Report to the
State of Washington
Stadium Commission on

STADIUM SITE SELECTION SEATTLE-KING COUNTY WASHINGTON

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Frank L. Hope & Associates,
Architects and Engineers

Wilbur Smith and Associates, Inc.

Shannon & Wilson, Inc.

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INDEX

I. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A. Study in Perspective

The Washington State Stadium Commission was formed in 1967 for the purpose of selecting a site for a multi-purpose stadium to serve King County, Washington. The Commission thereby engaged the professional services of the consultants who have prepared this report.

The voters of King County approved (in February 1968) the issue of up to $40 million in General Obligation Bonds for the purpose of financing the Seattle-King County multi-purpose stadium. A total of 94 sites were considered by the Commission in an initial screening process. From this number, 11 sites were designated for further study. In their preliminary report presented March 27, 1968 the consultants recommended that the following five sites be retained for detailed final evaluation:

1. Seattle Center
2. Yesler Way
3. Riverton
4. South Park
5. Northrup Way

B. General Conclusions

The subject of multiple use of the stadium has been a central issue in the site evaluation procedure. The initial conclusion, based on extensive research by the consultants, is that the stadium will serve a multiplicity of uses, as follows:

1. Best served — baseball, football, soccer, rodeos, auto thrill shows, motorcycle races and similar sports events.
2. Served adequately, if designed for such use — boat shows, home shows, auto shows and similar consumer oriented shows.

The second conclusion is that the stadium will not serve adequately, regardless of design, such functions as circuses, basketball and personal appearances (except when especially large crowds occur).

The third conclusion is that the stadium will not meet contemporary requirements of conventions, large or small. The functional requirements are too varied and dissimilar to the spatial characteristics of a stadium to be effectively utilized by conventions.

Economic benefits have also been of vital concern. The consultants calculate the internal benefits (expenditures by local residents) and external benefits (expenditures by visitors to King County) will accrue to the overall benefit of King County regardless of stadium location, provided the stadium is well located in terms of good accessibility to its market, good environment, and adequate and convenient parking.

The basic site evaluation criteria evolved for application in the study of the stadium site selection procedure for King County is as follows:

1. Market Area
2. Cost
3. Utility
4. Accessibility
5. Environment
6. Public Acceptance
7. Configuration
8. Availability
9. Competition
10. Flexibility
11. Climate

See Section IV for detailed definitions of the above criteria.

After presentation of the preliminary report, additional data were developed on market area, cost, utility, environment, and foundation conditions for use in the final site evaluations. Both preliminary and final site evaluations demonstrate the superiority of the suburban sites over urban areas. In the urban areas each site would require additional expenditures exceeding the $40 million bond issue. (See Section V, B) These additional costs are for parking structures at both urban sites due to high land costs. A thorough study demonstrates not only a lack of financial feasibility, if parking structures were to be financed separately, but that the stadium would lose a substantial part of its expected revenue as well. (See Section VI, C)

It should be noted that the consultants exercised every effort to maximize the feasibility of the two downtown sites. Provisions for patron convenience, in terms of stadium configuration, parking and access capacity, and vertical transportation have been reduced to a reasonable minimum. Any further reduction in the facilities planned, whether in the guise of "deferment" or of transfer of financial responsibility, will result in an outmoded, inconvenient development. It will be found that the $40 million bond issue provides barely sufficient funds for stadium development in even the most economical location.

All five sites considered will be adjacent or convenient to future proposed rail rapid transit. In addition the South Park suburban site can be served by Seattle Transit as well as Metropolitan Transit bus routes.

The results of final site evaluations are:

Site	Score	
South Park	619	Suburban
Riverton	606	Suburban
Northrup Way	591	Suburban
Seattle Center	536	Urban
Yesler Way	464	Urban

C. Recommendations

The consultants conclude that the South Park site is the best suburban site although all of these can be considered as excellent. The Seattle Center site con-

sistently ranked higher than the Yesler Way site in the consultant's evaluation, and should be regarded as the best of the urban sites. In consideration of the ranking and of the limitation of the $40 million bond issue, and of the fact that separate financing of parking facilities would result in a serious loss of revenue to the stadium, the consultants recommend that the Stadium Commission adopt the South Park site as the most appropriate location for the Seattle-King County stadium.

D. Site Characteristics.

1. SOUTH PARK

   South Park's geographical relationship to Greater Seattle's market area is good and accessibility to this site is excellent, the highest of all considered. The site can be developed for the stadium and ample parking within the $40 million bond issue. The site will present no major construction problems, and the resulting development will prove convenient and attractive to patrons. The environmental characteristics of South Park are good: adequate buffering can be provided between differing land uses. This location would be likely to attract as many events as any other, with the exception of the Seattle Auto Show. Seattle and Metropolitan Transit will be able to serve the site.

2. RIVERTON

   The site is less well related to the primary market than South Park, but accessibility to the site is excellent. Estimates of cost indicate that the Riverton site can be developed within the $40 million bond issue. Soft soils underlying the site will require removal and replacement, thus increasing construction time as compared with South Park. The resulting development will be attractive and convenient for patrons. Environmental characteristics of the site are good, and a high degree of visibility is afforded by the site's proximity to I-5. As at South Park, only the Seattle Auto Show would be unlikely to use facilities in this location. This King County location could not be served by Seattle Transit unless special legislation were passed.

3. NORTHRUP WAY

   This northeast Bellevue site is less well related to the primary market than South Park, and access to the site is limited. The $40 million bond issue will be sufficient for the development of the stadium and ample parking, and the facilities provided will prove attractive and convenient for patrons. Very minor construction limitations are present, and environmental factors were considered good. This site was judged to be the least visible of all sites, and as in the case of the other suburban sites, the Seattle Auto Show would not be presented here. The Northrup Way site would experience less competition for access than any other.

4. SEATTLE CENTER

   Geographical relationship to primary market area is better here than at any other site, but accessibility to the site is not only physically limited, but competition for access is higher at this site than at any other as well. The cost of

developing the stadium and adequate parking in structures would exceed the $40 million bond issue (See Section V). The limited size of the site is bound to produce undesirable congestion and attendant patron inconvenience. Most environmental factors were considered excellent, but the lack of a buffer between the stadium complex and the residential neighborhood to the north limited this site's compatibility. The existence of Seattle Center was considered as an advantage to the stadium, but the existence of the stadium would probably prove to be a disadvantage to Seattle Center.

5. YESLER WAY

While the Yesler Way site's relationship to the primary market, and its accessibility were both considered excellent, other factors evaluated seriously downgraded this option. Highly unstable soils underlie the site, and account in part for the cost by which development would exceed the $40 million bond issue. (See Section V). The site is very limited in size, and topography and the location of permanent adjacent structures require that parking structures be less conveniently located than at the Seattle Center site. Present environmental conditions are the least desirable of all sites considered, and competition for access will be experienced.

II. BACKGROUND

In April, 1966, two parallel reports were received by the Board of County Commissioners of King County and the Mayor and City Council of Seattle. One of these, *Economic Feasibility of a Multi-Purpose Stadium for King County and Seattle,* was prepared by Western Management Consultants, Inc., Phoenix, Arizona. The other report, *Engineering Study, Seattle-King County Stadium,* was prepared by the firm of Praeger-Kavanaugh-Waterbury, New York, New York.

The first report supported the economic feasibility of a major league, multi-purpose stadium serving King County and Seattle. The conclusions resulting from that evaluation are reproduced below.

> ***Major League Potential.*** *The Seattle Area is unique among larger urban centers in the United States for having neither major league baseball nor professional football. Its population and income levels, the improved team travel situation implied by jet transportation, and the existence of other West Coast sports franchises have removed most economic limitations that might prevent the area from realizing its major league potential. The relatively untapped local television and radio revenue potentials, as well as local population and industrial growth prospects enhance the attractiveness of the Seattle Area as a market capable at present of supporting professional football. Income and population projections indicate the likelihood that the area could support both professional football and major league baseball within five to seven years — the earliest that a stadium could be expected to reach a 'normal' level of operation.*
>
> ***Revenue Outlook.*** *It is doubtful that any 50,000 seat multi-purpose stadium completed at current construction costs could generate sufficient revenue to cover all costs of operations and fully service the requisite debt load. A multi-purpose stadium in Seattle could, however, reasonably be expected to cover its direct operating costs and make a $200,000 to $400,000 yearly contribution to debt service, assuming both major league baseball and professional football tenants were available and the teams were adequately supported by the local market. If professional football and an AAA baseball team were to be the stadium's major tenants, the facility's income would be substantially lower. It would not fully cover all operating and improvement costs. An annual operating subsidy of $50,000 to $150,000 would be required in addition to assumption by the public of the full debt service.*
>
> ***Economic Impact.*** *Depending on the degree of stadium utilization, economic impact in terms of increased local income generated by its operation could range from a negative quantity to well over $20 million annually. In addition, intangible community benefits from publicity, expansion of the local recreation base, and the pleasure derived from attending stadium events, are compelling reasons to consider favorably such a project. The aggregate benefits would, if suitable tenants become available, exceed the costs to residents in the relevant political jurisdictions.*[1]

[1] *Economic Feasibility of a Multi-Purpose Stadium for King County and Seattle* (Phoenix: Western Management Consultants, Inc. 1966). pp. II-1 and II-2.

The Praeger-Kavanaugh-Waterbury report considered the relative costs of open and enclosed stadiums constructed in either an urban or a suburban location.

In recognition of the conclusion that a multi-purpose stadium probably would not be self-supporting, legislation was enacted in 1967 authorizing a special hotel-motel room tax to be levied county-wide, with a portion of the resultant revenue directed to the support of the Seattle-King County Stadium.

Legislation was passed in 1967 by the Washington Legislature which authorized the Governor to appoint a six-member stadium commission to function within any class AA county, class A county or first-class county in the State of Washington.

The responsibility of a stadium commission thus appointed by the Governor is to make a complete study and investigation into the acquisition of a site for public stadium facilities, including feasibility studies in connection therewith, and to report its findings and recommendations to the governing body of the county requesting the stadium commission.

Subsequently, the Governor of the State of Washington appointed the following members to the State of Washington Stadium Commission:

Mr. Joseph Gandy, Chairman
Mr. Dave Cohn, Vice Chairman
Mr. John Spellman, King. County Commissioner
Mr. John O'Brien, King County Commissioner
Mr. Floyd Miller, President, Seattle City Council
Mr. Charles Carroll, Seattle City Councilman
Mr. Jack Keene, Secretary to the Commission.

During 1967, the newly-appointed Stadium Commission received some 94 stadium site proposals from various individuals and organizations. In order to expedite the selection of a site, the Stadium Commission appointed a committee to review the 94 proposals with the objective of recommending a lesser number for further study. Members of this committee are as follows:

Mr. Jean DeSpain, King County Engineer and Chairman
Mr. Edward Sand, King County Planning Department
Mr. Robert Hintz, Seattle Planning Department
Mr. Myron Mitchell, Seattle Traffic Engineer
Mr. Richard Anderson, Seattle Engineering Department.

Eleven of the proposals were recommended by the committee for further study. Those sites eliminated consisted of numerous duplications and those conflicting with the following criteria:

1. *Those sites which have an obvious conflict with a predetermined public use such as schools or parks.*
2. *Those sites which present nearly insurmountable parking problems and/or traffic movement problems of great magnitude. For this purpose a 60,000-seat facility was assumed and would require about 20,000 parking spaces.*
3. *Lack of accessibility from and to major transportation facilities such as freeways,*

airports, railroad stations, proposed rapid transit routes and stations, taking into account the timing and/or programming of proposed improvements.

4. *Conflict with existing land use, as placing of stadium site within an established residential neighborhood or introducing a traffic generator of major proportion into an area where the livelihood depends on traffic getting to and from the area and which normal traffic would encounter great difficulty with the added traffic load, or where large employment centers might reasonably be expected to discharge traffic coincident with the discharge from the stadium.*
5. *Lack of proximity to the major population center, which is obviously the City of Seattle, to secondary population centers and to available fast and safe transportation routes from the population centers and the stadium site.*
6. *Inconvenient accessibility to public accommodations in existence or known to be in the planning stage.*

In December, 1967, the State of Washington Stadium Commission retained the following consultants to assist it in the selection of a site in metropolitan Seattle for a new multipurpose stadium:

Western Management Consultants, Inc.
Frank L. Hope & Associates
Wilbur Smith & Associates, Inc.
Shannon and Wilson, Inc.
Fenton, Conger & Ballaine, Inc.

Western Management Consultants, Inc., a Phoenix-based firm with offices in New York and Los Angeles has primary responsibility for the project in addition to that specifically for the socio-economic locational factors in the project.

Frank L. Hope & Associates, a San Diego and Manila firm of planners, architects, and engineers, has specific experience in site selection techniques for stadiums and is responsible for the coordination of the efforts of all consultants.

Wilbur Smith & Associates, Inc., a firm of engineers and planners, with offices in San Francisco and New York, has primary responsibility for evaluation of transportation needs of the sites in terms of highway access, transit and parking.

Shannon & Wilson, Inc. is a Seattle, Portland and Burlingame firm of engineers responsible for the appraisal of geological and foundation factors influencing stadium location.

Fenton, Conger & Ballaine, Inc. is a Seattle firm of real estate appraisers having primary responsibility for estimating land costs and acquisition time.

A. Project Assignment

The State of Washington Stadium Commission requested the consultants to follow a two-phase procedure in the stadium site selection study. At the Commission's request, the first phase of site evaluation was to culminate with a preliminary report by March 31, 1968. The objective of the preliminary evaluation was to reduce the number of sites

under consideration from eleven proposed sites to some lesser number.

Phase II activity was to consist of a detailed evaluation of the sites recommended by the consultants in their preliminary report. The objective of the detailed evaluation was to further reduce the number of potential stadium sites to the best downtown Seattle site and to the best non-downtown site, considering all pertinent and germane factors bearing on the subject of site selection, and to indicate the consultants' recommendation between the two final sites.

In the course of their initial activity, the consultants reviewed each of the 94 site proposals originally submitted to the Stadium Commission. As a result of this review, the consultants concurred with the recommendations of the DeSpain committee.

Thus, the specific assignment of the consultants was to evaluate the eleven sites recommended by the committee directed by Mr. DeSpain plus any additional sites that the consultants might consider worthy of evaluation or requested by the Commission.

In several instances, the land area of the originally proposed site was not large enough, or was of too irregular a configuration to accommodate a multi-purpose stadium. Consequently, the consultants enlarged the areas to obtain more workable sizes and configurations. In other instances, the consultants examined more than one site in the general vicinity of the originally proposed site

The general site areas evaluated in Phase I are as follows:

1. Seattle Center
2. King Street
3. Atlantic Street
4. Tukwila
5. Longacres
6. Orillia
7. Factoria
8. Woodinville
9. Yesler Way
10. South Park
11. Riverton
12. Northrup Way

The Northrup Way site is supplemental to the eleven sites initially described by the Commission.

B. Interim Preliminary Activities and Findings.

Operating from a special office in Seattle during the preliminary phase of the work, the consultants collected data from many public and private sources. Principal areas of interest in the data were population, its distribution now and in the future, family income levels, streets and highways (both existing and planned), existing and planned utilities systems, soils and foundation information, land values, existing and planned land uses, and major community elements of institutions, industries and activities. A complete list of this information will be found in the Bibliography Section.

In addition to original research conducted by the consultants, data were collected from public records and personnel, such as the planning officers of cities and counties, engineers of the various municipalities, and public information officials of institutions and private industries.

The purpose of this broad research was to apply statistical data against a system of site evaluation criteria. These data were then organized so that the differences between the proposed stadium sites could be measured, in many cases, in quantifiable terms, or real numbers. By applying these measurements, the question, "How much better is this site than another?", could be answered in fact.

A thoroughly tested procedure, based on the consultants' extensive past experience, was used in this system of criteria analysis. First, all aspects of importance in site selection were described. Then, the site evaluation criteria were weighted as to their relative importance, since obviously one criterion can be twice as important as another. Later, each site was scored against the weighted criteria as to how well it met the requirements of a good stadium site. While basic criteria for stadium site selection in one city are similar to those selected for another, the differences are very important. It is pointed out here that the site evaluation criteria applied in the Seattle-King County stadium site selection are different, and their relative importance weighted differently, than those used for any other similar project in other metropolitan areas.

It should be noted that many of the criteria reinforce others and that all criteria are selected and weighted to produce a site selection which will result in placing the stadium in the location of greatest economic benefit to King County.

The criteria and weights selected for use in the "Interim Preliminary Report" presented to the Commission March 27, 1968 are as follows:

Market Area	10
Accessibility	10
Cost	8
Configuration	7
Environment	8
Utility	10
Public Acceptance	6
Availability	3
Competition	5
Flexibility	3
Climate	1

Definitions of these criteria will be found in Section IV "Site Evaluation Criteria."

In order to thoroughly test the validity of the criteria evaluation system for the Phase I report, the consultants computed scores for the 12 sites considered under the following conditions of analysis:

1. Using all criteria and weights listed above.
2. Using only the criteria market area, accessibility, cost, environment and utility.

3. Using only the criteria market area, accessibility, environment and utility.
4. Using all criteria except cost.
5. Using all criteria but assigning utility a weight of 60 (one-half the total weight).
6. Using all criteria but assigning weights of 20 to market area, accessibility and utility.

Based on the results of this preliminary scoring, the consultants recommended the following sites be retained for further consideration: (not in order of rank)

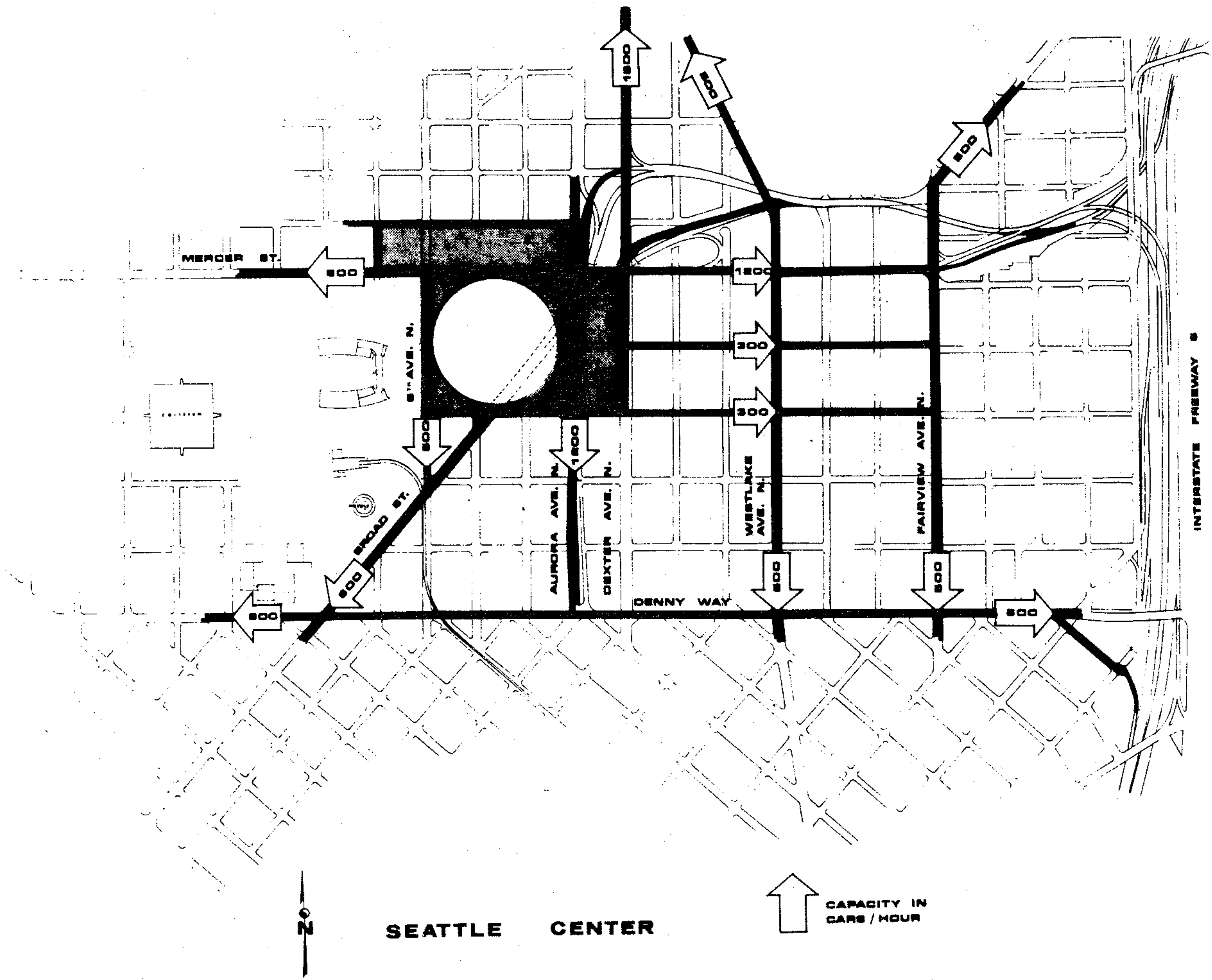
Seattle Center
Yesler Way
South Park
Riverton
Northrup Way.

The Seattle Center, South Park, Riverton and Northrup Way sites consistently ranked high in the scoring; the Yesler Way site, while ranking lower overall, was retained due to its high scores in market area and accessibility as well as because substantial public and private support for that site had been expressed to the consultants.

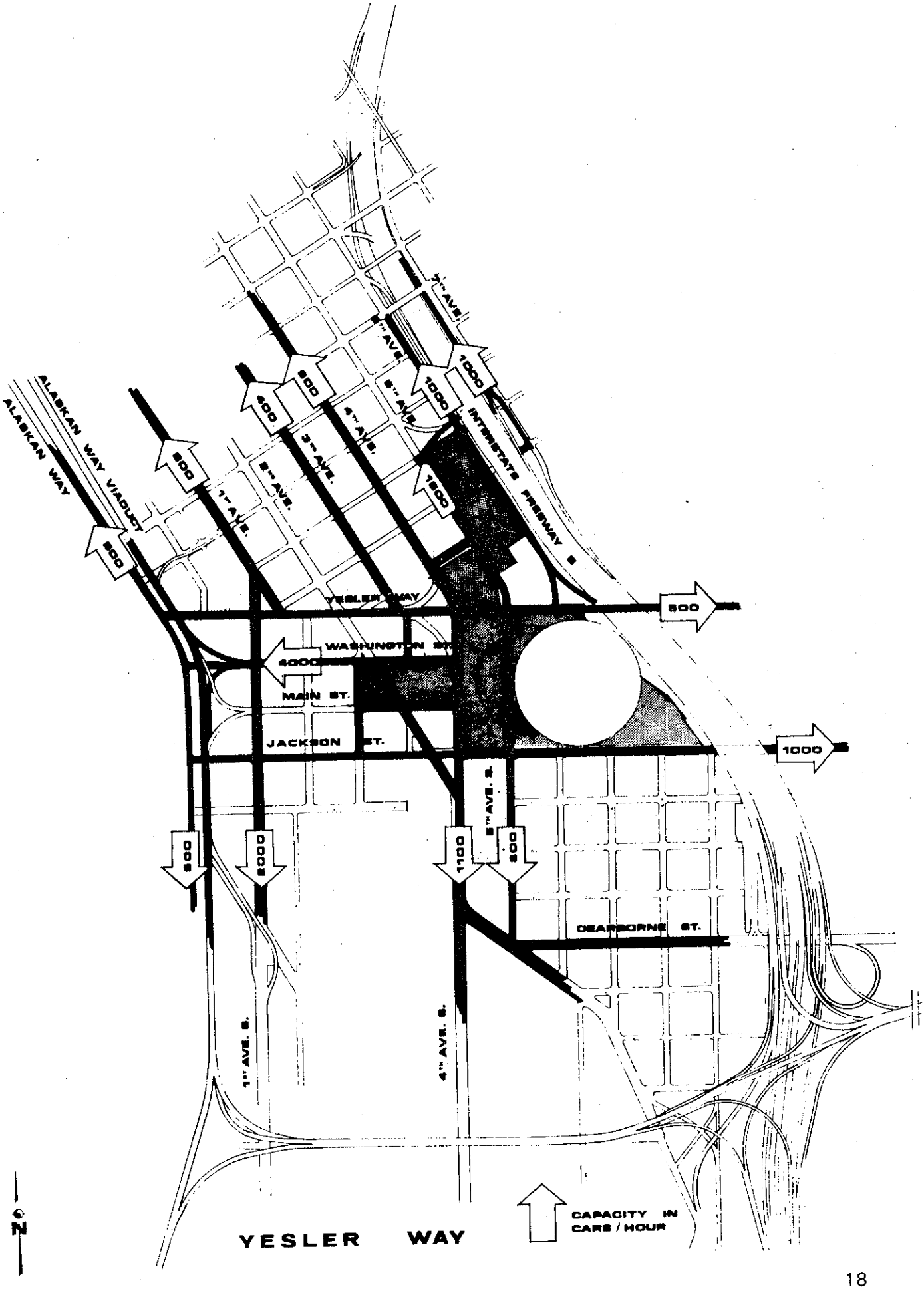
A joint meeting of the Stadium Commission and the stadium consultants was held on March 27, 1968, to formally review the Interim Preliminary Report. In its course of action, the Commission unanimously passed two motions:

1. The first motion accepted and approved the Interim Preliminary Report.
2. The second motion instructed the consultants to group the five remaining sites into suburban and urban categories and then to recommend the best site of the urban sites (Seattle Center and Yesler Way) and the best site of the suburban sites (South Park, Riverton and Northrup Way).

Further, the Commission requested that the consultants rank all the final sites in order of their final scores.



SEATTLE CENTER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YESLER WAY
WASHINGTON ST.
MAIN ST.
JACKSON ST.
DEARBORN ST.
1ST AVE. S.
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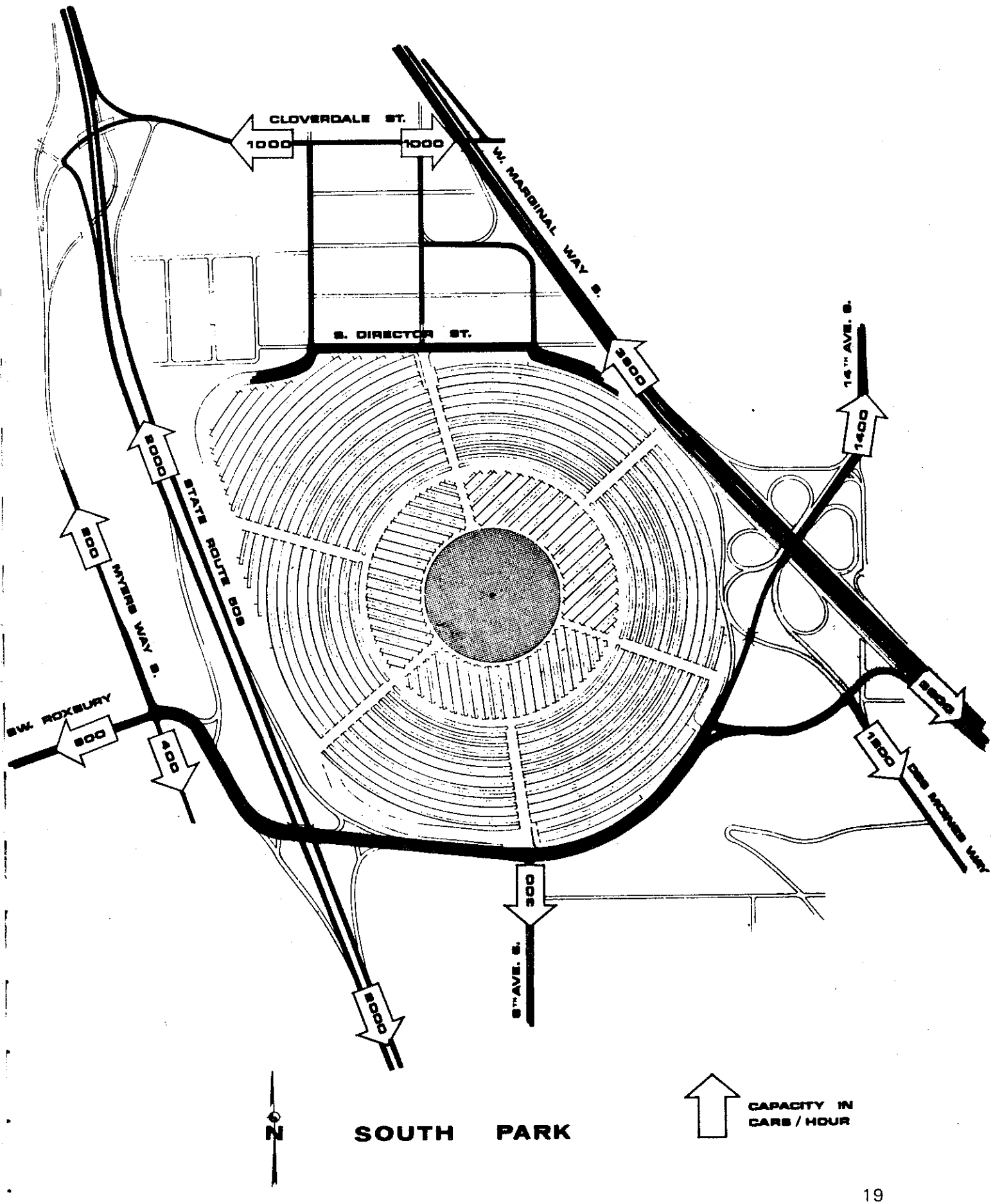
CAPACITY IN CARS / HOUR
YESLER WAY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MYERS WAY S.
SW. ROXBURY
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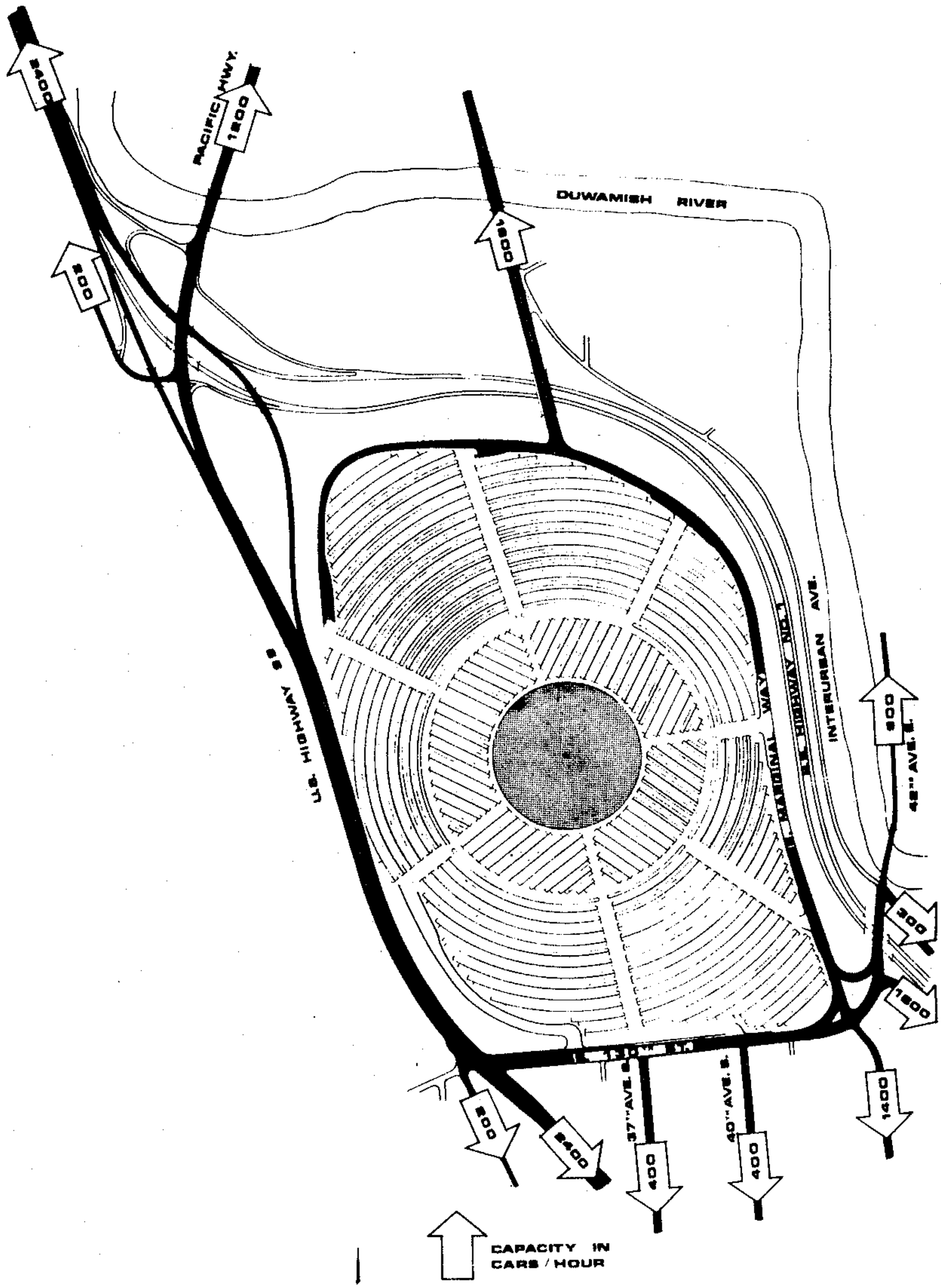
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37TH AVE. S.
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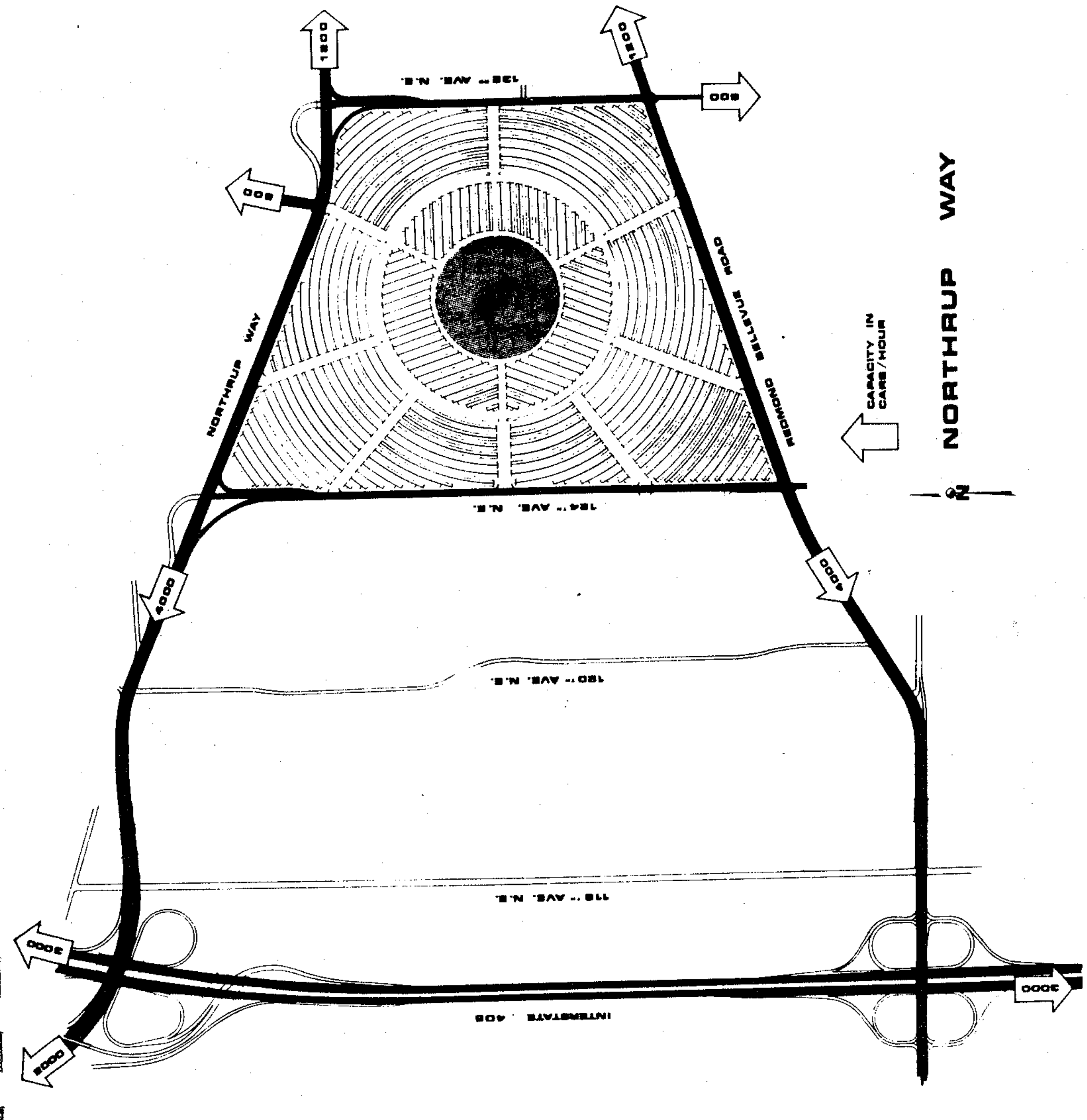
RIVERTON


NORTHRUP WAY
CAPACITY IN CARS/HOUR
NORTHRUP WAY
REDMOND BELLEVUE ROAD
INTERSTATE 405
800
800
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3000
3000
2000

V. FINAL SITE EVALUATION

Since the consultants submitted the Interim Preliminary Report at the end of March, 1968, numerous studies in depth have been made. At the Commission's direction, Wilbur Smith & Associates made an extensive survey in Seattle's central business district to determine the feasibility of parking revenues from both the stadium users and business parkers defraying the costs of the parking structures required at the Yesler Way site. Western Management Consultants conducted a nationwide survey of convention and trade show promoters, stadium managers, and visitor and convention bureaus to determine the requirements for meeting and display facilities. Shannon and Wilson made engineering tests at all sites to verify preliminary findings on foundation requirements. Fenton, Conger & Ballaine reviewed in more detail the appraised values of the land required at each site. Frank L. Hope & Associates recalculated market area values for each site based on new and more detailed driving time information. All cost estimates have been refined and updated to reflect all new data. Detailed traffic engineering studies have been made for all sites to refine the differences between them.

The Commission and the consultants have heard in public sessions presentations from all major site proponents, and through numerous letters and personal contacts, many private individuals' views on the site selection process. Many of the individuals questioned the consultants as to why their site suggestions had not been considered. Without exception, these proved to be within the group of sites considered by Mr. DeSpain's Committee and not recommended by that group for further consideration. Many of the sites thus re-proposed involved the incorporation of public lands either developed as parks or designated for use as parks. Since one part of the Forward Thrust program passed last February provided funds for additional public recreational facilities, it did not make sense to the consultants to further consider sites which would preempt that use.

It should be pointed out that while the consultants reviewed at length the favorable and unfavorable aspects of site location on the urban fabric from a planning and urban design point of view, as well as from an economic point of view, it is not within the purview of the consultants' responsibility to subordinate the socio-economic viability of the stadium to that of any other interest.

One of the most difficult tasks of the consultants was to consider the attributes of all sites on an equal basis. For instance, while it is clearly judged to be most economical to acquire a large amount of land in a suburban location and to develop on-grade parking; economics dictate that the urban site be limited in its land acquisition and that parking structures be developed. The question then arises: Is surface parking more convenient to the patrons than parking in multi-level strucutres? If parking conditions were equalized at the Seattle Center site as nearly as possible to those at a suburban site, (all parking at grade) all the land between Mercer Street and Denny Way, and between 5th Avenue North and Fairview Avenue North would in theory have to be acquired.

In considering the criterion "cost," the consultants have been advised by the Commission that the $40 million bond issue constaint is a real and actual limitation of the money to be spent on the stadium and its necessary appurtenances. Accordingly,

scoring of the sites in this category recognizes this constraint. However, in recognition that supplemental funds could be forthcoming from other sources (St. Louis businessmen contributed $20 million toward the construction of Busch Stadium), scores have also been tabulated eliminating cost as a consideration.

Much has been said about the number of non-sports events that would be "lost" if the stadium were not to be located downtown. The results of a nationwide survey of convention managers, show promoters, and stadium operators do not support this claim. In fact, substantial differences in facility requirements between conventions, trade shows and the like on the one hand, and mass spectator events such as sports, personal appearances and the like on the other, lead to the conclusion that the stadium facility even if located downtown, would in all likelihood not prove attractive to the convention business — particularly if more suitable facilities were available elsewhere. Cities of Seattle's stature throughout the country are constructing facilities specifically designed for the convention-trade show business, and thus will be able to offer a more convenient "package" to the convention manager or show promoter. It is unlikely that Seattle will be able to compete successfully for this business without comparable facilities. Additional exhibition facilities at Seattle Center may solve this problem.

The results of the preliminary findings combined with the additional data developed subsequent to the Interim Preliminary Report are reflected in the final site evaluation that follows:

A. Market Area

The scores for market area published in the Interim Preliminary Report were based on an estimated 15-minute driving time from each site. That is, from an analysis of average speeds recorded on freeways and major streets, 15-minute isochrones were calculated for each site. Using population distributions for 1968 and 1985, and median family income by census tract, a total average market was calculated for each site. The isochrones were later tested by actual driving times recorded for 5, 10, 15, 20, 25 and 30 minutes duration. As in the Interim Preliminary Report, however, the 15-minute isochrone was used to compare sites. (See sample isochrone illustrations). The following tabulation shows the differences in market areas calculated.

15-MINUTE DRIVING TIME

	INTERIM PRELIMINARY REPORT AVG. TOT. INCOME 1968-1985	SCORE
Seattle Center	$1,452,796,000	9.5
Yesler Way	1,523,784,000	10.0
South Park	1,027,941,000	6.7
Riverton	1,185,526,000	7.8
Northrup Way	1,043,625,000	6.8

1. SEATTLE CENTER	
a. Stadium	
Land and demolition	$3,618,000
Site development	5,530,300
* Structure	26,010,600
Subtotal Stadium	$35,158,900
b. Parking (6400 cars and 320 buses)	
Land and demolition	$4,361,000
Structures and improvements	13,817,500
Subtotal Parking	$18,178,500
Total Stadium and Parking	$53,337,500
* Optional extras	
Concessions finish	$1,732,500
Scoreboard	693,000
2. YESLER WAY	
a. Stadium	
Land and demolition	$2,118,350
Site development	6,946,800
* Structure	26,010,600
Subtotal Stadium	$35,075,750
b. Parking (5,500 cars and 420 buses)	
Land and demolition	$3,983,000
Structures and improvements	13,227,900
Subtotal Parking	$17,210,900
Total Stadium and Parking	$52,286,650
* Optional extras	
Concessions finish	$1,732,500
Scoreboard	693,000
3. SOUTH PARK	
a. Stadium	
Land and demolition	$ 562,500
Site development	2,863,900
* Structure	26,010,600
Subtotal Stadium	$29,437,000
b. Parking (13,800 cars and 250 buses)	
Land and demolition	$5,452,500
Lots and improvements	4,188,400
Subtotal Parking	$9,640,900
Total Stadium and Parking	$39,077,900

Amount available for contingency	$922,100
* Optional extras	
Concessions finish	$1,732,500
Scoreboard	693,000
4. RIVERTON	
a. Stadium	
Land and demolition	$ 547,500
Site development	3,698,100
* Structure	26,010,600
Subtotal Stadium	$30,256,200
b. Parking (13,800 cars and 250 buses)	
Land and demolition	$5,427,500
Lots and improvements	4,130,500
Subtotal Parking	$9,558,000
Total Stadium and Parking	$39,814,200
Amount available for contingency	$185,800
* Optional extras	
Concessions finish	$1,732,500
Scoreboard	693,000
5. NORTHRUP WAY	
a. Stadium	
Land and demolition	$ 747,000
Site development	1,123,300
* Structure	26,010,600
Subtotal Stadium	$27,880,900
b. Parking (14,000 cars and 240 buses)	
Land and demolition	$7,375,000
Lots and improvements	3,666,400
Subtotal Parking	$11,041,400
Total Stadium and Parking	$38,922,300
Amount available for contingency	$1,077,700
* Optional extras	
Concessions finish	$1,732,500
Scoreboard	693,000

agencies rather than by stadium bond funds, they neverthelss represent a cost to the taxpayer, and were listed separately, with other stadium costs, in that chapter.

The sixth and final step in accessibility evaluation was to compare all of the sites against one another. The differences between available and required capacity in each direction, both for present and possible future conditions are quantitative numbers, and can be compared with one another.

The cost of achieving the required capacity was not directly used in accessibility scoring, (though it went into total cost as noted above), but a scale was made indicating qualitatively the chances of such highway work actually being done. This "feasibility" score does not indicate feasibility, but rather indicates design feasibility and the practical constraints other than cost.

The accessibility score, then, became the difference between available and required capacity, weighted by the design feasibility of overcoming the difference, and as such represented a summation of all the preceding steps.

Though every design possibility has not been exhaustively studied, a great deal of time and attention has been given to each site, in an attempt to determine the best and most economical means of upgrading the existing access to a desirable level. This has also required study of stadium location upon the site, and the relationship of stadium parking to both the stadium and to points of access and egress.

A brief summary of the access design constraints for each site follows.

1. SEATTLE CENTER

Several possible sites for a stadium at Seattle Center were investigated. From a traffic access viewpoint, the better of these several sites is the area bounded by Denny Way, 5th Avenue, Aurora Street, and Broad Street. However, the cost of acquisition of this site was deemed impractical by the appraisers. For similar reasons, in various combination, the other possible sites around Seattle Center were found to be less suitable than the originally proposed site between 5th and Aurora, Mercer Street and Harrison Street, so the access studies were then directed primarily to that location.

It is estimated that approximately 45 percent of auto-driving fans at a Seattle Center Stadium site would wish to travel north and 55 percent south when leaving a game. Of these, the majority in each case would prefer to use I-5 freeway. At present, the shortest route between the stadium site and the freeway is Mercer Street. However, the freeway ramps at Mercer Street are only one-lane ramps, and in peak traffic conditions even now (for example, when Seattle Center is in heavy night usage) there is considerable backup and delay resulting.

Further, the relatively short weaving distance available to northbound traffic entering I-5 from Mercer Street and wishing to go east on the Evergreen Point Floating Bridge is a serious restraint upon capacity, even if additional lanes were added to the on ramp.

The completion of the Bay Freeway between I-5 and Aurora Street will give some relief, but will not really solve the basic problems of I-5 entering capacity, as discussed above.

Also the capacity of the Bay Freeway interchange as proposed near Aurora and Mercer would be totally inadequate to handle stadium crowds and empty garages rapidly.

For these reasons, design studies were made to see if an interchange at Aurora could be constructed that would both serve basic, day-by-day traffic needs and would be able to absorb traffic loads from a stadium. The most likely method devised involves the construction of a directional type interchange, with connections to Aurora Avenue and Dexter Avenue. Aurora Avenue would be made one-way southerly to Thomas Street, and Dexter Avenue would be made one-way northbound from Thomas Street and tied back into two-way Aurora Avenue south of the Aurora Bridge. The design studies also evaluated the possibility of widening existing southbound ramps, plus two new direct access or "crossover" type ramps at I-5 from the Bay Freeway, to avoid that capacity problem. These latter connections would be particularly difficult and expensive. Even with these measures all existing major surface streets in the vicinity of Seattle Center would be utilized as egress routes when capacity crowds attended stadium events.

2. YESLER WAY

The proposed stadium site east of 5th Avenue, between Yesler Way and Jackson Street has a number of important access advantages, as well as some difficult problems. The advantages are, first, that the site is close to the I-5 freeway and to a number of interchanges and freeway crossing points; second, that stadium parking will probably take place over a large area at the south end of the CBD, giving a broader, less concentrated range for traffic disposal; and third, it is the closest of the sites to existing public transportation with suburban connections.

The problems of the Yesler Way site are, first, that the provision of sufficient close-in stadium parking is economically impractical without massive subsidy (see special chapter on parking); second, that northbound auto egress movements, either on downtown streets or onto freeway ramps, such as the Cherry Street ramps, are very difficult without making major operational and design changes in the city street system in that area; and third, that movement southbound on I-5, or eastbound on U.S. 10 (Connecticut Street) to cross Lake Washington, can only be efficiently provided by constructing new ramp connections just south of Yesler Way to the Alaskan Way viaduct, which will later interchange with U.S. 10 and provide good eastbound-southbound connection possibilities.

The design assumed stadium garages would be constructed between the 5th and 6th Avenues, north of Yesler Way, west of 5th Avenue, between Yesler Way and Jackson Street; and possibly extending westward from 4th Avenue between Washington Street and Main Street.

Design studies call for 5th Avenue to have parking eliminated on both sides and be made a 4-lane two-way street from Yesler Way to Cherry Street; for the approach to the express lane ramp at Cherry Street to be widened and reconstructed; for parking to be prohibited on Cherry Street, Yesler Way and James Street between 2nd Avenue and 9th Avenue, at least during game hours; for 6th Avenue to be operated as a completely reversible street between Cherry Street and Yesler Way, permitting

northbound auto egress to occur on 6th Avenue at post-game times. Access studies further propose one-way ramps to be constructed to both levels of the Alaskan Way viaduct from Main and Washington Streets, respectively.

Generally, the Yesler Site has reasonably good possibilities of meeting stadium access needs, if the operational measures could be effected without disruption to other city traffic needs.

3. SOUTH PARK

The South Park site is located in a natural bowl between hills to the north and south, the West Seattle Ridge to the west and the Duwamish River to the east. Its primary access advantages stem from the fact that the West Marginal Freeway forms its eastern boundary, the new Route 509 Freeway is under construction along its western boundary, and a proposed future major street — 14th Avenue South – Roxbury Way S.W. — can form its southern boundary, with freeway interchanges at three of the four corners at the site.

Access problems of the South Park site include the problem of widening the structure and ramps of the existing 14th Avenue S. – Des Moines Way interchange with West Marginal Freeway to meet stadium capacity requirements; the difficulty of designing an interchange with the new Route 509 Freeway at the southwest corner at the site because of the steep sidehill; and the problem of connections from these two freeways to I-5 and the Lake Washington Bridges. Design studies indicate that the first two problems can be met without great difficulty; and that southbound movement to I-5 via West Marginal Freeway, and to the Burien area via Route 509 freeway and Des Moines Way will have adequate capacity.

The northbound stadium egress will be hampered by the problem of crossing the Duwamish River with only the U.S. 99 and 14th Avenue S. bridges now available. However, early construction of the proposed new Carson Avenue-Kenyon Street Bridge will largely obviate that problem. In the interim, some northbound egressing traffic would be required to go out of their way to the south to use the Pacific Highway Bridge.

Generally, the accessibility and design possibilities at the South Park site are excellent.

4. RIVERTON

The proposed stadium site at Riverton is located between old Pacific Highway and West Marginal Freeway, at the old Riverton quarry. This site is similar to the South Park site in many of its access characteristics, including the problem of northbound egress across the Duwamish River, but with perhaps slightly less opportunity for future improvements. However, the accessibility is generally very good. Like the South Park site, the provision of space for future reversible express lanes in the West Marginal Freeway is a real advantage.

The primary access design problems at Riverton are, first, to relocate E. Marginal Way S. to the east, against the new freeway, to serve both through traffic and as an access road to the stadium; second, the widening or addition of new bridges on E. Marginal Way

across both the Duwamish River and W. Marginal Freeway; and third, the local street widening needed in the immediate stadium vicinity, including S.W. 130th Street, along the southern edge of the site. All of these are within the realm of design feasibility.

5. NORTHRUP WAY

This proposed site, located in Bellevue, between Northrup Way and Bellevue-Redmond Road, has characteristics similar to South Park and Riverton, in that it would be surrounded by access roads, but has very serious highway capacity limitations. A very high proportion of the stadium users would wish to cross the Lake Washington Bridges, and practically all would be using the two interchanges of I-405 at N.E. 8th Street and Northrup Way—Route 520. These interchanges would have to be reconstructed to provide wider East-West bridges and ramps of at least tow-lane width in some quadrants.

In addition, an interchange with Northrup Way and 132nd Avenue, S.E., at the N.E. corner of the site would probably be required, unless it were constructed early, as a part of future Route 520 Freeway, by the State Highway Department.

If the construction of Route 520 Freeway could be accelerated to meet the stadium construction schedule, widening of Northrup Way would be less important. Bellevue-Redmond Road and N.E. 8th Street would have to be widened to six lanes in any event, with the center two lanes reversible, and special treatment at the N.E. 8th intersection.

While all of these projects could technically be done, serious delay in any of them could adversely affect stadium utility, and some of them are technically and politically quite difficult to accomplish.

Capacity is a more serious concern at this site than at any other, and includes concern about the capacity of the Lake Washington bridges. For all these reasons, the Northrup Way site can only be rated "fair" on accessibility.

NUMERICAL RATING

The following charts indicate the rating that results from quantitative analysis of the accessibility of the sites.

	INTERIM PRELIMINARY REPORT WEIGHTS	FINAL REPORT WEIGHTS
Market Area	10	10
Cost	8	10
Accessibility	10	10
Configuration	7	7
Availability	3	3
Environment	8	
Compatibility		4
Identity		4
Image		2
Nuisance		1
Utility	10	5
Public Acceptance	6	6
Flexibility	3	3
Competition	5	5
Climate	1	1

Using all criteria and the new weights, total scores for the sites are as follows:

	SCORE	RANK
Seattle Center	536	4
Yesler Way	464	5
South Park	619	1
Riverton	606	2
Northrup Way	591	3

Using all criteria except cost:

	SCORE	RANK
Seattle Center	469	4
Yesler Way	389	5
South Park	519	1
Riverton	506	2
Northrup Way	491	3

Using only the criteria market area, accessibility, cost, environment and utility:

	SCORE	RANK
Seattle Center	395	2
Yesler Way	362	4
South Park	398	1
Riverton	390	3
Northrup Way	359	5

Using only the criteria market area, accessibility, environment and utility:

	SCORE	RANK
Seattle Center	328	1
Yesler Way	289	4
South Park	298	2
Riverton	290	3
Northrup Way	259	5

Using all criteria, giving utility one-half the total of all weights:

	SCORE	RANK
Seattle Center	1186	3
Yesler Way	1049	5
South Park	1204	1
Riverton	1191	2
Northrup Way	1176	4

Using all criteria, giving market area, accessibility, and utility double weights:

	SCORE	RANK
Seattle Center	766	4
Yesler Way	701	5
South Park	835	1
Riverton	810	2
Northrup Way	772	3

Using all criteria, but weighting them as in the interim preliminary report:

	SCORE	RANK
Seattle Center	546	4
Yesler Way	480	5
South Park	622	1
Riverton	608	2
Northrup Way	595	3

Averaging the rankings of each site:

Seattle Center	3.1
Yesler Way	4.7
South Park	1.1
Riverton	2.3
Northrup Way	3.7

However, since the $40 million cost constraint is real, the rank averages eliminating the criteria combinations which ignore cost results in:

Seattle Center	3.4
Yesler Way	4.8
South Park	1.0
Riverton	2.2
Northrup Way	3.6

E. Stadium Site Foundation Conditions

The text of this section was prepared by Shannon & Wilson, Inc., Soil Mechanics and Foundations Engineers. Since much of the information contained in their full report to the commission is highly specialized in nature, technical records of exploration and supporting charts and maps have not been included in this report in the interest of brevity. Copies of their full report have been presented to the commission.

The information on foundation conditions presented in this section is considered adequate for the purpose of determining the approximate cost for developing a stadium and attendant parking structures or lots on the sites considered. Additional studies must be made for final design.

1. SEATTLE CENTER

a. SITE DESCRIPTION The proposed Seattle Center Stadium Site is located southwest of Lake Union and is bounded on the west by the Seattle Center, on the north by Roy Street, on the east by Dexter Avenue North and on the south by Harvard Avenue North. Within the area, two streets — Mercer and Broad — have been depressed to pass beneath Aurora Avenue with Broad Street also passing beneath Mercer Street and Dexter Avenue.

It is known that considerable regrading has taken place in this area since the turn of the century. In the early 1900's fill was placed around the southern shore of Lake Union thus extending the shoreline several hundred feet to the north and east. The Denny Hill No. 2 Regrade during 1929-1930 is believed to have extended over a portion of the site. The 1893 and 1908 topographic surveys of Seattle show a swampy depression in the vicinity of the site. Test borings indicate this depression is now filled with as much as 25 feet of fill material and underlain by soft to stiff cohesive soils.

b. SUBSURFACE CONDITIONS Over the surface of most of the site, fill is present ranging from a few feet to as much as 15 feet in depth. The fill for the most part is believed to have been dumped without systematic compaction, hence is generally loose or soft.

Immediately beneath the fill and probably extending throughout the low portion a thin layer of peat, up to 3 feet in depth is present. The peat was encountered in the construction of the Broad and Mercer Streets undercrossings.

Beneath the peat and elsewhere on the site there exists a variable layer, consisting generally of silts and clays, with some sands, which are normally consolidated. The upper portion of the clay is stiff, probably as a result of desiccation, but immediately below the clay becomes soft with water contents above the liquid limit.

Underlying the entire site are very dense gravelly sand and very stiff silty gravelly clay, both of which have been overconsolidated as a result of the weight of glacial ice which occupied this region during pleistocene times.

Perched groundwater is expected to be encountered near the base of the fills. The main groundwater is expected to be encountered at elevation 30 to 50 feet. The

throughout the site and therefore each building will probably be supported on more than one of the following types of foundations, i.e. (1) spread footings on original ground, (2) spread footings on replacement fill or (3) high capacity piles.

(a) Spread Footings On Original Ground Spread footings placed on the overconsolidated soils may be designed for an allowable bearing capacity of 4 tons per square foot. Total settlement is expected to be less than ½ inch. These soils are within 10 feet of the present ground surface almost everywhere outside the depression. In many places, especially near the west side of the site it is very near the present ground surface.

(b) Spread Footings on Replacement Fill If spread footings are to be used in the depressed area all of the soft soils must be removed and replaced with a compacted granular backfill. The allowable bearing pressure for footings on compacted fill is 3 tons per square foot. The lowest part of this depression appears to be near the intersection of 6th Avenue North and Republican Street. The bottom elevation is about +23 feet or about 37 feet below the proposed play field elevation, which is an excessive depth of excavation. Hence this method is applicable only to the fringe of the depressed area.

(c) Piles Within the depressed area piles are recommended to support the major structures. These piles should be driven through the soft or loose compressible soils into the dense over-consolidated soils. An allowable load of 80 tons per pile is recommended. Where piles extend through additional fill, an allowance for drag down should be made and these piles designed for an allowable load of 60 tons each.

The longest piles will have tip elevations in the order of +23 feet. We do not recommend any pile shorter than 10 feet. For the highly variable subsurface conditions it is difficult to estimate the average pile length. However, for the purpose of preliminary cost estimate it is recommended that an average pile tip elevation of +40 feet be assumed and that piles will be required for the stadium and for other major structures located inside the depressed area.

2. YESLER WAY

a. TOPOGRAPHY The site for the stadium is located on the west slope of First Hill, a generally north-south trending hill which extends for some distance both north and east of the site. The Seattle Freeway (Interstate 5) passes uphill of the site, and, hence, forms the uphill or eastern boundary. From the Freeway the ground surface slopes downward to the southwest from about elevation 175 to about elevation 50 feet. At present, the playing field is proposed to be placed at elevation 100 feet, and hence, side-hill excavations and fills will be required to develop the site. Parking garages are proposed to the north, between Yesler and James and 4th and 6th Avenues and to the west between Main and Washington and from 2nd to 4th Avenues. The parking garage to the north will require side-hill excavations and fills whereas the garage complex to the west, since the topography is relatively flat, can be constructed close to existing grade.

The stadium site and other areas in the vicinity have a history of landslide activity which has been recorded in City documents. The site area shows numerous small slides and one fairly large slide. The large landslide occurred in 1915 and it may have been related to some of the extensive regrading work being done in the area between 1907 and 1910. Parts of this large slide have been moving up to the present time. It appears, based upon a visual examination of the ground at the site and the borings, that the slide activity in the vicinity is not extremely deep-seated, but restricted to the upper 30 or 40 feet of the near-surface soils.

b. DISCUSSION OF GEOLOGY AND ITS RELATIONSHIP TO THE USE OF CYLINDER PILE RETAINING WALLS The general configuration of First Hill and the subsurface soils which comprise it are in large measure due to the several glacial and interglacial periods which occurred some 10,000 to 15,000 years ago.

Bedrock underlies the Hill st some depth, but for the most part the subsurface materials, at least above sea level, are composed of sediments of the Duwamish Formation. The Duwamish sediments consist predominantly of interbedded to varved silt and clay strata which contain occasional zones of sand. These beds were deposited in a lake or still water basin most likely during an interglacial period after the glacier had withdrawn from the area.

The thickness of the silt and clay zones in the Duwamish Formation vary from a fraction of an inch to several or more feet. The composition of the silt and clay strata is also variable. In some instances the silt zones are rather sandy, but in other instances variable amounts of clay are found too. The clay in the Formation varies from a highly plastic clay (CH) to only a slightly plastic clay (CL).

After deposition in lake waters, the Formation was overridden several times by glaciers, whose thickness in some areas of Seattle reached as much as 2,000 to 4,000 feet. This thickness exerted immense pressure on the Formation, changing the sediments from relatively soft lake-bottom soils to very stiff to hard materials. The initial impression is that these soils are quite competent and that open excavations can be made in them on relatively steep slopes. However, that this is not the case was dramatically demonstrated during the construction of the Seattle Freeway (Interstate 5). The first contract for the Freeway was let in about 1962 for a short segment of the west slope of Capitol Hill, a hill just to the north of First Hill. Excavations for retaining walls, some very small, but located at the toes of slopes underlain by the stiff to hard silt and clay sediments, triggered massive slides which extended back into the hill-side, endangering and, in some instances damaging expensive high-rise apartment units along the uphill right-of-way.

Elaborate and detailed field investigations and office studies were authorized by the State and undertaken to obtain some understanding of the causes of the slide movements and to evaluate the long-term adequacy of a relatively novel retaining wall — the cylinder pile retaining wall which was developed by personnel of the Washington State Highway Department to control the landslide activity.

These studies revealed that the silt and clay formation contained residual or

4. RIVERTON

a. SITE DESCRIPTION The Riverton Stadium site is located south of the City of Seattle bounded approximately by U.S. 99 on the west, Interurban Ave. on the east, S 118th Street on the north, and S. 130th Street on the south. The northwesterly portion of the site consists of a low lying valley flood plain used in the past for truck gardens. This area was at one time protected from flooding of the Duwamish River by a dike and tide gate which drained a system of ditches extending throughout the area. The southern portion is a gently sloping hillside now occupied by a number of modest residences. The easterly portion consists of an isolated knoll, the north part of which is a basalt rock outcrop still being used as a quarry but now nearly exhausted. Over the south portion of this knoll, basalt rock is deeply covered generally by silty sand and gravel. The north portion of this knoll is being developed as a borrow area by the Washington State Department of Highways.

b. SUBSURFACE CONDITIONS Some of the area which lies generally below elevation 15 has a surficial layer of soft fibrous peat varying between 5 and 15 feet in thickness. The peat has been covered by fill along the west side of Marginal Way. Elsewhere in the low lying area the deep rich topsoil is underlain probably to shallow depths, by loose silt which in turn is underlain by deposits of peat of the order of 5 feet in thickness. Medium dense to dense sands underlie the silt and peat to the 60 feet depth explored at the stadium site. Borings by the Highway Department north of the north edge of the stadium parking area (some 1400 feet north of the stadium) indicates beneath the surface fill, peat approximately 7 feet thick, then dense fine sand in turn underlain by a soft silty clay layer between depths of 80 and 110 feet. This soft silty clay layer is not expected to underlie the stadium site.

Basalt rock is currently being mined from the northeast portion of the site. This rock when processed is of good quality for base course material.

South of the quarry is a knoll from the north portion of which dense silty sand and gravel is being excavated and used for highway construction.

The southern portion of the site consists of dense sands overlain by a surficial layer of silt. Clayey silt is exposed in the steep slope along the west side of the site.

In the low lying central area groundwater during the wet season will be at the ground surface with local ponding while during the dry season it will be at a depth of several feet. Elsewhere over the site, groundwater is expected to be at the ground surface or at a shallow depth below ground surface, except in the knoll south of the rock quarry where it is at approximately elevation 25 feet. A perched water table at an elevation of about 110 feet was also found in the knoll.

c. ENGINEERING EVALUATION

(1) *Site Grading.* The site for and in the vicinity of the structure should be prepared by excavating the peat and existing fill within the area. All peat should be wasted off site. Some of the existing fill (assume 50 percent) may be stockpiled for reuse and the remainder will not be usable and require wasting off site. As the