Yeh and Associates, Inc.
Consulting Engineers & Scientists

Addendum

FINAL Preliminary Subsurface Investigation Report

I-70 East Corridor Project

Partial Cover Lowered Alternative with Managed Lanes Option

Brighton Boulevard to Chambers Road

Denver, Colorado

CDOT Project No: FBR 0704-234 (19631)

Yeh Project No.: 213-208

June 9, 2016

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Prepared by:

for
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1. Purpose and Scope of Study

This Addendum to Yeh and Associates, Inc. (Yeh) FINAL Preliminary Subsurface Investigation Report (dated September 21, 2015) was prepared in response to due diligence requests submitted by the design/build teams currently pursuing the design, build, finance, operate and maintain contract for a portion of the I-70 East Corridor. The addendum presents the results of the additional subsurface investigation that was completed between Race Street and Interstate 270 (I-270) and updated groundwater observations in the monitoring wells installed in 2012 and the temporary monitoring wells installed in 2014 and 2015.

The scope of services for the additional subsurface investigation included the following:

- Drilling 8 borings between Race Street and I-270, including:
  - Two borings at locations for the proposed pump tests.
  - One boring for the proposed bridge at York Street.
  - Four borings for bedrock conditions between approximately Josephine Street and Elizabeth Street.
  - One boring at the I-270 south abutment embankment to determine the subsurface conditions and obtain soil samples for one dimensional consolidation tests.
- Obtaining Standard Penetration Test results and bedrock core samples from the borings.
- Assigning and performing geotechnical laboratory tests on representative soil and bedrock samples collected during the subsurface investigation.
- Obtaining groundwater depths in the 2012 monitoring wells and 2014/2015 temporary monitoring wells.
- Preparing a report presenting the field and laboratory information that was obtained.

2. Subsurface Investigation

2.1. Field Exploration

This subsurface investigation program included a total of 8 borings. The borings were drilled by the Colorado Department of Transportation (CDOT) Geotechnical Program Drill Shop between April 12, 2016 and April 29, 2016. The boring locations are shown in on the Engineering Geology sheets (Sheets A-1.1 and A-1.2) and I-270 Boring Location Sheet (Sheet A-2) that are included in Appendix A. A representative from Yeh was on site to observe drilling operations and log the subsurface conditions.

Access permits were obtained from the City and County of Denver (CCD). Traffic control, as required by the CCD access permit, was provided by Colorado Barricade LLC, as a subcontractor to Yeh. After the borings were drilled, the boring locations were surveyed by Lund Partnership, who provided coordinates and ground surface elevations. The coordinates and elevations are shown on the boring logs.

The boring logs are included in Appendix B, and are also shown on the engineering geology sheets in Appendix A (Sheets A-1.1and A-1.2). The engineering geology sheets also show previous borings that have been performed in the area. An engineering geology sheet is not included for the boring on the proposed I-270 embankment.

The boring designations are described below:

- YA-PT-1 and 2: Borings drilled at the locations of proposed pump tests.
- YA-BY-1: Boring drilled near the north abutment of the proposed York Street Bridge.
- Four (4) borings were drilled for an increased understanding of the bedrock elevations between Josephine Street and Elizabeth Court.
    - YA-WJO-1 and 2: Borings drilled between Josephine Street and Columbine Street, on the north and south side of the existing I-70 viaduct, respectively.
    - YA-WEL-1 and 2: Borings drilled between Columbine Street and Elizabeth Court, on the north and south side of the existing I-70 viaduct, respectively
- YA-EM270-1: Drilled for the south approach embankment of the proposed I-270 Bridge to determine subsurface conditions and obtain soil samples for one dimensional consolidation tests.

Borings that were drilled in landscaped areas were backfilled with cuttings from the boreholes. In paved areas, approximately the top one foot of the boreholes were patched using non-shrink, rapid set, cementitious grout after they were backfilled with cuttings. There were no excess cutting materials after the borings were backfilled.

Samples were obtained using a standard penetration split spoon sampler (SPT) and Shelby tubes during the site investigation. Once bedrock was encountered, the drilling and sampling method was switched to NQ coring except in borings YA-PT-1 and YA-PT-2. The SPT sampler has an outside diameter of 2.0 inches, an interior diameter of 1⅜ inches, and length of 18 inches. The sampler was seated at the bottom of the boring, then advanced by a 140 pound hammer falling a distance of 30 inches. An automatic (i.e. hydraulic) hammer was used to

advance the sampler. The SPT procedure was performed in general accordance with ASTM D1586. The SPT penetration resistance value was recorded as the total number of blows required to advance the split spoon sampler for three 6 inch intervals for a total drive of 18 inches. The sum of the final two 6 inches of penetration is reported as the N-value, and is identified as “N” on the boring logs. If 50 blows could not advance the sampler in a 6-inch interval, driving was terminated.

Samples of the clayey soils encountered near I-270 were obtained from a boring drilled adjacent to YA-EM270-1 (Boring YA-EM270-1(A)), using Shelby tube samplers in general accordance with ASTM 1587. The Shelby tubes had a 3 inch outside diameter, 2.8 inch inside diameter, and length of 30 inches. They were advanced by downward pressure from the drill rig’s hydraulic Kelly bar system. The samples were sealed and returned to the Yeh laboratory for test assignment.

The NQ coring equipment utilized a 2.98 inch outside diameter drill string that advanced an inter liner sample collector, which when retrieved produces a 1.87 inch outside diameter bedrock core. The NQ coring produced continuous sampling from near the top of bedrock to a maximum penetration of about 46 feet into bedrock. The length of core runs varied based on the material characteristics of the bedrock. Each retrieved core was measured for percent recovered and rock quality designation (RQD). RQD is an estimate of the degree of jointing or fracture in a rock mass and is calculated as a percent of the total length of pieces of core greater than or equal to four inches divided by the total length of core retrieved in an individual run.

Upon arrival at the Yeh laboratory, all core boxes were photographed. Photographs are presented in Appendix C. Each photograph depicts up to 10 feet of continuous core with box ends or wooden spacers showing the start/end points of each run or partial run. Pink tabs were placed at the locations of mechanical breaks. Each photograph has a placard identifying the borehole number, core interval, and Yeh project number. Table 2-1 summarizes boring depths, depth to bedrock, and the approximate elevation of the top of bedrock for the additional borings.

Table 2-1 Boring Depths and Approximate Elevations of Top of Bedrock

Boring No.	Ground Surface Elevation (feet)	Boring Depth (feet)	Approximate Depth to Bedrock (1) (feet)	Approximate Elevation Top of Bedrock (1) (feet)
YA-PT-1	5186.0	40.5	39	5147
YA-PT-2	5186.5	50.4	47	5139.5
YA-BY-1	5184.8	82.5	37	5148
YA-WJO-1	5186.2	105	56	5130
YA-WJO-2	5187.4	100	58.5	5129
YA-WEL-1	5189.1	127	79	5110
YA-WEL-2	5189.1	120.1	79	5110
YA-EM270-1	5242.5	53.5	24	5218.5

Note:
(1) Bedrock depths and elevations are presented to the nearest 0.5 foot.

2.2 Groundwater Observations

Groundwater conditions were observed during drilling for all borings and are recorded on the boring logs. In addition, monitoring wells were installed borings YA-PT-1 and YA-PT-2 as requested by Pinyon Environmental, Inc. (Pinyon). Groundwater observation in these monitoring wells will be reported by Pinyon.

In 2012, ten (10) monitoring wells were installed by Yeh. They were denoted YA-MW1 through YA-MW10. They were surveyed in 2014 and 2015, and the survey coordinates and elevations are provided in Table 2-2. Ground water observations are shown in Table 2-3. A description of the monitoring well construction is presented in Preliminary Subsurface Investigation Report dated October 31, 2012.

In 2014 and 2015, 18 temporary monitoring wells were installed by Yeh. They were surveyed in 2014 and 2015, and surveyed coordinates and elevations are provided in Table 2-2. Ground water observations are shown in Table 2-4. A description of the monitoring well construction is presented in FINAL Preliminary Subsurface Investigation Report dated September 21, 2015.

Table 2-2 Surveyed Monitoring Well Locations

Description	Northing	Easting	Elevation (feet)
Monitoring Wells Installed in 2012			
YA-MW1	456,244.56	651,044.48	5,187.06
YA-MW2	455,978.23	651,930.80	5,187.15
YA-MW3	456,497.80	652,874.00	5,185.68
YA-MW4	456,150.53	653,581.57	5,186.56
YA-MW5	456,724.57	654,466.51	5,187.42
YA-MW6	455,988.63	655,091.18	5,205.39
YA-MW7	456,104.17	655,781.80	5,206.56
YA-MW8	455,972.13	656,354.34	5,212.67
YA-MW9	456,143.26	657,079.77	5,227.30
YA-MW10	456,566.05	658,022.33	5,236.18
Temporary Monitoring Wells Installed in 2014 and 2015			
YA-BB-2	455,949.45	650,810.30	5,187.41
YA-UP-5	456,299.46	652,481.39	5,186.96
YA-BCL-1	456,276.64	654,393.74	5,195.76
YA-BML-1	456,233.53	656,810.73	5,223.42
YA-BCB-2	455,946.98	658,328.69	5,236.97
YA-BD-2	456,024.69	660,583.88	5,269.28
YA-BRI-1	455,344.78	667,551.65	5,272.67
YA-BQ-2	455,485.18	668,722.01	5,273.97
YA-B270-2	455,072.16	670,818.27	5,235.15
YA-RW-2	456,287.32	652,039.02	5,184.69
YA-RW-13	455,943.50	659,036.05	5,240.35
YA-RW-14	456,176.69	659,891.08	5,242.02
YA-RW-18	455,739.38	662,441.85	5,249.89
YA-RW-21	455,332.29	664,265.66	5,269.90
YA-RW-24	455,516.78	666,763.09	5,271.07
YA-DOF-6	455,929.11	653,031.43	5,188.51
YA-DON-2	457,283.81	652,659.34	5,181.01
YA-DON-3	457,903.95	652,351.04	5,179.94

Groundwater depths were measured using a Heron Instruments groundwater level meter. The groundwater observations for the monitoring wells are rounded to the nearest foot except for June 2016, which are recorded to the nearest tenth of a foot. As a result of the due diligence request, groundwater observations going forward will be recorded to the nearest hundredth of a foot.

Table 2-3 Groundwater Observations (Monitoring Wells Installed in 2012)

Monitoring Well (Permit No.)	Date Installed	Measured Well Depth (feet)	Elevation of Monitoring Well Cover (feet) (2)	Groundwater Observations - Elevation (feet) (1)														
				At Time of Installation	9/14/12	9/17/12	9/18/12	10/2/12	10/3/12	10/4/12	10/25/12	5/2/13	2/24/14	7/23/14	11/26/14	1/6/16	2/8/16	6/1/16 (1)
YA-MW1 (050883)	9/10/2012	50.0	5187.06	5153	5155	5155			5155		5155	5155	5155	5155	5155	5155		5155.7
YA-MW2 (050884)	8/27/2012	44.2	5187.15	5157	5159	5159			5159		5159	5158	5158	5158	5158	5158		Not Visible at Current Grade
YA-MW3 (050885)	9/7/2012	43.8	5185.68	5159	5158	5158			5158		5158	5158	5158	5158	5158	5158		5164.0
YA-MW4 (050886)	8/31/2012	79.6	5186.56	5160	5160	5160				5160	5160	5160	5159	5159	5159	5159		5160.6
YA-MW5 (050887)	9/14/2012	40.0	5187.42	5161	5161	5161			5160		5160	5160	5159	5159	5159	5159		5159.8
YA-MW6 (050888)	8/22/2012	48.3	5205.39	5163	5163	5163			5163		5163	5163	5162		5162	5162		5162.4
YA-MW7 (050889)	8/27/2012	49.3	5206.56	5165	5165		5165			5165	5165	5165	5165	5165	Unable to Access Under Ice		5165	5165.3
YA-MW8 (050890)	8/30/2012	49.7	5212.67	5166	5166		5166	5166			5166	5165	5165 (3)	5165	5165		5166	5165.8
YA-MW9 (050898)	8/30/2012	69.5	5227.30	5164	5164		5164	5164			5164	5164	5164	5164	5164	5164		5164.6
YA-MW10 (050891)	9/10/2012	78.3	5236.18	5161	5162		5162			5164	5164	5164	5163	5164	5164	5164		Standing Water Above Monitoring Well

Notes:
(1) Prior to June 2016, groundwater observations are rounded to the nearest foot. After the due diligence request, the observations in June 2016 were recorded to the nearest tenth of a foot.
(2) Monitoring wells have a flush mount cover at the existing ground surface.
(3) Groundwater observation was taken on 4/17/2014.

Table 2-4 Groundwater Observations (Temporary Monitoring Wells Installed in 2014 and 2015)

Monitoring Well (Permit No.)	Date Installed	Ground Surface Elevation (feet) (2)	Groundwater Observations - Elevation (feet) (1)																
			At Time of Installation	3/31/14	4/9/14	4/18/14	5/8/14	5/23/14	6/20/14	7/23/14	11/26/14	3/6/15	3/19/15	4/1/15	7/9/15	7/10/15	1/6/16	1/7/16	6/1/2016 (1)
YA-BB-2 (295257)	3/21/14	5187.41	5152	5155	5155	5155	5157	5155	5156	5155	5155			5155	5156		5156		5156.1
YA-UP-5 (295268)	3/18/14	5186.96	5158			5158	5158	5158	5158	5158	5158			5158	5159		5159		5159.8
YA-BCL-1 (295259)	4/24/14	5195.76	5160					5161	5161	5161	5161			5161	5161		5161		5162.0
YA-BML-1 (295261)	6/10/14	5223.42	5163						5164	5164	5164			5164	5165		5165		5165.0
YA-BCB-2 (295258)	5/13/14	5236.97	5169					5170	5170	5170	5170			5171	5171		5171		Standing Water Above Monitoring Well
YA-BD-2 (295260)	5/30/14	5269.28	5201						5210	5210	5210			5210				5211	5210.6
YA-BRI-1 (2) (053146)	1/28/15	5272.67	5224									5228		5227		5227		5227	5227.6
YA-BQ-2 (053150)	1/7/15	5273.97	5232									5228		5231	5233			5232	5232.6
YA-B270-2 (2) (053145)	1/27/15	5235.15	5225										5228	5228		5231		5228	Standing Water Above Monitoring Well
YA-RW-2 (295265)	3/28/14	5184.69	5157				5157	5157	5157	5157	5157			Blocked by Car	5158		Blocked by Car		5158.1
YA-RW-13 (295266)	5/2/14	5240.35	5178					5193	5193	5193	5194			5193	5193		5193		5193.9
YA-RW-14 (295267)	5/5/14	5242.02	5203					5203	5202	5203	5204			5204	5203		5204		5204.1
YA-RW-18 (2) (053149)	2/13/15	5249.89	5215									5177		5215		5216		5216	5216.6
YA-RW-21 (2) (053148)	2/19/15	5269.90	5237									5190		5223		5223		5224	5223.9
YA-RW-24 (2) (053147)	2/11/15	5271.07	5222									5173		5222	5223			5223	5223.4
YA-DOF-6 (295262)	4/1/14	5188.51	5160			5160	5160	5160	5160	5160	5160			Unsanitary Conditions Near Well			5161		5160.6
YA-DON-2 (295263)	4/2/14	5181.01	5154	5155	5155	5155	5155	5155	5155	5155	5155			5155			Blocked by Car		5155.9
YA-DON-3 (295264)	4/2/14	5179.94	5153	5151	5151	5151	5151	5151	5151	5151	5151			5152			5152		5152.5

Notes:
(1) Prior to June 2016 groundwater observations are rounded to the nearest foot. After the due diligence request, the observations in June 2016 were recorded to the nearest tenth of a foot.
(2) The temporary monitoring wells have a flush mount cover at existing grade except for YA-BRI-1, YA-B270-2, YA-RW-18, YA-RW-21, and YA-RW-24. These temporary monitor wells consist of a capped standpipe that extends above the ground surface.

2.3 Laboratory Testing

The samples collected during the subsurface investigation were transported to our laboratory in Denver, Colorado, where they were reviewed, and laboratory tests were assigned to samples representative of the subsurface materials encountered in the borings. The geotechnical laboratory tests included sieve analyses, Atterberg limits, natural moisture content, and dry density. The results of the sieve analyses and Atterberg limits were used to classify the soils according to AASHTO and Unified Soil Classification System (USCS) classification systems. The Atterberg limit tests were performed in general accordance with AASHTO T89 and T90, and sieve analyses were performed in general accordance with ASTM D421. Dry density tests and moisture content tests were performed in general accordance with ASTM D2937 and ASTM D2216, respectively.

Unconfined compressive strength tests were performed on select bedrock samples. The lengths of tested core were between 2.0 and 2.5 times the diameter of the retrieved core. There is a possibility that the samples were disturbed during drilling and may not accurately represent the shear strength of the in-situ materials.

The results for the laboratory tests performed by Yeh are presented in Appendix D and on the boring logs included in Appendix B.

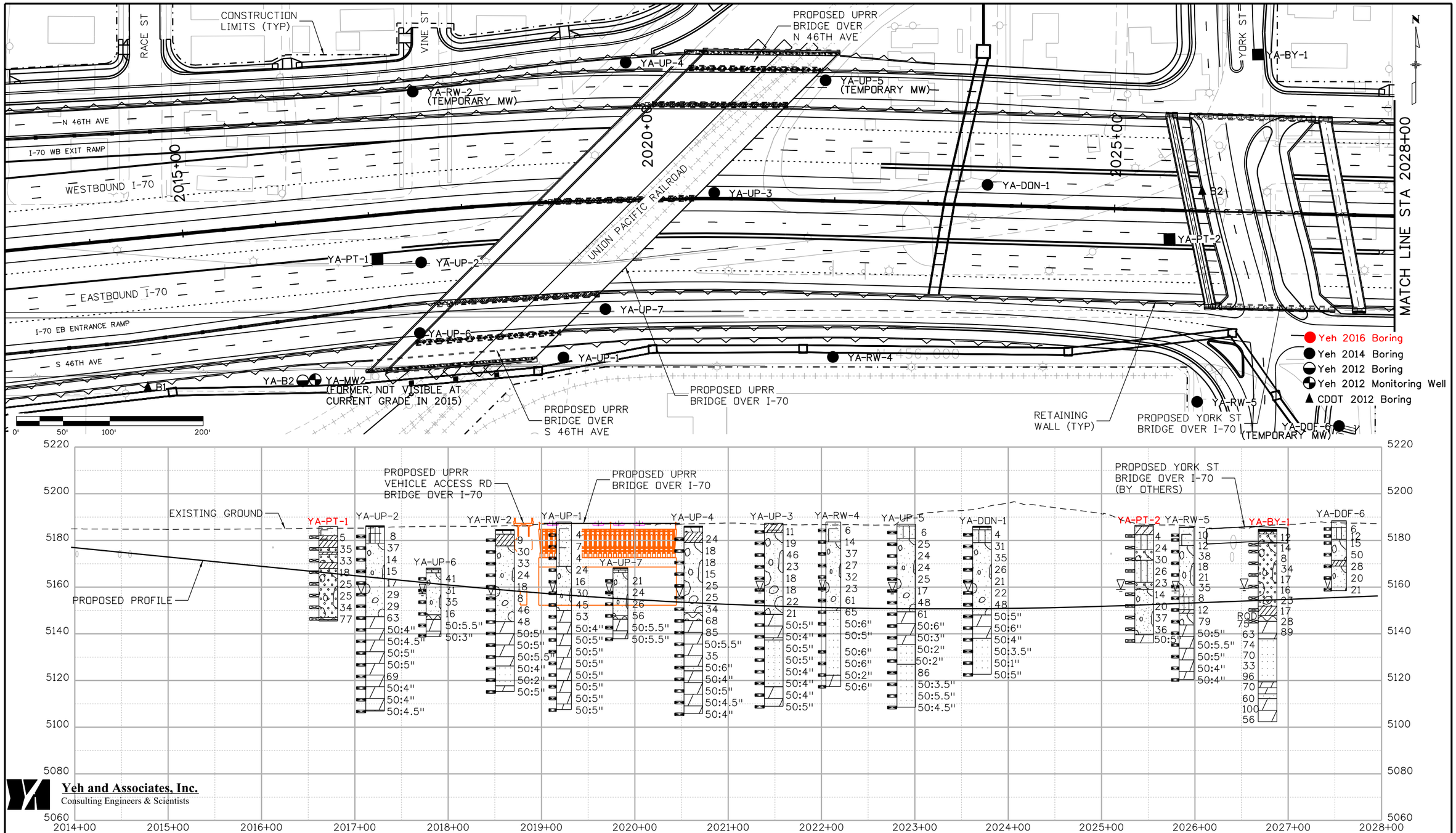
One dimensional consolidation tests were performed on samples obtained with Shelby tubes at the location of the I-270 approach embankment. The one dimensional consolidation tests were performed by Knight Piesold Consulting in general accordance with ASTM D2435. These test results are presented in Appendix E.

3. Limitations

This addendum to the FINAL Preliminary Subsurface Investigation Report (dated September 21, 2015) was prepared to document the additional subsurface investigations performed in response to due diligence requests submitted by proposing teams and updated groundwater observations. The data presented in this report is based on the exploratory borings, field observations and laboratory testing. This study has been conducted in accordance with generally accepted geotechnical engineering practices in this area. No warranty, expressed or implied, is made.

Appendix A

Engineering Geology Sheets and I-270 Boring Location Plan



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Horiz. Scale: 1:100 Vert. Scale: As Noted		Region 1 KJS	Revised:
Unit Information Unit Leader Initials		BNSF RAILWAY	Void:
ATKINS 7604 Technology Way, Suite 400, Denver, CO 80237, Phone: (303) 221-7275 Fax: (303) 221-7276			

I-70 ROADWAY PROCUREMENT PHASE 1
ENGINEERING GEOLOGY

Designer:	MLK	Structure Numbers	
Detailer:	MJW		
Sheet Subset:		Subset Sheets:	of

Project No./Code
FBR 0704-234
19631
Sheet Number A-1.1

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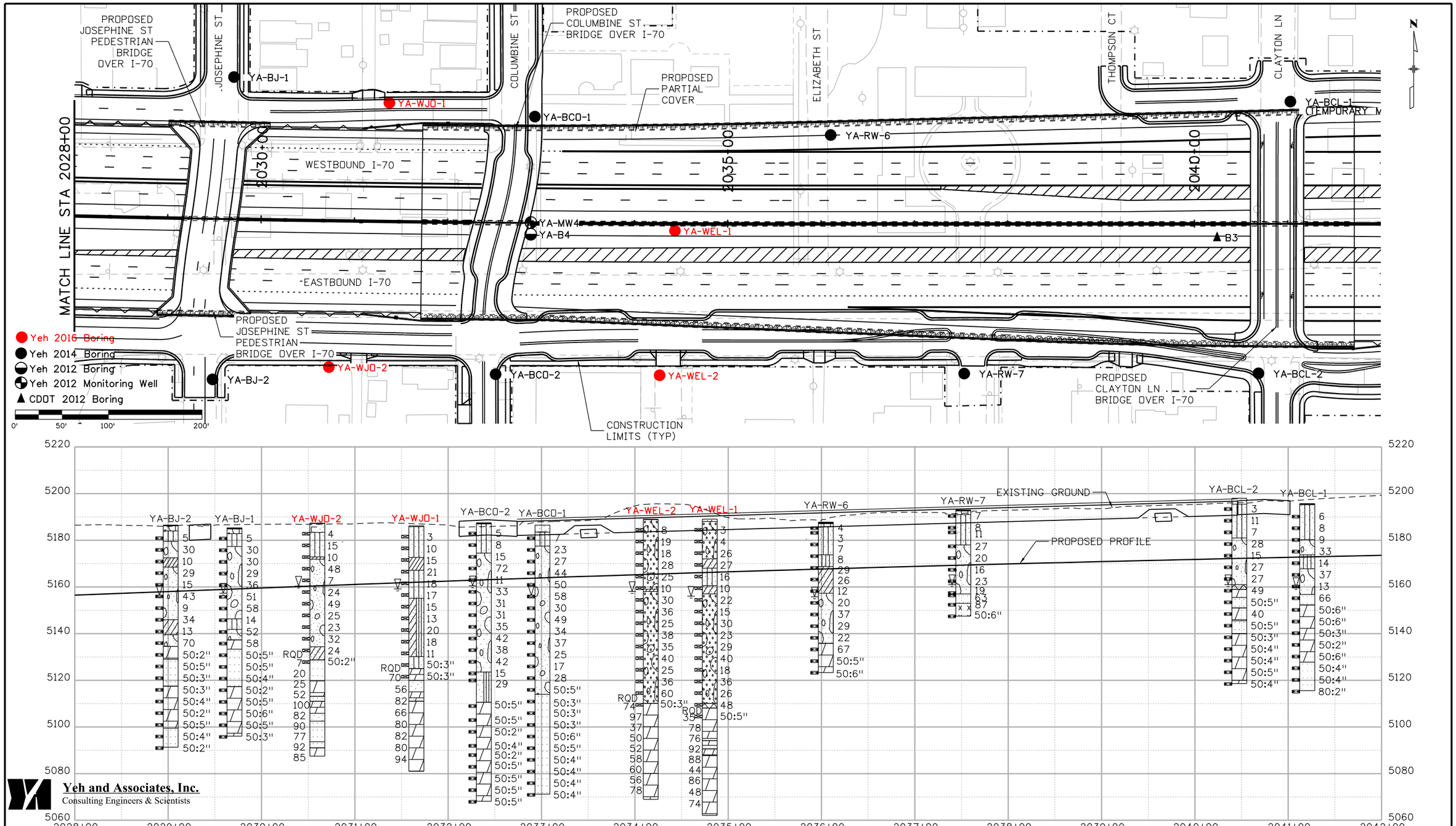

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Unit Information Unit Leader Initials		BNSF RAILWAY	Void:
ATKINS 7604 Technology Way, Suite 400, Denver, CO 80237, Phone: (303) 221-7275 Fax: (303) 221-7276			

I-70 ROADWAY PROCUREMENT PHASE 1
ENGINEERING GEOLOGY

Designer:	MLK	Structure Numbers	
Detailer:	MJW		
Sheet Subset:		Subset Sheets:	of

Project No./Code: FBR 0704-234
19631
Sheet Number A-1.2

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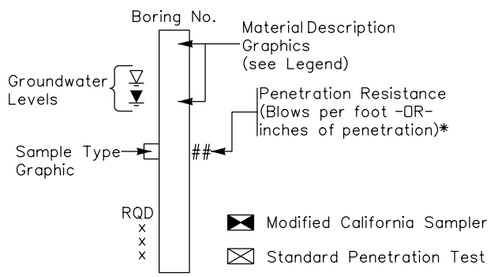
Asphalt
Fill (made ground)
USCS Clayey Sand
Topsoil
CLAYSTONE
USCS Low Plasticity Clay
Fill with Clay as major soil
USCS Silty Sand
Sandstone
USCS Low Plasticity Sandy Clay
Fill with Sand as major soil
USCS Poorly-graded Gravelly Sand
Interbedded claystone and sandstone
Concrete
USCS Clayey Sand
USCS Well-graded Gravelly Sand
Weathered Bedrock

TYPICAL BOREHOLE LOG



*e.g. A value of 50/3 or 50:3 indicates that 50 blows were applied to the sampler, with a penetration of 3 inches.

Notes

1. The Standard Penetration Test (SPT) involves driving a standard split sampler with blows from a 140-pound slide hammer falling 30 inches per blow as per ASTM D1586. The number of blows required for the tube to penetrate each 6-inch interval up to a depth of 18 inches is recorded. The sum of the number of blows required for the second and third 6-inch intervals of penetration is reported as "N" on the boring logs. When sampling with a Modified California (MC) sampler, the penetrationresistance (N_m) is the total number of blows required to advance the sampler two 6-inch intervals of penetration. The Modified California penetration resistance is also identified as "N" on the boring logs.

2. Shelby tube samples were obtained per ASTM D1587 using 3-inch OD, 2.8-inch ID samplers 30 inches in length. The sample tubes were advanced by continuous down-pressure of the drill rig's hydraulic Kelly bar system to a depth of 24 inches each.

3. Continuous core samples were collected using an NQ-size core system. The NQ system involves advancing the boring with a 2.98-inch OD drill string. The inner core barrel retains the samples of 1.87-inch OD bedrock core. Recovery and Rock Quality Designation (RQD) were measured and recorded for each interval of drilled core. Recovery is defined as the measured amount of core retained by the inner core barrel divided by the length of the core run for that interval. RQD is defined as the sum of the lengths of pieces of core greater than 4 inches, excluding mechanical breaks, divided by the length of the core run. Recovery and RQD are reported as percentages on the boring logs.

4. Laboratory data shown is only for additional borings included in this addendum. Laboratory data for the other borings are included in the engineering geology sheets presented in the Final Preliminary Subsurface Investigation Report dated 9/21/15. See Appendix B for boring YA-EM270-1 lithology.

Summary of Laboratory Test Results

Project No: 213-208 Project Name: I-70 East, PCL Alternative Date: 4/26/2016

Sample Location			Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg			PH	Water Soluble Sulfate %	Resistivity ohm.cm	Unconfined Compressive Strength (psf)	CLASSIFICATION	
Boring No.	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					AASHTO	USCS
YA-PT-1	4	SPT	20.2	_	1	19	80	37	19	18	_	_	_	_	A-6 (13)	CL
YA-PT-1	9	SPT	2.9	_	17	76	7	NV	NP	NP	_	_	_	_	A-1-b (0)	SW-SM
YA-PT-1	14	SPT	1.6	_	35	59	6	NV	NP	NP	_	_	_	_	A-1-a (0)	SW-SM
YA-PT-1	24	SPT	2.7	_	36	56	8	NV	NP	NP	_	_	_	_	A-1-a (0)	SW-SM
YA-PT-1	39	SPT	21.0	_	8	5	87	49	24	25	_	_	_	_	BEDROCK	
YA-PT-2	4	SPT	7.2	_	0	61	39	NV	NP	NP	_	_	_	_	A-4 (0)	SM
YA-PT-2	14	SPT	1.5	_	29	65	6	NV	NP	NP	_	_	_	_	A-1-a (0)	SW-SM
YA-PT-2	24	SPT	7.7	_	38	47	15	NV	NP	NP	_	_	_	_	A-1-a (0)	SM
YA-PT-2	34	SPT	13.1	_	6	82	12	NV	NP	NP	_	_	_	_	A-1-b (0)	SP-SM
YA-PT-2	44	SPT	10.5	_	24	67	9	NV	NP	NP	_	_	_	_	A-1-a (0)	SP-SM
YA-PT-2	49	SPT	21.0	_	0	3	97	39	22	17	_	_	_	_	BEDROCK	
YA-BY-1	3	MC	9.7	_	0	85	15	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-BY-1	3-5	Bulk	3.9	_	29	57	14	NV	NP	NP	_	_	_	_	A-1-b (0)	SM
YA-BY-1	9	SPT	1.7	_	19	76	5	NV	NP	NP	_	_	_	_	A-1-b (0)	SW-SM
YA-BY-1	14	SPT	11.4	_	0	58	42	28	21	7	_	_	_	_	A-4 (0)	SM-SC
YA-BY-1	24	SPT	3.2	_	20	75	5	NV	NP	NP	_	_	_	_	A-1-a (0)	SW
YA-BY-1	34	SPT	33.4	_	0	17	83	51	19	32	_	_	_	_	A-7-6 (27)	CH
YA-BY-1	41-41.5	Core	11.8	116.1	_	_	_	_	_	_	_	_	_	60600	BEDROCK	
YA-BY-1	65.8-66.7	Core	13.7	109.9	_	_	_	_	_	_	_	_	_	120500	BEDROCK	
YA-WEL-1	4	SPT	7.5	_	0	69	31	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-WEL-1	14	SPT	2.6	_	21	76	3	NV	NP	NP	_	_	_	_	A-1-a (0)	SW
YA-WEL-1	29	SPT	28.6	_	0	29	71	36	20	16	_	_	_	_	A-6 (10)	CL
YA-WEL-1	44	SPT	15.3	_	12	81	7	NV	NP	NP	_	_	_	_	A-1-b (0)	SW-SM
YA-WEL-1	59	SPT	15.1	_	6	89	5	NV	NP	NP	_	_	_	_	A-1-b (0)	SW
YA-WEL-1	79	SPT	28.9	_	0	9	91	55	29	26	_	_	_	_	BEDROCK	
YA-WEL-1	84	SPT	20.5	_	0	15	85	51	22	29	_	_	_	_	BEDROCK	
YA-WEL-1	94-94.8	Core	17.9	110.3	_	_	_	_	_	_	_	_	_	55500	BEDROCK	
YA-WEL-1	118-118.5	Core	16.5	114.6	_	_	_	_	_	_	_	_	_	21600	BEDROCK	
YA-WEL-2	9	SPT	3.2	_	14	79	7	NV	NP	NP	_	_	_	_	A-1-b (0)	SW-SM
YA-WEL-2	19	SPT	2.4	_	20	76	4	NV	NP	NP	_	_	_	_	A-1-b (0)	SP
YA-WEL-2	29	SPT	10.8	_	25	60	15	50	18	32	_	_	_	_	A-2-7 (0)	SC
YA-WEL-2	39	SPT	11.5	_	20	76	4	NV	NP	NP	_	_	_	_	A-1-a (0)	SW
YA-WEL-2	54	SPT	13.3	_	5	91	4	NV	NP	NP	_	_	_	_	A-1-b (0)	SW
YA-WEL-2	69	SPT	14.0	_	6	90	4	NV	NP	NP	_	_	_	_	A-1-b (0)	SW
YA-WEL-2	79	SPT	24.6	_	0	45	55	46	27	19	_	_	_	_	BEDROCK	
YA-WEL-2	85.5-86.1	Core	12.5	123.3	_	_	_	_	_	_	_	_	_	58600	BEDROCK	
YA-WEL-2	118.4-119.1	Core	14.2	118.6	_	_	_	_	_	_	_	_	_	71900	BEDROCK	
YA-WJO-1	4	SPT	8.6	_	0	56	44	NV	NP	NP	_	_	_	_	A-4 (0)	SM
YA-WJO-1	14	SPT	13.5	_	4	37	59	36	14	22	_	_	_	_	A-6 (10)	CL
YA-WJO-1	24	SPT	8.4	_	18	55	27	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-WJO-1	34	SPT	31.4	_	1	40	59	41	23	18	_	_	_	_	A-7-6 (9)	CL
YA-WJO-1	39	SPT	33.1	_	0	25	75	41	19	22	_	_	_	_	A-7-6 (16)	CL
YA-WJO-1	49	SPT	33.9	_	0	18	82	47	22	25	_	_	_	_	A-7-6 (21)	CL
YA-WJO-1	54	SPT	31.0	_	0	17	83	36	18	18	_	_	_	_	A-6 (15)	CL
YA-WJO-1	73-73.8	Core	13.7	120.5	_	_	_	_	_	_	_	_	_	21400	BEDROCK	
YA-WJO-1	93-93.8	Core	15.3	113.9	_	_	_	_	_	_	_	_	_	122300	BEDROCK	
YA-WJO-2	4	SPT	7.9	_	0	84	16	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-WJO-2	9	SPT	14.4	_	0	84	16	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-WJO-2	14	SPT	14.0	_	17	34	49	50	19	31	_	_	_	_	A-7-6 (11)	SC
YA-WJO-2	19	SPT	1.6	_	30	64	6	NV	NP	NP	_	_	_	_	A-1-b (0)	SP-SM
YA-WJO-2	29	SPT	13.1	_	16	80	4	NV	NP	NP	_	_	_	_	A-1-b (0)	SP
YA-WJO-2	49	SPT	12.3	_	15	78	7	NV	NP	NP	_	_	_	_	A-1-b (0)	SW-SM
YA-WJO-2	54	SPT	22.5	_	0	65	35	40	21	19	_	_	_	_	A-2-6 (2)	SC
YA-WJO-2	77-77.7	Core	15.0	116.3	_	_	_	_	_	_	_	_	_	106600	BEDROCK	
YA-WJO-2	92-92.8	Core	11.0	118.1	_	_	_	_	_	_	_	_	_	353200	BEDROCK	
YA-EM270-1	0	SPT	7.7	_	1	83	16	NV	NP	NP	_	_	_	_	A-2-4 (0)	SM
YA-EM270-1	3	SPT	19.2	_	0	26	74	42	14	28	_	_	_	_	A-7-6 (19)	CL
YA-EM270-1	4.5	SPT	23.3	_	0	11	89	36	15	21	_	_	_	_	A-6 (18)	CL
YA-EM270-1	6	SPT	12.7	_	3	43	54	38	16	22	_	_	_	_	A-6 (8)	CL
YA-EM270-1	10.5	SPT	20.8	_	0	23	77	45	15	30	_	_	_	_	A-7-6 (22)	CL
YA-EM270-1	12	SPT	11.2	_	0	78	22	38	16	22	_	_	_	_	A-2-6 (0)	SC
YA-EM270-1	15	SPT	26.5	_	0	20	80	50	24	26	_	_	_	_	A-7-6 (22)	CL
YA-EM270-1	16.5	SPT	13.6	_	8	89	3	NV	NP	NP	_	_	_	_	A-1-b (0)	SP
YA-EM270-1	19.5	SPT	11.4	_	16	79	5	NV	NP	NP	_	_	_	_	A-1-b (0)	SP
YA-EM270-1	22.5	SPT	33.7	_	0	25	75	34	18	16	_	_	_	_	A-6 (11)	CL
YA-EM270-1	24	SPT	28.4	_	0	27	73	50	19	31	_	_	_	_	BEDROCK	
YA-EM270-1	30	SPT	32.2	_	0	28	72	51	22	29	_	_	_	_	BEDROCK	

Yeh and Associates, Inc.
Consulting Engineers & Scientists

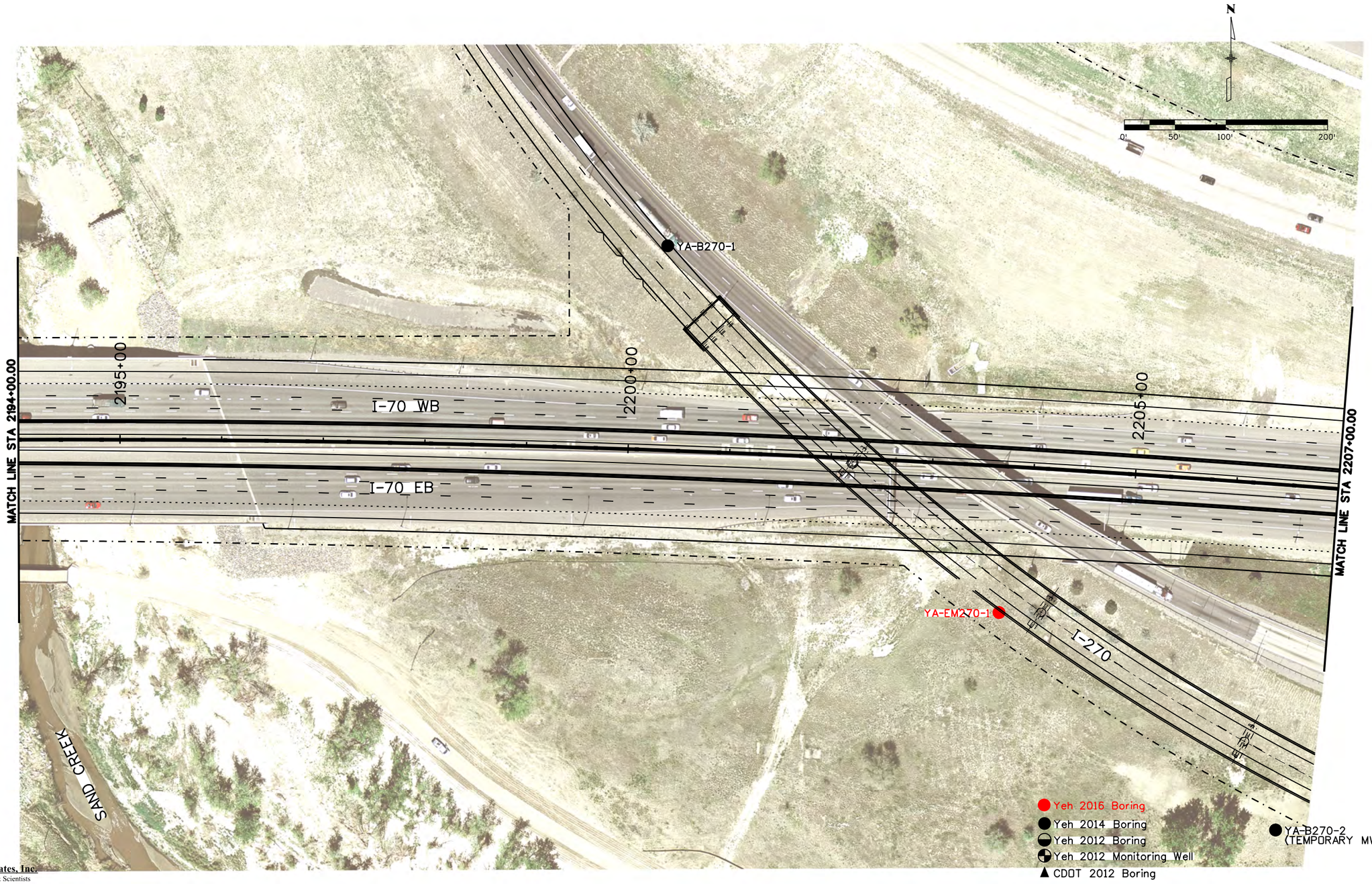
Print Date: 5/19/2016	Sheet Revisions	Colorado Department of Transportation	PRELIMINARY
File Name: 13599GEOT_Legend_Lab.dgn	Date: / Comments / Init.	2000 South Holly Street, Denver, CO 80222, Phone: 303-757-9934 FAX: 303-757-9907	No Revisions:
Horiz. Scale: 1:100 Vert. Scale: As Noted		Region 1 KJS	Revised:
Unit Information Unit Leader Initials			Void:
ATKINS 7604 Technology Way, Suite 400, Denver, CO 80237, Phone: (303) 221-7275 Fax: (303) 221-7276			

I-70 ROADWAY PROCUREMENT PHASE 1
ENGINEERING GEOLOGY
LEGEND AND LABORATORY DATA

Designer: M. Kiefer | Structure Numbers
Detailer: M. Walz
Sheet Subset: Geology | Subset Sheets:

Project No./Code: FBR 0704-234
19631
Sheet Number A-1.3

Mike Walz 9:59:58 AM W:\2013 Projects\213-208 I-70 East PCL Alternative\Dwg\Report\13599GEOT_Legend_Lab.dgn



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Consulting Engineers & Scientists

Print Date: 5/31/2016			
File Name: 13599GEOT_Plan Sheet03.dgn			
Horiz. Scale: 1:100	Vert. Scale: As Noted		
Unit Information	Unit Leader Initials		
ATKINS	7604 Technology Way, Suite 400 Denver, CO 80237 Phone: (303) 221-7275 Fax: (303) 221-7276		

Sheet Revisions

Date:	Comments	Init.

Colorado Department of Transportation
2000 South Holly Street
Denver, CO 80222
Phone: 303-757-9934 FAX: 303-757-9907
Region 1 KJS

PRELIMINARY
No Revisions:
Revised:
Void:

I-70 ROADWAY PROCUREMENT PHASE 1
BORING LOCATION PLAN

Designer:	M. Kiefer	Structure Numbers	
Detailer:	M. Walz		
Sheet Subset:	Geology	Subset Sheets:	16 of 24

Project No./Code
FBR 0704-234
19631
Sheet Number A-2

Mike Walz 2:59:10 PM W:\2013 Projects\213-208 I-70 East PCL Alternative\Dwg\Report\13599GEOT_Plan Sheet03.dgn

Appendix B

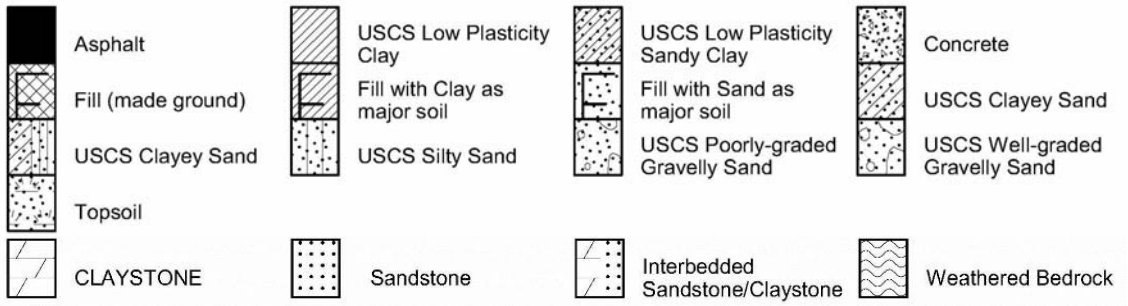
Legend and Boring Logs

YEH AND ASSOCIATES, INC. GEOTECHNICAL ENGINEERING CONSULTANTS	Project: I70 East, PCL Alternative Project Number: 213-208 Date:

Legend for Symbols Used on Borehole Logs

Sample Types

Soil and Bedrock Lithology



Lab Test Abbreviations

MC-Moisture Content
DD-Dry Density
#200-Percent Passing #200 Sieve
LL-Liquid Limit
PL-Plastic Limit
PI-Plasticity Index
S-Sulfate Content
Chl-Chloride Content
S/C-Swell/Consolidation
UCCS-Unconfined Compressive Strength
Re-Resistivity
PtL-Point Load Test
AASHTO-AASHTO Classification
USCS-USCS Classification

NOTES:

1. The Standard Penetration Test (SPT) involves driving a standard split sampler with blows from a 140-pound slide hammer falling 30 inches per blow as per ASTM D1586. The number of blows required for the tube to penetrate each 6-inch interval up to a depth of 18 inches is recorded. The sum of the number of blows required for the second and third 6-inch intervals of penetration is reported as “N” on the boring logs. When sampling with a Modified California (MC) sampler, the penetration resistance (N_{MC}) is the total number of blows required to advance the sampler two 6-inch intervals of penetration. The Modified California penetration resistance is also identified as “N” on the boring logs.
2. Shelby tube samples were obtained per ASTM D1587 using 3-inch OD, 2.8-inch ID samplers 30 inches in length. The sample tubes were advanced by continuous down-pressure of the drill rig’s hydraulic Kelly bar system to a depth of 24 inches each.
3. Continuous core samples were collected using an NQ-size core system. The NQ system involves advancing the boring with a 2.98-inch OD drill string. The inner core barrel retains the samples of 1.87-inch OD bedrock core. Recovery and Rock Quality Designation (RQD) were measured and recorded for each interval of drilled core. Recovery is defined as the measured amount of core retained by the inner core barrel divided by the length of the core run for that interval. RQD is defined as the sum of the lengths of pieces of core greater than 4 inches, excluding mechanical breaks, divided by the length of the core run. Recovery and RQD are reported as percentages on the boring logs.

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-PT-1**
Sheet 1 of 2

Boring Began: 4/27/2016
Drilling Method: Hollow-Stem Auger
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: K. Asay
Final By: M. Boyd
Inclination: Vertical

Completed: 4/27/2016
Drill Bit:
Casing:
Weather: Sunny, Warm

Total Depth: 40.5 ft
Ground Elevation: 5186 ft
Location: Dirt at 46th and Vine St
Coordinates: N: 456,107.9 E: 652,001.3

Ground Water Notes:

Depth	∇ 28 ft	-	-	-
Date	4/27/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	N	Lithology	Material Description	Field Notes and Lab Tests
5185								**0 - 4 ft. clayey SAND FILL** with gravel, dark brown.	
	5				3/2/3	5		**4 - 6 ft. sandy CLAY FILL**, dark brown, medium stiff.	**SPT Sample @ 4 ft** MC= 20.2 % #200= 80 % LL= 37 PL= 19 PI= 18 AASHTO: A-6 (13) USCS: CL
5180								**6 - 9 ft. sandy CLAY**, dark brown.	
	10				10/18/17	35		**9 - 39 ft. well graded SAND** with variable amounts of gravel and silt, light brown, medium dense to dense, sandy clay lenses between 9-18 ft.	**SPT Sample @ 9 ft** MC= 2.9 % #200= 7 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW-SM
5175									
	15				11/16/17	33			**SPT Sample @ 14 ft** MC= 1.6 % #200= 6 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW-SM
5170									
	20				6/9/9	18			
5165									
	25				7/8/17	25			**SPT Sample @ 24 ft** MC= 2.7 % #200= 8 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW-SM
5160									
	30				19/15/10	25			
5155									

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-PT-1**
Sheet 2 of 2

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	35				8/20/14	34			
5150									
	40				9/27/50	77		**39 - 40 ft. WEATHERED CLAYSTONE**, brown, medium hard.	**SPT Sample @ 39 ft** MC= 21 % #200= 87 % LL= 46 PL= 24 PI= 25 AASHTO: A-7-6 (23) USCS: CL
5145								**40 - 40.5 ft. CLAYSTONE**, brown, very hard. Bottom of Hole at 40.5 ft.	
	45								
5140									
	50								
5135									
	55								
5130									
	60								
5125									
	65								
5120									
	70								
5115									

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-PT-2**
Sheet 1 of 2

Boring Began: 4/27/2016
Drilling Method: Hollow-Stem Auger
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: K. Asay
Final By: M. Boyd
Inclination: Vertical

Completed: 4/27/2016
Drill Bit:
Casing:
Weather: Clear

Total Depth: 50.4 ft
Ground Elevation: 5186.5 ft
Location: Grass at York and I-70
Coordinates: N: 456,129.4 E: 652,849.9

Ground Water Notes:

Depth	∇ 27.5 ft	-	-	-
Date	4/27/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5185								**0 - 0.4 ft. 5" TOPSOIL**. **0.4 - 4 ft. clayey SAND**, brown to dark brown, very loose.	
	5				4/2/2	4		**4 - 10.5 ft. silty SAND**, light brown, loose to medium dense, organic material at 4 ft.	**SPT Sample @ 4 ft** MC= 7.2 % #200= 39 % LL= NV PL= NP PI= NP AASHTO: A-4 (0) USCS: SM
5180									
	10				6/9/15	24			
5175								**10.5 - 47 ft. well graded SAND** with variable amounts of gravel and silt, light brown, medium dense to dense.	
	15				13/20/10	30			**SPT Sample @ 14 ft** MC= 1.5 % #200= 6 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW-SM
5170									
	20				11/13/13	26			
5165									
	25				6/10/13	23			**SPT Sample @ 24 ft** MC= 7.7 % #200= 15 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SM
5160	∇								
	30				5/10/4	14			
5155									

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-PT-2**
Sheet 2 of 2

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	35				8/9/11	20			**SPT Sample @ 34 ft** MC= 13.1 % #200= 12 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP-SM
5150									
	40				8/18/19	37			
5145									
	45				6/17/19	36			**SPT Sample @ 44 ft** MC= 10.5 % #200= 9 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SP-SM
5140								Gravelly in bottom foot. **47 - 50.4 ft. CLAYSTONE**, gray.	
	50				27/36/50:5"	50:5"			**SPT Sample @ 49 ft** MC= 21 % #200= 97 % LL= 39 PL= 22 PI= 17 AASHTO: A-6 (17) USCS: CL
5135								Bottom of Hole at 50.4 ft.	
	55								
5130									
	60								
5125									
	65								
5120									
	70								
5115									
	75								

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-BY-1**
Sheet 1 of 3

Boring Began: 4/12/2016
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: K. Asay
Final By: M. Boyd
Inclination: Vertical

Completed: 4/13/2016
Drill Bit:
Casing:
Weather: Sunny, Warm

Total Depth: 82.5 ft
Ground Elevation: 5184.8 ft
Location: In front of 4634 York St.
Coordinates: N: 456,327.1 E: 652,944.6

Ground Water Notes:

Depth	∇ 25.5 ft	-	-	-
Date	4/12/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	N	Lithology	Material Description	Field Notes and Lab Tests
								0 - 0.9 ft. 10.5" ASPHALT.	YA-BY-1 was drilled through the borehole for YA-PY-2. The material descriptions from 0-6 ft are based on conditions observed in boring YA-PY-2.
								0.9 - 2 ft. 13.5" BASE COURSE.	
								2 - 6 ft. gravelly SAND with silt, brown, loose to medium dense, rust stains.	
					5/7	12			**CA Sample @ 3 ft** MC= 9.7 % #200= 15 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
5180	5				9/5	14			
					3/3/5	8		**6 - 33 ft. well graded SAND** with variable amounts of gravel and silt, brown, loose to medium dense, rust stains. Grades to medium dense at 8 ft.	**Bulk Sample @ 3-5 ft** MC= 3.9 % #200= 14 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SM
5175	10				6/13/21	34			**SPT Sample @ 9 ft** MC= 1.7 % #200= 5 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW-SM
5170	15				3/8/9	17		Clay interbeds observed at about 14 ft.	**SPT Sample @ 14 ft** MC= 11.4 % #200= 42 % LL= 28 PL= 21 PI= 7 AASHTO: A-4 (0) USCS: SM-SC
5165	20				6/9/7	16			
5160	25				4/7/16	23			**SPT Sample @ 24 ft** MC= 3.2 % #200= 5 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-BY-1**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5155	30				6/7/10	17			
								33 - 37 ft. sandy CLAY, brown to gray, very stiff, rust stains.	
5150	35				11/12/16	28			**SPT Sample @ 34 ft** MC= 33.4 % #200= 83 % LL= 51 PL= 19 PI= 32 AASHTO: A-7-6 (27) USCS: CH
								37 - 39.5 ft. WEATHERED CLAYSTONE, gray to brown, residuum, rust stains.	
					22/39/50	89			
5145	40							**39.5 - 49 ft. SANDY CLAYSTONE**, gray.	
			89	75					**Core Sample @ 41-41.5 ft** MC= 11.8 % DD= 116.1 pcf UCCS= 60600 psf
5140	45		78	63					
5135	50		100	74				**49 - 53 ft. SANDSTONE**, gray.	
								53 - 63 ft. SANDSTONE INTERBEDDED WITH CLAYSTONE, gray.	
5130	55		83	70					
5125	60		33	33					

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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-BY-1**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
								63 - 67.3 ft. SANDSTONE, gray, with claystone fragments.	
5120	65		96	96				6" claystone lense at 65.5 ft.	**Core Sample @ 65.8-66.7 ft** MC= 13.7 % DD= 109.9 pcf UCCS= 120500 psf
								67.3 - 82.5 ft. CLAYSTONE, gray, trace lignite.	
5115	70		70	70					
			97	60					
5110	75								
			100	100					
5105	80		87	57					
								Bottom of Hole at 82.5 ft.	
5100	85								
5095	90								
5090	95								

YEH AND ASSOCIATES, INC.
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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-1**
Sheet 1 of 3

Boring Began: 4/28/2016
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: R. Desterhouse
Final By: M. Boyd
Inclination: Vertical

Completed: 4/28/2016
Drill Bit:
Casing:
Weather: Cloudy, Snow, Rain, Cold

Total Depth: 105 ft
Ground Elevation: 5186.2 ft
Location: Backyard at 4621 Columbine
Coordinates: N: 456,275.2 E: 653,428.5

Ground Water Notes:

Depth	∇ 27 ft	-	-	-
Date	4/28/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	N	Lithology	Material Description	Field Notes and Lab Tests
5185								**0 - 0.3 ft. CONCRETE**. **0.3 - 13.5 ft. silty SAND**, brown, very loose to medium dense.	
	5				3/2/1	3			**SPT Sample @ 4 ft** MC= 8.6 % #200= 44 % LL= NV PL= NP PI= NP AASHTO: A-4 (0) USCS: SM
5180									
	10				4/3/7	10			
5175									
								13.5 - 19 ft. sandy CLAY with sand lenses, brown, very stiff.	
	15				3/6/9	15			**SPT Sample @ 14 ft** MC= 13.5 % #200= 59 % LL= 36 PL= 14 PI= 22 AASHTO: A-6 (10) USCS: CL
5170									
								19 - 31 ft. silty SAND, brown, medium dense, rust stained.	
	20				9/9/12	21			
5165									
	25				12/8/10	18			**SPT Sample @ 24 ft** MC= 8.4 % #200= 27 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
5160	∇								
	30				4/8/9	17			
5155								**31 - 56 ft. sandy CLAY** with sand lenses, brown, medium dense, stiff to very stiff, rust stained.	

YEH AND ASSOCIATES, INC.
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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-1**
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	35				3/7/8	15			**SPT Sample @ 34 ft** MC= 31.4 % #200= 59 % LL= 41 PL= 23 PI= 18 AASHTO: A-7-6 (9) USCS: CL
5150									
	40				3/5/8	13			**SPT Sample @ 39 ft** MC= 33.1 % #200= 75 % LL= 41 PL= 19 PI= 22 AASHTO: A-7-6 (16) USCS: CL
5145									
	45				5/8/12	20			
5140									
	50				4/8/10	18			**SPT Sample @ 49 ft** MC= 33.9 % #200= 82 % LL= 47 PL= 22 PI= 25 AASHTO: A-7-6 (21) USCS: CL
5135									
	55				3/6/5	11			**SPT Sample @ 54 ft** MC= 31 % #200= 83 % LL= 36 PL= 18 PI= 18 AASHTO: A-6 (15) USCS: CL
5130								**56 - 61 ft. WEATHERED SILTY SANDSTONE**, brown, hard to very hard.	
	60				14/50:3"	50:3"			
5125								**61 - 75 ft. INTERBEDDED CLAYSTONE AND SANDSTONE**, gray.	
	65				27/50:3"	50:3"			
5120			86	70					
	70								
5115			76	56					**Core Sample @ 73-73.8 ft** UCCS= 21400 psf MC= 13.7 % DD= 120.5 pcf
	75								

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-1**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5110								**75 - 105 ft. SANDY CLAYSTONE**, gray, calcareous, trace lignite.	
			100	82					
	80								
5105			100	66					
	85								
5100			98	80					
	90								
5095			88	82					**Core Sample @ 93-93.8 ft** MC= 15.3 % DD= 113.9 pcf UCCS= 122300 psf
	95								
5090			94	80					
	100								
5085			100	94					
	105							Bottom of Hole at 105 ft.	
5080									
	110								
5075									
	115								
5070									

YEH AND ASSOCIATES, INC.
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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-2**
Sheet 1 of 3

Boring Began: 4/19/2016
Completed: 4/20/2016
Total Depth: 100 ft
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill Bit:
Ground Elevation: 5187.4 ft
Casing:
Location: NE corner of 2400 E 46th Ave
Drill: CME 75, Automatic Hammer
Weather: Cloudy/Rain - Clear
Coordinates: N: 455,992.1 E: 653,363.5
Driller: CDOT
Logged By: K. Asay
Final By: M. Boyd
Inclination: Vertical

Ground Water Notes:

Depth	∇ 27 ft	-	-	-
Date	4/19/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	N	Lithology	Material Description	Field Notes and Lab Tests
								0 - 0.3 ft. ASPHALT.	
								0.3 - 4 ft. silty SAND, dark brown.	5 ft: Petroleum odor. Pinyon PID reading less than 22.5 ppm
					2/2/2	4		**4 - 14.5 ft. silty SAND** with gravel and lenses of clay, brown to dark brown, loose to medium dense, rust-stained.	**SPT Sample @ 4 ft** MC= 7.9 % #200= 16 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
5180									
	10				5/6/9	15			**SPT Sample @ 9 ft** MC= 14.4 % #200= 16 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
					5/4/6	10		**14.5 - 15.5 ft. clayey SAND** with gravel, brown, medium dense.	**SPT Sample @ 14 ft** MC= 14 % #200= 49 % LL= 50 PL= 19 PI= 31 AASHTO: A-7-6 (11) USCS: SC
								15.5 - 53 ft. poorly graded SAND with variable amounts of gravel and silt, tan to brown, dense to loose.	
5170									
	20				12/21/27	48			**SPT Sample @ 19 ft** MC= 1.6 % #200= 6 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP-SM
					5/4/3	7			
5160									
	30				9/12/12	24			**SPT Sample @ 29 ft** MC= 13.1 % #200= 4 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP
					11/23/26	49			

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-2**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5150									
	40				7/11/14	25			
					6/13/10	23			
5140									
	50				11/15/17	32			**SPT Sample @ 49 ft** MC= 12.3 % #200= 7 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW-SM
								53 - 58.7 ft. clayey SAND, brown, medium dense.	**SPT Sample @ 54 ft** MC= 22.5 % #200= 35 % LL= 40 PL= 21 PI= 19 AASHTO: A-2-6 (2) USCS: SC
					6/9/15	24			
5130									
					50/50:2"	50:2"		**58.7 - 67.7 ft. SILTY SANDSTONE**, brown, rust stains, claystone fragments.	
	60		18	8					
			30	20					
5120								**67.7 - 74.3 ft. SANDY CLAYSTONE**, brown to gray.	
	70		88	25					
			98	53				**74.3 - 76.5 ft. SILTY SANDSTONE**, gray, trace lignite.	
5110			100	100				**76.5 - 85 ft. INTERBEDDED CLAYSTONE AND SANDSTONE**, gray.	**Core Sample @ 77-77.7 ft** MC= 15 % DD= 116.3 pcf UCCS= 106600 psf
	80								

YEH AND ASSOCIATES, INC.
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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WJO-2**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
			83	83					
			98	90				**85 - 93.8 ft. SILTY SANDSTONE**, gray, with claystone fragments.	
5100									
	90		100	78					
			93	93				**93.8 - 96.4 ft. SANDSTONE**, gray, with claystone fragments, calcite viens 96-96.4 ft.	**Core Sample @ 92-92.8 ft** MC= 11 % DD= 118.1 pcf UCCS= 353200 psf
			85	85				**96.4 - 100 ft. SANDY CLAYSTONE**, gray.	
5090									
	100							Bottom of Hole at 100 ft.	
5080									
	110								
5070									
	120								

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Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-1**
Sheet 1 of 4

Boring Began: 4/24/2016
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: R. Desterhouse
Final By: M. Boyd
Inclination: Vertical

Completed: 4/25/2016
Drill Bit:
Casing:
Weather: Clear

Total Depth: 127 ft
Ground Elevation: 5189.1 ft
Location: Grass S of Swansea Elementary
Coordinates: N: 456,138.2 E: 653,734.4

Ground Water Notes:

Depth	∇ 33 ft	-	-	-
Date	4/25/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
								0 - 1 ft. TOPSOIL, dark brown.	
								1 - 17 ft. well graded SAND with variable amounts of gravel and silt, brown, very loose to medium dense.	
5185	5				3/1/2	3			**SPT Sample @ 4 ft** MC= 7.5 % #200= 31 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
5180	10				3/2/2	4			
5175	15				10/12/14	26			**SPT Sample @ 14 ft** MC= 2.6 % #200= 3 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW
								17 - 21 ft. silty SAND with clay lenses, orange-brown, medium dense, rust stains.	
5170	20				4/12/15	27			
								21 - 28.5 ft. silty SAND, brown, medium dense.	
5165	25				6/7/9	16			
								28.5 - 32 ft. sandy CLAY, brown, stiff, rust stains.	
5160	30				3/5/5	10			**SPT Sample @ 29 ft** MC= 28.6 % #200= 71 % LL= 36 PL= 20 PI= 16 AASHTO: A-6 (10) USCS: CL
								32 - 79 ft. well graded SAND with variable amounts of gravel and silt, brown, medium dense to dense.	

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-1**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	35				5/8/14	22			
5150	40				9/7/8	15			
5145	45				12/16/14	30			**SPT Sample @ 44 ft** MC= 15.3 % #200= 7 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW-SM
5140	50				8/12/11	23			
5135	55				6/15/14	29			
5130	60				7/19/21	40			**SPT Sample @ 59 ft** MC= 15.1 % #200= 5 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW
5125	65				5/7/11	18			
5120	70				12/16/20	36			
5115	75				7/12/14	26			

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-1**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5110	80				10/16/32	48		**79 - 81 ft. WEATHERED CLAYSTONE**, brown to gray, medium hard, rust stains.	**SPT Sample @ 79 ft** MC= 28.9 % #200= 91 % LL= 55 PL= 29 PI= 26 AASHTO: A-7-6 (28) USCS: CH
								81 - 94 ft. SANDY CLAYSTONE, blue-gray.	
5105	85				35/50:5"	50:5"			**SPT Sample @ 84 ft** MC= 20.5 % #200= 85 % LL= 51 PL= 22 PI= 29 AASHTO: A-7-6 (26) USCS: CH
			70	35					
5100	90		96	78					
5095	95		100	76				**94 - 95 ft. SANDSTONE**, gray.	**Core Sample @ 94-94.8 ft** MC= 17.9 % DD= 110.3 pcf UCCS= 55500 psf
								95 - 97 ft. SANDY CLAYSTONE, gray.	
								97 - 98.5 ft. SANDSTONE, gray, trace lignite.	
5090	100		92	92				**98.5 - 101.3 ft. INTERBEDDED CLAYSTONE AND SANDSTONE**, gray.	
								101.3 - 127 ft. SANDY CLAYSTONE, gray, trace lignite.	
5085	105		102	88					
5080	110		90	44					
5075	115		100	86					

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-1**
Sheet 4 of 4

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5070	120		86	48					**Core Sample @118-118.5 ft** MC= 16.5 % DD= 114.6 pcf UCCS= 21600 psf
5065	125		94	74					
								Bottom of Hole at 127 ft.	
5060	130								
5055	135								
5050	140								
5045	145								
5040	150								
5035	155								

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-2**
Sheet 1 of 4

Boring Began: 4/21/2016
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: R. Desterhouse
Final By: M. Boyd
Inclination: Vertical

Completed: 4/29/2016
Drill Bit:
Casing:
Weather: Clear

Total Depth: 120.1 ft
Ground Elevation: 5189.1 ft
Location: SW corner of Elizabeth Ct and 46th Ave
Coordinates: N: 455,983.4 E: 653,717.9

Ground Water Notes:

Depth	∇ 31 ft	-	-	-
Date	4/21/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
								0 - 0.3 ft. ASPHALT.	
								0.3 - 30 ft. well graded to poorly graded SAND with variable amounts of gravel and silt, brown, loose to medium dense.	
5185	5				3/4/4	8			
5180	10				5/9/10	19			9 ft: Petroleum odor. Pinyon PID reading below 22.5 ppm **SPT Sample @ 9 ft** MC= 3.2 % #200= 7 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW-SM
5175	15				6/8/10	18			
5170	20				7/13/15	28			**SPT Sample @ 19 ft** MC= 2.4 % #200= 4 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP
5165	25				9/12/13	25			
5160	30				9/6/4	10		**30 - 31 ft. sandy CLAY**, brown, stiff.	**SPT Sample @ 29 ft** MC= 10.8 % #200= 15 % LL= 50 PL= 18 PI= 32 AASHTO: A-2-7 (0) USCS: SC
								31 - 79 ft. well graded SAND with variable amounts of gravel and silt, brown, medium dense to dense.	

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-2**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	35				13/16/14	30			
5150	40				7/14/22	36			**SPT Sample @ 39 ft** MC= 11.5 % #200= 4 % LL= NV PL= NP PI= NP AASHTO: A-1-a (0) USCS: SW
5145	45				8/11/14	25			
5140	50				12/19/19	38			
5135	55				7/17/18	35			**SPT Sample @ 54 ft** MC= 13.3 % #200= 4 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW
5130	60				8/17/23	40			
5125	65				7/11/14	25			
5120	70				10/18/18	36			**SPT Sample @ 69 ft** MC= 14 % #200= 4 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SW
5115	75				13/22/38	60			

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-2**

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
5110	80				38/41/50:3"	50:3"		**79 - 92 ft. SANDY CLAYSTONE**, gray to dark gray.	**SPT Sample @ 79 ft** MC= 24.6 % #200= 55 % LL= 46 PL= 27 PI= 19 AASHTO: A-7-6 (8) USCS: CL
			94	74					
5105	85		98	98					**Core Sample @ 85.5-86.1 ft** MC= 12.5 % DD= 123.3 pcf UCCS= 58600 psf
5100	90		75	38					
5095	95		75	50				**92 - 96 ft. SILTY SANDSTONE**, gray to dark gray, trace lignite.	
5090	100		61	53				**96 - 120.1 ft. CLAYSTONE**, gray to dark gray, calcareous.	
5085	105		70	58					
5080	110		68	60					
5075	115		74	56					

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-WEL-2**
Sheet 4 of 4

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
			90	78					**Core Sample @ 118.4-119.1 ft** MC= 14.2 % DD= 118.6 pcf UCCS= 71900 psf
5070	120							Bottom of Hole at 120.1 ft.	
5065	125								
5060	130								
5055	135								
5050	140								
5045	145								
5040	150								
5035	155								

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-EM270-1**
Sheet 1 of 3

Boring Began: 4/13/2016
Drilling Method: Hollow-Stem Auger/Wireline Coring
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: K. Asay
Final By: M. Boyd
Inclination: Vertical

Completed: 4/14/2016
Drill Bit:
Casing:
Weather: Sunny, Warm

Total Depth: 53.5 ft
Ground Elevation: 5242.5 ft
Location: Grass at I-270 and I-70
Coordinates: N: 455,286.0 E: 670,546.1

Ground Water Notes:

Depth	∇ 15.5 ft	-	-	-
Date	4/14/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	N	Lithology	Material Description	Field Notes and Lab Tests
					2/4/7	11		**0 - 2 ft. silty SAND**, brown, loose, rust stains.	**SPT Sample @ 0 ft** MC= 7.7 % #200= 16 % LL= NV PL= NP PI= NP AASHTO: A-2-4 (0) USCS: SM
5240					4/4/4	8		**2 - 6 ft. sandy CLAY**, brown, stiff.	
					2/4/4	8			**SPT Sample @ 3 ft** MC= 19.2 % #200= 74 % LL= 42 PL= 14 PI= 28 AASHTO: A-7-6 (19) USCS: CL
	5				2/4/6	10			**SPT Sample @ 4.5 ft** MC= 23.3 % #200= 89 % LL= 36 PL= 15 PI= 21 AASHTO: A-6 (18) USCS: CL
					2/4/3	7		**6 - 12 ft. sandy CLAY** with sand lenses, brown, loose to medium dense, medium stiff to stiff.	
5235					3/4/5	9			**SPT Sample @ 6 ft** MC= 12.7 % #200= 54 % LL= 38 PL= 16 PI= 22 AASHTO: A-6 (8) USCS: CL
	10				2/3/4	7			
					3/5/8	13			**SPT Sample @ 10.5 ft** MC= 20.8 % #200= 77 % LL= 45 PL= 15 PI= 30 AASHTO: A-7-6 (22) USCS: CL
5230					4/4/4	8		**12 - 14.5 ft. clayey SAND**, brown, loose to medium dense.	**SPT Sample @ 12 ft** MC= 11.2 % #200= 22 % LL= 38 PL= 16 PI= 22 AASHTO: A-2-6 (0) USCS: SC
					3/3/3	6		**14.5 - 16.5 ft. sandy CLAY**, brown, very stiff.	
	15 ∇				7/12/13	25			**SPT Sample @ 15 ft** MC= 26.5 % #200= 80 % LL= 50 PL= 24 PI= 26 AASHTO: A-7-6 (22) USCS: CL
5225					6/14/16	30		**16.5 - 22.5 ft. poorly graded SAND** with variable amounts of gravel and silt, brown, medium dense to dense.	

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-EM270-1**
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
					10/24/31	55			**SPT Sample @ 16.5 ft** MC= 13.6 % #200= 3 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP
	20				2/10/20	30			**SPT Sample @ 19.5 ft** MC= 11.4 % #200= 5 % LL= NV PL= NP PI= NP AASHTO: A-1-b (0) USCS: SP
					11/19/11	30			
5220					4/7/13	20		**22.5 - 24 ft. sandy CLAY**, brown, hard.	**SPT Sample @ 22.5 ft** MC= 33.7 % #200= 75 % LL= 34 PL= 18 PI= 16 AASHTO: A-6 (11) USCS: CL
	25				9/18/27	45		**24 - 32 ft. SANDY CLAYSTONE**, brown, medium hard to hard.	**SPT Sample @ 24 ft** MC= 28.4 % #200= 73 % LL= 50 PL= 19 PI= 31 AASHTO: A-7-6 (22) USCS: CH
					14/26/37	63			
5215					13/28/32	60			
					20/15/28	43			
	30				10/25/30	55			**SPT Sample @ 30 ft** MC= 32.2 % #200= 72 % LL= 51 PL= 22 PI= 29 AASHTO: A-7-6 (20) USCS: CH
					10/42/50:3"	50:3"		**32 - 45.5 ft. INTERBEDDED CLAYSTONE AND SANDSTONE**, blue-gray to gray, rust stained, calcareous, claystone fragments in sandstone layers.	
5210									
	35		88	88					
5205									
			100	100					

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-EM270-1**
Sheet 3 of 3

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
	40								
5200			100	95					
	45								
5195			65	65				**45.5 - 53.5 ft. CLAYSTONE**, gray.	
	50								
5190			95	95					
								Bottom of Hole at 53.5 ft.	
	55								
5185									
	60								

YEH AND ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS

Project: I70 East, PCL Alternative
Project Number: 213-208 Date:

Boring: **YA-EM270-1(A)**
Sheet 1 of 1

Boring Began: 4/20/2016
Drilling Method: Hollow-Stem Auger
Drill: CME 75, Automatic Hammer
Driller: CDOT
Logged By: J.El-Hehiawy
Final By: M. Boyd
Inclination: Vertical

Completed: 4/20/2016
Drill Bit:
Casing:
Weather: Cloudy

Total Depth: 20 ft
Ground Elevation: 5242.5 ft
Location: Not surveyed
Coordinates: N: E:

Ground Water Notes:

Depth	∇ 14 ft	-	-	-
Date	4/20/16	-	-	-
Time	During Drilling	-	-	-

Elevation (feet)	Depth (feet)	Run / Sample Type	Recovery (%)	Rock RQD	Soil Samples Blows per 6 in	Soil Samples N	Lithology	Material Description	Field Notes and Lab Tests
								0 - 2 ft. silty SAND, brown, loose, rust stains.	Drilled 5 ft south of YA-EM270-1 to collect Shelby tube samples. Material descriptions are from YA-EM270-1.
5240			100					**2 - 6 ft. sandy CLAY**, brown, stiff.	**Shelby tube sample @ 2-4 ft** MC= 18.1 % DD= 99.1 pcf LL= 34 PL= 17 PI= 17 AASHTO: A-6 (6) USCS: CL
	5		100						**Shelby tube sample @ 4-6 ft** MC= 22.9 % DD= 90.1 pcf LL= 41 PL= 24 PI= 17 AASHTO: A-7-6 (10) USCS: CL
5235			100					**6 - 12 ft. sandy CLAY** with sand lenses, brown, loose to medium dense, medium stiff to stiff.	
			100						
	10								
5230			100					**12 - 14.5 ft. clayey SAND**, brown, loose to medium dense.	
	15		100					**14.5 - 16.5 ft. sandy CLAY**, brown, very stiff.	**Shelby tube sample @ 14-16 ft** MC= 22.6 % DD= 92.4 pcf LL= 38 PL= 22 PI= 16 AASHTO: A-6 (9) USCS: CL
			0					**16.5 - 20 ft. poorly graded SAND** with variable amounts of gravel and silt, brown, medium dense to dense.	
5225									

Bottom of Hole at 20 ft.

Appendix C

Photographs of Cored Bedrock

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 3 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

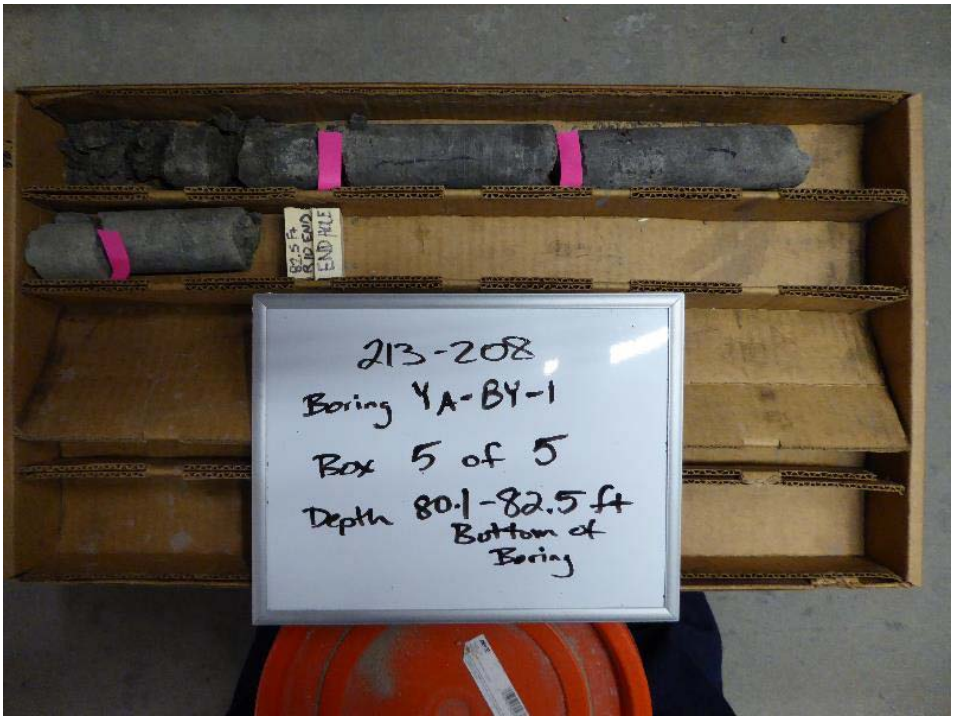
Runs 3 (partial) through 5 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 5 (partial) through 7 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 7 (partial) through 10 (partial)



Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Run 10 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 3 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 3 (partial) through 4 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with "MECH" or "↑" indicate zone of mechanical breaks.

Runs 4 (partial) through 6 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with "MECH" or "↑" indicate zone of mechanical breaks.

Runs 6 (partial) through 8

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 4

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 5 through 6

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 7 through 8

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 9 through 10

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 3 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

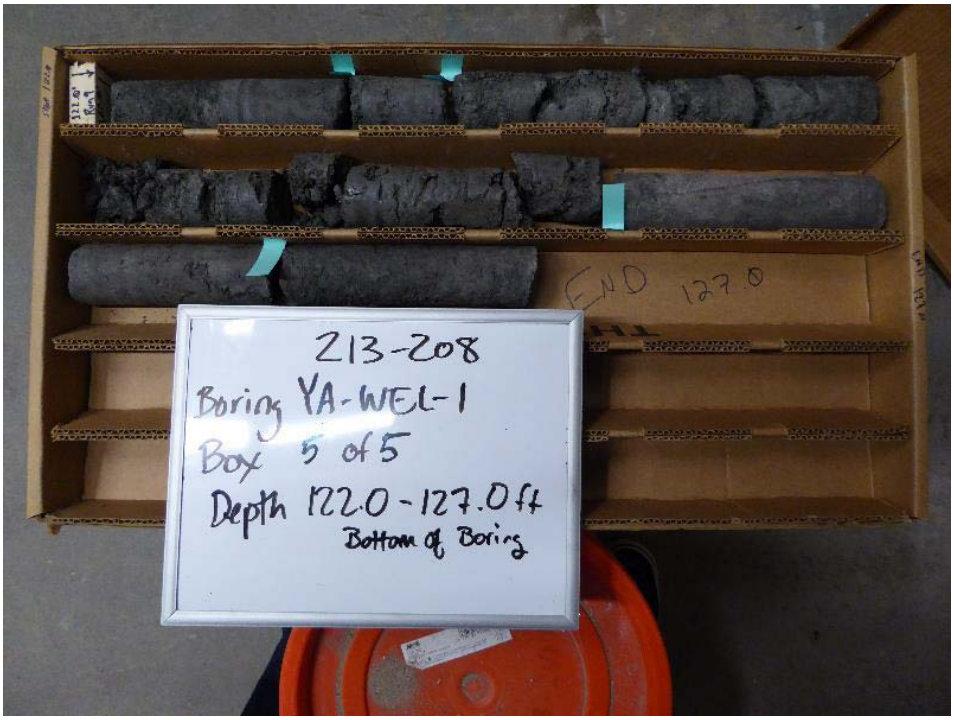
Runs 3 (partial) through 5 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 5 (partial) through 7 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 7 (partial) through 8



Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Run 9

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 3 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 3 (partial) through 4

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 5 through 7 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 7 (partial) through 9

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 1 through 3 (partial)

Pink tabs indicate single mechanical breaks.
Pink tabs with “MECH” or “↑” indicate zone of mechanical breaks.

Runs 3 (partial) through 5

Appendix D

Laboratory Test Results

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 213-208 Project Name: I-70 East, PCL Alternative Date: 4/26/2016

Sample Location			Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg			PH	Water Soluble Sulfate %	Resistivity ohm.cm	Unconfined Compressive Strength (psf)	CLASSIFICATION	
Boring No.	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					AASHTO	USCS
YA-PT-1	4	SPT	20.2	–	1	19	80	37	19	18	–	–	–	–	A-6 (13)	CL
YA-PT-1	9	SPT	2.9	–	17	76	7	NV	NP	NP	–	–	–	–	A-1-b (0)	SW-SM
YA-PT-1	14	SPT	1.6	–	35	59	6	NV	NP	NP	–	–	–	–	A-1-a (0)	SW-SM
YA-PT-1	24	SPT	2.7	–	36	56	8	NV	NP	NP	–	–	–	–	A-1-a (0)	SW-SM
YA-PT-1	39	SPT	21.0	–	8	5	87	49	24	25	–	–	–	–	BEDROCK	
YA-PT-2	4	SPT	7.2	–	0	61	39	NV	NP	NP	–	–	–	–	A-4 (0)	SM
YA-PT-2	14	SPT	1.5	–	29	65	6	NV	NP	NP	–	–	–	–	A-1-a (0)	SW-SM
YA-PT-2	24	SPT	7.7	–	38	47	15	NV	NP	NP	–	–	–	–	A-1-a (0)	SM
YA-PT-2	34	SPT	13.1	–	6	82	12	NV	NP	NP	–	–	–	–	A-1-b (0)	SP-SM
YA-PT-2	44	SPT	10.5	–	24	67	9	NV	NP	NP	–	–	–	–	A-1-a (0)	SP-SM
YA-PT-2	49	SPT	21.0	–	0	3	97	39	22	17	–	–	–	–	BEDROCK	
YA-BY-1	3	MC	9.7	–	0	85	15	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-BY-1	3-5	Bulk	3.9	–	29	57	14	NV	NP	NP	–	–	–	–	A-1-b (0)	SM
YA-BY-1	9	SPT	1.7	–	19	76	5	NV	NP	NP	–	–	–	–	A-1-b (0)	SW-SM
YA-BY-1	14	SPT	11.4	–	0	58	42	28	21	7	–	–	–	–	A-4 (0)	SM-SC
YA-BY-1	24	SPT	3.2	–	20	75	5	NV	NP	NP	–	–	–	–	A-1-a (0)	SW
YA-BY-1	34	SPT	33.4	–	0	17	83	51	19	32	–	–	–	–	A-7-6 (27)	CH

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 213-208 Project Name: I-70 East, PCL Alternative Date: 4/26/2016

Sample Location			Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg			PH	Water Soluble Sulfate %	Resistivity ohm.cm	Unconfined Compressive Strength (psf)	CLASSIFICATION	
Boring No.	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					AASHTO	USCS
YA-BY-1	41-41.5	Core	11.8	116.1	–	–	–	–	–	–	–	–	–	60600	BEDROCK	
YA-BY-1	65.8-66.7	Core	13.7	109.9	–	–	–	–	–	–	–	–	–	120500	BEDROCK	
YA-WJO-1	4	SPT	8.6	–	0	56	44	NV	NP	NP	–	–	–	–	A-4 (0)	SM
YA-WJO-1	14	SPT	13.5	–	4	37	59	36	14	22	–	–	–	–	A-6 (10)	CL
YA-WJO-1	24	SPT	8.4	–	18	55	27	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-WJO-1	34	SPT	31.4	–	1	40	59	41	23	18	–	–	–	–	A-7-6 (9)	CL
YA-WJO-1	39	SPT	33.1	–	0	25	75	41	19	22	–	–	–	–	A-7-6 (16)	CL
YA-WJO-1	49	SPT	33.9	–	0	18	82	47	22	25	–	–	–	–	A-7-6 (21)	CL
YA-WJO-1	54	SPT	31.0	–	0	17	83	36	18	18	–	–	–	–	A-6 (15)	CL
YA-WJO-1	73-73.8	Core	13.7	120.5	–	–	–	–	–	–	–	–	–	21400	BEDROCK	
YA-WJO-1	93-93.8	Core	15.3	113.9	–	–	–	–	–	–	–	–	–	122300	BEDROCK	
YA-WJO-2	4	SPT	7.9	–	0	84	16	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-WJO-2	9	SPT	14.4	–	0	84	16	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-WJO-2	14	SPT	14.0	–	17	34	49	50	19	31	–	–	–	–	A-7-6 (11)	SC
YA-WJO-2	19	SPT	1.6	–	30	64	6	NV	NP	NP	–	–	–	–	A-1-b (0)	SP-SM
YA-WJO-2	29	SPT	13.1	–	16	80	4	NV	NP	NP	–	–	–	–	A-1-b (0)	SP
YA-WJO-2	49	SPT	12.3	–	15	78	7	NV	NP	NP	–	–	–	–	A-1-b (0)	SW-SM

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 213-208 Project Name: I-70 East, PCL Alternative Date: 4/26/2016

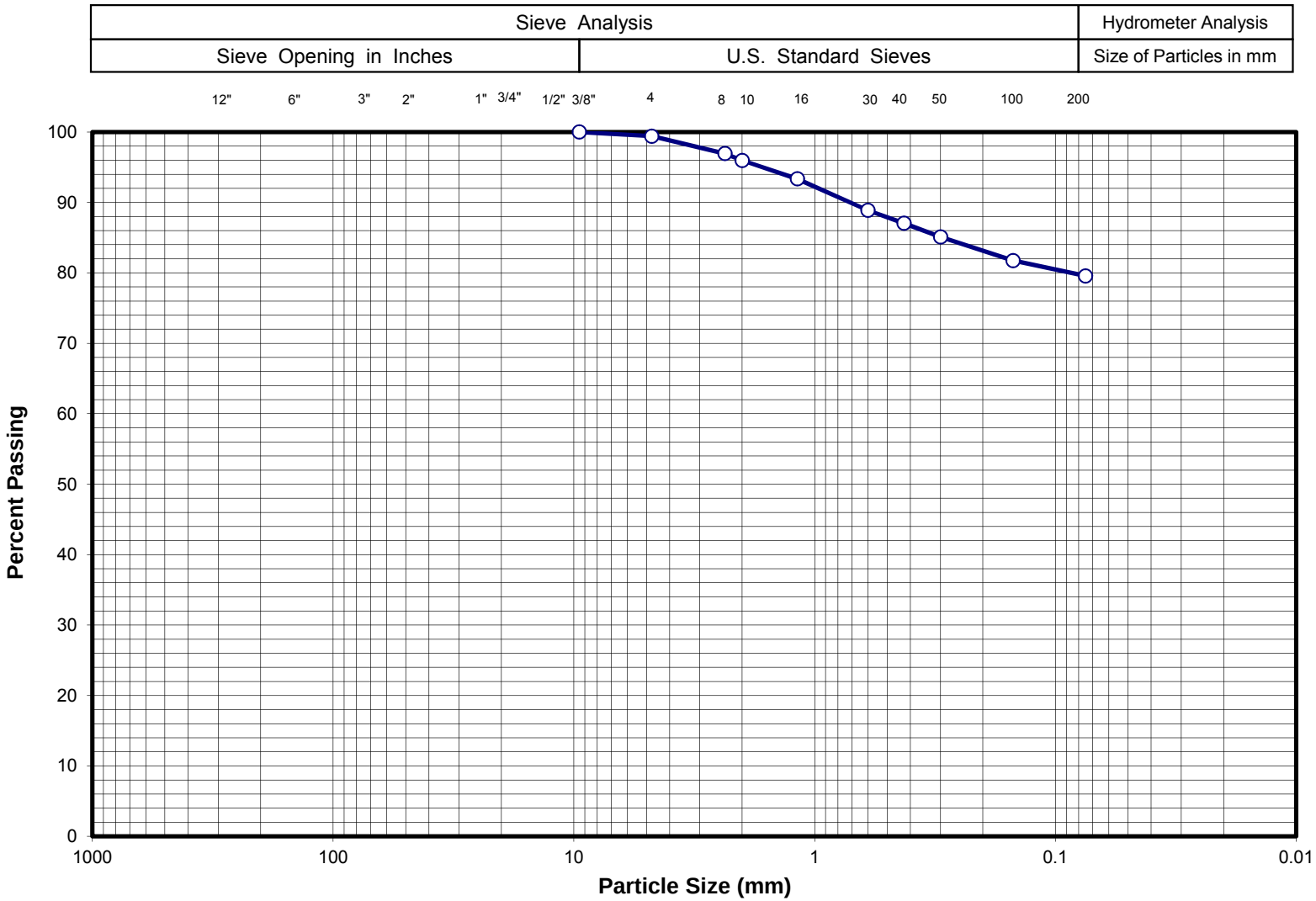
Sample Location			Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg			PH	Water Soluble Sulfate %	Resistivity ohm.cm	Unconfined Compressive Strength (psf)	CLASSIFICATION	
Boring No.	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					AASHTO	USCS
YA-WJO-2	54	SPT	22.5	–	0	65	35	40	21	19	–	–	–	–	A-2-6 (2)	SC
YA-WJO-2	77-77.7	Core	15.0	116.3	–	–	–	–	–	–	–	–	–	106600	BEDROCK	
YA-WJO-2	92-92.8	Core	11.0	118.1	–	–	–	–	–	–	–	–	–	353200	BEDROCK	
YA-WEL-1	4	SPT	7.5	–	0	69	31	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-WEL-1	14	SPT	2.6	–	21	76	3	NV	NP	NP	–	–	–	–	A-1-a (0)	SW
YA-WEL-1	29	SPT	28.6	–	0	29	71	36	20	16	–	–	–	–	A-6 (10)	CL
YA-WEL-1	44	SPT	15.3	–	12	81	7	NV	NP	NP	–	–	–	–	A-1-b (0)	SW-SM
YA-WEL-1	59	SPT	15.1	–	6	89	5	NV	NP	NP	–	–	–	–	A-1-b (0)	SW
YA-WEL-1	79	SPT	28.9	–	0	9	91	55	29	26	–	–	–	–	BEDROCK	
YA-WEL-1	84	SPT	20.5	–	0	15	85	51	22	29	–	–	–	–	BEDROCK	
YA-WEL-1	94-94.8	Core	17.9	110.3	–	–	–	–	–	–	–	–	–	55500	BEDROCK	
YA-WEL-1	118-118.5	Core	16.5	114.6	–	–	–	–	–	–	–	–	–	21600	BEDROCK	
YA-WEL-2	9	SPT	3.2	–	14	79	7	NV	NP	NP	–	–	–	–	A-1-b (0)	SW-SM
YA-WEL-2	19	SPT	2.4	–	20	76	4	NV	NP	NP	–	–	–	–	A-1-b (0)	SP
YA-WEL-2	29	SPT	10.8	–	25	60	15	50	18	32	–	–	–	–	A-2-7 (0)	SC
YA-WEL-2	39	SPT	11.5	–	20	76	4	NV	NP	NP	–	–	–	–	A-1-a (0)	SW
YA-WEL-2	54	SPT	13.3	–	5	91	4	NV	NP	NP	–	–	–	–	A-1-b (0)	SW

YEH & ASSOCIATES, INC

Summary of Laboratory Test Results

Project No: 213-208 Project Name: I-70 East, PCL Alternative Date: 4/26/2016

Sample Location			Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Atterberg			PH	Water Soluble Sulfate %	Resistivity ohm.cm	UnconfIned Compressive Strength (psf)	CLASSIFICATION	
Boring No.	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI					AASHTO	USCS
YA-WEL-2	69	SPT	14.0	–	6	90	4	NV	NP	NP	–	–	–	–	A-1-b (0)	SW
YA-WEL-2	79	SPT	24.6	–	0	45	55	46	27	19	–	–	–	–	BEDROCK	
YA-WEL-2	85.5-86.1	Core	12.5	123.3	–	–	–	–	–	–	–	–	–	58600	BEDROCK	
YA-WEL-2	118.4-119.1	Core	14.2	118.6	–	–	–	–	–	–	–	–	–	71900	BEDROCK	
YA-EM270-1	0	SPT	7.7	–	1	83	16	NV	NP	NP	–	–	–	–	A-2-4 (0)	SM
YA-EM270-1	3	SPT	19.2	–	0	26	74	42	14	28	–	–	–	–	A-7-6 (19)	CL
YA-EM270-1	4.5	SPT	23.3	–	0	11	89	36	15	21	–	–	–	–	A-6 (18)	CL
YA-EM270-1	6	SPT	12.7	–	3	43	54	38	16	22	–	–	–	–	A-6 (8)	CL
YA-EM270-1	10.5	SPT	20.8	–	0	23	77	45	15	30	–	–	–	–	A-7-6 (22)	CL
YA-EM270-1	12	SPT	11.2	–	0	78	22	38	16	22	–	–	–	–	A-2-6 (0)	SC
YA-EM270-1	15	SPT	26.5	–	0	20	80	50	24	26	–	–	–	–	A-7-6 (22)	CL
YA-EM270-1	16.5	SPT	13.6	–	8	89	3	NV	NP	NP	–	–	–	–	A-1-b (0)	SP
YA-EM270-1	19.5	SPT	11.4	–	16	79	5	NV	NP	NP	–	–	–	–	A-1-b (0)	SP
YA-EM270-1	22.5	SPT	33.7	–	0	25	75	34	18	16	–	–	–	–	A-6 (11)	CL
YA-EM270-1	24	SPT	28.4	–	0	27	73	50	19	31	–	–	–	–	BEDROCK	
YA-EM270-1	30	SPT	32.2	–	0	28	72	51	22	29	–	–	–	–	BEDROCK	



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	96
#40	87
#200	80

Gravel (%)	1	LL	37	Project Name:	I-70 East, PCL Alternative
Sand (%)	19	PL	19	Sample ID:	YA-PT-1
Fines (%)	80	PI	18	Sample Depth (ft.):	4
Sample Description:	A-6 (13) / CL				

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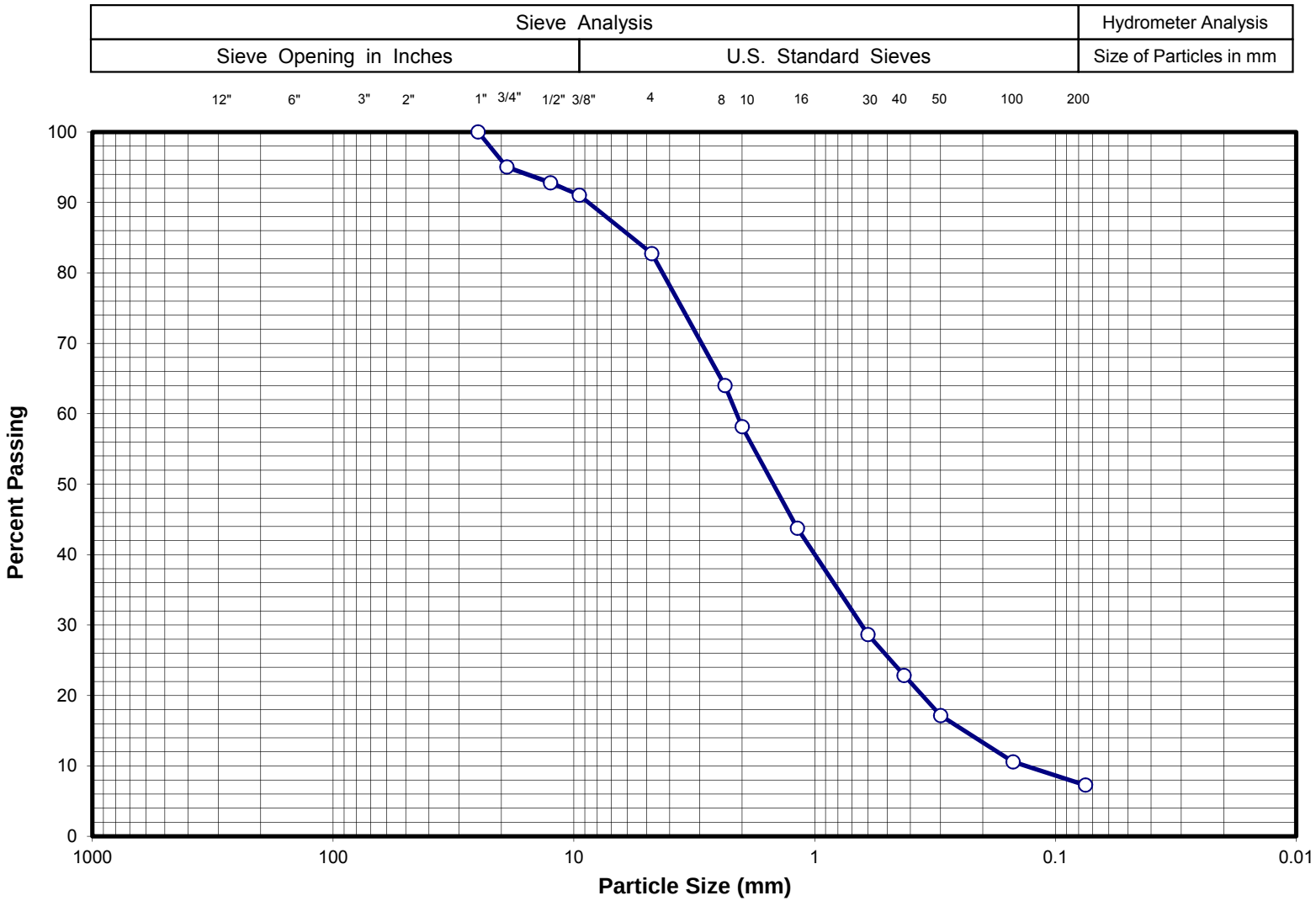
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	93
⅜"	91
#4	83
#10	58
#40	23
#200	7

Gravel (%)	17	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	76	PL	NP	Sample ID:	YA-PT-1
Fines (%)	7	PI	NP	Sample Depth (ft.):	4
Sample Description:	A-1-b (0) / SW-SM				

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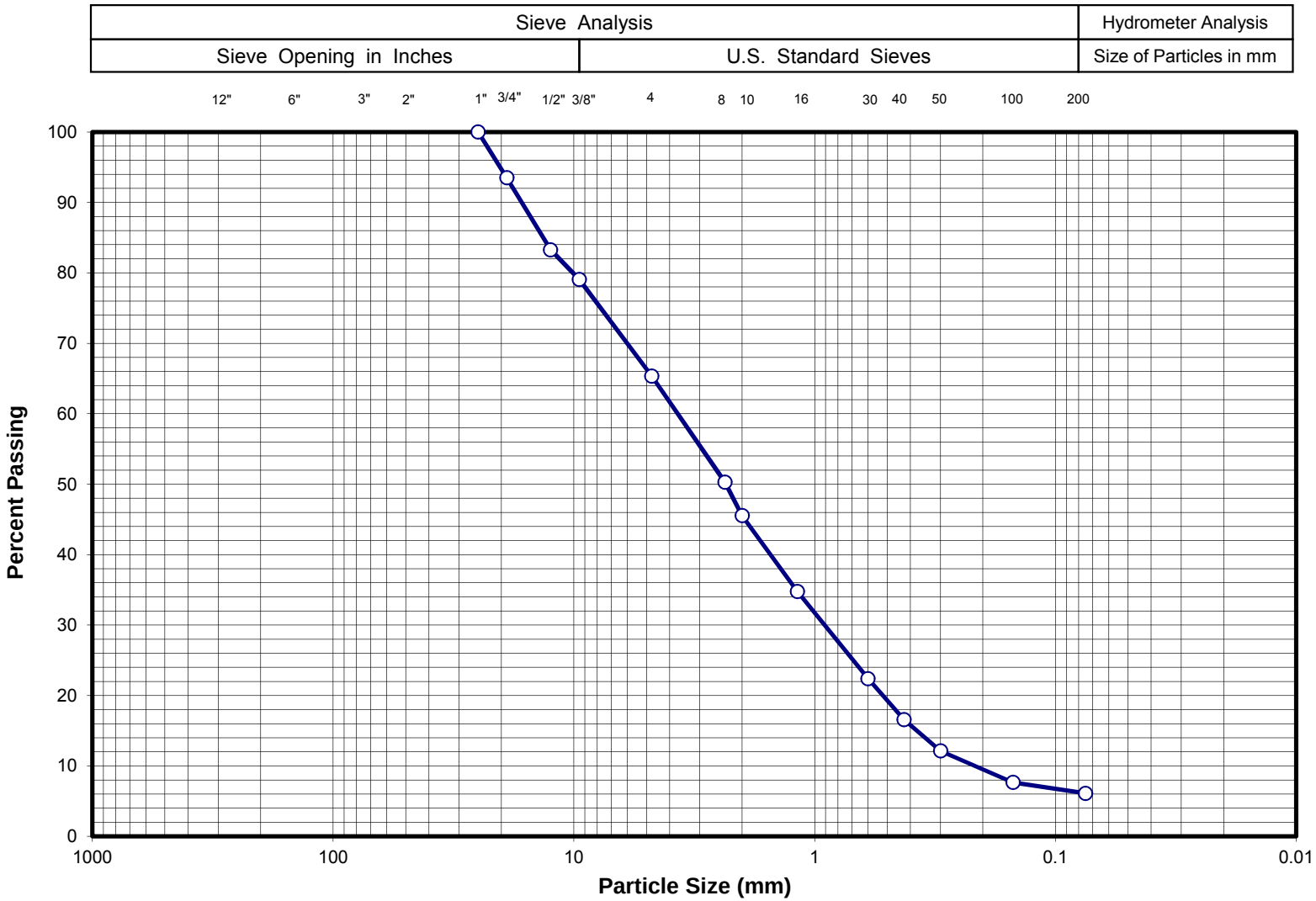
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	94
½"	83
⅜"	79
#4	65
#10	46
#40	17
#200	6

Gravel (%)	35	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	59	PL	NP	Sample ID:	YA-PT-1
Fines (%)	6	PI	NP	Sample Depth (ft.):	14
Sample Description:	A-1-a (0) / SW-SM				

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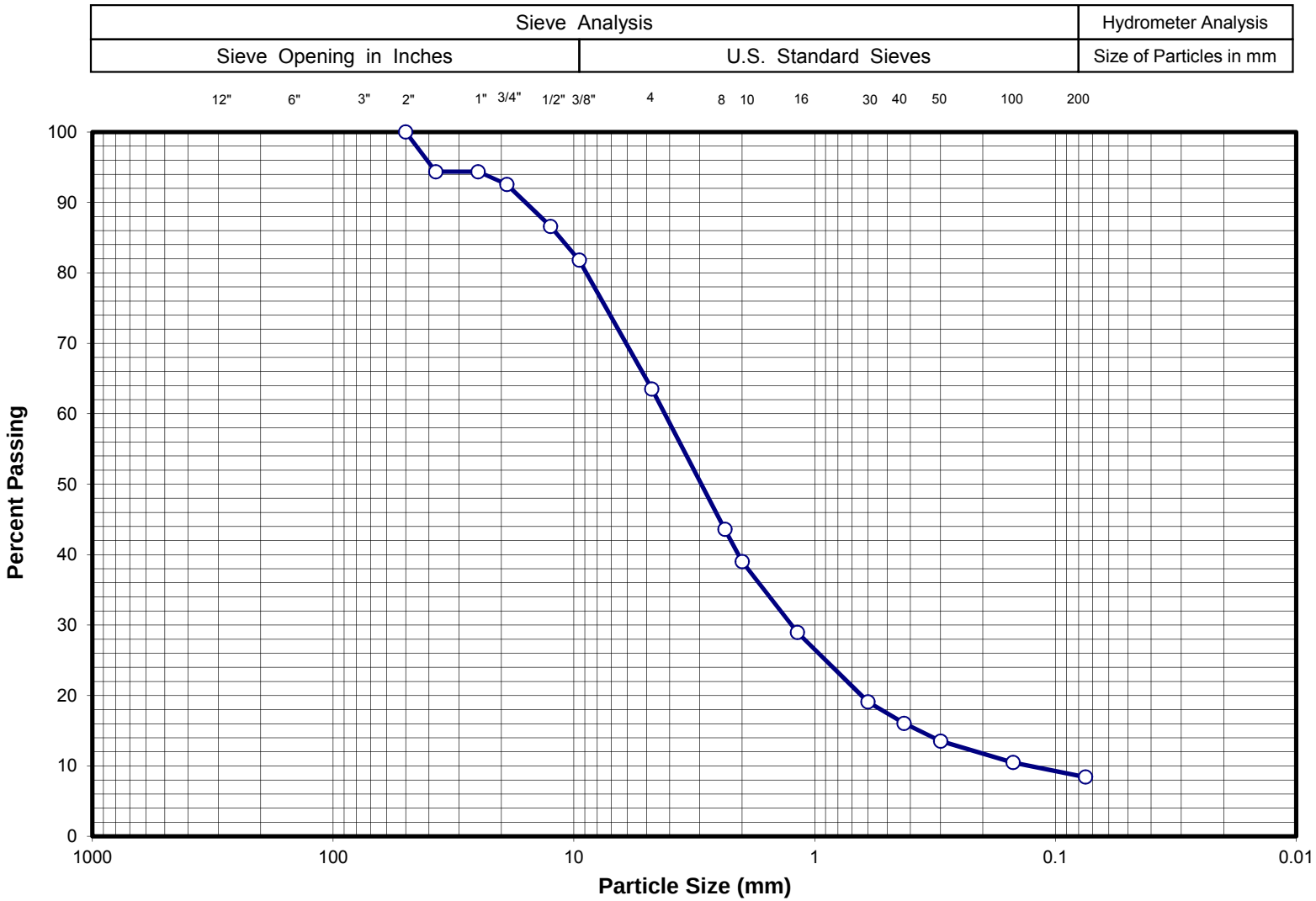
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	94
1"	94
¾ "	93
½"	87
⅜"	82
#4	64
#10	39
#40	16
#200	8

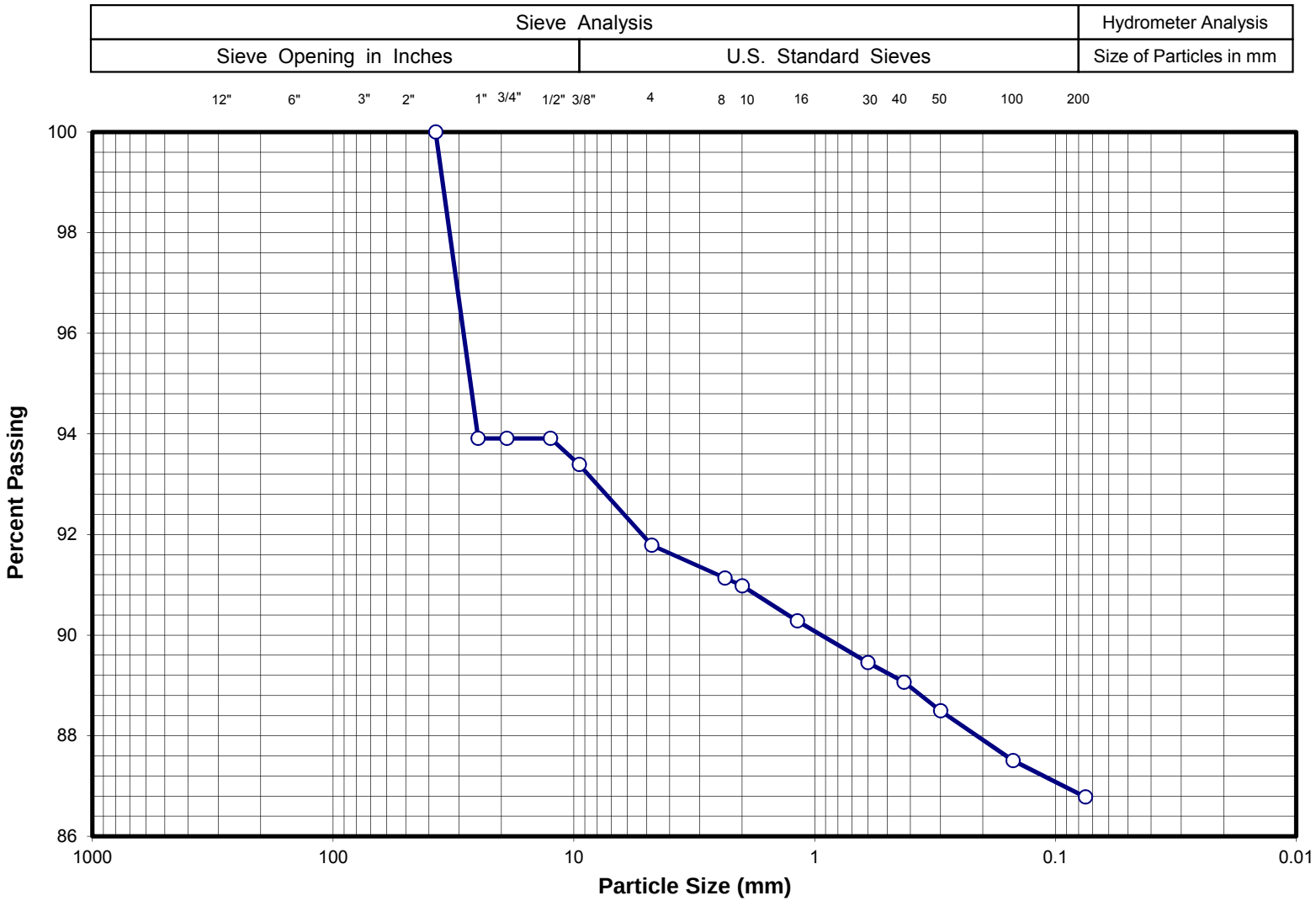
Gravel (%)	36	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	56	PL	NP	Sample ID:	YA-PT-1
Fines (%)	8	PI	NP	Sample Depth (ft.):	24
Sample Description:	A-1-a (0) / SW-SM				

Yeh & Associates, Inc.
Geotechnical Engineering Consultants

SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	94
½"	94
⅜"	93
#4	92
#10	91
#40	89
#200	87

Gravel (%)	8	LL	49	Project Name:	I-70 East, PCL Alternative
Sand (%)	5	PL	24	Sample ID:	YA-PT-1
Fines (%)	87	PI	25	Sample Depth (ft.):	39
Sample Description:	A-7-6 (23) / CL				

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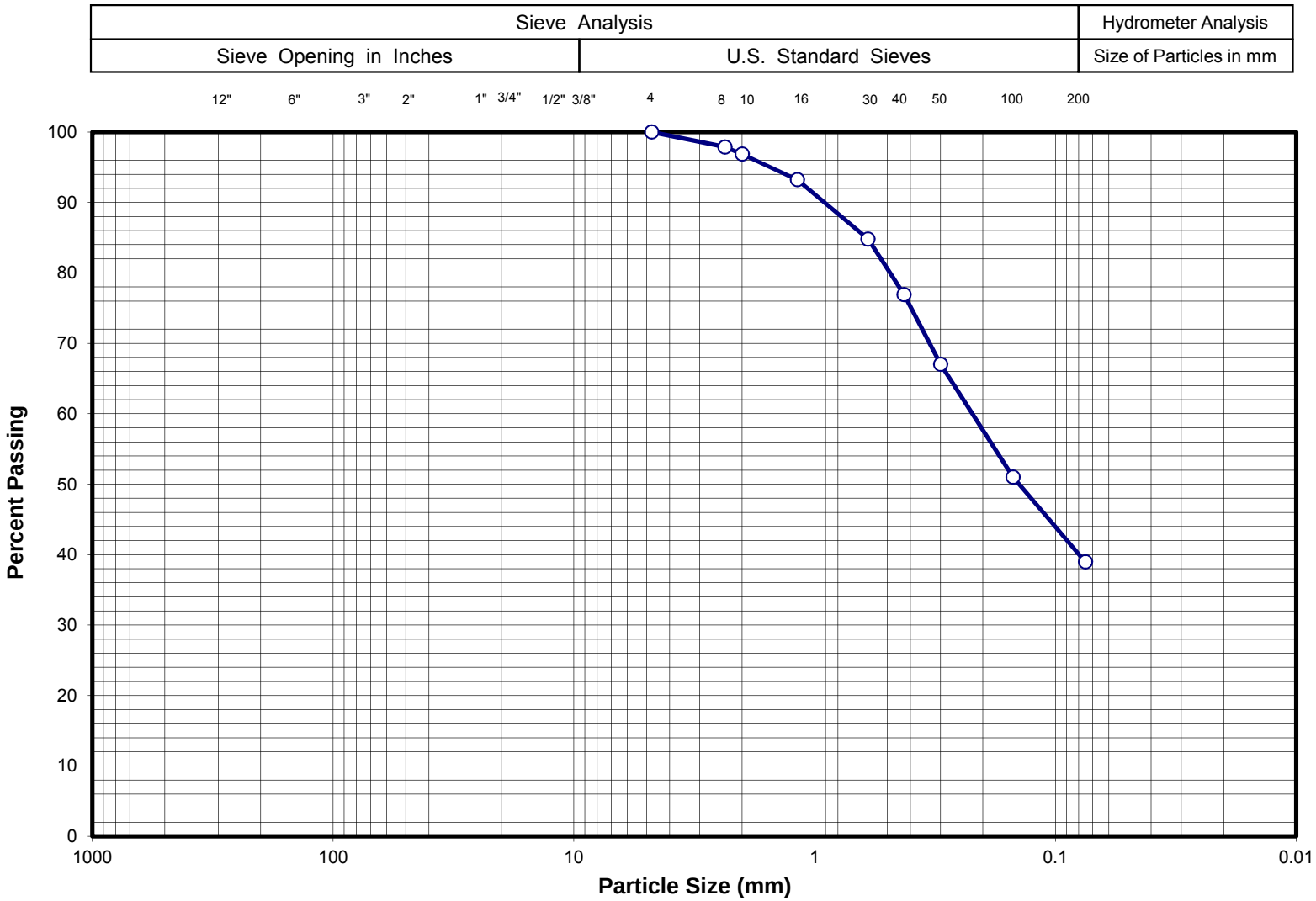
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	97
#40	77
#200	39

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	61	PL	NP	Sample ID:	YA-PT-2
Fines (%)	39	PI	NP	Sample Depth (ft.):	4
Sample Description:	A-4 (0) / SM				

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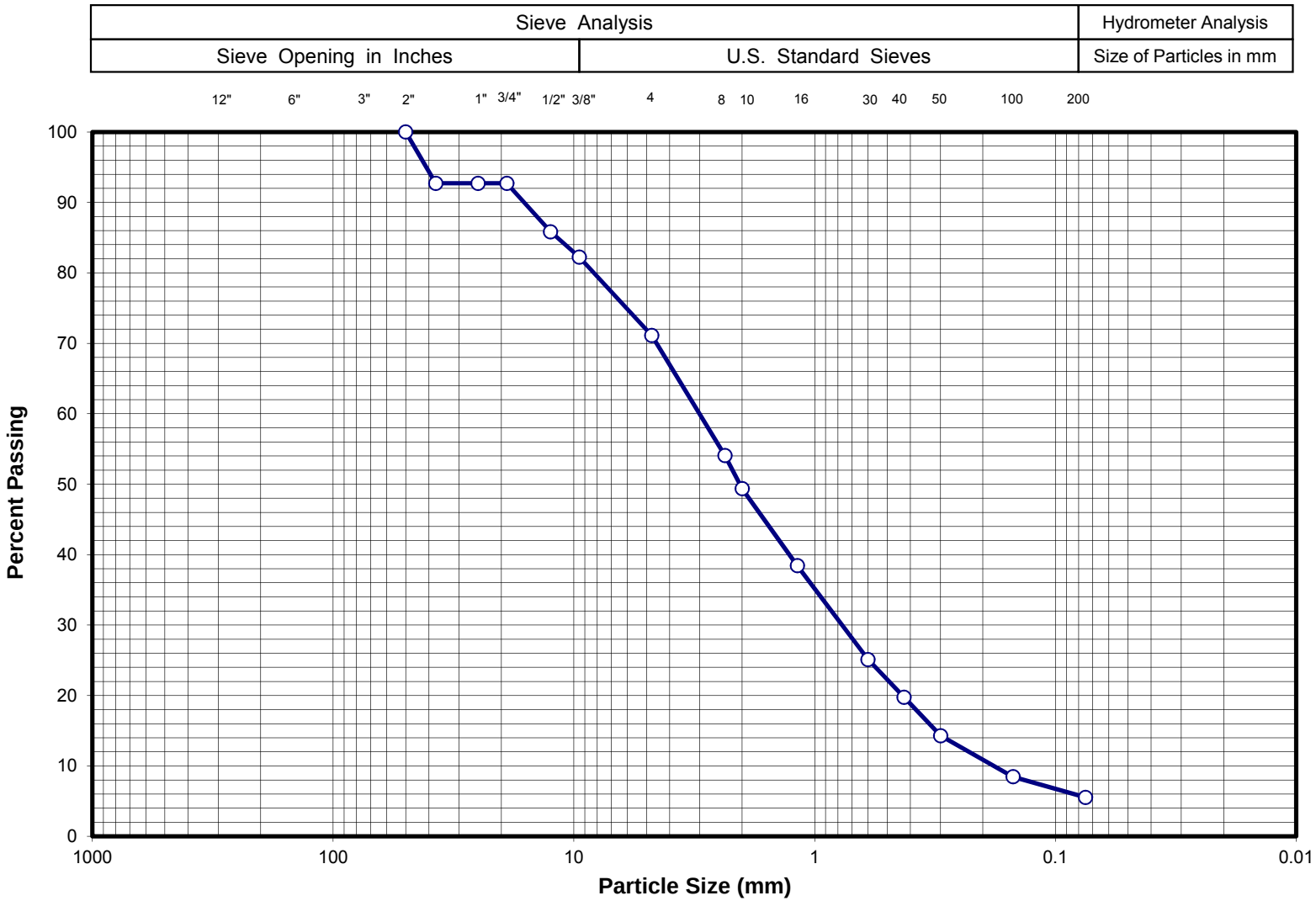
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	100
1 ½"	93
1"	93
¾ "	93
½"	86
⅜"	82
#4	71
#10	49
#40	20
#200	6

Gravel (%)	29	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	65	PL	NP	Sample ID:	YA-PT-2
Fines (%)	6	PI	NP	Sample Depth (ft.):	14
Sample Description:	A-1-a (0) / SW-SM				

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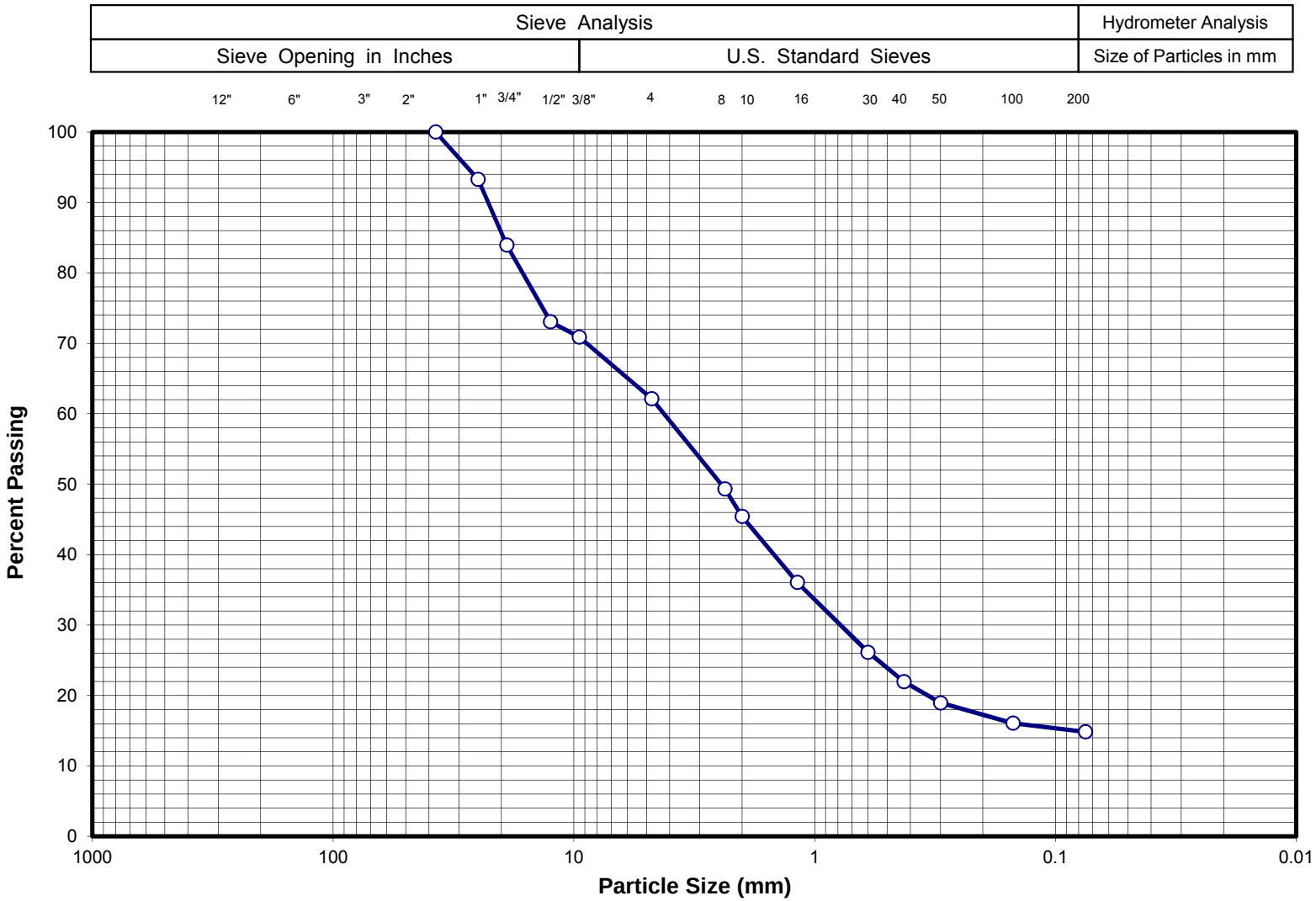
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	93
¾ "	84
½"	73
⅜"	71
#4	62
#10	45
#40	22
#200	15

Gravel (%)	38	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	47	PL	NP	Sample ID:	YA-PT-2
Fines (%)	15	PI	NP	Sample Depth (ft.):	24
Sample Description:	A-1-a (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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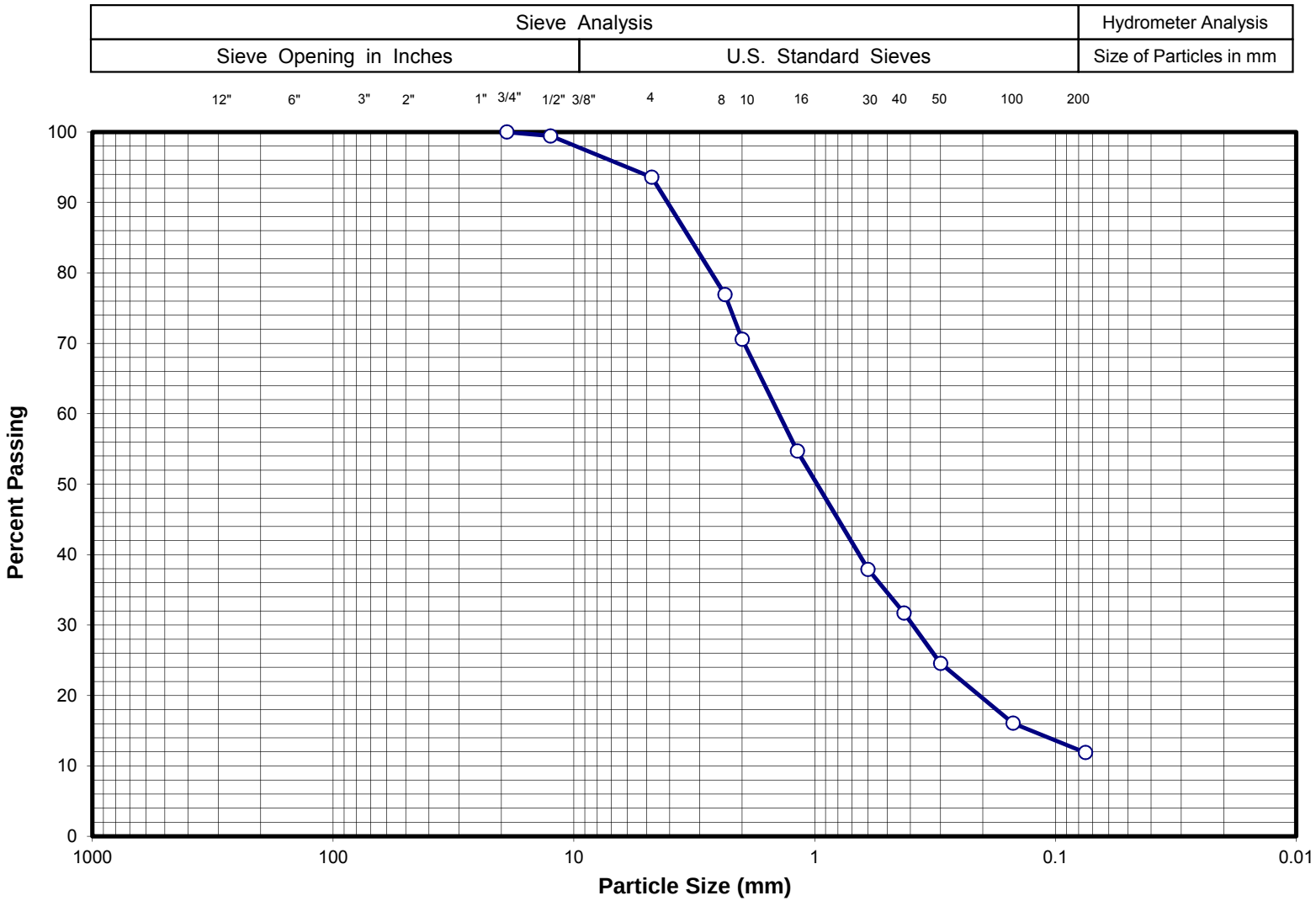

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	99
#4	94
#10	71
#40	32
#200	12

Gravel (%)	6	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	82	PL	NP	Sample ID:	YA-PT-2
Fines (%)	12	PI	NP	Sample Depth (ft.):	34
Sample Description:	A-1-b (0) / SP-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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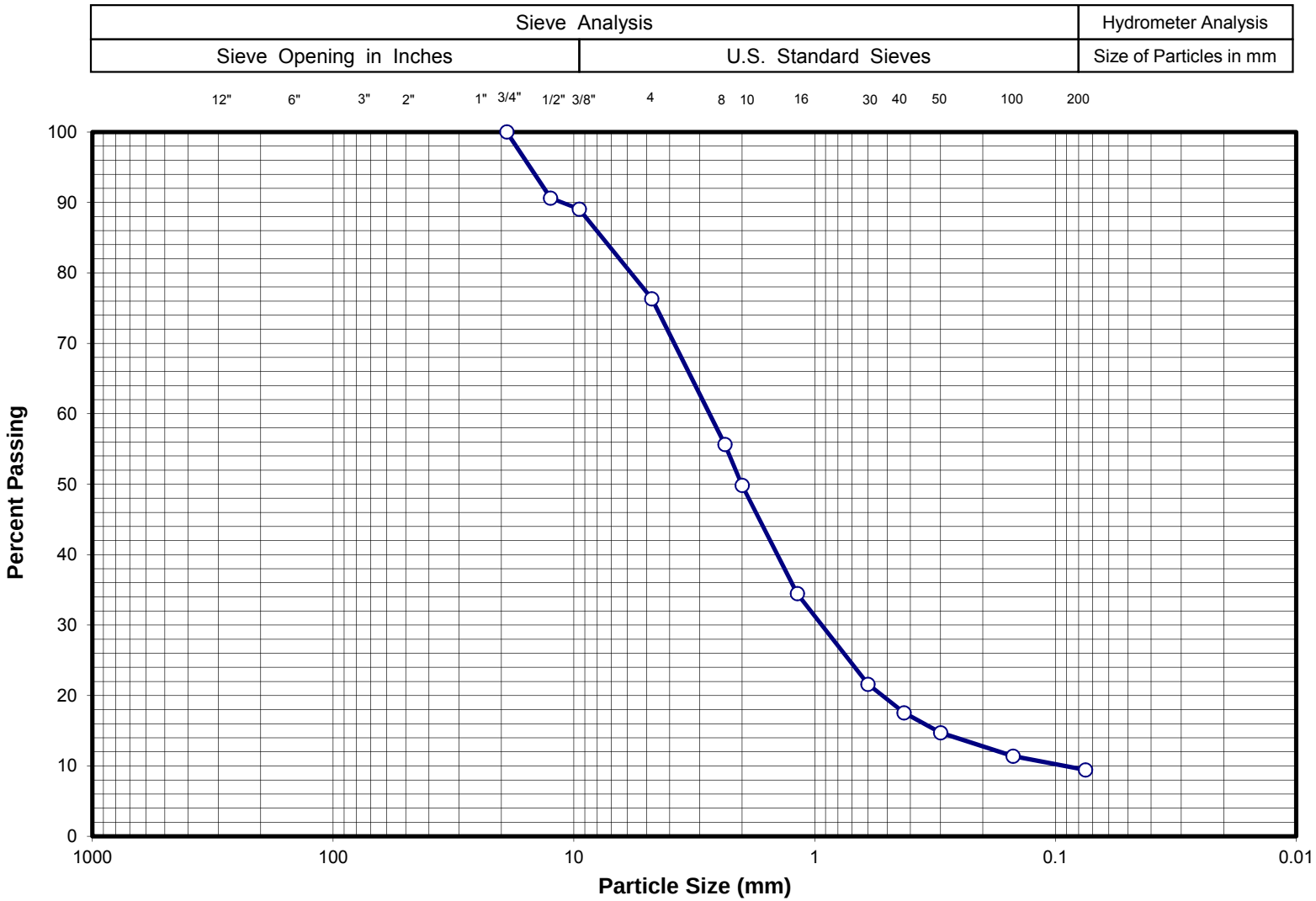

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	91
⅜"	89
#4	76
#10	50
#40	18
#200	9

Gravel (%)	24	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	67	PL	NP	Sample ID:	YA-PT-2
Fines (%)	9	PI	NP	Sample Depth (ft.):	44
Sample Description:	A-1-a (0) / SP-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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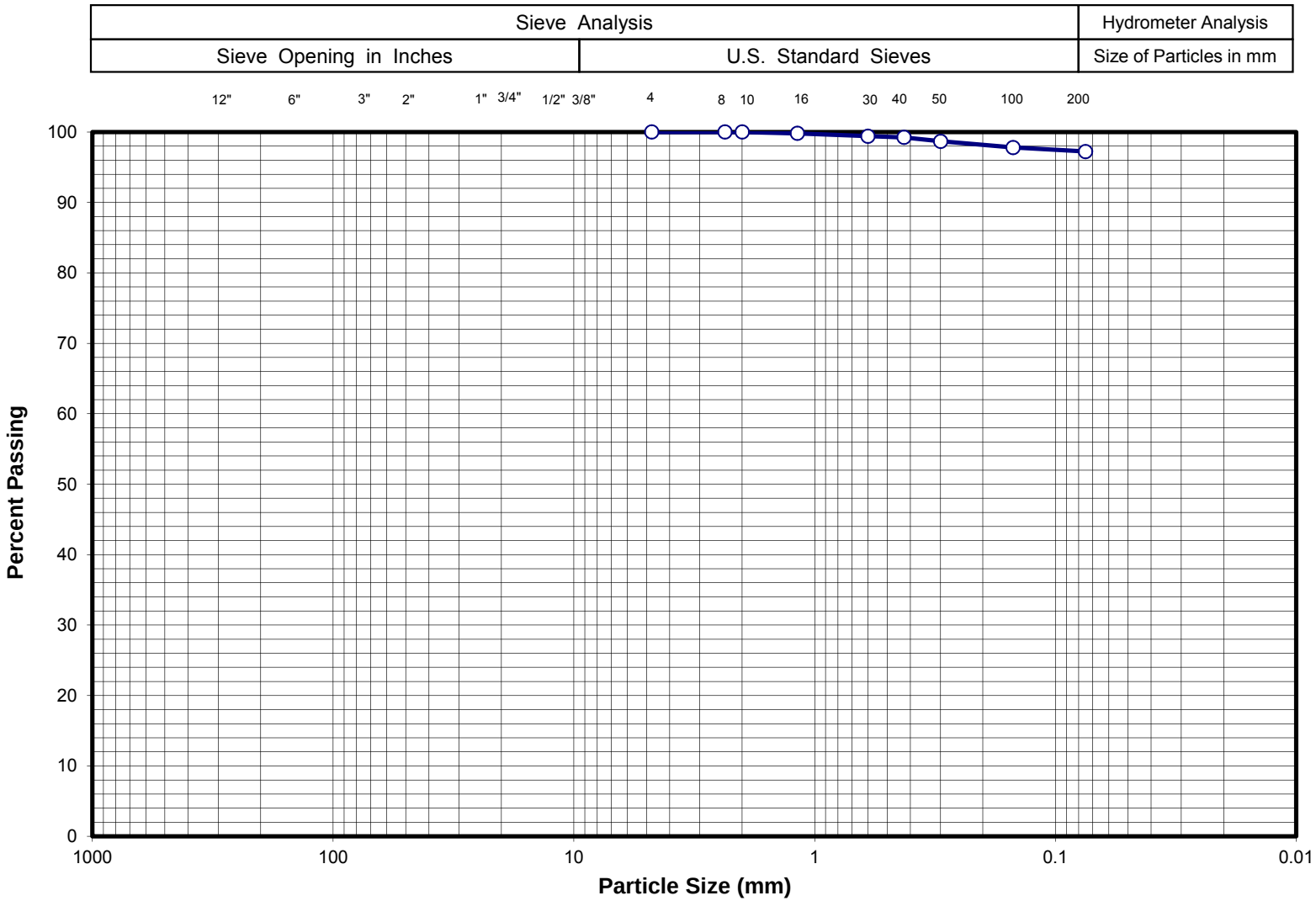

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	99
#200	97

Gravel (%)	0	LL	39	Project Name:	I-70 East, PCL Alternative
Sand (%)	3	PL	22	Sample ID:	YA-PT-2
Fines (%)	97	PI	17	Sample Depth (ft.):	49
Sample Description:	A-6 (17) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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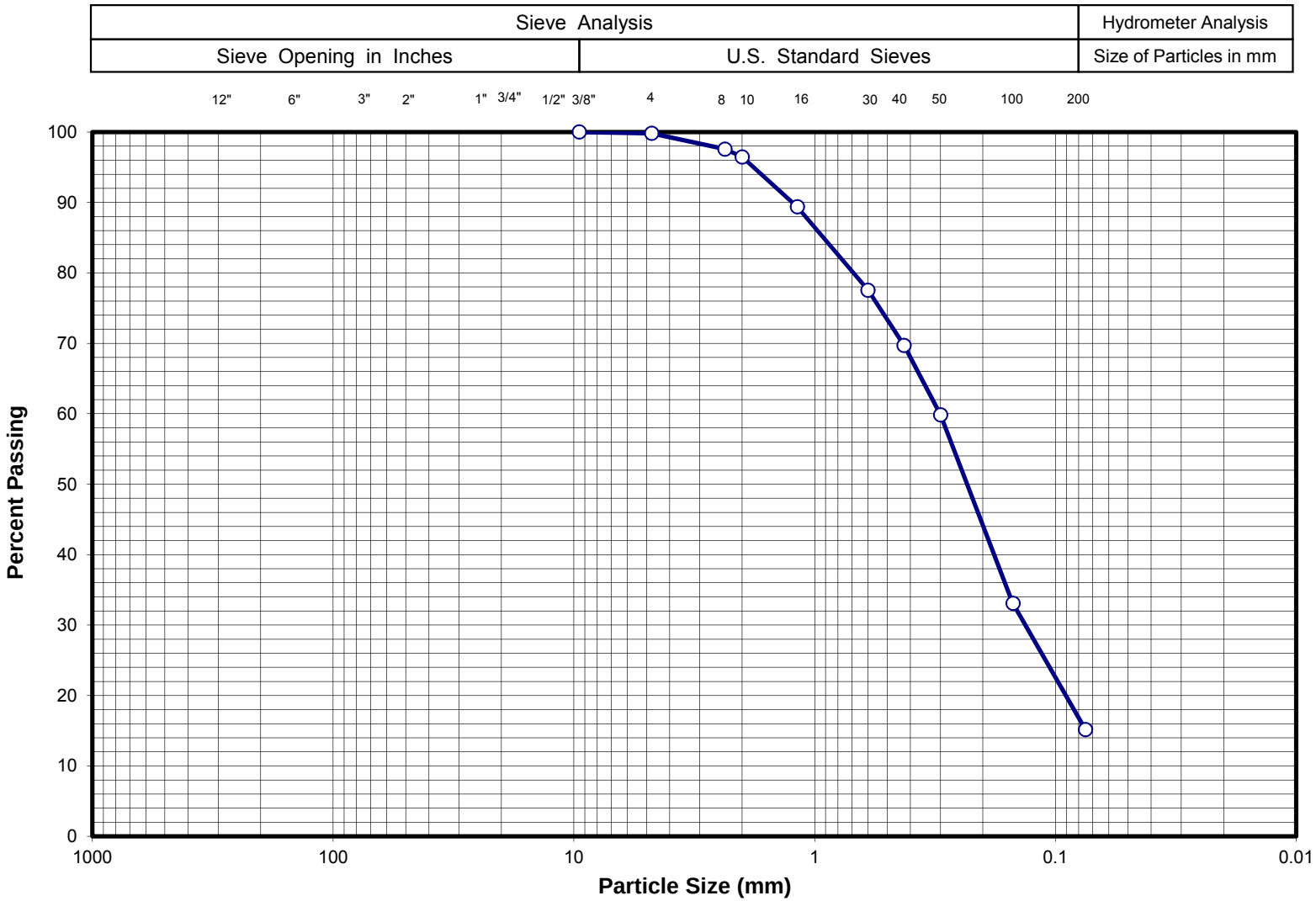

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	96
#40	70
#200	15

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	85	PL	NP	Sample ID:	YA-BY-1
Fines (%)	15	PI	NP	Sample Depth (ft.):	3
Sample Description:	**A-2-4 (0) / SM**				

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SIEVE ANALYSIS

Drawn By:	MA	Project No.:	213-208
Checked By:	M.G		
Date:	08/10/15	Figure No.:	-

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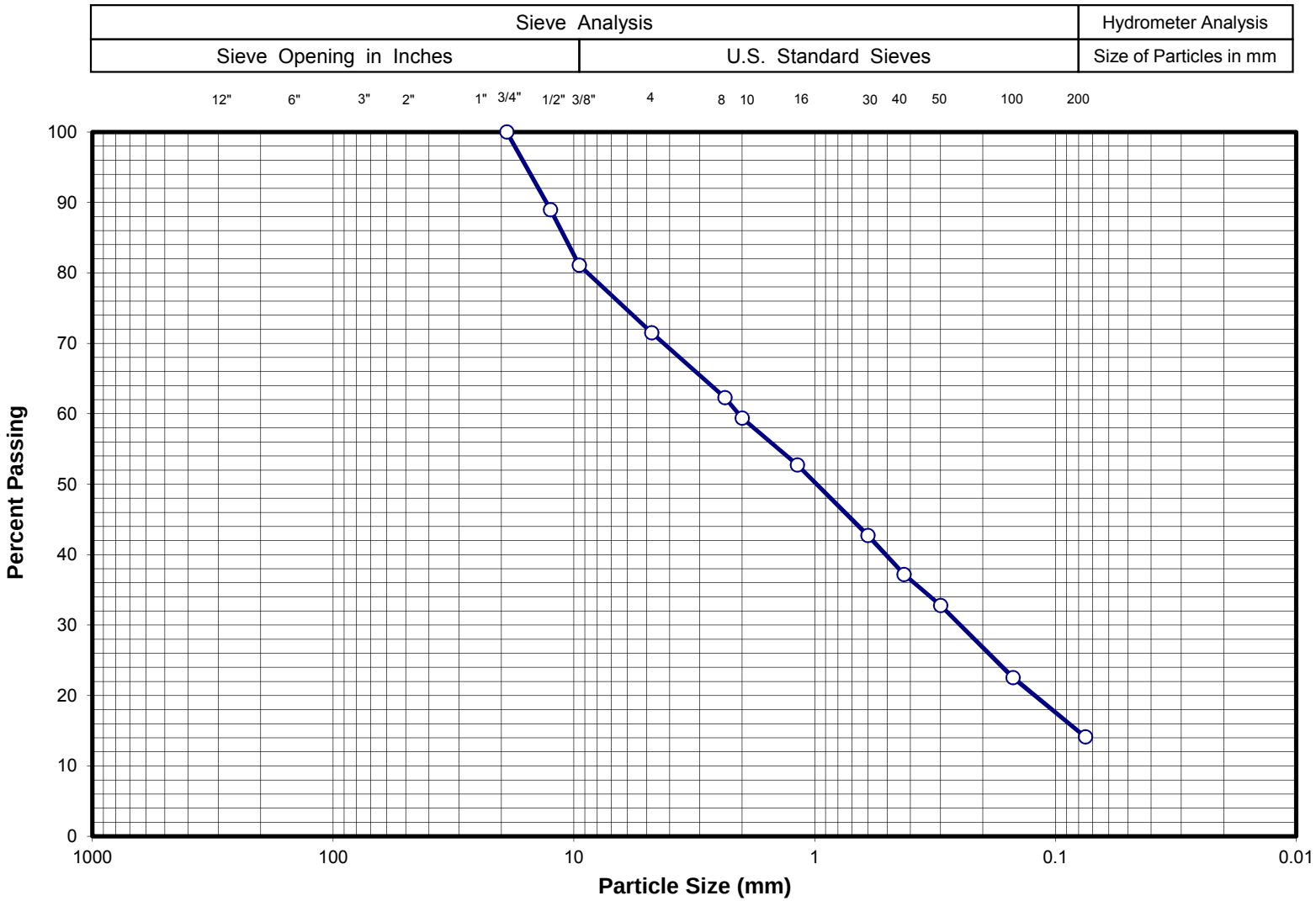

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	89
⅜"	81
#4	71
#10	59
#40	37
#200	14

Gravel (%)	29	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	57	PL	NP	Sample ID:	YA-BY-1
Fines (%)	14	PI	NP	Sample Depth (ft.):	3-5
Sample Description:	A-1-b (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.Kiefer		
Date:	07/09/15	Figure No.:	-

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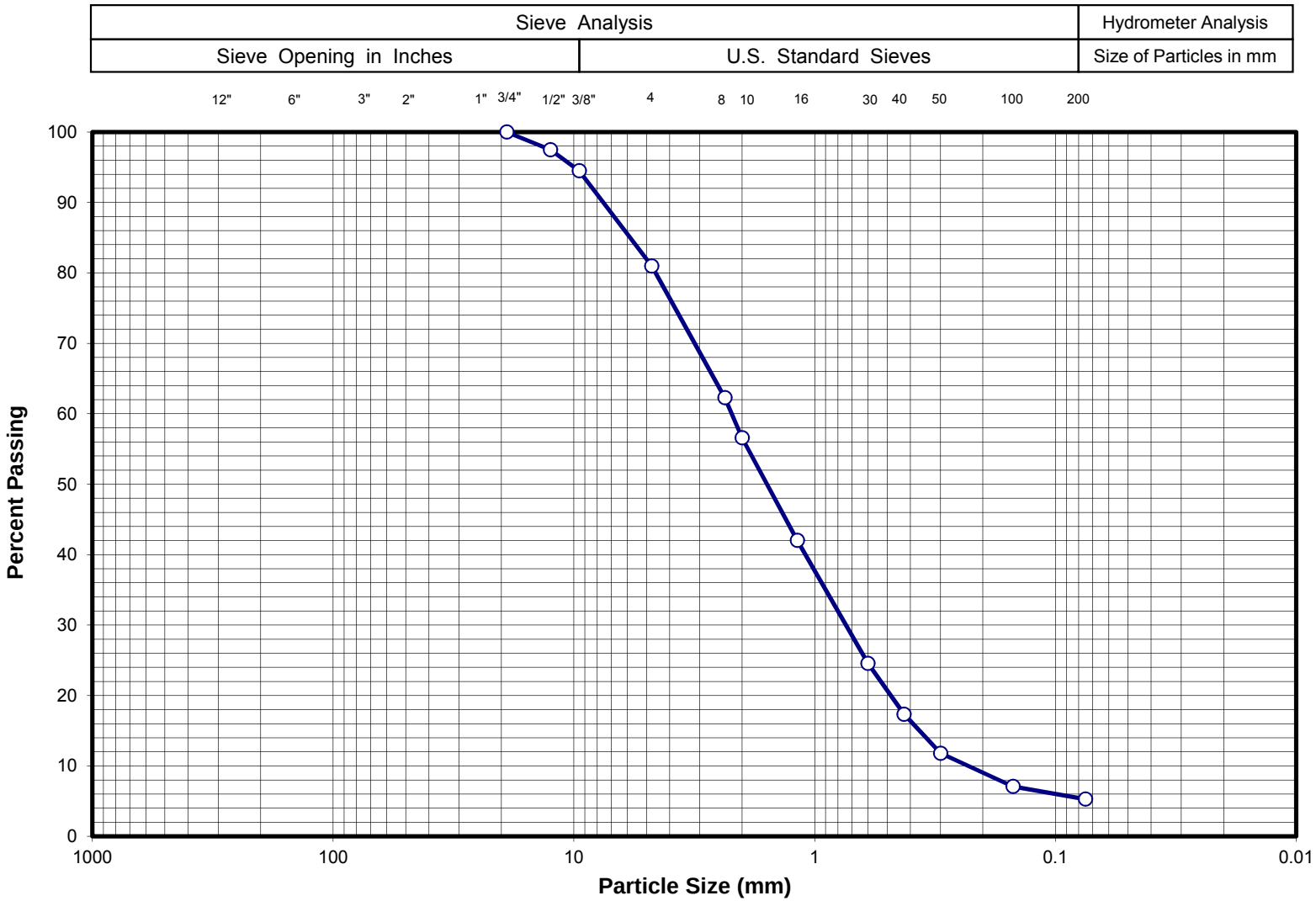

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	97
⅜"	94
#4	81
#10	57
#40	17
#200	5

Gravel (%)	19	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	76	PL	NP	Sample ID:	YA-BY-1
Fines (%)	5	PI	NP	Sample Depth (ft.):	9
Sample Description:	A-1-b (0) / SW-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

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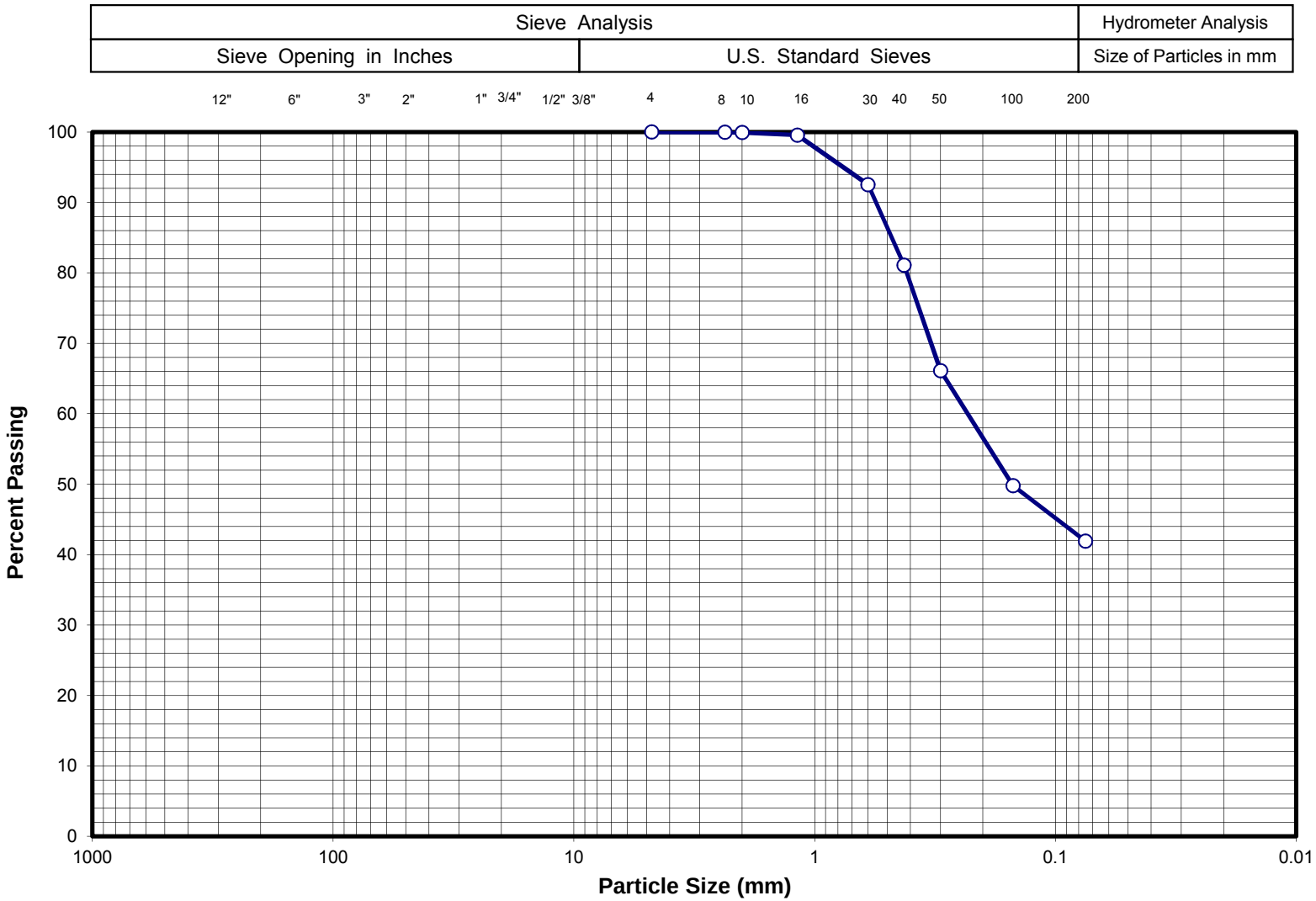

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	81
#200	42

Gravel (%)	0	LL	28	Project Name:	I-70 East, PCL Alternative
Sand (%)	58	PL	21	Sample ID:	YA-BY-1
Fines (%)	42	PI	7	Sample Depth (ft.):	14
Sample Description:	A-4 (0) / SM-SC				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

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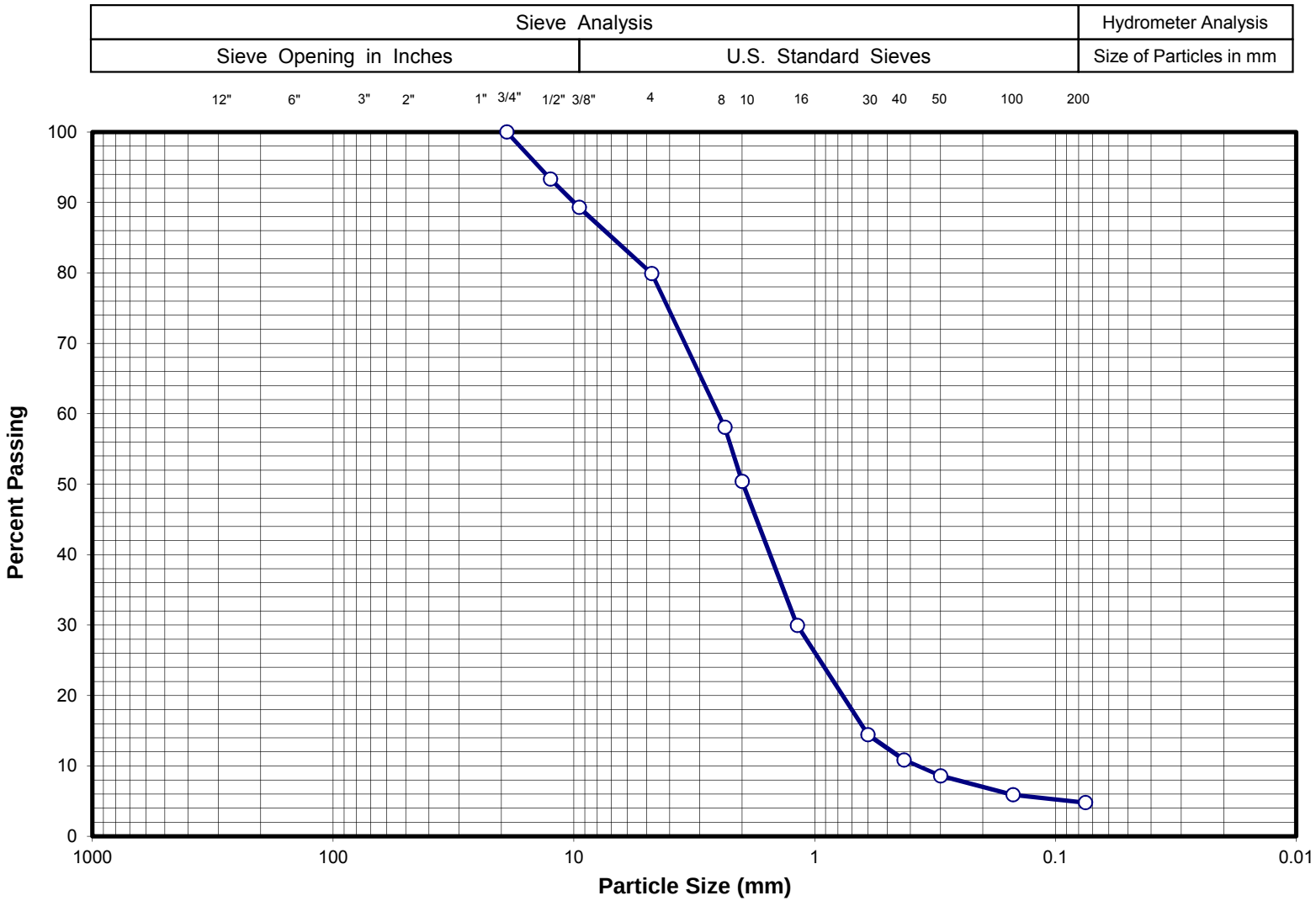

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	93
⅜"	89
#4	80
#10	50
#40	11
#200	5

Gravel (%)	20	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	75	PL	NP	Sample ID:	YA-BY-1
Fines (%)	5	PI	NP	Sample Depth (ft.):	14
Sample Description:	A-1-a (0) / SW				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

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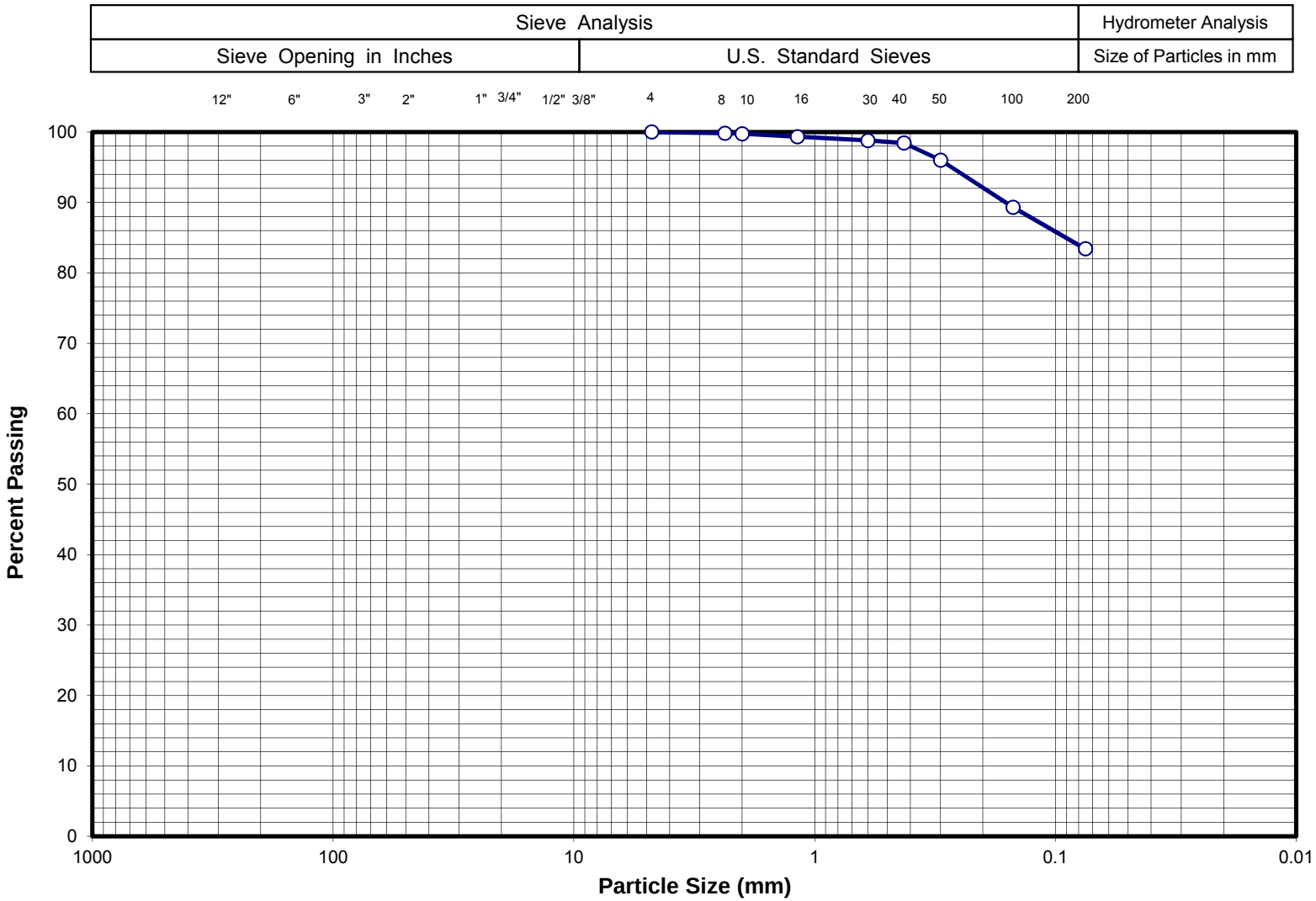

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	98
#200	83

Gravel (%)	0	LL	51	Project Name:	I-70 East, PCL Alternative
Sand (%)	17	PL	19	Sample ID:	YA-BY-1
Fines (%)	83	PI	32	Sample Depth (ft.):	34
Sample Description:	A-7-6 (27) / CH				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

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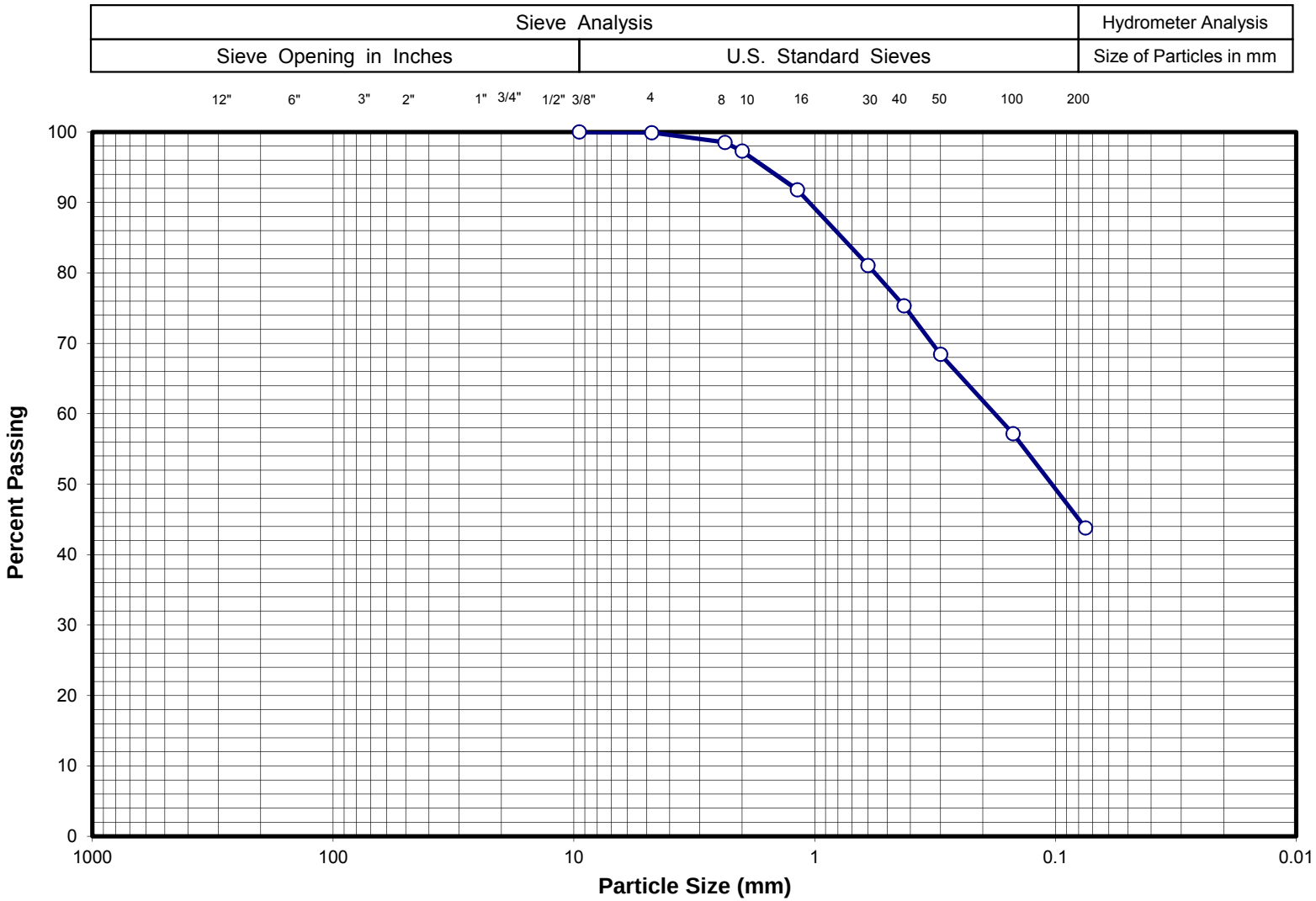

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	97
#40	75
#200	44

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	56	PL	NP	Sample ID:	YA-WJO-1
Fines (%)	44	PI	NP	Sample Depth (ft.):	4
Sample Description:	A-4 (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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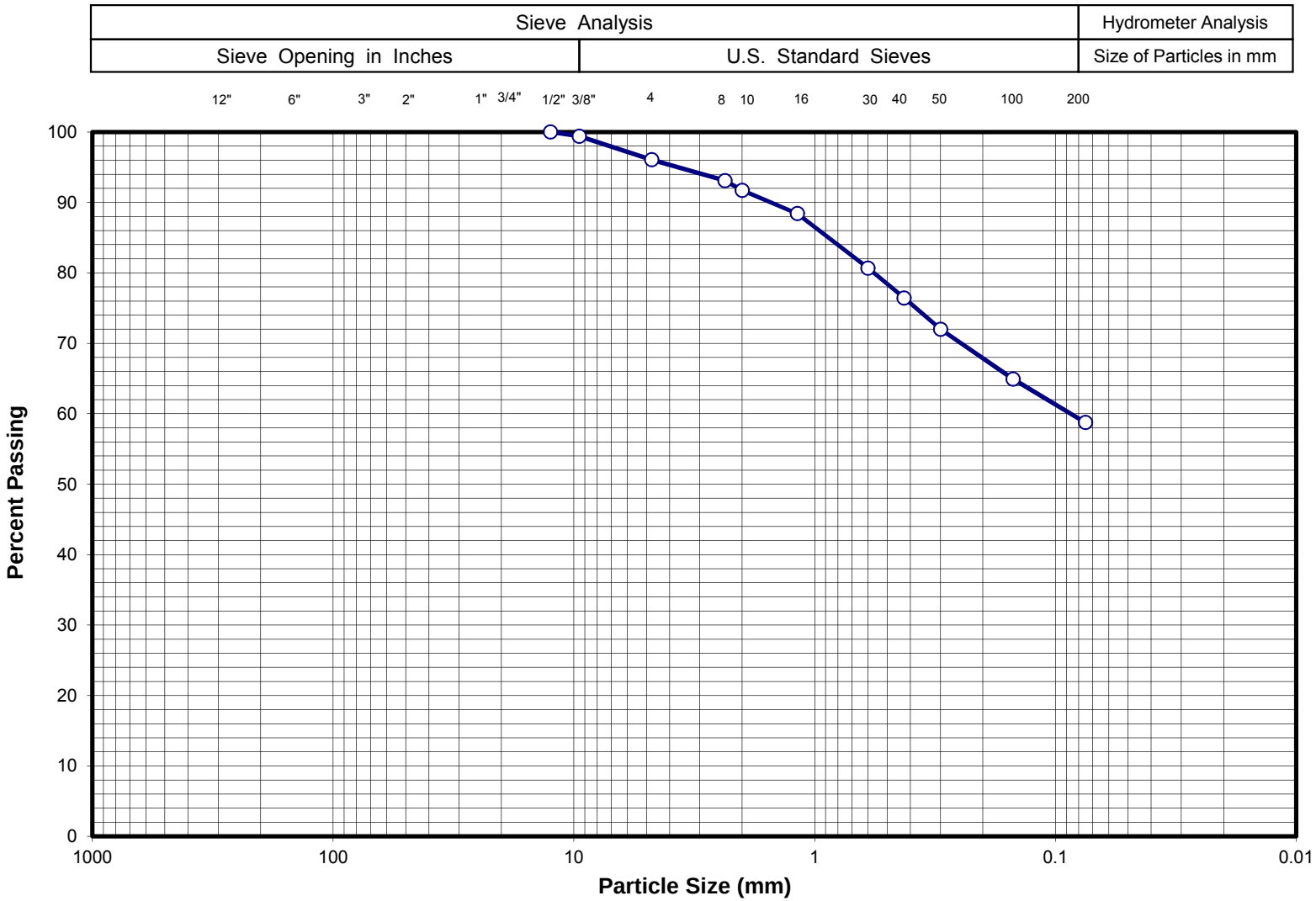

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	99
#4	96
#10	92
#40	76
#200	59

Gravel (%)	4	LL	36	Project Name:	I-70 East, PCL Alternative
Sand (%)	37	PL	14	Sample ID:	YA-WJO-1
Fines (%)	59	PI	22	Sample Depth (ft.):	14
Sample Description:	A-6 (10) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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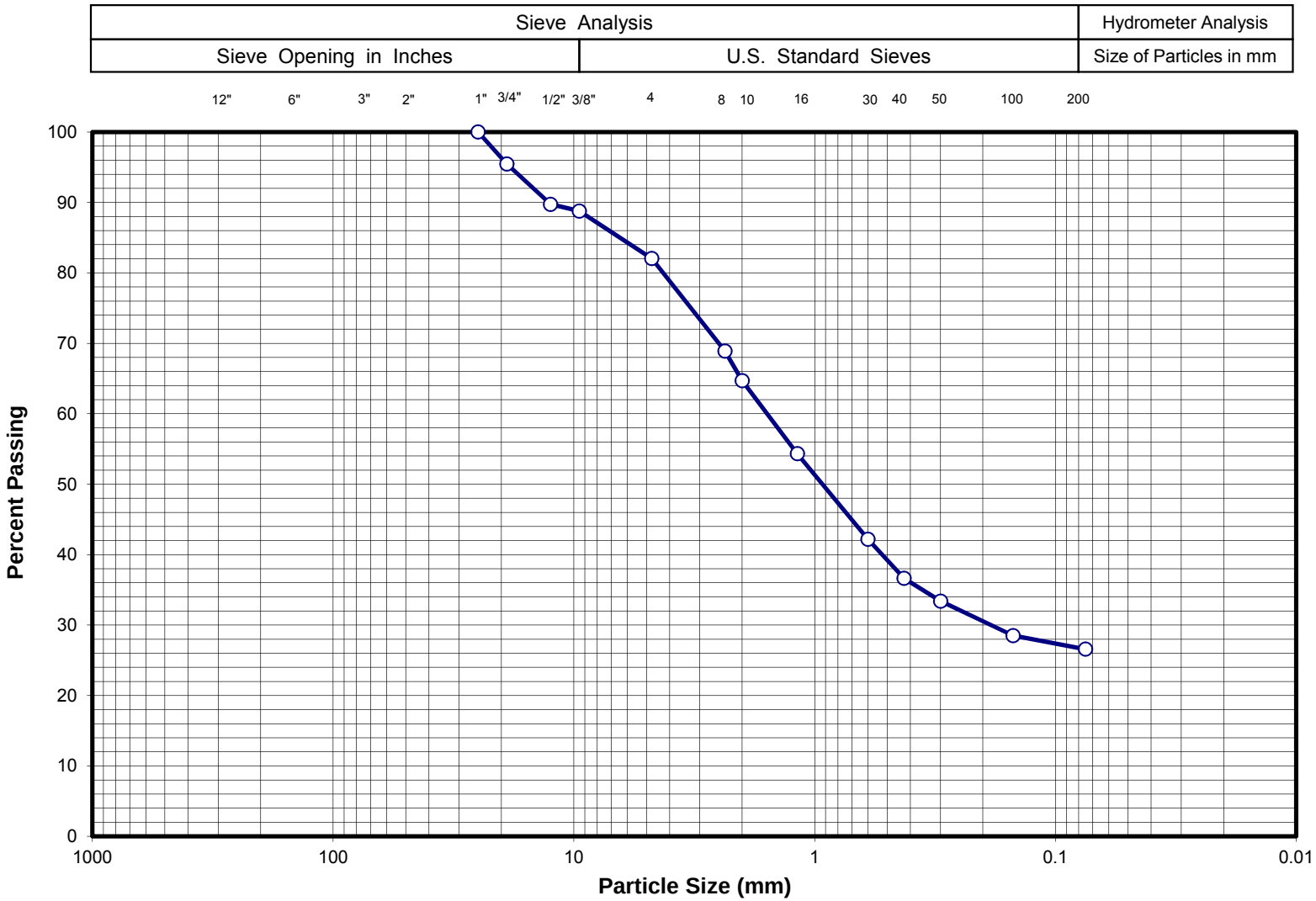

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	95
½"	90
⅜"	89
#4	82
#10	65
#40	37
#200	27

Gravel (%)	18	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	55	PL	NP	Sample ID:	YA-WJO-1
Fines (%)	27	PI	NP	Sample Depth (ft.):	24
Sample Description:	A-2-4 (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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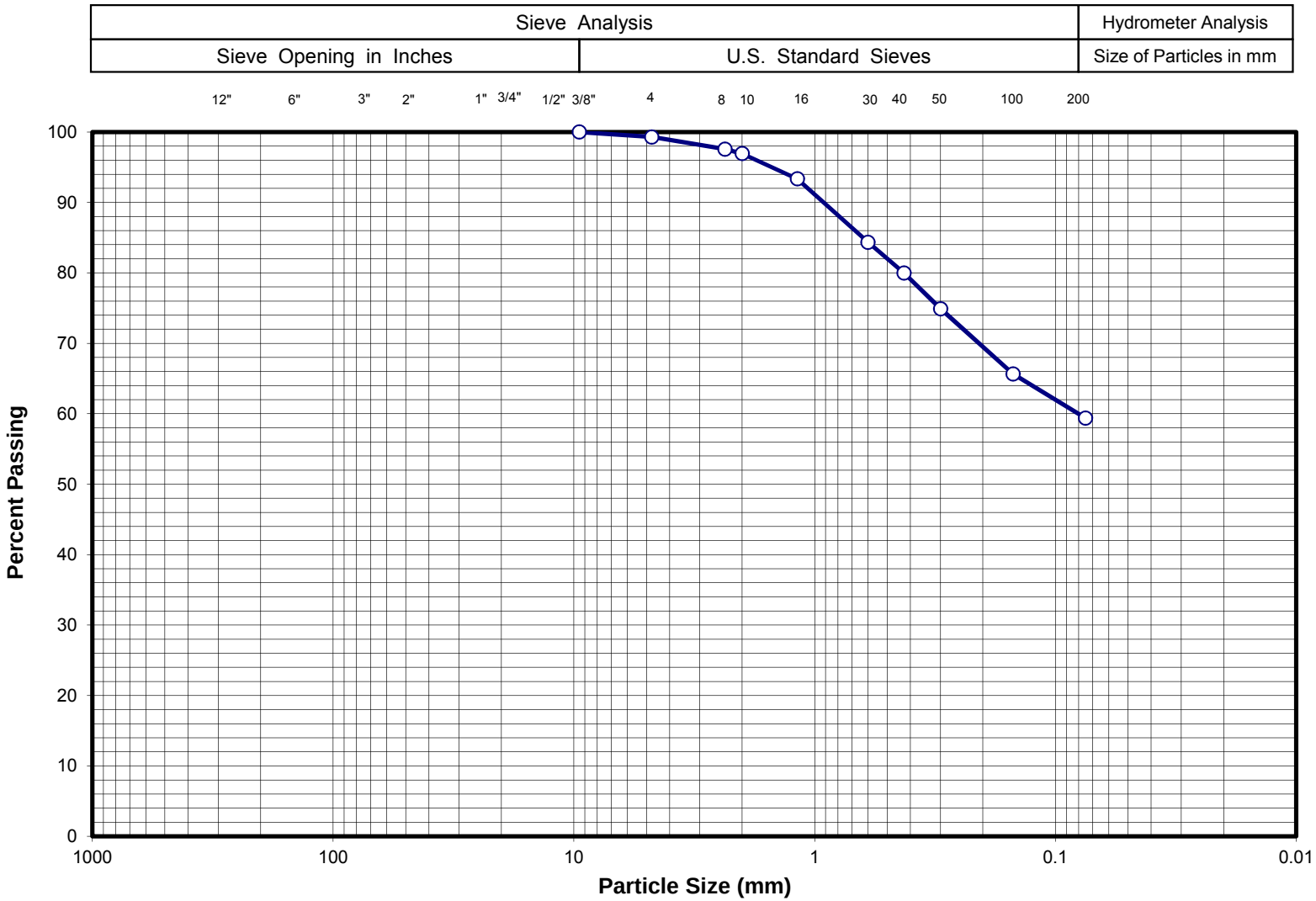

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	97
#40	80
#200	59

Gravel (%)	1	LL	41	Project Name:	I-70 East, PCL Alternative
Sand (%)	40	PL	23	Sample ID:	YA-WJO-1
Fines (%)	59	PI	18	Sample Depth (ft.):	34
Sample Description:	A-7-6 (9) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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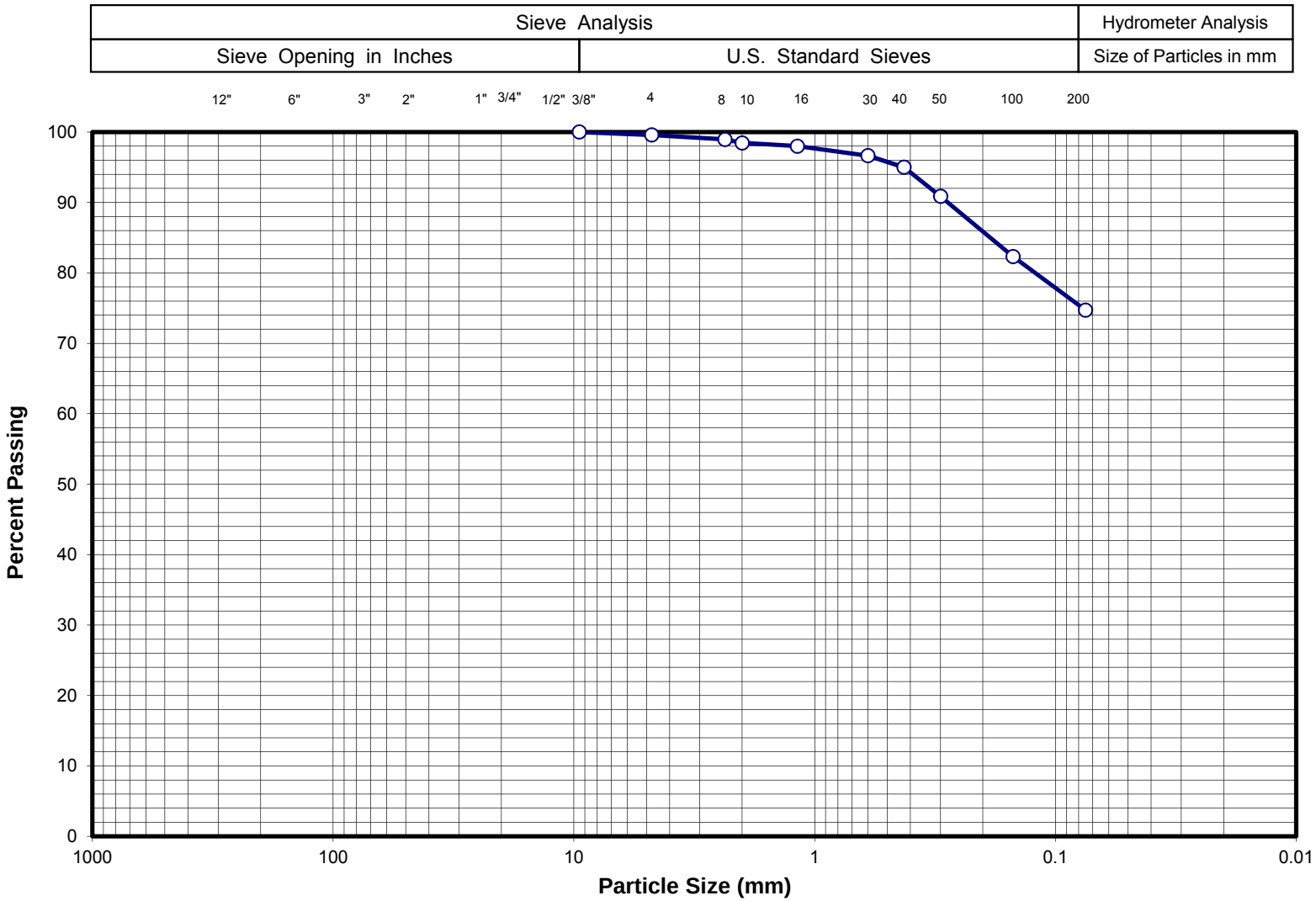

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	98
#40	95
#200	75

Gravel (%)	0	LL	41	Project Name:	I-70 East, PCL Alternative
Sand (%)	25	PL	19	Sample ID:	YA-WJO-1
Fines (%)	75	PI	22	Sample Depth (ft.):	39
Sample Description:	A-7-6 (16) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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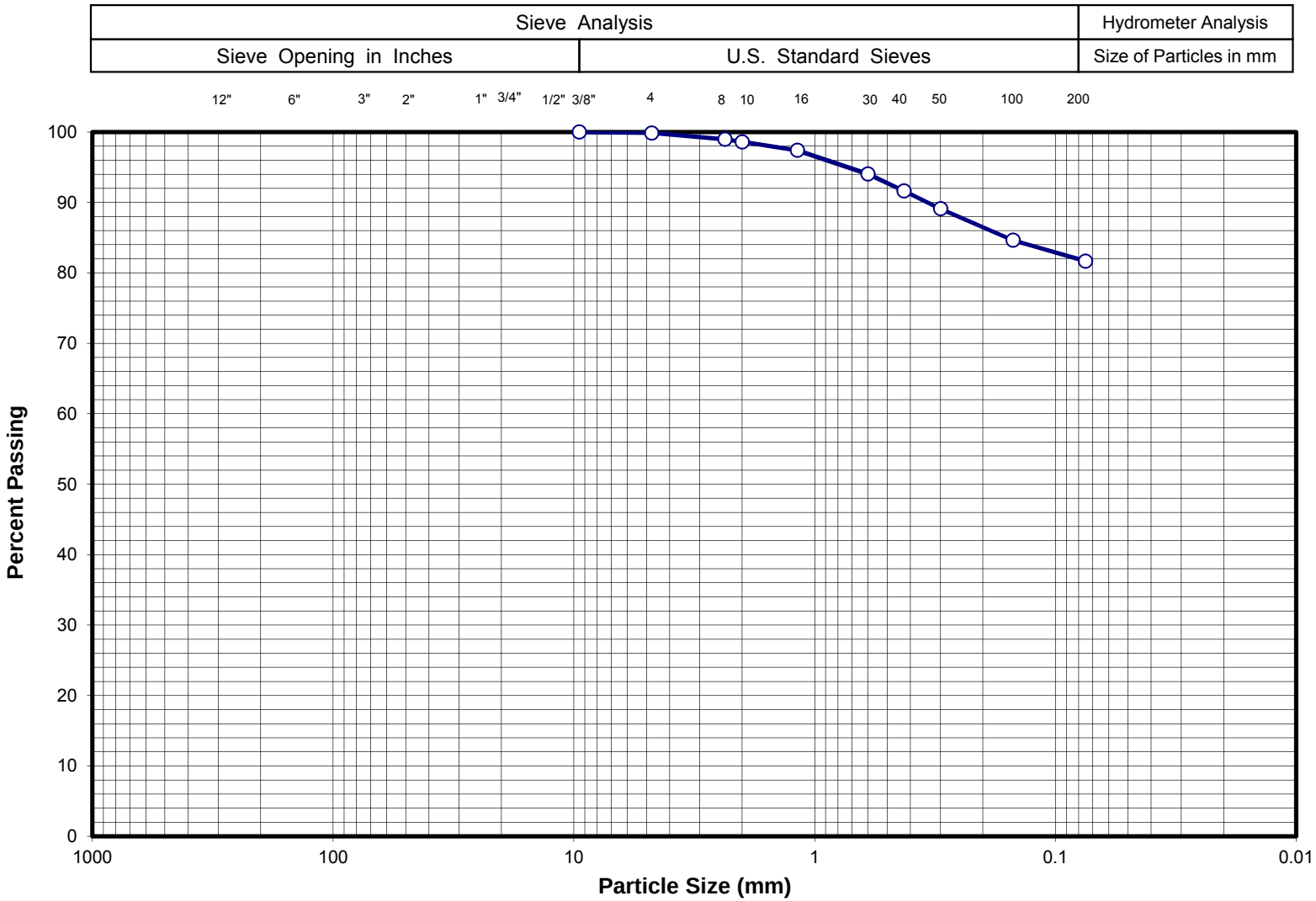

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	99
#40	92
#200	82

Gravel (%)	0	LL	47	Project Name:	I-70 East, PCL Alternative
Sand (%)	18	PL	22	Sample ID:	YA-WJO-1
Fines (%)	82	PI	25	Sample Depth (ft.):	49
Sample Description:	A-7-6 (21) / CL				

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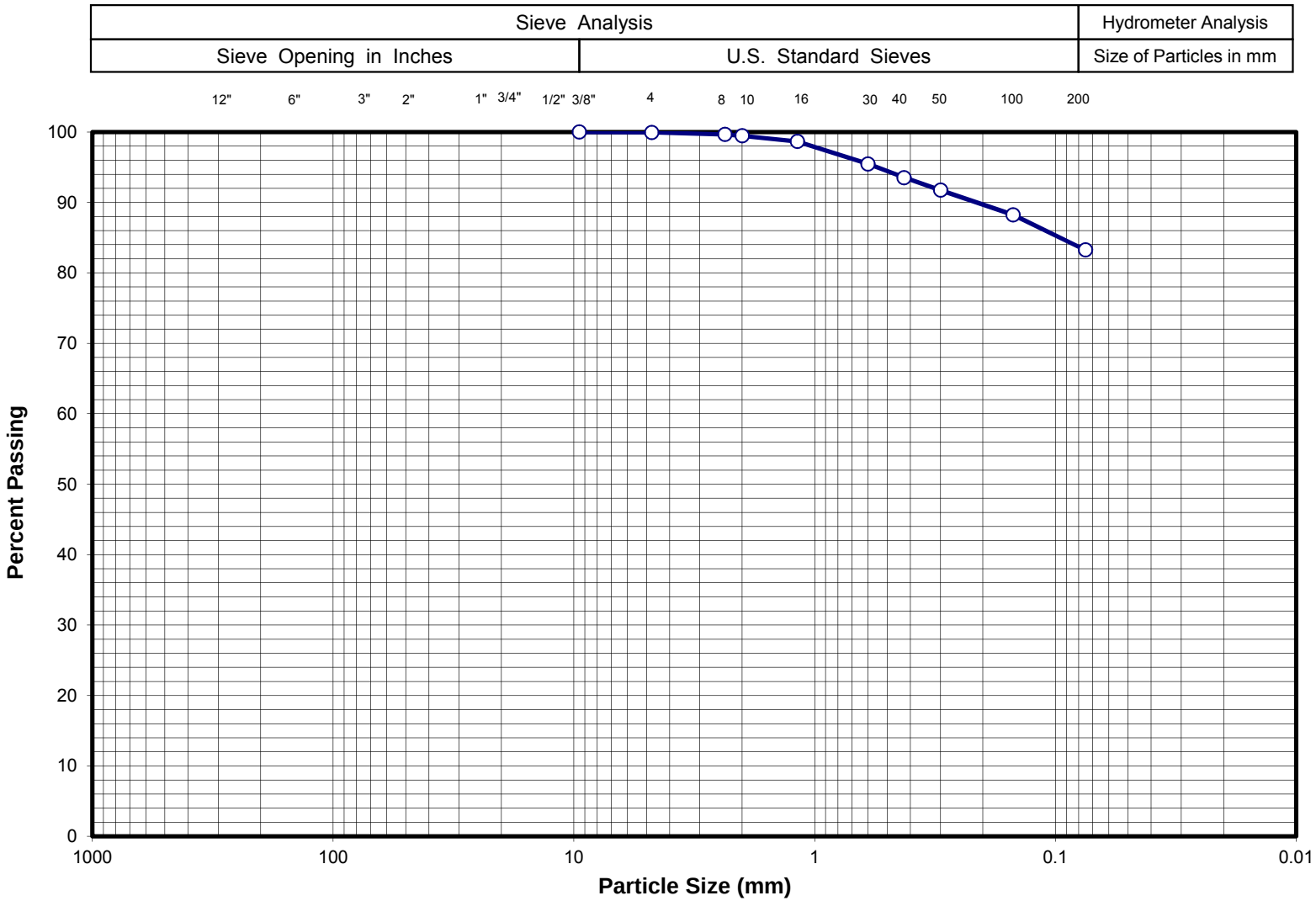
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	99
#40	94
#200	83

Gravel (%)	0	LL	36	Project Name:	I-70 East, PCL Alternative
Sand (%)	17	PL	18	Sample ID:	YA-WJO-1
Fines (%)	83	PI	18	Sample Depth (ft.):	54
Sample Description:	A-6 (15) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/09/16	Figure No.:	-

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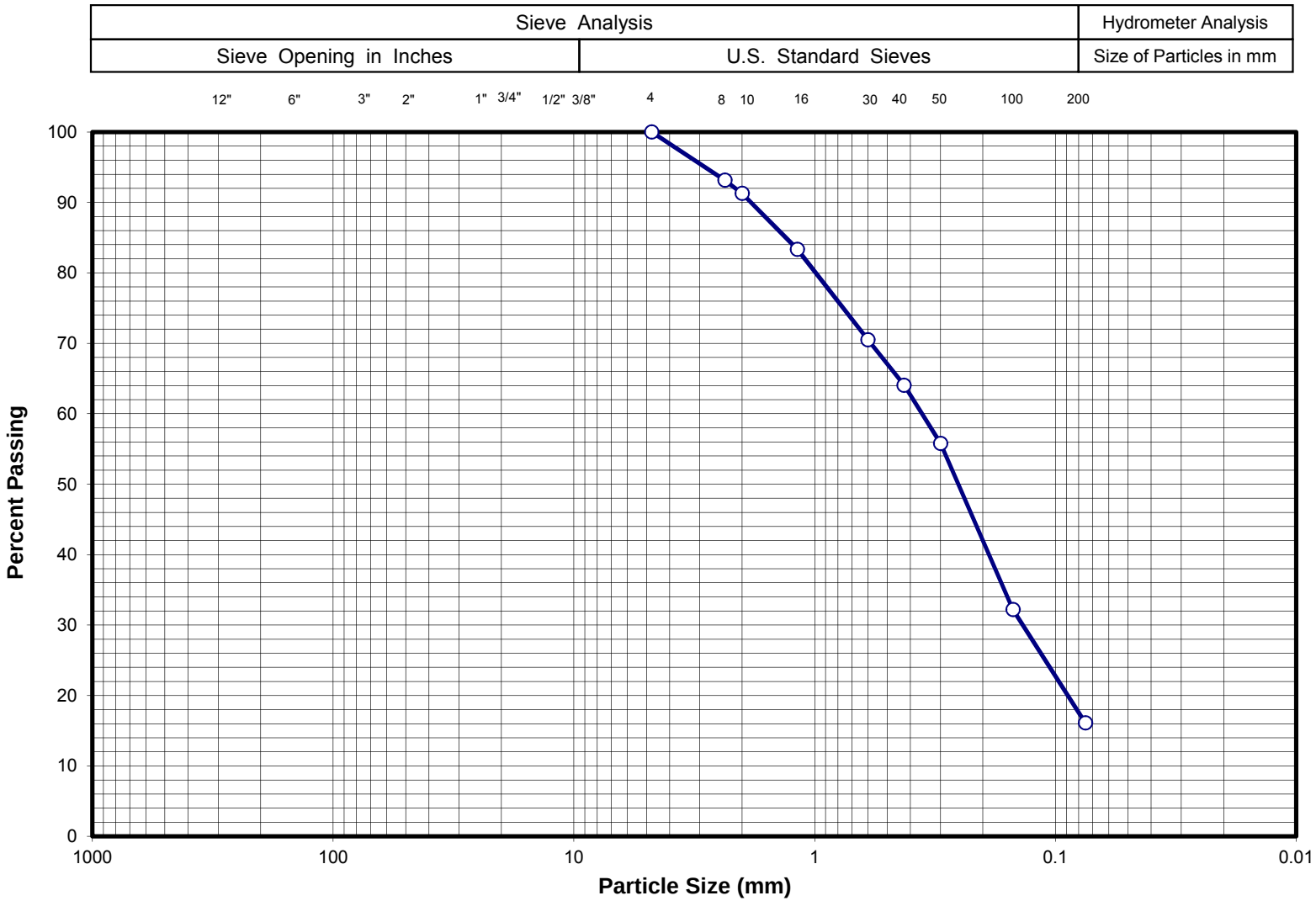

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	91
#40	64
#200	16

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	84	PL	NP	Sample ID:	YA-WJO-2
Fines (%)	16	PI	NP	Sample Depth (ft.):	4
Sample Description:	A-2-4 (0) / SM				

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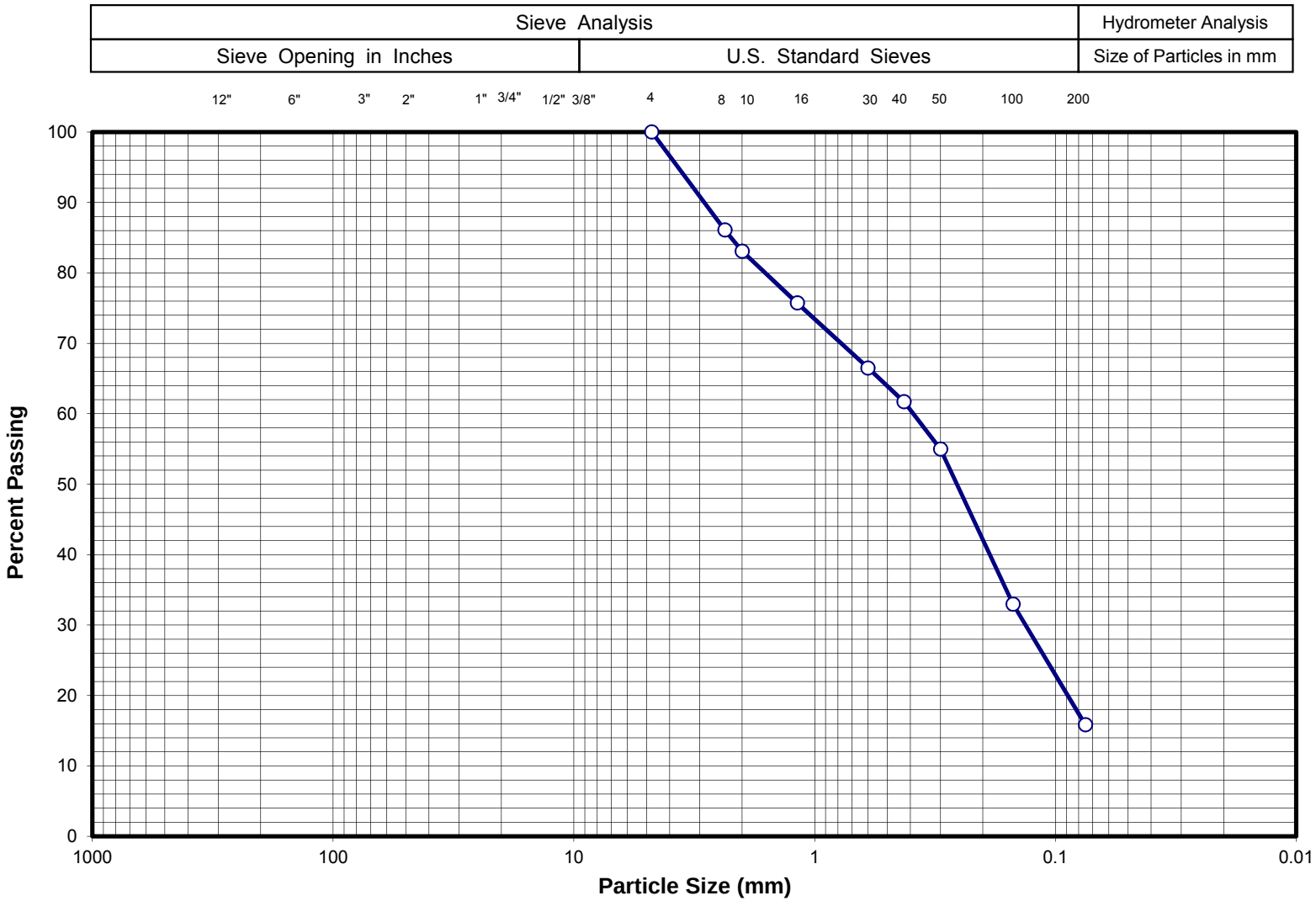
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	83
#40	62
#200	16

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	84	PL	NP	Sample ID:	YA-WJO-2
Fines (%)	16	PI	NP	Sample Depth (ft.):	9
Sample Description:	A-2-4 (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

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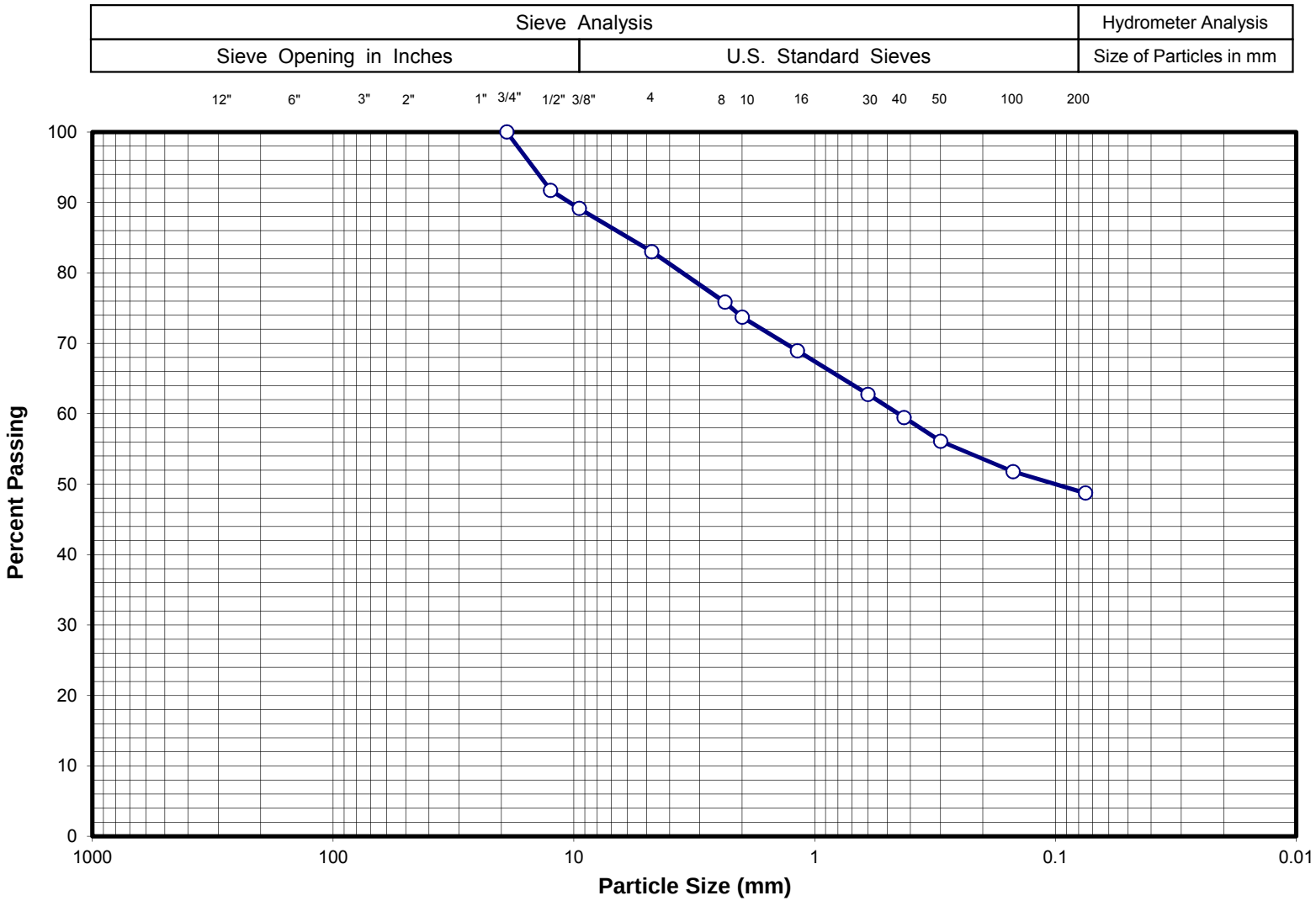

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	92
⅜"	89
#4	83
#10	74
#40	59
#200	49

Gravel (%)	17	LL	50	Project Name:	I-70 East, PCL Alternative
Sand (%)	34	PL	19	Sample ID:	YA-WJO-2
Fines (%)	49	PI	31	Sample Depth (ft.):	14
Sample Description:	A-7-6 (11) / SC				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

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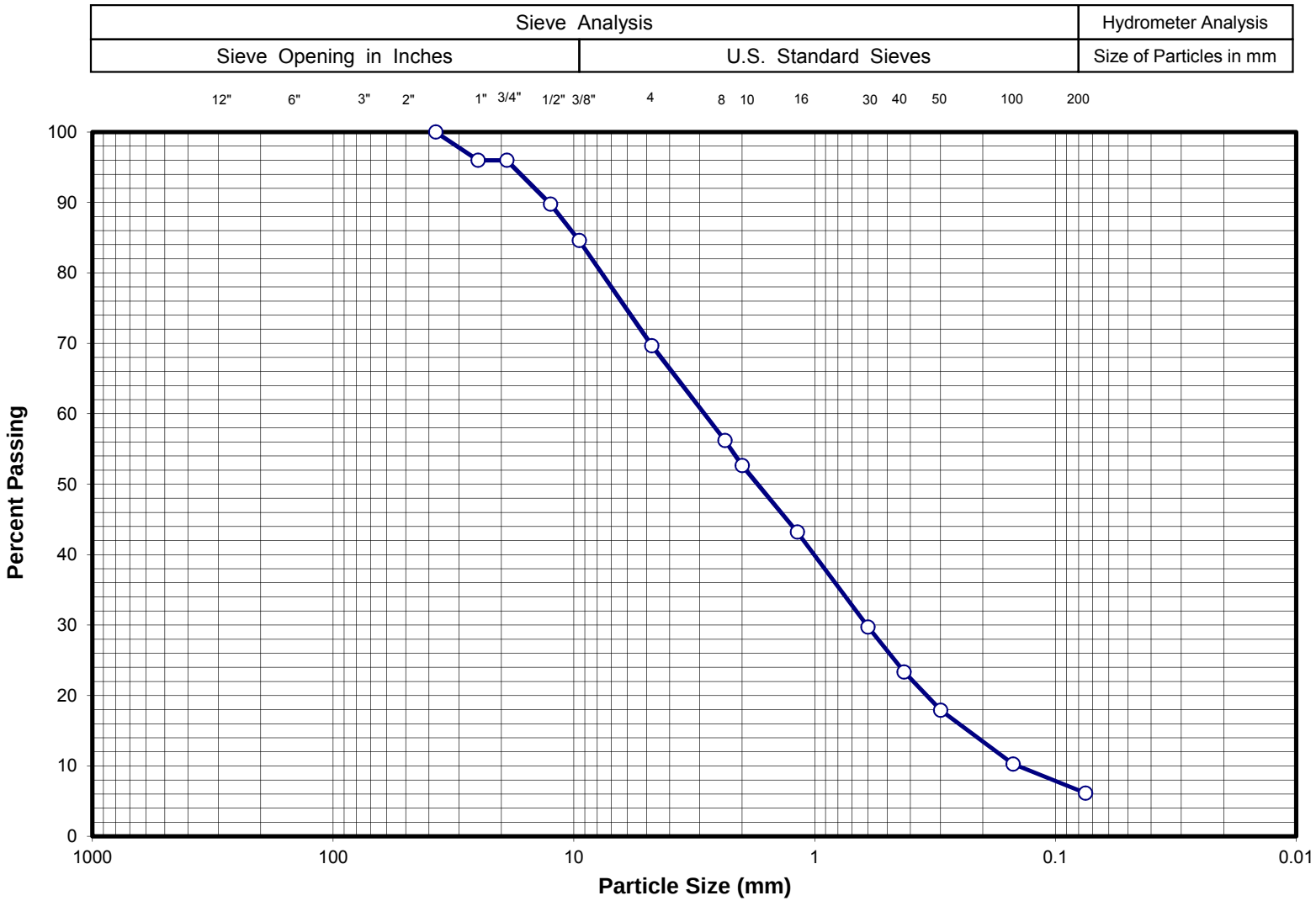

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	96
¾ "	96
½"	90
⅜"	85
#4	70
#10	53
#40	23
#200	6

Gravel (%)	30	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	64	PL	NP	Sample ID:	YA-WJO-2
Fines (%)	6	PI	NP	Sample Depth (ft.):	19
Sample Description:	A-1-b (0) / SP-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

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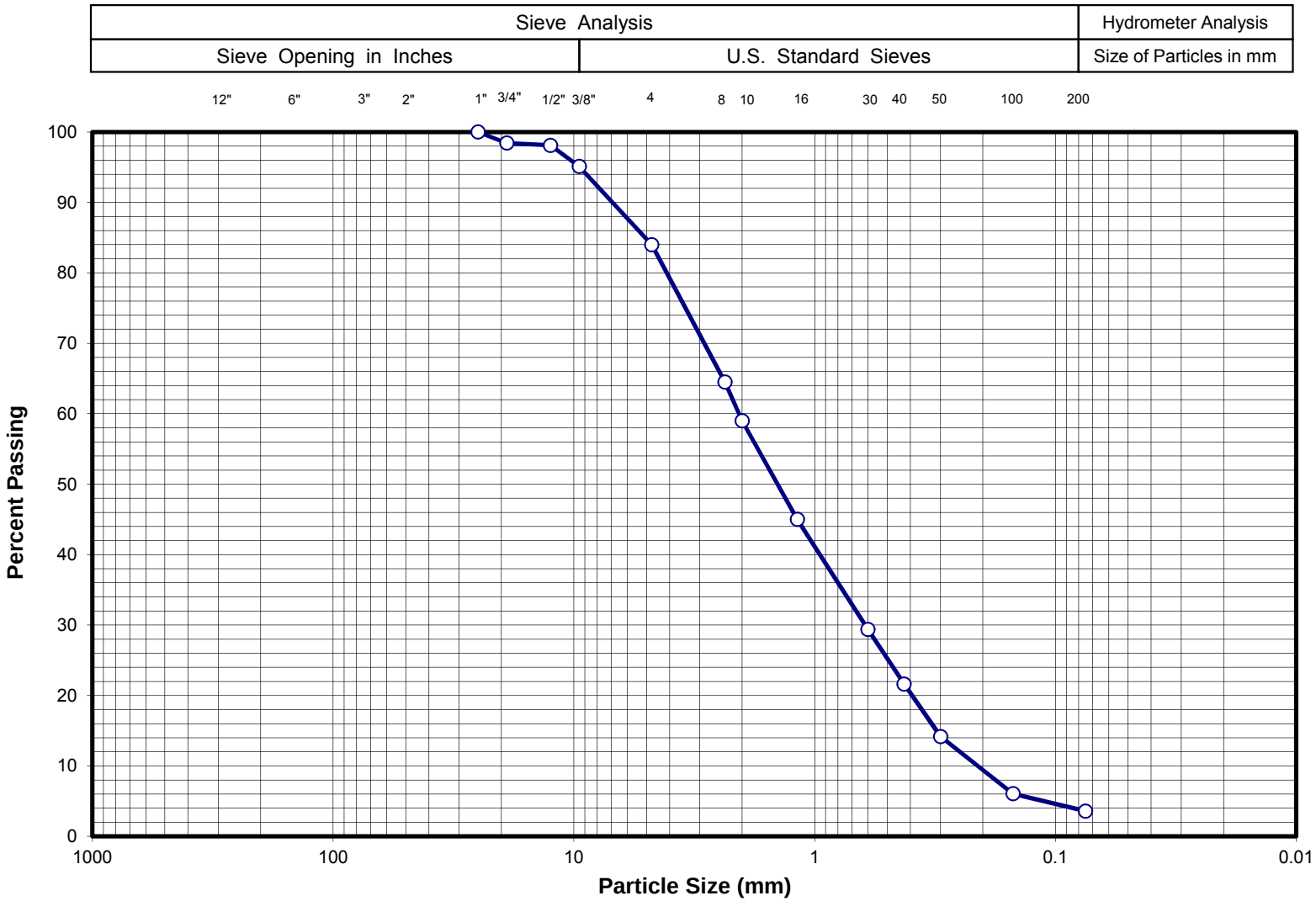

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	98
½"	98
⅜"	95
#4	84
#10	59
#40	22
#200	4

Gravel (%)	16	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	80	PL	NP	Sample ID:	YA-WJO-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	29
Sample Description:	A-1-b (0) / SP				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
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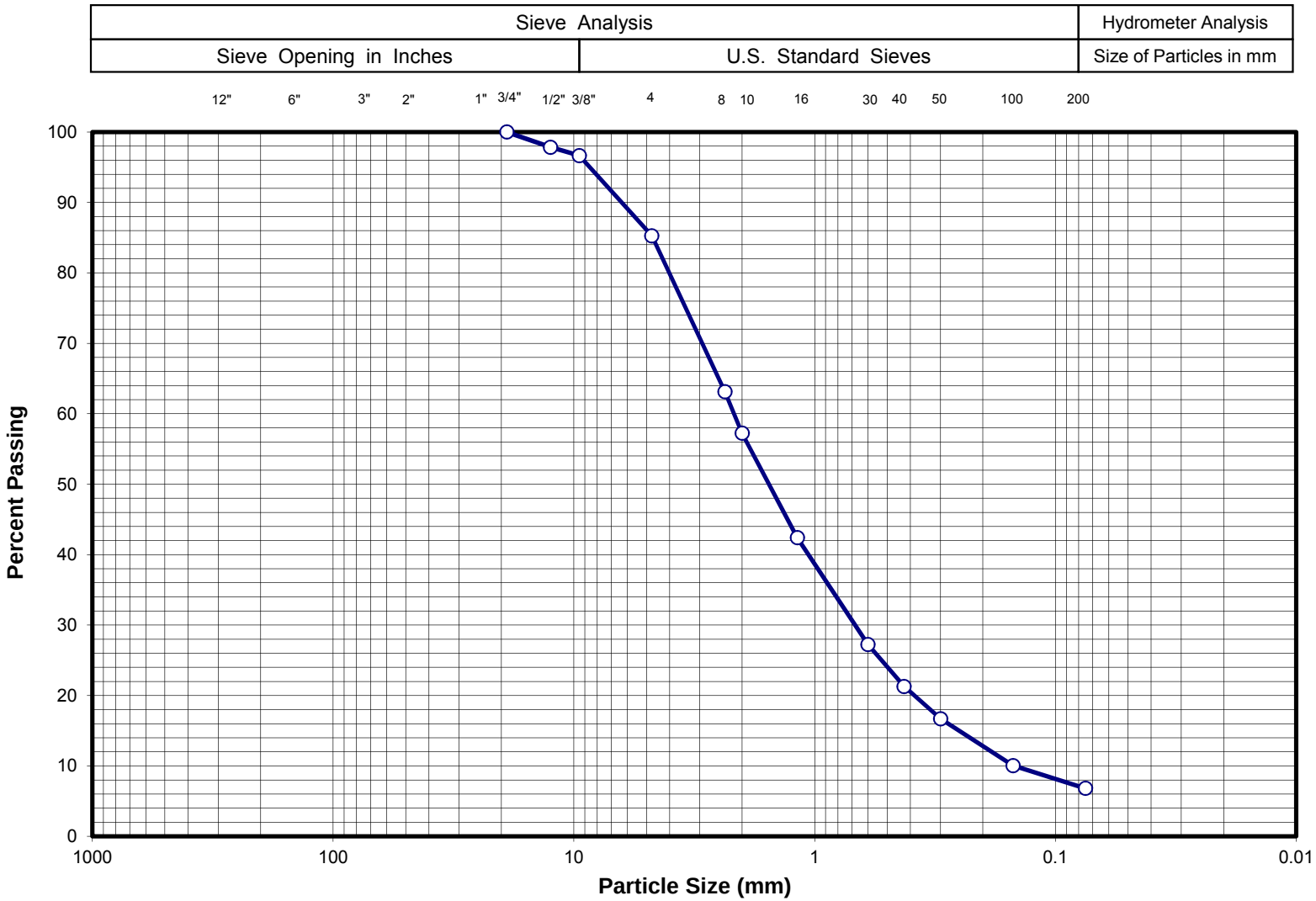

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	98
⅜"	97
#4	85
#10	57
#40	21
#200	7

Gravel (%)	15	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	78	PL	NP	Sample ID:	YA-WJO-2
Fines (%)	7	PI	NP	Sample Depth (ft.):	49
Sample Description:	A-1-b (0) / SW-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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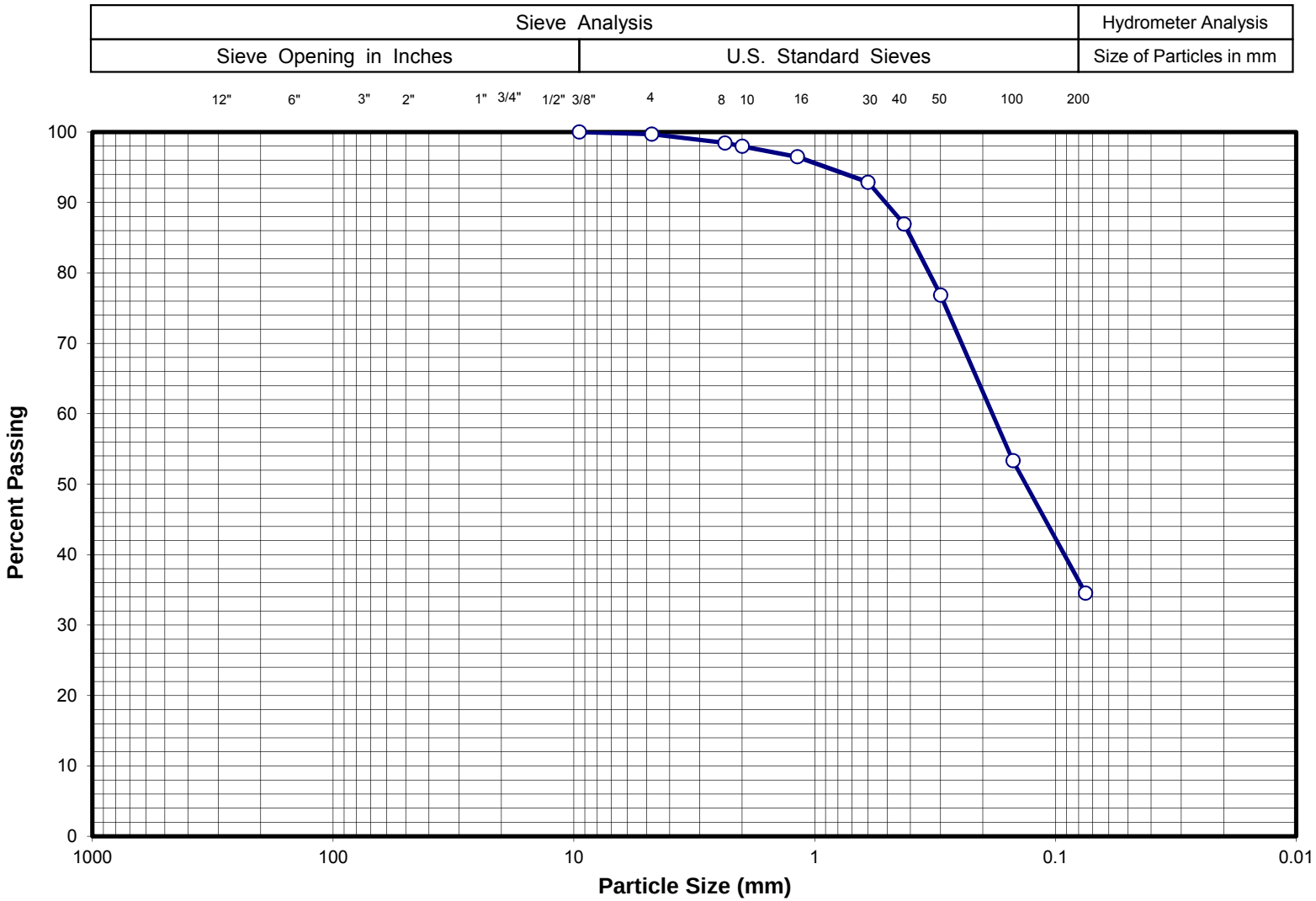

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	98
#40	87
#200	35

Gravel (%)	0	LL	40	Project Name:	I-70 East, PCL Alternative
Sand (%)	65	PL	21	Sample ID:	YA-WJO-2
Fines (%)	35	PI	19	Sample Depth (ft.):	54
Sample Description:	A-2-6 (2) / SC				

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Drawn By:	M.A	Project No.:	213-208
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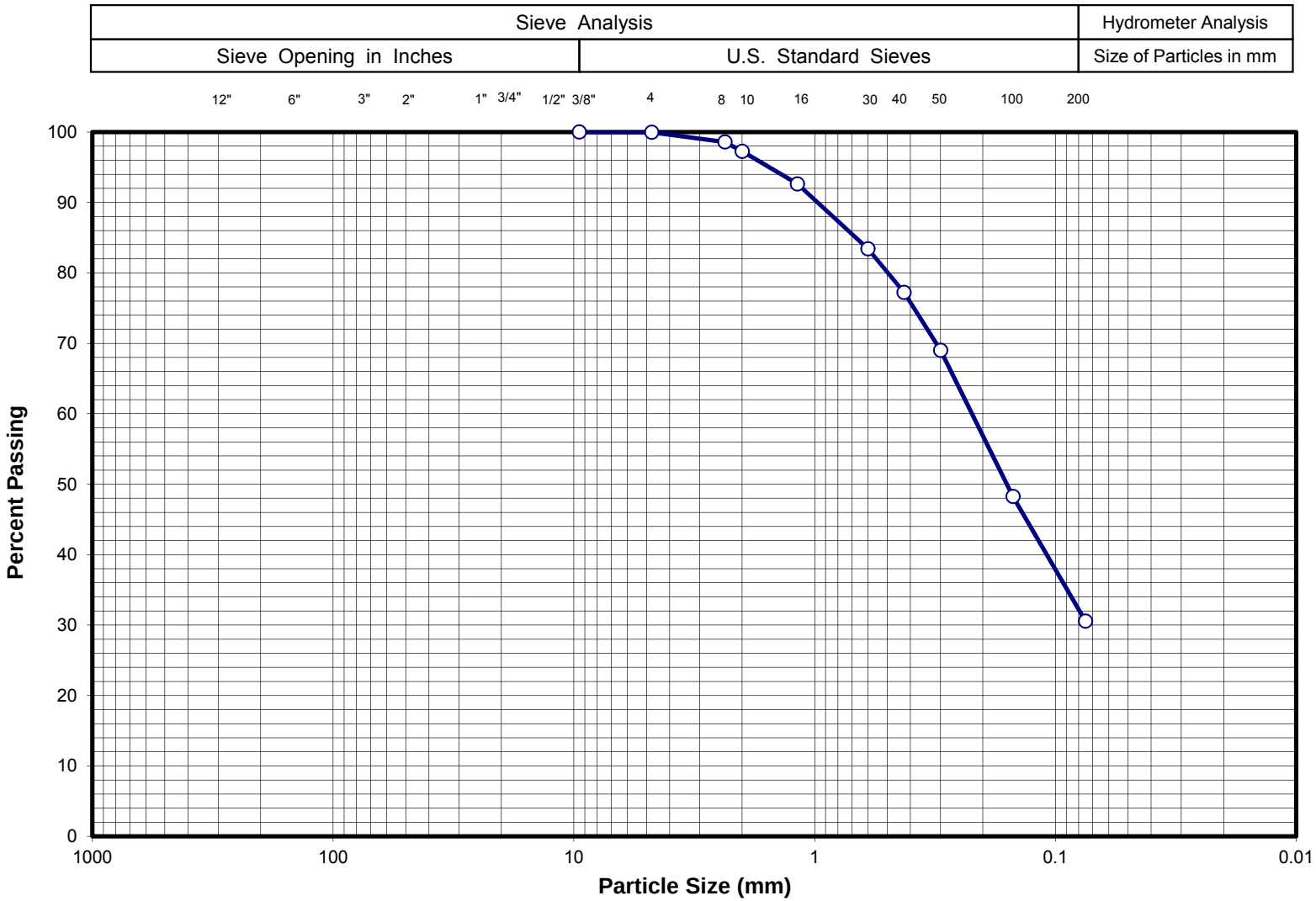

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	97
#40	77
#200	31

Gravel (%)	0	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	69	PL	NP	Sample ID:	YA-WEL-1
Fines (%)	31	PI	NP	Sample Depth (ft.):	4
Sample Description:	A-2-4 (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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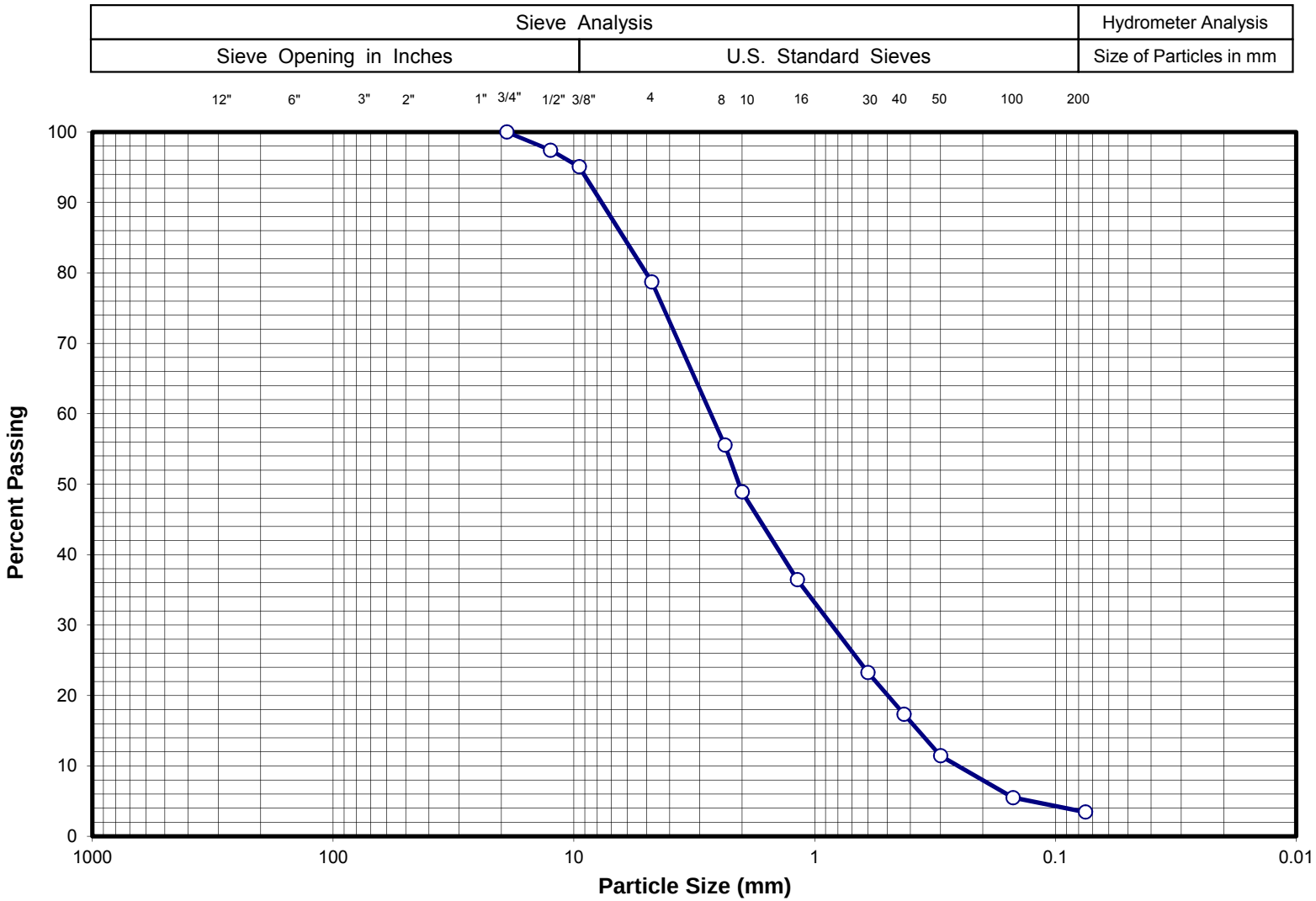

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	97
⅜"	95
#4	79
#10	49
#40	17
#200	3

Gravel (%)	21	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	76	PL	NP	Sample ID:	YA-WEL-1
Fines (%)	3	PI	NP	Sample Depth (ft.):	14
Sample Description:	A-1-a (0) / SW				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
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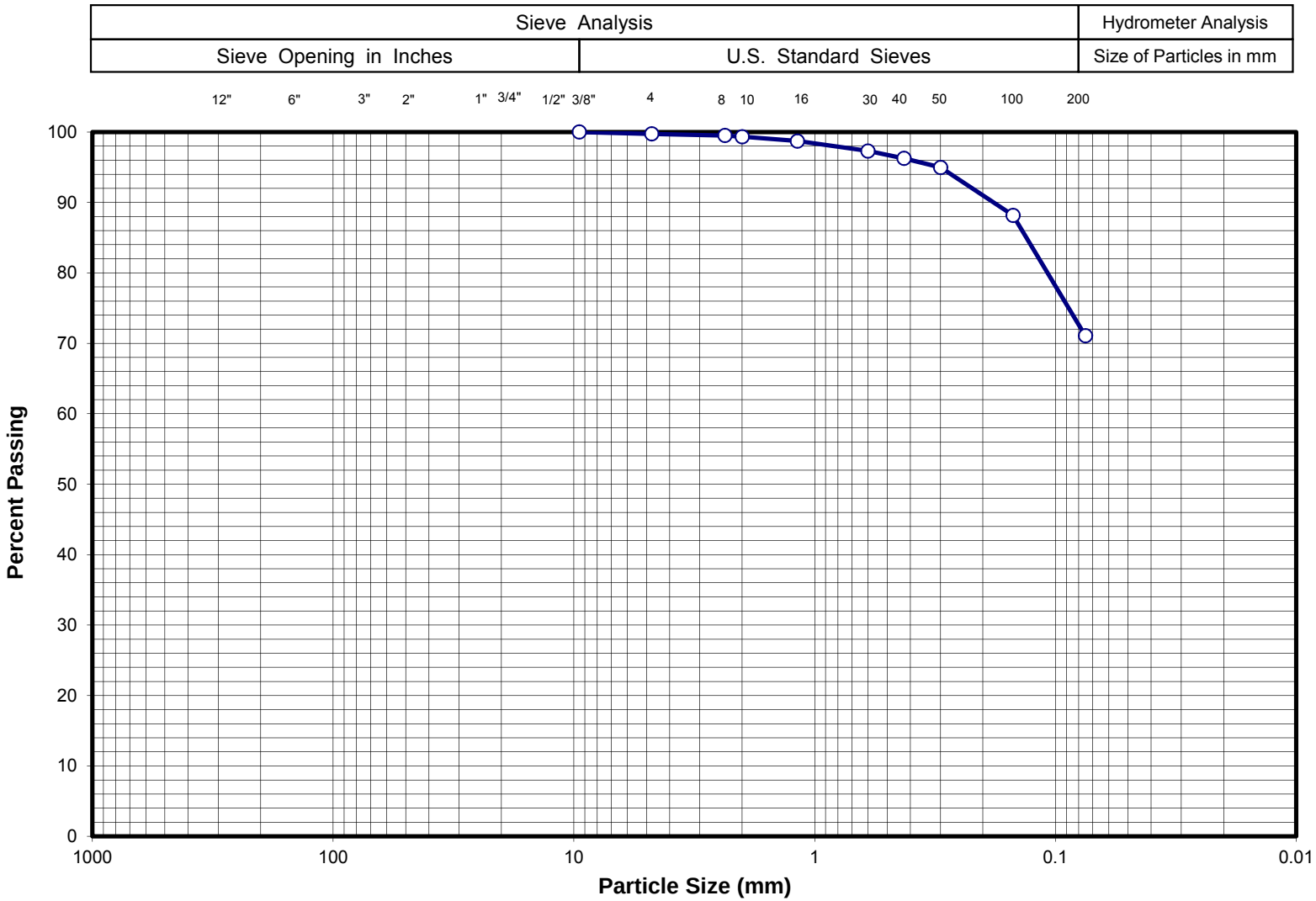

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	99
#40	96
#200	71

Gravel (%)	0	LL	36	Project Name:	I-70 East, PCL Alternative
Sand (%)	29	PL	20	Sample ID:	YA-WEL-1
Fines (%)	71	PI	16	Sample Depth (ft.):	29
Sample Description:	A-6 (10) / CL				

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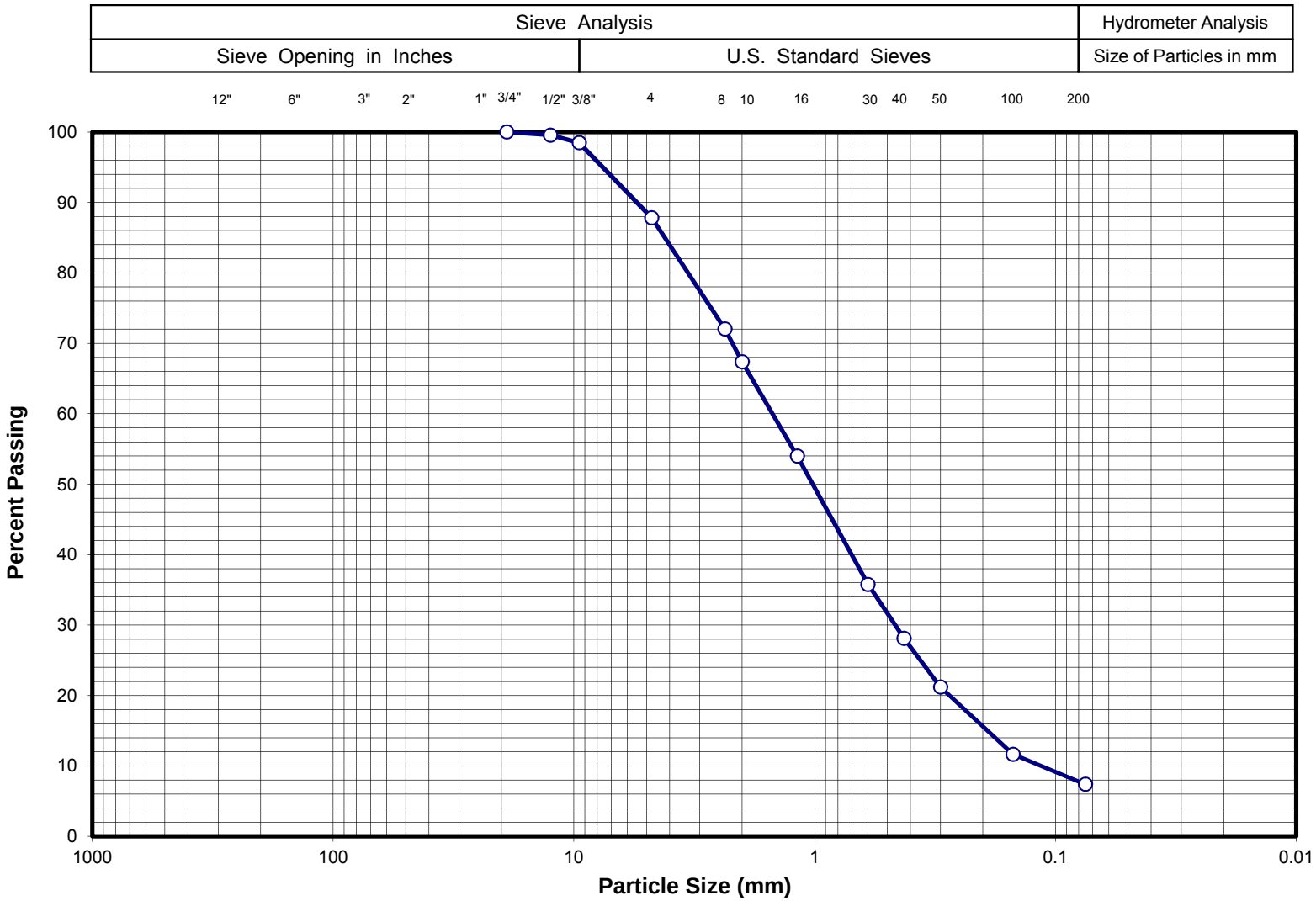

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	100
⅜"	98
#4	88
#10	67
#40	28
#200	7

Gravel (%)	12	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	81	PL	NP	Sample ID:	YA-WEL-1
Fines (%)	7	PI	NP	Sample Depth (ft.):	44
Sample Description:	A-1-b (0) / SW-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
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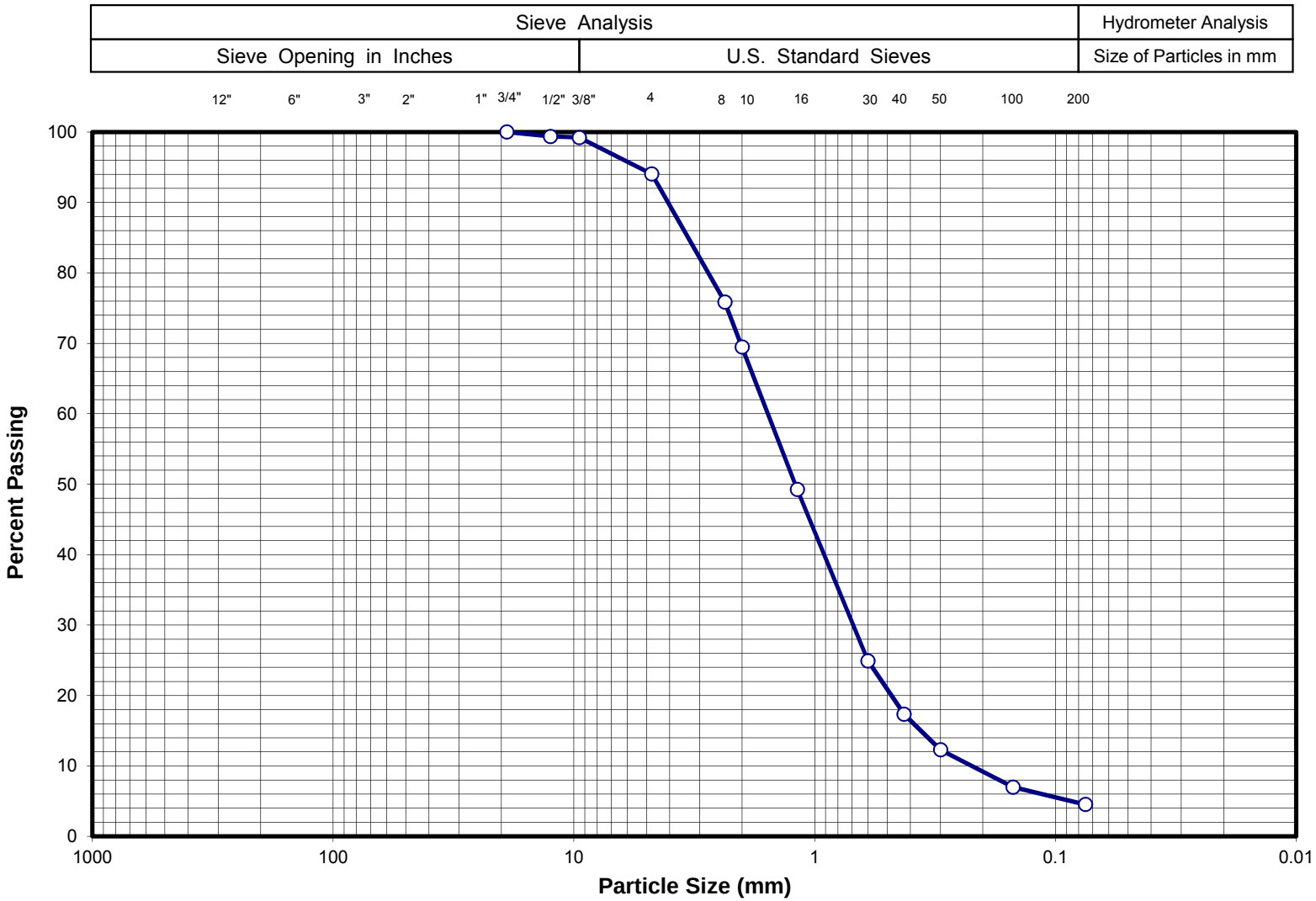

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	99
⅜"	99
#4	94
#10	69
#40	17
#200	5

Gravel (%)	6	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	89	PL	NP	Sample ID:	YA-WEL-1
Fines (%)	5	PI	NP	Sample Depth (ft.):	59
Sample Description:	A-1-b (0) / SW				

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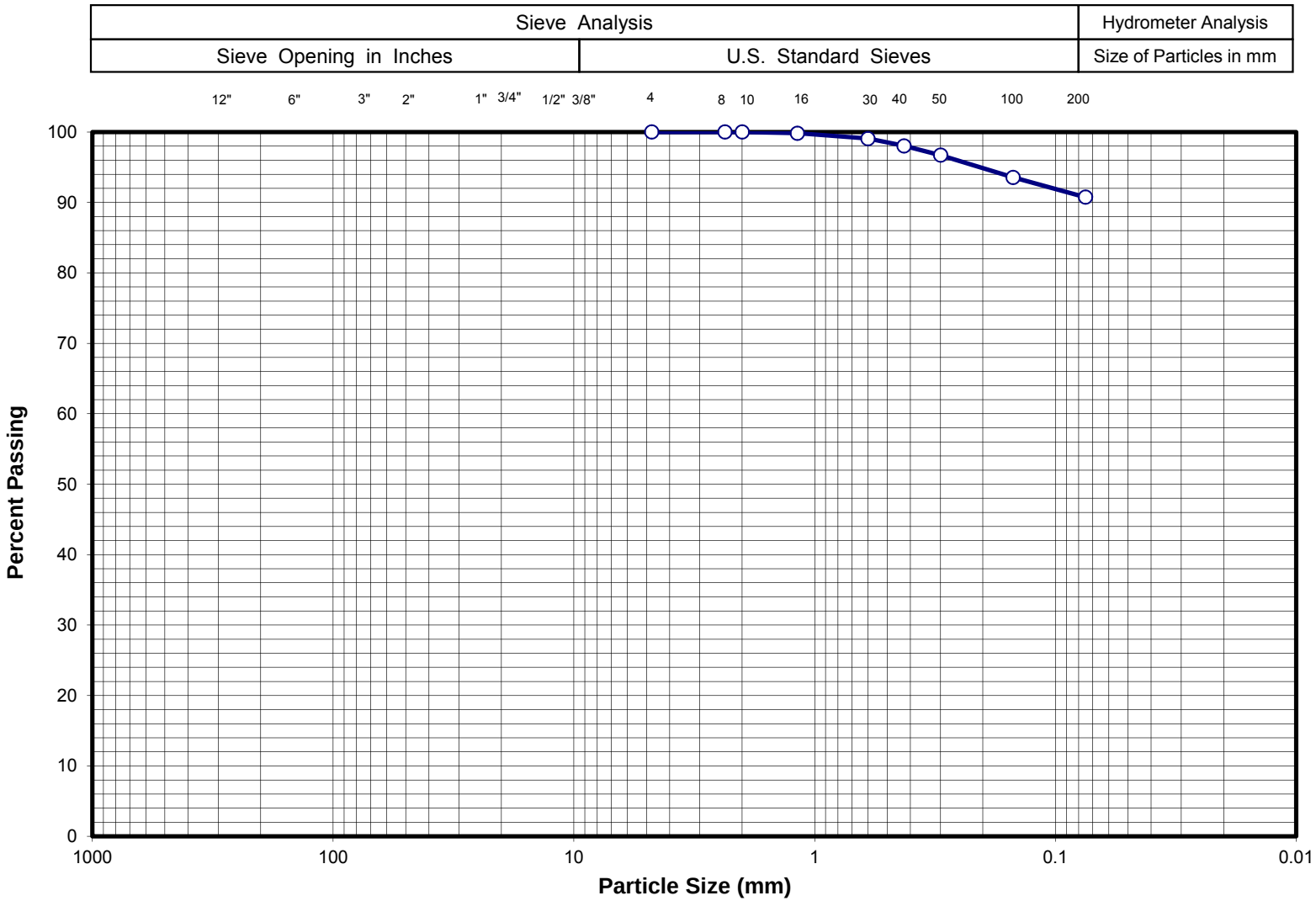

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	98
#200	91

Gravel (%)	0	LL	55	Project Name:	I-70 East, PCL Alternative
Sand (%)	9	PL	29	Sample ID:	YA-WEL-1
Fines (%)	91	PI	26	Sample Depth (ft.):	79
Sample Description:	A-7-6 (28) / CH				

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SIEVE ANALYSIS

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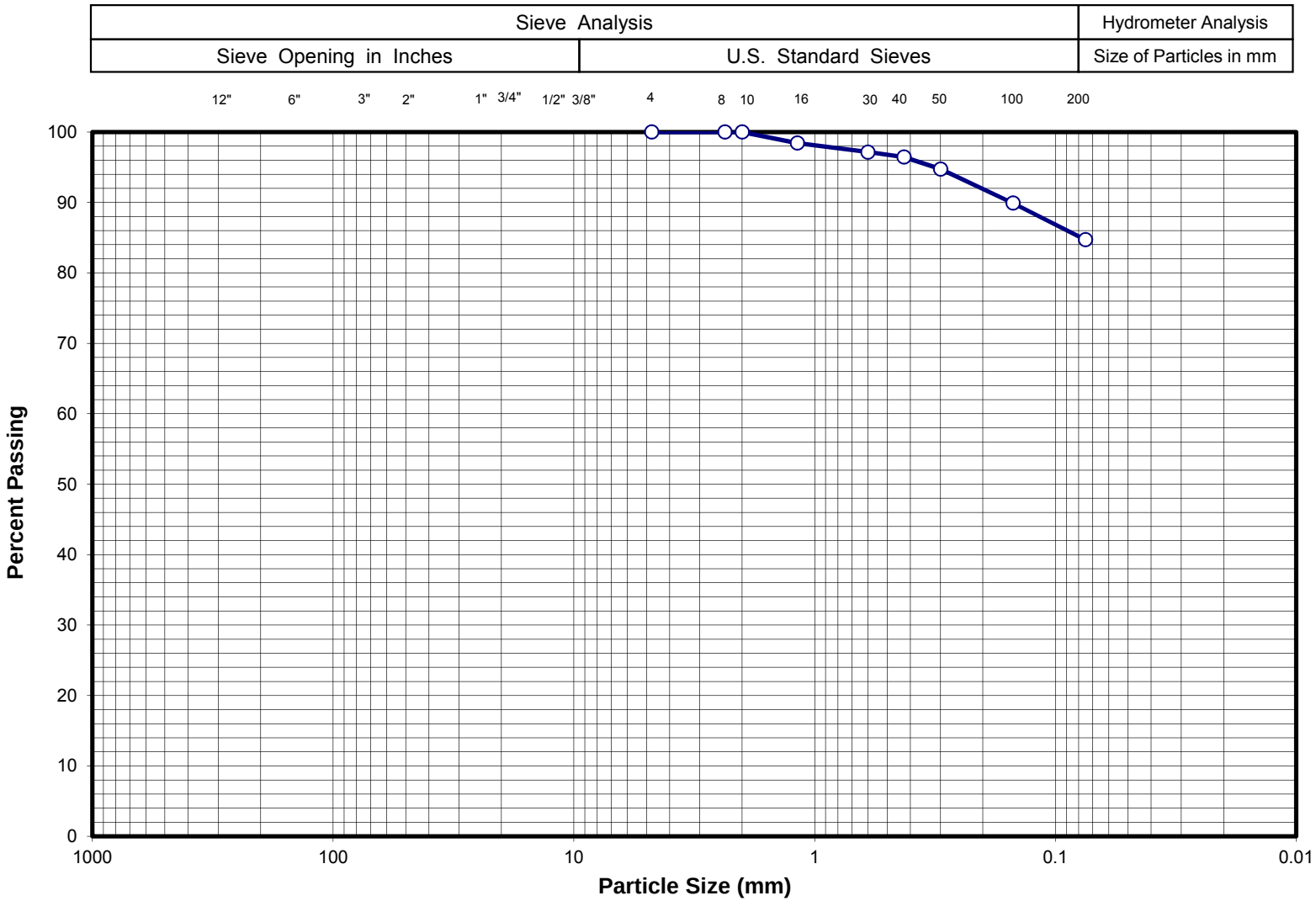

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	96
#200	85

Gravel (%)	0	LL	51	Project Name:	I-70 East, PCL Alternative
Sand (%)	15	PL	22	Sample ID:	YA-WEL-1
Fines (%)	85	PI	29	Sample Depth (ft.):	84
Sample Description:	A-7-6 (26) / CH				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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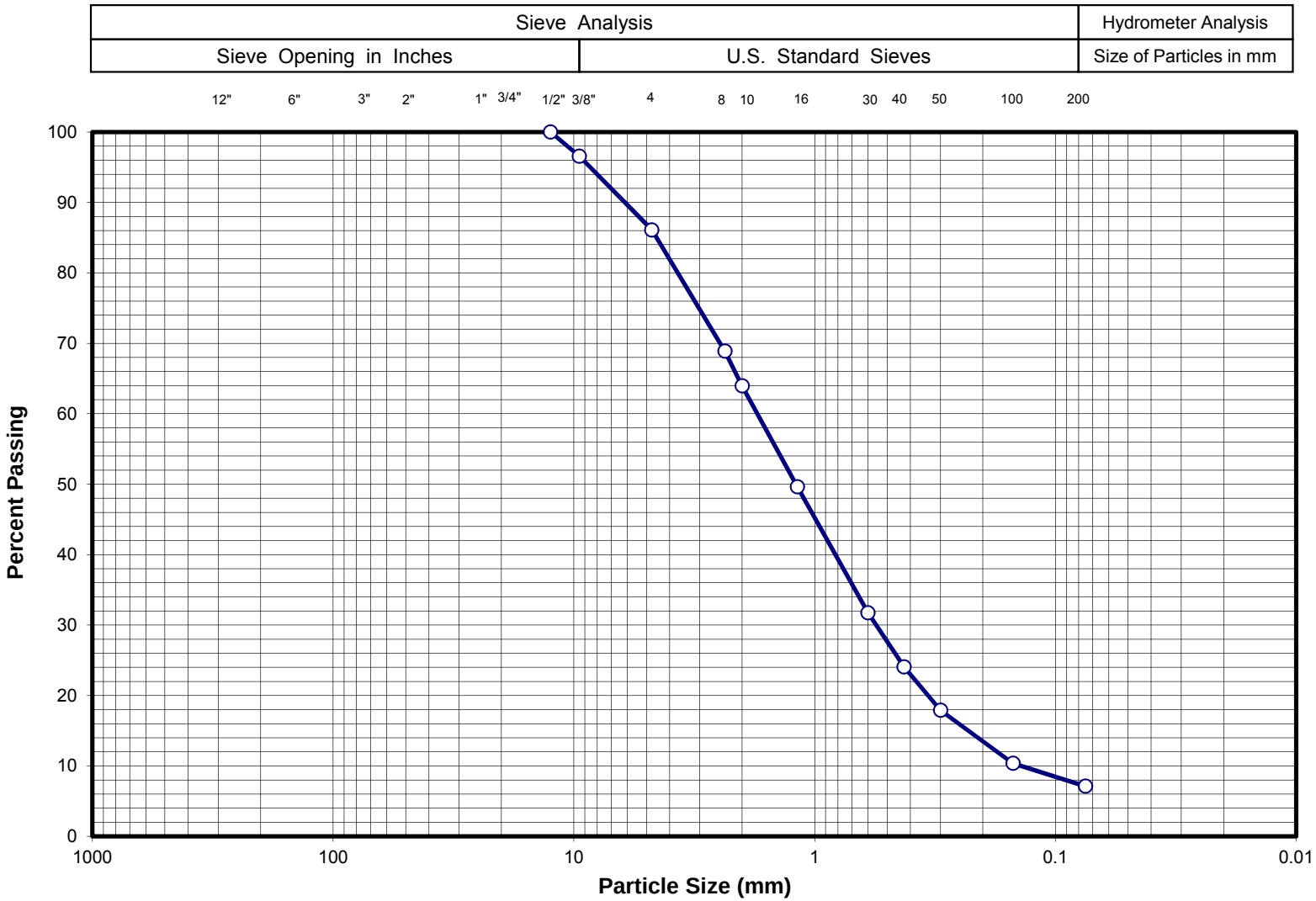

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	97
#4	86
#10	64
#40	24
#200	7

Gravel (%)	14	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	79	PL	NP	Sample ID:	YA-WEL-2
Fines (%)	7	PI	NP	Sample Depth (ft.):	9
Sample Description:	A-1-b (0) / SW-SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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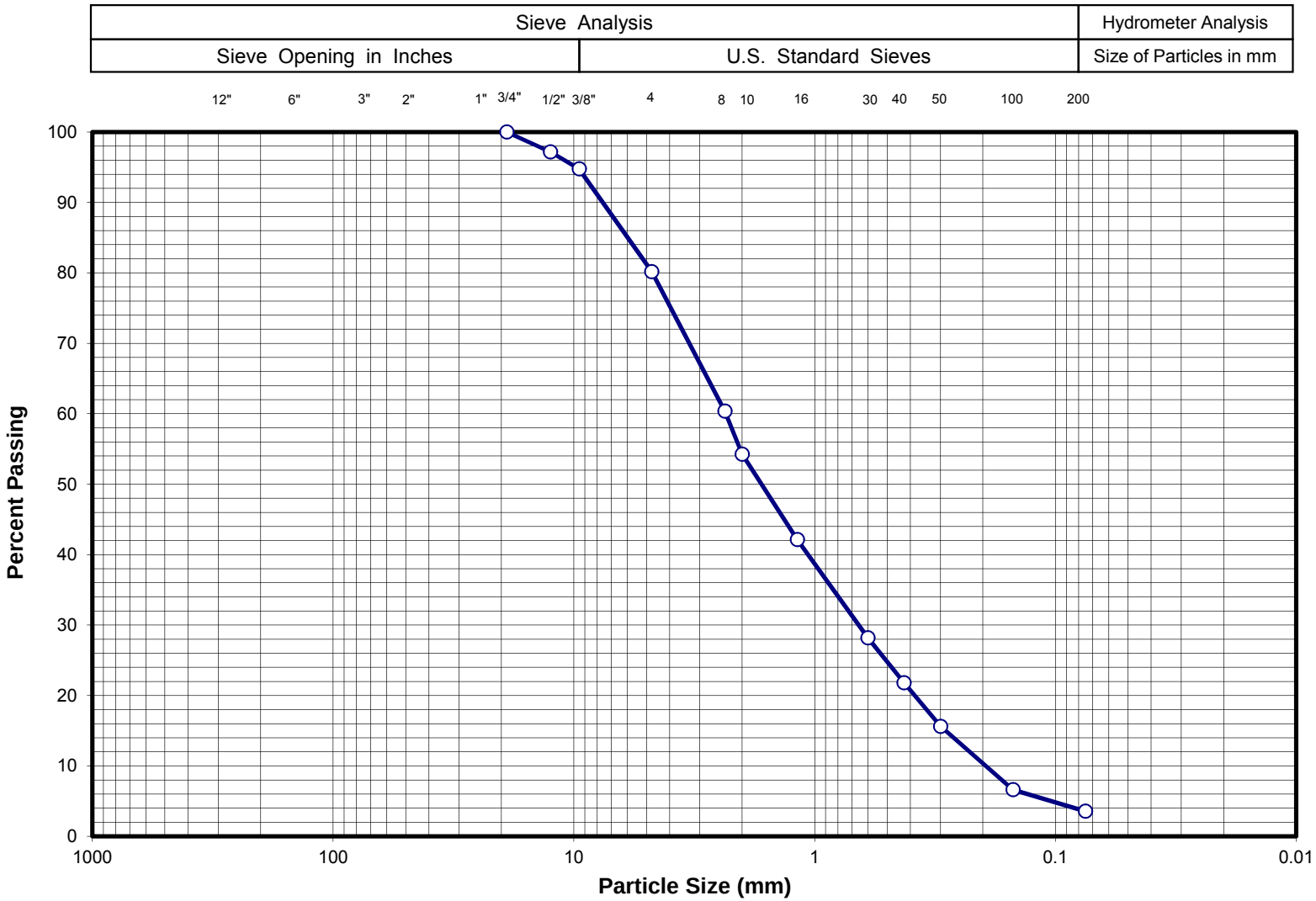

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	97
⅜"	95
#4	80
#10	54
#40	22
#200	4

Gravel (%)	20	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	76	PL	NP	Sample ID:	YA-WEL-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	19
Sample Description:	A-1-b (0) / SP				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
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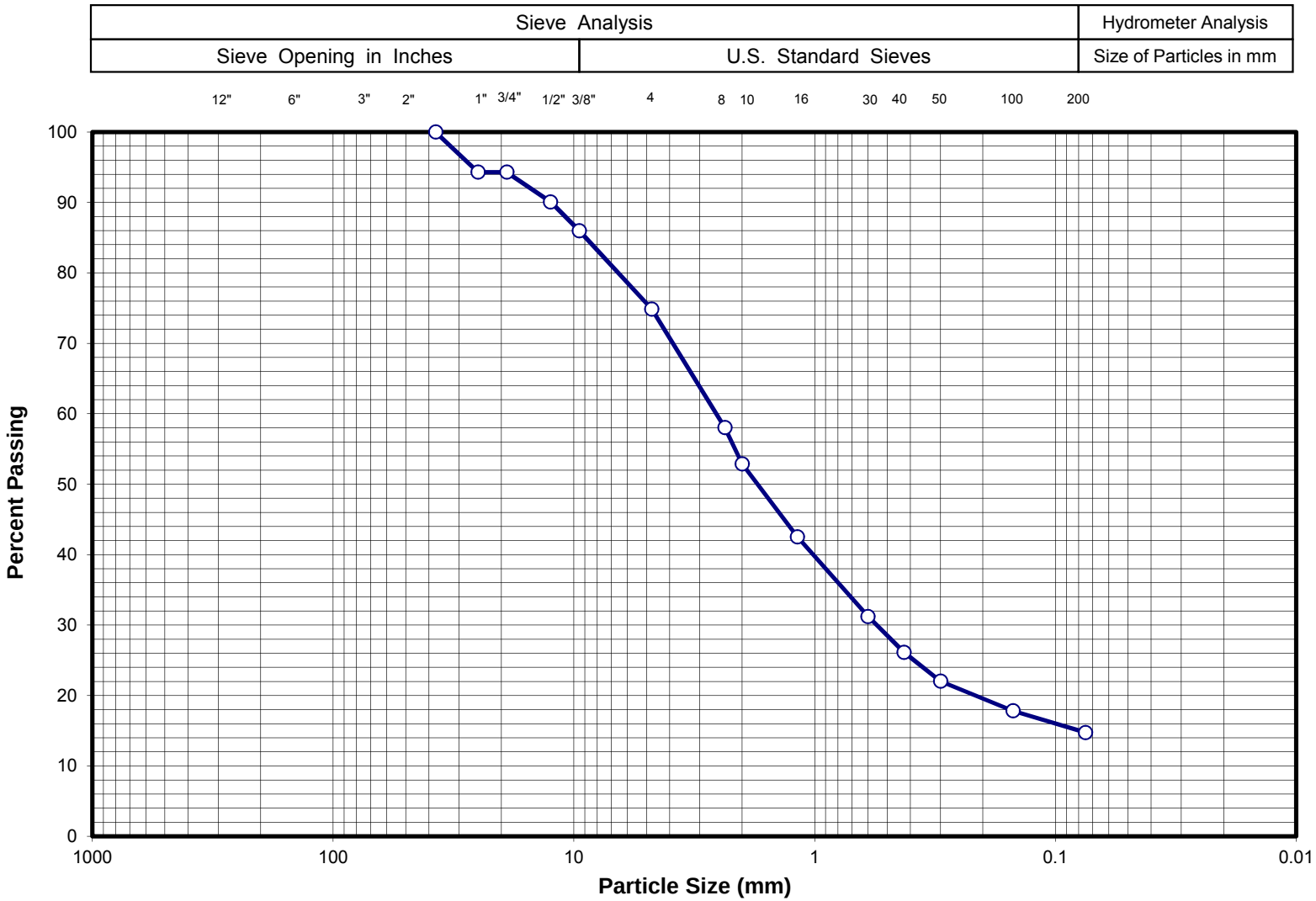

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	100
1"	94
¾ "	94
½"	90
⅜"	86
#4	75
#10	53
#40	26
#200	15

Gravel (%)	25	LL	50	Project Name:	I-70 East, PCL Alternative
Sand (%)	60	PL	18	Sample ID:	YA-WEL-2
Fines (%)	15	PI	32	Sample Depth (ft.):	29
Sample Description:	A-2-7 (0) / SC				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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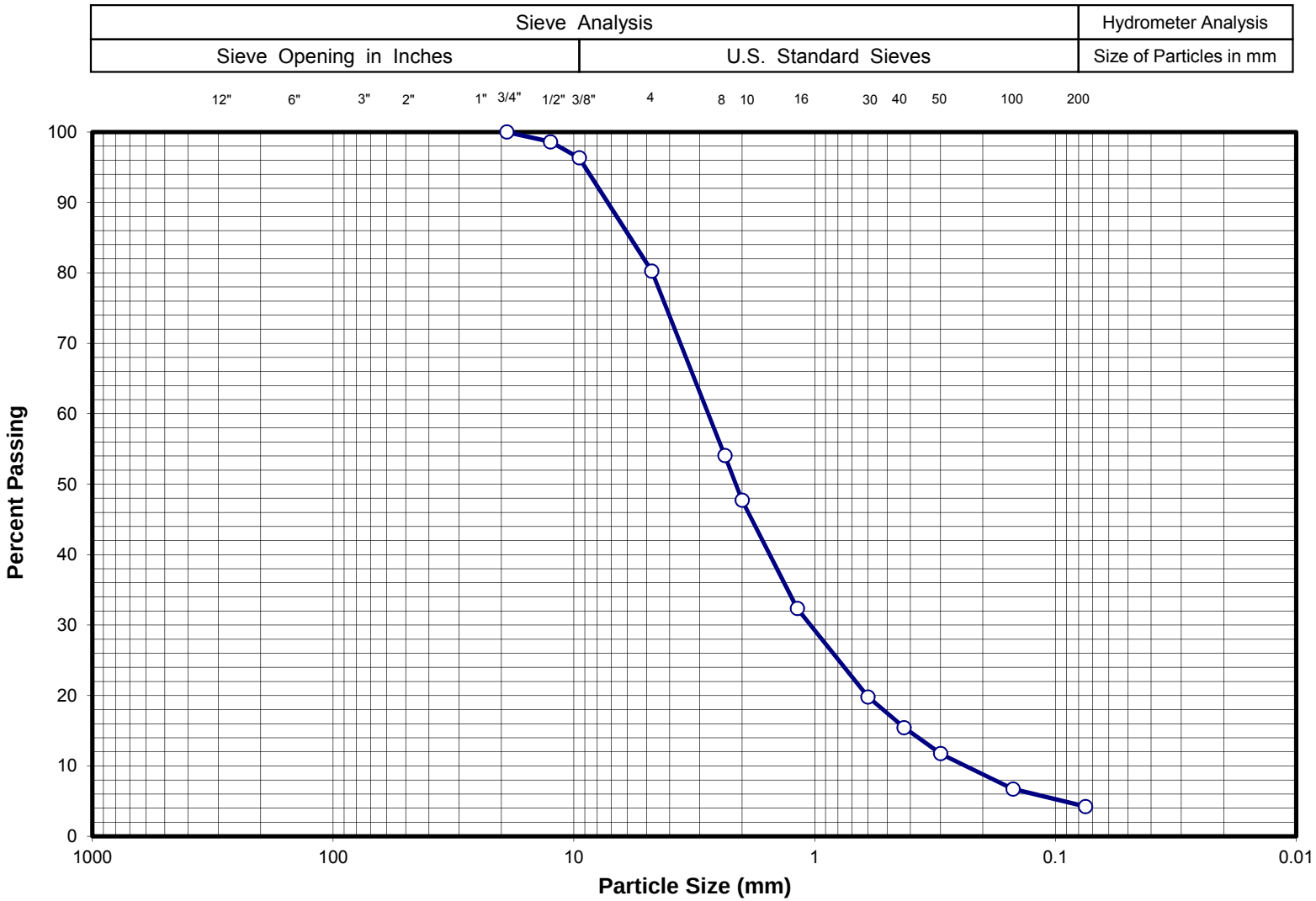

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	100
½"	99
⅜"	96
#4	80
#10	48
#40	15
#200	4

Gravel (%)	20	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	76	PL	NP	Sample ID:	YA-WEL-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	39
Sample Description:	A-1-a (0) / SW				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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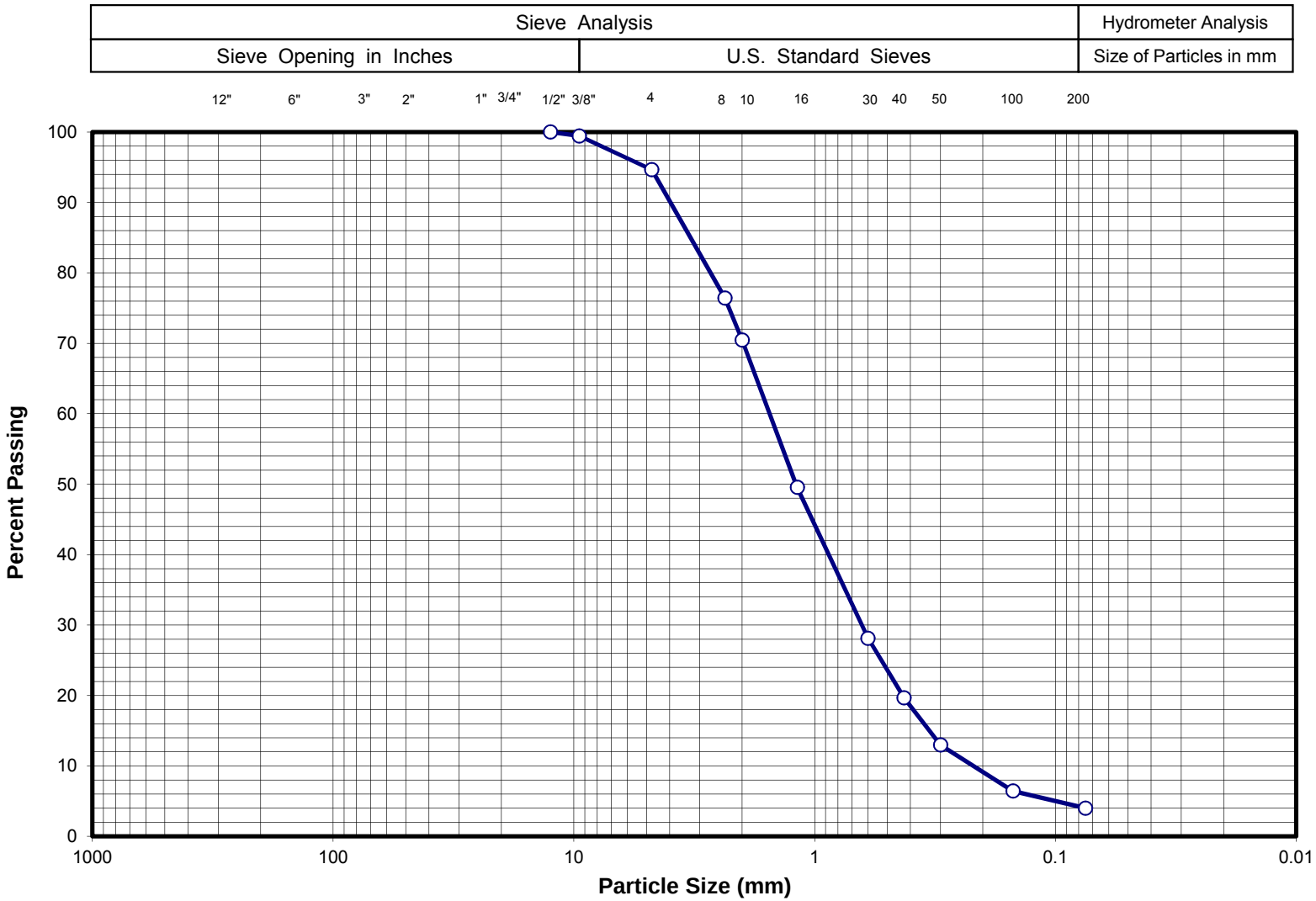

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	99
#4	95
#10	70
#40	20
#200	4

Gravel (%)	5	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	91	PL	NP	Sample ID:	YA-WEL-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	54
Sample Description:	A-1-b (0) / SW				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
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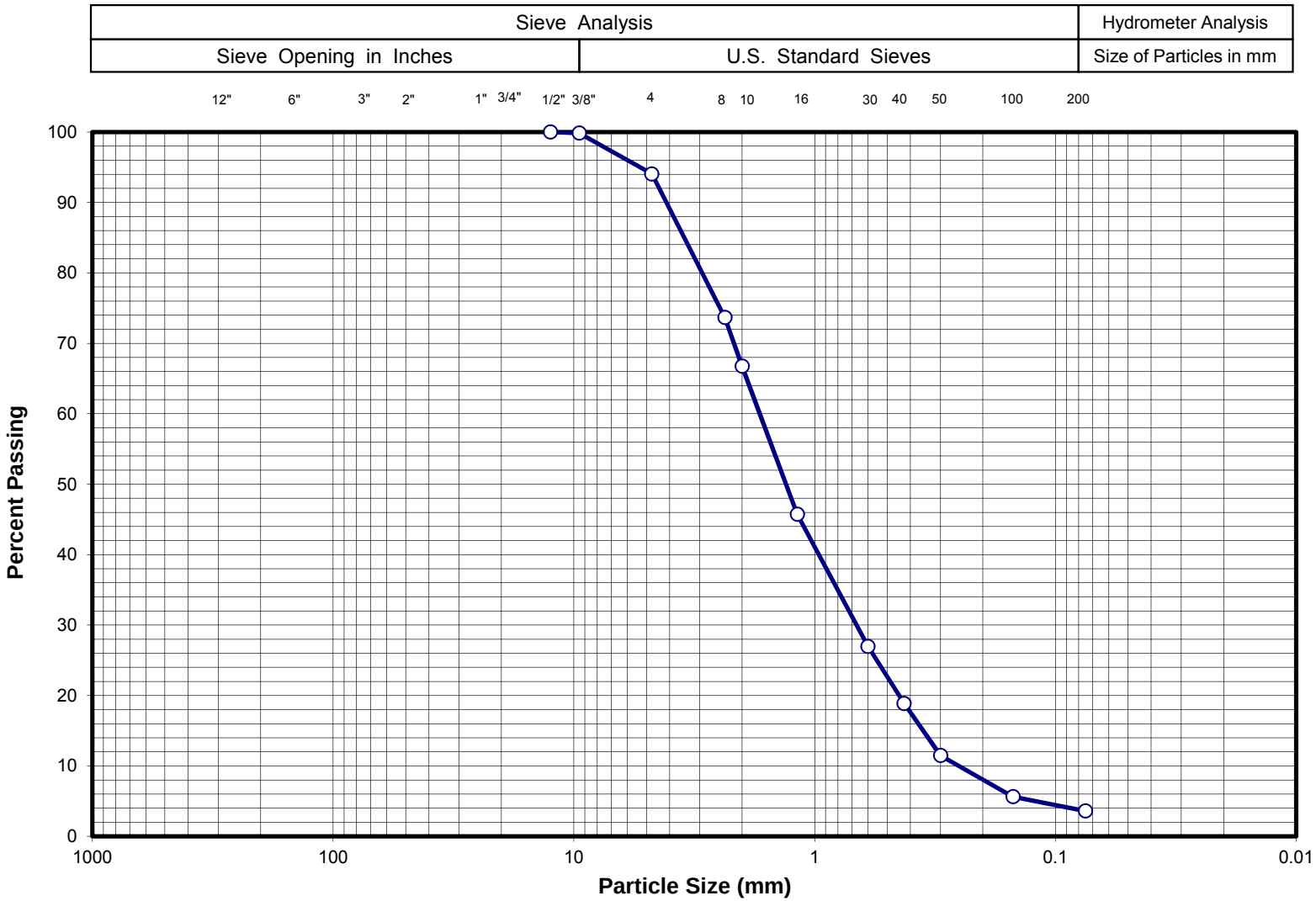

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	100
#4	94
#10	67
#40	19
#200	4

Gravel (%)	6	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	90	PL	NP	Sample ID:	YA-WEL-2
Fines (%)	4	PI	NP	Sample Depth (ft.):	69
Sample Description:	A-1-b (0) / SW				

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Checked By:	M.G		
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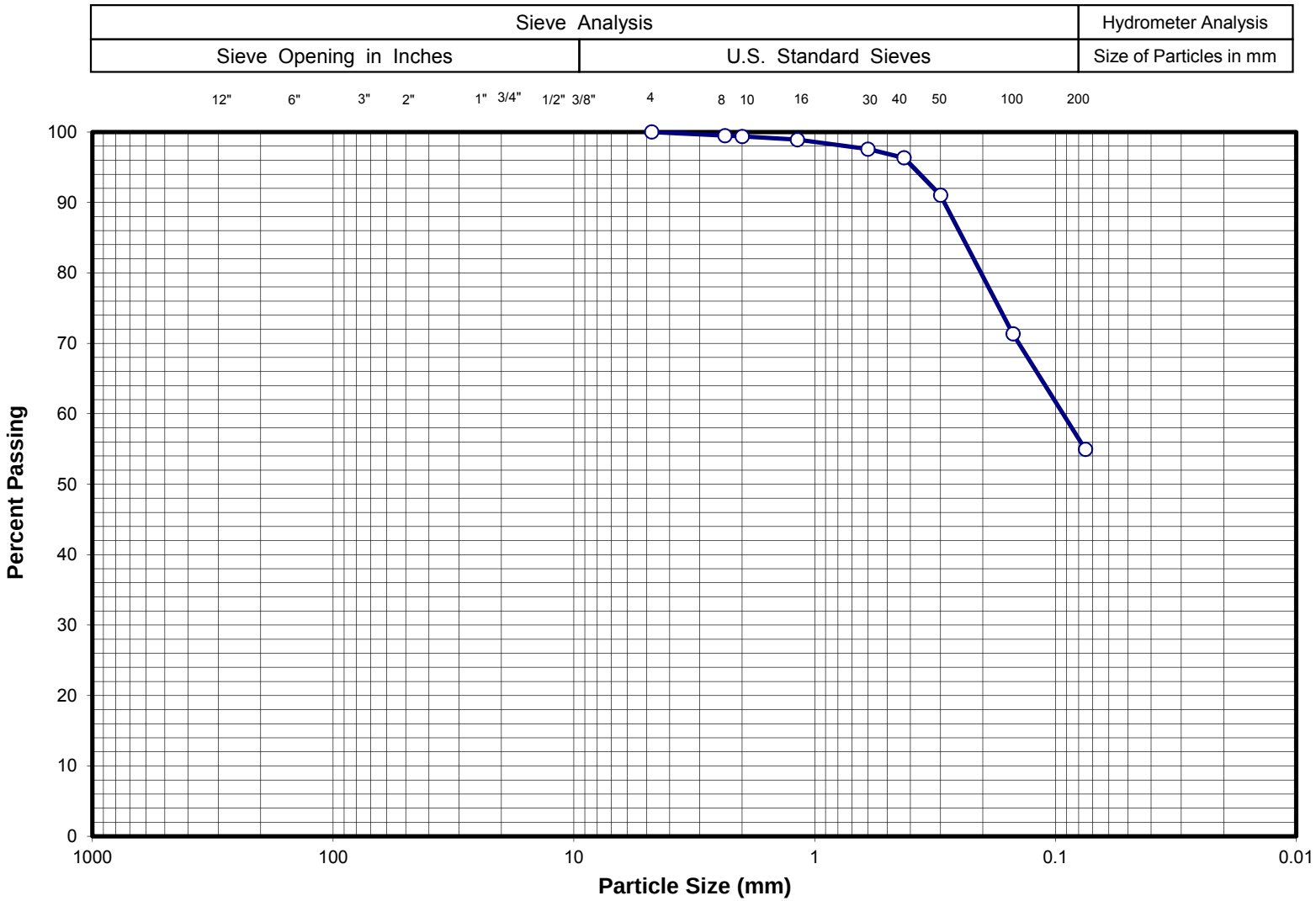

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	99
#40	96
#200	55

Gravel (%)	0	LL	46	Project Name:	I-70 East, PCL Alternative
Sand (%)	45	PL	27	Sample ID:	YA-WEL-2
Fines (%)	55	PI	19	Sample Depth (ft.):	79
Sample Description:	A-7-6 (8) / CL				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	05/03/16	Figure No.:	-

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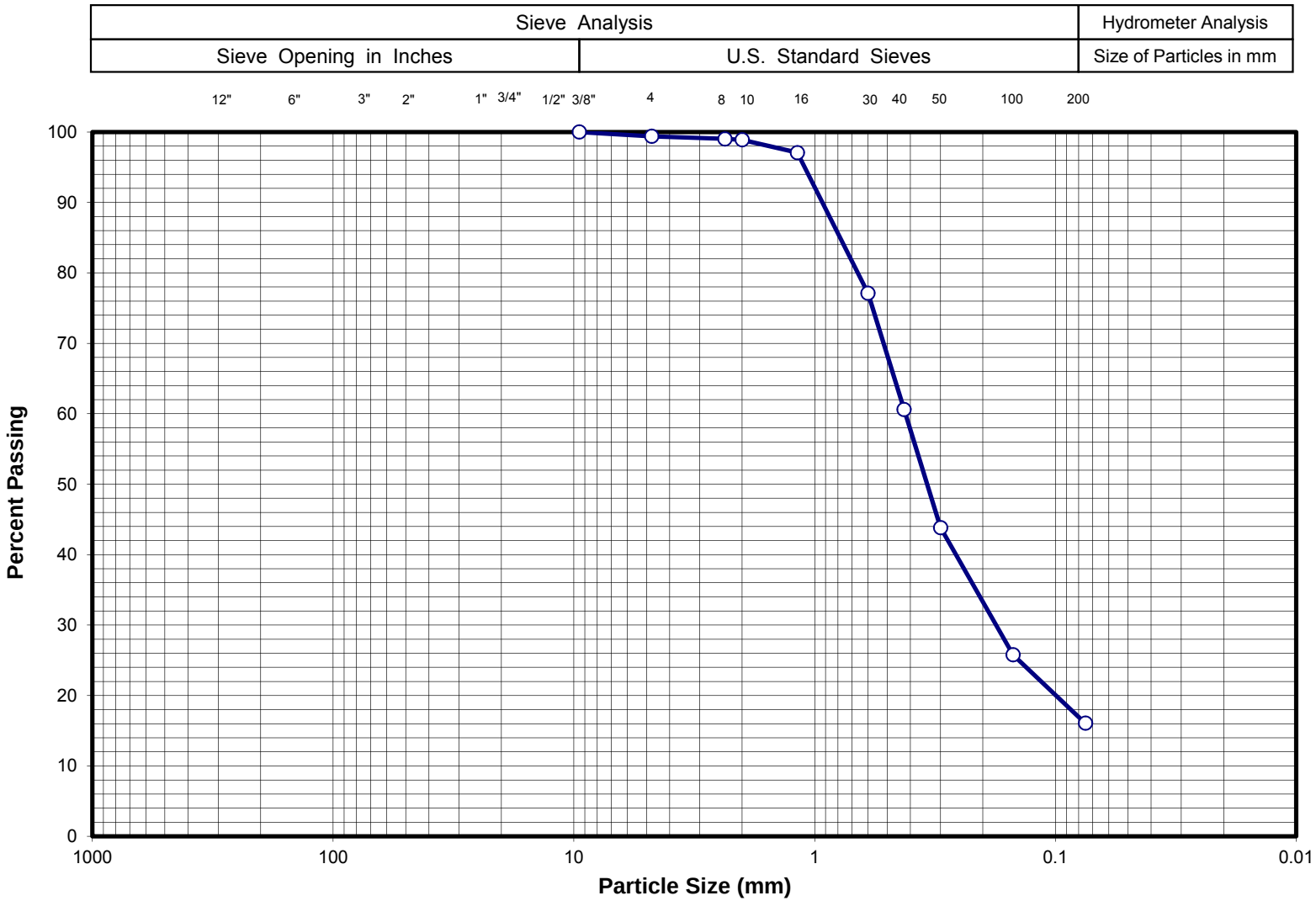

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	99
#10	99
#40	61
#200	16

Gravel (%)	1	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	83	PL	NP	Sample ID:	YA-EM270-1
Fines (%)	16	PI	NP	Sample Depth (ft.):	0
Sample Description:	A-2-4 (0) / SM				

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SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
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Date:	04/26/16	Figure No.:	-

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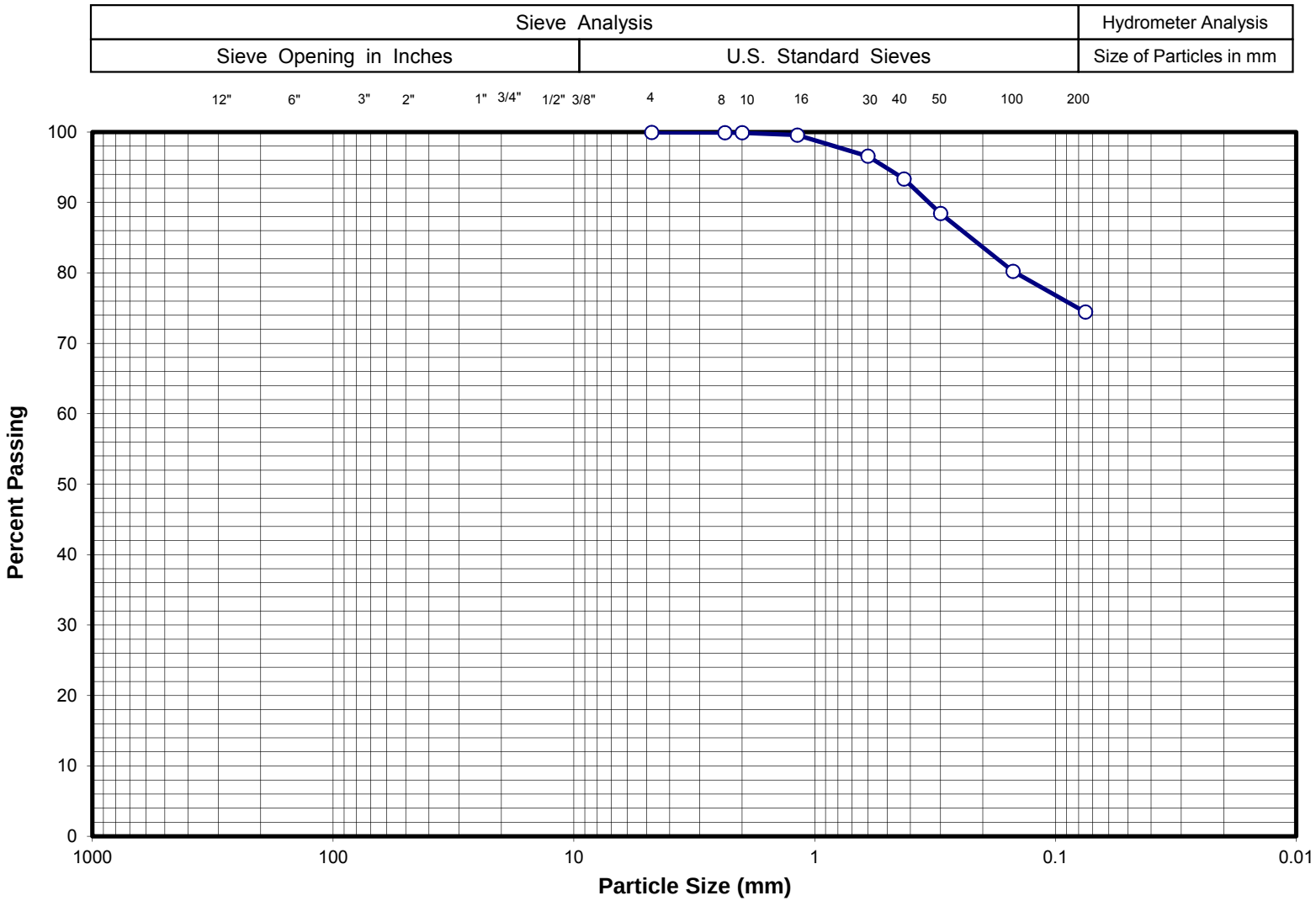

Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	93
#200	74

Gravel (%)	0	LL	42	Project Name:	I-70 East, PCL Alternative
Sand (%)	26	PL	14	Sample ID:	YA-EM270-1
Fines (%)	74	PI	28	Sample Depth (ft.):	3
Sample Description:	A-7-6 (19) / CL				

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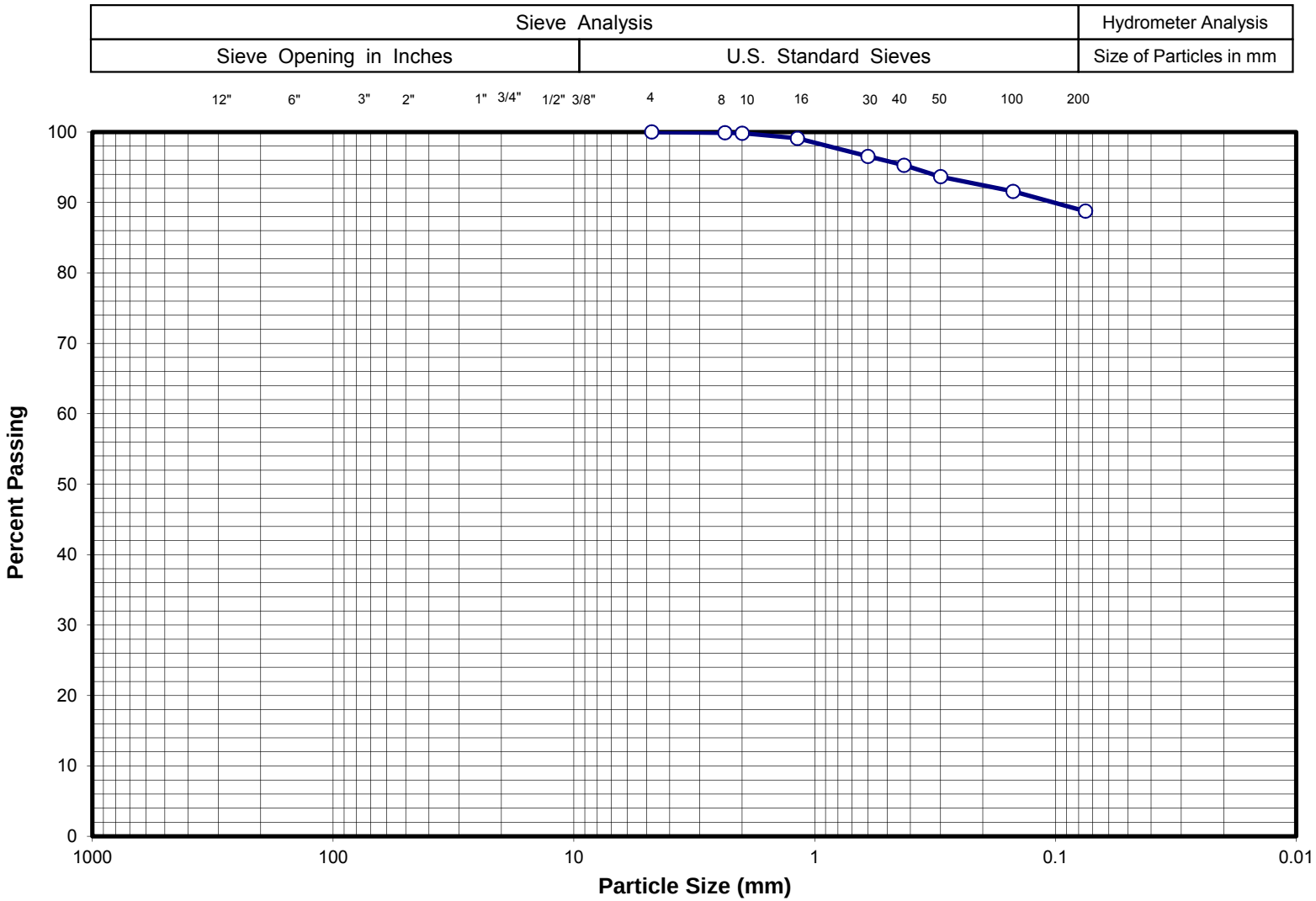
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	95
#200	89

Gravel (%)	0	LL	36	Project Name:	I-70 East, PCL Alternative
Sand (%)	11	PL	15	Sample ID:	YA-EM270-1
Fines (%)	89	PI	21	Sample Depth (ft.):	4.5
Sample Description:	A-6 (18) / CL				

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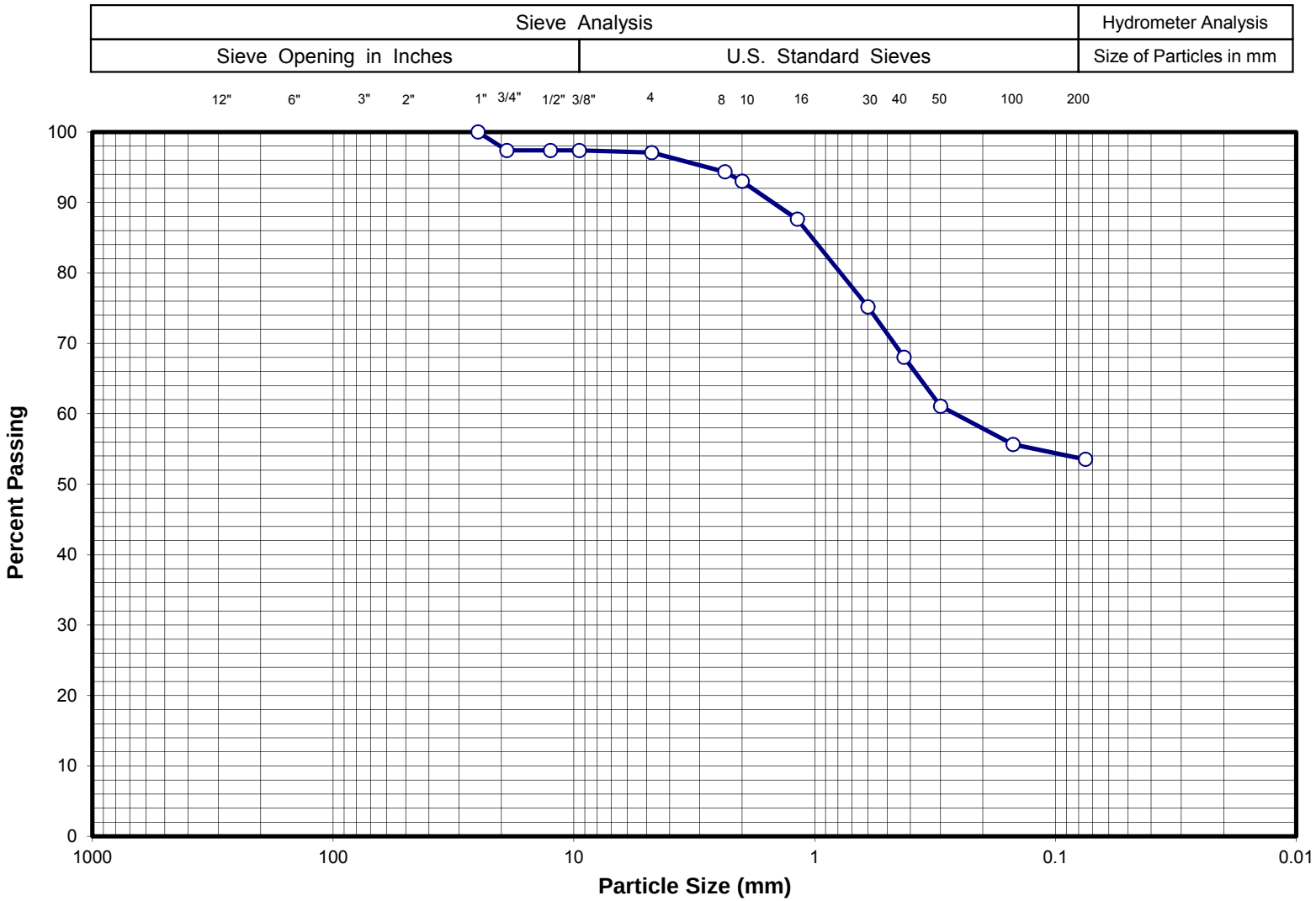
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	97
½"	97
⅜"	97
#4	97
#10	93
#40	68
#200	54

Gravel (%)	3	LL	38	Project Name:	I-70 East, PCL Alternative
Sand (%)	43	PL	16	Sample ID:	YA-EM270-1
Fines (%)	54	PI	22	Sample Depth (ft.):	4.5
Sample Description:	A-6 (8) / CL				

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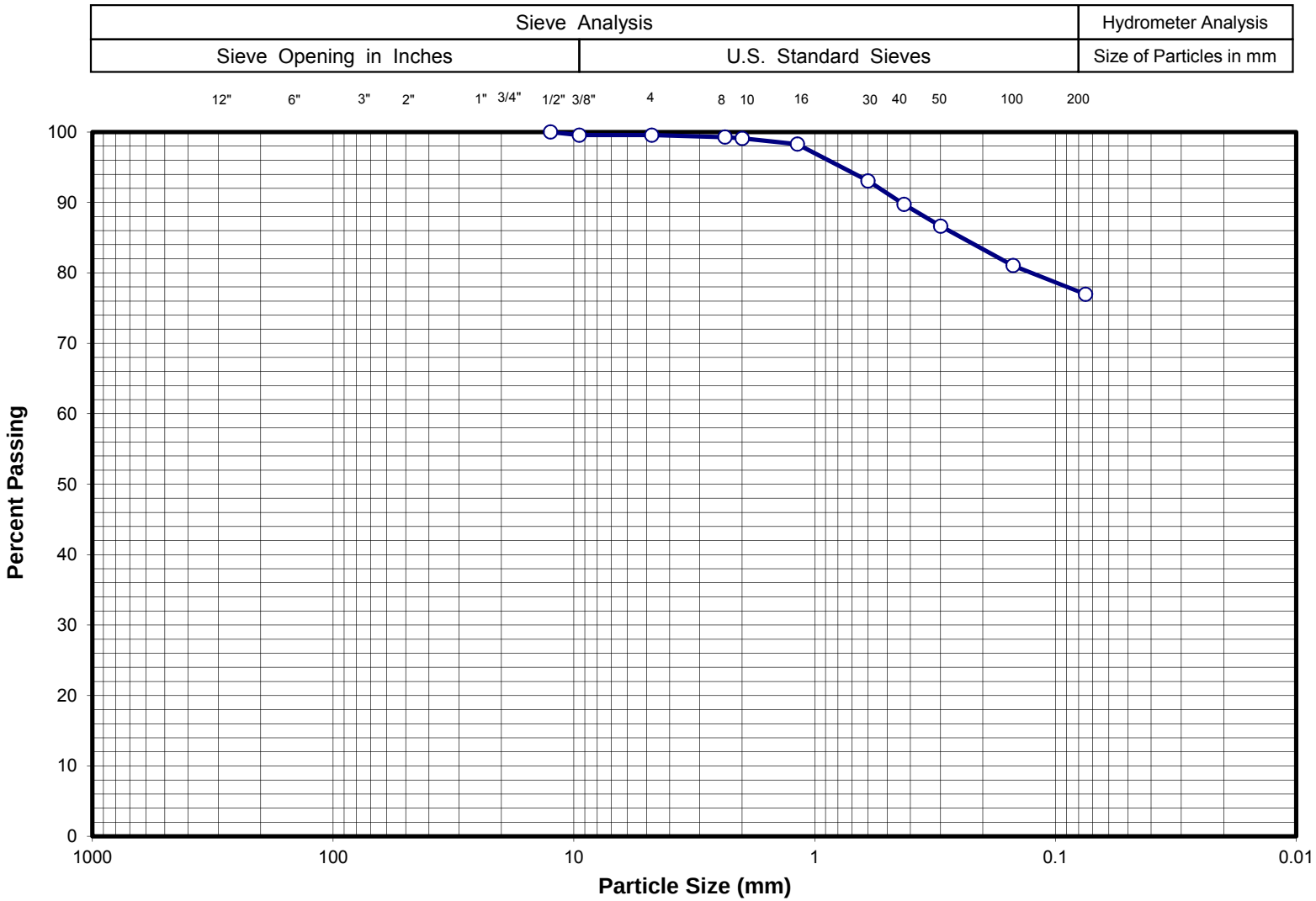
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	100
⅜"	100
#4	100
#10	99
#40	90
#200	77

Gravel (%)	0	LL	45	Project Name:	I-70 East, PCL Alternative
Sand (%)	23	PL	15	Sample ID:	YA-EM270-1
Fines (%)	77	PI	30	Sample Depth (ft.):	10.5
Sample Description:	A-7-6 (22) / CL				

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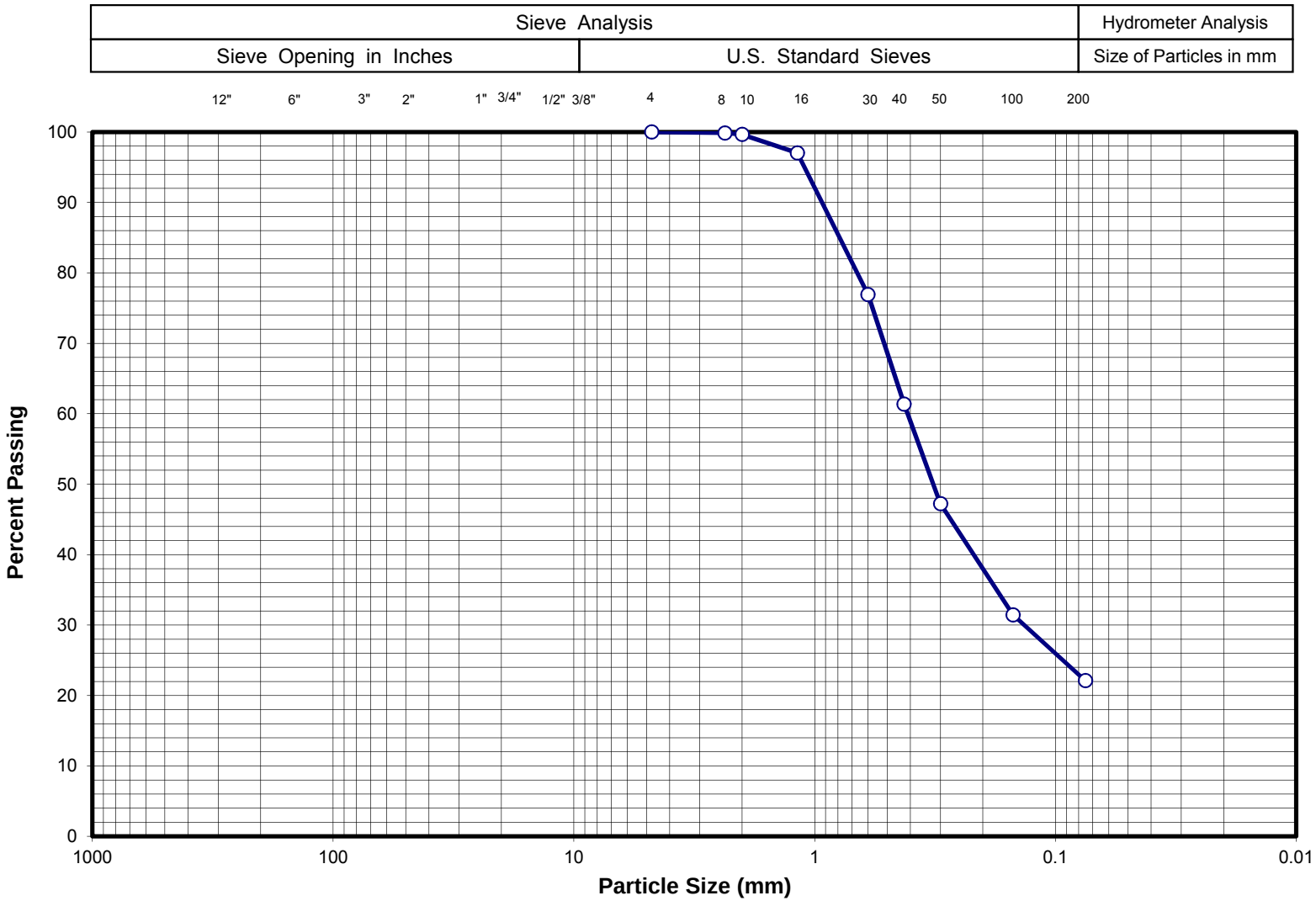
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	-
#4	100
#10	100
#40	61
#200	22

Gravel (%)	0	LL	38	Project Name:	I-70 East, PCL Alternative
Sand (%)	78	PL	16	Sample ID:	YA-EM270-1
Fines (%)	22	PI	22	Sample Depth (ft.):	12
Sample Description:	A-2-6 (0) / SC				

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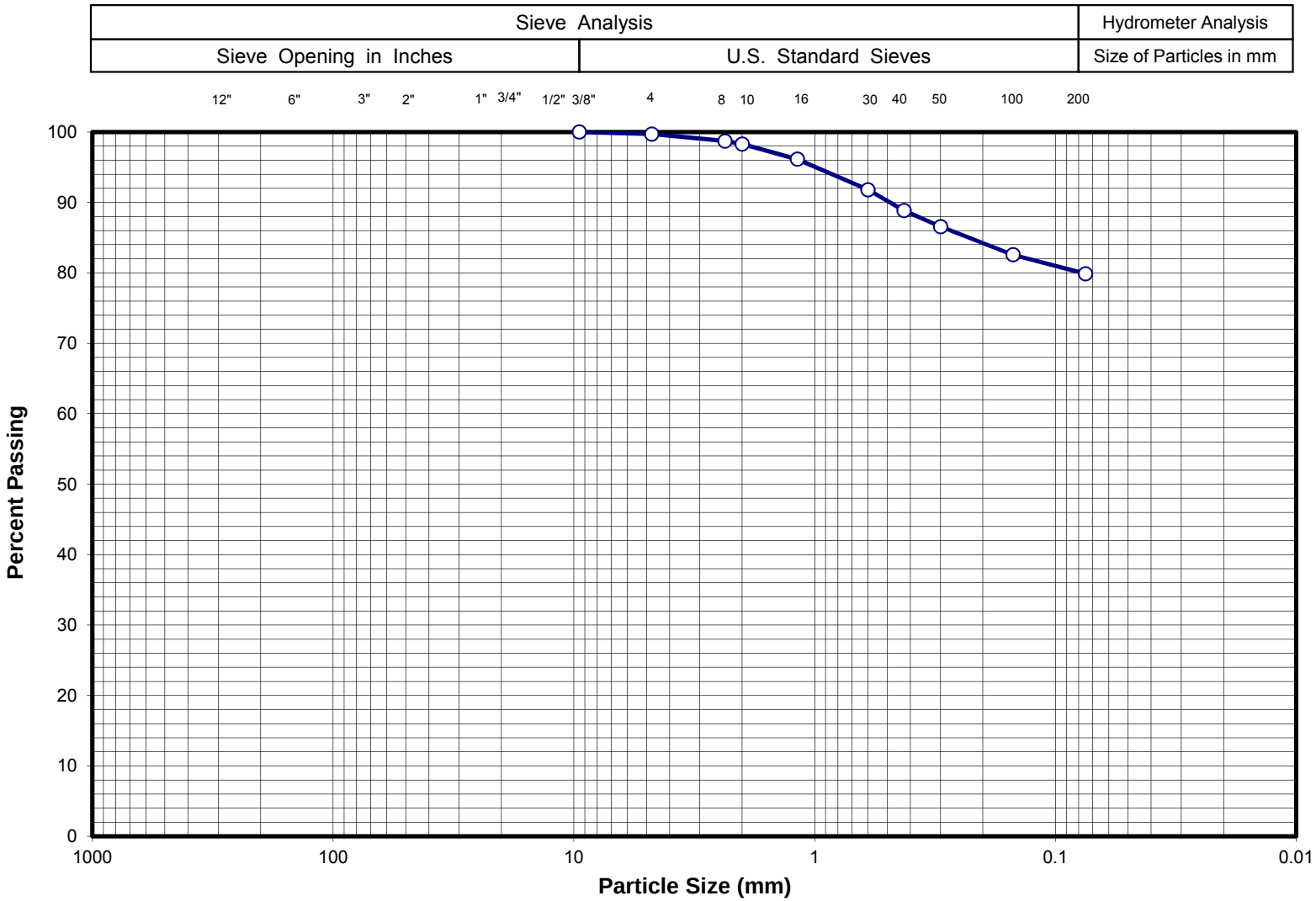
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	98
#40	89
#200	80

Gravel (%)	0	LL	50	Project Name:	I-70 East, PCL Alternative
Sand (%)	20	PL	24	Sample ID:	YA-EM270-1
Fines (%)	80	PI	26	Sample Depth (ft.):	15
Sample Description:	A-7-6 (22) / CL				

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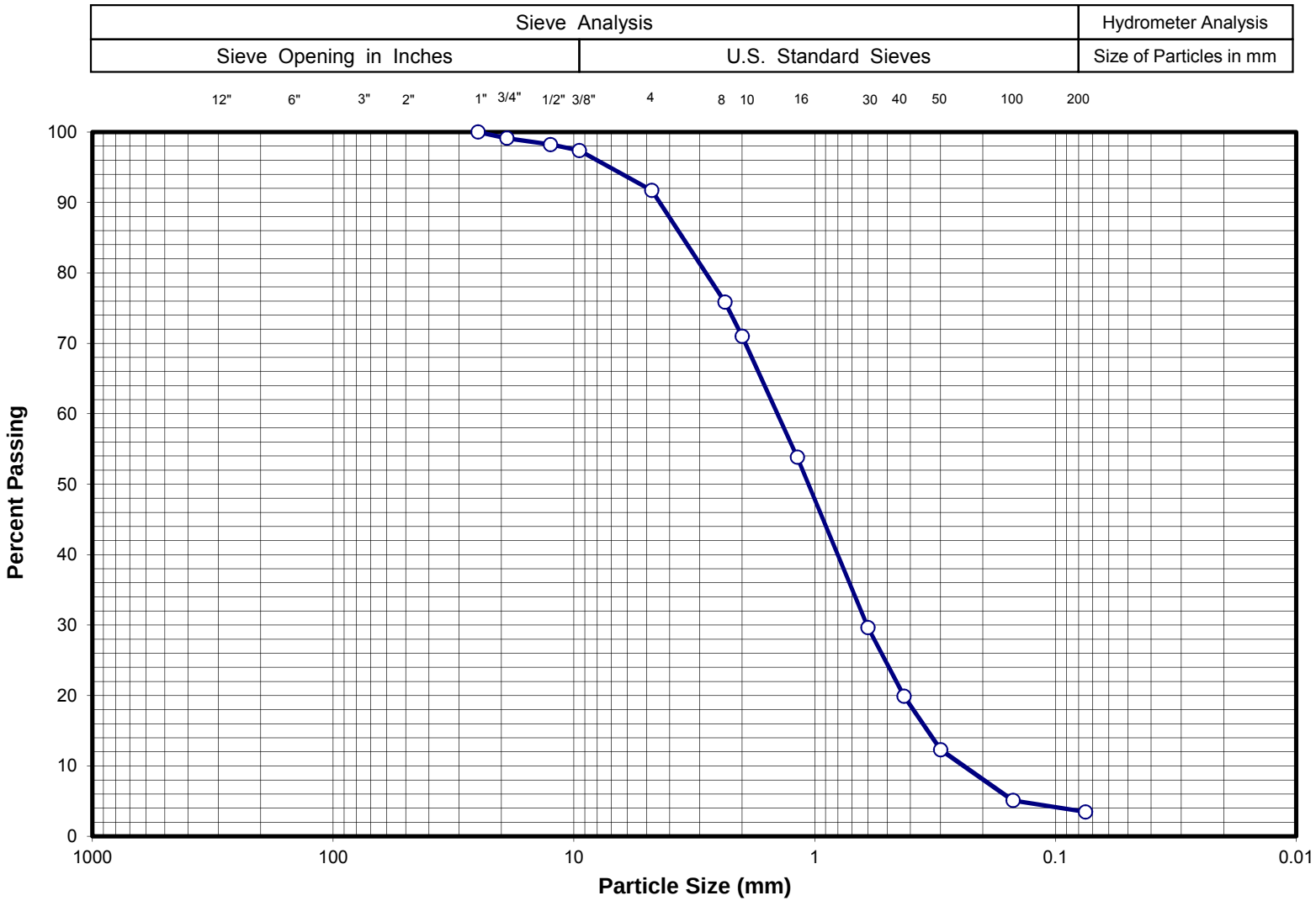
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	99
½"	98
⅜"	97
#4	92
#10	71
#40	20
#200	3

Gravel (%)	8	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	89	PL	NP	Sample ID:	YA-EM270-1
Fines (%)	3	PI	NP	Sample Depth (ft.):	16.5
Sample Description:	A-1-b (0) / SP				

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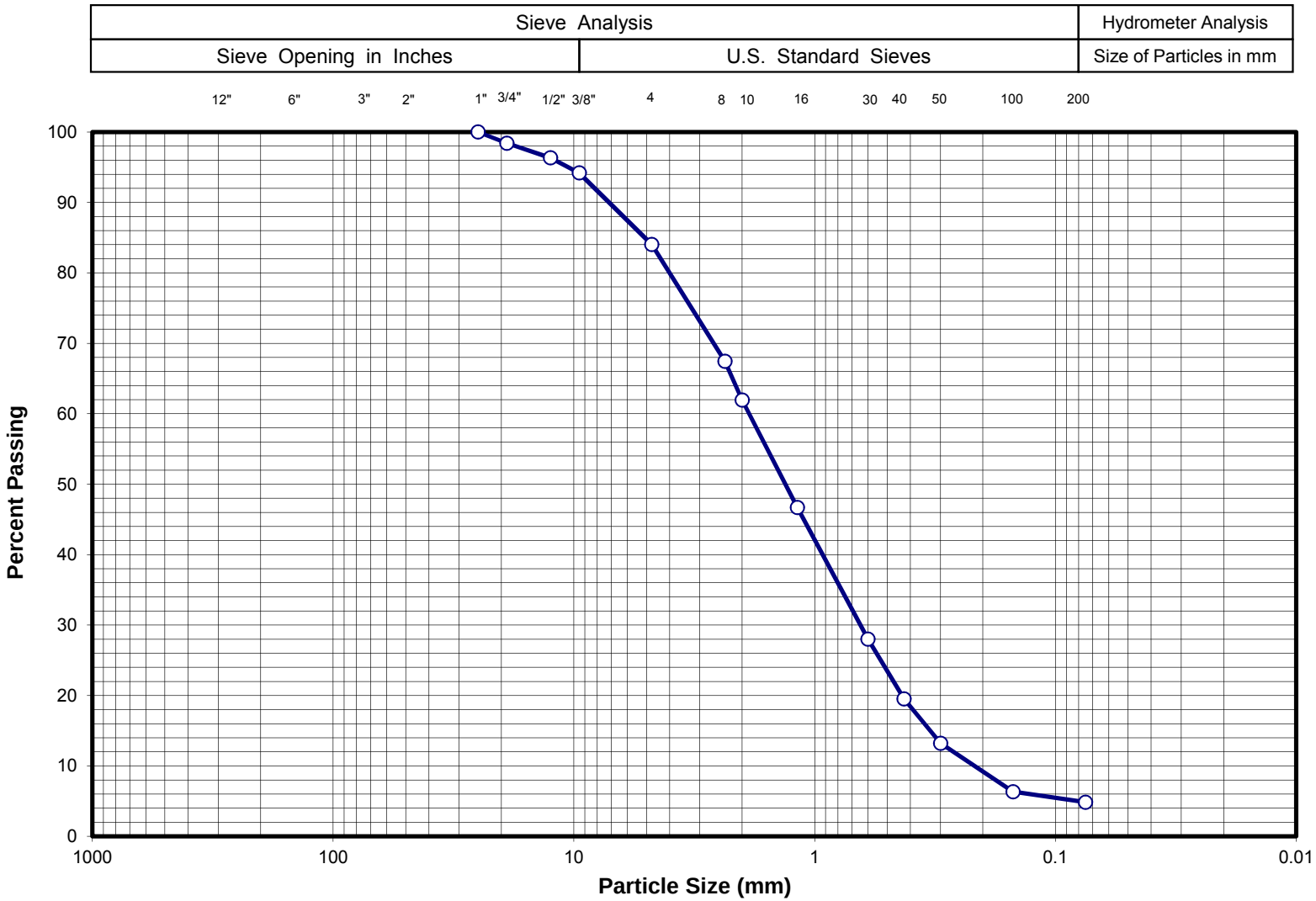
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	100
¾ "	98
½"	96
⅜"	94
#4	84
#10	62
#40	20
#200	5

Gravel (%)	16	LL	NV	Project Name:	I-70 East, PCL Alternative
Sand (%)	79	PL	NP	Sample ID:	YA-EM270-1
Fines (%)	5	PI	NP	Sample Depth (ft.):	19.5
Sample Description:	A-1-b (0) / SP				

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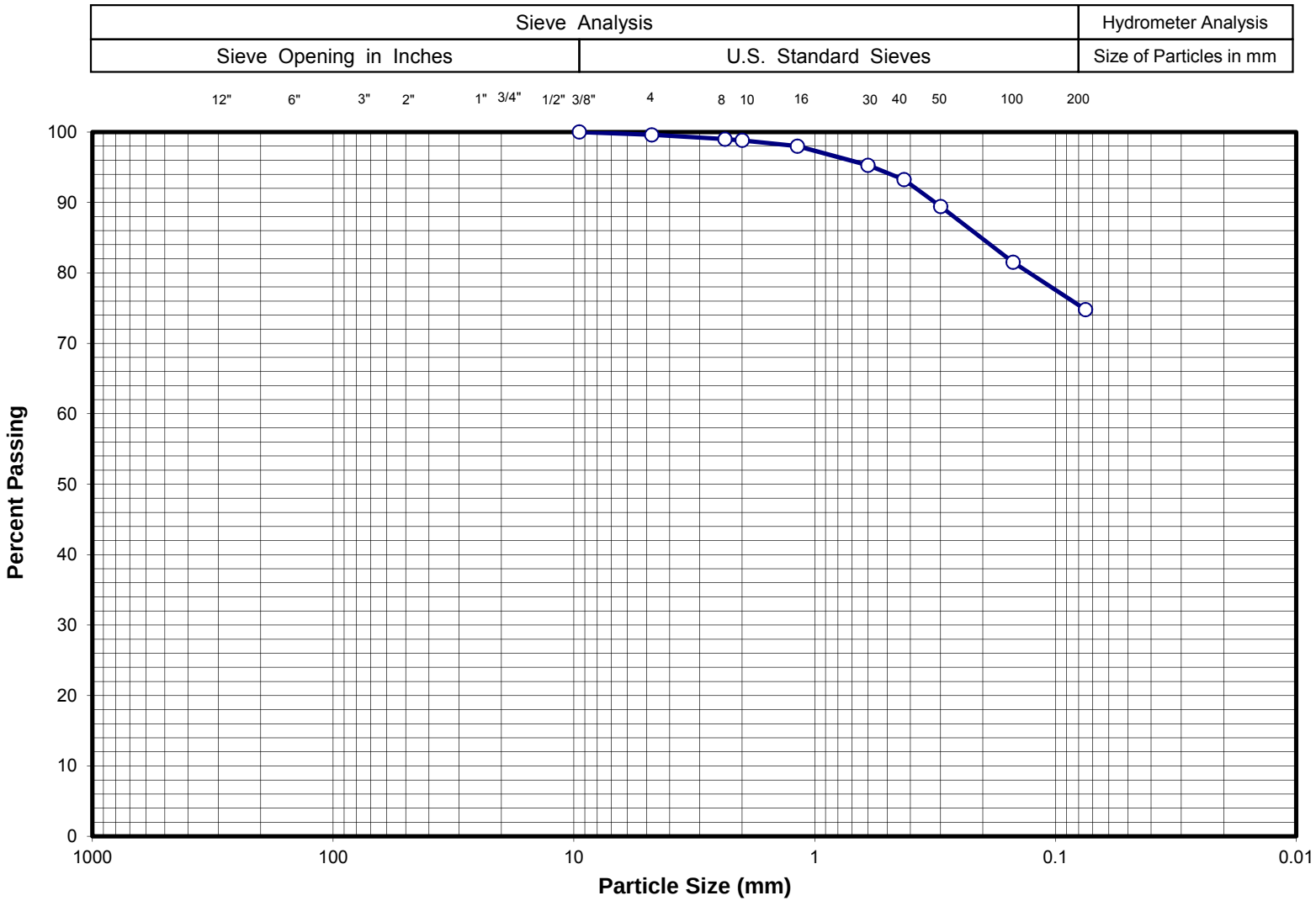
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	99
#40	93
#200	75

Gravel (%)	0	LL	34	Project Name:	I-70 East, PCL Alternative
Sand (%)	25	PL	18	Sample ID:	YA-EM270-1
Fines (%)	75	PI	16	Sample Depth (ft.):	22.5
Sample Description:	A-6 (11) / CL				

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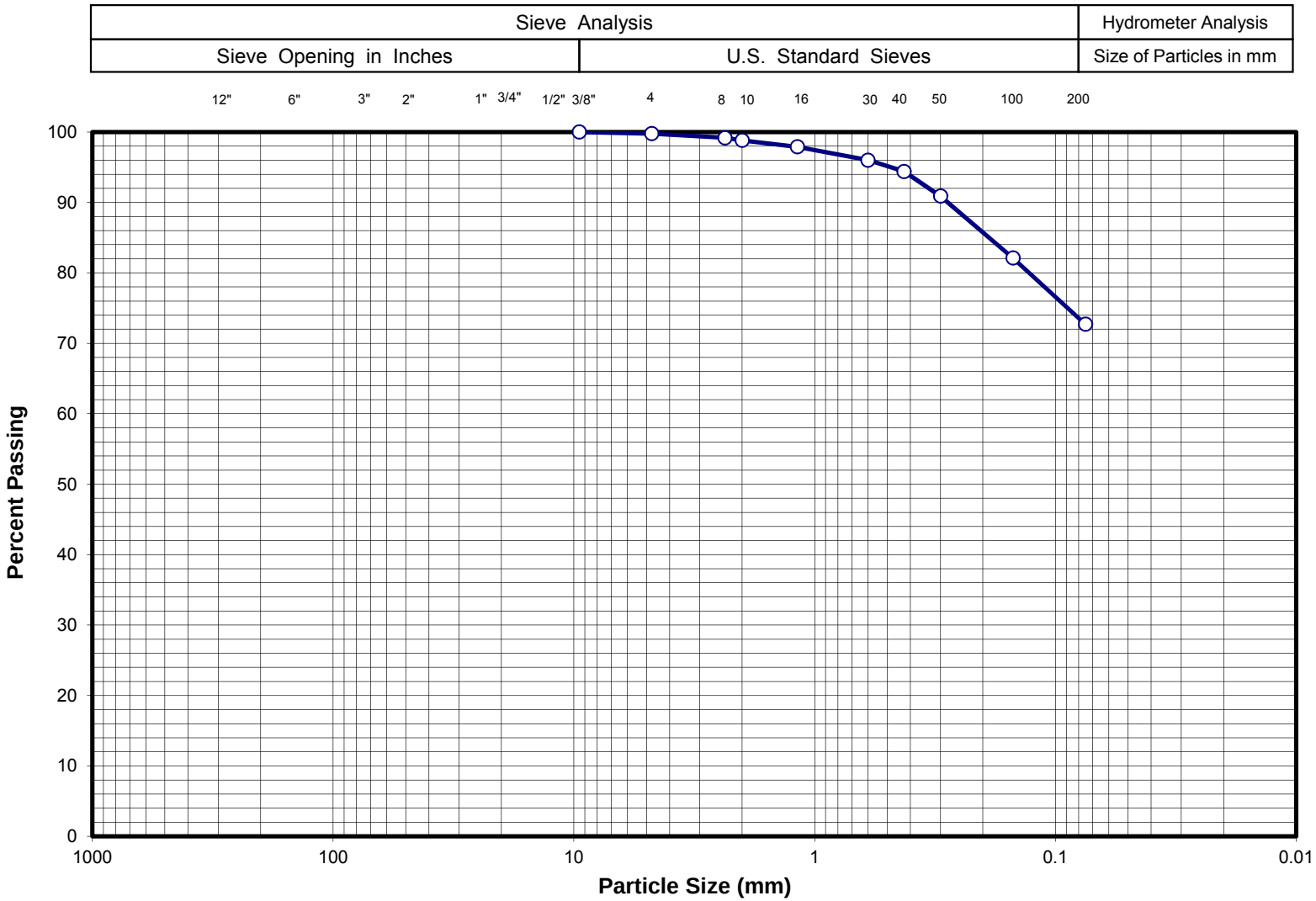
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	99
#40	94
#200	73

Gravel (%)	0	LL	50	Project Name:	I-70 East, PCL Alternative
Sand (%)	27	PL	19	Sample ID:	YA-EM270-1
Fines (%)	73	PI	31	Sample Depth (ft.):	24
Sample Description:	A-7-6 (22) / CH				

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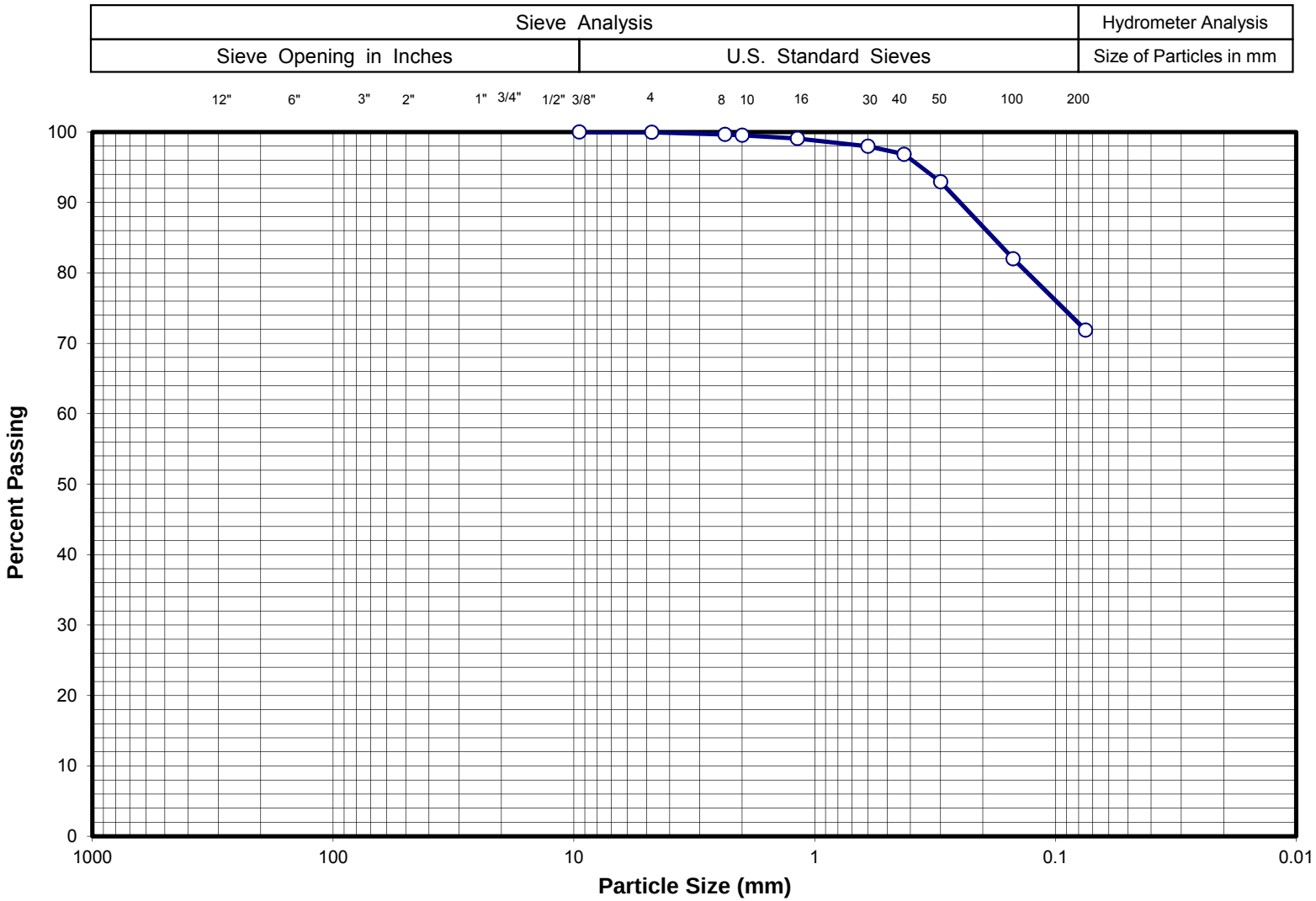
SIEVE ANALYSIS

Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004



Sieve Size	% Passing
3"	-
2 ½"	-
2"	-
1 ½"	-
1"	-
¾ "	-
½"	-
⅜"	100
#4	100
#10	100
#40	97
#200	72

Gravel (%)	0	LL	51	Project Name:	I-70 East, PCL Alternative
Sand (%)	28	PL	22	Sample ID:	YA-EM270-1
Fines (%)	72	PI	29	Sample Depth (ft.):	30
Sample Description:	A-7-6 (20) / CH				

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SIEVE ANALYSIS

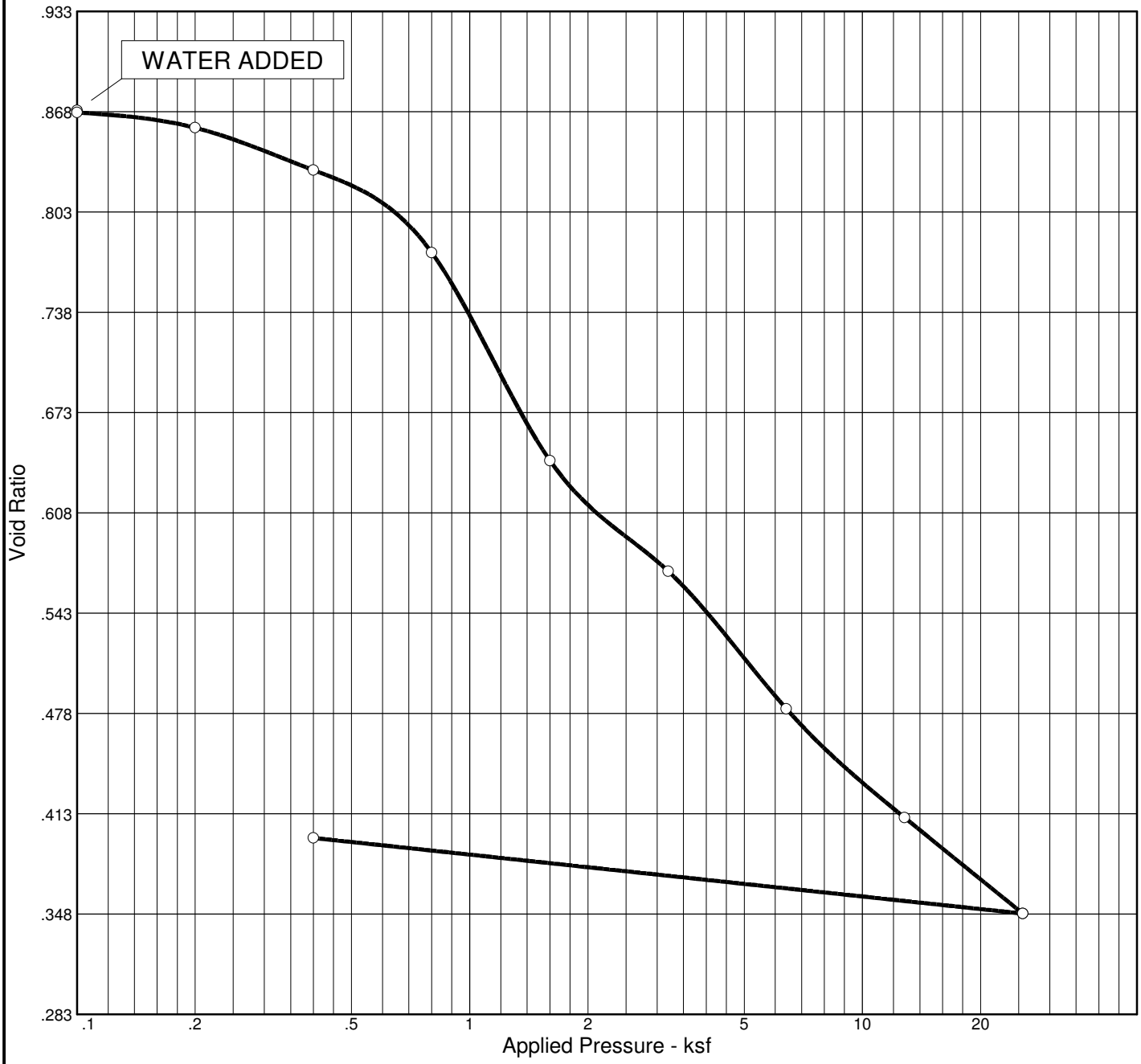
Drawn By:	M.A	Project No.:	213-208
Checked By:	M.G		
Date:	04/26/16	Figure No.:	-

Revised 04/27/2004

Appendix E

One Dimensional Consolidation Test Results

ONE DIMENSIONAL CONSOLIDATION ASTM D2435



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
70.9 %	22.9 %	90.1	41	24	2.7	CL	A-7-6(10)	0.871

MATERIAL DESCRIPTION

sandy lean clay

Project No. DV108-129/ **Client:** Yeh and Associates

Project: I-70 PCL Design Team Requests
Y&A#213-208

Location: YA-EM270 @ 4-6'

Remarks:

Specimens were trimmed from Shelby Tube. Gs is assumed.

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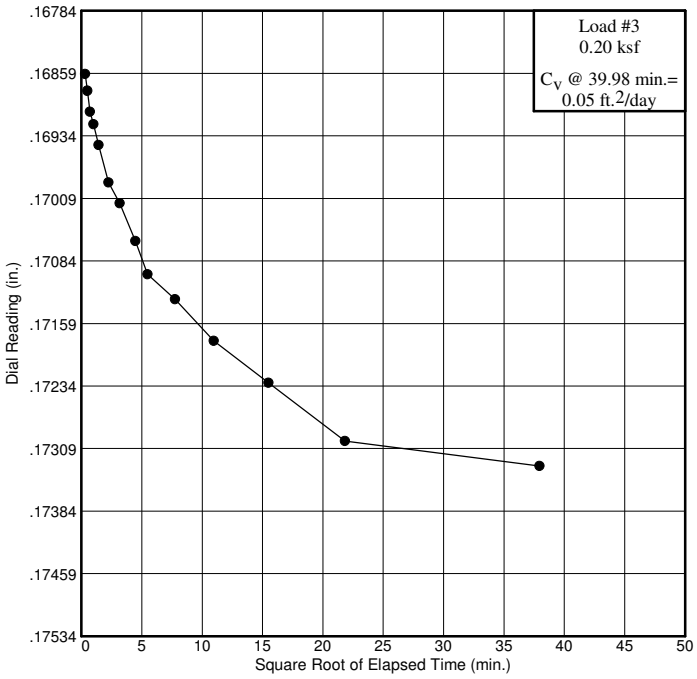
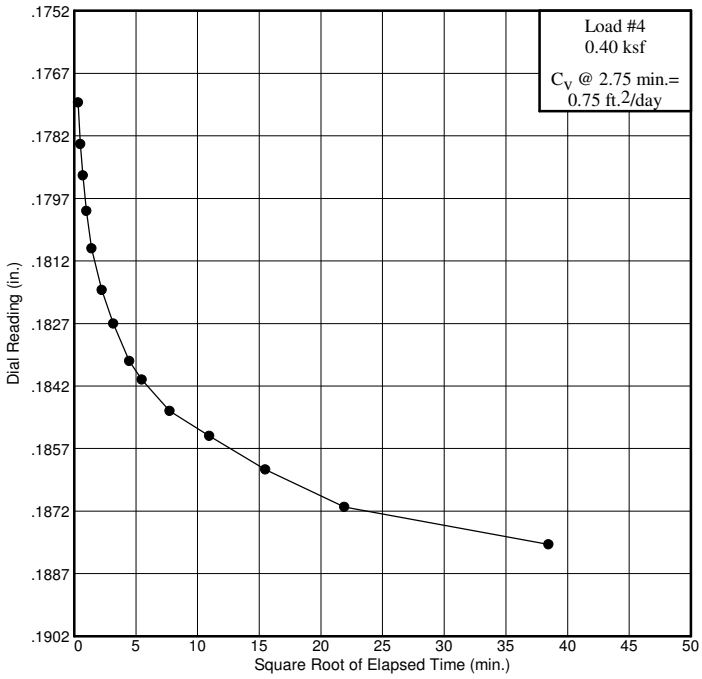
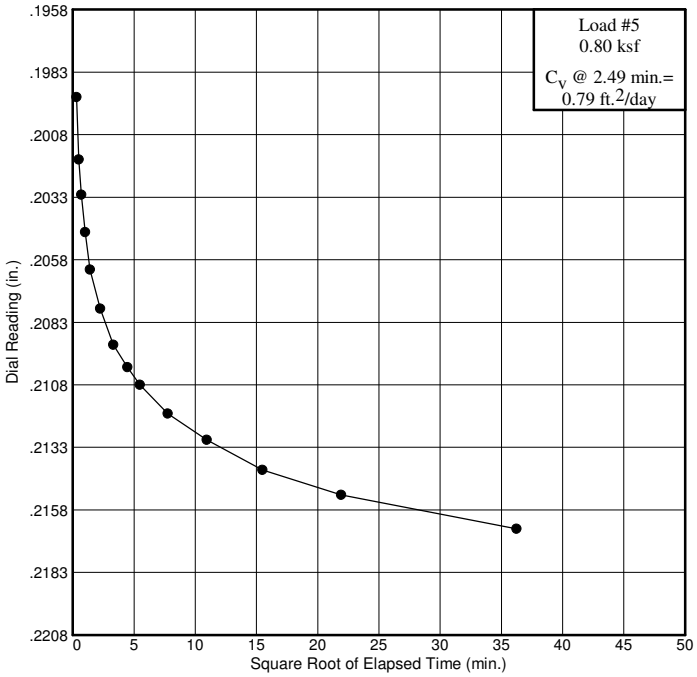
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 4-6'







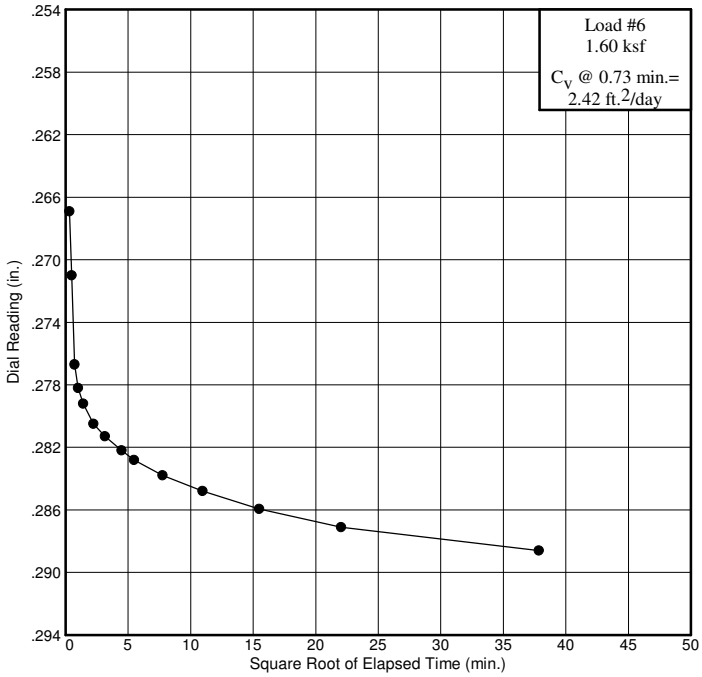


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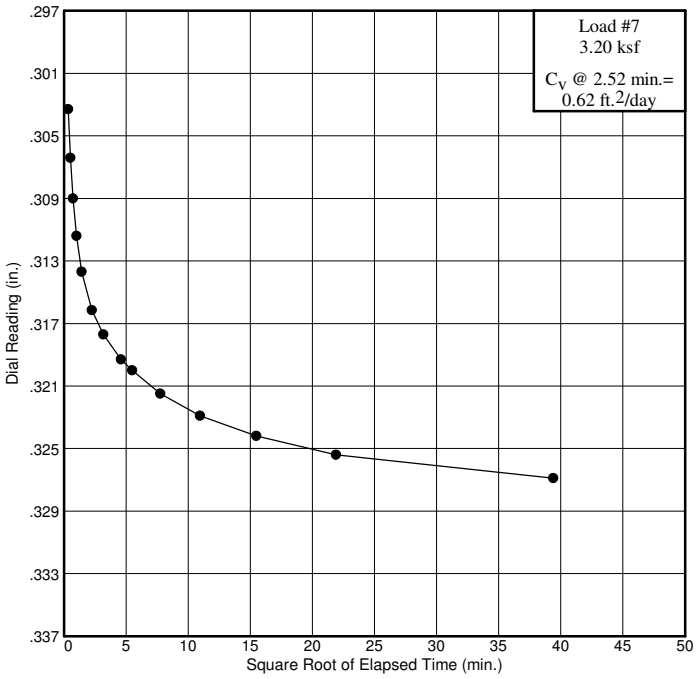
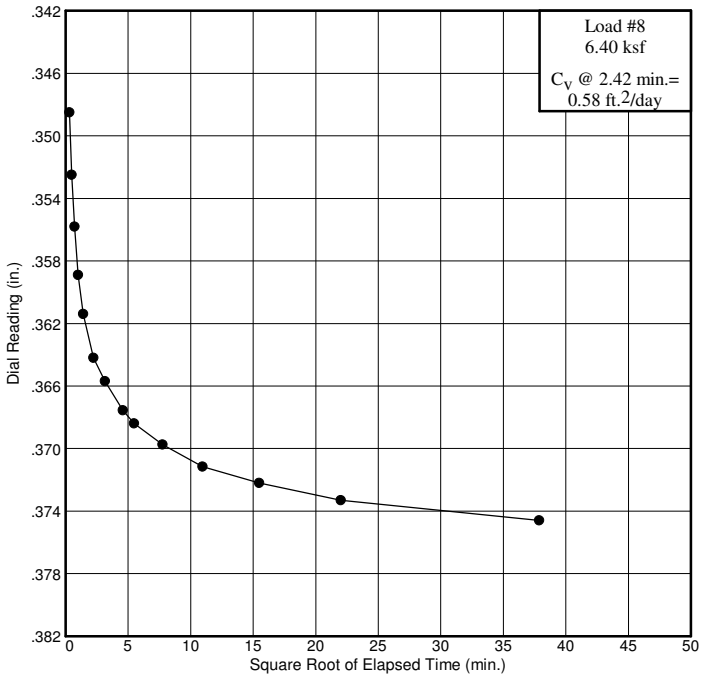
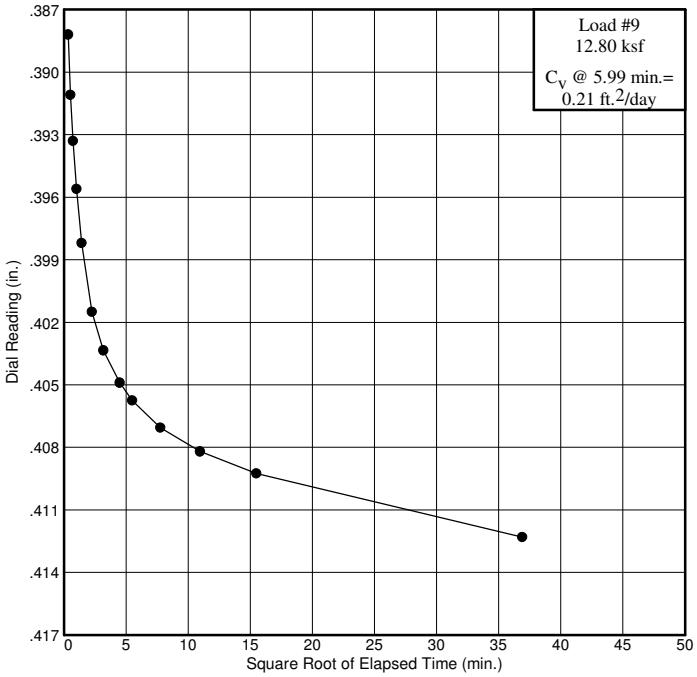
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 4-6'







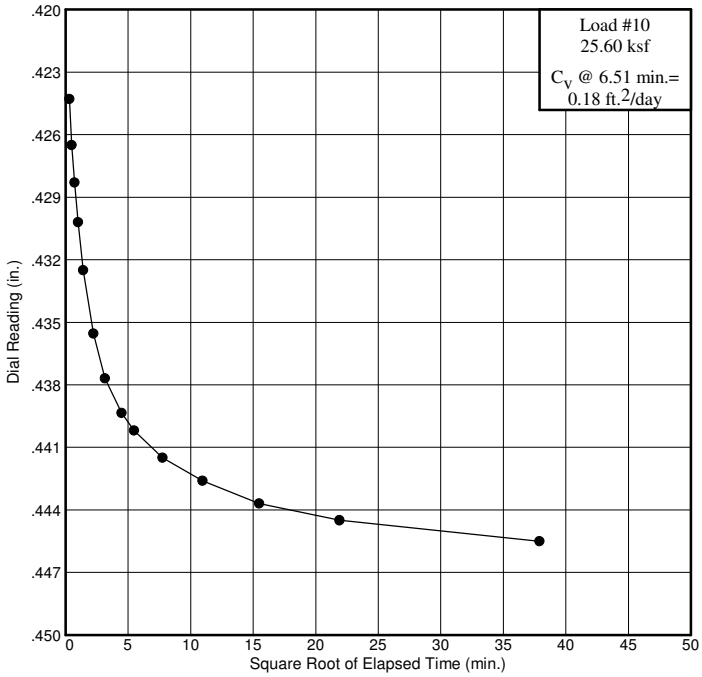


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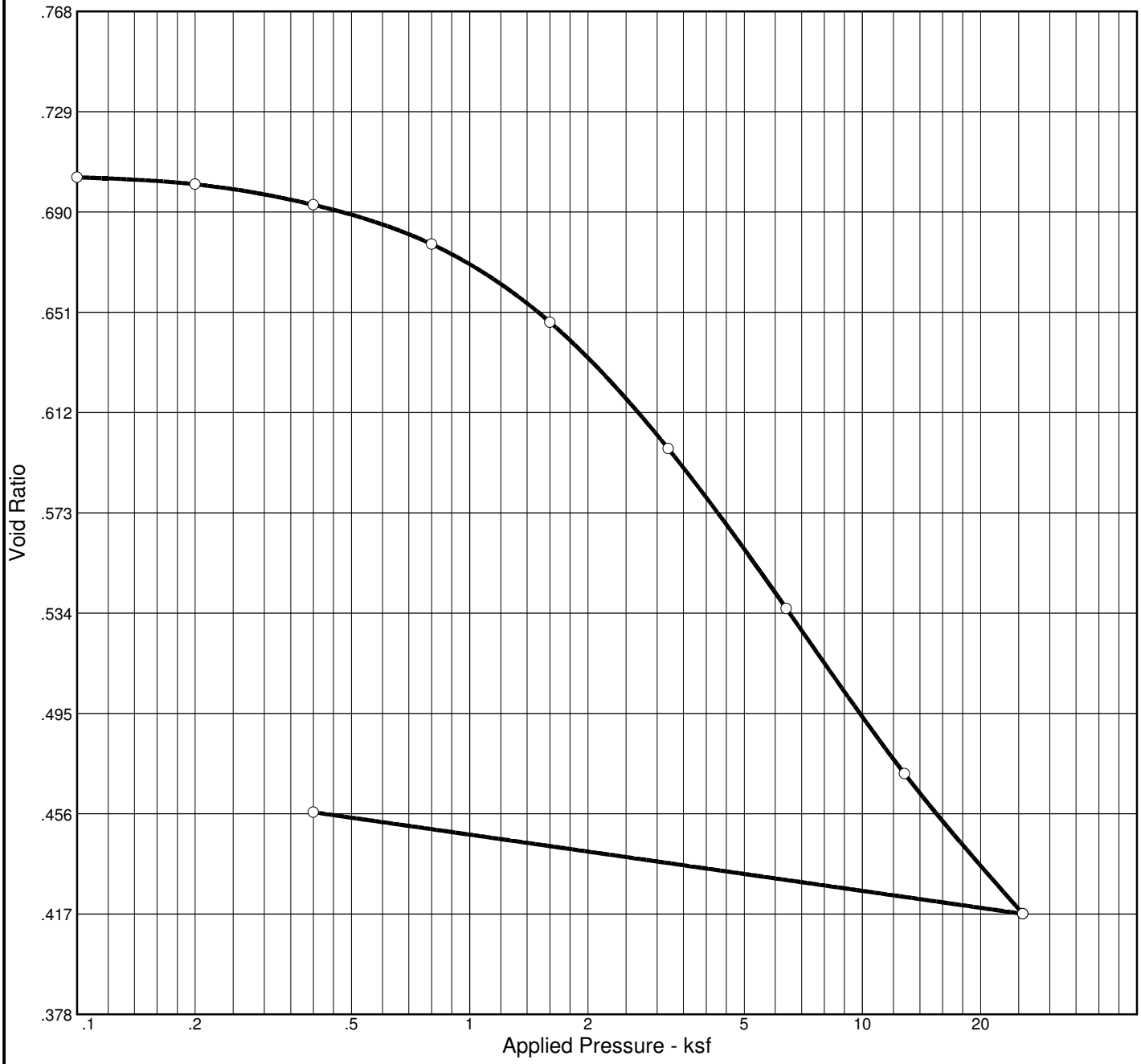
Figure

ONE DIMENSIONAL CONSOLIDATION ASTM D2435



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
69.7 %	18.1 %	99.1	34	17	2.7	CL	A-6(6)	0.703

MATERIAL DESCRIPTION

sandy lean clay

Project No. DV108-129/ **Client:** Yeh and Associates

Project: I-70 PCL Design Team Requests
Y&A#213-208

Location: YA-EM270 @ 2-4'

Remarks:

Specimen trimmed from Shelby tube. Gs is assumed.

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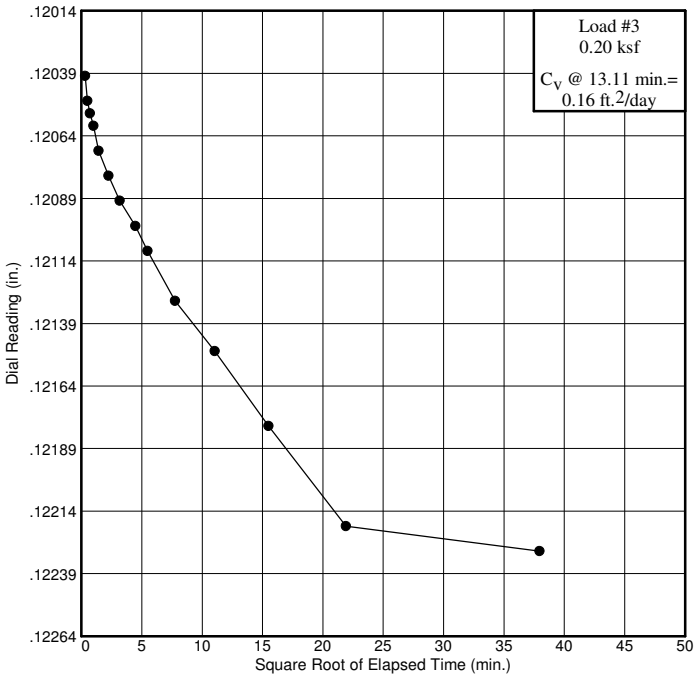
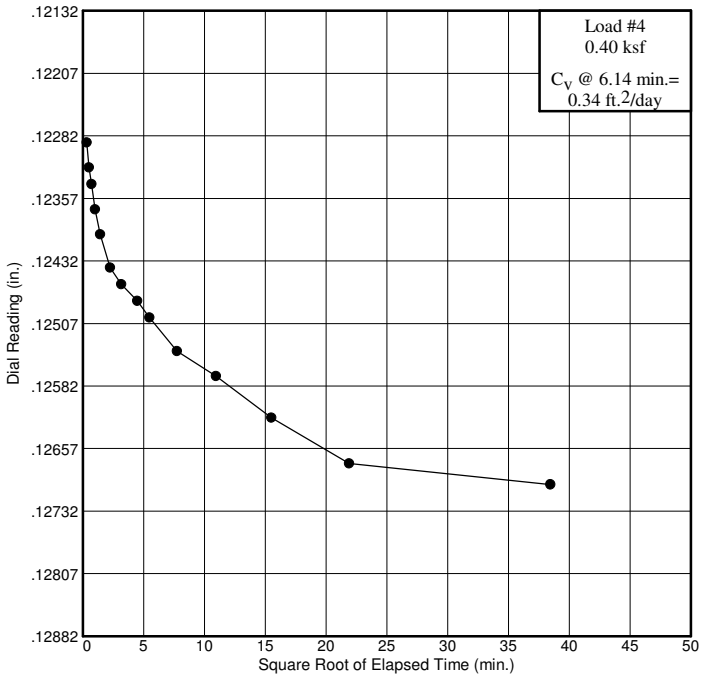
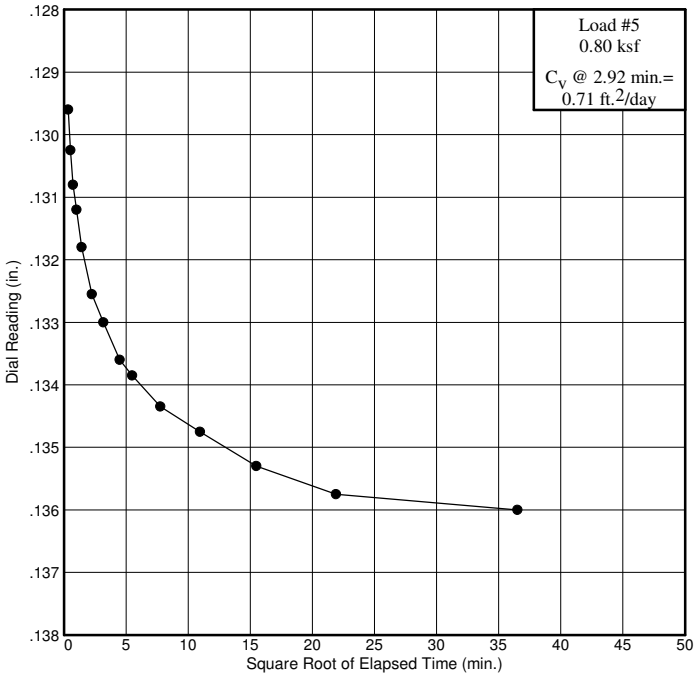
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 2-4'







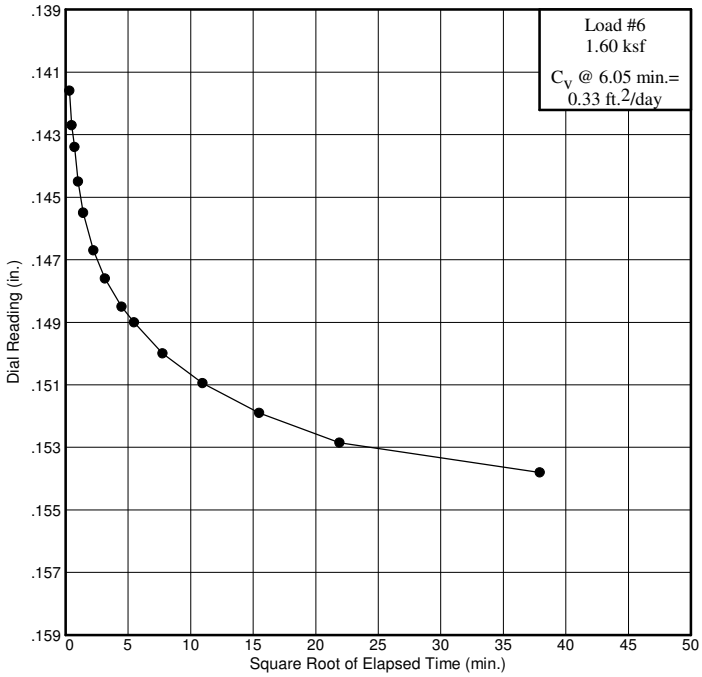


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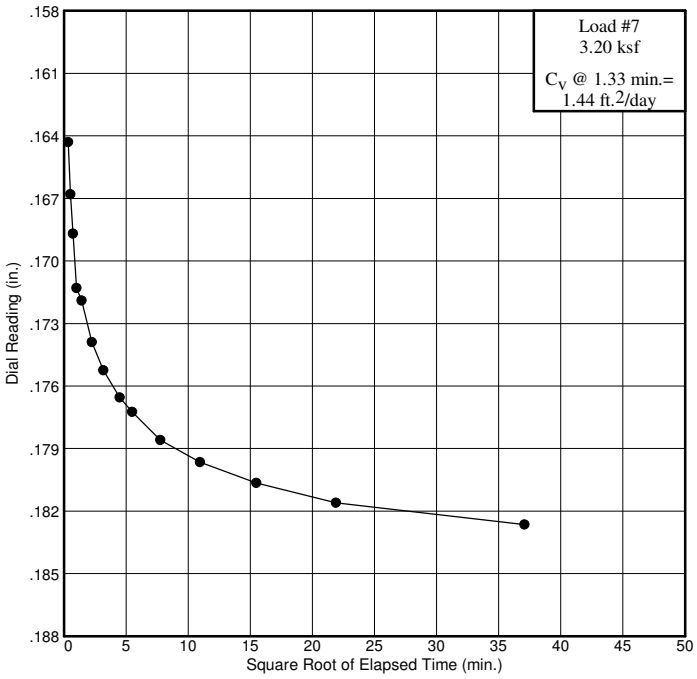
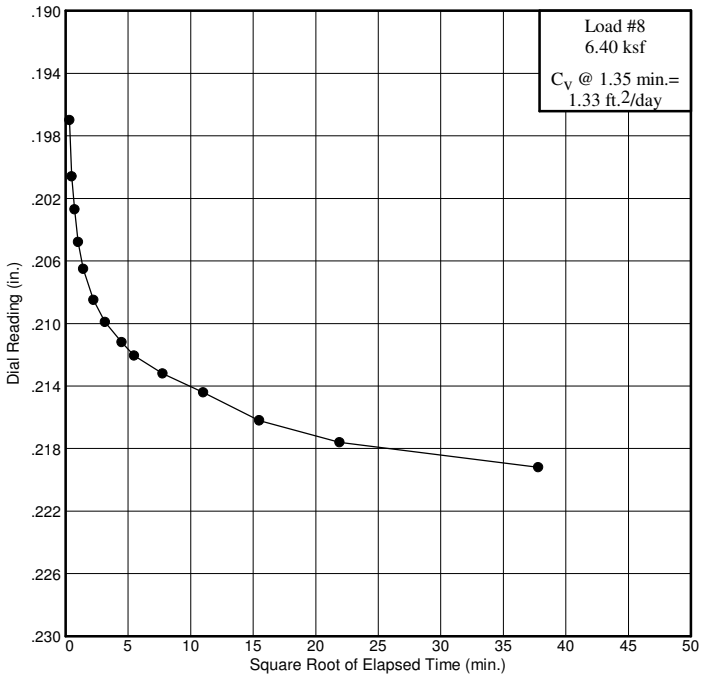
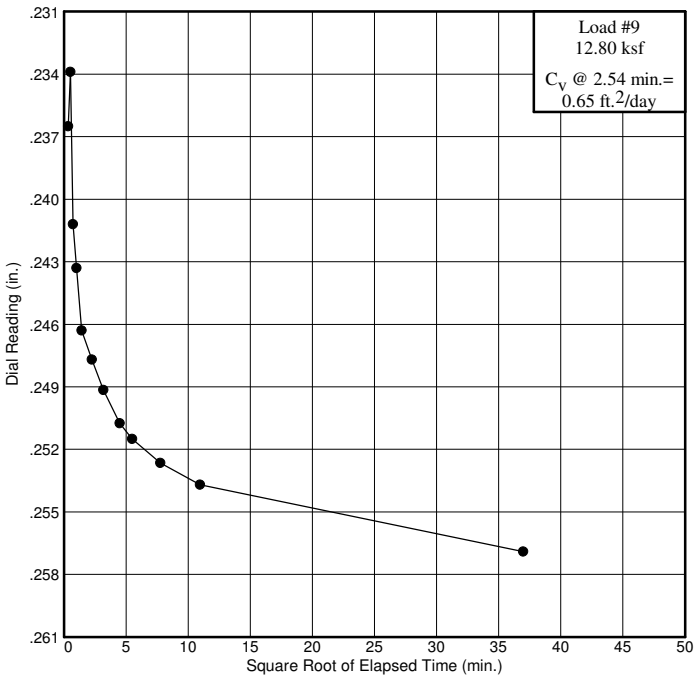
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 2-4'







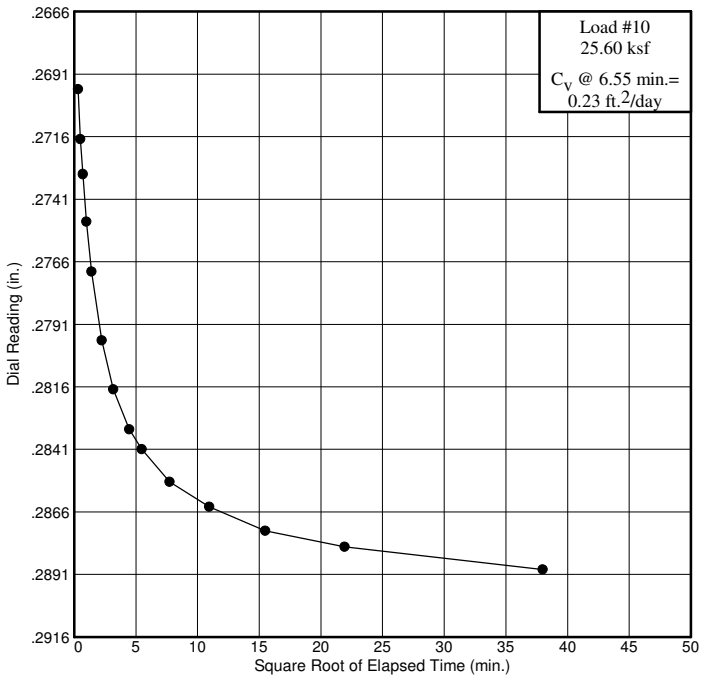


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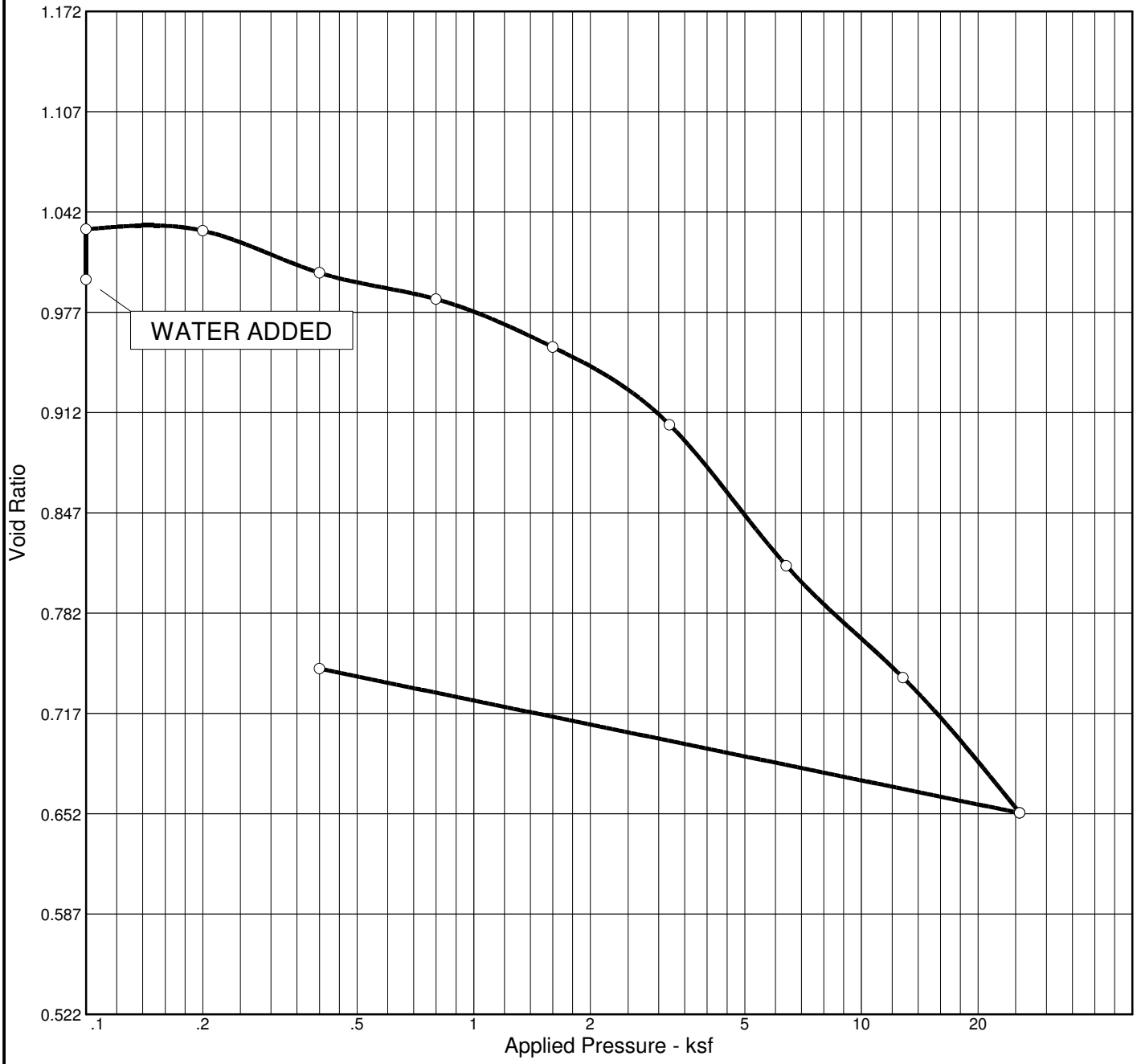
Figure

ONE DIMENSIONAL CONSOLIDATION ASTM D2435



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	USCS	AASHTO	Initial Void Ratio
Saturation	Moisture							
61.1 %	22.6 %	92.4	38	22	2.7	CL	A-6(9)	0.998

MATERIAL DESCRIPTION

sandy lean clay

Project No. DV108-129/ **Client:** Yeh and Associates

Project: I-70 PCL Design Team Requests
Y&A#213-208

Location: YA-EM270 @ 14-16'

Remarks:

Speciemn trimmed from Shelby tube. Gs is assumed.

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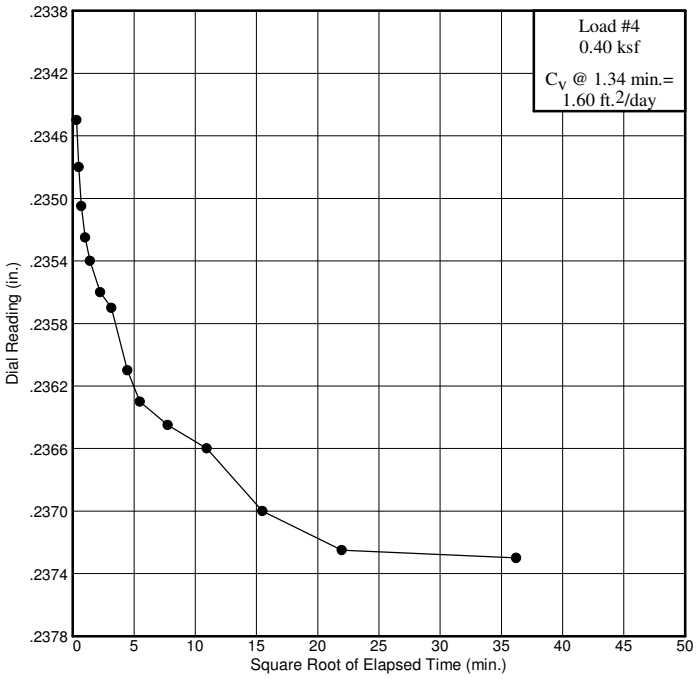
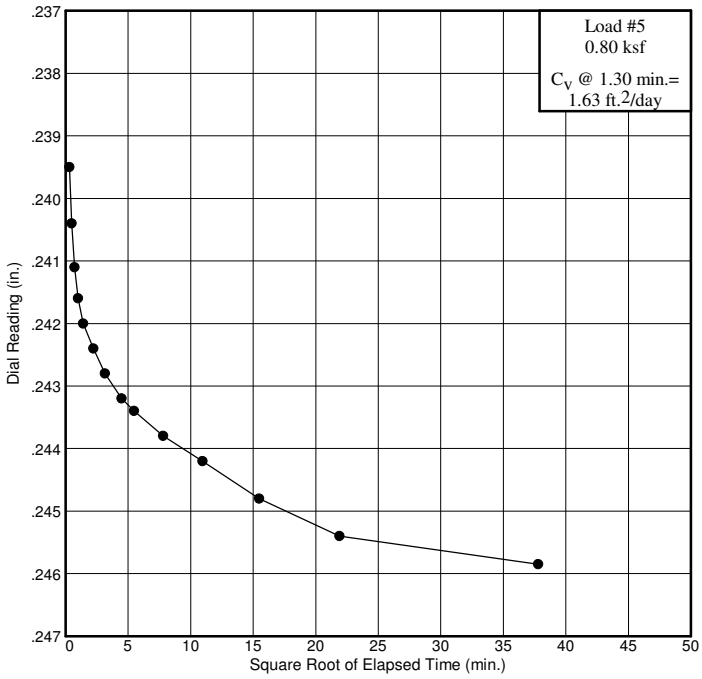
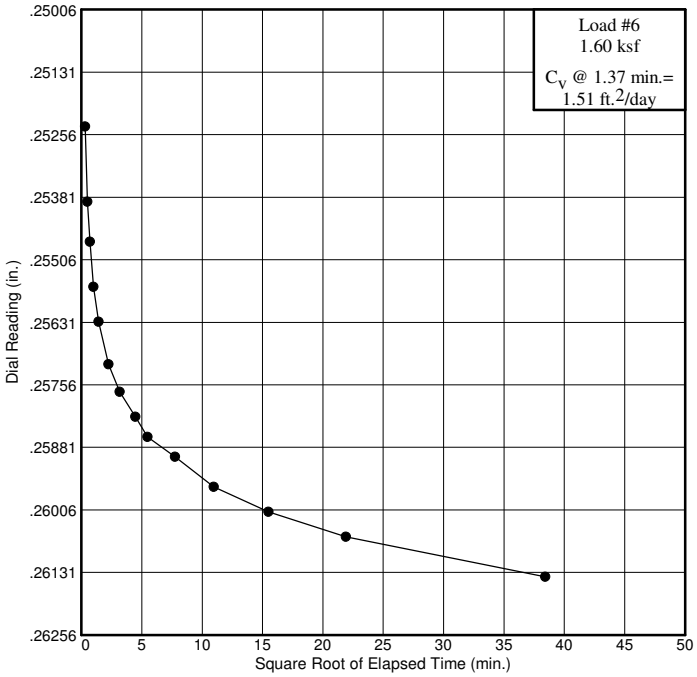
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 14-16'







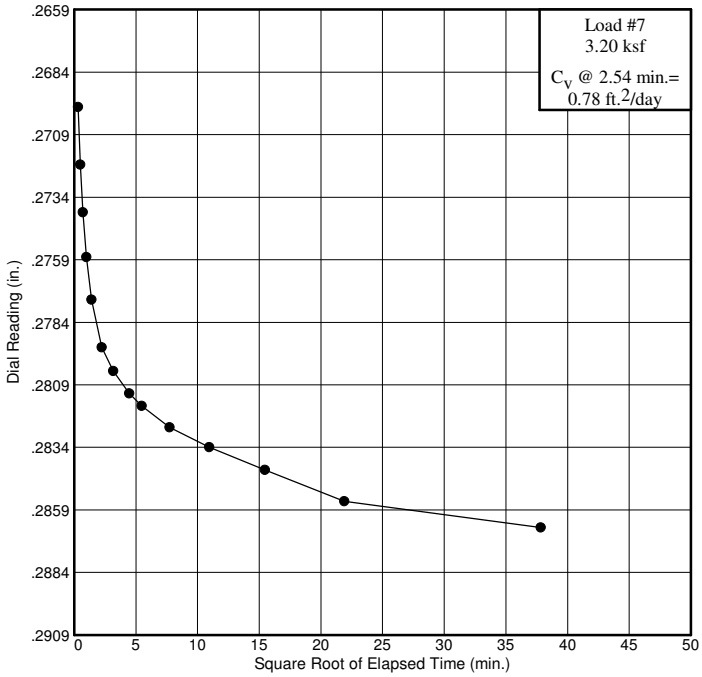


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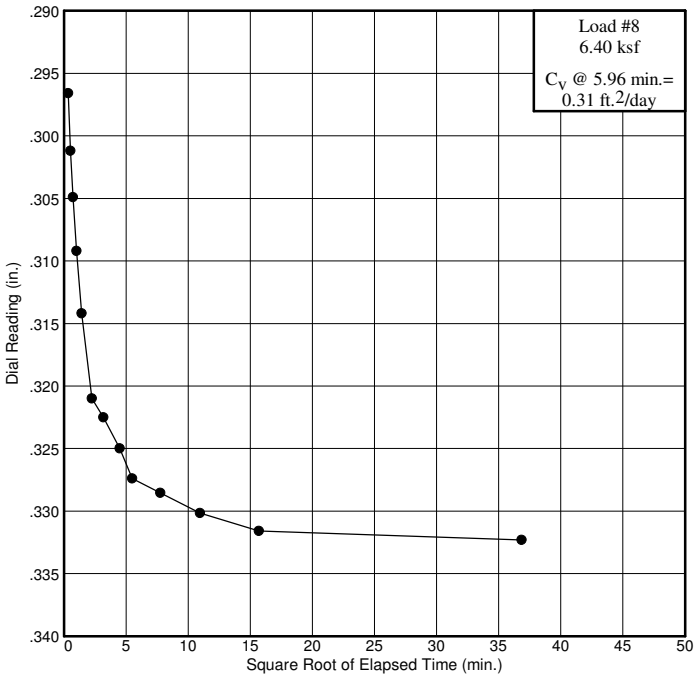
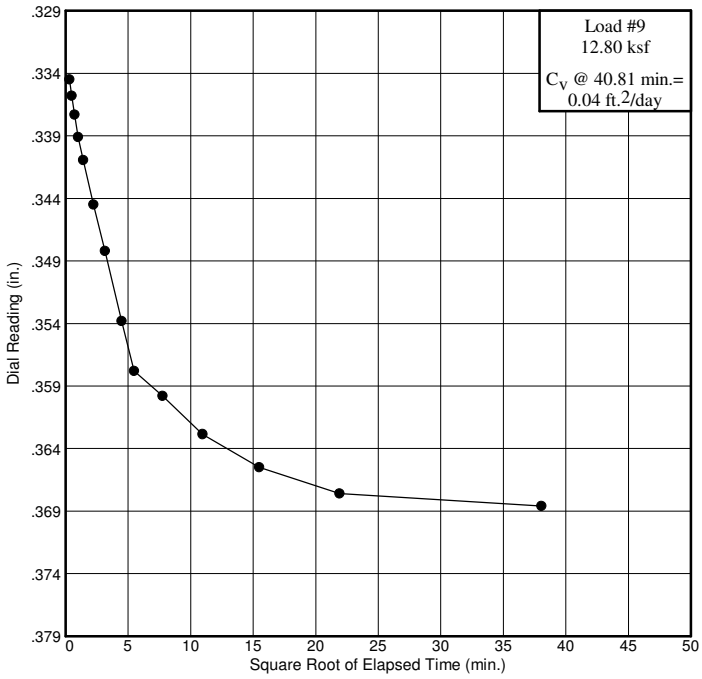
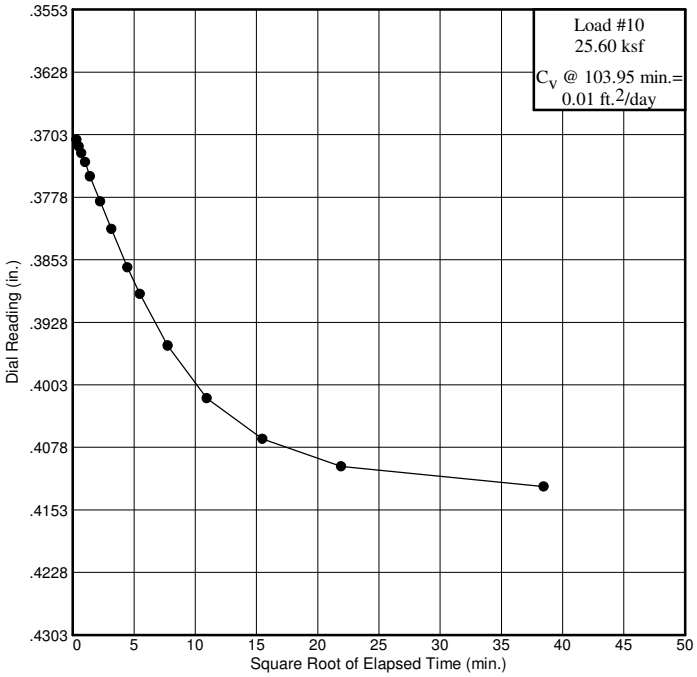
Figure

Dial Reading vs. Time

Project No.: DV108-129/08
Project: I-70 PCL Design Team Requests
Y&A#213-208
Location: YA-EM270 @ 14-16'







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Figure