



**SWENGEL-ROBBINS**

Constructors-Construction Managers  
837 East Southern Avenue  
Phoenix, Arizona 85040-3144  
Phone . . . . (602)268-1724  
Fax . . . . . (602)276-9405

**TRANSMITTAL**

**RECEIVED**  
3 August '99  
*Laurin*

DATE: August 3, 1999

COE & VAN LOO CONSULTANTS, INC.  
4550 N. 12TH STREET, SUITE 2050  
PHOENIX, ARIZONA 85253

FILE #: 680(H1)0.2

SUBJECT: Adobe Highlands  
Sewer, Water & Drainage Imprvts.  
Pinnacle Peak Rd. & 35th Avenue  
Phoenix, Arizona

Attention: Eric Laurin

The following items are transmitted: ATTACHED  UNDER SEPARATE COVER:

\_\_\_\_\_

# Copies	Description
1	Submittals from Specialized Services Co. [Swengel-Robbins Document No. 680(H2)0.1]
1	Proposed Construction Schedule for Adobe Crossing [Swengel-Robbins Document No. 680(H3)0.1]
1	Swengel-Robbins Safety Policy & Hazard Communication Program [Swengel-Robbins Document No. 680(H4)0.1]
1	Swengel-Robbins Emergency Telephone List [Swengel-Robbins Document No. 680(H5)0.1]
1	Swengel-Robbins Service Water Diversion Plan [Swengel-Robbins Document No. 680(H6)0.1]
1	Pipe Certification for 10" DIP Epoxy Lined Carrier Pipe [Swengel-Robbins Document No. 680(H7)0.1]
1	Submittal for "Bentonite" to be used for Bore Pit Backfill [Swengel-Robbins Document No. 680(H8)0.1]

The above items are transmitted:

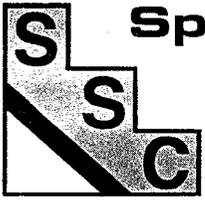
AT YOUR REQUEST  FOR YOUR APPROVAL   
FOR YOUR ACTION  FOR YOUR REVIEW

\_\_\_\_\_

Remarks or Special Information:

SWENGEL-ROBBINS INC.

Robert E. Robbins III  
Manager-Construction Operations



# Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

July 30, 1999

Swengle-Robbins  
837 East Southern Avenue  
Phoenix, AZ 85040-3144  
Attn: Robert Robbins III  
Manager - Construction Operations

## RE: Adobe Dam Sewer Project

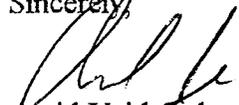
Dear Bob:

Enclosed please find submittals for the above referenced job. The enclosures are listed below for your convenience.

- 1) description of pipe ramming procedure
- 2) manufactures literature on the ITT Goliath hammer
- 3) layout of equipment around pit
- 4) cutting head configuration
- 5) soil removal detail
- 6) pipe lubrication detail
- 7) water level detail
- 8) concrete slab-flange detail
- 9) calculations demonstrating proper pipe selection
- 10) grout design mix
- 11) contractors safety plan
- 12) pipe certification
- 13) pipe joining method (included in #1 pipe ramming procedures)
- 14) personnel documentation
- 15) emergency contact numbers
- 16) list of experience
- 17) tentative work schedule

If you have any questions, please do not hesitate to call.

Sincerely,

  
Arvid Veidmark,  
Project Superintendent for  
Pipe Ramming



# Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

## Description of Pipe Ramming Procedure

Once the bore pit is dug to the proper elevation, please note Exhibit 1, Specialized Services Co. will set up equipment as noted in Exhibit A. Once equipment is in place and all safety concerns are addressed the pit will be shot to confirm proper elevation and additional grading will be done as needed. Five concrete slabs will be formed and poured in the bottom of the bore pit. After the concrete cures (overnight) a fourteen inch by fifty foot long flange H beam will be installed on center line of the bore and anchored to concrete slab as per Exhibit 2.

After the beam is in place the bore casing will be set on the beam with the cutting head already on the bore casing. Please see Exhibit B. At this time both a water level line and an external lubricating line will be installed. Please note Exhibit D. Also at this time a clean out cable will be installed inside of the 24" bore casing. Please note Exhibit C.

Bore casing will be advanced forward by mechanical means approximately eight feet beyond the end of the H beam to make contact with the existing soils. After the casing is advanced forward a 3000 psi concrete collar measuring two foot thick by eight foot wide by six foot high will then be poured at the front of the bore pit around the bore casing. This is to lock the bore casing solidly on line and grade. Please note Exhibit 2. Also at this time the ITT Goliath Grundoram (driving tool) will be attached to the bore casing.

The concrete collar will be allowed to dry a minimum of forty-eight hours after which time the hammering process will commence. Once the casing is advanced approximately forty feet a new section of pipe will be set using a forty-ton crane and welded as per welding specs AWWA C 206-82 Standard for field welding of steel water pipe using a full penetration weld. Once welding is complete and inspected the hammer will be reconnected and the hammering operation will commence again. This process will continue until two hundred ten feet has been installed under the dam. See Exhibit 7 for specifications and operating mechanics of the ITT Goliath Grundoram.

Once the bore is complete a reception pit will be excavated to expose the end of the casing. Elevations will be shot to confirm line and grade. If all is o.k., a clean out pig will be attached to the clean out cable in the reception end of the pipe inside of the 24" casing. Also, a steel plate will be placed in front of the reception end of the pipe and the reception pit will be backfilled. The steel plate is used to minimize forward movement of the casing as a slight hammering effect is applied at the bore side and tension is applied to the clean out cable. A clean out port is cut in the casing at the bore side to remove spoils as they are pulled back with the clean out pig.

After the pipe is cleaned out all equipment will be removed from the bore pit and the reception pit will be re-dug and the steel plate will be removed. Grout rings will be installed inside the 24" casing to accommodate two 2" grout lines. Only one grout line is needed; however, the second is installed as a spare in case something happens to the first grout line during grouting operations. After grout lines are installed, sewer lines will be installed as per specs and plans and line and grade will be checked again for accuracy. The sewer line will then be capped on both ends and filled with water to check for leaks and also to minimize buoyancy.

At this time a bulk head will be installed on the reception end of the casing and a partial bulk head will be installed on the bore end of the casing. Grouting will commence the following day after the bulk heads are in place. Both grout lines will be removed simultaneously as grout is injected inside the casing. Please see Exhibit 8 for grout submittals. Once grouting is complete the bulkhead is closed up on the bore side. Water will be pumped from the 10" sewer line and the end caps removed.

Now we can all breathe again because the bore is *DONE!*

EXHIBIT 7

# yourself trouble - once again!

version and not only that: practical experience has shown that the unique "in-the-pipe"



On so many sites time is wasted when the boring system in use fails to perform accurately enough. With real quality, as well as impact power, incorporated safety and accuracy, such as with the GRUNDORAM hammers, you can be sure of no such occurrences.

You can count on our wealth of practical experience and our range of suitably robust and powerful machines, which are supplied in a complete, reliable package.

The GRUNDORAM range will precisely complete every job

## MINI-GIGANT

(The second figure refers to the rear cone or to the protruding length in the case of "in-the-pipe" pushing).

Ø of rammer..... 11"/13"  
Length..... 48"/18"  
Weight..... 1012 lbs  
Air consumption..... 350 cfm  
Strokes per min..... 430  
From pipe diameter..... 8"/12"

ramming process opens up many other applications for this machine.



## GIGANT

Ø of rammer..... 11"  
Length..... 80"  
Weight..... 1342 lbs  
Air consumption..... 420 cfm  
Strokes per min..... 300  
From pipe diameter..... 8"

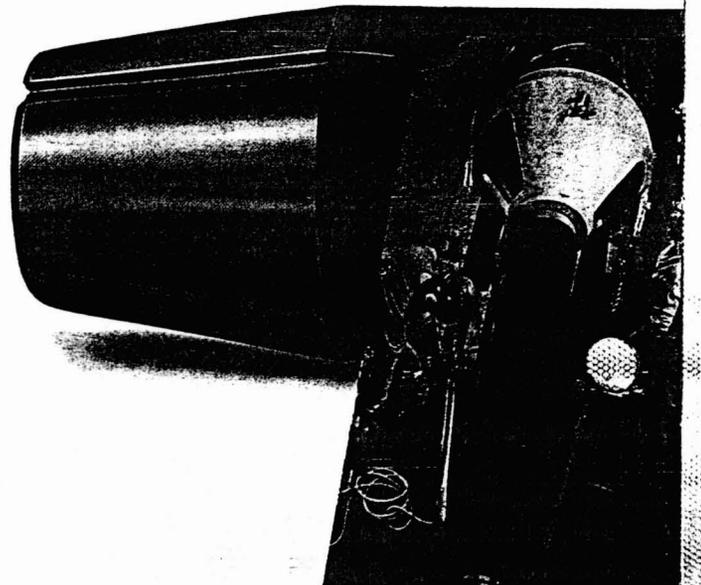
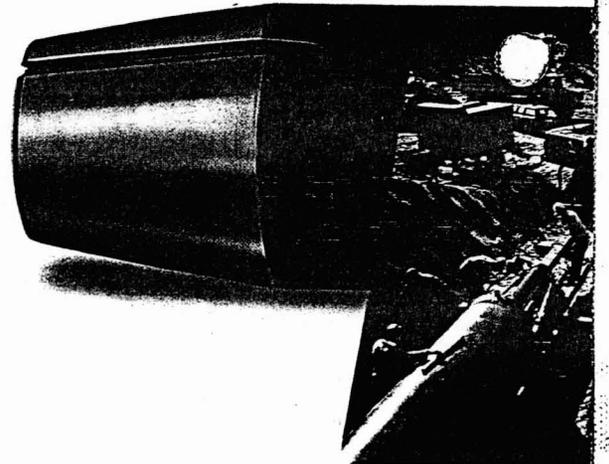
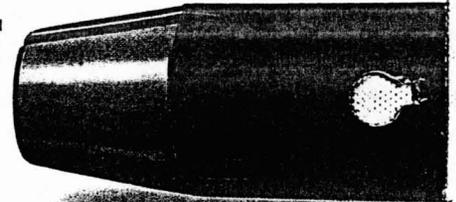
## KOLOSS

Ø of rammer..... 14"  
Length..... 92"  
Weight..... 2585 lbs  
Air consumption..... 700 cfm  
Strokes per min..... 220  
From pipe diameter..... 11"

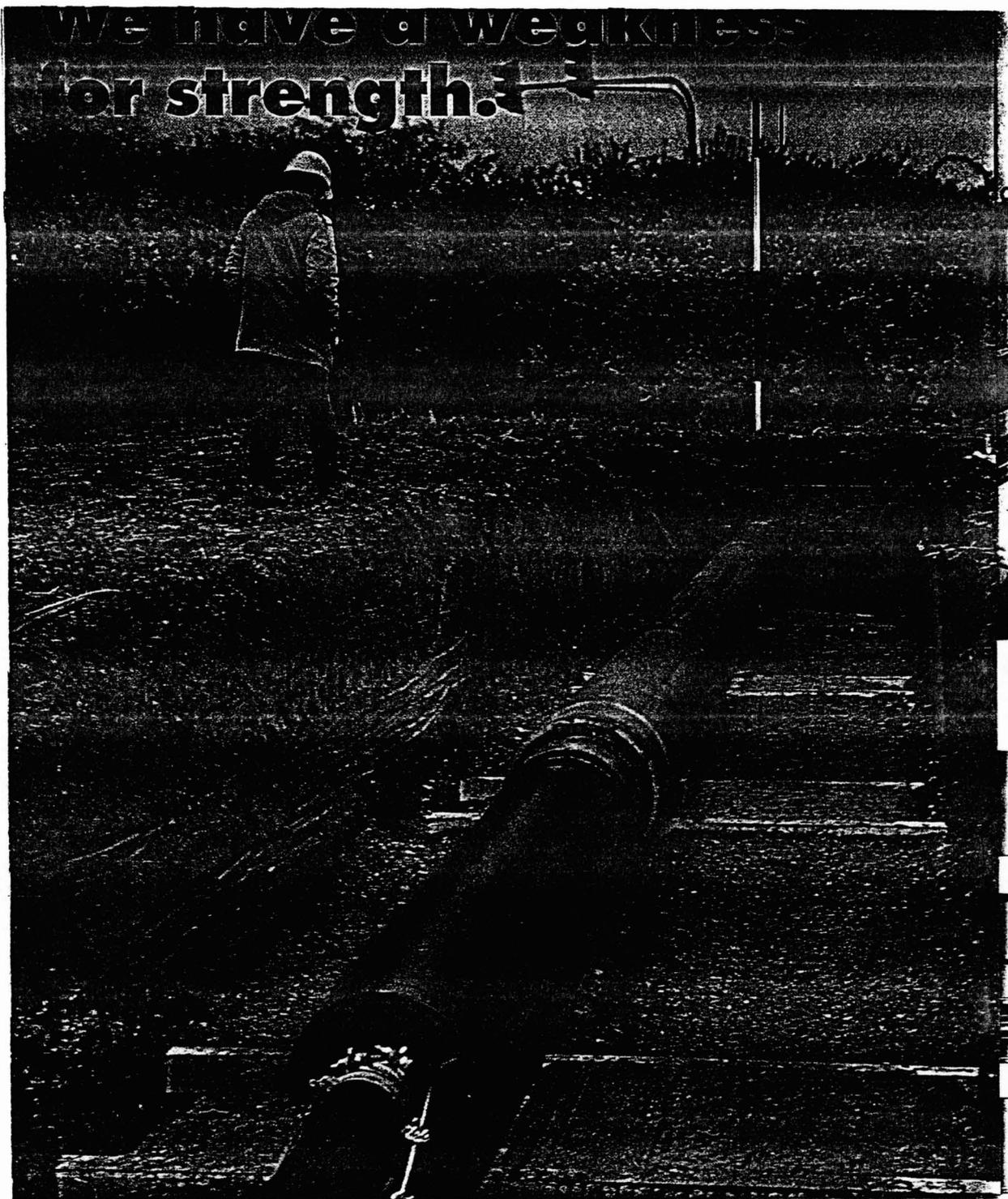
## GOLIATH

Ø of rammer..... 18"  
Length..... 112"  
Weight..... 6248 lbs  
Air consumption..... 1225 cfm  
Strokes per min..... 180  
From pipe diameter..... 15"

in all suitable soils. For example: the enormous impact power of the GRUNDORAM type GOLIATH, with over 10.000 kN ramming power. With this machine steel pipes with diameters even up to 55" can be driven home.



**We have a weakness  
for strength.**



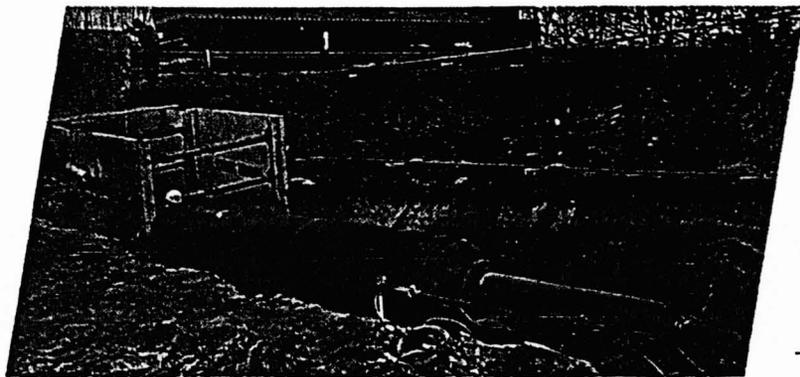
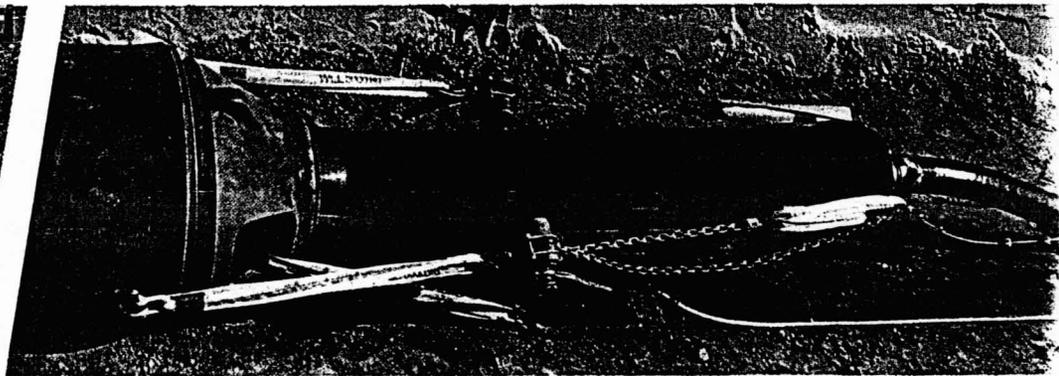
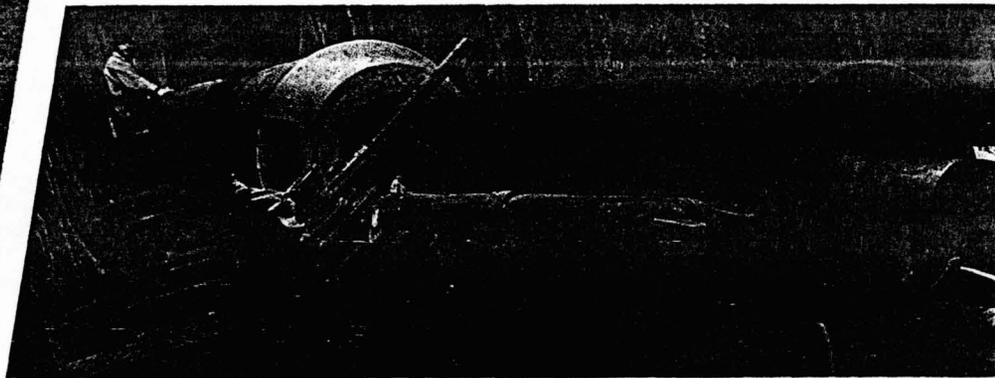
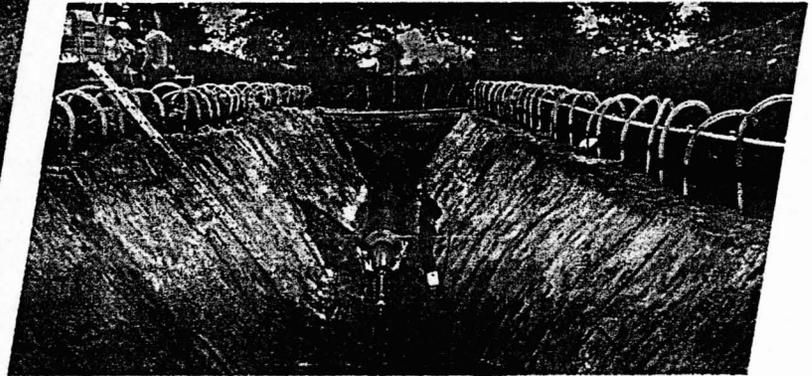
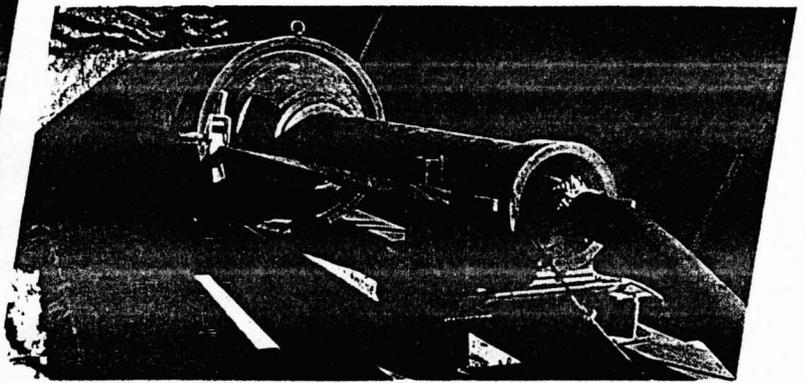
*Soil compaction limits the use of GRUNDOMAT Soil Displacement Hammers to 8" diameter. Therefore, a range of pneumatic GRUNDORAM Steel Pipe Ramming machines was developed by TRACTO-TECHNIK many years ago.*

*The main use of these GRUNDORAM hammers is for the range of steel pipes up to 55" as casings or product carrying pipes underneath roads, motorways, railway embankments, rivers and canals. When used as a casing, a number*

*pipes for gas/ water, can be accommodated.*

*As the soil is not compacted or totally displaced but evacuated by the GRUNDORAM system, steel pipe pushing with minimum ground cover is possible thus eliminating the need for deep, costly excavations for starting pits.*

*The use of this system is possible in all soils with the exception of rock.*



● 90 steel pipes of 20" diameter were driven in vertically to provide solid foundations for a noise-protection barrier in Germany.

There are many other typically good examples that could be listed. If you are interested in specific cases, contact us - we will supply you with detailed information.



# Pipe Ramming Demonstrated in Pennsylvania

by Steve Durham

**P**ipe ramming had been around for nearly twenty years, but for a number of reasons contractors generally have not paid much attention. The old methods seemed to work well enough. TT Technologies has been hard at work during that time, demonstrating the system on a one-to-one basis to contractors all across North America. This time the interest in pipe ramming was real enough that contractors considered the method worth the trip to look into it. Over a dozen contractors from New York and Pennsylvania attended a demonstration held recently in Media, Pa.

The demonstration itself was simple enough. A crew from TT Technologies, acting on behalf of a local contractor, Rencor, Inc., installed a 140 ft. 30-in. casing 35-ft. under Highway 352, near the intersection with Route 1 in Media, PA. The installation lasted only a day and a half. The installation on the first day included setup and 60 ft of casing. The second day, the remaining 80 ft of casing was driven in by 1:00 p.m. Average speed of installation was 18-in. per minute. Spoils were ejected in the afternoon.

One of the differences between



TT Technologies sets up the GrundorRam for a 140-ft crossing.

pipe ramming and augering is that continuous spoil removal is a part of the augering process. Once the pipe is installed, it is also clean. Pipe ramming requires spoil evacuation as the last step. This is generally accomplished with compressed air. In the case of the Media demonstration, the compressed air was augmented by 75 gallons of bentonite slurry. When the air was applied, the casing was completely cleaned out in less than three minutes.

Many of the attending contractors expressed surprise that this process worked so smoothly, saying that concern over spoil evacuation was one of the reasons they had not seriously considered a pipe rammer for their operations in the past. Frank Heffner of Rencor, Inc. remarked that he was "astonished at how a 30-in. casing 140 ft in length could have earth

blown out in 3 minutes."

Pipe ramming is a very simple method of installation. In fact, the rammer itself only has one moving part, the internal piston. Air is channeled inside the rammer at differing pressures to produce the steady forward/backward motion of the piston. This channeling is ingeniously accomplished so the forward motion produces several thousand tons of impact force, while the backward motion merely serves to return the piston to position for the next stroke. The result is a smooth, continuous action that produces the fastest installation speed of any trenchless pipe installation method currently available. The contractors present were very impressed by the 18-in. per minute installation speed.

The safety benefits of the Grundoram process impressed the contractors. The pipe rammer is very stable during the installation process. There is no dynamic tension and there's no danger of a sudden, destructive release of energy. In con-



At an average ramming speed of 18 in. per minute, the 30-in. casing emerges within hours from setup.

EXHIBIT A

Equipment on site - placed as needed.

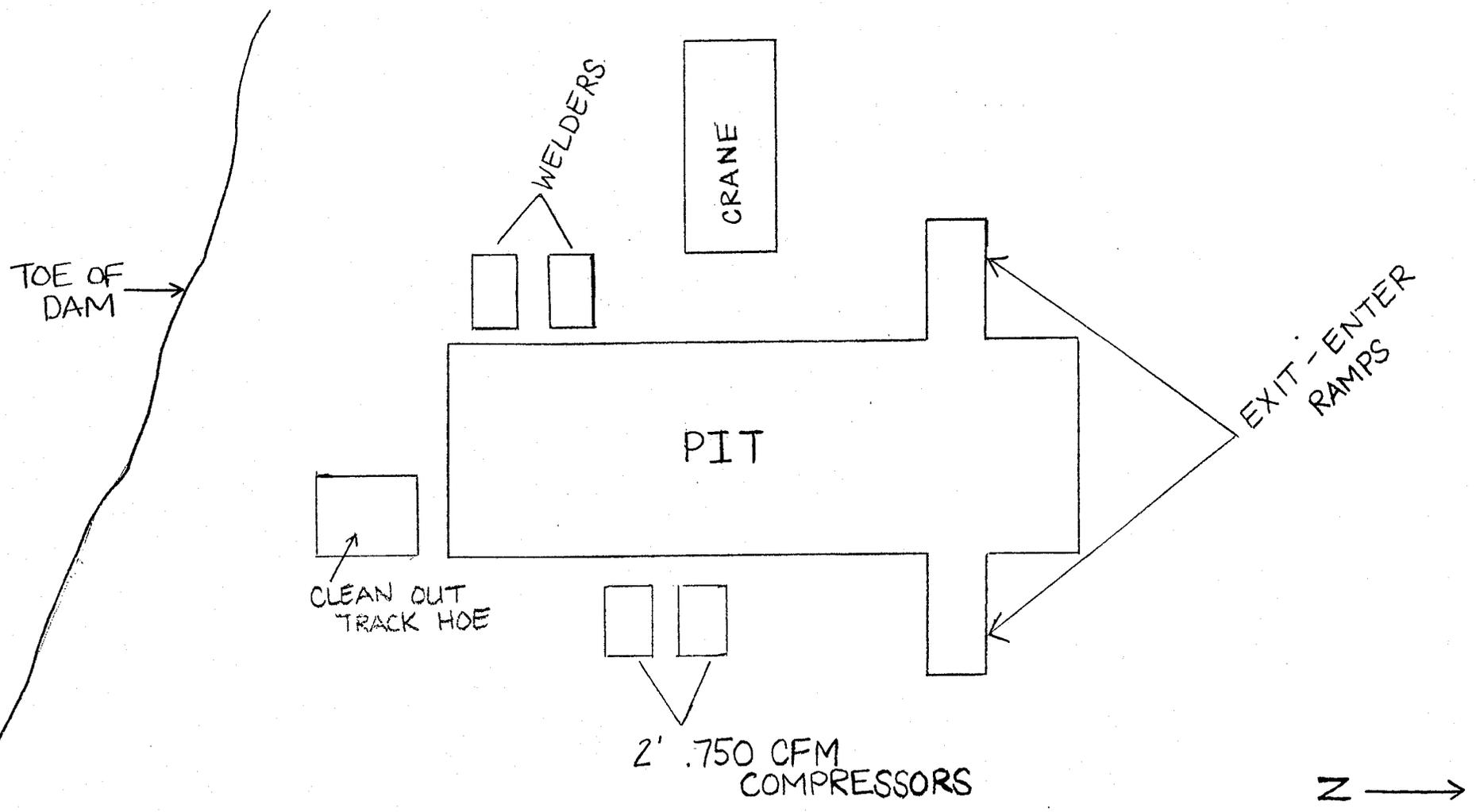
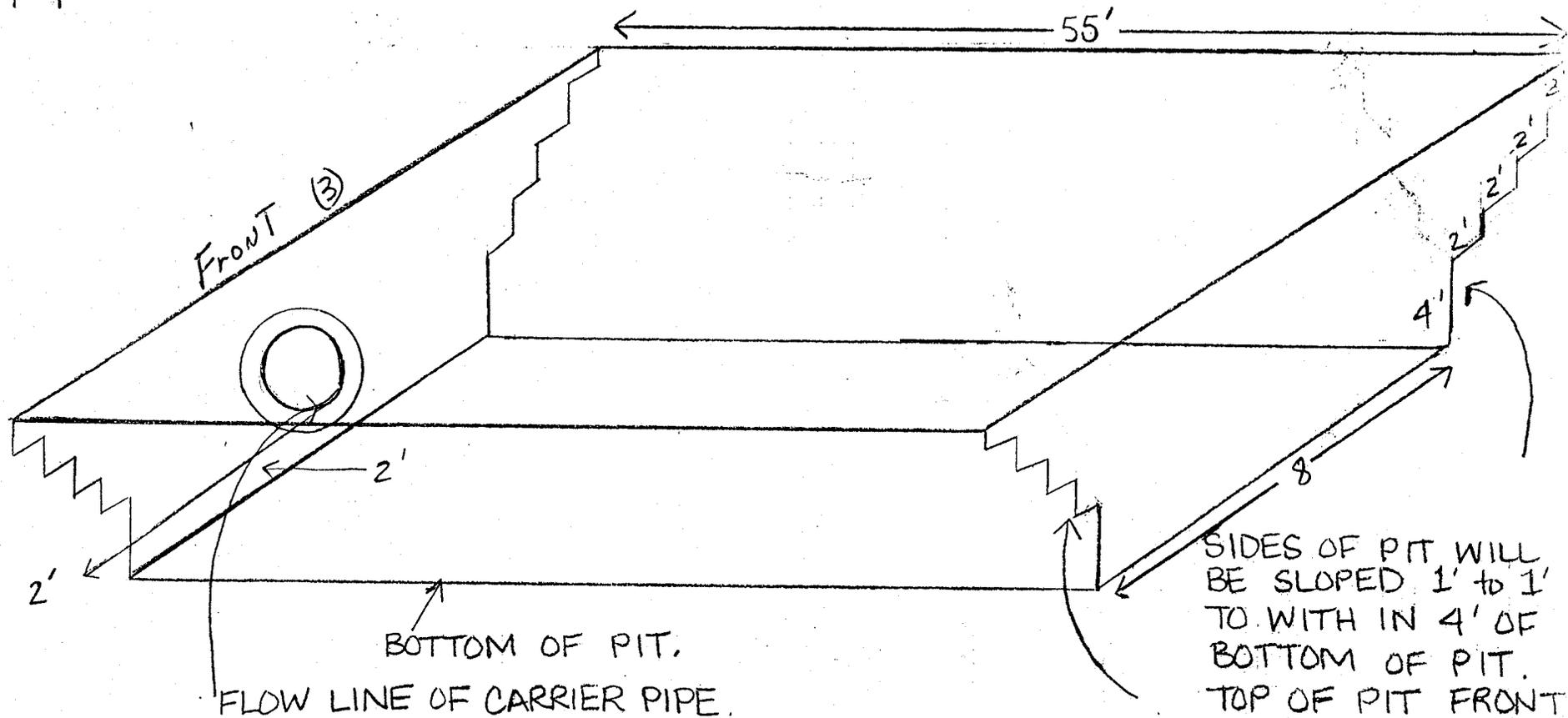


EXHIBIT 1



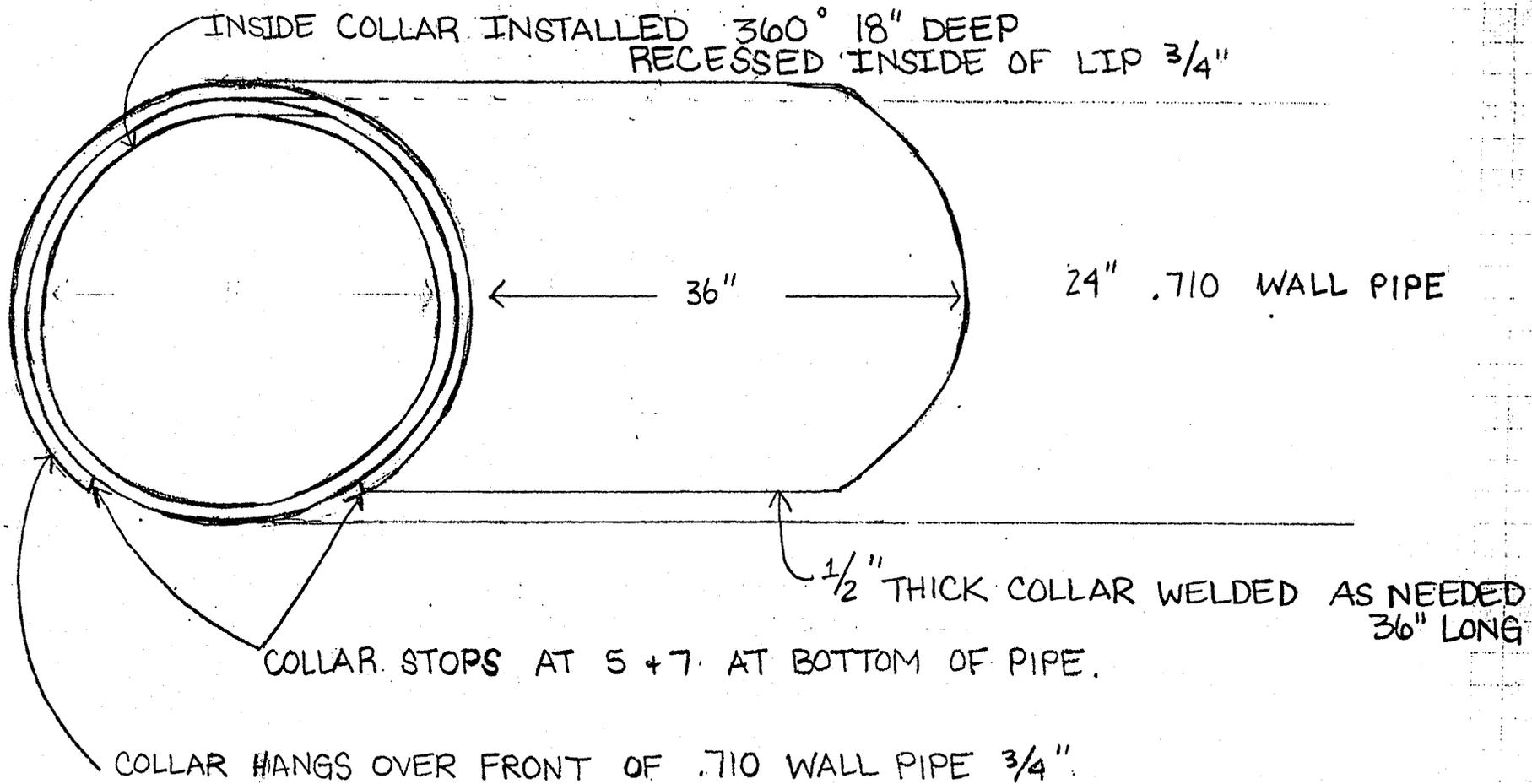
BOTTOM OF PIT.  
FLOW LINE OF CARRIER PIPE.

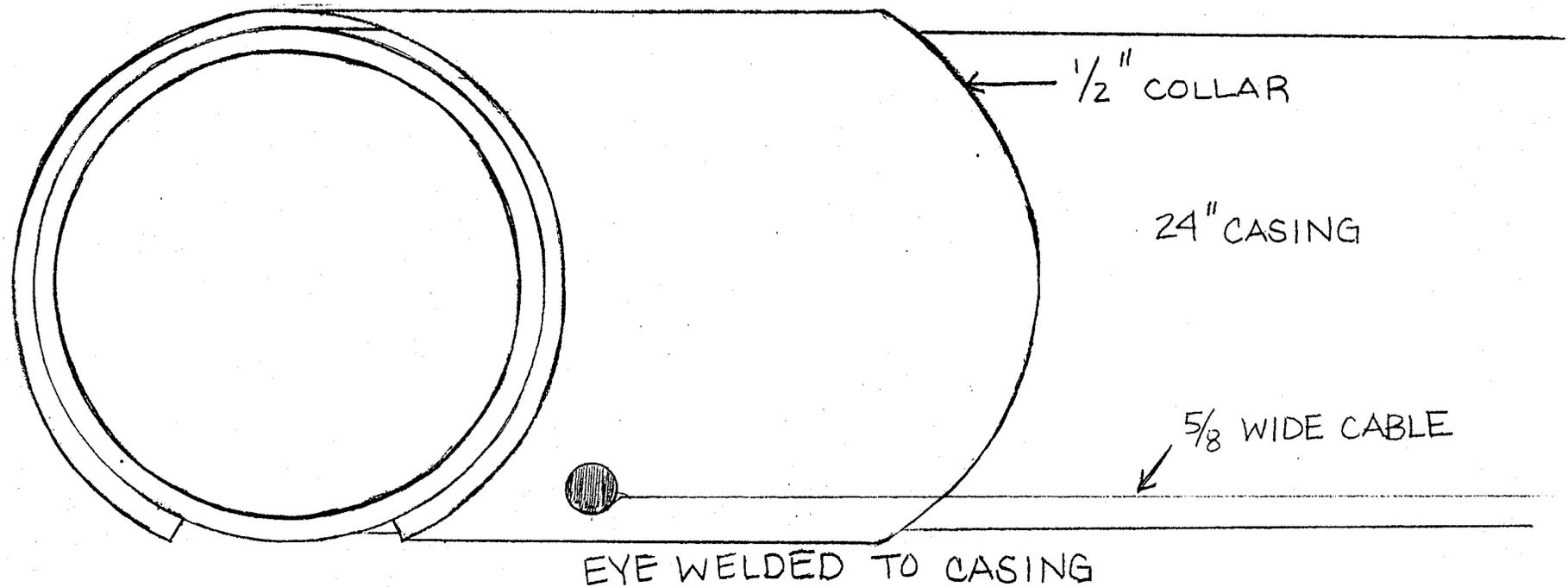
SIDES OF PIT WILL BE SLOPED 1' TO 1' TO WITH IN 4' OF BOTTOM OF PIT. TOP OF PIT FRONT + REAR ARE TO BE SLOPED TOP 4' ONLY.

- 1) SPOILS FROM PIT ARE TO BE PLACED + LEVELED AROUND ALL FOUR SIDES OF PIT.
- 2) PIT DIMENSIONS AT BOTTOM OF PIT ARE 55' LONG, 8' WIDE, 2' BELOW FLOW LINE OF CARRIER PIPE.
- 3) FRONT OF PIT IS TO BE VERTICAL FROM BOTTOM OF PIT TO WITH IN 4' OF TOP OF PIT WITH THIS BEING SLOPED 1' TO 1' TO GROUND LEVEL.

EXHIBIT B

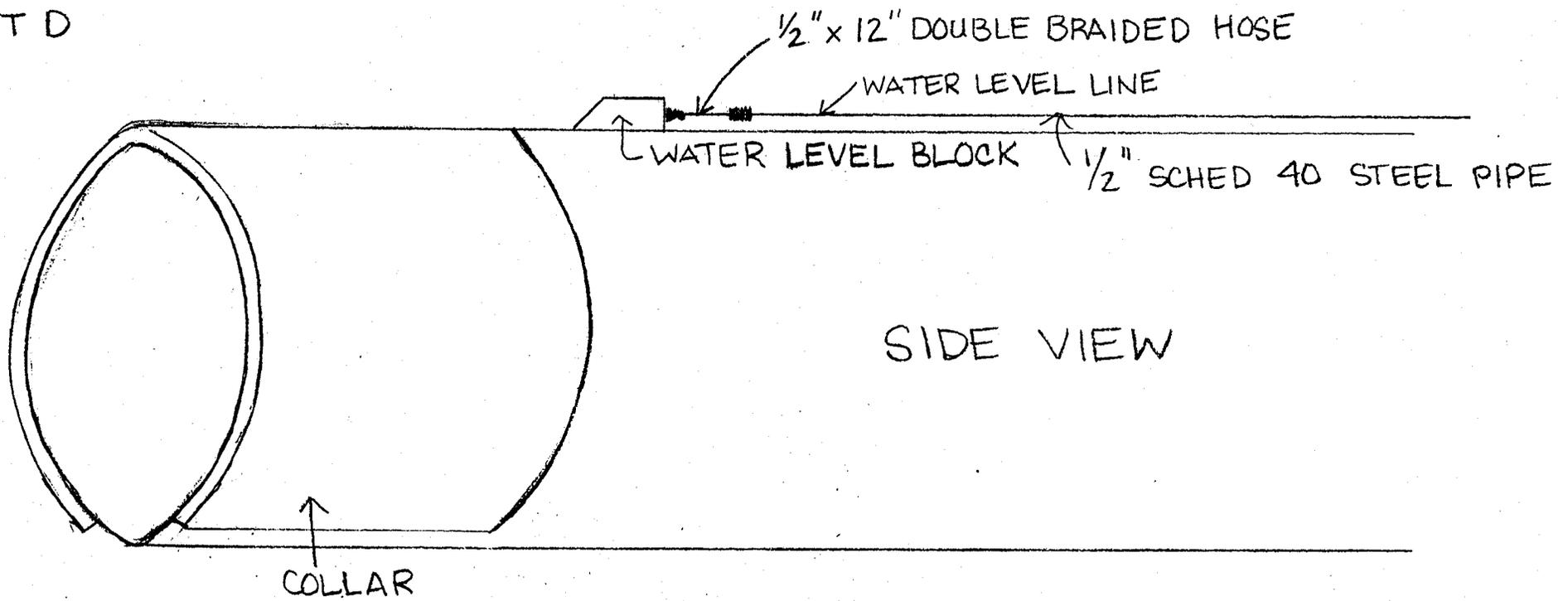
CUTTING HEAD FOR .710 WALL CASING





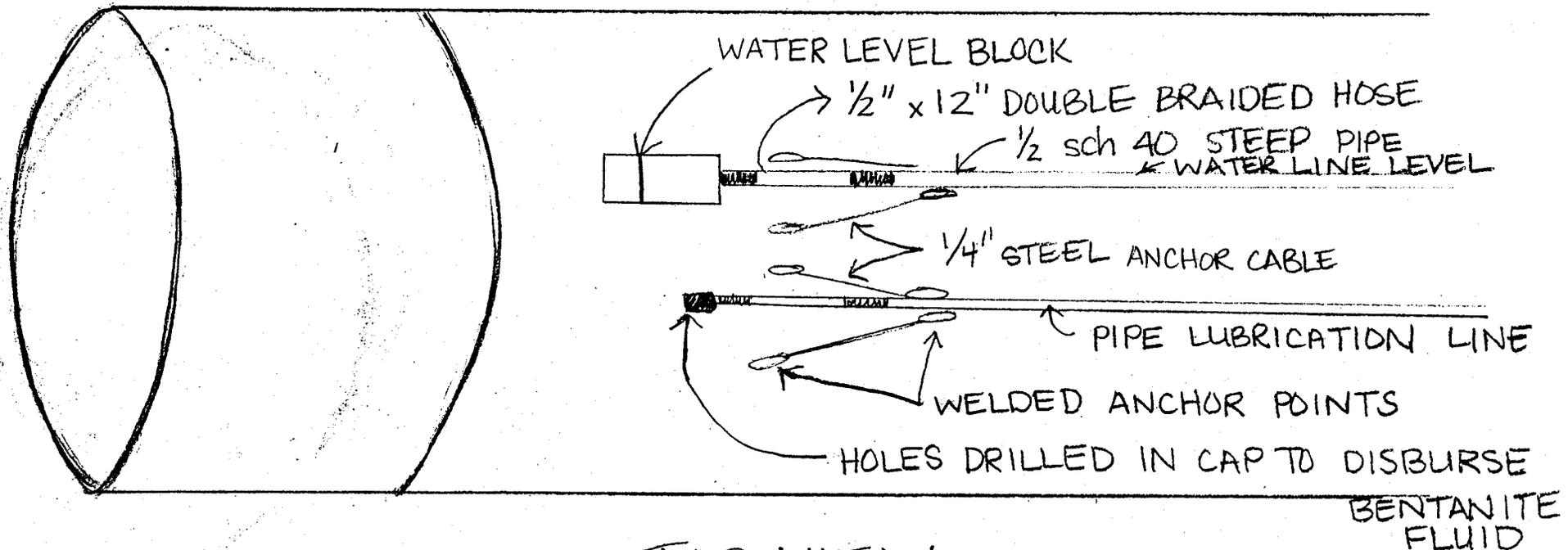
FOR CLEANING OUT INSIDE OF CASING A  $\frac{5}{8}$ " CABLE WILL BE ANCHORED TO AN EYELET THAT IS WELDED TO THE CASING - WHEN BORE IS COMPLETE A CLEAN OUT PIG IS ATTACHED TO CABLE & PULLED BACK THROUGH THE CASING WHILE A SLIGHT HAMMERING EFFECT IS INDUCED AT BORE END OF PIT. A STEEL PLATE IS INSTALLED AT RECEPTION SIDE TO HAMMER AGAINST TO MINIMIZE CASING MOVEMENT.

EXHIBIT D



SIDE VIEW

PIPE LUBRICATION DETAIL  
AND WATER LEVEL DETAIL



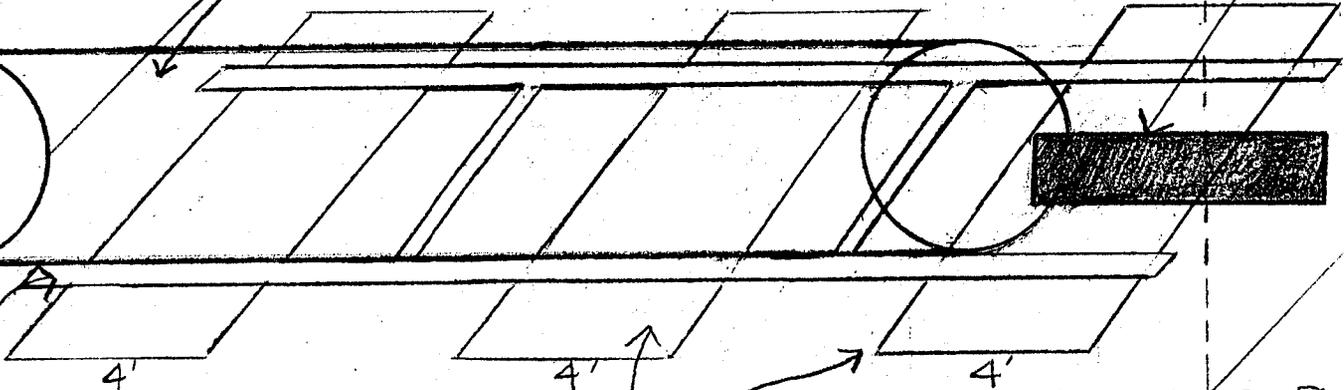
TOP VIEW

CONCRETE SLAB/ FLANGE DETAIL

2' THICK CONCRETE  
STABILIZATION COLLAR  
8' WIDE.  
6' HIGH.

24" .710 WALL PIPE.

TT Goliath  
Hammer



4' x 5' x 4" CONCRETE SLABS POURED TO PIPE GRADE  
5'-6" SPACING BETWEEN EACH SLAB.

14" x 50' WIDE FLANGE BEAM ANCHORED TO CONCRETE

FLANGE PLACED TO GRADE OF RAMMED PIPE.



# AGRA Earth & Environmental

ENGINEERING GLOBAL SOLUTIONS

July 30, 1999  
AEE Job No. 9-117-001019

AGRA Earth & Environmental, Inc.  
3232 West Virginia Avenue  
Phoenix, Arizona 85009-1502  
Tel (602) 272-6948  
Fax (602) 272-7239  
Toll Free 1-800-246-AGRA

Specialized Services Company  
2001 West North Lane  
Phoenix, Arizona 85021

Attention: Mr. Arvid Veidmark

Gentlemen:

**RE: REVIEW OF PROPOSED PIPE SUBMITTAL  
ADOBE DAM SEWER JACK/BORE  
35<sup>TH</sup> AVENUE SOUTH OF PINNACLE PEAK ROAD  
PHOENIX, ARIZONA**

Pursuant to the request of Mr. Arvid Veidmark of Specialized Services Company (SSC), we have reviewed a Letter of Compliance (dated July 21, 1999) provided to SSC by KDC Pipe and Steel, Inc., regarding the steel pipe to be provided for pipe ramming at the referenced project. The Letter of Compliance indicates that 24-inch diameter, 0.710-inch wall thickness, Grade 60 (yield strength of 60,000 pounds/square inch) steel pipe is to be provided, and further that the pipe will meet or exceed American Petroleum Institute (API) Specification API-5LX60 (API Specification 5L, Specification for Line Pipe, most current edition). Our previous engineering analyses and calculations for the project were presented in a March 4, 1999 letter to Coe & Van Loo Consultants, Inc. (AGRA Earth & Environmental Job No. 9-117-001019). The results of these analyses, including the governing assumptions presented in the March 4 letter, indicated that 24-inch diameter, 0.656-inch wall, Grade 60 pipe could be rammed without failure to the pipe, with the exception that buckling failure of the lead (unsupported) segment of pipe or "mushrooming" of the pipe at the drive head possibly could occur.

In our opinion, the proposed 24-inch diameter, 0.710-inch wall thickness, Grade 60 pipe to be provided by KDC Pipe and Steel should be adequate for the project.

Should you have any questions concerning this letter, please do not hesitate in contacting the undersigned.

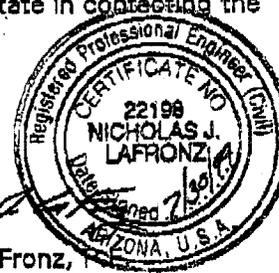
Respectfully submitted,  
AGRA Earth & Environmental

*Norman H. Wetz*  
Norman H. Wetz, P.E.  
Senior Geotechnical Engineer



Reviewed by:

*Nicholas J. LaFronz*  
Nicholas J. LaFronz,  
Senior Engineer



c: Addressee (2)  
Coe & Van Loo Consultants, Inc.  
Attn: Eric T. Laurin, P.E.  
Project Manager (1)



# Vulcan Materials - CalMat Division

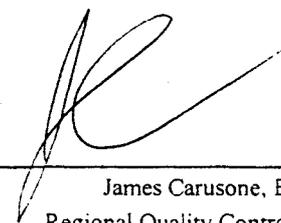
## Mix Specifications

EXHIBIT 8

Product Code	486005
Date	07/26/1999

<b>Strength</b>	2500 psi @ 28 Day	<b>Aggregate Size</b>	3/8"	<b>Type</b>	Grout	<b>Description</b>	6.0 Sack w/ 15 % Agg w/ Eclipse
<b>Client</b>	Specialized Services						
<b>Project</b>	Adobe Dam Bore; 35th Ave. & Deer Valley, Phoenix					<b>Project #</b>	
<b>Plants</b>	12 Sun City, 16 Mesa, 18 43rd Ave. West, 24 Litchfield, 32 Phoenix, 39 Higley,						
<b>Mix Properties</b>	<b>Slump Range</b>	5.0 to 7.0 ins	<b>Unit Weight</b>	147.88 lbs	<b>Percent Fine Aggregate</b>	84.98	
<b>Weight</b>	<b>Weight per Cubic Yard</b>	3,993.88 lbs	<b>Water/Cement ratio</b>	0.532	<b>Water/(C + P) ratio</b>	0.532	
<b>Volume</b>	<b>Total Volume</b>	27.01 ft <sup>3</sup>					

Material	Quantity	Unit	Weight (lbs)	S.G.	Volume (ft <sup>3</sup> )
<b>Cement</b>					
ASTM C 150, Type II, LA	6.00	Sacks	564.00	3.150	2.869
<b>Water</b>					
City/Well, (Potable)	36.00	Gallons	299.88	1.000	4.806
<b>Fine Aggregate</b>					
ASTM C-33	84.98	% of Agg	2,660.00	2.650	16.086
<b>Coarse Aggregate</b>					
ASTM C-33 Size #8 (0.375")	15.02	% of Agg	470.00	2.650	2.842
<b>Entrapped Air</b>					
0 to 3 %	1.50	% of Vol	0.00	0.000	0.405
<b>Liquid Admixture</b>					
WRDA-64, Grace, ASTM C-494 Type A @ 2-5 oz/cwt	11.28	Oz/Yard <sup>3</sup>	0.00	0.000	0.000
ADVA, Grace, ASTM C-494 Type F @ 3-8 oz/cwt	28.20	Oz/Yard <sup>3</sup>	0.00	0.000	0.000
Eclipse, Shrinkage Reducing Admixture; Grace	191.76	Oz/Yard <sup>3</sup>	0.00	0.000	0.000

Reviewed By   
 James Carusone, E.I.T.  
 Regional Quality Control Manager

This design submittal has been prepared by CalMat for the above client and project ONLY. It is not to be used or reproduced by the client or any third party for any other project without the written permission of CalMat. CalMat's "Concrete/Grout Submittal Certification, Terms & Conditions 1999" applies to this mix submittal. CalMat may use admixtures or procedures not listed above to control the mixture during Hot or Cold weather, for pumping, long hauls, or other special applications, unless restricted in writing by the client.



## CalMat Division

### CalMat Concrete/Grout Submittal Certifications, Terms & Conditions 1999

CalMat has designed and proportioned its Concrete and/or Grout designs in general accordance with the criteria set forth in ACI 318 or the appropriate job specifications.

#### Certification

The ingredients incorporated into the concrete are hereby certified to meet the quality requirements of ASTM C494 for Admixtures and ASTM C33 for Coarse and Fine aggregates.

Ready mixed concrete supplied to the project by CalMat is hereby certified to have been batched according to the attached submittal sheet and mixed in general accordance with the applicable provisions of ASTM C94. If the slump and/or air percentage of CalMat concrete is within the range on the submittal sheet and the concrete is tested in strict accordance with ASTM procedures, CalMat's experience and/or previous testing indicate that the concrete will meet, or exceed the specified compressive strength when evaluated in accordance with the provisions of Chapter 5, of the ACI Manual of Concrete Practice ACI 318.

The batching facilities and transit mixer trucks for the attached submittal sheets are certified as established by the National Ready Mixed Concrete Association, the Arizona Rock Products Association and/or the Arizona Department of Transportation.

#### Disclaimers

CalMat intends to supply concrete meeting the requirements for slump and strength as specified. However, since we have no control over such things as weather and workmanship, etc., we cannot accept the responsibility for levelness or flatness in the finished products. Additionally, CalMat will make every attempt to conform to the ACI recommended practice to Hot Weather (ACI 305R) and Cold Weather (ACI 306) Concreting. However, depending upon ambient temperature conditions, it may be necessary to maintain temperature controls in the concrete by artificial means, such as using ice or ice water in hotter months, hot water in the colder months or admixtures. We will only do this at the request of the customer or engineer. Requests for temperature control should be given to dispatcher when the concrete order is placed, preferably a day or so ahead of the pour.

#### Closing

In accordance with ASTM C94-90, 14.4, please furnish our corporate office with copies of all concrete test reports from the independent testing laboratory performing the daily testing on your project. Receipt of this test data enables us to maintain a current record of the concrete performance in regard to strength, slump, and other properties.

Phoenix Cement Company  
Clarkdale, Arizona 86324

MILL TEST REPORT

Shipped to:

CALMAT COMPANY OF AZ  
ATTN: JAMES CARUSONE  
P O BOX 52012  
PHOENIX, AZ 85072

Material: TYPE I/II LOW ALKALI

ASTM Designation: C 150-95A

Federal Specification: SS-C-1960/3B

Silo Number: 5-1517

Date: 7-13-99

CHEMICAL ANALYSIS:

Silicon Dioxide, SiO <sub>2</sub>	21.15 %
Aluminum Oxide, Al <sub>2</sub> O <sub>3</sub>	4.46 %
Ferric Oxide, Fe <sub>2</sub> O <sub>3</sub>	3.25 %
Magnesium Oxide, MgO	2.17 %
Sulfur Trioxide, SO <sub>3</sub>	3.07 %
Loss on Ignition	1.21 %
Insoluble Residue	0.23 %
Alkalies, (%Na <sub>2</sub> O + 0.658% K <sub>2</sub> O)	0.37 %

POTENTIAL COMPOSITION:

Tricalcium Silicate, C <sub>3</sub> S	57 %
Tricalcium Aluminate, C <sub>3</sub> A	6 %

PHYSICAL DATA:

Fineness, Blaine (Sq. CM. per Gm.)	3980
Autoclave Expansion	0.04-%
Air Content	6.8 %
Compressive Strength, Lbs per Sq. In.	
1 Day	2220
3 Days	4270
7 Days	5510
Time of Setting: Vicat <u>XX</u> Gillmore	
Initial set	2 Hrs. 25 Mins.
Final set	4 Hrs. 10 Mins.

All tests have been made in strict accordance with the current standards of the American Society for Testing and Materials covering the type of cement specified above.

*Lee Gorby*  
Lee Gorby, Quality Control Manager

# WRDA<sup>®</sup>-64

WATER-REDUCING ADMIXTURE ASTM C 494 TYPES A & D

## Description:

WRDA<sup>®</sup>-64 is a polymer based aqueous solution of complex organic compounds. WRDA-64 is a ready-to-use low viscosity liquid which is factory pre-mixed in exact proportions to minimize handling, eliminate mistakes and guesswork.

WRDA-64 contains no calcium chloride and weighs approximately 10.1 lbs./gallon (2.1 kg/l).

## Uses:

WRDA-64 produces a concrete with lower water content (typically 8 to 10% reduction), greater plasticity and higher strength. It is used in ready-mix plants, block and concrete product plants, in lightweight and prestressed work, and wherever concrete is produced.

## Advantages:

WRDA-64 offers significant advantages over single component water reducers. Water reduction and setting times are more consistent due to the polymer components. WRDA-64 also performs especially well in concrete containing fly ash and other pozzolans.

The use of WRDA-64 produces a plastic concrete that is more workable, easier to place and more finishable than plain or other admixed concrete. In the hardened state, WRDA-64 concrete has higher compressive and flexural strengths at all ages than untreated or conventional admixed concrete.

The greater degree of plasticity achieved, compared with conventional water-reducing admixtures, allows improved finishability.

## Finishability:

Finishers have stated that the cement paste or mortar in WRDA-64 admixed concrete has improved trowability. The influence of

WRDA-64 on the finishability of lean mixes has been particularly noticeable. Floating and troweling, by machine or hand, imparts a smooth, close tolerance surface.

## Addition Rate:

The addition rate range of WRDA-64 is 3 to 6 fluid ounces per 100 pounds (195-390 mL/100 kg) of cement. Pretesting is required to determine the appropriate addition rate for Type A and Type D performance. Optimum addition depends on the other concrete mixture components, job conditions, and desired performance characteristics.

## Dispensing Equipment:

A complete line of accurate, automatic dispensing equipment is available. WRDA-64 may be introduced to the mix or the sand or in the water.

## Compatibility with other Admixtures:

WRDA-64 is compatible in concrete with all air-entraining admixtures such as Darex<sup>®</sup> II AEA and Daravair<sup>®</sup>. Due to the slight air-entraining properties of WRDA-64, itself, the addition rate of air-entraining admixture may be reduced by about 25%. By combining the separate effects of air-entraining and dispersion, the water requirement of concrete may be reduced up to 15%. Each admixture should be added separately. While WRDA-64 contains no calcium chloride, it is compatible with calcium chloride in concrete mixes. Again, each should be added separately.

## Packaging:

WRDA-64 is available in bulk, delivered by metered tank trucks, and in 55 gallon (210 L) drums. WRDA-64 contains no flammable ingredients. It will freeze at about 23°F



(-2°C), but will return to full strength after thawing and thorough agitation.

## Architects' Specification for Concrete Water-Reducing Admixture:

Concrete shall be designed in accordance with ACI Standard Recommended Practice for Selecting Proportions for Concrete, ACI 211.

The water-reducing (or water-reducing and retarding) admixture shall be WRDA-64 as manufactured by Grace Construction Products, or equal. The admixture shall not contain calcium chloride. It shall be used in strict accordance with the manufacturer's recommendations. The admixture shall comply with ASTM Designation C 494, Type A water-reducing (or Type D water-reducing and retarding) admixtures. Certification of compliance shall be made available on request.

The admixture shall be considered part of the total water. The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or jobsite.

W.R. Grace & Co.-Conn.

211 Whitemore Avenue, Cambridge, MA 02140-1992

Telephone: 617-552-1000

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CMD-3658

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P R O D U C T



## ADVA Flow

Superplasticizer ASTM C 494, Type F

### Description

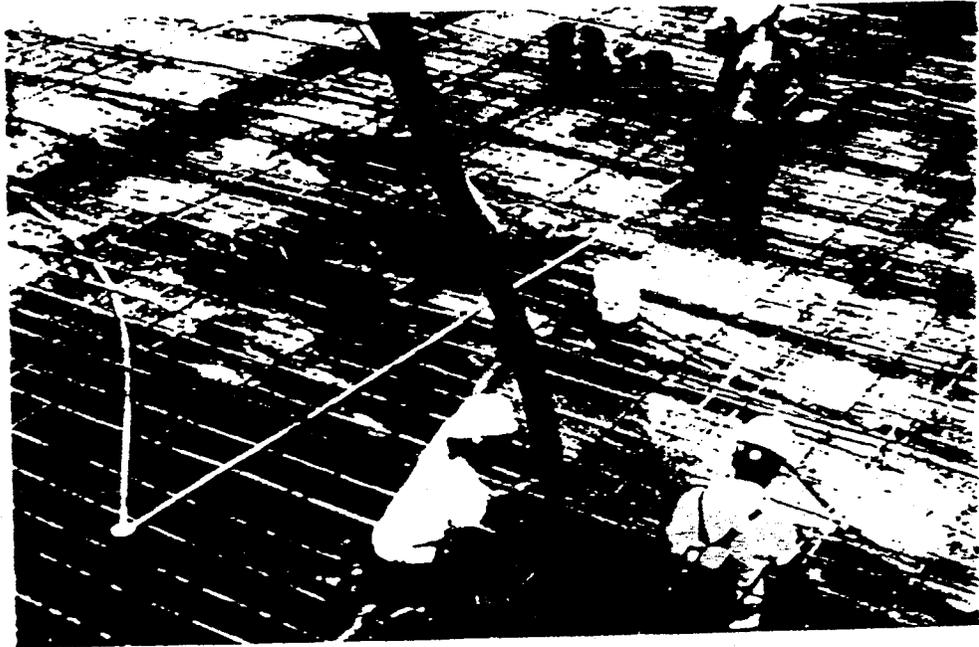
ADVA™ Flow Superplasticizer is a high range water-reducing admixture. It is a liquid which has been formulated by the manufacturer for use as received. ADVA Flow Superplasticizer contains no added chloride. ADVA Flow Superplasticizer is formulated to comply with Standard Specification for Chemical Admixtures for Concrete, ASTM C 494, Type F. One liter weighs approximately 1.08 kg (9 lb/gal).

### Dispersion

ADVA Flow Superplasticizer is a superior dispersing admixture having a marked capacity to disperse the cement agglomerates normally found in a cement-water suspension. This capability exceeds that of normal water-reducing admixtures, resulting in lower dosages and better control.

### Uses

ADVA Flow Superplasticizer produces concrete with extreme workability characteristics for high slump, flowing concrete. It also allows concrete to be produced with very low water-cement ratios at low or normal slumps.



ADVA Flow Superplasticizer is ideal for use in any concrete where it is desired to keep the water-cement ratio to a minimum and still achieve the degree of workability necessary to provide easy placement and consolidation. ADVA Flow Superplasticizer will also produce concrete with a reduced shrinkage, increasing its resistance to cracking and spalling.

### Advantages

1. ADVA Flow Superplasticizer is highly efficient, producing high slump concrete at very low dosage with no loss in strength.
2. ADVA Flow Superplasticizer is added to concrete mix water for rapid batching.
3. ADVA Flow Superplasticizer provides a superior combination of high slump concrete with low neutral set time.

4. ADVA Flow Superplasticizer concrete, even at high slump, exhibits no significant segregation in comparison to concrete without a superplasticizer at the same slump.
5. ADVA Flow Superplasticizer finishes easily without stickiness, tearing or spotty set characteristics.

#### Addition Rates

Addition rates of ADVA Flow Superplasticizer can vary with type of application, but will normally range from 195 to 650 mL/100 kg (3 to 10 fl oz/100 lb) of cement. In most instances the addition of 195 to 325 mL/100 kg (3 to 5 fl oz/100 lb) of cement will be sufficient. For best results, ADVA Flow Superplasticizer should be added to the initial mix water. At a given water/cement ratio, the slump required for placement can be controlled by varying the addition rate. Should job site conditions require using more than recommended addition rates, please consult your Grace Representative.

#### Compatibility

In concrete containing ADVA Flow Superplasticizer the use of an air-entraining agent (such as Daravair<sup>®</sup> 1000 or Darex<sup>®</sup> II AEA) is recommended to provide suitable air void parameters for resistance against freeze-thaw attack. Due to synergistic effects between ADVA Flow Superplasticizer and air-entraining agents, the quantity of air-entraining admixture added to concrete containing ADVA Flow Superplasticizer may be reduced. Please consult your Grace Representative for dosage guidance.

Most Type A water reducers or Type D water-reducing retarders are compatible with ADVA Flow Superplasticizer as long as they are separately added to the concrete. Caution should be exercised when using ADVA Flow Superplasticizer together with a retarder, as excessive retardation can occur if the admixture

dosages are too high. Pre-testing of the concrete should be performed to optimize dosages and addition times of these admixtures. The admixtures should not contact each other before they enter the concrete.

#### Packaging

ADVA Flow Superplasticizer is available in bulk, delivered by metered tank trucks, in 1250 L (330 gal) disposable totes, and in 210 L (55 gal) drums. ADVA Flow Superplasticizer contains no flammable ingredients.

It will begin to freeze at approximately 0°C (32°F), but will return to full strength after thawing and thorough agitation.

In storage, and for proper dispensing, ADVA Flow Superplasticizer should be maintained at temperatures above 0°C (32°F).

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# Eclipse™

## Shrinkage Reducing Admixture from Grace Construction Products



**Description:**  
ECLIPSE™ Shrinkage Reducing Admixture is a liquid admixture for concrete (or virtually any portland cement based material) which dramatically reduces the materials shrinkage due to drying. ECLIPSE contains no expansive material, but instead acts chemically to attack the primary mechanism causing shrinkage. Concrete containing ECLIPSE at a dosage of 2% by weight of cement has been shown to reduce shrinkage, as measured per ASTM C157, by as much as 80% at 28 days, and up to 50% at one year or beyond. This level of shrinkage reduction, in well proportioned concrete

mixtures utilizing quality materials, has been demonstrated to eliminate cracking due to drying shrinkage in fully restrained concrete. One liter of ECLIPSE Shrinkage Reducing Admixture weighs approximately 0.93 kg (7.8 lb/ gal).

**Use:**  
ECLIPSE Shrinkage Reducing Admixture may be used in any concrete, but will provide the most value in structures and environments where cracks due to drying shrinkage are prevalent and the repercussions are most severe. Some examples of applications where this is true are bridge decks, parking garages, marine structures, containment structures, and high performance floors.

**Chemical Action:**  
Drying shrinkage of concrete is a complicated phenomena which is widely acknowledged to be the function of several mechanisms. The primary driver in the predominant mechanism causing shrinkage for internal relative humidities in excess of 40% is the surface tension of water. As water-filled pores in the size range of 2.5 to 50 nm (nm = nanometers = one billionth

of a meter) lose moisture, curved menisci are formed and the surface tension of water pulls the walls of the pores. (In pores greater than 50 nm, the magnitude of the tensile force, relative to the size of the pore, becomes negligible; pores smaller than approx. 2.5 nm will not support the formation of a meniscus.) ECLIPSE reduces the surface tension of water. With reduced surface tension, the force pulling in on the walls of the pores is reduced, and the resultant shrinkage strain is reduced. With ECLIPSE at a dosage of 2% by weight of cement, this effect results in ultimate shrinkage reductions on the order of 25 to 50%.

**Addition Rates:**  
The recommended addition rate to maximize the effectiveness of ECLIPSE is 2% by weight of cement (or total cementitious material). This equates to 7 kg/m<sup>3</sup> or 7.5 liters/m<sup>3</sup> for a concrete mixture with 350 kg/m<sup>3</sup> of cementitious material (12 lb/cy or 1.5 gal/cy for a concrete mixture with 600 lb/cy of cementitious material). For the range of addition rates between 1% and 2.5%, shrinkage reduction as a function of dosage is relatively linear and any dosage

within this range may be selected to obtain a desired level of shrinkage performance. Addition rates outside this range are not recommended unless adequately tested.

#### **Compatibility With Other Admixtures:**

ECLIPSE Shrinkage Reducing Admixture is compatible with all conventional air entraining agents, water reducers, mid-range water reducers, superplasticizers, set retarders, accelerators, silica fume admixtures, and DCI® corrosion inhibitor. Precaution should be taken to avoid mixing ECLIPSE with other admixtures before they enter the concrete. However, once they have been separately added to the mixture, the products will not exhibit any incompatibility. ECLIPSE does have minor retarding properties (set times are typically extended less than one hour). If used in combination with other products exhibiting retarding properties the net retardation may be more than the simple additive effect of the two products used separately.

#### **Mixture Adjustment:**

ECLIPSE contains no water, but is added at fairly high dosages and should be accounted for in the mixture design. At a 2% dosage (by weight of cement) in a mixture with 350 kg/m<sup>3</sup> of cement, the volume of the product is 7.5 L/m<sup>3</sup> (600 lb/cy of cement, the volume of the product is 1.5 gal/cy). This liquid volume will contribute to the overall porosity of the concrete in the same fashion that an added 7.5 L/m<sup>3</sup> (1.5 gal/cy) of water will. In addition, the effect on concrete slump will be virtually the same

as the equivalent volume of water. It is therefore recommended that when incorporating ECLIPSE into an established mixture design that it should replace an equal volume of water.

#### **Impact on Fresh Concrete Properties:**

When substituted in a mixture design for an equivalent volume of water, ECLIPSE has little or no effect on concrete slump. It does however have a slight retarding effect (typically less than one hour extension of set time, see section on compatibility), and will aid in extending slump life. Where tested to date, mixtures containing ECLIPSE have been described by concrete finishers to be equal or superior in terms of finishing characteristics to reference concrete mixtures. Mixtures with ECLIPSE will require increased amounts of air entrainer to achieve a specified level of air.

#### **Impact on Hardened Concrete Properties:**

The primary impact of ECLIPSE is the reduction in drying shrinkage as previously detailed, but other hardened concrete properties are affected as well. The addition of ECLIPSE acts to flatten out the heat generation due to hydration, reducing peak temperatures in concrete but also reducing concrete compressive strengths. These reductions in compressive strengths vary from 0 to 15% depending on the mixture and materials used. The typical reduction is of 10% or less. In mixtures proportioned for durability, this level of strength reduction is typically not an issue. For established concrete mixtures

where strength must be maintained, superplasticizers such as Daracem® 19 may be used to cut water to offset the strength reduction of ECLIPSE, without compromising its shrinkage reducing capabilities. For more information on this topic consult your local Grace Sales Professional.

#### **Packaging and Availability:**

ECLIPSE is currently available in bulk quantities by Grace metered systems, in 1250 L (330 gal) totes, or in 210 L (55 gal) drums.

#### **Dispensing:**

Dispensing equipment will be provided by W. R. Grace & Co.-Conn. ECLIPSE may be introduced at any time in the batching cycle, but delayed addition has been shown to work best for controlling entrained air.

#### **Flammability:**

ECLIPSE is a potentially combustible material with a flash point of 96 °C (205 °F). This is substantially above the upper limit of 60 °C (140 °F) for classification as a flammable material, and above the limit of 93 °C (200 °F) where DOT requirements would classify this as a combustible material. Nonetheless, this product must be treated with care and protected from excessive heat, open flame or sparks. For more information consult the MSDS.

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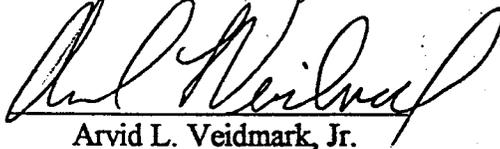
Safety Program

for

Specialized Services Company

Safety Director: J.R. Veidmark, III

Approved by:



Arvid L. Veidmark, Jr.  
President

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## Written Safety Program

### I. Purpose

The purpose of the Specialized Services Company Safety Program is to provide policy and guidelines to eliminate all injuries and the consequences of all accidents to moderate levels. Injuries to employees are the first and primary consideration, facility and property damage secondary. In as much as human injury is of equal gravity on and off work, and the personal habits and mental attitude of a person will not change when on or off the job, off-the-job safety efforts are included in this program.

### II. Scope

This program assigns responsibilities, outlines actions and methods which will reduce, and keep to a minimum manpower and monetary losses resulting from accidents, thus providing efficient utilization and resources and advancing the effectiveness by which the company's construction projects will be completed.

### III. Concepts

Accident prevention is a total management responsibility. Top management will keep informed and assured that supervision is given direction to carry out the proper safe practices and procedures. Direct supervision is held accountable, within the scope of its work assignment for personnel, property and materials under its immediate jurisdiction.

### IV. Philosophy

The philosophy of this Safety Program is that through engineering, preventive maintenance, training and motivation of employees, all accidents can and must be prevented.

- A. Minor injuries: All injuries will be investigated to the fullest extent by the Superintendents. The Safety Director will monitor the hospital visits and will also investigate as many of the first aid type injuries as practical.
- B. Lost Time Injuries: The circumstances surrounding a possible lost time injury will be investigated by the Safety Director. Findings of the investigation will be reported to the company president.
- C. Motor Vehicles or Property Damage: All motor vehicle or property damage must be reported regardless of the cost involved to the Safety Director. Except in the case of an emergency or a situation creating a hazard because of location, vehicles or other equipment involved in accidents will not be moved before representatives from the Police Department arrive at the scene.
- D. Analysis: Each unusual occurrence (resulting in personal injury, property damage, motor vehicles accidents, etc.) or near miss accident or incident, will be thoroughly investigated through interviews on the scene investigation and establishing contracting factors. The information derived from these investigations and continual analysis will be used as a basis for changes, modifications

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and/or addition to the safety program.

### Reports

- A. To company President from Superintendent: A reportable injury or accident will be immediately reported to Arvid L. Veidmark, Jr. by the construction manager.

Copies of all accident reports are furnished to the Safety Director, J.R. Veidmark, III, to aid in his accident analysis daily.

- B. To Area Director: Occupational safety And Health Administration: A written or oral report where one or more fatalities or an accident requiring hospitalization of five or more employees shall be made within forty-eight hours after the occurrence. This report shall be made by the Safety Director.

- C. To Internal: Accident analysis is prepared bimonthly and presented at the scheduled company core meetings to all directors and Superintendents by the Safety Director.

A weekly summary of inspection effort is prepared and submitted to the company president by the Safety Director.

### V. **Regulations**

There are multiple sources of regulations and guidance which affect the Specialized Services company Safety Program. The most significant are:

1. Occupational Safety and Health Standards for the Construction Industry; (29 CFR Part 1926) with amendments September 1, 1995
2. Safety and Health Standards; (29 CFR Part 1910) with amendments as of May 1, 1995

This Safety Program is considered to collect the important, basis and most useful elements of these sources in a working document that will be of the most service to management and supervision of the work sites, branch office and home offices.

It should be understood that documents listed above require the observance of all OSHA publications and all other federally recognized standards; for example, those of the National Fire Protection Association, American National Standards Institute and the Department of Transportation.

Conflicts occasionally arise in this mass of information and generally must be resolved on a case-by-case basis. In regards to state safety codes and federal safety standards, the more stringent will prevail. The federal construction safety standards are applicable to all construction standards will prevail. However, if requirements exist in OSHA and not in the construction standards, then OSHA will apply.

## VI. Accident Investigation & Reports

### Investigation

Every accident constitutes proof that adequate preventive action was not taken. The purpose of accident investigation is to discover the causative factors, the hazardous conditions and practices that brought the accident about. Investigation procedure is as follows:

Quarterly summary of injuries or occupational illness shall be furnished by the superintendents to the Safety Director during the scheduled Foreman meetings.

## VII. Pre-job Safety Conference

- A. The home office is responsible for technical guidance, coordination and monitoring the work site Safety Program. The corporate and group staffs of the company are responsible and available for assistance in the entire loss prevention, industrial hygiene and toxicology effort.
- B. The Safety Director is responsible for the direction of the Safety Programming in an advisory capacity. He recommends Safety Policy to the company president and implements approved policy. He coordinates the efforts of the divisions and continuously evaluates the effectiveness and/or requirements of the program and reports findings together with his recommendations to the company president and field Superintendents.
- C. Field Superintendents have full responsibility for the execution of the company's Safety Program within their areas of responsibility. In any case in the planning or execution of the Safety Program where an interference of responsibility exists or arises, each Superintendents involved has the responsibility to see that proper and effective action is taken. Any safety matter of this type which cannot be resolved by the Field Superintendent shall be referred to the company Safety Director without delay.

Field Superintendents shall be responsible for the safety of all employees assigned to their projects and for the protection of the facilities, equipment, tooling, etc. furnished them for the performance of their mission.

Field Superintendents shall also be responsible for:

1. Displaying aggressive leadership in the safety activities of their assigned projects and assuring compliance by their subordinates with the accident prevention directives outlined in this program.
2. Coordinating with the Safety Director on matters relating to work site activities, existing or planned, to ensure adequate consideration is given to the prevention of accidents and

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injuries and compliance with regulation agencies concerning safety matter is expedited.

3. Assuring that proper and positive corrective actions are accomplished on safety recommendations resulting from deficiencies needed by safety inspections, or evident in the accident analysis of major or minor accidents.
- D. Foremen have direct daily contact with their workmen. They are the men from whom employees receive their orders on what to do and how to do it. Therefore, the influence of superiors with employees will be utilized to the fullest extent to promote safety. Foremen of all trades are responsible for enforcement of all safety precautions applicable to the work under their supervision in order to prevent construction accidents. They have no authority to waive or alter safety regulations or to permit their violation by others. As minimum guidance, they will be responsible for:
1. Enforcing all safety rules and regulations within the scope of their work assignment
  2. Expediting corrective action to correct unsafe acts or unsafe conditions.
  3. Coordinating with the Safety Department on matters pertaining to accident prevention and consulting safety services for assistance in the implementation of the accident prevention program.
  4. Monitoring their operations to detect and correct unsafe acts and/or conditions.
  5. Familiarity with the requirements of and compliance with OSHA and all other pertinent safety instructions.
  6. Explanation of all applicable safe proactive rules and regulations to employees under their direct supervision.
  7. Training of assigned employees in the safe and efficient way to perform assigned tasks and react in emergency.
  8. Judging the training level and capability of each employee by being sure he satisfactorily demonstrates his ability and knowledge to perform assigned work in a safe and efficient manner before being permitted to do this work without constant supervision. The judgment should include the ability of the employee to meet the physical and mental requirements of the assignment.
  9. Conducting safety meeting with employees and submitting reports of meetings for record purposes.
  10. The use and maintenance of all protective devices and safeguards.

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11. Reporting to their Superintendent employees who, after reasonable training, fail to carry out assigned work safely.
  12. Reporting all locations where protective devices are necessary in order that suitable action may be initiated to obtain them. Such devices shall include, but are not limited to, the following: railing, toe boards, lights, machine guards, hoods, automatic stops, nets, and shelter.
  13. Reporting all cases where employees lack sufficient room for the performance of their duties, or where adequate ventilation, heat light or other necessary facilities are lacking.
  14. Investigation all accidents and reporting injuries on the form as required.
  15. Attending the safety meeting for supervision.
  16. Periodically analyzing work methods in detail as indicated by reports of accident-cause analyses for the purpose of work simplifications and the establishment of safe job methods. This may be done in cooperation with the Safety Director.
  17. Forwarding to his immediate supervisor all worthwhile request, suggestions and complaints made to him (together with comments as he may make) with regard to safe working conditions.
  18. Initiate action to obtain appropriate consideration necessary for the health and safety of employees under his supervision.
  19. Cooperation in the rehabilitation and return of injured employees to useful work.
- E. The Employee has responsibility to himself for his own safety, but helikewise has a responsibility to his family to his fellow workers, to the community and to his employer by whom he s paid.  
Employees will:
1. Comply with all company rules including company safety policy and all govern ment safety regulations.
  2. Follow instructions from their supervisors.
  3. Use personal protective equipment and devices provided for machinery, equip ment, tools and processes.
  4. Report all accidents and injuries immediately.

5. Know exact duties in case of fire or other catastrophe.
6. Report all unsafe conditions to their supervisor.

## IX. EDUCATION & TRAINING

The key to this Safety Program is the training of each employee. Each employee must know the best way to perform each assignment and must be kept continually aware that proper conduct and adherence to instructions are necessary for safe operation. Safety education and training methods to be utilized are as follows:

### A. Superintendents & Foremen

1. Superintendents when assigned by the Safety Director will attend the 10- Hour U.S. Department of Labor Safety Training course for construction. The Safety Director will advise when this course is available.
2. Superintendents and foremen who do not have a valid certificate for receiving first aid training will attend the new American Red Cross 8-Hour Standard First Aid Course. The Course consists of filmed demonstrations, guided practice sessions and programmed workbooks.

### B. Employees

Types of Safety Education and Training Programs are as, but not limited to, the following:

1. Each new employee receives orientation which includes understanding of company rules and concludes with a question and answer session.
2. Special safety reorientation shall be given to these employees being reassigned to different jobs, other than what they have normally done in the past. The job instructions shall be carefully explained to the employee by his Foreman. The Foreman shall make certain that those employees under his supervision carry out their jobs in a safe and efficient manner and familiarize themselves with basic guidelines.

### C. Safety Meetings of Employees

All employees will attend periodic safety meetings. It is the responsibility of each Superintendents that safety meetings be conducted a required and in an effective manner. Guidelines for safety meetings are as follows:

1. Safety meetings are normally of the "stand up" or "on-the-job" type of short duration. Twenty minutes is suggested as maximum. Occasionally a film or formal presentation of longer duration requiring employees to gather in a meeting room may take the place of a

"stand up" meeting.

2. Work site employees are required to attend such safety meetings.
3. Only employees absent for sickness or on leave are excused from the requirement to attend safety meetings at the stipulated intervals. If necessary, additional safety meetings will be held for full coverage of assigned personnel. employees whose absence is short term will be given information covered at missed safety meetings upon their return.
4. A Superintendents or Foreman shall conduct or be present at all employee safety meeting. Employee participation should be encouraged.
5. A collection of suggested safety meeting topics will be available to each Foreman. Additional topics appropriate to the moment will be furnished each quarter by the Safety Director.
6. The Safety Director will coordinate the availability of safety films with the job Superintendents and assist their scheduling and showing.
7. "On-the-job" and "off-the-job" safety topics are appropriate for discussion at employee safety meetings. administrative matters not contributing to safety are not appropriate topics.
8. The Safety Director should call upon his insurance carrier, fire department and the Department of Industry, Labort and human Relations specialist fir assistance.
9. Safety Meetings will be reported in writing on what took place and when the meeting was held.

#### **X. MOTOR VEHICLE SAFETY**

Motor Vehicle Safety includes all cars, trucks, tractor trailer, light and heavy equipment owned or leased by this company.

The Maintenance Department is responsible for maintaining in safe condition all company vehicles and motorized equipment. Those vehicles not owned by this company shall be inspected for safety defects before there is any operation of the equipment and proper action shall be taken to correct these defects.

Some of the standards for commonly used Areas relating to motor vehicles are as follows:

1. Equipment left unattended at night next to a highway or active construction area must have lights or reflectors to identify the location of the equipment.
2. A safety tire rack, cage or equivalent must be used in repairing tires with split rims.

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3. Heavy machinery or parts which are suspended or held aloft must be cribbed or blocked before employees may work under or around them. All blades, buckets or beds shall be fully lower or blocked when not in use or are being repaired.
4. Parked equipment shall be chocked and parking brakes set.
5. All motor vehicles shall have:
  - (a) A service brake system
  - (b) an emergency brake system
  - (c) a parking brake system
  - (d) audible warning device
  - (e) seat belts
6. All haulage vehicles loaded with cranes, shovels, etc. must have a cab shield and/or canopy.
7. Tools and equipment must be secured when transported in employee compartment.
8. All rubber tired vehicles shall be equipped with fenders.
9. All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, etc. are in safe operating condition and free from apparent damage that could cause failure while in use:
  - (a) service brakes, including trailer brake connections
  - (b) parking system
  - (c) tires
  - (d) emergency stopping system
  - (e) horn
  - (f) steering mechanism
  - (g) coupling devices
  - (h) seat belts
  - (i) operating controls
  - (j) safety devices

Note: (All defects shall be corrected before the vehicle is used).

10. No modifications which affect the capacity of safe operation of equipment shall be made.

## **XI. SAFETY INSPECTIONS BY FIELD SUPERINTENDENT**

Safety inspections are a means of surveying and appraising the problems of unsafe conditions and work practices which result from continual change during the development of construction projects.

During the course of inspection, which shall be conducted at a minimum of once a month, close attention

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shall be paid to all Safety and Health Regulations for Construction (Part 1926). Physical conditions or construction practices not covered by federal construction regulations (Part 1926) shall be under the Occupational Safety and Health Standards (Part 1910).

## **XII. FIRST AID REQUIREMENTS**

It is the responsibility of the employer to have medical personnel available for consultation on matters of occupational health. The employer must also provide for first aid protection. Specific requirements include:

1. First aid supplies for your particular job requirements shall be easily accessible.
2. The first aid supplies must be in a weatherproof container with individual sealed packages for each type of item.
3. The contents of the first aid kit must be checked by the employer before being sent out to the job site, and at least monthly on each job to make sure used items are replaced.
4. Provision must be made before each job starts to provide prompt medical attention in case of serious injury. This includes transportation to a physician or hospital.
5. Telephone numbers of the selected doctor, hospital and ambulance service must be conspicuously posted.
6. For each isolated job site there must be at least one person who has a validated certificate in first aid training from the U.S. Bureau of Mines or the American Red Cross.
7. Where the eyes or body of any person may be exposed to injurious corrosive materials, provision for flushing or quick drenching the eyes and body must be provided within the work area.

## **XIII. PERSONAL PROTECTION**

Where hazards exist that cannot be eliminated by engineering or a change in process, personal protective devices must be used. The general areas are as follows:

1. Head protection - where there is a possible danger from head injury from:
  - (a) impact or
  - (b) falling or flying objects or
  - (c) electrical shock or
  - (d) burns

Note: (employees must wear protective helmets, which meet OSHA standards).

2. Eye and face protection - Protective eye and face equipment must be used where there is a reasonable probability that injury can be prevented by the use of such equipment. If

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conditions require such protection, the employer shall make conveniently available suitable equipment and the employee shall use it.

3. Gases, vapors, fumes, dusts, mists - Exposure of employees to any contact with any harmful material or substance above the concentration limits or exposure duration specified by OSHA must be avoided.
4. Hearing protection - When it is not feasible to reduce the noise levels or duration of exposure below those specified by OSHA, authorized ear protective devices must be provided and used.
5. Protective footwear - Safety toe footwear where required must meet the requirements specified by OSHA.
6. Illumination - Construction areas, ramps, runways, corridors, offices, shops and storage areas must be lighted to not less than the degrees of illumination specified for each area by OSHA.
7. Other - All persons required to work in a manner that their clothing may become wet must provide their own garments to keep their clothing dry. This includes footwear.

#### **XIV. FIRE PREVENTION**

Practices designed to help prevent fires around construction projects are required to be followed. Some of the more obvious standards are summarized here:

1. Electrical wiring, both temporary and permanent, must be in accord with the standards.
2. Smoking must be prohibited in areas which are a fire hazard. Proper signs must be conspicuously posted.
3. Engine exhausts must be well away from combustible materials.
4. No temporary building may in habit or block any exit.
5. Combustible materials must be piled in stable piles, never over 20' high.
6. Driveways between and around combustible storage piles must be at least 15 feet wide. They must always be free of rubbish, equipment or any obstruction.
7. Driveways shall be spaced so that a grid system of no more than 50 feet x 150 feet is maintained.
8. Weeds and grass shall be kept down on open lot storage. Periodic cleanups shall be provided.

9. No combustible material shall be stored outdoors within 10 feet of a building or structure.
10. Only approved containers shall be used for handling or storage of flammable materials of over 1 gallon quantity. Quantities less than 1 gallon must be kept in the original shipping container.
11. Detailed standards for storage of flammable or combustible liquids, both indoors and outdoors, must be followed to minimized fire danger. See Federal Register, Volume 39, No. 122, June 24, 1974, Section 1925.151.
12. Combustible scrap and debris must be removed at regular intervals during the course of construction.
13. Containers must be provided for the collection of waste, trash, oily and used rags.
14. Containers used for:
  - (a) garbage
  - (b) oily rags
  - (c) flammable materials
  - (d) caustic materials

must be equipped with covers. Garbage and other waste must be disposed of at frequent and regular intervals.

## XV. FIRE PROTECTION

Usually an employer's insurance carrier will specify the fire protection provisions that must be maintained at each job site and establishment. Detailed standards of equipment are included in OSHA which apply to most operations.

Before equipment can be specified, you must determine which class is involved. They are:

- Class A: ordinary combustible materials such as wood, cloth, paper and rubber
- Class B: flammable liquids, gases and greases
- Class C: energized electrical equipment where the material used must be non-conductive. (Where the electrical equipment is de-energized, extinguishers for Class A or B fires may be used safely).
- Class D: combustible metals such as magnesium, titanium, zirconium, sodium or potassium.

You must also determine whether there is a light hazard, ordinary hazard or extra hazard. When all

determinations have been made, then selection of proper fire protection equipment can be done, usually with the advice of your insurance carrier.

Some of the general standards of portable equipment are listed in case this type of equipment meets your requirements:

1. Portable extinguishers must be kept fully charged and usable.
2. They must be in conspicuous locations, and readily visible and accessible, along normal routes of travel.
3. If you need extinguishers of different classes, each must be conspicuously marked and identified to ensure its use on the proper fire.
4. Extinguishers under 40 pounds weight must not be over 5 feet above the floor. Those over 40 pounds must not be over 3 1/2 feet above the floor level.
5. Extinguishers shall be suitable for use within a temperature range of plus 40 degrees F to 120 degrees F. Those exposed to temperatures outside this range must be certified for such exposure or protected from such exposure.
6. Extinguishers must be mounted on hangers or brackets supplied, or in cabinets, unless they are mounted on wheels.
7. Inspection must be made monthly of all extinguishers to make sure they are:
  - (a) in their proper place
  - (b) have not been tampered with
  - (c) have not been damaged
  - (d) have not been used
8. At regular intervals, not more than one year apart, all extinguishers must be thoroughly examined and/or recharged to ensure operability and safety. If they are removed from the plant or job site for this maintenance, they must be replaced by spare extinguishers during this period.

## **XVI. EXCAVATION & TRENCHING**

Since the primary work function of Specialized Services Company involves excavation and trenching, the regulations and safety standards developed by OSHA are to be followed.

Employee education described earlier will emphasize the safety procedures and dangers that can present themselves when the safety procedures are not followed in Excavation and Trenching operations

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Also, it is the policy of this company to properly slope, bench, or brace as required all excavations or trenches where employees are required to work.

#### **XVII. OFF-THE-JOB ACCIDENT PREVENTION**

An injury to an employee off-the-job causes the same suffering and disability as one at work. If an off-the-job injury is disabling the company is deprived of the employee's service, and costs to the company and funds contributed by fellow employees are substantial.

Unsafe actions off-the-job are a reasonable indication of lack of safety awareness in general. Emphasis must be placed on making not only the employee safety conscious but members of his family as well.

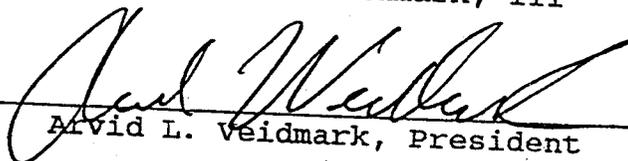
This company will include substantial effort through encouragement and motivation to convince employees of the wisdom of being safe "off-the -job". Any means available to this company will be used for the purpose.

Specialized Services Company

Confined Space Program

Safety Director - J.R. Veidmark, III

Approved:

  
Arvid L. Veidmark, President

Date: 1-1-96

The following procedures for the confined Space Program are to be implemented on all Projects deemed necessary by Specialized Services Company.

For Definition purposes, "**Confined Space**" is:

- Where air Space is confined or an area is enclosed with unfavorable natural ventilation.
- Entry or exit is limited an/or restricted.
- An area where a person is not designated to be in continuously.
- Manholes, tanks and pits.
- Areas you have to enter into or exit that have hatches, covers, doors that are bolted on, or areas you have to crawl into to get access.

All employees of Specialized Services Company who enter into a confined space must adhere to the following procedures.

**Preliminary Action:**

**Documentation:**

- This program is to be on site, and a copy in possession of the General Contractor. Specialized Services Company will not work in Confined Space areas without this information (as required by OSHA).
- Specialized Services Company will maintain a current log and fill documenting permits, trainings, events, and communications of employees while working in the confined space areas.

**Training:**

Before commencement of work in the "Confined Space" areas, all employees must be trained in the following areas:

- Identification of "Confined Space" areas and informed of hazards and risks in working in these areas.
- Evacuation and emergency rescue procedures.
- Communication Systems.
- Communication documentation procedures.
- First Aid
- Atmosphere testing.
- Self contained breathing apparatus (herein after referred to as SCBA).

### Ventilation and Air Quality Testing:

- An exhaust fan will be required to provide air flow from the entry way. this system will be maintained to ensure the required protection by maintaining volumes and velocities, or exhaust air to gather and remove all (if any) contaminants.
- No gas powered equipment and/or hazardous material will be permitted near the entry way. In addition, the entry areas will be flagged off identifying the area.
- Air quality will be tested, reported, and documented before, during, and after all operations. Reports will be logged into the office for documentation via the permit system (see attached permit).

### Communication Procedures - "Buddy System":

- All employees will be trained the communication procedures before working in any "Confined Space".
- One (1) person will be designated as the Communication Specialist (person working in the space). He/she will make visual contact with all workers to verify their condition. He/She will report to the communications contact (person in field office) every on-half (1/2) hour to record date, time, and condition of personnel on the communication log.
- These logs will be turned into the General Contractor. The General Contractor will provide a channel on which Specialized Services Company can be monitored.
- All "Confined Space" employees will be knowledgeable in radio procedures.

### Permit System:

- No employee will be permitted to work in a "Confined Space" unless he/she has been permitted (see attached permit).
- Permits will be clipped on a clip board located at the job board.
- Copies of the permits must be turned into the General Contractor daily. No one will be permitted to work the following day unless the prior day's permit is registered with the General Contractor.

### Emergency Response Procedure:

- No one will be permitted to enter the "Confined Space" until a full assessment of the emergency has been made (prevents rescue victims).
- Only designated and trained rescuers will be permitted to enter the "Confined Space".
- In the event of any emergency, the General Contractor will be notified immediately by radio. The location, brief description of the emergency and current rescue operations will be communicated.

- If the situations warrants, an ambulance will be called for immediately by the General Contractor. A designated General Contractor employee will meet the ambulance or rescue team at the entrance to escort the rescue team to the emergency locations.
- All rescue team employees will be trained in the SCBA.
- A complete investigation of any "Confined Space" emergency will be carried out by Specialized Services Company. Correspondence of the investigation will be documented and on file at Specialized Services Company main office.

**Other Items:**

- **Smoking:**

Smoking will not be allowed in confined spaces or near air intake areas. No smoking signs will be posted.

- **Unauthorized Restriction:**

No one will be permitted to enter the "Confined Space" areas unless authorized. Warning signs will be posted "Confined Space" entrances will be barricaded when not in use.

- **Fire Extinguishers/Fire Protection:**

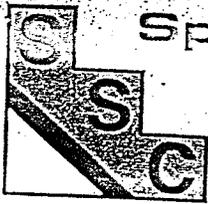
- Each location will be furnished by the General Contractor or SSC with a properly charged and maintained fire extinguisher. All personnel will be knowledgeable of extinguisher locations.

- **Housekeeping:**

- Areas will be kept clear and clean and maintained daily. No material or equipment will be permitted to be stored as to impede the access of the entrance and exit.

- **Protective Equipment:**

Each employee must wear necessary protective equipment, as required, such as eye protection, hard hats, face shields, gloves, body harness, etc., as determined by the competent person.



Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

## Documentation of Training for Tunneling Personnel

Tunnel employees of Specialized Services Company have been trained in the method developed by Arvid Veidmark, Owner of Specialized Services Company. Employees received class room training as well as on the job training until fully qualified.

The following employees have been trained to the level of full qualification by Arvid Veidmark:

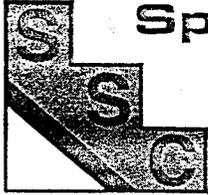
J.R. Veidmark, III  
Aaron Veidmark  
Tony Cantarella  
Scott Crowe  
Leland McPherson  
Ken Todd  
Reggie Franklin  
Roy Menendez  
Richard Conroy  
Roger Davis

Signed: \_\_\_\_\_

*Arvid Veidmark*  
Arvid L. Veidmark, Owner

Date: \_\_\_\_\_

*5-6-96*



# Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

## CONFINED / HAZARDOUS ENTRY PERMIT

\_\_\_\_\_ Confined Space      \_\_\_\_\_ Hazardous Area

DATE OF ENTRY: \_\_\_\_\_ PERMIT: \_\_\_\_\_

1. Permit is valid for 12 hours maximum. All copies of permit will remain at job site location until job is complete.

2. Site Location and Description: \_\_\_\_\_  
\_\_\_\_\_

3. Purpose of Entry: \_\_\_\_\_

4. Supervisor(s)	Company	Type of Crew	Phone #
_____	_____	_____	_____
_____	_____	_____	_____

5. Minimum requirements to be completed and reviewed prior to entry.

<u>Description</u>	<u>Date</u>	<u>Time</u>	<u>Description</u>	<u>Date</u>	<u>Time</u>
a. Lockout/de-energize	_____	_____	f. Written Program	_____	_____
b. Ventilation (Purge & Flash)	_____	_____	g. Lighting	_____	_____
c. Access	_____	_____	h. Signage	_____	_____
d. Secure Area (Flagging)	_____	_____	i. Fire Watch	_____	_____
e. Breathing Apparatus	_____	_____	j. Retrieval Equipment (Tripod, Harnesses, Lifeline)	_____	_____

NOTE: Items that do not appear, enter N/A in the blank.

6. \*\*\*\*\*RECORD ATMOSPHERE RESULTS BEFORE DURING AND AFTER\*\*\*\*\*

<u>TEST TO BE TAKEN</u>	<u>MIN. LEVEL</u>	<u>BEFORE</u>	<u>DURING</u>	<u>AFTER</u>
Percent of Oxygen	19.5%-23.5%	_____	_____	_____
Combustibles	Under 10%	_____	_____	_____
Carbon Monoxide	+35 PPM	_____	_____	_____
Toxins	Per Monitor	_____	_____	_____

(See OSHA Manual for minimum levels of toxins)

7. Gas Tester Name: \_\_\_\_\_ Calibration Date: \_\_\_\_\_

Instrument Used: \_\_\_\_\_ Model #: \_\_\_\_\_

8. Any of these above conditions are not met and atmosphere is not at minimum permissible entry level, contact your Supervisor and DO NOT PROCEED with work in confined-hazardous area until further notification.

## General Safety Rules

- 1) Report all unsafe conditions to your supervisor immediately.
- 2) Horseplay is prohibited.
- 3) All injuries must be reported to your supervisor immediately, no matter how minor.
- 4) Personal protective equipment must be worn as prescribed for each job (hard hats, safety glasses with side shields respirators, steel toed boots, etc).
- 5) Never use compressed air or other gases for blowing off or cleaning clothing or body.
- 6) Practice good housekeeping and orderliness. They are the first principles of safety.
- 7) Fighting on the job is prohibited.
- 8) Possession or use of intoxicants on job sites is prohibited and employees reporting for work in an unfit condition will not be allowed to work.
- 9) Each employee will be adequately clothed. Minimum clothing for upper body is a "T" shirt with sleeves. No cutoffs or gym shorts allowed.
- 10) Use designated entrances and exits in going to and from jobs.
- 11) Warning signs and tags are for the protection of you and your fellow workers. Heed them.
- 12) Never remove warning or danger tags from any valve, switch or apparatus.
- 13) When working around excavators, cranes, trucks or any other piece of heavy equipment, be sure that the operator sees you. MAKE EYE CONTACT.
- 14) Be alert to conditions in surrounding areas so you can avoid any dangers. Be aware of other employees and equipment.
- 15) Barricaded or roped off areas are considered to be danger zones. Stay out unless you are assigned to work in these areas.
- 16) Protect floor openings by providing adequate barricades or covers.
- 17) All employees have the responsibility to attend and take active part in all safety training meetings and read and abide by all safety materials made available to you.
- 18) Throwing or dropping materials from one area or level to another is prohibited unless every precaution is taken to eliminate the possibility of injuring persons or damaging equipment.
- 19) Riding or standing on equipment while it is in motion is prohibited.

- 20) Sitting or standing on tailgates or bumpers while vehicles are in motion is prohibited.
- 21) Sitting under or leaning against heavy equipment or trucks while eating lunch or during breaks is not allowed.
- 22) Follow instructions on shoring of trenches to avoid danger to yourself or fellow workers. Collapsing soil can be fatal. Sides of trenches in unstable or soft material 5 feet or more in depth must be shored, shielded, sloped or supported.
- 23) Excavated soil and material must be stored at least 2 feet from edge of excavation.
- 24) Follow guidelines on entry into confined spaces. Use the equipment you have been provided. Use a safety backup as instructed.
- 25) Do not wear loose or long sleeve shirts around any rotating equipment.

### **Housekeeping**

- 1) All protruding nails must be pulled before wood is stacked or piled.
- 2) There is a place for everything - order is the fundamental ingredient to good housekeeping.
- 3) Rags, packing materials, paper cups and sawdust shall be collected daily from saw areas.
- 4) All objects with sharp edges (scrap banding material, sheet metal scrap and metal cans) must be placed in containers.
- 5) No glass containers will be allowed on the job sites.
- 6) Do not place debris and other obstacles in roadways, walkways, aisles and other travel routes.
- 7) Keep sanitary facilities and drinking water stations clean; they are provided for your health and convenience.
- 8) Return all tools and equipment to the tool boxes or storage sheds after use.

### **Rigging**

- 1) Know the proper use of chain falls, come-a-longs, chokers, shackles and clamps.
- 2) Never raise a load over people.
- 3) Use tag lines to control hoisted loads.
- 4) Know the capacities of rigging equipment and the weights of loads.
- 5) Inspect all rigging daily. Load limit charts will be available for the your use.

## **Material Handling**

- 1) When lifting objects, use your legs not your back.
- 2) Do not try to handle heavy material alone. Ask for help.
- 3) Riding on hooks, headache balls or slings of hoisting equipment is prohibited.
- 4) Using forks or pallets as a working platform is not allowed.
- 5) Stack material and equipment so that it will not create a falling or tripping hazard.
- 6) Never walk under a lift or place yourself in a position where the swing or movement of the lift will strike or pin you against any object.
- 7) To prevent slipping and/or toppling over, store "I" beams with the webs vertical.
- 8) Material loaded on vehicles shall be limited to an amount constituting a legal, safe load. Material must be placed and secured in a manner so it will not be jarred loose during travel.
- 9) Pipe, cords, boards and other materials shall not be strewn in work areas. Materials should be stacked neatly and securely to prevent tripping hazards.

## **Electrical**

- 1) Do not use extension cords or any power tools or equipment when the cords are frayed, worn out or bare wire is showing. Turn the equipment in for repair.
- 2) Electrical equipment shall not be installed, repaired or removed except by qualified trained employees.
- 3) Electrically grounded equipment must be grounded.
- 4) Temporary lighting must be guarded. Report unguarded or broken light bulbs. Do not hang lights by their cords unless the light was designed to be suspended in that manner.
- 5) All electrical equipment will be UL approved with GFI circuits.

## **Heavy Equipment**

- 1) Only qualified operators may operate power equipment.
- 2) Operators must inspect their equipment daily before using and report any defects for repair immediately.
- 3) Operators must respect the load capacities of cranes and other hoisting equipment and prevent overloading.
- 4) Operators will not permit anyone to ride on hooks or loads.

- 5) Heavy equipment shall not be operated within 10 feet of electric power lines. Check your requirements. Never operate within less distance than that required by applicable safety rules.
- 6) Keep clear of all heavy equipment. Always make eye contact with the operator. Stay away from blind spots and the swing radii of cranes and excavators.
- 7) Using a loader or backhoe bucket as a man lift is prohibited.
- 8) Hard hats and appropriate Personal Protective Equipment must be worn at all times while operating heavy equipment.

### **Cranes**

- 1) The crane for the San Manuel Magma Copper Mine 42" auger bore project is to be provided by The Ashton Company.

### **Welding**

- 1) Inspect equipment before use. Be sure it is in good condition.
- 2) Keep welding areas well ventilated.
- 3) When working in the vicinity of other employees, use a welding screen.
- 4) Wear proper personal protective equipment for welding.
- 5) When working in an area where flammables are present, a fire watch must be used. The fire watch must be equipped with an appropriate fire extinguisher.
- 6) A hot work permit will be filled out and kept current.
- 7) Welding hoods will be attached to hard hats when working in mines.

### **Compressed Gas Cylinders**

- 1) Keep empty or full compressed gas cylinders standing and securely tied off. Make sure valve protection caps are on when cylinders are not in use. The valve shall be closed on all empty cylinders.
- 2) Transport compressed gas cylinders only in a standing position and then only when securely tied off.
- 3) When transporting cylinders, remove gauges and place protective caps securely.
- 4) All cylinders will be equipped with flame arrest check valves.

### **Ladders**

- 1) Select the right ladder for the job. Ladders should extend 3 feet beyond top landing.
- 2) Do not splice two ladders together.

- 3) Inspect ladders for defective parts\; which include rungs, side rails, feet and any other weakness. Remove defective ladders from service immediately.
- 4) Face the ladder and use both hands when going up and down ladders. Hoist material to keep hands free.
- 5) Do not climb higher than the third rung from the top on extension or straight ladders, more than the second step from the top on stepladders.
- 6) Tie off all straight ladders to keep them secure.
- 7) The base of a ladder should be set out at least one-fourth of the ladder height measured from bottom to point of bearing.
- 8) Ladders shall not be placed in walk or traffic areas without being barricaded or guarded.
- 9) The use of metal ladders is prohibited when they may come in contact with electrical current.
- 10) Job built ladders must be approved by a supervisor or designated competent person.

### **Fire Prevention**

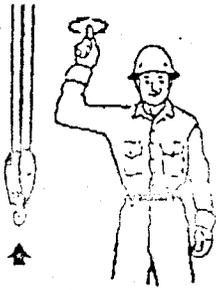
- 1) Use only approved cleaning agents - never gasoline or flammable liquids.
- 2) Gasoline and other flammable liquids will be stored only in approved safety containers and in areas free of burning hazards.
- 3) Keep all heat sources from flammable liquids, gases or other combustible materials.
- 4) Smoke only in designated areas.
- 5) Know the location of all the provided fire extinguishers and methods of use of all fire extinguishers in your work area. Do not remove or tamper with fire extinguishers.
- 6) Know how to report a fire immediately.
- 7) Discard or store oily rags only in approved containers.
- 8) Do not smoke when fueling equipment or in proximity to fueling areas.
- 9) Equipment fuel is to be handled only in safety containers.
- 10) Never leave open fires unattended.

## Personal Protective Equipment

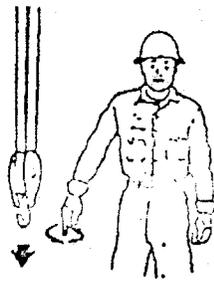
- 1) COMPANY POLICY - All employees shall use the personal protective equipment prescribed by the government and/or Specialized Service's Rules and Regulations to control or eliminate any hazard or other exposure to illness or injury. Any employee who willfully refuses to use the prescribed personal protective equipment designed to protect him or willfully damages such equipment shall be subject to disciplinary action which may lead to termination.
  
- 2) EAR PLUGS OR MUFFS - Appropriate hearing protection shall be worn in work areas where noise levels exceed established standards. Wear hearing protection when using equipment that exceeds noise standards.
  
- 3) GOGGLES, SAFETY GLASSES, FACE SHIELDS & HARD HATS - Appropriate eye and head protection shall be worn by every employee when:
  - A) Placing concrete.
  - B) Welding, burning or cutting with torches.
  - C) Using abrasive wheels, portable grinders, saws or files.
  - D) Chipping concrete, stone or metal.
  - E) Working with any materials subject to scaling, flaking or chipping.
  - F) Soldering, handling or working with molten metal or hot compounds, handling or working with hazardous liquids, powders or substances (such as glass).
  - G) Drilling or working under dusty conditions.
  - H) Waterproofing.
  - I) Working on energized switchboards.
  - J) Using explosive powder, actuated fastening or nailing tools.
  - K) Working with compressed air or other gases.
  - L) Working near any of the operations listed above.
  
- 4) HARD HATS - All construction areas will be considered "Hard Hat Areas". All employees and visitors must wear company approved hard hats inside construction areas.
  
- 5) RESPIRATORS - Approved respirators will be used when excessive dust, mist, fumes, gases or other atmospheric impurities are determined to be harmful to health.

- 6) FOOTWEAR - All employees working in construction areas should wear sturdy working boots with sole and upper in good condition. In areas such as tunnels where there is a danger of falling rocks, timbers or other objects, hard toe safety boots or shoes shall be worn.

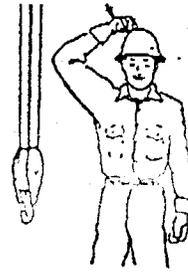
(safety1.qw#13)



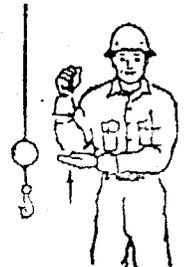
HOIST



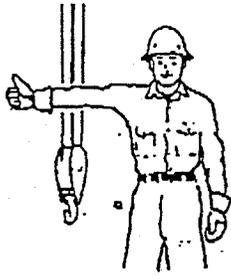
LOWER



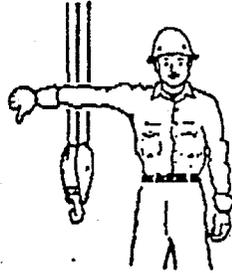
USE MAIN HOIST



USE WHIP LINE  
(Auxiliary Hoist)



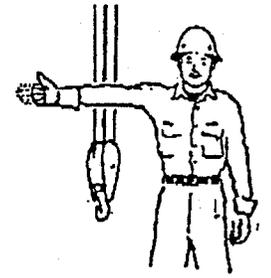
RAISE BOOM



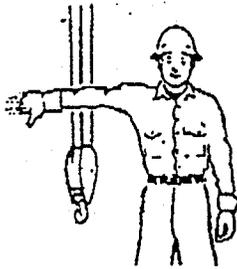
LOWER BOOM



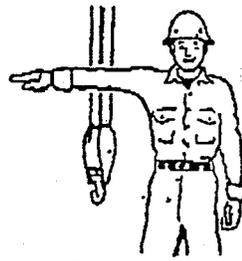
MOVE SLOWLY



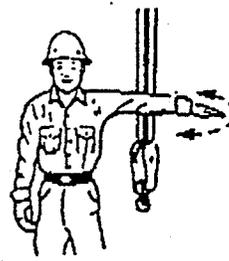
RAISE THE BOOM AND  
LOWER THE LOAD



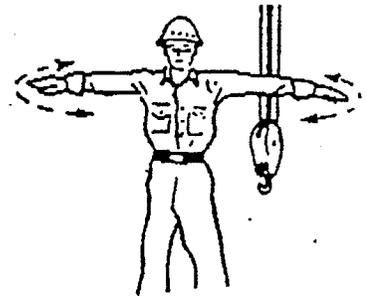
LOWER THE BOOM AND  
RAISE THE LOAD



SWING



STOP



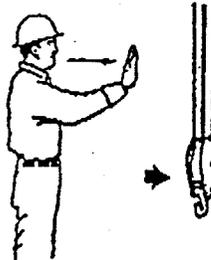
EMERGENCY STOP



EXTEND BOOM



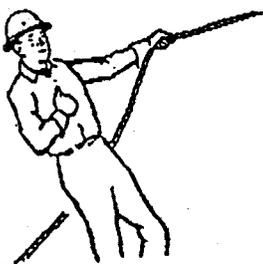
DOG EVERYTHING



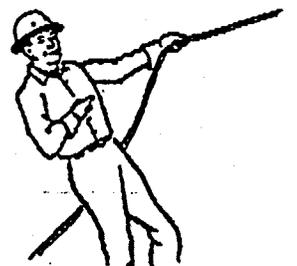
TRAVEL



RETRACT BOOM



EXTEND BOOM  
(ONE HAND)

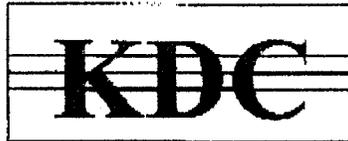


RETRACT BOOM  
(ONE HAND)

# HAND SIGNALS:



## Anthony Crane Rental



PIPE & STEEL, INC.

LETTER OF COMPLIANCE

July 21, 1999

Specialized Services Co.  
2001 W. North Lane  
Phoenix, AZ. 85021

Via Fax: (602) 997.4811

RE: 240'-24" OD x710 W STEEL Pipe

To whom it may concern,

Per your purchase order #7133, the above referenced material will meet or exceed API- 5LX60 specifications.

If you require any further information please contact the undersigned.

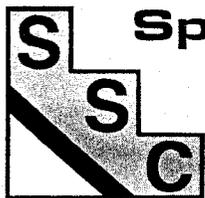
Very truly yours,

A handwritten signature in black ink, appearing to read "A. Bowers", with a long horizontal line extending to the right.

Andy Bowers  
General Manager

AB:ng

14561 Merrill Ave., Fontana, CA 92335 • Tel: (909) 350-4477 • (800) 950-4055 • Fax (909) 350-4800  
4501 W. Waltann Ln., Glendale, AZ 85306 • Tel: (602) 439-0396 • (800) 947-0396 • Fax: (602) 439-0398



## Specialized Services Co.

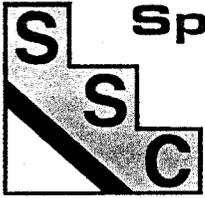
2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

July 29, 1999

### Superintendent's Qualifications

The Superintendent for the Adobe Dam Bore will be Arvid Veidmark. Arvid Veidmark has been with Specialized Services Company for thirty-one years. The past eight years he has been involved with pipe bursting in the horizontal boring industry.

In 1993 and 1994 Arvid Veidmark was involved with installing three thousand four hundred feet of 12" steel casing for ADOT throughout the Central Phoenix Corridor. Soil conditions for all areas of work where the Pipe Ramming were performed were rock, cobbles and sand dirt. Since that time he has done miscellaneous bores via the pipe ramming method ranging in size from 12" to 26". Please see Exhibit 16 for a detailed list of four additional jobs.



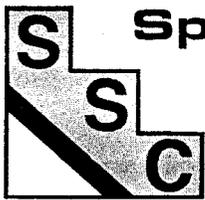
# Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

July 29, 1999

## Operator on the Job

The Operator on the Adobe Dam job will be Aaron Veidmark. Aaron has been with Specialized Services Company for twelve years. During this time he has performed Pipe Ramming operations on the ADOT job in the Central Phoenix Corridor (three thousand four hundred feet of 12" steel casing) and worked on all four jobs listed on Exhibit 16.



**Specialized Services Co.**

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

July 30, 1999

## **PIPE RAMMING TECHNICAL SUPPORT**

Rick Melvin will join Specialized Services Company for the Ramming Operation at Adobe Dam. Rick Melvin was employed by Specialized Services Company from 1985 thru 1995 and was involved with Ramming casing on various jobs throughout the valley.

In 1995 Rick Melvin left employment at Specialized Services Company to go work for TT Technology Inc as a Training and Demonstration Technician. He will be on hand during this job to offer technical assistance related to the operation of the ITT Goliath Grundoram. Attached is some information provided by TT Technology regarding his work experience.



## **TT TECHNOLOGIES, Inc.**

*"Leaders in Trenchless Technology"*

Rick Melvin joined T.T. Technologies, Inc. in 1995, and since that time has gained invaluable knowledge and experience in the piercing tool, pipe ramming, and pipe bursting industry. His past work history includes a four-year military career, plus ten years of working for various contractors throughout the Rocky Mountain States. During this ten-year period, Rick gained a vast wealth of information and actual hands-on training in performing jacks, bores, and tunneling projects, along with main line and residential water and sewer installations.

Since becoming a product specialist for T.T. Technologies, Inc., he has continued to develop his skills in directional drilling, pipe bursting, and pipe ramming, and have been involved in numerous projects throughout the United States. Rick's natural abilities, combined with a sincere work ethic and positive attitude, make him a highly respected product specialist at T.T. Technologies, Inc.

### WORK EXPERIENCE

#### PIPE RAMMING

- 48" X 90' / 3 Bores Totaling 270 Ft. McAlister, OK
- 48" X 90' Newark, NJ
- 42" X 120' Middletown, NJ
- 36" X 305' One Bore Park City, UT
- 24" X 250' One Bore Mosis Lake, WA
- 24" X 120' Hilo, HI
- 24" X 140' Grand Rapids, MI
- 20" X 60' Grand Rapids, MI
- 30" X 60' St. Simon Island, GA
- 20" X 60' / 2 Bores Totaling 120' Roanoke, VA
- 20" X 140' / 2 Bores Totaling 280' Utah
- 30" X 140' Steamboat Springs, CO
- 30" X 160' Steamboat Springs, CO
- 30" X 160' Steamboat Springs, CO



Page 1 of 2

## TT TECHNOLOGIES, Inc.

*"Leaders in Trenchless Technology"*

### WORK EXPERIENCE

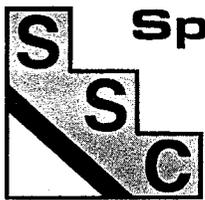
#### PIPE RAMMING

- 48" x 90' / 3 Bores Totalling 270 Ft.	McAlister, OK
- 48" x 90'	Newark, NJ
- 42" x 120'	Middletown, NJ
- 36" x 305' One Bore	Park City, UT
- 24" x 250' One Bore	Mosis Lake, WA
- 24" x 120'	Hilo, HI
- 24" x 140'	Grand Rapids, MI
- 20" x 60'	Grand Rapids, MI
- 30" x 60'	St. Simon Island, GA
- 20" x 60' 2 Bores Totalling 120'	Roanoke, VA
- 20" x 140' 2 Bores Totalling 280'	UT
- 30" x 140'	Steamboat Springs, CO
- 30" x 160'	Steamboat Springs, CO
- 30" x 160'	Steamboat Springs, CO



2020 East New York Street • Aurora, IL 60504  
 630-851-8200 • 800-533-2078 • FAX 630-851-8299  
<http://www.tttechnologies.com>





**Specialized Services Co.**

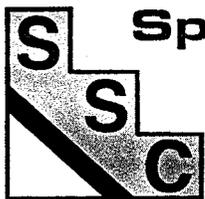
2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

**EMERGENCY CONTACTS  
PHONE NUMBERS**

<b>SUPERINTENDENT</b>	Arvid Veidmark	997-6164 (ofc) 725-4040 (mbl) 587-0888 (hme)
-----------------------	----------------	--

<b>OPERATOR</b>	Aaron Veidmark	997-6164 (ofc) 725-4040 (mbl) 938-2818 (hme)
-----------------	----------------	--

<b>ESTIMATOR</b>	J.R. Veidmark, III	997-6164 (ofc) 725-4041 (mbl) 942-2909 (hme)
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# Specialized Services Co.

2001 W. North Lane, Phoenix, AZ 85021  
(602) 997-6164 FAX (602) 997-4811

Exhibit #16

## List of Experience

### Specialized Services Company

2001 West North Lane  
Phoenix, AZ 85021

### PIPE RAMMING

- 01/30/99 Valley Crest, Tony (602)692-6891, Loop 202 & Alma School Rd.  
Pipe ram 12" steel casing for 75 linear feet.
- 11/25/97 Pauly Construction, Joe Perrin (623)581-1800, 7th Ave. & Beardsley  
Pipe ram 26" steel casing for 80 lf casing under concrete box culvert.
- 08/14/96 Wickenberg Properties, Myron Deilbel (520)684-3866. Hwy 93 and Rose  
Lane, Wickenberg. Pipe ram 24" casing for 87 linear feet.
- 08/22/95 Pauley Construction, Joe Perrin (623)581-1800, Priest south of 23rd Street.  
Pipe ram 12" steel casing for 36 linear feet

#8/qawin/letters/exp Updated 7/99

# August 1999

## Proposed Schedule for Adobe Dam Bore

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday																																																																																																		
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# **Swengel-Robbins**

## **SAFETY POLICY AND PROCEDURES MANUAL**

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## GENERAL STATEMENT OF POLICY

To Our Employees:

Swengel-Robbins has a direct responsibility in providing all reasonable safeguards for employee health and safety. We also have a responsibility to direct and insure that employees perform their assigned tasks in a safe working manner. Most of all, we have a responsibility to develop a safety awareness in our people.

We have instituted a formal safety and health program which, with your help, will succeed in providing safe, healthy, and pleasant working conditions.

Everyone stands to benefit. The cooperation of all the employees in our organization is expected. The results will be worth the effort.

### OBJECTIVES OF INJURY / ILLNESS PREVENTION PROGRAM

It is the objective of Swengel-Robbins to implement an effective Injury & Illness Prevention Program to minimize injury and suffering to our employees, promote maximum efficiency of operations throughout the company, and to conserve expenses associated with unsafe working conditions and practices.

Our overall objective will be successfully achieved by initiation and continued observance of the following:

1. Planning all work to minimize personal injury, property damage, and loss of production time.
2. Maintenance of a system for prompt detection and correction of faulty procedures, unsafe practices and conditions.
3. Making available and enforcing the use of personal protective equipment and all necessary mechanical guards.
4. Establishing an effective system of tool, equipment and facility inspection and maintenance.
5. Institution of an education program to maintain interest and cooperation of all levels of employment through:
  - a) Investigation of all accidents to determine the cause and initiate prompt corrective action.

## OBJECTIVES OF INJURY / ILLNESS PREVENTION PROGRAM

- b) Regularly scheduled General Safety Meetings & Weekly Tool Box Safety Meetings.
- c) Place the Swengel-Robbins Safety Manual and MSDS Log Book at each job site and enforce minimum safety requirements for all job procedures.
- d) Use Safety bulletins, posters, and other appropriate visual aids.

## RESPONSIBILITY FOR SAFETY

The safety and health of all employees of Swengel-Robbins is of primary importance. The prevention of work-related injuries and illnesses is of such consequences that it should be given precedence over operating productivity.

Swengel-Robbins pledges to work diligently and conscientiously in the elimination of unsafe and unhealthful acts.

It is the company's intent always to maintain an effective program for guarding against injury and illness. To be successful, proper attitudes toward accident prevention on everyone's part is required. Success in all safety and health matters also depends upon cooperation among management, all employees, and also between each employee and fellow workers. Only through such cooperation can a safe environment, which is in the best interest of all, be established and preserved.

### SWENGEL-ROBBINS SHALL:

1. Establish a comprehensive safety and health program.
2. Designate Ken Swengel, President as Safety Director to administer program.
3. Fully comply with all safety and health laws, rules and regulations.
4. Conduct periodic safety and health inspections to identify and eliminate unsafe and unhealthful working conditions and/or practices.

## RESPONSIBILITY FOR SAFETY

5. Investigate promptly and thoroughly every accident to determine the cause and appropriate corrective action to prevent recurrence.
6. Provide and enforce the use of appropriate personal protective equipment.
7. Provide continuing safety training and education for all personnel.

## MANAGEMENT RESPONSIBILITY

Management has the following responsibilities under the Swengel-Robbins Safety Program and Injury/Illness Prevention Program.

1. Legally to comply with the **Occupational Safety and Health Act (OSHACT)** in accordance with the **Arizona Division of Occupational Safety and Health (ADOSH)**, both under the General Duty Clause and all applicable regulations, as well as to comply with all other applicable State and local regulations covering our activities.
2. To be familiar with all applicable legal regulations related to employee safety and notify our affected key employees of their regulations.
3. To develop and implement safety rules designated for the protection of our employees and facilities.
4. Demonstrate a positive attitude and set the example for accident prevention.
5. To develop company safety policies and activities for implementation.
6. To provide a company Safety Manual to each employee.
7. To monitor the overall accident prevention activities.
8. To keep the staff informed as to the overall impact of accidents upon our company.

## SUPERVISOR RESPONSIBILITY

Supervisors are defined in this manual as those who supervisor or direct other employees. They include supervisors, lead persons and foreman. Supervisors shall:

1. Be held accountable for all accidents on their job or under their supervision.
2. Set the proper example for workers to follow. If you violate a company safety rule, then how can you expect those that you supervise to follow the rules?
3. Be responsible at all times to see that work is performed in a safe manner and that safety rules, regulations and instructions are complied with. Good supervision is the art of getting our people to do safe and productive work.
4. Take disciplinary action when necessary to enforce safety rules and practices.
5. Be responsible for orientating new employees on safety aspects of the job and the proper method of doing the job. Nothing can take the place of persistence in trying to keep someone from being hurt. The Safety Policy and Prevention Manual should be given to each employee.
6. Be responsible for the inspection of the work areas and all equipment. Supervisors shall give prompt attention to needed repairs and to safety suggestions.
7. Not permit the use of intoxicating beverages on the job or allow any employee on the job under the influence of alcohol, drugs or barbiturates.
8. Be responsible to see that all personal injury accidents and property damage accidents are investigated and reported to the office.
9. Determine that needed first-aid, safety equipment, and protective devices are provided wherever necessary.
10. Take prompt corrective action wherever unsafe conditions and unsafe acts are noted or reported.
11. See that emergency first-aid and hospital phone numbers are readily available at each location.

## EMPLOYEE RESPONSIBILITY

Swengel-Robbins expects each employee, regardless of his/her position with the organization, to cooperate in every respect with the company's Safety Policy and Procedures Manual. Our safety program requires that:

1. All injuries and accidents are reported immediately to your supervisor and to obtain medical aid without delay.
2. Personal protective equipment, where required, must be worn by all employees. There will be no exceptions to this requirement.
3. Machine guards will be used and maintained in good condition.
4. Machines without adequate guards or guards in questionable condition will not be used.
5. Hazardous conditions and other safety concerns must be reported immediately to your supervisor.
6. The employee will follow all company safety rules. Failure to follow the rules will result in disciplinary action and possible termination.

## SAFETY INSPECTION

Formal periodic safety inspections are an important part of an accident prevention program. Safety inspections are a formal review of the work environment conducted to identify physical conditions or employee actions that may result in employee injuries or illness. The desired result is to make changes in the work environment or employee behavior prior to an accident occurring.

The inspection process provides a means to review the work process performed by the employees to determine if the workers are following the safety requirements of their work.

Inspections are performed to assist in the effective control of loss producing activity. The more likelihood of a severe injury occurring or probability of a high frequency of minor injuries occurring would require a higher frequency of inspection.

When the inspection process identifies substandard items, corrective action must be forthcoming or the credibility of the safety effort may come into questions.

## **SAFETY INSPECTION**

Inspections allow for the general review of operations to determine the effectiveness of the overall safety program. High number of substandard conditions or practices may be symptomatic of the need for management action.

**Safety inspections will be performed periodically at each job location to insure safe working conditions are maintained.**

## **HAZARD ABATEMENT PROCEDURE**

Managers, supervisors, and employees will report any hazardous conditions or activities noted as a result of the safety inspections, or during daily routine operations to the job site superintendent.

The appropriate action will be taken by the supervisor in charge to address any noted hazardous activities. This action will be documented on the individual employee's personnel record.

## **ACCIDENT INVESTIGATION**

Accident investigation is a systematic method for collecting factual information that makes it possible to accurately reconstruct the accident and determine the underlying reasons for the cause of the accident. The investigation is fact finding, not fault finding. Once the primary causes for the accident have been determined, preventative measures can be identified and effectively instituted.

Each supervisor has a prominent role in conducting an accident investigation. The responsibility for conducting an accident investigation includes collecting the facts, determining the sequence of events that resulted in the accident, identifying action to prevent recurrence, and providing follow-up to ensure that corrective action was effective.

All accidents should be investigated promptly regardless of their severity. Promptness of the investigation is essential since conditions at the accident scene change.

Witnesses are more likely to relate circumstances as they were, without the added conjecture that comes late from discussions of the accident with other employees. Promptness in checking the scene assures employees that management is highly concerned for their well being. The type of investigation depends on the nature and magnitude of the accident.

Each supervisor shall promptly investigate, thoroughly analyze, and report all accidents involving personal injury and/or property damage or the potential therefor to the Safety Director.

## ACCIDENT INVESTIGATION

Accident investigation reports shall be submitted to the Safety Director within 24 hours of the first notice to the supervisor.

To get the facts, the investigator must determine:

1. Accident description; vehicle, equipment, employee
2. Cause; unsatisfactory performance or unsatisfactory conditions
3. The reason the cause exists
4. Preventive measures planned or taken to prevent recurrence of the accident

In most instances, supervisor actions prior to an accident have prevented the accident. Some of the prior actions are:

1. Proper training of personnel
2. Hazard identification and communication
3. Pre-planning of jobs; especially non-routine jobs.
4. Involvement by supervisors to the point where they are aware of what and how the job is being performed.
5. Changes in standard operating procedure
6. Improved supervision
7. Enforcement
8. Follow up

## ACCIDENT INVESTIGATION PROCEDURE

The supervisor in charge will investigate each industrial injury.

The accident investigation reports shall be submitted to the Safety Director. Appropriate recommendations for policy changes will be made as necessary.

## **BASIC RULES FOR ACCIDENT INVESTIGATION**

1. The purpose of an investigation is to find the cause of an accident and prevent further occurrences, not to fix the blame. An unbiased approach is necessary to obtain objective findings.
2. Visit the accident scene as soon as possible while the facts are fresh and before witnesses forget important details.
3. If possible, interview the injured worker at the scene of the accident and "walk" him or her through a re-enactment.
4. All interviews should be conducted as privately as possible. Interview witnesses one at a time. Talk with anyone who has knowledge of the accident, even if they did not actually witness it.
5. Consider taking signed statements in cases where facts are unclear or there is element of controversy.
6. Document details graphically. Use sketchers, diagrams, and photos as needed, and take measurements when appropriate.
7. Focus on causes and hazards. Develop an analysis of what happened, how it happened, and how it could have been prevented. Determine what caused the accident itself, not just the injury.
8. If a third party or defective product contributed to the accident, save any evidence. It could be critical to the recovery of claims costs.

## **RECORD KEEPING**

Records will be kept of all the above safety activities, and this will include:

1. Initial training and evaluation.
2. Safety meetings.
3. Accident investigations.
4. Employee and employer claim forms.
5. Inspections performed in-house and any performed by outside Federal, State, County, or City agencies.
6. Disciplinary actions.

## RECORD KEEPING

7. OSHA required records (Form 200, medical exposure records, and injury reports).
8. CPR/First aid training.

The Safety Director will maintain a copy of the above records

## CORRECTIVE ACTION

When it becomes necessary, Swengel-Robbins reserves the right to discipline employees who knowingly violate company safety rules or policies. Disciplinary measures will include but not be limited to:

1. Verbal warning for minor offenses.
2. TERMINATION of any employees who continue to jeopardize their own safety, and the safety of others.

## CODE OF SAFE WORK PRACTICES SAFETY RULES SECTION

1. GENERAL SAFETY
  - a) Be alert for unsafe work methods or unsafe conditions. Either correct them or report them to your supervisor immediately
  - b) Report every injury immediately, whether serious or not, to your supervisor.
  - c) Drinking alcohol or taking narcotics are habit-forming drugs in any form just before or during work hours is not permitted.
  - d) Horseplay, practical jokes and sparring cause accidents and are not permitted.
  - e) Obey warning tags and signs. They are posted to alert you to hazards.
  - f) Do not block fire fighting equipment, fire doors, exits, or stretchers with any material or equipment.

## 1. GENERAL SAFETY

- g) Obey all smoking rules. (Smoking is permitted in designated areas only.)

## 2. HOUSEKEEPING

Good housekeeping practices improve the working environment, improve morale and reduce accidents. Accidents can be avoided when everyone practices good housekeeping.

- a) Keep your working environment clean and in order at all times. Put things where they belong when you have finished with them.
- b) Do not place material or equipment in aisles, corridors, or in front of exits. Tools, equipment and chemicals shall be stored in designated spaces when not in use.
- c) Do not place or stack material or equipment in such a manner that they constitute a falling hazard.
- d) Do not drop cigarettes or matches on the floor. Use the proper containers provided for that purpose.
- e) Put paper, styro-foam cups and other waste materials in trash containers.
- f) If anything is spilled in the work area, it should be cleaned up as soon as possible after it has been determined if the spilled substance is not hazardous. If it is hazardous call your supervisor.

## 3. SLIP AND FALLS

- a) Wear safe, strong shoes, which are in good repair.
- b) Watch where you step. Be sure your footing is secure.
- c) Don't get in an awkward position. Keep control of your movements at all times.
- d) Pick up litter. Don't let tripping hazards exist.
- e) Install cables, extension cords, and hoses so they don't trip you.

### 3. SLIP AND FALLS

- f) If you must climb to reach something, use a sound ladder, set in properly secured top and bottom positions.
- g) When climbing, face the ladder and use both hands.
- h) When reaching from a ladder, keep your shoulder inside the vertical stringer. If you must reach further than this, move the ladder first.
- i) Walk, don't run.

### 4. MATERIAL HANDLING

Material handling is a job everyone does. It is easier and faster to do it the safe way, why do it the hard way? The following safe practices will help you.

- a) Don't move it twice if once will do. Plan your work!
- b) Don't try to lift objects, which may be beyond your physical capacity and training. Get help or use a machine or hand truck.
- c) Use gloves, aprons or pads when handling materials, which are rough, sharp, hot, or cold, or which are covered with hazardous substances.
- d) When moving a load, be sure you can see where you are going. Check for obstructions or tripping hazards in the direction you will be moving.
- e) When carrying long objects like pipe or lumber, keep the leading end just above head height.
- f) When lifting heavy objects from the floor, kneel on one knee, roll or tip the object onto the other knee, then pull the load next to your stomach and stand up. Use the reverse procedure to set a load down. Your back is not made of steel.
- g) Pile material on a strong, level base. Interlock so the pile won't come apart. Chock pipe so it can't roll.

## 5. FIRE PREVENTION SAFETY

One of the most common and serious emergencies anyone faces is fire. Regardless of how a fire starts, it can destroy an entire facility and endanger the lives of numerous employees. Therefore, you must know what to do in all emergencies involving fire.

- a) Fire fighting equipment and emergency exits must be kept clear and ready for immediate use. Do not block them with equipment or material. All personnel should be familiar with the position of fire fighting equipment
- b) Know where your primary exit route is, and what alternative emergency routes are available. Always use the closest emergency door to exit when evacuating the building.
- c) Observe all "No Smoking" signs.
- d) Makes sure that flammable liquids and vapors are not exposed to ignition sources. All flammable liquids must be dispensed from and transported in approved containers. Glass containers are expressly forbidden.
- e) Report all fires, not matter how small to your Supervisor.
- f) Immediate response to small fires is essential if we are to keep them from growing into large fires.
- g) If a fire occurs, the first consideration must be the safety of personnel. All employees must be evacuated in the immediate area then attention can be given to the saving of property. Notify your Supervisor as soon as soon as possible.
- h) Swengel-Robbins provides instruction and training on the use of fire extinguisher and evacuation procedures.
- i) Learn how to use the extinguisher in your area (frequently read the instructions label on extinguisher) and know where they are located. If you are not sure, ask your supervisor.

## 6. FIRST AID AND MEDICAL

- a) Report all accidents to your supervisor even those where no one is injured because some could in the future unless steps are taken to correct the factors which can contribute to the accident. If you injure yourself in any way at work, have treatment for even small cuts, scratches or burns. They can be painful and become infected if not given first aid treatment right away. Your supervisor must complete an accident report even if you do not require medical care.
- b) Employees must clear through their supervisors and/or Personnel:
  - 1. When leaving work prior to the end of the working day for illness or injury.
  - 2. When returning from any absence due to occupational illness or injury.
  - 3. When returning from any absence due to non-occupational illness or three days or more. A release from the treating physician may be required.
  - 4. When wearing a bandage or dressing which **obscures** vision.
  - 5. When wearing a cast or splint; using a cane or crutch.
- c) Be sure to notify Personnel of any change in your name or address. This is important in order to maintain necessary contact with you and your family.
- d) In case of accident or sickness or inability to report to work, phone the office at 268-1724 before 8:00 a.m. Three days without notification is grounds for termination of employment.

## 7. EMERGENCY EVACUATION PROCEDURES

In the event of fire, earthquake or any other emergency, it may be necessary to quickly evacuate the building in a safe and orderly manner.

## 7. EMERGENCY EVACUATION PROCEDURES

The evacuation procedure to be followed by all personnel under these circumstances is:

- a) The instruction to evacuate the building will be given by individual department supervisors.
- b) Immediately stop work, switch off equipment and leave the building by the nearest emergency exit. All exits have illuminated signs and are shown on the building diagram.
- c) Once outside the building you should proceed to the parking lot of the building and report to your supervisor.
- d) Supervisors will check that all their staff is clear of the building.
- e) Under no circumstances shall you leave the vicinity of the building without reporting to your supervisor since it may be considered you are trapped within the building.
- f) If there is a person missing the supervisor will report this information to the facility manager who will relay this information to the appropriate emergency response agency representative.
- g) Under no circumstances will personnel be permitted to re-enter the building until a safety clearance has been obtained from the facility manager.
- h) All employees shall follow the directions of the facility manager. They are there to protect your safety and to handle emergencies. They are specially trained to deal with all emergencies. Any refusal to follow directions or insubordination will be dually reported and disciplinary action will be taken.

## 8. PERSONAL PROTECTIVE EQUIPMENT AND PERSONAL HYGIENE

Protective equipment such as safety glasses, gloves, aprons, face shields and hearing protectors are provided by Swengel-Robbins if you require any protective equipment ask your Supervisor and he will provide it for you.

## 8. PERSONAL PROTECTIVE EQUIPMENT AND PERSONAL HYGIENE

- a) This equipment shall be used whenever it is necessary by reason of the hazards of the environment.
- b) Personal protective equipment must be carefully checked each time before wearing to assure its integrity to provide protection which it is designed.
- c) Protective equipment must be worn where required. Your supervisor will advise you as to what equipment is necessary for a particular job.
- d) Always wear protective clothing when working with chemicals. Clothing which has become contaminated must be removed immediately.
- e) Avoid handling chemicals or immersing your hands in chemical solutions without wearing rubber gloves.
- f) A welders helmet or goggles with the correct tint to protect the eyes from ultraviolet or infrared radiation shall be worn when welding.
- g) If you are cut or if you receive a puncture wound from a fish spine, personal hygiene becomes extremely important. Always keep cuts and puncture wounds clean to avoid unnecessary infections. Report any such minor injuries to your supervisor.
- h) If skin contact with chemicals occur, immediately rinse the exposed area with running water. The important factor is always to remove chemical material as quickly as possible.
- i) Employees must not clean their hands by washing in oils or solvents. Soap and water is the best and safest to use.
- j) Wash hands after using any chemicals or solvents and before smoking, eating or contacting sensitive body areas such as eyes to prevent contamination.
- k) Sun glasses and regular prescription glasses do not afford the same protection as safety glasses; therefore, employees will be required to wear safety glasses in all areas, which require their use.
- l) Contact lenses increase the danger of eye damage when used in areas of potential eye injury. Contact lenses shall not be worn in any area where chemicals are used.

## 8. PERSONAL PROTECTIVE EQUIPMENT AND PERSONAL HYGIENE

- m) Wear appropriate clothing for the work that you do.
- n) Appropriate footwear shall be worn. No high heeled shoes or slippery soled shoes should be worn.

## 9. ELECTRICAL SAFETY

The attitudes and habits of workers relating to electricity and the precautions they routinely take are extremely important. The following guidelines will reduce the hazards of working with and around electrical equipment.

- a) Only competent and responsible people may work on electrical equipment.
- b) While working on electrical equipment, clothing and jewelry, which could create a hazard, should be removed. Personal protection devices such as face shields, safety glasses, insulating gloves and mats should be used when necessary.
- c) All repairs and test must be made with the equipment in a de-energized state employing good lockout procedures. Only those workers who placed the lockout or tagout should remove them before energizing the circuit. (See lockout/tagout procedures)
- d) Work on equipment with interlock defeated or barriers removed and equipment fully energized is not permitted.
- e) All cases of electrical shock must be reported to Job site Supervisor.
- f) Energized and unshielded soldering irons, hot plates, coffee pots and similar fire hazards must not be left unattended.
- g) All electrical control panels, witch panels and circuit breaker panels must be kept free of obstruction and remain easily accessible at all times.
- h) All portable/stationary power tools shall be grounded during use and shall be equipped with a 3-pronged plug.
- i) Permanent extension cords cannot be used as an alternative to permanent wiring.

## 9. ELECTRICAL SAFETY

- j) Do not use metal ladders when working on electrical installations or equipment.
- k) If it is necessary to leave equipment running after hours, written instructions shall be available on the equipment so that it may be switched off safely in case of emergency.
- l) When in doubt always check to insure that the power is turned off or the unit is unplugged and has adequate time to discharge any storage devices. When working with high voltage always work with one hand behind your back or in your pocket.
- m) No one should work around any high voltage or where they could be subjected to an electrical shock when they are alone in the building or if no one knows that they are working around those conditions. Have someone check on you every 15 minutes so they can check on you to insure that you are okay, or work in pairs.

## 10. MACHINERY/MECHANICAL SAFETY

A hazardous piece of machinery, unguarded, will eventually injure someone.

- a) Use machinery only when you have been authorized to do so and when you have received safety instructions
- b) Do not operate any machine without its guards being properly in place.
- c) If you see an unguarded machine, report it at once.
- d) A safe guard covers all moving parts and is designed to permit safe lubrication and adjustment without removing the guard.
- e) If it is necessary to remove the guard, stop the machine and either lock the switch or tag it so another worker will not inadvertently start the machine.

## 11. HAND TOOLS

- a) Cutting tools must be dressed at the proper angle and kept sharp. Keep them in a scabbard, not your pocket. Store them in a safe place.
- b) The heads of striking tools must be dressed square (with a few exceptions) and without burrs.
- c) Use the right kind of tool. Use the right sized tool.
- d) Hold screwdrivers, wrenches, chisels, etc., in such a way that if there is a slip or a miss, you will not be hurt.
- e) Do not use a file without a handle.
- f) The proper tool for the job in the hands of a craftsman does not require a lot of muscle power.

## 12. PORTABLE POWER TOOLS

- a) Every electric power tool must be electrically grounded before it can be used.
- b) Check the insulation on the wires and the condition of plugs and sockets every day. If they are frayed, worn, cut or broken, repair them before using.
- c) String temporary extension cords and power lines so they will not create a tripping hazard and so they are protected from physical damage.
- d) Before using a drill on a wall, floor or ceiling be sure electrical wires, gas lines and high pressure lines are not in the way.
- e) Skill saws shall not be used without the guard in safe working conditions. Do not pin the guard back.
- f) Do not use "cartridge" tools for driving nails or spikes in walls, ceiling or floors when people are working on the other side.

### 13. COMPRESSED GAS CYLINDERS

Compressed gas cylinders may be handled only by personnel who have been instructed by their supervisors and fully understand the hazards involved. The following guidelines are designed for routine, daily practice.

- a) Cylinders shall be secured with a heavy chain to a work bench, wall or other stationary object, so as to prevent falling or rolling. Never drop cylinders or allow them to strike each other.
- b) The valve protection cap shall be kept securely in place whenever the cylinder is not connected for use.
- c) Cylinders shall not be transported by hand. Use an appropriate handcart to transport them with the valve protection cap in position.
- d) Empty and full cylinders should be stored separately and correctly secured in the storage rack.
- e) There are many different types of gas regulators, each designed for a specific use and specific gas. Do not interchange fittings on regulators in an effort to adapt it to gases, which it is not designed to handle.
- f) Do not attempt to bypass the regulator when discharging gas.
- g) Do not use adapters to connect regulators to gas cylinders.
- h) Always open cylinder valves slowly.
- i) Always turn off valve when not in use.

### 14. OFFICE SAFETY

Although the office environment is generally considered to be a safe area, serious accident can occur if safety rules are not followed.

- a) Never leave desk, file or cabinet drawers open since they can create a tripping or bumping hazard.

#### 14. OFFICE SAFETY

- b) Never open more than one drawer at a time in a file cabinet. If it is necessary to keep books or other objects in a file cabinet, put them in the bottom drawers.
- c) Do not extend electrical cord, telephone and equipment cables across aisles or walkways where they create tripping hazards.
- d) Do not use extension cords to power equipment, request permanent plugs to be installed where needed.
- e) Do not climb on chairs, up-turned wastepaper baskets, or other improvised hazardous supported.
- f) Do not attempt to repair any electrical equipment. Report faults to your supervisor or maintenance.
- g) Do not store materials on top of filing cabinets and open shelf units where they are likely to fall and injure someone.
- h) No smoking is permitted in restrooms or production areas. No smoking is allowed in open office areas without the permission of fellow workers. In areas where smoking is permitted, if you smoke, be courteous to others and have adequate ashtrays; do not dump materials in waste baskets or on the floor.

#### 15. MOTORIZED VEHICLES

- a) Only authorized employees will operate company vehicles, including autos, trucks, forklifts, and other equipment requiring a driver.
- b) All drivers shall possess a valid Driver's License where necessary.
- c) Drivers required to have special class licenses shall possess these endorsements.
- d) Any driver known to be under the influence of drugs or intoxicating substances is subject to immediate termination.

## 15. MOTORIZED VEHICLES

- e) Passengers are forbidden to ride on vehicles, which are not equipped with seats for passengers.
- f) Do not get on or off a vehicle while it is in motion -- even slow motion.
- g) Overloading a vehicle with passengers or materials is forbidden.
- h) All vehicles will be maintained in a safe operating condition. It is the responsibility of the driver to report any defective conditions immediately.
- i) No vehicle shall be driven in a fast or reckless manner. The maximum speed any vehicle shall be driven at any time shall be such that the driver can stop the vehicle within the clear unobstructed distance ahead of him giving due regard for possible unforeseen obstructions and the condition of the road surface and the vehicle.
- j) All vehicle accidents, whether involving injury or not, shall be reported to your supervisor.

## 16. FORKLIFTS/BACKHOES/LOADERS – SAFETY RULES

- a) Proper operating rules and signals will be observed when hoisting equipment or materials.
- b) Employees shall keep clear of suspended loads, traffic areas, or other possible hazardous areas.
- c) It is the responsibility of all Supervisors to ensure the safety of all employees with above-average attention during hoisting operations. If unsafe practices are observed, it is imperative that immediate action be taken; including notification to job superintendent, general superintendent, & Safety Director.
- d) Due to severity of an accident if one should occur, it is highly recommended that the Supervisor take any and all precautions that are prudent, with weight give to the situation at hand.

## 16. FORKLIFTS/BACKHOES/LOADERS – SAFETY RULES

- e) Do not operate forklift/backhoe/loader unless certified to do so.
- f) Avoid hitting or lifting anything if it appears it could fall on the operator or a bystander. Equipment equipped with an overhead guard and load backrest extensions provides reasonable protection to the operator, but cannot protect against every possible impact.
- g) When lifting someone up, make sure that they are standing in the safety cage. Shut the motor off and set emergency brake while they are off the ground.
- h) Keep head, arms, legs, etc. inside the compartment.
- i) Keep yourself and all others clear of hoisting mechanism.
- j) Allow no one under load and carriage.
- k) Report damage or faulty operation immediately to a supervisor.
- l) Avoid bumps, holes, slick spots, and loose materials that may cause lift to swerve or tip.
- m) Be careful when driving near machinery or moving vehicles.
- n) Always drive at the mandatory 5 m.p.h. speed limit. **Riders are not permitted.**
- o) Do not fill fuel tank while engine is running.
- p) Avoid sudden stops or starts.
- q) Travel with forks or buckets close to, but not on, the ground. Point them slightly upward.
- r) Watch overhead clearances, especially top of boom.
- s) Observe the following load handling procedures:

## 16. FORKLIFTS/BACKHOES/LOADERS – SAFETY RULES

1. Handle loads within rated capacity of lift.
  2. Center weight of load between forks or in the bucket.
  3. Be extra careful with unstable loads.
  4. When staking materials make sure the stack is stable and will not fall on someone.
  5. Watch "swing" when handling long loads.
  6. Do not travel with load raised unless it is necessary to clear an obstruction.
  7. For better vision with bulky loads, travel in reverse, but always keep a proper lookout in the direction of travel.
- t) When driving, be on the lookout for people walking and other vehicles, especially when rounding corners.
- u) When taking materials off a pile, make sure materials does not get hung up on stack next to it; otherwise, it may fall off.
- v) When forklift/backhoe/loader is not in use, leave forks flat on ground.

## SAFETY COMMUNICATION

It is our company policy to maintain open communication between management and employee on matters pertaining to safety. Your thoughts regarding safety are considered important, and we encourage your active participation in our company safety program. Please feel free to express any of your concerns or suggestions during safety meetings to your supervisor. Be assured that all safety suggestions will be given serious consideration, and that each will receive a response.

Regular General Safety Meetings and Weekly Tool Box Safety Meetings will be held so that all employees have and opportunity to receive safety training and voice personal opinions regarding safety.

## SAFETY AND HEALTH TRAINING (NEW HIRES)

All new employees must undergo an initial orientation in order to be instructed in:

1. General company rules and policies.
2. Safe work procedures.

In addition, other work related education will be included in the orientation process.

## **SAFETY AND HEALTH TRAINING (NEW HIRES)**

The Safety Training Program for all new employees will consist of:

1. An initial training period that will include individual instruction on the safe use of equipment to be used and operated, accident reporting procedures, work site and all other miscellaneous safe work practices.
2. Routine reinforcement of safe performance of individual work assignments.
3. Proper use and care of required protective equipment such as gloves, boots, eye protection, hearing protection, etc.
4. Hazard communication when hazardous chemicals are to be used.
5. Hearing conservation when harmful noise levels exist.
6. Lock out/tag out procedures.
7. Safe lifting techniques.
8. Other specific safety information pertinent to the employees job.

## **SAFETY AND HEALTH TRAINING (EXISTING EMPLOYEES)**

The Safety Training Program is also intended to provide general and specific job safety training to existing company personnel. To insure that all employees receive appropriate job safety training, all company employees will participate in:

1. Scheduled General Safety Meetings and Weekly Tool Box Safety Meetings.
2. Additional training as job duties or work assignments are expanded or changed.
3. Defensive driving when company vehicles are to be used.

Further training will be provided whenever employees are exposed to new processes, machinery, chemicals, or when previously unrecognized hazards will have an effect on their safety and health.

The Safety Director will keep records of all the above training in the main office. An employee training record will be kept for all employees.

## **TOOL BOX MEETINGS**

Tool Box Safety Meetings will be conducted on a weekly basis, by the job supervisor. These meetings will be short (5 –10 minutes), and will cover 1-2 specific subjects. Tool Box Safety Meetings are required by OSHA in order to successfully communicate important information to employees, as well as promote safety awareness. All Tool Box Safety Meetings will be documented and submitted to the Safety Director.

## **ACKNOWLEDGEMENT**

After reading the forgoing information, please keep a copy of the Swengel-Robbins Inc. SAFETY MANUAL for reference and future use.

Also acknowledge receiving the SAFETY MANUAL by signing page 28 and returning it to your supervisor.

## HAZARD COMMUNICATION PROGRAM

Swengel-Robbins Inc. has developed a Hazard Communication Program to ensure that all employees stay safe and healthy. This Hazard Communication Program provides information about the hazardous materials present in the workplace. The information includes container labeling, Material Safety Data Sheets (MSDS) and employee training.

### A. CONTAINER LABELING

It is our policy that before use, each container of hazardous materials must possess a label with the following information:

1. Name of the contents
2. Appropriate hazard warnings
3. Name and address of the manufacturer

The job site supervisor will ensure that each container has a label with the appropriate information.

### B. MATERIAL SAFETY DATA SHEETS (MSDS)

Material Safety Data Sheets for each hazardous material to which all employees may be exposed are filed in the MSDS Log Book located in the job site tool shed.

The Safety Director, will review newly arriving data sheets for significant health and safety information and see that new information is passed on to the appropriate employees. The Safety Director will also check each new MSDS for completeness. If an MSDS is missing or incomplete a new MSDS will be requested from the manufacturer. OSHA will be notified if a complete MSDS is not received.

The Material Safety Data Sheets are available to all employees during regular working hours. If an MSDS is not available for a particular material, contact the job site supervisor.

### C. EMPLOYEE INFORMATION AND TRAINING

Employees will attend hazardous material health and safety training meetings.

The training will consist of separate modules or chapters that address the safe handling of hazardous materials. Safety posters are used to reinforce the training materials along with additional information to be provided by the instructor.

## HAZARD COMMUNICATION PROGRAM

### C. EMPLOYEE INFORMATION AND TRAINING (CONTINUED)

Collectively the training content will address the following areas:

1. The Employee's "Right to Know" Law
2. Product Labels and Material Safety Data Sheets
3. Handling Hazardous Materials Using Protective Equipment
4. Storage and Mixing of Hazardous Materials
5. Cleanup of Spills and Disposal
6. Exposure and First Aid Procedures
7. Fire and Explosion

It is important that all employees understand the training. If you have questions, please contact the job site superintendent.

### D. HAZARDOUS MATERIALS

Specific information for each hazardous material can be found on the Material Safety Data Sheets (MSDS) in the MSDS Log Book located at each job site.

The Safety Director is responsible for updating the Hazardous Materials Inventory Reference Chart and notifying the job site superintendent so he can make the employees aware of the new materials that will be using in the workplace.

### E. INFORMING CONTRACTORS

Swengel-Robbins Inc. will ensure that outside contractors are informed about the hazardous materials they may be exposed to and how to protect themselves from these materials while working in our workplace.

If you have questions about this plan, contact the job site supervisor. The Safety Director will make sure that the policies in this plan are carried out.

1. All Material Safety Data Sheets (MSDS) are available for your review. The information is kept in the job site tool shed.
2. You must be informed of the hazardous properties of all the chemicals you work with.
3. Read the label on the containers and follow the manufacturer's instructions to the letter.
4. Know what the first aid treatment is and be prepared to carry it out immediately if need be.

## HAZARD COMMUNICATION PROGRAM

### E. INFORMING CONTRACTORS (CONTINUED)

5. Store chemicals in a safe manner and in accordance with the manufacture's recommendations.
6. Keep containers closed when not in use.
7. Inspect containers and pipelines of corrosive materials at regular intervals. Report leaks immediately to your supervisors.
8. If using corrosive material, know where the closest shower and eye wash are located. Keep the emergency facilities unobstructed and in a working condition at all times.
9. Use goggles, gloves, masks, and other protective equipment as required.
10. Do not smoke, eat, or drink in areas where chemicals are used.
11. Use appropriate disposal methods for chemicals.

### F. ACKNOWLEDGEMENT

After reading the forgoing information, please keep a copy of the Swengel-Robbins Inc. HAZARD COMMUNICATION PROGRAM for reference and future use.

Also acknowledge receiving the HAZARD COMMUNICATION PROGRAM by signing page 4 and returning it to your supervisor.



**SWENGEL-ROBBINS**

837 East Southern Avenue  
Phoenix, Arizona 85040-3144  
(602) 268-1724

Fax (602) 276-9405

August 3, 1999

Coe & Van Loo Consultants, Inc.  
4550 N. 12<sup>th</sup> Street, Suite 2050  
Phoenix, Arizona 85253

File No.  
680(H1)0.1

Attention: Eric Laurin

Reference: **EMERGENCY TELEPHONE NUMBERS:**

1. Phil Molina - Project Superintendent  
Mobile Telephone Number: 315-0405  
Home Telephone Number: 730-0704
2. Steve Marsh - General Superintendent  
Mobile Telephone Number: 550-4152  
Home Telephone Number: 587-7496
3. Bob Robbins - Manager-Construction Operations  
Home Telephone Number: 492-0354  
Mobile Telephone Number: 697-3155
4. Butch Robbins - Vice President  
Mobile Telephone Number: 809-0033  
Home Telephone Number: 948-5721

**BARRICADES AND TRAFFIC CONTROL:**

1. Starlite Barricade & Sign  
Telephone Number: 252-8811



**SWENGEL-ROBBINS**

837 East Southern Avenue  
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August 3, 1999

Coe & Van Loo Consultants, Inc.  
4550 N. 12<sup>th</sup> Street, Suite 2050  
000(B)0.0  
Phoenix, Arizona 85253

File No.

Attention: Eric Laurin

Reference: Adobe Dam Crossing – Surface Water Diversion Plan

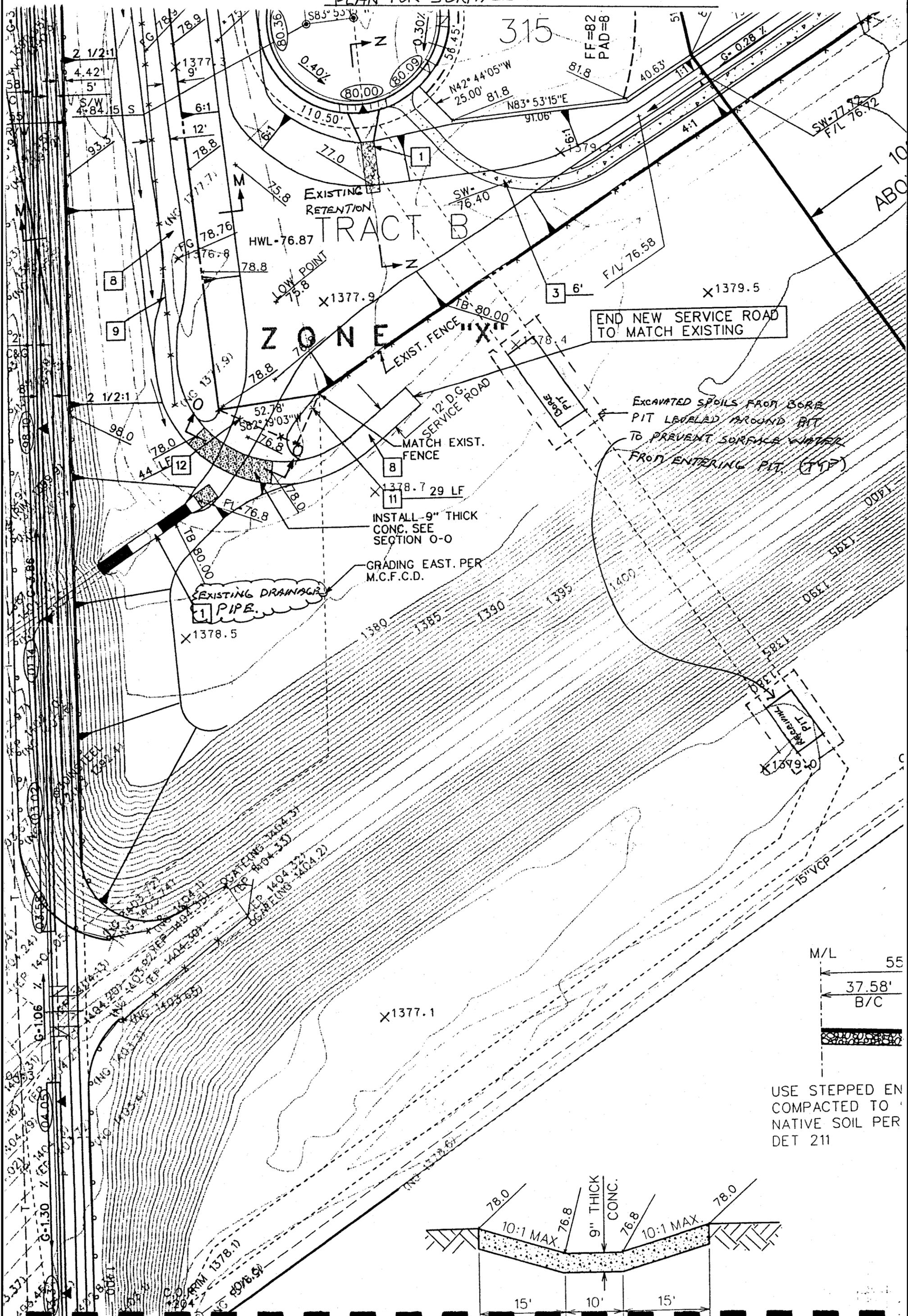
Please see that attached plan that details that existing conditions at the proposed dam crossing. We plan to utilize the existing retention basin that has been installed just to the North of the Bore Pit to collect any surface water that may occur during the project. The water is collected in the retention basin and then will flow out the South West End of the Retention Basin thru the existing drainage pipe. We also plan to elevate the area around the bore & receiving pits by placing the spoils around the pits and leveling them out to provide for a level working surface.

As discussed during the pre-job conference we have not found any groundwater on the project and do not anticipate that there will be any subsurface water to deal with on this project.

Respectfully  
SWENGEL-ROBBINS INC.

Robert E. Robbins III  
Manager-Construction Operations

PLAN FOR SURFACE WATER DIVERSION.



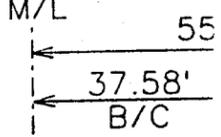
END NEW SERVICE ROAD TO MATCH EXISTING

EXCAVATED SPOILS FROM BORE PIT LEVELLED AROUND PIT TO PREVENT SURFACE WATER FROM ENTERING PIT. (TYP)

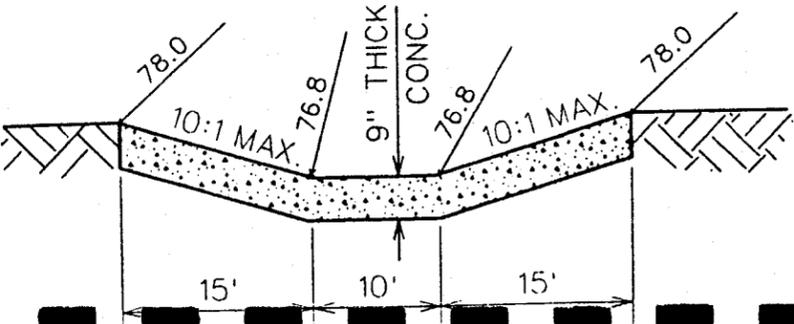
INSTALL-9" THICK CONC. SEE SECTION O-O

GRADING EAST PER M.C.F.C.D.

EXISTING DRAINAGE PIPE



USE STEPPED EN COMPACTED TO NATIVE SOIL PER DET 211



**PACIFIC STATES  
CAST IRON PIPE COMPANY**



DIVISION OF McWANE, INC.

P.O. BOX 1219, PROVO, UTAH 84603  
TELEPHONE (AREA CODE 801) 373-4910  
FAX (801) 377-0338

SOLD TO: US FILTER  
PHOENIX, AZ

August 2, 1999

SHIP TO: SWENGEL ROBBINS CONTR CO  
PHOENIX, AZ

SHIPPER #68837  
PO #0643653

This is to certify that the following material:

14 PCS 10" DI PIPE, CLASS 350, TJ, CERAMIC EPOXY LINED

was manufactured, tested and inspected in accordance with the following specifications and meets all the requirements thereof:

- a. ANSI/AWWA C151/A21.51-81 for ductile iron pipe
- b. ANSI/AWWA C111/A21.11-85 for tyton and mechanical joints
- c. ANSI/AWWA C104 (A21.4-81) for seal coating

All ductile iron pipe has a Protecto 401 Ceramic Epoxy (or coal tar epoxy, as appropriate) interior lining of 40 mils (35 mils minimum) in the barrel area, 10 mils minimum in the bell area and 10 mils minimum on the exterior of the spigot end.

Each piece of pipe has been checked for holidays utilizing a testing voltage of 2500 volts with a dry conductive probe in the barrel area and a testing voltage of 67 1/2 volts with a wet sponge in both the bell area and the exterior of the spigot end, and no holidays were found.

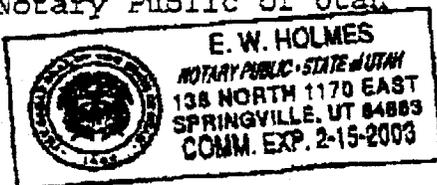
The Protecto 401 Ceramic Epoxy or coal tar epoxy lining shall extend from the bottom of the gasket socket in the bell to a point on the exterior of the spigot end of the pipe where the next pipe gasket would overlap the lining.

Sworn to and subscribed before me this 2<sup>nd</sup> day of August, 1999

Sincerely,

Notary Public of Utah

Sales Department



# CASING SEAL™

Sealing and Plugging Material



THE *Original* DRILLING FLUIDS COMPANY.

## Description

CASING SEAL is a mixture of random sized particles of a utility grade, granular Wyoming sodium bentonite, a naturally occurring, non-treated swellable clay. Because of its high swelling capacity, CASING SEAL is an effective sealing material for sealing a leaking pond, and for use as a clay liner.

## Applications/Functions

- Seal leaking ponds and dams
- Seal earthen structures
- Use to prepare a clay liner under storage tanks and landfills
- Seal casing in cable tool and in air drill casing hammer operations
- Lubricate casing while being driven
- Plug abandoned holes

## Advantages

- Effective in sealing and grouting
- Non-toxic
- Simple to apply
- Flexible seal providing low permeability that prevents commingling of aquifers and entry of surface contaminants
- Prevents entry of pollutants from the surface

## Typical Properties

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| • Appearance                       | coarse granular                     |
| • Color                            | variable in color from blue to gray |
| • Particle size                    | 8 to 14 mesh                        |
| • Bulk density, lb/ft <sup>3</sup> | 73 (as packaged) - 2000 #/cy        |
| • Specific gravity                 | 2.6                                 |

## Recommended Treatment

*To seal a pond*

Depending on the native soil, disc in or mix 1 to 4 pounds of CASING SEAL per square foot uniformly over the area to be sealed so that a 6-inch blanket of soil and CASING SEAL is formed. Do not neglect the edges of the dam or the sides/walls of the pond. This sealing blanket should then be compacted in place and as a further protection to the sealing blanket, 2 to 4 inches of local soil or sand should cover the sealing blanket and be compacted.

If there is water in the pond that is leaking and the leaking area can be localized, cover the leaking area from the surface with 4 to 6 pounds per square foot of CASING SEAL. The CASING SEAL area should then be covered with a layer of local sand to protect the CASING SEAL.

*Note:* Uncovered CASING SEAL is non-toxic. However, colloidal particles formed as a result of the free swell of bentonite clay could clog the gill action of some fish.

*To seal and lubricate driven steel casing*

1. Dig a cone-shaped depression around the casing. Depression should be 2 to 3 feet deep and 6 to 8 inches larger at the surface than the casing diameter.
2. Keep cone-shaped depression filled with dry CASING SEAL protected from getting wet at all times while driving the casing.

*To suspend cuttings while cable tool drilling*

1. Place CASING SEAL in plastic bags.
2. With the tools out of the hole, drop enough bags to get about 10 pounds of CASING SEAL to the bottom of the hole.
3. If the hole is dry, add water. While drilling ahead, the churning action of the tools will form a thick slurry that will support the cuttings off bottom and make it easier for the bailer to remove them.

**Packaging**

CASING SEAL bentonite is packaged in multiwall paper bags containing 50 pounds (22.7 kg).

**Availability**

CASING SEAL can be purchased through any QUIK-GEL® distributor, or by contacting the Customer Service Department in Houston.

**Baroid Division of Dresser Industries, Inc.  
Industrial Drilling Products**

3000 N. Sam Houston Pkwy E.	410 17th Street, Suite 880
Houston, TX 77032	Denver, Colorado 80202
(281) 871-4612	(800) 735-6075
	(303) 571-8270

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Rev. 1/98 • IDP 028

Because the conditions of use of this product are beyond the seller's control, the product is sold without warranty either express or implied and upon condition that purchaser make its own test to determine the suitability for purchaser's application. Purchaser assumes all risk of use and handling of this product. This product will be replaced if defective in manufacture or packaging or if damaged. Except for such replacement, seller is not liable for any damages caused by this product or its use. The statements and recommendations made herein are believed to be accurate. No guarantee of their accuracy is made, however.