



CONTACT INFORMATION  
Mining Records Curator  
Arizona Geological Survey  
416 W. Congress St., Suite 100  
Tucson, Arizona 85701  
602-771-1601  
<http://www.azgs.az.gov>  
[inquiries@azgs.az.gov](mailto:inquiries@azgs.az.gov)

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General Contractor & Engineers

2502 W. Lily  
Tucson, Arizona 85705  
602 • 293-3245  
602 • 293-3128 FAX

May 23, 1995

Arimetco Inc.  
335 N. Wilmot Rd. Suite 400  
Tucson, Az. 85711

Attn: Mr. Allen E. Wells, Engineer II

Re: Zonia Mine Raffinate Pond Wall

Dear Sir:

We are pleased to give the following price to construct wall by Raffinate Pond at your Zonia Mine Project.

We will furnish all Material, Labor and Equipment. Grading to be done by others. Price includes Mobilization and Demobilization.

\$18,150.00 Total Price

Exclusions: Bonds, Permits, Testing, Grading and Taxes.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Clark M. Richins".

Clark's, Inc.  
Clark M. Richins  
President

CMR:SR

Post-It™ brand fax transmittal memo 7671		# of pages ▶	1
To	Allen Wells	From	Clark Richins
Co	Arimetco Inc	Co	Clark's Inc
Dept.		Phone #	293-3245
Fax #	748-2626	Fax #	293-3128

Lic.: AZ: A-084940  
L-5-072434  
NM: GS-25 GS-28  
29581  
NV: A10-0030619  
C11-0030854



Super Sonic Hydro Energy

**HYDRO LASER**



May 19, 1995

Mr. Clark  
Clark's Gunite  
2502 West Lilly  
Tucson, Arizona

Dear Mr. Clark:

In accordance with our conversation we had yesterday I have enclosed a drawing of the erosion control wall that is proposed for construction at our Zonia Mine. Zonia is located about 40 miles SW of Prescott. I would like if you could put together a cost estimate for Clark's Gunite to construct the wall. This estimate should address materials, labor, mob/demob and any other associated costs. Any questions or comments concerning this wall can be directed to me at (520) 748-2600.

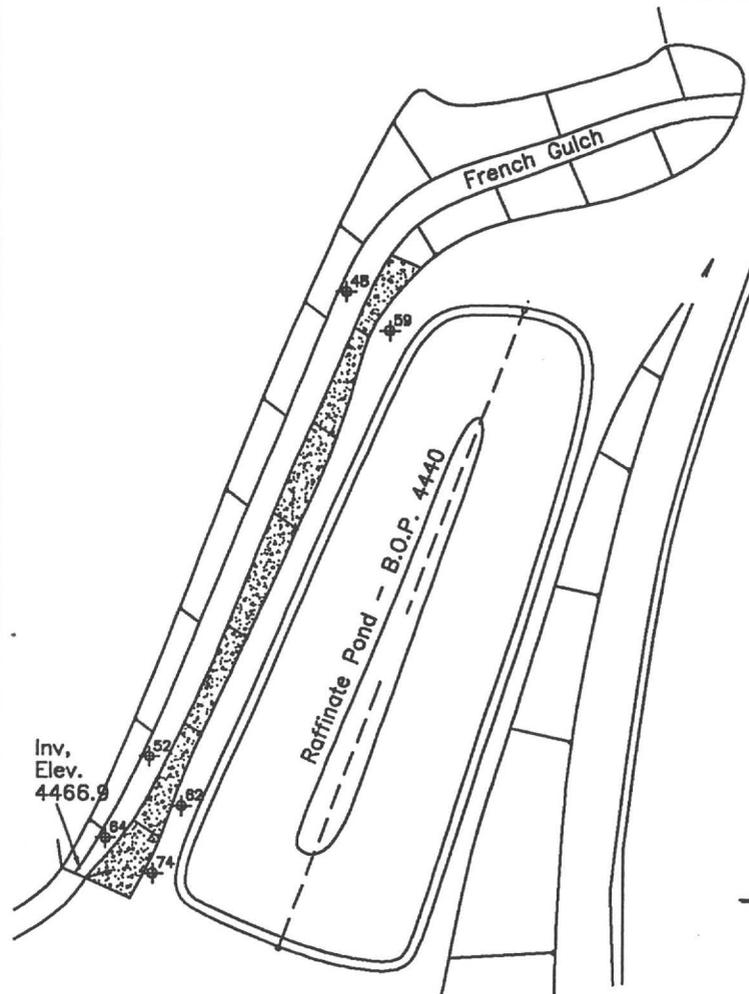
Again I would like to thank you for your interest.

Sincerely,

A handwritten signature in black ink, appearing to read 'Allen E. Wells', is written over a horizontal line.

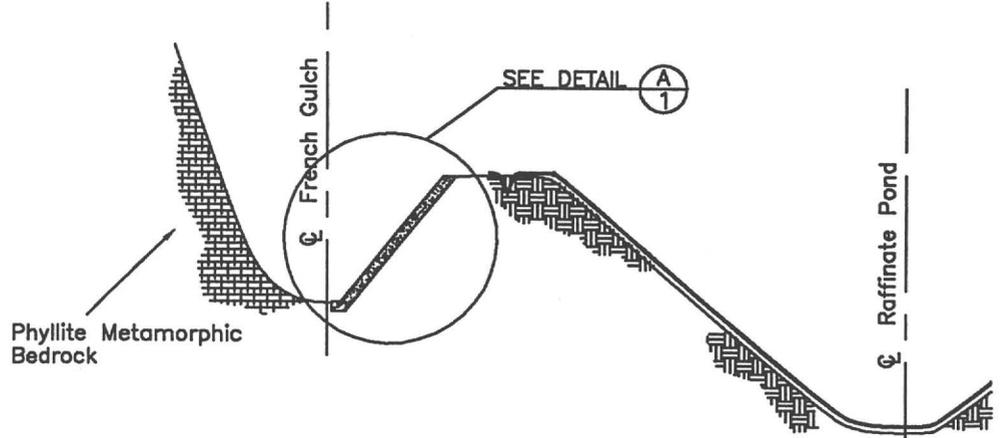
Allen E. Wells  
Engineer II

Enc.



**SITE PLAN**

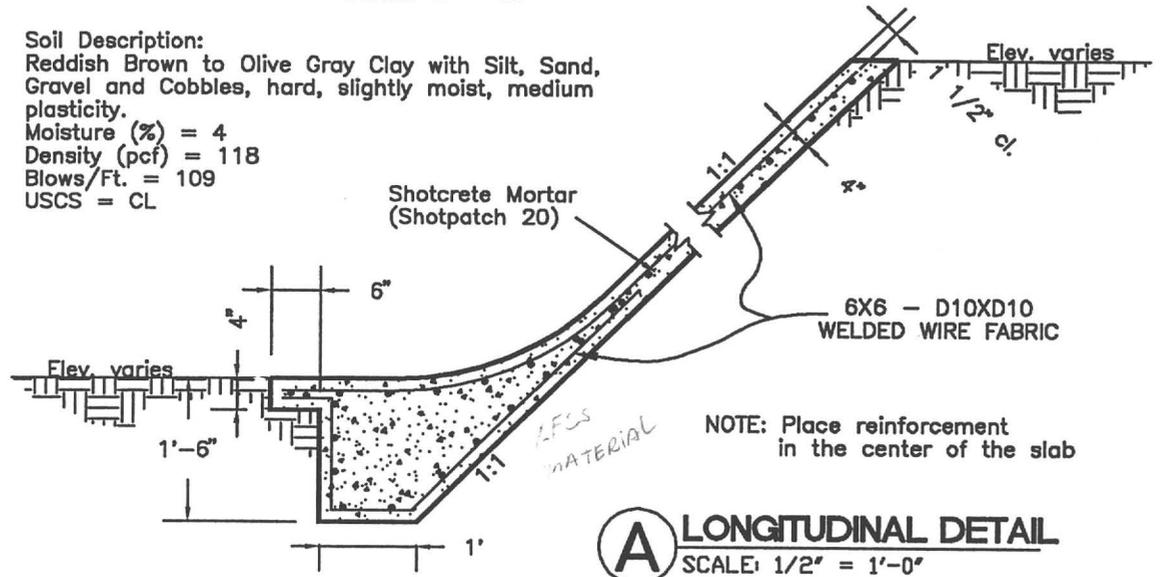
SCALE: 1" = 100'



**CROSS-SECTION**

SCALE: 1" = 30'

Soil Description:  
 Reddish Brown to Olive Gray Clay with Silt, Sand, Gravel and Cobbles, hard, slightly moist, medium plasticity.  
 Moisture (%) = 4  
 Density (pcf) = 118  
 Blows/Ft. = 109  
 USCS = CL



**A LONGITUDINAL DETAIL**

SCALE: 1/2" = 1'-0"

DRAWN BY:	AEW
DESIGNED BY:	AEW
CHECKED BY:	
PROJECT	95-003

**ZONIA MINE  
 EROSION CONTROL WALL**

**ARIMETCO INC.**  
 335 N. WILMOT RD, STE 400  
 TUCSON, ARIZONA 85711

DRAWING NO. **65-05-C-01**

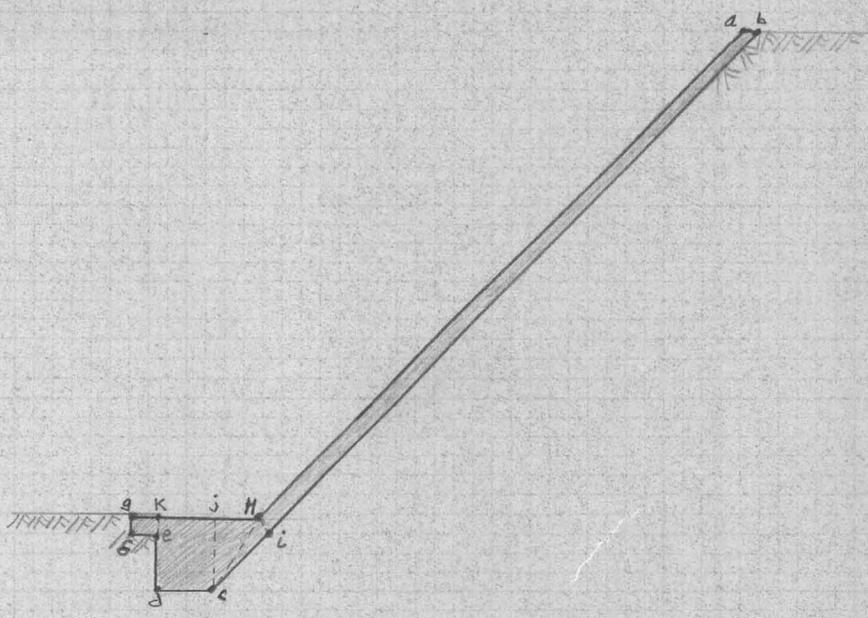
SCALE: NOTED DATE 5-18-95

ZONIA MINE

EROSION CONTROL WALL (FRENCH GULCH)

5/19/1995

A. E. W.



SCALE: 1/4" = 1'-0"

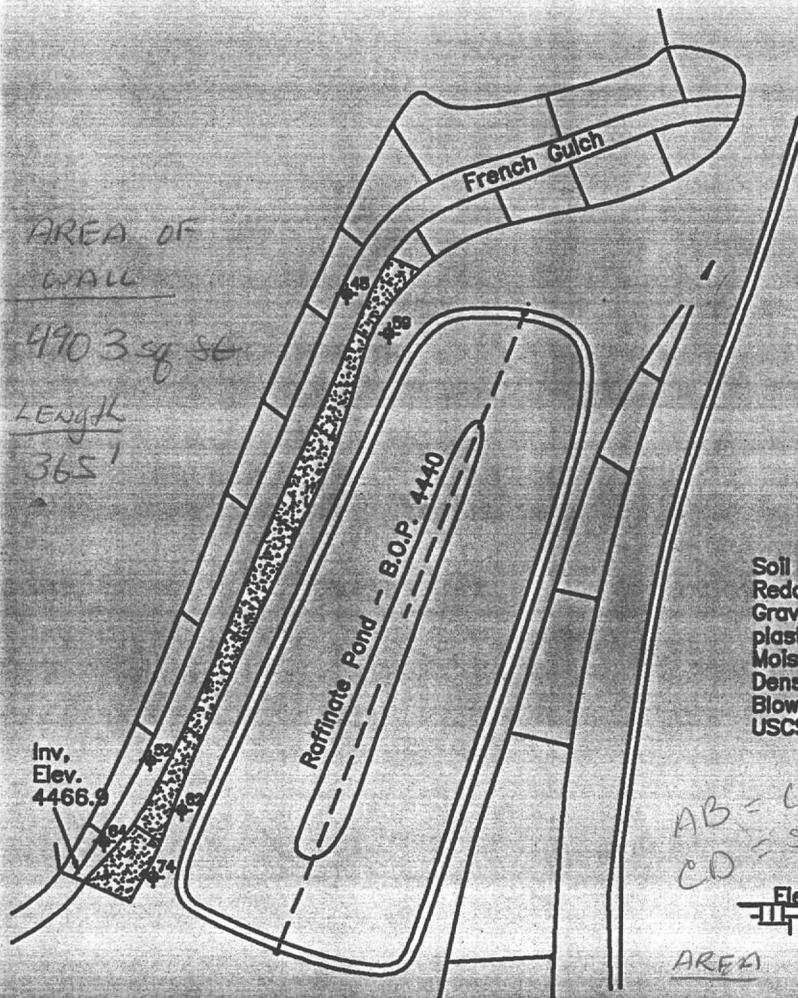
DISTRIBUTION LIST : 65-05-C-01

CLARK'S GUNITE 5-19-95 LETTER/DRAWING  
FAXED & MAILED.

AREA OF WALL

4903 sq ft

Length  
365'



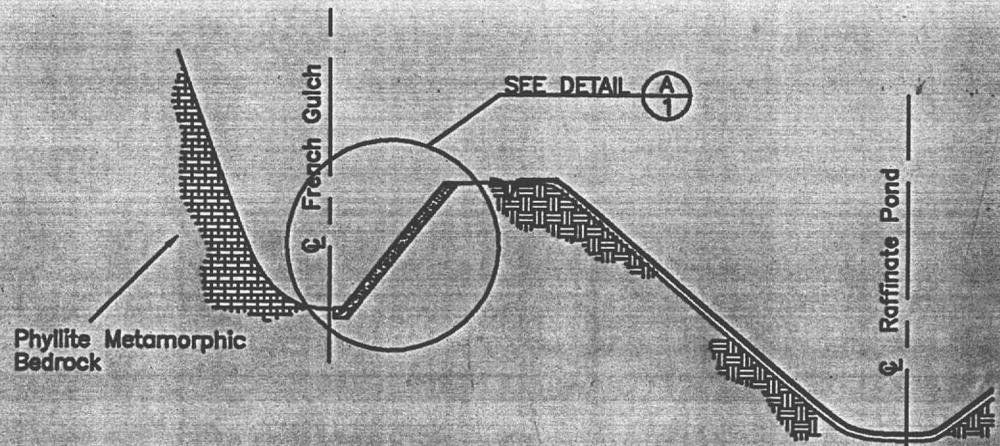
**SITE PLAN**  
SCALE: 1" = 100'

Inv. Elev.  
4466.9

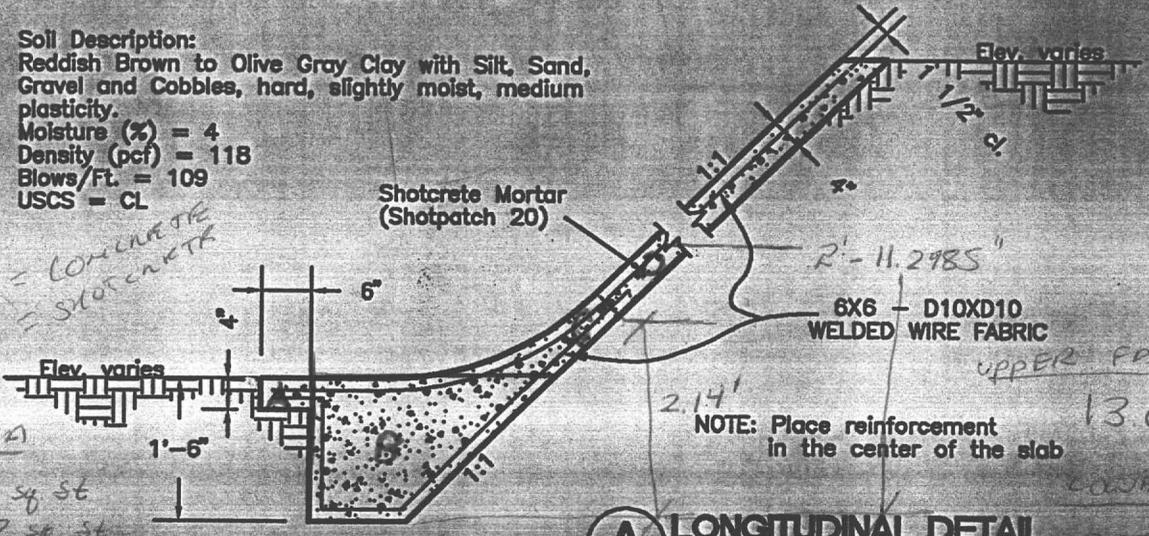
**Soil Description:**  
 Reddish Brown to Olive Gray Clay with Silt, Sand, Gravel and Cobbles, hard, slightly moist, medium plasticity.  
 Moisture (%) = 4  
 Density (pcf) = 118  
 Blows/Ft. = 109  
 USCS = CL

AB = CONCRETE  
 CD = SHOTCRETE

**AREA**  
 A 0.16 sq ft  
 B 2.62 sq ft  
 C 0.55 sq ft  
 D 3.12 sq ft  
 TOTAL 6.45 sq ft



**CROSS-SECTION**  
SCALE: 1" = 30'



**A LONGITUDINAL DETAIL**  
SCALE: 1/2" = 1'-0"

NOTE: Place reinforcement in the center of the slab

DRAWN BY:	AEW
DESIGNED BY:	AEW
CHECKED BY:	
PROJECT	95-003

**ZONIA MINE  
EROSION CONTROL WALL**

**ARIMETCO INC.**  
 535 N. WILMOT RD, STE 400  
 TUCSON, ARIZONA 85711

DRAWING NO. **65-05-C-01**

SCALE: NOTED      DATE: 5-18-95

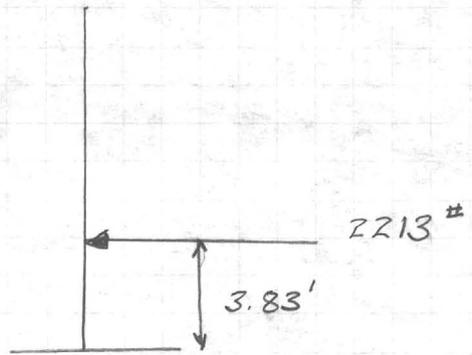
UPPER FABRIC = 4'-6.4360'  
 + 8.5585'  
 13.09'

$$\gamma = 117 \text{ pcf}$$

$$S_c' = 2500 \text{ psi}$$

$$S_s' =$$

$$P = 0.286 \frac{(117)(11.5)^2}{2} = 2,213 \text{ lb}$$



$$P = \frac{1}{2} \omega h^2 \cos \phi$$

$$\phi = 33^\circ 42' = 33.2512$$

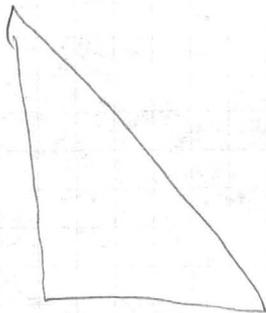
$$K_p = \frac{1 + \sin(33^\circ 42')}{1 - \sin(33^\circ 42')} = \frac{1.54831}{0.451689} = 3.428 \quad \checkmark$$

$$\sigma_p = K_p \sigma_v$$

$$= (3.428)(117)(11.5)$$

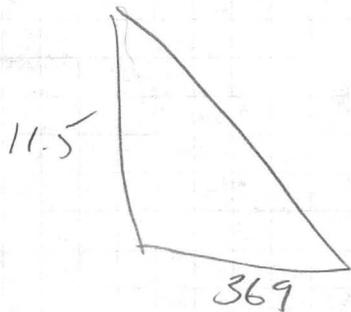
$$= 4,612,374 \text{ lb/ft}^2 @ 3.83'$$

$$\sigma_{pp} = 0.08(4612.374) = 369 \text{ lb/ft}^2$$



$$\frac{1}{2} (369 \text{ lb/ft}^2) \times 11.5$$

$$\frac{2121.75 \text{ lb/ft}}{4243.5 \text{ lb/ft}}$$



$$K_a = \tan^2(45 - \phi/2) = 0.292$$

$$K_p = \tan^2(45 + \phi/2) = 3.428$$

$$P_a = 2259$$

$$P_p = 26521$$

$$E_s = 29,000 \text{ ksi}$$

$$n = \frac{29,000}{2850} = 10.18$$

$$F_c = 57,000 \sqrt{S_c} = 2,850 \text{ ksi}$$

$$K = \frac{10.18}{10.18 + (26000/1350)} = 0.403$$

$$j = 1 - \frac{0.403}{3} = 0.866$$

$$\text{ACTIVE} = 50 = 8h (\text{TAN}^2 45 - \phi/2)$$

$$0.08419 \quad \phi = 45 - \phi/2$$

$$10.4757$$

$$69^\circ$$

$$45 - \phi/2 = 10.47$$



$$4556$$

$$= 8h \text{TAN}^2 (45 - \phi/2)$$

$$= (117)(12.5) (\text{TAN}^2 (45 - \phi/2))$$

$$2.5 = \frac{4556}{3.1152}$$

$$0.65575018$$



$$M = \frac{(44804)}{3000} \cdot 14.9 = \frac{6d^2}{6} = 2.7$$

CLARK'S INC. - 293-3245

PRAIRIE

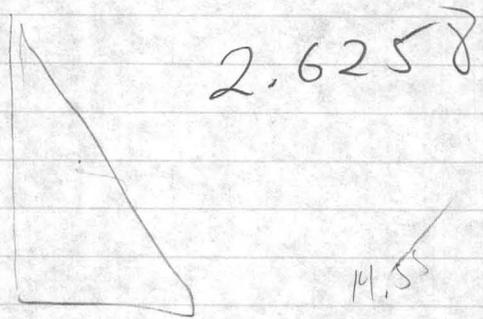
FN 884-0455

DUANE  
SC

STALSKI

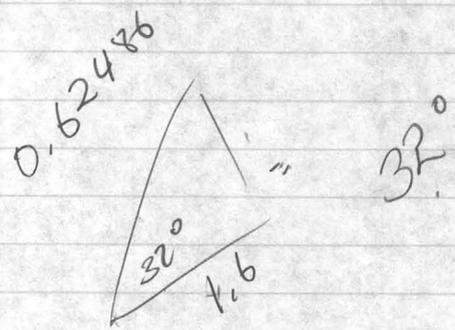
$$\sigma_A = 4556$$

$R''$



$$\sigma_v = 117 \times 14.5 = 1696.5 \text{ psf}$$

$1.62 = T$   
 $58.32$



B.O.P. EL. 4440'

DETAIL

2

DETAIL

1

DETAIL

NOMINAL GRADE

EL. 4460'-0"

VARIABLE

1

1

6x6 WIRE MESH

18" THK. CONC. WALL

#5 @ 12" O.C.

(5) #5 CONT. EQUALLY SPACED

1'-6"

5'-0"

NATIVE BACKFILL

# EROSION CONTROL WALL

SCALE: 1/8" = 1'-0"

5

200 MIL

4" PERFORATED PIPE (FOR LEAK DETECTION)

60 MIL HDPE LINER

4440'

▽

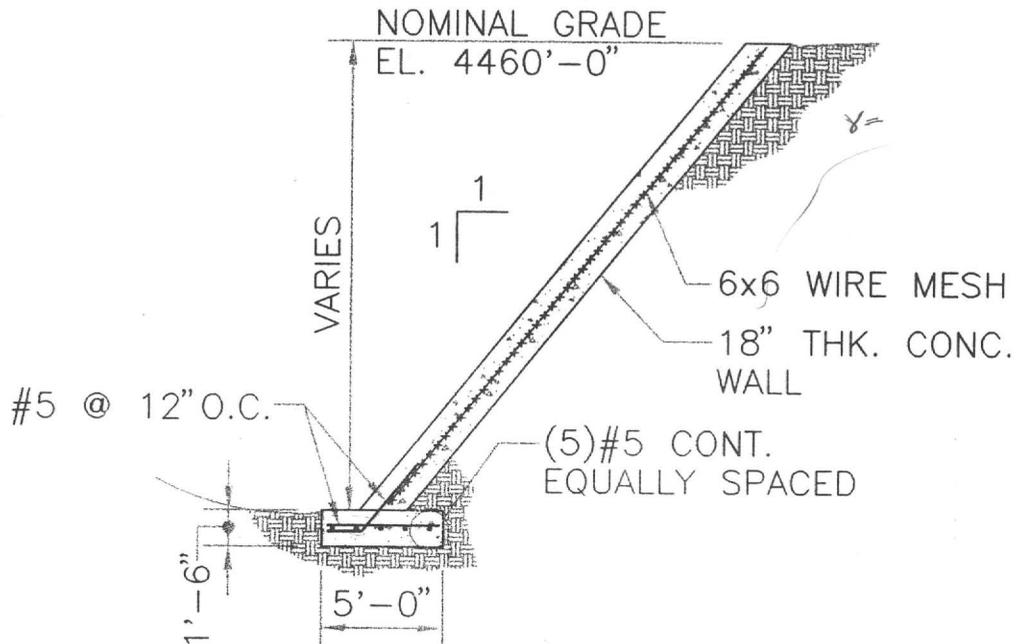
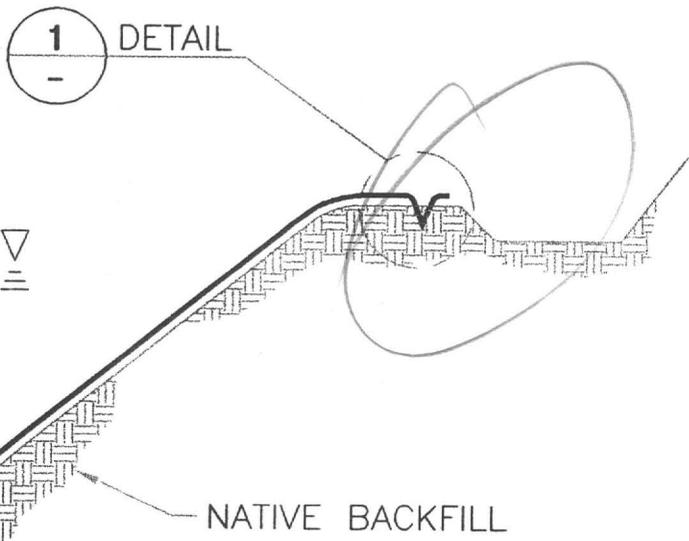
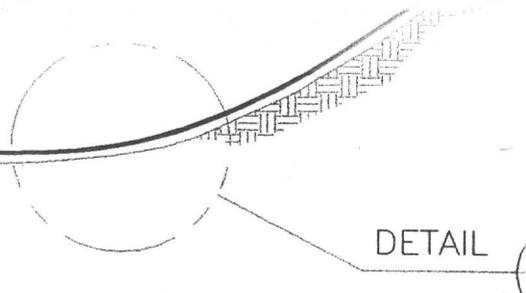
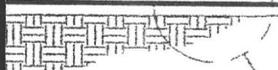


Fig. 3

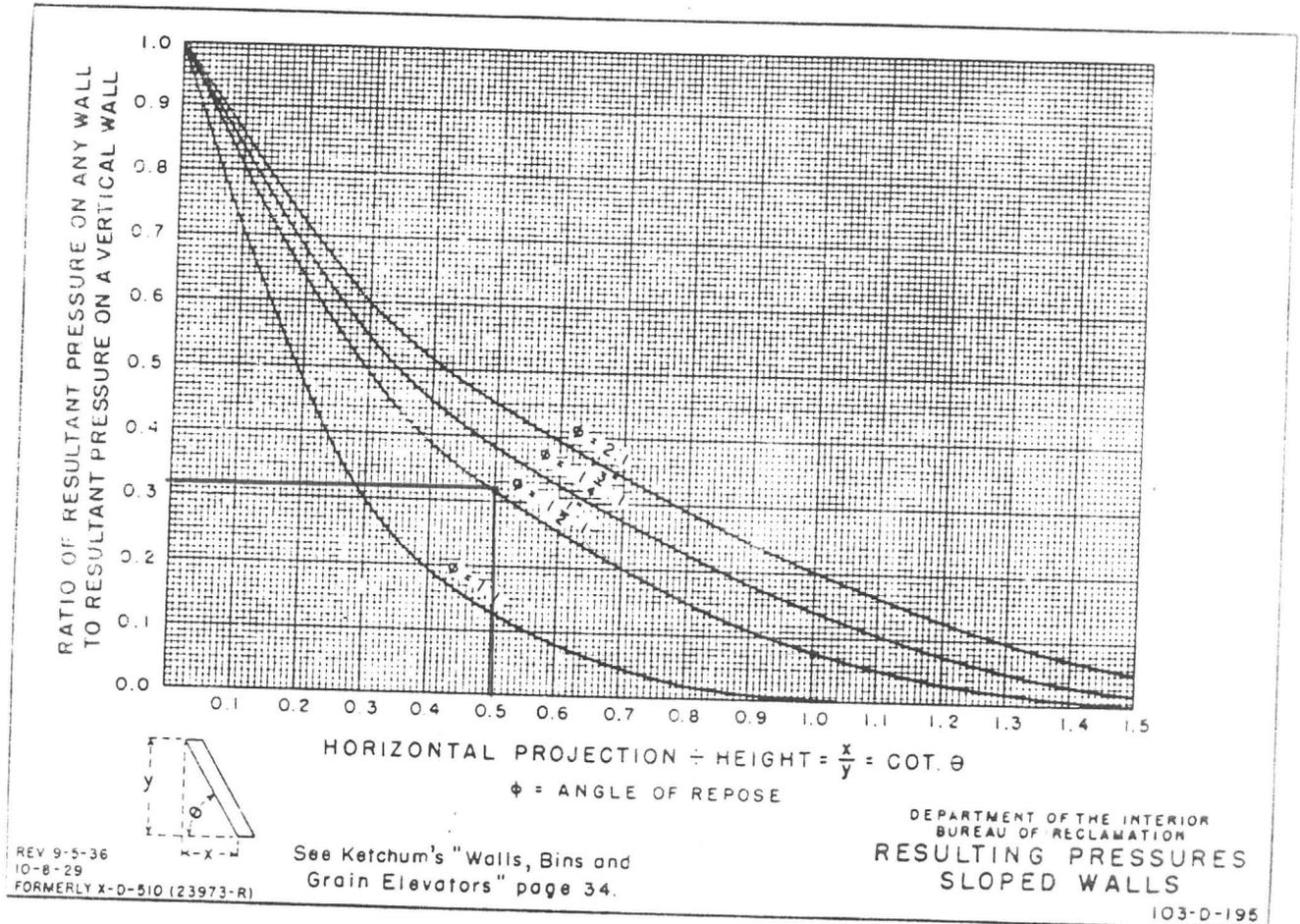
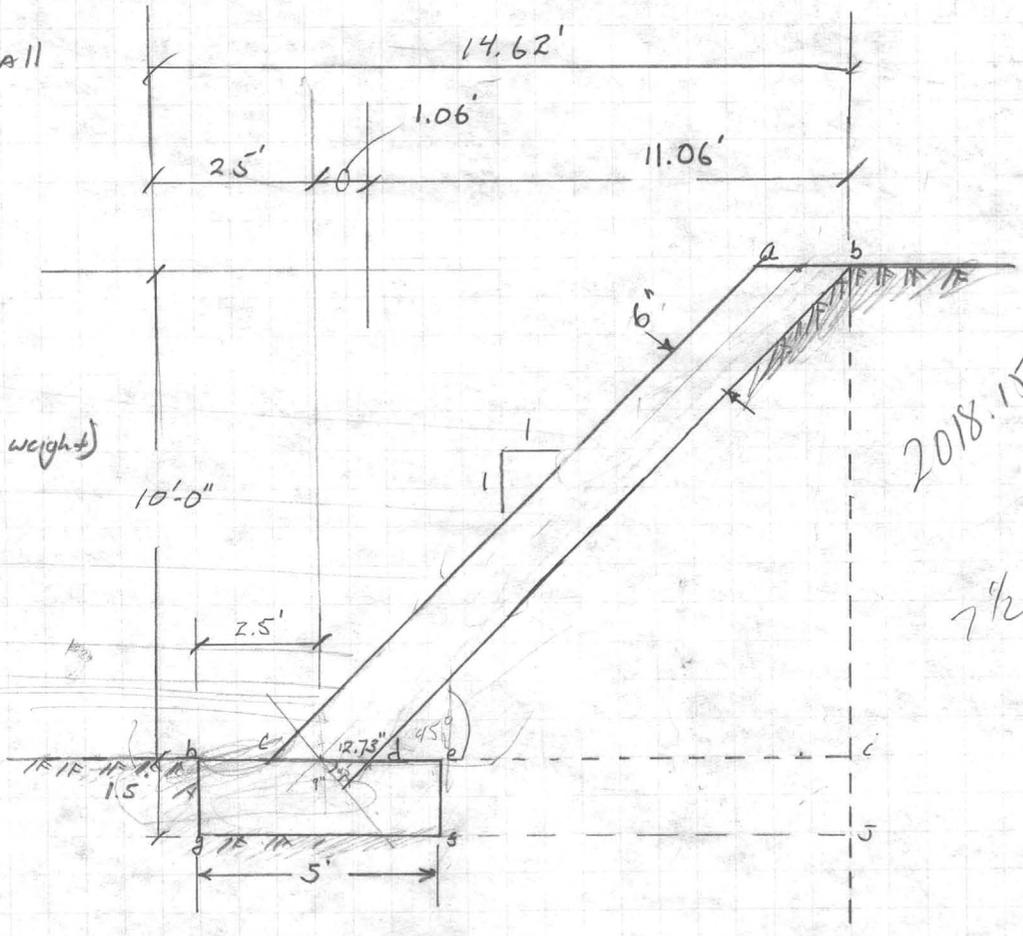


Figure 3. - Resulting pressures - sloped walls

ZONIA MINE  
Culch Retaining Wall

SPECIFICATIONS

- $\gamma_{soil} = 117 \text{ pcf}$
- $f'_c = 4000 \text{ psi}$
- $\gamma_{conc} = 150 \text{ pcf (Normal weight)}$
- $f_c =$
- $\phi = 33^\circ 42' \approx 1.5:1$
- $LF = 1.8$



2018.1521

7/2

SCALE: 1/4" = 1'-0"

STEM PRESSURE DISTRIBUTION

RANKINE'S ACTIVE STATE

$$K_a = \tan^2(45 - \phi/2)$$

$$= \tan^2(45 - 33.25/2)$$

$$= 0.292$$

$$P_a = \frac{1}{2} K_a \gamma H^2$$

$$= \frac{1}{2} (0.292) (117) (11.5')^2$$

$$= 2,259 \text{ lb/ft}$$

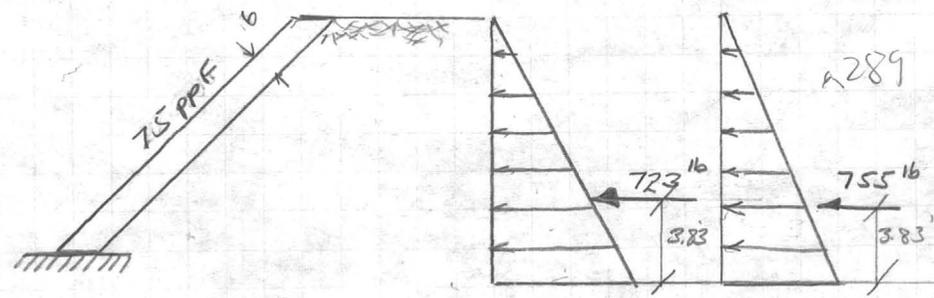
From Fig 3  $\Rightarrow \gamma_g = 0.5, \phi = 1.5:1 \Rightarrow r = 0.32$

$$P_a' = (0.32)(2259) = 723 \text{ lb/ft}$$

$$P_{int}' = (0.792)(175)(11.5) = 252 \text{ lb/ft}$$

SHEAR AT BOTTOM:  $\gamma_e = (2)(0.85)(50) = 85 \text{ pcf}$

EM base  $t$  REQ. FOR SHEAR =  $\frac{(723 + 252)(1.8)}{(85)(12)} = 1.72''$



6.819

2289

5"  
398-5

### BASE MOMENT

$$M_{STEM} = (723)(3.83) + (252)(3.83) = 3734.25 \stackrel{10.56}{=} 44,811$$

### AREA OF CONCRETE REQ.

$$\frac{M}{S} = \frac{bd^2}{6} \Rightarrow \frac{44,811}{(0.85)(4000)} = \frac{(12)d^2}{6}$$

$$d = 2.57" / (0.7)(60)$$

$$d = 3"$$

$$r = \frac{29,000}{57,000 \sqrt{4000}} = \frac{0.48112}{2605000} = 8$$

$$k = \frac{8}{8 + (20,000/4000)} = 0.348$$

$$j = 1 - \frac{0.348}{3} = 0.884$$

$$K = \frac{1}{2} (4000) (0.884) (0.348) = 615,264$$

$$d = \sqrt{\frac{44811}{(615,264)(12)}} = 2.46"$$

# SHOTPATCH® 20

*Ready To Use Cement-Based Shotcrete Mortar*

## DESCRIPTION:

SHOTPATCH 20 is a ready-to-use, multi-component, cement-based mortar "soft" fibers. It is specially designed for durable repairs or overlays using either the wet or dry mix shotcrete application system.

## RECOMMENDED FOR:

- Repair to the underside of bridge decks, bridge piers and stems, tunnels, parking garages, sewer pipe, navigation locks, dams and sea walls.

## FEATURES/BENEFITS:

- Built-in factory quality control for uniform results
- Easy to use - requires only the addition of potable water for mixing.
- Economical - reduces handling and cleanup costs
- Is easily pumped using the wet-mix shotcrete system
- Good working time - over one hour at 72°F (22°C)
- Acryl-Set® Liquid Polymer acrylic-polymer bonding additive can be mixed with SHOTPATCH 20 for increased bond strength, greatly reduced permeability and better resistance to scaling

## PHYSICAL PROPERTIES<sup>1</sup>:

Strength, psi (MPa)	1 day	7 day	28 day
<b>Compressive</b> (ASTM C 42)	2500 (17.3)	5000 (34.5)	6500 (45)
<b>Flexural</b> (ASTM C 78-84)	640 (4.4)	750 (5.2)	825 (5.7)
<b>Tensile Bond to Concrete</b> (Master Builders Test)		320 (2.2)	375 (2.6)
<b>Slant Shear</b> (ASTM C 882 Modified)		680 (4.7)	800 (5.5)

<sup>1</sup> All performance data is determined by testing of actual, in place shotcreted specimens such as cores and beams taken from test panels. Reasonable variations for the data shown can be expected, depending on the care taken in evaluating test specimens, and jobsite conditions such as the quality of the substrate preparation, level of expertise of the nozzle man, curing procedures and weather.

	SHOTPATCH 20	SHOTPATCH 20 w/Acryl-Set® 913
<b>Permeability</b> (AASHTO-277)	3,110 Coulombs (Medium)	913 Coulombs (Very Low)
<b>Scaling</b> (ASTM C 627)	Slight to Moderate	None
<b>Durability Factor</b> (ASTM C 666) (Procedure A)	96%	96%

\*1:1 Acryl-Set Liquid Polymer with water

## LIMITATIONS:

- Shelf life is 24 months when stored at temperatures between 35°F and 110°F (2°C and 43°C) in a dry area.
- Allowance must be made for rebound and cut-off which will reduce coverage accordingly.

## APPLICATION:

**Coverage Rate**  
0.43 ft<sup>3</sup> per 55 lb. bag. Will cover 5.2 ft<sup>2</sup> at a 1" depth per 55 lb. bag, before rebound.

**Packaging**  
55 lb. polyethylene lined bags. 3,300 lb. bulk bag

### Surface Preparation

Prepare the surface to be shotcreted by removing all concrete, dirt, dust and debris. The surface to be shotcreted should be roughened (1/4" profile), clean and sound. If unsound concrete is encountered at or beyond the midpoint of the depth of rebar or mesh, removal of concrete must be extended 3/4" beyond the rebar or mesh to allow access to fully encase the steel. Dampen the properly prepared concrete surface just prior to shotcreting.

Mix SHOTPATCH 20 with approximately 0.7 to 0.9 gallons of water per 55 lb. bag.

SHOTPATCH 20 can be shotcreted in depths of ranging from 1/2" to 4". For depths over 4", consult your Master Builders representative.

### Curing

Proper curing is extremely important and should be done in accordance with ACI recommendations. Use a quality curing compound such as MB 429, Masterkure® 100W or 200W other approved curing method. If Acryl-Set Liquid Polymer or other approved polymer latex is mixed with SHOTPATCH 20, only a water-based curing compound such as Masterkure 100W or 200W can be used. Do not use a solvent based curing compound.



# SHOTPATCH® 15

(Formerly Shotcrete Mix SF)

*Ready To Use Cement-Based Shotcrete Mortar*

## DESCRIPTION:

Shotpatch 15 is a ready-to-use, specially proportioned sand/cement mortar with silica fume designed for repairs and restoration using dry or wet mix shotcrete application systems.

## RECOMMENDED FOR:

- General repairs and restoration when the added performance benefits of Shotpatch 20 are not required or not specified.

## FEATURES/BENEFITS:

- Easy to use - requires only the addition of potable water for mixing.
- Designed for low permeability.
- Economical - reduces handling and cleanup costs.
- Good working time.
- Built-in factory quality control for uniform results.
- Cement meets ASTM C 150, Type II requirements.
- Sand meets ASTM C 33 requirements.
- Reduced rebound.

## PHYSICAL PROPERTIES:

Strength, psi (MPa)	1 day	7 day	28 day
<b>Compressive</b> (ASTM C 42)	4,000 (27.6)	5,200 (35.9)	6,000 (41.4)
<b>Flexural</b> (ASTM C 78-84)	375 (2.6)	550 (3.8)	700 (4.8)
<b>Tensile Bond to Concrete</b> (Master Builders Test)			350 (2.4) (Concrete Failure)
<b>Permeability (AASHTO 277)</b>		1,050 Coulombs(Low)	
<b>Durability Factor</b> (ASTM C 666) (Procedure A)		99%	
<b>Scaling Resistance</b> (ASTM C 672)		1	

\*All performance data is determined by testing of actual, in place shotcreted specimens such as cores and beams taken from test panels. Reasonable variations for the data shown can be expected, depending on the care taken in evaluating test specimens, and jobsite conditions such as the quality of the substrate preparation, level of expertise of the nozzle man, curing procedures and weather.

## APPLICATION:

Mix Shotpatch 15 with .7 to .9 gals. (2.7 to 3.4 liters) of potable water per 55 lb. (25 kg) bag.

### Coverage Rate

0.41 ft<sup>2</sup> per 55 lb. bag. Will cover 4.9 ft<sup>2</sup> at a 1" depth, before rebound.

### Packaging

55 lb. polyethylene lined bags or 3,300 lb. bulk bags.

### Surface Preparation

Prepare the surface to be shotcreted by removing all concrete, dirt, dust and debris. The surface to be shotcreted should be roughened (1/4" profile), clean and sound. If unsound concrete is encountered at or beyond the midpoint of the depth of rebar or mesh, removal of concrete must be extended 1-1/2" beyond the rebar or mesh to allow access to fully encase the steel. Dampen the properly prepared concrete surface just prior to shotcreting.

### Curing

Proper curing is extremely important and should be done in accordance with ACI recommendations. Use a quality curing compound such as MB-429, Masterkure 100W or 200W or other approved curing method.

## LIMITATIONS:

- Shelf life is 12 months when stored at temperatures between 35°F and 100°F (2°C and 43°C) in a dry area.
- Allowance must be made for rebound and cut-off which will reduce coverage accordingly.
- For wet mix application Shotpatch 15 may require air entrainment such as Micro-Air®. Consult your Master Builders representative when wet mix systems are used.

## SAFETY:

For detailed safety information, please refer to the product Material Safety Data Sheet (MSDS).

## TECHNICAL ASSISTANCE:

For additional information on the use of Shotpatch 15 and suggestions concerning equipment and shotcreting procedures, contact your Master Builders representative.

POST-IT brand fax transmittal memo / 0/1 / # of pages • 2

To: <b>TIM TREFZ</b>	From: <b>D. GOMEZ</b>
Co: <b>ARMEICO</b>	Co: <b>WESTERN STATES</b>
Dept.:	Phone #
Fax # <b>748-2626</b>	Fax #

# SHOTPATCH® 5

(Formerly Shotcrete Mix)

## Ready To Use Cement-Based Shotcrete Mortar

### DESCRIPTION:

Shotpatch 5 is a ready-to-use, specially proportioned sand/cement mortar designed for repairs and restoration using dry or wet mix shotcrete application systems.

### RECOMMENDED FOR:

- General repairs and restoration when the added performance benefits of Shotpatch 15 or 20 are either not required or not specified.

### FEATURES/BENEFITS:

- Easy to use - requires only the addition of potable water for mixing.
- Economical - reduces handling and cleanup costs.
- Good working time.
- Built-in factory quality control for uniform results.
- Cement meets ASTM C 150, Type II requirements.
- Sand meets ASTM C 33 requirements.

### PHYSICAL PROPERTIES<sup>1</sup>:

Strength, psi (MPa)	1 day	7 day	28 day
Compressive (ASTM C 42)	2,200 (15.2)	4,000 (27.6)	5,000 (34.5)
Flexural (ASTM C 78-84)	—	450 (3.1)	550 (3.8)

<sup>1</sup> All performance data is determined by testing of actual, in place shotcreted specimens such as cores and beams taken from test panels. Reasonable variations for the data shown can be expected, depending on the care taken in evaluating test specimens, and jobsite conditions such as the quality of the substrate preparation, level of expertise of the nozzle man, curing procedures and weather.

### APPLICATION:

Mix Shotpatch 5 with approximately .7 to .9 gals. (2.7 to 3.4 litres) of potable water per 55 lb. (25 kg) bag. For higher bond strengths and reduced absorption, 50% or more of the mix water may be replaced with Acryl-Set® Liquid Polymer.

### Coverage Rate

0.41 ft<sup>2</sup> per 55 lb. bag. Will cover 4.9 ft<sup>2</sup> at a 1" depth, before rebound.

### Packaging

55 lb. polyethylene lined bags.  
3,300 lb. bulk bags.

### Surface Preparation

Prepare the surface to be shotcreted by removing all concrete, dirt, dust and debris. The surface to be shotcreted should be roughened (1/4" profile), clean and sound. If unsound concrete is encountered at or beyond the midpoint of the depth of rebar or mesh, removal of concrete must be extended 1-1/2" beyond the rebar or mesh to allow access to fully encase the steel. Dampen the properly prepared concrete surface just prior to shotcreting.

### Curing

Proper curing is extremely important and should be done in accordance with ACI recommendations. Use a quality curing compound such as MB-429, Masterkure® 100W or 200W or other approved curing method.

### LIMITATIONS:

- Shelf life is 12 months when stored at temperatures between 35°F and 100°F (2°C and 43°C) in a dry area.
- Allowance must be made for rebound and cut-off which will reduce coverage accordingly.
- For wet mix application Shotpatch 5 may require an air entraining agent such as Micro-Air®. Consult your Master Builders representatives when wet mix systems are used.

### SAFETY:

For detailed safety information, please refer to the product Material Safety Data Sheet (MSDS).

### TECHNICAL ASSISTANCE:

For additional information on the use of Shotpatch 5 and suggestions concerning equipment and shotcreting procedures, contact your Master Builders representative.