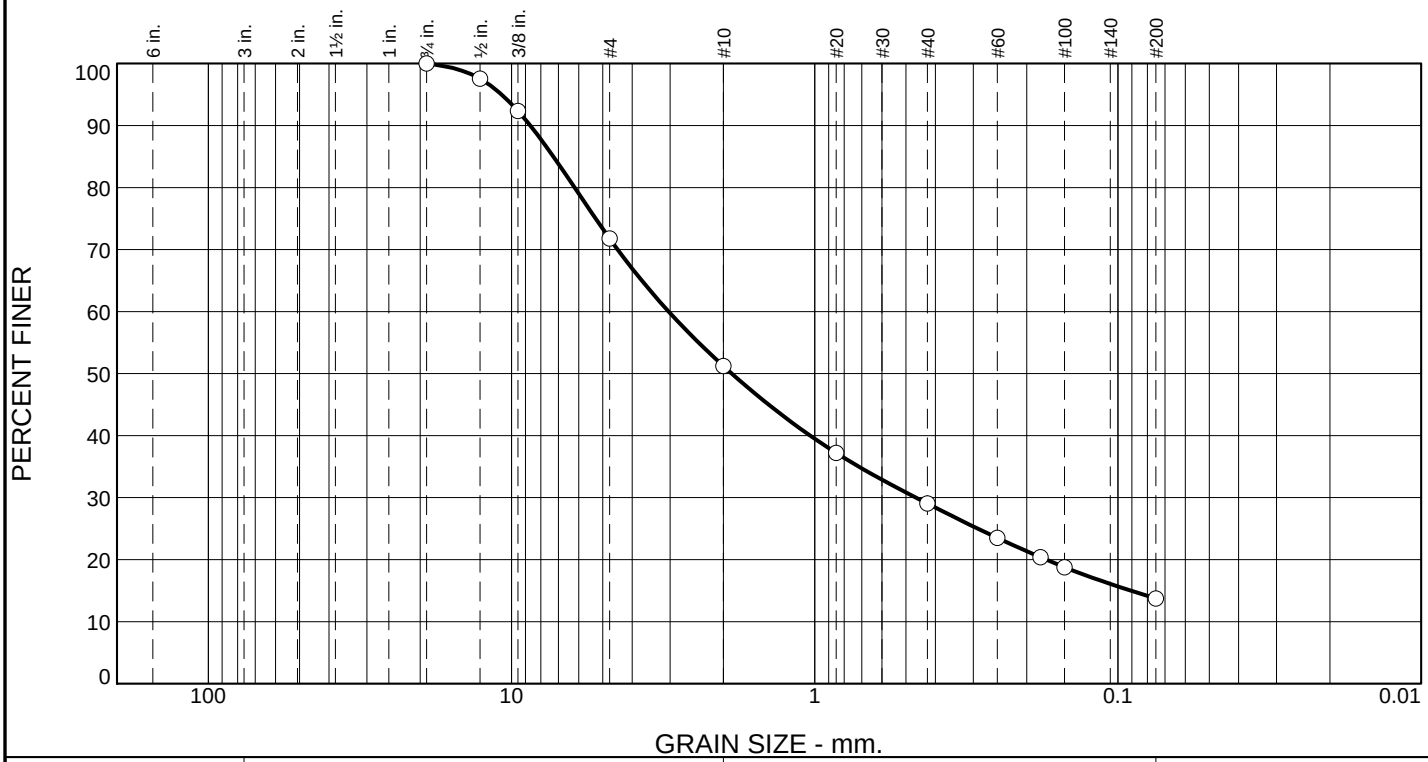
Approved By: *Stefan Mack* Stefan Mack PE, Lab Manager

Appendix 6

Miscellaneous Soil Test Results

Pogo Bedding Sand

Particle Size Distribution Report



% +3"	% Gravel	% Sand		% Fines
		Coarse	Fine	Silt
0	49	22	15	14

Test Results (ASTM C136 & ASTM C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100		
1/2"	98		
3/8"	92		
#4	72		
#10	51		
#20	37		
#40	29		
#60	24		
#80	20		
#100	19		
#200	14		

* (no specification provided)

Material Description

1/2" minus - silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 8.6764 D_{85}= 7.2791 D_{60}= 3.0322
D_{50}= 1.8774 D_{30}= 0.4638 D_{15}= 0.0907
D_{10}= C_u= C_c=

Remarks

Max Dry Density = 139.2 pcf @ 7.8% moisture

Date Received: 08/22/2012 **Date Tested:** 08/24/2012

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

Location: Crusher Stockpile
Sample Number: 12-1288

Date Sampled: Client

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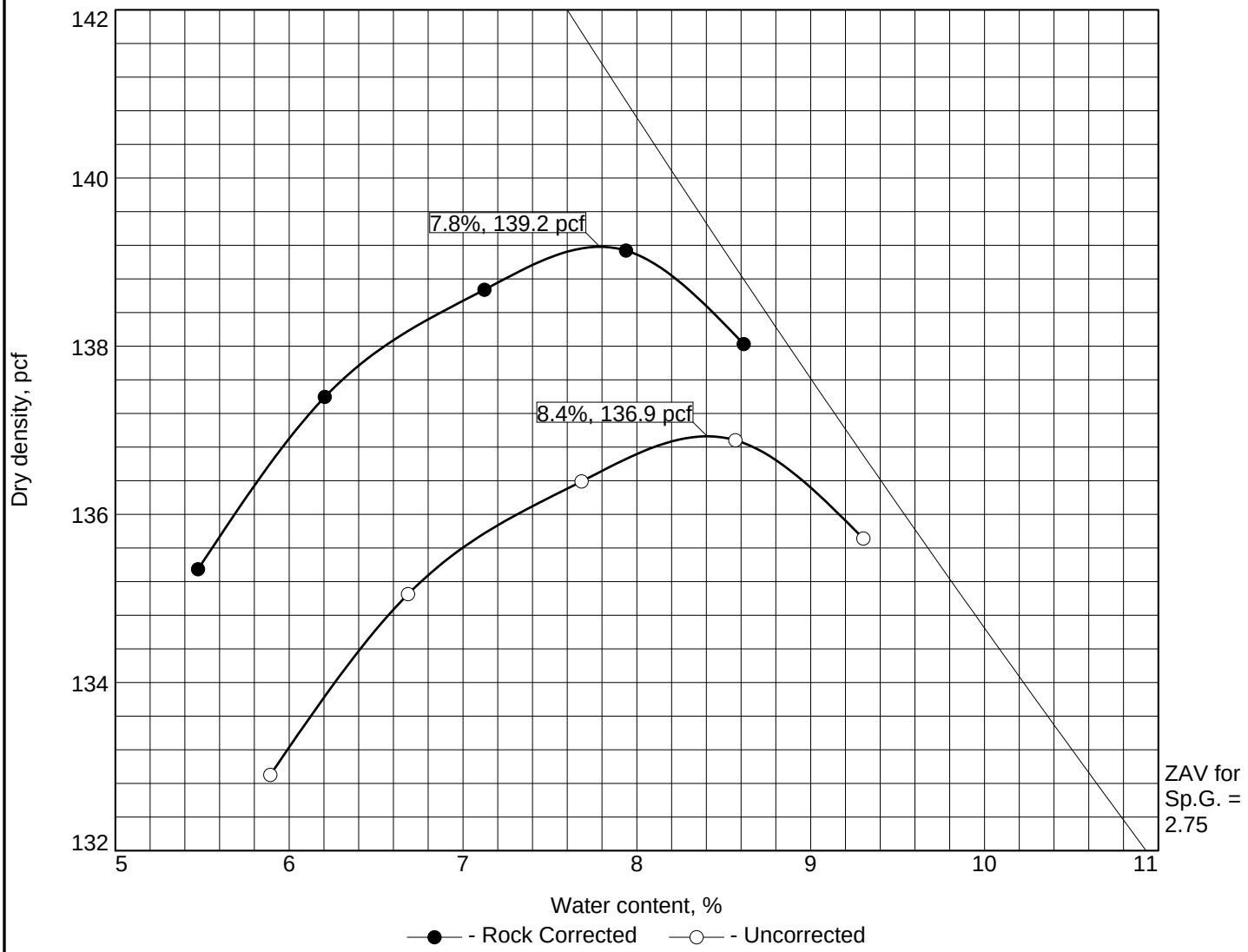
Client: Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK
Project No: 2012-182 **Figure**

COMPACTION TEST REPORT For Curve No. 12-1288



Test specification: ASTM D 698-07 Method B Standard
ASTM D 4718-87 Oversize Corr. Applied to Each Test Point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
	SM	A-1-b		2.75	NV	NP	8	14

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 139.2 pcf	136.9 pcf	1/2" minus - silty sand with gravel
Optimum moisture = 7.8 %	8.4 %	

Project No. 2012-182 **Client:** Sumitomo Metal Mining Pogo LLC
Project: Dry Stack Tailing Facility Expansion
Pogo Mine, AK **Date:** 08/22/2012
○ **Location:** Crusher Stockpile **Sample Number:** 12-1288

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Remarks:
Specific Gravity Determined by ASTM C 127

Figure

Tested By: Mika Mack **Checked By:** Stefan Mack, PE

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Anchorage, AK 99518
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ASTM D6938 In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Project: Dry Stack Diversion, PO #: 15379070C, Pogo Mine, Alaska
Client: Sumitomo

Project #: 2011-052
Date: August 29, 2012
Area Tested: N Ditch & N Channel Access Roads

Material / Source:
Crusher stockpile ½" minus 139.2 12-1288
Crusher stockpile 1" minus 147.9 12-1274

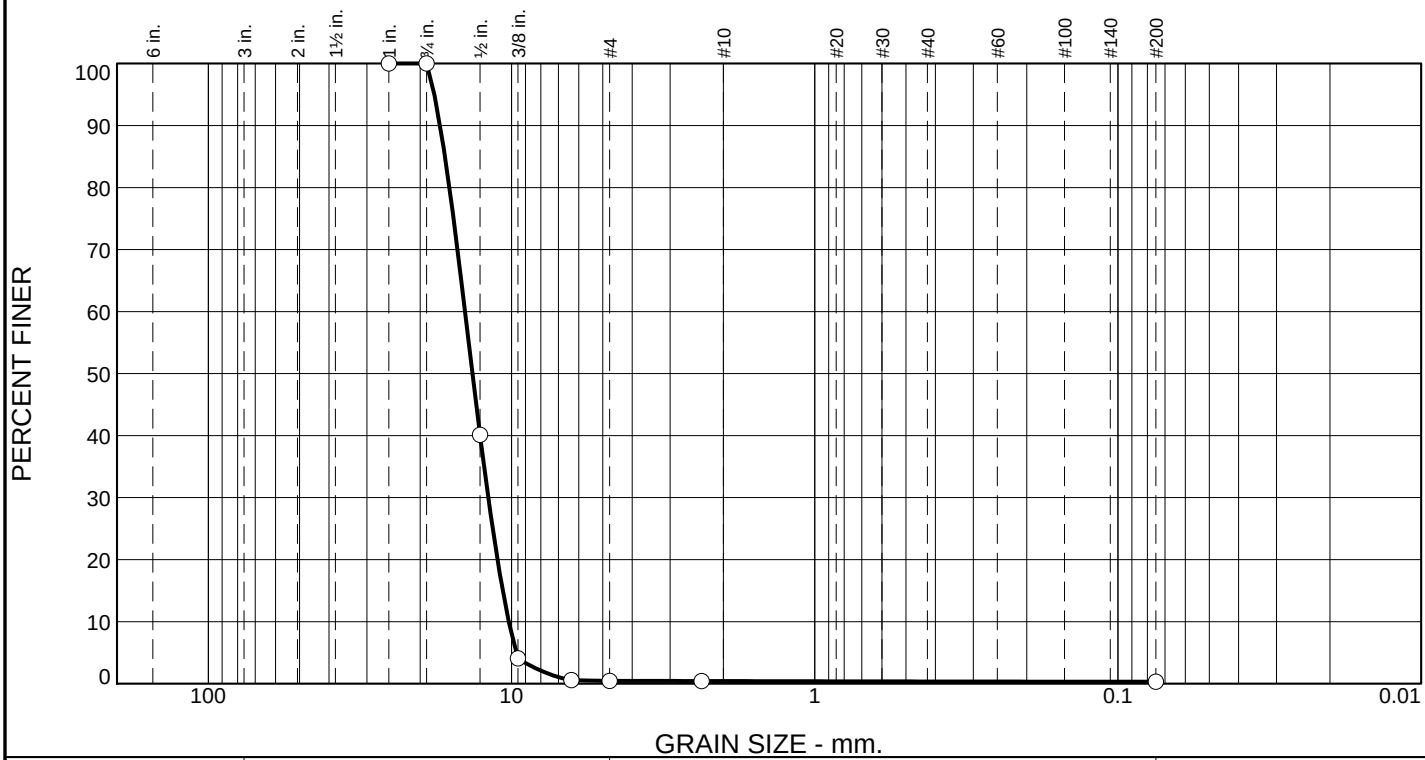
Gauge: Troxler 3430 **Ser: #** 23606
Operator: Mika Mack

Test #	Soil Type	Test Depth(in)	Lift Elev	Location	Wet Density	% Moist.	Dry Density	Proctor Value	Percent Density	Required Density
1	Bedding	12	1 above pipe	North Ditch Road, station 5+60 36" CMP	137.3	6.9	128.4	139.2	92.3%	95%
2	Bedding	12	1 above pipe	North Ditch Road, station 5+60 36" CMP	139.1	6.6	130.5	139.2	93.7%	95%
3	Bedding	8	1 above pipe	North Ditch Road, station 4+50	144.3	6.7	135.2	139.2	97.2%	95%
4	Bedding	8	1 above pipe	North Ditch Road, station 4+00	137.1	6.5	128.7	139.2	92.5%	95%
5	Bedding	8	1 above pipe	Retest of #4	141.0	6.2	132.8	139.2	95.4%	95%
6	Bedding	8	1 above pipe	Retest of #1	141.0	6.6	132.3	139.2	95.0%	95%
7	Bedding	8	1 above pipe	Retest of #2	139.9	6.4	131.5	139.2	94.5%	95%
8	1" minus	12	FG	North Channel Access Road, station 23+50 right of center line	151.6	5.8	143.3	147.9	96.9%	95%
9	1" minus	6	6" BFG	North Channel Access Road, station 19+60 left of center line	154.6	6.6	145.0	147.9	98.1%	95%
10	1" minus	8	FG	North Channel Access Road, station 15+00 right of center line	150.3	5.9	141.9	147.9	96.0%	95%

Approved By: ***Stefan Mack*** Stefan Mack PE, Lab Manager

Drain Gravel

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines
	Coarse	Fine	Coarse	Medium	Fine	Silt
0	0	100	0	0	0	0

Test Results (C136 & C117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100		
3/4	100		
1/2	40		
3/8	4		
1/4	1		
#4	0		
#8	0		
#200	0.3		

* (no specification provided)

Material Description

Drain Gravel

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 17.2096 D_{85}= 16.5816 D_{60}= 14.2313
D_{50}= 13.4478 D_{30}= 11.9265 D_{15}= 10.6911
D_{10}= 10.2148 C_u= 1.39 C_c= 0.98

Remarks

Date Received: 3/20/13 **Date Tested:** 03/25/13

Tested By: Mika Mack

Checked By: Stefan Mack, PE

Title: Engineer

Source of Sample: Client Sample
Sample Number: 13-175

Date Sampled: Client

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1956 Richardson Highway
North Pole, Alaska 99705

Client: Sumitomo Metal Mining Pogo LLC
Project: Diversion Ditch Project

Project No: 2013-004 **Figure**

Appendix 7

Shotcrete Compressive Strength Test Results and AAP QC Shotcrete Testing

Testing Summary and Results

Table A.7.1: Shotcrete Core Compressive Strength Test Results.

Sample Type	Mappa #	Batch #	Station	Test Panel #	Date Placed	Date Tested	Age (days)	Strength (psi)
Core	12-3418	N/A	N DIV 13+50 to 16+30	1	8-Sep-12	20-Sep-12	12	5080
Core	12-3419			2	9-Sep-12	20-Sep-12	11	5210
Core	12-3420			3	9-Sep-12	20-Sep-12	11	5490
Core	12-3421			4	10-Sep-12	20-Sep-12	10	5610
Core	12-3422			5	10-Sep-12	20-Sep-12	10	5650
Core	12-3423	1	N DIV 16+30 to 16+55	6	11-Sep-12	20-Sep-12	9	5870
Core	12-3424	2	N DIV 16+55 to 16+70	7	11-Sep-12	20-Sep-12	9	5590
Core	12-3425	3	N DIV 16+70 to 17+00	8	11-Sep-12	20-Sep-12	9	6060
Core	12-3426	2	N DIV 17+60 to 17+90	9	12-Sep-12	20-Sep-12	8	6720
Core	12-3427	4	N DIV 18+20 to 18+50	10	12-Sep-12	20-Sep-12	8	6550
Core	12-3428	5	N DIV 18+40 to 18+60	11	12-Sep-12	20-Sep-12	8	5390
Core	12-3429	1	N DIV 18+90 to 19+20	13	13-Sep-12	20-Sep-12	7	9070
Core	12-3430	5	N DIV 20+10 to 20+40	16	13-Sep-12	20-Sep-12	7	8480
Core	12-3431	7	N DIV 20+70 to 20+95	17	13-Sep-12	20-Sep-12	7	7290
Core	12-3432	1	N DIV 20+90 to 21+30	18	14-Sep-12	21-Sep-12	7	4530
Core	12-3433	3	N DIV 21+60 to 22+00	20	14-Sep-12	21-Sep-12	7	4510
Core	12-3434	6	N DIV 22+80 to 22+20	23	14-Sep-12	21-Sep-12	7	5520
Core	12-3582	1	N DIV 4+75 to 5+00	36	18-Sep-12	25-Sep-12	7	4380
Core	12-3583	3	N DIV 5+15 to 5+50	38	18-Sep-12	25-Sep-12	7	4480
Core	12-3584	6	N DIV 6+00 to 6+25	41	18-Sep-12	25-Sep-12	7	4080
Core	12-3585	1	N DIV 6+75 to 7+00	44	19-Sep-12	26-Sep-12	7	5250

Core	12-3586	2	N DIV 7+00 to 7+50	45	19-Sep-12	26-Sep-12	7	4950
Core	12-3587	3	N DIV 7+50 to 7+75	46	19-Sep-12	26-Sep-12	7	6220
Core	12-3688	1	N DIV 8+00 to 8+50	48	20-Sep-12	27-Sep-12	7	5800
Core	12-3689	3	N DIV 8+75 to 9+00	50	20-Sep-12	27-Sep-12	7	5340
Core	12-3690	4	N DIV 9+00 to 9+75	51	20-Sep-12	27-Sep-12	7	4890
Core	12-3691	1	N DIV 23+25 to 23+50	59	22-Sep-12	27-Sep-12	7	6970
Core	12-3692	2	N DIV 23+50 to 24+00	60	22-Sep-12	27-Sep-12	7	6390
Core	12-3693	5	N DIV 24+50 to 25+00	63	22-Sep-12	27-Sep-12	7	3270
Core	12-3694	1	N DIV 25+00 to 25+25	64	23-Sep-12	27-Sep-12	7	3990
Core	12-3695	2 & 3	N DIV 25+25 to 26+00	65	23-Sep-12	27-Sep-12	7	4280
Core	12-3696	4	N DIV 26+00 to 26+25	66	23-Sep-12	27-Sep-12	7	5110
Core	12-3697	1	N DIV 27+00 to 27+25	70	24-Sep-12	27-Sep-12	7	2860
Core	12-3698	3	N DIV 27+50 to 27+75	72	24-Sep-12	27-Sep-12	7	4880
Core	12-3699	4	N DIV 27+75 to 28+00	73	24-Sep-12	27-Sep-12	7	3780
Core	12-3719	1	N DIV 10+00 to 10+25	53	21-Sep-12	28-Sep-12	7	3720
Core	12-3720	2	N DIV 10+25 to 10+50	54	21-Sep-12	28-Sep-12	7	3690
Core	12-3721	5	N DIV 11+25 to 11+75	57	21-Sep-12	28-Sep-12	7	3850
Core	12-3793	1	N DIV 28+00 to 28+25	76	25-Sep-12	2-Oct-12	7	5720
Core	12-3794	4	N DIV 28+75 to 29+50	79	25-Sep-12	2-Oct-12	7	7180
Core	12-3795	5	N DIV 29+50 to 30+00	80	25-Sep-12	2-Oct-12	7	5310
Core	12-3796	1	N DIV 30+25 to 30+50	82	26-Sep-12	3-Oct-12	7	5660
Core	12-3797	3	N DIV 30+75 to 31+00	84	26-Sep-12	3-Oct-12	7	5650
Core	12-3798	5	N DIV 31+25 to 31+50	86	26-Sep-12	3-Oct-12	7	5800

Core	12-3799	1	N DIV 32+00 to 32+50	87	27-Sep-12	4-Oct-12	7	6000
Core	12-3800	4	N DIV 32+75 to 33+00	90	27-Sep-12	4-Oct-12	7	4340
Core	12-3801	5	N DIV 33+00 to 33+25	91	27-Sep-12	4-Oct-12	7	5390
Core	12-3489	1	N DIV 1+50 to 1+80	24	15-Sep-12	11-Oct-12	28	8090
Core	12-3490	4	N DIV 2+30 to 2+65	27	15-Sep-12	11-Oct-12	28	7520
Core	12-3491	5	N DIV 2+65 to 2+85	28	15-Sep-12	11-Oct-12	28	7030
Core	12-3492	6	N DIV 2+85 to 3+00	29	15-Sep-12	11-Oct-12	28	9380
Core	12-3493	1	N DIV 3+20 to 3+50	31	16-Sep-12	11-Oct-12	28	8110
Core	12-3494	3	N DIV 3+80 to 4+10	33	16-Sep-12	11-Oct-12	28	7930
Core	12-3495	1	N DIV 4+15 to 4+45	34	17-Sep-12	11-Oct-12	28	7620
Core	12-3496	2	N DIV 4+45 to 4+75	35	17-Sep-12	11-Oct-12	28	8580
Core	12-4052	1	N DIV 33+75 to 34+00	93	28-Sep-12	11-Oct-12	13	5400
Core	12-4053	2	N DIV 34+00 to 34+25	94	28-Sep-12	11-Oct-12	13	6730
Core	12-4054	5	N DIV 34+75 to 35+00	97	28-Sep-12	11-Oct-12	13	5300
Core	12-4055	1	N DIV 36+50 to 36+75	98	29-Sep-12	11-Oct-12	12	5260
Core	12-4056	3	N DIV 37+00 to 37+25	100	29-Sep-12	11-Oct-12	12	5850
Core	12-4057	5	N DIV 37+25 to 38+00	102	29-Sep-12	11-Oct-12	12	5460
Core	12-4058	1	N DIV 38+00 to 38+25	103	30-Sep-12	11-Oct-12	11	6160
Core	12-4059	2	N DIV 38+25 to 38+75	104	30-Sep-12	11-Oct-12	11	5970
Core	12-4060	3	N DIV 38+75 to 39+50	105	30-Sep-12	11-Oct-12	11	6800
Core	12-4061	1	N DIV 12+00 to 12+50	106	1-Oct-12	11-Oct-12	10	3440
Core	12-4062	2	N DIV 12+50 to 13+00	107	1-Oct-12	11-Oct-12	10	3800
Core	12-4063	2	N DIV 13+00 to 13+25	109	3-Oct-12	11-Oct-12	8	6080

Core	12-4064	3	N DIV 13+25 to 13+50	110	3-Oct-12	11-Oct-12	8	5490
Core	12-4065	4	N DIV 13+50 to 14+00	111	3-Oct-12	11-Oct-12	8	5930
Core	12-4066	N/A	N/A	112	4-Oct-12	11-Oct-12	7	5870
Core	12-4067	1	N DIV 39+50 to 40+00	113	5-Oct-12	11-Oct-12	7	5860
Core	12-4068	2	N DIV 40+00 to 40+50	114	5-Oct-12	12-Oct-12	7	5530
Core	12-4069	3	N DIV 40+50 to 40+75	115	5-Oct-12	12-Oct-12	7	4380
Core	12-4070	4	N DIV 40+75 to 41+00	116	5-Oct-12	12-Oct-12	7	6460
Core	12-4071	1	N DIV 41+50 to 41+80	118	7-Oct-12	12-Oct-12	5	3800
Core	12-4072	2	N DIV 41+80 to 42+25	119	7-Oct-12	12-Oct-12	5	3870
Core	12-4073	3	N DIV 42+25 to 42+75	120	7-Oct-12	12-Oct-12	5	4650
Core	12-4216	See above		53	21-Sep-12	19-Oct-12	28	6790
Core	12-4217			54	21-Sep-12	19-Oct-12	28	6730
Core	12-4218			57	21-Sep-12	19-Oct-12	28	6580
Core	12-4219			63	22-Sep-12	20-Oct-12	28	4980
Core	12-4220			64	23-Sep-12	21-Oct-12	28	5930
Core	12-4221			70	24-Sep-12	22-Oct-12	28	6130
Core	12-4222			73	24-Sep-12	22-Oct-12	28	5960
Core	12-4223			106	1-Oct-12	29-Oct-12	28	6130
Core	12-4224			107	1-Oct-12	29-Oct-12	28	7170
Core	12-4225			118	7-Oct-12	4-Nov-12	28	5810
Core	12-4226			119	7-Oct-12	4-Nov-12	28	6740
Sample Type	**Mappa #**	**Batch #**	**Station**	**Test Panel #**	**Date Placed**	**Date Tested**	**Age (days)**	**Strength (psi)**
Core	13-1973	1	S DIV 18+00 to 18+25	200	8-Jul-13	15-Jul-13	7	9394
Core	13-2199	3	S DIV 27+45 to 27+20	203	11-Jul-13	18-Jul-13	7	7720
Core	13-2200	5	S DIV 26+90 to 26+75	205	11-Jul-13	18-Jul-13	7	8690
Core	13-2201	6	S DIV 26+75 to 26+45	206	11-Jul-13	18-Jul-13	7	9170
Core	13-2202	1	S DIV 26+45 to 26+10	207	12-Jul-13	19-Jul-13	7	9580
Core	13-2203	1	S DIV 26+10 to 25+80	208	13-Jul-13	20-Jul-13	7	7838

Core	13-2204	4	S DIV 25+30 to 25+00	211	13-Jul-13	20-Jul-13	7	8589
Core	13-2205	6	S DIV 24+60 to 24+35	213	13-Jul-13	20-Jul-13	7	7734
Core	13-2206	1	S DIV 24+35 to 24+05	214	15-Jul-13	22-Jul-13	7	8838
Core	13-2207	7	S DIV 22+55 to 22+25	220	15-Jul-13	22-Jul-13	7	7411
Core	13-2208	9	S DIV 21+80 to 21+45	222	15-Jul-13	22-Jul-13	7	8427
Core	13-2272	3	S DIV 20+60 to 20+15	225	16-Jul-13	23-Jul-13	7	8390
Core	13-2209	1	S DIV 21+45 to 21+05	223	16-Jul-13	23-Jul-13	7	6639
Core	13-2210	7	S DIV 18+80 to 18+25	229	16-Jul-13	23-Jul-13	7	8338
Core	13-2211	2	N DIV 43+15 to 43+55	232	17-Jul-13	24-Jul-13	7	4604
Core	13-2212	5	N DIV 44+60 to 45+10	235	17-Jul-13	24-Jul-13	7	5755
Core	13-2213	8	N DIV 45+50 to 45+95	238	17-Jul-13	24-Jul-13	7	3890
Core	13-2274	3	N DIV 46+85 to 47+20	241	18-Jul-13	25-Jul-13	7	7720
Core	13-2276	1	N DIV 49+85 to 50+25	245	19-Jul-13	26-Jul-13	7	5740
Core	13-2459	1	N DIV 50+25 to 50+60	246	22-Jul-13	29-Jul-13	7	5085
Core	13-2460	2	N DIV 50+60 to 50+95	247	22-Jul-13	29-Jul-13	7	4122
Core	13-2461	5	N DIV 51+45 to 51+85	249	22-Jul-13	29-Jul-13	7	3925
Core	13-2462	2	N DIV 52+20 to 52+65	251	23-Jul-13	30-Jul-13	7	4353
Core	13-2463	4	N DIV 52+85 to 53+55	253	23-Jul-13	30-Jul-13	7	4905
Core	13-2464	5	N DIV 53+55 to 53+90	254	23-Jul-13	30-Jul-13	7	4722
Core	13-2465	1	N DIV 36+40 to 36+00	255	24-Jul-13	31-Jul-13	7	5056
Core	13-2466	3	N DIV 35+25 to 34+75	257	24-Jul-13	31-Jul-13	7	4442
Core	13-2467	4	N DIV 47+60 to 48+00	258	24-Jul-13	31-Jul-13	7	5355
Core	13-2630	2	N DIV 54+30 to 54+70	261	31-Jul-13	7-Aug-13	7	4600

Core	13-2631	3	N DIV 54+70 to 55+20	262	31-Jul-13	7-Aug-13	7	4250
Core	13-2632	6	N DIV 55+90 to 56+35	265	31-Jul-13	7-Aug-13	7	4430
Core	13-2633	1	N DIV 56+35 to 56+85	266	1-Aug-13	8-Aug-13	7	4340
Core	13-2634	3	N DIV 57+35 to 57+80	268	1-Aug-13	8-Aug-13	7	4430
Core	13-2635	4	N DIV 48+00 to 48+50	269	1-Aug-13	8-Aug-13	7	4580
Core	13-2636	1	N DIV Inlet 2	270	2-Aug-13	9-Aug-13	7	3538
Core	13-3078	1	N DIV Inlet 2	271	5-Aug-13	12-Aug-13	7	5155
Core	13-3079	2	N DIV Inlet 2 / 48+50 to 48+75	272	5-Aug-13	12-Aug-13	7	5043
Core	13-3080	3	N DIV 48+75 to 49+00	273	5-Aug-13	12-Aug-13	7	5687
Core	13-2782	1	S DIV 5+25 to 5+65	274	6-Aug-13	13-Aug-13	7	4349
Core	13-2783	2	S DIV 5+65 to 6+05	275	6-Aug-13	13-Aug-13	7	6058
Core	13-2784	4	S DIV 6+45 to 6+90	277	6-Aug-13	13-Aug-13	7	5879
Core	13-2785	5	S DIV 6+90 to 7+40	278	6-Aug-13	13-Aug-13	7	5411
Core	13-2790	1	S DIV 7+40 to 7+90	279	7-Aug-13	15-Aug-13	7	5823
Core	13-2791	2	S DIV 7+90 to 8+30	280	7-Aug-13	15-Aug-13	7	5685
Core	13-2847	1	N DIV 57+80 to 58+05	281	9-Aug-13	16-Aug-13	7	5166
Core	13-2848	3	S DIV 27+90 to 28+40	283	9-Aug-13	16-Aug-13	7	5813
Core	13-2963	5	S DIV 28+90 to 29+40	285	9-Aug-13	16-Aug-13	7	6147
Core	13-2849	1	S DIV 8+30 to 8+75	286	10-Aug-13	17-Aug-13	7	5762
Core	13-2850	5	S DIV 10+25 to 10+70	290	10-Aug-13	17-Aug-13	7	6774
Core	13-2851	6	S DIV 10+70 to 11+15	291	10-Aug-13	17-Aug-13	7	6236
Core	13-2852	1	S DIV 11+15 to 11+55	292	11-Aug-13	18-Aug-13	7	5243
Core	13-2853	3	S DIV 12+00 to 12+45	294	11-Aug-13	18-Aug-13	7	5947
Core	13-2854	6	S DIV 13+40 to 13+95	297	11-Aug-13	18-Aug-13	7	4928

Core	13-2964	1	S DIV 14+75 to 15+00	300	12-Aug-13	19-Aug-13	7	6570
Core	13-2965	2	S DIV 15+00 to 15+50	301	12-Aug-13	19-Aug-13	7	6519
Core	13-2966	3	S DIV 15+50 to 15+90	302	12-Aug-13	19-Aug-13	7	5447
Core	13-2967	1	S DIV 16+00 to 16+50	303	13-Aug-13	20-Aug-13	7	5015
Core	13-2968	3	S DIV 16+95 to 17+30	305	13-Aug-13	20-Aug-13	7	4628
Core	13-2969	4	S DIV 17+30 to 17+75	306	13-Aug-13	20-Aug-13	7	4832
Core	13-2970	1	N DIV 0+00 to 0+40	308	14-Aug-13	21-Aug-13	7	7787
Core	13-2971	3	N DIV 0+90 to 1+40	310	14-Aug-13	21-Aug-13	7	5811
Core	13-2972	4	N DIV 1+40 to 1+65	311	14-Aug-13	21-Aug-13	7	7002
Core	13-3562	1	S DIV 4+50 to 4+70	312	5-Sep-13	12-Sep-13	7	6430
Core	13-3563	2	S DIV 4+70 to 4+90	313	5-Sep-13	12-Sep-13	7	9120
Core	13-2962	8	N DIV 45+50 to 45+95	238	17-Jul-13	14-Aug-13	28	4538
Core	13-2961	5	N DIV 51+45 to 51+85	249	22-Jul-13	19-Aug-13	28	6828

Table A.7.2: Shotcrete Cylinder Compressive Strength Test Results.

Sample Type	Mappa #	Batch #	Station	Date Placed	Date Tested	Age (days)	Strength (psi)
Cylinder	12-3337	N/A	N DIV 13+50 to 16+30	8-Sep-12	18-Sep-12	10	6120
Cylinder	12-3338	N/A		8-Sep-12	6-Oct-12	28	6540
Cylinder	12-3339	N/A		9-Sep-12	18-Sep-12	9	5640
Cylinder	12-3340	N/A		9-Sep-12	7-Oct-12	28	6580
Cylinder	12-3341	N/A		9-Sep-12	18-Sep-12	9	5180
Cylinder	12-3342	N/A		9-Sep-12	7-Oct-12	28	7120
Cylinder	12-3343	N/A		9-Sep-12	18-Sep-12	9	5610
Cylinder	12-3344	N/A		9-Sep-12	7-Oct-12	28	6300
Cylinder	12-3345	N/A		10-Sep-12	18-Sep-12	8	5680
Cylinder	12-3346	N/A		10-Sep-12	8-Oct-12	28	6980
Cylinder	12-3347	N/A		10-Sep-12	18-Sep-12	8	5480
Cylinder	12-3348	N/A		10-Sep-12	8-Oct-12	28	7380

Cylinder	12-3349	N/A		10-Sep-12	18-Sep-12	8	5670
Cylinder	12-3350	N/A		10-Sep-12	8-Oct-12	28	6860
Cylinder	12-3351	3 & 5	N DIV 16+70 to 17+00 & N DIV 17+30 to 17+50	11-Sep-12	18-Sep-12	7	4900
Cylinder	12-3352			11-Sep-12	9-Oct-12	28	6930
Cylinder	12-3353			11-Sep-12	18-Sep-12	7	5800
Cylinder	12-3354			11-Sep-12	9-Oct-12	28	8020
Cylinder	12-3355			11-Sep-12	18-Sep-12	7	5940
Cylinder	12-3356			11-Sep-12	9-Oct-12	28	7090
Cylinder	12-3357	2 & 5	N DIV 17+60 to 17+90 & N DIV 18+40 to 18+60	12-Sep-12	19-Sep-12	7	4210
Cylinder	12-3358			12-Sep-12	10-Oct-12	28	7360
Cylinder	12-3359			12-Sep-12	19-Sep-12	7	5850
Cylinder	12-3360			12-Sep-12	10-Oct-12	28	6940
Cylinder	12-3361			12-Sep-12	19-Sep-12	7	6030
Cylinder	12-3362			12-Sep-12	10-Oct-12	28	8260
Cylinder	12-3363	3 & 4	N DIV 19+50 to 19+85 & N DIV 19+85 to 20+10	13-Sep-12	20-Sep-12	7	5770
Cylinder	12-3364			13-Sep-12	11-Oct-12	28	7540
Cylinder	12-3365			13-Sep-12	20-Sep-12	7	4940
Cylinder	12-3366			13-Sep-12	11-Oct-12	28	6080
Cylinder	12-3367			13-Sep-12	20-Sep-12	7	5240
Cylinder	12-3368			13-Sep-12	11-Oct-12	28	6860
Cylinder	12-3369	2, 4 & 6	N DIV 21+30 to 21+60, N DIV 22+00 to 22+40 & N DIV 22+80 to 23+20	14-Sep-12	21-Sep-12	7	6380
Cylinder	12-3370			14-Sep-12	12-Oct-12	28	8290
Cylinder	12-3371			14-Sep-12	21-Sep-12	7	5440
Cylinder	12-3372			14-Sep-12	12-Oct-12	28	6760
Cylinder	12-3373			14-Sep-12	21-Sep-12	7	6630
Cylinder	12-3374			14-Sep-12	12-Oct-12	28	8250
Cylinder	12-3471	1, 4 & 7	N DIV 1+50 to 1+80, N DIV 2+30 to 2+65 & N DIV 3+00 to 3+35	15-Sep-12	22-Sep-12	7	6290
Cylinder	12-3472			15-Sep-12	13-Oct-12	28	8110
Cylinder	12-3473			15-Sep-12	22-Sep-12	7	5580
Cylinder	12-3474			15-Sep-12	13-Oct-12	28	7190
Cylinder	12-3475			15-Sep-12	22-Sep-12	7	5400
Cylinder	12-3476			15-Sep-12	13-Oct-12	28	7230
Cylinder	12-3477	2	N DIV 3+50 to 3+80	16-Sep-12	23-Sep-12	7	5730
Cylinder	12-3478			16-Sep-12	14-Oct-12	28	7170
Cylinder	12-3479			16-Sep-12	23-Sep-12	7	6280
Cylinder	12-3480			16-Sep-12	14-Oct-12	28	7430
Cylinder	12-3483	2	N DIV 4+45 to 4+75	17-Sep-12	24-Sep-12	7	5230
Cylinder	12-3484			17-Sep-12		28	
Cylinder	12-3485			17-Sep-12	24-Sep-12	7	5140
Cylinder	12-3486			17-Sep-12		28	

Cylinder	12-3487			17-Sep-12	24-Sep-12	7	5260
Cylinder	12-3488			17-Sep-12		28	
Cylinder	12-3570	2 & 4	N DIV 5+00 to 5+15 & N DIV 5+50 to 5+75	18-Sep-12	25-Sep-12	7	5290
Cylinder	12-3571			18-Sep-12		28	
Cylinder	12-3572			18-Sep-12	25-Sep-12	7	5180
Cylinder	12-3573			18-Sep-12		28	
Cylinder	12-3574			18-Sep-12	25-Sep-12	7	6290
Cylinder	12-3575			18-Sep-12		28	
Cylinder	12-3576	2	N DIV 7+00 to 7+50	19-Sep-12	26-Sep-12	7	6020
Cylinder	12-3577			19-Sep-12		28	
Cylinder	12-3578			19-Sep-12	26-Sep-12	7	6240
Cylinder	12-3579			19-Sep-12		28	
Cylinder	12-3580			19-Sep-12	26-Sep-12	7	6270
Cylinder	12-3581			19-Sep-12		28	
Cylinder	12-3669	2 & 4	N DIV 23+50 to 24+00 & N DIV 24+25 to 24+50	22-Sep-12	29-Sep-12	7	6410
Cylinder	12-3670			22-Sep-12		28	
Cylinder	12-3671			22-Sep-12	29-Sep-12	7	6570
Cylinder	12-3672			22-Sep-12		28	
Cylinder	12-3673			22-Sep-12	29-Sep-12	7	6700
Cylinder	12-3674			22-Sep-12		28	
Cylinder	12-3675	2 & 3	N DIV 25+25 to 26+00	23-Sep-12	30-Sep-12	7	6290
Cylinder	12-3676			23-Sep-12		28	
Cylinder	12-3678			23-Sep-12	30-Sep-12	7	6490
Cylinder	12-3679			23-Sep-12		28	
Cylinder	12-3680			23-Sep-12	30-Sep-12	7	6750
Cylinder	12-3681			23-Sep-12		28	
Cylinder	12-3682	2, 3 & 4	N DIV 27+25 to 27+50, N DIV 27+50 to 27+75 & N DIV 27+75 to 28+00	24-Sep-12	1-Oct-12	7	6730
Cylinder	12-3683			24-Sep-12	22-Oct-12	28	8360
Cylinder	12-3684			24-Sep-12	1-Oct-12	7	6590
Cylinder	12-3685			24-Sep-12	22-Oct-12	28	7810
Cylinder	12-3686			24-Sep-12	1-Oct-12	7	6530
Cylinder	12-3687			24-Sep-12	22-Oct-12	28	8190
Cylinder	12-3700	1, 3 & 4	N DIV 8+00 to 8+50, N DIV 8+75 to 9+00 & N DIV 9+00 to 9+75	20-Sep-12	27-Sep-12	7	6520
Cylinder	12-3701			20-Sep-12		28	
Cylinder	12-3702			20-Sep-12	27-Sep-12	7	6090
Cylinder	12-3703			20-Sep-12		28	
Cylinder	12-3704	1, 2 & 4	N DIV 10+00 to 10+25, N DIV 10+25 to 10+50 & N DIV 10+75 to	21-Sep-12	28-Sep-12	7	6290
Cylinder	12-3705			21-Sep-12		28	
Cylinder	12-3706			21-Sep-12	28-Sep-12	7	7240
Cylinder	12-3707			21-Sep-12		28	

Cylinder	12-3708		11+25	21-Sep-12	28-Sep-12	7	6790
Cylinder	12-3709			21-Sep-12		28	
Cylinder	12-3769	3, 4 & 5	N DIV 32+50 to 32+75, N DIV 32+75 to 33+00 & N DIV 33+00 to 33+25	27-Sep-12	4-Oct-12	7	6180
Cylinder	12-3770			27-Sep-12		28	
Cylinder	12-3771			27-Sep-12	4-Oct-12	7	5340
Cylinder	12-3772			27-Sep-12		28	
Cylinder	12-3773			27-Sep-12	4-Oct-12	7	5360
Cylinder	12-3774			27-Sep-12		28	
Cylinder	12-3775	1, 2 & 3	N DIV 33+75 to 34+00, N DIV 34+00 to 34+25 & N DIV 34+25 to 34+50	28-Sep-12	5-Oct-12	7	6420
Cylinder	12-3776			28-Sep-12		28	
Cylinder	12-3777			28-Sep-12	5-Oct-12	7	6410
Cylinder	12-3778			28-Sep-12		28	
Cylinder	12-3779			28-Sep-12	5-Oct-12	7	6650
Cylinder	12-3780			28-Sep-12		28	
Cylinder	12-3781	1 & 3	N DIV 28+00 to 28+25 & N DIV 28+50 to 28+75	25-Sep-12	2-Oct-12	7	6130
Cylinder	12-3782			25-Sep-12		28	
Cylinder	12-3783			25-Sep-12	2-Oct-12	7	6180
Cylinder	12-3784			25-Sep-12		28	
Cylinder	12-3785			25-Sep-12	2-Oct-12	7	5160
Cylinder	12-3786			25-Sep-12		28	
Cylinder	12-3787	1 & 2	N DIV 30+25 to 30+50 & N DIV 30+50 to 30+75	26-Sep-12	3-Oct-12	7	6480
Cylinder	12-3788			26-Sep-12		28	
Cylinder	12-3789			26-Sep-12	3-Oct-12	7	6210
Cylinder	12-3790			26-Sep-12		28	
Cylinder	12-3791			26-Sep-12	3-Oct-12	7	6750
Cylinder	12-3792			26-Sep-12		28	
Cylinder	12-4034	1, 2 & 4	N DIV 13+00 to 13+25 & N DIV 13+50 to 14+00	3-Oct-12	11-Oct-12	8	6080
Cylinder	12-4035			3-Oct-12	11-Oct-12	8	5600
Cylinder	12-4036			3-Oct-12	11-Oct-12	8	6490
Cylinder	12-4037	N/A	N/A	4-Oct-12	11-Oct-12	7	6240
Cylinder	12-4038			4-Oct-12		28	
Cylinder	12-4040	1, 2 & 3	N DIV 39+50 to 40+00, N DIV 40+00 to 40+50 & N DIV 40+50 to 40+75	5-Oct-12	12-Oct-12	7	6230
Cylinder	12-4041			5-Oct-12		28	
Cylinder	12-4042			5-Oct-12	12-Oct-12	7	5550
Cylinder	12-4043			5-Oct-12		28	
Cylinder	12-4044			5-Oct-12	12-Oct-12	7	5650
Cylinder	12-4045			5-Oct-12		28	
Cylinder	12-4018	1, 2 & 4	N DIV 36+50 to 36+75, N DIV 36+75 to 37+00 &	29-Sep-12	13-Oct-12	14	7080
Cylinder	12-4019			29-Sep-12		28	
Cylinder	12-4022			29-Sep-12	13-Oct-12	14	7090

Cylinder	12-4023		N DIV 37+00 to 37+25	29-Sep-12		28	
Cylinder	12-4024			29-Sep-12	13-Oct-12	14	6380
Cylinder	12-4025			29-Sep-12		28	
Cylinder	12-4020	1, 2 & 3	N DIV 38+00 to 38+25, N DIV 38+25 to 38+75 & N DIV 38+75 to 39+50	30-Sep-12	14-Oct-12	14	6750
Cylinder	12-4021			30-Sep-12		28	
Cylinder	12-4026			30-Sep-12	14-Oct-12	14	6630
Cylinder	12-4027			30-Sep-12		28	
Cylinder	12-4028			30-Sep-12	14-Oct-12	14	6680
Cylinder	12-4029			30-Sep-12		28	
Cylinder	12-4030	1 & 2	N DIV 12+00 to 12+50 & N DIV 12+50 to 13+00	1-Oct-12	15-Oct-12	14	7330
Cylinder	12-4031			1-Oct-12		28	
Cylinder	12-4032			1-Oct-12	15-Oct-12	14	7790
Cylinder	12-4033			1-Oct-12		28	
Cylinder	12-4046	1 & 2	N DIV 41+50 to 41+80 & N DIV 41+80 to 42+25	7-Oct-12	14-Oct-12	7	5900
Cylinder	12-4047			7-Oct-12		28	
Cylinder	12-4048			7-Oct-12	14-Oct-12	7	6160
Cylinder	12-4049			7-Oct-12		28	
Cylinder	12-4050			7-Oct-12	14-Oct-12	7	6020
Cylinder	12-4051			7-Oct-12		28	
Sample Type	**Mappa #**	**Batch #**	**Station**	**Date Placed**	**Date Tested**	**Age (days)**	**Strength (psi)**
Cylinder	13-1971	1	S DIV 18+00 to 18+25	8-Jul-13	15-Jul-13	7	5140
Cylinder	13-2034	3, 5 & 6	S DIV 27+45 to 27+20, S DIV 26+90 to 26+75 & S DIV 26+75 to 26+45	11-Jul-13	18-Jul-13	7	6180
Cylinder	13-2036			11-Jul-13	18-Jul-13	7	5360
Cylinder	13-2038			11-Jul-13	18-Jul-13	7	5420
Cylinder	13-2040	1	S DIV 26+45 to 26+10	12-Jul-13	19-Jul-13	7	5860
Cylinder	13-2042	1, 4 & 6	S DIV 26+10 to 25+80, S DIV 25+30 to 25+00 & S DIV 24+60 to 24+35	13-Jul-13	20-Jul-13	7	5040
Cylinder	13-2044			13-Jul-13	20-Jul-13	7	5080
Cylinder	13-2047			13-Jul-13	20-Jul-13	7	5040
Cylinder	13-2049	1 & 7	S DIV 24+35 to 24+05 & S DIV 22+55 to 22+25	15-Jul-13	22-Jul-13	7	4460
Cylinder	13-2052			15-Jul-13	22-Jul-13	7	5270
Cylinder	13-2184	1 & 7	S DIV 21+45 to 21+05 & S DIV 18+80 to 18+25	16-Jul-13	23-Jul-13	7	5620
Cylinder	13-2186			16-Jul-13	23-Jul-13	7	5400
Cylinder	13-2188			16-Jul-13	23-Jul-13	7	5360
Cylinder	13-2190	2, 4 & 7	N DIV 43+15 to 43+55, N DIV	17-Jul-13	24-Jul-13	7	4860
Cylinder	13-2192			17-Jul-13	24-Jul-13	7	5210

Cylinder	13-2194		44+10 to 44+60 & N DIV 45+30 to 45+50	17-Jul-13	24-Jul-13	7	5670
Cylinder	13-2266	2 & 4	N DIV 46+45 to 46+85 & N DIV 47+20 to 47+55	18-Jul-13	25-Jul-13	7	5020
Cylinder	13-2264			18-Jul-13	25-Jul-13	7	5414
Cylinder	13-2268			18-Jul-13	25-Jul-13	7	6370
Cylinder	13-2270	1	N DIV 49+85 to 50+25	19-Jul-13	26-Jul-13	7	5300
Cylinder	13-2443	1, 3 & 5	N DIV 50+25 to 50+60, N DIV 50+95 to 51+45 & N DIV 51+45 to 52+85	22-Jul-13	29-Jul-13	7	7030
Cylinder	13-2445			22-Jul-13	29-Jul-13	7	5600
Cylinder	13-2447			22-Jul-13	29-Jul-13	7	5530
Cylinder	13-2449	2 & 5	N DIV 52+20 to 52+65 & N DIV 53+55 to 53+90	23-Jul-13	30-Jul-13	7	6080
Cylinder	13-2451			23-Jul-13	30-Jul-13	7	6040
Cylinder	13-2453			23-Jul-13	30-Jul-13	7	6190
Cylinder	13-2455	3 & 4	N DIV 35+25 to 34+75 & N DIV 47+60 to 48+00	24-Jul-13	31-Jul-13	7	5880
Cylinder	13-2457			24-Jul-13	31-Jul-13	7	5680
Cylinder	13-2620	1, 3 & 5	N DIV 53+90 to 54+30, N DIV 54+70 to 55+20 & N DIV 55+45 to 55+90	31-Jul-13	7-Aug-13	7	5940
Cylinder	13-2618			31-Jul-13	7-Aug-13	7	5680
Cylinder	13-2628			31-Jul-13	7-Aug-13	7	5550
Cylinder	13-2622	1 & 3	N DIV 56+35 to 56+85 & N DIV 57+35 to 57+80	1-Aug-13	8-Aug-13	7	6190
Cylinder	13-2624			1-Aug-13	8-Aug-13	7	5130
Cylinder	13-2626	1	N DIV Inlet 2	2-Aug-13	9-Aug-13	7	5380
Cylinder	13-2751	1 & 3	N DIV Inlet 2 & N DIV 48+75 to 49+00	5-Aug-13	12-Aug-13	7	6193
Cylinder	13-2752			5-Aug-13	12-Aug-13	7	6210
Cylinder	13-2753	2, & 5	S DIV 5+65 to 6+05, S DIV 6+45 to 6+90 & S DIV 6+90 to 7+40	6-Aug-13	13-Aug-13	7	5690
Cylinder	13-2754			6-Aug-13	13-Aug-13	7	6160
Cylinder	13-2755			6-Aug-13	13-Aug-13	7	6560
Cylinder	13-2756	1	S DIV 7+40 to 7+90	7-Aug-13	14-Aug-13	7	5560
Cylinder	13-2757	1, 3 & 5	N DIV 57+80 to 58+05, S DIV 27+90 to 28+40 & S DIV 28+90 to 29+40	9-Aug-13	16-Aug-13	7	5510
Cylinder	13-2758			9-Aug-13	16-Aug-13	7	5620
Cylinder	13-2759			9-Aug-13	16-Aug-13	7	5610
Cylinder	13-2760	1, 3 & 6	S DIV 8+30 to 8+75, S DIV 9+25 to 9+75 & S DIV 10+75 to 11+15	10-Aug-13	17-Aug-13	7	6330
Cylinder	13-2761			10-Aug-13	17-Aug-13	7	6760
Cylinder	13-2762			10-Aug-13	17-Aug-13	7	7300

Cylinder	13-2763	1, 4 & 8	S DIV 11+15 to 11+55, S DIV 12+45 to 12+95 & S DIV 14+40 to 14+85	11-Aug-13	18-Aug-13	7	5890
Cylinder	13-2764			11-Aug-13	18-Aug-13	7	5630
Cylinder	13-2765			11-Aug-13	18-Aug-13	7	6910
Cylinder	13-2831	1 & 3	S DIV 14+75 to 15+00 & S DIV 15+50 to 15+90	12-Aug-13	19-Aug-13	7	5840
Cylinder	13-2833			12-Aug-13	19-Aug-13	7	5780
Cylinder	13-2839	1, 3 & 5	S DIV 16+00 to 16+50, S DIV 16+95 to 17+30 & S DIV 17+75 to 18+00	13-Aug-13	20-Aug-13	7	4170
Cylinder	13-2835			13-Aug-13	20-Aug-13	7	4930
Cylinder	13-2837			13-Aug-13	20-Aug-13	7	4760
Cylinder	13-2841	1, 2 & 4	N DIV 0+00 to 0+40, N DIV 0+40 to 0+90 & N DIV 1+40 to 1+65	14-Aug-13	21-Aug-13	7	6490
Cylinder	13-2843			14-Aug-13	21-Aug-13	7	5470
Cylinder	13-2845			14-Aug-13	21-Aug-13	7	6120
Cylinder	13-3684	1 & 2	S DIV 4+50 to 4+70 & S DIV 4+70 to 4+90	5-Sep-13	12-Sep-13	7	6600
Cylinder	13-3686			5-Sep-13	12-Sep-13	7	6910
Cylinder	13-3688	1, 2 & 3	S DIV 4+90 to 5+15, S DIV 29+25 to 29+70 & S DIV 29+70 to 30+10	6-Sep-13	13-Sep-13	7	7260
Cylinder	13-3690			6-Sep-13	13-Sep-13	7	6980
Cylinder	13-3697	1 & 2	S DIV 30+10 to 30+50 & S DIV 30+50 to 30+75	7-Sep-13	14-Sep-13	7	6590
Cylinder	13-3694			7-Sep-13	14-Sep-13	7	6850

Notes:

1. Red test result indicates failing test result; green test result indicates a passing test result for a failing test result.
2. Shotcrete placement data from AAP QC forms, and test results from Mappa.
3. Pogo requested that Mappa stop testing cylinders for 28-day breaks when the corresponding 7-day breaks had already met the compressive strength requirements.
4. AAP accidentally labeled two test panels “65” on 9/23/13. The table uses the numbers that correspond to AAP’s QC forms.
5. Panels 100 & 101 indicate the same station location on AAP’s QC forms.
6. Panels 108 & 109 indicate the same station location on AAP’s QC forms.
7. No cylinder test results exist for shotcrete placed on 8/8/13.
8. No core test results exist for panels 314, 315, 316 (9/6/13) and 317, 318 (9/7/13), and no 28-day break exists for panel 270 (8/2/13).

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

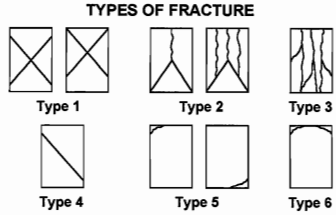
Date Placed: 9/8/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3337	9/18/2012	10	76875	4.00	12.57	6120		4
12-3338	10/6/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/8/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

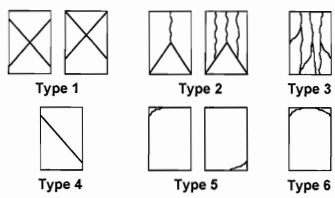
Date Placed: 9/8/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3337	9/18/2012	10	76875	4.00	12.57	6120		4
12-3338	10/6/2012	28	82195	4.00	12.57	6540		3

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

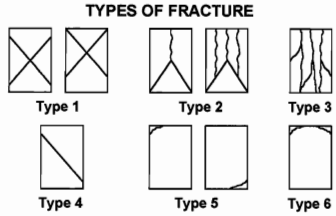
Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3339	9/18/2012	9	70935	4.00	12.57	5640		5
12-3340	10/7/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

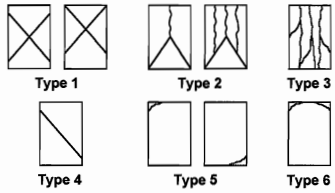
Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3341	9/18/2012	9	65150	4.00	12.57	5180		5
12-3342	10/7/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

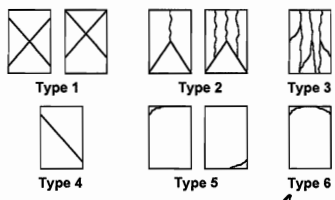
Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3343	9/18/2012	9	70500	4.00	12.57	5610		4
12-3344	10/7/2012	28						

Remarks:

TYPES OF FRACTURE



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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/8/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

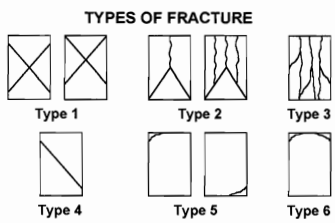
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3339	9/18/2012	9	70935	4.00	12.57	5640		5
12-3340	10/7/2012	28	82690	4.00	12.57	6580		3

Remarks:



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/8/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

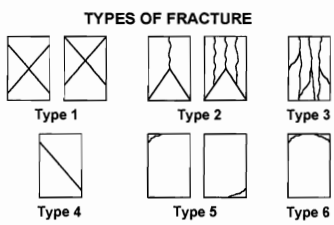
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3341	9/18/2012	9	65150	4.00	12.57	5180		5
12-3342	10/7/2012	28	89470	4.00	12.57	7120		3

Remarks:



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/8/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

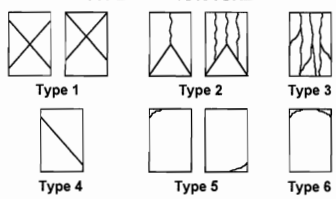
Date Placed: 9/9/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3343	9/18/2012	9	70500	4.00	12.57	5610		4
12-3344	10/7/2012	28	79240	4.00	12.57	6300		3

Remarks:

TYPES OF FRACTURE



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Reported by: Stf Mak

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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/9/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

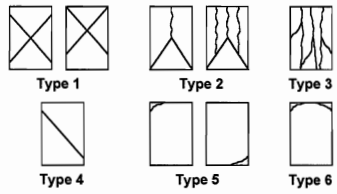
Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3345	9/18/2012	8	71760	4.01	12.63	5680		5
12-3346	10/8/2012	28	87775	4.00	12.57	6980		5

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/9/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

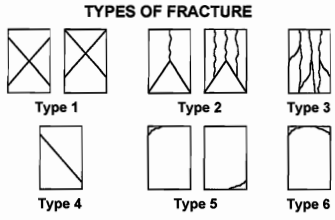
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3347	9/18/2012	8	68835	4.00	12.57	5480		5
12-3348	10/8/2012	28	92815	4.00	12.57	7380		5

Remarks:



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/9/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

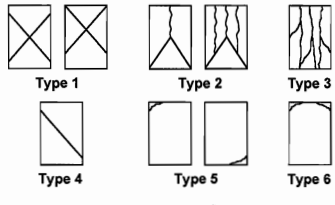
Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3349	9/18/2012	8	71650	4.01	12.63	5670		4
12-3350	10/8/2012	28	86255	4.00	12.57	6860		2

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

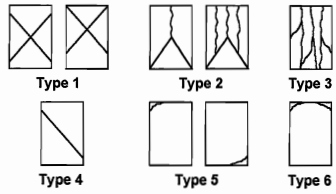
Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3345	9/18/2012	8	71760	4.01	12.63	5680		5
12-3346	10/8/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

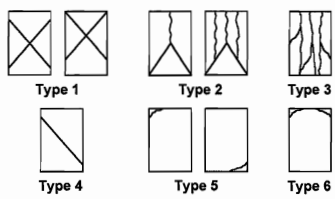
Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3347	9/18/2012	8	68835	4.00	12.57	5480		5
12-3348	10/8/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

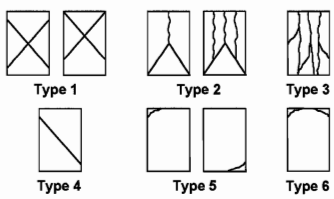
Date Placed: 9/10/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3349	9/18/2012	8	71650	4.01	12.63	5670		4
12-3350	10/8/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

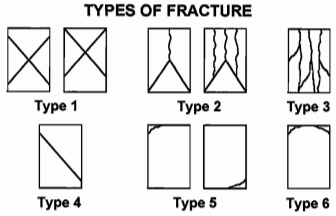
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3351	9/18/2012	7	61590	4.00	12.57	4900		4
12-3352	10/9/2012	28						

Remarks:

Copies to:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

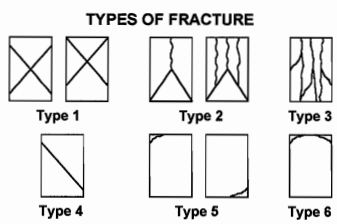
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3353	9/18/2012	7	73295	4.01	12.63	5800		5
12-3354	10/9/2012	28						

Remarks:



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Reported by: Stefan Mack

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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/19/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

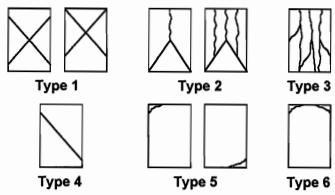
Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3355	9/18/2012	7	75040	4.01	12.63	5940		5
12-3356	10/9/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/10/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

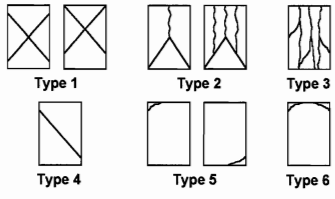
Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3351	9/18/2012	7	61590	4.00	12.57	4900		4
12-3352	10/9/2012	28	87060	4.00	12.57	6930		3

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/10/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

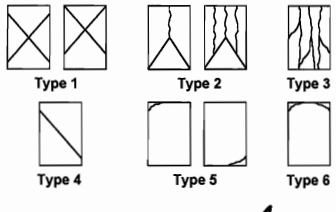
Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3353	9/18/2012	7	73295	4.01	12.63	5800		5
12-3354	10/9/2012	28	100865	4.00	12.57	8020		3

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/10/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

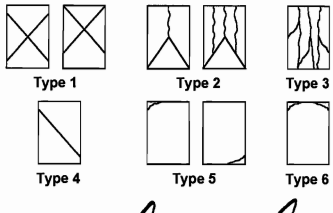
Date Placed: 9/11/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3355	9/18/2012	7	75040	4.01	12.63	5940		5
12-3356	10/9/2012	28	89120	4.00	12.57	7090		3

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

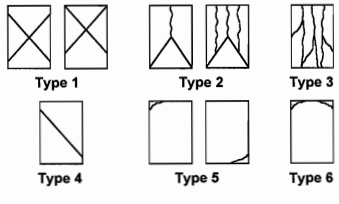
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3357	9/19/2012	7	53140	4.01	12.63	4210	105%	5
12-3358	10/10/2012	28	92540	4.00	12.57	7360	184%	5

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

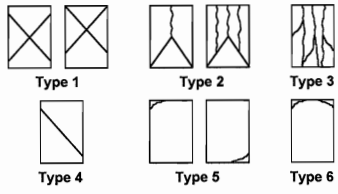
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3359	9/19/2012	7	73475	4.00	12.57	5850	146%	3
12-3360	10/10/2012	28	87245	4.00	12.57	6940	174%	3

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

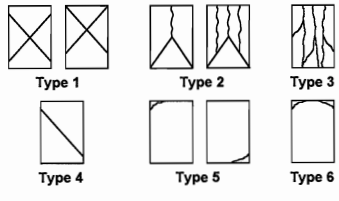
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3361	9/19/2012	7	76155	4.01	12.63	6030	151%	3
12-3362	10/10/2012	28	103780	4.00	12.57	8260	207%	3

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

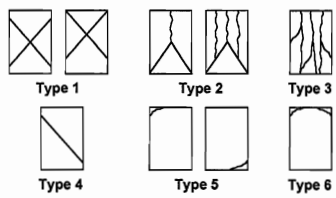
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3357	9/19/2012	7	53140	4.01	12.63	4210		5
12-3358	10/10/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

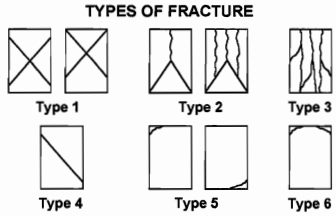
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3359	9/19/2012	7	73475	4.00	12.57	5850		3
12-3360	10/10/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

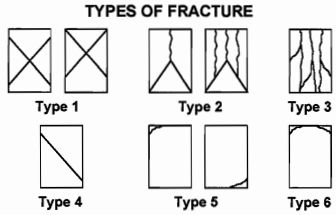
Date Placed: 9/12/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3361	9/19/2012	7	76155	4.01	12.63	6030		3
12-3362	10/10/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/21/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

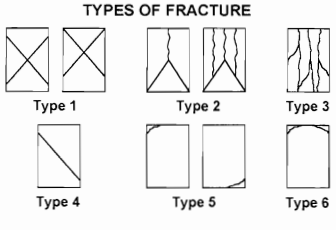
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3429	9/20/2012	7	22145	1.73	2.36	2.75	2.75	9070		2
12-3430	9/20/2012	7	20780	1.73	2.35	2.58	2.58	8480		2
12-3431	9/20/2012	7	17120	1.73	2.35	3.45	3.45	7290		2

Remarks: Shotcrete core #13, #16, #17



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

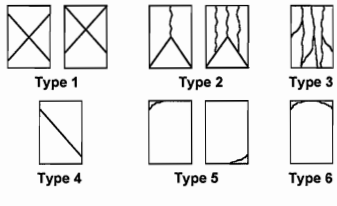
Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3363	9/20/2012	7	72525	4.00	12.57	5770	144%	6
12-3364	10/11/2012	28	94725	4.00	12.57	7540	189%	5

Remarks:

TYPES OF FRACTURE



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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

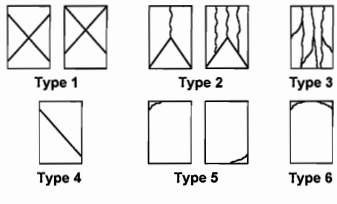
Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3365	9/20/2012	7	62060	4.00	12.57	4940	124%	5
12-3366	10/11/2012	28	76445	4.00	12.57	6080	152%	3

Remarks:

TYPES OF FRACTURE



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1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

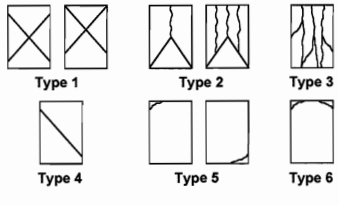
Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3367	9/20/2012	7	65905	4.00	12.57	5240	131%	5
12-3368	10/11/2012	28	86225	4.00	12.57	6860	172%	3

Remarks:

TYPES OF FRACTURE



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1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

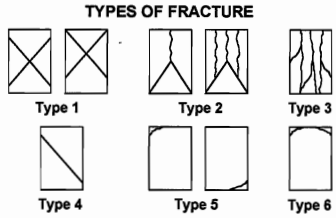
Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3363	9/20/2012	7	72525	4.00	12.57	5770		6
12-3364	10/11/2012	28						

Remarks:

TYPES OF FRACTURE



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Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

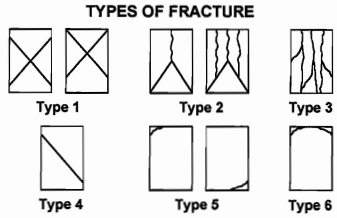
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3365	9/20/2012	7	62060	4.00	12.57	4940		5
12-3366	10/11/2012	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/13/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number:
Mix Number:
Design Strength:
Time Batched:
Batch Size:
Slump: (ASTM C 143)
Shotcrete Temp: (ASTM C 1064)
Water Added:

Ticket Number:

Time Placed:

Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client cast

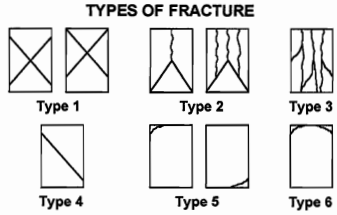
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3367	9/20/2012	7	65905	4.00	12.57	5240		5
12-3368	10/11/2012	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/21/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

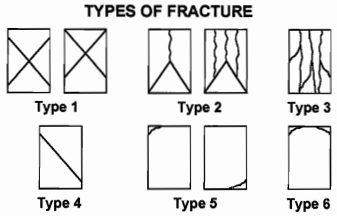
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3432	9/21/2012	7	10645	1.73	2.35	3.36	3.36	4530		2
12-3433	9/21/2012	7	10555	1.73	2.34	3.69	3.69	4510		3
12-3434	9/21/2012	7	13315	1.73	2.35	2.89	2.89	5520		4

Remarks: Shotcrete core #18, #20, #23

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

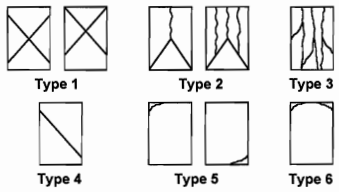
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3369	9/21/2012	7	80520	4.01	12.63	6380	160%	5
12-3370	10/12/2012	28	104255	4.00	12.57	8290	207%	3

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

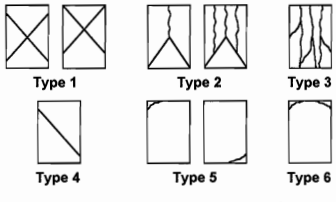
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3371	9/21/2012	7	68370	4.00	12.57	5440	136%	5
12-3372	10/12/2012	28	84915	4.00	12.57	6760	169%	3

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

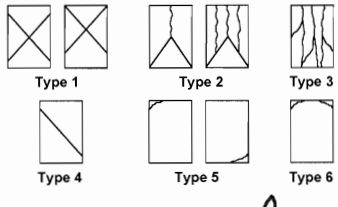
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3373	9/21/2012	7	83690	4.01	12.63	6630	166%	2
12-3374	10/12/2012	28	103640	4.00	12.57	8250	206%	2

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/21/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

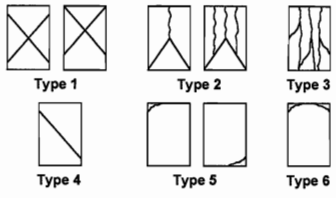
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3369	9/21/2012	7	80520	4.01	12.63	6380		5
12-3370	10/12/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/21/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

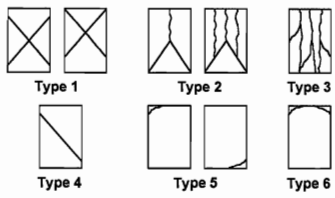
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3371	9/21/2012	7	68370	4.00	12.57	5440		5
12-3372	10/12/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/21/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

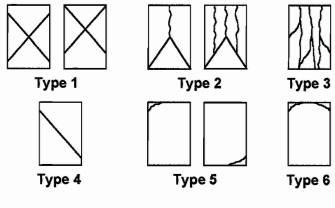
Date Placed: 9/14/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3373	9/21/2012	7	83690	4.01	12.63	6630		2
12-3374	10/12/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/24/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

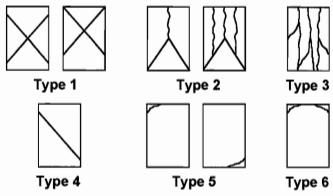
Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3471	9/22/2012	7	79380	4.01	12.63	6290		2
12-3472	10/13/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/24/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

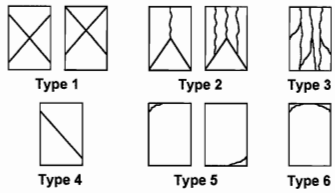
Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3473	9/22/2012	7	70155	4.00	12.57	5580		4
12-3474	10/13/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stf. Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/24/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

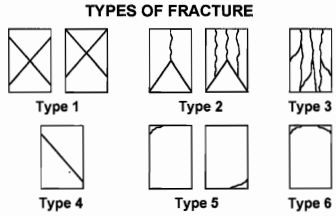
Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3475	9/22/2012	7	67825	4.00	12.57	5400		4
12-3476	10/13/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/15/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

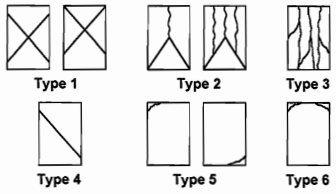
Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3471	9/22/2012	7	79380	4.01	12.63	6290	157%	2
12-3472	10/13/2012	28	101925	4.00	12.57	8110	203%	3

Remarks:

TYPES OF FRACTURE



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Reported by: Stef Mack

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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/15/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

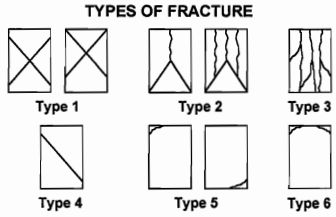
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3473	9/22/2012	7	70155	4.00	12.57	5580	140%	4
12-3474	10/13/2012	28	90345	4.00	12.57	7190	180%	3

Remarks:



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/15/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

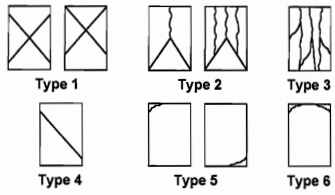
Date Placed: 9/15/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3475	9/22/2012	7	67825	4.00	12.57	5400	135%	4
12-3476	10/13/2012	28	90920	4.00	12.57	7230	181%	3

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/16/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

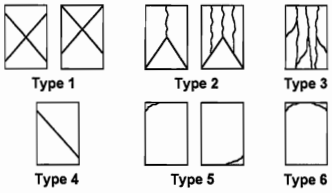
Date Placed: 9/16/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3477	9/23/2012	7	72085	4.00	12.57	5730	143%	4
12-3478	10/14/2012	28	90135	4.00	12.57	7170	179%	4

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/16/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

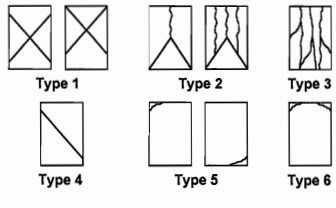
Date Placed: 9/16/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3479	9/23/2012	7	79310	4.01	12.63	6280	157%	4
12-3480	10/14/2012	28	93825	4.01	12.63	7430	186%	2

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/24/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

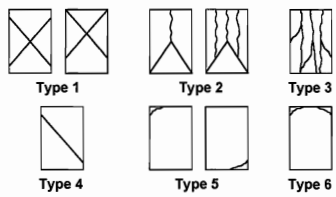
Date Placed: 9/16/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3477	9/23/2012	7	72085	4.00	12.57	5730		4
12-3478	10/14/2012	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/24/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

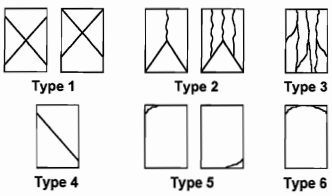
Date Placed: 9/16/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3479	9/23/2012	7	79310	4.01	12.63	6280		4
12-3480	10/14/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/17/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

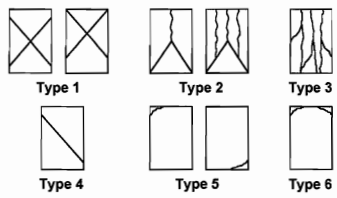
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3483	9/24/2012	7	65735	4.00	12.57	5230		4
12-3484	10/15/2012	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

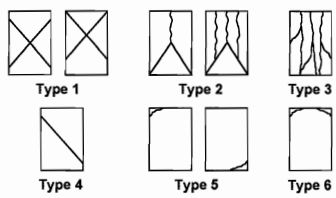
Date Placed: 9/17/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3485	9/24/2012	7	64605	4.00	12.57	5140		5
12-3486	10/15/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

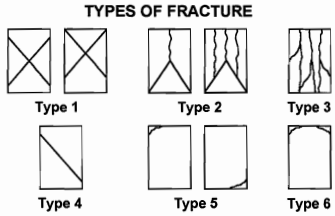
Date Placed: 9/17/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3487	9/24/2012	7	66170	4.00	12.57	5260		4
12-3488	10/15/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

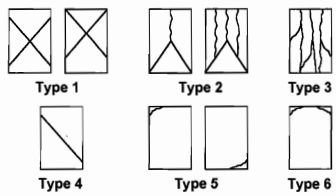
Date Placed: 9/18/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3570	9/25/2012	7	66540	4.00	12.57	5290		5
12-3571	10/16/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

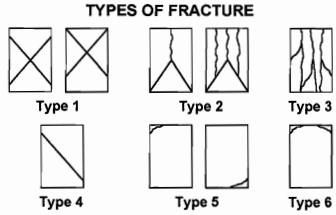
Date Placed: 9/18/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3572	9/25/2012	7	65075	4.00	12.57	5180		4
12-3573	10/16/2012	28			.			

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

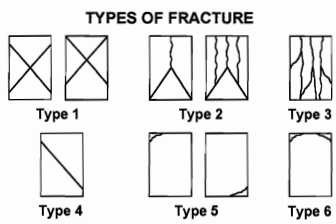
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/18/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3574	9/25/2012	7	79420	4.01	12.63	6290		2
12-3575	10/16/2012	28						

Remarks:



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/25/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

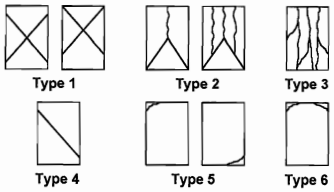
Date Placed: 9/18/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3582	9/25/2012	7	10510	1.73	2.34	2.90	2.90	4380		2
12-3583	9/25/2012	7	10720	1.72	2.32	2.80	2.80	4480		4
12-3584	9/25/2012	7	9730	1.72	2.33	2.95	2.95	4080		2

Remarks: Shotcrete cores 36, 38, 41

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/26/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

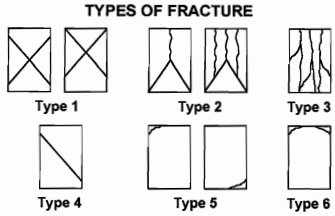
Date Placed: 9/19/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3576	9/26/2012	7	75660	4.00	12.57	6020		5
12-3577	10/17/2012	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/26/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

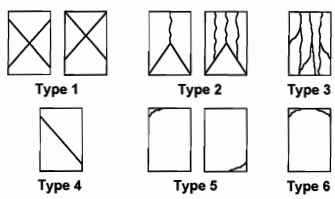
Date Placed: 9/19/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3578	9/26/2012	7	78815	4.01	12.63	6240		4
12-3579	10/17/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/26/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

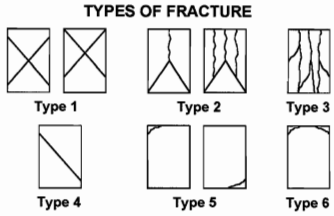
Date Placed: 9/19/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3580	9/26/2012	7	79245	4.01	12.63	6270		5
12-3581	10/17/2012	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stf Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/26/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

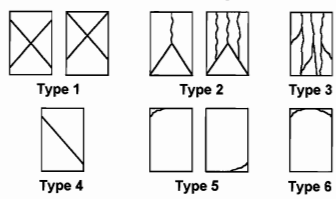
Date Placed: 9/19/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3585	9/26/2012	7	12560	1.73	2.34	3.00	3.00	5250		2
12-3586	9/26/2012	7	11640	1.73	2.35	3.27	3.27	4950		5
12-3587	9/26/2012	7	15000	1.72	2.33	2.73	2.73	6220		4

Remarks: Shotcrete cores 44, 45, 46

TYPES OF FRACTURE



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Reported by: Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

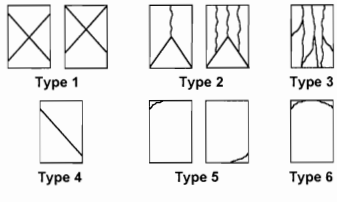
Date Placed: 9/20/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3489	10/11/2012	21	19775	1.73	2.35	2.62	2.62	8090	202%	2
12-3490	10/11/2012	21	18200	1.73	2.34	2.73	2.73	7520	188%	4
12-3491	10/11/2012	21	16975	1.73	2.36	2.97	2.97	7030	176%	4
12-3492	10/11/2012	21	22050	1.73	2.35	3.03	3.03	9380	235%	4
12-3493	10/11/2012	21	18970	1.73	2.34	3.07	3.07	8110	203%	4
12-3494	10/11/2012	21	19295	1.73	2.35	2.72	2.72	7930	198%	2
12-3495	10/11/2012	21	18300	1.72	2.33	2.80	2.80	7620	191%	2
12-3496	10/11/2012	21	20380	1.72	2.32	2.93	2.93	8580	215%	2

Remarks: Shotcrete cores 24, 27, 28, 29, 31, 33, 34, 35

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

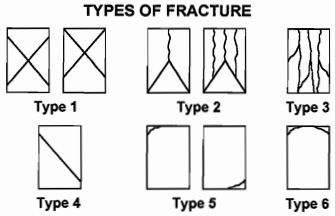
Date Placed: 9/20/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3688	9/27/2012	7	13635	1.73	2.35	3.35	3.35	5800		
12-3689	9/27/2012	7	12540	1.73	2.35	3.16	3.16	5340		
12-3690	9/27/2012	7	11490	1.73	2.35	3.19	3.19	4890		
12-3691	9/27/2012	7	16930	1.73	2.35	2.77	2.77	6970		
12-3692	9/27/2012	7	15465	1.73	2.35	2.84	2.84	6390		
12-3693	9/27/2012	7	7870	1.73	2.35	2.93	2.93	3270		
12-3694	9/27/2012	7	9860	1.73	2.35	2.45	2.45	3990		
12-3695	9/27/2012	7	10365	1.73	2.35	2.81	2.81	4280		
12-3696	9/27/2012	7	12375	1.73	2.35	2.83	2.83	5110		
12-3697	9/27/2012	7	6900	1.73	2.35	2.90	2.90	2860		

Remarks: Shotcrete cores 48, 50, 51, 59, 60, 63
64, 65, 66, 70, 72, 73

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

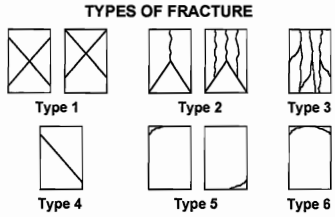
Date Placed: 9/20/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3698	9/27/2012	7	11805	1.73	2.35	2.85	2.85	4880		
12-3699	9/27/2012	7	9165	1.73	2.35	2.82	2.82	3780		

Remarks: Shotcrete cores 48, 50, 51, 59, 60, 63
64, 65, 66, 70, 72, 73

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

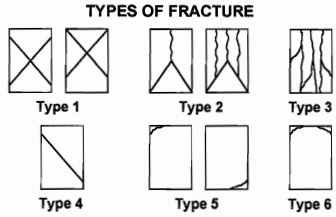
Date Placed: 9/20/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3700	9/27/2012	7	82005	4.00	12.57	6520		3
12-3701	10/18/2012	28						
12-3702	9/27/2012	7	76595	4.00	12.57	6090		3
12-3703	10/18/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

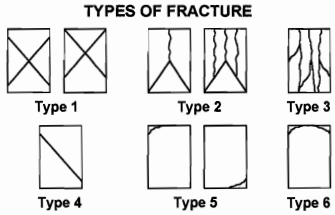
Date Placed: 9/21/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3704	9/28/2012	7	79070	4.00	12.57	6290		5
12-3705	10/19/2012	28						
12-3706	9/28/2012	7	91010	4.00	12.57	7240		5
12-3707	10/19/2012	28						
12-3708	9/28/2012	7	85305	4.00	12.57	6790		5
12-3709	10/19/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

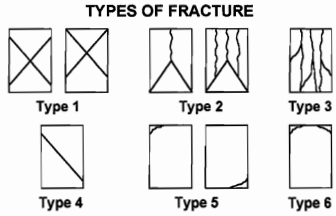
Date Placed: 9/21/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3719	9/28/2012	7	8950	1.73	2.35	2.98	2.98	3720		
12-3720	9/28/2012	7	9120	1.73	2.35	2.46	2.46	3690		
12-3721	9/28/2012	7	9350	1.73	2.35	2.75	2.75	3850		

Remarks: Shotcrete cores 53, 54, 57

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/20/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

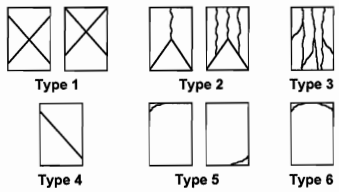
Date Placed: 9/21/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4216	10/19/2012	28	16610	1.74	2.37	2.79	2.79	6790	170%	4
12-4217	10/19/2012	28	16545	1.73	2.36	2.60	2.60	6730	168%	2
12-4218	10/19/2012	28	15520	1.73	2.36	3.21	3.21	6580	165%	2

Remarks: Cores 53, 54, 57

TYPES OF FRACTURE



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1956 Richardson Highway, North Pole, AK 99705

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Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

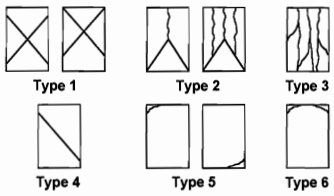
Date Placed: 9/22/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3669	9/29/2012	7	80545	4.00	12.57	6410		3
12-3670	10/20/2012	28						
12-3671	9/29/2012	7	82640	4.00	12.57	6570		5
12-3672	10/20/2012	28						
12-3673	9/29/2012	7	84210	4.00	12.57	6700		3
12-3674	10/20/2012	28						

Remarks:

TYPES OF FRACTURE



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1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/23/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

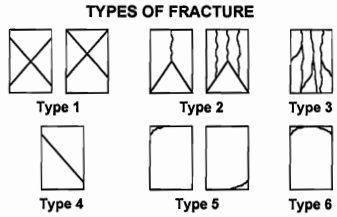
Date Placed: 9/22/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4219	10/20/2012	28	12160	1.74	2.36	2.74	2.74	4980	125%	2

Remarks: Core 63

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

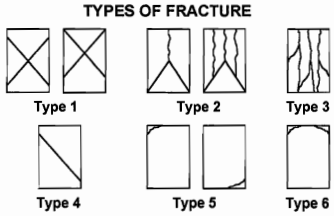
Date Placed: 9/23/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3675	9/30/2012	7	79065	4.00	12.57	6290		3
12-3676	10/21/2012	28						
12-3678	9/30/2012	7	81580	4.00	12.57	6490		3
12-3679	10/21/2012	28						
12-3680	9/30/2012	7	84910	4.00	12.57	6750		3
12-3681	10/21/2012	28						

Remarks:

TYPES OF FRACTURE



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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/23/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

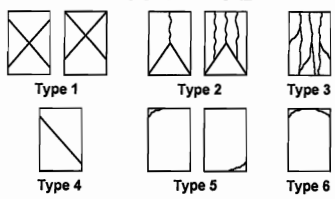
Date Placed: 9/23/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4220	10/21/2012	28	13985	1.74	2.36	3.07	3.07	5930	148%	2

Remarks: Core 64

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/23/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

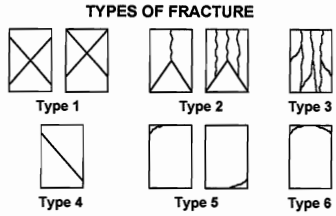
Date Placed: 9/24/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3682	10/1/2012	7	84605	4.00	12.57	6730	168%	3
12-3683	10/22/2012	28	104550	3.99	12.50	8360	209%	4
12-3684	10/1/2012	7	82800	4.00	12.57	6590	165%	3
12-3685	10/22/2012	28	98210	4.00	12.57	7810	195%	3
12-3686	10/1/2012	7	82100	4.00	12.57	6530	163%	3
12-3687	10/22/2012	28	102910	4.00	12.57	8190	205%	3

Remarks:

TYPES OF FRACTURE



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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/23/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

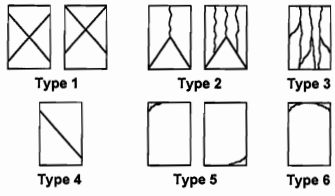
Date Placed: 9/24/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4221	10/22/2012	28	15275	1.73	2.36	2.42	2.42	6130	153%	4
12-4222	10/22/2012	28	14355	1.73	2.36	3.03	3.03	5960	149%	4

Remarks: Core 70, 73

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

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MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/4/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

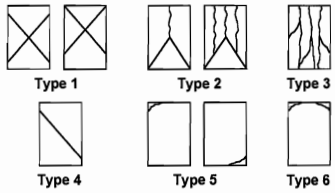
Date Placed: 9/24/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3682	10/1/2012	7	84605	4.00	12.57	6730		3
12-3683	10/22/2012	28						
12-3684	10/1/2012	7	82800	4.00	12.57	6590		3
12-3685	10/22/2012	28						
12-3686	10/1/2012	7	82100	4.00	12.57	6530		3
12-3687	10/22/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/6/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

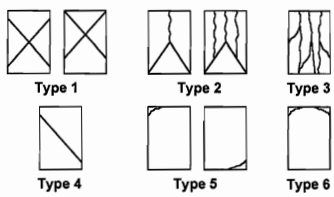
Date Placed: 9/25/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3793	10/2/2012	7	13810	1.73	2.35	2.88	2.88	5720		2
12-3794	10/2/2012	7	16880	1.73	2.35	3.38	3.38	7180		2
12-3795	10/2/2012	7	12745	1.73	2.35	3.00	3.00	5310		2

Remarks: Shotcrete cores 76, 79, 80

TYPES OF FRACTURE



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Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

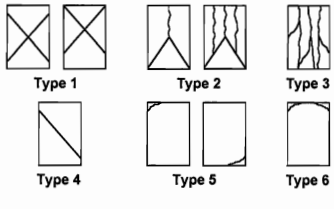
Date Placed: 9/26/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3796	10/3/2012	7	13675	1.73	2.35	2.88	2.88	5660		2
12-3797	10/3/2012	7	13635	1.73	2.35	2.88	2.88	5650		2
12-3798	10/3/2012	7	14000	1.73	2.35	2.88	2.88	5800		2

Remarks: Shotcrete cores 82, 84, 86

TYPES OF FRACTURE



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Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

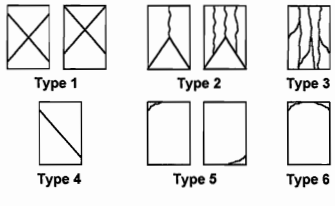
Date Placed: 9/27/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-3799	10/4/2012	7	14495	1.73	2.35	2.88	2.88	6000		2
12-3800	10/4/2012	7	10485	1.73	2.35	2.88	2.88	4340		2
12-3801	10/4/2012	7	12950	1.73	2.35	3.00	3.00	5390		2

Remarks: Shotcrete 87, 90, 91

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

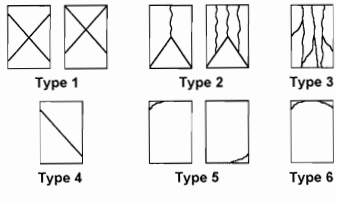
Date Placed: 9/28/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4052	10/11/2012	13	13115	1.73	2.35	2.75	2.75	5400	135%	2
12-4053	10/11/2012	13	16165	1.73	2.35	3.00	3.00	6730	168%	2
12-4054	10/11/2012	13	12715	1.73	2.35	3.00	3.00	5300	133%	2

Remarks: Shotcrete cores 93, 94, 97

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/6/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

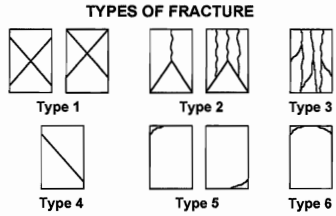
Date Placed: 9/28/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength:
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-3775	10/5/2012	7	80650	4.00	12.57	6420		3
12-3776	10/26/2012	28						
12-3777	10/5/2012	7	80545	4.00	12.57	6410		3
12-3778	10/26/2012	28						
12-3779	10/5/2012	7	83600	4.00	12.57	6650		3
12-3780	10/26/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

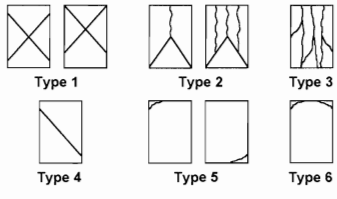
Date Placed: 9/29/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4055	10/11/2012	12	13095	1.73	2.35	2.38	2.38	5260		2
12-4056	10/11/2012	12	14680	1.73	2.35	2.25	2.25	5850		2
12-4057	10/11/2012	12	13355	1.73	2.35	2.63	2.63	5460		2

Remarks: Shotcrete cores 98, 100, 102

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/15/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

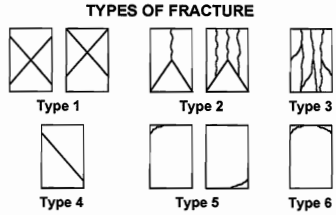
Date Placed: 9/29/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4018	10/13/2012	14	89005	4.00	12.57	7080		5
12-4019	10/27/2012	28						
12-4022	10/13/2012	14	89130	4.00	12.57	7090		3
12-4023	10/27/2012	28						
12-4024	10/13/2012	14	80180	4.00	12.57	6380		2
12-4025	10/27/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

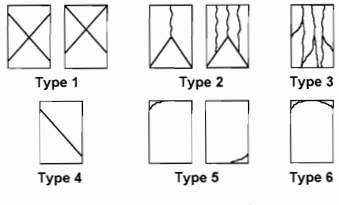
Date Placed: 9/30/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4058	10/11/2012	11	14975	1.73	2.35	2.75	2.75	6160	154%	2
12-4059	10/11/2012	11	14020	1.73	2.35	3.25	3.25	5970	149%	2
12-4060	10/11/2012	11	15975	1.73	2.35	3.13	3.13	6800	170%	2

Remarks: Shotcrete cores 103, 104, 105

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/16/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

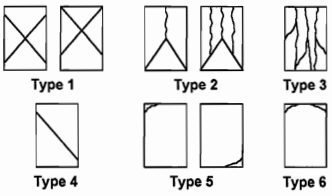
Date Placed: 9/30/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4020	10/14/2012	14	85300	4.01	12.63	6750		1
12-4021	10/28/2012	28						
12-4026	10/14/2012	14	83310	4.00	12.57	6630		5
12-4027	10/28/2012	28						
12-4028	10/14/2012	14	84425	4.01	12.63	6680		5
12-4029	10/28/2012	28						

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

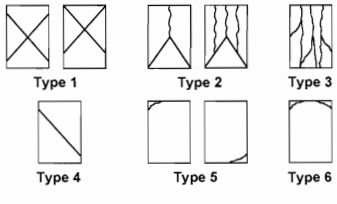
Date Placed: 10/1/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4061	10/11/2012	10	8260	1.73	2.35	3.00	3.00	3440	86%	2
12-4062	10/11/2012	10	9175	1.73	2.35	2.88	2.88	3800	95%	2

Remarks: Shotcrete cores 106, 107

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/30/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

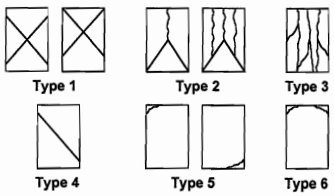
Date Placed: 10/1/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4223	10/29/2012	28	14945	1.73	2.36	2.79	2.79	6130	153%	2
12-4224	10/29/2012	28	16785	1.73	2.34	3.30	3.30	7170	179%	4

Remarks: Core 106, 107

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/16/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

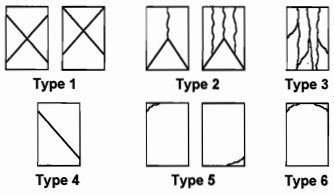
Date Placed: 10/1/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4030	10/15/2012	14	92195	4.00	12.57	7330	183%	4
12-4031	10/29/2012	28						
12-4032	10/15/2012	14	98420	4.01	12.63	7790	195%	4
12-4033	10/29/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

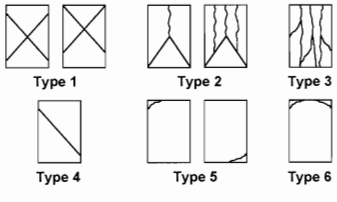
Date Placed: 10/3/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4063	10/11/2012	8	15135	1.73	2.35	2.38	2.38	6080	152%	2
12-4064	10/11/2012	8	13540	1.73	2.35	2.50	2.50	5490	137%	2
12-4065	10/11/2012	8	14485	1.73	2.35	2.63	2.63	5930	148%	2

Remarks: Shotcrete cores 109, 110, 111

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

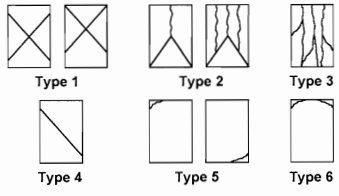
Date Placed: 10/3/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4034	10/11/2012	8	76480	4.00	12.57	6080		5
12-4035	10/11/2012	8	70335	4.00	12.57	5600		5
12-4036	10/11/2012	8	81575	4.00	12.57	6490		5

Remarks:

TYPES OF FRACTURE



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REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

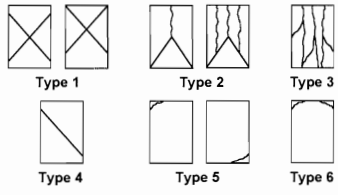
Date Placed: 10/4/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4066	10/11/2012	7	14265	1.73	2.35	2.75	2.75	5870	147%	2
12-4067	10/11/2012	7	14080	1.73	2.35	3.00	3.00	5860	147%	2

Remarks: Shotcrete cores 112, 113

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

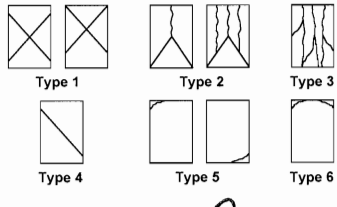
Date Placed: 10/4/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4037	10/11/2012	7	78485	4.00	12.57	6240		5
12-4038	11/1/2012	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

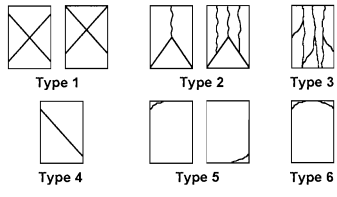
Date Placed: 10/5/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4068	10/12/2012	7	13640	1.73	2.35	2.50	2.50	5530	138%	2
12-4069	10/12/2012	7	10795	1.73	2.35	2.50	2.50	4380	110%	2
12-4070	10/12/2012	7	15700	1.73	2.35	2.75	2.75	6460	162%	2

Remarks: Shotcrete cores 114, 115, 116

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

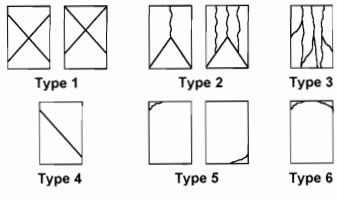
Date Placed: 10/5/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4045	11/2/2012	28						
12-4040	10/12/2012	7	78255	4.00	12.57	6230	156%	5
12-4041	11/2/2012	28						
12-4042	10/12/2012	7	69740	4.00	12.57	5550	139%	5
12-4043	11/2/2012	28						
12-4044	10/12/2012	7	70990	4.00	12.57	5650	141%	5

Remarks:

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/12/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

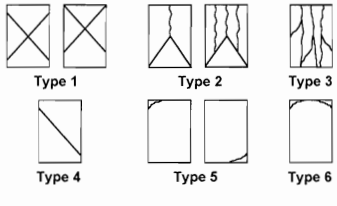
Date Placed: 10/7/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4071	10/12/2012	5	9360	1.73	2.35	2.50	2.50	3800	95%	2
12-4072	10/12/2012	5	9540	1.73	2.35	2.50	2.50	3870	97%	2
12-4073	10/12/2012	5	11160	1.73	2.35	3.00	3.00	4650	116%	2

Remarks: Shotcrete cores 118, 119, 120

TYPES OF FRACTURE



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Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 11/6/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

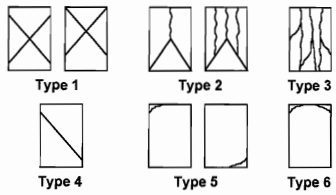
Date Placed: 10/7/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 42)

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
12-4225	11/4/2012	28	14295	1.73	2.36	2.59	2.59	5810	145%	4
12-4226	11/4/2012	28	16465	1.74	2.37	2.82	2.82	6740	169%	4

Remarks: Cores 118, 119

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF SHOTCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/16/12

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

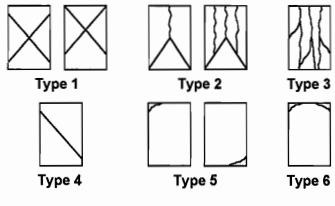
Date Placed: 10/7/2012
Time Sampled:
Location of Sample:
Supplier:
Truck Number: Ticket Number:
Mix Number:
Design Strength: 4000
Time Batched: Time Placed:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Shotcrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client cast

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
12-4046	10/14/2012	7	74205	4.00	12.57	5900		4
12-4047	11/4/2012	28						
12-4048	10/14/2012	7	77860	4.01	12.63	6160		5
12-4049	11/4/2012	28						
12-4050	10/14/2012	7	76005	4.01	12.63	6020		4
12-4051	11/4/2012	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack, P.E.
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/8/2013
Time Sampled:
Location of Sample: Batch #1
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

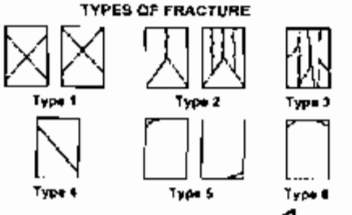
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-1971	7/15/2013	7	64605	4.00	12.57	5140		2
13-1972	8/5/2013	28	84360	4.00	12.57	6710		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/16/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

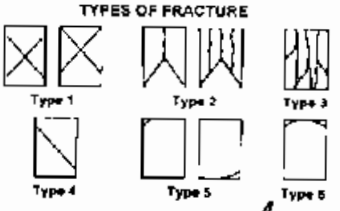
Date Placed: 7/8/2013
Time Sampled:
Location of Sample: Batch #1
Supplier:
Truck Number:
Ticket Number:
Mix Number:
Time Placed:
Design Strength:
Time Batched:
Batch Size:
Slump: (ASTM C 143)
Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064)
Ambient Temp:
Water Added:
Technician: Client
Initial Curing:
Final Curing:
Max Field Curing Temp.:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-1971	7/15/2013	7	64605	4.00	12.57	5140		2
13-1972	8/5/2013	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST
MAPPA TESTLAB

Report Date: 7/16/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled:

Time Sampled:

Technician: Client

Date Placed: 7/8/2013

Location of Sample: #203

Supplier:

Mix Number:

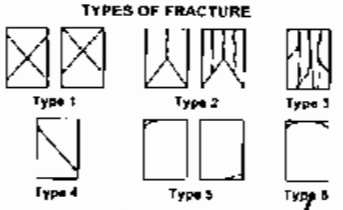
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-1973	7/15/2013	7	22640	1.75	2.41	2.55		9394		

Remarks:

TYPES OF FRACTURE



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REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/19/13

Project Number: AAP 2013 AAP Grout Project Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

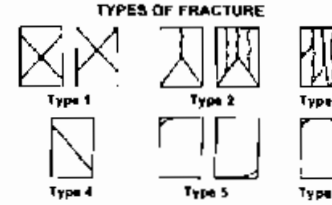
Date Placed: 7/11/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2034	7/18/2013	7	77670	4.00	12.57	6180		3
13-2035	8/8/2013	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/19/13

Project Number: AAP 2013 AAP Grout Project Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

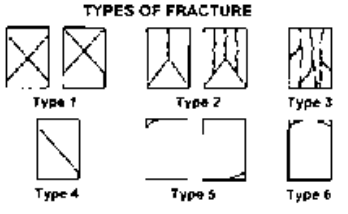
Date Placed: 7/11/2013
Time Sampled:
Location of Sample: Batch 2
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2036	7/18/2013	7	67375	4.00	12.57	5360		5
13-2037	8/8/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/19/13

Project Number: AAP 2013 AAP Grout Project Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

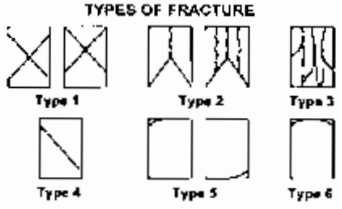
Date Placed: 7/11/2013
Time Sampled:
Location of Sample: Batch 3
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2038	7/18/2013	7	68080	4.00	12.57	5420		5
13-2039	8/8/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/19/13

Project Number: AAP 2013 AAP Grout Project Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

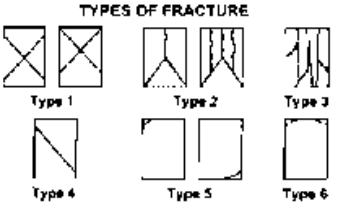
Date Placed: 7/12/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2040	7/19/2013	7	73585	4.00	12.57	5860		5
13-2041	8/9/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/22/13

Project Number: AAP 2013 AAP Grout Project Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/13/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

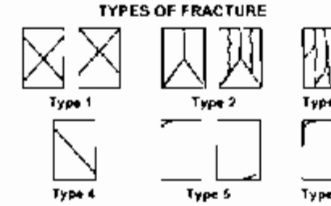
Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2042	7/20/2013	7	63290	4.00	12.57	5040		2
13-2043	8/10/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/22/13

Project Number: AAP 2013 AAP Grout Project Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/13/2013
Time Sampled:
Location of Sample: Batch 2
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

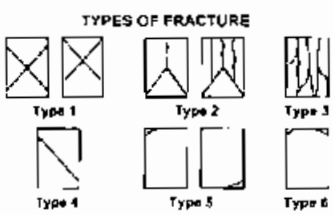
Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2044	7/20/2013	7	63850	4.00	12.57	5080		3
13-2045	8/10/2013	28						
13-2046	8/10/2013	28						

Remarks:



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/22/13

Project Number: AAP 2013 AAP Grout Project Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

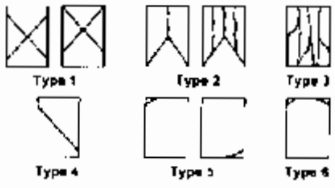
Date Placed: 7/13/2013
Time Sampled:
Location of Sample: Batch 3
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2047	7/20/2013	7	63335	4.00	12.57	5040		2
13-2048	8/10/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/23/13

Project Number: AAP 2013 AAP Grout Project Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

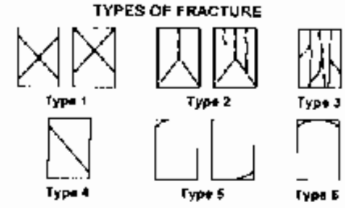
Date Placed: 7/15/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2049	7/22/2013	7	56010	4.00	12.57	4460		2
13-2050	8/12/2013	28						

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/23/13

Project Number: AAP 2013 AAP Grout Project Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

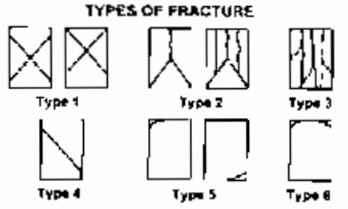
Date Placed: 7/15/2013
Time Sampled:
Location of Sample: Batch 3
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2052	7/22/2013	7	66180	4.00	12.57	5270		2
13-2053	8/12/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/24/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

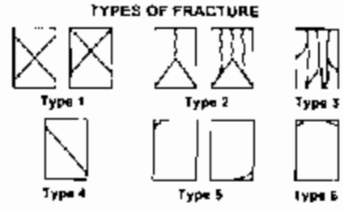
Date Placed: 7/16/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number:
Ticket Number:
Mix Number:
Time Placed:
Design Strength:
Time Batched:
Batch Size:
Slump: (ASTM C 143)
Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064)
Ambient Temp:
Water Added:
Technician: Client
Initial Curing:
Final Curing:
Max Field Curing Temp.:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2184	7/23/2013	7	70660	4.00	12.57	5620		2
13-2185	8/13/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/24/13

Project Number: AAP 2013 AAP Grout Project Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

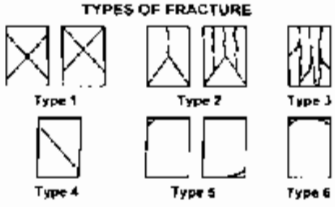
Date Placed: 7/16/2013
Time Sampled:
Location of Sample: Batch 2
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2186	7/23/2013	7	67905	4.00	12.57	5400		5
13-2187	8/13/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/24/13

Project Number: AAP 2013 AAP Grout Project Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

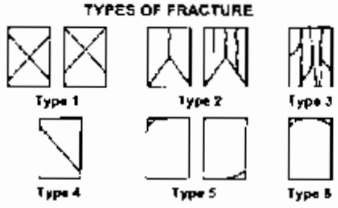
Date Placed: 7/16/2013
Time Sampled:
Location of Sample: Batch 3
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2188	7/23/2013	7	67345	4.00	12.57	5360		2
13-2189	8/13/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 7/25/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled:

Time Sampled:

Technician: Client

Date Placed: 7/12/2013

Location of Sample:

Supplier:

Mix Number:

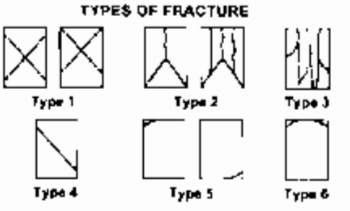
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13 2202	7/19/2013	7	23085	1.75	2.41	2.70		9580		1

Remarks: 13-2202 = #207

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Engineer

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 7/25/13

Project Number: AAP 2013 AAP Grout Project Report Number: 4
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/11/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

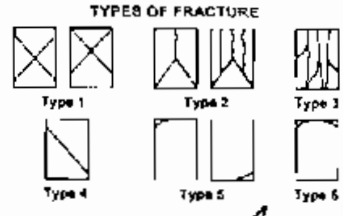
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2199	7/18/2013	7	18610	1.75	2.41	3.00		7720		1
13-2200	7/18/2013	7	20940	1.75	2.41	2.75		8690		1
13-2201	7/18/2013	7	22105	1.75	2.41	2.55		9170		1

Remarks: 13-2199 = #203
13-2200 = #205
13-2201 = #206

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Engineer

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 7/25/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 4
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled:

Time Sampled:

Technician: Client

Date Placed: 7/13/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

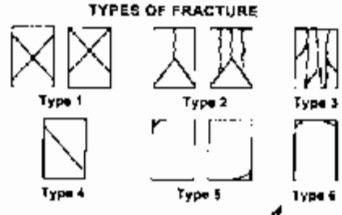
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2203	7/20/2013	7	18890	1.75	2.41	2.70		7838		
13-2204	7/20/2013	7	20700	1.75	2.41	2.70		8589		
13-2205	7/20/2013	7	18640	1.75	2.41	2.70		7734		

Remarks: 13-2203 = #208
13-2204 = #211
13-2205 = #213

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Engineer

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 7/25/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 4
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled:

Time Sampled:

Technician: Client

Date Placed: 7/15/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

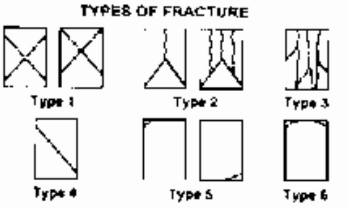
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2206	7/22/2013	7	21300	1.75	2.41	2.70		8838		
13-2207	7/22/2013	7	17860	1.75	2.41	2.70		7411		
13-2208	7/22/2013	7	20310	1.75	2.41	2.70		8427		

Remarks: 13-2206 = #214
13-2207 - #220
13-2208 = #222

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Engineer

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 7/25/13

Project Number: AAP 2013 AAP Grout Project
Report Number: 4
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

SAMPLING INFORMATION

Date Sampled:

Time Sampled:

Technician: Client

Date Placed: 7/16/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

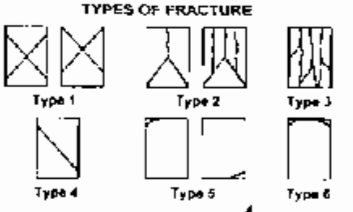
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2209	7/23/2013	7	16000	1.75	2.41	2.70		6639		
13-2210	7/23/2013	7	20095	1.75	2.41	2.70		8338		

Remarks: 13-2209 = #223
13-2210 = #229

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Engineer

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 5
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/17/2013

Location of Sample: Core 238

Supplier:

Mix Number:

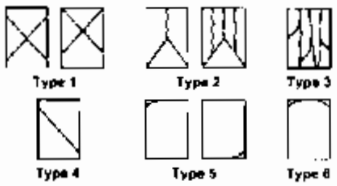
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2962	8/14/2013	28	10665	1.73	2.35	3.47		4538		

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/1/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/17/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

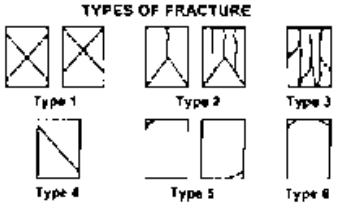
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2211	7/24/2013	7	11095	1.75	2.41	2.60		4604		
13-2212	7/24/2013	7	13870	1.75	2.41	3.35		5755		
13-2213	7/24/2013	7	9375	1.75	2.41	2.20		3890		

Remarks: 13-2211 = #232
13-2212 = #235
13-2213 = #238

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Meck, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 1
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

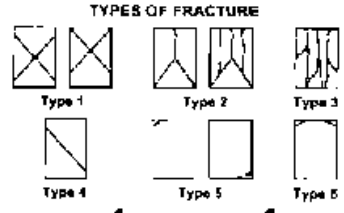
Date Placed: 7/17/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2190	7/24/2013	7	61130	4.00	12.57	4860		2
13-2191	8/14/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/17/2013
Time Sampled:
Location of Sample: Batch 2
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

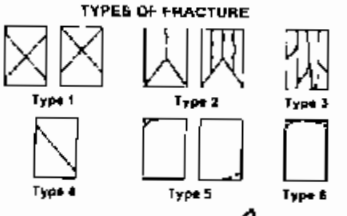
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2192	7/24/2013	7	65445	4.00	12.57	5210		2
13-2193	8/14/2013	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/17/2013
Time Sampled:
Location of Sample: Batch 3
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

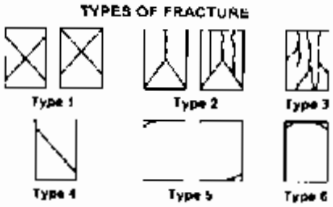
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2194	7/24/2013	7	71235	4.00	12.57	5670		2
13-2195	8/14/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 3
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/18/2013
Time Sampled:
Location of Sample: Batch 2 Panel 242
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Pleced:
Time Batched:

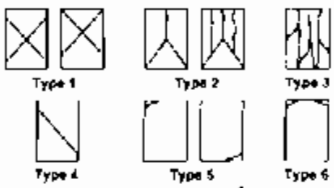
Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2266	7/25/2013	7	63055	4.00	12.57	5020		3
13-2267	8/15/2013	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 2
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

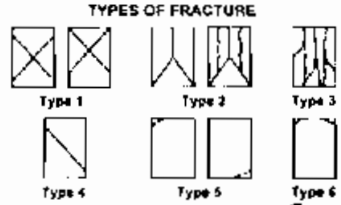
Date Placed: 7/18/2013
Time Sampled:
Location of Sample: Batch 1 Panel 240
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 231)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2264	7/25/2013	7	68050	4.00	12.57	5414		2
13-2265	8/15/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 7/26/13

Project Number: AAP Pogo Mine Diversion Ditch Report Number: 4
Project: Pogo Mine Diversion Ditch
Client: Alaska Aggregate Products
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/18/2013
Time Sampled:
Location of Sample: Batch 3 Panel 244
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

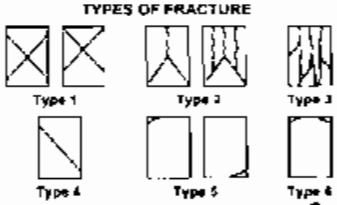
Air Content: (ASTM C 231)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2268	7/25/2013	7	80000	4.00	12.57	6370		2
13-2269	8/15/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 5
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/22/2013

Location of Sample: Core 249

Supplier:

Mix Number:

Design Strength:

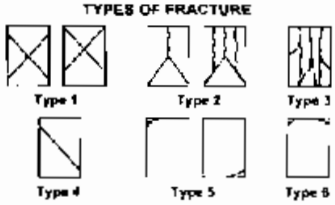
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2961	8/19/2013	28	16045	1.73	2.35	2.71		6828		

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/22/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

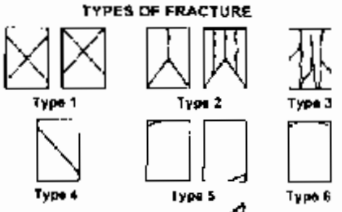
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2459	7/29/2013	7	12255	1.75	2.41	3.35		5085		
13-2460	7/29/2013	7	9935	1.75	2.41	3.00		4122		
13-2461	7/29/2013	7	9460	1.75	2.41	2.95		3925		

Remarks: 13-2459 = #246
13-2460 = #247
13-2461 = #249

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/22/2013
Time Sampled:
Location of Sample: Batch #1 - Panel 246
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

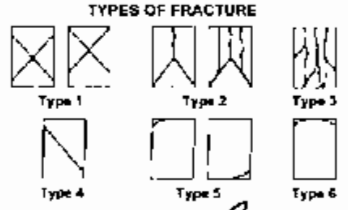
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2443	7/29/2013	7	88390	4.00	12.57	7030		2
13-2444	8/19/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/22/2013
Time Sampled:
Location of Sample: Batch #2 - Panel 248
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

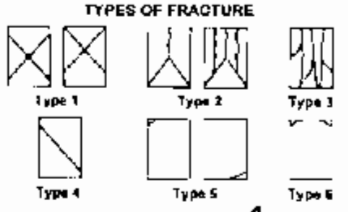
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2445	7/29/2013	7	70385	4.00	12.57	5600		2
13-2446	8/19/2013	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/22/2013
Time Sampled:
Location of Sample: Batch #3 - Panel #249
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

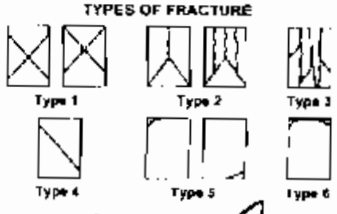
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2447	7/29/2013	7	69505	4.00	12.57	5530		3
13-2448	8/19/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/23/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

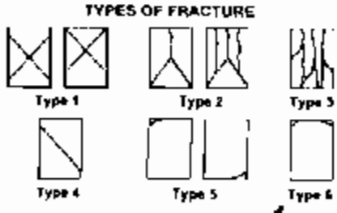
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2462	7/30/2013	7	10490	1.75	2.41	3.25		4353		
13-2463	7/30/2013	7	11820	1.75	2.41	2.95		4905		
13-2464	7/30/2013	7	11380	1.75	2.41	2.35		4722		

Remarks: 13-2462 = #251
13-2463 = #253
13-2464 = #254

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #1 - Panel #251
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

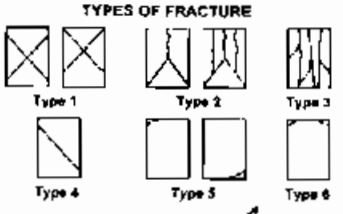
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2449	7/30/2013	7	76385	4.00	12.57	6080		2
13-2450	8/20/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #2 - Panel #252
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

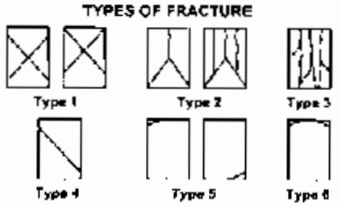
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2451	7/30/2013	7	75915	4.00	12.57	6040		5
13-2452	8/20/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #3 - Panel #254
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

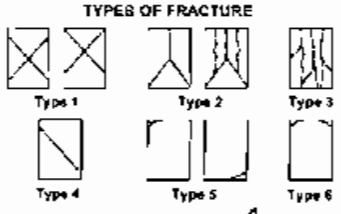
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2453	7/30/2013	7	77760	4.00	12.57	6190		2
13-2454	8/20/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

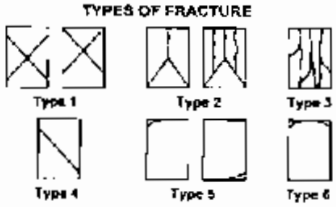
Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #1 - Panel #251
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2449	7/30/2013	7	76385	4.00	12.57	6080		2
13-2450	8/20/2013	28	90380	4.00	12.57	7190		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

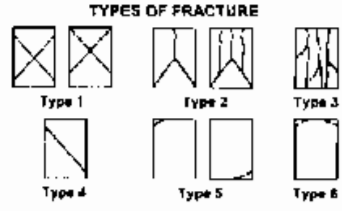
Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #2 - Panel #252
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2451	7/30/2013	7	75915	4.00	12.57	6040		5
13-2452	8/20/2013	28	88550	4.00	12.57	7050		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

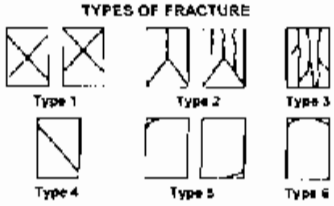
Date Placed: 7/23/2013
Time Sampled:
Location of Sample: Batch #3 - Panel #254
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2453	7/30/2013	7	77760	4.00	12.57	6190		2
13-2454	8/20/2013	28	88945	4.00	12.57	7080		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion **Report Number:** 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/24/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

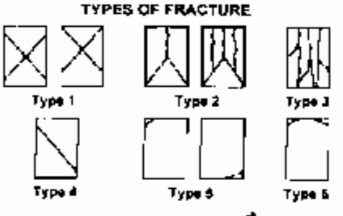
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2465	7/31/2013	7	12185	1.75	2.41	2.60		5056		
13-2466	7/31/2013	7	10705	1.75	2.41	2.80		4442		
13-2467	7/31/2013	7	12905	1.75	2.41	3.05		5355		

Remarks: 13-2465 = #255
13-2466 = #257
13-2467 = #258

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/24/2013
Time Sampled:
Location of Sample: Batch #1 - Panel 257
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

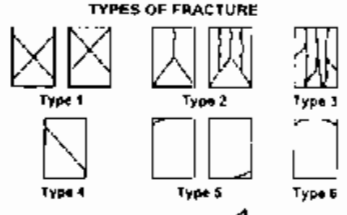
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2455	7/31/2013	7	73915	4.00	12.57	5880		2
13-2456	8/21/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/24/2013
Time Sampled:
Location of Sample: Batch #2 - Panel 258
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

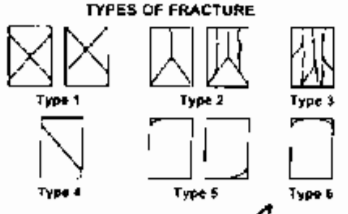
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2457	7/31/2013	7	71385	4.00	12.57	5680		2
13-2458	8/21/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/8/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 2 - Panel 262
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

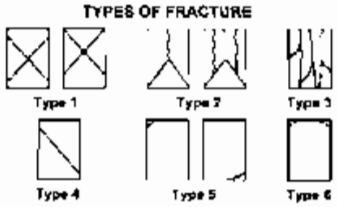
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2620	8/7/2013	7	74685	4.00	12.57	5940		2
13-2621	8/28/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/29/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 1 - 13-2618
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

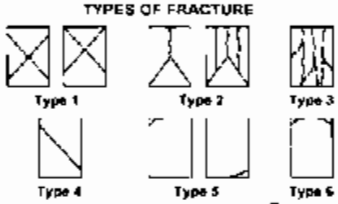
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2618	8/7/2013	7	71370	4.00	12.57	5680		2
13-2619	8/28/2013	28	84840	4.00	12.57	6750		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/29/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

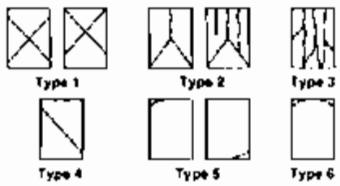
Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 2 - Panel 262
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2620	8/7/2013	7	74685	4.00	12.57	5940		2
13-2621	8/28/2013	28	75935	4.00	12.57	6040		2

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/29/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

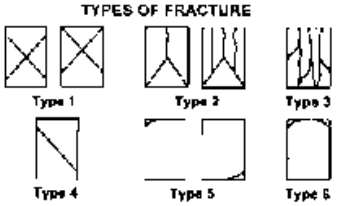
Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 3 - Panel 264
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2628	8/7/2013	7	69700	4.00	12.57	5550		2
13-2629	8/28/2013	28	84325	4.00	12.57	6710		5

Remarks:

TYPES OF FRACTURE



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Reported by: Stef. Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/8/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 1 - 13-2618
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

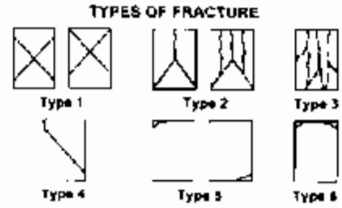
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2618	8/7/2013	7	71370	4.00	12.57	5680		2
13-2619	8/28/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/8/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

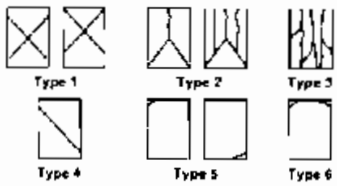
Date Placed: 7/31/2013
Time Sampled:
Location of Sample: Batch 3 - Panel 264
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2628	8/7/2013	7	69700	4.00	12.57	5550		2
13-2629	8/28/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/1/2013
Time Sampled:
Location of Sample: Batch 1 - Panel 266
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

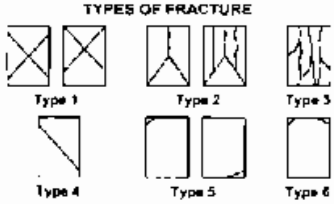
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2622	8/8/2013	7	77840	4.00	12.57	6190		2
13-2623	8/29/2013	28	84380	4.00	12.57	6710		2

Remarks:

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

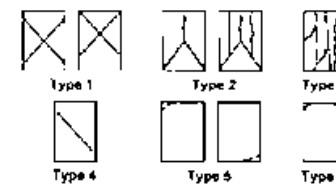
Date Placed: 8/1/2013
Time Sampled:
Location of Sample: Batch 2 - Panel 268
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2624	8/8/2013	7	64450	4.00	12.57	5130		2
13-2625	8/29/2013	28	78935	4.00	12.57	6280		3

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/2/2013
Time Sampled:
Location of Sample: Batch 1 - Panel 270
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

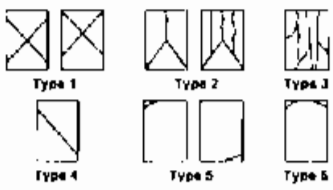
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2626	8/9/2013	7	67660	4.00	12.57	5380	135%	2
13-2627	8/30/2013	28	85555	4.00	12.57	6810	170%	3

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/12/13

Project Number: Sumitomo Dry Stack Diversion **Report Number:** 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: **Time Sampled:**

Technician: Client

Date Placed: 8/2/2013

Location of Sample:

Supplier:

Mix Number:

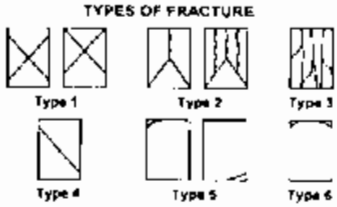
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2636	8/9/2013	7	8315	1.73	2.35	2.71		3538		

Remarks: 13-2636 = 27C

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/12/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

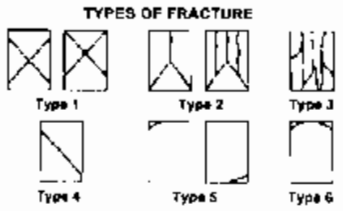
Date Placed: 8/2/2013
Time Sampled:
Location of Sample: Batch 1 - Panel 270
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2626	8/9/2013	7	67660	4.00	12.57	5380	135%	2
13-2627	8/30/2013	28						

Remarks:



Copies to:

Reported by: Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379C70C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/5/2013
Time Sampled:
Location of Sample: Panel 271
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

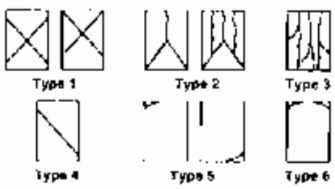
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2751	8/12/2013	7	77845	4.00	12.57	6193		2
13-2766	9/2/2013	28	93805	4.00	12.57	7460		3

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790770C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

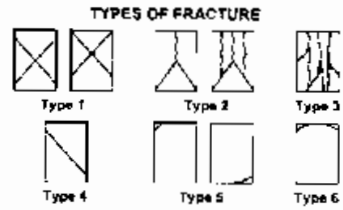
Date Placed: 8/5/2013
Time Sampled:
Location of Sample: Panel 273
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2752	8/12/2013	7	78020	4.00	12.57	6210		2
13-2767	9/2/2013	28	89760	4.00	12.57	7140		3

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/6/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

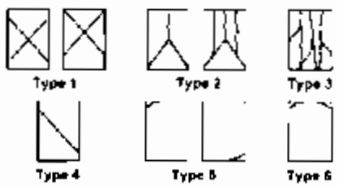
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2782	8/13/2013	7	10090	1.72	2.32	2.89	3.18	4349		
13-2783	8/13/2013	7	14055	1.72	2.32	2.80	3.05	6058		
13-2784	8/13/2013	7	14170	1.73	2.35	2.68	2.92	5879		
13-2785	8/13/2013	7	12715	1.73	2.35	3.12	3.35	5411		

Remarks: 13-2782 = core 274
13-2783 - core 275
13-2784 - core 277
13-2785 = core 278

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/5/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

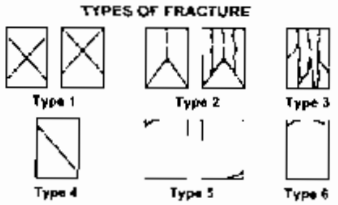
Date Placed: 8/7/2013
Time Sampled:
Location of Sample: Panels 279
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2756	8/14/2013	7	69825	4.00	12.57	5560		5
13-2771	9/4/2013	28	86075	4.00	12.57	6850		3

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/8/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

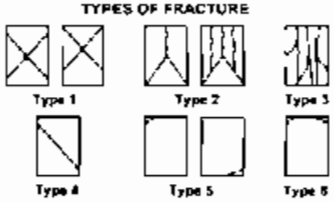
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2790	8/15/2013	7	13510	1.72	2.32	3.04	3.28	5823		
13-2791	8/15/2013	7	13360	1.73	2.35	3.12	3.30	5685		

Remarks: 13-2790 = core 279
13-2791 = core 280

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Meck, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 281
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

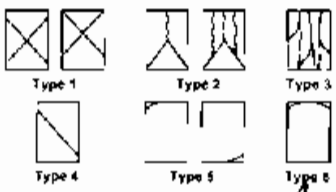
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2757	8/16/2013	7	69195	4.00	12.57	5510		2
13-2772	9/6/2013	28	87885	4.00	12.57	6990		2

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790700
Client: SumiLomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 283
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

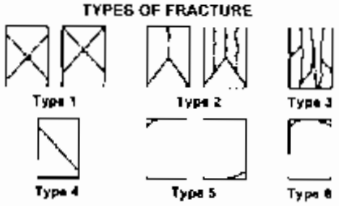
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2758	8/16/2013	7	70605	4.00	12.57	5620		2
13-2773	9/6/2013	28	86805	4.00	12.57	6910		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 285
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

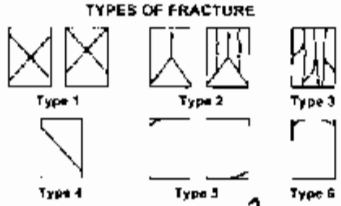
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2759	8/16/2013	7	70515	4.00	12.57	5610		2
13-2774	9/6/2013	28	89935	4.00	12.57	7160		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790/0C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 281
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

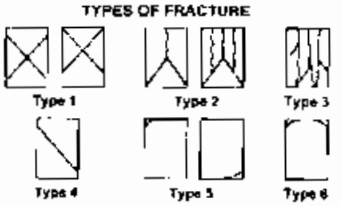
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2757	8/16/2013	7	69195	4.00	12.57	5510		2
13-2772	9/6/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Muck

Stefan Muck, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 283
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

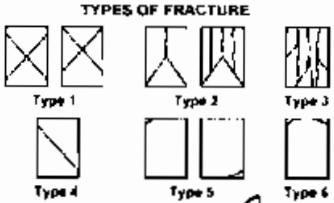
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2758	8/16/2013	7	70605	4.00	12.57	5620		2
13-2773	9/6/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

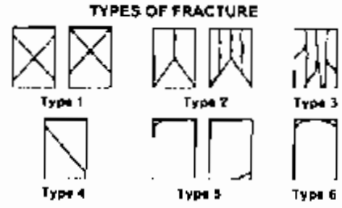
Date Placed: 8/9/2013
Time Sampled:
Location of Sample: Panels 285
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2759	8/16/2013	7	70515	4.00	12.57	5610		2
13-2774	9/6/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO I5379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/9/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

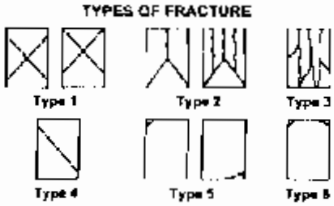
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2847	8/16/2013	7	12140	1.73	2.35	3.36		5166		
13-2848	8/16/2013	7	13660	1.73	2.35	3.54		5813		

Remarks: 13-2847 = core 281
13-2848 = core 283

Copies to:

TYPES OF FRACTURE



Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 286
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

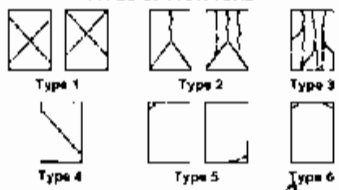
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2760	8/17/2013	7	79540	4.00	12.57	6330		2
13-2775	9/7/2013	28	92585	4.00	12.57	7370		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

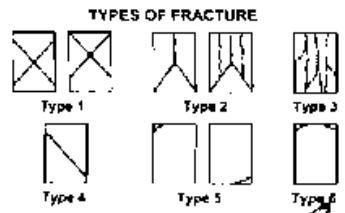
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 288
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2761	8/17/2013	7	84925	4.00	12.57	6760		2
13-2776	9/7/2013	28	98855	4.00	12.57	7870		2

Remarks:



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

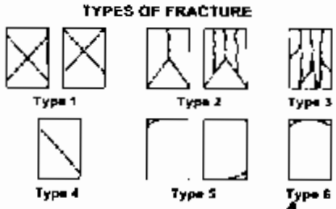
Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 291
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2762	8/17/2013	7	91770	4.00	12.57	7300		2
13-2777	9/7/2013	28	104685	4.00	12.57	8330		2

Remarks:



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 286
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

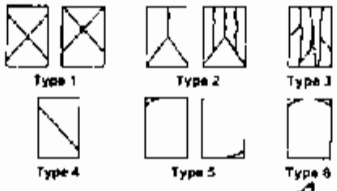
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2760	8/17/2013	7	79540	4.00	12.57	6330		2
13-2775	9/7/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

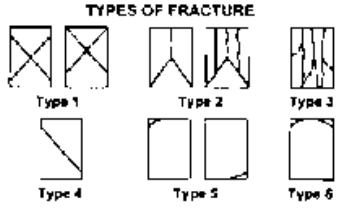
Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 288
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2761	8/17/2013	7	84925	4.00	12.57	6760		2
13-2776	9/7/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/10/2013
Time Sampled:
Location of Sample: Panels 291
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

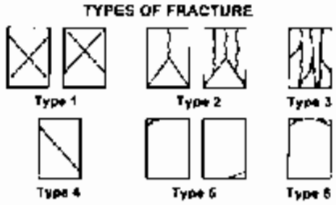
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2762	8/17/2013	7	91770	4.00	12.57	7300		2
13-2777	9/7/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/10/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

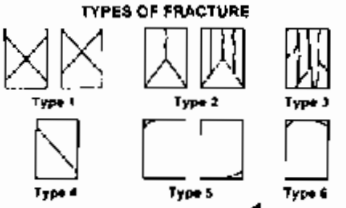
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2849	8/17/2013	7	13540	1.73	2.35	2.68		5762		
13-2850	8/17/2013	7	15920	1.73	2.35	3.27		6774		
13-2851	8/17/2013	7	14655	1.73	2.35	2.87		6236		

Remarks: 13-2849 - core 286
13-2850 - core 290
13-2851 = core 291

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 292
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

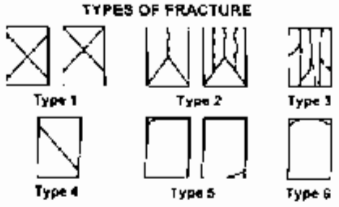
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2763	8/18/2013	7	73990	4.00	12.57	5890		2
13-2778	9/8/2013	28	89645	4.00	12.57	7130		2

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

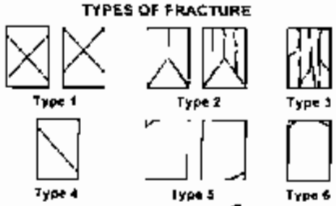
Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 295
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2764	8/18/2013	7	70690	4.00	12.57	5630		2
13-2779	9/8/2013	28	79980	4.00	12.57	6360		2

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

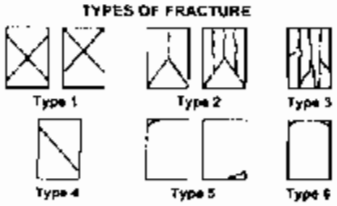
Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 299
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2765	8/18/2013	7	86810	4.00	12.57	6910		2
13-2780	9/8/2013	28	97295	4.00	12.57	7740		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 292
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

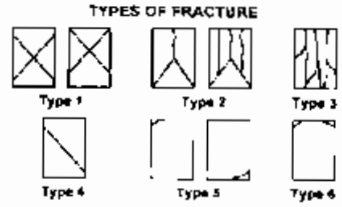
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2763	8/18/2013	7	73990	4.00	12.57	5890		2
13-2778	9/8/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 295
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

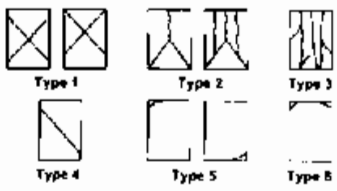
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2764	8/18/2013	7	70690	4.00	12.57	5630		2
13-2779	9/8/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/11/2013
Time Sampled:
Location of Sample: Panels 299
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

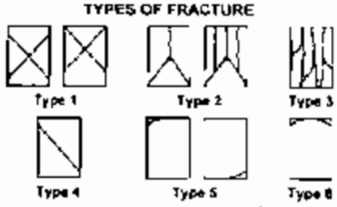
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2765	8/18/2013	7	86810	4.00	12.57	6910		2
13-2780	9/8/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 8/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/11/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

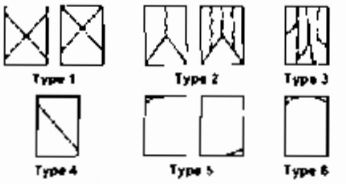
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2852	8/18/2013	7	12320	1.73	2.35	3.47		5243		
13-2853	8/18/2013	7	13975	1.73	2.35	3.67		5947		
13-2854	8/18/2013	7	11580	1.73	2.35	2.55		4928		

Remarks: 13-2852 = core 292
13-2853 = core 294
13-2854 - core 297

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/12/2013
Time Sampled:
Location of Sample: Panel 300
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

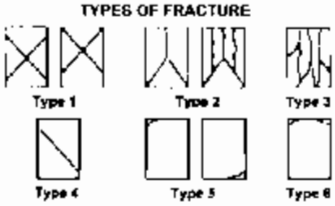
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2831	8/19/2013	7	73425	4.00	12.57	5840		5
13-2832	9/9/2013	28	91360	4.00	12.57	7270		2

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/12/2013
Time Sampled:
Location of Sample: Panel 302
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

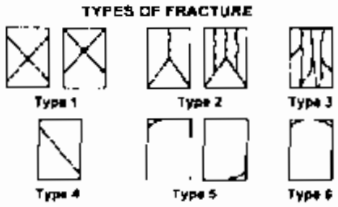
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2833	8/19/2013	7	72575	4.00	12.57	5780		2
13-2834	9/9/2013	28	91360	4.00	12.57	7270		2

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1958 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 303
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

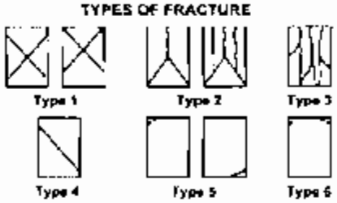
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2835	8/20/2013	7	61980	4.00	12.57	4930		2
13-2836	9/10/2013	28	77535	4.00	12.57	6170		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

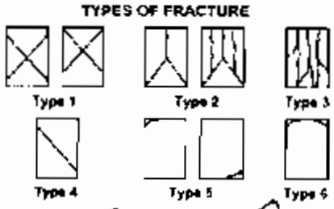
Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 305
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2837	8/20/2013	7	59870	4.00	12.57	4760		2
13-2838	9/10/2013	28	74250	4.00	12.57	5910		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 307
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

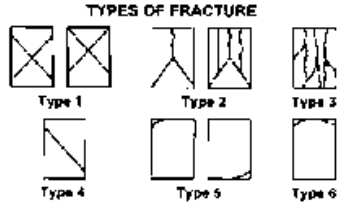
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2839	8/20/2013	7	52425	4.00	12.57	4170		2
13-2840	9/10/2013	28	65825	4.00	12.57	5240		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 303
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

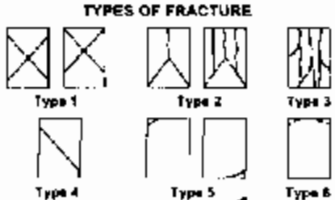
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2835	8/20/2013	7	61980	4.00	12.57	4930		2
13-2836	9/10/2013	28						

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 305
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

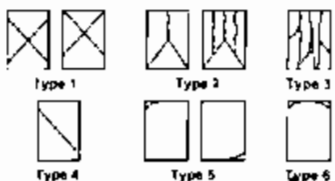
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2837	8/20/2013	7	59870	4.00	12.57	4760		2
13-2838	9/10/2013	28						

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/20/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/13/2013
Time Sampled:
Location of Sample: Panel 307
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

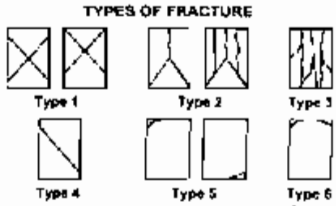
Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2839	8/20/2013	7	52425	4.00	12.57	4170		2
13-2840	9/10/2013	28						

Remarks:



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

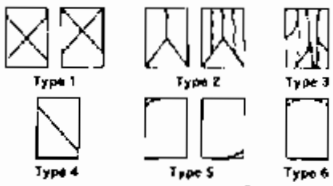
Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 308
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2841	8/21/2013	7	81535	4.00	12.57	6490		2
13-2842	9/11/2013	28	97305	4.00	12.57	7740		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 309
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

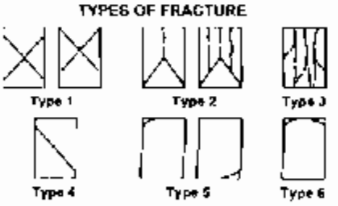
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13 2843	8/21/2013	7	68730	4.00	12.57	5470		2
13-2844	9/11/2013	28	81385	4.00	12.57	6480		2

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/11/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 153798070
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 311
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

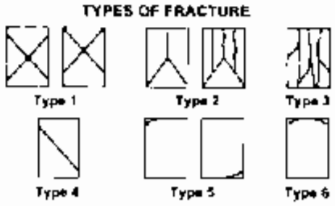
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2845	8/21/2013	7	76920	4.00	12.57	6120		2
13-2846	9/11/2013	28	96085	4.00	12.57	7650		2

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/22/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

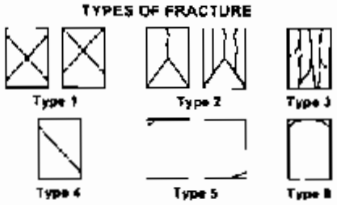
Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 308
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2841	8/21/2013	7	81535	4.00	12.57	6490		2
13-2842	9/11/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/22/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 309
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

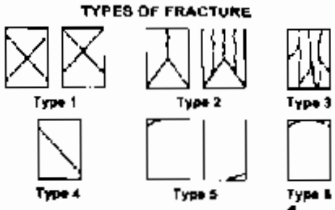
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2843	8/21/2013	7	68730	4.00	12.57	5470		2
13-2844	9/11/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/22/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/14/2013
Time Sampled:
Location of Sample: Panel 311
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

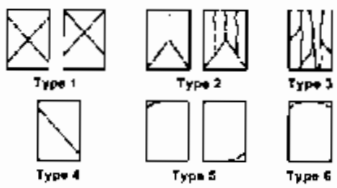
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2845	8/21/2013	7	76920	4.00	12.57	6120		2
13-2846	9/11/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/14/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

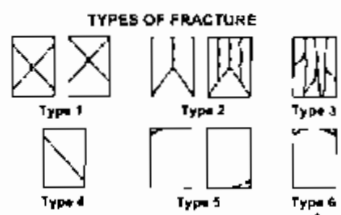
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2970	8/21/2013	7	18300	1.73	2.35	2.98		7787		
13-2971	8/21/2013	7	13655	1.73	2.35	3.29		5811		
13-2972	8/21/2013	7	16455	1.73	2.35	3.11		7002		

Remarks: 13-2970 = core 308
13-2971 = core 310
13-2972 - core 311

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

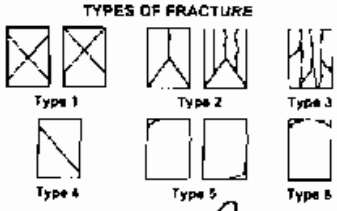
Date Placed: 9/5/2013
Time Sampled:
Location of Sample: Panel 313
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3686	9/12/2013	7	86850	4.00	12.57	6910		2
13-3687	10/3/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 11/4/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 5
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: 9/11/2013 Time Sampled:

Technician: Client

Date Placed: 9/5/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

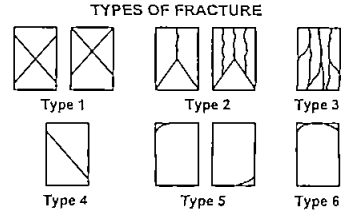
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-3562	9/12/2013	7	16245	1.75	2.41	2.40	2.53	6430		
13-3563	9/12/2013	7	22985	1.75	2.41	2.42	2.57	9120		

Remarks: 13-3562 = core 312
13-3563 = core 313

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/6/2013
Time Sampled:
Location of Sample: Panel 314
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

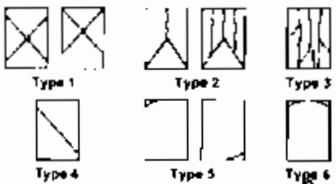
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3688	9/13/2013	7	91275	4.00	12.57	7260		2
13-3689	10/4/2013	28	100150	4.00	12.57	7970		2

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

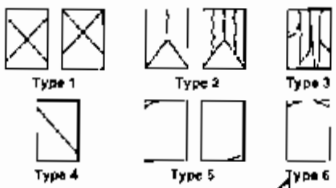
Date Placed: 9/6/2013
Time Sampled:
Location of Sample: Panel 315
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3690	9/13/2013	7	87740	4.00	12.57	6980		3
13-3691	10/4/2013	28	102790	4.00	12.57	8180		2

Remarks:

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/6/2013
Time Sampled:
Location of Sample: Panel 314
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

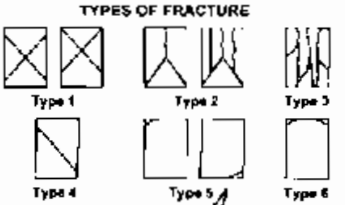
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3688	9/13/2013	7	91275	4.00	12.57	7260		2
13-3689	10/4/2013	28						

Remarks:

TYPES OF FRACTURE



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

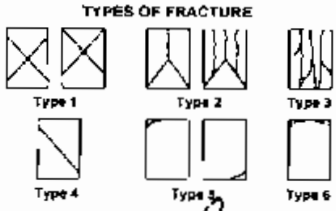
Date Placed: 9/6/2013
Time Sampled:
Location of Sample: Panel 315
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3690	9/13/2013	7	87740	4.00	12.57	6980		3
13-3691	10/4/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/9/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/7/2013
Time Sampled:
Location of Sample: Panel 317
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

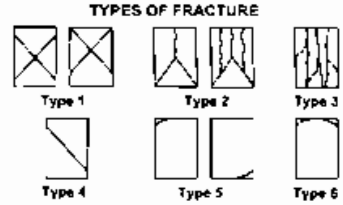
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3697	9/14/2013	7	82750	4.00	12.57	6590		3
13-3698	10/5/2013	28	108300	4.00	12.57	8620		2

Remarks:

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/9/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

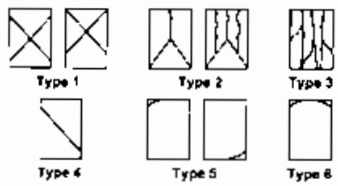
Date Placed: 9/7/2013
Time Sampled:
Location of Sample: Panel 318
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3694	9/14/2013	7	86140	4.00	12.57	6850		2
13-3695	10/5/2013	28	114275	4.00	12.57	9090		2

Remarks:

TYPES OF FRACTURE



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Reported by:

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Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790/70C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

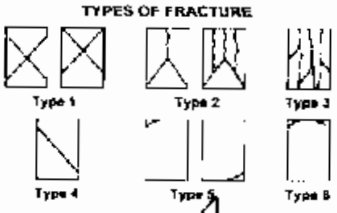
Date Placed: 9/7/2013
Time Sampled:
Location of Sample: Panel 317
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3697	9/14/2013	7	82750	4.00	12.57	6590		3
13-3698	10/5/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by: Stef Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/7/2013
Time Sampled:
Location of Sample: Panel 318
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:

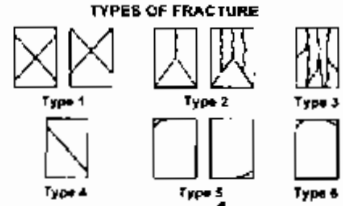
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3694	9/14/2013	7	86140	4.00	12.57	6850		2
13-3695	10/5/2013	28						

Remarks:

TYPES OF FRACTURE



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Reported by:

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Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 5
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/16/2013

Location of Sample:

Supplier:

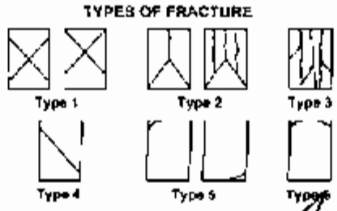
Mix Number:

Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2272	7/23/2013	7	20230	1.75	2.41	2.70		8390		

Remarks: 13-2272 = #225



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Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/18/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

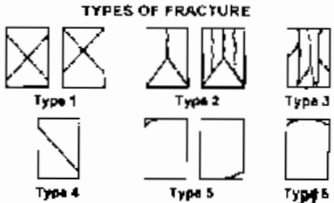
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2273	7/25/2013	7	18255	1.75	2.41	2.70		7570		
13-2274	7/25/2013	7	18615	1.75	2.41	2.70		7720		

Remarks: 13-2273 = #234
13-2274 = #241
13-2275 - #244 (too small to break)

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/19/2013

Location of Sample:

Supplier:

Mix Number:

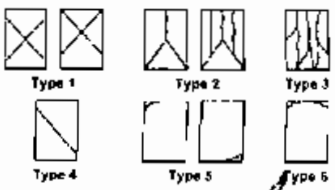
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2276	7/26/2013	7	13825	1.75	2.41	2.90		5740		

Remarks: 13-2276 = #245

TYPES OF FRACTURE



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Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/24/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

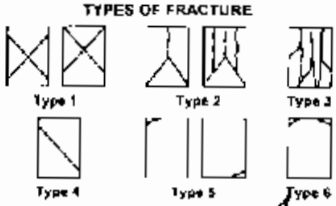
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2465	7/31/2013	7	12185	1.75	2.41	2.60		5060		
13-2466	7/31/2013	7	10705	1.75	2.41	2.80		4440		
13-2467	7/31/2013	7	12905	1.75	2.41	3.05		5350		

Remarks: 13-2465 = #255
13-2466 = #257
13-2467 = #258

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 7/31/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

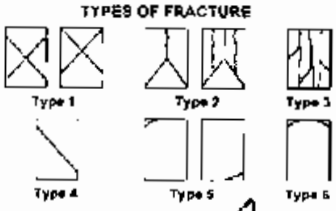
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2630	8/7/2013	7	10680	1.72	2.32	3.21		4600	115%	
13-2631	8/7/2013	7	9980	1.73	2.35	2.01		4250	106%	
13-2632	8/7/2013	7	10420	1.73	2.35	3.07		4430	111%	

Remarks: 13-2630 = 261
13-2631 = 262
13-2632 = 265

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/1/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

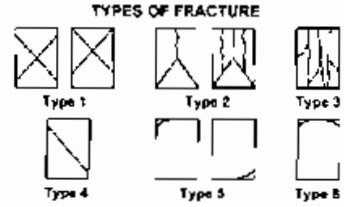
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2633	8/8/2013	7	10200	1.73	2.35	2.68		4340		
13-2634	8/8/2013	7	10420	1.73	2.35	3.08		4430		
13-2635	8/8/2013	7	10760	1.73	2.35	2.53		4580		

Remarks: 13-2633 = 266
13-2634 = 268
13-2635 = 269

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/5/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

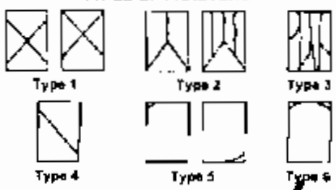
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-3078	8/12/2013	7	12115	1.73	2.35	2.80		5155		
13-3079	8/12/2013	7	11850	1.73	2.35	3.28		5043		
13-3080	8/12/2013	7	13365	1.73	2.35	2.88		5687		

Remarks: 13-3078 = core 271
13-3079 = core 272
13-3080 = core 273

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 5
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/9/2013

Location of Sample: Core 285

Supplier:

Mix Number:

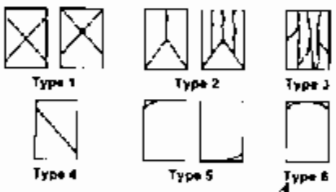
Design Strength:

LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2963	8/16/2013	7	14445	1.73	2.35	3.10		6147		

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by:

Stefan Neck, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 3
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/12/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

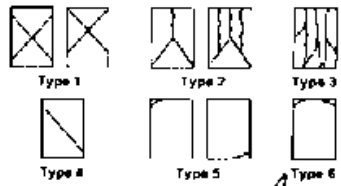
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2964	8/19/2013	7	15440	1.73	2.35	3.38		6570		
13-2965	8/19/2013	7	15320	1.73	2.35	3.52		6519		
13-2966	8/19/2013	7	12800	1.73	2.35	3.01		5447		

Remarks: 13-2964 = core 300
13-2965 = core 301
13-2966 = core 302

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CORED CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Hwy, North Pole, AK

Report Date: 10/21/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 4
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

SAMPLING INFORMATION

Date Sampled: Time Sampled:

Technician: Client

Date Placed: 8/13/2013

Location of Sample:

Supplier:

Mix Number:

Design Strength:

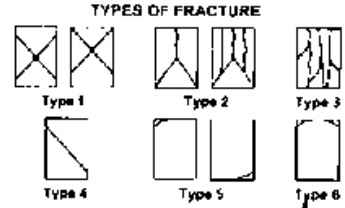
LABORATORY TEST RESULTS

Specimen	Test Date	Age	Load	Diameter	Area	Un-capped Height	Capped Height	Strength	Percent of Design	Type of Fracture
13-2967	8/20/2013	7	11785	1.73	2.35	3.07		5015		
13-2968	8/20/2013	7	10875	1.73	2.35	2.71		4628		
13-2969	8/20/2013	7	11355	1.73	2.35	3.10		4832		

Remarks: 13-2967 = 303
13-2968 = core 305
13-2969 = core 306

Copies to:

TYPES OF FRACTURE



Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

Shotcrete Installation Form

Batch Number	QTY
1	4.5 cy

Nozzleman Name	Richie Ramos	Date: 9/11/2012
Helper Name: JEREMY		Start/End Time: 9:19
Weather Conditions: CLEAR	Ambient Temperature (Max/Min): 37°	
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 16+30 to 16+55		Mix Water Temp
Panel Number	Slump: 3"	Shotcrete Temp: 42° / 45°
	Air Content: 8.7%	Applied Temp

TD
Report Compiled By

9/11
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number: 2	QTY: 4.5	
Nozzleman Name: Richie Ramos		Date: 9/11/2012
Helper Name: JEREMY		Start/End Time: 11:20 11:55
Weather Conditions: CLEAR	Ambient Temperature: 42°	(Max/Min)
Equipment Used: LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant		400 CFM IR Aircompressor
Placment Location: North Diversion STA. 16+55		Mix Water Temp:
Panel Number: 7	Slump: 2"	Shotcrete Temp: 42°
	Air Content: 7.8%	Applied Temp:

TD
Report Compiled By

9/11/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
3	4.5

Nozzleman Name	Richie Ramos	Date: 9/11/2012
Helper Name: JEREMY		Start/End Time: 12:30 1:20 / RESTART 2:00
Weather Conditions: CLEAR	Ambient Temperature: 44°	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 16+70 to 17+00		Mix Water Temp
Panel Number: 6 CYLINDERS	Slump: 1 3/4"	Shotcrete Temp: 53°
	Air Content: 6%	Applied Temp

TD
Report Compiled By

9/11/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
4	4.5 cy

Nozzleman Name	Richie Ramos	Date: 9/11/2012
Helper Name: JEREMY		Start/End Time: 2:20 3:50
Weather Conditions: CLEAR	Ambient Temperature: 54°	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 17+00 to 17+30		Mix Water Temp
Panel Number	Slump: INITIAL 3/4"	Shotcrete Temp: 57°
	Air Content: 6.2%	Applied Temp

TD
Report Compiled By

9/11/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
5	4.5

Nozzleman Name	Richie Ramos	Date 9/11/2012
Helper Name		Start/End Time 4:13 5:00

Weather Conditions	Ambient Temperature	(Max/Min)
MOSTLY CLEAR		

Equipment Used	LS-60 Mayco Pump	400 CFM IR Aircompressor
	2EA Delta Concrete Mixer Truck	
	Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 17+30 to 17+50	

Panel Number	Slump	Shotcrete Temp
6	3/4" INITIAL	64
3 CYLINDERS	Air Content	Applied Temp
	8.6	

TO
Report Compiled By

9/11/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
1	4.5

Nozzleman Name	Richie Ramos	Date 9/12/12
Helper Name JEREMY		Start/End Time 9:45 / 10:35
Weather Conditions PARTLY CLOUDY	Ambient Temperature 47°	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location North Diversion STA. 17+30 17+60		Mix Water Temp
Panel Number	Slump 2"	Shotcrete Temp 45°
	Air Content 7.5%	Applied Temp

TD
Report Compiled By

9/12/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY	
(2)	4.5	COMPUTER SHUT OFF NO BATCH TICKET

Nozzleman Name	Richie Ramos	Date	9/12/12
Helper Name	JEREMY	Start/End Time	11:09 11:

Weather Conditions	Ambient Temperature	(Max/Min)
PARTLY CLOUDY	52°	

Equipment Used	LS-60 Mayco Pump	400 CFM IR Aircompressor
	2EA Delta Concrete Mixer Truck	
	Delta Concrete Batch Plant	

Placment Location North Diversion STA. 17+60 17+90	Mix Water Temp

Panel Number PANEL #9 3 CYLINDERS	Slump 2"	Shotcrete Temp 48°
	Air Content 6.6%	Applied Temp

TD
Report Compiled By

9/18/2012
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
3	4.5

Nozzleman Name	Richie Ramos	Date: 9/12/12
Helper Name: JEREMY		Start/End Time: 12:00 12:45

Weather Conditions: MOSTLY CLOUDY	Ambient Temperature	(Max/Min)

Equipment Used	LS-60 Mayco Pump	400 CFM IR Aircompressor
	2EA Delta Concrete Mixer Truck	
	Delta Concrete Batch Plant	

Placment Location: North Diversion STA. 17+90 18+20	Mix Water Temp

Panel Number	Slump: 10.5"	Shotcrete Temp
	Air Content: 6.6"	Applied Temp

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

Shotcrete Installation Form

Batch Number	QTY
④ 1550	4.5

Nozzleman Name	Richie Ramos	Date 9/12/12
Helper Name	JEREMY	Start/End Time 1:15 1:55
Weather Conditions	MOSTLY CLOUDY	Ambient Temperature (Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location	North Diversion STA. 18+20 18+50	Mix Water Temp

Panel Number	Slump	Shotcrete Temp
10	3/4	56°
	Air Content	Applied Temp
	5.7%	

TD
Report Compiled By

9/12/12
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
5	4.5

Nozzleman Name	Richie Ramos	Date	9/12/2012
Helper Name	JEREMY	Start/End Time	2:10 3:57

Weather Conditions	Ambient Temperature	(Max/Min)
CLOUDY		

Equipment Used	LS-60 Mayco Pump	400 CFM IR Aircompressor
	2EA Delta Concrete Mixer Truck	
	Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 18+40 18+60	

Panel Number	Slump	Shotcrete Temp
11	1 1/4"	56°
3 CYLINDERS	Air Content	Applied Temp
	6%	

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

Shotcrete Installation Form

Batch Number	QTY
6	4.5

Nozzleman Name: Richie Ramos	Date: 9/12/2012
Helper Name: ERIC M.	Start/End Time: 4:13 / 5:11
Weather Conditions: CLOUDY	Ambient Temperature (Max/Min): 55°
Equipment Used: LS-60 Mayco Pump; 2EA Delta Concrete Mixer Truck; Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 18+60 to 18+95	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
12	1 3/4	55°
	Air Content: 6.4	Applied Temp:

TD
Report Compiled By

9/12/
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	4.5 CY

Nozzleman Name	Richie Ramos	Date: 9/13/12
Helper Name	JEREMY	Start/End Time: 9:41 10:14

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY/OVERCAST	48°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 18+90 19+20	

Panel Number	Slump	Shotcrete Temp
13	2¼	56°
	Air Content	Applied Temp
	6.6%	

TD
Report Compiled By

9/13/12
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number (2)	QTY 4.5	
Nozzleman Name	Richie Ramos	Date 9/13/12
Helper Name	JEREMY	Start/End Time 10:45 11:25
Weather Conditions	CLOUDY OVERCAST	Ambient Temperature (Max/Min) 50°
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location	North Diversion STA. 19+20 19+50	Mix Water Temp
Panel Number (14)	Slump 2.5"	Shotcrete Temp 56°
	Air Content 7%	Applied Temp

TD
Report Compiled By

9/13/12
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	4.5

Nozzleman Name: Richie Ramos	Date: 9/13/12
Helper Name: JEREMY	Start/End Time: 11:40 12:25
Weather Conditions	Ambient Temperature (Max/Min): 48°
Equipment Used: LS-60 Mayco Pump; 2EA Delta Concrete Mixer Truck; Delta Concrete Batch Plant; 400 CFM IR Aircompressor	
Placment Location: North Diversion STA. 19+50 19+85	Mix Water Temp

Panel Number	Slump	Shotcrete Temp
~~14~~ 15 2 Cylinders	2.5	56°
	Air Content: 6.8%	Applied Temp

TD
Report Compiled By

9/13/12
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	4.5

Nozzleman Name	Richie Ramos	Date	9/13/2012
Helper Name	ERIC M.	Start/End Time	1:00PM 1:45
Weather Conditions	CLOUDY OVERCAST	Ambient Temperature (Max/Min)	46°
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor	
Placment Location	North Diversion STA. 19+85 to 20+10	Mix Water Temp	
Panel Number	2 CYLINDERS	Slump	3/4"
		Shotcrete Temp	56°
		Air Content	
		Applied Temp	

TD
Report Compiled By

9/13/2012
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	4.5

Nozzleman Name: Richie Ramos	Date: 9/13/2012
Helper Name: ERIC M.	Start/End Time: 2:10 / 2:45

Weather Conditions	Ambient Temperature (Max/Min)
OVERCAST CLOUDY	49°

Equipment Used

LS-60 Mayco Pump

2EA Delta Concrete Mixer Truck

Delta Concrete Batch Plant

400 CFM IR Aircompressor

Placment Location	Mix Water Temp
North Diversion STA. 20+10 to 20+40	~~2:10~~

Panel Number	Slump	Shotcrete Temp
~~17~~ 16	2.25"	56°
	Air Content: AIR METER SEAL OUT	Applied Temp

TD

Report Compiled By

9/13/2012

Date

Sumitomo's Representative

Date

alaska aggregate products

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6	4.5

Nozzleman Name: Richie Ramos	Date: 9/13/2012
Helper Name: ERIC M.	Start/End Time: 3:00 – 3:40
Weather Conditions: CLOUDY	Ambient Temperature (Max/Min): 52°
Equipment Used: LS-60 Mayco Pump; 2EA Delta Concrete Mixer Truck; Delta Concrete Batch Plant; 400 CFM IR Aircompressor	
Placment Location: North Diversion STA. 20+40 20+70	Mix Water Temp
Panel Number	Slump: 2"
	Shotcrete Temp: 54°
	Air Content: AIR METER REQUIRES REPAIR
	Applied Temp

9/13/12 TD
Report Compiled By

9/13/12
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
7	4.5 CY

Nozzleman Name	Richie Ramos	Date 9/13/2012
Helper Name ERIC		Start/End Time 4:00 to 4:45
Weather Conditions CLOUDY / OVERCAST	Ambient Temperature 50	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location North Diversion STA. 20+70 - 20+95		Mix Water Temp
Panel Number	Slump 3/4	Shotcrete Temp 50
	Air Content	Applied Temp

TD
Report Compiled By

9/13/2012
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
7	6 ~~4.5~~

Nozzleman Name: Richie Ramos	Date: 9/14/12
Helper Name: ERIC	Start/End Time: 9:40 10:25

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY/OVERCAST	43° / 45°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 20+90 21+30	

Panel Number	Slump	Shotcrete Temp
18	1.5"	~~48°~~ 54°
	Air Content: 7.8	Applied Temp

TD
Report Compiled By

9/14/12
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	4.5

Nozzleman Name	Richie Ramos	Date: 9/14
Helper Name: ERIC		Start/End Time: 10:45
Weather Conditions: CLOUDY/OVERCAST	Ambient Temperature (Max/Min): 47°	
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 21+30 21+60		Mix Water Temp

Panel Number	Slump	Shotcrete Temp
19	2"	48°
2 CYLINDERS	Air Content: 5.2%	Applied Temp

TD
Report Compiled By

9/14
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	60

Nozzleman Name	Richie Ramos	Date	9/14/12
Helper Name	JEREMY	Start/End Time	11:50 12:40

Weather Conditions	Ambient Temperature (Max/Min)
MOSTLY CLOUDY	43°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 21+60 to 22+00	

Panel Number	Slump	Shotcrete Temp
20	2.5"	50°
	Air Content	**Applied Temp**
	5.8%	

21+10 to 21+30

20+50 to 20+65

19+50 to 19+70

18+50

21+75

21+90 to 21+25

22+10 to 22+25

21+30

23+05 to 23+25

23+35 to 23+45

23+70 to 24+00

JD 9/14/12

Report Compiled By — Date

Sumitomo's Representative — Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	6CY

Nozzleman Name: Richie Ramos	Date: 9/14/2012
Helper Name: JEREMY	Start/End Time: 1:00PM 1:40

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY OVERCAST	49°

Equipment Used

LS-60 Mayco Pump

400 CFM IR Aircompressor

2EA Delta Concrete Mixer Truck

Delta Concrete Batch Plant

Placment Location	Mix Water Temp
North Diversion STA. 22+00 to 22+40	

Panel Number	Slump	Shotcrete Temp
21	2"	50
2 CYLINDERS	Air Content: 6%	Applied Temp

TD

Report Compiled By

9/14/2012

Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	6CY

Nozzleman Name	Richie Ramos	Date
		9/14/2012

Helper Name	Start/End Time
JEREMY	2:05 / 3:13

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY OVERCAST	47°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 22+40 to 22+80	

Panel Number	Slump	Shotcrete Temp
22	1 3/4"	54°
	Air Content	**Applied Temp**
	5.8%	

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Shotcrete Installation Form

DELTA CONCRETE

3:15

Batch Number	QTY
10	6 CY

Nozzleman Name	Richie Ramos	Date	9/14
Helper Name	JEREMY	Start/End Time	3:15

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY	53°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 22+80 to 22+20	

Panel Number	Slump	Shotcrete Temp
23	2 3/4"	54°
2 CYLINDERS	Air Content: 5.7	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
1	4.5

Nozzleman Name	Richie Ramos	Date: 9/15/2012
Helper Name: JEREMY		Start/End Time: 9:50 10:30
Weather Conditions: OVERCAST	Ambient Temperature (Max/Min): 51°	
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 1+50 to 1:80		Mix Water Temp

Panel Number	Slump	Shotcrete Temp
24	1 3/4"	53°
2 CYLINDERS	Air Content: 7%	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
2	4.5

Nozzleman Name	Richie Ramos	Date 9/15/2012
Helper Name JEREMY		Start/End Time 10:40 11:35
Weather Conditions HAZY	Ambient Temperature 56	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location North Diversion STA. 1+80 to 2+05		Mix Water Temp

Panel Number	Slump	Shotcrete Temp
25	2"	54°
	Air Content 6.4%	Applied Temp

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Shotcrete Installation Form

Batch Number (3)	QTY 4.5	
Nozzleman Name: Richie Ramos		Date: 9/15/2012
Helper Name: JEREMY		Start/End Time: 11:50 12:25
Weather Conditions: HAZY/OVERCAST	Ambient Temperature: 57°	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 2+05 2+30		Mix Water Temp
Panel Number (26)	Slump: 2"	Shotcrete Temp: 56°
	Air Content: 7.2	Applied Temp

1+50

1+60 to 1+75

1+90 to 2+00

2+50 to 3+50

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Shotcrete Installation Form

Batch Number	QTY
4	4.5

Nozzleman Name	Richie Ramos	Date: 9/15/2012
Helper Name	JEREMY	Start/End Time: 12:40 1:30
Weather Conditions	HAZY OVERCAST	Ambient Temperature (Max/Min): 56
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location	North Diversion STA. 2+30 2+65	Mix Water Temp

Panel Number	Slump	Shotcrete Temp
27	2.25"	54°
2 CYLINDERS	Air Content: 8.0%	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
5	4.5

Nozzleman Name	Richie Ramos	Date
		9/15/2012

Helper Name	Start/End Time
JEREMY	1:52 2:20

Weather Conditions	Ambient Temperature (Max/Min)
MOSTLY CLOUDY CONTINUOUS WIND ~15 MPH	56

Equipment Used		
	LS-60 Mayco Pump	400 CFM IR Aircompressor
	2EA Delta Concrete Mixer Truck	
	Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 2+65 2+85	

Panel Number	Slump	Shotcrete Temp
28	2 1/4	60°
	Air Content	**Applied Temp**
	8%	

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Shotcrete Installation Form

DELTA CONCRETE

19+00

BREAKS 12

19

Batch Number	QTY
6	4.5

Nozzleman Name	Richie Ramos	Date	9/15/2012
Helper Name	JEREMY	Start/End Time	2:45 3:30
Weather Conditions	CLOUDY/WINDY 15 MPH	Ambient Temperature (Max/Min)	58°
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant		400 CFM IR Aircompressor
Placment Location	North Diversion STA. 2+85 to 3+00	Mix Water Temp	
Panel Number	29	Slump	2 3/4"
		Shotcrete Temp	61°
		Air Content	6.9%
		Applied Temp	

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Shotcrete Installation Form

Batch Number	QTY
7	4.5

Nozzleman Name: Richie Ramos	Date: 9/15/2012
Helper Name: JEREMY	Start/End Time: 3:51 4:35

Weather Conditions	Ambient Temperature (Max/Min)
CLOUDY/OVERCAST 15MPH WIND	58°

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA. 3+00 to 3+35	

Panel Number	Slump	Shotcrete Temp
30	2 1/4	58°
2 Cylinders	Air Content: 6.8	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	4.5

Nozzleman Name: Richie Ramos	Date: 9/16/12
Helper Name: ERIC	Start/End Time: 9:30 10:15
Weather Conditions: CLOUDY / WINDY	Ambient Temperature (Max/Min): 59°
Equipment Used: LS-60 Mayco Pump; 2EA Delta Concrete Mixer Truck; Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location: North Diversion STA. 3+20 to 3+50	Mix Water Temp

Panel Number	Slump	Shotcrete Temp
3	2 1/2"	58°
	Air Content: 6.8	Applied Temp

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Shotcrete Installation Form

Batch Number: 2	QTY: 4.5	
Nozzleman Name: Richie Ramos		Date: 9/16/2012
Helper Name: ERIC		Start/End Time: 10:45 / 11:15
Weather Conditions: ~~CLOUDY~~ CLOUDY/BREEZY	Ambient Temperature: 59°	(Max/Min)
Equipment Used: LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant		400 CFM IR Aircompressor
Placment Location: North Diversion STA. 3+50 3+80		Mix Water Temp
Panel Number: 32	Slump: 1 1/2"	Shotcrete Temp: 54°
2 CYLINDERS	Air Content: 7.6%	Applied Temp

3+25 to 3+75

4+00 to 4+25

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Shotcrete Installation Form

Batch Number	QTY
3	4.5

Nozzleman Name	Richie Ramos	Date 9/16
Helper Name ERIC		Start/End Time 11:45 12:30
Weather Conditions CLOUDY/WINDY	Ambient Temperature 60°	(Max/Min)
Equipment Used	LS-60 Mayco Pump 2EA Delta Concrete Mixer Truck Delta Concrete Batch Plant	400 CFM IR Aircompressor
Placment Location North Diversion STA. ~~4+85~~ / ~~4+00~~ 3+80 to 4+10		Mix Water Temp

Panel Number	Slump	Shotcrete Temp
33	2"	56°
	Air Content 6.2%	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
1	4.5

Nozzleman Name: RICHIE	Date: 9/17
Helper Name: ERIC M.	Start/End Time: 9:05 / 9:45
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 51°
Equipment Used: MAYCO LS-60 185 COMPRESSOR	
Placment Location: 4+15 to 4+45	Mix Water Temp:
Panel Number: 34	Slump: 2.5"
	Shotcrete Temp: 54°
	Air Content: 6.6%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/17/2012

Helper Name	Start/End Time
ERIC	10:00 : 10:50

Weather Conditions	Ambient Temperature
PARTLY CLOUDY/WINDY	50°

Equipment Used
MAYCO LS-60
185 AIR COMPRESSOR

Placment Location	Mix Water Temp
4+45 to 4+75	

Panel Number	Slump	Shotcrete Temp
35	1 3/4"	56°
6 CYLINDERS	Air Content	Applied Temp
	6.7%	

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Shotcrete Installation Form

Batch Number	QTY
1	4.5

Nozzleman Name: RICHIE	Date: 9/18/2012
Helper Name: ERIC	Start/End Time: 9:07: - 9:50 AM

Weather Conditions	Ambient Temperature
OVERCAST	49°

Equipment Used: MAYCO LS-60
185 COMPRESSOR

Placment Location	Mix Water Temp
4+75	

Panel Number	Slump	Shotcrete Temp
36	3 1/2	51°
	Air Content: 7.8	Applied Temp:

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9/18
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Shotcrete Installation Form

Batch Number	QTY
2	4.5

Nozzleman Name: RICHIE RAMOS	Date: 9/18/12
Helper Name: ERIC MONTAGUE	Start/End Time: 10:18 AM / 10:50 AM

Weather Conditions	Ambient Temperature
OVER CAST, LIGHT BREEZE	45°

Equipment Used
MAYCO - LS-60
185 COMPESSOR

Placment Location	Mix Water Temp
5+0	

Panel Number	Slump	Shotcrete Temp
~~36~~ 37	2"	54°
2 CYLINDERS	Air Content: 7.1	Applied Temp

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DELTA CONCRETE

Batch Number	QTY
3	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/18/12
Helper Name	**Start/End Time**
ERK MONTAGUE	11:40 AM / 12:18 PM

Weather Conditions	Ambient Temperature
OVERCAST, LIGHT BREEZE	46.9°

Equipment Used

MAYCO LS-60

185 COMPRESSOR

Placment Location	Mix Water Temp
5+15	

Panel Number	Slump	Shotcrete Temp
38	3.5"	57°F
	Air Content	**Applied Temp**
	8	

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Shotcrete Installation Form

Batch Number	QTY
4	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/18/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:50pm

Weather Conditions	Ambient Temperature
OVERCAST, LIGHT WIND	50°F

Equipment Used

MAYCO LS-60

185 COMPRESSOR

Placment Location	Mix Water Temp
5+50	

Panel Number	Slump	Shotcrete Temp
39	2 1/4"	57°
2 CYLINDERS	**Air Content**	**Applied Temp**
	8%	

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Shotcrete Installation Form

Batch Number	QTY
5	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/18/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	2:05pm / 2:43pm

Weather Conditions	Ambient Temperature
OVER CAST, LIGHT WIND	47°F

Equipment Used
MAYCO LS-60
185 COMPRESSOR

Placment Location	Mix Water Temp
5+75	

Panel Number	Slump	Shotcrete Temp
40	1"	56°
	Air Content	**Applied Temp**
	5 1/4 %	

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Shotcrete Installation Form

Batch Number	QTY
6	4.5

Nozzleman Name RICHIE RAMOS	Date 9/18/12
Helper Name ERIC MONTAGUE	Start/End Time 3:10pm / 4:00pm

Weather Conditions OVERCAST, LIGHT WIND	Ambient Temperature 46° F

Equipment Used
MAYCO LS-60
185 COMPRESSOR

Placment Location 640	Mix Water Temp

Panel Number 41	Slump 1 1/4"	Shotcrete Temp 57°
	Air Content 4.1%	Applied Temp

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Batch Number	QTY
7	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/18/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	4:35 / 5:13 pm

Weather Conditions	Ambient Temperature
OVER CAST WITH LIGHT WIND	50° F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
6+25	

Panel Number	Slump	Shotcrete Temp
42	2½"	56°F
	Air Content	**Applied Temp**
	5.5%	

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Shotcrete Installation Form

Batch Number	QTY
8	4,5

Nozzleman Name RICHIE RAMOS	Date 9/18/12
Helper Name ERIC MONTAGUE	Start/End Time 5:40pm / 6:28pm

Weather Conditions OVER CAST,	Ambient Temperature 50°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location 6+50	Mix Water Temp

Panel Number 13	Slump 1"	Shotcrete Temp 56°
	Air Content 4.9%	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
1	4.5

Nozzleman Name	Date
RICHIE RAMOS	9/19/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:00 AM / 9:40 AM

Weather Conditions	Ambient Temperature
OVER CAST WITH WIND	47° F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
6+75	

Panel Number	Slump	Shotcrete Temp
44	1½"	54°
	Air Content	**Applied Temp**
	4.6%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	6

Nozzleman Name: RICHIE RAMOS	Date: 9/19/12
Helper Name: ERIC MONTAGUE	Start/End Time: 10:10 AM / 11:09 AM
Weather Conditions: OVERCAST + WINDY	Ambient Temperature: 48°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 7+00	Mix Water Temp:
Panel Number: 45	Slump: 1 3/8"
	Shotcrete Temp: 57°F
2 CYLINDERS	Air Content: 3.5%
	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
3	6

Nozzleman Name RICHIE RAMOS	Date 9/19/12
Helper Name ERIC MONTAGUE	Start/End Time 11:45 AM / 12:28 PM
Weather Conditions OVERCAST + WINDY	Ambient Temperature 49° F
Equipment Used MAYCO LS-60, 185 COMPRESSOR	
Placment Location 7+50	Mix Water Temp

Panel Number	Slump	Shotcrete Temp
46	2"	56° F
	Air Content 3.5	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
4	6

Nozzleman Name: RICHIE RAMOS	Date: 9/19/12
Helper Name: ERIC MONTAGUE	Start/End Time: 1:15 pm / 2:15 pm
Weather Conditions: OVERCAST + WINDY	Ambient Temperature: 54.9°
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 7+75	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
47	1½"	59°F
	Air Content: 4.8 %	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
1	6

Nozzleman Name: RICHIE RAMOS	Date: 9/20/12
Helper Name: ERIC MONTAGUE	Start/End Time: 9:15 AM / 10:00 AM
Weather Conditions: OVERCAST NO WIND	Ambient Temperature: 54°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 8+00	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
48	2"	58°
2 CYLINDERS	Air Content: 5.2%	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
2	6

Nozzleman Name: RICHIE RAMOS	Date: 9/20/12
Helper Name: ERIC MONTAGUE	Start/End Time: 10:30 AM / 11:20 AM
Weather Conditions: OVERCAST, NO WIND	Ambient Temperature: 53° F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 8+50	Mix Water Temp:
Panel Number: 49	Slump: 1 1/2"
	Shotcrete Temp: 59°
	Air Content: 5%
	Applied Temp:

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Batch Number	QTY
3	6

Nozzleman Name	Date
RICHIE RAMOS	9/20/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	11:51 / 12:45

Weather Conditions	Ambient Temperature
OVERCAST, NO WIND, LIGHT RAIN	52°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
8+75	

Panel Number	Slump	Shotcrete Temp
50	2"	59°
	Air Content	**Applied Temp**
2 CYLINDERS	4.8%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	6

Nozzleman Name: RICATE RAMOS	Date: 9/20/12
Helper Name: ERIC MONTAGUE	Start/End Time: 1:30 / 2:30
Weather Conditions: OVER CAST LIGHT RAIN	Ambient Temperature: 53° F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 9+00	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
51	2"	59°
2 CYLINDERS	Air Content: 5%	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	6

Nozzleman Name	Date
RICHIE RAMOS	9/20/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	4:50 pm /

Weather Conditions	Ambient Temperature
PARTLY CLOUDY, ~~NO WIND~~ LIGHT WIND, NO RAIN	52°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
9+75	

Panel Number	Slump	Shotcrete Temp
52 MISSED	2 1/4"	63°F
	Air Content	**Applied Temp**
	4.5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number 1526 (1)	QTY 6
Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 8:56 /
Weather Conditions: PARTLY SUNNY, PARTLY CLOUDY, NO RAIN OR WIND	Ambient Temperature: 52°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 10+00	Mix Water Temp
Panel Number: (53)	Slump: 2 3/4"
	Shotcrete Temp: 62°F
2 CYLINDERS	Air Content: 4.5%
	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	6

Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 11:10 am / 12:00 pm
Weather Conditions: [redacted] SUNNY, NO WIND	Ambient Temperature: 58° F
Equipment Used: MAYCO - LS - 60, 185 COMPRESSOR	
Placment Location: 10+25	Mix Water Temp:
Panel Number: 54	Slump: 1 3/4"
	Shotcrete Temp: 63 °F
2 CYLINDERS	Air Content: 4%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	6

Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 12:45/1:30
Weather Conditions: SUNNY	Ambient Temperature: 62° F
Equipment Used: MAYCO - LS 60, 185 COMPRESSOR	
Placment Location: 10+50	Mix Water Temp:
Panel Number: 55	Slump: 2"
	Shotcrete Temp: 65° F
	Air Content: 4.8%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	6

Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 2:12 pm / 3:00 pm
Weather Conditions: SUNNY	Ambient Temperature: 62°F
Equipment Used: MAYCO - LS 60, 185 COMPRESSOR	
Placment Location: 10+75	Mix Water Temp:
Panel Number: 56	Slump: 1 3/4"
	Shotcrete Temp: 68°F
2 CYLINDERS	Air Content: 4.8
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	6

Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 3:30 pm / 4:31 pm
Weather Conditions: SUNNY	Ambient Temperature: 55°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 11+25	Mix Water Temp:
Panel Number: 57	Slump: 1 1/4"
	Shotcrete Temp: 70.2°F
	Air Content: 4.5%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6	6

Nozzleman Name: RICHIE RAMOS	Date: 9/21/12
Helper Name: ERIC MONTAGUE	Start/End Time: 5:20 pm /
Weather Conditions: SUNNY	Ambient Temperature: 55°F
Equipment Used: MAYCO - LS - 60 , 185 COMPRESSOR	
Placment Location: 11 + 75	Mix Water Temp:
Panel Number: 58	Slump: 2"
	Shotcrete Temp: 62°F
	Air Content: 5.5%
	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
1	6

Nozzleman Name RICHIE RAMOS	Date 9/22/12
Helper Name ERIC MONTAGUE	Start/End Time 10:45 / 11:30
Weather Conditions OVER CAST w/ SUN.	Ambient Temperature 61 °F
Equipment Used MAYCO LS-60, 185 COMPESSOR	
Placment Location 23 +25	Mix Water Temp

Panel Number 59	Slump 2 1/4"	Shotcrete Temp 64 °F
	Air Content 3.5% ?	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	6

Nozzleman Name	Date
RICHIE RAMOS	9/22/12
Helper Name	**Start/End Time**
ERIC MONTABLE	12:00pm / 1:00 pm

Weather Conditions	Ambient Temperature
OVERCAST, LIGHT WIND	61 °F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
23+50	

Panel Number	Slump	Shotcrete Temp
60	1"	64°F
	Air Content	**Applied Temp**
2 CYLINDERS	6%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	6

Nozzleman Name RICHIE RAMOS	Date 9/22/12
Helper Name ERIC MONTAGUE	Start/End Time 1:47 / 2:37

Weather Conditions OVERCAST W/ SUN	Ambient Temperature 66°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location 24+00		Mix Water Temp
Panel Number 61	Slump 2 1/4"	Shotcrete Temp 66°F
	Air Content 4.5%	Applied Temp

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9/22/12
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
4	6

Nozzleman Name	Date
RICHIE RAMOS	9/22/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:18 / 4:13

Weather Conditions	Ambient Temperature
OVER CAST WINDY	62°F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
24+25	

Panel Number	Slump	Shotcrete Temp
62	2 3/4"	65°F
	Air Content	**Applied Temp**
2 CYLINDERS	4.5%	

SHAYNE NORTON
Report Compiled By

9/22/12
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	6

Nozzleman Name	Date
RICHIE RAMOS	9/22/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	4:55

Weather Conditions	Ambient Temperature
OVERCAST + ~~[illegible]~~ WINDY	61°F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
24+50	

Panel Number	Slump	Shotcrete Temp
63	2 3/4"	63°F
	Air Content	**Applied Temp**
	5%	

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Shotcrete Installation Form

Batch Number	QTY
1	6

Nozzleman Name	Date
RICHIE RAMOS	9/23/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:17 Am / 10:25

Weather Conditions	Ambient Temperature
CLEAR + SUNNY	52°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
25 + 00	

Panel Number	Slump	Shotcrete Temp
64	2 3/4	55°F
	Air Content	**Applied Temp**
	5.5%	

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Shotcrete Installation Form

Batch Number	QTY
2	6

Nozzleman Name	Date
RICHIE THE MAN RAMOS	9/23/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	10:40 / 11:40

Weather Conditions	Ambient Temperature
CLEAR + SUNNY	55°F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
25 + 25	

Panel Number	Slump	Shotcrete Temp
65	1 3/4"	63°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.5%	

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Date

Shotcrete Installation Form

Batch Number	QTY
3	6

Nozzleman Name RICHIE "THE MAN" RAMOS	Date 9/23/12
Helper Name ERIC "THE GATOR" MONTAGUE	Start/End Time 12:15 / 1:55
Weather Conditions PARTLY CLOUDY, WARM SUN	Ambient Temperature 57°F
Equipment Used MYCO LS-60, 185 COMPRESSOR	
Placment Location 25+75	Mix Water Temp
Panel Number 65 2 CYLINDERS	Slump 3 1/2"
	Shotcrete Temp 64°F
	Air Content 6.5%
	Applied Temp

SARAH NORTON
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9/23/12
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Shotcrete Installation Form

Batch Number	QTY
4	6

Nozzleman Name	Date
RICHIE RAMOS	9/23/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	1:25 / 2:30

Weather Conditions	Ambient Temperature
MOSTLY SUNNY, SOME WIND GUSTS	55°F

Equipment Used
MARCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
26+00	

Panel Number	Slump	Shotcrete Temp
66	3"	62°F
	Air Content	**Applied Temp**
	5.5 %	

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Shotcrete Installation Form

Batch Number	QTY
5	6

Nozzleman Name	Date
RICHIE RAMOS	9/23/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	

Weather Conditions	Ambient Temperature
OVER CAST LIGHT WIND	58°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
26 + 25	

Panel Number	Slump	Shotcrete Temp
67	2 1/4	63° F
	Air Content	**Applied Temp**
	5 %	

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9/23/12
Date

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Shotcrete Installation Form

Batch Number	QTY
6	6

Nozzleman Name	Date
RICHIE RAMOS	9/23/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	

Weather Conditions	Ambient Temperature
OVER CAST, LIGHT WIND	58° F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
26+75	

Panel Number	Slump	Shotcrete Temp
68	2 1/4"	63° F
	Air Content	**Applied Temp**
	5.5	

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Date

Shotcrete Installation Form

Batch Number	QTY
1	6

Nozzleman Name: RICHIE RAMOS	Date: 9/24/12
Helper Name: ERIC MONTAGUE	Start/End Time: 10:25 / 11:15
Weather Conditions: CLOUDY, FOG, LIGHT RAIN	Ambient Temperature: 35°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 27+00	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
70	2 1/4"	53°F
	Air Content: 4%	Applied Temp:

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Date

Shotcrete Installation Form

Batch Number	QTY
2	6

Nozzleman Name: RICHIE RAMOS	Date: 9/24/12
Helper Name: ERIC MONTAGUE	Start/End Time: 12:00 /
Weather Conditions: OVER CAST, FOG,	Ambient Temperature: 35° F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 27 + 25	Mix Water Temp:
Panel Number: 71	Slump: 2 1/4"
	Shotcrete Temp: 57° F
2 CYLINDERS	Air Content: 5.5%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	6

Nozzleman Name: RICHIE RAMOS	Date: 9/24/12
Helper Name: ERIC MONTAGUE	Start/End Time: 1:20 / 2:20

Weather Conditions: CLOUDY / FOG	Ambient Temperature: 35° F

Equipment Used: MAYCO LS-60, 185 COMPRESSOR

Placment Location: 27+50	Mix Water Temp:

Panel Number: 72	Slump: 3½"	Shotcrete Temp: 57°F
2 CYLINDERS	Air Content: 5.5	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	6

Nozzleman Name: RICHIE RAMOS	Date: 9/24/12
Helper Name: ERIC MONTAGUE	Start/End Time: 3:07 / 4:10

Weather Conditions: SUNNY, CLEAR SKYS	Ambient Temperature: 56°F

Equipment Used: MARCO-LS-60, 185 COMPRESSOR

Placment Location: ~~[illegible]~~ 27+75	Mix Water Temp:

Panel Number: 73	Slump: 2"	Shotcrete Temp: 58°F
	Air Content: 5.5	Applied Temp:

2 CYLINDERS

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Shotcrete Installation Form

Batch Number	QTY
5	6

Nozzleman Name: RICHIE RAMOS	Date: 9/24/12
Helper Name: ERIC MONTAGUE	Start/End Time:
Weather Conditions: SUNNY + CLEAR	Ambient Temperature: 56°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 28+00	Mix Water Temp:
Panel Number: 74	Slump: 2"
	Shotcrete Temp: 58%
	Air Content: 5.5
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1) 1618	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:15 / 10:34

Weather Conditions	Ambient Temperature
PARTLY SUNNY	45°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
28+00	

Panel Number	Slump	Shotcrete Temp
(76)	1 3/4"	53°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2) 1619	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	11:10 / 12:00

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	43°F

Equipment Used

MAMCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
28+25	

Panel Number	Slump	Shotcrete Temp
(77)	1 1/2"	60°F
	Air Content	**Applied Temp**
	5%	

SHANE Nowlin
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(3) 1620	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:30 / 1:30

Weather Conditions	Ambient Temperature
SUNNY	55°F

Equipment Used

MAYCO LS-600, 185 COMPRESSOR

Placment Location	Mix Water Temp
28+50	

Panel Number	Slump	Shotcrete Temp
(78)	2 1/4	58 °F
	Air Content	**Applied Temp**
2 CYLINDERS	5.5 %	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1621	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	2:10 / 3:05

Weather Conditions	Ambient Temperature
SNOW	55 °F

Equipment Used

MARCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
28 + 75	

Panel Number	Slump	Shotcrete Temp
79	NA	NA
	Air Content	**Applied Temp**
	NA	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(5) 1622	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:15/4:08

Weather Conditions	Ambient Temperature
SUNNY	55 °F

Equipment Used
MAYCO-LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
29+50	

Panel Number	Slump	Shotcrete Temp
(80)	1 1/2"	NA
	Air Content	**Applied Temp**
	6 %	

SHAWNE [signature]
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Shotcrete Installation Form

Batch Number	QTY
(6) 1623	6

Nozzleman Name	Date
RICHIE RAMOS	9/25/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	4:15/5:15

Weather Conditions	Ambient Temperature
SUNNY	50°F

Equipment Used
MAMCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
30+00	

Panel Number	Slump	Shotcrete Temp
(81)	2¼	58°F
	Air Content	**Applied Temp**
	5%	

SHAYNE [signature]
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Date

Shotcrete Installation Form

Batch Number	QTY
(1) 1624	6

Nozzleman Name	Date
RICHIE RAMOS	9/26/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:45 / 10:40

Weather Conditions	Ambient Temperature
OVERCAST	43° F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
30+25	

Panel Number	Slump	Shotcrete Temp
(82)	2 1/4"	56° F
	Air Content	**Applied Temp**
2 CYLINDERS	5 %	

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Shotcrete Installation Form

Batch Number	QTY
② 1625	6

Nozzleman Name	Date
RICHIE RAMOS	9/26/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	11:15 / 12:15

Weather Conditions	Ambient Temperature
OVERCAST	50°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
30+50	

Panel Number	Slump	Shotcrete Temp
(83)	1 3/4"	58°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(3) 1626	6

Nozzleman Name	Date
RICHIE RAMOS	9/26/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:30 / 1:30

Weather Conditions	Ambient Temperature
SUNNY	57°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
30+75	

Panel Number	Slump	Shotcrete Temp
(84)	1 1/2"	59°F
	Air Content	**Applied Temp**
	5.5%	

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Date

Shotcrete Installation Form

Batch Number	QTY
(4) 1627	6

Nozzleman Name	Date
RICHIE RAMOS	9/26/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	2:12

Weather Conditions	Ambient Temperature
SUNNY	61 °F

Equipment Used

MAYCO LS-60 / 185 COMPRESSOR

Placment Location	Mix Water Temp
31+00	

Panel Number	Slump	Shotcrete Temp
(85)	2"	62° F
	Air Content	**Applied Temp**
	6%	

Shane Northy
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Date

Shotcrete Installation Form

Batch Number	QTY
(5) 1628	6

Nozzleman Name	Date
RICHIE ROMOS	9/26/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:52/4:45

Weather Conditions	Ambient Temperature
SUNNY	61 °F

Equipment Used

MAMCO LS-60, IBS COMPRESSOR

Placment Location	Mix Water Temp
31+25	

Panel Number	Slump	Shotcrete Temp
(86)	1 1/4"	62 °F
	Air Content	**Applied Temp**
	5.3 %	

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Shotcrete Installation Form

Batch Number	QTY
(6) 1629	6

Nozzleman Name	Date
Richie Ramos	9/26/12
Helper Name	**Start/End Time**
Eric Montague	3:00 / 6:00

Weather Conditions	Ambient Temperature
Sunny	59°F

Equipment Used
Mamco, LS-60, 185 Compressor

Placment Location	Mix Water Temp
31+50	

Panel Number	Slump	Shotcrete Temp
(87)	2"	60°F
	Air Content	**Applied Temp**
	5.5%	

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Shotcrete Installation Form

Batch Number	QTY
(1) 1630	6

Nozzleman Name: RICHIE RAMOS	Date: 9/27/12
Helper Name: ERIC MONTAGUE	Start/End Time: 9:15/10:15
Weather Conditions: OVERCAST	Ambient Temperature: 40 °F
Equipment Used: MAMCO LS-60, 185 COMPRESSOR	
Placment Location: 32×00	Mix Water Temp:
Panel Number: (87)	Slump: NA
	Shotcrete Temp: NA
	Air Content: NA
	Applied Temp:

Shane [illegible]
Report Compiled By

9/27/12
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Date

Shotcrete Installation Form

Batch Number	QTY
(2) 1631	6

Nozzleman Name RICHIE RAMOS	Date 9/27/12
Helper Name ERIC MONTAGUE	Start/End Time 11:00 / 12:00
Weather Conditions OVERCAST	Ambient Temperature 40°F
Equipment Used MARCO LS-60, 185 COMPRESSOR	
Placment Location 32+50	Mix Water Temp
Panel Number (88)	Slump 2"
	Shotcrete Temp NA
	Air Content 5.5 %
	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
3 1632	6

Nozzleman Name	Richie Ramos	Date
RICHIE RAMOS		9/27/12
Helper Name		**Start/End Time**
ERIC MONTAGUE		12:30 / 1:37

Weather Conditions	Ambient Temperature (Max/Min)
OVERCAST	42°F

Equipment Used	
LS-60 Mayco Pump	400 CFM IR Aircompressor
2EA Delta Concrete Mixer Truck	
Delta Concrete Batch Plant	

Placment Location	Mix Water Temp
North Diversion STA.	

Panel Number	Slump	Shotcrete Temp
89	2"	NA
	Air Content	**Applied Temp**
2 CYLINDERS	5 %	

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Shotcrete Installation Form

Batch Number	QTY
(4) 1633	6

Nozzleman Name: Richie Ramos	Date: 9/27/12
Helper Name: Eric Montague	Start/End Time: 2:10 / 3:00
Weather Conditions: OVERCAST ~~OVERCAST~~	Ambient Temperature (Max/Min): 42°F
Equipment Used: LS-60 Mayco Pump, 2EA Delta Concrete Mixer Truck, Delta Concrete Batch Plant	400 CFM IR Aircompressor ~~LS-60~~ , ~~185~~ ~~Compressor~~
Placment Location: North Diversion STA. 32+25	Mix Water Temp:
Panel Number: (90) 2 CYLINDERS	Slump: 1 1/4"
	Shotcrete Temp: 58°F
	Air Content: 5.5%
	Applied Temp:

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Date: 9/27/12

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(5) 1634	6

Nozzleman Name	Date
RICHIE RAMOS	9/27/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:30 / 4:30

Weather Conditions	Ambient Temperature
OVERCAST	~~42°F~~ 50°F

Equipment Used
MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
~~[illegible]~~ 33+00	

Panel Number	Slump	Shotcrete Temp
(91)	1 3/4"	56°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.5%	

Stephen [signature]
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6 1635	6

Nozzleman Name	Date
RICHIE RAMOS	9/27/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	5:00 pm

Weather Conditions	Ambient Temperature
SUNNY	53 °F

Equipment Used

MAYCO LS-60, 185# COMPRESSOR

Placment Location	Mix Water Temp
33 +25	

Panel Number	Slump	Shotcrete Temp
92	2"	54 °F
	Air Content	**Applied Temp**
	5.5 %	

SHANE [signature]
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1) 1636	6

Nozzleman Name RICHIE RAMOS	Date 9/28/12
Helper Name ERIC MONTAGUE	Start/End Time 9:15 / 10:15
Weather Conditions OVERCAST	Ambient Temperature 43°F
Equipment Used MAYCO LS-60, 185 COMPRESSOR	
Placment Location 33+75	Mix Water Temp
Panel Number (93) 2 CYLINDERS	Slump 1 3/4"
	Shotcrete Temp 56°
	Air Content 5 %
	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2) 1637	6

Nozzleman Name	Date
RICHIE RAMOS	9/28/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	10:57 / 12:00

Weather Conditions	Ambient Temperature
OVERCAST, LIGHT WIND	41°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
34+00	

Panel Number	Slump	Shotcrete Temp
(94)	1 1/4"	56°F
	Air Content	**Applied Temp**
2 CYLINDERS	5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(3) 1638	6

Nozzleman Name	Date
RICHIE RAMOS	9/28/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:32 / 1:30

Weather Conditions	Ambient Temperature
OVERCAST	37.8 °F

Equipment Used

MARCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
34+25	

Panel Number	Slump	Shotcrete Temp
(95)	2½"	55 °F
	Air Content	**Applied Temp**
2 CYLINDERS	5 %	

SHANE

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4 1639	6

Nozzleman Name	Date
RICHIE RAMOS	9/28/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	1:50 / 3:12

Weather Conditions	Ambient Temperature
OVER CAST	48° F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
34+50	

Panel Number	Slump	Shotcrete Temp
96	2½	56°F
	Air Content	**Applied Temp**
	5.5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(5) 1640	4.5 ~~16~~

Nozzleman Name	Date
RICHIE RAMOS	9/28/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:40/4:45

Weather Conditions	Ambient Temperature
OVER CAST	45°F

Equipment Used

MAMCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
34+75	

Panel Number	Slump	Shotcrete Temp
(97)	NA	NA
	Air Content	**Applied Temp**
	NA	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1) 1641	6

Nozzleman Name	Date
RICHIE RAMOS	9/29/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:30 / 10:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	40 °F

Equipment Used

MAYCO LS-60 , 185 COMPRESSOR

Placment Location	Mix Water Temp
36+50	

Panel Number	Slump	Shotcrete Temp
(98)	1 1/2"	53°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.8%	

SHAYNE [illegible]
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9/29/12
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2) 1642	6

Nozzleman Name	Date
RICHIE RAMOS	9/29/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	11:00 / 12:00

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	40 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
36+75	

Panel Number	Slump	Shotcrete Temp
(99)	1"	53° F
	Air Content	**Applied Temp**
2 CYLINDERS	5 %	

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9/29/12
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3 1643	6

Nozzleman Name RICHIE RAMOS	Date 9/29/12
Helper Name ERIC MONTAGUE	Start/End Time 12:30 / 1:30
Weather Conditions PARTLY SUNNY	Ambient Temperature 38 °F
Equipment Used MAYCO - LS60, 185 COMPRESSOR	
Placment Location 37+00	Mix Water Temp
Panel Number 100	Slump 1"
	Shotcrete Temp 54 °F
	Air Content 5 %
	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(4) 1644	6

Nozzleman Name	Date
RICHIE RAMOS	9/29/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	2:00 / 3:00

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	37 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
37+00	

Panel Number	Slump	Shotcrete Temp
(101)	2 3/4"	60 °F
2 CYLINDERS	Air Content: 5.2 %	Applied Temp

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9/29/12

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(5) 1645	6

Nozzleman Name	Date
RICHIE RAMOS	9/29/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	

Weather Conditions	Ambient Temperature
~~PT~~ OVER CAST	39 °F

Equipment Used
MAMCO - LS 60, 185 COMPRESSOR

Placment Location	Mix Water Temp
37+25	

Panel Number	Slump	Shotcrete Temp
(102)	2 ½"	60 °F
	Air Content	**Applied Temp**
	5.3%	

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1) 1646	6

Nozzleman Name RICHIE RAMOS	Date 9/30/12 ~~10:30 / 11:36~~
Helper Name ERIC MONTAGUE	Start/End Time 10:30 / 11:36
Weather Conditions OVERCAST	Ambient Temperature 28°F
Equipment Used MAMCO LS-60, 185 COMPRESSOR	
Placment Location 38+00 ~~28+00~~	Mix Water Temp
Panel Number 103 2 CYLINDERS	Slump 2 1/2"
	Shotcrete Temp 56°
	Air Content 6%
	Applied Temp

SHAYNE. Norton
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9/30/12
Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2) 1648	7.5 ~~Ba~~

Nozzleman Name	Date
RICHIE RAMOS	9/30/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:42

Weather Conditions	Ambient Temperature
OVERCAST	27°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
~~29~~ 38+25	

Panel Number	Slump	Shotcrete Temp
(104)	1 1/2"	60°F
	Air Content	**Applied Temp**
2 CYLINDERS	5.3%	

SHAYNE
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3 1650	7.5

Nozzleman Name	Date
RICHIE RAMOS	9/30/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:39

Weather Conditions	Ambient Temperature
OVERCAST	30 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
38+75	

Panel Number	Slump	Shotcrete Temp
105	2"	57 °F
	Air Content	**Applied Temp**
2 CYLINDERS	6%	

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
① 1652	7.5

Nozzleman Name	Date
RICHIE RAMOS	10/1/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	2:00 / 3:00

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	35 °F

Equipment Used

MANCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
12+00	

Panel Number	Slump	Shotcrete Temp
106	2 1/2"	56 °F
	Air Content	**Applied Temp**
2 CYLINDERS	5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2) 1654	7.5

Nozzleman Name	Date
RICHARD RAMOS	10/1/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	3:30 / 4:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	35 °F

Equipment Used

MARCO 25-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
12 + 50	

Panel Number	Slump	Shotcrete Temp
(107)	2"	56 °F
	Air Content	**Applied Temp**
2 CYLINDERS	5.2%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
0 1656	7.5

Nozzleman Name RICHIE RAMOS	Date 10/3/12
Helper Name ERIC MONTAGUE	Start/End Time 10:40 / 12:00

Weather Conditions CLEAR	Ambient Temperature 38 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location B TOD	Mix Water Temp

Panel Number 108	Slump 2 1/4"	Shotcrete Temp 60 °F
1 CYLINDER 7DAY ONLY AS PER POBLO	Air Content 5.8%	Applied Temp

SHAYNE

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10/3/12

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2 1658	7.5

Nozzleman Name	Date
RICHIE RAMOS	10/3/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	12:32 / 1:40

Weather Conditions	Ambient Temperature
CLEAR	48 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
13+00	

Panel Number	Slump	Shotcrete Temp
109	1 1/4"	60 °F
	Air Content	**Applied Temp**
1 CYLINDER	4.8%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3 1659	6

Nozzleman Name: RICHIE RAMOS	Date: 10/3/12
Helper Name: ERIC MONTAGUE	Start/End Time: 2:20 / 3:30

Weather Conditions: SUNNY	Ambient Temperature: 50 °F

Equipment Used: MAYCO LS-40, 185 COMPRESSOR

Placment Location: 13 + 25	Mix Water Temp:

Panel Number: 110	Slump: NA	Shotcrete Temp:
	Air Content: NA	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1660	4.5

Nozzleman Name	Date
RICHIE RAMOS	10/3/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	4:00 / 5:00

Weather Conditions	Ambient Temperature
CLEAR	48°F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
13+50	

Panel Number	Slump	Shotcrete Temp
111	1 3/4"	60°F
1 CYLINDER	Air Content: 3.8%	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1) 1666	7.5

Nozzleman Name	Date
RICHIE RAMOS	10/5/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	9:30 / 10:30

Weather Conditions	Ambient Temperature
OVERCAST	47 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
39+50	

Panel Number	Slump	Shotcrete Temp
1/3	2 3/4"	56 °F
	Air Content	**Applied Temp**
2 CYLINDERS	5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
② 1668	7.5

Nozzleman Name	Date
RICHIE RAMOS	10/5/12
Helper Name	**Start/End Time**
ERIC MONTAGUE	11:00 / 12:20

Weather Conditions	Ambient Temperature
OVERCAST	47 °F

Equipment Used

MAYCO LS-60, 185 COMPRESSOR

Placment Location	Mix Water Temp
40 +00	

Panel Number	Slump	Shotcrete Temp
114	2"	56 °F
2 CYLINDERS	Air Content: 4.8 %	Applied Temp

Shane [signature]
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10/5/12
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(3) 1670 -	7.5

Nozzleman Name RICHIE RAMOS	Date 10/5/12
Helper Name ERIC MONTAGUE	Start/End Time 1:00 / 2:00

Weather Conditions OVER CAST	Ambient Temperature 47° F

Equipment Used

MAMCO LS-60 , 185 COMPRESSOR

Placment Location 40+50	Mix Water Temp

Panel Number 115	Slump 1 1/2"	Shotcrete Temp 56°F
2 CYLINDERS	Air Content 4.8	Applied Temp

SKAYNE
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10/5/12
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(4) 1672	7.5

Nozzleman Name: RICHIE RAMOS	Date: 10/5/12
Helper Name: ERIC MONTAGUE	Start/End Time: 2:30 / 3:30
Weather Conditions: OVER CAST	Ambient Temperature: 47°F
Equipment Used: MAMCO LS-60, 185 COMPRESSOR	
Placment Location: 40+75	Mix Water Temp:
Panel Number: 116	Slump: 2"
	Shotcrete Temp: 61°F
	Air Content: 4.8
	Applied Temp:

SHANE
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10/5/12
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(5) 1674	7.5

Nozzleman Name: RICHIE RAMOS	Date: 10/5/12
Helper Name: ERIC MONTAGUE	Start/End Time: ~~1~~ 4:30 / 5:45
Weather Conditions: OVERCAST / RAIN	Ambient Temperature: 48°F
Equipment Used: MAYCO LS-60, 185 COMPRESSOR	
Placment Location: 41+00	Mix Water Temp:
Panel Number: 117	Slump: 2"
	Shotcrete Temp: 64°F
	Air Content: 5.2%
	Applied Temp:

Report Compiled By: [signature] Date: 10/5/12

Sumitomo's Representative: _____ Date: _____

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	7.5 CY

Nozzleman Name: RICHIE .	Date: 10/7/2012
Helper Name: SHAYNE N.	Start/End Time: 12:30 1:35 PM

Weather Conditions	Ambient Temperature
OVERCAST HAZY	52°

Equipment Used: MAYCO LS-60
IR 185 AIRCOMPRESSOR

Placment Location	Mix Water Temp
41+50 to N DIVERSION 41+80	

Panel Number	Slump	Shotcrete Temp
118	1.5"	55°
2 CYLINDERS	Air Content: 4.2%	Applied Temp

TD
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10/7/12
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(2)	7.5

Nozzleman Name: R. RAMOS	Date: 10/7/2012
Helper Name: SHAYNE NORTON	Start/End Time: 2:30 3:35
Weather Conditions: HAZY / OVERCAST	Ambient Temperature: 47°
Equipment Used: LS-60 MAYCO PUMP 185 IR AIR COMPRESSOR	
Placment Location: 4+80 to N. DIVERSION	Mix Water Temp:
Panel Number: (119) 2 CYLINDERS	Slump: 1"
	Shotcrete Temp: 55°
	Air Content: 4.9%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(3)	7.5

Nozzleman Name: R. RAMOS	Date: 10/7/12
Helper Name: SHAYNE No	Start/End Time: 4:25 5:30
Weather Conditions: OVERCAST/HAZY/ DRIZZLE	Ambient Temperature: 43°
Equipment Used: MAYCO LS-60	
Placment Location: 42+25 N. DIVERSION	Mix Water Temp:
Panel Number: (120)	Slump: ~~50~~ 1"
	Shotcrete Temp: 55°
	Air Content: 5%
	Applied Temp:

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Actual date is 7/8/13. CAM

Batch Number	QTY
1	4.5 cy

Nozzleman Name: RICHIE	Date: 9/8/12
Helper Name: BEN	Start/End Time: 10:00AM

Weather Conditions: LT RAIN CLOUDY	Ambient Temperature

Equipment Used

Placment Location: SOUTH 18+00 to 18+25	Mix Water Temp

Panel Number: 2 CYLINDER 1 PANEL	Slump: 2.5"	Shotcrete Temp: 56°
	Air Content: 7.8°	Applied Temp: 57°

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9-8-2013
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
(2)	4

Nozzleman Name: RICHIE	Date: 7/11/2013
Helper Name: BEN	Start/End Time: 11:20 : 12:00
Weather Conditions: CLOUDY	Ambient Temperature: 57°
Equipment Used:	
Placment Location: 27+60 27+45	Mix Water Temp:
Panel Number: (2)	Slump: 1.5"
	Shotcrete Temp: 70°
	Air Content: 6.4 %
	Applied Temp:

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Report Compiled By

7/11/13
Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY
3	4

Nozzleman Name	Date
ED	7/11/2013
Helper Name	**Start/End Time**
RICHIE	12:35 - 1:15

Weather Conditions	Ambient Temperature
CLOUDY	56°

Equipment Used

Placment Location	Mix Water Temp
27+45 27+20	

Panel Number	Slump	Shotcrete Temp
2 CYLINDERS	3"	65°
	Air Content	**Applied Temp**
	6.4%	

2

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7/11/13
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Date

Shotcrete Installation Form

Batch Number	QTY
4	4

Nozzleman Name	Date
ED	7/11/13
Helper Name	**Start/End Time**
	1:50 - 2:20

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	63

Equipment Used

Placment Location	Mix Water Temp
27+20 to 26+90	

Panel Number	Slump	Shotcrete Temp
	2"	64°
	Air Content	**Applied Temp**
5	6.2%	

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Shotcrete Installation Form

Batch Number	QTY
5	4

Nozzleman Name: RICHIE	Date: 7/11/13
Helper Name: ED	Start/End Time: 3:00 3:41
Weather Conditions: CLOUDY	Ambient Temperature: 62°
Equipment Used:	
Placment Location: 26+90 26+75	Mix Water Temp:
Panel Number: 6	Slump: 3.5"
	Shotcrete Temp: 66°
	Air Content: 6%
	Applied Temp:

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Sumitomo's Representative _____ Date _____

Shotcrete Installation Form

Batch Number	QTY
(6)	~~4~~ 4

Nozzleman Name	Date
ED	7/11
Helper Name	**Start/End Time**
RICHIE	4:00pm 4:45

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	60°

Equipment Used

Placment Location	Mix Water Temp
26+75 26+45	

Panel Number	Slump	Shotcrete Temp
2 CYLINDERS	3"	64°
(7)	**Air Content**	**Applied Temp**
	5.4%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	~~6~~ 4

Nozzleman Name: RICHIE	Date: 7/11/2013
Helper Name: BEN	Start/End Time: 10:35 - 11:05
Weather Conditions: CLOUDY	Ambient Temperature: 59°
Equipment Used: MAYCO 183 CFM	
Placment Location: 27+75 27+60	Mix Water Temp:
Panel Number: 1 PANEL 2 CYLINDERS	Slump: 1.5"
	Shotcrete Temp: 64°
	Air Content: 5.5%
	Applied Temp:

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7/11/13
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WIDE DITCH

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	6

Nozzleman Name: RICHIE	Date: 7/12/13
Helper Name: ED	Start/End Time: 4:35 : 6:00
Weather Conditions: SUNNY PARTLY CLOUDY	Ambient Temperature: 76°
Equipment Used:	
Placment Location: S. DIVERSION 25+45 to 26+10	Mix Water Temp:
Panel Number: 207 2 CYLINDERS	Slump: 1 3/4"
	Shotcrete Temp: 70°
	Air Content: 8%
	Applied Temp:

TD
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7/12/13
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
1	6

Nozzleman Name: RICHIE	Date: 7/12/13
Helper Name: ED	Start/End Time: 9:30 - 10:15
Weather Conditions: CLEAR	Ambient Temperature: 73°
Equipment Used:	
Placment Location: S. DIVERSION 26+10 to 25+80	Mix Water Temp:
Panel Number: 208	Slump: 2 3/4
	Shotcrete Temp: 70°
2 CYLINDERS	Air Content: 6.4%
	Applied Temp:

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7/13/13
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Date

Shotcrete Installation Form

Batch Number	QTY
2	6

Nozzleman Name	Date
ED SLIKER	7/13/13
Helper Name	**Start/End Time**
RICHIE	10:55 - 11:45

Weather Conditions	Ambient Temperature
CLEAR / SUNNY	73°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 25+80 to 25+55	

Panel Number	Slump	Shotcrete Temp
209	2.5"	70°
	Air Content	**Applied Temp**
	6.2%	

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7/13/13
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
3	6

Nozzleman Name	Date
RICHIE	7/13/13
Helper Name	**Start/End Time**
ED	12:40 - 1:20

Weather Conditions	Ambient Temperature
SUNNY / CLEAR	72°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 25+55 to 25+30	

Panel Number	Slump	Shotcrete Temp
210	1 3/4"	74°
	Air Content	**Applied Temp**
2 CYLINDERS BATCH 2	7%	

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7/13/13
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Date

Shotcrete Installation Form

Batch Number	QTY
4	6

Nozzleman Name: RICHIE	Date: 7/13/13
Helper Name: ED	Start/End Time: 1:55 : 2:45
Weather Conditions: SUNNY/CLEAR	Ambient Temperature: 72°
Equipment Used:	
Placment Location: S DIVERSION 25+30 to 25+00	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
211	3.25"	74
	Air Content: 7.2%	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
5	64

Nozzleman Name: ED	Date: 7/13/13
Helper Name: RICHIE	Start/End Time: 3:20 4:10
Weather Conditions: SUNNY/CLEAR	Ambient Temperature: 76°
Equipment Used:	
Placment Location: S. DIVERSION 25+00 to 24+60	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
2/2	2 1/4"	76°
2 CYLINDERS	Air Content: 6.9%	Applied Temp:

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Sumitomo's Representative _____ Date _____

Shotcrete Installation Form

Batch Number	QTY
6	6 CY

Nozzleman Name	Date
ED Slikker the great!	7/13/13
Helper Name	**Start/End Time**
RICHIE	4:40 - 5:30

Weather Conditions	Ambient Temperature
SUNNY / CLEAR	78°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 24+60 to 24+35	

Panel Number	Slump	Shotcrete Temp
213	1 3/4	70°
	Air Content	**Applied Temp**
	7%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	4 CY

Nozzleman Name	Date
RICHIE	7/15/2013
Helper Name	**Start/End Time**
ED	8:30 - 9:25

Weather Conditions	Ambient Temperature
CLEAR / SUNNY	68°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIV ~ 24+35 to 24+05	

Panel Number	Slump	Shotcrete Temp
214	1 1/2"	74
	Air Content	**Applied Temp**
	7.2%	

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Date

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Shotcrete Installation Form

Batch Number	QTY
2	6

Nozzleman Name: ED	Date: 7/15/2013
Helper Name: RICHIE	Start/End Time: 9:35 - 10:20

Weather Conditions: CLEAR / SUNNY	Ambient Temperature: 69°

Equipment Used:

Placment Location: SOUTH DIVERSION 24+05 to 23+80	Mix Water Temp:

Panel Number: 2 CYLINDERS 215	Slump: 2"	Shotcrete Temp: 74°
	Air Content: 6.8%	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
3	7cy

Nozzleman Name	Date
RICHIE	7/15
Helper Name	**Start/End Time**
ED	10:25 - 11:25

Weather Conditions	Ambient Temperature
SUNNY / CLEAR	69°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 23+80 23+45	

Panel Number	Slump	Shotcrete Temp
216	2 1/4	74°
	Air Content	**Applied Temp**
	6.9%	

TD
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7/15/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	7cy

Nozzleman Name: ED	Date: 7/15/13
Helper Name: RICHIE	Start/End Time: 11:30 - 12:25
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 71°
Equipment Used:	
Placment Location: S. DIV. 23+45 to 23+25	Mix Water Temp:
Panel Number: 27 2 CYLINDERS	Slump: 1 3/4"
	Air Content: 7.2%
	Shotcrete Temp: 75°
	Applied Temp:

TD
Report Compiled By

7/15/13
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
E	7

Nozzleman Name	Date
RICHIE	7/15/2013
Helper Name	**Start/End Time**
ED	12:30 - 1:15

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	74°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 23+25 to 22+90	

Panel Number	Slump	Shotcrete Temp
218	2 1/4	76°
	Air Content	**Applied Temp**
	7%	

TD 7/15/2013
Report Compiled By

Date

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Date

Shotcrete Installation Form

Batch Number	QTY
10	7cy

Nozzleman Name	Date
ED	7/15/2013
Helper Name	**Start/End Time**
RICHIE	1:25 - 2:10

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	75°

Equipment Used

Placment Location	Mix Water Temp
S DIV 22+90 to 22+55	

Panel Number	Slump	Shotcrete Temp
219	1 3/4"	75°
	Air Content	**Applied Temp**
	7.6%	

TD
Report Compiled By

7/15
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
7	7cy

Nozzleman Name: RICHIE	Date: 7/15/2013
Helper Name: ED the great!.	Start/End Time: 2:15 - 3:10

Weather Conditions: PARTLY CLOUDY	Ambient Temperature
Equipment Used	

Placment Location: SDIVERSION 22+55 to 22+25		Mix Water Temp
Panel Number: 220	Slump: 2"	Shotcrete Temp
	Air Content: 7.8	Applied Temp

TD
Report Compiled By

7/15
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
8	7c4

Nozzleman Name	Date
ED	7/15/2013
Helper Name	**Start/End Time**
RICHIE	3:10 - 4:00

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	79°

Equipment Used

Placment Location	Mix Water Temp
S. DIV 22+25 21+80	

Panel Number	Slump	Shotcrete Temp
221	2"	75°
	Air Content	**Applied Temp**
	4.8	

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7/15
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
9	8 CY

Nozzleman Name	Date
RICHIE	7/15/2013
Helper Name	**Start/End Time**
ED	4:30 - 5:15

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	72°

Equipment Used

Placment Location	Mix Water Temp
S. DIV 21+80 21+45	

Panel Number	Slump	Shotcrete Temp
222	2¼	78°
	Air Content	**Applied Temp**
	4.6%	

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

24+35
21+45
290

Shotcrete Installation Form

Batch Number	QTY
8	2 CY

Nozzleman Name	Date
RICHIE	7/16/13
Helper Name	**Start/End Time**
ED	5:00

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	77°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 18+00 to 17+85	

Panel Number	Slump	Shotcrete Temp
230	2"	75°
	Air Content	**Applied Temp**
	6.7%	

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

2145
1825
320
+
15
335 FT

58 YDS

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
7	8

Nozzleman Name: ED	Date: 7/16/2013
Helper Name: RICHIE	Start/End Time: 4:00 4:45
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 77°
Equipment Used:	
Placment Location: SOUTH DIVERSION 18+80 to 18+25	Mix Water Temp:
Panel Number: 229 2 CYLINDERS	Slump: 2 1/4"
	Shotcrete Temp: 75
	Air Content: 6.4%
	Applied Temp:

TD
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Date

Sumitomo's Representative

Date

Shotcrete Installation Form

Batch Number	QTY.
6	8CY

Nozzleman Name	Date
RICHIE	7/16/13
Helper Name	**Start/End Time**
ED	3:00 - 3:50

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	73°

Equipment Used

Placment Location	Mix Water Temp
S DIVERSION 19+25 to 18+80	

Panel Number	Slump	Shotcrete Temp
228	2.5"	74°
	Air Content	**Applied Temp**
	6.7%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8CY

Nozzleman Name: JAMES/ED	Date: 7/16/2013
Helper Name: RICHIE	Start/End Time: 1:55 2:50
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 73°
Equipment Used:	
Placment Location: SOUTH DIVERSION 19+70 to 19+25	Mix Water Temp:
Panel Number: 227	Slump: 2 3/4"
	Shotcrete Temp: 75°
	Air Content: 6.5%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8 Cy

Nozzleman Name	Date
RICHIE	7/16/2013
Helper Name	**Start/End Time**
ED	12:32

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	79

Equipment Used

~~20+15~~

Placment Location	Mix Water Temp
SOUTH DIVERSION 20+15 to 19+70	

Panel Number	Slump	Shotcrete Temp
226	2"	74
	Air Content	**Applied Temp**
	7.6%	

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Shotcrete Installation Form

Batch Number	QTY
3	8 CY

Nozzleman Name: ED	Date: 7/16/2013
Helper Name: RICHIE	Start/End Time: 11:20 - 12:15
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 69°
Equipment Used:	
Placment Location: S. DIVERSION 20+60 to 20+15	Mix Water Temp:
Panel Number: 225	Slump: 2"
	Shotcrete Temp: 74°
	Air Content: 7.7%
	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
(2)	8 CY

Nozzleman Name	Date
RICHIE	7/16/13
Helper Name	**Start/End Time**
ED	10:15 - 11:05

Weather Conditions	Ambient Temperature
CLOUDY	68°

Equipment Used

Placment Location	Mix Water Temp
S. DIVERSION 21+05 to 20+60	

Panel Number	Slump	Shotcrete Temp
224	2 1/4	74°
	Air Content	**Applied Temp**
	7.1%	

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Shotcrete Installation Form

Batch Number	QTY
1	8

Nozzleman Name: ~~[illegible]~~ FD	Date: 7/16/2013
Helper Name: ~~[illegible]~~ RICHIE	Start/End Time: 9:30 - 10:10
Weather Conditions: CLOUDY	Ambient Temperature: 64°
Equipment Used:	
Placment Location: S. DIVERSION 21+45 to 21+05	Mix Water Temp:
Panel Number: 223 2 CYLINDERS	Slump: 1.5"
	Shotcrete Temp: 74°
	Air Content: 7.2 %
	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
1	8CY

Nozzleman Name	Date
ED	7/17/2013
Helper Name	**Start/End Time**
RICHIE	9:00AM - 9:45

Weather Conditions	Ambient Temperature
CLOUDY/DRIZZLE	54°

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 42+75 to 43+15	

Panel Number	Slump	Shotcrete Temp
231	2"	64
	Air Content	**Applied Temp**
	6.7%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8CY

Nozzleman Name	Date
RICHIE	7/17/13

Helper Name	Start/End Time
ED the great!	10:00 10:45

Weather Conditions	Ambient Temperature
CLOUDY / DRIZZLE	54°

Equipment Used

~~CLOUDY / DRIZZLE~~

Placment Location	Mix Water Temp
N. DIVERSION 43+15 43+55	

Panel Number	Slump	Shotcrete Temp
232	2'/4"	66°
2 CYLINDERS	Air Content: 6.2%	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: ED	Date: 7/17/2013
Helper Name: RICHIE	Start/End Time: 10:50 11:45
Weather Conditions: DRIZZLE / CLOUDY	Ambient Temperature: 56°
Equipment Used:	
Placment Location: N DIVERSION 43+55 to 44+10	Mix Water Temp:
Panel Number: 233	Slump: 2 3/4
	Shotcrete Temp: 65°
	Air Content: 6.6%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8CY

Nozzleman Name	Date
RICHIE L	7/17/13
Helper Name	**Start/End Time**
ED	11:50 12:35

Weather Conditions	Ambient Temperature
CLOUDY DRIZZLE	60°

Equipment Used

Placment Location	Mix Water Temp
N. DIVERSION 44+10 to 44+60	

Panel Number	Slump	Shotcrete Temp
234	1 3/4"	68°
2 CYLINDERS	**Air Content**	**Applied Temp**
	7.2	

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Shotcrete Installation Form

Batch Number	QTY
5	8 CY

Nozzleman Name: ED	Date: 7/17
Helper Name: RICHIE	Start/End Time: 1:20 - 2:20
Weather Conditions: CLOUDY/DRIZZLE	Ambient Temperature: 66°
Equipment Used:	
Placment Location: N. DIVERSION 44+60 45+10	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
235	1 1/4"	70°
	Air Content: 7.0%	Applied Temp:

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Shotcrete Installation Form

Batch Number	QTY
6	4 ~~8~~ CY

Nozzleman Name	Date
RICHIE	7/17/2013
Helper Name	**Start/End Time**
ED	2:45 - 3:10

Weather Conditions	Ambient Temperature
CLOUDY	65°

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 45+10 45+30	

Panel Number	Slump	Shotcrete Temp
236	2.5"	70°
	Air Content	**Applied Temp**
	6.5%	

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Shotcrete Installation Form

Batch Number	QTY
7	4 ~~8~~ cy

Nozzleman Name: ED the great!	Date: 7/17/2013
Helper Name: RICHIE	Start/End Time: 3:30 - 4:05

Weather Conditions	Ambient Temperature
CLOUDY	67°

Equipment Used:

Placment Location	Mix Water Temp
45+30 45+50	

Panel Number	Slump	Shotcrete Temp
237	2 3/4	
2 CYLINDERS	Air Content: 6%	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
8	8CY

Nozzleman Name	Date
RICHIE	7/17/13
Helper Name	**Start/End Time**
ED the great!	4:30 - 5:15

Weather Conditions	Ambient Temperature
CLOUDY	67

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 45+50 45+95	

Panel Number	Slump	Shotcrete Temp
238	2 1/4	70°
	Air Content	**Applied Temp**
	6.3%	

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335
320
~~290~~
945
3 DAYS

4595
4275
320 FT

54 CY

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name	Date
ED the great!	7/18/13
Helper Name	**Start/End Time**
RICHIE	9:25 - 10:15

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	61°

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 45+95 to 46+45	

Panel Number	Slump	Shotcrete Temp
239	1 7/8"	69°
	Air Content	**Applied Temp**
	6.2%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8CY

Nozzleman Name: RICHIE	Date: 7/18/13
Helper Name: ED the Great!	Start/End Time: 10:40 11:30
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 63°
Equipment Used:	
Placment Location: No DIVERSION 46+45 to 46+85	Mix Water Temp:
Panel Number: 240 2 CYLINERS BATCH #1	Slump: 1 3/4"
	Shotcrete Temp: 73°
	Air Content: 7.3%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: ED	Date: 7/18/13
Helper Name: RICHIE	Start/End Time: 11:50 : 12:40

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	65°

Equipment Used:

Placment Location	Mix Water Temp
46+85 to 47+20	

Panel Number	Slump	Shotcrete Temp
2A1	2"	74°
	Air Content: 6.4%	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8Cy

Nozzleman Name: RICHIE	Date: 7/18/2013
Helper Name: ED the Great!	Start/End Time: 1:05 PM 1:50
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 72°
Equipment Used:	
Placment Location: N. DIVERSION 47+20 to 47+55	Mix Water Temp:
Panel Number: 242 2 CYLINDERS BATCH #2	Slump: 1 1/4"
	Shotcrete Temp: 72°
	Air Content: 7.4%
	Applied Temp:

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47+55
45+95
160

Shotcrete Installation Form

Batch Number	QTY
5	8 Cy

Nozzleman Name: ED the great!	Date: 7/18/2013
Helper Name: RICHIE	Start/End Time: 2:55

Weather Conditions: MOSTLY CLOUDY	Ambient Temperature

Equipment Used

Placment Location: NORTH DIVERSION 49+05 to 49+45	Mix Water Temp

Panel Number: 243	Slump: 1 3/4	Shotcrete Temp: 76
	Air Content: 5.9%	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6	8CY

Nozzleman Name: RICHIE	Date: 7/18/13
Helper Name: FREDDY	Start/End Time: 4:10 - 5:00
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature: 75°
Equipment Used:	
Placment Location: N DIVERSION 49+45 to 49+80	Mix Water Temp:
Panel Number: 244	Slump: 1 3/4"
	Shotcrete Temp: 79
	Air Content: 6.5%
	Applied Temp:

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49+80
49+05
75
160
235

Shotcrete Installation Form

Batch Number	QTY
1	8

Nozzleman Name: Richie Ramos	Date: 7/19/13
Helper Name: ED SLIKER	Start/End Time: 9:00 am / 9:41 am
Weather Conditions: Mostly Cloudy with Drizzle	Ambient Temperature: 62° F
Equipment Used: Mayco LS60 pump	
Placment Location: 49+85 — 50+25	Mix Water Temp:
Panel Number: 2 cylinders BATCH 1 245	Slump: 1 1/4"
	Shotcrete Temp: 71.6° F
	Air Content: 6.75
	Applied Temp:

Alfredo Villalobos

Alfredo Villalobos

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name: ED	Date: 7/22/13
Helper Name: RICHIE	Start/End Time: 9:30-10:25
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 56°F
Equipment Used: MAYCO PUMP	
Placment Location: N DIVERSION 50+25 50+60	Mix Water Temp:
Panel Number: 246 2 CYLINDERS BATCH #1	Slump: 1.25"
	Shotcrete Temp: 71.4°F
	Air Content: 6.4%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 cy

Nozzleman Name	Date
RICHIE RAMOS	7/22/13
Helper Name	**Start/End Time**
ED SLIKER	10:30 - 11:15

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 50+60 50+95	

Panel Number	Slump	Shotcrete Temp
247	2 3/4	72°
	Air Content	**Applied Temp**
	6.7%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number: 3	QTY: 8CY
Nozzleman Name: ED	Date: 7/22/13
Helper Name: RICHIE	Start/End Time: 11:25 12:20
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 68°
Equipment Used:	
Placment Location: NORTH DIVERSION 50+95 51+45	Mix Water Temp:
Panel Number: 248 2 CYLINDERS BATCH 2	Slump: 1 1/2"
	Shotcrete Temp: 71°
	Air Content: 6.5%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8 CY

Nozzleman Name	Date
RICHIE	7/22/13
Helper Name	**Start/End Time**
ED	12:25

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	68°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 51+45	

Panel Number	Slump	Shotcrete Temp
REJECTED ~~249~~ LOAD TOO WET		
	Air Content	**Applied Temp**

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8CY

Nozzleman Name	Date
RICHIE	7/22/13

Helper Name	Start/End Time
	1:40 2:35

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	70°

Equipment Used

Placment Location	Mix Water Temp
N. DIV. 51+45 to 52+85	

Panel Number	Slump	Shotcrete Temp
249	2"	73°
2 CYLINDERS ~~[illegible]~~ BATCH 3	Air Content: 6.1%	Applied Temp

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Shotcrete Installation Form

Batch Number	QTY
1	8CY

Nozzleman Name	Date
RICHIE	7/23/13
Helper Name	**Start/End Time**
ED the great!	9:10 : 10:10

Weather Conditions	Ambient Temperature
CLOUDY	59°

Equipment Used

MAYCO PUMP 185 COMPRESSOR

Placment Location	Mix Water Temp
N DIVERSION 51+85 to 52+20	

Panel Number	Slump	Shotcrete Temp
250	1 3/4"	68°
	Air Content	**Applied Temp**
	6.5%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 CY

Nozzleman Name	Date
RICHIE	7/23/13

Helper Name	Start/End Time
ED	10:25 - 11:30

Weather Conditions	Ambient Temperature
CLOUDY	60°

Equipment Used

MAYCO PUMP, 185 COMPRESSOR

Placment Location	Mix Water Temp
NORTH DIVERSION 52+20 52+65	

Panel Number	Slump	Shotcrete Temp
251	1 1/2"	71°
2 BATCH #1 CYLINDERS	Air Content: 5.6%	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: ED	Date: 7/23/13
Helper Name: RICHIE	Start/End Time: 11:55 - 12:45
Weather Conditions: CLOUDY	Ambient Temperature: 63°
Equipment Used:	
Placment Location: N. DIVERSION 52+65 to 52+85	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
252	1.5"	72°
	Air Content: 7%	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8cy

Nozzleman Name	Date
ED	7/23/13
Helper Name	**Start/End Time**
RICHIE	1:00 PM - 2:30

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	70°

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 52+85 to 53+55	

Panel Number	Slump	Shotcrete Temp
253	2 1/2"	73°
	Air Content	**Applied Temp**
	6.7%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8CY

Nozzleman Name: RICHIE	Date: 7/23/2013
Helper Name: ED the great!	Start/End Time: 3:00PM - 4:15
Weather Conditions: MOSTLY CLOUDY	Ambient Temperature:
Equipment Used:	
Placment Location: N DIVESION 53+55 53+90	Mix Water Temp:
Panel Number: 254 2 CYLINDERS BATCH #3	Slump: 1 1/4"
	Air Content: 6.5%
	Shotcrete Temp: 72°
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name: RICHIE	Date: 7/24/13
Helper Name: ED	Start/End Time: 9:20 - 10:10
Weather Conditions: CLOUDY	Ambient Temperature: 62°
Equipment Used:	
Placment Location: N DIVERSION 36+40 to 36+00	Mix Water Temp:
Panel Number: 255	Slump: 3.5"
	Shotcrete Temp: 72°
	Air Content: ~~6~~ 5.9%
	Applied Temp:

TD
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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 CY

Nozzleman Name	Date
ED	7/24/13
Helper Name	**Start/End Time**
RICHIE	11:10 : 12:40

Weather Conditions	Ambient Temperature
CLODY	63°

Equipment Used

Placment Location	Mix Water Temp
N DIVERSION 36+00 to 35+80 → 35+50 to ~~34+25~~ 35+25	

Panel Number	Slump	Shotcrete Temp
256	1 3/4"	72°
	Air Content	**Applied Temp**
	6.1%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: RICHIE	Date: 7/24/13
Helper Name: ED	Start/End Time: 2:25 - 3:15

Weather Conditions: CLOUDY	Ambient Temperature: 66°

Equipment Used:

Placment Location: N DIVERSION 35+25 to 34+75	Mix Water Temp:

Panel Number: 257 BATCH #1	Slump: 1 1/4"	Shotcrete Temp: 79°
	Air Content: 6.0%	Applied Temp:

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Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8CY +1

Nozzleman Name: RICHIE	Date: 7/24/13
Helper Name: ED	Start/End Time: 5:35 :

Weather Conditions	Ambient Temperature
CLOUDY	65°

Equipment Used:

Placment Location	Mix Water Temp
NORTH DIVERSION 47+60 + 48+	

Panel Number	Slump	Shotcrete Temp
258	1 1/4"	75°
BATCH #2	Air Content: 6.2%	Applied Temp

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7/24
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name	Date
RICHIE	7/31/13
Helper Name	**Start/End Time**
ED	8:30 to 9:55

Weather Conditions	Ambient Temperature
CLEAR/SUNNY	57°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 53+90 to 54+30	

Panel Number	Slump	Shotcrete Temp
260	1.5"	66°
2 CYLINDERS BATCH #1	**Air Content**	**Applied Temp**
	6.8%	

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Date

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Date

Shotcrete Installation Form

Batch Number	QTY
2	8CY

Nozzleman Name: ED	Date: 7/31/13
Helper Name: RICHIE	Start/End Time: 10:25 to 12:00

Weather Conditions	Ambient Temperature
CLEAR	65°

Equipment Used:

Placment Location	Mix Water Temp
N. DIVERSION 54+30 54+70	

Panel Number	Slump	Shotcrete Temp
261	2"	77°
	Air Content: 8.1	Applied Temp

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8C4

Nozzleman Name: ED	Date: 7/31/13
Helper Name: RICHIE	Start/End Time: 12:40 - 1:37

Weather Conditions: CLEAR	Ambient Temperature

Equipment Used

Placment Location: N DIVERSION 54+70 55+20	Mix Water Temp

Panel Number: 262 2 CYLINDERS BATCH #2	Slump: 1 1/4"	Shotcrete Temp: 77°
	Air Content: 7.2%	Applied Temp

TD
Report Compiled By

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Date

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Date

Shotcrete Installation Form

Batch Number	QTY
4	8CY

Nozzleman Name: RICHIE	Date: 7/31
Helper Name: ED	Start/End Time: 1:45 - 2:45
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 72°
Equipment Used:	
Placment Location: NORTH DIVERSION 55+20 to 55+45	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
263	1 3/4"	76°
	Air Content: 7.4%	Applied Temp:

TD
Report Compiled By

7/31
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
5	8CY

Nozzleman Name	Date
ED	7/31/13
Helper Name	**Start/End Time**
RICHIE	3:00PM 3:50

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	76°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 55+45 to 55+90	

Panel Number	Slump	Shotcrete Temp
264	1.5"	79°
2 CYLINERS BATCH #3	**Air Content** 7.5%	**Applied Temp**

TD
Report Compiled By

7/31
Date

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Date

Shotcrete Installation Form

Batch Number	QTY
6	8CY

Nozzleman Name: RICHIE	Date: 7/31/13
Helper Name: ED	Start/End Time: 4:00 - 5:00
Weather Conditions: PARTLY CLOUDY	Ambient Temperature: 78°
Equipment Used:	
Placment Location: NORTH DIVERSION 55+90 56+35	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
265	1 3/4"	78°
	Air Content: 7.7%	Applied Temp:

TD
Report Compiled By

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Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8 CY

Nozzleman Name: Ed Sliker	Date: 8/1/13
Helper Name: Richie Ramos	Start/End Time: 9:30 - 10:30

Weather Conditions	Ambient Temperature
CLEAR	64°

Equipment Used:

Placment Location	Mix Water Temp
NORTH DIVERSION 56+35 to 56+85	

Panel Number	Slump	Shotcrete Temp
266 BATCH #1 2 CYLINDERS	1e5"	76
	Air Content	**Applied Temp**
	5.6%	

TD
Report Compiled By

8/1/13
Date

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Date

55

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8CY

Nozzleman Name: RICHIE RAMOS	Date: 8/1/13
Helper Name: ED SLIKER	Start/End Time: 10:45 - 11:30
Weather Conditions: CLEAR	Ambient Temperature: 66°
Equipment Used:	
Placment Location: NORTH DIVERSION 56+85 to 57+35	Mix Water Temp:
Panel Number: 267	Slump: 1 3/4"
	Shotcrete Temp: 75
	Air Content: 5.5%
	Applied Temp:

TD
Report Compiled By

8/1/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8CY

Nozzleman Name	Date
RICHIE	8/1/2013
Helper Name	**Start/End Time**
ED	2:30 3:20

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	73°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION ~48+05 to 48+50	

Panel Number	Slump	Shotcrete Temp
269	1 3/4	83°
	Air Content	**Applied Temp**
	7.5%	

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8/1/13
Date

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Date

1800
450
1450

alaska aggregate PRODUCTS

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: ED	Date: 8/1/2013
Helper Name: RICHIE	Start/End Time: 12:30 - 1:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	80°

Equipment Used:

Placment Location	Mix Water Temp
NORTH DIVERSION 57+35 to 57+80	

Panel Number	Slump	Shotcrete Temp
268	1 3/4	78°
2 CYLINDERS BATCH #2	Air Content: 5.7%	Applied Temp

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8/1/2013
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number: 1	QTY: 8 CY
Nozzleman Name: RICHIE	Date: 8/2/13
Helper Name: ED	Start/End Time: 10:30 - 12:15
Weather Conditions: CLEAR / TO PARTLY CLOUDY	Ambient Temperature: 64°
Equipment Used:	
Placment Location: INLET #2	Mix Water Temp:
Panel Number: 270	Slump: 2 1/8"
	Shotcrete Temp: 80.6°
	Air Content: 6.5
	Applied Temp:

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8/2/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	6 ~~8~~ CY

Nozzleman Name: RICHIE	Date: 8/5/13
Helper Name: ED	Start/End Time: 12:25 - 1:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	67°

Equipment Used

~~PARTLY CLOUDY~~

Placment Location	Mix Water Temp
INLET #2	

Panel Number	Slump	Shotcrete Temp
271	2"	79°
2 CYLINDERS BATCH #1	Air Content: 6.5	Applied Temp

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8/5/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8cy

Nozzleman Name	Date
ED	8/5/13
Helper Name	**Start/End Time**
RICHIE	2:45 - 3:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	74°

Equipment Used

Placment Location	Mix Water Temp
INLET #2 / 48+50 to 48+75	

Panel Number	Slump	Shotcrete Temp
272	1 3/4"	78°
	Air Content	**Applied Temp**
	6.3%	

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8/5/13
Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	6CY

1/2 YARD LEFT

Nozzleman Name	Date
RICHIE	8/5/13
Helper Name	**Start/End Time**
ED	5:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	76°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 48+75 to 49+00	

Panel Number	Slump	Shotcrete Temp
273	2"	79°
2 CYLINDERS BATCH #2	**Air Content**	**Applied Temp**
	7.2	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name	Date
RICHIE	8/6/13

Helper Name	Start/End Time
ED	11:25 12:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	72°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 5+25 to 5+65	

Panel Number	Slump	Shotcrete Temp
274	2"	79°
	Air Content	Applied Temp
	6.7%	

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Report Compiled By

8/6/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 CY

Nozzleman Name	Date
RICHIE	8/6/13
Helper Name	**Start/End Time**
ED	12:50 1:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	74°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 5+65 to 6+05	

Panel Number	Slump	Shotcrete Temp
275	2"	77°
2 CYLINDERS BATCH #1	**Air Content**	**Applied Temp**
	7.8%	

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8 C4

Nozzleman Name	Date
ED	8/6/13
Helper Name	**Start/End Time**
RICHIE	2:10 2:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY BREEZY	74°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 6+05 6+45	

Panel Number	Slump	Shotcrete Temp
276	2 1/4	79°
	Air Content	**Applied Temp**
	7.3%	

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Report Compiled By

8/6/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number: 4	QTY: 8 cy
Nozzleman Name: RICHIE	Date: 8/6/13
Helper Name: ED	Start/End Time: 3:20 - 4:15
Weather Conditions: PARTLY CLOUDY BREEZY	Ambient Temperature: 75°
Equipment Used:	
Placment Location: SOUTH DIVESION 6+45 6+90	Mix Water Temp:
Panel Number: 277 BATCH #2 2 CYLINDERS	Slump: 2.25
	Shotcrete Temp: 77°
	Air Content: 7.7%
	Applied Temp:

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8CY

Nozzleman Name	Date
ED	8/6/13
Helper Name	**Start/End Time**
RICHIE	4:30 - 5:35

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	73°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 6+90 to 7+40	

Panel Number	Slump	Shotcrete Temp
~~265~~ 278	1 1/2	81
2 CYLINDERS BATCH 3	**Air Content**	**Applied Temp**
	7.3%	

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8/6/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8Cy

Nozzleman Name: RICHIE	Date: 8/7/13
Helper Name: ED	Start/End Time: 9:30 - 10:45

Weather Conditions	Ambient Temperature
CLEAR	74°

Equipment Used:

Placment Location	Mix Water Temp
SOUTH DIVERSION 7+40 to 7+90	

Panel Number	Slump	Shotcrete Temp
279	1 3/4"	76
2 CYLINERS BATCH #1	Air Content: 5.7	Applied Temp

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8/7/13
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8CY

Nozzleman Name	Date
ED	8/7/13
Helper Name	**Start/End Time**
RICHIE	10:30 - 11:20

Weather Conditions	Ambient Temperature
PARTLY CLOUDY / BREEZY	74°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 7+90 to 8+30	

Panel Number	Slump	Shotcrete Temp
280	2"	77
	Air Content	**Applied Temp**
	5.9	

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8/7/13
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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name	Date
RICHIE	8/7/13
Helper Name	**Start/End Time**
ED	11:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY BREEZY	

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 8+30	

Panel Number	Slump	Shotcrete Temp
PUMP ISSUES		
	Air Content	**Applied Temp**

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Report Compiled By

8/7/13
Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1 (Inlet 3)	8 yds

Nozzleman Name	Date
Richie Ramos	8/9/13
Helper Name	**Start/End Time**
Ed Sliker	9:45am - 10:45am

Weather Conditions	Ambient Temperature
67°F	Partly Cloudy

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
Inlet 3 N. ditch 57+80 to 58+05	

Panel Number	Slump	Shotcrete Temp
281	1 1/2"	64.8°F
	Air Content	**Applied Temp**
	5.75	64.8°F

Alfredo Villalobos

Report Compiled By

8/9/13

Date

Sumitomo's Representative

Date

Samples Collected

BATCH #1

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	4 yds

Nozzleman Name	Date
Richie Ramos	8/9/13
Helper Name	**Start/End Time**
Ed Sliker	11:25am - 12:10 pm

Weather Conditions	Ambient Temperature
Cloudy	64°F

Equipment Used

~~60°F~~ SHWING PUMP

Placment Location	Mix Water Temp
27+75 to 27+90 ~~E~~ South Diversion Ditch	

Panel Number	Slump	Shotcrete Temp
282	1-1/2"	73.4°F
	Air Content	**Applied Temp**
	5.75	73.4°F

A. Villalobos

Report Compiled By

8/9/13

Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8 yds

Nozzleman Name	Date
Ed Sliker	8/9/13
Helper Name	**Start/End Time**
Richie Ramos	12:45 pm 1:30 pm

Weather Conditions	Ambient Temperature
Cloudy	68°F

Equipment Used

SHWING Pump

Placment Location	Mix Water Temp
27+90 to 28+40 S. Diversion Ditch	

Panel Number	Slump	Shotcrete Temp
283	1-1/2"	71.4
	Air Content	**Applied Temp**
	5.80	71.4

Alfredo U. Llacobos

Report Compiled By

8/9/13

Date

Sumitomo's Representative

Date

Cylinders Collected
BATCH # 2

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8 yds

Nozzleman Name	Date
Richie Ramos	8/9/13
Helper Name	**Start/End Time**
Ed Slike	1:45p - 2:40p

Weather Conditions	Ambient Temperature
Cloudy	68°F

Equipment Used

Shwing

Placment Location	Mix Water Temp
28+40 to 28+90 South Diversion Ditch	

Panel Number	Slump	Shotcrete Temp
284	1-3/4"	72.3°F
	Air Content	**Applied Temp**
	5.75	

A. Villa Cosos

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8/9/13

Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8yds

Nozzleman Name	Date
ED Sliker	8/9/13
Helper Name	**Start/End Time**
Richie Ramos	2:50p - 3:50p

Weather Conditions	Ambient Temperature
Cloudy	68 °F

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
28+90 to 29+40 South Diversion Ditch	

Panel Number	Slump	Shotcrete Temp
285	1-3/4"	70.4°F
	Air Content	**Applied Temp**
	5.25%	70.4°F

Alfredo Villalobos

Report Compiled By

8/9/13

Date

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Date

BATCH #3
Cylinders

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8 yds

Nozzleman Name	Date
Richie Ramos	8/10/13
Helper Name	**Start/End Time**
Ed Slicer	9:40 am ~~to~~ 10:37 am

Weather Conditions	Ambient Temperature
Cloudy	58 °F

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
8+30 to 8+75 S. Diversion Ditch	

Panel Number	Slump	Shotcrete Temp
286	1-1/4"	66 °F
	Air Content	**Applied Temp**
	5.25%	66 °F

Ra Villa 65.05

Report Compiled By

8/10/13

Date

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Date

BATCH # 1
Cylinders Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 yds

Nozzleman Name	Date
Ed Sikes	

Helper Name	Start/End Time
Richie Ramos	10:55am - 11:45

Weather Conditions	Ambient Temperature
Cloudy	65 °F

Equipment Used

SHWING Pump

Placment Location	Mix Water Temp
8+75 - 9+25	

Panel Number	Slump	Shotcrete Temp
287	1-¼"	76.4°F
	Air Content	**Applied Temp**
	5.25%	76.4°F

Alfredo Villarroos

Report Compiled By

Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8 yds

Nozzleman Name	Date
Richie Ramos	8/10/13
Helper Name	**Start/End Time**
Ed Sliker	12:05 - 12:50

Weather Conditions	Ambient Temperature
Cloudy	65°F

Equipment Used

SHWING Pump

Placment Location	Mix Water Temp
9+25 to 9+75	

Panel Number	Slump	Shotcrete Temp
288	2"	73.4
	Air Content	**Applied Temp**
	5.5%	73.4

A Villalobos

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8/10/13

Date

Sumitomo's Representative

Date

BATCH #2

Samples Collected

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
34	8 yds

Nozzleman Name: Ed Slikker	Date: 8/10/13
Helper Name: James Ashton	Start/End Time: 1:15 - 2:05
Weather Conditions: Cloudy	Ambient Temperature: 65°F
Equipment Used: SHWING PUMP	
Placment Location: S. Diversion Ditch 9+75 to 10+25	Mix Water Temp:
Panel Number: 289	Slump: 1-3/4"
	Shotcrete Temp: 72.6
	Air Content: 5.25
	Applied Temp: 72.6

AKM66605

Report Compiled By

8/10/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8 yds

Nozzleman Name	Date
Richie Ramos	8/10/13
Helper Name	**Start/End Time**
Ben Farnham	2:35p - 3:30

Weather Conditions	Ambient Temperature
Cloudy	69°F

Equipment Used

MAYCO LS-60 Pump

Placment Location	Mix Water Temp
10+25 - 10+70	

Panel Number	Slump	Shotcrete Temp
290	1-1/4"	75.5°F
	Air Content	**Applied Temp**
	5.1%	75.5°F

AN 116605

Report Compiled By

Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6	8 yds

Nozzleman Name: Ed Sliker	Date: 8/10/13
Helper Name: James Ashton	Start/End Time: 3:50 to 4:45
Weather Conditions: Cloudy	Ambient Temperature: 68°F
Equipment Used: Mayco LS-66	
Placment Location: S. Diversion Ditch 10+70 to 11+15	Mix Water Temp:
Panel Number: 291	Slump: 1½"
	Shotcrete Temp: 75.8°F
	Air Content: 5.0%
	Applied Temp: 75.8°F

Alfredo Villalobos

Report Compiled By

8/10/13

Date

Sumitomo's Representative

Date

BATCH #3

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8yds

Nozzleman Name	Date
Richie Ramos	8/11/13
Helper Name	**Start/End Time**
Ben Farnham	9:00am - 9:45

Weather Conditions	Ambient Temperature
Cloudy	62°F

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
S. Diversion Ditch 11+15 to 11+55	

Panel Number	Slump	Shotcrete Temp
292	1-1/4"	71.4
	Air Content	**Applied Temp**
	5.0%	71.4

Alfredo Villalobos

Alfredo Villalobos

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Date

BATCH # 1

SAMPLES COLLECTED

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8yds

Nozzleman Name	Date
Edward Sliker	8/11/13
Helper Name	**Start/End Time**
James Ashton	10:00 am – 10:42 am

Weather Conditions	Ambient Temperature
Partly ~~Cloudy~~ Cloudy	68°F

Equipment Used

SHWING Pump

Placment Location	Mix Water Temp
S. Diversion Ditch 11+55 to 12+00	

Panel Number	Slump	Shotcrete Temp
293	1-½"	73.2°F
	Air Content	**Applied Temp**
	5.1%	73.2°F

Alfredo Villalobos

Report Compiled By

8/11/13

Date

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Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8yds

Nozzleman Name	Date
Richie Ramos	8/11/13
Helper Name	**Start/End Time**
Ben Farnham	11:15 am to 11:48 am

Weather Conditions	Ambient Temperature
Partly Cloudy	68°F

Equipment Used

STWING Pump

Placment Location	Mix Water Temp
S. Ditch 12+00 to 12+45	

Panel Number	Slump	Shotcrete Temp
294	1-1/2"	71.6°F
	Air Content	**Applied Temp**
	5.2%	71.6°F

A. Villegas

Report Compiled By

8/11/13

Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8yds

Nozzleman Name	Date
Edward Sliker	8/11/13
Helper Name	**Start/End Time**
James Ashton	12:00pm to 12:45pm

Weather Conditions	Ambient Temperature
Sunny	71°F

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
S. Diversion Ditch 12+45 to 12+95	

Panel Number	Slump	Shotcrete Temp
295	1-1/2"	71.3°F
	Air Content	**Applied Temp**
	5.2%	71.3°F

Alfredo Villalobos

Report Compiled By

8/11/13

Date

Sumitomo's Representative

Date

BATCH #2

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	8 yds

Nozzleman Name: Rvhie Ramos	Date: 8/11/13
Helper Name: Ben Farnham	Start/End Time: 1:10 pm – 1:40
Weather Conditions: Sunny	Ambient Temperature: 71°F
Equipment Used: SHWING Pump	
Placment Location: S. Ditch 12+95 to 13+40	Mix Water Temp:
Panel Number: 296	Slump: 1-½"
	Shotcrete Temp: 71.7°F
	Air Content: 5.0%
	Applied Temp: 71.7°F

Alfredo Villegas

Report Compiled By

Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
6	8 yds

Nozzleman Name	Date
Edward Sliker	8/11/13
Helper Name	**Start/End Time**
~~Ed~~ Jame Ashton	2:15p - 3:10pm

Weather Conditions	Ambient Temperature
Sunny	72°F

Equipment Used

SHWING PUMP

Placment Location	Mix Water Temp
S. Ditch 13+40 to 13+95	

Panel Number	Slump	Shotcrete Temp
297	2"	76.1°F
	Air Content	**Applied Temp**
	4.9%	76.1°F

Alfredo Villalobos

Report Compiled By

8/11/13

Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
7	8yds

Nozzleman Name	Date
Richie Ramos	8/11/13
Helper Name	**Start/End Time**
Ben Farnham	3:30p – 4:15p

Weather Conditions	Ambient Temperature
Partly Cloudy + Sunny	71°F

Equipment Used

SHWING Pump

Placment Location	Mix Water Temp
S. Ditch 13+95 to 14+40	

Panel Number	Slump	Shotcrete Temp
298	1-3/4"	71.9%
	Air Content	**Applied Temp**
	5.3%	71.9%

Alfredo Villalobos

Report Compiled By

8/11/13

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
8	8 yds

Nozzleman Name	Date
Edward Sliker	8/11/13
Helper Name	**Start/End Time**
James Ashton	5:15p – 6:00pm

Weather Conditions	Ambient Temperature
Partly Cloudy	70°F

Equipment Used

SHWING

Placment Location	Mix Water Temp
S. Diversion Ditch 14+40 – 14+85	

Panel Number	Slump	Shotcrete Temp
299	1-3/4"	75.6
	Air Content	**Applied Temp**
	6.1%	75.6

A. Villacobos

Report Compiled By

8/11/13

Date

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Date

BATCH #3
Samples Collected

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	4 YRDS

Nozzleman Name: ED SLIKER	Date: 08-12-2013
Helper Name: RICHIE RAMOS	Start/End Time: 3:05 PM - 3:32 PM
Weather Conditions: SUNNY	Ambient Temperature: 72°
Equipment Used:	
Placment Location: STA 14+75 - 15+00	Mix Water Temp:
Panel Number: 300	Slump: 1.5"
	Shotcrete Temp: 70°
	Air Content: 6.5%
	Applied Temp:

JAMES ASHTON
Report Compiled By

08/12/13
Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8 YRDS

Nozzleman Name	Date
EP SLIKER	08-12-2013
Helper Name	**Start/End Time**
RICHIE RAMOS	4:02PM - 4:45PM

Weather Conditions	Ambient Temperature
SUNNY	72°

Equipment Used

Placment Location	Mix Water Temp
15+00 - 15+50	

Panel Number	Slump	Shotcrete Temp
301	2"	71°
	Air Content	**Applied Temp**
	7.25%	

JAMES ASHTON
Report Compiled By

08/12/13
Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8 YRDS

Nozzleman Name	Date
RICHIE RAMOS	08/12/13
Helper Name	**Start/End Time**
ED SLIKER	5:05PM - 6:25PM

Weather Conditions	Ambient Temperature
SUNNY	68°

Equipment Used

Placment Location	Mix Water Temp
15+50 - 15+90	

Panel Number	Slump	Shotcrete Temp
302	1.5"	75°
	Air Content	**Applied Temp**
	6.25%	

SAMES ASHTON
Report Compiled By

08/12/13
Date

Sumitomo's Representative

Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8CY

Nozzleman Name	Date
RICHIE	8/13/13
Helper Name	**Start/End Time**
ED	9:00AM - 9:55

Weather Conditions	Ambient Temperature
CLEAR/SMOKEY	72°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION ~ 16+00 to 16+50	

Panel Number	Slump	Shotcrete Temp
303	1.5"	76°
2 CYLINDERS BATCH 1	**Air Content**	**Applied Temp**
	5.5%	

TD
Report Compiled By

8/13/13
Date

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Date

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Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8CY

Nozzleman Name	Date
ED	8/13/13

Helper Name	Start/End Time
RICHIE	10:05 - 11:00

Weather Conditions	Ambient Temperature
CLEAR/SMOKEY	73°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION (INLET 4) (16+75 → 16+95) 16+50 to 16+95	

Panel Number	Slump	Shotcrete Temp
304	2"	76°
	Air Content	**Applied Temp**
	5.3%	

TD
Report Compiled By

8/13/13
Date

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Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8

Nozzleman Name	Date
RICHIE	8/B/13
Helper Name	**Start/End Time**
ED	11:20 to 12:30

Weather Conditions	Ambient Temperature
CLEAR / SMOKEY	74°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION INLET #4 16+95 to 17+15 16+95 to 17+30	

Panel Number	Slump	Shotcrete Temp
305	1 1/4"	77°
BATCH #2 2 CYLINDERS	**Air Content**	**Applied Temp**
	6.2%	

JD
Report Compiled By

8/13/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	8CY

Nozzleman Name	Date
ED	8/13/13

Helper Name	Start/End Time
RICHIE	12:45 1:30

Weather Conditions	Ambient Temperature
CLEAR/SMOKEY	78

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 17+30 to 17+75	

Panel Number	Slump	Shotcrete Temp
306	1 1/2"	77°
	Air Content	**Applied Temp**
	6%	

TD
Report Compiled By

8/13/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
5	4 CY

1.5 CY WASTE

Nozzleman Name	Date
RICHIE	8/13/13
Helper Name	**Start/End Time**
ED	1:45 2:30

Weather Conditions	Ambient Temperature
CLEAR/ SMOKEY	78°

Equipment Used

Placment Location	Mix Water Temp
SOUTH DIVERSION 17+75 to 18+00	

Panel Number	Slump	Shotcrete Temp
307	1 3/4	78
BATCH 3 2 CYLINDERS	Air Content: 5.8%	Applied Temp

TD
Report Compiled By

8/13/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
(1)	8 CY

Nozzleman Name	Date
RICHIE	8/14/13

Helper Name	Start/End Time
ED	9:30 10:30

Weather Conditions	Ambient Temperature
PARTLY CLOUDY HAZY/SMOKEY	56°

Equipment Used

Placment Location	Mix Water Temp
NORTH DIVERSION 0+00 to 0+40	

Panel Number	Slump	Shotcrete Temp
308	2"	62°
2 CYLINDERS BATCH #1	Air Content: 6.4%	Applied Temp

TD
Report Compiled By

8/14/13
Date

Sumitomo's Representative

Date

303
4
5
6
7

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8cy

Nozzleman Name: RICHIE	Date: 8/14/13
Helper Name: ED	Start/End Time: 10:45 - 11:45
Weather Conditions: SUNNY PARTLY CLOUDY SMOKEY/HAZY	Ambient Temperature: 60
Equipment Used:	
Placment Location: NORTH DIVERSION 0+40 to 0+90	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
309	2¼	64°
2 CYLINDERS	Air Content	Applied Temp
BATCH 2	5.7%	

Report Compiled By _____ Date 8/14/13

Sumitomo's Representative _____ Date _____

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8CY

Nozzleman Name: ED	Date: 8/14/13
Helper Name: RICHIE	Start/End Time: 12:10 to 1:05
Weather Conditions: MOSTLY CLOUDY HAZY/SMOKEY	Ambient Temperature: 65°
Equipment Used:	
Placment Location: 0+90 to 1+40	Mix Water Temp:
Panel Number: 310	Slump: 1 3/4
	Shotcrete Temp: 67°
	Air Content: 5.9%
	Applied Temp:

TD
Report Compiled By

8/14/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
4	6 cy

Nozzleman Name: RICHIE	Date: 8/14/13
Helper Name: ED	Start/End Time: 1:35
Weather Conditions: CLOUDY HAZY/SMOKEY	Ambient Temperature: 65°
Equipment Used:	
Placment Location: 1+40 to 1+65	Mix Water Temp:
Panel Number: 311 BATCH #3	Slump: 1 3/4"
	Air Content: 6.3%
	Shotcrete Temp: 68
	Applied Temp:

TD
Report Compiled By

8/14/13
Date

Sumitomo's Representative

Date

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8

Nozzleman Name: Richie Ramos	Date: 9-5-13
Helper Name: Wesley Poling	Start/End Time: 3:40 - 5:00
Weather Conditions: Partly Cloudy	Ambient Temperature: 60°F
Equipment Used: Mayco Pump and Mixer truck	
Placment Location: 4+50 to 4+70	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
312	3"	65°F
	Air Content: 5.0%	Applied Temp:

Report Compiled By _____ Date _____

Sumitomo's Representative _____ Date _____

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8

Nozzleman Name	Date
Richie Ramos	9/5/13
Helper Name	**Start/End Time**
Wesley Poling	6:15 - 7:50p

Weather Conditions	Ambient Temperature
partly Cloudy	60°F

Equipment Used

Mayco Pump and mixer truck

Placment Location	Mix Water Temp
4+70 to 4+90 & only 4 yds used because of pump issues	

Panel Number	Slump	Shotcrete Temp
313	2.5"	65°F
	Air Content	**Applied Temp**
	5.1%	

Report Compiled By _____ Date 9/5/13

Sumitomo's Representative _____ Date _____

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	4

Nozzleman Name	Date
Richie Ramos	9-6-13
Helper Name	**Start/End Time**
Freddy Villalobos	3:15 to 4:00

Weather Conditions	Ambient Temperature
Cloudy	62°F

Equipment Used

Mayco Pump

Placment Location	Mix Water Temp
4+90 to 5+15	

Panel Number	Slump	Shotcrete Temp
314	2"	65°F
	Air Content	**Applied Temp**
	5.3%	65°F

Report Compiled By — Date: 9-6-13

Sumitomo's Representative — Date

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8

Nozzleman Name	Date
Richie Ramos	9-6-13
Helper Name	**Start/End Time**
Wesley Poling	5:15 to 6:20 p

Weather Conditions	Ambient Temperature
Cloudy	62°F

Equipment Used

Mayco Pump

Placment Location	Mix Water Temp
29+25 to 29+70	

Panel Number	Slump	Shotcrete Temp
315	1.5"	65°F
	Air Content	**Applied Temp**
	5.1%	65°F

Report Compiled By — Date: 9-6-13

Sumitomo's Representative — Date

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
3	8

Nozzleman Name: Richie Ramos	Date: 9·6·13
Helper Name: Wesley Poling	Start/End Time: 7:40 to 8:30
Weather Conditions: Cloudy	Ambient Temperature: 58°F
Equipment Used: Mayco Pump	
Placment Location: 29+70 to 30+10	Mix Water Temp:

Panel Number	Slump	Shotcrete Temp
316	2.5"	67°F
	Air Content: 5.3%	Applied Temp: 67°F

Report Compiled By _____ Date: 9·6·13

Sumitomo's Representative _____ Date _____

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8

Nozzleman Name	Date
Riche Ramos	9-7-13
Helper Name	**Start/End Time**
Freddy Villalobos	4:30 to 6:00

Weather Conditions	Ambient Temperature
Partly Cloudy	63°F

Equipment Used
Mayco Pump

Placement Location	Mix Water Temp
~~30+50~~ 30+10 to 30+50	

Panel Number	Slump	Shotcrete Temp
317	2"	67°
	Air Content	**Applied Temp**
	5.1%	

Report Compiled By

9-7-13
Date

Sumitomo's Representative

Date

Samples Collected

alaska aggregate

Shotcrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	6

Nozzleman Name	Date
Richie Ramos	9-7-13
Helper Name	**Start/End Time**
Wesley Polrag	7:10 to 8:05p

Weather Conditions	Ambient Temperature
Partly Cloudy	60°F

Equipment Used

Mayco Pump

Placment Location	Mix Water Temp
30+50 + 30+75 (inlet 3)	

Panel Number	Slump	Shotcrete Temp
318	2.5"	65°F
	Air Content	**Applied Temp**
	5.3%	

Report Compiled By — Date: 9-7-13

Sumitomo's Representative — Date

Samples Collected

Appendix 8

Concrete Compressive Strength Test Results and AAP QC Concrete Testing

Testing Summary and Results

Table A.8.1: Concrete Compressive Strength Test Results.

Sample Type	Mappa #	Batch #	Location	Date Placed	Date Tested	Age (days)	Strength (psi)
Cylinder	13-2611	1	Flume Dropbox Base	29-Jul-13	5-Aug-13	7	2910
Cylinder	13-2612	1	Flume Dropbox Base	29-Jul-13	5-Aug-13	7	2900
Cylinder	13-2613	1	Flume Dropbox Base	29-Jul-13	12-Aug-13	14	3100
Cylinder	13-2614	1	Flume Dropbox Base	29-Jul-13	12-Aug-13	14	3170
Cylinder	13-2615	1	Flume Dropbox Base	29-Jul-13	26-Aug-13	28	3210*
Cylinder	13-2616	1	Flume Dropbox Base	29-Jul-13	26-Aug-13	28	2960*
Cylinder	13-2949	1	Flume Dropbox Walls	15-Aug-13	22-Aug-13	7	3500
Cylinder	13-2950	1	Flume Dropbox Walls	15-Aug-13	22-Aug-13	7	3500
Cylinder	13-2951	1	Flume Dropbox Walls	15-Aug-13	29-Aug-13	14	4190
Cylinder	13-2952	1	Flume Dropbox Walls	15-Aug-13	29-Aug-13	14	4390
Cylinder	13-2953	1	Flume Dropbox Walls	15-Aug-13	12-Sep-13	28	4910
Cylinder	13-2954	1	Flume Dropbox Walls	15-Aug-13	12-Sep-13	28	4840
Cylinder	13-2955	2	Flume Dropbox Walls	15-Aug-13	22-Aug-13	7	3250
Cylinder	13-2956	2	Flume Dropbox Walls	15-Aug-13	22-Aug-13	7	3490
Cylinder	13-2957	2	Flume Dropbox Walls	15-Aug-13	29-Aug-13	14	3560
Cylinder	13-2958	2	Flume Dropbox Walls	15-Aug-13	29-Aug-13	14	3950
Cylinder	13-2959	2	Flume Dropbox Walls	15-Aug-13	12-Sep-13	28	4090**
Cylinder	13-2960	2	Flume Dropbox Walls	15-Aug-13	12-Sep-13	28	4830
Cylinder	13-3198	1	Upper Flume Thrust Block	21-Aug-13	28-Aug-13	7	4060
Cylinder	13-3199	1	Upper Flume Thrust Block	21-Aug-13	28-Aug-13	7	3830
Cylinder	13-3200	1	Upper Flume Thrust Block	21-Aug-13	4-Sep-13	14	4250
Cylinder	13-3201	1	Upper Flume Thrust Block	21-Aug-13	4-Sep-13	14	4220
Cylinder	13-3202	1	Upper Flume Thrust Block	21-Aug-13	18-Sep-13	28	4620
Cylinder	13-3203	1	Upper Flume Thrust Block	21-Aug-13	18-Sep-13	28	4890
Cylinder	13-3527	1	Thrust Block 2	5-Sep-13	12-Sep-13	7	3890
Cylinder	13-3528	1	Thrust Block 2	5-Sep-13	19-Sep-13	14	4550
Cylinder	13-3529	1	Thrust Block 2	5-Sep-13	3-Oct-13	28	5520
Cylinder	13-3530	2	Thrust Block 2 / ND	5-Sep-13	12-Sep-13	7	3690

			Channel Plug				
Cylinder	13-3531	2	Thrust Block 2 / ND Channel Plug	5-Sep-13	19-Sep-13	14	4250
Cylinder	13-3532	2	Thrust Block 2 / ND Channel Plug	5-Sep-13	3-Oct-13	28	5000
Cylinder	13-3521	1	Thrust Block 1	4-Sep-13	11-Sep-13	7	4530
Cylinder	13-3522	1	Thrust Block 1	4-Sep-13	18-Sep-13	14	4960
Cylinder	13-3523	1	Thrust Block 1	4-Sep-13	2-Oct-13	28	5160
Cylinder	13-3524	2	Thrust Block 1	4-Sep-13	11-Sep-13	7	4320
Cylinder	13-3525	2	Thrust Block 1	4-Sep-13	18-Sep-13	14	4640
Cylinder	13-3526	2	Thrust Block 1	4-Sep-13	2-Oct-13	28	5510
Cylinder	13-3554	1	SD Channel Plug	10-Sep-13	17-Sep-13	7	5290
Cylinder	13-3555	1	SD Channel Plug	10-Sep-13	24-Sep-13	14	6120
Cylinder	13-3556	1	SD Channel Plug	10-Sep-13	8-Oct-13	28	6210

*Failing test result; concrete hardener applied to floor as discussed in Section 6 of report.

**Extra cylinder; IFC Specifications require testing one cylinder per batch.

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 8/27/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 7/29/2013
Time Sampled:
Location of Sample: Base
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initiel Curing:
Max Field Curing Temp.:

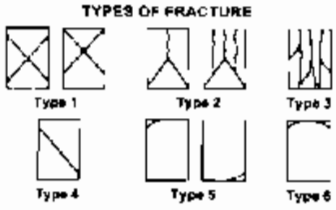
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2611	8/5/2013	7	36600	4.00	12.57	2910		2
13-2612	8/5/2013	7	36450	4.00	12.57	2900		2
13-2613	8/12/2013	14	38995	4.00	12.57	3100		2
13-2614	8/12/2013	14	39885	4.00	12.57	3170		2
13-2615	8/26/2013	28	40335	4.00	12.57	3210		3
13-2616	8/26/2013	28	37150	4.00	12.57	2960		2

Remarks:

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/16/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/15/2013
Time Sampled:
Location of Sample: Batch 1
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

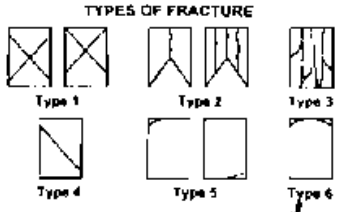
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2949	8/22/2013	7	44025	4.00	12.57	3500		2
13-2950	8/22/2013	7	44025	4.00	12.57	3500		2
13-2951	8/29/2013	14	52705	4.00	12.57	4190		3
13-2952	8/29/2013	14	55195	4.00	12.57	4390		3
13-2953	9/12/2013	28	61695	4.00	12.57	4910		3
13-2954	9/12/2013	28	60860	4.00	12.57	4840		3

Remarks:

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/16/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 8/15/2013
Time Sampled:
Location of Sample: Batch 2
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

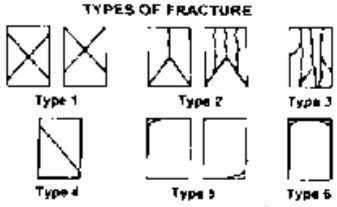
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-2955	8/22/2013	7	40845	4.00	12.57	3250		3
13-2956	8/22/2013	7	43840	4.00	12.57	3490		3
13-2957	8/29/2013	14	44795	4.00	12.57	3560		5
13-2958	8/29/2013	14	49670	4.00	12.57	3950		2
13-2959	9/12/2013	28	51350	4.00	12.57	4080		3
13-2960	9/12/2013	28	60715	4.00	12.57	4830		2

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 9/23/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

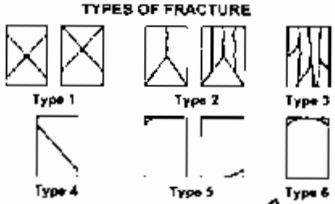
Date Placed: 8/21/2013
Time Sampled:
Location of Sample: Thrust Block #1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3198	8/28/2013	7	50975	4.00	12.57	4060		2
13-3199	8/28/2013	7	48125	4.00	12.57	3830		3
13-3200	9/4/2013	14	53440	4.00	12.57	4250		5
13-3201	9/4/2013	14	53020	4.00	12.57	4220		2
13-3202	9/18/2013	28	58085	4.00	12.57	4620		3
13-3203	9/18/2013	28	61705	4.01	12.63	4890		4

Remarks:

TYPES OF FRACTURE



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Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790/00
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/4/2013
Time Sampled:
Location of Sample: Batch #1
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

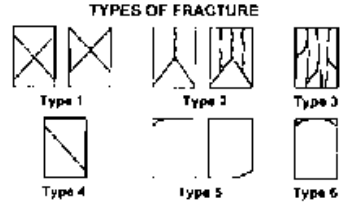
Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3521	9/11/2013	7	56970	4.00	12.57	4530		2
13-3522	9/18/2013	14	62305	4.00	12.57	4960		3
13-3523	10/2/2013	28	64870	4.00	12.57	5160		4

Remarks:

TYPES OF FRACTURE



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Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/4/2013
Time Sampled:
Location of Sample: Batch #2
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

Ticket Number:
Time Placed:
Time Batched:
Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

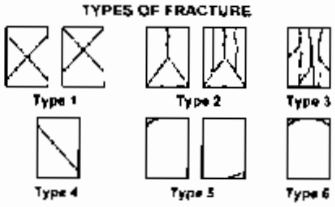
LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3524	9/11/2013	7	54300	4.00	12.57	4320		2
13-3525	9/18/2013	14	58360	4.00	12.57	4640		3
13-3526	10/2/2013	28	69270	4.00	12.57	5510		2

Remarks:

Copies to:

TYPES OF FRACTURE



Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 153790700
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

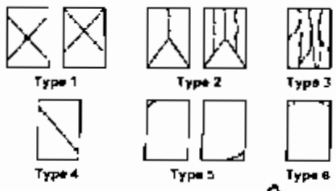
Date Placed: 9/5/2013
Time Sampled:
Location of Sample: Batch #1
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3527	9/12/2013	7	48870	4.00	12.57	3890		2
13-3528	9/19/2013	14	57505	4.01	12.63	4550		2
13-3529	10/3/2013	28	69325	4.00	12.57	5520		2

Remarks:

TYPES OF FRACTURE



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/7/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 2
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/5/2013
Time Sampled:
Location of Sample: Batch #2
Supplier:
Truck Number:
Mix Number:
Design Strength:
Batch Size:
Slump: (ASTM C 143)
Concrete Temp: (ASTM C 1064)
Water Added:
Initial Curing:
Max Field Curing Temp.:

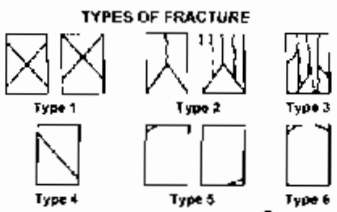
Ticket Number:
Time Placed:
Time Batched:

Air Content: (ASTM C 173)
Ambient Temp:
Technician: Client
Final Curing:
Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3530	9/12/2013	7	46340	4.00	12.57	3690		2
13-3531	9/19/2013	14	53370	4.00	12.57	4250		4
13-3532	10/3/2013	28	62800	4.00	12.57	5000		3

Remarks:



Copies to:

Reported by:

Stefan Mack, PE
Concrete Laboratory Supervisor

REPORT OF CONCRETE CYLINDER TEST

MAPPA TESTLAB

1956 Richardson Highway, North Pole, AK 99705

Report Date: 10/10/13

Project Number: Sumitomo Dry Stack Diversion Report Number: 1
Project: Dry Stack Diversion PO 15379070C
Client: Sumitomo
Address:

Attn:

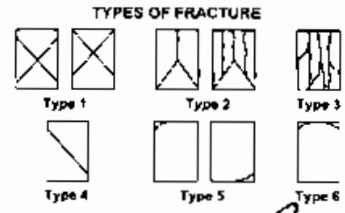
FIELD TEST CONDITIONS AND RESULTS (ASTM C 31)

Date Placed: 9/10/2013
Time Sampled:
Location of Sample: Old South Diversion Concrete Plug
Supplier:
Truck Number: Ticket Number:
Mix Number: Time Placed:
Design Strength: Time Batched:
Batch Size:
Slump: (ASTM C 143) Air Content: (ASTM C 173)
Concrete Temp: (ASTM C 1064) Ambient Temp:
Water Added: Technician: Client
Initial Curing: Final Curing:
Max Field Curing Temp.: Min Field Curing Temp.:

LABORATORY TEST RESULTS (ASTM C 39)

Specimen	Test Date	Age	Load	Diameter	Area	Strength	Percent of Design	Type of Fracture
13-3554	9/17/2013	7	66820	4.01	12.63	5290		3
13-3555	9/24/2013	14	76890	4.00	12.57	6120		3
13-3556	10/8/2013	28	78085	4.00	12.57	6210		3

Remarks:



Copies to:

Reported by: Stefan Mack

Stefan Mack, PE
Concrete Laboratory Supervisor

alaska aggregate

~~Shotcrete~~ CONCRETE Installation Form

DELTA CONCRETE

Batch Number	QTY
1	6.5 CY

~~Nozzleman Name~~	Date
FOREMAN : RICHIE	7/29/13
~~Helper Name~~	Start/End Time
	5:00 - 5:45

Weather Conditions	Ambient Temperature
PARTLY CLOUDY	70°

Equipment Used

VIBRATORS/ 1 BATCH TRUCK

Placment Location	Mix Water Temp
SOUTH FLUME INTAKE FOOTER/BOTTOM SLAB	

Panel Number	Slump	~~Shotcrete~~ CONCRETE Temp
NO PANEL	4.5"	79.5°
6 CYLINDERS 7/14/28 DAY	Air Content	Applied Temp
	7.5%	

TD
Report Compiled By

7/29/13
Date

Sumitomo's Representative

Date

alaska aggregate

CON ~~Shot~~crete Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8 YRDS

Nozzleman Name	Date
RICHIE RAMOS	08-15-13
Helper Name	**Start/End Time**
ED SLIKER	1:30PM - 2:~~30~~ 15PM

Weather Conditions	Ambient Temperature
CLOUDY	62°

Equipment Used

Placment Location	Mix Water Temp
DROPBOX WALLS	

Panel Number	Slump	Shotcrete Temp
	2.25"	
6 CYLINDERS	**Air Content**	**Applied Temp**
	6.5%	

JAMES ASHTON
Report Compiled By

8-15-13
Date

Sumitomo's Representative

Date

alaska aggregate

~~Shot~~Concrete Installation Form

DELTA CONCRETE

Batch Number	QTY
2	4 YRDS

Nozzleman Name: RICHIE RAMOS	Date:
Helper Name: ED SLIKER	Start/End Time: 2:40 PM - 3:30 PM
Weather Conditions: CLOUDY - SPRINKLING RAIN ↓.02"	Ambient Temperature: 65°
Equipment Used:	
Placement Location: DROPBOX WALLS	Mix Water Temp:
Panel Number: 6 CYLINDERS	Slump: 2.5"
	Shotcrete Temp:
	Air Content: 7%
	Applied Temp:

JAMES ASHTON
Report Compiled By

8-15-13
Date

Sumitomo's Representative

Date

DROP BOX / THRUST BLOCK

alaska aggregate

CONCRETE ~~Shotcrete~~ Installation Form

DELTA CONCRETE

Batch Number	QTY
1	5.5CY

~~Nozzleman Name~~	Date
FOREMAN: RICHIE RAMOS	8/21/13
Helper Name	**Start/End Time**
	12:00 - 12:30

Weather Conditions	Ambient Temperature
MOSTLY CLOUDY	59°

Equipment Used

Placment Location	Mix Water Temp
UPPER THRUST BLOCK @ DROP BOX	

Panel Number	Slump	Shotcrete Temp
6 CYLINDERS	5.5"	52°
	Air Content	**Applied Temp**
	11%	

TD
Report Compiled By

8/21/13
Date

Sumitomo's Representative

Date

Concrete

alaska aggregate

~~Shotcrete~~ Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8

Nozzleman Name	Date
Richie Ramos	9/4/13
Helper Name	**Start/End Time**
Freddy Villalobos	12:03 - 2:55 pm

Weather Conditions	Ambient Temperature
Cloudy	50°F

Equipment Used

460 Excavator and mixer truck

Placment Location	Mix Water Temp
Thrust Block # 1 Lower	

Panel Number	Slump	Shotcrete Temp
	3-1/2"	54°F
	Air Content	**Applied Temp**
	3.30%	

Report Compiled By — Date: 9/4/13

Sumitomo's Representative — Date

Concrete

alaska aggregate

~~Shotcrete~~ Installation Form

DELTA CONCRETE

Batch Number	QTY
2	8

Nozzleman Name	Date
Richie Ramos	9/4/13
Helper Name	**Start/End Time**
Freddy Villalobos	3:50 - 4:30

Weather Conditions	Ambient Temperature
Cloudy	54°F

Equipment Used

460 Excavator and mixer truck

Placment Location	Mix Water Temp
THRUST BLOCK #1 LOWER	

Panel Number	Slump	Shotcrete Temp
	3"	54°F
	Air Content	**Applied Temp**
	4%	

Report Compiled By

Date 8/4/13

Sumitomo's Representative

Date

Concrete

alaska aggregate

[redacted] Installation Form

DELTA CONCRETE

Batch Number	QTY
1	8

Nozzleman Name	Date
Richie Ramos	9/5/13
Helper Name	**Start/End Time**
Alfredo Villalobos	10:25am - 11:00

Weather Conditions	Ambient Temperature
Partly Cloudy	60°F

Equipment Used
Mixer Truck

Placment Location	Mix Water Temp
Thrust block #2 LOWER	

Panel Number	Slump	Shotcrete Temp
[redacted]	2"	64°F
	Air Content	**Applied Temp**
	4.2%	64°F

Report Compiled By — Date: 9/5/13

Sumitomo's Representative — Date

Samples collected

Concrete

alaska aggregate

~~Shotcrete~~ Installation Form

DELTA CONCRETE

Batch Number	QTY
2	5

Nozzleman Name: Richie Ramos	Date: 9/5/13
Helper Name: Alfredo Villalobos	Start/End Time: 11:30 – 12:30
Weather Conditions: Partly Cloudy	Ambient Temperature: 60°F
Equipment Used: Mixer truck	
Placment Location: LOWER Thrust block #2 and old North ditch plug	Mix Water Temp:
Panel Number: [redacted]	Slump: 2.5"
	Shotcrete Temp: 64°F
	Air Content: 4.9
	Applied Temp: 64°F

Report Compiled By _____ Date 9/5/13

Sumitomo's Representative _____ Date _____

Samples Collected

Appendix 9

AAP QC HDPE Pipe Fusion Welding Forms

HDPE Pipe Fusion Welding Form

Weld Number: 1 Flange Adapter		
Bonder Name: EDWARD SLIKER		Date: 7/30/13
Inspected By: Alfredo Villalobos		Start/End Time: 7:45 am – 8:20 am
Accepted By:		
Weather Conditions: Sunny Clear + Skies	Ambient Temperature: 72°F	
Equipment Used: McElroy 824/630		
Placment Location: S. Flume		Weld Temperature: 443°F
Pipe Lot Number:	Heat Time: 7:45 am – 7:55 am 10 minutes	Cool Down Time: 7:55 am – 8:20 am 25 minutes
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°F

A. Villalobos

Report Compiled By

7/30/13

Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 2 Flange Adapter			
Bonder Name: EDWARD ELIKER		Date: 7/30/13	
Inspected By:	Alfredo Villalobos	Start/End Time: 10:01am — 10:36 am	
Accepted By:			
Weather Conditions: Sunny		Ambient Temperature: 72° F	
Equipment Used: Mc Elroy 824/630			
Placment Location: S. Flume		Weld Temperature: 450°F	
Pipe Lot Number:	Heat Time: 10:01am - 10:11am 10 minutes	Cool Down Time: 10:11 am — 10:36 am 25 minutes	
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450° F	

A. Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 3			
Bonder Name: ED SUKER		Date: 7/30/13	
Inspected By:	Alfredo Villalobos	Start/End Time: 10:46 am / 11:17am	
Accepted By:			
Weather Conditions: 72°F		Ambient Temperature: Sunny + Clear Skies	
Equipment Used: McElroy 824/630			
Placment Location: S. Flume		Weld Temperature: 450° F	
Pipe Lot Number:	Heat Time: 10:46 - 10:56 10 minutes	Cool Down Time: 10:56 - 11:17 21 minutes	
	Surface Cleaned Prior to Weld? Yes	Applied Temp: 450° F	

Alfredo Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 4		
Bonder Name: Alfredo Villalobos		Date: 7/30/13
Inspected By:	ED SLIKER	Start/End Time: 11:29 am - 12:00p
Accepted By:		
Weather Conditions: Sunny + Clear Skies	Ambient Temperature: 72°F	
Equipment Used: McElroy 824/630		
Placment Location: S. Flume		Weld Temperature: 450°
Pipe Lot Number:	Heat Time: 11:29 - 11:39 10 minutes	Cool Down Time: 11:39 - 12:00 21 minutes
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°

A. Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 5		
Bonder Name: RICARDO RAMOS		Date: 7/30/13
Inspected By:	EDWARD SLIKE	Start/End Time: 12:32 — 1:07
Accepted By:		
Weather Conditions: Sunny + Clear Skies	Ambient Temperature: 72°F	
Equipment Used: McElroy 824/630		
Placment Location: S. Flume		Weld Temperature: 445°
Pipe Lot Number:	Heat Time: 12:32 - 12:42 pm 10 minutes	Cool Down Time: 12:42 - 1:07 25 minutes
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°

A. Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 6		
Bonder Name: EDWARD SLIKER		Date: 7/30/13
Inspected By:	Alfredo Villalobos	Start/End Time: 1:20 - 1:53
Accepted By:		
Weather Conditions: Sunny	Ambient Temperature: 74°F	
Equipment Used: McElroy 824/630		
Placment Location: S. Flume		Weld Temperature: 445°
Pipe Lot Number:	Heat Time: 1:20p - 1:30p 10 minutes	Cool Down Time: 1:30p - 1:53p 23 minutes
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°

A. Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 7			
Bonder Name: Alfredo Villalobos		Date: 7/30/13	
Inspected By:	EDWARD SLIKER	Start/End Time: 2:12p - 2:52p	
Accepted By:			
Weather Conditions: Sunny		Ambient Temperature: 74°F	
Equipment Used: McElroy 824/630			
Placment Location: S. Flume			Weld Temperature: 435°
Pipe Lot Number:	Heat Time: 2:12p - 2:24p 12 minutes		Cool Down Time: 2:24p - 2:52p 28 minutes
	Surface Cleaned Prior to Weld? yes		Applied Temp: 450°

A. Villalobos
Report Compiled By

7/30/13
Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 8			
Bonder Name: RICARDO RAMOS		Date: 7/30/13	
Inspected By: EDWARD SLIKER		Start/End Time: 3:03p — 3:40p	
Accepted By:			
Weather Conditions: Sunny		Ambient Temperature: 74°F	
Equipment Used: McElroy 824/630			
Placment Location: S. Flume		Weld Temperature: 435°F	
Pipe Lot Number:	Heat Time: 3:03p – 3:15p 12 minutes	Cool Down Time: 3:15p – 3:40 25 minutes	
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°F	

A. Villalobos

Report Compiled By

7/30/13

Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 9		
Bonder Name: EDWARD SLIKER		Date: 7/30/13
Inspected By:	Alfredo Villalobos	Start/End Time: 3:46p – 4:20p
Accepted By:		
Weather Conditions: Sunny	Ambient Temperature: 74°F	
Equipment Used: McElroy 824/630		
Placment Location: S. Flume		Weld Temperature: 435°F
Pipe Lot Number:	Heat Time: 3:46p – 3:56p 10 minutes	Cool Down Time: 3:56p – 4:20p 24 minutes
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°F

A. Villalobos

Report Compiled By

7/30/13

Date

Client's Representative

Date

HDPE Pipe Fusion Welding Form

Weld Number: 10			
Bonder Name: Alfredo Villalobos		Date: 7/30/13	
Inspected By:	EDWARD SLIKER	Start/End Time: 4:25p –	
Accepted By:			
Weather Conditions: Sunny		Ambient Temperature: 74°F	
Equipment Used: McElroy 824/630			
Placment Location: S. Flume		Weld Temperature: 437°F	
Pipe Lot Number:	Heat Time: 4:25p – 4:38p 13 minutes	Cool Down Time: 4:38p – 5:06p 28 minutes	
	Surface Cleaned Prior to Weld? yes	Applied Temp: 450°F	

A. Villalobos

Report Compiled By

7/30/13

Date

Client's Representative

Date

Appendix 10

AAP QC HDPE Geomembrane Forms

Drainage Inlet 2 Records

Alaska Aggregate Products

Liner Repair Record

Project:	Project Number:	Location:	Customer:
Inlet Two Liner	**12011**	**Mine** **Pogo**	**Pogo Mine**

Geosynthetic: HDPE	Type: **Dbl Sided Textured**	Thickness: **60 mil**	Supplier: **Solmax**

Repair Date	Repair Number	Location	Repair Dimensions	Technician	Re-Test Date	Accept Y / N	Comments
3/26/2013	1	Center of Seam	1' by 2' 6"	Alfredo Villalobos	3/26/2013	Yes	Wedge welder Heater turned off for a second in the middle of the weld. A repair was made to avoid any leaks. The seam air channel was air tested on both sides of the repair from the repair to the start of the weld and from the repair to the end of the weld. The Repair was made by Extrusion and vacuum tested.

AAP Representative: Alfredo Villalobos Date: 3/26/13 Customer Representative:_____ Date: _____

Alaska Aggregate Products

Air Test Record

Page 1 of 1

Project: Inlet Two Liner	Project Number: 12011	Location: Pogo Mine	Customer: Pogo Mine

Geosynthetic: HDPE	Type: Dbl Sided Textured	Thickness: 60 mil	Supplier: Solmax

Date	Seam Number	Location	Testing Technician	Test Pressure	Start Pressure	Finish Pressure	Accept Y / N	Remarks
3/26/2013	1	From the repair to the start of the weld	A.Villalobos	35	35	35	Yes	
3/26/2013	1	From the repair to the end of the weld	A.Villalobos	35	35	35	Yes	

AAP Representative: Alfredo Villalobos Alfredo Villalobos Date: 3/26/2013 Customer Representative Date:

Alaska Aggregate Products

Field Seaming Log

Project:	Project Number:	Location:	Customer:
Inlet Two Liner	**12011**	**Pogo Mine**	**Pogo Mine**

Geosynthetic: **HDPE**	Type: **Dbl Sided Textured**	Thickness: **60mil**		Supplier: **Solmax**

Seam No.	Seaming Date	Ambient Temp. F.	Wedge Temp. F.	Travel Speed	Extruder Temp. F.	Machine Serial No.	Machine Operator	Seaming Complete Yes / No	Seam Acceptance	Quality Representative	Comments
1	3/26/2013		765	3.8		3107-08T	A.Villalobos	Yes	Approved	A.Villalobos	

AAP Representative: Alfredo Villalobos Date: 3/26/13 Customer Representative: _____ Date: _____

Alaska Aggregate Products

Daily Test Weld Record

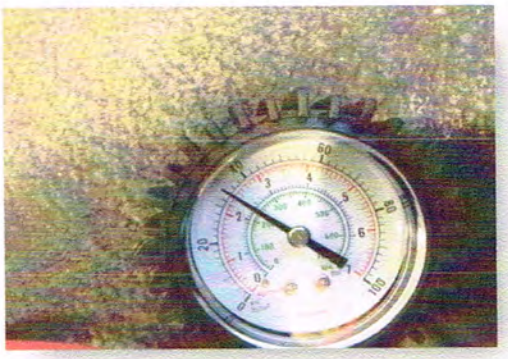
Project: **Inlet Two Liner** | Project Number: **12011** | Location: **Pogo Mine** | Customer: **Pogo Mine**

Geosynthetic: **HDPE** | Type: **Dbl Sided Textured** | Thickness: **60 mil** | Supplier: **Solmax**

Sample Information				Peel Test (Lbs.) Req. (91 For Weldge Weld) (78 For Extrusion Weld)										Shear Test (Lbs.) Req. (120)					Test Acceptable
Date	AM/PM	Bonder	Machine Number	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5	
3/26/2013	2:30pm	Alfredo Villalobos	3159-08T	190	180	168	179	181	186	177	165	176	178	245	255	241	247	241	Yes
3/26/2013	7:30pm	Alfredo Villalobos	Extrusion	131	127	134	129	127						163	166	158	160	159	Yes

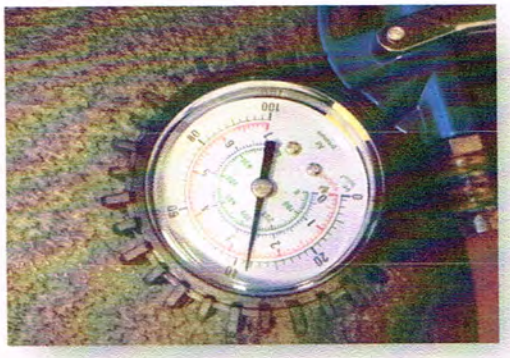
AAP Representative: Alfredo Villalobos Date: 3/26/13 Customer Representative: Date:

Charging air channel with 35 psi
from repair down

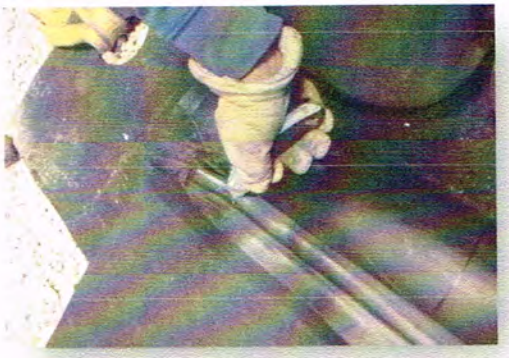


Holding 35 psi for 5 minutes

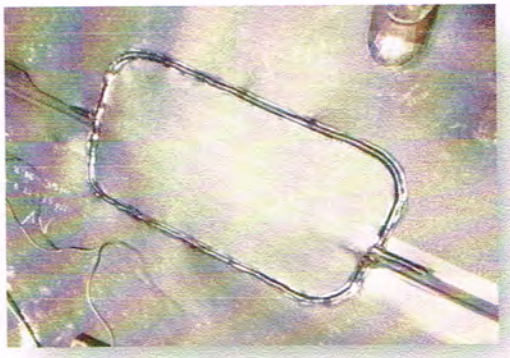
Relieving the air at opposite end of air channel



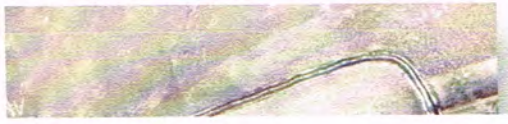
Holding 35 psi in air channel from repair up



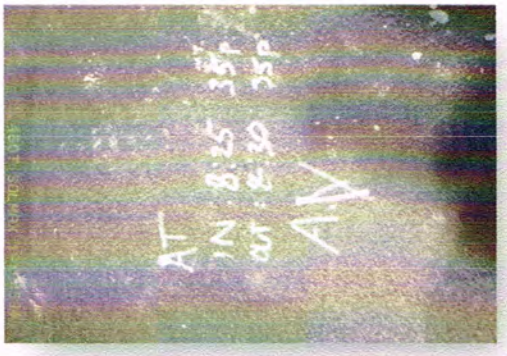
Relieving the air from the repair up



Patched repair with a 1' by 2'6" patch



Air Test Past



Air test Passed

Vacuum testing the patch

Vacuum test passed

Drainage Inlets 3N and 4 QC Records

Alaska Aggregate Products

Liner Repair Record

Project:	Project Number:	Location:	Customer:
Inlet construction	12011	Mine Pogo	Sumitomo

Geosynthetic: HDPE	Type: DBL Sided Textured	Thickness: 60 mil	Supplier: **Solmax**

Repair Date	Repair Number	Location	Repair Dimensions	Technician	Re-Test Date	Accept Y / N	Comments
	1	Inlet 3	5' by 22'	Alfredo Villalobos		Yes	Section added to the bottom
							of Inlet 3
8/16/2013	2	Inlet 4	1' by1'	Alfredo Villalobos	8/16/2013	Yes	repaired a hole
8/16/2013	3	Inlet 4	Bead	Alfredo Villalobos	8/16/2013	Yes	small dents
8/16/2013	4	Inlet 4	Bead	Alfredo Villalobos	8/16/2013	Yes	

AAP Representative: _____ Date: _____ Customer Representative:_____ Date: _____

Alaska Aggregate Products

Daily Test Weld Record

Project: **Inlet Construction** | Project Number: **12011** | Location: **Pogo Mine** | Customer: **Sumitomo**

Geosynthetic: **HDPE** | Type: **Dbl Sided Textured** | Thickness: **60 mil** | Supplier: **Solmax**

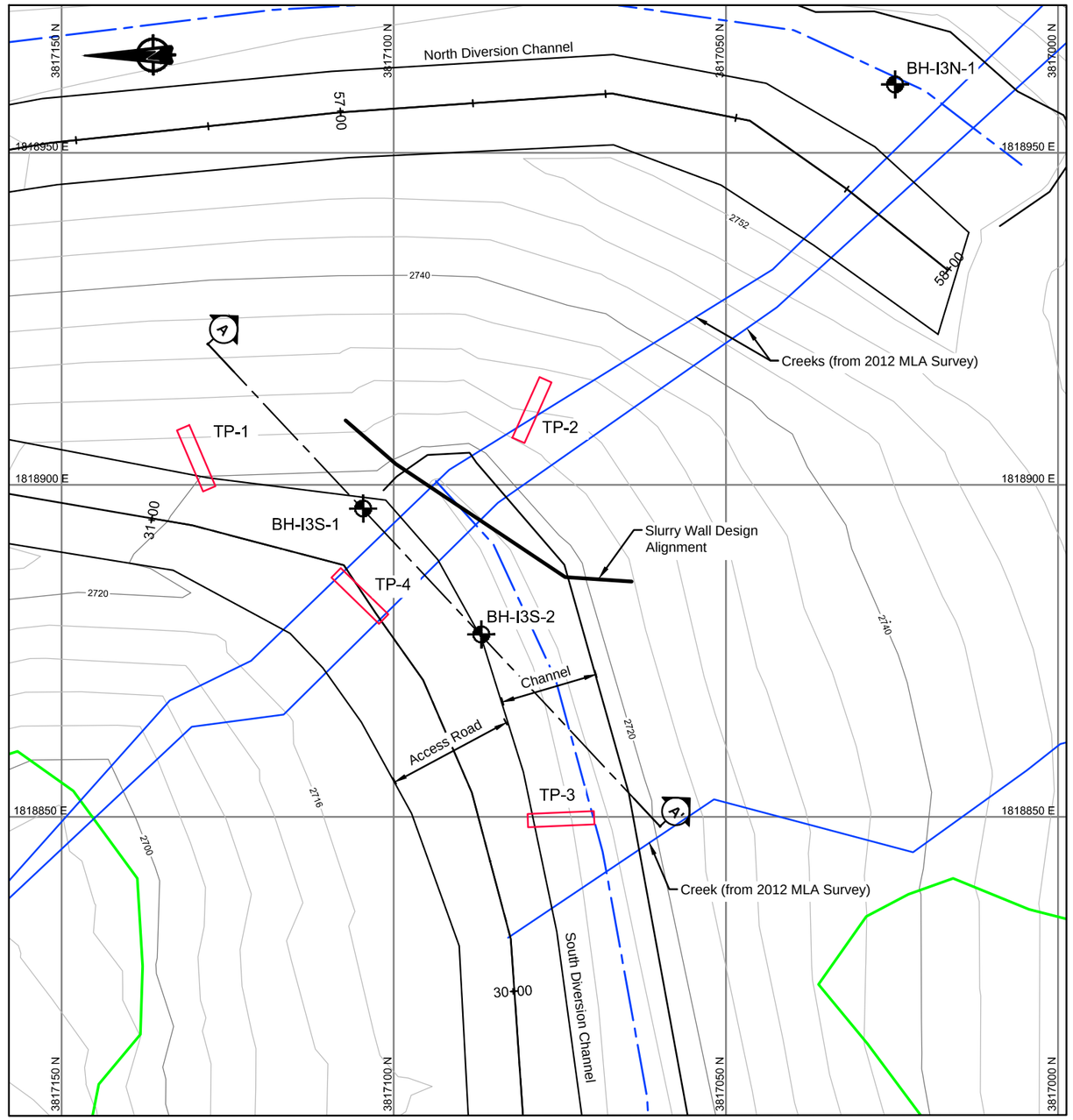
Sample Information				Peel Test (Lbs.) Req. (91 For Weldge Weld) (78 For Extrusion Weld)										Shear Test (Lbs.) Req. (120)				
Date	AM/PM	Bonder	Machine Number	#1	# 2	# 3	# 4	# 5	# 1	# 2	# 3	# 4	# 5	# 1	# 2	# 3	# 4	# 5
	8:30am	Alfredo Villalobos	Extrusion	136	141	139	131	138						170	173	169	166	170
8/16/2013	10:00am	Alfredo Villalobos	Extrusion	127	133	134	129	131						165	158	155	163	163

AAP Representative: Date: Customer Representative: Date:

Test Acceptable
Yes
Yes

Appendix 11

Inlet 3 Test Pit and Borehole Data



DRAINAGE INLET #3 PLAN VIEW

0 5' 10' 15' 20'
Scale in Feet
(1" = 20' on 11"x17" plot)

LEGEND

- Extent of Diversion Grading
- As-Built Diversion Channel Centerline
- Test Pit Location
- Borehole Location

NOTE

1. BH-I3N-1 borehole location is approximate.
2. Topographic contours are from September 18th, 2013 MLA survey.
3. Test pit and borehole survey by Alaska Aggregate Products.

srk consulting

SRK JOB NO.: 147900.010
FILE NAME: Inlet 3 Sections.dwg

POGO MINE
MINING DONE RIGHT

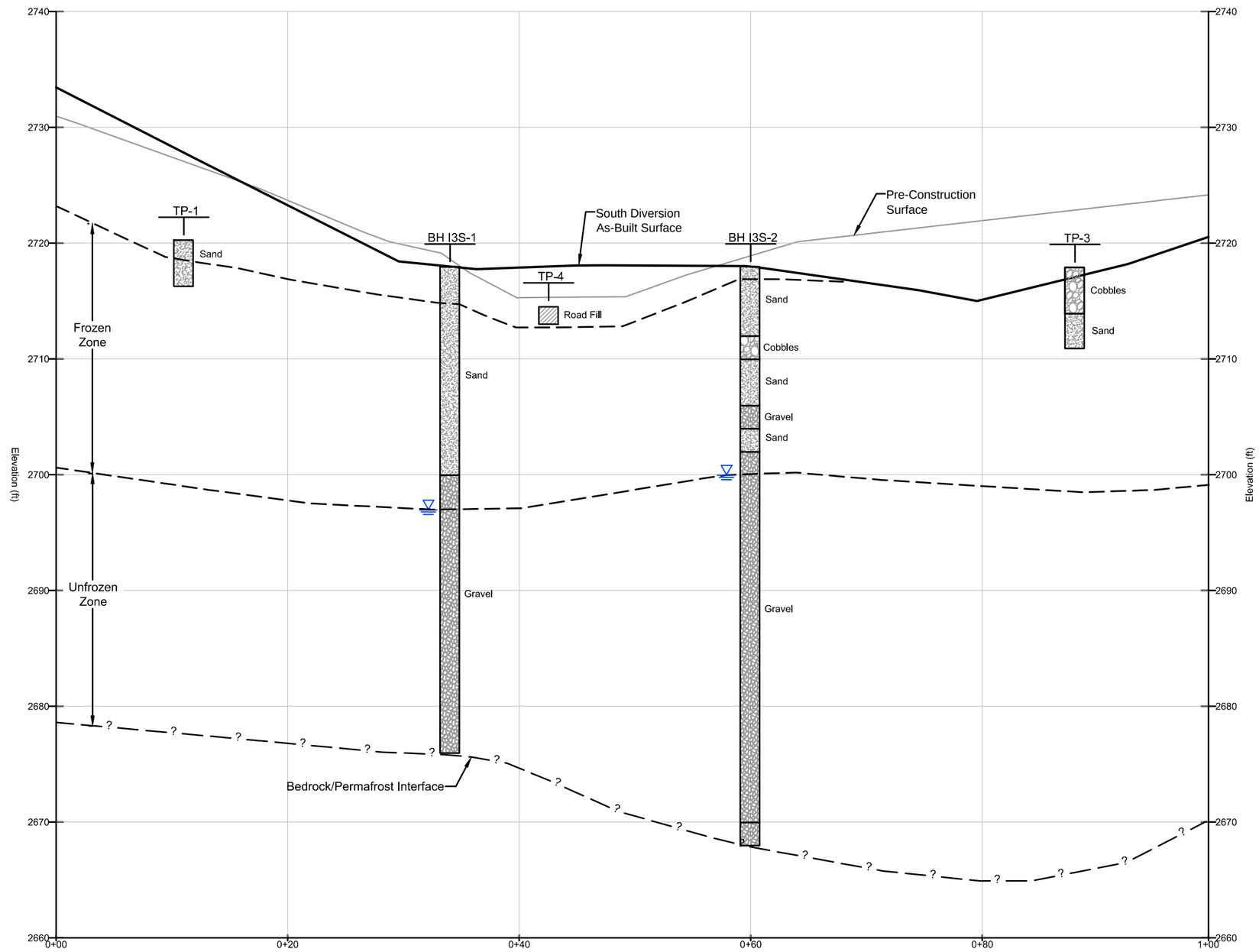
Sumitomo Metal Mining LLC (Pogo)

POGO DSTF Expansion As-Built

Inlet 3 Borehole and Test Pit Locations

DATE:	APPROVED:	FIGURE:
Jan. 2014	DPN	A11.1

C:\01_SITES\POGO\Detailed Design\Inlet 3 Sections.dwg



LEGEND

- Cobbles
- Gravel
- Sand
- Road Fill
- Water Level During Drilling
- Frozen / Unfrozen Interface
- Inferred Bedrock / Permafrost Interface

NOTE

TP-1 is offset by 13ft.
TP-4 is offset by 9ft.
TP-3 is offset by 8ft.

0 5' 10' 15' 20'
Scale in Feet

srk consulting

SRK JOB NO.: 147900.010
FILE NAME: Inlet 3 Sections.dwg

POGO MINE
MINING DONE RIGHT

Sumitomo Metal Mining LLC (Pogo)

POGO DSTF Expansion As-Built

Inlet 3
Section A

DATE:	APPROVED:	FIGURE:
Jan. 2014	DPN	A11.2

C:\01_SITES\POGO\Detailed Design\Inlet 3 Sections.dwg

srk consulting

GRAPHIC LOG OF TEST PIT

TP-1

PROJECT: POGO DSTF

PROJECT NO.: 147900.010

TOTAL DEPTH: 4.0'

LOGGED BY: D.Neuffer / J.Gerber

DATE: 5/17/2013

GROUND WATER ENCOUNTERED: NO

GROUND WATER LEVEL: N/A

LOCATION AND ELEVATION: Inlet 3 South

EQUIPMENT: CAT 318C

SURFACE CONDITIONS: WET GROUND SURFACE

COORDINATES OF LOCATION: See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material gradations estimated by visual/manual methods.
0–1			Pt/SM	Heavily organic topsoil.
1–4			SP-SM	Brown 10% cobbles, 5% gravel, 75% sand, 10% fines. Non-plastic Diorite clasts Frozen ground beginning at 2.5' bgs: Nbn
4				Refusal at 4' below top of bank excavation due to frozen ground.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

GRAPHIC LOG OF TEST PIT

TP-2

PROJECT: POGO DSTF

PROJECT NO.: 147900.010

TOTAL DEPTH: 0.5'

LOGGED BY: D.Neuffer / J.Gerber

DATE: 5/18/2013

GROUND WATER ENCOUNTERED: NO

GROUND WATER LEVEL: N/A

LOCATION AND ELEVATION: Inlet 3 South

EQUIPMENT: CAT 318C

SURFACE CONDITIONS: WET GROUND SURFACE

COORDINATES OF LOCATION: See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material gradations estimated by visual/manual methods.
0			Pt/SM	Organic topsoil (4").
			GP-GM	Light brown 18" Max, 15% boulders, 40% cobbles, 5% gravel, 35% sand, 5% fines, very low organics. Non-plastic. Sub-rounded to sub-angular clasts Frozen: Vc, Vr, Ice
1				
2				
3				Refusal at 0.5' bgs due to frozen ground.
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

srk consulting

GRAPHIC LOG OF TEST PIT

TP-3

PROJECT: POGO DSTF

PROJECT NO.: 147900.010

TOTAL DEPTH: 7.0'

LOGGED BY: D.Neuffer / J.Gerber

DATE: 5/17/2013

GROUND WATER ENCOUNTERED: NO

GROUND WATER LEVEL: N/A

LOCATION AND ELEVATION: Inlet 3 South

EQUIPMENT: CAT 318C

SURFACE CONDITIONS: WET GROUND SURFACE

COORDINATES OF LOCATION: See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material gradations estimated by visual/manual methods.
0 – 4			GP-GM	Wet surface, Grey-green 35% cobbles, 5% gravel, 35% sand, 25% fines, <5% organics. Non to low plastic Frozen
4 – 7			SP	Grey-green 15% cobbles, 10% gravel, 45% sand, 30% fines, <5% organics. Frozen: Nbe, Vr, 2" random ice, Nbn
7 – 22				Refusal at 7' below top of bank excavation due to frozen ground. 0-4' bgs was excavated into road cut. 4-7' bgs was excavated into road.

srk consulting

GRAPHIC LOG OF TEST PIT

TP-4

PROJECT: POGO DSTF

PROJECT NO.: 147900.010

TOTAL DEPTH: 1.5'

LOGGED BY: D.Neuffer / J.Gerber

DATE: 5/17/2013

GROUND WATER ENCOUNTERED: NO

GROUND WATER LEVEL: N/A

LOCATION AND ELEVATION: Inlet 3 South

EQUIPMENT: CAT 318C

SURFACE CONDITIONS: Wet Ground

COORDINATES OF LOCATION: See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material gradations estimated by visual/manual methods.
0			GM	Brown, wet, Angular diorite cobbles (R5), Road fill
1			GM	Brown, Angular diorite cobbles (R5), Frozen: Nbn, Road fill
2				Refusal at 1.5' bgs due to frozen ground. Test pit dug in roadway. All material: 15% boulders, 15% cobbles, 30% gravel, 25% sand, 15% fines, <5% organics, 2' max.
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

srk consulting

GRAPHIC LOG OF BOREHOLE

BH I3N-1

PROJECT POGO DSTF

PROJECT NO. 147900.070

TOTAL DEPTH: 27'

LOGGED BY J.Gerber

DATE 5/24/2013

GROUND WATER ENCOUNTERED: YES

GROUND WATER LEVEL: ~3' and ~27' BGS

LOCATION AND ELEVATION INLET 3 NORTH

EQUIPMENT ECM 590 DRILL, AIR ROTARY

SURFACE CONDITIONS WET

COORDINATES OF LOCATION See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material descriptions inferred from cuttings and driller observations. Approximate groundwater level based on observations during drilling.
0–3			Sand	Sand
3–6			Sand	Water Sand
6–13			Sand	Dry/frozen Sand and cobbles
13–18			Sand	Dry/frozen Sand
18–24			Gravel	Dry/frozen Gravel
24–28			Gravel	Dry/frozen Gravel and cobbles
28–44				Bottom of hole at 28' bgs. Drill unable to continue deeper due to hole collapse and blown hydraulic hose. Hole collapse probably due to water at ~27' bgs.

srk consulting

GRAPHIC LOG OF BOREHOLE

BH I3S-1

PROJECT POGO DSTF

PROJECT NO. 147900.070

TOTAL DEPTH: 42'

LOGGED BY J.Gerber

DATE 5/23/2013

GROUND WATER ENCOUNTERED: YES

GROUND WATER LEVEL: ~21' BGS

LOCATION AND ELEVATION INLET 3 SOUTH

EQUIPMENT ECM 590 DRILL, AIR ROTARY

SURFACE CONDITIONS DRY

COORDINATES OF LOCATION See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material descriptions inferred from cuttings and driller observations. Approximate groundwater level based on observations during drilling.
0–3			Sand	Unfrozen Sand
3–11			Sand	Dry/frozen Sand
11–15			Sand	Dry/frozen Sand and cobbles
15–18			Sand	Dry/frozen Sand
18–20			Gravel	Dry/frozen Gravel
20–21			Gravel	Dry/frozen, Gravel and cobbles
21–40			Gravel	Water Gravel and cobbles
40–41			Cobbles	Bedrock or permafrost, Drilling firmer.
41–42			Cobbles	Bedrock or permafrost. Drilling hard.
42–44				Bottom of hole at 42' bgs. Drill unable to continue deeper due to hole collapse.

srk consulting

GRAPHIC LOG OF BOREHOLE

BH I3S-2

PROJECT POGO DSTF

PROJECT NO. 147900.070

TOTAL DEPTH: 50'

LOGGED BY J.Gerber

DATE 5/23/2013

GROUND WATER ENCOUNTERED: YES

GROUND WATER LEVEL: ~18' BGS

LOCATION AND ELEVATION INLET 3 SOUTH

EQUIPMENT ECM 590 DRILL, AIR ROTARY

SURFACE CONDITIONS DRY

COORDINATES OF LOCATION See Figure A11.1

DEPTH (feet)	SAMPLE TAKEN	GRAPHIC LOG	USCS SOIL CLASS	DESCRIPTION OF MATERIAL
				Material descriptions inferred from cuttings and driller observations. Approximate groundwater level based on observations during drilling.
0–1			Sand	Unfrozen, Sand
1–6			Sand	Frozen Sand
6–8			Cobbles	Frozen Cobbles, Drilling firm
8–12			Sand	Frozen Sand and cobbles
12–14			Gravel	Frozen, Fine gravel and sand
14–16			Sand	Frozen, Sand
16–18			Gravel	Grey, Gravel and sand
18–29			Gravel	Water Gravel and sand
29–30			Gravel	Frozen, Gravel and sand
30–48			Gravel	Water Gravel
48–50			Bedrock	Fractured bedrock, Drilling firmer
50–55				Bottom of hole at 50' bgs. Drill unable to continue deeper due to hole collapse.

Appendix 12

AAP Product Submittals

Recommended Concrete Mix Design
Mix # DC5000 0.39 (NAS Units)

Concrete Strength = 5000 psi in 28 Days w/Type I/II Cement

Maximum Nominal Size Aggregate (in)	0.75
Cementitious Materials (Sacks/yd^3)	7.0
Water/Cement Ratio (lb/lb)	0.39
Entrained Air (%)	4.0 – 7.0
Slump (in)	Diversion Ditch Specs (2.0" - 4.25") 1 - 9
Sand Content (% by Volume)	38
Coarse Agg SPG (SSD) / Abs %	2.71 / 0.6
Fine Agg SPG (SSD) / Abs %	2.68 / 0.4
Cement Specific Gravity	3.15

Batch Weights in Pounds
One Cubic Yard

Ingredient	Weight (lb)	Volume (ft^3)
Cement	658	3.348
Water	257 [30.8 gal]	4.113
Sand (SSD)	1146	6.851
Gravel (SSD)	1890	11.177
Air Content (5.6%)	4.6 oz	1.512
Glenium 7500	32 oz	
Pozzutec 20+	16 oz	
Totals	3951	27.000

Cement = LaFarge Type I/II ASTM C150
Water = Plant Water Conforms to ASTM C1602 and C94
Sand = DC Richardson Hwy Pit Delta Junction, AK
Gravel = DC Size #67 Richardson Hwy Pit Delta Junction, AK
Air Content = MBAE90 (BASF product) meets ASTM C260
Glenium 7500 = Full Range Water Reducing Admixture (BASF product) meets ASTM C494 Type A & F
Pozzutec 20+ = Accelerating Agent (BASF product) meets ASTM C494 Type C accelerator

The Concrete Mix design Batch weights recommended are based on SSD Aggregates and they must be adjusted to meet existing moisture conditions at the plant.

Test Batch Results

Ingredient	Test Batch # 1 (1.0 ft^3)
Cementitious Materials	11054 g
Water*	4311 g
Water/Cement Ratio	0.39
Gravel Weight (SSD)	31888 g
Sand Weight (SSD)*	20162 g
MBAE 90	5.0 mL
Glenium 7500	35 mL
Pozzutec 20+	18 mL
Slump (ASTM C143)	8.0 in
Unit Weight	143.0 pcf
Air Content, % (ASTM C231)	7.1
Workability	Good
3 Day Compressive Strength Test	3890 psi
7 Day Compressive Strength Test	4920 psi
14 Day Compressive Strength Test	5410 psi
28 Day Compressive Strength Test	5880 psi

*Actual sand wt was 20666 g due to 2.5% moisture greater than absorption. 504 g of water was added to batched water weight (actual water batched was 3807 g)

SHOTCRETE PLACEMENT PLAN

POGO DRY STACK TAILINGS FACILITY EXPANSION: DIVERSION DITCH

General Placement

Shotcrete will be placed on the diversion ditch as shown on the plans at a nominal depth of three (3) inches. Shotcrete will be placed on prepared surfaces that are approved and signed off by Pogo. Depth will be controlled using pink survey chasers that are cut to the nominal thickness.

Shotcrete will not be placed during significant rain, snow, or wind events unless approved by Pogo.

Shotcrete mix will be batched using preapproved materials with an on-site batch plant provided by Delta Concrete. The location of the batch plant, aggregate stockpile, and washout facility will be located on shelf two of the dry stack tailings facility. Onsite pump cleanout will be in the ditch in a location not covered with shotcrete. Clean out material will be removed prior to shotcrete being placed.

Shot Crete Mix Design:

Description	QTY	Unit
Type I Cement	791	lb
3/8" Minus	700	lb
Sand	2106	lb
Rheomac 300D	16	lb
Strux 85/50 Fiber	5	lb
Superplasticer 1466	28	oz
Microair	8.5	oz
W/C Ratio	35	%
Slump	2 ± 3/4	in

Shotcrete materials will be delivered to the concrete pump utilizing two eight (8) cubic yard rear discharge concrete mixer trucks.

Shotcrete mix will be applied to the ditch utilizing Mayco LS-60 Concrete pump and a 400 CFM Air Compressor. AAP has two certified ACI/ASA Nozzle men for wet-mix shotcrete applications.

Shotcrete surfaces shall be left in the natural gun state, and core holes shall be repaired with hand placed mortar.

Shotcrete placement shall commence in a manner such to maximize joints overlapping in a downstream orientation, and shall be in consecutive order as minimize “leap-frogging” or leaving gaps in the shotcrete mat. Construction joints will be placed on green concrete within 3 days.

Concrete joints that are greater than 3 days of age will be prepared with a bonding compound to ensure an adequate bond between panels. BASF Acryl 60 “Moose Milk” will be used to treat shotcrete surfaces

prior to an overlap placement. The manufacture's recommendations will be followed prior to application at an Acryl to water ratio of 2:1.

Surfaces shall be covered with blankets during rain events for not less than 24 hours after being placed. Shotcrete surfaces will be inspected for defects, delamination, cracking or damage.

Cold Weather Placement:

Historically over the last five years, ACI would require implementation of Cold Weather Concrete protection starting September 21. Based on anticipated daily production, it is not expected to perform cold weather protection measures to complete the North Diversion.

In the event the cold weather concrete protection and batching is required the following conditions should be met as defined under ACI Section 306 Cold Weather Concreting:

Cold Weather Concreting

Reported by ACI Committee 306

Table 3.1 - Recommended concrete temperatures

Line	Air temperature	Section size, minimum dimension, in. (mm): < 12 in. (300 mm)	12-36 in. (300-900 mm)	36-72 in. (900-1800 mm)	> 72 in. (1800 mm)
Minimum concrete temperature as placed and maintained					
1	-	55 F (13 C)	50 F (10 C)	45 F (7 C)	40 F (5 C)
Minimum concrete temperature as mixed for indicated air temperature*					
2	Above 30 F (- 1 C)	60 F (16 C)	55 F (13 C)	50 F (10 C)	45 F (7 C)
3	0 to 30 F (-18 to -1 C)	65 F (18 C)	60 F (16 C)	55 F (13 C)	50 F (10 C)
4	Below 0 F (- 18 C)	70 F (21 C)	65 F (18 C)	60 F (16 C)	55 F (13 C)
Maximum allowable gradual temperature drop in first 24 hr after end of protection					
5	-	50 F (28 C)	40 F (22 C)	30 F (17 C)	20 F (11 C)

*For colder weather a greater margin in temperature is provided between concrete as mixed and required minimum temperature of fresh concrete in place.

Table 5.1 - Length of protection period required to prevent damage from early-age freezing of air-entrained concrete

Line	Exposure	Protection period at temperature indicated in Line 1 of Table 3.1, days*: Type I or II cement	Type III cement, or accelerating admixture, or 100 lb/yd³ (60 kg/m³) of additional cement
1	Not exposed	2	1
2	Exposed	3	2

*A day is a 24-hr period.

Table 5.3 - Length of protection period for concrete placed during cold weather

Line	Service category	Protection period at temperature indicated in Line 1 of Table 3.1, days*: Type I or II cement	Type III cement, or accelerating admixture, or 100 lb/yd³ (60 kg/m³) of additional cement
1	1 - no load, not exposed	2	1
2	2 - no load, exposed	3	2
3	3 - partial load, exposed	6	4
4	4 - full load	See Chapter 6	

*A day is a 24-hr period.

Quality Control

Quality Control forms are attached for your review:

Slump and Air Content testing will be self-performed by AAP. Testing will be performed as directed by Pogo. Core extraction will be performed by AAP and shipped to MAPPA for compression breaks. Test Panels (attached) will be constructed as detailed in the specifications. Test panels will be shot as directed by Pogo.

Two (2) inch diameter Core specimens will be collected from in-place shotcrete. Six cores will be collected as one sample. Two cores from each sample will be compressed on the following intervals: 7 and 28 days.

Quality Control reports will be submitted to Pogo for their records.

OFFICE

TIME REQUESTED

Delta Concrete Products, Inc.

P.O. Box 289
Delta Junction, Alaska 99737
Phone (907) 895-4679
Fax (907) 895-1001

DELIVERY TICKET
WEIGHMASTER CERTIFICATE

SOLD TO: Rheomec 300d w/1466

LOAD #	LOAD SIZE	YDS.DEL.	YDS. ORDERED	MIX	SLUMP	USE	TICKET #
	3.00 yd	3.00 yd	3.50 yd	POGO	3.00 in		1872

DATE	DRIVER	TRUCK #	P.O. #	JOB #	BATCH #	PLANT/TRANS.
07-26-12		8				C

QUANTITY	CODE	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
3.00	POGO	ditchlining with shotcrete		

5 MINUTES PER YARD FREE UNLOADING TIME ALLOWED, ADDITIONAL UNLOADING TIME CHARGED AT CURRENT PREVAILING RATES.

LEFT PLANT	ARRIVE JOB	START UNLOAD

FINISH UNLOAD	LEAVE JOB	ARRIVE PLANT

DELAY EXPLANATION/CYLINDER TEST

1. JOB NOT READY
2. SLOW POUR
3. TRUCK AHEAD ON JOB
4. CONTRACTOR BROKE DOWN
5. ADDED WATER
6. TRUCK BROKE DOWN
7. ACCIDENT
8. CITATION
9. OTHER

MIXER REVOLUTIONS

LEAVE PLANT	ARRIVE JOB	START UNLOAD

JOB SITE WATER ADDED	DRIVERS SLUMP
Gal.	

JOB SITE PLASTICIZER
Gal.

AUTHORIZED

ADDITIONAL CHARGE 1 _____

ADDITIONAL CHARGE 2 _____

GRAND TOTAL →

WARNING

IRRITATING TO THE SKIN AND EYES

Contains Portland Cement. Wear Rubber Boots and Gloves. PROLONGED CONTACT MAY CAUSE BURNS. Avoid contact with Eyes and Prolonged contact with skin. In case of Contact With Skin or Eyes, Flush Thoroughly With Water. If irritation persists, Get Medical Attention. KEEP CHILDREN AWAY.

CONCRETE is a PERISHABLE COMMODITY and BECOMES the PROPERTY of the PURCHASER UPON BATCHING at the PLANT. Any CHANGES or CANCELLATION of ORIGINAL INSTRUCTIONS MUST be TELEPHONED to the OFFICE BEFORE LOADING STARTS.

Not responsible for Reactive Aggregate or Color Quality.
No Claim Allowed Unless Made at Time Material is Delivered.
A $20.00 Service Charge will be collected on all returned checks.
Excess Delay Time Charged at Current Prevailing Rates.

WASH OUT PROCEDURE

NO EXCEPTIONS

Customer is responsible for providing a designated wash out area. TICKET MUST BE SIGNED BEFORE POURING OUT.

Excessive Water is Detrimental to Concrete Performance
H_2O Added by Request/Authorized by
_____ Gal. X _____

ON SITE ADDITIONS: ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK

CONCRETE SUPPLIED TO MEET MIX CRITERIA STATED ABOVE IN ACCORDANCE WITH CLIENT'S REQUEST. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED.

NOTICE READ IMPORTANT INFORMATION ON OTHER SIDE. MY SIGNATURE BELOW INDICATES I HAVE READ THE HEALTH WARNING NOTICE ON THE FRONT AND AGREE WITH THE TERMS AND CONDITIONS ON THE BACK AND AGREE NOT TO HOLD THE SUPPLIER RESPONSIBLE FOR ANY DAMAGE CAUSED WHEN DELIVERING INSIDE THE CURB.

X _____

Ticket No. 1872

Batch size 3.00 yd

-MatTrim:-	-Indication-	- Targets --	-% Tol-	WatFree	%Moist
3/8 MINUS	2340 lb	2100 lb	11.4*	13.8	0.60
SAND	6320 lb	6320 lb	0.0	123.0	2.00
CEMENT	2360 lb	2375 lb	-0.6		
WATER	69 G	74 G	-6.8	575.8	Trim Water
POLYHEED	0 fl.oz	0 fl.oz	0.0		
MICRO AIR	0 fl.oz	0 fl.oz	0.0		

Dry Aggs	8456 lb
Cems:	2360 lb
Waters:	713 lb
Total:	11596 lb
Wat/Cem:	0.302
G/yd	-7.0

28 oz
1466 28oz/cy 84 oz
Rheomac 300 D 28 #
STRUX 8850 15 # TTL

03:27:50p 07-26-12
--Bottles Empty------

AGG	-20	20 lb
CEM	0	25 lb

OFFICE

TIME REQUESTED
REPRINT

Delta Concrete Products, Inc.

P.O. Box 289
Delta Junction, Alaska 99737
Phone (907) 895-4679
Fax (907) 895-1001

DELIVERY TICKET
WEIGHMASTER CERTIFICATE

SOLD TO: Rheomec 300d w/1466

LOAD #	LOAD SIZE	YDS.DEL.	YDS. ORDERED	MIX	SLUMP	USE	TICKET #
	3.00 yd	6.00 yd	3.00 yd	POGO	3.00 in		1873

DATE	DRIVER	TRUCK #	P.O. #	JOB #	BATCH #	PLANT/TRANS.

QUANTITY	CODE	DESCRIPTION	UNIT PRICE	EXTENDED PRICE
3.00	POGO	ditchlining with shotcrete air 9.0%		

5 MINUTES PER YARD FREE UNLOADING TIME ALLOWED, ADDITIONAL UNLOADING TIME CHARGED AT CURRENT PREVAILING RATES.

LEFT PLANT	ARRIVE JOB	START UNLOAD

FINISH UNLOAD	LEAVE JOB	ARRIVE PLANT

DELAY EXPLANATION/CYLINDER TEST

1. JOB NOT READY
2. SLOW POUR
3. TRUCK AHEAD ON JOB
4. CONTRACTOR BROKE DOWN
5. ADDED WATER
6. TRUCK BROKE DOWN
7. ACCIDENT
8. CITATION
9. OTHER

MIXER REVOLUTIONS

LEAVE PLANT	ARRIVE JOB	START UNLOAD

JOB SITE WATER ADDED: Gal.

JOB SITE PLASTICIZER: Gal.

AUTHORIZED

DRIVERS SLUMP

ADDITIONAL CHARGE 1

ADDITIONAL CHARGE 2

GRAND TOTAL →

WARNING

IRRITATING TO THE SKIN AND EYES

Contains Portland Cement. Wear Rubber Boots and Gloves. PROLONGED CONTACT MAY CAUSE BURNS. Avoid contact with Eyes and Prolonged contact with skin. In case of Contact With Skin or Eyes, Flush Thoroughly With Water. If irritation persists, Get Medical Attention. KEEP CHILDREN AWAY.

CONCRETE is a PERISHABLE COMMODITY and BECOMES the PROPERTY of the PURCHASER UPON BATCHING at the PLANT. Any CHANGES or CANCELLATION of ORIGINAL INSTRUCTIONS MUST be TELEPHONED to the OFFICE BEFORE LOADING STARTS.

Not responsible for Reactive Aggregate or Color Quality.
No Claim Allowed Unless Made at Time Material is Delivered.
A $20.00 Service Charge will be collected on all returned checks.
Excess Delay Time Charged at Current Prevailing Rates.

WASH OUT PROCEDURE

NO EXCEPTIONS

Customer is responsible for providing a designated wash out area. TICKET MUST BE SIGNED BEFORE POURING OUT.

Excessive Water is Detrimental to Concrete Performance
H_2O Added by Request/Authorized by
_____ Gal. X _____

ON SITE ADDITIONS: ADDITIONAL WATER ADDED TO THIS CONCRETE WILL REDUCE ITS STRENGTH. ANY WATER ADDED IS AT CUSTOMER'S RISK

CONCRETE SUPPLIED TO MEET MIX CRITERIA STATED ABOVE IN ACCORDANCE WITH CLIENT'S REQUEST. NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED.

NOTICE READ IMPORTANT INFORMATION ON OTHER SIDE. MY SIGNATURE BELOW INDICATES I HAVE READ THE HEALTH WARNING NOTICE ON THE FRONT AND AGREE WITH THE TERMS AND CONDITIONS ON THE BACK AND AGREE NOT TO HOLD THE SUPPLIER RESPONSIBLE FOR ANY DAMAGE CAUSED WHEN DELIVERING INSIDE THE CURB.

X _____

Ticket No. 1873

Batch size 3.00 yd

-MatTrim:-	-Indication-	- Targets --	-% Tol-	WatFree	%Moist
3/8 MINUS	2200 lb	2100 lb	4.8	13.0	0.60
SAND	6420 lb	6320 lb	1.6	124.9	2.00
CEMENT	2360 lb	2375 lb	-0.6		
WATER	74 G	74 G	0.0	617.5	Trim Water G/yd -7.0
POLYHEED	180 fl.oz	180 fl.oz	0.0		
MICRO AIR	0 fl.oz	0 fl.oz	0.0		

Dry Aggs	8415 lb
Cems:	2360 lb
Waters:	755 lb
Total:	11598 lb
Wat/Cem:	0.320

Rheomac 3000 28 oz
Glen 15 #

04:34:49p 07-26-12
--Bottles Empty-----

AGG	0	-20 lb
CEM	25	20 lb

Alaska Interstate Construction, LLC
301 W. Northern Lights Blvd., Suite 600
Anchorage, Alaska 99503

Pogo Mine: DSTF Expansion, Diversion Ditch

TRANSMITTAL

TO:	*Dan Neuffer or Alvin Tong*	FROM:	*Tyler Dyer*
COMPANY:	*SRK Consulting*	DATE:	*June 28, 2012*
PHONE NO:		PHONE NO:	*(907) 895-2912*
FAX NO:		FAX NO:	
NUMBER OF COPIES INCLUDED:	*1Copy(s)*	REF:	*DSTF-062812A*

☑ FOR APPROVAL ☐ AS REQUESTED ☐ FOR INFORMATION ☐ RESUBMITTED ☐ OTHER _____

DESCRIPTION: Strux Fiber and Rheomac 300D for Shotcrete Reinforcement and Addmixture submitted under register item 8-D

RECEIVED BY _____ DATE: _____

PRODUCT INFORMATION

STRUX® 85/50

SYNTHETIC MACRO FIBER REINFORCEMENT

Description

STRUX® 85/50 synthetic macro fiber reinforcement is a unique form of high strength, high modulus synthetic macro reinforcement that is distributed throughout the concrete matrix. It consists of synthetic macro fibers 50 mm (2 in.) in length with an aspect ratio of 85 that have specifically been designed to ensure ease of use and rapid dispersion in concrete. STRUX 85/50 is used in concrete to improve the material properties including toughness (post crack energy absorption), impact and fatigue resistance.

Uses

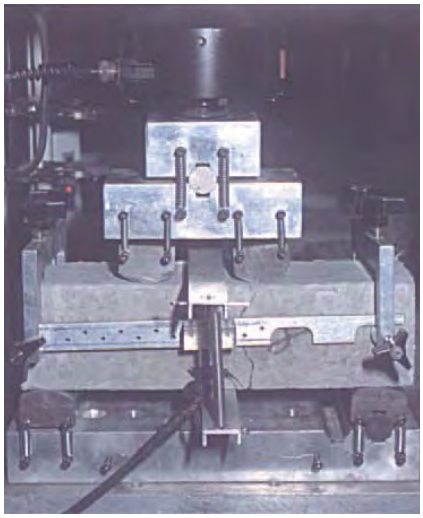
STRUX 85/50 may be used in a variety of ready mix, precast and shotcrete applications including: bridge decks, overlays, whitetopping, pipes, vaults, septic tanks, tunnel linings, slope stabilization, and swimming pools.

Advantages

When added to shotcrete and concrete, the primary benefit of STRUX 85/50 is a significant improvement in flexural toughness as outlined in Table 1.

Addition Rates

STRUX 85/50 addition rates are dependent on the specific application and desired properties and will typically vary between 3.0 to 9.0 kg/m^3 (5.0 to 15.0 lb/yd^3).



ASTM C 1018-97 testing in progress

Product Advantages

STRUX 85/50 has been designed to provide:

- Safety
- Ductility
- Durability
- Crack control
- Energy absorption
- Stain free concrete surfaces
- Quick, easy and safe application
- An efficient and cost effective secondary reinforcement alternative

Mix Design and Mixing Requirements

The utilization of fibers generally requires the use of a superplasticizer such as ADVA® to restore the required workability to fiber reinforced concrete.

STRUX 85/50 may be added to concrete at any point during the batching or mixing process. STRUX 85/50 should be added at a maximum rate of one bag every 30 seconds. After fiber addition the concrete should be mixed at the recommended mixing speed for a minimum of 70 revolutions to ensure adequate fiber dispersion.

Please contact your Grace representative with any questions.

Compatibility

STRUX 85/50 is compatible with all GRACE admixtures. Their action in concrete is mechanical and will not affect the hydration process of the cement and therefore will not effect the compressive strength. Each liquid admixture should be added separately to the concrete mix.

Packaging and Dispensing

STRUX 85/50 is available in 4.5 kg (10 lb) bags.

U.S. Patent No. 6,569,525
U.S. Patent No. 6,569,526
U.S. Patent No. 6,758,897

GRACE
Construction Products

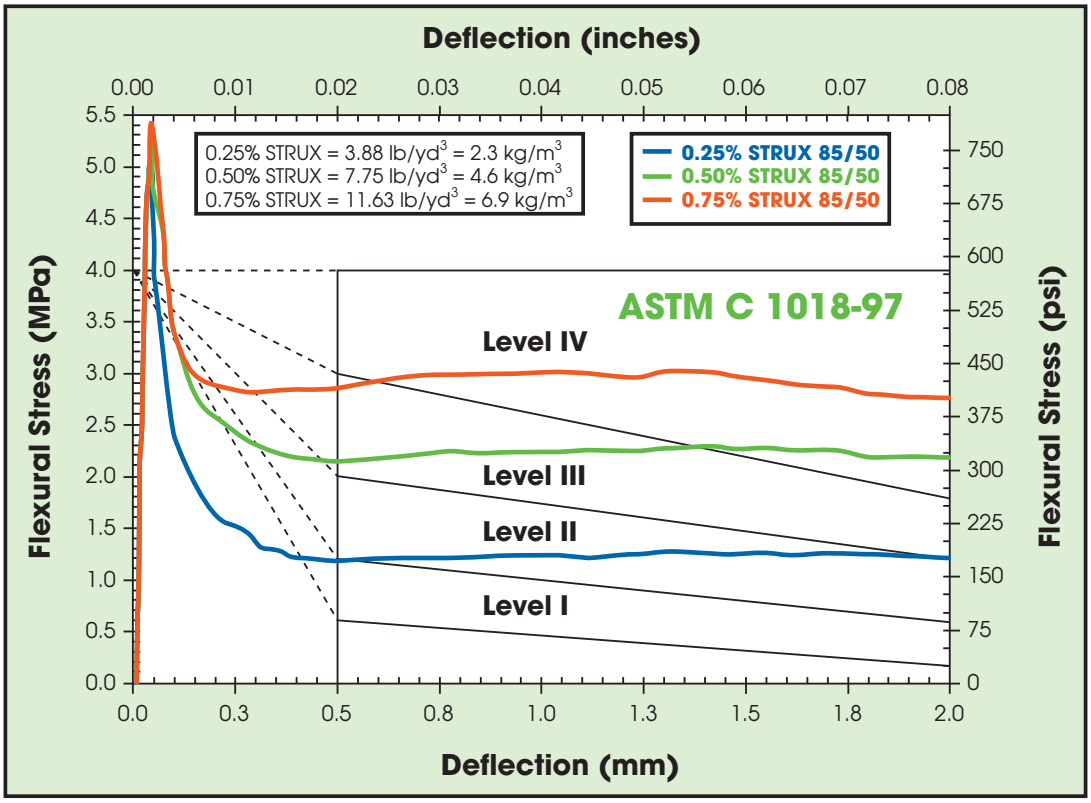
Table 1

Typical Flexural Strength and Toughness results that can be expected from a 40 MPa (5800 psi), air entrained, concrete at 28 days

STRUX 85/50 Dosage Rate	Defl. @ 1 in. crack (mm)	Specimen Cross Section		Max. Load (kN)	Flexural Strength (MPa)	ASTM C 1018-97 Toughness Indices					ASTM C 1018-97 Residual Strength Factors					JSCE* (MPa)
		Base (mm)	Height (mm)			I_5	I_{10}	I_{20}	I_{30}	I_{60}	$R_{5,10}$	$R_{10,20}$	$R_{20,30}$	$R_{30,60}$	$R_{10,50}$	
Control	0.038	102.1	102.0	19.20	5.50	2.88	3.94	4.89	5.30	5.73	21.3	9.5	4.1	1.4	4.3	0.35
0.25%	0.037	101.8	103.5	18.60	5.19	3.15	4.76	7.12	9.17	15.37	32.1	23.6	20.5	20.7	21.4	1.44
0.50%	0.038	102.0	103.8	19.30	5.37	3.51	5.63	9.24	12.60	23.07	42.4	36.1	33.6	34.9	34.7	2.42
0.75%	0.039	102.1	103.7	20.20	5.60	3.49	5.72	10.00	14.36	27.93	44.5	42.8	43.6	45.2	44.2	3.07

STRUX 85/50 Dosage Rate	Defl. @ 1 in. crack (mil)	Specimen Cross Section		Max. Load (lbf)	Flexural Strength (psi)	ASTM C 1018-97 Toughness Indices					ASTM C 1018-97 Residual Strength Factors					JSCE* (psi)
		Base (in.)	Height (in.)			I_5	I_{10}	I_{20}	I_{30}	I_{60}	$R_{5,10}$	$R_{10,20}$	$R_{20,30}$	$R_{30,60}$	$R_{10,50}$	
Control	1.50	3.98	3.98	4316	798	2.88	3.94	4.89	5.30	5.73	21.3	9.5	4.1	1.4	4.3	51
0.25%	1.46	3.97	4.04	4181	753	3.15	4.76	7.12	9.17	15.37	32.1	23.6	20.5	20.7	21.4	209
0.50%	1.50	3.98	4.05	4339	779	3.51	5.63	9.24	12.60	23.07	42.4	36.1	33.6	34.9	34.7	351
0.75%	1.54	3.98	4.04	4541	812	3.49	5.72	10.00	14.36	27.93	44.5	42.8	43.6	45.2	44.2	445

* Japanese Society for Civil Engineering



North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Visit our web site at: www.graceconstruction.com

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140

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GRACE
Construction Products

Alaska Interstate Construction, LLC
301 W. Northern Lights Blvd., Suite 600
Anchorage, Alaska 99503

Pogo Mine: DSTF Expansion, Diversion Ditch

TRANSMITTAL

TO:	*Dan Neuffer or Alvin Tong*	FROM:	*Tyler Dyer*
COMPANY:	*SRK Consulting*	DATE:	*June 28, 2012*
PHONE NO:		PHONE NO:	*(907) 895-2912*
FAX NO:		FAX NO:	
NUMBER OF COPIES INCLUDED:	*1Copy(s)*	REF:	*DSTF-062812A*

☑ FOR APPROVAL ☑ AS REQUESTED ☐ FOR INFORMATION ☐ RESUBMITTED ☐ OTHER _____

DESCRIPTION: Strux Fiber for Shotcrete Reinforcement submitted under register item 8-D

RECEIVED BY _____ DATE: _____

BASF
The Chemical Company

3/7

03 30 00
03 40 00
04 22 00
07 16 16

Product Data
Cast-in-place Concrete
Precast Concrete
Concrete Unit Masonry
Crystalline Waterproofing

Rheomac® 300D

Crystalline Capillary Waterproofing Admixture

Description

Rheomac 300D admixture is an integral crystalline capillary waterproofing admixture for concrete. It is designed for use in above- and below-grade applications.

Applications

Recommended for use in:

- Foundations
- Sewage and water treatment plants
- Tanks
- Underground vaults
- Tunnel and subway systems
- Water reservoirs
- Secondary containment structures
- Parking structures
- Precast components
- Swimming pools

Features

- Crystalline cementitious material
- Integral addition
- Reduces concrete permeability
- Allows concrete to breathe

Benefits

- Reduces penetration of water and other liquids
- Seals hairline cracks
- Resists positive and negative side hydrostatic pressure
- Protects against sewage and industrial wastes

Performance Characteristics

Setting Time: Rheomac 300D admixture has little to no effect on concrete setting time within the recommended dosage range.

Permeability: Rheomac 300D capillary waterproofing admixture is a portland cement-based crystalline cementitious material that reacts in concrete to form non-soluble crystalline hydration products in the capillary pores of the concrete. These crystalline hydration products effectively reduce the permeability of concrete thus reducing capillary absorption and the penetration of water and other liquids.

Typical Data for Rheomac 300D admixture @ 2% by mass of cement

Performance characteristic	*Test method*	*Performance relative to untreated concrete mixture*
Capillary Absorption	ASTM C 1585	43% reduction
Water Penetration	Modified DIN 1048	40% reduction
Moisture Vapor Emission Rate	ASTM F 1869	Same
Electrical Conductance	ASTM C 1202	Same
Compressive Strength	ASTM C 39/C 39M	7% increase

Guidelines for Use

Dosage: The dosage range for Rheomac 300D admixture is 2% to 2.5% by mass of cement. For most applications, the recommended optimum dosage is 2% by mass of cement.

Dispensing and Mixing: Rheomac 300D admixture is batched at the concrete production plant in a manner similar to that for cement or other cementitious materials. It may be batched in either a central or truck mixer. Follow the procedures outlined in ASTM C 94/C 94M, Standard Specification for Ready-Mixed Concrete, for general batching and mixing instructions for concrete. Provide at least 5 minutes of mixing after the addition of Rheomac 300D admixture to ensure thorough and uniform distribution of the admixture in the concrete mixture.

Master Builders

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: Rheomac 300D admixture will neither initiate nor promote corrosion of reinforcing or prestressing steel embedded in concrete or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of Rheomac 300D admixture.

Compatibility: Rheomac 300D admixture can be used with portland cements approved under ASTM, AASHTO or CRD specifications. It is compatible with most concrete admixtures, including all BASF Construction Chemicals products. Rheomac 300D admixture is recommended for use with high-range water-reducing admixtures, such as the Glenium® series, for maximum workability while maintaining a low water-to-cementitious materials ratio.

Storage and Handling

Rheomac 300D admixture must be stored in a clean, dry area maintained at a minimum temperature of 45 ºF (7 ºC). Rheomac 300D admixture has a shelf life of one year when stored under recommended conditions.

Packaging

Rheomac 300D admixture is available in 48 lb (22 kg) bags.

Related Documents

Material Safety Data Sheet: Rheomac 300D admixture.

Additional Information

For additional information on Rheomac 300D admixture or its use in developing concrete mixtures with special performance characteristics, contact your local sales representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative admixtures for specialty concrete used in the ready-mixed, precast, manufactured concrete products, underground construction and paving markets throughout the North American region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

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owing gradations, as determined by WAQTC FOP for AASHTO T 27/T 11:

TABLE 703-2
AGGREGATE FOR BASE AND SURFACE COURSE
Percent Passing By Weight

	GRADATION			
	BASE COURSE		SURFACE COURSE	
	C-1	D-1	E-1	F-1
	100			
	70-100	100	100	100
	60-90	70-100	70-100	85-100
	45-75	50-80	50-85	60-100
	30-60	35-65	35-65	50-85
	22-52	20-50	20-50	40-70
	8-30	8-30	15-30	25-45
)	0-6	0-6	8-15	8-20

GGREGATE FOR ASPHALT CONCRETE PAVEMENT.

gregate (retained on the No. 4 sieve). Crushed stone or crushed gravel consisting of gh, durable rock of uniform quality. Free from clay balls, vegetative matter, or other matters. Not coated with dirt or other finely divided mineral matter. Meet the following ts:

, %	AASHTO T 96	45, max.
on Value	ATM 313	30, min.
ulfate Loss,%	AASHTO T 104	9, max. (5 cycles)
%	WAQTC FOP for AASHTO TP 61	80, min. (single face)
gated Pieces,%	ATM 306	8%, max.

egate (passing the No. 4 sieve). Meet the quality requirements of AASHTO M 29, 1.1, Sulfate Soundness.

ggregate. Blend the aggregate fractions to meet the grading requirements of Table determined by WAQTC FOP for AASHTO T 27/T 11. Ensure that the fraction actually tween any two consecutive sieves larger than the No. 100 sieve is not less than 2% of

TABLE 703-3
D BAND GRADATIONS FOR ASPHALT CONCRETE PAVEMENT AGGREGATE
Percent Passing by Weight

SIEVE	GRADATION		
	Type I	Type II	Type III
1 in.	100		
3/4 in.	80-90	100	
1/2 in.	60-84	75-90	100
3/8 in.	48-78	60-84	80-90
No. 4	28-63	33-70	44-81
No. 8	14-55	19-56	26-70
No. 16	9-44	10-44	16-59
No. 30	6-34	7-34	9-49
No. 50	5-24	5-24	6-36
		4-16	4-22

703-2.05 AGGREGATE FOR COVER COAT AND SURFACE TREATMENT. Crushed stone or crushed gravel, consisting of sound, tough, durable pebbles or rock fragments of uniform quality. Free from clay balls, vegetable matter, or other deleterious matters, and with no adherent films or coatings of dirt, clay, dust or other deleterious matter that could impede adherence of the bituminous material. Wash the aggregate if necessary. Meet the following requirements:

L.A. Wear,%	AASHTO T 96	45, max.
Degradation Value	ATM 313	50, min.
Sodium Sulfate loss,%	AASHTO T 104	9, max. (5 cycles)
Fracture,%	WAQTC FOP for AASHTO TP 61	90, min. (single face)

At least 15 days before beginning work, submit a representative 30-pound sample of the aggregate and 1-quart sample of the bituminous material proposed for use in the work. The Department will test the materials using ATM 414 as submitted (that is, without addition of anti-stripping additives). The Department will reject materials failing to meet or exceed 70% retention of the asphalt, unless you provide approved anti-stripping additives or employ other approved measures which correct this deficiency.

Cover Coat Material. Meet the gradation requirements of Table 703-4, as determined by WAQTC FOP for AASHTO T 27/T 11.

TABLE 703-4
REQUIREMENTS FOR GRADING OF COVER COAT MATERIAL
Percent Passing By Weight

SIEVE	TYPE 2 COVER AGGREGATE	TYPE 3 COVER AGGREGATE		
		Grading A	Grading B	Grading C
1/2 in.	--	--	--	100
3/8 in.	100	100	100	90-100
No. 4	85-100	85-100	60-100	10-30
No. 8	--	0-25	0-10	0-8
No. 50	0-20	--	--	--
No. 200	0-1	0-1	0-1	0-1

Surface Treatment Material. Meet the gradation requirements of Table 703-5, as determined by WAQTC FOP for AASHTO T 27/T 11.

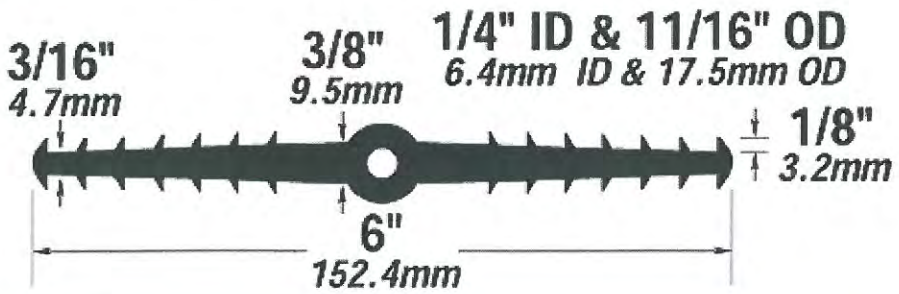
TABLE 703-5
REQUIREMENTS FOR GRADING OF AGGREGATE FOR ASPHALT SURFACE TREATMENT

SIEVE	GRADING Percent Passing by Weight						
	A	B	C	D	E	F	G
1-1/2 in.	100	--	--	--	--	--	--
1 in.	90-100	100	--	--	--	--	--
3/4 in.	--	90-100	100	--	--	--	--
1/2 in.	0-15	20-55	90-100	100	100	--	--
3/8 in.	--	0-15	40-75	90-100	90-100	100	100
No. 4	--	--	0-15	0-10	10-30	75-100	85-100
No. 8	--	--	0-5	0-5	0-8	0-10	60-100
No. 200	0-1	0-1	0-1	0-1	0-1	0-1	0-10

Print this Page

Waterstops - PVC: Catalog Item: 705

- Ribbed with Centerbulb - Tapered
- - - Application: Moving



Specifications on this product:

Weight (lbs/ft): 1.19	**Weight (Kg/m):** 1.77
Width (inches): 6	**Width (mm):** 152
Thickness (inches): 3/8	**Thickness (mm):** 9.5
BulbID (inches): 1/4	**Bulb ID (mm):** 6.4
BulbOD (inches): 11/16	**Bulb OD (mm):** 17.5
Head Pressure (ft): 125	**Head Pressure (KPa):** 373

Other Notes:

None

Matching Products:

None

Close Window

< Fields Coatings & Mastics 100 to 300 Series

Product Information Sheet

A300 AtcoMastic

All Weather Asphalt Mastic

USES: A300 AtcoMastic stops leaks in the rain. It even adheres under water. You can effectively seal around chimneys, vents, pipes, air conditioning equipment, skylights, drains, flashings, and sheet metal. AtcoMastic also repairs surface fissures, seals down shingle tabs, stops leaking nail heads, cements laps on roll roofing, and bonds roofing sheets to the deck. AtcoMastic is compatible with SEBS, APP, and SBS modified bitumen roofing products and will adhere to most surfaces including roofing, wood, metal, glass, and concrete.

DIRECTIONS: A300 AtcoMastic is friendly to apply, even in below freezing, wet conditions. Apply with a broad putty knife. Warm AtcoMastic to room temperature for easiest application. Clean gravel, dirt, vegetation, and debris from the application area. Make sure the application surface is smooth, firm, and frost-free. Apply directly from the container without diluting. When applying to a wet surface, trowel and work the AtcoMastic onto the surface until a secure bond is achieved. Seal areas exposed to water penetration with AtcoMastic. Generously apply a minimum .5" thick layer of AtcoMastic over the exposed area. Make 3 layer repair with AtcoMastic and PolyWeb over fissures or to reinforce degraded areas. First trowel a generous application of AtcoMastic over the application area and beyond the width and length of the PolyWeb you intend to install. Second, lightly trowel the PolyWeb into the AtcoMastic. Third, carefully trowel a generous application of AtcoMastic over the entire repair, making sure to completely cover the PolyWeb. For severe fissures, apply additional layers of PolyWeb and AtcoMastic.

DESCRIPTION: A300 AtcoMastic is a quality all weather asphalt mastic manufactured from 100% oxidized roofing asphalt. Select raw materials have been formulated to make AtcoMastic a premium product. AtcoMastic provides superior elastic performance against thermal shock, the daily expansion and contraction of a roof caused by temperature changes. In addition, the sun's UV rays attack the roof membrane making it brittle and weak, inducing membrane ruptures during thermal shock cycles. AtcoMastic is your best defense against these attacks. With AtcoMastic your roofing and waterproofing installations will perform much longer. AtcoMastic is asbestos free.

SPECIFICATIONS: A300 AtcoMastic exceeds the standards of the American Society for Testing and Materials ASTM D 4586 Type 1. Maximum VOC is 300 grams per liter.

PACKAGING: A300 AtcoMastic is available in 11 oz tubes, 29 oz tubes, 1 quart cans, 1 gallon cans, 3 gallon pails, and 5 gallon pails.

TECHNICAL INFORMATION:

Approximate Pounds Per Gallon	8.2
Minimum Percent Nonvolatile Weight	70
Approximate Hours Set Up Time to the Touch	24
Days Set Up Time Before Applying Reflective Coating	90
Optimum Application Temperature Range in deg. F	40 to 90
Application Consistency	Trowelable

RECOMMENDED APPLICATION RATE PER 100 SQUARE FEET:

N/A

A300 MSDS >

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Certification of Conformance

Date: 06/05/2013

JM Eagle Order #: PSU G3 524267

Your Order #: 14019940

Product Description: 24" 40' IPS DR21 PE4710

Project Name & Location: N/A

Distributor & Branch: ISCO; SEATTLE, WASHINGTON

The product(s) covered by this certification were manufactured in the USA in accordance with the specification(s) noted below.

( ) ½"-6" Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter per ASTM D2239

( ) ½"-12" Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings per ASTM D2513

( ) ½"-2" Specification for Polyethylene (PE) Plastic Tubing per ASTM D2737

(X) ½"-24" Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter per ASTM D3035

( ) Polyethylene Plastic Pipe and Fittings Material. PE 3408/3608/3708 Cell Classification PE 345464C/E per ASTM D3350

(X) Polyethylene Plastic Pipe and Fittings Material. PE 4710 Cell Classification PE 445574C per ASTM D3350

(X) 3"-63" Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter per ASTM F714

( ) ½"-3" Polyethylene (PE) Pressure Pipe and Tubing for Water Services per AWWA C901

(X) 4"-63" Polyethylene (PE) Pressure Pipe and Fittings for Water Distribution and Transmission per AWWA C906

(X) Plastics Piping System Components and Related Materials per ANSI/NSF 14/61

Sincerely,

Gilbert A. Garcia II
Quality Assurance Engineer
JM Eagle HQ- Los Angeles

Polyethylene
cc: Order Packet

JM Eagle Product Assurance Dept.
5200 W. Century Blvd • Los Angeles, CA 90045 • Tel: 310.621.4404 • Fax: 310.693.8230 • www.jmeagle.com

JMM HIGH DENSITY POLYETHYLENE (HDPE) PE4710 PRODUCT SPECIFICATION

Description:

JMM manufactures High Density Polyethylene (HDPE) water pressure pipes for municipal and industrial transmission systems. Our pressure pipe is used in many types of applications such as potable water, sewer, drain, mining, irrigation, slip lining, and reclaimed water.

Materials:

JMM HDPE pressure pipe is manufactured with premium, highly engineered PE4710 resin that provides maximum performance benefits to service today's municipal and industrial water needs. The PE4710 material conforms to ASTM D3350 with the cell classification of 445574C/E and is listed with the Plastic Pipe Institute's (PPI) TR4. It is formulated with carbon black and/or ultraviolet stabilizer for maximum protection against UV rays for added assurance.

Size	Type	DR	Standard (If Applicable)
4" – 63"	IPS / DIPS	7 – 41	ASTM F714

Quality Assurance:

JMM takes great pride in the quality and workmanship of all of our products. JMM quality control programs monitor three critical aspects of the manufacturing process: the raw material, pipe production, and the finished goods. Incoming raw material is inspected and tested to ensure the material meets all applicable requirements before its release for production. During production, the pipe will be examined and pipe samples will be collected for physical verification and testing for compliance. The finished product is subjected to further visual inspection to ensure it has met all the appropriate specifications and packaging requirements. Our pipes are continuously monitored throughout the entire manufacturing process to validate that they are in accordance with all applicable specifications. Certificates of Compliance are available upon request.

Lengths & Bending Radius:

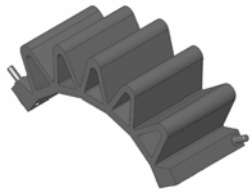
Standard laying lengths of HDPE pressure water pipe is 40/50 foot lengths. Pipe sizes under 6" may be coiled at continuous longer lengths upon request.

Marking:

The standard markings printed on JMM pipes generally consist of the JMM logo, nominal size and OD base, material code, dimension ratio, pressure class, current AWWA C906 (if applicable), ASTM F714 (if applicable), and production date (day, month, & year).

39605 Independence, Shawnee, OK, 74804 | 1.800.654.3872 | www.gfcp.com

PRODUCT SPECIFICATIONS SHEET
ELECTROFUSION FLEX RESTRAINT
Works on solid wall pipe 6” IPS & larger



At Georg Fischer Central Plastics (GFCP) we are proud to be recognized as the company that pioneered and introduced to industries within the United States to the concept of joining polyethylene piping systems together via the process of electrofusion. As an International leader in the world of manufactured Polyethylene (PE) Electrofusion fittings and with manufacturing facilities located around the world, GFCP has been actively involved since the early 1960’s in the research and promotion of innovative joining methods for polyethylene piping systems for the natural gas, potable water, wastewater, oilfield, mining landfill, telecommunications and geothermal industries.

With unparalleled expertise focusing on the design and manufacturing of polyethylene electrofusion fittings, GFCP offers the largest, most complete line of electrofusion products, manufactured from a variety of common virgin resins, available in the market. Our substantial vertically integrated manufacturing capabilities allow GFCP to exercise complete control of our manufactured products. From design, to “state of the art” manufacturing, to shipping; GFCP maintains a high level of product consistency and quality throughout our manufacturing processes.

Electrofusion Flex Restraints are produced from a pre-blended virgin resin that has a PPI listing of PE3408, which complies with ASTM D1248 and ASTM D3350. The pre-blended virgin resin has a PPI listing of PE3408 that meets or exceeds the requirements of NSF Standard 61.

Available Features:

- Engineered for use on HDPE Pipe
- Manufactured to work on all solid wall polyethylene pipes 6" and larger
- PE3408 resin complies with ASTM D3350
- Designed to restrain Polyethylene pipe movement
- Axial resistance rated at 7,000 lbf. per saddle
- Permanently attached to pipe by electrofusion
- Quick and easy installation
- Needs no cumbersome equipment
- Manufactured in U.S.A.

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AN AFFILIATE OF

PACIFIC CORRUGATED PIPE CO.®

THE PACIFIC CORRUGATED FAMILY OF COMPANIES HAS BEEN LEADING THE DRAINAGE INDUSTRY SINCE 1935

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  - Corrugated HDPE Products
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HDPE PRODUCTS

Pipe

Pacific Corrugated Plastic Pipe offers a variety of HDPE pipe products that can suit a wide range of applications. We have single wall pipe, double wall pipe, and perforated pipe with attached filter fabric. The following table summarizes the products we offer by type. For information about specifications or product details, please Contact Us

Diameter	Single Wall for Private Use	Single Wall Perforated for Private Use	Single Wall AASHTO M 252	Single Wall AASHTO M 294	Single Wall Perforated AASHTO M 252	Single Wall Perforated AASHTO M 294
3"	✔	✔	✔		✔	
4"	✔	✔	✔		✔	
6"	✔	✔	✔		✔	
8"	✔	✔	✔		✔	
10"	✔	✔	✔		✔	
12"	✔	✔		✔		✔
15"	✔	✔		✔		✔
18"				✔		✔
24"				✔		✔
30"						
36"						
42"						
48"						

Diameter	Double Wall for Private Use	Double Wall Perforated for Private Use	Double Wall AASHTO M 252	Double Wall AASHTO M 294	Double Wall Perforated AASHTO M 252	Double Wall Perforated AASHTO M 294	StormTite Bell & Spigot AASHTO M 294
3"							
4"	✔	✔	✔		✔		
6"	✔	✔	✔		✔		
8"	✔	✔	✔		✔		
10"	✔	✔	✔		✔		
12"	✔	✔		✔		✔	✔
15"	✔	✔		✔		✔	✔
18"				✔		✔	✔
24"				✔		✔	✔
30"				✔		✔	✔
36"				✔		✔	✔
42"				✔		✔	✔
48"				✔		✔	✔

Couplers

We offer several different coupler types to suit a variety of different applications. Available couplers include:

Type	Sizes Available	Product Suitability	
		Single Wall	Double Wall
Internal Couplers	3", 4", 6", 8"	✔	

- Corporate Headquarters
- Mobile Operations
- Pacific Corrugated Plastic Pipe
- Image Gallery
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- Corporate News
- Employment Information
- Employee Portal

Search here... Go!

Snap Couplers	4", 6", 8", 10", 12"	✔	✔
Split Couplers	3", 4", 6", 8", 10", 12", 15", 18", 24", 30"	✔	✔
PolySeal Couplers	6", 8", 10", 12", 15", 18", 24", 30", 36", 42", 48"		✔
SealTite Couplers	18", 24", 30", 36", 42", 48"		✔

* Mar-Mac Construction Products, Inc. manufactures and holds Trademarks on Polyseal Couplers.
** SpringSeal, Inc. manufactures and holds Trademarks on Seal-Tite Couplers.

Fittings

A variety of fitting types are available including elbows, tees, wyes, lateral connections, drop inlets, bulkheads, and end caps. Fittings can be utilized for either single wall or double wall pipe runs. For additional information about available stock and customized fittings, please Contact Us

Other Items

Pacific Corrugated offers other complimentary pipe products and attachments. Some examples of these other items include Detention Systems, Flared End Sections, Water-Stop Gaskets for connecting corrugated HDPE pipe to concrete manholes, Geotextiles, and Underground Stormwater Chambers. Please Contact Us for additional information.

- **Products**
- **Technical Specifications**
- **Links**

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PACIFIC CORRUGATED PLASTIC PIPE

www.pcpipe.com

HDPE Manufactured by Pacific Corrugated Plastic Pipe

Pacific Corrugated High Density Polyethylene (HDPE) pipe is a heavy-duty pipe for storm sewers, culverts, storm water storage and water quality applications. Pacific HDPE load-bearing capacity is comparable to that of concrete or metal pipes...in addition, corrugated HDPE pipe is lightweight, flexible and highly resistant to corrosion and abrasion. Using Pacific HDPE on your next installation can lower your overall project construction costs.

We manufacture both type C - single wall with a corrugated interior and exterior, and Type S - double wall with a corrugated exterior and a smooth interior wall. Sizes range from 3″ to 48″ in diameter. Both solid and perforated pipe are available.

The following table summarizes our Type-S pipe attributes by diameter:

Please note available sizes listed on page 2 and 3 of submittal

Nominal Inside Diameter	Outside Diameter	Minimum Wall Stiffness (psi)	Minimum Liner Thickness	Weight (lbs/ft)
8	9.4	50.0	.025	1.5
10	11.8	50.0	.025	2.2
12	14.9	50.0	.036	3.3
15	17.9	42.1	.040	4.9
18	21.5	40.0	.052	6.5
24	27.9	34.1	.060	11.3
30	35.7	28.3	.060	15.0
36	42.1	21.8	.067	19.6
42	48.2	20.3	.071	26.2
48	54.3	18.1	.071	35.0

Other sizes are also available. Values expressed in inches (unless otherwise noted).

Type-S pipe is available with a plain end or an integral bell and spigot system for pressure applications.

Commitment to Product Quality

Pacific Corrugated processes premium plastic raw materials in a clean and controlled environment. All of our products are marked with applicable specification designations. Incoming resins are subject to acceptance testing and finished products must exceed our stringent quality control standards before leaving our manufacturing facility.

Superior Strength and Service Reliability

Research shows the corrugations of Pacific HDPE give the product an extremely high strength-to-weight ratio. Because it's made of chemically inert materials, our pipe is extremely durable and highly effective in both acidic and alkaline soils alike. HDPE pipe resists breakdown caused by abrasion and freeze/thaw cycles and has been effectively used in environments with ambient temperatures above 120°F.

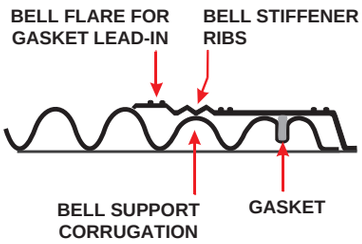
Optimum Hydraulics

Pacific HDPE double wall pipe is highly efficient due to the low friction factor of the smooth pipe interior, resulting in optimum hydraulic flow design. This type of pipe has been found to have an effective manning's "n" factor as low as 0.012.

StormTite™ for Fast & Secure Connections

StormTite™, our 10.8 psi bell and spigot joint systems for Type-S pipe have been certified by independent third party laboratories to meet the "watertight" requirements defined in ASTM D-3212. This system eliminates the need for separate couplers without giving-up strength or superior hydraulic flow. The ease of installation of StormTite™, combined with its light weight and longer sections, ensures project savings over materials like concrete. Cost savings result from smaller crews, faster installation, easier handling, and smaller equipment.

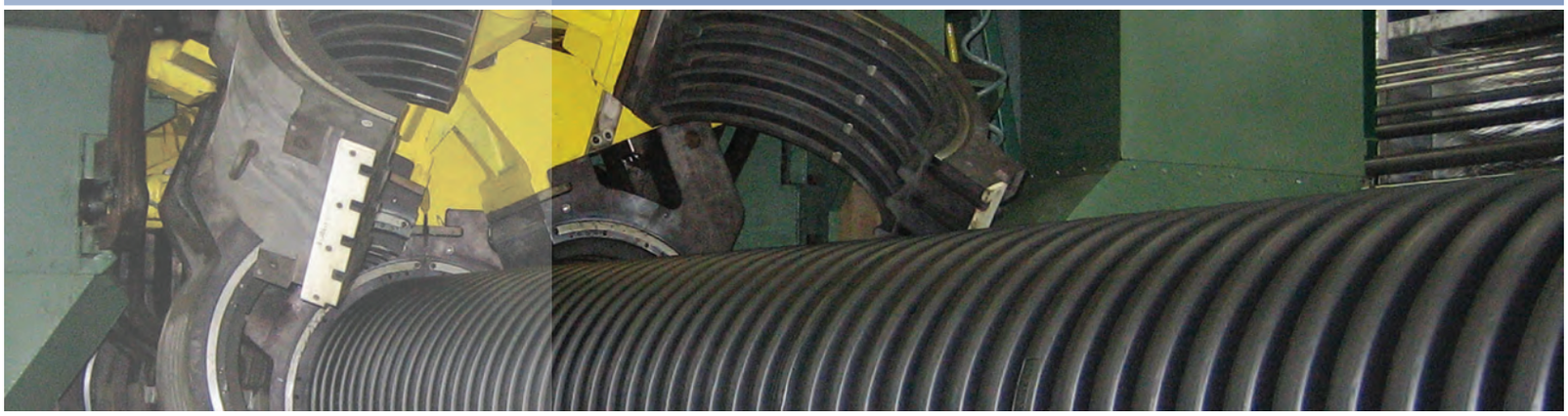
SPECIFICATIONS		
AASHTO	M-252	Standard Specification for HDPE: 3" - 10"
AASHTO	M-294	Standard Specification for HDPE: 12" - 48"
ASTM	D-2321	Installation of HDPE
ASTM	D-3212	Water-tight Joint Testing Specification
ASTM	D-3350	HDPE Resin Cell Classification Specification
ASTM	F-477	Gasket Specification



StormTite™

PACIFIC CORRUGATED PLASTIC PIPE

www.pcpipe.com



Count on Pacific Corrugated

Pacific Corrugated Pipe Company has been providing the industry with fabrication and product innovations in drainage, culvert crossings, bridge replacement, special hydraulic conveyance, and other applications since 1935. Our solutions utilize the most effective materials for each application, and are designed with durability and value in mind.

Our clients are the leading builders, engineers and developers working on local, municipal and state construction projects throughout the West. The Pacific Corrugated commitment means precision manufacturing, timely delivery, a knowledgeable team of fabricators, and project support. We are also happy to assist landowners, homeowners, and farmers with their drainage questions and needs.

Complimentary Products

CORRUGATED STEEL PIPE

Our corrugated steel pipe is available in a variety of thicknesses and is available with a galvanized, aluminized or polymer coating. We also offer corrugated stainless steel pipe. These products are used extensively in flood control, drainage and sewer systems because steel is reliable, traceable, sustainable, and strong.

SPIRAL RIB PIPE

Spiral Rib Pipe (SRP) is one of many innovative steel pipe products developed by the Pacific Corrugated design group. This product was developed in response to our clients' needs for a pipe product with smooth-wall hydraulics, pipe at an exceptional value, in sizes ranging up to 144″ diameter.

TRISHIELD COMPOSITE PIPE

TriShield steel ribbed polyethylene pipe combines smooth wall hydraulics and the structural strength of steel with the corrosion and abrasion resistance of high-performance engineered polyethylenes.

SUPER-SIZED CSP

Pacific Corrugated's new mobile production facility can produce pipe up to 24 feet in diameter right at the jobsite. Perfect for bridge caissons, windmill tower bases, detention systems, and other large diameter pipe projects. Our mobile capabilities now include the ability to re-roll pipe ends for ease of coupling multiple pipes together.

STRUCTURAL PLATE PRODUCTS

Corrugated metal sections can be bolted together to form pipe or other shapes with very large spans. Pacific Corrugated offers a variety of plate products allowing for large spans, extreme fill heights, and other unique applications.

PACIFIC CORRUGATED PLASTIC PIPE

Contact Information

Eastern WA	509-882-5700
Puget Sound Area	360-432-1367
Portland & Southwest WA	503-263-3330
Coastal & Southern OR	541-461-0990
Northern CA	916-383-4891
Southern CA	909-829-4235
Arizona	520-426-6000
New Mexico	505-474-5400

PACIFIC CORRUGATED PIPE CO.®

www.pcpipe.com

TECHNICAL DATA SHEET

Geomembrane HDPE Textured DS [3]

Solmax International Inc., 2801 Boul. Marie-Victorin, Varennes, Qc, Canada, J3X 1P7
Tel.: (450) 929-1234 Fax: (450) 929-2550 www.solmax.com

PROPERTY	TEST METHOD	FREQUENCY [1]	UNIT Imperial	Solmax 460T-1000
SPECIFICATIONS				
Thickness (min. avg.)	ASTM D-5994	Every roll	mils	57.0
Lowest individual for 8 out of 10 values			mils	54.0
Lowest individual for 10 out of 10 values			mils	51.0
Asperity Height (min. avg.) (3)	ASTM D-7466	Every roll	mils	10
Resin Density	ASTM D-1505	1/Batch	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D-1238	1/Batch	g/10 min	1.0
Sheet Density	ASTM D-1505	Every 2 rolls	g/cc	> 0.94
Carbon Black Content	ASTM D-4218	Every 2 rolls	%	>2.0 / <3.0
Carbon Black Dispersion	ASTM D-5596	Every 6 rolls	Category	Cat. 1 & Cat. 2
Oxidation Induction Time (min. ave)	ASTM D-3895	1/Batch	min	100
Tensile Properties (min. avg) (2)	ASTM D-6693	Every 2 rolls		
Strength at Yield			ppi	132
Elongation at Yield			%	13
Strength at Break			ppi	132
Elongation at Break			%	150
Tear Resistance (min. avg.)	ASTM D-1004	Every 6 rolls	lbf	45
Puncture Resistance (min. avg.)	ASTM D-4833	Every 6 rolls	lbf	120
Dimensional Stability	ASTM D-1204	Every 6 rolls	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D-5397	1/Batch	hr	300
Oven Aging - % retained after 90 days	ASTM D-5721	Per formulation		
HP OIT (min. avg.)	ASTM D-5885		%	80
UV Resistance - % retained after 1600 hr	GRI-GM-11	Per formulation		
HP-OIT (min. avg.)	ASTM D-5885		%	50
SUPPLY SPECIFICATIONS *(Roll dimensions may vary ±1%)*				
Roll Dimension - Width	-		ft	22.3
Roll Dimension - Length	-		ft	540
Area (Surface/Roll)	-		sf	12,042

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
3. Of 10 readings; 8 out of 10 must be >7 mils (0.18 mm), and lowest individual reading must be >5 mils (0.13 mm). ASTM D7466 is identical to GRI-GM12.
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.

* All values are nominal test results, except when specified as minimum or maximum.
* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsability of the user. SOLMAX assumes no liability in connection with the use of this information.

SOLMAX INTERNATIONAL

Solmax International Inc.
2801, Boul. Marie-Victorin
Varennes, Quebec, Canada, J3X 1P7

Tel.: 1-800-571-3904 Fax: 1-450-929-2547

List of Geomembrane Rolls

MF-CQ-01 Rev. 06/ 2011-12-23

Solmax ACCEPTED ACCEPTED Chantal Gagnon Quality Department

Project Name : KENT, WA

Reference Number : 105869

Project Number : 5791

Invoice Number : 212231

Roll Number	*Product Code*	*Resin Lot Number*	*Manufactured Date*	Resin Melt Index 190/2.16 g/10 min D1238	Resin Density g/cc D1505	OIT *Spec* min D3895	OIT Result min D3895	HPOIT *Spec* min D5885	HPOIT Result min D5885	ESCR SP-NCTL *Spec* hours D5397	ESCR SP-NCTL Roll Tested hours D5397
1-104593	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104594	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104595	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104596	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104597	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104598	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104599	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104600	Solmax 460T-1000	H8221385	19-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104601	Solmax 460T-1000	H8221385	20-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104602	Solmax 460T-1000	H8221385	20-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED
1-104603	Solmax 460T-1000	H8221385	20-Jan-13	0.08	0.938	*100*	> 120			*>400*	1-104577 CERTIFIED

Quantity (rolls) : **11**

SOLMAX INTERNATIONAL

Solmax International Inc.
2801, Boul. Marie-Victorin
Varennes, Quebec, Canada, J3X 1P7

Tel.: 1-800-571-3904 Fax: 1-450-929-2547

Manufacturing Quality Control

MF-CQ-11 Rev. 05/2011-12-23

Test Results - Rolls

Project Name : KENT, WA

Project Number : 5791

Reference Number : 105869

Invoice Number : 212231

Solmax ACCEPTED ACCEPTED Chantal Bagnon Quality Department

Product : Solmax 460T-1000

Properties	Thickness ave / min.	Geo-membrane Density	Carbon Black Content	Carbon Black Dispersion	Tensile Yield Strength	Tensile Yield Elong.	Tensile Break Strength	Tensile Break Elong.	Tear Resist.	Puncture Resist.	Dimension. Stability	Asperity Height in / out
Unit	mils	g/cc	%	Cat. 1 and 2	ppi	%	ppi	%	lbs	lbs	%	mils
Test Method	D5994	D1505/D792	D4218	D5596	D6693				D1004	D4833	D1204	D7466
Frequency	Each roll	1/2 ro	1/2 ro	1/6 ro	1/2 ro				1/6 ro	1/6 ro	1/6 ro	Each roll
Specification	57 / 51	≥ 0.940	2.0 - 3.0	Cat. 1 - Cat. 2	132	13	132	150	45	120	± 2	15
1-104593 MD	57 / 54	0.948	2.47	10 /10	163.2	16.1	195	513	53.0	147.1	-0.53	23.7 / 23.8
XD				Views	170.3	14.7	165	448	53.9		0.17	
1-104594 MD	57 / 56	0.948	2.47	10 /10	163.2	16.1	195	513	53.0	147.1	-0.53	21.0 / 22.3
XD				Views	170.3	14.7	165	448	53.9		0.17	
1-104595 MD	60 / 56	0.948	2.63	10 /10	170.8	15.8	210	532	53.0	147.1	-0.53	17.0 / 16.9
XD				Views	178.0	15.0	175	445	53.9		0.17	
1-104596 MD	61 / 59	0.948	2.63	10 /10	170.8	15.8	210	532	53.0	147.1	-0.53	17.0 / 18.0
XD				Views	178.0	15.0	175	445	53.9		0.17	
1-104597 MD	59 / 58	0.942	2.37	10 /10	162.1	17.3	216	571	53.0	147.1	-0.53	17.0 / 16.5
XD				Views	173.8	15.2	198	548	53.9		0.17	
1-104598 MD	59 / 57	0.942	2.37	10 /10	162.1	17.3	216	571	53.0	147.1	-0.53	17.1 / 16.5
XD				Views	173.8	15.2	198	548	53.9		0.17	
1-104599 MD	58 / 56	0.947	2.53	10 /10	163.4	16.8	204	533	51.8	153.9	-0.47	16.7 / 17.1
XD				Views	167.4	15.0	203	564	52.1		0.05	
1-104600 MD	59 / 55	0.947	2.53	10 /10	163.4	16.8	204	533	51.8	153.9	-0.47	18.0 / 16.5
XD				Views	167.4	15.0	203	564	52.1		0.05	
1-104601 MD	58 / 56	0.948	2.52	10 /10	158.3	17.2	197	524	51.8	153.9	-0.47	16.6 / 16.5
XD				Views	172.3	15.7	189	518	52.1		0.05	
1-104602 MD	58 / 56	0.948	2.52	10 /10	158.3	17.2	197	524	51.8	153.9	-0.47	16.5 / 16.7
XD				Views	172.3	15.7	189	518	52.1		0.05	
1-104603 MD	59 / 55	0.949	2.32	10 /10	160.5	16.8	203	545	51.8	153.9	-0.47	16.6 / 16.9
XD				Views	166.8	14.7	185	534	52.1		0.05	

CoA Date: 11/17/2012

Certificate of Analysis

Shipped To: SOLMAX 2801 BOUL MARIE-VICTORIN VARENNES QC J3X 1P7 CANADA	Delivery #: 88555874 PO #: 109703-0 Weight: 186000 LB Ship Date: 11/17/2012 Package: BULK
Recipient: Giguere Fax:	Mode: Hopper Car Car #: CPCX007161 Seal No: 299840

Product:
MARLEX POLYETHYLENE K306 BULK
Additive levels have been tested and meet minimum the specification for this lot.
As a result, Standard OIT (by ASTM D 3895) is greater than 120 minutes (nominal value, not tested on every lot).
As a result, High Pressure OIT (by ASTM D 5885) is greater than 1000 minutes (nominal value, not tested on every lot).

Lot Number: H8221385

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.080	g/10mi
HLMI Flow Rate	ASTM D1238	12.30	g/10mi
Density	D1505 or D4883	0.9380	g/cm3
Production Date		11/15/2012	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at 800-231-1212

Page 1 of 1

InsulFoam® 60

Description

InsulFoam 60 is a high-performance insulation consisting of a superior closed-cell, lightweight and resilient expanded polystyrene (EPS). InsulFoam 60 is manufactured in a plank mold and available from the Insulfoam Anchorage, AK facility. The plank mold process provides individually molded panels that typically need no further cutting or trimming. The plank mold process gives the finished product a hard, skin-like finish. InsulFoam 60 meets the compressive strength, flexural strength, dimensional stability and water absorption physical property requirements of ASTM C578, Type VII, *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*. In addition, InsulFoam 60 offers a long-term, stable R-Value, is an Energy Star® qualified insulation and qualifies for LEED points.

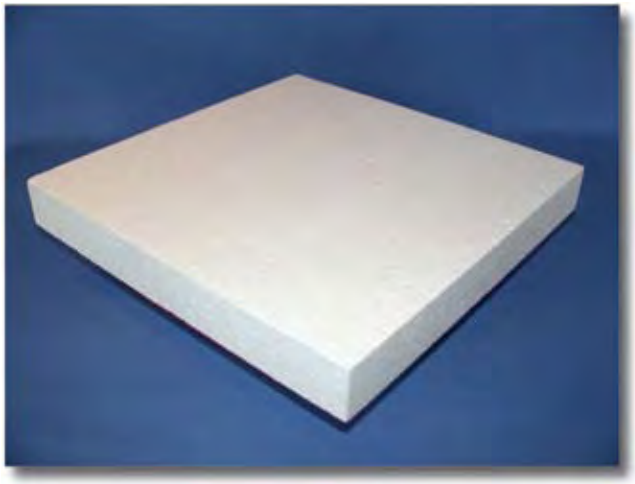
Uses

InsulFoam 60 insulation has been used successfully in Alaska for numerous commercial, industrial and residential applications. The following applications are a sample of the many InsulFoam 60 uses:

- Road & Highway Base
- Permafrost Protection
- Foundations
- Waterlines & Septic Systems
- Drill Pads & Mud Pits
- Freezer Slabs
- Railroad Base
- Under Slab
- Utilidors
- Plazas & Parking Structures
- Ice Rinks
- Cold Storage

Advantages

- *Proven Performance.* The same fundamental EPS chemistry has been in use since the mid-1950s, so the actual performance of the product is well known. In addition, InsulFoam 60 has been successfully used in Alaska for 25 years.
- *Stable R-Value.* Designers are well served knowing the product's thermal properties will remain stable over the entire service-life. There is no thermal drift so the product is eligible for an Insulfoam 20-year thermal performance warranty.
- *Environmentally Friendly.* InsulFoam 60 contains no formaldehyde or ozone-depleting CFCs or HCFCs and is 100% recyclable.
- *Water-Resistant.* InsulFoam 60 does not readily absorb moisture from the environment.
- *Locally Produced.* InsulFoam 60 is produced in Anchorage, AK, providing reduced lead times in comparison to competing products.



- *Wide Product Acceptance.* InsulFoam 60 has been accepted and used by numerous institutions and public companies. Some entities of note are: FHWA, Alaska DOT, US Army Corp of Engineers, Municipality of Anchorage, Fairbanks North Star Borough, Mat-Su Borough, ARCO, Phillips, Alyeska, AWWU, FAA, and GSA. InsulFoam 60 also meets the strength and water resistance properties of AASHTO M230 (Type VII). Please contact your local Insulfoam representative for details.

Sizes

InsulFoam 60 is available in 2' x 8' and 4' x 8' planks with standard thicknesses of 1" and 2". InsulFoam 60 is also available in other thicknesses with little to no impact on lead time.

Key Product Comparisons

Property	InsulFoam 60	Type VI XPS	Test Method
Compressive Strength (psi, 5% deformation)	60	60	ASTM D1621
Flexural Strength (psi)	120	75	ASTM C203
Water Absorption (% vol.)	0.1	0.3	ASTM C272
Water Vapor Transmission (perm.)	1.1	1.1	ASTM E96
Dimensional Stability (maximum %)	2%	2%	ASTM D2126

R-Value Comparisons

R-Value	InsulFoam 60	Type VII XPS	Test Method
Warranted R-Values @ 20 years	4.9/inch 4.5/inch	Not Warranted Not Warranted	ASTM C518 @ 40 ˚F @ 75 ˚F
Warranted R-Values @ 15 years	4.9/inch 4.5/inch	4.9/inch 4.5/inch	ASTM C518 @ 40 ˚F @ 75 ˚F
Published R-Value (Thermal Resistance)	5.0/inch 4.9/inch 4.5/inch	5.6/inch 5.4/inch 5.0/inch	ASTM C518 @ 25 ˚F @ 40 ˚F @ 75 ˚F

Additional Comparisons

Product Features	InsulFoam 60	Type VII XPS
Stable R-Value	Yes	No
Free of CFC or HCFC	Yes	No
Made in Alaska	Yes	No
LEED Points for Transportation	Yes	No

Alaska Interstate Construction, LLC
301 W. Northern Lights Blvd., Suite 600
Anchorage, Alaska 99503

Pogo Mine: DSTF Expansion, Diversion Ditch

TRANSMITTAL

TO:	*Dan Neuffer*	FROM:	*Tyler Dyer*
COMPANY:	*SRK Consulting*	DATE:	*May 10, 2012*
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NUMBER OF COPIES INCLUDED:	*1Copy(s)*	REF:	*DSTF-050512A*

☑ FOR APPROVAL ☐ AS REQUESTED ☐ FOR INFORMATION ☐ RESUBMITTED ☐ OTHER _____

DESCRIPTION: 12 Oz Non Woven Cloth

Submitted under Submittal Register Tab 7-H

RECEIVED BY _____ DATE: _____

TENCATE Mirafi

Drainage Separation

Mirafi® 1120N

Mirafi® 1120N is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® 1120N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	1335 (300)	1335 (300)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	512 (115)	512 (115)
CBR Puncture Strength	ASTM D 6241	N (lbs)	3560 (800)	
Apparent Opening Size (AOS)[1]	ASTM D 4751	mm (U.S. Sieve)	0.15 (100)	
Permittivity	ASTM D 4491	sec^{-1}	0.8	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	2648 (65)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

[1] ASTM D 4751: AOS is a Maximum Opening Diameter Value

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	414 (12.2)
Thickness	ASTM D 5199	mm (mils)	2.7 (105)
Roll Dimensions (width x length)	--	m (ft)	4.5 x 91 (15 x 300)
Roll Area	--	m^2 (yd^2)	418 (500)
Estimated Roll Weight	--	kg (lb)	183 (404)

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TENCATE materials that make a difference

FGS000357
ETQR21

DAYTON® SUPERIOR®

PENTRA-HARD® DENSIFIER

Lithium Concrete Hardener, Dustproofer, Sealer

TECHNICAL DATA SHEET

DESCRIPTION

PENTRA-HARD® DENSIFIER is advanced lithium chemistry that hardens and dustproofs new and existing concrete. This easy-to-use water-based solution requires no rinsing and is VOC compliant in all areas of the world. When sprayed on new or existing concrete, it penetrates into the concrete, where it reacts with free calcium to form insoluble calcium silica hydrate, which makes concrete more water, stain, and abrasion resistant for easier maintenance and longer life. It is also suitable for concrete polishing procedures and helps prolong the life of polished finishes.

For applications where greater shine and stain resistance is required (schools, restaurants, retail, grocery, commercial, etc.) the **DURABLE FLOOR SYSTEM™ (DFS)** is recommended. For this system, PENTRA-HARD® FINISH is applied directly over the top of PENTRA-HARD® DENSIFIER. Ask your Dayton Superior representative for more details on this product/system.

USE

New and Existing Concrete
Commercial: Grocery Stores, Office Building, Retail, Banks, Malls, Warehouses, Distribution Centers
Industrial: Food Processing Facilities, Cold Storage / Freezers, Beverage and Manufacturing Plants
Institutional: Churches, Hospitals, Universities, Schools, Museums
Theme & Leisure: Resorts, Hotels, Casinos, Restaurants, Theaters
Governmental: Federal & State Buildings, Prisons
Residential: Concrete floors and Garages

FEATURES

- Easy application, no rinsing required
- Penetrates, no film to lift or peel off
- Reduces efflorescence and surface sweating
- Does not contribute to surface ASR
- VOC Compliant, can contribute to LEED points
- Prolongs finish of polished surfaces
- Resists stains and dusting, making concrete easier to maintain

PROPERTIES

Active Ingredients: 100% of total solids
Total Solids: 8.8%
Specific Gravity: 1.05
Wt/gal: 8.79 lbs.
pH: 11
Flash Point: NA
Freeze Point: 32°F (0°C)

V.O.C.

Less than 50 g/L. Compliant with all US VOC regulations including Federal EPA, OTC, LADCO, SCAQMD & CARB.

ESTIMATING GUIDE

New Construction Steel Troweled 400-650 sq. ft./gal. (37.16 – 60.38 sq m/L)

Texture and absorption of surface will determine final coverage rates. Porous concrete surfaces may require additional material.

PACKAGING

ITEM #	PACKAGE	SIZE	
		Gallons	Liters
143610	Pail	5	18.93
143611	Drum	55	208.20
143612	Tote	275	1040.99

STORAGE

Keep from freezing. Shelf life is 12 months from date of manufacture in original unopened containers.

APPLICATION

Surface Preparation: Precautions: Apply only when temperatures will be above 36° F (2° C) for at least 4 hours following application. In hot, windy conditions, apply in the early morning or at night. It may be necessary to spray water on hot concrete to cool the surface prior to application so PENTRA-HARD® DENSIFIER does not flash-dry on the surface. Clean surface to remove any dirt, laitance, curing compounds or coatings that may prevent PENTRA-HARD® DENSIFIER from penetrating the surface. Do not use citrus or acidic cleaners. If acid dyes or cleaners have been used, neutralize the surface using an alkali cleaner (TSP, Tide laundry detergent, etc.). Do not use high pressure sprayers as they may over atomize the material. Do not allow PENTRA-HARD® DENSIFIER to come into contact with glass, fabric, metal, or painted surfaces. Immediately wipe contaminated surfaces with a damp cloth, then wipe dry with a second clean cloth.

Mixing: Mildly agitate before each use.

nanoLithium
(Patented) Nano Lithium™ (NL) Concrete Floor Treatments

PROUDLY MADE IN AMERICA

PENTRA-HARD® DENSIFIER

Lithium Concrete Hardener, Dustproofer, Sealer

Placement: Using an HVLP sprayer, or a good pump up sprayer for smaller jobs, spray PENTRA-HARD® DENSIFIER evenly on the surface. Spread out any pools with a soft bristle broom or a flat microfiber pad. If areas begin to dry out before 20 minutes (edges, high spots) spray on more material. Surface is ready for use when dry, but the complete reaction may take up to two weeks to develop depending on site temperature and conditions.

If concrete is dyed, acid stained, or integrally colored, it may be advisable to clean with scrubbing equipment once the application is complete to produce a more even finish. To enhance the color intensity, gloss and light reflectance, and to reduce efflorescence, mineral deposits and staining use PENTRA-HARD® FINISH High-gloss, Stain and Wear Protector in conjunction with PENTRA-HARD® DENSIFIER as a post-applied topical treatment.

On newly placed concrete, PENTRA-HARD® DENSIFIER may be applied immediately after the finishing, or immediately after joints have been cut and cleaned, or anytime thereafter, at the project manager's discretion. Dayton Superior approved membrane forming curing materials or bond breakers may be applied over the top of PENTRA-HARD® DENSIFIER once it is no longer wet on the surface. Contact Dayton Superior for recommendations.

CLEAN UP

Use soap and water to clean tools and equipment. Although PENTRA-HARD® DENSIFIER is non-toxic and environmentally safe, it is alkali—use up or dry out extra material and dispose of according to local regulations. Don't pour into sewer systems or storm drains.

MAINTENANCE

Clean up spills promptly. Regular aggressive scrubbing with neutral cleaners is recommended. Avoid cleaners containing citrus or butyl compounds, or cleaners with a pH below 7.

LIMITATIONS

FOR PROFESSIONAL USE ONLY

PENTRA-HARD® DENSIFIER will not bridge or fill cracks and will not salvage honeycombed or structurally unsound surfaces.

Not suitable for asphalt or non-cement surfaces or painted surfaces.

Keep from freezing.

Does not replace need for proper concrete mix design, placement and finishing techniques, proper joint installation and/or proper curing of newly placed concrete.

PRECAUTIONS

READ MSDS PRIOR TO USING PRODUCT

- KEEP OUT OF REACH OF CHILDREN.
- Although this product is non-toxic and non-hazardous, it is alkali. Do not drink. If swallowed, do not induce vomiting, call physician.
- Keep container closed tightly when not in use. Wear goggles and gloves. If splashed in eyes, rinse eyes immediately with clean water and call a physician if irritation persists.
- PENTRA-HARD® DENSIFIER will dry out and irritate the skin. Clean skin with soap and water promptly.
- Additional precautions, safety information and first aid treatments are contained in the Material Safety Data Sheet.
- PENTRA-HARD® DENSIFIER will bond to most surfaces immediately, so wash off over spray with water and mild detergent.
- CAUTION: Surfaces wet with PENTRA-HARD® DENSIFIER may be slippery.

MANUFACTURER

Distributed by:
Dayton Superior Corporation
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Customer Service: 888-977-9600
Technical Services: 866-329-8724
Website: www.daytonsuperior.com

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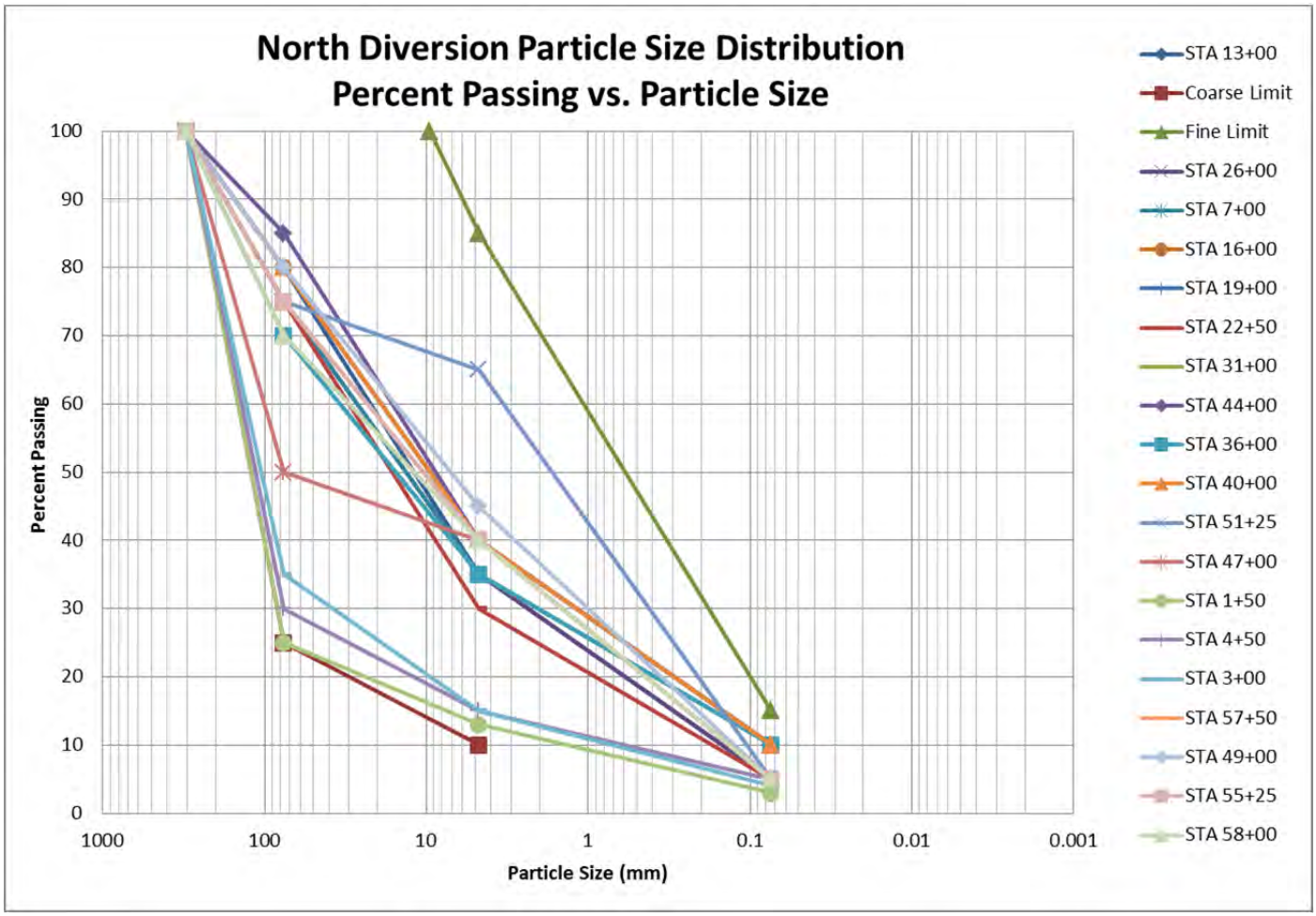
Appendix 13

Gradation Records

North Diversion

Summary Plot and Records



GRADATION RECORD

Date: June 10, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 13+00

Elevation: 2 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 45	**% Sand:** 30	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Note – Battery in camera died when third photo was taken.

GRADATION RECORD

Date: June 16, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 26+00

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 40	**% Sand:** 30	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 6, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 7+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 40	**% Sand:** 25	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 6, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 16+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 40	**% Sand:** 30	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 7, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 19+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 40	**% Sand:** 30	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 7, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 22+50

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 45	**% Sand:** 25	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 7, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 31+00

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 30	**% Gravel:** 35	**% Sand:** 25	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 12, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 44+00

Elevation: 0.3 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 15	**% Gravel:** 45	**% Sand:** 30	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 14, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 36+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 30	**% Gravel:** 35	**% Sand:** 25	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 15, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 40+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 40	**% Sand:** 30	**% Fines:** 10
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 28, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dave Dix

Station Location: North Diversion, STA 51+25

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 10	**% Sand:** 60	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Poorly-graded sand with gravel (SP)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 29, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dave Dix

Station Location: North Diversion, STA 47+00

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 50	**% Gravel:** 10	**% Sand:** 35	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Poorly-graded gravel with gravel (GP)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 31, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dave Dix

Station Location: North Diversion, STA 1+50

Elevation: 3 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 75	**% Gravel:** 12	**% Sand:** 10	**% Fines:** 3
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Poorly-graded gravel (GP)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 31, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dave Dix

Station Location: North Diversion, STA 4+50

Elevation: 3 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 70	**% Gravel:** 15	**% Sand:** 10	**% Fines:** 5
(3" to 12")	(#4 to 3")	(#200 to #4)	(< #200)

USCS Classification: Poorly-graded gravel with sand (GP)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: September 9, 2012

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dave Dix

Station Location: North Diversion, STA 3+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 65	**% Gravel:** 20	**% Sand:** 11	**% Fines:** 4
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Poorly-graded gravel (GP)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 25, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: North Diversion, STA 57+50

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 35	**% Sand:** 35	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 17, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 49+00

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 35	**% Sand:** 40	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 17, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 55+25

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 35	**% Sand:** 35	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 17, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, STA 58+00

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 30	**% Gravel:** 30	**% Sand:** 35	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

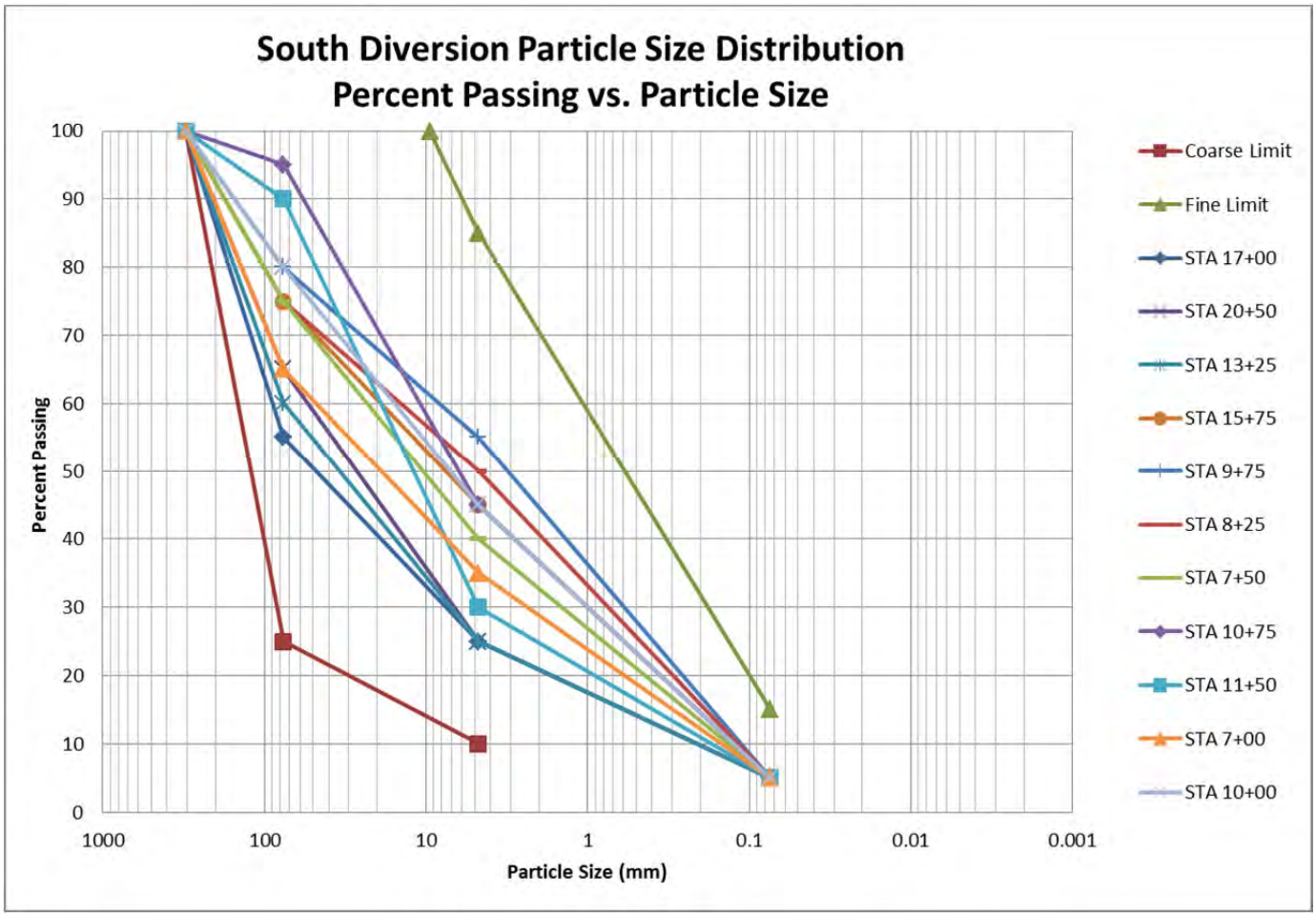
Photo 1

Photo 2

Photo 3

South Diversion

Summary Plot and Records



GRADATION RECORD

Date: June 11, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: South Diversion, STA 17+00

Elevation: 3 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 45	**% Gravel:** 30	**% Sand:** 20	**% Fines:** 5
(3" to 12")	(#4 to 3")	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 11, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: South Diversion, STA 20+50

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 35	**% Gravel:** 40	**% Sand:** 20	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 18, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 13+25

Elevation: At final grade

Maximum Particle Size: 1 ft

% Cobbles: 40	**% Gravel:** 35	**% Sand:** 20	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 23, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 15+75

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 30	**% Sand:** 40	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 27, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 9+75

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 25	**% Sand:** 50	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 28, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 8+25

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 25	**% Sand:** 45	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: June 30, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 7+50

Elevation: 1 ft below subgrade

Maximum Particle Size: 1 ft

% Cobbles: 25	**% Gravel:** 35	**% Sand:** 35	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 21, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Daniel Neuffer

Station Location: South Diversion, STA 10+75

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 5%	**%Gravel:** 50	**% Sand:** 40	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 21, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Daniel Neuffer

Station Location: South Diversion, STA 11+50

Elevation: At subgrade

Maximum Particle Size: 1 ft

% Cobbles: 10	**%Gravel:** 60	**% Sand:** 25	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 26, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 7+00

Elevation: At final grade

Maximum Particle Size: 1 ft

% Cobbles: 35	**% Gravel:** 30	**% Sand:** 30	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: July 26, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, STA 10+00

Elevation: At final grade

Maximum Particle Size: 1 ft

% Cobbles: 20	**% Gravel:** 35	**% Sand:** 40	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

North and South Diversion

Rip-Rap Records

GRADATION RECORD

Date: March 21, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, Inlet 1

Elevation: 18” below final grade

Maximum Particle Size: 9 in

% Passing 6”: 95% **% Passing 1”:** 25 **% Passing ½”:** 20
% Passing #4: 10 **% Passing #200:** 5

Classification: 3-inch rip-rap

Photo 1

Photo 2

GRADATION RECORD

Date: May 16, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Dan Neuffer, Josiah Gerber

Station Location: North Diversion, Inlet 1

Elevation: At final grade

Maximum Particle Size: 18 in

D_{100}: 18” **D_{85}:** 12” **D_{50}:** 8” **D_{30}:** 5” **D_{15}:** 3”

Classification: 9-inch rip-rap

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: March 29, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, Inlet 2

Elevation: 18” below final grade

Maximum Particle Size: 9 in

% Passing 6”: 95% **% Passing 1”:** 25 **% Passing ½”:** 20
% Passing #4: 15 **% Passing #200:** 5

Classification: 3-inch rip-rap

Photo 1

Photo 2

GRADATION RECORD

Date: March 29, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: North Diversion, Inlet 2

Elevation: At final grade

Maximum Particle Size: 18 in

D_{100}: 18” **D_{85}:** 12” **D_{50}:** 9” **D_{30}:** 6” **D_{15}:** 3”

Classification: 9-inch rip-rap

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 3, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: North Diversion, Inlet 3N

Elevation: At final grade

Maximum Particle Size: 26 in

D_{100}: 26” **D_{85}:** 22” **D_{50}:** 12” **D_{30}:** 9” **D_{15}:** 5”

Classification: 9-inch rip-rap

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 3, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, Inlet 4, Seep

Elevation: At final grade

Maximum Particle Size: 18 in

D_{100}: 18” **D_{85}:** 14” **D_{50}:** 9” **D_{30}:** 6” **D_{15}:** 4”

Classification: 9-inch rip-rap

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 4, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, Inlet 4, Main Channel

Elevation: At final grade

Maximum Particle Size: 20 in

D_{100}: 20” **D_{85}:** 14” **D_{50}:** 9” **D_{30}:** 6” **D_{15}:** 5”

Classification: 9-inch rip-rap

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: August 4, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Josiah Gerber

Station Location: South Diversion, Flume Outlet Ramp

Elevation: At final grade

Maximum Particle Size: 1 ft

% Cobbles: 40	**% Gravel:** 30	**% Sand:** 25	**% Fines:** 5
(3” to 12”)	(#4 to 3”)	(#200 to #4)	(< #200)

USCS Classification: Well-graded gravel with silt and sand (GW-GM)

Photo 1

Photo 2

Photo 3

GRADATION RECORD

Date: September 15, 2013

Project: Pogo DSTF Expansion (147900.010)

Collected By: Christine McCabe

Station Location: South Diversion, Stilling Basin

Elevation: At final grade

Maximum Particle Size: 48 in

D_{100}: 48” **D_{85}:** 36” **D_{50}:** 20” **D_{30}:** 12” **D_{15}:** 6”

Classification: 20-inch rip-rap

Photo 1

Photo 2

Photo 3

Appendix 14

Compaction Test Fill Memos

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Memo

To:	Sally McLeod	**Date:**	June 15, 2012
Company:	Sumitomo Metal Mining Pogo LLC	**From:**	Christine McCabe, Dan Neuffer
Copy to:	Alvin Tong, Cam Scott	**Project #:**	147900.010
Subject:	Compaction Test Fill		

The Technical Specifications for the Pogo Dry Stack Tailings Facility (DSTF) Diversion Channel and Haul Road Project allow for compaction trials, or test fills, to be performed on Type 2 General Fill material to determine the site-specific compaction parameters. The test fills are performed as part of fill placement, and a test fill must be performed for each distinct Type 2 General Fill material to ensure the necessary compaction will be achieved.

To fulfill this requirement, SRK Consulting (U.S.), Inc. (SRK) and Alaska Aggregate Products LLC (AAP) conducted a compaction test fill on June 7, 2012 for the North Diversion Channel. AAP was responsible for placing and compacting the fill material and using survey methods to determine local elevations. SRK was responsible for engineering oversight, recording the surveyed elevations, and analyzing the resulting data.

1 Test Fill Summary

The test fill was conducted from STA 12+50 to 13+00 outside the traffic limits of the North Diversion Channel, approximately 10 feet below final grade of the access road.

1.1 Soil Classification

The material used for the test fill was a native well-graded gravel with silt and sand (GW-GM). The material contains approximately 65% gravel, 25% sand, and 10% fines, with very little plasticity and particles up to 12 inches in greatest dimension. The material meets the Specifications for Type 2 General Fill and is generally representative of overburden materials from Station 0+00 to 31+00.

1.2 Set Up

The test fill was conducted on a pad with a length of 50 feet and a width of 20 feet. The test fill area subgrade was compacted and an 18-inch-thick lift of fill was then placed over the area. Three survey points, each approximately 10 feet from the edge of the pad and 10 feet apart, were selected and marked. The elevation of each survey point was recorded immediately after fill placement. Ten vibratory roller compaction passes were made. The elevation was recorded at each survey point after passes 2, 4, 6, 8, and 10.

1.3 Equipment Used

CAT D6K and D8 Dozers were used to place fill over the test fill area. A 15-ton CAT CS-583E Vibratory Roller Compactor was used to compact the fill.

2 Results

Figure 1 shows the results of the test fill plotted as percent settlement (of total lift thickness) vs. number of compactor passes for each of the three points and the average for the pad. As Figure 1 shows, the settlement curves flatten out or begin to flatten out at 6 passes. Given the intended use of the road (occasional light vehicle or trackhoe access), we consider 6 passes to be sufficient to

achieve design compaction for the materials and methods described above. The final elevation recorded for survey point G4 was omitted because the compactor inadvertently stopped right on the point for an excessive amount of time on the final pass.

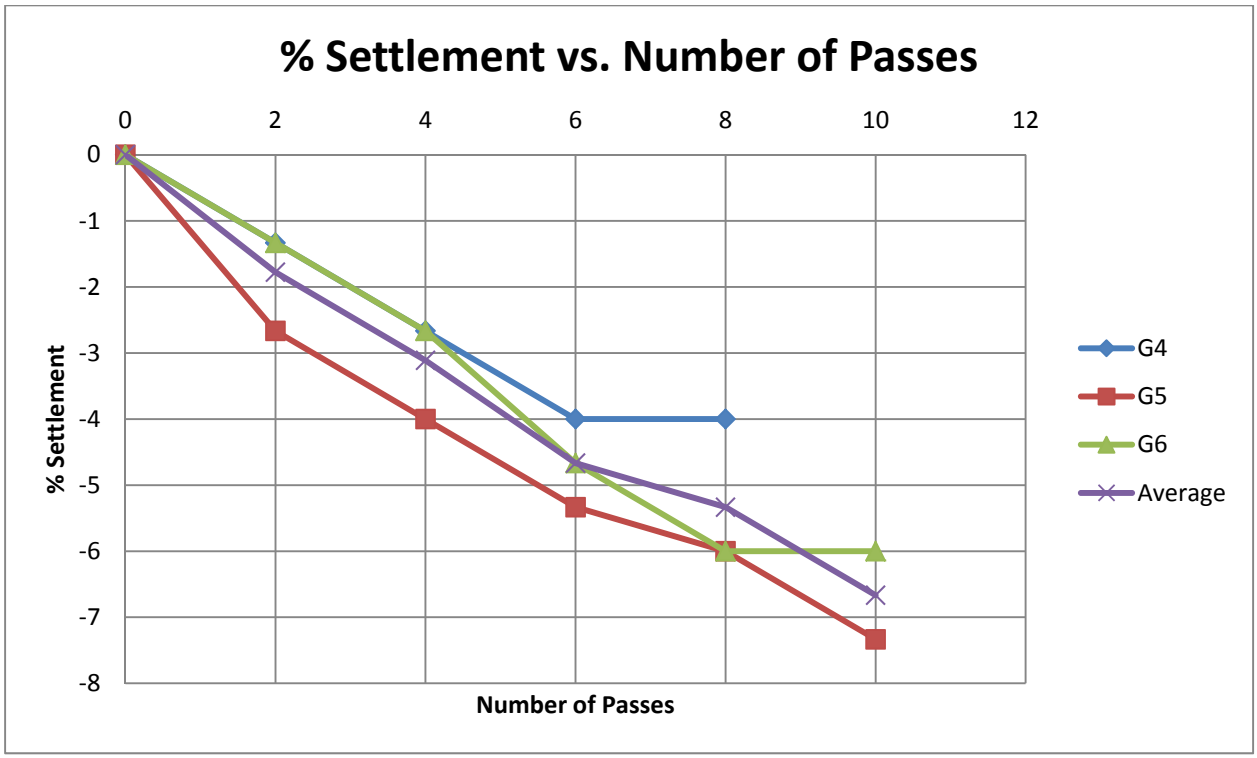

Figure 1. Percent Settlement vs. Number of Passes.

In summary, for native overburden materials between stations 0+00 and 31+00 on the North Diversion alignment, Type 2 General Fill shall be placed in 18-inch-thick lifts (maximum), leveled, and compacted by a minimum of 6 passes with a 15-ton vibratory roller.

Additional test fills shall be conducted for representative native fill materials between stations 31+00 and 58+00 on the North Diversion, the South Diversion, and for representative borrow materials, if any, used for Type 2 General Fill.

Regards,

SRK Consulting (U.S.), Inc.

Christine McCabe, EIT
Staff Consultant

Daniel Neuffer, PE
Senior Consultant

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Memo

To:	Makoto Umedera, Julia Andoe	**Date:**	June 17, 2012
Company:	Sumitomo Metal Mining Pogo LLC	**From:**	Christine McCabe, Dan Neuffer
Copy to:	Sally McLeod, Alvin Tong, Cam Scott	**Project #:**	147900.010
Subject:	Compaction Test Fill at STA 26+00, North Diversion		

The Technical Specifications for the Pogo Dry Stack Tailings Facility (DSTF) Diversion Channel and Haul Road Project allow for compaction trials, or test fills, to be performed on Type 2 General Fill material to determine the site-specific compaction parameters. The test fills are performed as part of fill placement, and a test fill must be performed for each distinct Type 2 General Fill material to ensure the necessary compaction will be achieved.

To fulfill this requirement, SRK Consulting (U.S.), Inc. (SRK) and Alaska Aggregate Products LLC (AAP) conducted a compaction test fill on June 16, 2012 for the North Diversion Channel. AAP was responsible for placing and compacting the fill material and using survey methods to determine local elevations. SRK was responsible for engineering oversight, recording the surveyed elevations, and analyzing the resulting data.

1 Test Fill Summary

The test fill was conducted from STA 25+50 to 26+00 of the North Diversion Channel, approximately 1 foot below final grade of the access road.

1.1 Soil Classification

The material used for the test fill was from a cut along the existing North Diversion Channel Road at STA 30+50 of the New Haul Road, which is a new borrow source, and was a well-graded gravel with silt and sand (GW-GM). The material contains approximately 65% gravel, 30% sand, and 5% fines, with very little plasticity and particles up to 12 inches in greatest dimension. The material meets the Specifications for Type 2 General Fill and is generally representative of the borrow site materials between STA 28+00 and 31+00 of the New Haul Road.

1.2 Set Up

The test fill was conducted on a pad with a length of 50 feet and a width of 20 feet. The test fill area subgrade was compacted and an 18-inch-thick lift of fill was then placed over the area. Three survey points, each approximately 10 feet from the edge of the pad and 10 feet apart, were selected and marked. The elevation of each survey point was recorded immediately after fill placement. Ten vibratory roller compaction passes were made. The elevation was recorded at each survey point after passes 2, 4, 6, 8, and 10.

1.3 Equipment Used

CAT D6K and D8 Dozers were used to place fill over the test fill area. A 15-ton CAT CS-583E Vibratory Roller Compactor was used to compact the fill.

2 Results

Figure 1 shows the results of the test fill plotted as percent settlement (of total lift thickness) vs. number of compactor passes for each of the three points and the average for the pad. As Figure 1

shows, the settlement curves generally flatten out or begin to flatten out by 8 passes. Given the intended use of the road (occasional light vehicle or trackhoe access), we consider 8 passes to be sufficient to achieve design compaction for the materials and methods described above.

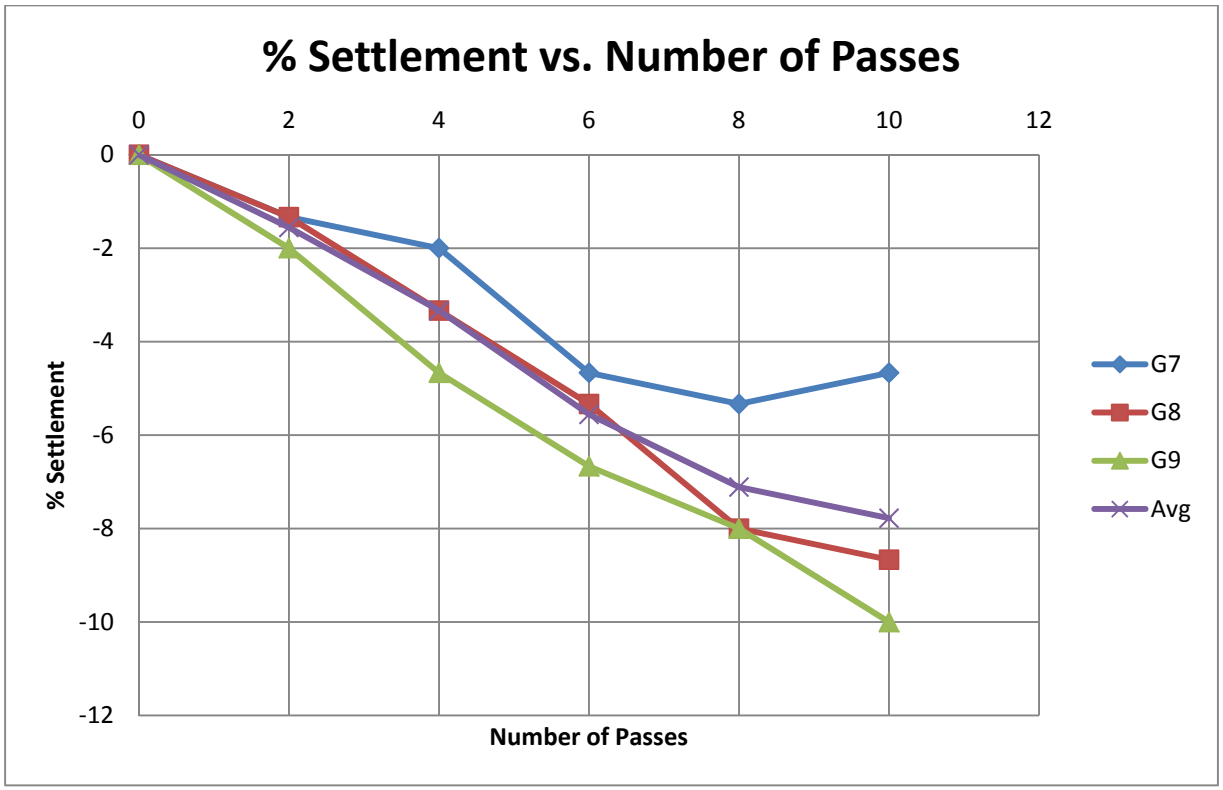

Figure 1. Percent Settlement vs. Number of Passes.

In summary, for the borrow source materials located along the existing North Diversion Channel Road (STA 28+00 to 31+00 of the New Haul Road cut and similar materials), Type 2 General Fill shall be placed in 18-inch-thick lifts (maximum), leveled, and compacted by a minimum of 8 passes with a 15-ton vibratory roller.

Additional test fills shall be conducted for representative native fill materials between stations 31+00 and 58+00 on the North Diversion, the South Diversion, and for any other borrow materials used for Type 2 General Fill.

Regards,

SRK Consulting (U.S.), Inc.

Christine McCabe, EIT
Staff Consultant

Daniel Neuffer, PE
Senior Consultant

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Memo

To:	File	**Date:**	July 14, 2012
Company:		**From:**	Christine McCabe, Dan Neuffer
Copy to:		**Project #:**	147900.010
Subject:	Compaction Test Fill		

The Technical Specifications for the Pogo Dry Stack Tailings Facility (DSTF) Diversion Channel and Haul Road Project allow for compaction trials, or test fills, to be performed on Type 2 General Fill material to determine the site-specific compaction parameters. The test fills are performed as part of fill placement, and a test fill must be performed for each distinct Type 2 General Fill material to ensure the necessary compaction will be achieved.

To fulfill this requirement, SRK Consulting (U.S.), Inc. (SRK) and Alaska Aggregate Products LLC (AAP) conducted a compaction test fill on July 12, 2012 for the North Diversion Channel. AAP was responsible for placing and compacting the fill material and using survey methods to determine local elevations. SRK was responsible for engineering oversight, recording the surveyed elevations, and analyzing the resulting data.

1 Test Fill Summary

The test fill was conducted from STA 43+50 to 44+00 of the North Diversion Channel, approximately 1.3 feet below final grade of the access road.

1.1 Soil Classification

The material used for the test fill was a native well-graded gravel with silt and sand (GW-GM). The material contains approximately 60% gravel or larger, 30% sand, and 10% fines, with very little plasticity and particles up to 12 inches in greatest dimension. The material meets the Specifications for Type 2 General Fill and is generally representative of overburden materials from Station 31+00 to 58+00.

1.2 Set Up

The test fill was conducted on a pad with a length of 50 feet and a width of 20 feet. The test fill area subgrade was compacted and an 18-inch-thick lift of fill was then placed over the area. Three survey points, each approximately 10 feet from the edge of the pad and 10 feet apart, were selected and marked. The elevation of each survey point was recorded immediately after fill placement. Ten vibratory roller compaction passes were made. The elevation was recorded at each survey point after passes 2, 4, 6, 8, and 10.

1.3 Equipment Used

CAT D6K and D8 Dozers were used to place fill over the test fill area. A 15-ton CAT CS-583E Vibratory Roller Compactor was used to compact the fill.

2 Results

Figure 1 shows the results of the test fill plotted as percent settlement (of total lift thickness) vs. number of compactor passes for each of the three points and the average for the pad. As Figure 1 shows, the settlement curves flatten out or begin to flatten out at 4 passes. However, field

observations during test fill construction indicate 6 passes are needed to achieve design compaction. Given the intended use of the road (occasional light vehicle or trackhoe access), we consider 6 passes to be sufficient to achieve design compaction for the materials and methods described above.

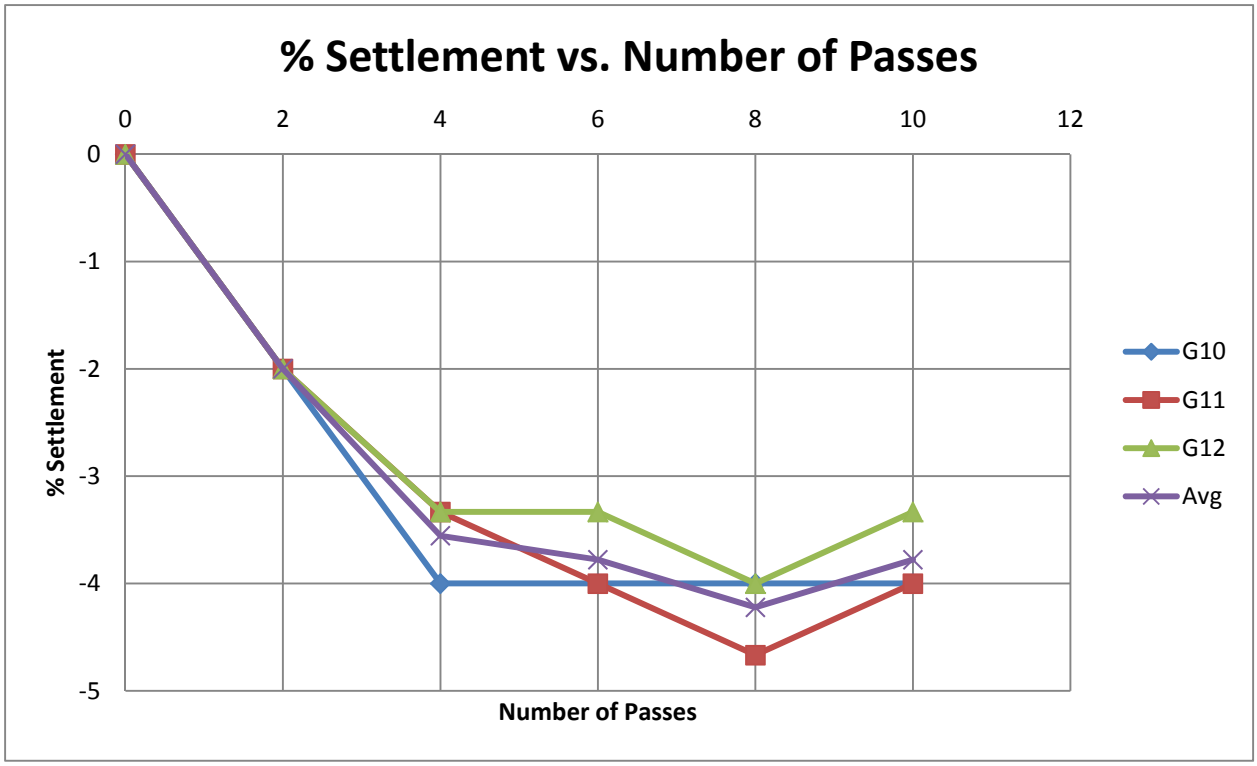

Figure 1. Percent Settlement vs. Number of Passes.

In summary, for native overburden materials between stations 31+00 and 58+00 on the North Diversion alignment, Type 2 General Fill shall be placed in 18-inch-thick lifts (maximum), leveled, and compacted by a minimum of 6 passes with a 15-ton vibratory roller.

Additional test fills shall be conducted for representative native fill materials for the South Diversion, and for representative borrow materials, if any, used for Type 2 General Fill.

Regards,

SRK Consulting (U.S.), Inc.

Christine McCabe, EIT
Staff Consultant

Daniel Neuffer, PE
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Memo

To:	File	**Date:**	June 12, 2013
Company:		**From:**	Christine McCabe, Dan Neuffer
Copy to:		**Project #:**	147900.010
Subject:	Compaction Test Fill		

The Technical Specifications for the Pogo Dry Stack Tailings Facility (DSTF) Diversion Channel and Haul Road Project allow for compaction trials, or test fills, to be performed on Type 2 General Fill material to determine the site-specific compaction parameters. The test fills are performed as part of fill placement, and a test fill must be performed for each distinct Type 2 General Fill material to ensure the necessary compaction will be achieved.

To fulfill this requirement, SRK Consulting (U.S.), Inc. (SRK) and Alaska Aggregate Products LLC (AAP) conducted a compaction test fill on June 9, 2013 for the South Diversion Channel. AAP was responsible for placing and compacting the fill material and using survey methods to determine local elevations. SRK was responsible for engineering oversight, recording the surveyed elevations, and analyzing the resulting data.

1 Test Fill Summary

The test fill was conducted from STA 18+50 to 18+00 of the South Diversion Channel, approximately 3.0 feet below final grade of the access road.

1.1 Soil Classification

The material used for the test fill was a native well-graded gravel with silt and sand (GW-GM). The material contains approximately 75% gravel or larger, 20% sand, and 5% fines, with very little plasticity and particles up to 12 inches in greatest dimension. The material meets the Specifications for Type 2 General Fill and is generally representative of overburden and blasted rock materials sourced from Station 29+00 to 23+00 of the South Diversion Channel.

1.2 Set Up

The test fill was conducted on a pad with a length of 50 feet and a width of 20 feet. The test fill area subgrade was compacted and an 18-inch-thick lift of fill was then placed over the area. Three survey points, each approximately 10 feet from the edge of the pad and 10 feet apart, were selected and marked. The elevation of each survey point was recorded immediately after fill placement. Ten vibratory roller compaction passes were made. The elevation was recorded at each survey point after passes 2, 4, 6, 8, and 10.

1.3 Equipment Used

A CAT D6K dozer was used to place fill over the test fill area. A 15-ton CAT CS-583E Vibratory Roller Compactor was used to compact the fill.

2 Results

Figure 1 shows the results of the test fill plotted as percent settlement (of total lift thickness) vs. number of compactor passes for each of the three points and the average for the pad. As Figure 1 shows, a majority of the settlement curves flatten out or begin to flatten out at 6 passes. Field

observations of the test fill also indicate 6 passes are needed to achieve design compaction. The middle survey point, G21, does not flatten out until 8 passes. Field observations indicate this was likely an anomaly due to a large rock that was close to G21, which most likely finally settled after 8 passes. Given the intended use of the road (occasional light vehicle or trackhoe access), we consider 6 passes to be sufficient to achieve design compaction for the materials and methods described above.

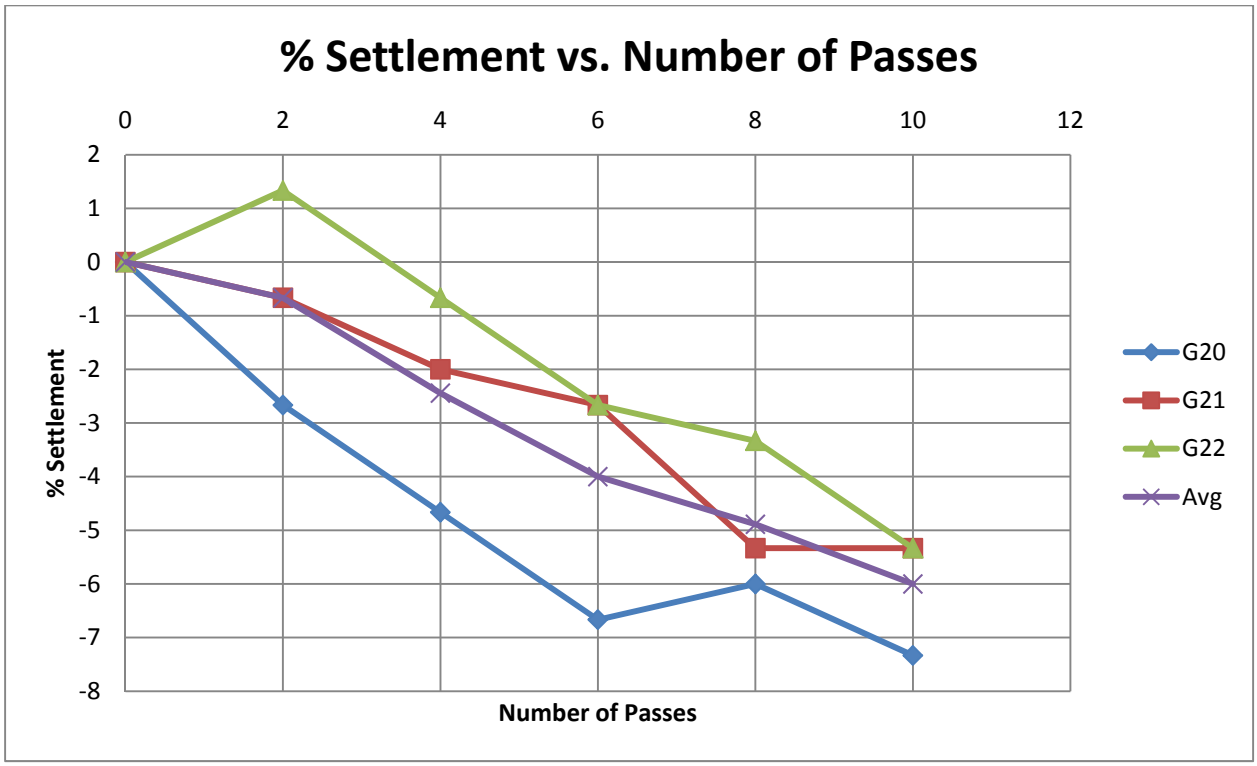

Figure 1. Percent Settlement vs. Number of Passes.

In summary, for native overburden and blasted rock materials sourced from between Stations 29+00 and 23+00 on the South Diversion alignment, Type 2 General Fill shall be placed in 18-inch-thick lifts (maximum), leveled, and compacted by a minimum of 6 passes with a 15-ton vibratory roller.

Additional test fills shall be conducted for representative native fill materials used for Type 2 General Fill for the South Diversion if source material differs between Stations 23+00 and 4+00 from source material between Stations 29+00 and 23+00.

Regards,

SRK Consulting (U.S.), Inc.

Christine McCabe, EIT
Staff Consultant

Daniel Neuffer, PE
Senior Consultant

Appendix 15

August 27, 2013 Technical Memorandum:

Diversion Channel Shotcrete Cracks

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Technical Memorandum

To:	Makoto Umedera	**Date:**	August 27, 2013
Company:	Sumitomo Metal Mining Pogo LLC	**From:**	Christine McCabe, Ivan Clark
Copy to:	Sally McLeod (Pogo), Cam Scott (SRK), John Duncan (SRK), Dan Neuffer (SRK)	**Project #:**	147900.010
Subject:	DSTF Expansion - Diversion Channel Shotcrete Cracks		

1 Introduction

Sumitomo Metal Mining Pogo LLC is expanding the Pogo Mine Dry Stack Tailings Facility (DSTF), located near Delta Junction, Alaska, to a capacity of 20 million tons. The Expansion requires construction of new upgradient diversion channels and a new haul road. To date, a majority of the shotcrete for the North Diversion Channel and South Diversion Channel have been placed. During daily on-site CQA activities during both 2012 and 2013, multiple cracks in the shotcrete in the new diversion channels were observed and locations where erosion has undermined the shotcrete were identified. At the request of Pogo, SRK Consulting (U.S.), Inc. has characterized the shotcrete issues and presented potential remediation methods and a monitoring program in this memo. Shotcrete Cracks

2 Shotcrete Cracks

2.1 Characterization

Three types of cracks are identified in the placed shotcrete: transverse, longitudinal, and random. The most common type of crack is the transverse crack (photos 1 and 2). Most transverse cracks are less than 1/8 inches wide and span the perpendicular width of the channel. Several longitudinal cracks (photos 3 and 4) are also present. Longitudinal cracks range in length from 10 to 20 feet and are generally less than 1/8 inches wide. Areas of hairline or random cracks (photos 5 and 6) are also present. Random cracks are generally less than 1/8 inches wide, and spread over a wide area along the channel side slopes.

2.2 Locations of Cracks

Transverse cracks are located approximately every 50 to 200 feet along the new North and South Diversion Channels. The transverse cracks are likely the result of expansion and contraction of the shotcrete. The transverse cracks will likely open and close over time with fluctuating temperatures.

Longitudinal cracks are sporadic and relatively rare throughout the project limits, but found near areas of random cracking.

Random cracks are located primarily from STA 21+50 to 26+50 along the South Diversion Channel.

3 Undermined Shotcrete

The original ground along the shotcrete channel has been undermined (photo 7) in limited areas, and the shotcrete is suspended above the original ground. Likely causes of undermining include erosion due to running water removing fine particles from the original ground or frost heaving due to water presense and poorly draining soils in freezing conditions. The most notable location is near Inlet 2 on the North Diversion from STA 34+20 to 35+00. The contractor, Alaska Aggregate Products

(AAP), removed and replaced the undermined shotcrete on the cut slope side of the channel at this location. However, additional smaller isolated areas of undermined shotcrete are present. New areas may develop over time due to erosion and freeze-thaw cycles in the presence of water.

4 Remediation Recommendations

4.1 Cracks

There are three options available to remediate the crack types identified above:

- **Domestic crack fillers available in local hardware stores.** These products will fill the crack and adhear to the concrete but will lose adhesion over time and must be inspected and reapplied. Products available but not limited to are:
  - Epoxy Shield Premium Crack Filler ® manufactured by Rust-Oleum ®; and
  - LATEX-ITE Crack Filler ® manufactured by Dalton Enterprises Inc.
- **Flexible membrane coating applied evenly over the cracked area.** Membrane coatings, such as anionic emulsified asphalts, have been widely used in the transportation industry to rejuvenate highways in North America. These types of asphalts can be used as a sealer for both concrete, and asphalt concrete surfaces. A product recommended for this application is HF100p, Manufactured by Pounder Emulsions, or an approved equal. The polymer-modified emulsified asphalt that can be applied to the surface using a heavy duty paint roller or spray nozzle. In both cases, the product application rate can be controlled until the surface cracks are adequately filled in.
- **High strength rapid setting concrete repair mortar.** Repair mortar has no limit on crack width or length, nor requires reapplication years later. Once applied, the mortar will chemically bond to the concrete filling the void; whereas. The chemical bond of the mortar will last as long as the concrete. Alaskrete® a manufactured by APUN ® is locally available product. In areas where surface cracking is extensive it is recommend a skim coat ¼" thick minimum be applied.

Although application of Alaskrete ® is the preferred option, it is recommended the product manufacturer's specifications be followed for proper usage and application regardless of the product applied to the cracks.

4.2 Undermined Shotcrete

Sections of the channel with substantial undermining (i.e. unsupported shotcrete of more than 2 feet in length, from the edge of the shotcrete to the center of channel) should be removed and replaced as needed.

SRK recommends filling the eroded void space with Ready Mixed Flowable Fill (RFF). RFF is a low strength, low aggregate, high slump, flowable concrete that does not require tamping or vibration to achieve consolidation. Filling the eroded void space with RFF may prevent further erosion and damage to the channel. SRK can provide further specifications for RFF.

To prevent undermining of the shotcrete in areas that are prone to erosion, the edge of the channel, which grades into the hillside, should have Turf Reinforcement Mat (TRM) installed. The objective of the TRM is to protect the soil adjacent to the shotcrete from eroding to avoid the shotcrete being undermined. In conjunction with the TRM, there should be consideration to vegetating the slopes with native plants as soon as practical. The proper installation of the TRM should follow manufacturer's recommendations and allow for an overlap with the shotcrete channel. An overlap will help convey surface flow into the channel. Commonly used TRM is LP-C3 manufactured by Layfield Environmental Systems. SRK can provide further specifications for TRM.

5 Surface Monitoring and Maintenance

A routine monitoring and maintenance program should be in place while the channels are functioning. Prudent maintenance will minimize the life cycle cost of the channels and improve performance. An effective monitoring program for the channels may include visual inspection of its

entire length after spring freshet, heavy rainfalls (greater than $^1/_2$ inch), and during periods when the temperatures fluctuate above and below freezing. SRK recommends periodic channel inspections at a minimum of each month when snow cover is absent. Issues relating to cracks and erosion are best caught early to avoid problems compounding with time.

We appreciate the opportunity to support Pogo on this critical project. If you have any questions or comments on this memo, please contact us at 907-677-3520.

Regards,

SRK Consulting (U.S.), Inc.

Christine McCabe, EIT
Staff Consultant

Ivan Clark, P.E.
Senior Consultant

Photos:

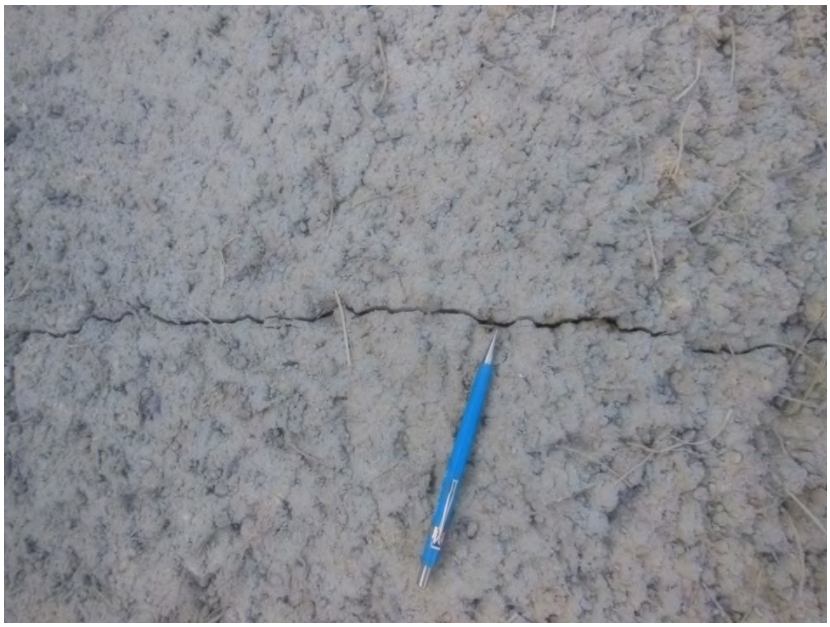

Photo 1: Transverse Crack.

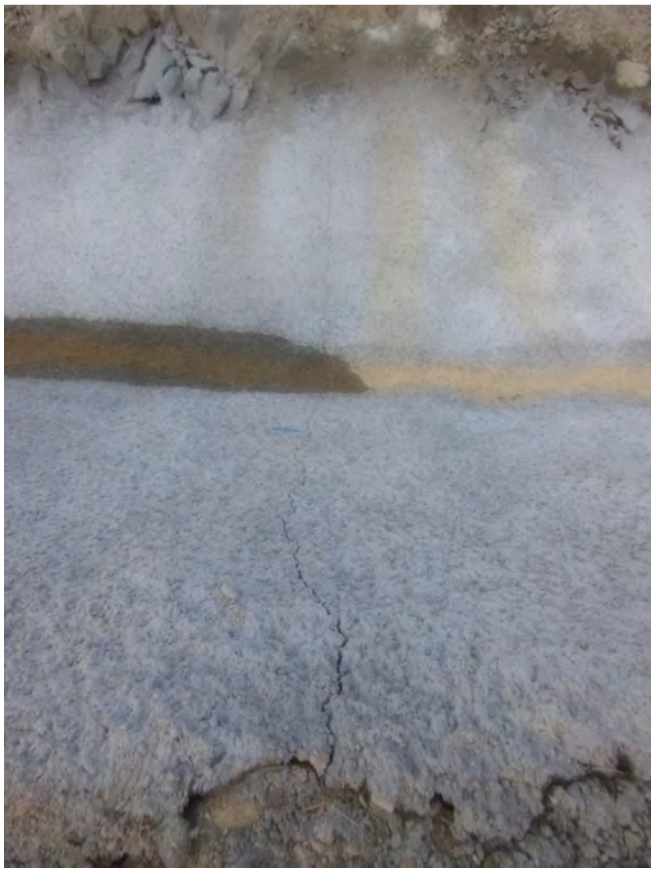

Photo 2: Transverse Crack.

Photo 3: Longitudinal Crack.

Photo 4: Longitudinal Crack.

Photo 5: Random Cracks.

Photo 6: Random Cracks.

Photo 7: Undermined Shotcrete.