GEOTECHNICAL EXPLORATION REPORT

Sediment Sampling for Agua Fria River Water Course,
Maricopa County, Arizona

Prepared for:

Kimley-Horn & Associates, Inc.
7600 North 16th Street, Suite 250
Phoenix, Arizona 85020

Prepared by:

Hoque & Associates, Inc.
1797 West University Drive, Suite 167
Tempe, Arizona 85281

Project Number: 00084

May 9, 2001

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HOQUE
& ASSOCIATES Consulting Geotechnical, Materials and Environmental Engineers

May 9, 2001

Mr. Robert Eichinger, P.E.
Project Manager, Kimley-Horn & Associates, Inc.
7600 North 16th Street, Suite 250
Phoenix, Arizona 85020

Subject: Sediment Sampling For Agua Fria River Water Course,
Maricopa County, Arizona

Dear Mr. Eichinger:

Hoque & Associates, Inc. (HA) is pleased to submit this report for the sampling and laboratory testing for the Agua Fria River Water Course in Maricopa County, Arizona (subject site). The sampling and testing was completed in accordance with HA's contract with Kimley-Horn & Associates, Inc. (KHA) and complies with ASTM testing standards. The work was authorized by Mr. Robert Eichinger, P.E. of Kimley-Horn & Associates, Inc. The exploration program completed for the subject site consisted of collecting representative bulk samples of soils from forty-two (42) locations designated by KHA; visual documentation of the site conditions within proximity of each sample location; associated laboratory testing consisting of forty-two (42) particle size analyses and four (4) hydrometer tests; and preparation of this report.

The subject site is located within the Agua Fria watercourse from approximately Southern Avenue to State Route 74 in Maricopa County.

The results of our field exploration and laboratory tests indicate that the soils on-site generally consist of poorly graded sand (SP) with a trace of fines and some cobbles.

HA is available to discuss our sampling, documentation and laboratory testing with you during the design stage and proposed development. If you require any assistance for this project, or require additional studies, we would be gratified to be of service.

1797 W. University Drive • Suite 167 • Tempe, Arizona 85281-3253
Tel: 480-921-1368 • Fax: 480-921-0194 • e-mail: HoqueEng@aol.com

HA appreciates the opportunity to work on your project. If you have any questions, or if we can be of any further assistance, please contact us at (480) 921-1368.

Sincerely
Hoque & Associates, Inc.

Michael Staten, E.I.T.
Project Manager

Enamul Hoque, P.E.
President

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Laboratory Results

1.0 INTODUCTION

1.1 General

Hoque & Associates, Inc. (HA) is pleased to submit this report for the sampling and laboratory testing for the Agua Fria River Water Course in Maricopa County, Arizona (subject site). The sampling and testing was completed in accordance with HA's contract with Kimley-Horn & Associates, Inc. (KHA) and complies with ASTM testing standards. The work was authorized by Mr. Robert Eichinger, P.E. of Kimley-Horn & Associates, Inc. The exploration program completed for the subject site consisted of collecting representative bulk samples of soils from forty-two (42) locations designated by KHA; visual documentation of the site conditions within proximity of each sample location; associated laboratory testing consisting of forty-two (42) particle size analyses and four (4) hydrometer tests; and preparation of this report.

1.2 Purpose and Scope of Work

The purpose of this exploration program was to characterize the site surface and subsurface conditions to estimate scour and lateral migration of the Agua Fria River Channel. To fulfill this purpose, HA has completed the following scope of work:

- Review of the project backgound information and sample location map provided to us by Mr. Robert Eichinger, P.E. of Kimley-Horn & Associates, Inc.;
- Performed a site reconnaissance to document the site conditions that may influence the proposed construction;
- Collected forty-two (42) bulk soil samples extending three (3) feet below the surface from designated locations utilizing manual methods of a pick and shovel;
- Performed laboratory tests to determine some of the physical properties of the soils; and
- Prepared this report.

1.3 Project Background

Information on the proposed project was gathered from Mr. Robert Eichinger, P.E. of Kimley-Horn & Associates, Inc. According to the information received by HA, the project will consist of identifying alternative plans of providing flood mitigation along the Agua Fria River Channel. In addition, the future plan calls for developing linear park and several habitat areas within the 40 mile stretch of the Agua Fria River. The park and habitat area may consist of trails, ramadas, bike/horse paths, parks, lakes or ponds in selected urbanized locations. The sections outside the urbanized areas may be developed for habitat consisting of local and other selected plants.

2.0 SITE CONDITIONS

2.1 Surface Conditions

Information on site conditions were gathered on several occasions from October 18, 2000 to November 10, 2000 by personnel of HA. Observations of the site conditions at the time of sampling were recorded according to KHA#. KHA# refers to the Kimley-Horn bed sample site. KHA maintains a bed material sample location map. The following is a brief description for each sample location:

KHA1 was sampled on 10/18/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Light to medium native vegetation, mostly shrubs and bushes, surrounded the location. The channel was approximately 500 feet in width and 20 feet deep at low points.

KHA2 was sampled on 10/18/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Medium native vegetation, mostly shrubs and bushes with a few trees, surrounded the location. The channel was approximately 400 feet in width and 20 feet deep at low points. A sand island of approximately 100 x 20 x 10 existed to the west of the sample location.

KHA3 was sampled on 10/21/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Medium native vegetation, mostly shrubs and bushes with a few trees, surrounded the location. The channel was approximately 400 feet in width and 20 feet deep at low points. Two sand islands of approximately 50 x 20 x 10 and 40 x 10 x 10 existed near the sample location.

KHA4 was sampled on 10/21/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel and silt, loose and dry to slightly damp. Light native vegetation, some shrubs and one tree, surrounded the location. The channel was approximately 600 feet in width and 15 to 20 feet deep at low points. Evidence of excessive public use and soil disturbance was observed at the channel bottom.

KHA5 was sampled on 10/21/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Light native vegetation, mostly shrubs and bushes, surrounded the location. The channel was approximately 450 feet in width and 15

to 20 feet deep at low points. Evidence of some public use and soil disturbance was observed at the channel bottom.

KHA6 was sampled on 11/2/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown silty sand (SM) with a few fine to medium gravel, trace of cobbles, loose and dry to slightly damp. Sand is mostly fine and medium grained. Light native vegetation, mostly shrubs and bushes, surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1) and constructed of concrete. The channel was relatively flat at the bottom with the low flow channel in the middle.

KHA7 was sampled on 11/2/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with few to some fine and medium gravel, trace to few cobbles and silt, loose and dry to slightly damp. Sand is mostly fine and medium grained. Light native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1) and constructed of concrete. The channel was relatively flat at the bottom with the low flow channel in the middle.

KHA8 was sampled on 10/21/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Medium native vegetation, mostly shrubs and bushes, surrounded the location. Some cobbles and boulders were on the surface. The channel was relatively flat with a width of approximately 400 feet and 15 feet deep at low points. Some pools of water were observed near location.

KHA9 was sampled on 10/20/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Light native vegetation consisting of shrubs and bushes surrounded the location. The channel was approximately 400 feet in width and 15 to 20 feet deep at low points. The side slopes were steep and constructed of concrete.

KHA10 was sampled on 10/20/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown fine to medium grained sand (SP) with a trace of fine gravel, loose and dry to slightly damp. Cobbles and small boulders were observed on the surface of the site. Light native vegetation consisting of shrubs and bushes surrounded the location. The channel was approximately 400 feet in width and 15 to 20 feet deep at low point. The side slopes were steep and constructed of concrete.

KHA11 was sampled on 10/20/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown fine to medium grained sand (SP) with a trace of fine gravel, loose to medium density and slightly damp. Cobbles and small boulders were observed on the surface of the site. Light to medium native vegetation consisting of mostly shrubs and bushes surrounded the location. The channel was approximately 350 feet in width and 15 feet deep at low points. The side slopes were steep and constructed of concrete.

KHA12 was sampled on 11/2/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with few to some fine and medium gravel, few cobbles, trace of silt, loose and dry to slightly damp. Light native vegetation consisting of shrubs, bushes, grasses and a few trees surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1) and constructed of concrete.

KHA13 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand with silt (SP-SM) with few to some fine and medium gravel, few cobbles, loose and dry to slightly damp. Light native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 1000 feet in width and 15 feet deep at low points. The banks were steep (approximately 1:1).

KHA14 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with some fine and medium gravel, few cobbles, trace of silt, loose and dry to slightly damp. Sparce native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 1000 feet in width and 15 feet deep at low points. The banks were steep (approximately 1:1). Evidence of some public use and soil disturbance was observed at the channel bottom.

KHA15 was sampled on 11/2/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium and coarse grained sand and silt (SM) with some fine and medium gravel, few cobbles, loose and dry to slightly damp. Sparce native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1). Evidence of some public use and soil disturbance was observed at the channel bottom.

KHA16 was sampled on 10/25/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location

consisted of a brown, mostly medium grained sand (SP) with some fine and medium gravel, few cobbles, trace of silt, loose and dry to slightly damp. Sparce native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1).

KHA17 was sampled on 11/3/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly fine and medium grained sand (SP) with a trace of fine and medium gravel, trace of cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and few trees surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. The banks were steep (approximately 1:1).

KHA18 was sampled on 11/3/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with a trace of fine gravel, few to some cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and some trees surrounded the location. The channel was approximately 800 feet in width and 25 feet deep at low points. The east bank was steep (more than 1:1), and the west bank is more gentle.

KHA19 was sampled on 10/25/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand with silt (SP-SM) with some fine and medium gravel, few to some cobbles, loose and dry to slightly damp. Heavy native vegetation consisting of shrubs, bushes, grasses and some trees surrounded the location. The channel was approximately 800 feet in width and 30 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA20 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with few fine gravels, few cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and many trees surrounded the location. The channel was approximately 600 feet in width and 40 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA21 was sampled on 10/25/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium and coarse grained sand (SP) with some fine to coarse gravels, some cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and many trees

surrounded the location. The channel was approximately 600 feet in width and 40 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA22 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown, mostly medium grained sand (SP) with few to some fine and medium gravels, some cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and few trees surrounded the location. The channel was approximately 600 feet in width and 30 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA23 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown and gray, mostly fine grained gravel (GP) with some medium and coarse sand, some cobbles, trace of silt, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes and grasses surrounded the location. The channel was approximately 600 feet in width and 30 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA24 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface around the vicinity of the sample location consisted of a brown and gray, mostly fine grained gravel and silt (GP-GM) with some medium and coarse sand, some cobbles, loose and dry to slightly damp. Medium native vegetation consisting of shrubs, bushes, grasses and few trees surrounded the location. The channel was approximately 1000 feet in width and 30 feet deep at low points. The east bank was steep (more than 1:1), and the west bank had a 10 foot steep slope with a gentle slope beyond.

KHA25 was sampled on 10/25/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown medium sand (SP) and gravel with trace of silt, loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 1500 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA26 was sampled on 11/7/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown medium sand (SP) with some gravel with trace of silt, loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 1500 feet in width and

50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA27 was sampled on 11/7/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown fine to coarse gravel with sand and few fines (GP-GM), loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA28 was sampled on 11/7/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, slightly damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA29 was sampled on 11/7/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, slightly damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA30 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, slightly damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA31 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, slightly damp. A large amount of cobbles

were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA32 was sampled on 10/30/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA33 was sampled on 10/30/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA34 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine gravel and trace of fines (SP), loose to medium density, slightly damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope.

KHA35 was sampled on 11/9/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and few fines (SP-SM), loose to medium density, slightly damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope with orange groves on the top.

KHA36 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope with orange groves on the top.

KHA37 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown silt with fine and medium sand and trace of gravel (ML), loose to medium density, moist. A large amount of cobbles were observed on the surface of the site. Light vegetation consisting of grass and occasional mesquite tree surrounded the location. The channel was approximately 2000 feet in width and 50 feet deep at low points. East bank had a steep slope with a variety of cacti on the top, and the west bank had a gentle slope with orange groves on the top.

KHA38 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, fine to medium gravel with fine to coarse sand and few fines (GP-GM), loose to medium density, damp. A large amount of cobbles were observed on the surface of the site. Medium vegetation consisting of grass and mesquite trees surrounded the location. The channel was approximately 1000 feet in width and 20 feet deep at low points. East bank had a steep slope, and the west bank had a medium slope with hilly terrain beyond.

KHA39 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly medium grained sand with fine to medium gravel and trace of fines (SP), loose to medium density, damp. A large amount of cobbles and exposed boulders were observed on the surface of the site. Heavy vegetation consisting of grass and many mesquite trees surrounded the location. The channel was approximately 500 feet in width and 25 feet deep at low points. Both east and west banks had steep slopes with a variety of cacti on the top, and rolling hills beyond. Evidence of some public use and soil disturbance was observed at the channel bottom.

KHA40 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly fine and medium grained sand with fine to medium gravel and few fines (SP-SM), loose to medium density, damp. A large amount of cobbles and exposed boulders were observed on the surface of the site. Medium vegetation consisting of grass, cat tails and mesquite trees surrounded the location. Standing pools of water were also observed in the vicinity. The channel

was approximately 500 feet in width and 30 feet deep at low points. Both east and west banks had vertical rock slopes with rolling hills beyond.

KHA41 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, mostly fine and medium grained sand with few fines and trace of fine gravel (SP-SM), loose to medium density, damp. A large amount of cobbles and exposed boulders were observed on the surface of the site. Medium vegetation consisting of grass, cat tails and mesquite trees surrounded the location. Standing pools of water were also observed in the vicinity. The channel was approximately 500 feet in width and 50 feet deep at low points. Both east and west banks had vertical rock slopes with rolling hills beyond.

KHA42 was sampled on 11/10/00 from the surface to approximately three feet in depth. Material on the surface in close proximity of the sample location consisted of brown, fine and medium grained gravel with medium sand and few fines (GP-GM), loose to medium density, damp to moist. Large boulders and small beds of rock were observed on the surface of the site. Medium vegetation consisting of grass, cat tails and willows surrounded the location. Standing pools of water were also observed in the vicinity. The channel was approximately 500 feet in width and 100 feet deep at low points. Both east and west banks had vertical rock slopes with rolling hills beyond.

2.2 Field Methods

Information on subsurface conditions was collected manually by hand utilizing a shovel from the surface to approximately three feet in depth consistent with the procedures described in the Bureau of Reclamation's, Computing Degradation and Local Scour, January 1984, or the US Army, Corps of Engineers, Sedimentation Investigations of Rivers and Reservoirs, 31 October 1995.

2.3 Subsurface Conditions

Detailed information regarding soil classifications are provided in the appendix of this report. As presented in the appendix, samples collected from the surface to a depth of three feet are classified as brown, damp to moist, poorly graded sand (SP) with trace of fines. Few to some cobbles were also present at certain locations. A saturated condition was not encountered during our exploration.

2.4 Laboratory Tests

The following laboratory tests were performed:

- Particle Size Analyses (ASTM D422)

Samples that contained at least ten percent fines (passing a #200 US standard sieve) were tested for grain size distribution using the hydrometer in accordance with ASTM D422. HA provided laboratory results for each sample reported in tabular and graphical form indicating the sediment material and class size for HEC-6 modeling as required by the project. The tabular form contained amount of soils in several different classification schemes as proposed by KHA's facsimile procedure by the American Geophysical Union's Hydrologic Classification.

3.0 CONCLUSION

Due to the inherent natural variations of the soil and rock stratification and the nature of geotechnical exploration, there is always a possibility that conditions between borings may be different from those encountered at the boring locations.

Appendix

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L424
Location:	KHA1	Date Received :	10/19/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	M. Staten	PI	
Sampled Date :	10/18/00	Proctor	
Submitted by :	M. Staten	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	74.4	Coarse Factor :	0.056742
- #4	1708.4	Fine Factor :	0.177477
Total	1782.8		

Natural Moisture	
Wet WT (g) :	510.00
Dry WT (g):	503.90
% Moisture:	1.2

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	19.0	1	99	
3/8" / 9.5	13.1	1	98	
1/4" / 6.3	28.1	2	97	
No.4 /4.75	14.2	1		
Min #4			96	
+#4 Total	74.4		WBW (Wet):	546.2
-#4: Wet	1708.4		WBW (Dry):	539.7
-#4: Dry	1688		WAW (Dry):	536.3
Total	1762		Elutration:	3.4
#8 /2.36	7.6	1	94	
#10 / 2.00	3.4	1	94	
#15 /1.18	19.3	3	90	
#30 / 0.60	107.2	19	71	
#40/ 0.425	152.8	27	44	
#50 / 0.30	141.2	25	19	
#100 / 0.15	97.5	17	2	
#200 /0.075	6.7	1		
-#200/0.075	0.6		0.7	
Total	536.3			
Elutration	3.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
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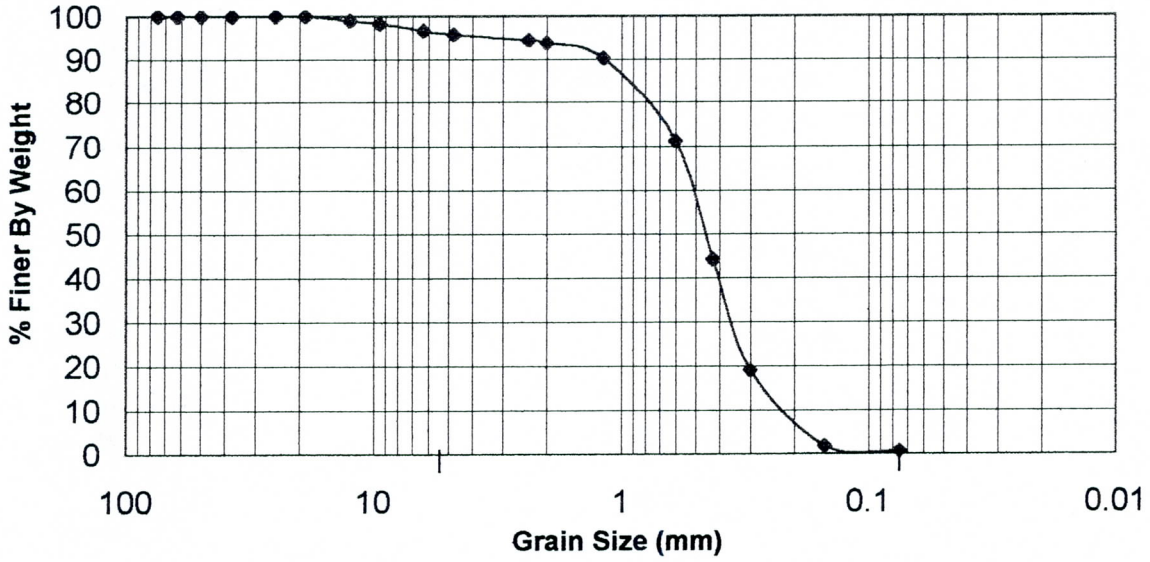
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L424
Location:	KHA1	Date Received :	10/19/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	10.3
1	Very Fine Sand (VFS)	0.125	1%	16.0
2	Fine Sand (FS)	0.25	13%	210.3
3	Medium Sand (MS)	0.5	56%	748.1
4	Coarse Sand (CS)	1	84%	504.3
5	Very Coarse Sand (VCS)	2	94%	164.4
6	Very Fine Gravel (VFG)	4	95%	26.8
7	Fine Gravel (FG)	8	97%	36.7
8	Medium Gravel (MG)	16	100%	36.5
9	Coarse Gravel (CG)	32	100%	8.8
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L425
Location:	KHA2	Date Received :	10/19/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS	PI	
Sampled Date :	10/18/00	Proctor	
Submitted by :	MS	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	17.7	Coarse Factor :	0.047472
- #4	2153.4	Fine Factor :	0.183038
Total	2171.1		

Natural Moisture	
Wet WT (g) :	300.00
Dry WT (g):	291.00
% Moisture:	3.1

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	7.1	0	100	
3/8" / 9.5	0.0	0	100	
1/4" / 6.3	4.5	0	99	
No.4 /4.75	6.1	0		
Min #4			99	
+#4 Total	17.7		WBW (Wet):	558.5
-#4: Wet	2153.4		WBW (Dry):	541.7
-#4: Dry	2089		WAW (Dry):	522.5
Total	2106		Elutration:	19.2
#8 /2.36	6.8	1	98	
#10 / 2.00	4.2	1	97	
#15 /1.18	16.7	3	94	
#30 / 0.60	59.3	11	83	
#40/ 0.425	81.5	15	68	
#50 / 0.30	115.5	21	47	
#100 / 0.15	177.9	33	15	
#200 /0.075	55.8	10		
-#200/0.075	4.8		4.4	
Total	522.5			
Elutration	19.2			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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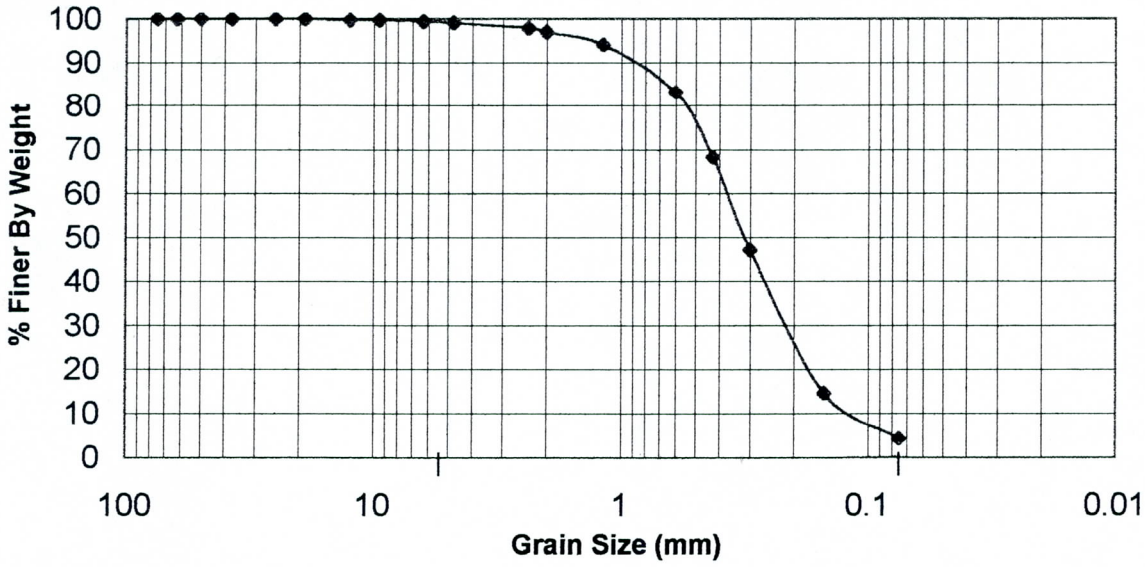
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L425
Location:	KHA2	Date Received :	10/19/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	77.3
1	Very Fine Sand (VFS)	0.125	11%	158.9
2	Fine Sand (FS)	0.25	36%	529.0
3	Medium Sand (MS)	0.5	75%	808.6
4	Coarse Sand (CS)	1	91%	337.2
5	Very Coarse Sand (VCS)	2	97%	135.3
6	Very Fine Gravel (VFG)	4	99%	34.0
7	Fine Gravel (FG)	8	100%	16.9
8	Medium Gravel (MG)	16	100%	5.9
9	Coarse Gravel (CG)	32	100%	3.3
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L435
Location:	KHA03	Date Received :	10/23/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS	PI	
Sampled Date :	10/21/00	Proctor	
Submitted by :	MS	Test Dates :	10/23/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	318.4	Coarse Factor :	0.011177
- #4	8855.6	Fine Factor :	0.191525
Total	9174.0		

Natural Moisture	
Wet WT (g) :	358.70
Dry WT (g):	349.50
% Moisture:	2.6

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	14.7	0	100	
3/8" / 9.5	48.9	1	99	
1/4" / 6.3	137.4	2	98	
No.4 /4.75	117.4	1		
Min #4			96	
+#4 Total	318.4		WBW (Wet):	516.8
-#4: Wet	8855.6		WBW (Dry):	503.5
-#4: Dry	8628		WAW (Dry):	496.4
Total	8947		Elutration:	7.1
#8 /2.36	18.8	4	93	
#10 / 2.00	11.3	2	91	
#15 /1.18	51.9	10	81	
#30 / 0.60	129.7	25	56	
#40/ 0.425	114.2	22	34	
#50 / 0.30	99.8	19	15	
#100 / 0.15	67.3	13	2	
#200 /0.075	3.2	1		
-#200/0.075	0.2		1.4	
Total	496.4			
Elutration	7.1			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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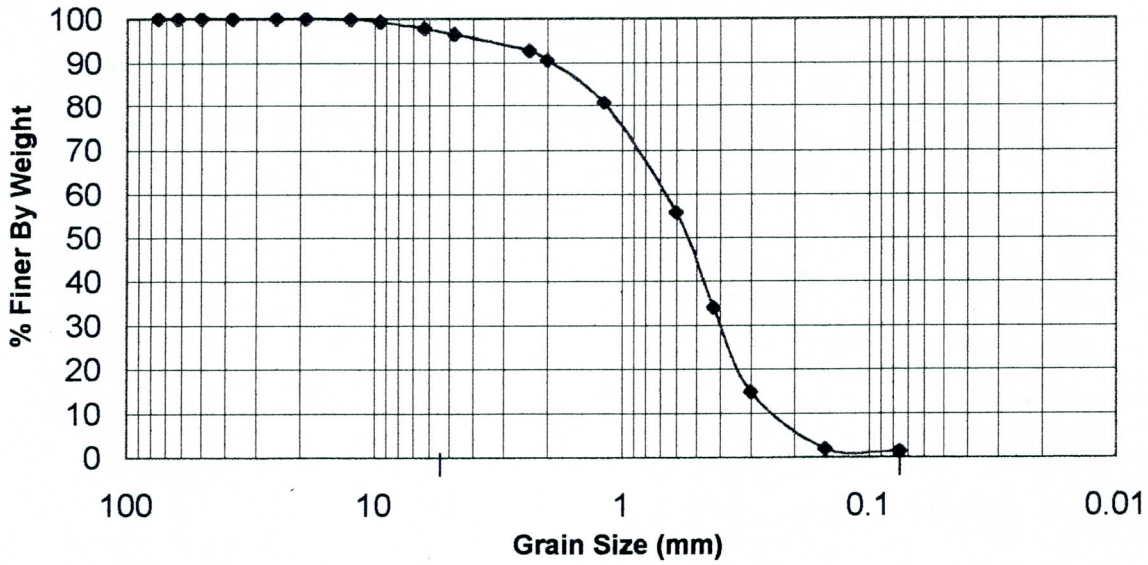
Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L435
Location:	KHA03	Date Received :	10/23/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	104.9
1	Very Fine Sand (VFS)	0.125	2%	57.5
2	Fine Sand (FS)	0.25	11%	787.1
3	Medium Sand (MS)	0.5	43%	2933.2
4	Coarse Sand (CS)	1	73%	2650.9
5	Very Coarse Sand (VCS)	2	91%	1579.1
6	Very Fine Gravel (VFG)	4	95%	412.9
7	Fine Gravel (FG)	8	99%	293.3
8	Medium Gravel (MG)	16	100%	121.2
9	Coarse Gravel (CG)	32	100%	6.8
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L436
Location:	KHA04	Date Received :	10/23/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS	PI	
Sampled Date :	10/21/00	Proctor	
Submitted by :	MS	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	12.6	Coarse Factor :	0.010763
- #4	9405.3	Fine Factor :	0.190853
Total	9417.9		

Natural Moisture	
Wet WT (g) :	445.20
Dry WT (g):	439.20
% Moisture:	1.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	0.0	0	100	
3/8" / 9.5	0.0	0	100	
1/4" / 6.3	3.6	0	100	
No.4 /4.75	9.0	0		
Min #4			100	
+#4 Total	12.6		WBW (Wet):	530.4
-#4: Wet	9405.3		WBW (Dry):	523.3
-#4: Dry	9279		WAW (Dry):	500.1
Total	9291		Elutration:	23.2
#8 /2.36	4.4	1	99	
#10 / 2.00	2.8	1	98	
#15 /1.18	25.7	5	94	
#30 / 0.60	133.7	26	68	
#40/ 0.425	147.1	28	40	
#50 / 0.30	127.6	24	16	
#100 / 0.15	55.5	11	5	
#200 /0.075	3.1	1		
-#200/0.075	0.2		4.5	
Total	500.1			
Elutration	23.2			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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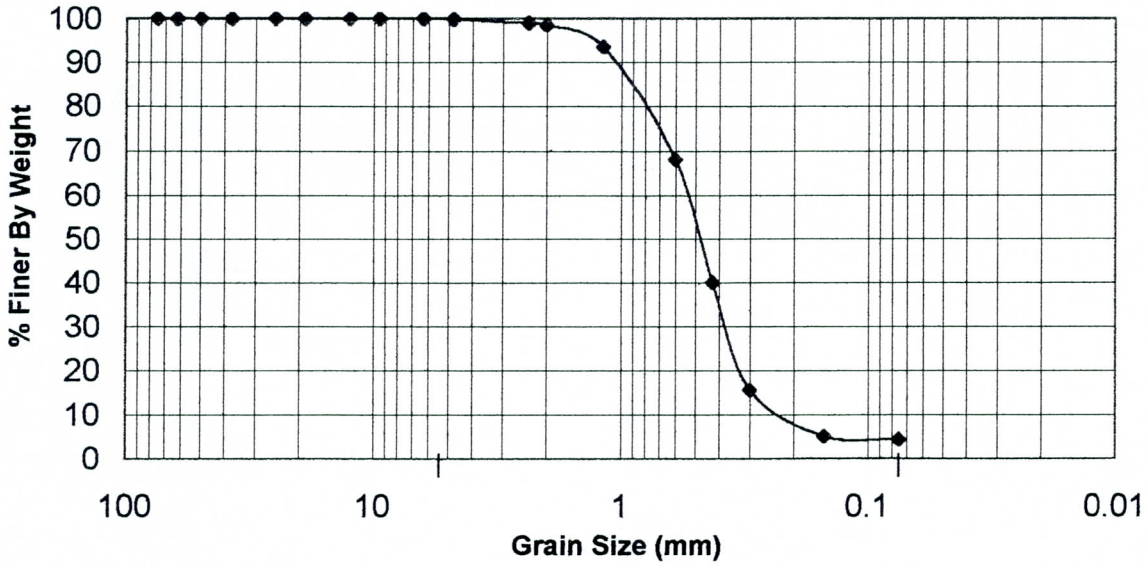
Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L436
Location:	KHA04	Date Received :	10/23/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	345.1
1	Very Fine Sand (VFS)	0.125	5%	105.7
2	Fine Sand (FS)	0.25	12%	674.4
3	Medium Sand (MS)	0.5	52%	3708.6
4	Coarse Sand (CS)	1	86%	3125.6
5	Very Coarse Sand (VCS)	2	98%	1191.5
6	Very Fine Gravel (VFG)	4	100%	102.7
7	Fine Gravel (FG)	8	100%	35.8
8	Medium Gravel (MG)	16	100%	1.7
9	Coarse Gravel (CG)	32	100%	0.0
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L437
Location:	KHA05	Date Received :	10/23/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS	PI	
Sampled Date :	10/21/00	Proctor	
Submitted by :	MS	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	148.9	Coarse Factor :	0.013868
- #4	7370.3	Fine Factor :	0.19744
Total	7519.2		

Natural Moisture	
Wet WT (g) :	365.40
Dry WT (g):	350.10
% Moisture:	4.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	49.2	1	99	
1/2"/12.5	27.0	0	99	
3/8" / 9.5	21.8	0	99	
1/4" / 6.3	27.6	0	98	
No.4 /4.75	23.3	0		
Min #4			98	
+#4 Total	148.9		WBW (Wet):	517.7
-#4: Wet	7370.3		WBW (Dry):	496.0
-#4: Dry	7062		WAW (Dry):	456.5
Total	7211		Elutration:	39.5
#8 /2.36	11.1	2	96	
#10 / 2.00	2.8	1	95	
#15 /1.18	16.8	3	92	
#30 / 0.60	64.8	13	79	
#40/ 0.425	73.7	15	65	
#50 / 0.30	87.5	17	47	
#100 / 0.15	158.9	31	16	
#200 /0.075	40.6	8		
-#200/0.075	0.3		7.9	
Total	456.5			
Elutration	39.5			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
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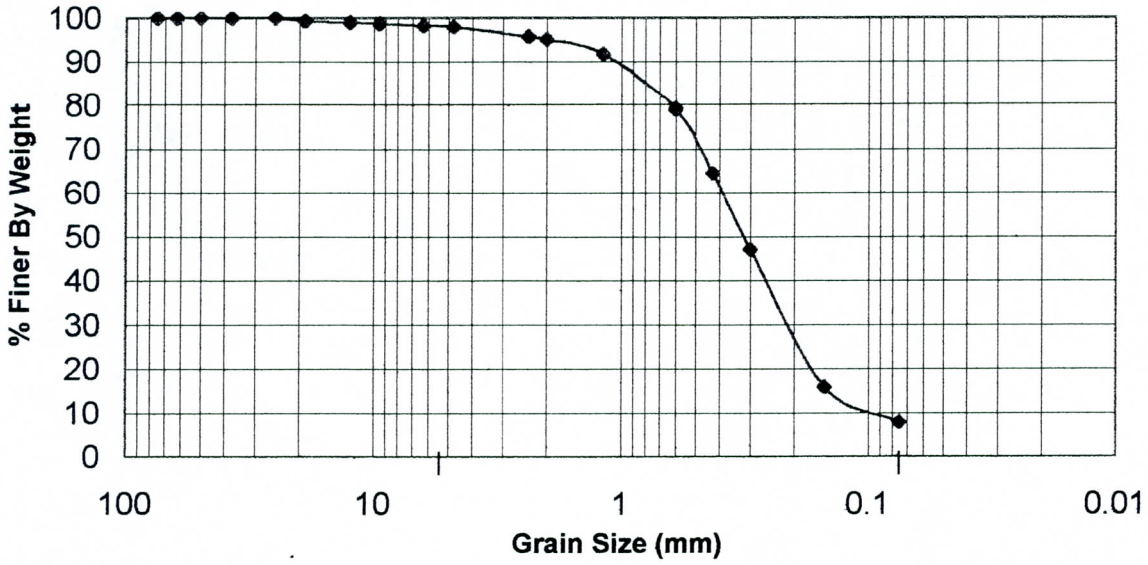
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L437
Location:	KHA05	Date Received :	10/23/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	7%	472.5
1	Very Fine Sand (VFS)	0.125	13%	479.8
2	Fine Sand (FS)	0.25	37%	1700.8
3	Medium Sand (MS)	0.5	71%	2449.4
4	Coarse Sand (CS)	1	88%	1235.8
5	Very Coarse Sand (VCS)	2	95%	525.5
6	Very Fine Gravel (VFG)	4	97%	147.4
7	Fine Gravel (FG)	8	98%	88.5
8	Medium Gravel (MG)	16	99%	49.3
9	Coarse Gravel (CG)	32	100%	61.7
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L453
Location:	KHA6	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/2/00	Proctor	
Submitted by :	CC	Test Dates :	11/6/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	727.8	Coarse Factor :	0.012463
- #4	7789.9	Fine Factor :	0.182763
Total	8517.7		

Natural Moisture	
Wet WT (g) :	394.40
Dry WT (g):	369.40
% Moisture:	6.8

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	148.2	2	98	
3/4" / 19	74.4	1	97	
1/2"/12.5	112.2	1	96	
3/8" / 9.5	112.6	1	94	
1/4" / 6.3	159.5	2	92	
No.4 /4.75	120.9	2		
Min #4			91	
+#4 Total	727.8		WBW (Wet):	531.2
-#4: Wet	7789.9		WBW (Dry):	497.5
-#4: Dry	7296		WAW (Dry):	428.3
Total	8024		Elutration:	69.2
#8 /2.36	19.7	4	87	
#10 / 2.00	8.5	2	86	
#15 /1.18	40.9	7	78	
#30 / 0.60	89.5	16	62	
#40/ 0.425	67.4	12	50	
#50 / 0.30	74.1	14	36	
#100 / 0.15	95.8	18	19	
#200 /0.075	29.1	5		
-#200/0.075	3.3		13.3	
Total	428.3			
Elutration	69.2			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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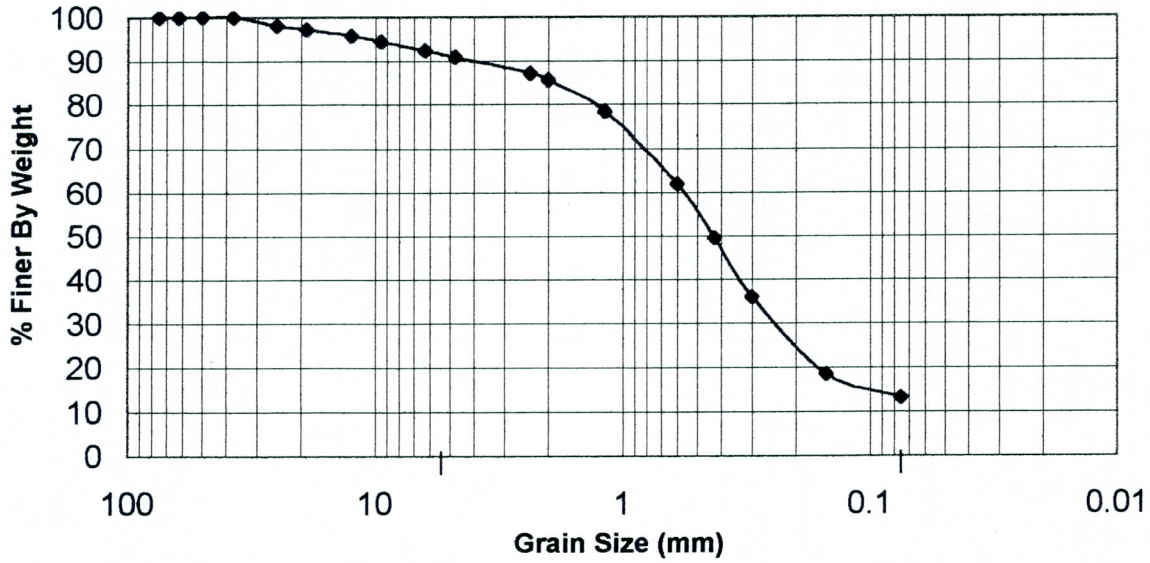
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L453
Location:	KHA6	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	11%	886.3
1	Very Fine Sand (VFS)	0.125	17%	461.8
2	Fine Sand (FS)	0.25	30%	1078.8
3	Medium Sand (MS)	0.5	55%	1978.6
4	Coarse Sand (CS)	1	73%	1470.0
5	Very Coarse Sand (VCS)	2	86%	1007.1
6	Very Fine Gravel (VFG)	4	90%	321.2
7	Fine Gravel (FG)	8	93%	297.9
8	Medium Gravel (MG)	16	97%	247.8
9	Coarse Gravel (CG)	32	99%	209.2
10	Very Coarse Gravel (VCG)	64	100%	65.2

WORKSHEET ****HYDROMETER ANALYSIS****

Project Name: Agua Fria Flood Control

Project No:

Date: 6-Dec-00

Sample Source: KHA6

Sampled By: Client

Sample Date: 2-Nov

Lab No: 6063

Specific Gravity: 2.70

Init. Wt. Of Sample: 71.55

W = 77.1

a = 0.99

Composite Correction : 0.003

% Passing #10: 92.8

Elapsed Time(min)	Temperature F	C	Hydro Reading	L (cm)	K	Particle Dia.(mm)	Percent Passing
		-17.77777778		280.8110931			-1358.253397
2	62.6	17.0	1.011	13.385	0.014013	0.0363	16.5
5	62.6	17.0	1.01	13.650	0.013779	0.0228	14.4
15	64.4	18.0	1.009	13.914	0.013578	0.0131	12.4
30	66.2	19.0	1.008	14.179	0.013391	0.0092	10.3
60	68	20.0	1.006	14.708	0.013216	0.0065	6.2
250	71.6	22.0	1.006	14.708	0.012896	0.0031	6.2
1440	73.4	23.0	1.004	15.237	0.012749	0.0013	2.1
					#DIV/0!	#DIV/0!	-2065.2

wet wt	dry wt	wt container	moisture
57.21	57.09	14.8	0.283755025

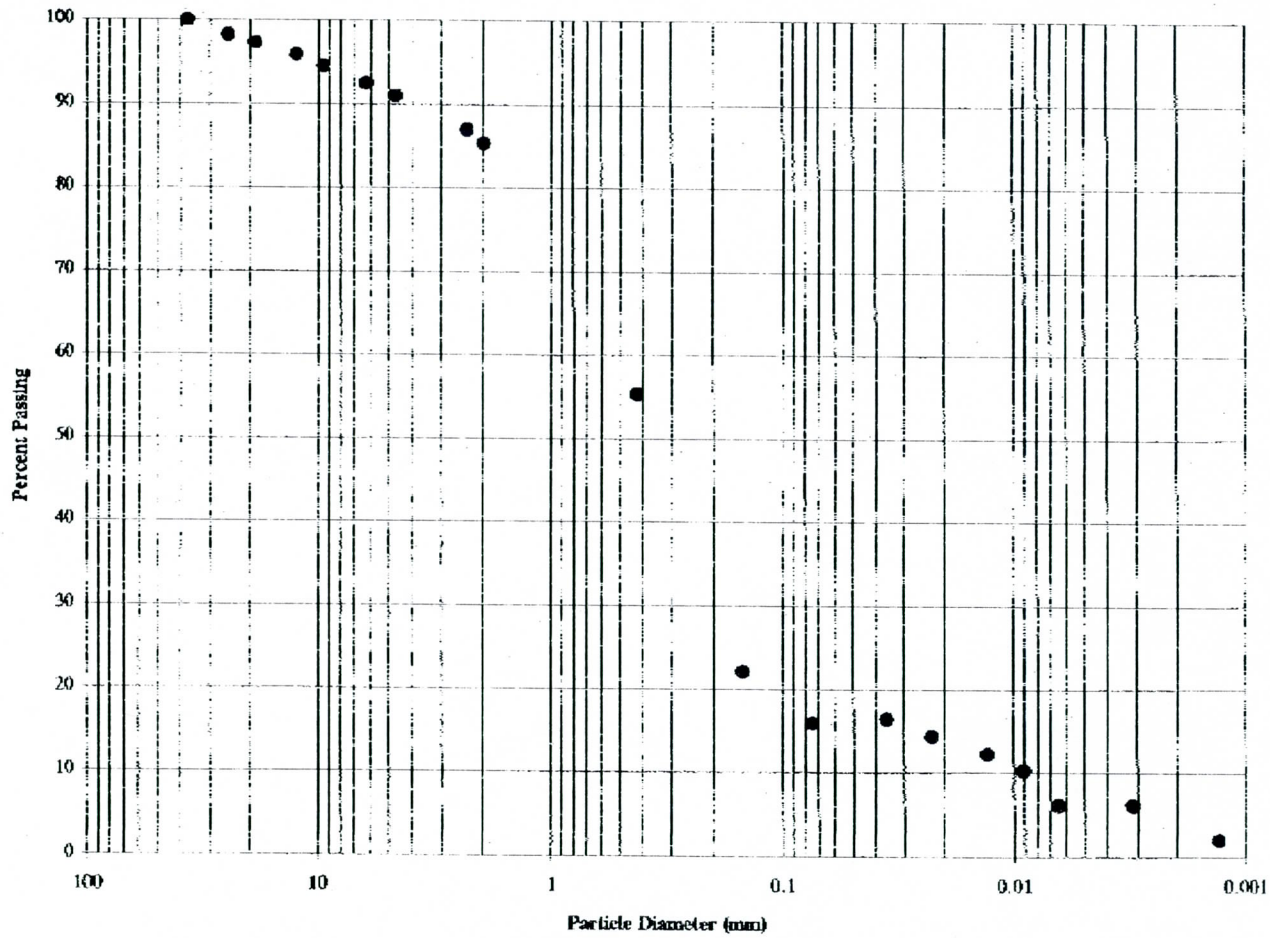
sieve	wt. ret	%ret	%pass
2"			100.0
1-1/2"			100.0
1"		1.8	98.2
3/4"		0.9	97.3
1/2"		1.4	95.9
3/8"		1.4	94.5
1/4"		2.0	92.5
#4		1.5	91.0
#8		4.0	87.0
#10		1.6	85.4
total+10		wbw(w)	71.75
pass 10 ww		wbw(d)	71.55
pass 10 dw		waw	58.36
total wt		elut	13.19
#16			85.4
#30			85.4
#40	25.1	30.0	55.4
#50			55.4
#100	27.9	33.3	22.1
#200	5.11	6.1	16.0
pass#200	0.21	16.0	
	58.32	100.0	

Specific Gravity

wt pycnometer	57		84.42
wt sample	38.44		temperature
wt pyc + water	156.46		27
wt pyc,H2O, sample	180.7		27
rel dens =	0.9965451	at	27
rel dens =	0.9965451	at	27
k =	0.9983	at	27
W_s =	156.46		
Sp. Gr =	2.707	at	27
Sp. Gr. =	2.702	at	20

PARTICLE-SIZE ANALYSIS TEST RESULTS

(ASTM D422)



Sample Source:

KHA6

Specific Gravity:

2.70 @ 20 deg. C

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L454
Location:	KHA7	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/2/00	Proctor	
Submitted by :	CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	1492.7	Coarse Factor :	0.011902
- #4	7421.9	Fine Factor :	0.170961
Total	8914.6		

Natural Moisture	
Wet WT (g) :	185.30
Dry WT (g):	172.50
% Moisture:	7.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	181.9	2	98	
3/4" / 19	162.8	2	96	
1/2"/12.5	341.0	4	92	
3/8" / 9.5	243.1	3	89	
1/4" / 6.3	342.5	4	85	
No.4 /4.75	221.4	3		
Min #4			82	
+#4 Total	1492.7		WBW (Wet):	516.7
-#4: Wet	7421.9		WBW (Dry):	481.0
-#4: Dry	6909		WAW (Dry):	464.0
Total	8402		Elutration:	17.0
#8 /2.36	11.6	2	80	
#10 / 2.00	9.3	2	79	
#15 /1.18	55.8	10	69	
#30 / 0.60	143.9	25	45	
#40/ 0.425	96.1	16	28	
#50 / 0.30	77.3	13	15	
#100 / 0.15	59.5	10	5	
#200 /0.075	9.3	2		
-#200/0.075	1.2		3.1	
Total	464			
Elutration	17.0			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

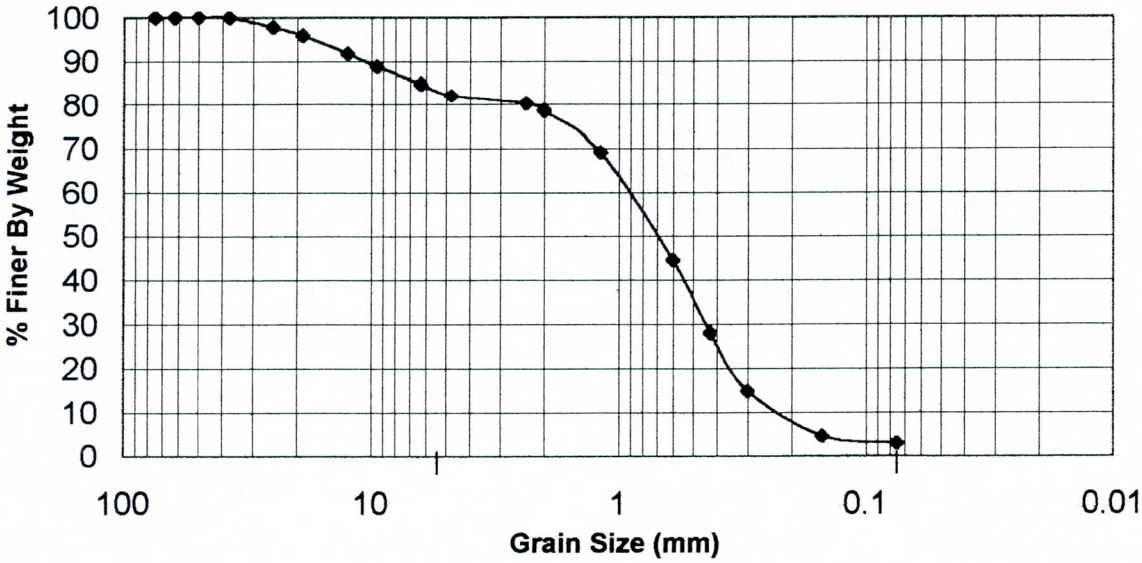
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L454
Location:	KHA7	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	3%	217.9
1	Very Fine Sand (VFS)	0.125	4%	132.6
2	Fine Sand (FS)	0.25	11%	614.3
3	Medium Sand (MS)	0.5	35%	1986.8
4	Coarse Sand (CS)	1	61%	2214.3
5	Very Coarse Sand (VCS)	2	79%	1443.0
6	Very Fine Gravel (VFG)	4	82%	247.0
7	Fine Gravel (FG)	8	87%	456.6
8	Medium Gravel (MG)	16	94%	587.3
9	Coarse Gravel (CG)	32	99%	422.0
10	Very Coarse Gravel (VCG)	64	100%	80.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L438
Location:	KHA08	Date Received :	10/23/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS	PI	
Sampled Date :	10/21/00	Proctor	
Submitted by :	MS	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	33.7	Coarse Factor :	0.01782
- #4	5782.4	Fine Factor :	0.187692
Total	5816.1		

Natural Moisture	
Wet WT (g) :	432.70
Dry WT (g):	417.40
% Moisture:	3.7

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	7.0	0	100	
3/8" / 9.5	9.8	0	100	
1/4" / 6.3	10.9	0	100	
No.4 /4.75	6.0	0		
Min #4			99	
+#4 Total	33.7		WBW (Wet):	549.0
-#4: Wet	5782.4		WBW (Dry):	529.6
-#4: Dry	5578		WAW (Dry):	519.0
Total	5612		Elutration:	10.6
#8 /2.36	6.6	1	98	
#10 / 2.00	2.5	0	98	
#15 /1.18	26.6	5	93	
#30 / 0.60	153.7	29	64	
#40/ 0.425	150.2	28	36	
#50 / 0.30	115.0	22	14	
#100 / 0.15	62.4	12	2	
#200 /0.075	1.6	0		
-#200/0.075	0.4		2.1	
Total	519			
Elutration	10.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

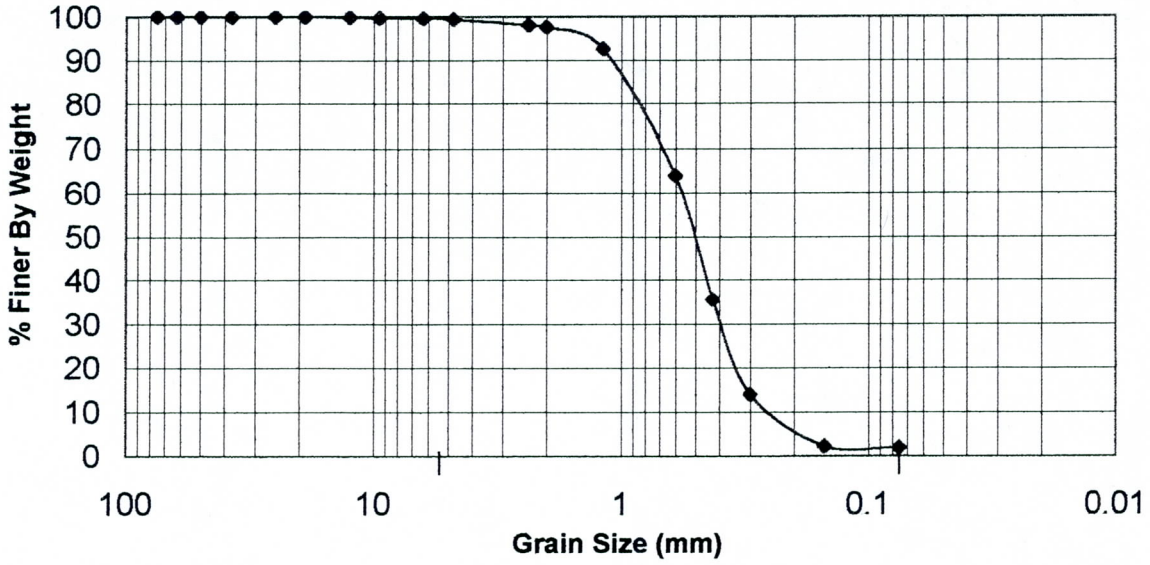
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L438
Location:	KHA08	Date Received :	10/23/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	2%	96.4
1	Very Fine Sand (VFS)	0.125	2%	30.5
2	Fine Sand (FS)	0.25	10%	443.8
3	Medium Sand (MS)	0.5	48%	2108.3
4	Coarse Sand (CS)	1	84%	2020.5
5	Very Coarse Sand (VCS)	2	98%	782.6
6	Very Fine Gravel (VFG)	4	99%	73.6
7	Fine Gravel (FG)	8	100%	34.0
8	Medium Gravel (MG)	16	100%	18.7
9	Coarse Gravel (CG)	32	100%	3.2
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES

Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L432
Location:	KHA9	Date Received :	10/20/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS/CC	PI	
Sampled Date :	10/20/00	Proctor	
Submitted by :	MS/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	409.3	Coarse Factor :	0.009585
- #4	10197.1	Fine Factor :	0.180024
Total	10606.4		

Natural Moisture	
Wet WT (g) :	341.90
Dry WT (g):	336.10
% Moisture:	1.7

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	3.4	0	100	
3/8" / 9.5	45.7	0	100	
1/4" / 6.3	171.0	2	98	
No.4 /4.75	189.2	2		
Min #4			96	
+#4 Total	409.3		WBW (Wet):	542.9
-#4: Wet	10197.1		WBW (Dry):	533.7
-#4: Dry	10024		WAW (Dry):	524.0
Total	10433		Elutration:	9.7
#8 /2.36	41.6	7	89	
#10 / 2.00	17.1	3	86	
#15 /1.18	80.3	14	71	
#30 / 0.60	147.1	26	45	
#40/ 0.425	96.2	17	27	
#50 / 0.30	84.7	15	12	
#100 / 0.15	54.8	10	2	
#200 /0.075	2.1	0		
-#200/0.075	0.1		1.8	
Total	524			
Elutration	9.7			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

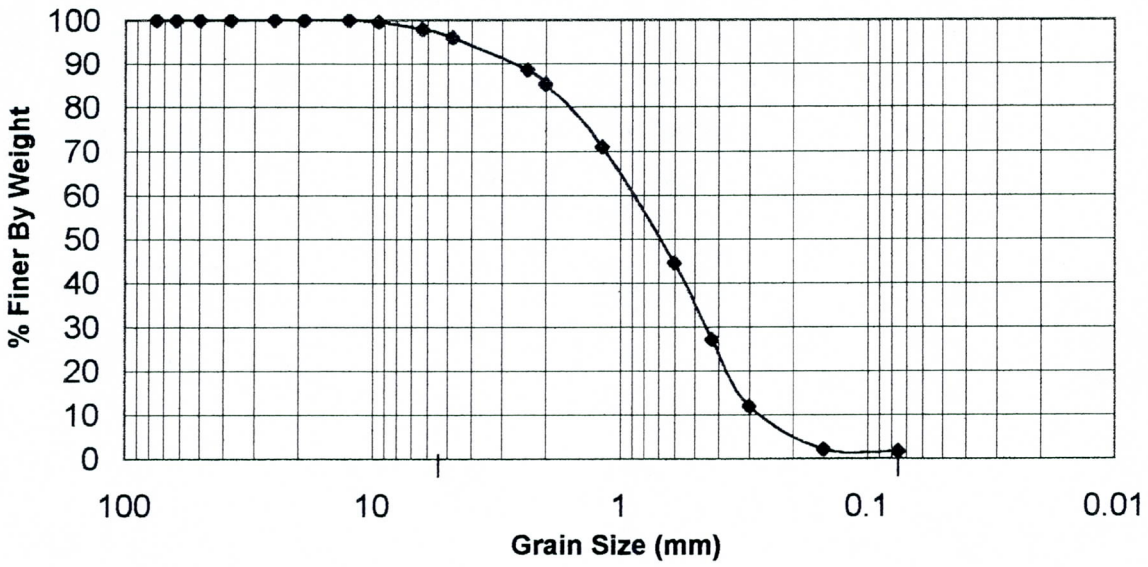
BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR

Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L432
Location:	KHA9	Date Received :	10/20/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	153.2
1	Very Fine Sand (VFS)	0.125	2%	56.9
2	Fine Sand (FS)	0.25	9%	699.3
3	Medium Sand (MS)	0.5	35%	2708.4
4	Coarse Sand (CS)	1	63%	2938.0
5	Very Coarse Sand (VCS)	2	86%	2365.7
6	Very Fine Gravel (VFG)	4	94%	852.9
7	Fine Gravel (FG)	8	99%	529.7
8	Medium Gravel (MG)	16	100%	127.7
9	Coarse Gravel (CG)	32	100%	1.6
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L433
Location:	KHA10	Date Received :	10/20/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS/CC	PI	
Sampled Date :	10/20/00	Proctor	
Submitted by :	MS/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	80.4	Coarse Factor :	0.011921
- #4	8466	Fine Factor :	0.190601
Total	8546.4		

Natural Moisture	
Wet WT (g) :	327.20
Dry WT (g):	321.10
% Moisture:	1.9

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	0.0	0	100	
3/8" / 9.5	4.3	0	100	
1/4" / 6.3	29.1	0	100	
No.4 /4.75	47.0	1		
Min #4			99	
+#4 Total	80.4		WBW (Wet):	529.5
-#4: Wet	8466		WBW (Dry):	519.6
-#4: Dry	8308		WAW (Dry):	513.7
Total	8389		Elutration:	5.9
#8 /2.36	17.2	3	96	
#10 / 2.00	10.0	2	94	
#15 /1.18	61.7	12	82	
#30 / 0.60	172.0	33	49	
#40/ 0.425	123.8	24	26	
#50 / 0.30	81.6	16	10	
#100 / 0.15	45.4	9	2	
#200 /0.075	2.0	0		
-#200/0.075	0.0		1.1	
Total	513.7			
Elutration	5.9			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

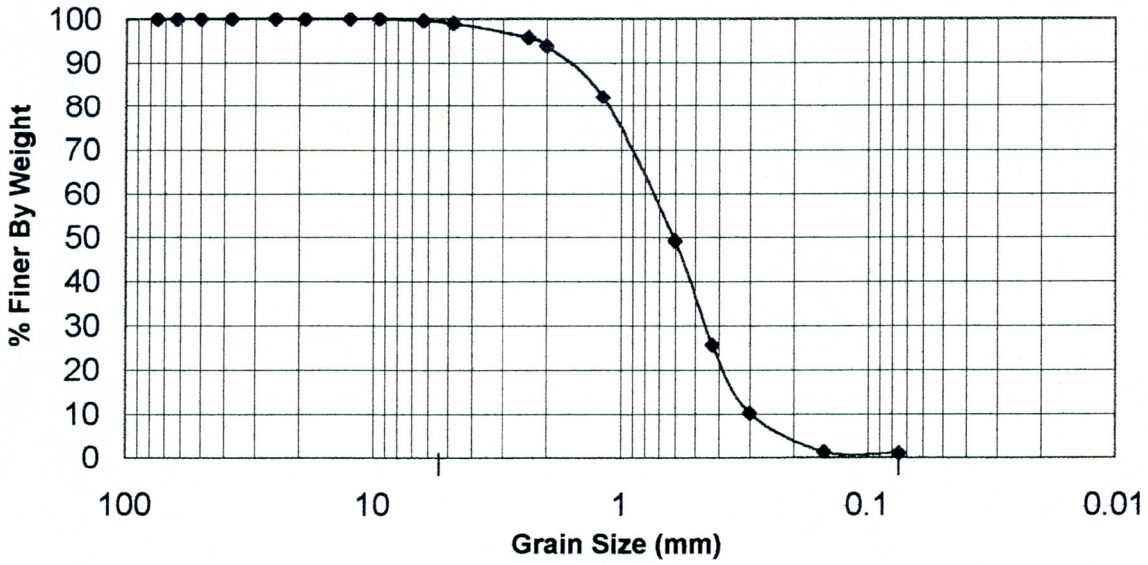
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L433
Location:	KHA10	Date Received :	10/20/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	79.0
1	Very Fine Sand (VFS)	0.125	1%	37.1
2	Fine Sand (FS)	0.25	7%	494.6
3	Medium Sand (MS)	0.5	36%	2395.0
4	Coarse Sand (CS)	1	72%	3027.7
5	Very Coarse Sand (VCS)	2	94%	1840.0
6	Very Fine Gravel (VFG)	4	98%	347.0
7	Fine Gravel (FG)	8	100%	150.3
8	Medium Gravel (MG)	16	100%	17.9
9	Coarse Gravel (CG)	32	100%	0.0
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L434
Location:	KHA11	Date Received :	10/20/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	MS/CC	PI	
Sampled Date :	10/20/00	Proctor	
Submitted by :	MS/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	482.1	Coarse Factor :	0.010756
- #4	8884.5	Fine Factor :	0.172175
Total	9366.6		

Natural Moisture	
Wet WT (g) :	437.50
Dry WT (g):	434.10
% Moisture:	0.8

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	11.4	0	100	
1/2"/12.5	51.2	1	99	
3/8" / 9.5	108.0	1	98	
1/4" / 6.3	182.1	2	96	
No.4 /4.75	129.4	1		
Min #4			95	
+#4 Total	482.1		WBW (Wet):	555.0
-#4: Wet	8884.5		WBW (Dry):	550.7
-#4: Dry	8815		WAW (Dry):	533.2
Total	9298		Elutration:	17.5
#8 /2.36	19.7	3	91	
#10 / 2.00	10.7	2	90	
#15 /1.18	62.0	11	79	
#30 / 0.60	142.1	24	54	
#40/ 0.425	100.0	17	37	
#50 / 0.30	90.7	16	22	
#100 / 0.15	98.3	17	5	
#200 /0.075	9.6	2		
-#200/0.075	0.1		3.0	
Total	533.2			
Elutration	17.5			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

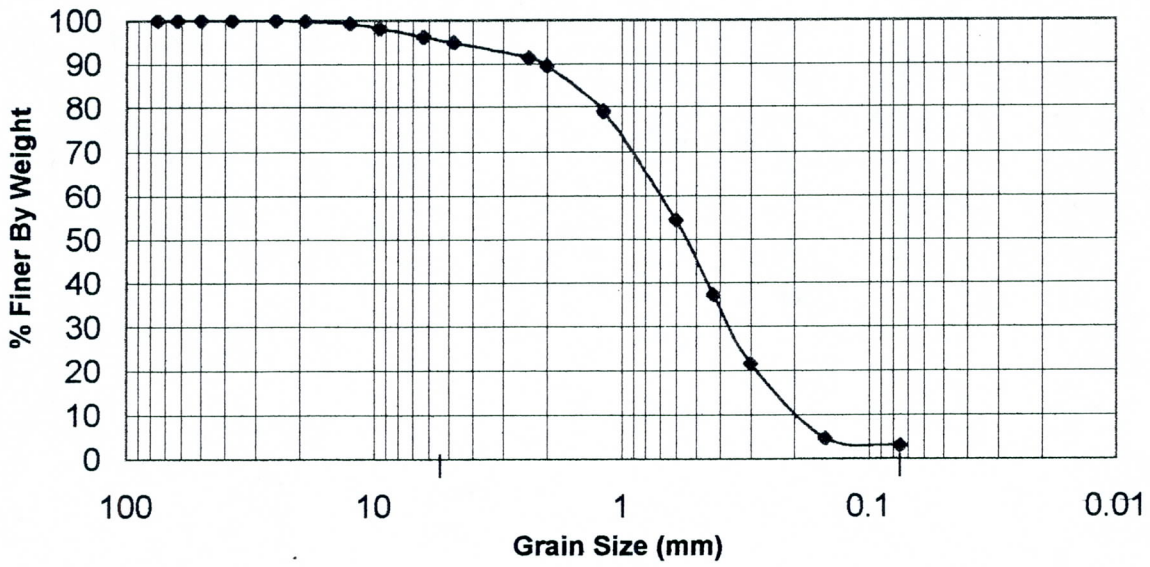
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L434
Location:	KHA11	Date Received :	10/20/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	3%	234.6
1	Very Fine Sand (VFS)	0.125	4%	149.4
2	Fine Sand (FS)	0.25	16%	1100.3
3	Medium Sand (MS)	0.5	45%	2662.5
4	Coarse Sand (CS)	1	71%	2483.5
5	Very Coarse Sand (VCS)	2	90%	1698.5
6	Very Fine Gravel (VFG)	4	94%	385.9
7	Fine Gravel (FG)	8	97%	326.9
8	Medium Gravel (MG)	16	100%	220.9
9	Coarse Gravel (CG)	32	100%	35.0
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L455
Location:	KHA12	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/2/00	Proctor	
Submitted by :	CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	1138.5	Coarse Factor :	0.014229
- #4	6009	Fine Factor :	0.151551
Total	7147.5		

Natural Moisture	
Wet WT (g) :	416.70
Dry WT (g):	414.70
% Moisture:	0.5

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	153.0	2	98	
1" / 25	79.8	1	97	
3/4" / 19	96.5	1	95	
1/2"/12.5	121.8	2	94	
3/8" / 9.5	155.8	2	91	
1/4" / 6.3	254.2	4	88	
No.4 /4.75	186.4	3		
Min #4			85	
+#4 Total	1047.5		WBW (Wet):	564.2
-#4: Wet	6009		WBW (Dry):	561.5
-#4: Dry	5980		WAW (Dry):	533.4
Total	7028		Elutration:	28.1
#8 /2.36	31.1	5	80	
#10 / 2.00	15.3	2	78	
#15 /1.18	73.5	11	67	
#30 / 0.60	149.3	23	44	
#40/ 0.425	97.9	15	29	
#50 / 0.30	74.5	11	18	
#100 / 0.15	70.1	11	8	
#200 /0.075	19.6	3		
-#200/0.075	2.1		4.6	
Total	533.4			
Elutration	28.1			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

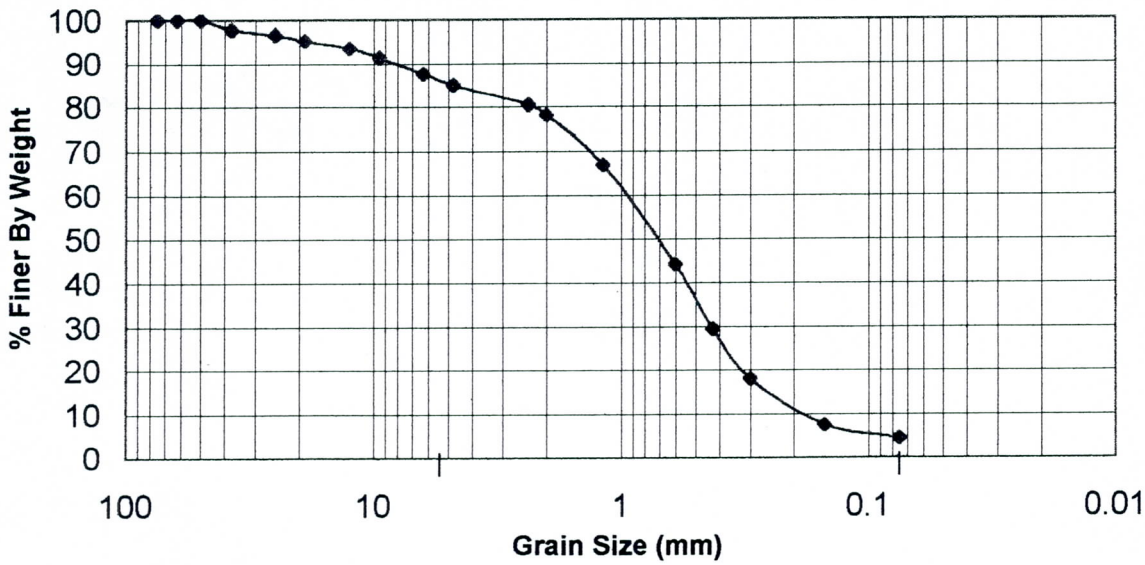
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L455
Location:	KHA12	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	268.0
1	Very Fine Sand (VFS)	0.125	7%	192.8
2	Fine Sand (FS)	0.25	15%	567.3
3	Medium Sand (MS)	0.5	36%	1489.2
4	Coarse Sand (CS)	1	60%	1692.5
5	Very Coarse Sand (VCS)	2	78%	1276.3
6	Very Fine Gravel (VFG)	4	84%	388.4
7	Fine Gravel (FG)	8	90%	427.3
8	Medium Gravel (MG)	16	95%	340.5
9	Coarse Gravel (CG)	32	97%	197.4
10	Very Coarse Gravel (VCG)	64	100%	188.1

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L466
Location:	KHA13	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	2141.2	Coarse Factor :	0.006685
- #4	13030.9	Fine Factor :	0.156816
Total	15172.1		

Natural Moisture	
Wet WT (g) :	427.80
Dry WT (g):	420.80
% Moisture:	1.7

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	158.2	1	99	
1" / 25	732.7	5	94	
3/4" / 19	246.1	2	92	
1/2"/12.5	318.2	2	90	
3/8" / 9.5	225.0	2	89	
1/4" / 6.3	248.4	2	87	
No.4 /4.75	212.6	1		
Min #4			86	
+#4 Total	2141.2		WBW (Wet):	555.5
-#4: Wet	13030.9		WBW (Dry):	546.4
-#4: Dry	12818		WAW (Dry):	513.7
Total	14959		Elutration:	32.7
#8 /2.36	26.6	4	82	
#10 / 2.00	14.4	2	79	
#15 /1.18	92.1	14	65	
#30 / 0.60	222.0	35	30	
#40/ 0.425	86.5	14	16	
#50 / 0.30	33.3	5	11	
#100 / 0.15	28.1	4	7	
#200 /0.075	10.1	2		
-#200/0.075	0.6		5.2	
Total	513.7			
Elutration	32.7			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

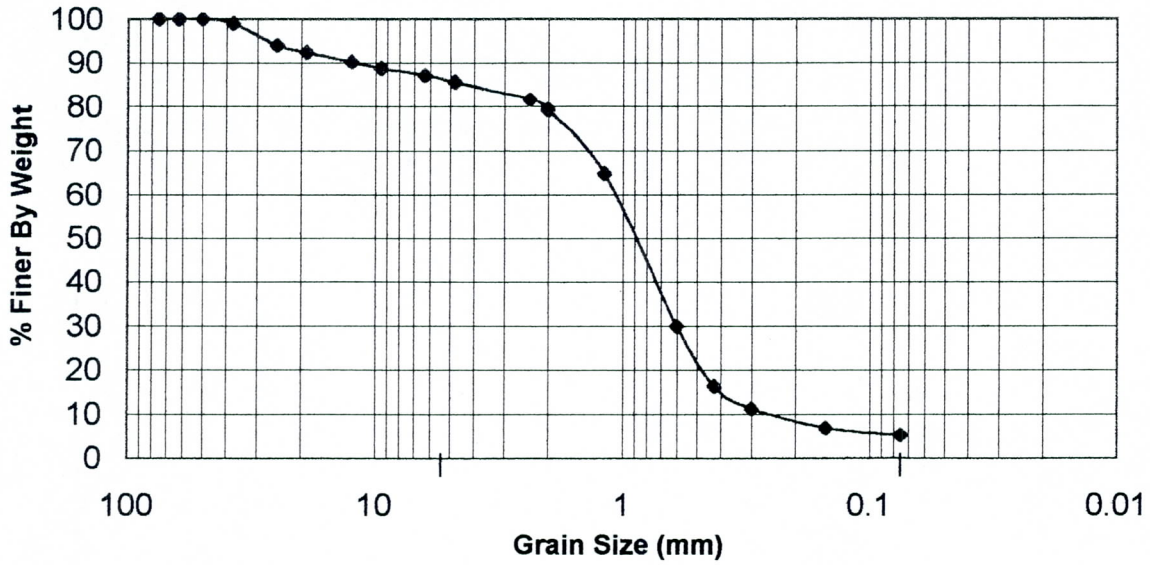
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L466
Location:	KHA13	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	651.2
1	Very Fine Sand (VFS)	0.125	6%	288.2
2	Fine Sand (FS)	0.25	10%	518.4
3	Medium Sand (MS)	0.5	22%	1870.5
4	Coarse Sand (CS)	1	54%	4751.0
5	Very Coarse Sand (VCS)	2	79%	3776.7
6	Very Fine Gravel (VFG)	4	84%	762.4
7	Fine Gravel (FG)	8	88%	543.9
8	Medium Gravel (MG)	16	91%	512.8
9	Coarse Gravel (CG)	32	97%	803.3
10	Very Coarse Gravel (VCG)	64	100%	480.6

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L467
Location:	KHA14	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	10/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	4189.9	Coarse Factor :	0.006394
- #4	11581.2	Fine Factor :	0.144395
Total	15771.1		

Natural Moisture	
Wet WT (g) :	363.80
Dry WT (g):	359.70
% Moisture:	1.1

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	122.4	1	99	
1" / 25	434.4	3	96	
3/4" / 19	486.4	3	93	
1/2"/12.5	906.1	6	88	
3/8" / 9.5	704.9	5	83	
1/4" / 6.3	943.5	6	77	
No.4 /4.75	592.2	4		
Min #4			73	
+#4 Total	4189.9		WBW (Wet):	512.8
-#4: Wet	11581.2		WBW (Dry):	507.0
-#4: Dry	11451		WAW (Dry):	501.8
Total	15641		Elutration:	5.2
#8 /2.36	52.1	8	66	
#10 / 2.00	23.6	3	62	
#15 /1.18	115.5	17	46	
#30 / 0.60	190.7	28	18	
#40/ 0.425	60.5	9	9	
#50 / 0.30	24.9	4	6	
#100 / 0.15	26.4	4	2	
#200 /0.075	7.9	1		
-#200/0.075	0.2		0.8	
Total	501.8			
Elutration	5.2			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

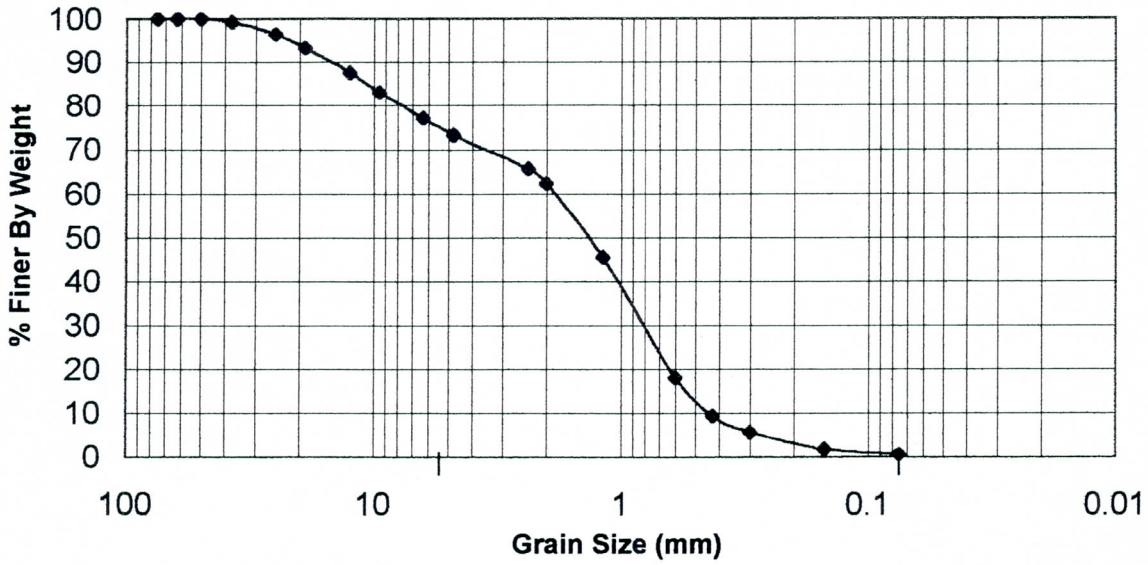
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L467
Location:	KHA14	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	102.0
1	Very Fine Sand (VFS)	0.125	2%	139.3
2	Fine Sand (FS)	0.25	4%	457.0
3	Medium Sand (MS)	0.5	13%	1346.7
4	Coarse Sand (CS)	1	37%	3751.0
5	Very Coarse Sand (VCS)	2	62%	3945.1
6	Very Fine Gravel (VFG)	4	71%	1333.7
7	Fine Gravel (FG)	8	80%	1469.4
8	Medium Gravel (MG)	16	91%	1635.1
9	Coarse Gravel (CG)	32	98%	1147.9
10	Very Coarse Gravel (VCG)	64	100%	313.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L456
Location:	KHA15	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/2/00	Proctor	
Submitted by :	CC	Test Dates :	11/6/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	1368.5	Coarse Factor :	0.024029
- #4	2905.6	Fine Factor :	0.139635
Total	4274.1		

Natural Moisture	
Wet WT (g) :	387.80
Dry WT (g):	372.80
% Moisture:	4.0

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	71.8	2	98	
3/4" / 19	228.6	5	93	
1/2"/12.5	286.2	7	86	
3/8" / 9.5	222.3	5	81	
1/4" / 6.3	320.0	8	73	
No.4 /4.75	239.6	6		
Min #4			67	
+#4 Total	1368.5		WBW (Wet):	500.0
-#4: Wet	2905.6		WBW (Dry):	480.7
-#4: Dry	2793		WAW (Dry):	354.0
Total	4162		Elutration:	126.7
#8 /2.36	41.0	6	61	
#10 / 2.00	18.0	3	59	
#15 /1.18	75.0	10	48	
#30 / 0.60	110.3	15	33	
#40/ 0.425	41.7	6	27	
#50 / 0.30	22.4	3	24	
#100 / 0.15	27.8	4	20	
#200 /0.075	16.2	2		
-#200/0.075	1.6		17.9	
Total	354			
Elutration	126.7			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

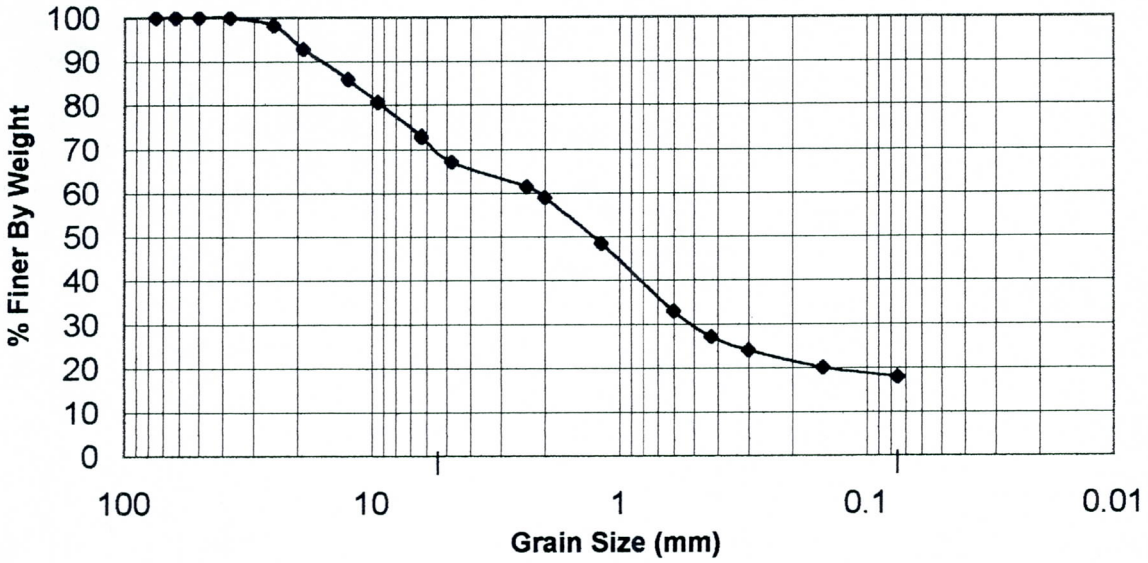
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L456
Location:	KHA15	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	15%	621.1
1	Very Fine Sand (VFS)	0.125	19%	187.0
2	Fine Sand (FS)	0.25	23%	139.1
3	Medium Sand (MS)	0.5	30%	287.9
4	Coarse Sand (CS)	1	44%	580.5
5	Very Coarse Sand (VCS)	2	59%	634.8
6	Very Fine Gravel (VFG)	4	65%	266.7
7	Fine Gravel (FG)	8	77%	485.7
8	Medium Gravel (MG)	16	90%	526.4
9	Coarse Gravel (CG)	32	99%	400.9
10	Very Coarse Gravel (VCG)	64	100%	31.6

WORKSHEET ****HYDROMETER ANALYSIS****

Project Name: Agua Fria Flood Control

Project No:

Date: 6-Dec-00

Sample Source: KHA15

Sampled By: Client

Sample Date: 2-Nov

Lab No: 6064

Specific Gravity: 2.69

Init. Wt. Of Sample: 69.66

W= 75.1

a= 0.992

Composite Correction : 0.003

% Passing #10: 92.8

Elapsed Time(min)	Temperature F	C	Hydro Reading	L (cm)	K	Particle Dia.(mm)	Percent Passing
		-17.77777778		280.8110931			-1358.253397
2	73.4	23.0	1.011	13.385	0.013012	0.0337	17.0
5	73.4	23.0	1.011	13.385	0.012795	0.0209	17.0
15	73.4	23.0	1.01	13.650	0.012795	0.0122	14.8
30	73.4	23.0	1.009	13.914	0.012795	0.0087	12.7
60	73.4	23.0	1.008	14.179	0.012795	0.0062	10.6
250	75.2	24.0	1.006	14.708	0.012655	0.0031	6.4
1440	73.4	23.0	1.004	15.237	0.012795	0.0013	2.1
					#DIV/0!	#DIV/0!	-2126.8

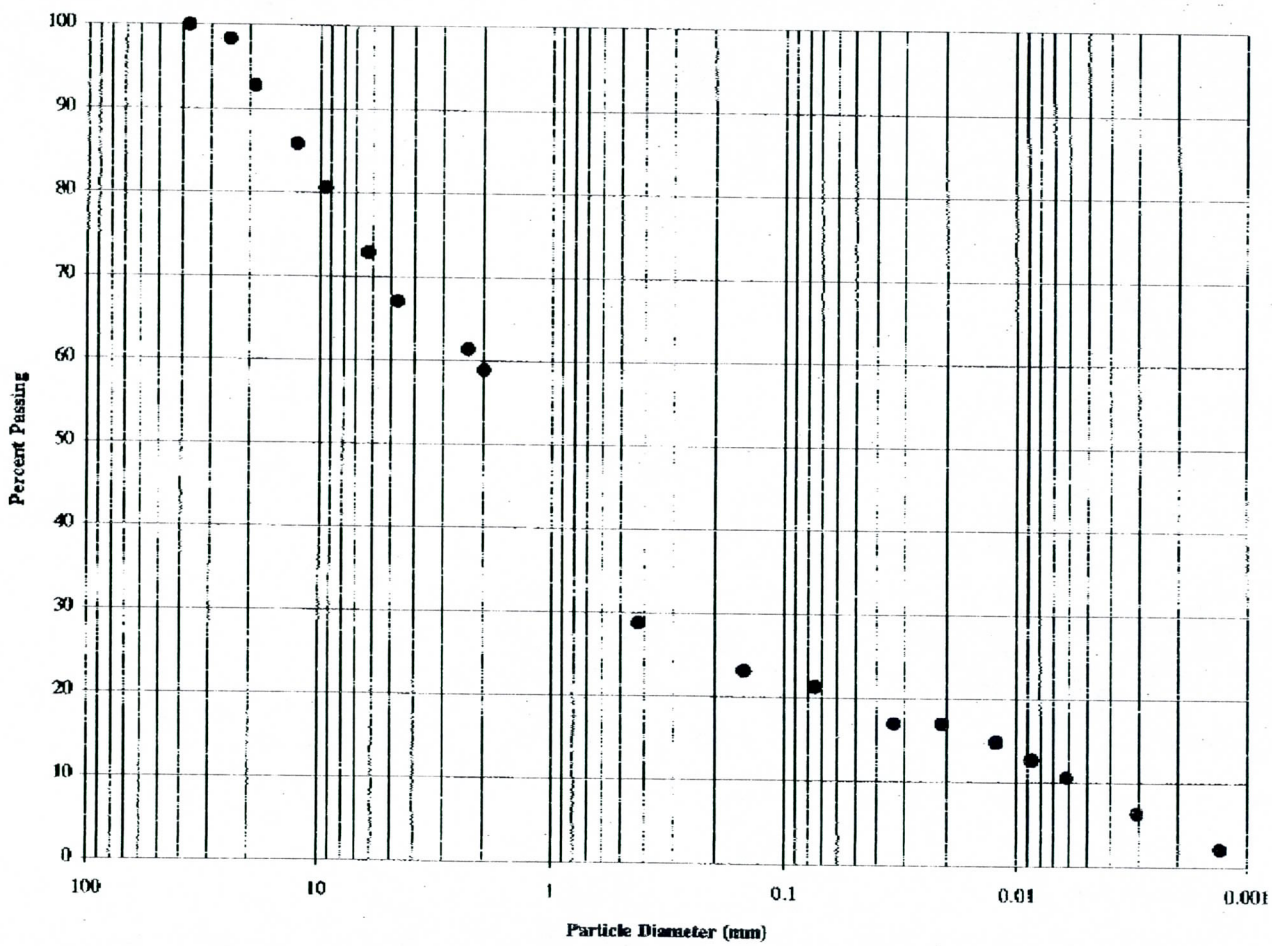
wet wt	dry wt	wt container	moisture
51.42	51.26	14.54	0.435729847

sieve	wt. ret	%ret	%pass
2"			100.0
1-1/2"			100.0
1"		1.7	98.3
3/4"		5.5	92.8
1/2"		6.9	85.9
3/8"		5.3	80.6
1/4"		7.7	72.9
#4		5.8	67.1
#8		5.7	61.4
#10		2.5	58.9
total+10		wbw(w)	69.96
pass 10 ww		wbw(d)	69.66
pass 10 dw		waw	44.7
total wt		elut	24.96
#16			58.9
#30			58.9
#40	35.6	30.1	28.8
#50			28.8
#100	6.74	5.7	23.1
#200	2.12	1.8	21.3
pass#200	0.27	21.3	
	44.73	100.0	

Specific Gravity

wt pycnometer	57		84.42
wt sample	36.60		temperature
wt pyc + water	156.46		27
wt pyc,H2O, sample		179.61	27
rel dens =	0.9965451	at	27
rel dens =	0.9965451	at	27
k =	0.9983	at	27
Wa =	156.46		
Sp. Gr =	2.721	at	27
Sp. Gr. =	2.717	at	20

PARTICLE-SIZE ANALYSIS TEST RESULTS
(ASTM D422)



Sample Source:

KHA15

Specific Gravity:

2.72 @ 20 deg. C

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L439
Location:	KHA16	Date Received :	10/25/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/25/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	7371.9	Coarse Factor :	0.005316
- #4	11697	Fine Factor :	0.112923
Total	19068.9		

Natural Moisture	
Wet WT (g) :	387.70
Dry WT (g):	379.10
% Moisture:	2.3

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	957.1	5	95	
1" / 25	1278.2	7	88	
3/4" / 19	1156.4	6	82	
1/2"/12.5	1370.9	7	75	
3/8" / 9.5	869.8	5	70	
1/4" / 6.3	1081.7	6	64	
No.4 /4.75	657.8	3		
Min #4			61	
+#4 Total	7371.9		WBW (Wet):	550.7
-#4: Wet	11697		WBW (Dry):	538.5
-#4: Dry	11438		WAW (Dry):	537.1
Total	18809		Elutration:	1.4
#8 /2.36	109.5	12	48	
#10 / 2.00	23.9	3	46	
#15 /1.18	97.8	11	35	
#30 / 0.60	150.4	17	18	
#40/ 0.425	75.0	8	9	
#50 / 0.30	44.9	5	4	
#100 / 0.15	32.2	4	1	
#200 /0.075	3.1	0		
-#200/0.075	0.3		0.2	
Total	537.1			
Elutration	1.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

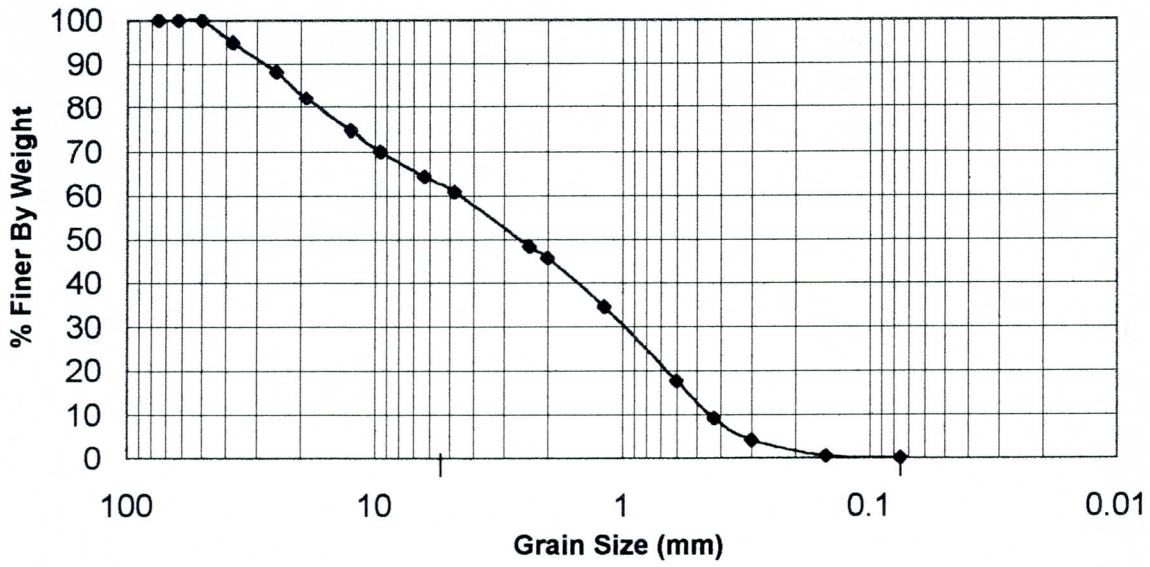
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L439
Location:	KHA16	Date Received :	10/25/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	0%	29.8
1	Very Fine Sand (VFS)	0.125	0%	49.9
2	Fine Sand (FS)	0.25	3%	477.9
3	Medium Sand (MS)	0.5	13%	1864.4
4	Coarse Sand (CS)	1	29%	3113.4
5	Very Coarse Sand (VCS)	2	46%	3068.7
6	Very Fine Gravel (VFG)	4	57%	2090.3
7	Fine Gravel (FG)	8	67%	1975.6
8	Medium Gravel (MG)	16	79%	2115.0
9	Coarse Gravel (CG)	32	92%	2504.9
10	Very Coarse Gravel (VCG)	64	100%	1519.5

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L457
Location:	KHA17	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/3/00	Proctor	
Submitted by :	CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	180.3	Coarse Factor :	0.020331
- #4	4800.6	Fine Factor :	0.172993
Total	4980.9		

Natural Moisture	
Wet WT (g) :	392.50
Dry WT (g):	387.40
% Moisture:	1.3

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	53.3	1	99	
3/4" / 19	0.0	0	99	
1/2"/12.5	63.3	1	98	
3/8" / 9.5	18.7	0	97	
1/4" / 6.3	26.1	1	97	
No.4 /4.75	18.9	0		
Min #4			96	
+#4 Total	180.3		WBW (Wet):	564.2
-#4: Wet	4800.6		WBW (Dry):	556.9
-#4: Dry	4738		WAW (Dry):	548.5
Total	4919		Elutration:	8.4
#8 /2.36	1.6	0	96	
#10 / 2.00	2.5	0	96	
#15 /1.18	13.7	2	93	
#30 / 0.60	81.3	14	79	
#40/ 0.425	123.2	21	58	
#50 / 0.30	143.4	25	33	
#100 / 0.15	152.0	26	7	
#200 /0.075	30.5	5		
-#200/0.075	3.5		1.5	
Total	551.7			
Elutration	8.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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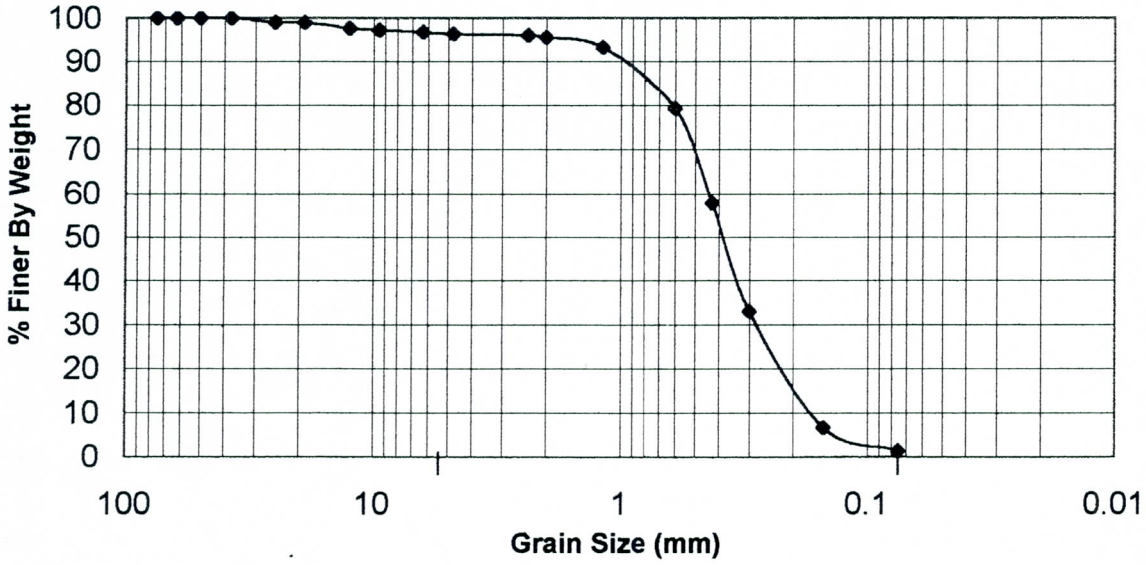
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L457
Location:	KHA17	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	61.5
1	Very Fine Sand (VFS)	0.125	5%	185.3
2	Fine Sand (FS)	0.25	24%	948.7
3	Medium Sand (MS)	0.5	67%	2100.5
4	Coarse Sand (CS)	1	89%	1076.1
5	Very Coarse Sand (VCS)	2	96%	331.3
6	Very Fine Gravel (VFG)	4	96%	30.5
7	Fine Gravel (FG)	8	97%	37.1
8	Medium Gravel (MG)	16	98%	65.0
9	Coarse Gravel (CG)	32	100%	59.1
10	Very Coarse Gravel (VCG)	64	100%	23.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L458
Location:	KHA18	Date Received :	11/3/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	CC	PI	
Sampled Date :	11/3/00	Proctor	
Submitted by :	CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	124	Coarse Factor :	0.015031
- #4	6606.9	Fine Factor :	0.178168
Total	6730.9		

Natural Moisture	
Wet WT (g) :	388.90
Dry WT (g):	384.30
% Moisture:	1.2

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	54.5	1	99	
3/4" / 19	0.0	0	99	
1/2"/12.5	0.0	0	99	
3/8" / 9.5	13.6	0	99	
1/4" / 6.3	22.0	0	99	
No.4 /4.75	33.9	1		
Min #4			98	
+#4 Total	124		WBW (Wet):	557.4
-#4: Wet	6606.9		WBW (Dry):	550.8
-#4: Dry	6529		WAW (Dry):	540.2
Total	6653		Elutration:	10.6
#8 /2.36	15.8	3	95	
#10 / 2.00	11.6	2	93	
#15 /1.18	74.0	13	80	
#30 / 0.60	191.8	34	46	
#40/ 0.425	116.4	21	25	
#50 / 0.30	67.3	12	13	
#100 / 0.15	53.7	10	4	
#200 /0.075	8.7	2		
-#200/0.075	0.9		2.1	
Total	540.2			
Elutration	10.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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Tempe, Arizona 85281
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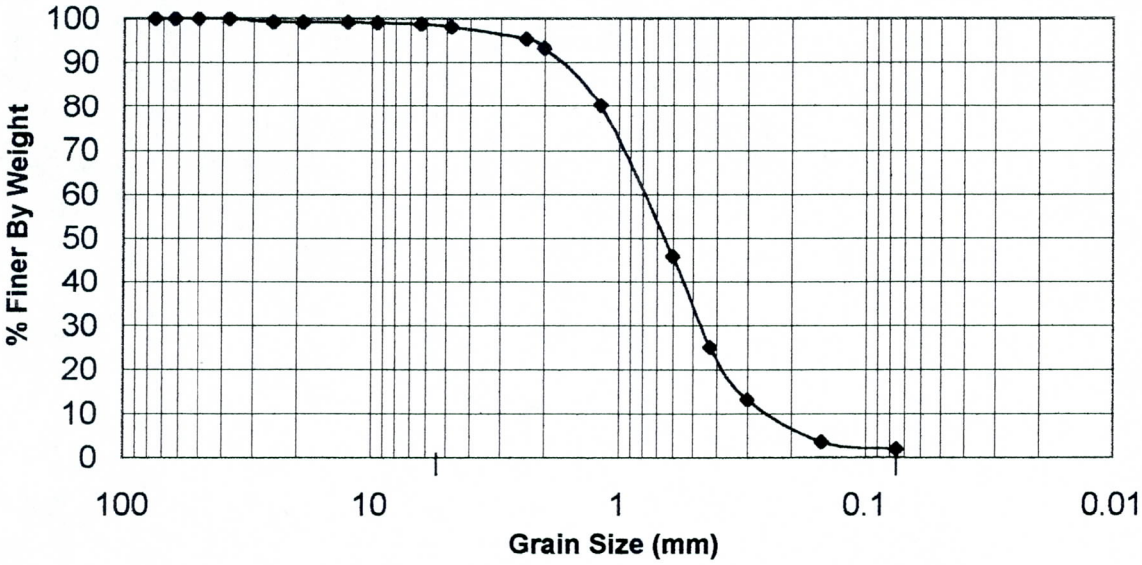
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L458
Location:	KHA18	Date Received :	11/3/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	2%	113.7
1	Very Fine Sand (VFS)	0.125	3%	91.5
2	Fine Sand (FS)	0.25	10%	458.7
3	Medium Sand (MS)	0.5	34%	1601.2
4	Coarse Sand (CS)	1	69%	2356.3
5	Very Coarse Sand (VCS)	2	93%	1582.7
6	Very Fine Gravel (VFG)	4	97%	264.9
7	Fine Gravel (FG)	8	99%	105.4
8	Medium Gravel (MG)	16	99%	23.9
9	Coarse Gravel (CG)	32	100%	30.5
10	Very Coarse Gravel (VCG)	64	100%	24.0

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L440
Location:	KHA19	Date Received :	10/25/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/25/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	4369.2	Coarse Factor :	0.007729
- #4	9337.4	Fine Factor :	0.142873
Total	13706.6		

Natural Moisture	
Wet WT (g) :	385.60
Dry WT (g):	353.90
% Moisture:	9.0

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	1024.9	8	92	
1-1/2"/ 37.5	584.0	5	88	
1" / 25	363.1	3	85	
3/4" / 19	588.2	5	80	
1/2"/12.5	494.7	4	76	
3/8" / 9.5	384.0	3	73	
1/4" / 6.3	552.7	4	69	
No.4 /4.75	377.6	3		
Min #4			66	
+#4 Total	4369.2		WBW (Wet):	505.1
-#4: Wet	9337.4		WBW (Dry):	463.6
-#4: Dry	8570		WAW (Dry):	432.1
Total	12939		Elutration:	31.5
#8 /2.36	31.9	5	62	
#10 / 2.00	19.5	3	59	
#15 /1.18	98.7	14	45	
#30 / 0.60	119.3	17	28	
#40/ 0.425	30.5	4	23	
#50 / 0.30	19.8	3	21	
#100 / 0.15	54.9	8	13	
#200 /0.075	52.6	8		
-#200/0.075	4.9		5.2	
Total	432.1			
Elutration	31.5			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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Tempe, Arizona 85281
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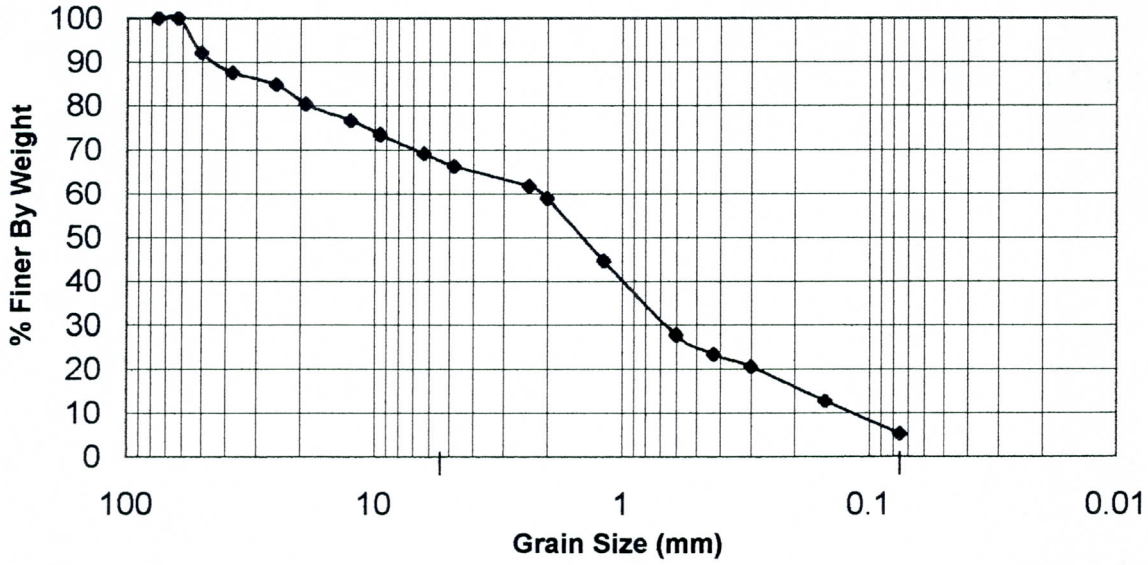
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L440
Location:	KHA19	Date Received :	10/25/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	560.4
1	Very Fine Sand (VFS)	0.125	10%	760.3
2	Fine Sand (FS)	0.25	18%	1000.7
3	Medium Sand (MS)	0.5	25%	946.0
4	Coarse Sand (CS)	1	39%	1843.2
5	Very Coarse Sand (VCS)	2	59%	2509.0
6	Very Fine Gravel (VFG)	4	65%	761.8
7	Fine Gravel (FG)	8	71%	859.6
8	Medium Gravel (MG)	16	78%	909.5
9	Coarse Gravel (CG)	32	86%	1019.9
10	Very Coarse Gravel (VCG)	64	100%	1768.7

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L468
Location:	KHA20	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	1234.8	Coarse Factor :	0.008104
- #4	11278.1	Fine Factor :	0.174097
Total	12512.9		

Natural Moisture	
Wet WT (g) :	331.10
Dry WT (g):	326.00
% Moisture:	1.6

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	78.5	1	99	
1/2"/12.5	232.9	2	97	
3/8" / 9.5	204.9	2	96	
1/4" / 6.3	409.6	3	92	
No.4 /4.75	308.9	3		
Min #4			90	
+#4 Total	1234.8		WBW (Wet):	525.0
-#4: Wet	11278.1		WBW (Dry):	516.9
-#4: Dry	11104		WAW (Dry):	514.5
Total	12339		Elutration:	2.4
#8 /2.36	28.9	5	85	
#10 / 2.00	20.1	3	81	
#15 /1.18	114.0	20	62	
#30 / 0.60	216.0	38	24	
#40/ 0.425	86.1	15	9	
#50 / 0.30	31.6	6	4	
#100 / 0.15	16.0	3	1	
#200 /0.075	1.6	0		
-#200/0.075	0.2		0.5	
Total	514.5			
Elutration	2.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

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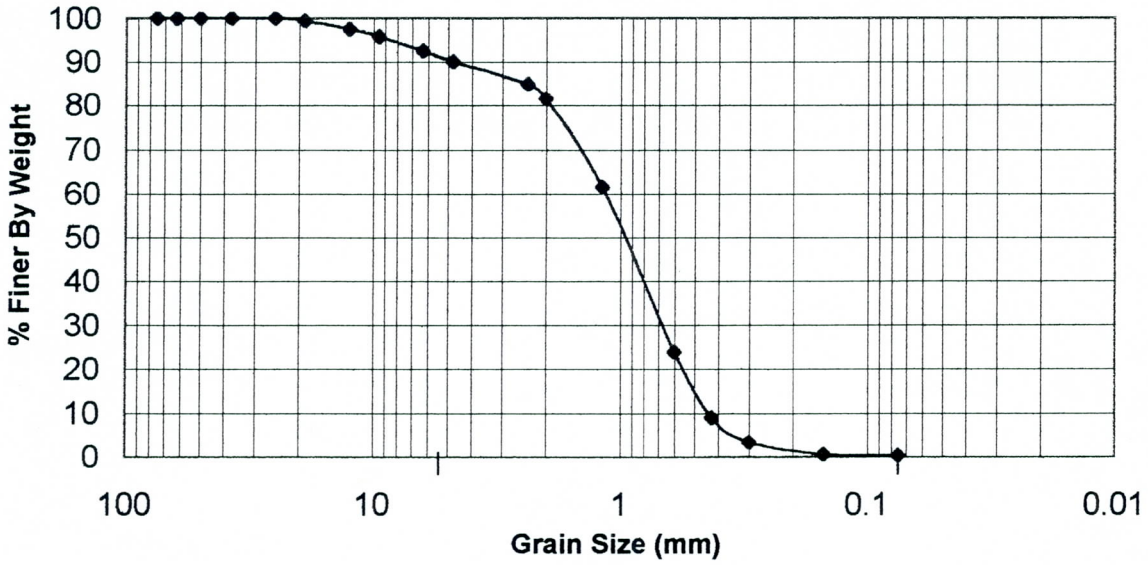
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L468
Location:	KHA20	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	0%	46.8
1	Very Fine Sand (VFS)	0.125	1%	32.3
2	Fine Sand (FS)	0.25	3%	240.6
3	Medium Sand (MS)	0.5	15%	1586.1
4	Coarse Sand (CS)	1	50%	4257.0
5	Very Coarse Sand (VCS)	2	81%	3889.0
6	Very Fine Gravel (VFG)	4	88%	854.3
7	Fine Gravel (FG)	8	94%	724.9
8	Medium Gravel (MG)	16	98%	522.3
9	Coarse Gravel (CG)	32	100%	186.0
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L441
Location:	KHA21	Date Received :	10/25/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/25/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	5405.9	Coarse Factor :	0.00702
- #4	9031.8	Fine Factor :	0.111063
Total	14437.7		

Natural Moisture	
Wet WT (g) :	443.90
Dry WT (g):	434.40
% Moisture:	2.2

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	478.3	3	97	
2"/50	299.4	2	95	
1-1/2"/ 37.5	404.8	3	92	
1" / 25	893.2	6	85	
3/4" / 19	746.6	5	80	
1/2"/12.5	959.1	7	73	
3/8" / 9.5	552.1	4	70	
1/4" / 6.3	687.6	5	65	
No.4 /4.75	384.8	3		
Min #4			62	
+#4 Total	5405.9		WBW (Wet):	570.9
-#4: Wet	9031.8		WBW (Dry):	558.7
-#4: Dry	8839		WAW (Dry):	552.0
Total	14244		Elutration:	6.7
#8 /2.36	119.0	13	49	
#10 / 2.00	39.2	4	44	
#15 /1.18	136.8	15	29	
#30 / 0.60	119.9	13	16	
#40/ 0.425	46.4	5	11	
#50 / 0.30	41.2	5	6	
#100 / 0.15	42.6	5	2	
#200 /0.075	6.6	1		
-#200/0.075	0.3		0.8	
Total	552			
Elutration	6.7			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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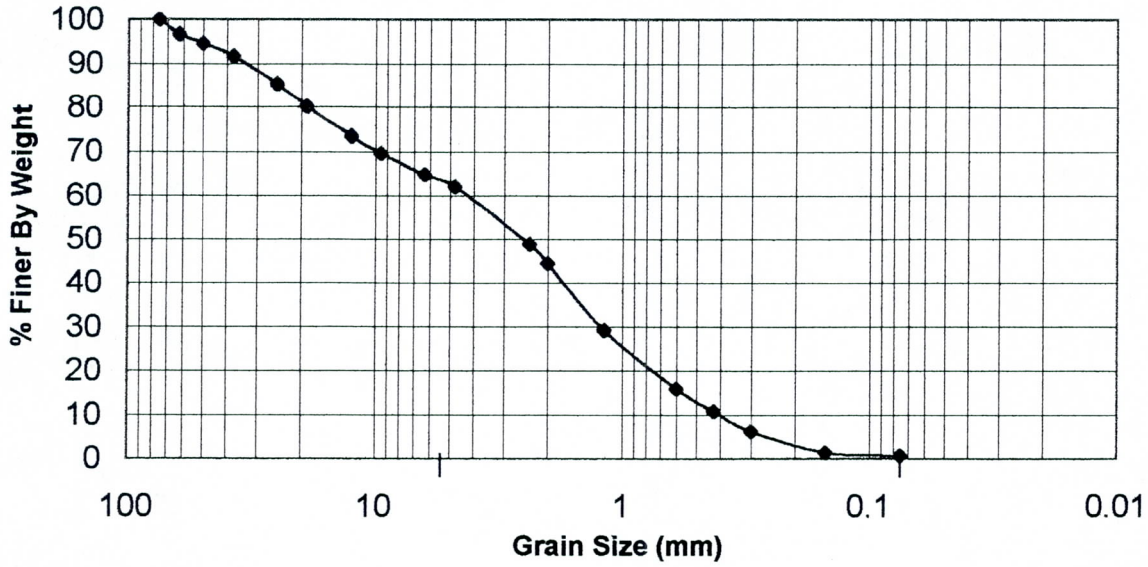
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L441
Location:	KHA21	Date Received :	10/25/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	92.0
1	Very Fine Sand (VFS)	0.125	1%	88.0
2	Fine Sand (FS)	0.25	5%	484.1
3	Medium Sand (MS)	0.5	13%	1191.0
4	Coarse Sand (CS)	1	25%	1727.6
5	Very Coarse Sand (VCS)	2	44%	2752.9
6	Very Fine Gravel (VFG)	4	58%	1901.3
7	Fine Gravel (FG)	8	67%	1351.6
8	Medium Gravel (MG)	16	77%	1390.9
9	Coarse Gravel (CG)	32	89%	1689.5
10	Very Coarse Gravel (VCG)	64	97%	1154.6

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L469
Location:	KHA22	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	2282.5	Coarse Factor :	0.005847
- #4	15179	Fine Factor :	0.166926
Total	17461.5		

Natural Moisture	
Wet WT (g) :	401.40
Dry WT (g):	391.90
% Moisture:	2.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	317.1	2	98	
1" / 25	497.2	3	95	
3/4" / 19	341.2	2	93	
1/2"/12.5	379.3	2	91	
3/8" / 9.5	233.1	1	90	
1/4" / 6.3	298.7	2	88	
No.4 /4.75	215.9	1		
Min #4			87	
+#4 Total	2282.5		WBW (Wet):	531.7
-#4: Wet	15179		WBW (Dry):	519.1
-#4: Dry	14820		WAW (Dry):	511.2
Total	17102		Elutration:	7.9
#8 /2.36	17.9	3	84	
#10 / 2.00	8.9	1	82	
#15 /1.18	40.4	7	75	
#30 / 0.60	103.6	17	58	
#40/ 0.425	102.9	17	41	
#50 / 0.30	112.2	19	22	
#100 / 0.15	103.7	17	5	
#200 /0.075	18.9	3		
-#200/0.075	2.7		1.8	
Total	511.2			
Elutration	7.9			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

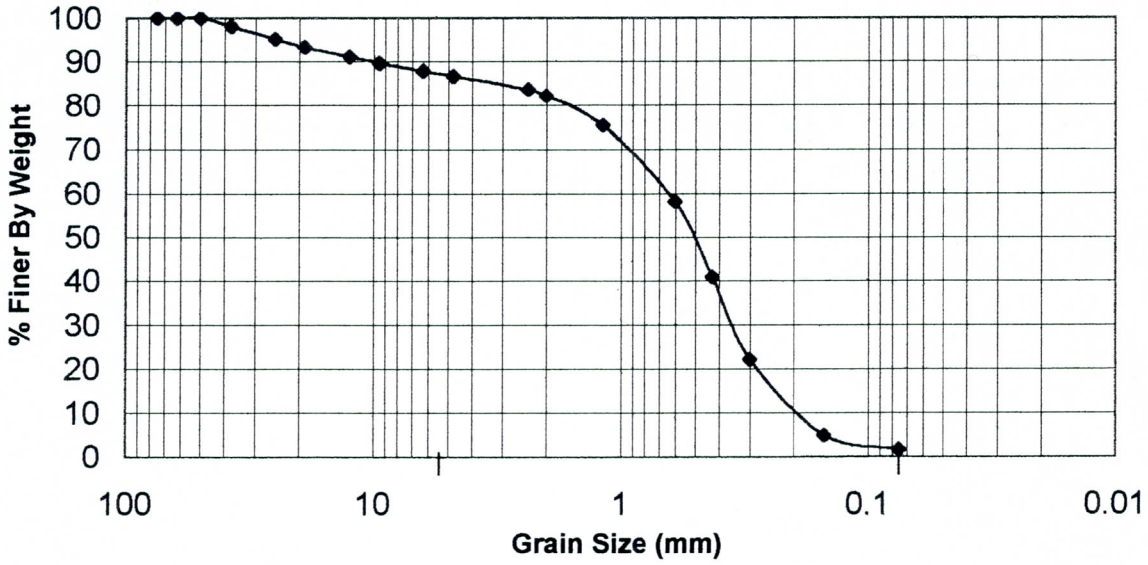
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L469
Location:	KHA22	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	252.6
1	Very Fine Sand (VFS)	0.125	4%	410.2
2	Fine Sand (FS)	0.25	16%	2153.5
3	Medium Sand (MS)	0.5	48%	5448.9
4	Coarse Sand (CS)	1	70%	3718.3
5	Very Coarse Sand (VCS)	2	82%	2071.2
6	Very Fine Gravel (VFG)	4	86%	601.8
7	Fine Gravel (FG)	8	89%	537.9
8	Medium Gravel (MG)	16	92%	577.4
9	Coarse Gravel (CG)	32	97%	794.7
10	Very Coarse Gravel (VCG)	64	100%	535.9

GRADATION & PI

HOQUE & ASSOCIATES
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Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L470
Location:	KHA23	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	8662	Coarse Factor :	0.006515
- #4	6786.1	Fine Factor :	0.081022
Total	15448.1		

Natural Moisture	
Wet WT (g) :	688.00
Dry WT (g):	677.90
% Moisture:	1.5

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	1155.5	8	92	
1" / 25	1114.0	7	85	
3/4" / 19	1821.1	12	73	
1/2"/12.5	2071.3	13	60	
3/8" / 9.5	1058.8	7	53	
1/4" / 6.3	967.4	6	47	
No.4 /4.75	473.9	3		
Min #4			44	
+#4 Total	8662		WBW (Wet):	545.7
-#4: Wet	6786.1		WBW (Dry):	537.7
-#4: Dry	6686		WAW (Dry):	533.1
Total	15348		Elutration:	4.6
#8 /2.36	97.5	8	36	
#10 / 2.00	25.9	2	34	
#15 /1.18	107.6	9	25	
#30 / 0.60	160.8	13	12	
#40/ 0.425	73.6	6	6	
#50 / 0.30	38.9	3	3	
#100 / 0.15	24.5	2	1	
#200 /0.075	4.3	0		
-#200/0.075	0.3		0.4	
Total	533.4			
Elutration	4.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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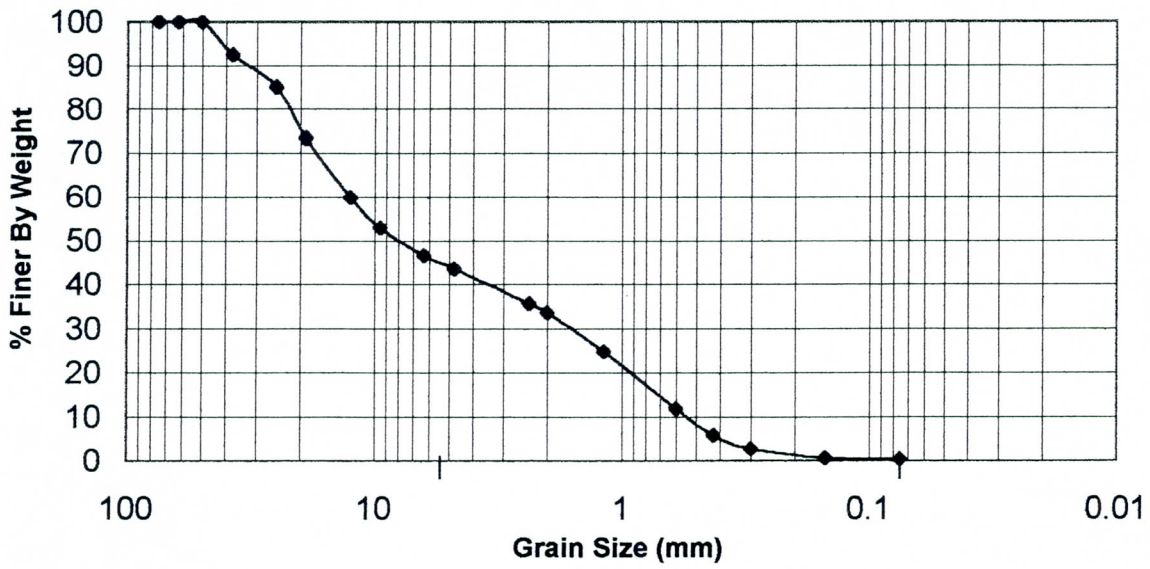
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L470
Location:	KHA23	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	0%	47.6
1	Very Fine Sand (VFS)	0.125	1%	45.2
2	Fine Sand (FS)	0.25	2%	220.9
3	Medium Sand (MS)	0.5	8%	977.6
4	Coarse Sand (CS)	1	21%	1902.1
5	Very Coarse Sand (VCS)	2	34%	1958.6
6	Very Fine Gravel (VFG)	4	41%	1147.2
7	Fine Gravel (FG)	8	50%	1375.2
8	Medium Gravel (MG)	16	67%	2627.6
9	Coarse Gravel (CG)	32	89%	3400.9
10	Very Coarse Gravel (VCG)	64	100%	1645.7

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L471
Location:	KHA24	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	11/10/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	7372.8	Coarse Factor :	0.007458
- #4	6466.9	Fine Factor :	0.09216
Total	13839.7		

Natural Moisture	
Wet WT (g) :	363.50
Dry WT (g):	339.30
% Moisture:	7.1

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	820.6	6	94	
1" / 25	1497.5	11	83	
3/4" / 19	943.7	7	76	
1/2"/12.5	1276.3	10	66	
3/8" / 9.5	920.0	7	59	
1/4" / 6.3	1218.9	9	50	
No.4 /4.75	695.8	5		
Min #4			45	
+#4 Total	7372.8		WBW (Wet):	523.3
-#4: Wet	6466.9		WBW (Dry):	488.5
-#4: Dry	6036		WAW (Dry):	390.1
Total	13409		Elutration:	98.4
#8 /2.36	69.9	6	39	
#10 / 2.00	25.8	2	36	
#15 /1.18	97.0	9	27	
#30 / 0.60	94.3	9	19	
#40/ 0.425	33.6	3	15	
#50 / 0.30	22.4	2	13	
#100 / 0.15	29.0	3	11	
#200 /0.075	17.2	2		
-#200/0.075	0.9		9.1	
Total	390.1			
Elutration	98.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

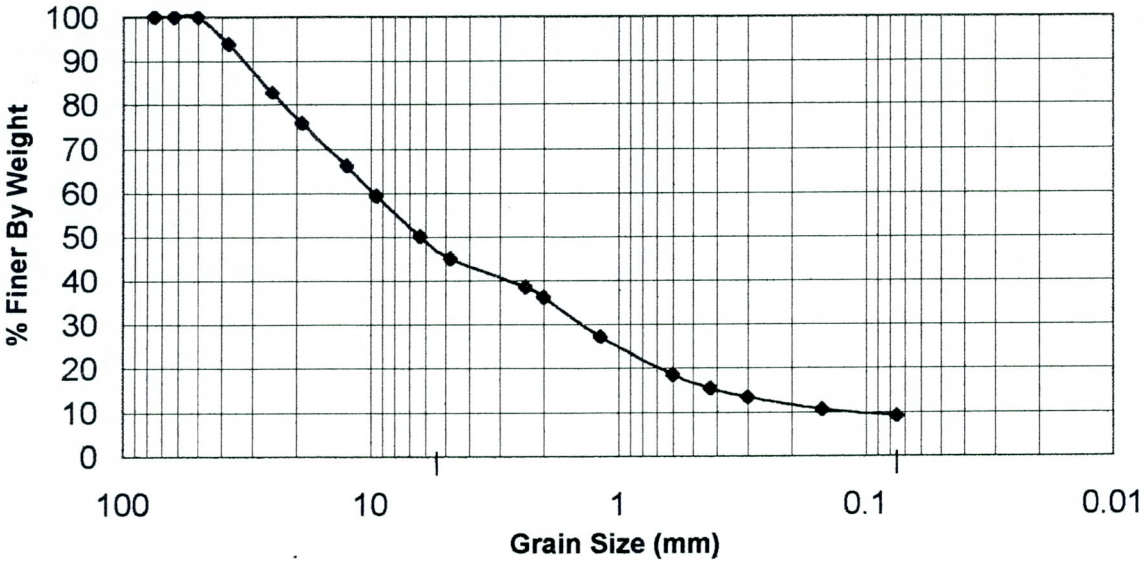
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L471
Location:	KHA24	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	8%	1022.2
1	Very Fine Sand (VFS)	0.125	10%	346.1
2	Fine Sand (FS)	0.25	13%	309.8
3	Medium Sand (MS)	0.5	17%	574.2
4	Coarse Sand (CS)	1	25%	1041.0
5	Very Coarse Sand (VCS)	2	36%	1560.4
6	Very Fine Gravel (VFG)	4	43%	906.7
7	Fine Gravel (FG)	8	55%	1619.3
8	Medium Gravel (MG)	16	71%	2178.6
9	Coarse Gravel (CG)	32	89%	2371.4
10	Very Coarse Gravel (VCG)	64	100%	1479.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L442
Location:	KHA25	Date Received :	10/25/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/25/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	5392.6	Coarse Factor :	0.009248
- #4	5508.5	Fine Factor :	0.086861
Total	10901.1		

Natural Moisture	
Wet WT (g) :	505.30
Dry WT (g):	497.20
% Moisture:	1.6

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	943.3	9	91	
1-1/2"/ 37.5	449.0	4	87	
1" / 25	1320.9	12	75	
3/4" / 19	581.7	5	70	
1/2"/12.5	759.3	7	63	
3/8" / 9.5	396.0	4	59	
1/4" / 6.3	555.5	5	54	
No.4 /4.75	386.9	4		
Min #4			50	
+#4 Total	5392.6		WBW (Wet):	586.5
-#4: Wet	5508.5		WBW (Dry):	577.1
-#4: Dry	5420		WAW (Dry):	573.7
Total	10813		Elutration:	3.4
#8 /2.36	60.5	5	45	
#10 / 2.00	23.5	2	43	
#15 /1.18	102.8	9	34	
#30 / 0.60	168.8	15	19	
#40/ 0.425	97.5	8	11	
#50 / 0.30	65.7	6	5	
#100 / 0.15	47.3	4	1	
#200 /0.075	7.2	1		
-#200/0.075	0.4		0.3	
Total	573.7			
Elutration	3.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
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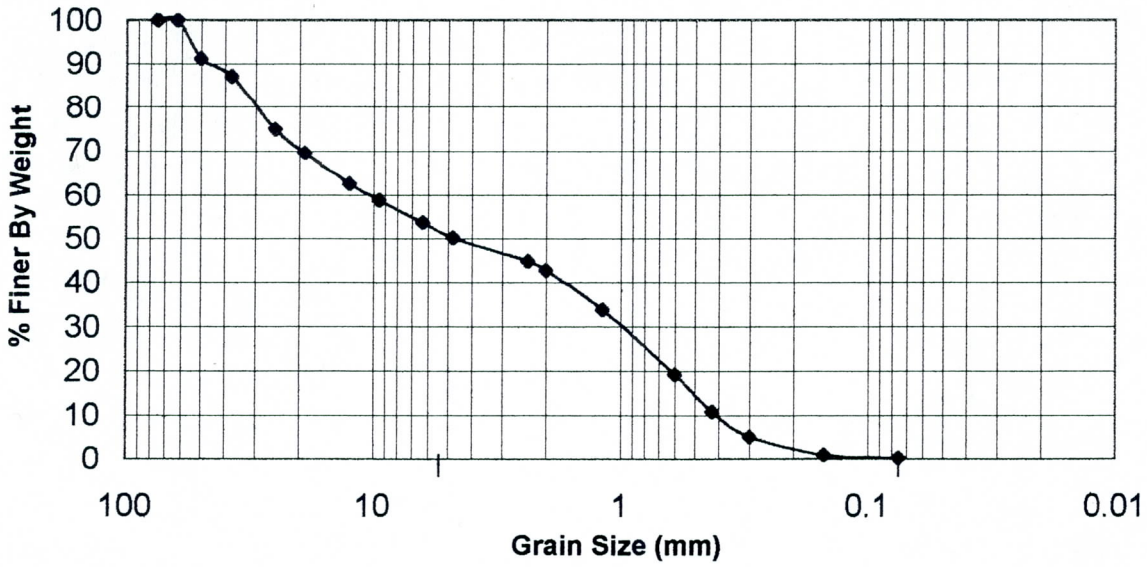
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L442
Location:	KHA25	Date Received :	10/25/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	0%	29.7
1	Very Fine Sand (VFS)	0.125	1%	51.0
2	Fine Sand (FS)	0.25	4%	318.7
3	Medium Sand (MS)	0.5	14%	1157.6
4	Coarse Sand (CS)	1	29%	1616.7
5	Very Coarse Sand (VCS)	2	43%	1457.5
6	Very Fine Gravel (VFG)	4	48%	607.4
7	Fine Gravel (FG)	8	56%	863.6
8	Medium Gravel (MG)	16	66%	1065.2
9	Coarse Gravel (CG)	32	82%	1671.9
10	Very Coarse Gravel (VCG)	64	100%	1973.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L461
Location:	KHA26	Date Received :	11/8/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA	PI	
Sampled Date :	11/7/00	Proctor	
Submitted by :	KA	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	6044.6	Coarse Factor :	0.006373
- #4	9769.4	Fine Factor :	0.109149
Total	15814.0		

Natural Moisture	
Wet WT (g) :	535.70
Dry WT (g):	528.50
% Moisture:	1.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	660.9	4	96	
1" / 25	1306.8	8	87	
3/4" / 19	790.3	5	82	
1/2"/12.5	1193.1	8	75	
3/8" / 9.5	707.9	5	70	
1/4" / 6.3	843.3	5	65	
No.4 /4.75	551.3	4		
Min #4			61	
+#4 Total	6053.6		WBW (Wet):	570.4
-#4: Wet	9769.4		WBW (Dry):	562.7
-#4: Dry	9638		WAW (Dry):	553.0
Total	15692		Elutration:	9.7
#8 /2.36	78.3	9	53	
#10 / 2.00	28.7	3	50	
#15 /1.18	136.1	15	35	
#30 / 0.60	193.6	21	14	
#40/ 0.425	58.6	6	7	
#50 / 0.30	22.4	2	5	
#100 / 0.15	24.0	3	2	
#200 /0.075	9.7	1		
-#200/0.075	1.6		1.2	
Total	553			
Elutration	9.7			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

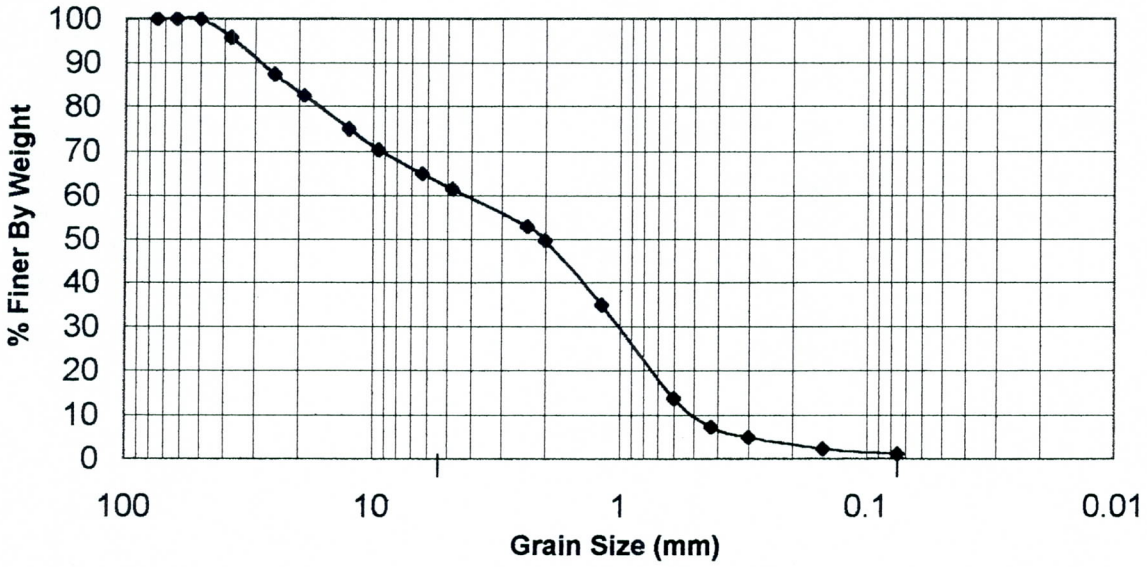
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L461
Location:	KHA26	Date Received :	11/8/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	161.8
1	Very Fine Sand (VFS)	0.125	2%	143.1
2	Fine Sand (FS)	0.25	4%	329.4
3	Medium Sand (MS)	0.5	10%	950.8
4	Coarse Sand (CS)	1	28%	2860.3
5	Very Coarse Sand (VCS)	2	50%	3360.1
6	Very Fine Gravel (VFG)	4	59%	1404.1
7	Fine Gravel (FG)	8	68%	1427.8
8	Medium Gravel (MG)	16	79%	1745.6
9	Coarse Gravel (CG)	32	92%	2072.8
10	Very Coarse Gravel (VCG)	64	100%	1235.9

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L462
Location:	KHA27	Date Received :	11/8/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA	PI	
Sampled Date :	11/7/00	Proctor	
Submitted by :	KA	Test Dates :	11/8/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	5401.9	Coarse Factor :	0.011045
- #4	3876.3	Fine Factor :	0.079272
Total	9278.2		

Natural Moisture	
Wet WT (g) :	327.90
Dry WT (g):	308.90
% Moisture:	6.2

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	884.4	10	90	
1-1/2"/ 37.5	499.1	6	85	
1" / 25	769.8	9	76	
3/4" / 19	626.3	7	69	
1/2"/12.5	887.4	10	59	
3/8" / 9.5	594.9	7	53	
1/4" / 6.3	727.9	8	45	
No.4 /4.75	412.1	5		
Min #4			40	
+#4 Total	5401.9		WBW (Wet):	540.1
-#4: Wet	3876.3		WBW (Dry):	508.8
-#4: Dry	3652		WAW (Dry):	443.4
Total	9054		Elutration:	65.4
#8 /2.36	78.5	6	34	
#10 / 2.00	25.9	2	32	
#15 /1.18	93.5	7	25	
#30 / 0.60	120.8	10	15	
#40/ 0.425	50.1	4	11	
#50 / 0.30	29.5	2	9	
#100 / 0.15	29.7	2	6	
#200 /0.075	15.0	1		
-#200/0.075	0.4		5.2	
Total	443.4			
Elutration	65.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

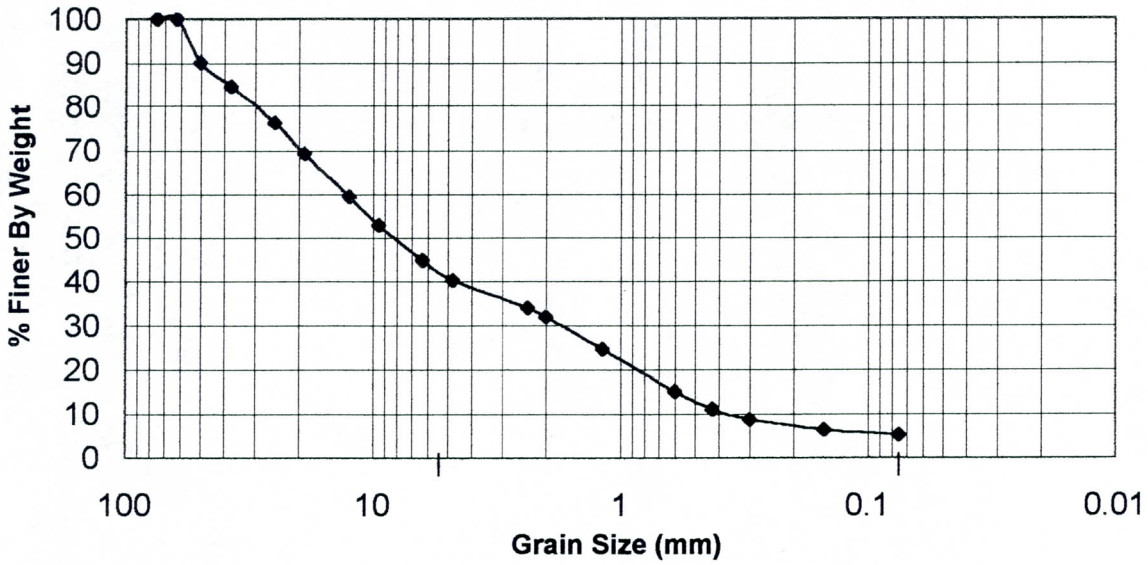
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L462
Location:	KHA27	Date Received :	11/8/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	393.6
1	Very Fine Sand (VFS)	0.125	6%	150.5
2	Fine Sand (FS)	0.25	8%	178.0
3	Medium Sand (MS)	0.5	13%	436.9
4	Coarse Sand (CS)	1	22%	803.4
5	Very Coarse Sand (VCS)	2	32%	940.1
6	Very Fine Gravel (VFG)	4	38%	569.3
7	Fine Gravel (FG)	8	49%	978.8
8	Medium Gravel (MG)	16	65%	1413.9
9	Coarse Gravel (CG)	32	81%	1467.0
10	Very Coarse Gravel (VCG)	64	100%	1722.2

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L463
Location:	KHA28	Date Received :	11/8/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA	PI	
Sampled Date :	11/7/00	Proctor	
Submitted by :	KA	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	4499.3	Coarse Factor :	0.008287
- #4	7744.2	Fine Factor :	0.126512
Total	12243.5		

Natural Moisture	
Wet WT (g) :	280.00
Dry WT (g):	273.60
% Moisture:	2.3

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	198.2	2	98	
1" / 25	27.9	0	98	
3/4" / 19	745.7	6	92	
1/2"/12.5	1025.8	9	83	
3/8" / 9.5	782.9	6	77	
1/4" / 6.3	1077.4	9	68	
No.4 /4.75	641.4	5		
Min #4			63	
+#4 Total	4499.3		WBW (Wet):	507.3
-#4: Wet	7744.2		WBW (Dry):	495.7
-#4: Dry	7567		WAW (Dry):	488.5
Total	12066		Elutration:	7.2
#8 /2.36	93.7	12	51	
#10 / 2.00	39.4	5	46	
#15 /1.18	147.1	19	27	
#30 / 0.60	136.6	17	10	
#40/ 0.425	39.1	5	5	
#50 / 0.30	17.3	2	3	
#100 / 0.15	11.5	1	1	
#200 /0.075	3.3	0		
-#200/0.075	0.5		1.0	
Total	488.5			
Elutration	7.2			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
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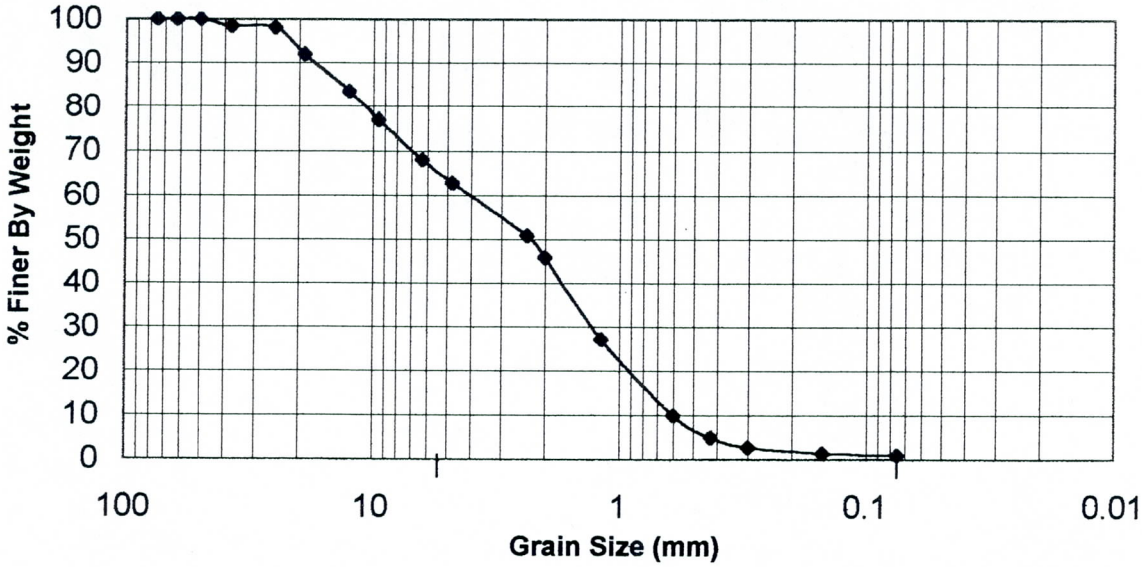
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L463
Location:	KHA28	Date Received :	11/8/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	98.0
1	Very Fine Sand (VFS)	0.125	1%	53.2
2	Fine Sand (FS)	0.25	2%	133.8
3	Medium Sand (MS)	0.5	7%	578.4
4	Coarse Sand (CS)	1	22%	1779.2
5	Very Coarse Sand (VCS)	2	46%	2892.7
6	Very Fine Gravel (VFG)	4	59%	1574.8
7	Fine Gravel (FG)	8	73%	1670.8
8	Medium Gravel (MG)	16	88%	1840.3
9	Coarse Gravel (CG)	32	98%	1234.8
10	Very Coarse Gravel (VCG)	64	100%	210.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L464
Location:	KHA29	Date Received :	11/8/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA	PI	
Sampled Date :	11/7/00	Proctor	
Submitted by :	KA	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	6617.6	Coarse Factor :	0.006348
- #4	9306.3	Fine Factor :	0.11184
Total	15923.9		

Natural Moisture	
Wet WT (g) :	355.30
Dry WT (g):	348.80
% Moisture:	1.9

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	372.6	2	98	
1-1/2"/ 37.5	1019.4	6	91	
1" / 25	1357.6	9	83	
3/4" / 19	640.7	4	78	
1/2"/12.5	852.8	5	73	
3/8" / 9.5	727.9	5	68	
1/4" / 6.3	982.3	6	62	
No.4 /4.75	664.3	4		
Min #4			58	
+#4 Total	6617.6		WBW (Wet):	528.2
-#4: Wet	9306.3		WBW (Dry):	518.5
-#4: Dry	9136		WAW (Dry):	515.4
Total	15754		Elutration:	3.1
#8 /2.36	90.5	10	48	
#10 / 2.00	27.6	3	45	
#15 /1.18	112.7	13	32	
#30 / 0.60	157.1	18	15	
#40/ 0.425	67.5	8	7	
#50 / 0.30	38.5	4	3	
#100 / 0.15	20.2	2	0	
#200 /0.075	1.2	0		
-#200/0.075	0.1		0.4	
Total	515.4			
Elutration	3.1			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

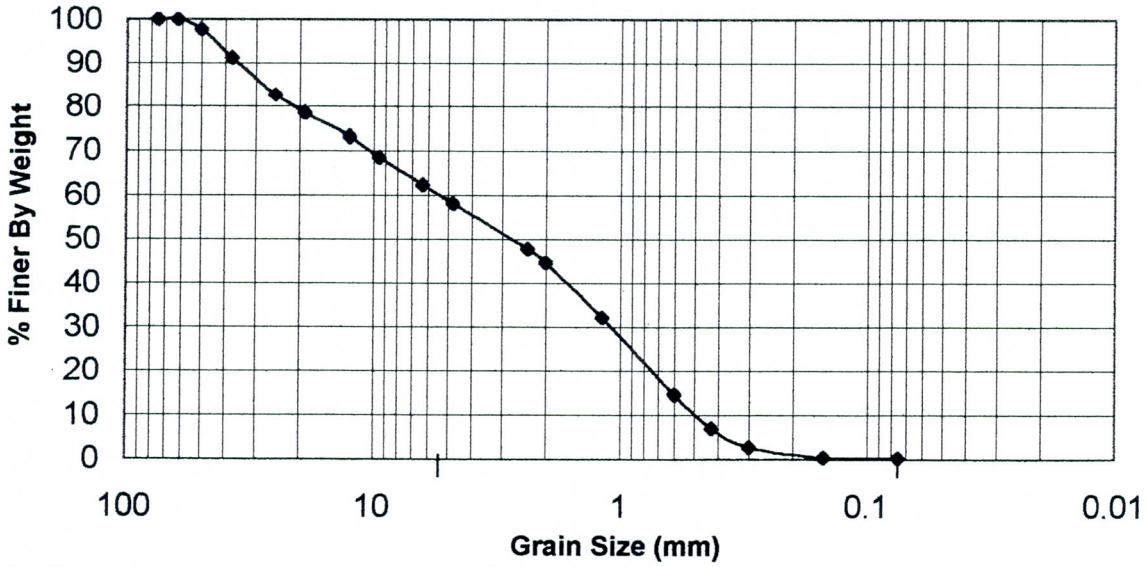
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L464
Location:	KHA29	Date Received :	11/8/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	0%	47.5
1	Very Fine Sand (VFS)	0.125	0%	23.6
2	Fine Sand (FS)	0.25	2%	244.3
3	Medium Sand (MS)	0.5	10%	1306.7
4	Coarse Sand (CS)	1	27%	2588.5
5	Very Coarse Sand (VCS)	2	45%	2844.7
6	Very Fine Gravel (VFG)	4	55%	1571.3
7	Fine Gravel (FG)	8	66%	1695.6
8	Medium Gravel (MG)	16	76%	1647.6
9	Coarse Gravel (CG)	32	87%	1794.6
10	Very Coarse Gravel (VCG)	64	100%	1989.3

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L472
Location:	KHA30	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	7878.2	Coarse Factor :	0.006282
- #4	8121.9	Fine Factor :	0.094879
Total	16000.1		

Natural Moisture	
Wet WT (g) :	313.30
Dry WT (g):	310.10
% Moisture:	1.0

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	513.1	3	97	
1-1/2"/ 37.5	875.5	6	91	
1" / 25	1300.8	8	83	
3/4" / 19	1260.4	8	75	
1/2"/12.5	1422.8	9	66	
3/8" / 9.5	860.3	5	61	
1/4" / 6.3	1035.2	7	54	
No.4 /4.75	610.2	4		
Min #4			51	
+#4 Total	7878.3		WBW (Wet):	537.8
-#4: Wet	8121.9		WBW (Dry):	532.3
-#4: Dry	8039		WAW (Dry):	516.0
Total	15917		Elutration:	16.3
#8 /2.36	71.0	7	44	
#10 / 2.00	22.8	2	42	
#15 /1.18	97.0	9	32	
#30 / 0.60	151.4	14	18	
#40/ 0.425	78.7	7	11	
#50 / 0.30	51.4	5	6	
#100 / 0.15	36.9	4	2	
#200 /0.075	6.4	1		
-#200/0.075	0.4		1.6	
Total	516			
Elutration	16.3			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

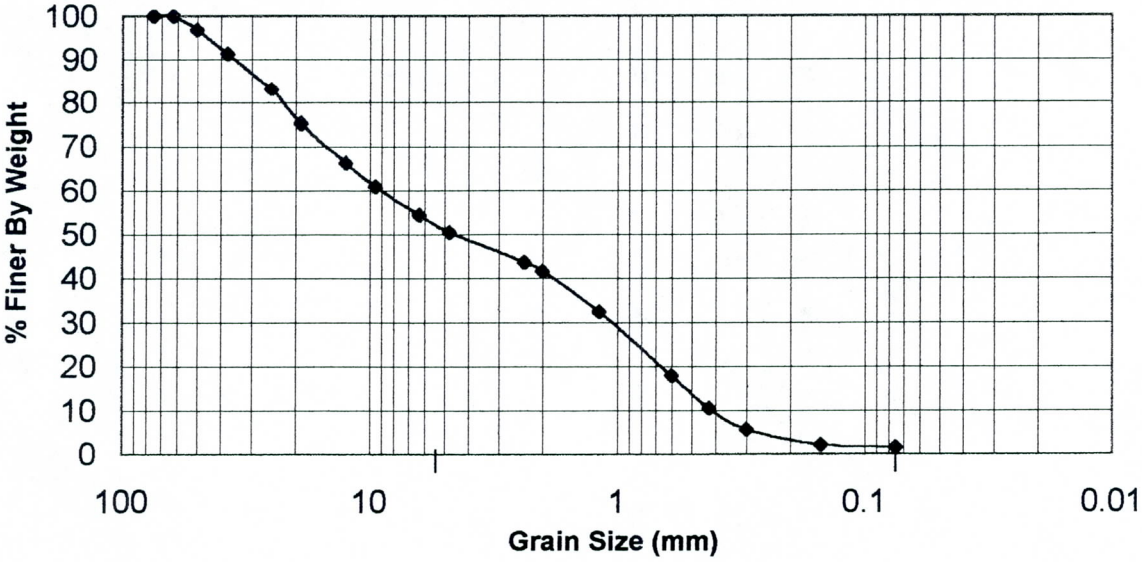
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L472
Location:	KHA30	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	210.3
1	Very Fine Sand (VFS)	0.125	2%	106.5
2	Fine Sand (FS)	0.25	5%	403.7
3	Medium Sand (MS)	0.5	14%	1471.4
4	Coarse Sand (CS)	1	28%	2256.0
5	Very Coarse Sand (VCS)	2	42%	2174.5
6	Very Fine Gravel (VFG)	4	48%	1074.0
7	Fine Gravel (FG)	8	58%	1502.7
8	Medium Gravel (MG)	16	71%	2111.7
9	Coarse Gravel (CG)	32	88%	2645.5
10	Very Coarse Gravel (VCG)	64	100%	1961.0

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L473
Location:	KHA31	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	3527.3	Coarse Factor :	0.0137
- #4	3810.2	Fine Factor :	0.10324
Total	7337.5		

Natural Moisture	
Wet WT (g) :	411.40
Dry WT (g):	407.30
% Moisture:	1.0

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	681.6	9	91	
1-1/2"/ 37.5	503.6	7	84	
1" / 25	538.5	7	76	
3/4" / 19	482.3	7	70	
1/2"/12.5	436.6	6	64	
3/8" / 9.5	306.0	4	60	
1/4" / 6.3	377.9	5	54	
No.4 /4.75	200.8	3		
Min #4			52	
+#4 Total	3527.3		WBW (Wet):	505.6
-#4: Wet	3810.2		WBW (Dry):	500.6
-#4: Dry	3772		WAW (Dry):	480.3
Total	7300		Elutration:	20.3
#8 /2.36	42.5	4	47	
#10 / 2.00	19.0	2	45	
#15 /1.18	90.4	9	36	
#30 / 0.60	148.3	15	21	
#40/ 0.425	69.7	7	13	
#50 / 0.30	42.9	4	9	
#100 / 0.15	51.3	5	4	
#200 /0.075	15.0	2		
-#200/0.075	1.2		2.2	
Total	480.3			
Elutration	20.3			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

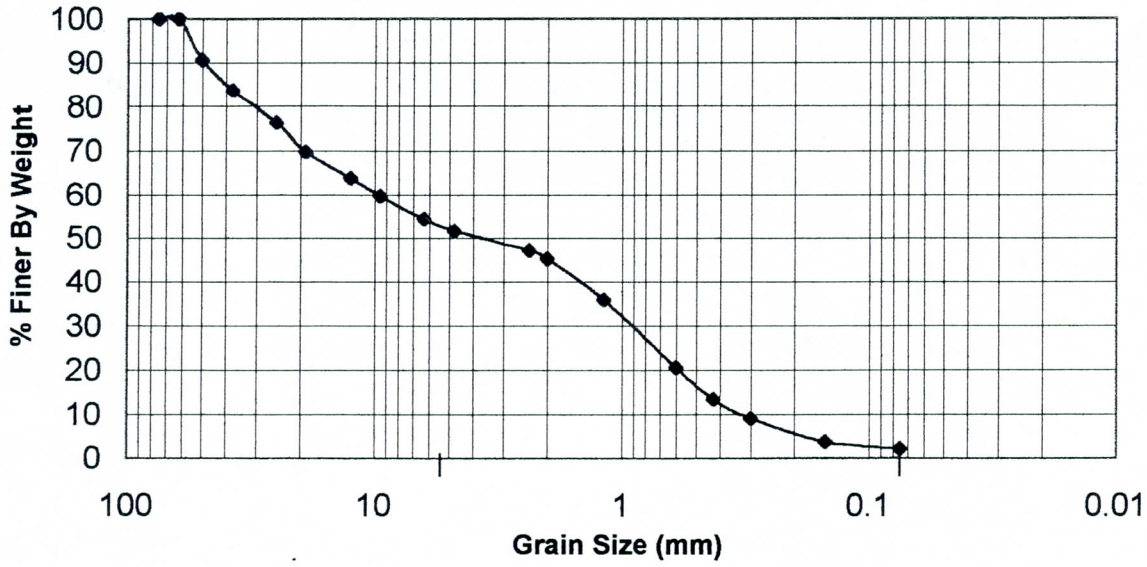
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L473
Location:	KHA31	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	2%	134.8
1	Very Fine Sand (VFS)	0.125	3%	102.3
2	Fine Sand (FS)	0.25	7%	295.4
3	Medium Sand (MS)	0.5	17%	677.3
4	Coarse Sand (CS)	1	31%	1070.9
5	Very Coarse Sand (VCS)	2	45%	1028.1
6	Very Fine Gravel (VFG)	4	50%	361.1
7	Fine Gravel (FG)	8	57%	503.9
8	Medium Gravel (MG)	16	67%	718.2
9	Coarse Gravel (CG)	32	81%	985.4
10	Very Coarse Gravel (VCG)	64	100%	1422.1

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L445
Location:	KHA32	Date Received :	10/30/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/30/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	4643.1	Coarse Factor :	0.008502
- #4	7427.5	Fine Factor :	0.122971
Total	12070.6		

Natural Moisture	
Wet WT (g) :	393.00
Dry WT (g):	376.70
% Moisture:	4.3

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	334.3	3	97	
1" / 25	1048.1	9	88	
3/4" / 19	826.5	7	81	
1/2"/12.5	806.2	7	74	
3/8" / 9.5	594.4	5	69	
1/4" / 6.3	661.5	6	64	
No.4 /4.75	372.1	3		
Min #4			61	
+#4 Total	4643.1		WBW (Wet):	513.5
-#4: Wet	7427.5		WBW (Dry):	492.2
-#4: Dry	7119		WAW (Dry):	480.6
Total	11763		Elutration:	11.6
#8 /2.36	50.1	6	54	
#10 / 2.00	16.8	2	52	
#15 /1.18	77.9	10	43	
#30 / 0.60	178.5	22	21	
#40/ 0.425	102.9	13	8	
#50 / 0.30	39.0	5	3	
#100 / 0.15	12.1	1	2	
#200 /0.075	2.9	0		
-#200/0.075	0.4		1.5	
Total	480.6			
Elutration	11.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

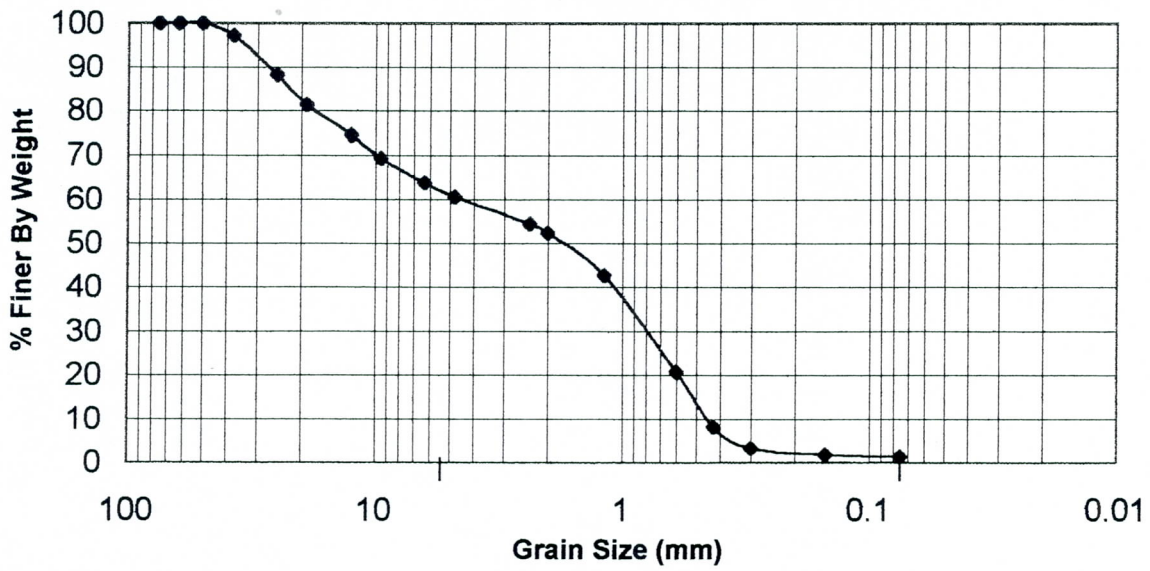
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L445
Location:	KHA32	Date Received :	10/30/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	144.7
1	Very Fine Sand (VFS)	0.125	2%	56.9
2	Fine Sand (FS)	0.25	3%	130.7
3	Medium Sand (MS)	0.5	14%	1260.3
4	Coarse Sand (CS)	1	36%	2631.1
5	Very Coarse Sand (VCS)	2	52%	1928.1
6	Very Fine Gravel (VFG)	4	59%	736.1
7	Fine Gravel (FG)	8	67%	955.1
8	Medium Gravel (MG)	16	78%	1338.6
9	Coarse Gravel (CG)	32	93%	1785.5
10	Very Coarse Gravel (VCG)	64	100%	795.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L446
Location:	KHA33	Date Received :	10/30/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	KA/CC	PI	
Sampled Date :	10/30/00	Proctor	
Submitted by :	KA/CC	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	3097.5	Coarse Factor :	0.00839
- #4	9234	Fine Factor :	0.148924
Total	12331.5		

Natural Moisture	
Wet WT (g) :	441.40
Dry WT (g):	421.70
% Moisture:	4.7

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	259.7	2	98	
3/4" / 19	248.6	2	96	
1/2"/12.5	538.1	5	91	
3/8" / 9.5	451.7	4	87	
1/4" / 6.3	902.6	8	80	
No.4 /4.75	696.8	6		
Min #4			74	
+#4 Total	3097.5		WBW (Wet):	520.2
-#4: Wet	9234		WBW (Dry):	497.0
-#4: Dry	8822		WAW (Dry):	487.4
Total	11919		Elutration:	9.6
#8 /2.36	122.5	18	56	
#10 / 2.00	42.9	6	49	
#15 /1.18	150.4	22	27	
#30 / 0.60	131.0	20	7	
#40/ 0.425	28.8	4	3	
#50 / 0.30	8.7	1	2	
#100 / 0.15	2.3	0	2	
#200 /0.075	0.7	0		
-#200/0.075	0.1		1.4	
Total	487.4			
Elutration	9.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
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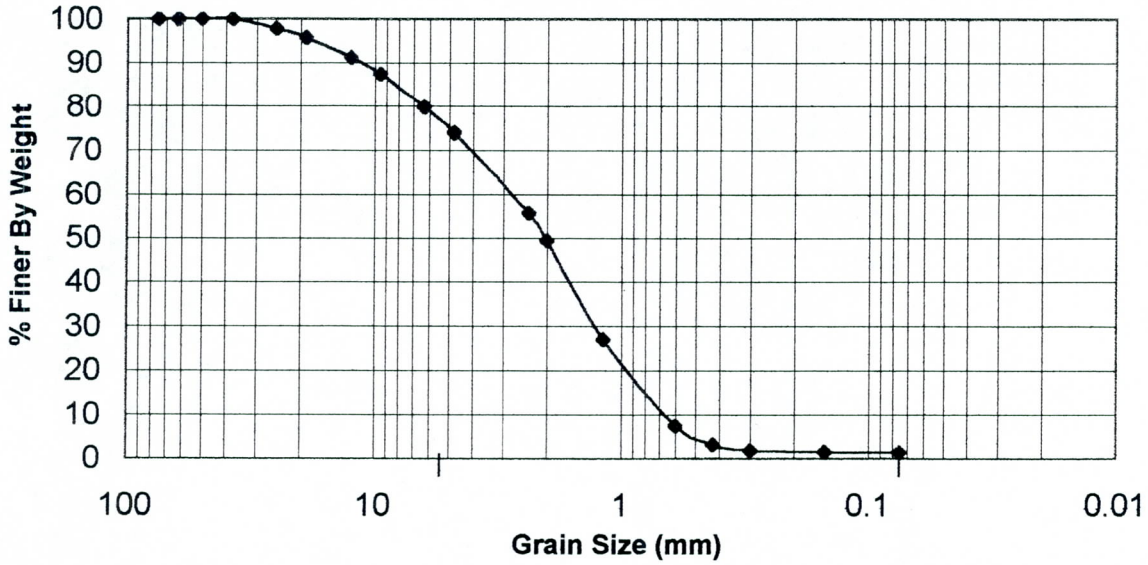
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L446
Location:	KHA33	Date Received :	10/30/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	1%	143.2
1	Very Fine Sand (VFS)	0.125	2%	36.9
2	Fine Sand (FS)	0.25	2%	31.4
3	Medium Sand (MS)	0.5	5%	387.1
4	Coarse Sand (CS)	1	21%	1895.8
5	Very Coarse Sand (VCS)	2	49%	3391.4
6	Very Fine Gravel (VFG)	4	68%	2241.2
7	Fine Gravel (FG)	8	84%	1871.1
8	Medium Gravel (MG)	16	94%	1164.5
9	Coarse Gravel (CG)	32	99%	642.4
10	Very Coarse Gravel (VCG)	64	100%	114.3

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L474
Location:	KHA34	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	488.3	Coarse Factor :	0.015917
- #4	5874.4	Fine Factor :	0.16549
Total	6362.7		

Natural Moisture	
Wet WT (g) :	308.30
Dry WT (g):	304.10
% Moisture:	1.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	13.7	0	100	
3/8" / 9.5	111.9	2	98	
1/4" / 6.3	72.5	1	97	
No.4 /4.75	290.2	5		
Min #4			92	
+#4 Total	488.3		WBW (Wet):	565.0
-#4: Wet	5874.4		WBW (Dry):	557.3
-#4: Dry	5794		WAW (Dry):	544.9
Total	6283		Elutration:	12.4
#8 /2.36	48.1	8	84	
#10 / 2.00	25.4	4	80	
#15 /1.18	149.4	25	55	
#30 / 0.60	226.8	38	18	
#40/ 0.425	69.2	11	6	
#50 / 0.30	21.5	4	3	
#100 / 0.15	4.3	1	2	
#200 /0.075	0.3	0		
-#200/0.075	0.4		2.0	
Total	545.4			
Elutration	12.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

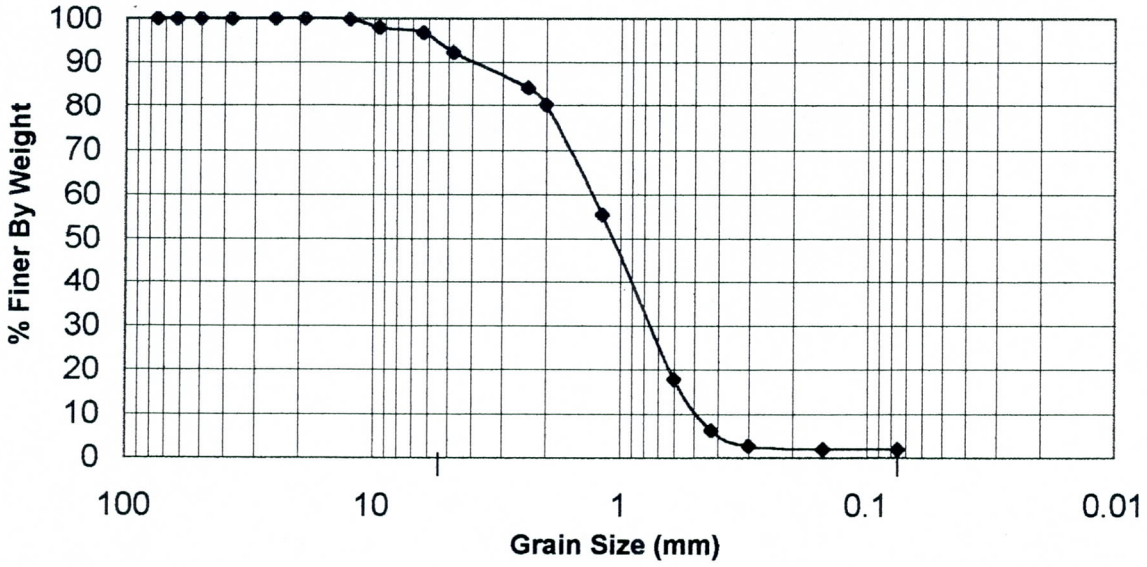
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L474
Location:	KHA34	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	2%	106.6
1	Very Fine Sand (VFS)	0.125	2%	23.4
2	Fine Sand (FS)	0.25	3%	30.8
3	Medium Sand (MS)	0.5	11%	546.8
4	Coarse Sand (CS)	1	44%	2037.4
5	Very Coarse Sand (VCS)	2	80%	2285.2
6	Very Fine Gravel (VFG)	4	90%	604.4
7	Fine Gravel (FG)	8	97%	488.5
8	Medium Gravel (MG)	16	100%	153.3
9	Coarse Gravel (CG)	32	100%	6.3
10	Very Coarse Gravel (VCG)	64	100%	0.0

GRADATION & PI

HOQUE & ASSOCIATES

Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L475
Location:	KHA35	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	10/9/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	1818.7	Coarse Factor :	0.018983
- #4	4158.7	Fine Factor :	0.136367
Total	5977.4		

Natural Moisture	
Wet WT (g) :	319.80
Dry WT (g):	312.20
% Moisture:	2.4

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	225.4	4	96	
1" / 25	122.9	2	93	
3/4" / 19	53.3	1	92	
1/2"/12.5	220.1	4	88	
3/8" / 9.5	239.4	5	84	
1/4" / 6.3	181.4	3	80	
No.4 /4.75	165.6	3		
Min #4			77	
+#4 Total	1208.1		WBW (Wet):	578.9
-#4: Wet	4158.7		WBW (Dry):	565.1
-#4: Dry	4060		WAW (Dry):	519.2
Total	5268		Elutration:	45.9
#8 /2.36	75.8	10	67	
#10 / 2.00	36.7	5	62	
#15 /1.18	167.0	23	39	
#30 / 0.60	179.7	25	14	
#40/ 0.425	39.5	5	9	
#50 / 0.30	13.3	2	7	
#100 / 0.15	5.8	1	6	
#200 /0.075	1.3	0		
-#200/0.075	0.1		6.3	
Total	519.2			
Elutration	45.9			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

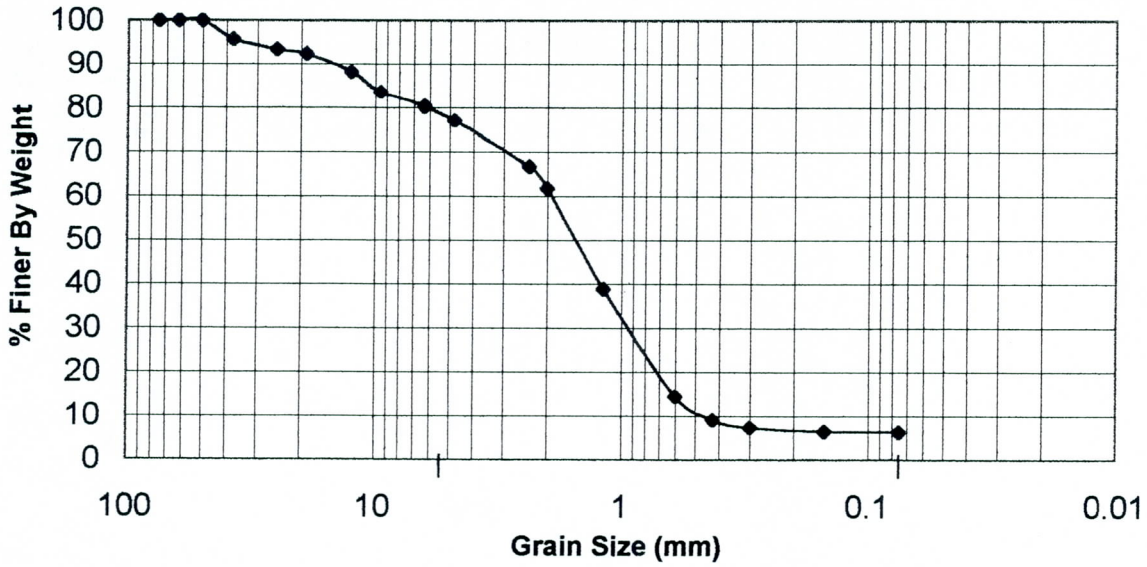
BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR

Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L475
Location:	KHA35	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	5%	275.6
1	Very Fine Sand (VFS)	0.125	6%	61.4
2	Fine Sand (FS)	0.25	7%	30.9
3	Medium Sand (MS)	0.5	11%	231.0
4	Coarse Sand (CS)	1	31%	1052.4
5	Very Coarse Sand (VCS)	2	62%	1600.3
6	Very Fine Gravel (VFG)	4	74%	634.2
7	Fine Gravel (FG)	8	82%	435.9
8	Medium Gravel (MG)	16	90%	442.9
9	Coarse Gravel (CG)	32	95%	223.7
10	Very Coarse Gravel (VCG)	64	100%	279.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L475
Location:	KHA36	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	2001.8	Coarse Factor :	0.013527
- #4	5613.5	Fine Factor :	0.134373
Total	7615.3		

Natural Moisture	
Wet WT (g) :	357.90
Dry WT (g):	343.70
% Moisture:	4.1

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	75.3	1	99	
1" / 25	177.7	2	97	
3/4" / 19	306.4	4	92	
1/2"/12.5	297.4	4	88	
3/8" / 9.5	262.5	4	85	
1/4" / 6.3	476.1	6	78	
No.4 /4.75	406.4	5		
Min #4			73	
+#4 Total	2001.8		WBW (Wet):	565.1
-#4: Wet	5613.5		WBW (Dry):	542.7
-#4: Dry	5391		WAW (Dry):	523.3
Total	7393		Elutration:	19.4
#8 /2.36	88.9	12	61	
#10 / 2.00	38.5	5	56	
#15 /1.18	163.0	22	34	
#30 / 0.60	178.7	24	10	
#40/ 0.425	39.1	5	5	
#50 / 0.30	10.6	1	3	
#100 / 0.15	3.8	1	3	
#200 /0.075	0.6	0		
-#200/0.075	0.1		2.6	
Total	523.3			
Elutration	19.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
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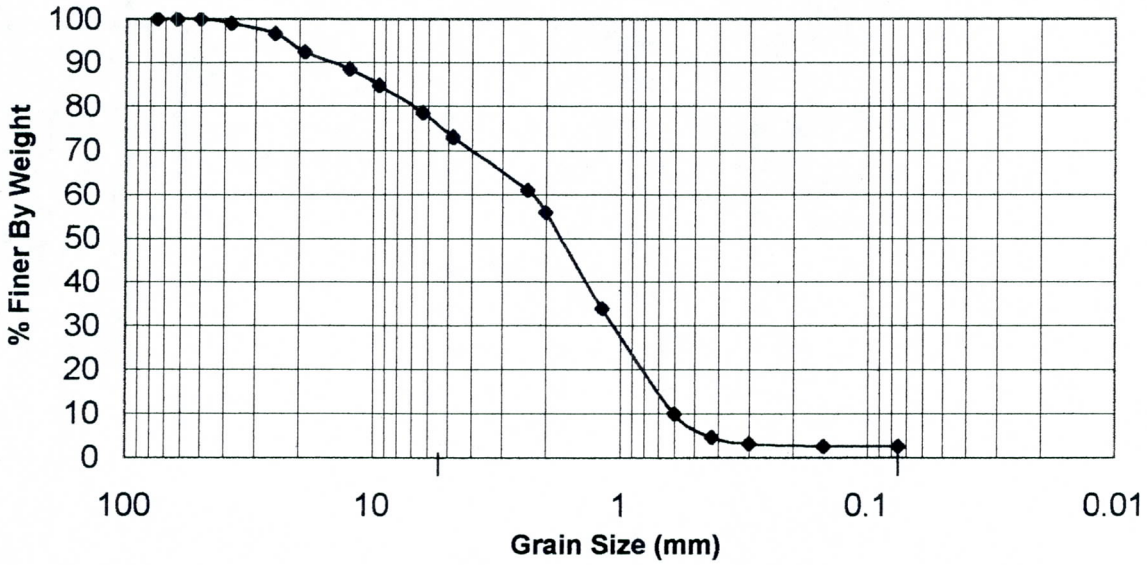
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L475
Location:	KHA36	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	2%	161.2
1	Very Fine Sand (VFS)	0.125	3%	36.2
2	Fine Sand (FS)	0.25	3%	27.2
3	Medium Sand (MS)	0.5	7%	284.3
4	Coarse Sand (CS)	1	26%	1446.2
5	Very Coarse Sand (VCS)	2	56%	2170.1
6	Very Fine Gravel (VFG)	4	69%	983.4
7	Fine Gravel (FG)	8	82%	941.5
8	Medium Gravel (MG)	16	91%	645.8
9	Coarse Gravel (CG)	32	98%	543.2
10	Very Coarse Gravel (VCG)	64	100%	153.5

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L476
Location:	KHA37	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	11/13/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	99.3	Coarse Factor :	0.018062
- #4	5835.1	Fine Factor :	0.181086
Total	5934.4		

Natural Moisture	
Wet WT (g) :	299.20
Dry WT (g):	278.80
% Moisture:	7.3

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	32.8	1	99	
1/2"/12.5	7.7	0	99	
3/8" / 9.5	12.9	0	99	
1/4" / 6.3	22.2	0	99	
No.4 /4.75	23.7	0		
Min #4			98	
+#4 Total	99.3		WBW (Wet):	582.0
-#4: Wet	5835.1		WBW (Dry):	542.3
-#4: Dry	5437		WAW (Dry):	210.5
Total	5537		Elutration:	331.8
#8 /2.36	4.4	1	97	
#10 / 2.00	1.7	0	97	
#15 /1.18	3.7	1	96	
#30 / 0.60	11.4	2	94	
#40/ 0.425	24.7	4	90	
#50 / 0.30	43.8	8	82	
#100 / 0.15	66.1	12	70	
#200 /0.075	49.1	9		
-#200/0.075	5.6		61.1	
Total	210.5			
Elutration	331.8			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

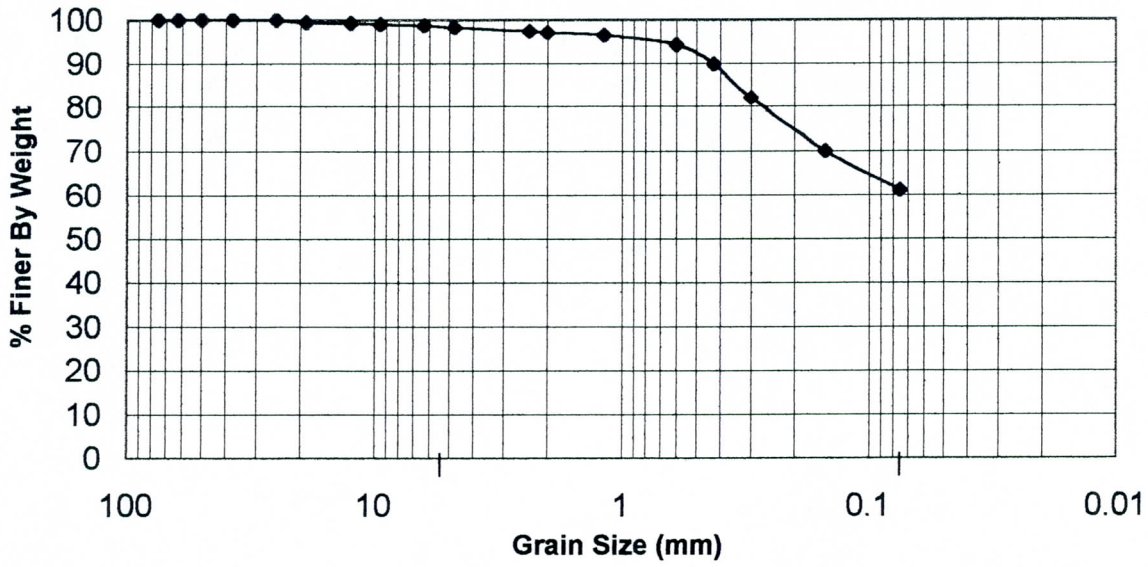
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L476
Location:	KHA37	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	51%	2819.1
1	Very Fine Sand (VFS)	0.125	67%	892.0
2	Fine Sand (FS)	0.25	78%	605.9
3	Medium Sand (MS)	0.5	92%	766.2
4	Coarse Sand (CS)	1	96%	220.3
5	Very Coarse Sand (VCS)	2	97%	72.6
6	Very Fine Gravel (VFG)	4	98%	47.1
7	Fine Gravel (FG)	8	99%	49.6
8	Medium Gravel (MG)	16	99%	27.5
9	Coarse Gravel (CG)	32	100%	36.4
10	Very Coarse Gravel (VCG)	64	100%	0.0

WORKSHEET ****HYDROMETER ANALYSIS****

Project Name: Agua Fria Flood Control

Project No:

Date: 6-Dec-00

Sample Source: KHA37

Sampled By: Client

Sample Date 10-Nov

Lab No: 6065

Specific Gravity: 2.67

Init. Wt. Of Sample: 67.59

W = 72.8

a = 0.998

Composite Correction : 0.003

% Passing #10: 92.8

Elapsed Time(min)	Temperature F	C	Hydro Reading	L (cm)	K	Particle Dia.(mm)	Percent Passing
		-17.77777778		280.8110931			-1358.253397
2	73.4	23.0	1.01	13.650	0.013093	0.0342	15.4
5	73.4	23.0	1.008	14.179	0.012875	0.0217	11.0
15	73.4	23.0	1.007	14.443	0.012875	0.0126	8.8
30	71.6	22.0	1.007	14.443	0.013023	0.0090	8.8
60	73.4	23.0	1.006	14.708	0.012875	0.0064	6.6
250	73.4	23.0	1.005	14.972	0.012875	0.0032	4.4
1440	71.6	22.0	1.005	14.972	0.013023	0.0013	4.4
					#DIV/0!	#DIV/0!	-2202.2

wet wt	dry wt	wt container	moisture
62.16	61.96	15.78	0.433087917

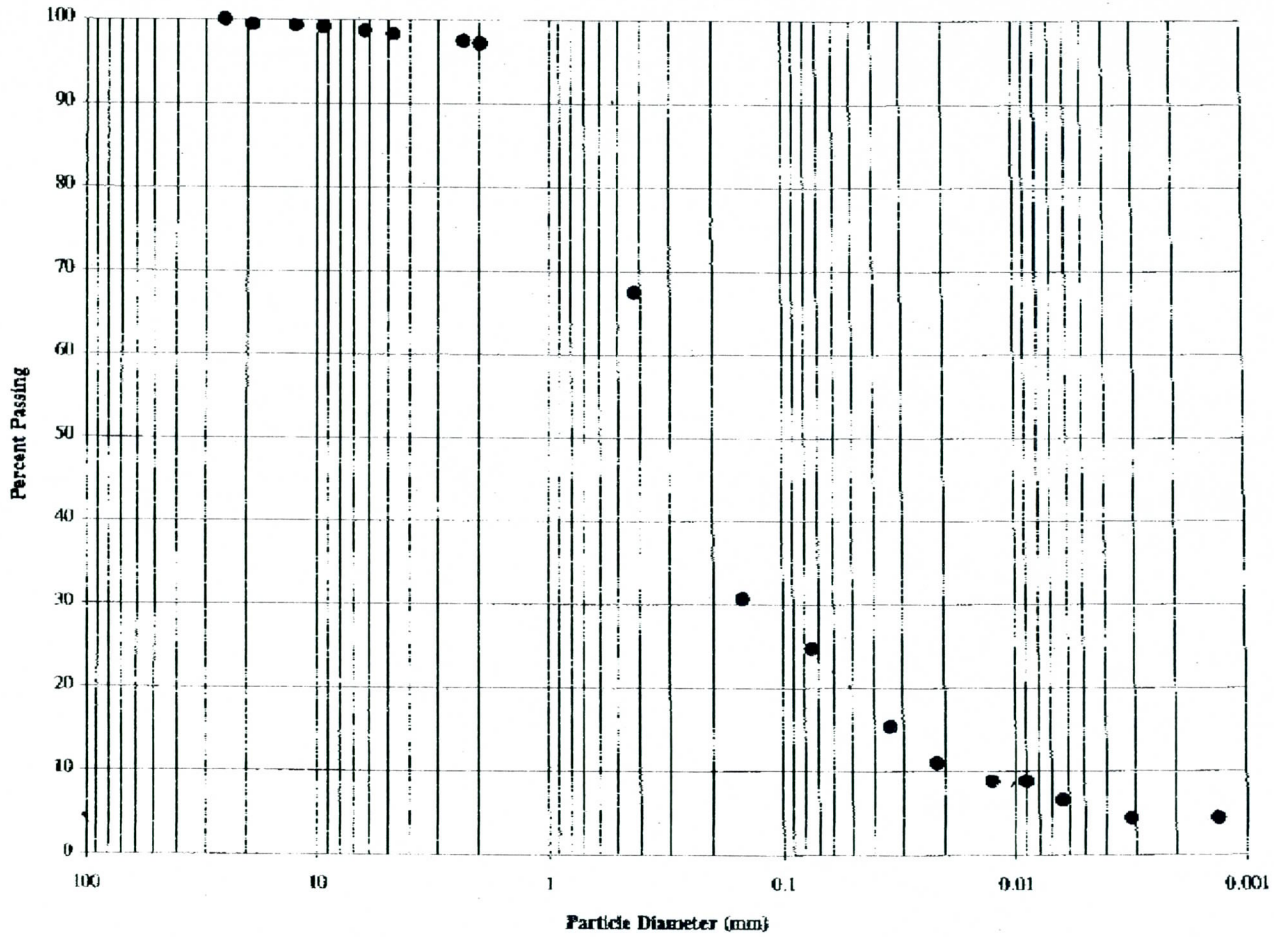
sieve	wt. ret	%ret	%pass
2"			100.0
1-1/2"			100.0
1"			100.0
3/4"		0.6	99.4
1/2"		0.1	99.3
3/8"		0.2	99.1
1/4"		0.4	98.7
#4		0.4	98.3
#8		0.8	97.5
#10		0.3	97.2
total+10		wbw(w)	67.88
pass 10 ww		wbw(d)	67.59
pass 10 dw		waw	51.55
total wt		clut	16.04
#16			97.2
#30			97.2
#40	20.66	29.7	67.5
#50			67.5
#100	25.6	36.8	30.7
#200	4.14	6.0	24.7
pass#200	1.14	24.7	
	51.54	100.0	

Specific Gravity

wt pycnometer	44.51		84.42
wt sample	46.15		temperature
wt pyc + water	143.91		27
wt pyc,H2O, sample		172.8	27
rel dens =	0.9965451	at	27
rel dens =	0.9965451	at	27
k =	0.9983	at	27
Wa =	143.91		
Sp. Gr =	2.674	at	27
Sp. Gr. =	2.669	at	20

PARTICLE-SIZE ANALYSIS TEST RESULTS

(ASTM D422)



Sample Source:

KHA37

Specific Gravity:

2.67 @ 20 deg. C

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L477
Location:	KHA38	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	11/13/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	3131.3	Coarse Factor :	0.014998
- #4	3660.8	Fine Factor :	0.100741
Total	6792.1		

Natural Moisture	
Wet WT (g) :	311.90
Dry WT (g):	301.30
% Moisture:	3.5

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	218.1	3	97	
1" / 25	610.4	9	88	
3/4" / 19	226.3	3	84	
1/2"/12.5	760.5	11	73	
3/8" / 9.5	396.6	6	67	
1/4" / 6.3	819.4	12	55	
No.4 /4.75	100.0	1		
Min #4			53	
+#4 Total	3131.3		WBW (Wet):	545.0
-#4: Wet	3660.8		WBW (Dry):	526.5
-#4: Dry	3536		WAW (Dry):	438.6
Total	6668		Elutration:	87.9
#8 /2.36	102.9	10	43	
#10 / 2.00	27.2	3	40	
#15 /1.18	87.6	9	31	
#30 / 0.60	100.1	10	21	
#40/ 0.425	42.1	4	17	
#50 / 0.30	28.6	3	14	
#100 / 0.15	33.4	3	11	
#200 /0.075	16.4	2		
-#200/0.075	0.3		8.9	
Total	438.6			
Elutration	87.9			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

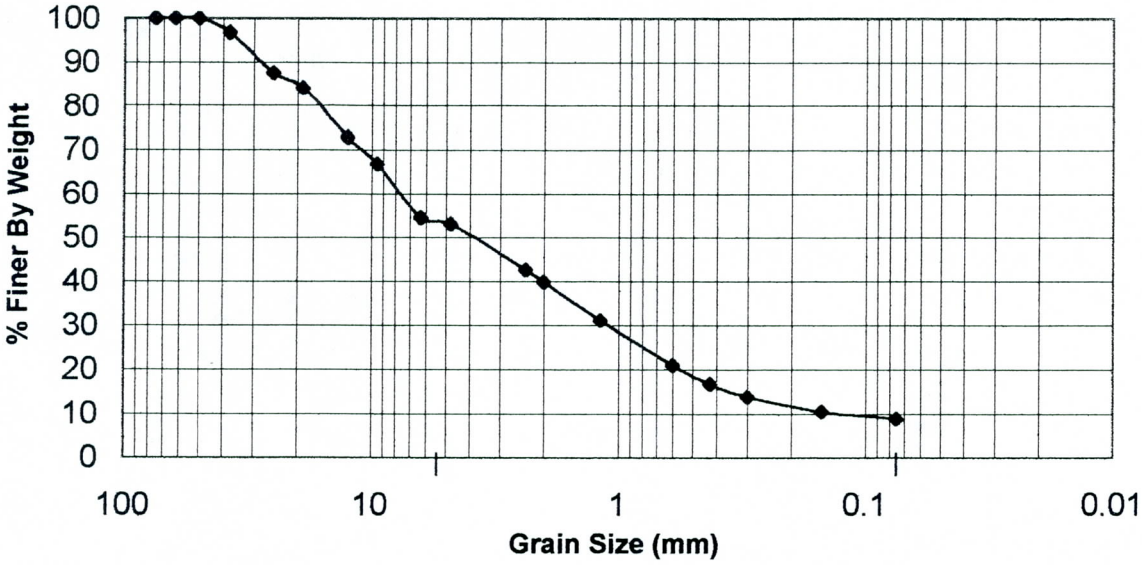
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L477
Location:	KHA38	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	7%	493.6
1	Very Fine Sand (VFS)	0.125	10%	172.2
2	Fine Sand (FS)	0.25	13%	186.3
3	Medium Sand (MS)	0.5	19%	388.1
4	Coarse Sand (CS)	1	28%	625.3
5	Very Coarse Sand (VCS)	2	40%	797.1
6	Very Fine Gravel (VFG)	4	50%	653.1
7	Fine Gravel (FG)	8	61%	756.1
8	Medium Gravel (MG)	16	79%	1190.2
9	Coarse Gravel (CG)	32	93%	919.1
10	Very Coarse Gravel (VCG)	64	100%	486.7

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L478
Location:	KHA39	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	779.1	Coarse Factor :	0.013024
- #4	7234.9	Fine Factor :	0.162682
Total	8014.0		

Natural Moisture	
Wet WT (g) :	308.20
Dry WT (g):	293.90
% Moisture:	4.9

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	108.7	1	99	
3/4" / 19	108.1	1	97	
1/2"/12.5	154.4	2	95	
3/8" / 9.5	105.0	1	94	
1/4" / 6.3	253.8	3	90	
No.4 /4.75	49.1	1		
Min #4			90	
+#4 Total	779.1		WBW (Wet):	579.2
-#4: Wet	7234.9		WBW (Dry):	552.3
-#4: Dry	6899		WAW (Dry):	526.9
Total	7678		Elutration:	25.4
#8 /2.36	22.4	4	86	
#10 / 2.00	10.2	2	85	
#15 /1.18	49.8	8	76	
#30 / 0.60	93.8	15	61	
#40/ 0.425	69.0	11	50	
#50 / 0.30	89.4	15	35	
#100 / 0.15	152.2	25	11	
#200 /0.075	39.2	6		
-#200/0.075	0.9		4.3	
Total	526.9			
Elutration	25.4			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

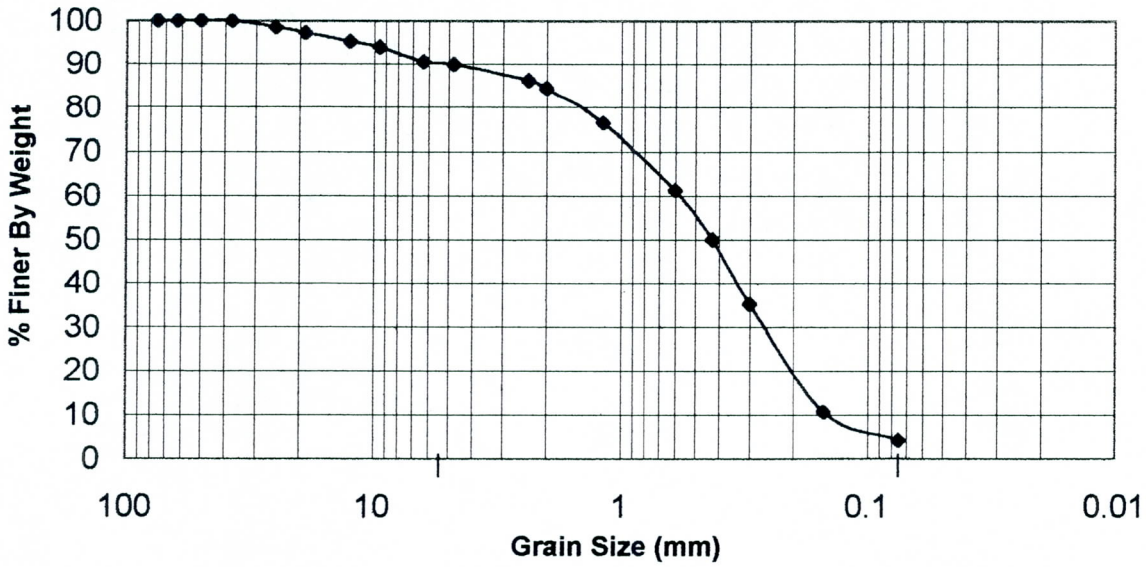
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L478
Location:	KHA39	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	4%	274.0
1	Very Fine Sand (VFS)	0.125	9%	381.2
2	Fine Sand (FS)	0.25	27%	1430.7
3	Medium Sand (MS)	0.5	55%	2119.8
4	Coarse Sand (CS)	1	72%	1300.6
5	Very Coarse Sand (VCS)	2	85%	985.7
6	Very Fine Gravel (VFG)	4	89%	317.8
7	Fine Gravel (FG)	8	92%	273.3
8	Medium Gravel (MG)	16	96%	307.1
9	Coarse Gravel (CG)	32	99%	240.2
10	Very Coarse Gravel (VCG)	64	100%	47.8

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L479
Location:	KHA40	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	10/20/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	748.3	Coarse Factor :	0.015474
- #4	5886.3	Fine Factor :	0.168649
Total	6634.6		

Natural Moisture	
Wet WT (g) :	345.00
Dry WT (g):	334.90
% Moisture:	3.0

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	394.6	6	94	
3/4" / 19	112.8	2	92	
1/2"/12.5	95.2	1	91	
3/8" / 9.5	51.7	1	90	
1/4" / 6.3	61.4	1	89	
No.4 /4.75	32.6	1		
Min #4			88	
+#4 Total	748.3		WBW (Wet):	540.1
-#4: Wet	5886.3		WBW (Dry):	524.3
-#4: Dry	5714		WAW (Dry):	481.3
Total	6462		Elutration:	43.0
#8 /2.36	1.0	0	88	
#10 / 2.00	1.6	0	88	
#15 /1.18	10.9	2	86	
#30 / 0.60	71.6	12	74	
#40/ 0.425	85.1	14	60	
#50 / 0.30	99.6	17	43	
#100 / 0.15	152.1	26	17	
#200 /0.075	55.4	9		
-#200/0.075	4.0		7.9	
Total	481.3			
Elutration	43.0			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

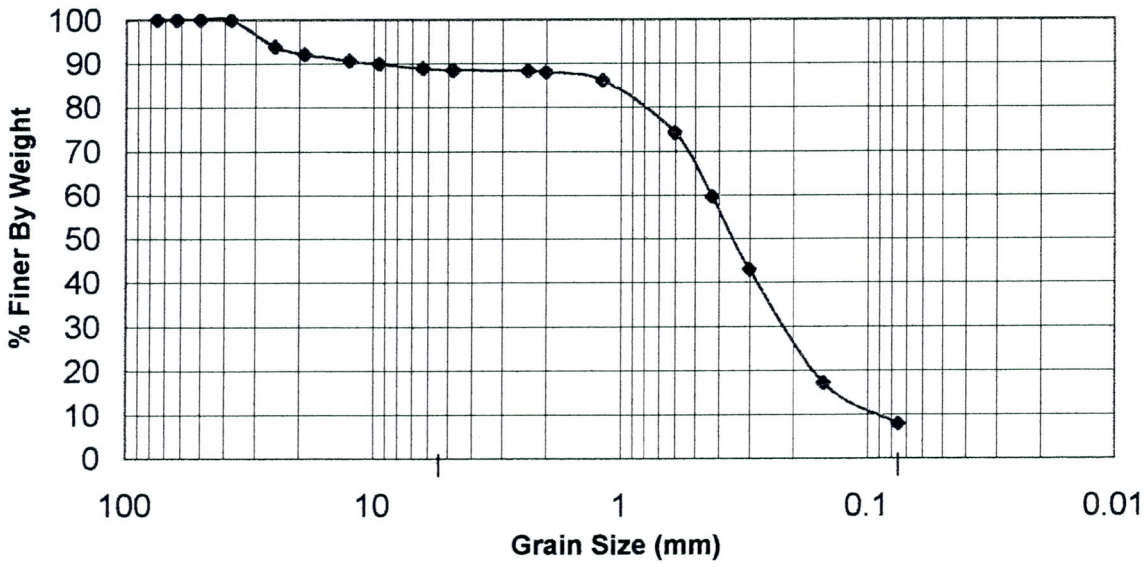
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L479
Location:	KHA40	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	7%	426.8
1	Very Fine Sand (VFS)	0.125	14%	487.9
2	Fine Sand (FS)	0.25	34%	1306.4
3	Medium Sand (MS)	0.5	66%	2035.5
4	Coarse Sand (CS)	1	82%	1068.1
5	Very Coarse Sand (VCS)	2	88%	361.0
6	Very Fine Gravel (VFG)	4	88%	24.9
7	Fine Gravel (FG)	8	89%	68.7
8	Medium Gravel (MG)	16	91%	131.7
9	Coarse Gravel (CG)	32	97%	377.7
10	Very Coarse Gravel (VCG)	64	100%	173.6

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L480
Location:	KHA41	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	11/13/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight	
+ #4	21.2
- #4	5548.4
Total	5569.6

Coarse / Fine Factor	
Coarse Factor :	0.018691
Fine Factor :	0.19597

Natural Moisture	
Wet WT (g) :	326.00
Dry WT (g):	313.10
% Moisture:	4.1

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	0.0	0	100	
1-1/2"/ 37.5	0.0	0	100	
1" / 25	0.0	0	100	
3/4" / 19	0.0	0	100	
1/2"/12.5	3.6	0	100	
3/8" / 9.5	5.4	0	100	
1/4" / 6.3	7.7	0	100	
No.4 /4.75	4.5	0		
Min #4			100	
+#4 Total	21.2		WBW (Wet):	529.2
-#4: Wet	5548.4		WBW (Dry):	508.3
-#4: Dry	5329		WAW (Dry):	456.7
Total	5350		Elutration:	51.6
#8 /2.36	3.3	1	99	
#10 / 2.00	2.8	1	98	
#15 /1.18	15.3	3	95	
#30 / 0.60	60.0	12	84	
#40/ 0.425	72.4	14	69	
#50 / 0.30	89.8	18	52	
#100 / 0.15	136.5	27	25	
#200 /0.075	68.6	13		
-#200/0.075	8.0		11.7	
Total	456.7			
Elutration	51.6			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

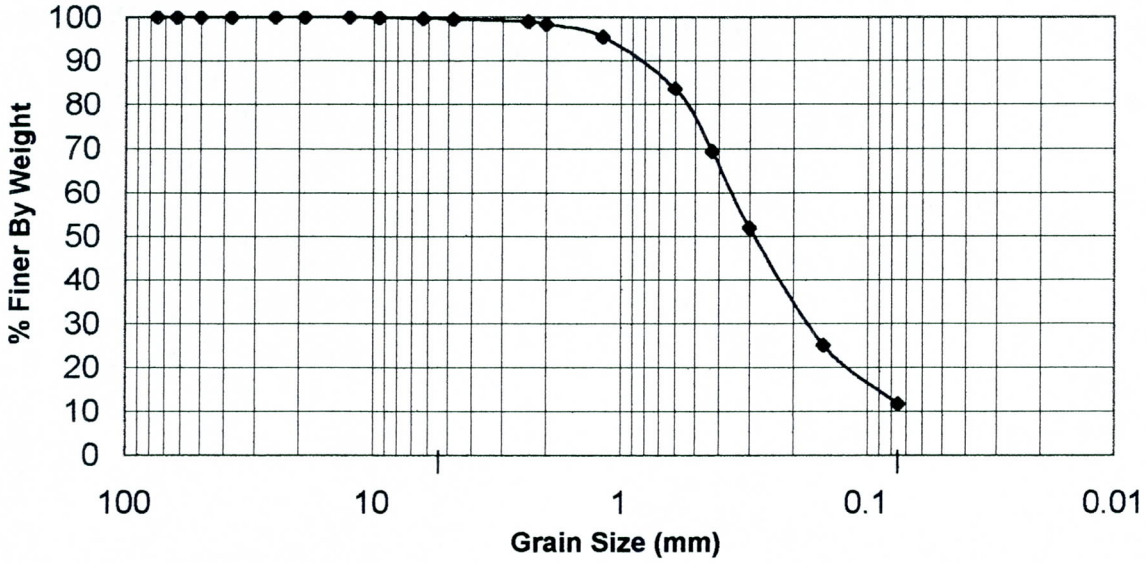
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L480
Location:	KHA41	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	10%	520.4
1	Very Fine Sand (VFS)	0.125	21%	583.6
2	Fine Sand (FS)	0.25	43%	1193.8
3	Medium Sand (MS)	0.5	76%	1743.9
4	Coarse Sand (CS)	1	92%	867.6
5	Very Coarse Sand (VCS)	2	98%	355.6
6	Very Fine Gravel (VFG)	4	99%	52.9
7	Fine Gravel (FG)	8	100%	19.6
8	Medium Gravel (MG)	16	100%	10.9
9	Coarse Gravel (CG)	32	100%	1.7
10	Very Coarse Gravel (VCG)	64	100%	0.0

WORKSHEET ****HYDROMETER ANALYSIS****

Project Name: Agua Fria Flood Control

Project No:

Date: 6-Dec-00

Sample Source: KHA41

Sampled By: Client

Sample Date: 10-Nov

Lab No: 6066

Specific Gravity: 2.74

Init. Wt. Of Sample: 77.27

W = 83.3

a = 0.982

Composite Correction: 0.003

% Passing #10: 92.8

Elapsed Time(min)	Temperature F	C	Hydro Reading	L (cm)	K	Particle Dia.(mm)	Percent Passing
		-17.77777778		280.8110931			-1358.253397
2	71.6	22.0	1.006	14.708	0.012963	0.0352	5.7
5	71.6	22.0	1.005	14.972	0.012747	0.0221	3.8
15	73.4	23.0	1.004	15.237	0.012602	0.0127	1.9
30	73.4	23.0	1.004	15.237	0.012602	0.0090	1.9
60	73.4	23.0	1.0035	15.369	0.012602	0.0064	0.9
250	73.4	23.0	1.0035	15.369	0.012602	0.0031	0.9
1440	71.6	22.0	1.0035	15.369	0.012747	0.0013	0.9
					#DIV/0!	#DIV/0!	-1896.1

wet wt	dry wt	wt container	moisture
44.61	44.51	15.86	0.34904014

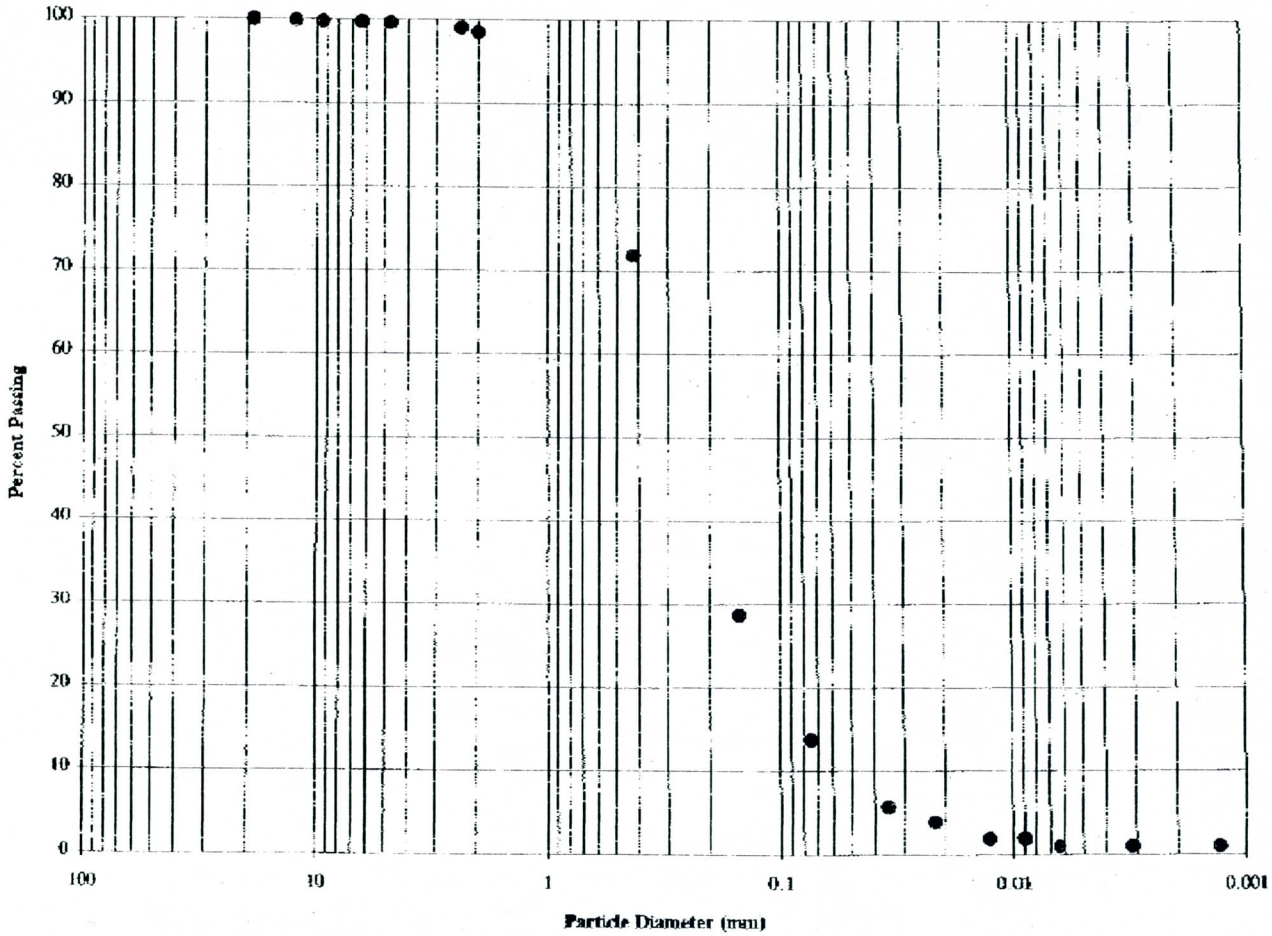
sieve	wt. ret	%ret	%pass
2"			100.0
1-1/2"			100.0
1"			100.0
3/4"			100.0
1/2"		0.1	99.9
3/8"		0.1	99.8
1/4"		0.1	99.7
#4		0.1	99.6
#8		0.6	99.0
#10		0.5	98.5
total+10		wbw(w)	77.54
pass 10 ww		wbw(d)	77.27
pass 10 dw		waw	67.57
total wt		clut	9.70
#16			98.5
#30			98.5
#40	20.84	26.6	71.9
#50			71.9
#100	33.98	43.3	28.6
#200	11.67	14.9	13.7
pass#200	1.02	13.7	
	67.51	100.0	

Specific Gravity

wt pycnometer	56.11		84.42
wt sample	28.62		temperature
wt pyc + water	155.6		27
wt pyc,H2O, sample		173.8	27
rel dens =	0.9965451	at	27
rel dens =	0.9965451	at	27
k =	0.9983	at	27
Wa =	155.6		
Sp. Gr =	2.747	at	27
Sp. Gr. =	2.742	at	20

PARTICLE-SIZE ANALYSIS TEST RESULTS

(ASTM D422)



Sample Source:

KHA41

Specific Gravity:

2.74 @ 20 deg. C

GRADATION & PI

HOQUE & ASSOCIATES
Tel : 480-921-1368 | Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L481
Location:	KHA42	Date Received :	11/10/00
		Test Required :	
Material :	Sand	Gradation	x
Mat. Source :	Existing River Bed	-200 Wash	x
Sampled By :	JH	PI	
Sampled Date :	11/10/00	Proctor	
Submitted by :	JH	Test Dates :	11/13/00

[ ] ASTM D1348 [x] ARIZ 201c [ ] AASHTO T-89/90

Sample Weight		Coarse / Fine Factor	
+ #4	4100.6	Coarse Factor :	0.012053
- #4	4559.8	Fine Factor :	0.100452
Total	8660.4		

Natural Moisture	
Wet WT (g) :	311.20
Dry WT (g):	286.40
% Moisture:	8.7

Sieve US/mm	Wt. Retained	% Retained	%Passing	Specs
3"/75	0.0	0	100	
2-1/2"/ 62.5	0.0	0	100	
2"/50	159.3	2	98	
1-1/2"/ 37.5	86.8	1	97	
1" / 25	464.5	6	91	
3/4" / 19	617.3	7	84	
1/2"/12.5	854.7	10	74	
3/8" / 9.5	541.4	7	67	
1/4" / 6.3	847.9	10	57	
No.4 /4.75	528.7	6		
Min #4			51	
+#4 Total	4100.6		WBW (Wet):	547.1
-#4: Wet	4559.8		WBW (Dry):	503.5
-#4: Dry	4196		WAW (Dry):	436.5
Total	8297		Elutration:	67.0
#8 /2.36	106.6	11	40	
#10 / 2.00	30.9	3	37	
#15 /1.18	96.9	10	27	
#30 / 0.60	92.8	9	18	
#40/ 0.425	35.7	4	14	
#50 / 0.30	21.9	2	12	
#100 / 0.15	22.5	2	10	
#200 /0.075	24.4	2		
-#200/0.075	4.8		7.2	
Total	436.5			
Elutration	67.0			

PLASTICITY INDEX (AASHTO T-89 & 90)

Liquid Limit		Plastic Limit	
Tare Wt. :		Tare Wt. :	
Wet Wt. :		Wet Wt. :	
Dry Wt. :		Drt Wt. :	
# of Blows			
Blos Factr			
LL =		PL =	

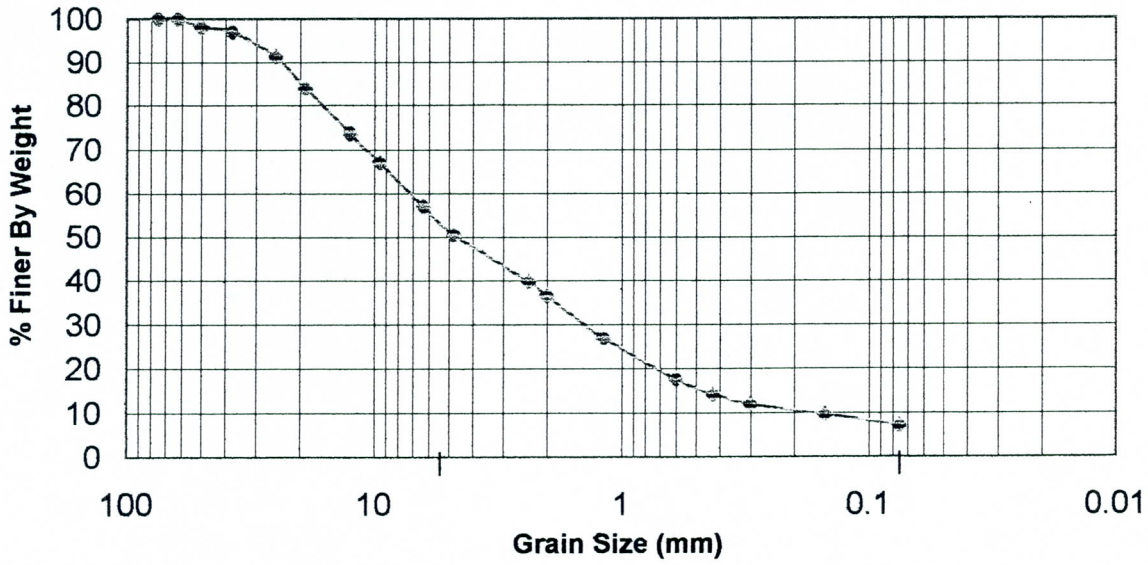
PLASTICITY INDEX =

BLOWS FACTOR	
20	0.9758
21	0.9806
22	0.9855
23	0.9903
24	0.9952
25	1
26	1.0048
27	1.0097
28	1.0145
29	1.0194
30	1.0242

Tested By : AR
Checked By : MS

HOQUE & ASSOCIATES
1225 North Stadem Drive
Tempe, Arizona 85281
Tel : 480-921-1368
Fax : 480-921-0194

Client :	Kimley-Horn & Associates, Inc.	HA Project No. :	00084
Project :	Aqua Fria Flood Control	HA Lab No.:	00L481
Location:	KHA42	Date Received :	11/10/00



NO	SEDIMENT MATERIAL	SEDIMENT SIZE (mm)	PERCENT FINER BY WEIGHT (%)	FRACTION BY WEIGHT (grams)
0	Clay and Silt	0.0625	6%	498.7
1	Very Fine Sand (VFS)	0.125	9%	235.3
2	Fine Sand (FS)	0.25	11%	192.8
3	Medium Sand (MS)	0.5	16%	372.6
4	Coarse Sand (CS)	1	24%	703.4
5	Very Coarse Sand (VCS)	2	37%	1047.6
6	Very Fine Gravel (VFG)	4	47%	862.1
7	Fine Gravel (FG)	8	62%	1263.0
8	Medium Gravel (MG)	16	79%	1399.1
9	Coarse Gravel (CG)	32	95%	1271.9
10	Very Coarse Gravel (VCG)	64	100%	450.5

Kimley-Horn
and Associates, Inc.

Suite 250
7600 N. 15th Street
Phoenix, AZ 85020

TEL 602 944 5500
FAX 602 944 7423

Transmittal

Date: *May 8, 2001* *Job No:* 091131004

FLOOD CONTROL DISTRICT
RECEIVED
MAY 10 '01
CH & EX | FINANCE
PIO | LANDS
ADMIN | O & M
REG | P & PM
ENG | FILE
CONTRACTS
OTHER

To: Kofi Awumah, Ph.D., P.E.
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

Re: Agua Fria Watercourse Master Plan
HEC-6 Moveable Bed Model

We are sending you

☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop Drawings ☐ Prints/Plans ☐ Samples ☐ Specifications ☐ Change

☒ Other: Transmitted by U.S. Mail

Copies	*Date*	*No.*	*Description*
1	04/11/01	2 pgs.	Memorandum for 04/11/01 meeting at the District regarding the referenced project.

These are transmitted as checked below:

☒ For your use ☐ Approved as submitted ☐ Resubmit ☐ copies for approval

☒ As requested ☐ Approved as noted ☐ Submit ☐ copies for distribution

☐ For review and comment ☐ Returned for corrections ☐ Return ☐ corrected prints

Remarks

Engineering
Planning
and
Environmental
Consultants

Copy to: File

Signed for *Robert A. Eichinger, P.E.*

K:\-Civil\91131004\CORRESP\Transmittals\050801 Kofi HEC-6 Model.doc

Kimley-Horn
and Associates, Inc.

Memorandum

To: File 091131004, Agua Fria River Watercourse Master Plan

From: Bob Eichinger, Kimley-Horn and Associates, Inc.

Date: April 11, 2001

Subject: HEC-6 Moveable Bed Model, Meeting w/FCD at KHA

Bob Eichinger and Kofi Awumah (District) met on this day to review HEC-6 cross sections for the Agua Fria River sediment trend study. Bob and Kofi reviewed cross section plots, moveable bed limits, encroachments, conveyance limits, and cross section locations. Kofi and Bob agreed to make the following revisions to the existing conditions moveable bed HEC-6 model:

HEC-6 Cross Section by River mile	Revision to HEC-6 Existing Conditions Model
0.16	Take out elect tower; reduce elevation to 913.5
0.44	Take out elect tower; reduce elevation to 917.5
0.73	Take out elect tower; reduce elevation to 920.0
1.33	Take out elect tower; reduce elevation to 925.5
8.105	Take out elect tower; reduce elevation to 1002.5
10.538	Take out elect tower; reduce elevation to 1033
11.847	Take out elect tower; reduce elevation to 1057
15.658	Delete cross section
15.719	Add cross section
18.275	HD left to 8800
22.462	HD right to 11800
22.935	HD right to 11750
26.730	HD right to 11200
27.030	HD right to 10600

27.680	HD to right 10200
29.800	HD to left 9882
23.692	Add cross section at sand and grave mine
8.768	Add cross section at sand and grave mine
8.433	Add cross section at sand and grave mine
10.343	Add cross section at sand and grave mine
12.816	Add cross section
13.007	Add cross section and HD to 9500

/rae

Copy to: Kofi Awumah, FCD

Kimley-Horn
and Associates, Inc.

Suite 250
7600 North 15th Street
Phoenix, Arizona 85020

TEL 602 944 5500
FAX 602 944 7423

TRANSMITTAL

Date: May 10 2001 **Job No.:** FCD 99-24

To: Kofi Awumah
Flood Control District
2801 W Durango
Phx Az

Re: Agua Fria River Watercourse Master Plan

We are sending you:

☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop Drawings ☐ Prints/Plans ☐ Samples ☐ Specifications ☐ Change Order

☐ _____

Copies	Date	No.	Description
2	5/2001		Geotechnical Exploratory Report - Agua Fria River sediment bed
			Material sampling and results of analysis

These are transmitted as checked below:

☒ For your use ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ As requested ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ For review and comment ☐ Returned for corrections ☐ Return _____ corrected prints

Remarks: _____

Copy to: 091141004_____ Signed: Bob Eichinger

K:\-Civil\91131004\Sedimentation\Correspondence\GeotechResultstoFCD.doc