THE USE OF PORTABLE SANITATION FACILITIES AT PUBLIC GATHERINGS

Excerpt of
Executive Summary

The attached report provides the results of the project completed by students and faculty members of the Center for Business and Industrial Studies at the University of Missouri - St. Louis. The following observations and recommendations serve as a summary:

1. Most users of portable sanitation facilities generally report that they are satisfied. However, substantial segments of the population (largely nonusers) report an aversion to them.

2. Length of time people spend at large public events is directly related to their plans to use portable sanitation facilities. People who plan to use portable sanitation facilities tend to stay longer. Their enjoyment of the event and expenditures therefore are affected by adequacy of portable sanitation facilities.

3. To address the problems of negative attitudes toward portable sanitation facilities, the industry should: (1) Safeguard against the provision of inadequate facilities at events because even a single bad experience with portable sanitation facilities at events can lead to persistently negative feelings toward them; and (2) Consider a promotional campaign that develops the theme that portable sanitation facilities are indeed sanitary, safe, convenient and not unpleasant to use. Such a promotional campaign could be based on an upscale consumer group, e.g., the country club set. Promotional pieces or ads could picture a scene with two well dressed people awaiting use of a unit at golf tournament or polo match.

4. Two types of standards are proposed - those appropriate for events where the portable sanitation facilities are serviced as needed during the event and those appropriate for the no- service option. Both types specify the needed number of portable sanitation facilities for a given crowd, taking into account a number of factors.

5. A site planning program was written to enable operators and promoters to develop the best configuration of facilities to service a specific event.

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The Use of Portable Sanitation Facilities at Public Gatherings

Introduction

The attached report provides the results of the project completed by students and faculty members of the Center for Business and Industrial Studies at the University of Missouri - St. Louis. The study dealt with the following questions.

1. How many portable sanitation units are required to service a public event, considering the following factors?

    a. Crowd Size
    b. Length of Stay
    c. Sex of Participants
    d. Maximum Queue Size
    e. Continuous Service vs. No Service
    (Section I)

2. What are the public's attitudes that should be considered in the marketing and operation of portable sanitation facilities?
(Section II)

3. What are the potential costs of failing to provide adequate facilities?
(Section III)

4. How should facilities be configured (numbers and locations) to meet various standards of service at events with large crowds and several centers of activity?
(Section IV)

Table 1 provides a description of the events at which the data for the study were gathered.

Table 1

Description of Events

	Event #1	Event #2	Event #3
Length	3 days	1 Evening 2 Days	1 Day
Hours	10 am - 10 pm	5 - 11 pm Noon - 11 pm Noon - 9 pm	Noon - 9 pm
Type	Family Fair	Beerfest	Neighborhood Celebration
Beer Sold	Yes	Yes	Until 7 pm
Permanent Facilities	Small Number	No	No
# of Units	500	90	75
Type of Service	Continuous	Twice Daily	Continuous
Location	National Park grounds, 100 acres	City Park 1 square block	Neighborhood Street & Nearby Parking Lots
Crowds	Peaked at 225,000 for 3 hours. Average stay of 3.5 hours	Peaked at 40,000 Average stay of 2.5 hours	25 - 30,000 Short visits
Weather	Hot (90-95˚) and dry	Hot (90˚+) and humid	Pleasant (80˚)

I. Portable Sanitation Facility Requirements

A. Service Option

This section provides a method for the determination of the number of portable sanitation units needed to adequately service an event. The assumption used here is that the units will be serviced during the event. The following section will cover those situations where the units are put in place and serviced only after the event.

The customer service level is defined here in terms of the length of the line (queue size), before each unit. It is felt that the visual impact of the queue size makes the greatest impression on the customer, influencing his/her perception of the quality of both the portable sanitation facilities and the event itself. For a given crowd size a larger number of portable sanitation units will reduce the queue sizes and thereby improve the customer service level over that of a smaller number. What constitutes an adequate number of portable sanitation units is dependent on a number of variables. These variables are listed below, along with the assumptions which were made to deal with each.

a) Average usage rate per person - It is assumed the rate is once every four hours on average for both sexes.[1]
b) The mean service times - 54 seconds for males and 75 seconds for females.[2]
c) Maximum number of units permitted at each site or bank (this does not refer to the actual number of portable sanitation units per bank, but only to the maximum allowable) - here a maximum of 25/bank is assumed.
d) If more than one bank is necessary to achieve a given service level, it is assumed that the usage is divided equally among the banks. If this were not the case, the number of units required would be somewhat higher.
e) The mix of males vs. females at the event - a 50/50 mix is assumed.

Standards. "Special Event" requirements Chart[3] is recommended as a standard for events at which service is provided. The chart uses the assumptions above and has as its axis the peak crowd size and average length of stay at the event. The standard specifies the number of units required to limit the queue to ten. Our observations suggest that few people refuse to join a line of ten or less and because this standard is based on a maximum of ten, the number of people choosing not to use the portable sanitation facilities is at a reasonable minimum.

The "Special Event" Chart give the requirements for improving customer service (reducing queue size) by providing additional units. It is the nature of queueing behavior that, once reasonable levels of service have been established, small additions to the facilities bring significant improvements in service. For example, the number of units needed to reduce the maximum queue from 10 to 2 at an event drawing a peak crowd of 15,000 staying for 6 hours is 10 (60 vs. 50). For an event of 7,000 staying 4 hours, only 1 additional unit is needed (21 vs. 20) to reduce the maximum queue from 10 to 4.

Because these additions are small and the improvement in customer service significant, promoters should consider carefully going beyond the standard level of service. Both shortening the average wait in line and improving the event-goer's perception of the quality of the event are obviously in the promoter's best interest.

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1 Taken from the Portable Sanitation Association's "Special Event" requirements Chart.
2 Based on 315 observations gathered here.
3 "Special Event" Chart on page 11.

B. No Service Option

For those events during which no pumping service is provided, the storage capacity of the unit is more likely to be the constraining factor than the length of queues that develop. The required number of units is then determined primarily by crowd size, the average length of stay at the event and the duration of the event itself. Because of the volume capacity of a typical holding tank, the deterioration in conditions that occur with accumulative use and the limits to the effectiveness of a unit's deodorant/additive, [there is a limited] number of times a unit can be used and still provide a reasonable and prudent safeguard for public health.

To determine the number of units required we therefore estimate the total number of visits to the portable sanitation facilities that would be expected to occur over the duration of the event. Then we divide the estimate by the number of people able to be served by a unit. The result is the expected number of units required to satisfy the needs of the crowd. We finally add a "safety factor" that considers random variations in the time intervals between customers' uses of the portable sanitation units.

The "Special Event" requirements Chart indicate the number of portable sanitation units required for the no-service option under various assumptions about crowd size, duration of event, average length of stay for visitors and average time interval between an individual's needs to use sanitation facilities. One can observe the doubling crowd size, doubling duration of the event, or cutting by half the time interval between uses will approximately double the requirements.

When planning for an event, one should consider the range of requirements that would prevail under different assumptions about the aforementioned factors and balance the costs of providing too few units (early departures, poor sanitation) against the costs of providing too many units (excess expenditures for equipment and service).

II. Attitudes

A. ENTRY Interviews

The entry survey disclosed that 32% of those surveyed did not plan to use the portable sanitation facilities at the event and that 22% have never used them in the past. Of those who had used them in the past, only 15% described them as "Good", 50% as "Adequate" and 35% as "Inadequate". The most common complaints cited by the people who found the portable sanitation facilities to be "Inadequate" are listed below in the order of their frequency:

Odor
Unsanitary Conditions
No Tissue
Long Wait
No Light

The time which the respondents planned to spend at the event varied considerably. As the table below suggests, one variable which many have entered into these plans is the attitude toward using the portable sanitation facilities.

Table 2

Event	Those Who Responded	Planned to Spend
#1	No, I don't plan to use the portable sanitation facilities	4.30 hours
#1	Yes, I plan to use the portable sanitation facilities	5.59 hours
#2	No, I don't plan to use the portable sanitation facilities	3.56 hours
#2	Yes, I plan to use the portable sanitation facilities	4.47 hours

Another item on the survey form concerned the perceptions of individuals regarding waiting time. Two estimates were requested, the expected length of wait and the maximum tolerable wait, beyond which an individual would choose to leave the event. The expected wait most often cited was 5 minutes for the maximum wait, approximately half (47%) said they would tolerate more than 10 minutes.

B. EXIT Interviews

The exit interviews were used to determine who had used the portable sanitation facilities, the opinions of these users and the nature of any complaints they may have had.

About 60% did not use the portable sanitation facilities. This figure differs only slightly by sex, with 61% females and 57% of males having reported non-use.

Of those using the portable sanitation facilities, approximately 75% report positive opinions ("Good" or "OK" on the interview form) and 25% report negative opinions ("Not to Good" or "Terrible"). Here the difference by sex is more pronounced with approximately twice as many females expressing negative attitudes as males (35% vs. 17%).

The table below summarizes the complaints received, by percent:

Table 3

	All	Male	Female
Odor	31	36	30
No Tissue	23	18	25
Unsanitary Conditions	21	14	25
No Light	17	23	16
Other	8	10	8
	100	100	100

The most significant differences appear to be the "Unsanitary Conditions" problem being cited by females more than by males and the reverse being reported in the case of the "No Light" complaint. At Event #1, "Odor" was the most common complaint and "No Light" was the most troublesome at Event #2.

Approximately 5% of the people surveyed in the exit interviews reported that they were leaving due to a reluctance to use the portable sanitation facilities (4% at Event #1 and 6% and Event #2). These people shortened their visits by an average of approximately 3 hours.

Another indication of the difference in behavior which may result in part from attitudes toward to the portable sanitation facilities can be seen in length of visit reported by users versus that reported by nonusers. Table 4 gives this data.

Table 4

Event #1	Average Time Spent (Hours)
Nonusers	3.11
Users	3.91
Difference	.80
Event #2	
Nonusers	2.04
Users	2.88
Difference	.84

The nonusers were individuals who did use the portable sanitation facilities but did not cite reluctance to use them as their reason for leaving. Therefore, they are not part of the 5% mentioned above.

III. Potential Costs of Inadequate Provisions for Sanitation Facilities

The costs of failing to provide adequate portable sanitation facilities are of two types. The first type is that of deterioration of public health conditions. The second type of cost is the economic impact suffered by promoters and vendors.

Threat to public health increases with the size of the queue. Our observations lead to the conclusion that people are more patient than is suggested by the 10 minutes which they give as the maximum acceptable wait to use the portable sanitation facilities. This patience does have limits, of course, and these limits appear to be encountered when the queue size reaches the mid-teens. At this point people make their own arrangements - arrangements which jeopardize public health and often interfere with the enjoyment of the event experienced by others. The problem is complicated by the contagious nature of such behavior. Once someone has "broken the ice" many others join and even those who remain in the queue examine their options closely.

Beyond this problem is that of the conditions existing within the units. This is particularly troublesome when the units are not serviced. The deodorant/additive treatment is overtaxed, splash becomes a problem and the general level of sanitation is inadequate. As a result, individuals are faced with the unappealing choices of using an offensive unit, making their own arrangements or leaving the event.

Choosing to leave is the response which has the most direct financial impact and it represents the second type of cost associated with inadequate portable sanitation facilities. These costs can be roughly calculated. While the numbers vary from event to event, the calculations can be made for two groups: First is the group which leaves the event prematurely because of an aversion to using the portable sanitation facilities. This group totaled only about 5% in this study, but represented a substantial loss in revenue nonetheless.

Example

If we assume a total crowd of 60,000/day for Event #2, using the figures given in Section II we can determine the following to be the result of reduction to 4% (from 6%) of those leaving early due to their refusal to use the portable sanitation facilities.

2% of 60,000	= 1,200	Early departees "saved".
1,200 x $15.79	= $18,948	Additional daily revenue realized through a reduction in rate of early departures.

An important point to stress here is that while a reduction of 2% (from 6% to 4%) is desirable, it may be difficult to achieve, as will additional reductions. That is something in the neighborhood of 5% may be an unavoidable minimum. The key consideration is not to permit the figure to rise. Savings generated by having fewer units at one event are quickly eliminated when people leave early because of the long waits or unsanitary conditions of the portable sanitation facilities.

The second group is considerably larger and harder to influence. This is the group which has no plans to use the portable sanitation facilities. For this group (about a third of the crowd) the obstacle appears to be attitudinal in nature. They come to the event planning not to use the portable sanitation facilities and planning to stay a shorter period of time than those who plan to use them. The impact of getting only 10% of this group to reconsider and thereby lengthen their visits would be substantial.

Summary

Negative perceptions of portable sanitation facilities are extremely costly. Our data indicate clearly that non-users do not stay as long as users and that people leave an event because of a reluctance to use the portable sanitation facilities.

While there is no obvious solution to this problem, three possible efforts to deal with it can be mentioned.

The first effort is that of an industry-wide public relations campaign. Portable sanitation facilities are better than the public recognizes - this state of affairs need not be tolerated. Changing attitudes is not an easy matter but it appears that it is a task to which the industry must give its most careful attention.

The second concerns the insistence on the part of portable sanitation facilities operators that adequate numbers and service be provided at every event. Promoters must be made to realize the economic consequences of inadequate portable sanitation facilities. To accept minimum or inadequate provisions leads to the perceptions, on the part of promoters and the public alike, of portable sanitation facilities being a source of trouble. One unpleasant episode will provide a lasting impression for many people.

The third possibility is that of governmental regulations. Public health officials must be made to recognize the importance of adequate portable sanitation facilities provisions to public sanitation. To rely on promoters to provide adequate safeguards is to open the door to serious problems.

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SPECIAL EVENT EXTENDED CHART BREAKDOWN

(No fixed facilities)

Number of Units required when no pumping service is provided
50/50 Mix of Men & Women
One unit provides approximately 200 uses with 4 hours between use

Average Crowd Size ↓	AVERAGE HOURS AT THE EVENT → 1	2	3	4	5	6	7	8	9	10
500	2	4	4	5	6	7	9	9	10	12
1,000	4	6	8	8	9	9	11	12	13	13
2,000	5	6	9	12	14	16	18	20	23	25
3,000	6	9	12	16	20	24	26	30	34	38
4,000	8	13	16	22	25	30	35	40	45	50
5,000	12	15	20	25	31	38	44	50	56	63
10,000	15	25	38	50	63	75	88	100	113	125
15,000	20	38	56	75	94	113	131	150	169	188
20,000	25	50	75	100	125	150	175	200	225	250
25,000	38	69	99	130	160	191	221	252	282	313
30,000	46	82	119	156	192	229	266	302	339	376
35,000	53	96	139	181	224	267	310	352	395	438
40,000	61	109	158	207	256	305	354	403	452	501
45,000	68	123	178	233	288	343	398	453	508	563
50,000	76	137	198	259	320	381	442	503	564	626
55,000	83	150	217	285	352	419	486	554	621	688
60,000	91	164	237	311	384	457	531	604	677	751
65,000	98	177	257	336	416	495	575	654	734	813
70,000	106	191	277	362	448	533	619	704	790	876
75,000	113	205	296	388	480	571	663	755	846	938
80,000	121	218	316	414	512	609	707	805	903	1001
85,000	128	232	336	440	544	647	751	855	959	1063
90,000	136	246	356	466	576	686	796	906	1016	1126
95,000	143	259	375	491	607	724	840	956	1072	1188
100,000	151	273	395	517	639	762	884	1006	1128	1251