

Geology and Geotechnical Considerations of the SSC Site in Texas:

Footprint Flexibility Study

SSC Site Committee
Bureau of Economic Geology, UTA

Material Presented at the meeting of the Underground Tunnelling Advisory Panel
April 30, 1989 at the
SSC Laboratory at Lawrence Berkeley Laboratory

FOOTPRINT FLEXIBILITY STUDY

GOALS:

- 1. INVESTIGATE FLEXIBILITY OF SUBSURFACE LOCATION FOR THE PROPOSED FOOTPRINT.**
- 2. INVESTIGATE FLEXIBILITY WITHIN AN ENVELOPE OF FOOTPRINTS CLOSE TO THE PROPOSED FOOTPRINT.**

**ALL WORK PERFORMED
CONSIDERING CURRENTLY REVISED
GEOLOGICAL INTERPRETATION FOR
THE SITE AREA.**

FOOTPRINTS INVESTIGATED

FOOTPRINT OPTION

- A AS PROPOSED**
- B SHIFTED ABOUT 1 MILE
NORTH AND SLIGHTLY
EAST (STILL SOUTH OF
RED OAK)**
- C SHIFTED ABOUT 2 MILES
NORTH AND SLIGHTLY
EAST (JUST NORTH OF
RED OAK)**

CONSTRAINTS CONSIDERED IN FOOTPRINT INVESTIGATION

- 1. COVER AT CREEK CROSSINGS
(WAXAHACHIE, RED OAK, SOUTH
PRONG, CHAMBERS).**
- 2. MINIMIZE PRESENCE OF EAGLE
FORD SHALE AT NEAR CLUSTER
(WEST) INTERACTION HALLS.**
- 3. AVOID RESIDENTIAL AREAS TO
THE NORTH AND EAST.**
- 4. KEEP SURFACE FACILITIES OUT
OF FLOODPLAINS.**
- 5. MINIMIZE DEPTH OF FAR
CLUSTER (EAST) INTERACTION
HALLS.**

FOOTPRINT A OPTIONS

- A-0 PROPOSED RING ALIGNMENT
- A-1 RING LOCATED WITH ≥ 30 FEET COVER OVER MAIN AND ABORT TUNNELS.
- A-2 RING LOCATED WITH ≥ 30 FEET COVER OVER MAIN AND ABORT TUNNELS, AVOIDING EAGLE FORD SHALE AT K1, K2 OR AT K1(ALT), K2(ALT) INTERACTION HALLS.
- A-3 RING LOCATED WITH ≥ 25 FEET COVER OVER MAIN ~~AND~~ ABORT TUNNELS, AVOIDING EAGLE FORD SHALE AT K1, K2 OR AT K1(ALT), K2(ALT) INTERACTION HALLS.
- A-4 THE A-1 OPTION WITH RING FLEXED UPWARDS TO REDUCE FAR CLUSTER HALL DEPTHS.

**OTHER FOOTPRINTS
INVESTIGATED:**

- B INTERMEDIATE RING
LOCATED WITH 30 FEET OF
COVER OVER THE MAIN AND
ABORT TUNNELS (LIKE
OPTION A-1)**

- C NORTHERN RING LOCATED
WITH 30 FEET OF COVER OVER
THE MAIN AND ABORT
TUNNELS (LIKE OPTION A-1)**

**RESULTS OF
INVESTIGATIONS
FOR FOOTPRINT A
OPTIONS**

FOOTPRINT A-0 OPTION

DIP OF RING PLANE - NOT PLANAR

2% OF MAIN TUNNEL IN EAGLE FORD

0% OF ABORT TUNNEL IN EAGLE FORD.

NEAR CLUSTER INTERACTION HALLS:

HALL	DEPTH	BOTTOM LOCATION
K1	211 FT	10 FT INTO EAGLE FORD
K2	218 FT	23 FT INTO EAGLE FORD
K1(ALT)	165 FT	10 FT ABOVE EAGLE FORD
K2(ALT)	150 FT	35 FT ABOVE EAGLE FORD

FAR CLUSTER INTERACTION HALLS:

K3	198 FT	55 FT INTO AUSTIN CHALK
K4	205 FT	20 FT INTO AUSTIN CHALK
K5	260 FT	15 FT INTO AUSTIN CHALK
K6	198 FT	20 FT ABOVE AUSTIN CHALK (BOTTOM IN TAYLOR)

ONLY 5 FEET OF COVER FOR MAIN TUNNEL BENEATH WAXAHACHIE, ONLY 20 FEET COVER FOR MAIN TUNNEL BENEATH RED OAK CREEK.

INADEQUATE COVER FOR ABORT TUNNEL AT CHAMBERS CREEK (ENTIRE TUNNEL DAYLIGHTS ABOVE CREEK BED). J-4 SHAFT FOR ABORT SYSTEM IN FLOODPLAIN AT CHAMBERS CREEK.

AVERAGE SHAFT DEPTH = 155 FEET.

FOOTPRINT A-1 OPTION

DIP OF RING PLANE - 0.195 DEGREES

11% OF MAIN TUNNEL IN EAGLE FORD
56% OF ABORT TUNNEL IN EAGLE FORD.

NEAR CLUSTER INTERACTION HALLS:

HALL	DEPTH	BOTTOM LOCATION
K1	265 FT	65 FT INTO EAGLE FORD
K2	269 FT	75 FT INTO EAGLE FORD
K1(ALT)	220 FT	45 FT INTO EAGLE FORD
K2(ALT)	205 FT	18 FT INTO EAGLE FORD

FAR CLUSTER INTERACTION HALLS:

K3	210 FT	70 FT INTO AUSTIN CHALK
K4	218 FT	35 FT INTO AUSTIN CHALK
K5	273 FT	27 FT INTO AUSTIN CHALK
K6	288 FT	2 FT ABOVE AUSTIN CHALK (BOTTOM IN TAYLOR)

ADEQUATE COVER FOR MAIN TUNNEL AND
ABORT TUNNEL EVERYWHERE.

J-4 SHAFT FOR ABORT SYSTEM IS IN FLOODPLAIN
AT CHAMBERS CREEK.

AVERAGE SHAFT DEPTH = 189 FEET.

**FOOTPRINT OPTIONS
A-2 AND A-3**

**CANNOT KEEP ADEQUATE
COVER AT**

**CHAMBERS,
RED OAK,
AND WAXAHACHIE CREEKS**

**AND KEEP K1,K2 (OR K1,K2
ALTERNATE LOCATIONS) OUT
OF OR DESIRABLE ABOVE THE
TOP OF THE EAGLE FORD SHALE.**

FOOTPRINT A-4 OPTION

DIP OF RING PLANE - 0.195 DEGREES
HINGE ALONG F3-E8 AXIS 0.06 DEGREES

11% OF MAIN TUNNEL IN EAGLE FORD
56% OF ABORT TUNNEL IN EAGLE FORD.

NEAR CLUSTER INTERACTION HALLS:

HALL	DEPTH	BOTTOM LOCATION
K1	265 FT	65 FT INTO EAGLE FORD
K2	269 FT	75 FT INTO EAGLE FORD
K1(ALT)	220 FT	45 FT INTO EAGLE FORD
K2(ALT)	205 FT	18 FT INTO EAGLE FORD

FAR CLUSTER INTERACTION HALLS:

K3	157 FT	17 FT INTO AUSTIN CHALK
K4	160 FT	25 FT ABOVE AUSTIN CHALK
K5	225 FT	33 FT ABOVE AUSTIN CHALK
K6	223 FT	65 FT ABOVE AUSTIN CHALK (BOTTOM IN TAYLOR)

ADEQUATE COVER EVERYWHERE.

J-4 SHAFT FOR ABORT SYSTEM IS IN FLOODPLAIN
AT CHAMBERS CREEK.

AVERAGE SHAFT DEPTH = 167 FEET.

RESULTS OF RING FLEXURE (HINGEING)

- 1. AVERAGE DEPTH OF SHAFTS AND INTERACTION HALLS DECREASED ON FAR CLUSTER (EAST) SIDE BY ABOUT 50 FEET (215 FT FOR A-1 TO 166 FT FOR A-4).**
- 2. MAXIMUM DEPTH OF INTERACTION HALLS ON FAR CLUSTER (EAST) SIDE DECREASED FROM 243 FT TO 178 FT.**
- 3. HOWEVER, ALL INTERACTION HALLS NOW BOTTOM IN THE TAYLOR MARL RATHER THAN AT LEAST SOME BOTTOMING IN THE AUSTIN CHALK.**

RESULTS OF
PRELIMINARY
INVESTIGATIONS
FOR FOOTPRINTS
B AND C

FOOTPRINT B OPTION

DIP OF RING PLANE - 0.24 DEGREES

0% OF MAIN TUNNEL IN EAGLE FORD
0% OF ABORT TUNNEL IN EAGLE FORD.

NEAR CLUSTER INTERACTION HALLS:

HALL	DEPTH	BOTTOM LOCATION
K1	211 FT	25 FT INTO EAGLE FORD
K2	165 FT	38 FT INTO EAGLE FORD
K1(ALT)	200 FT	5 FT INTO EAGLE FORD
K2(ALT)	171 FT	20 FT ABOVE EAGLE FORD

FAR CLUSTER INTERACTION HALLS:

K3	240 FT	45 FT INTO AUSTIN CHALK
K4	250 FT	29 FT INTO AUSTIN CHALK
K5	287 FT	25 FT INTO AUSTIN CHALK
K6	287 FT	5 FT INTO AUSTIN CHALK

ADEQUATE COVER EVERYWHERE.

J-4 SHAFT FOR ABORT SYSTEM IS NOT IN
FLOODPLAIN AT CHAMBERS CREEK.

AVERAGE SHAFT DEPTH = 169 FEET.

FOOTPRINT C OPTION

DIP OF RING PLANE - 0.12 DEGREES

1% OF MAIN TUNNEL IN EAGLE FORD
0% OF ABORT TUNNEL IN EAGLE FORD.

NEAR CLUSTER INTERACTION HALLS:

HALL	DEPTH	BOTTOM LOCATION
K1	153 FT	35 FT INTO EAGLE FORD
K2	182 FT	38 FT INTO EAGLE FORD
K1(ALT)	213 FT	18 FT INTO EAGLE FORD
K2(ALT)	249 FT	15 FT ABOVE EAGLE FORD

FAR CLUSTER INTERACTION HALLS:

K3	167 FT	45 FT INTO AUSTIN CHALK
K4	210 FT	0 FT INTO AUSTIN CHALK
K5	215 FT	35 FT ABOVE AUSTIN CHALK
K6	265 FT	30 FT ABOVE AUSTIN CHALK (BOTTOM IN TAYLOR)

ADEQUATE COVER EVERYWHERE.

J-4 SHAFT FOR ABORT SYSTEM IS NOT IN
FLOODPLAIN AT CHAMBERS CREEK.

AVERAGE SHAFT DEPTH = 148 FEET.

FOOTPRINT COMPARISONS

FOOTPRINT	MAIN TUNNEL		ABORT TUNNEL		
	% EAGLE FORD SHALE	% AUSTIN CHALK	% TAYLOR MARL	% EAGLE FORD SHALE	% AUSTIN CHALK
A-1	11	67	22	56	44
B	0	74	26	0	100
C	1	69	30	0	100

FOOTPRINT	INTERACTION HALL DEPTHS (FT)					
	BEST NEAR CLUSTER (ALTERNATE LOCATIONS)		FAR CLUSTER			
	K1(ALT)	K2(ALT)	K3	K4	K5	K6
A-1	220*	205*	210	218	273	288**
B	200*	171	240	250	287	287
C	213*	249	167	210	215**	265**

* EAGLE FORD SHALE AT BOTTOM OF HALL

** TAYLOR MARL AT BOTTOM OF HALL

FOOTPRINT

**AVERAGE SHAFT
DEPTH**

A-1 189 FT

A-4 167 FT

B 169 FT

C 148 FT

THE BB OPTION

- **AVOID SOUTH PRONG CREEK
SPILLWAY**
- **SOUTH OF RED OAK**
- **NORTH OF FORRESTON**
- **EAST OF BOZ**
- **WEST OF PALMER AND ENNIS**
- **MISS CEMETERY AT RED OAK**

SUGGESTED BORINGS FOR ADDITIONAL INFORMATION

HOLE	ESTIMATED DEPTH REQUIRED TO HIT EAGLE FORD CONTACT
1	175 FEET
2	155 FEET
3	155 FEET
4	135 FEET
5	190 FEET
6	120 FEET
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TOTAL	930 FEET