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# Choosing a Landing Site for Wright Air & Space Center

Chuck Gulas, Robert Premus and John P. Blair—draft document

When Colonel Mark N. Brown was orbiting the earth as a Mission Specialist aboard the Space Shuttle Columbia on STS-28 in 1989, and when he served aboard Discovery on STS-48 in 1991, the decision regarding where to land was primarily in the hands of NASA Mission Control. Barring an emergency, the landing sites were limited to Edwards AFB, California, Kennedy Space Center, Florida, or White Sands Space Harbor, New Mexico. In 2004, the “landing” decision for Colonel Brown would be very different.

Colonel Brown retired from NASA in 1993. In 2004 he was the Dayton, Ohio based vice president of the Aerospace Division of Computer Sciences Corporation. In addition, he was a founding board member of Wright Air & Space Center (WA&SC) a non-profit corporation. WA&SC was conceived to stimulate student interest in air and space careers by providing hands-on educational experiences to help students solve problems and learn about the basic principles of flight.

The idea of a hands-on educational outreach center focused on air and space emerged from the 2003 Inventing Flight celebrations. Inventing Flight was a major event held in Dayton, Ohio to commemorate the 100<sup>th</sup> anniversary of powered flight, the accomplishment of local heroes, Wilbur and Orville Wright who ushered in the era of flight. The establishment of Wright Air & Space Center as a non-profit organization was publicly announced on December 17, 2003 at the Next Century of Flight Gala in Washington D.C.

In the summer of 2004 the search for a permanent site for WA&SC began. Plans called for the construction of a 60,000+ square foot facility to support the learning and outreach programs of WA&SC. The site selection process would fall primarily on the shoulders of three members of the WA&SC board. Mark Brown was joined by Michael Farrell, president and CEO of the Farrell Aviation Company, and Amanda Wright-Lane, great-grandniece of Wilber and Orville Wright, trustee of the Wright Family Fund, and the Wright family’s liaison to numerous aviation-related organizations.

This case examines the decision of where to locate the learning center. Several factors distinguished this decision. First, like a for profit retail establishment WA&SC sought a propitious location that would facilitate its marketing efforts. Second, although the WA&SC Board hired a consulting team, they wished to remain actively involved throughout the process. Finally, concern over community support required that the location decision be seen as objective and transparent. The choice could not alienate parties associated with the sites that were not selected because WA&SC would require support from throughout the region in order to thrive.

The case provides an interesting study of the challenges involved in making a site selection decision. It can be used as a “how to” guide for businesses, non-profit organizations and communities seeking sites for recreational, educational, cultural or other sorts of facilities. The decision would require analysis of quantitative issues such as regional demographics as well as qualitative issues such as the “mommy factor.” This term, coined by a member of the board, refers to a set of factors that would make a location desirable to parents. Perhaps most importantly, the site selection would be critical to fund raising efforts.

## The Decision

To build support for WA&SC Mark Brown and Mike Farrell spoke with numerous business and community leaders. Many saw the opportunity that WA&SC would provide. The facility would draw large numbers of children and families, many of them on a repeat basis. It would have high regional visibility and regional draw. If WA&SC was successful, the facility might even attract national attention. It could spur further economic growth by providing a base of customers who could be served by restaurants, hotels, retail stores, and other businesses. As such, WA&SC was a highly desirable tenant. The WA&SC Board was soon approached by many commercial real estate developers, economic development officers, landowners, community leaders, and others attempting to lure them to specific sites. The decision would be complex. It would involve numerous economic, marketing, and political

considerations. The WA&SC Board needed a systematic method for evaluating the alternatives. WA&SC needed to choose the site most likely to lead to long-term success. Additionally, as a start-up non-profit organization it would need community support. WA&SC could not afford to alienate anyone whose site was not selected. The site selection process needed to be thorough and fair. It needed to avoid even the appearance of any sort of bias. To aid in this process the board enlisted the help of the authors a consulting team.

## Sites Considered

The locations considered for analysis were initially developed by the WA&SC Board. An interesting dynamic occurred during the site selection process. As the activities of the site selection team became known throughout the community, the interest of community groups in the site selection increased. This resulted in new sites being added to the consideration set during the process.

## The Location Model

Site selection studies are usually conducted in an iterative manner, referred to as winnowing and focusing. During the initial stages of site selection only information that is relatively easy and inexpensive to collect is gathered. In the case of WA&SC, the consulting team, working in consultation with the board, were able to eliminate several proposed sites from consideration after preliminary analysis. Ultimately, nine possible sites were analyzed with the model.

Since conditions sometimes change even during the selection process, flexibility is necessary. In a real sense, the site selection process may never be truly finalized until a contract is signed or ground is broken.

The location model used in this study was developed as a tool to aid in ranking and selecting sites. Although the WA&SC Board hired a site selection consulting team, they remained actively involved in the process. Furthermore they required a set of locational criteria that would be flexible enough to handle changes in the WA&SC concept that might be necessary as stakeholders provided input.

## Elements of the Model

Relevant site attributes were initially identified by the board in a brainstorming session. This initial list of attributes was modified during discussions with the consulting team. After reviewing the list, it was determined that some attributes contained redundancies, which could undermine the analysis. For example, the list of attributes included 1. ease of access, 2. distance to major highway, 3. ease of highway access—car, and 4. ease of highway access—bus. While each of these attributes reflects an important consideration, there is also a very high degree of overlap. In order to prevent overlapping attributes from having excessive weight, the numerous attributes-for distinction termed location items-were aggregated into eight major location factors(see Table 1). The items and the factors were assigned weights. Each site was then evaluated using the site selection model.

**Table 1 – Location Items and Factors**

Factor	Location Items	Factor	Location Items
<b>SITE CHARACTERISTICS</b>	Acreage available	<b>CLIENT ACCESS</b>	Distance to major highway
	Site visibility from highway		Distance to local schools
	Power availability		Access to public transportation
	water availability		Ease of access
	High speed data availability		Traffic congestion issues
	300'x20' green strip		Middle school population
	Rocket launch site		Ease of highway access-cars
	Room for expansion		Ease of highway access-busses
Prestige of site	<b>COMMUNITY</b>	Financial incentives	
<b>NEIGHBORHOOD</b>		Distance to hotels	Political representation

ATTRIBUTES	Distance to restaurants	SUPPORT	Population base and trends
	Proximity to retail shopping		Local noise ordinances
	Prestige of neighborhood		Community attitude
PROJECT FEASIBILITY	Part of village concept	PROXIMITY TO SUPPORTING INSTITUTIONS	Secondary revenue utility
	Prior experience with similar projects		Distance to local universities
	Development schedule		Distance to Sunshine Park
	Site impediments		Distance to Ring Valley
	Site availability		Distance to Wright-Dunbar Village
INTANGIBLES AND OTHER	Partnership Critical mass / draw Excitement factor/ pizzazz (applicable in model 2 only)	TAX	Distance to Boonshoft Museum
			Distance to a general aviation airport
			Location county (e.g. outside of a municipal tax authority)
			County tax rate
			Personal tax rate

## Defining Aspects of Location Items

While most of the location items are self-explanatory, some brief descriptions will make the specific features more tangible.

### Site Characteristics

The following site items were intended to focus only on aspects of the site itself without concern for the surrounding neighborhood:

**Acreage available:** The board anticipated that 2.0-2.5 acres would be required to accommodate the building. If shared parking, or nearby off-site parking is not available the lot size would have to be bigger to accommodate that need.

**Site visibility from highway:** The highest ratings went to sites where the building could be seen from an interstate highway. A sign visible from a highway would be good, but slightly less desirable. Visibility from a major transportation artery, other than a highway, would be less desirable. Combinations of signs and building visibility were also reflected in the score for this item.

**Power availability:** For rural sites, distance from power sources was considered to have a slightly higher risk of disruptions, possibly slower response/repair times and potentially higher cost during construction.

**Water availability:** Municipal water was preferred to well water.

**High speed data availability:** Hard lines were preferred to satellite service.

**300' x 20' green space:** This factor was required for some proposed outside activities such as flying remote-controlled planes. Absence of this item could be ameliorated by a nearby park, other accessible open space or a remote facility used in conjunction with the primary location.

**Rocket launch site:** The team envisioned an area about the size of a football field to accommodate launches. Even a large field would receive a reduced item score if it was crowded, had overhead power lines, or was otherwise unsuitable for this activity.

**Room for expansion:** The WA&SC Board was concerned with the ability to expand horizontally. A contiguous site was preferable. Non-contiguous expansion in the same neighborhood was considered a less desirable option.

**Prestige of site:** Locations that carry prestige and are well known in the community received highest item scores.

**Safety of site:** Detailed crime statistics are difficult to obtain and are unreliable at the neighborhood level needed to access a specific site. Thus the evaluation of the safety of a site was based on community perceptions as well as perception of physical threats such as traffic patterns. Since an important market segment for WA&SC would be children who would be dropped off by parents and entrusted to the staff of WA&SC it was felt that the perception of safety was critically important. Thus safety was one of the components of the previously noted "mommy

factor.” The “mommy factor” was not a formal factor in the model, but rather a combination of issues that could make a site more or less desirable to an important market segment. The mommy factor would be critical in the marketing of WA&SC.

**Site aesthetics:** This factor addressed how well the WA&SC would look on the site when viewed from various perspectives. While this judgment was made ahead of an actual architectural design, we assumed that an architect would produce a design to fit the site. This being said, some sites afforded more aesthetically pleasing opportunities for facility construction than others.

## **Neighborhood Attributes**

Neighborhood factors extended the geographic area of consideration and recognize that a good location will require a compatible neighborhood. Most of the sites we considered were part of an existing or planned development. Typically, the management of existing developments had plans for future development. In the evaluation of each site, including the assignment of weights and location scores, the site selection team considered whether these plans were consistent with the locational needs of WA&SC.

**Distance to hotels:** The WA&SC Board foresaw the possibility of weekend “camps” and multiple day family visits. Therefore, sites with hotels within walking were preferred over locations where access to hotels would require driving. A variety of hotel categories, (luxury, family, no frills) nearby was preferred to a site with fewer choices.

**Distance to restaurants:** Both this item and the one below were components in the “mommy factor.” This item was included, in part, to address the issue of having a place for parents to spend time when a child was at WA&SC. In addition, it addresses the possibilities of combining the WA&SC visit with other activities. Thus, walking distance and variety of dining styles was preferred ranging from coffee shops to quality dining.

**Distance to retail shopping:** See above.

**Prestige of neighborhood:** By neighborhood we mean the area in which the facility will be located. Nearby residential neighborhoods may have some influence on this, but we were primarily concerned with surrounding public enterprises.

**Part of village concept:** The WA&SC may be part of an overall development. This item was intended to reflect how compatible the theme of surrounding establishments fits with images the learning center wished to project.

**Client access:** This item is focused on ease with which users of the center can get to and from the site. Availability of parking was also considered. Emphasis was given to access by the target age population, grades 6-8.

**Distance to major highway:** Locations near an interstate exit received the highest ratings. Sites directly on a major arterial street were also considered good. Lower scores went to the remote, rural locations.

**Distance to local schools:** Any likely marketing plan for WA&SC would call for significant school involvement. Hence, the availability of schools to use WA&SC as a field trip location was important. Distance was measured in driving miles. However, it should be noted that a school located a 5 minute drive from the site has nearly equal access of a school located 20 minutes from the site because bus travel would be required in both cases.

**Access to public transportation:** This item examines access by bus service and the nearness of a bus stop.

**Traffic congestion issues:** Traffic counts were not used because an area with good traffic flow may have a high or low traffic count. This item was judged by visual observation during peak traffic times. Judgment was used as to evaluate how congestion will be influenced by future development of the area.

**Middle school population:** The number of middle school students located within reasonable driving miles of the proposed site was the primary factor used in assigning scores for this item.

**Ease of highway access—cars:** Both proximity to major highways and the ability to navigate from the highway to the site affected the item score.

**Ease of highway access—busses:** Similar to preceding item, but particular attention was given to parking and congestion.

## Community Support

The WA&SC is a 501c3 non-profit organization. The initial concept required that institutions in the Dayton region raise significant funds, particularly for the capital phase of the project. Thus strong community support was essential. A controversial location could poison later fund raising efforts.

There are several factors involved in community support including the likelihood that WA&SC would be welcome in the community, that students in the community would be receptive and that financial incentives might be available.

**Financial incentives:** During the location decision process, the site selection team was not in a position to negotiate for all of the incentives that might be available. Such negotiations can only be left to principals who can commit to a location. Nevertheless, the score for this item was based on indirect evidence, judgments about incentives received by others and the tone of general discussions with landowners, developers, and public officials. In some instances discussions with representatives of particular sites constituted a first step towards concrete development incentives.

**Political representation:** Because of the educational and community resource aspect of the project, support by local public officials could be critical in attracting public support. The ability of both state and federal office holders to support the project was judged based on previous accomplishments, seniority, and interest.

**Community socio-economic factors:** This item considered the likelihood that individual children and families would support the facility. Attendance rates and academic performance in schools were major considerations in scoring this item.

**Local noise ordinances:** At times the WA&SC may engage in activities that generate high noise levels. The more likely that excess noise would be permitted, the higher the score.

**Community attitude:** Areas where average citizens would welcome and support the WA&SC was the intent of this factor. The researcher's sense of citizen participation in civic activities and the likelihood that they would participate in the WA&SC in particular were considered.

**Secondary revenue utility:** The long-term plan for WA&SC was to be self-supporting, or nearly so. Thus the ability of WA&SC to generate a supplementary income flow at a particular location was a significant factor. In particular, the ability to use the WA&SC facilities for corporate functions, banquets, private parties, etc. was considered as was the likely success of a gift shop at various sites.

## Project Feasibility

This factor was designed to determine whether the developers had the willingness and ability to contribute to the WA&SC vision. Both the site and the entire development were considered. In the case of projects that were under governmental control, the government entity was considered the developer.

**Prior experience with similar projects:** Developers with prior successful experience with similar projects received the highest scores on this item. Success in bringing innovative, exciting projects to fruition was a large part of this item's scores.

**Development schedule:** The board was on a tight schedule, so the site selection team evaluated the stage of each development project and the probability that the developer could meet the WA&SC deadlines. Projects that were early in the development process were scored low on this item.

**Site impediments:** Site impediments included issues of ownership, need for public funding or infrastructure, number of ancillary interests that need accommodation, and the willingness and ability of developers to overcome the impediments.

**Site availability:** This item addresses issues such as whether the land owners are willing and able to sell the property as well as whether there are legal or other obstacles to using the site as envisioned. One otherwise outstanding site scored low on this item due to "turf" issues revolving around ownership and control of the physical facility.

## Proximity to Supporting Institutions

This factor recognizes that a successful project in the Dayton area will rely upon a variety of local institutions for joint programs, sharing of staff, regional marketing efforts and so forth. Both immediate and potential future endeavors were considered. Proximity was not a straight line transformation of mileage or driving time. Convenience was also considered. In some cases the willingness of institutions to work with the WA&SC depended on the location selected.

The institutions included in this assessment were as follows: 1) the National Museum of the United States Air Force, the world's oldest and largest military aviation museum which draws more than one million visitors each year, 2) the Wright-Dunbar Interpretive Center, the centerpiece of the Dayton Aviation Heritage National Historical Park, 3) Carillon Historical Park, a historical park whose collection includes the 1905 Wright Flyer, 4) general aviation airports, these could be used as possible sites of a remote facility, 5) local colleges and universities, primarily Wright State University, University of Dayton, and Sinclair Community College, a possible source of student teachers, museum employees, and volunteers, 6) Boonshoft Museum of Discovery, a local science museum with complementary programming.

## Taxes

A cost consideration to both the management of WA&SC and to the employees of the organization will be taxes.

**Location County:** A factor to account for possible lower taxes if the location is outside a municipality.

**County tax rate:** Differences in county sales tax rates for counties in the region.

**Personal tax rate:** Local payroll tax rate.

## Intangible and Other

In every location decision there are intangibles. Some locations generate more excitement or pizzazz than others. Some have generally better atmospherics. Some developers show high levels of enthusiasm for a project. Perhaps there is simply better chemistry between the parties involved. To account for these situations an "intangible and other" factor was created. In the first stage analysis, no items were included in this category. The initial location items were considered to be comprehensive for purposes of Model 1. As the project moved forward data emerged to allow for intangibles to enter the model.

## Determination of Weights in the Site Selection Model

The location model constructed for this project represents a way to organize and compare data. The ability of the model to present reasonable comparisons of various sites depends critically on the quality of the input into the model, specifically the weights and item scores. This section describes the determination of the weights. The next section describes scores for each item.

A telephone survey of school superintendents and other school officials within the Dayton region was conducted. The WA&SC's success will ultimately depend upon its ability to attract children in the area. For many of these children their first introduction to space studies might be through a school activity such as a field trip. Accordingly, superintendents were asked about their preferences regarding important location attributes.

Another important source of input into the location model was a benchmark survey of similar types of institutions. Specifically, the site selection team talked with directors of established science and technology museums and hands on learning centers in the Dayton region and in other parts of the country. Respondents were asked about location issues in general and asked which factors they would consider if they were selecting a new site. The results of these two studies were used to aid in assigning the weights to the items.

To derive the weights, each of the three members of the consulting team assigned weights to each item independently of each other. There was a high level of agreement on the weights assigned. Where differences existed they were discussed and agreement was reached. The consulting team then met

with the members of the board who had also independently assigned weights to the items. Again differences were resolved so that a consensus was reached regarding the proper weight for each item.

Table 2 shows the final item weights assigned. For instance, in consideration of the items related to Client Access, access to public transportation received a score of 6.50. In contrast, ease of access—cars received a weight of 9.75. This reflects the determination that the target market would be more likely to arrive by private automobile than by public transportation.

A standardized weight was also constructed for each item as follows: Standard item weight = item weight for that individual item /  $\Sigma$  weights for all items in the category. The standardization reflects each item's relative standing within the broad location factor category. The standardization is necessary to prevent one locational factor from having more weight solely because it has more items. Like the item weight, the standardized weight is used to evaluate each of the sites. For instance, site visibility from highway was given a location weight of 8.50. The 8.5 was 8.8% of the total weight given to items listed in the Site Characteristics factor. The value for each item was then calculated as: item value = standardized item weight \* item score.

The summation of the item values for each item provides a factor score for each of the eight factors. In addition, each of the eight site categories was assigned a weight. In the judgment of the site selection team, the importance of Site Characteristics, Neighborhood Attributes, Client Access, Community Support, Site Feasibility, and Proximity to Supporting institutions were all equally important and they therefore each received a weight of 10. Taxes were deemed less important, as reflected by the rating of 2. Part of the reason for the low rating for taxes is that there were only small differences in some taxes and also, some tax advantages could be negotiated and thus counted under the Community Support factor. In Table 2, the score shown next to each of the major factors represents the weight given to that factor.

**Table 2 - Item Weights Assigned to Location Factors—Model 1**

Factor and Factor Weight	Items	Item weight
<b>SITE CHARACTERISTICS—10</b>	safety of site	9.75
	high speed data availability	9.25
	site aesthetics	9.25
	300'x20' green strip	9.00
	acreage available	8.50
	site visibility from highway	8.50
	power availability	8.50
	water availability	8.50
	room for expansion	8.50
	prestige of site	8.50
	rocket launch site	7.50
<b>NEIGHBORHOOD ATTRIBUTES—10</b>	safety of neighborhood	9.75
	prestige of neighborhood	8.50
	distance to restaurants	7.75
	distance to hotels	7.00
	part of village concept	6.50
	proximity to retail shopping	6.00

**Table 2 - Item Weights Assigned to Location Factors—Model 1 (continued)**

Factor and Factor Weight	Items	Item weight
	ease of highway access-cars	9.75
	ease of highway access-busses	9.75





	Butler County, Ohio	Clark County, Ohio	Darke County, Ohio	Greene County, Ohio	Miami County, Ohio	Mont. County, Ohio	Preble County, Ohio	Warren County, Ohio	Total
Under 5 years	23,106	9,480	3,570	8,717	6,325	37,054	2,682	12,369	103,303
5 to 9 years	24,279	10,091	3,849	9,806	7,042	39,081	2,976	12,660	109,784
10 to 14	24,520	10,403	4,099	10,425	7,553	39,070	3,281	12,210	111,561
15 to 17	14,391	6,379	2,495	6,411	4,718	22,774	2,088	6,679	65,935
18 to 34	84,205	30,825	10,709	37,308	19,860	130,116	8,483	34,606	356,112
35 to 54	99,689	41,743	15,242	44,153	30,207	162,926	13,031	52,270	459,261
55 +	62,617	35,821	13,345	31,066	23,163	128,041	9,796	27,589	331,438
Total	332,807	144,742	53,309	147,886	98,868	559,062	42,337	158,383	1,537,394

Source: Population Division, US Census Bureau

**Table 5-School Age Enrollment/Population Ratio**

	Middle Schools	Population (2003)	Middle School Enrollment	MSE/Population
<b>Dayton MSA</b>	65	947,025	35,011	36.97
<b>Montgomery</b>	30	552,187	17,714	32.08
<b>Clark</b>	17	143,351	8,263	57.64
<b>Greene</b>	9	151,257	5,537	36.61
<b>Miami</b>	9	100,230	3,497	34.89
<b>Other Counties</b>				
<b>Preble</b>	5	42,417	1,438	33.90
<b>Warren</b>	9	181,743	5,843	32.15
<b>Butler</b>	14	343,207	10,285	29.97
<b>Darke</b>	8	52,960	2,581	48.73
<b>Greater Dayton Region</b>				

Source: <http://www.greatschools.com> & Population Division, U.S. Census Bureau, April, 2004

**Table 6-Population Growth for Selected Dayton Area Cities**

	1980	1990	2000	2002	% Change in Population (1980-2000)	% Change in Population (2000-2002)
Beavercreek	31,589	33,626	37,984	38,046	20%	0.2
Centerville	18,886	21,082	23,031	23,072	22%	0.2
Dayton	203,371	182,005	166,197	162,669	-18%	-2.1
Fairborn	29,702	31,300	32,052	32,459	8%	1.3
Huber Heights	35,480	38,696	38,224	38,055	8%	-0.4
Kettering	61,186	60,569	57,697	56,680	-6%	-1.8
Riverside	...	...	23,545	23,449	NA	-0.4
Springfield	72,563	70,487	65,556	64,132	-10%	-2.2
Xenia	24,653	24,664	24,185	24,160	-2%	-0.1
Oakwood village	NA	NA	3,667	3,662	NA	-0.1
Moraine city	NA	NA	6,897	6,859	NA	-0.6
West Carrollton city	NA	NA	13,818	13,562	NA	-1.9

Source: Population Division, U.S. Census Bureau, Release Date: July 10, 2003

**Table 7-Retail Sales & Effective Buying Income Analysis for Selected Ohio Counties and Cities (2003)**

	Total Retail Sales (\$000)	Food and Drink (\$000)	Total EBI	Median Household EBI	% of Household by EBI			Buying Power Index
					\$20,000-34,999	\$35,000-49,999	\$50,000-Over	
<b>DAYTON MSA</b>	12,536,539	1,045,928	17,458,049	37,753	23.90	20.70	33.60	0.3294
<b>CLARK</b>	1,925,408	147,095	2,458,098	36,987	24.60	21.70	31.60	0.0484
<b>Springfield</b>	1,072,804	89,560	943,065	30,069	27.20	20.40	21.70	0.0289
<b>GREENE</b>	2,006,647	171,276	2,880,033	42,633	20.90	20.40	40.50	0.0535
<b>Fairborn</b>	318,501	30,878	526,080	33,052	27.00	21.60	24.90	0.0130
<b>MIAMI</b>	1,305,526	75,039	1,810,213	38,838	24.40	22.70	33.60	0.0343
<b>MONTGOMERY</b>	7,298,958	652,518	10,309,705	36,637	24.40	20.10	32.40	0.1932
<b>Dayton</b>	1,451,840	147,741	2,098,143	26,217	26.40	16.90	18.40	0.0567
<b>Kettering</b>	782,333	68,769	1,296,873	40,428	24.60	22.50	36.80	0.0299
<b>DARKE</b>	532,873	33,748	848,354	35,357	26.10	23.30	27.30	0.0159
<b>PREBLE</b>	324,217	36,595	688,613	38,232	25.90	24.20	31.60	0.0120

WARREN	2,006,178	262,387	3,881,774	51,975	16.40	19.80	52.60	0.0646
BUTLER	3,656,127	542,480	6,503,278	43,183	20.80	20.70	41.20	0.1139

Source: Survey of Buying Power, Sales & Marketing Management Magazine, 2003

[1]

**Table 8-Cumulative Number of Middle School Students within Miles of Selected Sites**

Miles Zones	0 to 9.9	0 to 19.9	0 to 29.9	0 to 39.9	Residual Area <sup>1</sup>
Sunshine Park	9,303	22,254	35,982	43,924	55,158
Ring Valley	8,361	25,000	35,368	47,466	55,158
Burner Land Development	4,229	19,667	33,412	42,378	55,158
Greene Towne Center	8,449	23,757	34,402	46,378	55,158
Cheyenne Center	10,139	25,190	37,040	46,070	55,158
Fox Park	10,158	22,666	36,734	43,924	55,158
Tanker Commerce Center	10,815	25,267	35,427	46,352	55,158
Sage Hill	5,108	14,452	26,524	35,115	55,158
Miami Mill	5,407	20,992	34,036	42,047	55,158

<sup>1</sup> The residual area refers to the area beyond the 40 mile zone but within the Dayton area 8-county region.  
Source: maps.yahoo.com

Based on all of the information gathered each site was scored on each attribute (see Table 9). Model 1 was then used to evaluate each site (see Table 10). Further analysis was then conducted on the three sites that ranked highest based on Model 1 (see Table 11).

**Table 9 – Model 1 Item Scores without Intangibles**

	RingValley	Burner LandDevelopment	MiamiMill	CheyenneCenter	Fox Park	Sage Hill	GreeneTowneCenter	TankerCommerceCenter	SunshinePark
<b>SITE CHARACTERISTICS</b>									
acreage available	8.00	10.00	10.00	8.00	7.00	10.00	10.00	5.00	0.00
site visibility fm/hyw	9.00	1.00	10.00	1.00	6.00	1.00	7.00	1.00	8.00
power availability	10.00	9.00	10.00	10.00	10.00	9.00	10.00	10.00	10.00
water availability	10.00	7.00	10.00	10.00	10.00	7.00	10.00	10.00	10.00
high speed data availability	10.00	10.00	10.00	10.00	10.00	3.00	10.00	10.00	10.00
300'x20' green strip	8.00	10.00	10.00	6.00	5.00	10.00	1.00	5.00	0.00
rocket launch site	6.00	10.00	10.00	6.00	5.00	10.00	1.00	1.00	0.00
room for expansion	2.00	10.00	10.00	2.00	5.00	10.00	1.00	5.00	0.00
prestige of site	9.00	4.00	7.00	9.00	8.00	4.00	10.00	9.00	10.00
safety of site	9.00	9.00	10.00	6.00	9.00	9.00	10.00	6.00	10.00
site aesthetics	10.00	5.00	6.00	10.00	8.00	5.00	10.00	8.00	9.00

	RingValley	Burner LandDevelopment	MiamiMill	CheyenneCenter	Fox Park	Sage Hill	GreeneTowneCenter	TankerCommerceCenter	SunshinePark
<b>NEIGHBORHOOD Attributes</b>									
distance to hotels	6.00	4.00	7.00	5.00	6.00	2.00	9.00	4.00	6.00
distance to restaurants	5.00	4.00	5.00	7.00	5.00	2.00	9.00	4.00	5.00
proximity to retail shopping	3.00	3.00	4.00	4.00	3.00	4.00	9.00	3.00	3.00
prestige of neighborhood	8.00	2.00	6.00	10.00	5.00	2.00	10.00	5.00	5.00
safety of neighborhood	8.00	9.00	9.00	6.00	7.00	9.00	9.00	6.00	7.00
part of village concept	10.00	3.00	5.00	7.00	9.00	3.00	10.00	9.00	6.00

	RingValley	Burner LandDevelopment	MiamiMill	CheyenneCenter	Fox Park	Sage Hill	GreeneTowneCenter	TankerCommerceCenter	SunshinePark
<b>CLIENT ACCESS</b>									
distance to major highway	9.00	6.00	10.00	6.00	8.00	5.00	10.00	9.00	8.00
distance to local schools	6.00	4.00	8.00	6.00	7.00	3.00	10.00	8.00	7.00
access to public transportation	7.00	1.00	1.00	10.00	8.00	2.00	5.00	10.00	8.00
ease of access	4.00	3.00	9.00	4.00	6.00	5.00	9.00	7.00	6.00
traffic congestion issues	6.00	8.00	7.00	3.00	5.00	9.00	4.00	5.00	5.00
middle school population	6.00	6.00	7.00	5.00	9.00	5.00	10.00	7.00	9.00
ease of highway access-cars	4.00	5.00	9.00	6.00	7.00	5.00	9.00	9.00	7.00

ease of highway access-buses	4.00	5.00	9.00	6.00	7.00	3.00	9.00	9.00	7.00
<b>COMMUNITY SUPPORT</b>									
financial incentives	6.00	6.00	6.00	4.00	6.00	6.00	10.00	6.00	0.00
political representation	7.00	7.00	7.00	8.00	6.00	8.00	10.00	8.00	6.00
community socio-economic details	6.00	5.00	8.00	5.00	6.00	6.00	9.00	5.00	6.00
local noise ordinances	1.00	9.00	5.00	0.00	4.00	9.00	1.00	0.00	10.00
community attitude	6.00	8.00	7.00	6.00	6.00	8.00	8.00	6.00	0.00
secondary revenue utility	2.00	5.00	5.00	7.00	9.00	2.00	9.00	3.00	0.00
<b>PROJECT FEASIBILITY</b>									
prior experience with similar projects	5.00	3.00	9.00	8.00	6.00	3.00	10.00	6.00	6.00
development schedule	3.00	4.00	10.00	3.00	6.00	4.00	9.00	5.00	0.00
site impediments	3.00	10.00	10.00	3.00	5.00	9.00	8.00	4.00	0.00
site availability	4.00	9.00	10.00	5.00	5.00	9.00	9.00	10.00	0.00
<b>PROXIMITY TO SUPPORTING INST.</b>									
distance to local universities	7.00	4.00	6.00	7.00	6.00	5.00	7.00	8.00	6.00
distance to SunshinePark	5.00	5.00	5.00	6.00	10.00	4.00	6.00	6.00	10.00
distance to Ring Valley	10.00	4.00	5.00	8.00	6.00	2.00	6.00	8.00	6.00
distance to Wright-Dunbar Village	8.00	5.00	5.00	8.00	6.00	2.00	6.00	10.00	6.00
distance to BoonshoftMuseum	8.00	4.00	4.00	9.00	5.00	2.00	5.00	8.00	5.00
distance to a GA airport	3.00	10.00	5.00	3.00	4.00	10.00	6.00	3.00	4.00

**Table 9 - Model 1 Item Scores without Intangibles (continued)**

	RingValley	Burner LandDevelopment	MiamiMill	CheyenneCenter	FoxPark	Sage Hill	GreeneTownCenter	TankerCommerceCenter	SunshinePark
<b>TAX</b>									
location county	5.00	5.00	5.00	5.00	5.00	5.00	10.00	5.00	5.00
county tax rate	5.00	5.00	5.00	5.00	5.00	5.00	10.00	5.00	0.00
personal tax rate	4.00	10.00	5.00	4.00	5.00	5.00	10.00	4.00	5.00

**Table 10 - Site Rankings by Location Factor Scores, Model 1**

Site	Overall Score
Greene Town Center	491.34
Miami Mill	451.37
Fox Park	390.52
Tanker Commerce Center	384.54
Ring Valley	366.19
Cheyenne Center	363.64
Burner Land Development	363.56
Sage Hill	335.42
Sunshine Park	303.17

**Table 11-Child Demographics - Selected Sites**

	Greene Town Center	Fox Park	Miami Mill
Number of Middle Schools within 30 mile radius	92	92	83
Middle school enrollment within 30 mile radius	50,457	50,140	45,180
Household with children within 30 mile radius	207,123	180,724	166,293
Children ages 5-7 within 30 mile radius	305,359	267,378	246,477

Sensitivity analysis was performed to determine if the relative rankings provided by the site selection model are stable. This was done by introducing small changes in one or more of the location item scores and weights and observing the sensitivity of the relative ranking to these changes. This analysis

demonstrated the model to be stable. One reason for this stability was the large number of items considered.

The model was presented to the board in spreadsheet form. This provided them with the opportunity to change weights and item values, allowing board members to test their own assumptions to determine whether the location choice would be altered if values were adjusted. It also allowed the board the opportunity to do quick reassessments if any significant changes occurred at any of the potential sites.

In Model 2 the intangible factors were added. As the site selection team became familiar with the sites, and the principle parties involved with the sites, the intangible factors began to emerge. It became apparent that the principles involved with some of the sites were very enthusiastic about creating a partnership with WA&SC. Others were more reserved about the concept. It also became apparent that some locations had a greater long-term potential to draw a stream of visitors due to the critical mass of the site. As a stand alone facility WA&SC would draw large crowds if its overall business model was successful. However, being located near other facilities with significant draw of their own would make the marketing task easier for WA&SC. Finally, perhaps the most intangible of the intangible items was pizzazz. This item is difficult to fully describe. It includes atmospheric elements such as design factors, ambient factors and people factors. It also includes an evaluation of how trendy the location is and is likely to become. How interested are teens, pre-teens and families likely to be in visiting the site? The site selection team used their judgment to estimate all of these issues and included them in the intangible category. The inclusion of the intangible items did have an effect on site scores (see Table 12). However, the top three sites remained the same and the highest rated site increased its lead over the other sites.

**Table 12 - Site and Rankings by Location Factor Scores, Model 2**

Site	Overall Site Score
Greene Town Center	591.34
Fox Park	480.52
Miami Mill	471.37
Cheyenne Center	446.96
Tanker Commerce Center	444.52
Ring Valley	419.53
Burner Land Development	403.56
Sunshine Park	363.71
Sage Hill	355.42

STS-28 landed safely on Runway 17, Edwards Air Force Base, California on August 13, 1989 at 6:37:08 a.m. PDT. STS-48 was diverted from a planned landing at Kennedy Space Center due to bad weather. The Discovery landed safely on Runway 22, Edwards Air Force Base, California on September 12, 1991 at 12:38:42 a.m. Shuttle landings are complex decisions. A weather diversion is a judgment call that that involves tradeoffs. The potential danger of landing in questionable weather must be weighed against the additional cost of transporting the shuttle back to The Kennedy Space Center from California and the possible risks associated with this procedure. The final recommendation of the site selection team was to locate in the Greene Town Center. Shortly after this recommendation was made a memorandum of understanding was signed by all of the relevant parties and fund raising efforts to build the facility began. Construction of the Greene Town Center itself began in the fall of 2005.

Return [to John Blair's home page](#)

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[1] The names of all sites other than the recommended site, Greene Town Center, have been fictionalized.