

November 6, 2018



Asphalt Specialties Company, Inc.
10100 Dallas Street
Henderson, Colorado 80640

Attn: Mr. Gary Stillmunkes (GaryS@asphaltspecialties.com)

Re: Construction Observation and Testing – **Submittal No. 5**
Turnpike – Mine Backfill Process & Operations
Highway 52 and Weld County Road 1
Weld County, Colorado
EEC Project No. 1174016

Mr. Stillmunkes:

As requested, on October 20, 2017, Earth Engineering Consultants, LLC (EEC) personnel provided construction observation and testing services for the referenced project. The Turnpike Reservoir property is located northeast of the intersection of County Line Road/Weld County Road 1 and Highway 52 in Erie, Weld County, Colorado. More particularly the site is located within Section 31 and the South ½ of Section 30, Township 2 North, Range 68 West of 6th PM. The services completed were provided on a part-time, on-call/as-needed basis and included field density testing of “processed shale/siltstone bedrock” fill material placed and compacted to develop site grades within the backfill zones as presented herein. EEC personnel also obtained a representative processed shale/siltstone bedrock fill sample by means of hand-driving a “Shelby-tube” device into the compacted layer. The retrieved bedrock sample was then set up for a flex-wall Permeameter procedure: “*Hydraulic conductivity testing in general accordance with ASTM Specification D5084*” as per the agreed upon *Contractor’s Quality Control/Quality Assurance Plan (CQC/QA) Plan* dated March 12, 2013. Results of the field density services completed by EEC personnel during the referenced period as well as the flex-wall Permeameter laboratory test results are provided with this report.

Field Density Testing

On October 24, 2018, EEC personnel performed field density tests on shale/siltstone bedrock fill materials that had been placed and compacted prior to our site visit. Asphalt Specialties Company, Inc. (ASCI) has been using their own resources and personnel for the on-site stockpiled shale/bedrock material during the backfill operations at the Turnpike Sand & Gravel Pit. Their resources include personnel, heavy highway equipment such as Dozers, Front End Loaders, Self-propel Compacter,

Water Truck and 30 Yard Haul Trucks to place uniform lifts not to exceed 2 to 3-foot lifts. The equipment, especially the dozer and compactor, simulate the compaction efforts needed. Each lift is tested for percent compaction along with a Flex-Wall permeability testing procedure; with field density Flex Wall Permeameter test results presented herein.

The field density tests were completed at random locations and elevations in the embankment fill zone as noted herein and were performed in general accordance with ASTM Specification D6938. The results of the field density tests completed by EEC personnel during the referenced period are shown on the attached summary sheets. The field density test results, at the locations as described herein, conformed to the minimum project compaction requirements of at least 90% of standard Proctor maximum dry density (ASTM Specification D698) and were within the allotted moisture content range of 7% to 18% of the material's optimum moisture content, as per the agreed upon CQC/QA plan dated March 12, 2013.

Laboratory Testing

As per the CQC/QA plan, EEC personnel obtained a relatively undisturbed sample on October 24, 2018, of the previously placed and compacted shale/siltstone bedrock material by hand driving a “Shelby-tube” device approximately 12 inches into the compacted zone. This was performed to obtain a relative “*in-tact sample*” for hydraulic conductivity testing in general accordance with ASTM D 5084 Specifications. The samples were obtained at the general location of EEC Field Density Test No. 6 (10-24-18). Laboratory testing performed on the retrieved hydraulic conductivity sample included a remolded “Flex-Wall Permeameter” test in general accordance with ASTM Specification D 5084 Method A; results are shown below and are also included on the attached summary sheet.

Hydraulic Conductivity Test Results					
Hydraulic Conductivity Sample ID	Laboratory Testing - Soil Classification				
	In-Situ Moisture, %	In-Situ Dry Density, PCF	Final Moisture Content, %	Final Dry Density, PCF	Hydraulic Conductivity, cm/sec
10-24-18	13.5	115.3	16.8	114.5	2.17×10^{-6}

Based on the reported field density test results and the laboratory test results as presented herein, this lift within this phase of the placed and compacted shale/siltstone bedrock material generally conforms to the project specifications and the CQC/QA plan dated March 12, 2013.

ASCI – Turnpike Reservoir – Erie, Colorado
EEC Project No. 1174016
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Page 3

Earth Engineering Consultants, LLC

We appreciate the opportunity to work with you on this project. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,
Earth Engineering Consultants, LLC



David A. Richer, P.E.
Senior Geotechnical Engineer

cc: Asphalt Specialties Company

Mr. Dan Hunt (dan@asphaltspecialties.com)

Mr. Rob Laird (RobL@asphaltspecialties.com)

Date: October 2018

Proctor Designation	A					
Maximum Dry Density (pcf)	112.0					
Optimum Moisture Content (%)	15.5%					
Required Moisture Variance	7% to 18%					
Required Percent Compaction	90-108%					
Laboratory Method	ASTM D-698					

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Google Earth



Field Density Test Location Diagram
Turnpike Reservoir - Gravel Pit Backfill - Erie, Colorado
EEC Project #: 1174016
Fill, Subgrade, & Aggregate Base

EARTH ENGINEERING CONSULTANTS, LLC

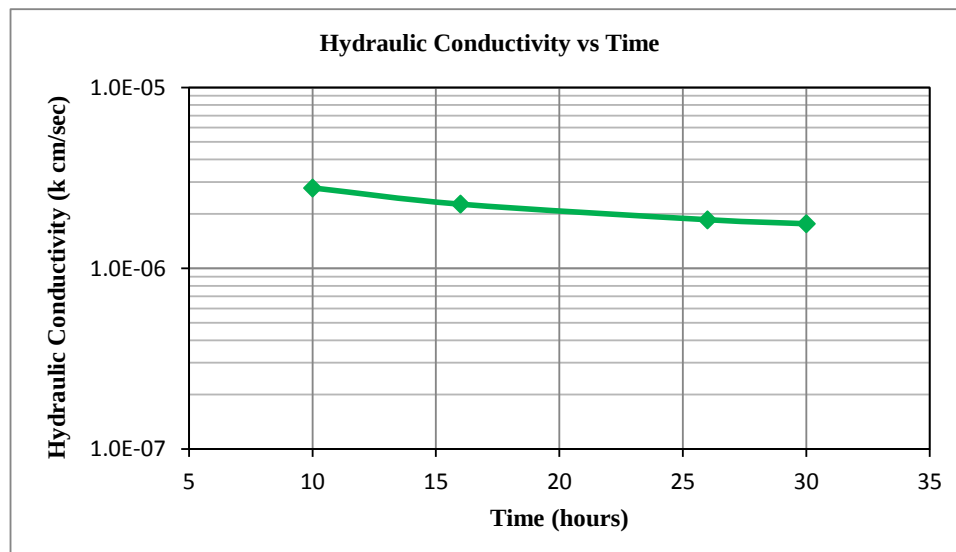
Summary of Laboratory Permeability Testing (ASTM Specification D5084)

Test Method		
Method	Description	Used
ASTM D5084	Measurement of Hydraulic Conductivity at Saturated Porous Materials Using a Flexible Wall Permeameter	Method A

Sample Description	
Sample Info	Results
Sample ID	Turnpike Reservoir: Intact Sample (10-24-18)
Sample Color	Gray
Sample Description	Processed Shale/Siltstone
Liquid Limit	37
Plasticity Index	22
Passing #200 (%)	85.0
Specific Gravity (assumed)	2.650

Specimen Information		
Properties	Initial	Final
Height (in)	3.12	3.12
Diameter (in)	2.86	2.86
Area (in ²)	6.42	6.42
Volume (in ³)	20.01	20.01
Water Content (%)	13.5	16.8
Dry Density (pcf)	115.3	114.5
B Value (%)	0.98	--

Test Information / Results	
Test	Results
Permeant Used	Tap Water
Magnitude of Back Pressure (psi)	35
Effective Stress (psi)	3.0
Hydraulic Gradient	12
Measurement 1 Hydraulic Conductivity (cm/s)	2.79E-06
Measurement 2 Hydraulic Conductivity (cm/s)	2.26E-06
Measurement 3 Hydraulic Conductivity (cm/s)	1.86E-06
Measurement 4 Hydraulic Conductivity (cm/s)	1.76E-06
Average Hydraulic Conductivity (cm/s)	2.17E-06



Project: Turnpike Reservoir - Gravel Pit Backfill CMT Services
 Location: Erie, Colorado
 Project No 1174016
 Date: October 2018



January 21, 2019

Asphalt Specialties Company, Inc.
10100 Dallas Street
Henderson, Colorado 80640



Attn: Mr. Greg Geras (GregG@asphaltspecialties.com)

Re: Construction Observation and Testing – **Submittal No. 6**
Turnpike – Mine Backfill Process & Operations
Highway 52 and Weld County Road 1
Weld County, Colorado
EEC Project No. 1174016

Mr. Geras:

As requested, on January 10, 2019, Earth Engineering Consultants, LLC (EEC) personnel provided construction observation and testing services for the referenced project. The Turnpike Reservoir property is located northeast of the intersection of County Line Road/Weld County Road 1 and Highway 52 in Erie, Weld County, Colorado. More particularly the site is located within Section 31 and the South ½ of Section 30, Township 2 North, Range 68 West of 6th PM. The services completed were provided on a part-time, on-call/as-needed basis and included field density testing of overburden fill material placed and compacted to develop site grades within the backfill zones as presented herein. EEC personnel also obtained a representative overburden subsoil sample by means of hand-driving a “Shelby-tube” device into the compacted layer. The retrieved compacted overburden sample was then set up for a flex-wall Permeameter procedure: “*Hydraulic conductivity testing in general accordance with ASTM Specification D5084*” as per the agreed upon *Contractor’s Quality Control/Quality Assurance Plan (CQC/QA) Plan* dated March 12, 2013. It should be noted that previous construction observation and testing reports prepared by EEC personnel were of the processed siltstone/shale bedrock material, and for this “round of testing services” ASCI provided us a copy of their standard Proctor density (ASTM Specification D698) test results for the overburden subsoils on-site. Results of the field density services completed by EEC personnel during the referenced period as well as the flex-wall Permeameter laboratory test results are provided with this report.

Field Density Testing

On January 10, 2018, EEC personnel performed field density tests on placed and compacted overburden subsoils in lieu of processed shale/siltstone bedrock fill materials that had been placed and compacted prior to our site visit. Asphalt Specialties Company, Inc. (ASCI) has been using their own

resources and personnel for the on-site overburden material during the backfill operations at the Turnpike Sand & Gravel Pit. Their resources include personnel, heavy highway equipment such as Dozers, Front End Loaders, Self-propel Compactor, Water Truck and 30 Yard Haul Trucks to place uniform lifts not to exceed 2 to 3-foot lifts. The equipment, especially the dozer and compactor, simulate the compaction efforts needed. Each lift is tested for percent compaction along with a Flex-Wall permeability testing procedure; with field density Flex Wall Permeameter test results presented herein.

The field density tests were completed at random locations and elevations in the embankment fill zone as noted herein and were performed in general accordance with ASTM Specification D6938. The results of the field density tests completed by EEC personnel during the referenced period are shown on the attached summary sheets. The field density test results, at the locations as described herein, conformed to the minimum project compaction requirements of at least 90% of standard Proctor maximum dry density (ASTM Specification D698) and were within the allotted moisture content range of 7% to 18% of the material's optimum moisture content, as per the agreed upon CQC/QA plan dated March 12, 2013.

Laboratory Testing

As per the CQC/QA plan, EEC personnel obtained a relatively undisturbed sample on January 10, 2019 of the previously placed and compacted overburden subsoil material by hand driving a "Shelby-tube" device approximately 12 inches into the compacted zone. This was performed to obtain a relative "*in-tact sample*" for hydraulic conductivity testing in general accordance with ASTM D 5084 Specifications. The sample was obtained at the general location of EEC Field Density Test No. 28 (1-10-19). Laboratory testing performed on the retrieved hydraulic conductivity sample included a remolded "Flex-Wall Permeameter" test in general accordance with ASTM Specification D 5084 Method A; results are shown below and are also included on the attached summary sheet.

Hydraulic Conductivity Test Results					
Hydraulic Conductivity Sample ID	Laboratory Testing - Soil Classification				
	In-Situ Moisture, %	In-Situ Dry Density, PCF	Final Moisture Content, %	Final Dry Density, PCF	Hydraulic Conductivity, cm/sec
1-10-19	14.4	117.7	17.3	119.0	7.46×10^{-7}

ASCI – Turnpike Reservoir – Erie, Colorado
EEC Project No. 1174016
January 21, 2019
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Based on the reported field density test results and the laboratory test results as presented herein, this lift within this phase of the placed and compacted overburden subsoil zone, generally conforms to the project specifications and the CQC/QA plan dated March 12, 2013.

We appreciate the opportunity to work with you on this project. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,
Earth Engineering Consultants, LLC



David A. Richer, P.E.
Senior Geotechnical Engineer

cc: Asphalt Specialties Company

Dan Hunt (dan@asphaltspecialties.com)
David King (davidk@asphaltspecialties.com)

Date: January 2019

Proctor Designation	A	ASCI				
Maximum Dry Density (pcf)	112.0	110.0				
Optimum Moisture Content (%)	15.5%	16.0%				
Required Moisture Variance	7% to 18%	7-18%				
Required Percent Compaction	90%	90%				
Laboratory Method	ASTM D-698	ASTM D-698				

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Google Earth



Field Density Test Location Diagram
Turnpike Reservoir - Gravel Pit Backfill - Erie, Colorado
EEC Project #: 1174016
Fill, Subgrade, & Aggregate Base

Proctor Test

Plant ASCI AGGREGATE PITS-4000
Product Misc Aggregate Samples-CH-001



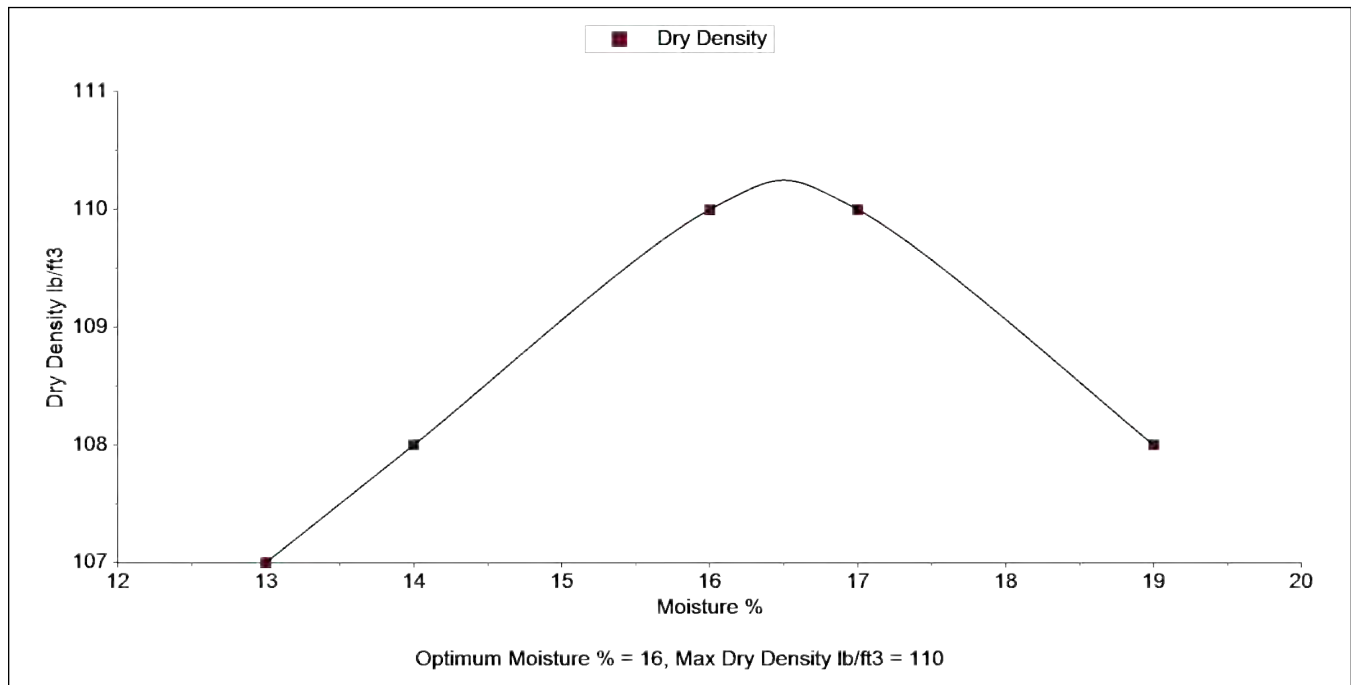
25036711

Test Information

Test Number 3540020
Date Started 1/7/2019 11:58:00 AM
Date Completed 01/07/2019 11:58
Tested By SCOTT CONNER
Procedure T 99
Lab

Sample No 25036711
Date Sampled 01/07/2019 11:58

	<u>Results</u>	<u>Targets</u>	<u>Specifications</u>
Opt Moisture (Proctor-Std) %	16		
Max Dry Density (Proctor-Std) lb/ft ³	110		
Max Wet Density (Proctor-Std) lb/ft ³	128		



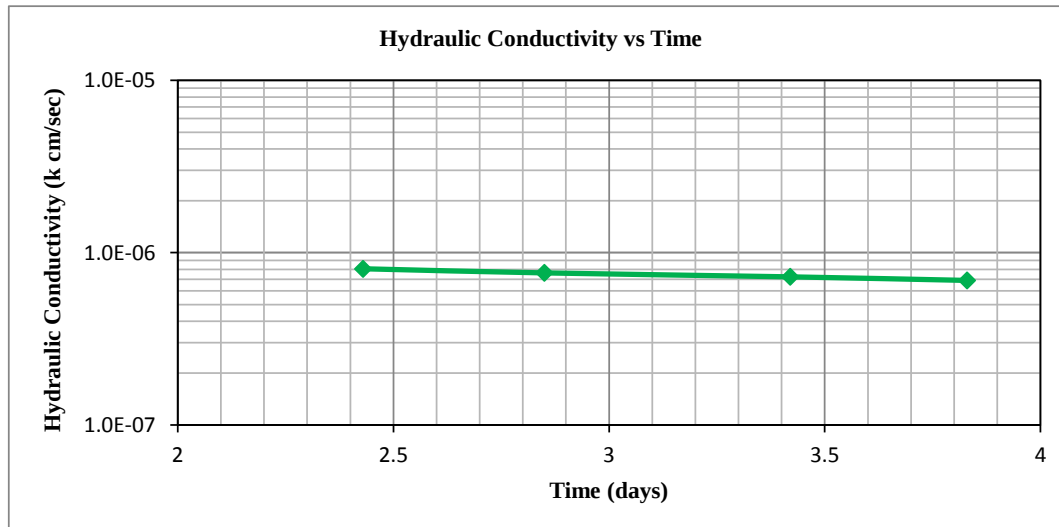
EARTH ENGINEERING CONSULTANTS, LLC
Summary of Laboratory Permeability Testing (ASTM Specification D5084)

Test Method		
Method	Description	Used
ASTM D5084	Measurement of Hydraulic Conductivity at Saturated Porous Materials Using a Flexible Wall Permeameter	Method A

Sample Description	
Sample Info	Results
Sample ID	Intact Sample: Turnpike Reservoir (1-10-19)
Sample Color	Brown
Sample Description	Overburden - Lean Clay w/ Sand (CL)
Liquid Limit	Not Provided
Plasticity Index	Not Provided
Passing #200 (%)	Not Provided
Specific Gravity (assumed)	2.650

Specimen Information		
Properties	Initial	Final
Height (in)	3.44	3.44
Diameter (in)	2.85	2.85
Area (in ²)	6.38	6.38
Volume (in ³)	21.97	21.97
Water Content (%)	14.4	17.3
Dry Density (pcf)	117.7	119.0
B Value (%)	0.95	--

Test Information / Results	
Test	Results
Permeant Used	Tap Water
Magnitude of Back Pressure (psi)	38
Effective Stress (psi)	3.0
Hydraulic Gradient	10
Measurement 1 Hydraulic Conductivity (cm/s)	8.06E-07
Measurement 1 Hydraulic Conductivity (cm/s)	7.63E-07
Measurement 2 Hydraulic Conductivity (cm/s)	7.24E-07
Measurement 3 Hydraulic Conductivity (cm/s)	6.90E-07
Average Hydraulic Conductivity (cm/s)	7.46E-07



Project: Turnpike Reservoir
 Location: ASCI - Overburden Subsoils (Standard PROCTOR Density results provided by ASCI)
 Project No: 1174016
 Date: January 2019



February 27, 2019

Asphalt Specialties Company, Inc.
10100 Dallas Street
Henderson, Colorado 80640



Attn: Mr. Greg Geras (GregG@asphaltspecialties.com)

Re: Construction Observation and Testing – **Submittal No. 7**
Turnpike – Mine Backfill Process & Operations
Highway 52 and Weld County Road 1
Weld County, Colorado
EEC Project No. 1174016

Mr. Geras:

As requested, on February 13, 2019, Earth Engineering Consultants, LLC (EEC) personnel provided construction observation and testing services for the referenced project. The Turnpike Reservoir property is located northeast of the intersection of County Line Road/Weld County Road 1 and Highway 52 in Erie, Weld County, Colorado. More particularly the site is located within Section 31 and the South ½ of Section 30, Township 2 North, Range 68 West of 6th PM. The services completed were provided on a part-time, on-call/as-needed basis and included field density testing of overburden fill material placed and compacted to develop site grades within the backfill zones as presented herein. EEC personnel also obtained a representative overburden subsoil sample by means of hand-driving a “Shelby-tube” device into the compacted layer. The retrieved compacted overburden sample was then set up for a flex-wall Permeameter procedure: “*Hydraulic conductivity testing in general accordance with ASTM Specification D5084*” as per the agreed upon *Contractor’s Quality Control/Quality Assurance Plan (CQC/QA) Plan* dated March 12, 2013. It should be noted that previous construction observation and testing reports prepared by EEC personnel were of the processed siltstone/shale bedrock material, and for this “*round of testing services*” ASCI provided us a copy of their standard Proctor density (ASTM Specification D698) test results for the overburden subsoils on-site. Results of the field density services completed by EEC personnel during the referenced period as well as the flex-wall Permeameter laboratory test results are provided with this report.

Field Density Testing

On February 13, 2019, EEC personnel performed field density tests on placed and compacted overburden subsoils in lieu of processed shale/siltstone bedrock fill materials that had been placed and compacted prior to our site visit. Asphalt Specialties Company, Inc. (ASCI) has been using their own

resources and personnel for the on-site overburden material during the backfill operations at the Turnpike Sand & Gravel Pit. Their resources include personnel, heavy highway equipment such as Dozers, Front End Loaders, Self-propel Compactor, Water Truck and 30 Yard Haul Trucks to place uniform lifts not to exceed 2 to 3-foot lifts. The equipment, especially the dozer and compactor, simulate the compaction efforts needed. Each lift is tested for percent compaction along with a Flex-Wall permeability testing procedure; with field density Flex Wall Permeameter test results presented herein.

The field density tests were completed at random locations and elevations in the embankment fill zone as noted herein and were performed in general accordance with ASTM Specification D6938. The results of the field density tests completed by EEC personnel during the referenced period are shown on the attached summary sheets. The field density test results, at the locations as described herein, conformed to the minimum project compaction requirements of at least 90% of standard Proctor maximum dry density (ASTM Specification D698) and were within the allotted moisture content range of 7% to 18% of the material's optimum moisture content, as per the agreed upon CQC/QA plan dated March 12, 2013.

Laboratory Testing

As per the CQC/QA plan, EEC personnel obtained a relatively undisturbed sample on February 13, 2019 of the previously placed and compacted overburden subsoil material by hand driving a "Shelby-tube" device approximately 12 inches into the compacted zone. This was performed to obtain a relative "*in-tact sample*" for hydraulic conductivity testing in general accordance with ASTM D 5084 Specifications. The sample was obtained at the general location of EEC Field Density Test No. 33 (2-13-19). Laboratory testing performed on the retrieved hydraulic conductivity sample included a remolded "Flex-Wall Permeameter" test in general accordance with ASTM Specification D 5084 Method A; results are shown below and are also included on the attached summary sheet.

Hydraulic Conductivity Test Results					
Hydraulic Conductivity Sample ID	Laboratory Testing - Soil Classification				
	In-Situ Moisture, %	In-Situ Dry Density, PCF	Final Moisture Content, %	Final Dry Density, PCF	Hydraulic Conductivity, cm/sec
2-13-19	12.5	114.3	17.3	118.8	7.36×10^{-7}

Based on the reported field density test results and the laboratory test results as presented herein, this lift within this phase of the placed and compacted overburden subsoil zone, generally conforms to the project specifications and the CQC/QA plan dated March 12, 2013.

We appreciate the opportunity to work with you on this project. If you have any questions concerning this report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,
Earth Engineering Consultants, LLC



David A. Richer, P.E.
Senior Geotechnical Engineer

cc: Asphalt Specialties Company

Dan Hunt (dan@asphaltspecialties.com)

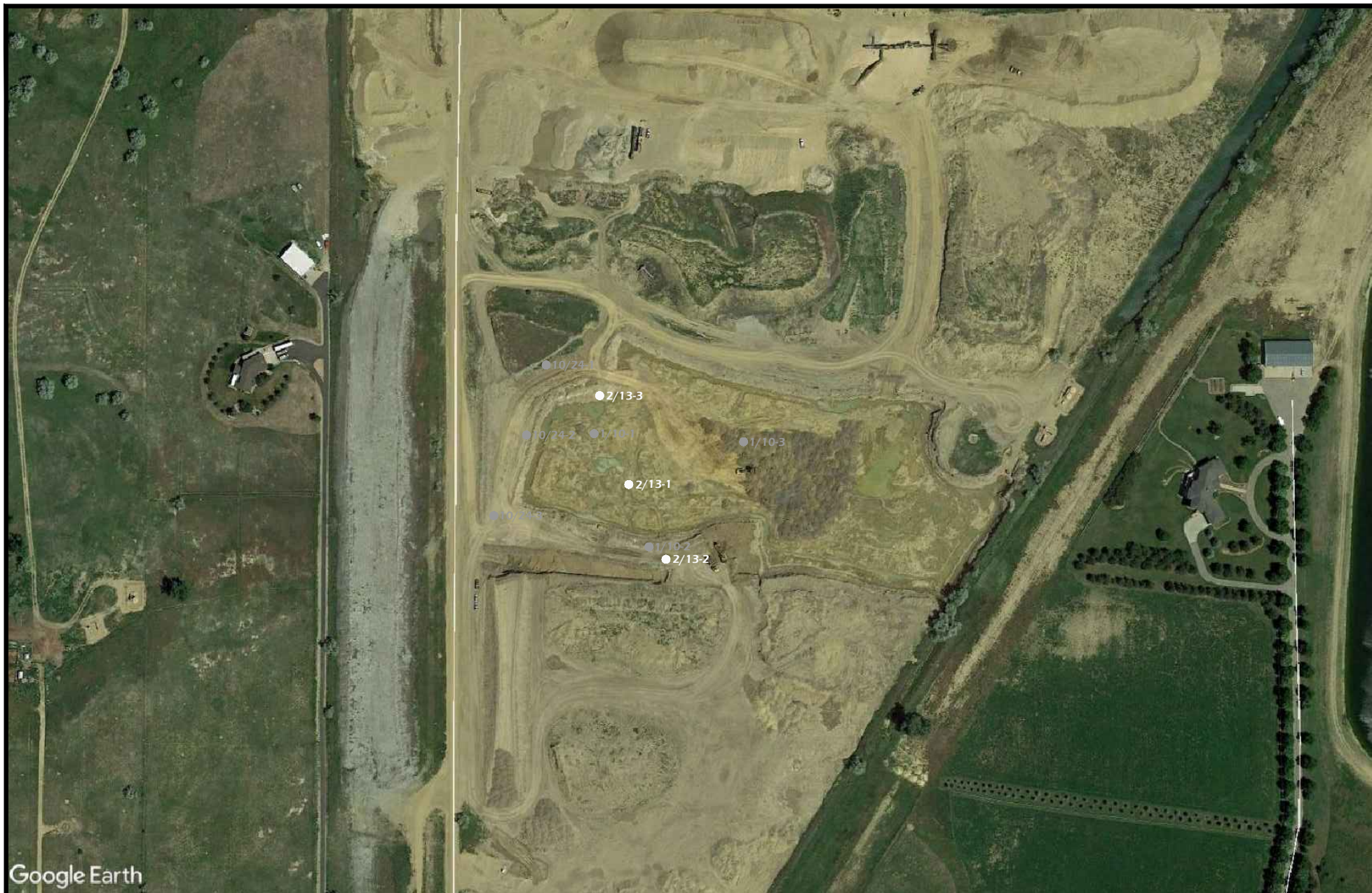
David King (davidk@asphaltspecialties.com)

Project No: 1174016

Date: February 2019

Proctor Designation	A					
Maximum Dry Density (pcf)	112.0					
Optimum Moisture Content (%)	15.5%					
Required Moisture Variance	7% to 18%					
Required Percent Compaction	90%					
Laboratory Method	ASTM D-698					

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Google Earth



Field Density Test Location Diagram
Turnpike Reservoir - Gravel Pit Backfill - Erie, Colorado
EEC Project #: 1174016
Fill, Subgrade, & Aggregate Base

EARTH ENGINEERING CONSULTANTS, LLC

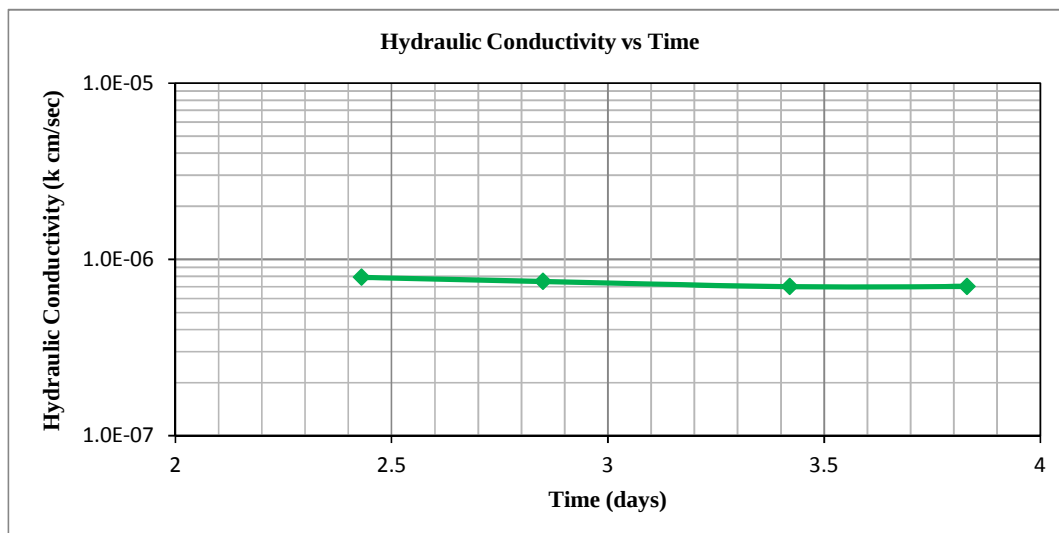
Summary of Laboratory Permeability Testing (ASTM Specification D5084)

Test Method		
Method	Description	Used
ASTM D5084	Measurement of Hydraulic Conductivity at Saturated Porous Materials Using a Flexible Wall Permeameter	Method A

Sample Description	
Sample Info	Results
Sample ID	Intact Sample: Turnpike Reservoir (2-13-19)
Sample Color	Brown
Sample Description	Remolded Overburden - Lean Clay w/ Sand (CL)
Liquid Limit	Not Provided
Plasticity Index	Not Provided
Passing #200 (%)	Not Provided
Specific Gravity (assumed)	2.650

Specimen Information		
Properties	Initial	Final
Height (in)	3.45	3.45
Diameter (in)	2.85	2.85
Area (in ²)	6.38	6.38
Volume (in ³)	22.01	22.01
Water Content (%)	12.5	17.3
Dry Density (pcf)	114.3	118.8
B Value (%)	0.95	--

Test Information / Results	
Test	Results
Permeant Used	Tap Water
Magnitude of Back Pressure (psi)	38
Effective Stress (psi)	3.0
Hydraulic Gradient	10
Measurement 1 Hydraulic Conductivity (cm/s)	7.90E-07
Measurement 1 Hydraulic Conductivity (cm/s)	7.49E-07
Measurement 2 Hydraulic Conductivity (cm/s)	7.00E-07
Measurement 3 Hydraulic Conductivity (cm/s)	7.03E-07
Average Hydraulic Conductivity (cm/s)	7.36E-07



Project: Turnpike Reservoir
 Location: ASCI - Overburden Subsoils (Standard PROCTOR Density results provided by ASCI)
 Project No: 1174016
 Date: February 2019

