AGENDA ITEM 5

GOLDEN GATE BRIDGE, HIGHWAY AND TRANSPORTATION DISTRICT

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DISTRICT ENGINEER

Sep 25, 1998
For: Sep 30, 1998

TO: Building & Operating Committee/
Committee of the Whole
FROM: Mervin C. Giacomini, District Engineer
SUBJECT: **GOLDEN GATE BRIDGE, SUICIDE DETERRENT - REPORT ON Z-CLIP SUICIDE DETERRENT PROTOTYPE (ACTION)**

The Board, by Resolution No. 97-69, authorized Phase I of the Suicide Deterrent Project, which includes the development and testing of a prototype using the Z-CLIP fencing system. By Resolution No. 97-106, the Board has authorized acceptance of a proposal in the amount of $46,840 from Z-CLIP International Fencing Systems to implement Phase I of the project.

Erection of the prototype was completed on June 9, 1998. The prototype is located in the Bridge employee parking lot. The prototype consists of 125 feet of the Z-CLIP system attached to surplus bridge railing.

On July 21, 1998, testing was performed to assess the system's effectiveness as a suicide deterrent. The testing was conducted by David Binder Research. The major findings of David Binder Research are as follows:

1. While 9 of 14 participants were able to climb to the top of the barrier, only 5 (mostly young and in good physical condition) made it over. This was due to the difficulty of pulling one's body weight over the overhang. Some participants suggested that the barrier may be even more effective if the overhang were extended or curved in a downward direction.

2. Most individuals found the suicide deterrent to be a more difficult fence to climb than most others they had attempted.

3. Without the aid of gloves or an effective wire cutting instrument, the ability of individuals to get over or pass through the barrier is limited.

4. Without adequate upper body strength, traversing the top of the fence is very difficult.

5. Thinner, lighter, and more agile individuals have the best chance of passing through the horizontal wires of the barrier. Only 5 of 14 participants successfully competed this part of the test when the Z-CLIP fasteners

were spaced six feet apart, and only 1 of 14 passed through when the fasteners were adjusted to five feet apart. No participant was able to pass through when Z-CLIP fastener spacing was reduced to four feet apart.

6. It is more difficult to pass through the deterrent the higher up an individual goes.

7. Most individuals have little success cutting through the wires unless they have special fence-cutting tools to accomplish the task. Only 7 of 14 participants were able to cut any of the sample wires from the testing.

In 1970, the Board of Directors authorized the firm of Anshen & Allen Architects to research and evaluate 18 possible physical barriers for the Golden Gate Bridge. Anshen & Allen developed the following comprehensive set of criteria that a deterrent should meet.

- Cannot cause safety or nuisance hazard to pedestrians or Bridge personnel.
- Must be totally effective as a barrier.
- Cannot bar pedestrian traffic.
- Weight cannot be beyond established allowable limits.
- Cannot cause excessive maintenance problems.
- Aerodynamics cannot be beyond established allowable limits.

Based on my assessment of the Z-CLIP Suicide Deterrent and the test results, the Z-CLIP Suicide Deterrent meets the 1970 criteria in all areas except total effectiveness as a barrier. In that regard, the preliminary test results show that it will serve effectively as a physical deterrent to most people, but can be breached by some physically fit individuals. Concerning other vital portions of the criteria, the system will not impact the use of the maintenance scaffolding on the Bridge; however, it does require design of an emergency and maintenance access system. Initial assessment of the aerodynamics of the Z-CLIP Suicide Deterrent based on previous wind tunnel tests are encouraging and it is anticipated that the system will not impact the wind stability of the Bridge; however, this must be confirmed by wind tunnel testing.

The Board, by Resolution No. 97-193, authorized selection of three eminent local architects to serve on an Architectural Advisory Panel to assist the District in coordination of the design of the suicide deterrent and the bicycle safety railing.

The panel has met a number of times this year to review

preliminary designs for the bicycle railing, to inspect and comment on the suicide deterrent prototype, and to review the aesthetic impact of the suicide deterrent and the bicycle railing in combination on the Bridge. The panel's findings are summarized in the attached letter from the Chairman, Mr. Henrick Bull, of BSA Architects, San Francisco. **Although the panel had been supportive of the preliminary design developed for the posts that support the Z-CLIP Suicide Deterrent system, review of the constructed prototype led the panel to recommend that a different approach should be developed which would provide an effective deterrent to suicides while minimizing visual impact and preserving the aesthetic and historic integrity of the Bridge.**

In view of the test results to date and the Architectural Advisory Committee's recommendation, two alternative policy options are available to the Committee and the Board:

1) cease further development of the Z-CLIP Suicide Deterrent if the Board determines this concept is not feasible or appropriate for installation on the Golden Gate Bridge. The contract with Z-CLIP Fencing International is complete which provides an appropriate time to stop further development on the project; or,
2) proceed with Phase II development of the Z-CLIP Suicide Deterrent. Phase II would involve installation design; emergency and maintenance access design; and placing a prototype of the suicide deterrent on the Bridge for evaluation of visual impact.

Should the Board decide to proceed with further development of the Z-CLIP Suicide Deterrent, development would consist of the following phases:

Phase II - Further engineering study to design modifications to the Bridge sidewalk framing to resist the forces created by tensioning the horizontal wires; design of emergency gates in the suicide deterrent; and, design of emergency and maintenance access. Upon the successful completion of the design, install a prototype on the Bridge for visual evaluation.

Phase III - Perform an environmental assessment, obtain approval of the State Historic Preservation Office, and hold public hearings.

Phase IV - Utilizing the information from the Bridge prototyping, finalize the design, and prepare plans and specifications.

Phase V - Finalize the plans, specifications, and bidding

documents.
Phase VI - Advertise for construction bids.

Should the Board decide to proceed with Phase II of the suicide deterrent, a proposal will be requested from Z-CLIP Fencing International to perform Phase II. The proposal will be submitted to the Board for approval.

NAS/gm

Attachment

Golden Gate Bridge Suicide Deterrent Test Executive Summary

Following is a summary of information gathered from the Tuesday July 21st Golden Gate Bridge Suicide Deterrent Testing. Fourteen candidates participated in the tests which were conducted to evaluate the climbability of a suicide deterrent which has been proposed for installation on the Golden Gate Bridge.

Z-Clip International constructed an 11 foot high. 100 foot long prototype which was placed at the District's Toll Plaza Administration Facility. The proposed deterrent is a fencing system consisting of closely spaced and highly tensed horizontal wires strung between widely spaced steel terminal posts. The prototype was tested by allowing individuals to attempt to climb over, squeeze through, or cut sample wires of the fencing system. Participants involved in the testing were carefully selected to provide a diverse demographic base with varying gender, age, height, weight, and physical condition.

Major Findings

1. While 9 of 14 participants were able to climb to the top of the barrier, only 5 (mostly young and in good physical condition) made it over. This was due to the difficulty of pulling one's body weight over the overhang. Some participants suggested that the barrier may be even more effective if the overhang were extended or curved in a downward direction.

2. Most individuals found the suicide deterrent to be a more difficult fence to climb than most others they had attempted.

3. Without the aid of gloves or an effective wire cutting instrument, the ability of individuals to get over or pass through the barrier is limited.

4. Without adequate upper body strength, traversing the top of the fence is very difficult.

5. Thinner, lighter, and more agile individuals have the best chance of passing through the horizontal wires of the barrier. Only 5 of 14 participants successfully completed this part of the test when the Z-clip fasteners were spaced six feet apart, and only 1 of 14 passed through when the fasteners were adjusted to five feet apart. No participant was able to pass through when z-clip fastener spacing was reduced to four feet apart.

6. It is more difficult to pass through the deterrent the higher up an individual goes.

7. Most individuals have little success cutting through the wires unless they have special fence-cutting tools to accomplish the task. Only 7 of 14 participants were able to cut any of the sample wires from the testing.

The Process

Participants arrived at the Toll Plaza Administration Building and signed and dated the District's liability waiver. Since participants were not allowed to observe the efforts of preceding participants, they waited at the Administration Building until being escorted to the prototype by a representative of the Golden Gate Bridge, Highway, and Transportation District.

Participants were asked to conduct three different tests:

1. Participants were asked to climb the deterrent at any point of their choosing and attempt to traverse the top. This was done without the help of any climbing aids, although all participants wore safety crash helmets to ensure protection against a fall.

   After the first climb, participants were asked to climb the deterrent again, but this time they were given protective gloves. For the second attempt, the participants were asked to climb at one of the support posts if they did not select this location on their own for the first climb. Conversely, if they chose the post location for the first climb, they were asked to climb between the support posts on the second attempt.

2. Following the two climbs, participants were then asked to attempt to pass through the deterrent by stretching its horizontal wires as wide as possible and climbing through. Participants were asked to pass through the wires three different times. On the first attempt, the Z-clip fasteners were spaced six feet apart, on the second the fasteners were spaced five feet apart, and the third attempt was made with the fasteners four feet apart. Participants were allowed to complete the first attempt at any point on the prototype.

3. Finally, climbers were asked to attempt to cut through sample wires from the prototype using needle nose wire cutters, heavy duty diagonal wire cutters known as "dykes," and a side cutter, which is made for the purpose of cutting sturdier, stronger wires, such as fencing. Participants wore goggles to ensure safety.

Once participants finished the climbing tests, they returned to the Administration Building to complete a questionnaire. After the last participant completed the wire cutting test, a final test was performed in which a horizontal wire was cut with a fencing tool, and the "recoil" was measured in order to evaluate the ability of the Z-clip to restrain a wire once it was cut.

Test #1 – Scaling the Fence

As part of the first test, participants were asked to choose any location of the fence inside the terminal posts, and attempt to climb and traverse it. The first attempt was made without the aid of any climbing materials. The second attempt, made with the aid of gloves, occurred at a different location. This location was dependent upon where the participants made their first climb. If it was along a post, then they were asked to climb in an area between the posts, and if the first attempt was between the posts, then participants were asked to climb along a post. The chart below summarizes the results of the two climbs:

Results of the Climbing Test

GENDER	AGE	HEIGHT	WEIGHT	ATTEMPT #1 (w/out gloves) LOCATION & RESULT	ATTEMPT #2 (w/ gloves) LOCATION & RESULT
Female	25	5' 4"	120 LBS	Middle - Successful	Post - Successful
Male	36	5' 10"	190 LBS	Middle - Successful	Post - Successful
Male	27	5' 9"	190 LBS	Post - Successful	Middle - Unsuccessful
Male	32	5' 11"	174 LBS	Post - Unsuccessful	Middle - Successful
Male	41	6'	170 LBS	Middle - Unsuccessful	Post - Successful
Female	20	5' 4"	120 LBS	Middle - Unsuccessful	Post - Unsuccessful
Male	25	5' 7"	135 LBS	Middle - Unsuccessful	Post - Unsuccessful
Female	26	5' 6"	130 LBS	Middle - Unsuccessful	Post - Unsuccessful
Female	26	5' 6"	160 LBS	Middle - Unsuccessful	Post - Unsuccessful
Female	37	5' 9"	175 LBS	Middle - Unsuccessful	Post - Unsuccessful
Female	39	5' 10"	180 LBS	Middle - Unsuccessful	Post - Unsuccessful
Female	44	5' 3"	155 LBS	Middle - Unsuccessful	Post - Unsuccessful
Male	45	5' 9"	180 LBS	Middle - Unsuccessful	Post - Unsuccessful
Male	48	5' 11"	205 LBS	Middle - Unsuccessful	Post - Unsuccessful

As the above results show, **three out of fourteen (21%)** participants were able to scale and traverse the top of the fence without the aid of gloves. Two of these three were also successful with gloves, along with an additional two climbers who were unable to get over the top with their bare hands (**four overall, 29%** with gloves).

Of the five climbers who were able to get over the top, four were male and one female. All indicated on their questionnaire that they are in either good or excellent physical condition, and many claimed to exercise regularly. Those who successfully traversed the top of the fence took one of two approaches: either by climbing up an area of the prototype which was stabilized by a post, therefore allowing less movement in the horizontal wiring of the fence and an easier climb; or by taking the opposite approach and scaling the wall in an area equidistant to the posts, and bending the top overhang structure downward to allow an easier ability to lift one's leg above the overhang. Four participants successfully scaled the fence along a post, while three were successful between the posts.

Nearly two-thirds (**9 of 14 - 64%**) of the climbers were able to reach the overhang structure at the top of the fence at least once during their two climbs. Most climbers stated that although the gloves did ease the pressure on their hands, getting to this point of the fence was not much of a problem with or without the gloves. The gloves were more helpful in attempting to traverse the overhang at the top of the fence.

The time it took for the five participants who successfully traversed the overhang at the top of the fence (either with or without gloves) is shown below:

Amount of Time to Get Over the Barrier

GENDER	AGE	HEIGHT	WEIGHT	TEST #1 TIME (w/out gloves)	TEST #2 TIME (w/ gloves)
Male	36	5' 10"	190 LBS	15 Seconds (Middle)	15 Seconds (Post)
Female	25	5' 4"	120 LBS	30 Seconds (Middle)	30 Seconds (Post)
Male	27	5' 9"	190 LBS	25 Seconds (Post)	Unsuccessful
Male	32	5' 11"	174 LBS	Unsuccessful	20 Seconds (Middle)
Male	41	6'	170 LBS	Unsuccessful	15 Seconds (Post)

The chart above shows that only one participant was able to get over the top quickly and easily on both tries. He was a 36-year old male who stated he was in excellent physical condition and exercised regularly. The others took substantially longer or needed gloves to complete the task in its entirety.

11 of the 14 participants (**79%**) commented after the testing that the hardest aspect to climbing the barrier was getting over the top. Many mentioned that in order to traverse the overhang at the top of the fence, a substantial amount of upper body strength is necessary. Many women and heavier men admitted that they simply were unable to pull themselves up high enough to lift their legs over the awning-like fencing at the top.

In addition, many stated that while hanging onto the fence at the top, the wire would cut into their hands causing enough pain to make it difficult to hang on for very long. Understandably, this would affect heavier people more because of the additional pressure on the wire caused by the greater overall weight of their bodies. This is also where the gloves came in handy for a couple of participants who had reached the overhang on the first try, but could not pull themselves over before the pressure on their hands caused too much pain. With gloves, two additional climbers were able to traverse the overhang.

11 of 14 participants (**79%**) stated on the questionnaire that they found the deterrent either somewhat difficult or very difficult to climb, and the same number found the fence to be either somewhat more difficult or very difficult to climb compared to other fences they have attempted to scale. Over half (**8 of 14 - 57%**) of the participants believed the barrier would be very difficult to climb for an individual who is not in good physical condition.

Suggestions to increase the difficulty of climbing the deterrent were made, including:

1. Increase the overall length of the overhang.

2. Curve the overhang back downward toward the ground, rather than allowing it to remain parallel to the ground.

Test #2 -- Passing Through The Fence

After the climbing attempts, participants were asked to try to pass between two of the horizontal wires of the fence and pass through to the other side. Participants made an attempt to pass through the wiring when the Z-clip fasteners were spaced six feet apart. If successful, a second attempt was made with the fasteners five feet apart. If a participant managed tp pass through at this point, a final attempt was made with the fasteners four feet apart. Similar to the climbs, participants were allowed to attempt this test at any point in the fencing.

The distance between the horizontal wires increased slightly at higher points in the deterrent. From the bottom of the deterrent to about six feet, the horizontal wires were approximately four inches apart. The next two feet saw the distance between the wires increase to five inches, and the space increased to six inches at the upper three feet of the barrier. On the following page is a diagram of the deterrent which shows this more clearly.

When asked on the questionnaire, 11 of 14 (**79%**) participants stated passing through the fence was a task which was either somewhat or very difficult to accomplish. Some climbers stated it was nearly impossible for them to get even part of their frame through the wiring, although four of fourteen (**29%**) participants did successfully maneuver their bodies through the fence and to the other side when the Z-clip fasteners were spaced six feet apart. Only one participant was able to pass through when the fasteners were five feet apart, and no participants passed through when the Z-clips were four feet apart. Following is a summary of the results:

Results of Passing Through The Horizontal Wiring

GENDER	AGE	HEIGHT	WEIGHT	THRU 6'	THRU 5'	THRU 4'
Female	25	5' 4"	120 LBS	Successful	Successful	Unsuccessful
Male	25	5' 7"	135 LBS	Successful	Unsuccessful	Unsuccessful
Female	26	5' 6"	130 LBS	Successful	Unsuccessful	Unsuccessful
Male	27	5' 9"	190 LBS	Successful	Unsuccessful	Unsuccessful
Female	20	5' 4"	120 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Female	26	5' 6"	160 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Male	32	5' 11"	174 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Male	36	5' 10"	190 LBS	Unuccessful	Unsuccessful	Unsuccessful
Female	37	5' 9"	175 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Female	39	5' 10"	180 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Male	41	6'	170 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Female	44	5' 3"	155 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Male	45	5' 9"	180 LBS	Unsuccessful	Unsuccessful	Unsuccessful
Male	48	5' 11"	205 LBS	Unsuccessful	Unsuccessful	Unsuccessful

In two different ways, body shape and size were important factors in the participants' ability to pass through the horizontal wiring.

First, those with slender frames were able to slide through the narrow passage created by stretching the wires. Three of the successful participants weighed 135 pounds or less. Second, those with strong forearm and upper body strength were able to create more separation between the wires than most other participants were able to. Those with medium or large frames and with average upper body strength were unable to extend the wiring apart to allow their bodies to pass through.

Another important finding involved the way in which the four successful participants made it to the other side. Although the wiring was only four inches apart at the bottom of the barrier and up to six inches at its top, three of the four successes were done through wires which were only four inches apart. This was because all four immediately stood on the bridge rail, inserted one leg, positioned the trunk of their bodies horizontally, and squeezed through. Their hands were not used to separate the wires. None of the unsuccessful participants used this technique. Although the distance between the wires was up to two inches greater at higher points in the fence, the "spongy" and shifting nature of the wires did not allow participants to have a stationary starting point from which they could easier maneuver themselves through the wiring.

The successful participants who had passed through with the Z-clip fasteners positioned six feet apart were then directed to attempt to pass through the fence in an area where the Z-clip spacing had been reduced to five feet. Only one participant was successful in doing so. This participant was then directed to try again with the Z-clip spacing reduced to four feet, and at this point she was unsuccessful.

Test #3 -- Wire Cutting

The final test of the day involved an attempt to cut through the horizontal wires of the prototype. Three different instruments were used: 1) pocket-sized needle-nosed wire cutters with limited cutting abilities, 2) a slightly larger, heavy duty, diagonal wire cutter known as "dykes," and 3) an arm-length fence cutting instrument known as a side cutter.

The fencing on the prototype was made with 12-gauge wiring, which was the least resistant of the wires which participants were asked to cut. They were also given 11, 10, and 9-gauge wires to cut. As the table on the following page shows, 7 of 14 (**50%**) participants were able to cut through at least one of the four sample wires given to them:

Successful Results of Wire-Cutting Test

GENDER	AGE	HEIGHT	WEIGHT	THICKNESS OF WIRES CUT	INSTRUMENTS USED TO CUT
Male	27	5' 9"	190 LBS	12 gauge; 11 gauge, 10 gauge; 9 gauge	12 w/ needle nose; 11 & 10 w/ dykes; 9 w/ side cutter
Male	36	5' 10"	190 LBS	12 gauge; 11 gauge	12 w/ needle nose; 11 w/ dykes
Male	48	5' 11"	205 LBS	12 gauge, 11 gauge	Both w/ dykes
Male	45	5' 9"	180 LBS	12 gauge	needle nose
Male	41	6'	170 LBS	12 gauge	dykes
Male	32	5' 11"	174 LBS	12 gauge	side cutter
Female	44	5' 2"	155 LBS	12 gauge	side cutter

As the chart on the preceding page shows, the strength of the sample wires held up well against the efforts of most participants. Only one individual was able to cut wires which were stronger than 11-gauge. Only 3 of 14 (**21%**) were able to cut through 11-gauge wiring, and to do so, dykes were needed.

In addition, only one female was able to cut through any wires at all, and she needed the special fence cutting instrument to accomplish the feat. In order to cut through the wires even with sharper tools, it appears a higher than average amount of forearm strength is necessary. The individual who was able to cut through all four gauges of wire was also one of the two participants who successfully passed through the horizontal wires by stretching them apart at a greater distance than any other participant.

The most important finding of the wire cutting test was that unless an individual is adequately prepared with the proper cutting tools, it appears to be very difficult to slice through the wires. One suggestion might be to increase the strength of the wiring from 12-gauge to 11-gauge. The success rate of cutting through the 11-gauge wire with any of the instruments decreased by **29%**, and nobody was able to cut through the 11-gauge wiring without using a more sophisticated set of cutting tools.

The Z-Clip Fastener Test

One final experiment conducted after the participants had finished with their part of the deterrent testing was a test to determine how well the z-clip fasteners hold back a wire once it has been cut or broken.

Results of the test proved successful. A wire on the prototype was cut, and on one side of the z-clip fasteners, the wire flew back approximately six inches. On the other side, the wire only flew back three inches. This shows that the Z-clip effectively restrains a cut wire, which demonstrates that, once cut, the tensioned wire will not present an undue hazard to vehicle and pedestrian traffic.

Frequencies

Q2. Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20	1	7.1	7.1	7.1
	25	2	14.3	14.3	21.4
	26	2	14.3	14.3	35.7
	27	1	7.1	7.1	42.9
	32	1	7.1	7.1	50.0
	36	1	7.1	7.1	57.1
	37	1	7.1	7.1	64.3
	39	1	7.1	7.1	71.4
	41	1	7.1	7.1	78.6
	44	1	7.1	7.1	85.7
	45	1	7.1	7.1	92.9
	48	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q3. Weight

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	112	1	7.1	7.1	7.1
	120	1	7.1	7.1	14.3
	130	1	7.1	7.1	21.4
	135	1	7.1	7.1	28.6
	155	1	7.1	7.1	35.7
	160	1	7.1	7.1	42.9
	170	1	7.1	7.1	50.0
	174	1	7.1	7.1	57.1
	175	1	7.1	7.1	64.3
	180	2	14.3	14.3	78.6
	190	2	14.3	14.3	92.9
	205	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q4. Height in inches

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	62	1	7.1	7.1	7.1
	64	2	14.3	14.3	21.4
	66	2	14.3	14.3	35.7
	67	1	7.1	7.1	42.9
	69	3	21.4	21.4	64.3
	70	2	14.3	14.3	78.6
	71	2	14.3	14.3	92.9
	72	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q5. Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	7	50.0	50.0	50.0
	Male	7	50.0	50.0	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q6. Which of the following words best describes your physical condition?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Excellent	1	7.1	7.1	7.1
	Good	12	85.7	85.7	92.9
	Fair	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q7. Are you involved in any sports such as rock climbing, gymnastics, or other similar activities?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	7.1	7.1	7.1
	No	13	92.9	92.9	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q8. Do you exercise regularly?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	78.6	78.6	78.6
	No	3	21.4	21.4	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q9. How easy or difficult was it to climb the suicide deterrent barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult to climb	4	28.6	28.6	28.6
	Somewhat difficult to climb	7	50.0	50.0	78.6
	Somewhat easy to climb	2	14.3	14.3	92.9
	Very easy to climb	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q10. How easy or difficult would it be for someone who is not in good physical condition to climb the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult to climb	8	57.1	57.1	57.1
	Somewhat difficult to climb	4	28.6	28.6	85.7
	Somewhat easy to climb	2	14.3	14.3	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q11. (OPEN END) What was the hardest aspect of climbing the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Getting over the top	11	78.6	78.6	78.6
	Hurting the hands	3	21.4	21.4	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q12. (OPEN END) What, if anything, made the barrier easy to climb?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Posts	7	50.0	50.0	50.0
	Horizontal Wires	6	42.9	42.9	92.9
	Nothing	1	7.1	7.1	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q13. Were you able to get to the top of the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	64.3	64.3	64.3
	No	5	35.7	35.7	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q14. If you were able to get to the top of the barrier, about how many seconds did it take you to get over the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	15	2	14.3	14.3	14.3
	20	1	7.1	7.1	21.4
	25	1	7.1	7.1	28.6
	30	1	7.1	7.1	35.7
	99	9	64.3	64.3	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q15. How would you compare this fence with others you have climbed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult to climb	3	21.4	21.4	21.4
	Somewhat difficult to climb	8	57.1	57.1	78.6
	Somewhat easy to climb	3	21.4	21.4	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q16. Were you able to pass through the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	28.6	28.6	28.6
	No	10	71.4	71.4	100.0
	Total	14	100.0	100.0	
Total		14	100.0		

Q17. How would you rate the difficulty of passing through the barrier?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very difficult	7	50.0	50.0	50.0
	Somewhat difficult	4	28.6	28.6	78.6
	Somewhat easy	3	21.4	21.4	100.0
	Total	14	100.0	100.0	
Total		14	100.0		