SUBMITTAL CERTIFICATION FORM			
CONTRACTOR'S NAME:	TAR/TBI Construction LLC		
PROJECT NAME:	Utility Service Ext APS 336A		
DU JOB NO:	J101395, J101396, and J101397		
As Prime Contractor, we checked this submittal and we certify it is correct, complete, and in compliance with Contract Drawings and Specifications. All affected Contractors and suppliers are aware of, and will integrate this submittal into their own work.			
SUBMITTAL NUMBER	3	DATE RECEIVED	8-8-10
REVISION NUMBER		DATE RECEIVED	
SPECIFICATION SECTION NUMBER /PARAGRAPH NUMBER		03300-2 1.3 A	
DRAWING NUMBER			
SUBCONTRACTOR'S NAME			
SUPPLIER'S NAME	HC Redi-Mix		
MANUFACTURER'S NAME			
NOTE: DEVIATIONS FROM CONTRACT DOCUMENTS ARE PROPOSED AS FOLLOWS (Indicate "NONE" if there are no deviations)			
None			
CERTIFIED BY	Kris Manke		

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

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

May 3, 2010

H.C. Redi Mix
P.O. Box 80688
Fairbanks, Alaska 99708

Subject: 2010 – 4000 psi (28 MPa) 5.85 sack Type I/II Cement & Size #67 Aggregate No Air Concrete Mix Design
Mix # 58534IN NAS & SI Units

Gentlemen:

Transmitted herein is the 4000 psi (28 MPa) concrete mix design using Type I/II Cement, Size #67 local aggregates, and water reducing admixture.

The concrete compressive strength test data is a similar 5.85 sack type I/II cement mix design used for Fairbanks Area Projects during 2009. The average strength and standard deviations were calculated from the enclosed 5.85 sack test data to confirm the mix design meets ACI 301 "Specifications for Structural Concrete" requirements for critical strength for a 4000 psi mix.

The contents of this report are as follows:

1. Mix # 58534IN Concrete Mix Design — Page 2 (NAS); 3 (SI)
2. Concrete Mix Test Data — Pages 4-6

If there are any questions, please contact our office.

Sincerely yours,

Stefan Mack
Stefan Mack, PE
Lab Manager

Recommended Concrete Mix Design
Mix # 58534IN (NAS Units)

Concrete F'c = 4000 psi in 28 Days w/Type I/II Cement
Concrete F'cr = 4540 psi in 28 Days w/Type I/II Cement

Maximum Nominal Size Aggregate (in)	0.75
Cementitious Materials (Sacks/yd^3)	5.85
Water/Cement Ratio (lb/lb)	0.39
Entrapped Air (%)	2.5
Slump (in) / Slump HRWR (in)	4 / 8
Sand Content (% by Volume)	40
Coarse SPG (SSD) / Absorption %	2.67 / 0.9
Fine SPG (SSD) / Absorption %	2.68 / 0.7

Batch Weights in Pounds
One Cubic Yard

Ingredient	Weight (lb)	Volume (ft^3)
Cement	550	2.798
Water	214	3.437
(gallons)	25.7	
Sand (SSD)	1344	8.036
Gravel (SSD)	2008	12.054
Entrapped Air (2.5%)		0.675
Polyheed 997	17 – 83 oz	
Totals	4117	27.000

Cement = ABI Type I/II ASTM C150
Water = Plant Water Conforms to ASTM C1602 and C94
Sand = HC Old Richardson Hwy Pit North Pole, AK
Gravel = HC Size #67 Old Richardson Hwy Pit North Pole, AK
Polyheed 997 = Mid to High Range Water Reducing Agent (BASF product) meets ASTM C494 Type A & F

The Concrete Mix design Batch weights recommended are based on SSD Aggregates and they must be adjusted to meet existing moisture conditions at the plant.

Recommended Concrete Mix Design
Mix # 58534IN (SI Units)

Concrete F'c = 28 MPa in 28 Days w/Type I/II Cement
Concrete F'cr = 31 MPa in 28 Days w/Type I/II Cement

Maximum Nominal Size Aggregate (mm)	19
Cementitious Materials (kg/m^3)	326
Water/Cement Ratio (kg/kg)	0.39
Entrapped Air (%)	2.5
Slump (mm) / Slump HRWR (mm)	100 / 200
Sand Content (% by Volume)	40
Coarse SPG (SSD) / Absorption %	2.67 / 0.9
Fine SPG (SSD) / Absorption %	2.68 / 0.7

Batch Weights in Kilograms
One Cubic Meter

Ingredient	Weight (kg)	Volume (m^3)
Cement	326	0.1036
Water	127	0.1272
Sand (SSD)	797	0.2977
Gravel (SSD)	1192	0.4465
Entrapped (2.5%)		0.0250
Polyheed 997	195 – 975 ml / 100kg	
Totals	2442	1.000

Cement = ABI Type I/II ASTM C150
Water = Plant Water Conforms to ASTM C1602 and C94
Sand = HC Old Richardson Hwy Pit North Pole, AK
Gravel = HC Size #67 Old Richardson Hwy Pit North Pole, AK
Polyheed 997 = Mid to High Range Water Reducing Agent (BASF product) meets ASTM C494 Type A & F

The Concrete Mix design Batch weights recommended are based on SSD Aggregates and they must be adjusted to meet existing moisture conditions at the plant.

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

DATE: May 03, 2010

PROJECT: 5.85 Sack Type I/II Cement Size #67 agg no air 2010

ARCHITECT:

ENGINEER:

CONTRACTOR: HC Redi Mix

TESTING
LABORATORY: Mappa Inc

REMARKS:

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

LAB TEST NUMBER	DATE OF TEST	CYLINDER STRENGTHS, psi 7	28	28	SLUMP in.	AIR CONT %	CONC TEMP	AVE TEST VALUE	CUMUL AVE	CUMUL S D	CUMUL C V	MOVE 3 S D	MOVE 3 C V	MOVE 3 AVE	RANGE OF TEST	CUMUL AVE RANGE	MOVE 3 RANGE	W/IN TEST C V
1	6/30/2009	3985	4775	4950	6.0	1.5%	56f	4863	4863	---	---	---	---	-----	175	175	---	3.19
2	6/30/2009	3525	4460	4800	3.5	1.9%	60f	4630	4746	164	3.5	---	---	-----	340	258	---	4.81
1	7/15/2009	4000	5225	5335	4.0	2.2%	58f	5285	4926	332	6.7	332	6.7	4926	100	205	205	3.69
2	7/15/2009	3890	4855	5140	5.0	2.3%	58f	4998	4944	273	5.5	328	6.6	4971	285	225	242	4.03
2	7/16/2009	3925	5040	5020	4.5	2.2%	53f	5030	4961	240	4.8	157	3.1	5104	20	184	135	3.29
1	7/16/2009	3575	4770	4400	6.0	1.8%	54f	4585	4898	264	5.4	248	5.1	4871	370	215	225	3.89
2	7/17/2009	4320	4920	5010	4.5	2.0%	53f	4965	4908	242	4.9	240	4.9	4860	90	197	160	3.56
1	7/18/2009	4155	4540	4810	3.0	2.4%	60f	4675	4879	239	4.9	199	4.2	4742	270	206	243	3.75
2	7/18/2009	3770	4700	4505	4.0	2.5%	58f	4603	4848	242	5.0	192	4.0	4748	195	205	185	3.75
3	7/18/2009	3600	4615	4430	5.25	2.2%	61f	4523	4816	250	5.2	76	1.7	4600	185	203	217	3.74
1	7/21/2009	3780	4365	4380	6.25	2.0%	58f	4373	4775	272	5.7	117	2.6	4499	15	186	132	3.45
2	7/29/2009	3620	4580	4625	6.0	1.9%	59f	4603	4761	264	5.6	117	2.6	4499	45	174	82	3.24
1	7/29/2009	3130	4075	4035	4.0	2.5%	59f	4055	4707	320	6.8	275	6.3	4343	40	164	33	3.09
1	8/11/2009	4045	5350	5355	5.5	2.5%	57f	5353	4753	353	7.4	651	13.9	4670	5	153	30	2.84
2	8/11/2009	4210	5305	4920	5.5	2.3%	57f	5113	4777	352	7.4	690	14.3	4840	385	168	143	3.12
2	8/19/2009	3805	4675	4815	6.0	1.8%	58f	4745	4775	340	7.1	306	6.0	5070	140	166	177	3.09
1	9/11/2009	3880	4795	4895	5.0	3.1%	64f	4845	4779	330	6.9	190	3.9	4901	100	162	208	3.01
1	8/25/2009	4435	5480	5525	3.0	2.5%	62f	5503	4819	363	7.5	412	8.2	5031	45	156	95	2.87

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

Analysis Summary

Number of Tests	18	
Correction factor	1.112	(ACI 301-99)
Average Strength	4819 psi	
Standard Deviation	363 psi	
Adjusted standard deviation	403 psi	
1.11 x 363 = 403 psi		
Design Strength	4000 psi	
Minimum Required Average Strength	4540 psi	(ACI 301-99 sec. 4.2.3.3.a)
1.34 x 403 + 4000 = 4540 psi		
2.33 x 403 + 4000 - 500 = 4440 psi		
Margin of Extra Performance	279 psi	
(Ave. str. - Min. req. ave. str.)		
Concrete Performance	Excellent	(ACI 214-77(97))
Laboratory Testing Proficiency	Excellent	(ACI 214-77(97))
Within test coeff. var.	2.87	Field control
Average Range	156 psi	testing criterion

The above statistical analysis as per ACI 301 Sec. 4.2.3.2.a and ACI 318 Sec. 4.3.1.1 will also qualify mixes:

Mix I.D.: _____ _____ _____ _____ _____ _____ _____ _____

Strength: _____ _____ _____ _____ _____ _____ _____ _____

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

March 12, 2008

Job#: 2008-013

H.C. Redi Mix
P.O. Box 80688
Fairbanks, Alaska 99708

Subject: Concrete Mix Design Studies Using Type I/II Cement with Air Entraining and Water Reducing Agents and HC Size #67 Concrete Aggregates

Dear Sir:

Transmitted herein are the results of the concrete mix design studies performed on trial mix design batches produced in our laboratory. All ingredients of the mix design were supplied by HC Redi Mix on January 10, 2008. The test batches of concrete were calculated using three different water-cement ratios using methodology described in ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete". On January 13, 2008, test batches were mixed per ASTM 192 "Making and Curing Concrete Test Specimens in the Laboratory". Using the data obtained from the trial mixes, a curve was developed to indicate the relationship between water-cement ratio and the compressive strength. In accordance with ACI 301 "Specifications for Structural Concrete", the specified compressive strength for each concrete mixture was determined by the formula f'cr = f'c + (1200 psi) for compressive strengths 3000 psi and above or by computing the standard deviations from at least 15 recent consecutive production batches.

The contents of this report are as follows:

1. Concrete Aggregate Tests — Pages 2-3
2. Concrete Test Batch Results — Page 4
3. Strength & Cement Content vs Water Cement Ratio Curves — Pages 5-6
4. Recommended Concrete Mix Designs (NAS & SI) — Follows

Sincerely yours

Stefan Mack

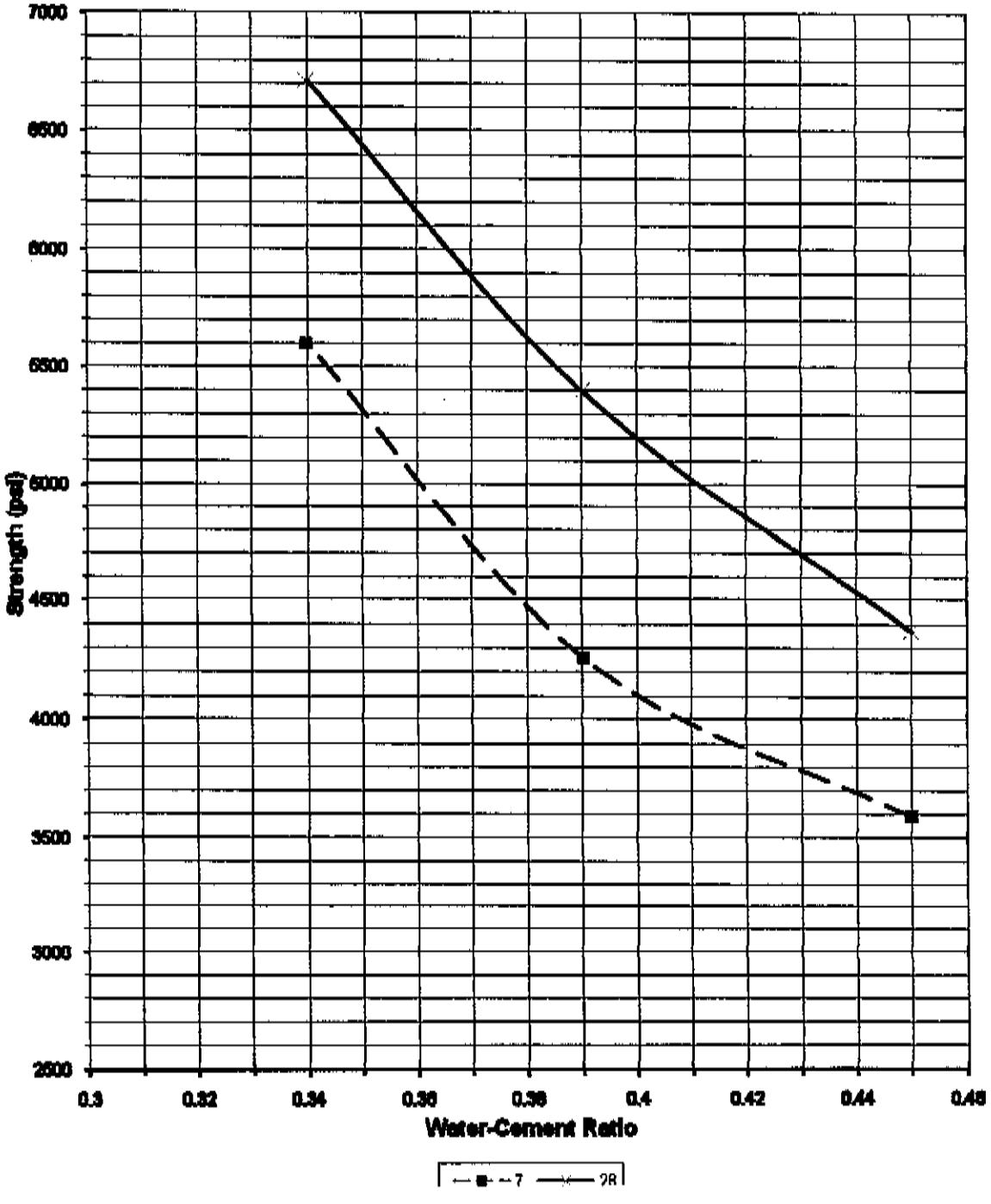
Stefan Mack, PE
Lab Manager

Aggregate Source: Fairbanks Area HC aggregates
Cementitious Materials: ASTM C150 Type I/II Cement

Test Batch Results

Ingredient	Test Batch # 1 (2.0 ft^3)	Test Batch # 2 (1.5 ft^3)	Test Batch # 3 (1.2 ft^3)
Cementitious Materials	34.8 lb 5.0 sack	31.3 lb 6.0 sack	29.2 lb 7.0 sack
Water	15.7 lb	11.9 lb	10.8 lb
Water/Cement Ratio	0.45	0.41	0.37
Gravel Weight (SSD)	142.2 lb	107.4 lb	89.4 lb
Sand Weight (SSD)	102.2 lb	71.1 lb	53.2 lb
Polyheed 997	62 mL	57 mL	87 mL
Slump (ASTM C143)	4.0 in	4.0 in	2.5 in
Unit Weight	142.2 pcf	142.8 pcf	147.6 pcf
Air Content, % (ASTM C231)	7.2	7.0	5.1
Workability	Excellent	Excellent	Excellent
7 Day Compressive Strength Test	3590 psi	4260 psi	5600 psi
28 Day Compressive Strength Test	4370 psi	5400 psi	6715 psi

Water-Cement Ratio Vs Strength



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Anchorage, AK 99518
907-336-6162

February 18, 2010

H.C. Redi Mix
P.O. Box 80688
Fairbanks, Alaska 99708

Subject: 2010 – Aggregate Suitability Testing

Gentlemen:

Transmitted herein is the Aggregate Suitability Tests requested by HC Redi Mix. The aggregates were sampled on January 6, 2010 by HC Redi Mix Personnel and were processed during the month of February. The aggregate source is HC Redi Mix Old Richardson Pit (at batchplant)

The contents of this report are as follows:

1. Coarse and Fine Sieve Analysis Page 2
2. Aggregate Suitability Results Page 3

If there are any questions, please contact our office.

Sincerely yours,
Mappa Testlab

Stefan Mack
Stefan Mack, PE
Lab Manager

HC Redi-Mix
Aggregate Suitability

February 18, 2010

Sieve Analysis Report

Test Method: ASTM C136 / C117

Concrete Aggregates & ASTM / AASHTO Specifications

Dated: 2/18/10

Screen Size	**Size #67 Aggregate % Passing**	ASTM & AASHTO Specs	**Concrete Fines % Passing**	ASTM Specs	AASHTO Specs
25mm (1")	**100**	100			
19mm (3/4")	**100**	90-100			
12.5mm (1/2")	**56**				
9.5 mm (3/8")	**29**	20-55	**100**	100	100
4.75 mm (#4)	**8**	0-10	**100**	95 – 100	95 – 100
2.36 mm (#8)	**0**	0-5	**82**	80 – 100	80 – 100
1.18 mm (#16)			**71**	50 – 85	50 – 85
0.6 mm (#30)			**60**	25 – 60	25 – 60
0.3 mm (#50)			**30**	5 – 30	10 – 30
0.15 mm (#100)			**4**	0 – 10	2 – 10
0.075 mm (#200)	**0**	0 – 1.0	**0.5**	0 – 3	0 – 2
F.M.			**2.5**	2.3 – 3.1	2.3 – 3.1

Prepared by: **Mappa Inc**

HC Redi-Mix
Aggregate Suitability

February 18, 2010

Aggregate Suitability Tests

Coarse Aggregates
Tests performed on stockpile aggregates from HC Redi Mix Aggregates

Tests Performed	Results (%)	Specs (%) 5S
Clay Lumps & Friable Particles ASTM C-142 (1/6/10)	0	2.0 Max
Material Finer Than # 200 Sieve ASTM C-117 (1/6/10)	0	1.0 Max
Los Angeles Abrasion Loss ASTM C-131 B (1/6/10)	25	50 Max
Sodium Sulfate Soundness ASTM C-88 (1/6/10)	0.4	12 Max
Specific Gravity Coarse Agg. ASTM C-127 (1/6/10)	2.67	
Absorption ASTM C-127 (1/6/10)	0.9	

Fine Aggregates
Tests performed on stockpile aggregates from HC Redi Mix Aggregates

Tests Performed	Results (%)	ASTM Specs (%)
Clay Lumps & Friable Particles ASTM C-142 (1/6/10)	0.3	3.0 Max
Material Finer Than # 200 Sieve ASTM C-117 (1/6/10)	0.5	3.0 Max
Organic Impurities ASTM C-40 (1/6/10)	Passes	Less than 300 ppm
Sodium Sulfate Soundness ASTM C-88 (1/6/10)	1	10 Max
Fineness Modulus COE CRD-C 114 (1/6/10)	2.5	2.3 – 3.1
Specific Gravity ASTM C-128 (1/6/10)	2.68	
Absorption ASTM C-127 (1/6/10)	0.7	

Prepared by: **Mappa Inc**

Mappa Inc
1956 Richardson Hwy
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Anchorage, AK 99518
907-336-6162

February 17, 2010

Job # 2010-005

H.C. Redi Mix
P.O. Box 80688
Fairbanks, Alaska 99708

Subject: 2010 – 4000 psi (28 MPa) 5.85 sack Type I/II Cement & Size #67 Aggregate Concrete Mix Design
Mix # 58534I NAS & SI Units

Gentlemen:

Transmitted herein is the 4000 psi (28 MPa) concrete mix design using Type I/II Cement, Size #67 local aggregates, and water reducing & air entrainment admixtures.

The concrete compressive strength test data is a 5.85 sack type I/II cement mix design used for Fairbanks Area Projects during 2009. The average strength and standard deviations were calculated from the enclosed 5.85 sack test data to confirm the mix design meets ACI 301 "Specifications for Structural Concrete" requirements for critical strength for a 4000 psi mix.

The contents of this report are as follows:

1. Mix # 58534I Concrete Mix Design — Page 2 (NAS); 3 (SI)
2. Concrete Mix Test Data — Pages 4-7

If there are any questions, please contact our office.

Sincerely yours,

Stefan Mack
Stefan Mack, PE
Lab Manager

Recommended Concrete Mix Design
Mix # 585341 (NAS Units)

Concrete F'c = 4000 psi in 28 Days w/Type I/II Cement
Concrete F'cr = 4430 psi in 28 Days w/Type I/II Cement

Maximum Nominal Size Aggregate (in)	0.75
Cementitious Materials (Sacks/yd^3)	5.85
Water/Cement Ratio (lb/lb)	0.39
Entrained Air (%)	6.0 ± 1.5
Slump (in) / Slump HRWR (in)	4 / 8
Sand Content (% by Volume)	40
Coarse SPG (SSD) / Absorption %	2.67 / 0.9
Fine SPG (SSD) / Absorption %	2.68 / 0.7

Batch Weights in Pounds
One Cubic Yard

Ingredient	Weight (lb)	Volume (ft^3)
Cement	550	2.798
Water	214	3.437
(gallons)	25.7	
Sand (SSD)	1290	7.712
Gravel (SSD)	1927	11.568
Micro-Air (5.5%)	0.7 – 8.3 oz	1.485
Polyheed 997	17 – 83 oz	
Totals	3981	27.000

Micro-Air = Air Entraining Agent (Master Builders product) meets ASTM C260

Polyheed 997 = Mid Range Water Reducing Agent (Master Builders product) meets ASTM C494 Type A & F

The Concrete Mix design Batch weights recommended are based on SSD Aggregates and they must be adjusted to meet existing moisture conditions at the plant.

Recommended Concrete Mix Design
Mix # 58534I (SI Units)

Concrete F'c = 28 MPa in 28 Days w/Type I/II Cement
Concrete F'cr = 31 MPa in 28 Days w/Type I/II Cement

Maximum Nominal Size Aggregate (mm)	19
Cementitious Materials (kg/m^3)	326
Water/Cement Ratio (kg/kg)	0.39
Entrained Air (%)	6.0 ± 1.5
Slump (mm) / Slump HRWR (mm)	100 / 200
Sand Content (% by Volume)	40
Coarse SPG (SSD) / Absorption %	2.67 / 0.9
Fine SPG (SSD) / Absorption %	2.68 / 0.7

Batch Weights in Kilograms
One Cubic Meter

Ingredient	Weight (kg)	Volume (m^3)
Cement	326	0.1036
Water	127	0.1272
Sand (SSD)	765	0.2857
Gravel (SSD)	1144	0.4285
Micro-Air (5.5%)	8 – 98 ml / 100kg	0.0550
Polyheed 997	195 – 975 ml / 100kg	
Totals	2386	1.000

Micro-Air = Air Entraining Agent (Master Builders product) meets ASTM C260

Polyheed 997 = Mid Range Water Reducing Agent (Master Builders product) meets ASTM C494 Type A & F

The Concrete Mix design Batch weights recommended are based on SSD Aggregates and they must be adjusted to meet existing moisture conditions at the plant.

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

DATE: 2-17-2010

PROJECT: 5.85 Sack Type I/II Cement 3/4" agg 2010

ARCHITECT:

ENGINEER:

CONTRACTOR: HC Redi Mix

TESTING LABORATORY: Mappa Inc

REMARKS:

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

LAB TEST NUMBER	DATE OF TEST	CYLINDER STRENGTHS, psi 7	28	28	SLUMP in.	AIR CONT %	CONC TEMP	AVE TEST VALUE	CUMUL AVE	CUMUL S D	CUMUL C V	MOVE 3 S D	MOVE 3 C V	MOVE 3 AVE	RANGE OF TEST	CUMUL AVE RANGE	MOVE 3 RANGE	W/IN TEST C V
1	7/11/09	3775	4650	4630	4.0	5.0	61	4640	4640	---	---	---	---	-----	20	20	---	0.38
1	7/11/09	3500	4350	4675	4.0	4.6	67.2	4513	4576	98	2.0	---	---	-----	325	173	---	3.34
1	7/16/09	3565	4430	4175	5.0	4.6	65.2	4303	4485	170	3.8	170	3.8	4485	255	200	200	3.95
1	7/15/09	3970	4800	4880	3.0	3.9	63.1	4840	4574	226	4.9	271	6.0	4552	80	170	220	3.30
1	7/17/09	3245	4535	4735	2.0	4.9	71.7	4635	4586	197	4.3	271	5.9	4593	200	176	178	3.40
1	7/21/09	3470	4210	4285	3.0	5.3	61.3	4248	4530	224	4.9	301	6.6	4574	75	159	118	3.12
1	7/21/09	3490	4275	4270	3.0	5.0	67.9	4273	4493	226	5.0	217	4.9	4385	5	137	93	2.71
1	7/23/09	3310	4440	4270	5.0	5.1	61	4355	4476	215	4.8	56	1.3	4292	170	141	83	2.80
1	7/23/09	3290	3925	4110	7.0	6.0	70	4018	4425	253	5.7	176	4.2	4215	185	146	120	2.93
1	7/28/09	3340	4335	4445	5.0	6.8	67.1	4390	4421	239	5.4	206	4.8	4254	110	143	155	2.86
1	7/31/09	3655	4640	4840	3.0	5.2	70.8	4740	4450	246	5.5	361	8.2	4383	200	148	165	2.94
1	8/4/09	3150	3915	4070	2.75	4.5	69	3993	4412	269	6.1	374	8.6	4374	155	148	155	2.98
1	8/1/09	3260	4545	4450	3.5	5.0	65.9	4498	4419	259	5.9	381	8.6	4410	95	144	150	2.89
1	8/10/09	3715	4510	4515	5.5	6.2	69	4513	4425	250	5.6	296	6.8	4334	5	134	85	2.69
1	8/12/09	3425	4520	4625	3.5	5.1	67	4573	4435	244	5.5	40	0.9	4528	105	132	68	2.65
1	8/14/09	3670	4505	4660	5.0	5.0	58	4583	4444	238	5.4	38	0.8	4556	155	134	88	2.67
1	8/24/09	3740	4575	4695	5.5	5.1	60	4635	4456	235	5.3	34	0.7	4597	120	133	127	2.65
1	8/26/09	3555	4560	4570	3.0	4.5	57	4565	4462	230	5.1	36	0.8	4594	10	126	95	2.51
1	8/28/09	4110	5170	5365	6.0	6.1	60	5268	4504	290	6.4	387	8.0	4823	195	130	108	2.55
1	9/10/09	3520	4810	4660	3.5	4.9	57	4735	4516	287	6.4	367	7.5	4856	150	131	118	2.57
1	9/12/09	3325	4510	4525	3.25	4.7	60	4518	4516	280	6.2	386	8.0	4840	15	125	120	2.46
1	9/22/09	3770	4995	4790	2.0	5.1	49	4893	4533	284	6.3	188	4.0	4715	205	129	123	2.52
1	10/31/09	4655	5110	5190	3.5	5.2	57	5150	4560	306	6.7	318	6.6	4853	80	127	100	2.46
1	7/13/09	3270	4475	4350	6.0	5.2	68	4413	4554	301	6.6	374	7.8	4818	125	127	137	2.47
1	7/21/09	3410	4395	4250	4.0	4.5	67.4	4323	4544	298	6.6	454	9.8	4628	145	127	117	2.49

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

MAPPA TESTLAB, INC. - North Pole, Alaska

LAB TEST NUMBER	DATE OF TEST	CYLINDER STRENGTHS, psi 7	28	28	SLUMP in.	AIR CONT %	CONC TEMP	AVE TEST VALUE	CUMUL AVE	CUMUL S D	CUMUL C V	MOVE 3 S D	MOVE 3 C V	MOVE 3 AVE	RANGE OF TEST	CUMUL AVE RANGE	MOVE 3 RANGE	W/IN TEST C V
1	7/28/09	3415	4280	4350	5.5	5.5	62.1	4315	4535	296	6.5	54	1.2	4350	70	125	113	2.45
1	8/3/09	3630	4295	4280	5.0	5.9	67.2	4288	4526	294	6.5	16	0.4	4308	15	121	77	2.37
1	8/28/09	4160	5105	5115	4.0	5.0	59	5110	4547	309	6.8	467	10.2	4571	10	117	32	2.28
1	9/25/09	3825	4885	5105	4.0	4.5	65	4995	4563	314	6.9	445	9.3	4798	220	121	82	2.35
1	10/23/09	3855	4935	4915	4.0	4.0	59	4925	4575	316	6.9	93	1.9	5010	20	117	83	2.27

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MAPPA TESTLAB, INC. - North Pole, Alaska

Analysis Summary

Number of Tests	30	
Correction factor	1.000	(ACI 301-99)
Average Strength	4575 psi	
Standard Deviation	316 psi	
Adjusted standard deviation	316 psi	
1.00 x 316 = 316 psi		
Design Strength	4000 psi	
Minimum Required Average Strength	4430 psi	(ACI 301-99 sec. 4.2.3.3.a)
1.34 x 316 + 4000 = 4423 psi		
2.33 x 316 + 4000 - 500 = 4236 psi		
Margin of Extra Performance (Ave. str. - Min. req. ave. str.)	145 psi	
Concrete Performance	Excellent	(ACI 214-77(97))
Laboratory Testing Proficiency	Excellent	(ACI 214-77(97))
Within test coeff. var.	2.27	Field control
Average Range	117 psi	testing criterion

The above statistical analysis as per ACI 301 Sec. 4.2.3.2.a and ACI 318 Sec. 4.3.1.1 will also qualify mixes:

Mix I.D.: _____ _____ _____ _____ _____ _____ _____ _____

Strength: _____ _____ _____ _____ _____ _____ _____ _____

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Cement Mill Certificate of Analysis

Alaska Basic Industries hereby certify that cement represented by this analysis complies with the current requirements for Type I and Type II of ASTM C150-07 specifications, and Type I of AASHTO M85-08.

General Information

Portland Cement: Type I/II Low Alkali

Meets: ASTM C150-07 AASHTO M85-08

Date Shipped: August 14th, 2009

Plant: SsangYong, South Korea

Test Data on ASTM Standard Requirements

Chemical Composition:

Silicon Dioxide (SiO_2):	20.1%
Aluminum Oxide (Al_2O_3):	4.7%
Ferric Oxide (Fe_2O_3):	3%
Calcium Oxide (CaO):	62.5%
Magnesium Oxide (MgO):	3.7%
Sulfur Trioxide (SO_3):	2.7%
Loss On Ignition:	1.6%
Insoluble Residue:	0.17%
Tricalcium Silicate (C_3S):	55
Dicalcium Silicate (C_2S):	16
Tricalcium Aluminate (C_3A):	7.1%
Tetracalcium Aluminoferrite (C_4AF):	9.74
Total Alkali as Na_2Eq:	0.67%
Limestone, 5 % max	1.3%
CaCO3 in Limestone, 70% min	89%

Physical Properties:

Blaine ($cm^2/gr.$):	3950
Vicat, Initial Set (mins.):	130
Vicat, Final Set (mins.):	280
Autoclave Expansion:	0.09%
False Set:	83%
Air Content (% by vol.):	7.80%

Mortar Cube Breaks:

Compressive Strength (PSI):

1 Day	2048
3 Days	4026
7 Days	5177
28 Days	

Notes

1 Test Results: This mill test represents typical data.
2
3
4

Type I/II

Mr. Ryan M. Morman
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Alaska Basic Industries, Cement Division
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BASF

The Chemical Company

3 | 03 30 00 Cast-in-Place Concrete | 03 40 00 Precast Concrete | 03 70 00 Mass Concrete

Product Data

MICRO AIR®

Air-Entraining Admixture

Description

Micro Air air-entraining admixture provides concrete with extra protection by creating air bubbles that are ultrastable, small and closely spaced – a characteristic especially useful in the types of concrete known for their difficulty to entrain and maintain the air content desired.

Even when used at a lower dosage than standard air-entraining admixtures, Micro Air admixture meets the requirements of ASTM C 260, AASHTO M 154, and CRD-C 13.

Applications

Recommended for use in:

- Concrete exposed to cyclic freezing and thawing
- Production of high-quality normal or lightweight concrete (heavyweight concrete normally does not contain entrained air)

Features

- Ready-to-use in the proper concentration for rapid, accurate dispensing
- Greatly improved stability of air-entrainment
- Ultra stable air bubbles

Benefits

- Increased resistance to damage from cyclic freezing and thawing
- Increased resistance to scaling from deicing salts
- Improved plasticity and workability
- Improved air-void system in hardened concrete
- Improved ability to entrain and retain air in low-slump concrete, concrete containing high-carbon content fly ash, concrete using large amounts of fine materials, concrete using high-alkali cements, high-temperature concrete, and concrete with extended mixing times
- Reduced permeability – increased watertightness
- Reduced segregation and bleeding

Performance Characteristics

Concrete durability research has established that the best protection for concrete from the adverse effects of freezing and thawing cycles and deicing salts results from: proper air content in the hardened concrete, a suitable air-void system in terms of bubble size and spacing and adequate concrete strength, assuming the use of sound aggregates and proper mixing, transporting, placing, consolidation, finishing and curing techniques. Micro Air admixture can be used to obtain adequate freezing and thawing durability in a properly proportioned concrete mixture, if standard industry practices are followed.

Air Content Determination: The total air content of normal weight concrete should be measured in strict accordance with ASTM C 231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method" or ASTM C 173/C 173M, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method."

The air content of lightweight concrete should only be determined using the Volumetric Method. The air content should be verified by calculating the gravimetric air content in accordance with ASTM C 138/C 138M, "Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete." If the total air content, as measured by the Pressure Method or Volumetric Method and as verified by the Gravimetric Method, deviates by more than 1-1/2%, the cause should be determined and corrected through equipment calibration or by whatever process is deemed necessary.

Master Builders

Product Data: MICRO AIR®

Guidelines for Use

Dosage: There is no standard dosage for Micro Air admixture. The exact quantity of air-entraining admixture needed for a given air content of concrete varies because of differences in concrete making materials and ambient conditions. Typical factors that might influence the amount of air entrained include: temperature, cementitious materials, sand gradation, sand-aggregate ratio, mixture proportions, slump, means of conveying and placement, consolidation and finishing technique.

The amount of Micro Air admixture used will depend upon the amount of entrained air required under actual job conditions. In a trial mixture, use 1/8 to 1-1/2 fl oz/cwt (8-98 mL/100 kg) of cement. In mixtures containing water-reducing or set-control admixtures, the amount of Micro Air admixture needed is somewhat less than the amount required in plain concrete. Due to possible changes in the factors that can affect the dosage of Micro Air admixture, frequent air content checks should be made during the course of the work. Adjustments to the dosage should be based on the amount of entrained air required in the mixture at the point of placement. If an unusually high or low dosage of Micro Air admixture is required to obtain the desired air content, consult your BASF Construction Chemicals representative. In such cases, it may be necessary to determine that, in addition to a proper air content in the fresh concrete, a suitable air-void system is achieved in the hardened concrete.

Dispensing and Mixing: Add Micro Air admixture to the concrete mixture using a dispenser designed for air-entraining admixtures; or add manually using a suitable measuring device that ensures accuracy within plus or minus 3% of the required amount. For optimum, consistent performance, the air-entraining admixture should be dispensed on damp, fine aggregate or with the initial batch water. If the concrete mixture contains lightweight aggregate, field evaluations should be conducted to determine the best method to dispense the air-entraining admixture.

Precaution

In a 2005 publication from the Portland Cement Association (PCA R&D Serial No. 2789), it was reported that problematic air-void clustering that can potentially lead to above normal decreases in strength was found to coincide with late additions of water to air-entrained concretes. Late additions of water include the conventional practice of holding back water during batching for addition at the jobsite. Therefore, caution should be exercised with delayed additions to air-entrained concrete. Furthermore, an air content check should be performed after any post-batching addition to an air-entrained concrete mixture.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: Micro Air admixture will neither initiate nor promote corrosion of reinforcing and prestressing steel embedded in concrete, or of galvanized steel floor and roof systems. No calcium chloride or other chloride-based ingredients are used in the manufacture of this admixture.

Compatibility: Micro Air admixture may be used in combination with any BASF Construction Chemicals admixture, unless stated otherwise on the data sheet for the other product. When used in conjunction with other admixtures, each admixture must be dispensed separately into the mixture.

Storage and Handling

Storage Temperature: Micro Air admixture should be stored and dispensed at 35 °F (2 °C) or higher. Although freezing does not harm this product, precautions should be taken to protect it from freezing. If it freezes, thaw and reconstitute by mild mechanical agitation. ***Do not use pressurized air for agitation.***

Shelf Life: Micro Air admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of Micro Air admixture has been exceeded.

Safety: Micro Air admixture is a caustic solution. Chemical goggles and gloves are recommended when transferring or handling this material. (See MSDS and/or product label for complete information.)

Packaging

Micro Air admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Material Safety Data Sheets: Micro Air admixture.

Additional Information

For suggested specification information or for additional product data on Micro Air admixture, contact your BASF Construction Chemicals representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative admixtures for specialty concrete used in the ready mix, precast, manufactured concrete products, underground construction and paving markets throughout the North American region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

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Master Builders

BASF

The Chemical Company

3 | 03 30 00 Cast-in-Place Concrete | 03 40 00 Precast Concrete | 03 70 00 Mass Concrete | **Product Data**

POLYHEED® 997

Mid-Range Water-Reducing Admixture

Description

PolyHeed 997 admixture is a patented multi-component, non-chloride, mid-range water-reducing admixture. PolyHeed 997 admixture meets ASTM C 494/C 494M requirements for Type A, water-reducing, and Type F, high-range water-reducing, admixtures.

Applications

Recommended for use in:

- Conventionally placed concrete mixes containing a wide range of cements, slag cement, Class C and F fly ashes, silica fume and aggregates
- Reinforced, precast, prestressed, lightweight or normal weight concrete and pumped concrete
- Residential/commercial flatwork and formed surfaces
- Rheodynamic® Self-Consolidating Concrete
- 4x4™ Concrete
- Pervious Concrete

Features

- True mid-range water reduction (5-15%) and excellent performance across a wide concrete slump range, especially the difficult slump range of 5-8 in. (125-200 mm)
- Superior workability, pumpability and finishability qualities even in concrete mixes containing low amounts of cementitious materials
- Compressive and flexural strength performance increased at all ages
- Strength performance comparable to chloride-bearing, water-reducing admixtures at all ages
- Superior finishing characteristics for residential/commercial flatwork and formed surfaces

Benefits

- Significantly reduced placement and finishing time resulting in lower in-place concrete costs
- Improved concrete durability to damage from freezing and thawing
- Increased service life of concrete structures

Performance Characteristics

Mixture Data: 500 lb/yd³ (295 kg/m³) of Type I cement; slump, 6-7 in. (150-180 mm); 5-6% air; concrete temperature 70 °F (21 °C); ambient temperature, 70 °F (21 ° C).

Setting Time Performance[1]

Mixture	Initial Set h:min	Difference h:min
Plain	6:01	–
PolyHeed 997 admixture @		
5 fl oz/cwt (325 mL/100 kg)	6:22	+0:21
10 fl oz/cwt (650 mL/100 kg)	6:57	+0:56
15 fl oz/cwt (980 mL/100 kg)	7:31	+1:30

Compressive Strength Performance

	7–Day			28–Day		
Mixture	psi	MPa	%	psi	MPa	%
Plain	2360	16.3	100	3320	22.9	100
PolyHeed 997 admixture @						
5 fl oz/cwt (325 mL/100 kg)	3060	21.1	129	3930	27.1	118
10 fl oz/cwt (650 mL/100 kg)	3740	25.8	158	4610	31.8	136
15 fl oz/cwt (980 mL/100 kg)	4620	31.9	196	5460	37.7	165

[1]*Note: The data shown are based on controlled laboratory tests. Reasonable variations from the results shown here may be experienced as a result of differences in concrete making materials and jobsite conditions.*

Master Builders

Product Data: POLYHEED® 997

Guidelines for Use

Dosage: PolyHeed 997 admixture has a recommended dosage range of 3-15 fl oz /cwt (195-980 mL/100 kg) of cementitious material for most concrete mixes.

As the dosage of PolyHeed 997 admixture increases to 15 fl oz/cwt (980 mL/100 kg) of cementitious materials, normal concrete setting characteristics are maintained and early and ultimate compressive strengths increase.

BASF Construction Chemicals does not recommend the use of dosages outside the recommended range without trial testing. Consult your local BASF Construction Chemicals sales representative for assistance in determining the dosage for optimum performance.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: PolyHeed 997 admixture will neither initiate nor promote corrosion of reinforcing or prestressing steel embedded in concrete, or of galvanized steel floor and roof systems. PolyHeed 997 admixture does not contain intentionally added calcium chloride or other chloride-based ingredients.

Compatibility: PolyHeed 997 admixture may be used in combination with any BASF Construction Chemicals admixtures. When used in conjunction with other admixtures, each admixture must be dispensed separately into the concrete mixture.

Storage and Handling

Storage Temperature: If PolyHeed 997 admixture freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. ***Do not use pressurized air for agitation.***

Shelf Life: PolyHeed 997 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of PolyHeed 997 admixture has been exceeded.

Packaging

PolyHeed 997 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Material Safety Data Sheets: PolyHeed 997 admixture.

Additional Information

For additional information on PolyHeed 997 admixture or its use in developing concrete mixtures with special performance characteristics, contact your BASF Construction Chemicals representative.

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