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THESIS

EXPANSION OF THE EQUIPMENT ALLOWANCE POOL
AT TWENTYNINE PALMS, CALIFORNIA,
USING RESERVE ASSETS

by

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and
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December 1988

Thesis Advisor: David R. Henderson

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Expansion of the Equipment Allowance Pool at Twentynine Palms, California, Using Reserve Assets

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ABSTRACT

Static marginal analysis is applied to the Marine Corps' proposed expansion of the Equipment Allowance Pool at Twentynine Palms, California, using Select Marine Corps Reserve assets. A formula is presented for determining potential equipment candidates. The formula combines various weighting factors, equipment use, and savings potential to produce a "keep factor". Assets with low keep factors are selected first. Recommendations for further studies are also made.

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I. INTRODUCTION

A. OVERVIEW

1. Reserve Training

> The mission of the Marine Corps Reserve is to provide trained and qualified units and individuals to be available for active duty in time of war, national emergency, and at such times as national security may require. [Ref. 1]

To provide these "...trained and qualified units...," [Ref. 1] the Marine Corps Reserves must ensure that individual Marines are trained in their respective occupational specialties and that units are capable of performing their mission in isolation. They must also be able to perform in concert, conducting their operations while interacting with various other units, including elements from both Air and Ground Combat Elements, as well as Combat Service Support.

This training mission is complicated by geographic separation of the Reserve units. This separation requires the transportation of both personnel and equipment to remote training sites to execute large operations that require interaction between units. In addition to amphibious landings and cold weather training, an annual event is the inclusion of Reserve units in two Combined Arms Exercises (CAX) each summer. Individual Marines and entire units travel from sites all over the United States to the Marine Corps Air-Ground Combat Center (MCAGCC), Twentynine Palms, California, to participate in the CAX.

2. Equipment Requirements

Marine Reserve units are often tasked to provide equipment for the CAX even though they may not be participants. Equipment shipped to Twentynine Palms is accompanied by a Government Bill of Lading (GBL), a Limited Technical Inspection (which itemizes deficiencies and/or defects), and an Equipment Custody Receipt. The Reserve Support Unit at Twentynine Palms assists in the smooth flow of sub-custody transactions to those units that use the assets during the exercise (which may or may not own the equipment), and again upon turn-in of equipment for shipment back to the sites.

This approach to providing the assets for conducting the Reserve CAX has been considered necessary for a number of reasons:

- Reserve equipment and training is funded separately from that of the active forces, as mandated by law, requiring that Reserve units use equipment that belongs to the Reserve establishment.

- To conduct training throughout the rest of the year, the units require that their assets be maintained at the Reserve sites.

- Money for transportation of unit gear is restricted, so gear must be borrowed from sites that are closer to the MCAGCC in an effort to conserve tight budget dollars.

3. Recent Developments

Due to Congressional budget reductions imposed on the Department of Defense, the Marine Corps cannot afford to continue to ship large quantities of equipment to and from the MCAGCC each year. Therefore, in October of 1987, the

Commandant of the Marine Corps indicated a desire to establish a Reserve Equipment Allowance Pool at the MCAGCC. The Reserve Equipment Allowance Pool was to be maintained by Reserve Marines to support training exercises conducted by the Select Marine Corps Reserve units [Ref. 2]. Due to funding and facility shortfalls, this task was modified and reduced in scope, with efforts directed to inclusion of a Reserve component in the expansion of the present Equipment Allowance Pool [Ref. 3].

4. Equipment Allowance Pool (EAP)

The current EAP functions as a consolidated training allowance pool that provides Ground Combat Equipment, Combat Equipment, and non-aviation Air Combat Element equipment for the active duty forces in exercises conducted at MCAGCC. Should the EAP not contain sufficient quantities of equipment to support the Combined Arms Exercise participants, additional assets are either brought by the units requiring them or are borrowed from other Marine Expeditionary Force units.

Equipment that is temporarily placed in the EAP for use during a CAX is invoiced and transferred by use of form DD 1348-1. Physical delivery of equipment is accomplished either by direct delivery by Marine operators or by a for-hire carrier through use of a Government Bill of Lading. The method chosen for delivery usually depends on the distance of the owning unit from Twentynine Palms.

Each unit participating in a CAX designates a Responsible Officer who precedes the exercise force and supervises the joint inspection of EAP equipment for acceptance. This acceptance is accomplished by the Responsible Officer's signature being affixed to the appropriate supply document, NAVMC 10359, Equipment Custody Record Card [Ref. 4:p. 1-3]. Responsible Officers are directly accountable for the care, maintenance, issue, recovery and security of all property on charge to their accounts [Ref. 4:p. 1-5].

B. PREMISE OF THESIS

1. Scenario

Efficient compliance with a reduced transportation budget forces recognition of a trade-off between training at the Reserve sites and training at the MCAGCC. The training most vital to the Marines' mission is that which is offered each year at the MCAGCC, encompassing combined arms and task-organized training. This preference can be illustrated as shown in Figure (1). Curve A represents the current level of training at both sites, within the present budget constraint. With expected budgets being smaller, Curve A' represents continuing the current level of training at Twentynine Palms, at the expense of equipment training held at the Select Marine Corps Reserve (SMCR) sites.

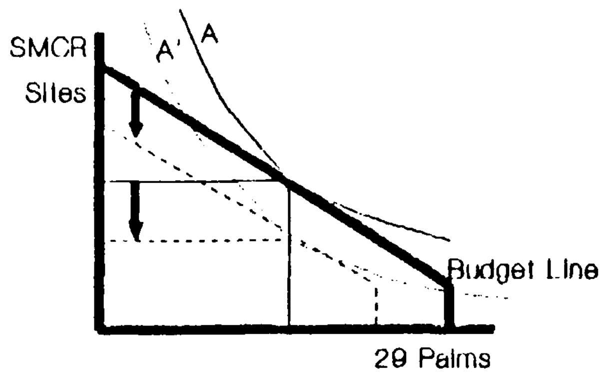

Figure 1. Training Preferences. The budget constraint shows that, even if all equipment were transferred to MCAGCC, some training could still be conducted at the Reserve sites.

With minimal Reserve equipment at the MCAGCC, the Commandant's desire for an equipment pool reflects this preference for training at Twentynine Palms. To provide the assets for the MCAGCC equipment pool, Reserve sites must give up assets.

In reducing the assets at the Reserve sites, decision makers at Headquarters, Marine Corps, are aware that some assets will continue to be shipped to the MCAGCC each year for the CAX. To economize on transportation in future years, the Marine Corps must also decide which sites to pull equipment from. This consideration is best imposed by higher headquarters, as the savings gained are realized only at the higher level.

Figure (2) illustrates the trade-off between future savings and equipment training potential at the Reserve sites. Line A represents one possible level of savings attainable, at the cost of a reduction in equipment training at the Reserve sites. Line A′ demonstrates that an additional, similar reduction in training potential at the sites will not provide a similar increase in savings.

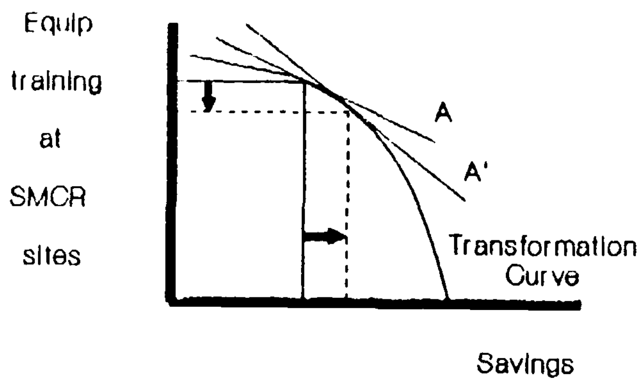

Figure 2. Trade-off Between Potential Training and Future Savings. The transformation curve shows the maximum output of equipment training that can be obtained, given each level of savings.

2. Decision Requirements

To complicate the matter for the decision maker, sites have varying quantities of equipment and are located varying distances from the destination (thus incurring different transportation costs). Also, each site performs different roles in possible contingency plans, causing a variance in the level of need for the equipment above and beyond peacetime training needs.

The decision must be centralized; vested interests at individual sites tend to obscure the benefits possible on a larger scale. Centralization, however, decreases confidence in the accuracy of the data:

- Do usage figures averaged over a period of time compensate for periods of non-availability due to maintenance difficulties?

- Does availability of assets lead to use for non-essential or extra trips?

- Have differences in training philosophies of the site commanders led to significant variances in usage data for similar units?

The decision maker must have at his disposal information concerning historical usage, unit missions, transportation costs, contingency plans, unit training plans, and manning levels, and should also be aware of what events will affect these areas in the future (such as site relocation plans, future equipment allocations and modifications to unit tables of organization).

The specific scenario is now introduced: with over 180 reserve sites, a choice must be made about which sites will give up equipment for redistribution to the MCAGCC. The abundance of information required to make a decision of this type begins to create the illusion of an impossible task: how can one person, even with the assistance of a competent staff, analyze and compare all this data and arrive at a reasonable conclusion?

3. The Problem

Stated in the simplest terms, the problem is one of optimization: how to obtain the highest benefit in terms of equipment usage, given the following constraints:

- There is a fixed quantity of equipment.

- Policy dictates that a fixed quantity of equipment will be relocated.

- Equipment performs a variety of functions that require varying types of usage (operator training, maintenance training, cargo and personnel transportation), each of which is measured on a different scale (miles, hours, cubic feet or pounds).

- Policy dictates a level of consideration for future transportation savings. This level may be reflected in a ceiling on allowable transportation charges for the initial asset relocation to Twentynine Palms (a short-range budget constraint), or, as proposed by this thesis, in a weight applied to each site that evaluates the Net Present Value of future savings.

4. Proposed Solution

This thesis will describe a means of applying static marginal analysis to determine the optimal quantities of equipment to pull from which sites. A spreadsheet program on a microcomputer is used to weigh the following elements: equipment use, transportation expense, and a catch-all for mission essentiality, training, etc., referred to as "commander's judgment". Chapter III contains the full description of the model.

5. Alternative Solutions

Of course, the solution proposed by this thesis is not the only viable option. Other possible options include the following:

- Establishing regional training equipment pools which would allow consolidation of assets located at sites within a reasonable distance of each other. Sites participating in such a venture would need to coordinate their training schedules, but would be able to perform their training missions with less overall equipment.

Surplus assets could then be transferred to the EAP at Twentynine Palms.

- Establishing Inter-Service Support Agreements to promote the sharing of similar resources between Reserve units of all branches of the Armed Forces. For example, Marine Corps and Army units located in the same geographic area, with proper coordination, could draw upon each other's assets as needed for training. This would free some assets for all services, with Marine equipment being transferred to the EAP.

- Transferring assets to the EAP only from units within a designated radius (500 miles, for example). These units would then be able to draw upon EAP assets throughout the year for training requirements, with restrictions placed on availability to provide for CAX requirements.

The solutions suggested here, as well as the body of this thesis, all require additional consideration in the area of mobilization contingency planning.

II. SELECTION CRITERIA

A. THE LIKELY APPROACH

The typical decision maker would probably attempt to contact all affected units and ask them to "volunteer" to give up assets. From experience, units tend to dig in and build defenses to protect themselves from being among those units that lose equipment.

Once the decision maker has collected volunteer equipment, if any, the next step is command selection. The obvious thing to do is to hit the larger units first and "skim the cream" from them. Should this not complete the quota, the decision maker most likely would hit those units least capable of maintaining their equipment due to shortages of mechanics or poor facilities. Ancther approach could be for the decision maker to delegate the quotas to sub-commanders. This approach would accomplish two things:

- Involve the sub-commanders in the decision process. Therefore they would be more supportive of the redistribution effort.

- Move the decision closer to the sites most affected by the decision outcome.

Keep in mind that there are over 180 sites to consider. The "logical" route described above would be exceptionally difficult for the decision maker, as knowledge of each site would be limited at best. It would also be inefficient. Taking from the larger units simply because they are larger would be inefficient if those sites had the highest per vehicle usage. Other factors to be considered include opportunity losses (lost training and decreased goodwill/ community service programs); facilities impact which include a decrease in Operations and Maintenance (O&M) funds, a decrease in maintenance tools, and a decrease in maintenance personnel.

Not all of the factors are considered negative. Decreasing the amount of tools rated by a site also decreases the amount of effort needed to inventory and control them. This would decrease the time required to ensure that inventories are up to date, and missing/lost tools replaced. Also, less check-out/check-in time would be required. The same is true of collateral equipment associated with each vehicle. Collateral gear is a term used to describe tire chains, jacks, canvas, fording equipment and other things associated with the ownership of a specific vehicle. Other factors are fewer publications required, fewer supply orders, fewer maintenance efforts, etc.... The combination of these decreased factors may yield more time for other types of training like Nuclear, Biological, and Chemical (NBC), field sanitation, or any other type of training that is normally shelved because of other, more pressing commitments.

The more astute decision maker would attempt to consider the impact on readiness. However, readiness is not a tangible asset than can be easily measured. One cannot apply a tape measure to it, nor weigh it upon a scale as one would weigh a side of beef. Readiness, although frequently discussed and an important element in any military decision, is an intangible attribute with many characteristics.

B. READINESS CONSIDERED

Some of the elements of readiness include personnel, equipment, and supplies. Difficulties in measurement are increased by the fact that each of these elements has its own specific sub-elements that must also be considered, i.e., personnel training, availability and experience; equipment reliability, maintainability and utilization; supply availability and support.

This section lists some of the definitions of readiness within the Department of Defense. It also shows the relationship of the concept of readiness to Military Capability and the elements and sub-elements of readiness, and briefly discusses two measuring devices used by the U. S. Marine Corps in its attempt to capture readiness.

1. Readiness Defined

Many definitions of readiness exist. The General Accounting Office defined readiness as: "...the degree to which the operating units in the force structure are capable of performing the tasks for which they were designed and organized." [Ref. 5]

Thomas A. Musson, in his Air War College report, listed this 1977 Department of Defense Report definition:

"Readiness" is a concept that integrates the diverse factors that affect the ability to deploy, engage, and sustain effective combat forces. It starts with the overall availability and proficiency of U.S. fighting men....An almost equally important determinant of overall readiness is the availability, capability, and condition of the forces' fighting equipment. [Ref. 6]

Paul F. Stahl, in his Naval Postgraduate School thesis, provided two more definitions:

> Readiness is the ability of forces, units, weapon systems, or equipment to deliver the outputs for which they were designed (including the ability to deploy and employ without unacceptable delays). It depends on having the required quantities of equipment in the hands of the units on a day-to-day basis and on having the required number of adequately trained people assigned with the necessary mix of grades and experience levels and to ensure that people and machines can work together.
>
> Readiness is essentially a measure of <u>pre-D-Day</u> status (extending at most into initial combat operations) while sustainability is a <u>post-D-Day</u> measure. Hence, we often speak of <u>peace time readiness</u>, but combat sustainability. [Ref. 7:p. 20]

Stahl also provided an excellent diagram (see Figure 3) that displayed the readiness concept elements and sub-elements as related to the pillars of military capability i.e., Force Structure, Force Modernization, Force Readiness and Force Sustainability [Ref. 7:p. 19].

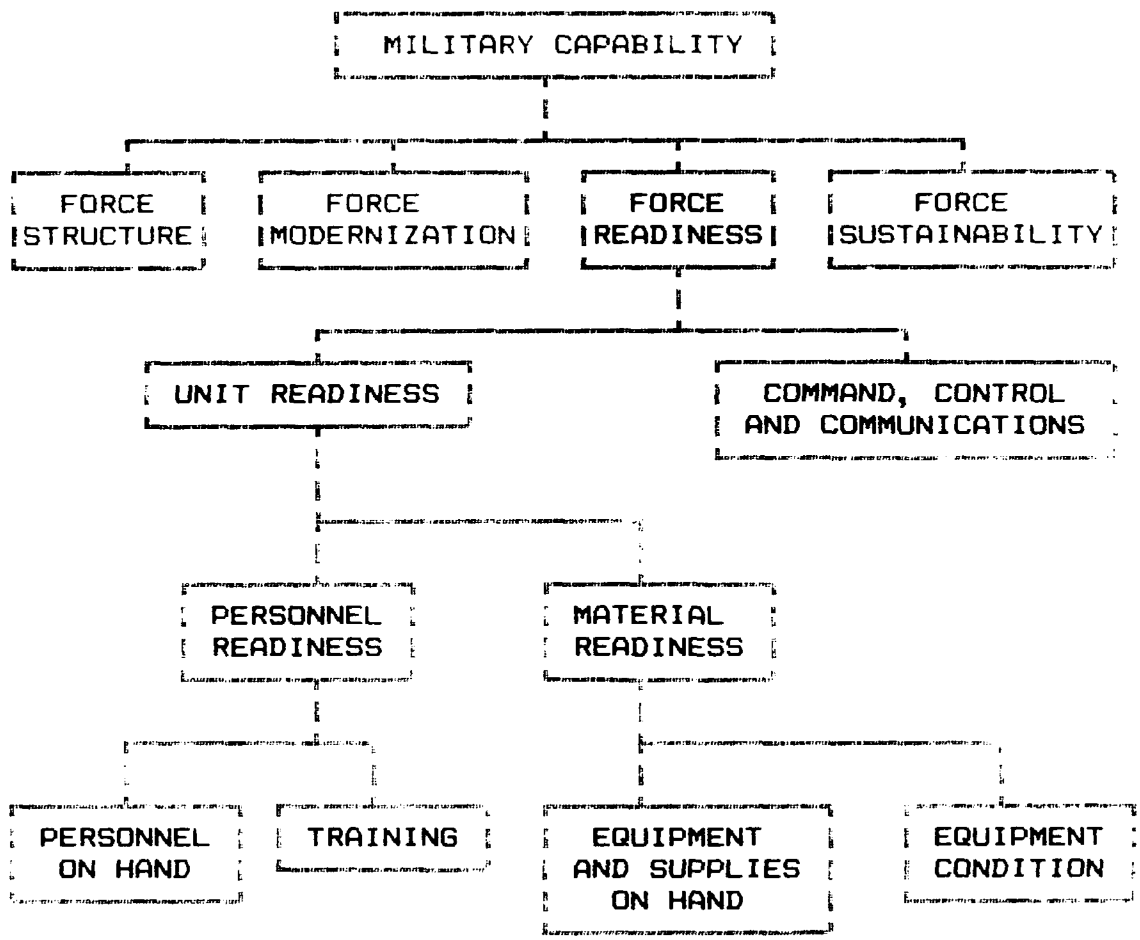

Figure 3. Readiness Factors within the "Four Pillars" of Military Capability

2. Sub-elements

Readiness elements are factors that can be directly attributed to readiness. Readiness sub-elements are combinations of factors or similar factors that have an indirect bearing upon the value of the readiness measure.

> Equipment status means the number or percent of equipment that are in an operational condition.... the sub-elements are those factors that could cause the equipment to not be

in an operational condition. Such factors include, but are not limited to:

- Equipment reliability.
- Equipment maintainability.
- Equipment utilization.
- Maintenance manpower available.
- Supply support.
- Maintenance training. [Ref. 6:pp. 34-35]

Careful analysis of why a unit's operational equipment status is lower than desired may be explained by examination of the sub-elements. For example,

- Equipment reliability is low, causing more supply demands than the supply system is capable of forecasting.
- Maintenance training is poor, resulting in longer times to correct equipment failures.
- Equipment maintainability is poor at the depot, resulting in fewer repaired items and less supply support at the unit level. [Ref. 6:p. 35]

3. Unit Identity and Status Report (UNITREP)

UNITREP was implemented in April, 1980. All U. S. military services are required to report specific data through their respective chains of command to the Joint Chiefs of Staff [Ref. 8]. UNITREP does not require information on all military assets but a sampling of specific, pre-selected resources which are organic to reporting units. Specific unit missions are not considered. The major resource areas measured by UNITREP are:

- Personnel.

- Equipment and supplies on hand.

- Equipment.

- Training.

The UNITREP data is quantified on a nominal scale as follows:

Combat (C) Rating	Definition
C - 1	Fully Ready
C - 2	Substantially Ready
C - 3	Marginally Ready
C - 4	Not Ready

UNITREP also includes the subjective measure of the commander's judgment which allows the commander to list how he/she feels about the unit's ability to perform its mission. The commander may choose between "ready" or "not ready." Additional information on the Marine Corps' implementation of the UNITREP program is contained in Marine Corps Order P3000.13 (UNITREP SOP).

4. Marine Corps Combat Readiness Evaluation System (MCCRES)

> MCCRES is designed to access unique U. S. Marine Corps air-ground team combat readiness. It was implemented in July 1978 and is used to test Infantry, Fixed Wing, Rotary Wing, Aerial Observation, Combat Support and Combat Service Support units, both regular and reserve. [Ref. 7:p. 21]

Marine Corps Order 3501.2 specifies the conduct of the MCCRES. Basically, MCCRES will evaluate the following ten categories:

- Reporting to higher headquarters.
- Preparing for operations.
- Communicating.
- Performing (field performance).
- Delivering supporting fire.
- Planning of operations.
- Conforming to Marine Corps doctrine.
- Executing operations.
- Providing combat service support functions.
- Supervising required actions.

MCCRES was developed as a tool for the Marine Corps to measure and/or evaluate the ability of its Fleet Marine Forces to accomplish missions for which the units were organized around a given task. Units are judged to be either Combat Ready or Not Combat Ready. A full analysis of MCCRES is beyond the scope of this writing, but it is mentioned here to show that measurements of readiness differ.

C. AUTHORS' CHOICE

This thesis proposes an alternative to the likely approach, with its inherent inefficiencies, and to the readiness approach, complicated as it is with differing definitions and methodologies. In selecting the evaluation criteria for determining which assets to relocate to the MCAGCC, the authors based their model on a form of static marginal analysis. Using transportation costs, equipment use, and commander's judgment as measures of utility for the decision, the proposed model allows subjective analysis of readiness aspects, as well as consideration of future transportation savings. The next chapter describes the model in detail.

III. THE MODEL

A. COMPONENTS

The model is a composite of both real and imaginary data. The real data includes the cities where SMCR units are located and the approximate distance of each of these sites from the MCAGCC. Imaginary data consists of the quantity of vehicles located at each site, and the usage for each vehicle for one year's time.

Imaginary data keeps this thesis unclassified, preventing inferences about actual training conducted or contingency staging of equipment. Naturally, this prevents the results of this application from being directly useful, but allows a clear illustration of how actual data may provide useful results.

The following sections will discuss the individual components in further detail.

1. Sites

The 180 cities chosen to represent the SMCR sites include all of the continental United States locations where SMCR units are located. Some cities consolidate many units; others have only one. Units in Puerto Rico and Hawaii were left out as the model, as presently constructed, includes only those sites that can use ground transportation to move equipment to the MCAGCC.

2. Distances

Distances as listed in the model are approximate, based on numbers obtained from the Rand McNally Standard Highway Mileage Guide for the distance between each city and Indio, California [Ref. 9]. (Indio is located about 80 miles from the MCAGCC.) As they are used in the model at present, these distances represent transportation expenses, with charges assumed to be proportional to distance.

For proper use of this model, site-specific transportation charges would be substituted into the formula where distances are currently used. (The authors attempted a number of times, with no success, to obtain these charges from the Directorate of Inland Traffic, Military Traffic Management Command, Oakland, California.)

3. Quantity of Vehicles

A random number function was used to select between 0 and 15 vehicles to be considered for each site. As the quantity of vehicles at actual sites varies, the model emulates this variation through random numbers. The total arrived at by this method was 1,257 vehicles for the 180 sites, an average of seven vehicles per site.

4. Mileage

Based on the quantity of vehicles at the site, a quantity of random numbers was used to provide "historical" usage figures between 0 and 10,000 miles driven for the period upon which the decision is to be based. Actual figures could be obtained from the sites' Dispatcher's Log or Maintenance Records for each vehicle.

Applying the model's formula required a number of preliminary calculations. First, the total number of miles driven for all vehicles at a particular site was found. This sum was then used to calculate the average number of miles driven per vehicle.

An assumption was necessary at this point: if one vehicle were to be removed from a site, would the total miles driven for that site change? If so, how much? To keep the model simple, the assumption was made that the total would remain constant.

Using the total mileage for each site, the model calculated new averages for each possible quantity of vehicles at a site, removing one vehicle at a time. The increasing average represents an increase in vehicle use as, with fewer vehicles to make the trips, each vehicle would be needed to make more trips.

With these preliminary calculations out of the way, the only other elements necessary for using the formula are the weights to be assigned. These weights indicate the degree of importance of two different items:

- This first weight is site-specific. It indicates a subjective measure of the criticality of the asset for the particular site's mission, training requirements, and/or contingency plan needs. Although these elements are not quantifiable by any present definition, this weight is only a **relative** measure and does not require an absolute standard.

- How important are the savings to be realized by the organization in future years? As these savings are predicated on the assumption that vehicles redistributed will not require shipping in future years, savings are assumed to lie in the Net Present Value of dollars not required to be spent for future transportation. This second weight is common to all sites, and is mandated by higher headquarters.

Once these weights are assigned, the model has all the information needed to apply the formula.

5. Overview of the Model

The authors chose to use Lotus 1-2-3™ to implement the model. Figure 4 is a pictorial representation of the spreadsheet, as printed and mounted on the wall.

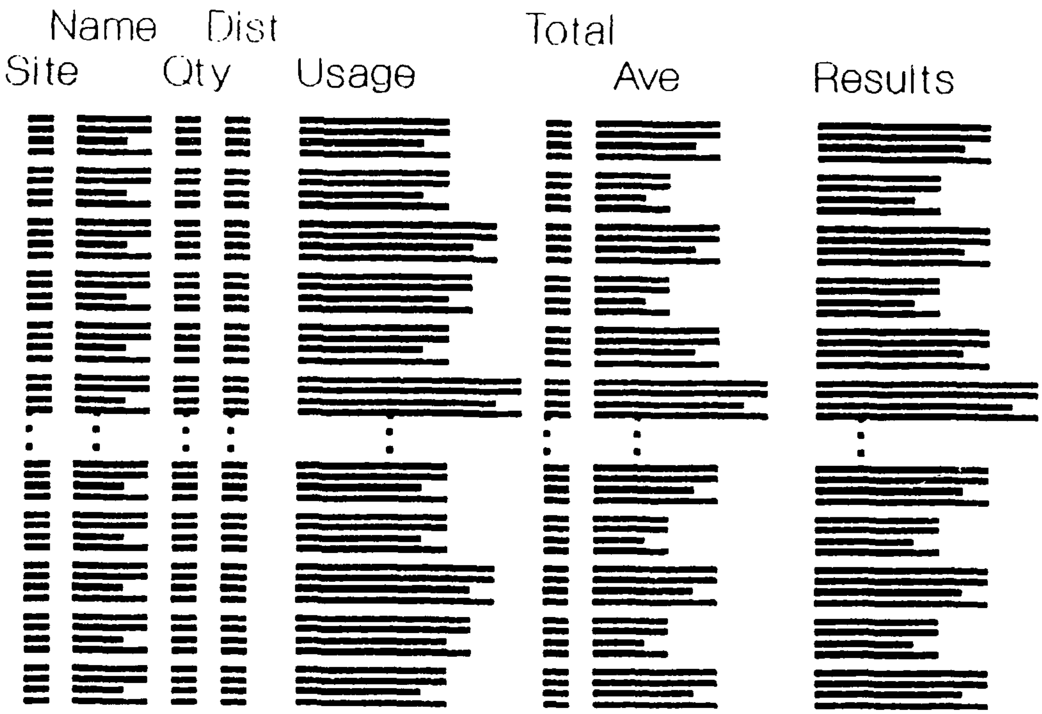

Figure 4. Pictorial Representation of the Model.

B. THE FORMULA

The formula is comprised of the following elements: commander's judgment is multiplied by the percentage of full use; this quantity is added to a similar quantity obtained by multiplying a savings weight by the percentage (adjusted) of savings possible. In algebraic form, this could be written as:

$$\text{Keep Factor} = (\text{Wt1})(\%\text{Use}) + (\text{Wt2})(\%\text{Saving})$$

The terms used in this formula are defined in the following paragraphs.

1. Commander's Judgment (Wt1)

A factor between 0 and 1, this term provides a site-specific weight, based on the commander's determination of how important the vehicles are to the site's missions (including training of personnel, mobilization plans, etc.) relative to other sites.

2. Percentage of Full Usage (%Use)

Term indicating the degree of utilization for each vehicle, for the period specified (probably one year). Initially, this factor is computed in this manner:

- Historical use (miles driven) for all vehicles at the site is totalled.
- An average use per vehicle is computed (total miles driven by the vehicles at this site divided by the number of vehicles at the site).
- Average use is divided by highest mileage (10,000 as simulated in this model) at any site to give a percentage of "maximum" use. (This is only a relative measure used

for comparison purposes and the number obtained does not have any significance by itself).

3. Savings Weight (Wt2)

A factor between 0 and 1, indicating the importance to higher headquarters (in the context of this decision) of the savings to be realized by not shipping a vehicle belonging to this site to and from Twentynine Palms numerous times in the future. This factor is applied equally to all sites.

4. Percent Savings Possible (%Saving)

Term derived by the following:

- Finding the highest cost to transport one vehicle from any site to Twentynine Palms. (Without actual tariffs, the authors used the distance of 3,000 miles, representing a near-maximum distance to the MCAGCC.)

- Subtract the cost to ship one vehicle (from the site in question) from the highest cost, found in step one. (This step is an adjustment to make this factor compatible to the % Full Use term. If the percentage of use is high, then the vehicle under consideration is more likely to be kept at the reserve site. If the site's transportation cost is low, fewer savings are possible by transferring a vehicle permanently to Twentynine Palms; therefore, a low transportation cost is converted to a relatively high factor by subtracting it from the highest cost.)

- Converting the figure found in step two to a percentage by dividing it by the highest cost (from step one).

C. OTHER ASPECTS OF THE MODEL

1. Assumptions

- Historical data on mileage driven is a good indicator of vehicle utilization at a particular site. If one or more vehicles have been out of commission for maintenance or other reasons, it is assumed that other vehicles will be driven the additional miles that would have been driven by the out-of-commission vehicles.

- If vehicle utilization is based upon some factor other than miles driven (training for mechanics, for example), this will be reflected in the site-specific weight (Wt1) assigned by the commander.
- Transportation costs are constant for one or more vehicles from the same site (no quantity discounts). If this is too inconsistent with actual practice, however, only a slight adjustment is necessary to correct this.

- The commander will be able to evaluate the requirements for training, mobilization and contingency planning, and assign relative weights to each site accordingly. To ensure impartial weight assignments, this should be done at the highest level possible, having cognizance over all sites whose vehicles are candidates for permanent assignment to Twentynine Palms.

- Once a vehicle is removed from a site, it is assumed that the miles driven will remain constant: The average miles driven per vehicle is adjusted to reflect the reduced quantity of vehicles, but still based on the historical total of all miles driven at the site.

This last assumption is probably the weakest element of the model. In actual practice, the total miles driven would decrease as some trips would be combined, some trivial trips would be cancelled, and elements of mileage associated with maintenance (trouble-shooting, road-testing, quality control checks) of the removed vehicle would be subtracted from the site's total mileage.

2. Interpreting the Results

The model provides a table of numbers, one for each vehicle at a site. These numbers represent what the authors call a "Keep Factor", as a higher number indicates a smaller probability of that vehicle being permanently transferred.

The model allows the Keep Factors to be sorted in ascending order, while maintaining a site identifier with each one. It is a simple matter to count down the column to where the required number of vehicles have been reassigned (assuming that higher headquarters dictates the number of assets to be transferred).

3. "Gaming"

Although the model is intended to be used only once, should it prove useful for redistributing Marine Corps assets, it is easy to imagine a scenario where future requirements might dictate its use again.

For this reason, a single site commander, not wishing to lose any assets, might be tempted to manipulate the model to that end by "adjusting" data elements that are inputs in the model. Elements which have the potential for manipulation include:

- Usage data (mileage) - actual or reported.
- Transportation costs - actual or reported.

These elements would have to be manipulated in sufficient time to skew the results of an anticipated use of the model, and perceived benefits would have to be timely enough to provide the incentive for such manipulation.

Addressing each element separately:

- Usage data (mileage) - Actual: Decisions affecting mileage include (but are not limited to) the following:
    - Locations of sites to conduct unit training.
    - Contracting via commercial transportation vs. unit transportation.
    - Choice of convoy routes.

- Local requirements, policies for operator training.

- Choice of maintenance facility utilization and/or maintenance tests requirements.

- Mode of transportation to distant sites (unit driven or piggy-back on commercial flatbed).

More obvious manipulation would include such acts as raising the drive wheels on jacks and allowing the vehicle to accrue "mileage" without going anywhere.

- Usage data (mileage) - Reported: The means of data collection for the model could limit the possibility of manipulation in this area. However, if data is just requested via correspondence, erroneous data is only limited by the creativity of the typist and the false intentions of the authenticating signer.

- Transportation costs - Actual: These costs are largely the result of the following decisions:

  - Mode of transportation (rail or flatbed truck).

  - Choice of carriers.

  - Amplifying instructions to the carrier (routing, reporting, registration, insurance).

  - The decision to have commercial transport or to have a unit operator deliver the vehicle.

In addition, such costs as depreciation, replacement of collateral gear (due to loss on transport) and other amortized costs could, conceivably, be added to transportation costs.

- Transportation costs - Reported: Same comments as under "Usage data - Reported".

4. Gaming in Perspective

Since this model is intended to be used only once, the greatest threat to the data gathering process is considered to be erroneous data reporting. Other types of gaming are constrained either financially or by personnel motivational factors. Each of these areas will be explored separately.

a. Erroneous Data Reporting

As stated earlier, this is limited by the creativity of the typist and the false intentions of the authenticating signer. The authors understand that this is an area involving officer integrity. However, efforts to guard against the slightest possibility of bias are encouraged. Two possible actions are readily apparent:

- Conduct an internal review: For example, the Commanding General of the Fourth Marine Division could direct his Maintenance Management Officer to schedule random site visits and verify the reported data.

- Request assistance form the Marine Corps Logistics Base (MCLB), Albany, Georgia. MCLB conducts yearly technical inspections of all reserve equipment. This team could:

  - Verify the data reported by the reserve center.

  - Physically collect and report the data as an unbiased third party.

b. Gaming Constrained Financially

The model uses an average figure for mileage on vehicles. Site commanders who obtain prior knowledge of how the model works would be hard pressed to build up enough mileage (at the last minute) to skew the average figure significantly. However, those commanders who may anticipate future applications of the formula may desire to increase mileage on their remaining vehicles to ward off future losses.

Actions such as these are constrained financially as the additional cost of the fuel required to increase vehicle usage would decrease the amounts of money left over to conduct mission essential/higher headquarters directed training (such as rifle re-qualification). Also, each higher headquarters fiscal section could target fuel usage to ensure that it stays within historical boundaries. These constraints also apply to transportation costs. Decisions to convoy to distant training sites are constrained not only by the budget but also by Marine Corps directive [MCO 11240.106 pg. 2-9] which restricts tactical vehicle convoys to a Primary Operating Distance (POD) of a 75 mile radius. Local Commanders must request permission through their chain of command to exceed this 75 mile POD.

c. *Personnel Motivation Factors*

Based on tours of duty with Marine reservists, the authors believe that they attend drill for reasons other than extrinsic motivation, i.e. money. Thus, if Marine reservists are to remain intrinsically motivated, they must derive some pleasure from the tasks they are asked to perform [Ref. 10]. Having reservists drive vehicles down the freeway every drill period just to build up mileage at a lower cost per gallon of fuel will likely result in lower drill attendance.

d. Conclusions

Not all gaming schemes can be eliminated. However, most can be constrained either through budgeting limitations, existing Marine Corps directives, internal reviews\inspections, and reliance upon officer integrity.

IV. DATA GENERATION AND RESULTS

A. OVERVIEW

1. Site Specific Information

Appendix A contains the specific data used by the authors in the model. Site information was obtained from the Director of the Productivity Improvement Office at Headquarters Marine Corps, Washington, D.C. [Ref. 11]. Sites were grouped by city, alphabetized by state, and assigned a site number, from 1 to 180.

Distances were approximated, based on Rand McNally's Standard Highway Guide. Unfortunately, Twentynine Palms was not listed; therefore, the closest city listed was used. This was found to be Indio, California, which is only about 80 miles away.

Quantities from 0 to 15 were randomly assigned as the number of vehicles held at each site. Based on the quantities listed in Appendix A, a yearly mileage figure was randomly generated for each vehicle. Total mileage for each site was obtained by adding the individual vehicle mileages for each site. These figures are provided in Appendix B.

2. Actual Application of the Model

The decision maker may choose to separate the sites in Appendix A into the individual units. This would increase the selectivity of the model, allowing more specific application of contingency plan considerations. The disadvantage would be the increased number of sites, requiring more determinations of the value of Wt1, the commander's judgment.

In applying actual data, the correct quantity of vehicles at each site would be required. Historical data on vehicle use could be obtained from the equipment records at each site.

In this model, the authors were forced to use distance rather than transportation costs. This necessitated the assumption that costs vary proportionally to distance, which may or may not be correct. More accurate and more concrete results would be obtained by tasking the Military Traffic Management Centers to provide actual transportation costs from each reserve center to Twentynine Palms. The model would require only slight revision: substitute costs for distances, with the highest cost taking the place of the 3000 mile "maximum" used by the authors.

Preliminary sensitivity analysis by the decision maker would, with actual costs, provide an indication of the expected savings possible in future years, based on the model results. Sensitivity analysis is discussed further in the next chapter.

B. DATA GENERATION

1. Average Per Decreasing Quantity

Appendix C contains the averages for each possible quantity of vehicles at a site. For example, a site with three vehicles has a given total number of miles driven, found in Appendix B. This total is divided by the three vehicles, giving an average figure per vehicle. If the site should be selected to give up a vehicle, the total mileage would have to be divided by the remaining two vehicles, giving a new average per vehicle.

As stated earlier, this assumption is not completely accurate; total miles driven at the site would probably decrease, reflecting combined trips, cancellation of marginal trips, and subtraction of miles driven for maintenance of the removed vehicle. The authors were unable to discover an appropriate reduction factor in their research; however, should such a factor become available, it would need to be included at this point in the model.

Incorporation of a decreased total mileage factor could be accomplished as follows:

- The first average, per total vehicles at the site, would remain unchanged.
- For each subsequent average, the total miles driven would be reduced by the factor (for example, ten percent) before being divided by the remaining number of vehicles.

2. **Model Results**

The model results, as given in Appendix D, are based on the data in Appendices A through C, with a commander's judgment (Wt1) of 0.5 for all sites, and a savings weight (Wt2) of 0.3. The numbers in each column represent the "Keep Factor" for each vehicle.

The keep factor is a relative measure of a particular vehicle's utility, including the elements of historical use, potential savings and subjective judgment. As can be seen, each vehicle at a site has a higher keep factor than its predecessor; this makes intuitive sense, as it indicates that remaining vehicles will be more valuable (have a higher utility) as each preceding vehicle is lost.

A review of the total miles driven at each site, as divided by its quantity of vehicles (found in the first average column of Appendix C), provides a relative value for the first vehicles. Comparison of these averages with the keep factors reveals a high correlation, with differences explained by the variance in distance of the site from Twentynine Palms. This too is intuitively correct, as the value of commander's judgment (Wt1) is equal for all sites. (The value of Wt1 will be varied in the next chapter during sensitivity analysis.)

3. Vehicle Selection

If Headquarters Marine Corps were to require that a specific quantity of vehicles, **n**, be transferred to the equipment pool at MCAGCC, the decision maker would be able to select the appropriate sites from which to remove vehicles by choosing the **n** lowest keep factors. For example, the first ten vehicles to be pulled would be the following:

Order of Removal	Site #	Keep Factor
1	118	0.1024
2	138	0.1355
3	166	0.1907
4	139	0.1929
5	77	0.1955
6	166	0.2068
7	164	0.2176
8	139	0.2177
9	80	0.2197
10	5	0.2223

Appendix E lists all of the keep factors in order, with site numbers, demonstrating the ease with which any quantity of vehicles could be selected.

4. Potential Savings

The term "savings" used throughout this thesis refers to the obvious benefit from not having to ship as many assets in future years. If the ten vehicles above are transferred to Twentynine Palms, they represent ten fewer vehicles that will have to be shipped in future years (to support CAXs).

An estimate of future savings can be obtained in the following manner:

- Calculate the total cost to transport the selected vehicles to Twentynine Palms. (For illustration, assume the ten vehicles listed in the previous section are shipped, at cost of $1.00 per mile per vehicle. Total charges would be $26,987.00, based on the distances in Appendix A.)

- For a round-trip movement of those assets in future years, the charge from step one is multiplied by two.

- Find the Net Present Value of the round-trip charges, at an appropriate discount rate, for a period of several years. (Using the previous illustration, round-trip charges amount to $53,974.00. Over five years, using a discount rate of 10%, the Net Present Value function of Lotus 1-2-3™ produces a figure of $204,603.93.)

- Subtract the one-way transportation charge obtained in step one from the Net Present Value obtained in step three. This result is the estimated savings. (To conclude the illustration, the savings value obtained is $177,616.93. If the discount rate is increased to 25%, savings are reduced to $118,164.20.)

C. FLEXIBILITY

Although the model as presented refers specifically to vehicles\, it could be applied easily to other categories of equipment with minimal revision. To review the formula, the key elements are:

- Percent of Use
- Commander's Judgment (Wt1)
- Percent of Savings Possible
- Savings Weight (Wt2)

The last three elements need not be changed, except possibly the transportation cost for the asset. Only the first element requires changing.

Engineer equipment, such as generators and forklifts, measure use in hours, not miles. The percent of use could be obtained in the same manner as for vehicles by simply changing all references from "miles" to "hours", i.e., total hours, average hours per decreasing quantities of equipment, etc.... Other categories of assets would require similar adjustments, such as rounds fired, days checked-out, and the like.

In this manner, the model can accommodate a variety of assets, aiding the decision maker in a multitude of determinations.

V. SENSITIVITY ANALYSIS

A. FORMULA RELATIONSHIPS

1. General

To understand the relationships between the components of the model, one must remember the crucial elements of the formula:

Keep Factor = (Wt1)(%Use) + (Wt2)(%Savings)

In performing sensitivity analysis, the authors will manipulate the two variable elements, Wt1 and Wt2.

The other two elements, however, are fixed. The %Savings, for example, varies from site to site, but is a constant for every vehicle at a particular site. Each site's value for %Savings is predicated upon its distance from Twentynine Palms (a proxy for transportation charges).

The %Use factor is unique for every vehicle at a site (although it may, coincidentally, be the same as that of a vehicle at another site). As each vehicle is removed from the site, the %Use for the next vehicle increases.

Figure 5 is a pictorial analogy of the fixed elements of the model. Each tree represents a vehicle, its height indicates its %Use. The apex of the hill represents Twentynine Palms, with the locations of the trees determined by the distance of each site from the MCAGCC. The hill indicates the effect of %Savings being added to the trees' height. (Remember that a large keep factor, or height for this analogy, decreases the likelihood of an asset being transferred.) As sites more distant from Twentynine Palms offer the largest future savings, they receive the smallest additions to the keep factor.

If both Wt1 and Wt2 were set to 1 (100%), the shortest trees, as measured from sea level, would represent the first assets to be transferred. Each tree's height can be decreased individually by reducing Wt1 below 100%; Wt2's reduction would effectively decrease the height of the hill.

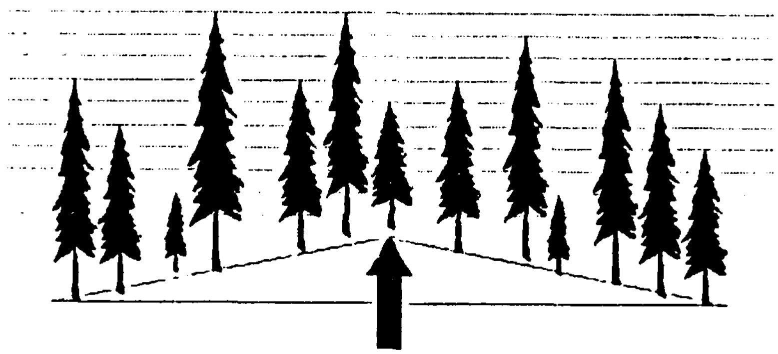

Figure 5. Analogy of Model Elements

2. Command Determinants

The weights applied to each of these elements (Wt1 and Wt2) will be assigned by two separate levels of Command. As one commander is senior, that assigned weight (Wt2) cannot be changed by the subordinate. However, the subordinate commander can affect the overall outcome of the decision through tactical placement of his half of the equation. This is as it should be, as the higher level commander is assumed to be primarily interested in saving money. The degree to which this interest is specified will be shown in the weight assigned to the formula. For example, if the commander is totally concerned with monetary savings, a value of 1.0 would be assigned. If headquarters is less concerned with savings because other contingencies are allowed to affect the decision, then a 0.40 may be selected as a proper weight.

3. Weight Analysis

The weight allowed the local, subordinate commander (Wt1) will now be discussed. The decisions made at this level are to be independent of the other; thus, a full 100 percent range is allowed (a range of 0.0 to 1.0). For full understanding, readers are referred to Figure 6.

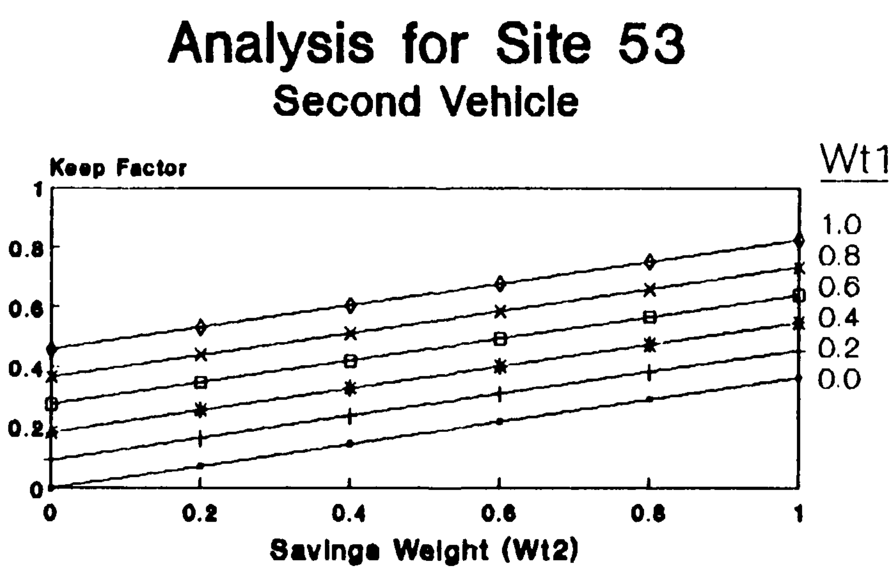

Figure 6. Site 53, Second Vehicle. Illustration of autonomy allowed the local commander for a given savings weight (Wt2).

This shows graphically how the two weights interact and what effect each has at various levels on the keep factor. The numerical results of the formula (shown below) are the numbers used to graph Figure 6. This site is located 1907 miles from MCCAGC and the vehicle average usage is 4599.5 miles.

Wt1/Wt2	0	0.2	0.4	0.6	0.8	1.0
0	0.00000	0.072866	0.145733	0.21860	0.291466	0.364333
0.2	0.09199	0.164856	0.237723	0.31059	0.383456	0.456323
0.4	0.18398	0.256846	0.329713	0.40258	0.475446	0.548313
0.6	0.27597	0.348836	0.421703	0.49457	0.567436	0.640303
0.8	0.36796	0.440826	0.513693	0.58656	0.659426	0.732293
1.0	0.45995	0.532816	0.605683	0.67855	0.751416	0.824283

For comparison, the figures from site 170 are also displayed. The distance for this site is 2305 miles from MCCAGC with an average usage of 4597.36 miles.

Wt1/Wt2	0	0.2	0.4	0.6	0.8	1.0
0	0.000000	0.046333	0.092667	0.139000	0.185333	0.231667
0.2	0.091947	0.138281	0.184614	0.230947	0.277281	0.323614
0.4	0.183894	0.230228	0.276561	0.322894	0.369228	0.415561
0.6	0.275842	0.322175	0.368508	0.414842	0.461175	0.507508
0.8	0.367789	0.414122	0.460455	0.506789	0.553122	0.599455
1.0	0.459736	0.506069	0.552403	0.598736	0.645069	0.691403

Each numerical result shows data related to the second vehicle up for consideration. These sites and vehicles where chosen for sensitivity analysis because of their geographic distances from one another and because both sites' vehicle average use figures are very close.

Assuming that Wt2 has been dictated at 0.6, what is the measure of autonomy allowed the subordinate? Referring to the results, find Wt2 across the top at 0.6 for each site. Note how the numbers change with each consideration of Wt1 (listed on the left). Assuming that the local commander considered site 170 to be of greater strategic importance than site 53, (note that site 170 is farther away, thus having greater savings potential) a higher weight could be assigned, probably a 1.0. Thus, a Wt1 of 1.0 and a Wt2 of 0.6 results in a keep factor of .598736 for site 170. Assume further that site 53, although less strategically important than site 170, still weighs rather heavily when considering the grand scheme of importance and has been assigned a 0.6 as its Wt1. This means that at a Wt2 of 0.6, site 170 would keep its second vehicle as site 53's keep factor was 0.49457 (the lower keep factors get pulled first).

It would not be difficult to be lead into the belief that the local commander has been allowed too much autonomy. However, this is not true. The autonomy allowed is considerable, but is at best equal only to the autonomy of the higher commander. For example, referring back to the last discussion, the local commander had established the strategic importance of a second vehicle at site 170 as 1.0. Site 53's strategic importance had been set at 0.6. Had Wt2 been set at 0.8 by the higher decision maker, then site 53's keep factor (0.567436) would have been higher than site 170's (0.461175) which means that site 170 would have lost a second vehicle because of the over riding power of the weight applied to the higher decision maker's desire to save future transportation charges.

B. EFFECTS ON OUTCOME

1. Savings Weight

Chapter IV suggested the order of removal for the first ten vehicles. This chapter will vary the weight of the model to measure the effects of the changes to those ten vehicle selections.

Reducing the savings weight (Wt2) to zero, and holding all other model variables constant i.e., Wt1 at 0.5, the model produces the following:

Order of Removal	Site#	Keep Factor
1	118	0.0247
2	138	0.0916
3	77	0.1403
4	59	0.1424
5	166	0.1450
6	53	0.1533
7	126	0.1545
8	166	0.1611
9	126	0.1686
10	93	0.1687

Note that sites 118 and 138 did not change from their original priority positions. Site 77 moved up in priority and site 166 moved down (for both vehicles). Sites 59, 53, 126, 164, 80, and 5 drop out.

Why did this happen? Reducing to zero the weight applied to the importance of savings removed the saving variable completely from the model. Thus, those sites with the least average use were prime targets for selection,. Comparing the average use of each site bears this out (from Appendix C):

Order of Removal	Site#	Average Use
1	118	494
2	138	1832
3	77	2805
4	59	2848
5	166	2900
6	53	3066
7	126	3090
8	166	3222
9	126	3371
10	93	3373

2. Commander's Judgment

The most intuitively satisfying indication of how well the model functions is to apply the model with varying commander's judgment weights. Returning the savings weight to 0.3 (which will likely be set by higher authority anyway), a commander's judgment weight of 0.7 was applied to all sites within a state located on the East and West coasts. This scenario might indicate that sites closer to ports of embarkation have a higher need for contingency assets. All other Wt1 factors were held at the constant 0.5. The model results for the top ten sites are as follows:

Order of Removal	Wt1	Site#	Keep Factor
1	0.5	118	0.1024
2	0.5	138	0.1355
3	0.5	138	0.2271
4	0.5	128	0.2294
5	0.5	59	0.2390
6	0.7	166	0.2487
7	0.7	77	0.2516
8	0.5	177	0.2551
9	0.5	134	0.2563
10	0.5	140	0.2616

The key point to be made here is that the commander's judgment weight can and does affect the outcome of the selection results. Although the previous list still displays two sites within the top ten, in spite of a higher commander's judgment weight, other sites previously not considered enter the picture i.e., a second vehicle from site 138, and first vehicles from any of sites 128, 177, 134, and 140. Thus, the local commander is allowed a great degree of autonomy in the outcome of the ultimate decision. Sites 166 and 77 remained because of relatively low average vehicle use and because they are both far from 29 Palms. A comparison of sites 166 and 77 to those sites listed above and below them on the priority list bears this out:

Site	Wt1	Ave. Use	Distance
128	0.5	3680	2546
59	0.5	2848	2034
166	0.7	2900	2543
77	0.7	2805	2448
177	0.5	3562	2230

3. Net Present Value

No sensitivity analysis would be complete without comparing the change in net present value of the "top 10" selection lists (discount rate at 10%):

First List Wt1 = 0.5 Wt2 = 0.3	Second List Wt1 = 0.5 Wt2 = 0.0	Third List Wt1 = 0.5/0.7 WT2 = 0.3	Not Listed Wt1 = 0.0 Wt2 = 0.3
NPV	NPV	NPV	NPV
$177,616.93	$129,092.56	$158,056.49	$240,885.59

As can be seen, not allowing for any savings weight (Wt2=0) results in a lower monetary savings over time (second NPV list). Alternatively, not allowing other factors to enter the formula (Wt1=0) maximizes savings (note the "Not Listed" NPV amount). Any other combination of variables is a form of "satisficing" which means that a compromise of the optimum solution is taking place.

C. CONTINGENCY PLANNING

1. Site Selectivity

The model as presented overlooks a strategic consideration: some sites may be holding assets for use during a specific contingency. Several possibilities spring to mind:

- A site located next to a port of embarkation may be prepared to load assets aboard ship, with personnel planned to arrive from another site.

- A site may hold assets for stock rotation into pre-positioned war reserves, maritime pre-positioned shipping or other long-term storage programs.

- National security plans may dictate strategic locations within the continental United States for potential emergencies.

Considerations such as those listed above would require that those assets so designated be excluded from consideration for transfer to the MCAGCC. Other exclusions could arise when, in the decision maker's viewpoint, sites <u>must</u> have a minimum number of assets to perform their specific missions.

Historically, some sites have been tapped more frequently than others for providing assets to the CAXs. Some may have been overlooked entirely, and never been tasked to provide equipment. This model will allow the decision maker to see if these tendencies have been valid from a budgetary perspective, based on asset utilization. Again, contingency planning factors must be considered for an accurate assessment.

2. Risk and Uncertainty

The decision maker as discussed thus far has been described as a singular entity. One might assume that the decision maker is a particular general, such as the Commanding General of the Fourth Marine Division. Whether at the division or at a higher level, the decision maker must rely on input from numerous other individuals to develop the insight and expertise necessary for correct application of this model.

The quantitative input is primarily of a logistic nature. Staff officers should have relatively easy work collecting the historical data and transportation costs, compared to the qualitative decisions needed to rank operations plans, training requirements, contingencies, etc., in order to assign appropriate weights to each site.

The assignment of the commander's judgment weight, Wt1, could be such a difficult task that the temptation might arise to overlook certain elements, or even to assign values based on intuition. Prolonged exposure to classified contingency plans while attempting to rank their relative importance might induce over-simplification or, conversely, frustration at the complexity of the chore.

As in all important decisions, the information gathering and relative ranking of priorities must end at a finite point in time, or the decision will never be made. Was all the data obtained? Were the figures correct? Were the plans up-to-date? What elements in the future will affect the decision today? Are missions changing or in the process of being eliminated? Does the absence of a specific contingency plan eliminate the possibility of one in the near future? Have all the issues been examined? Or are the most important elements still to be examined?

Questions such as these highlight the uncertainty and risks inherent in the reliance on a model such as this. The latitude allowed in assigning the weight for commander's judgment, in addition to the possibility of excluding assets or sites entirely, heightens the degree of confidence placed in the commander. Simultaneously, it emphasizes the possibility of error.

This model is only a tool; it knows no absolute truths. In the hands of a skilled planner, it may plant the seed for a bountiful future benefit in terms of maximized training potentials and saved transportation dollars. It could also, however, be easily abused and allowed to be a substitute for informed decision making.

VI. CONCLUSIONS AND RECOMMENDATIONS

The model as presented in this thesis demonstrates that static marginal analysis can be a valid tool for assisting in complex decisions. With the proper framework, sufficient data, and an informed, non-biased decision maker, the elements to be sorted can be arrayed in a logical manner, allowing the selection process to provide as-near-optimal results as possible.

For the model to be used as described in this thesis, the following conditions must exist:

- A decision must be made, at a Headquarters Marine Corps level, about the trade-off desired between future transportation savings and equipment availability at Reserve sites. This decision will provide the savings weight, Wt2.

- Proper analysis of contingency plans, coupled with accurate evaluation of unit missions and training requirements, must be conducted impartially to enable the assignment of Wt1, Commander's Judgement.

- Correct, historical usage data for all assets must be provided to the decision maker who will use the model.

These conditions, although complex and difficult in themselves, focus on specific elements in the larger problem. By providing focus, they simplify the larger problem by breaking it down into manageable parts. Once this is accomplished, the remainder of the selection process becomes a matter of simple data manipulation.

The selection of which assets to transfer is, in itself, only one aspect of the EAP expansion program. Other areas that require serious study include:

- Personnel requirements: Current policy requires a one-for-one reduction in billets elsewhere for each additional billet established. Reserve Full Time Support (FTS) billets, as well as reserve site active duty personnel (Inspector-Instructor billets), would be likely candidates for consideration.

- Facility/security requirements: Although a new EAP maintenance facility has recently been completed, storage, office, and personnel housing must also be addressed.

- Accountability/reporting requirements: Assets that belong to the Reserve establishment, having been purchased with funds ear-marked by Congress for Reserve use, have different reporting requirements than assets belonging to the active forces. Procedures for proper control, through all aspects of equipment operation and maintenance, would need to be approved and published.

Other alternatives, as discussed in section B.5 of Chapter 5, also merit study. The regional EAP concept, either by itself or combined with Inter-Service Support Agreements, could provide an offset to the reduced training availability discussed as a trade-off in consideration of future savings.

The budget impact of all of these proposals must, in the long run, play the decisive role. The costs of designing, preparing and implementing each choice must be weighed against the cost of continuing to do business "as usual."

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APPENDIX A: SITE IDENTIFICATION

#	City	State	Distance	Qty
1	Bessemer	Alabama	2154	0
2	Huntsville	Alabama	2107	1
3	Mobile	Alabama	1834	14
4	Montgomery	Alabama	1887	1
5	Anchorage	Alaska	3660	13
6	Phoenix	Arizona	251	8
7	Tucson	Arizona	361	9
8	Yuma	Arizona	143	10
9	Little Rock	Arkansas	1545	9
10	Alameda	California	515	13
11	Bakersfield	California	234	1
12	Camp Pendleton	California	115	2
13	Concord	California	510	6
14	El Toro	California	104	2
15	Encino	California	141	10
16	Fresno	California	357	0
17	Hayward	California	500	4
18	Lathrop	California	450	11
19	Long Beach	California	132	11
20	Los Alamitos	California	135	14
21	Los Angeles	California	130	14
22	Pasadena	California	139	1
23	Pico Rivera	California	130	5
24	Port Hueneme	California	192	0
25	Sacramento	California	502	2
26	San Bernardino	California	73	10
27	San Bruno	California	500	6
28	San Diego	California	131	13
29	San Francisco	California	505	13
30	San Jose	California	461	10
31	Aurora	Colorado	2604	8
32	New Haven	Connecticut	2707	7
33	Plainville	Connecticut	2767	2
34	Wilmington	Delaware	2550	4
35	Washington	D. C.	2491	4
36	Cecil Field	Florida	2218	5
37	Jacksonville	Florida	2233	4
38	Miami	Florida	2538	3
39	Orlando	Florida	2321	3
40	Tallahassee	Florida	2072	11
41	Tampa	Florida	2313	6
42	West Palm	Florida	2477	2
43	Albany	Georgia	2047	15
44	Atlanta	Georgia	2026	3
45	Augusta	Georgia	2173	8
46	Marietta	Georgia	2021	0
47	Rome	Georgia	1986	5
48	Savannah	Georgia	2216	11

#	City	State	Distance	Qty
49	Boise	Idaho	898	11
50	Chicago	Illinois	1945	4
51	Danville	Illinois	1872	0
52	Glenview	Illinois	1884	1
53	Joliet	Illinois	1907	3
54	Peoria	Illinois	1792	2
55	Rock Island	Illinois	1874	8
56	Springfield	Illinois	1754	1
57	Waukegan	Illinois	1966	8
58	Evansville	Indiana	1867	14
59	Ft. Wayne	Indiana	2034	1
60	Gary	Indiana	1950	15
61	Indianapolis	Indiana	1933	7
62	South Bend	Indiana	2005	14
63	Des Moines	Iowa	1638	0
64	Waterloo	Iowa	1741	0
65	Topeka	Kansas	1397	2
66	Wichita	Kansas	1260	9
67	Ft. Knox	Kentucky	1943	9
68	Lexington	Kentucky	2031	4
69	Baton Rouge	Louisiana	1650	3
70	Belle Chasse	Louisiana	1729	11
71	Lafayette	Louisiana	1917	7
72	New Orleans	Louisiana	1730	8
73	Shreveport	Louisiana	1428	3
74	Topsham	Maine	2950	6
75	Andrews AFB	Maryland	2493	5
76	Baltimore	Maryland	2495	4
77	Frederick	Maryland	2448	2
78	Camp Edwards	Massachusetts	2843	15
79	Chicopee	Massachusetts	2767	0
80	South Weymouth	Massachusetts	2843	11
81	Worcester	Massachusetts	2807	10
82	Battle Creek	Michigan	2082	15
83	Detroit	Michigan	2185	13
84	Flint	Michigan	2183	2
85	Grand Rapids	Michigan	2092	11
86	Lansing	Michigan	2132	14
87	Selfridge	Michigan	2207	15
88	Minneapolis	Minnesota	1812	5
89	Gulfport	Mississippi	1777	14
90	Jackson	Mississippi	1647	5
91	Kansas City	Missouri	1450	0
92	St. Louis	Missouri	1700	5
93	Billings	Montana	1229	2
94	Omaha	Nebraska	1503	13
95	Las Vegas	Nevada	277	1
96	Reno	Nevada	527	13
97	Manchester	New Hampshire	2840	9
98	Dover	New Jersey	2595	15

#	City	State	Distance	Qty
99	Red Bank	New Jersey	2633	14
100	West Trenton	New Jersey	2588	0
101	Albuquerque	New Mexico	666	11
102	Albany	New York	2689	13
103	Bronx	New York	2656	14
104	Brooklyn	New York	2656	13
105	Buffalo	New York	2408	10
106	Garden City	New York	2656	8
107	Huntington	New York	2656	0
108	New Rochelle	New York	2656	0
109	Rochester	New York	2477	3
110	Syracuse	New York	2558	7
111	Charlotte	North Carolina	2259	5
112	Cherry Point	North Carolina	2516	10
113	Greensboro	North Carolina	2318	2
114	Raleigh	North Carolina	2389	4
115	Wilmington	North Carolina	2430	11
116	Akron	Ohio	2222	15
117	Cincinnati	Ohio	2042	13
118	Cleveland	Ohio	2223	1
119	Columbus	Ohio	2103	11
120	Dayton	Ohio	2038	6
121	Toledo	Ohio	2136	10
122	Youngstown	Ohio	2272	4
123	Broken Arrow	Oklahoma	1311	1
124	Oklahoma City	Oklahoma	1208	15
125	Eugene	Oregon	959	0
126	Portland	Oregon	1066	12
127	Salem	Oregon	1020	5
128	Allentown	Pennsylvania	2546	6
129	Connellsville	Pennsylvania	2320	4
130	Ebensburg	Pennsylvania	2345	14
131	Erie	Pennsylvania	2320	11
132	Folsom	Pennsylvania	2560	14
133	Harrisburg	Pennsylvania	2465	6
134	Philadelphia	Pennsylvania	2563	14
135	Pittsburgh	Pennsylvania	2284	3
136	Reading	Pennsylvania	2517	13
137	Willow Grove	Pennsylvania	2563	6
138	Wyoming	Pennsylvania	2561	2
139	Providence	Rhode Island	2807	8
140	Charleston	South Carolina	2306	10
141	Columbia	South Carolina	2235	6
142	Greenville	South Carolina	2165	15
143	Chattanooga	Tennessee	1981	14
144	Johnson City	Tennessee	2151	5
145	Knoxville	Tennessee	2053	9
146	Memphis	Tennessee	1669	12
147	Nashville	Tennessee	1876	0
148	Abilene	Texas	1075	4

#	City	State	Distance	Qty
149	Amarillo	Texas	950	3
150	Austin	Texas	1229	6
151	Corpus Christi	Texas	1347	0
152	Dallas	Texas	1244	5
153	El Paso	Texas	649	5
154	Ft. Worth	Texas	1216	5
155	Galveston	Texas	1429	15
156	Harlingen	Texas	1424	9
157	Houston	Texas	1385	2
158	Lubbock	Texas	957	7
159	San Antonio	Texas	1203	8
160	Texarkana	Texas	1422	1
161	Waco	Texas	1260	6
162	Salt Lake City	Utah	689	12
163	Tooele	Utah	681	0
164	Dam Neck	Virginia	2552	11
165	Lynchburg	Virginia	2356	2
166	Newport News	Virginia	2543	10
167	Norfolk	Virginia	2536	2
168	Quantico	Virginia	2461	7
169	Richmond	Virginia	2470	13
170	Roanoke	Virginia	2305	15
171	Seattle	Washington	1240	0
172	Spokane	Washington	1259	1
173	Tacoma	Washington	1209	5
174	Whidbey Island	Washington	1310	8
175	Yakima	Washington	1147	10
176	S. Charleston	West Virginia	2206	4
177	Wheeling	West Virginia	2230	4
178	Green Bay	Wisconsin	2053	0
179	Madison	Wisconsin	1921	12
180	Milwaukee	Wisconsin	1991	11

Total number of vehicles, all sites: 1257

APPENDIX B: VEHICLE USE

Site No.	Vehicle use: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Site total
1																0
2	7,731															7731
3	3,055	3,215	8,143	1,262	3,260	4,148	5,744	3,199	6,646	6,571	8,995	9,071	4,178	111		67598
4	8,934															8934
5	8,167	257	5,907	5,905	9,140	7,490	6,069	3,683	832	5,100	6,295	6,152	9,973			74970
6	9,809	9,638	710	2,099	6,074	1,935	2,580	3,049								35894
7	4,249	4,511	8,535	3,538	424	4,289	8,326	2,228	8,696							44796
8	2,305	5,836	499	3,167	2,732	1,206	300	3,949	9,756	4,819						34569
9	6,683	6,619	9,569	2,674	4,908	5,024	9,075	4,865	3,159							52576
10	3,754	8,781	4,963	8,307	6,146	5,948	2,953	8,364	2,325	8,379	8,647	1,442	5,521			75530
11	7,844															7844
12	9,307	8,451														17758
13	8,682	4,405	1,711	9,239	7,729	2,113										33879
14	8,995	8,210														17205
15	8,628	8,481	7,222	2,252	2,190	1,291	720	2,756	6,537	6,424						46501
16																0
17	7,662	55	9,865	1,292												18874
18	6,014	8,171	3,856	6,478	2,703	5,098	3,307	469	4,098	3,143	5,457					48794
19	6,709	1,408	9,108	2,061	5,775	3,913	506	8,085	2,800	147	7,375					47887
20	5,959	9,982	6,293	4,929	260	5,681	8,300	1,615	6,630	4,396	5,427	3,978	7,638	5,222		76310
21	1,792	7,544	7,795	2,627	8,728	3,069	3,812	3,308	507	2,649	8,555	8,377	7,150	1,982		67895
22	8,781															8781
23	1,405	7,920	2,803	2,957	4,221											19306
24																0
25	8,788	8,661														17449
26	9,532	4,124	4,189	8,152	5,274	4,033	8,698	5,854	5,061	391						55308
27	9,094	1,277	5,492	7,554	3,257	3,758										30432
28	6,994	288	1,091	8,288	1,408	7,123	7,952	6,118	8,052	7,493	7,665	5,488	3,310			71270
29	9,039	5,127	1,506	7,747	8,789	4,574	7,851	5	7,238	1,963	6,742	621	197			61399
30	8,258	1,143	1,443	9,836	9,933	8,959	5,249	6,761	7,341	9,946						68869
31	1,738	5,770	4,402	9,680	4,252	1,761	969	9,689								38261
32	1,210	8,909	6,124	2,190	454	7,006	6,458									32351
33	4,951	3,030														7981
34	1,723	4,044	7,889	7,813												21469
35	5,295	9,208	6,333	6,419												27255
36	9,834	4	5,741	7,950	2,339											25868
37	6,991	2,546	3,325	8,385												21247
38	9,372	665	3,711													13748
39	9,748	1,861	985													12594
40	8,963	6,936	7,633	3,051	9,311	5,021	3,877	1,949	2,643	4,792	1,851					56027
41	9,375	8,408	66	6,827	2,427	3,640										30743
42	5,968	3,210														9178
43	4,958	8,574	7,302	7,771	6,239	3,088	9,943	3,007	8,721	321	6,402	5,080	9,840	5,668	6,560	93474
44	6,832	7,927	5,362													20121
45	897	9,097	6,143	27	9,411	8,298	752	5,515								40140
46																0

Site No.	Vehicle use: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Site total
47	9,073	3,280	4,553	4,967	7,359											29232
48	4,530	9,483	1,831	7,802	8,837	6,462	8,579	2,631	3,630	7,499	2,717					64001
49	8,840	5,226	8,410	1,667	4,100	1,805	8,304	6,593	7,640	2,687	9,187					64459
50	5,817	5,533	3,818	2,416												17584
51																0
52	6,496															6496
53	6,463	73	2,663													9199
54	7,487	7,474														14961
55	2,556	7,872	6,442	5,378	8,557	1,292	9,046	1,266								42409
56	4,376															4376
57	7,015	7,751	2,678	4,813	4,950	6,590	6,087	5,335								45219
58	9,810	4,945	8,230	6,996	1,404	4,456	8,967	3,213	9,538	2,428	5,624	9,647	4,148	1,749		81165
59	2,848															2848
60	349	1,757	6,986	3,440	408	1,588	8,545	8,097	9,071	6,430	3,208	3,242	164	620	2,187	56092
61	9,754	6,972	929	1,156	5,181	5,748	9,945									39685
62	3,242	941	4,411	7,556	7,397	153	2,872	4,842	5,487	7,990	331	7,993	5,022	2,684		60921
63																0
64																0
65	5,930	865														6795
66	6,925	7,411	6,896	8,484	5,264	5,420	3,991	7,998	4,161							56550
67	7,323	493	7,459	1,445	6,570	6,301	9,851	5,106	9,180							53728
68	5,408	1,816	1,793	6,354												15371
69	5,222	5,844	7,976													19042
70	4,040	2,472	7,761	8,956	3,376	6,216	402	5,913	278	4,476	957					44847
71	5,342	4,577	6,956	1,364	6,031	2,939	3,131									30340
72	3,299	4,534	6,612	1,769	4,096	5,169	2,659	2,388								30526
73	5,562	4,963	2,280													12805
74	2,656	3,561	9,643	978	2,944	8,311										28093
75	6,628	8,794	854	480	4,131											20887
76	2,287	7,096	4,012	7,785												21180
77	1,858	3,752														5610
78	4,385	1,376	6,065	9,674	4,373	8,305	5,536	5,163	6,280	8,046	6,544	2,682	7,820	6,380	7,119	89748
79																0
80	9,854	4,444	6,834	1,177	5,975	3,720	693	2,400	2,614	6,485	694					44890
81	1,547	8,985	9,763	9,316	8,494	6,050	4,158	9,284	3,262	1,926						62785
82	5,712	1,959	7,854	157	3,166	9,654	7,816	976	9,242	4,854	5,428	1,816	9,809	7,397	1,797	77637
83	3,965	6,441	1,443	9,428	857	7,496	8,546	169	9,522	6,887	1,985	3,081	9,958			69778
84	8,933	9,088														18021
85	7,470	3,363	309	8,602	9,468	8,894	6,203	2,196	4,229	8,053	8,763					67550
86	9,331	6,753	8,019	5,803	2,702	3,545	7,316	7,918	5,494	2,522	1,406	2,776	6,225	7,692		77502
87	7,730	9,551	6,611	1,510	4,558	5,411	2,480	1,224	4,911	3,942	2,336	2,466	1,640	6,621	4,681	65672
88	8,100	3,689	6,997	8,865	1,708											29359
89	1,028	1,566	2,273	1,131	511	941	3,821	442	7,147	8,977	6,649	4,208	7,190	3,659		49543
90	5,337	2,983	9,912	5,295	3,748											27275
91																0
92	9,975	3,572	3,010	9,349	4,811											31317

Site No.	Vehicle use: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Site total
93	1,086	5,661														6747
94	4,614	9,201	6,027	8,269	3,042	2,863	1,424	7,895	6,461	330	1,923	3,460	4,663			60172
95	8,291															8291
96	6,432	267	2,472	4,486	29	3,367	2,126	105	8,080	3,045	8,875	3,869	3,154			46307
97	6,610	313	8,918	2,909	2,276	5,916	5,938	9,199	921							43000
98	9,263	3,342	7,277	1,899	5,795	9,556	5,425	9,072	2,694	1,184	5,571	449	4,628	6,707	9,809	82671
99	5,688	668	5,606	9,351	8,148	7,289	4,468	3,412	8,887	6,683	4,654	3,423	7,835	2,757		78869
100																0
101	3,477	790	6,457	4,706	4,357	8,941	3,435	2,449	7,212	1,203	6,765					49792
102	7,418	3,136	5,092	3,284	9,447	9,556	5,322	3,899	7,528	7,323	7,937	2,303	8,196			80441
103	5,332	1,200	7,663	3,603	9,760	5,094	7,797	2,061	4,191	4,156	1,176	4,433	2,503	7,607		66576
104	7,012	895	2,453	4,280	4,178	8,057	4,555	1,866	9,725	2,037	8,100	2,907	9,486			65551
105	8,458	9,209	9,778	3,816	9,472	8,816	8,102	6,194	1,022	6,388						71255
106	2,284	1,211	1,186	4,965	8,532	9,825	2,547	6,784								37334
107																0
108																0
109	5,816	7,016	7,092													19924
110	7,758	9,742	2,329	3,417	2,984	8,498	4,009									38737
111	7,753	8,975	8,286	4,177	4,368											33559
112	6,683	985	4,002	4,179	9,073	9,757	4,134	4,641	8,303	9,613						61370
113	4,509	4,140														8649
114	5,453	1,988	9,977	2,871												20289
115	5,697	6,872	4,564	7,805	8,690	1,887	2,714	2,375	1,438	5,177	6,833					54052
116	27	3,466	7,074	4,827	3,927	5,039	8,777	6,425	5,357	2,114	8,628	9,537	1,085	4,549	9,691	80523
117	6,450	7,819	5,843	6,486	996	9,813	4,965	5,798	5,373	7,387	5,954	3,084	1,223			71191
118	494															494
119	1,620	635	2,416	5,321	9,493	5,453	4,210	8	9,288	1,969	3,632					44045
120	3,515	251	1,716	8,540	4,098	7,290										25410
121	8,808	6,545	2,511	8,988	7,389	851	9,532	5,955	252	7,632						58463
122	5,908	4,690	7,036	1,887												19521
123	8,163															8163
124	1,104	6,221	2,090	5,375	3,991	1,658	894	7,422	1,473	3,928	7,795	7,970	4,757	9,123	141	63942
125																0
126	7,968	1,617	1,766	1,925	979	47	2,398	636	7,886	2,191	5,837	3,835				37085
127	3,983	3,766	4,955	2,347	4,040											19091
128	8,972	3,941	3,019	4,499	1,524	126										22081
129	7,979	5,196	2,604	6,855												22634
130	7,322	8,957	9,372	1,308	3,654	4,835	358	1,215	2,389	3,151	3,394	2,710	1,418	5,292		55375
131	5,216	9,111	8,141	3,932	5,122	2,232	7,960	1,521	8,107	7,071	4,927					63340
132	1,199	8,146	3,113	8,310	8,077	4,625	4,414	3,122	9,704	2,473	2,710	3,737	5,945	735		66310
133	9,409	2,553	7,392	5,057	9,683	3,606										37700
134	3,263	8,387	3,098	5,645	111	1,807	405	42	8,099	6,881	4,921	7,115	5,421	4,327		59522
135	9,802	3,548	5,101													18451
136	5,705	9,690	9,081	1,949	551	1,496	6,381	3,389	2,784	1,806	6,913	3,848	8,490			62083
137	5,813	6,101	5,659	3,984	8,868	9,662										40087
138	974	2,690														3664

Site No.	Vehicle use: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Site total
139	8,883	2,603	4,780	371	809	596	7,789	1,943								27774
140	6,518	7,555	2,319	1,813	1,654	5,874	3,551	1,225	6,580	1,350						38439
141	9,055	7,066	8,596	4,464	615	527										30323
142	4,093	1,107	4,264	1,700	5,376	6,890	5,709	4,051	5,140	4,050	2,850	4,280	669	7,312	2,037	59528
143	2,010	621	7,039	1,499	2,386	8,470	2,984	5,652	1,237	5,725	3,724	3,184	6,019	5,733		56283
144	972	3	1,361	9,151	6,978											18465
145	5,979	527	6,729	3,602	9,118	5,358	4,179	5,742	4,749							45983
146	7,451	318	1,856	8,890	2,573	7,598	4,935	4,806	9,138	5,176	4,519	4,258				61518
147																0
148	2,940	8,482	6,303	7,344												25069
149	2,066	8,376	6,407													16849
150	7,313	914	7,480	2,436	9,326	7,897										35366
151																0
152	5,677	360	3,774	3,960	8,492											22263
153	2,869	1,158	8,756	6,582	7,549											26914
154	8,973	1,677	60	5,763	2,969											19442
155	7,270	9,173	1,576	570	1,343	6,384	4,434	3,789	6,039	8,838	8,809	8,162	1,125	8,796	3,478	79786
156	376	9,097	3,562	1,179	8,727	2,926	8,193	4,571	1,290							39921
157	8,704	6,751														15455
158	4,054	6,536	7,263	6,129	473	7,321	7,443									39219
159	9,414	5,618	3,918	9,745	2,307	2,808	1,378	8,821								44009
160	9,039															9039
161	560	6,367	7,160	1,341	8,483	1,397										25308
162	2,339	1,527	1,178	5,119	2,345	9,549	6,551	1,351	4,017	1,130	5,005	4,404				44515
163																0
164	2,742	5,748	7,597	1,585	162	4,196	1,606	3,355	7,271	2,648	1,112					38022
165	7,697	834														8531
166	5,491	1,612	4,325	2,434	5,299	1,121	1,714	3,002	2,936	1,067						29001
167	4,612	6,723														11335
168	8,890	5,995	9,327	2,550	8,117	4,702	3,859									43440
169	9,905	2,623	2,555	1,873	2,979	5,587	2,135	8,878	2,491	4,534	8,632	7,686	993			60871
170	2,503	9,688	826	318	3,522	8,757	1,891	5,242	5,003	3,908	8,360	1,749	8,162	3,214	1,220	64363
171																0
172	3,571															3571
173	9,888	1,611	9,165	2,564	8,022											31250
174	9,220	2,645	83	8,455	891	2,924	9,863	9,569								43650
175	8,197	9,101	1,585	6,653	5,502	1,213	6,034	357	1,974	6,709						47325
176	7,584	8,802	844	9,842												27072
177	3,746	5,016	1,588	3,898												14248
178																0
179	2,709	7,411	2,254	7,362	1,424	7,604	5,528	7,923	3,006	6,225	7,435	2,107				60988
180	7,243	7,083	3,035	7,495	140	5,191	2,437	9,981	9,193	4,822	5,744					62364

APPENDIX C: AVERAGES PER DECREASING QUANTITIES OF VEHICLES

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	7,731														
3	4,828	5,200	5,633	6,145	6,760	7,511	8,450	9,657	11,266	13,520	16,900	22,533	33,799	67,598	
4	8,934														
5	5,767	6,248	6,815	7,497	8,330	9,371	10,710	12,495	14,994	18,743	24,990	37,485	74,970		
6	4,487	5,128	5,982	7,179	8,974	11,965	17,947	35,894							
7	4,977	5,600	6,399	7,466	8,959	11,199	14,932	22,398	44,796						
8	3,457	3,841	4,321	4,938	5,762	6,914	8,642	11,523	17,285	34,569					
9	5,042	6,572	7,511	8,763	10,515	13,144	17,525	26,288	52,576						
10	5,810	6,294	6,866	7,553	8,392	9,441	10,790	12,588	15,106	18,883	25,177	37,765	75,530		
11	7,844														
12	8,879	17,758													
13	5,647	6,776	8,470	11,293	16,940	33,879									
14	8,603	17,205													
15	4,650	5,167	5,813	6,643	7,750	9,300	11,625	15,500	23,251	46,501					
16															
17	4,719	6,291	9,437	18,874											
18	4,436	4,879	5,422	6,099	6,971	8,132	9,759	12,199	16,265	24,397	48,794				
19	4,353	4,789	5,321	5,986	6,041	7,981	9,577	11,972	15,962	23,944	47,887				
20	5,451	5,870	6,359	6,937	7,631	8,479	9,539	10,901	12,718	15,262	19,078	25,437	38,155	76,310	
21	4,850	5,223	5,658	6,172	6,790	7,544	8,487	9,699	11,316	13,579	16,974	22,632	33,948	67,895	
22	8,781														
23	3,861	4,827	6,435	9,653	19,306										
24															
25	8,725	17,449													
26	5,531	6,145	6,914	7,901	9,218	11,062	13,827	18,436	27,654	55,308					
27	5,072	6,086	7,608	10,144	15,216	30,432									
28	5,482	5,939	6,479	7,127	7,919	8,909	10,181	11,878	14,254	17,818	23,757	35,635	71,270		
29	4,723	5,117	5,582	6,140	6,822	7,675	8,771	10,233	12,280	15,350	20,466	30,700	61,399		
30	6,887	7,652	8,609	9,838	11,478	13,774	17,217	22,956	34,435	68,869					
31	4,783	5,466	6,377	7,652	9,565	12,754	19,131	38,261							
32	4,622	5,392	6,470	8,088	10,784	16,176	32,351								
33	3,991	7,981													
34	5,367	7,156	10,735	21,469											
35	6,814	9,085	13,628	27,255											
36	5,174	6,467	8,623	12,934	25,868										
37	5,312	7,082	10,624	21,247											
38	4,583	6,874	13,748												
39	4,198	6,297	12,594												
40	5,093	5,603	6,225	7,003	8,004	9,338	11,205	14,007	18,676	28,014	56,027				
41	5,124	6,149	7,686	10,248	15,372	30,743									
42	4,589	9,178													
43	6,232	6,677	7,190	7,790	8,498	9,347	10,386	11,684	13,353	15,579	18,655	23,369	31,158	46,737	93,474
44	6,707	10,061	20,121												
45	5,018	5,734	6,690	8,028	10,035	13,380	20,070	40,140							
46															

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
47	5,846	7,308	9,744	14,616	29,232										
48	5,818	6,400	7,111	8,000	9,143	10,667	12,800	16,000	21,334	32,001	64,001				
49	5,860	6,446	7,162	8,057	9,208	10,743	12,892	16,115	21,486	32,230	64,459				
50	4,396	5,861	8,792	17,584											
51															
52	6,496														
53	3,066	4,600	9,199												
54	7,481	14,961													
55	5,301	6,058	7,068	8,482	10,602	14,136	21,205	42,409							
56	4,376														
57	5,652	6,460	7,537	9,044	11,305	15,073	22,610	45,219							
58	5,798	6,243	6,764	7,379	8,117	9,018	10,146	11,595	13,528	16,233	20,291	27,055	40,583	81,165	
59	2,848														
60	3,739	4,007	4,315	4,674	5,099	5,609	6,232	7,012	8,013	9,349	11,218	14,023	18,697	28,046	56,092
61	5,669	6,614	7,937	9,921	13,228	19,843	39,685								
62	4,352	4,686	5,077	5,538	6,092	6,769	7,615	8,703	10,154	12,184	15,230	20,307	30,461	60,921	
63															
64															
65	3,398	6,795													
66	6,283	7,069	8,079	9,425	11,310	14,138	18,850	28,275	56,550						
67	5,970	6,716	7,675	8,955	10,746	13,432	17,909	26,864	53,728						
68	3,843	5,124	7,686	15,371											
69	6,347	9,521	19,042												
70	4,077	4,485	4,983	5,606	6,407	7,475	8,969	11,212	14,949	22,424	44,847				
71	4,334	5,057	6,068	7,585	10,113	15,170	30,340								
72	3,816	4,361	5,088	6,105	7,632	10,175	15,263	30,526							
73	4,268	6,403	12,805												
74	4,682	5,619	7,023	9,364	14,047	28,093									
75	4,177	5,222	6,962	10,444	20,887										
76	5,295	7,060	10,590	21,180											
77	2,805	5,610													
78	5,983	6,411	6,904	7,479	8,159	8,975	9,972	11,219	12,821	14,958	17,950	22,437	29,916	44,874	89,748
79															
80	4,081	4,489	4,988	5,611	6,413	7,482	8,978	11,223	14,963	22,445	44,890				
81	6,279	6,976	7,848	8,969	10,464	12,557	15,696	20,928	31,393	62,785					
82	5,176	5,546	5,972	6,470	7,058	7,764	8,626	9,705	11,091	12,940	15,527	19,409	25,879	38,819	77,637
83	5,368	5,815	6,343	6,978	7,753	8,722	9,968	11,630	13,956	17,445	23,259	34,889	69,778		
84	9,011	18,021													
85	6,141	6,755	7,506	8,444	9,650	11,258	13,510	16,888	22,517	33,775	67,550				
86	5,536	5,962	6,459	7,046	7,750	8,611	9,688	11,072	12,917	15,500	19,376	25,834	38,751	77,502	
87	4,378	4,691	5,052	5,473	5,970	6,567	7,297	8,209	9,382	10,945	13,134	16,418	21,891	32,836	65,672
88	5,872	7,340	9,786	14,680	29,359										
89	3,539	3,811	4,129	4,504	4,954	5,505	6,193	7,078	8,257	9,909	12,386	16,514	24,772	49,543	
90	5,455	6,819	9,092	13,638	27,275										
91															
92	6,263	7,829	10,439	15,659	31,317										

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
93	3,374	6,747													
94	4,629	5,014	5,470	6,017	6,686	7,522	8,596	10,029	12,034	15,043	20,057	30,086	60,172		
95	8,291														
96	3,562	3,859	4,210	4,631	5,145	5,788	6,615	7,718	9,261	11,577	15,436	23,154	46,307		
97	4,778	5,375	6,143	7,167	8,600	10,750	14,333	21,500	43,000						
98	5,511	5,905	6,359	6,889	7,516	8,267	9,186	10,334	11,810	13,779	16,534	20,668	27,557	41,336	82,671
99	5,634	6,067	6,572	7,170	7,887	8,763	9,859	11,267	13,145	15,774	19,717	26,290	39,435	78,869	
100															
101	4,527	4,979	5,532	6,224	7,113	8,299	9,958	12,448	16,597	24,896	49,792				
102	6,188	6,703	7,313	8,044	8,938	10,055	11,492	13,407	16,088	20,110	26,814	40,221	80,441		
103	4,755	5,121	5,548	6,052	6,658	7,397	8,322	9,511	11,096	13,315	16,644	22,192	33,288	66,576	
104	5,042	5,463	5,959	6,555	7,283	8,194	9,364	10,925	13,110	16,388	21,850	32,776	65,551		
105	7,126	7,917	8,907	10,179	11,876	14,251	17,814	23,752	35,628	71,255					
106	4,667	5,333	6,222	7,467	9,334	12,445	18,667	37,334							
107															
108															
109	6,641	9,962	19,924												
110	5,534	6,456	7,747	9,684	12,912	19,369	38,737								
111	6,712	8,390	11,186	16,780	33,559										
112	6,137	6,819	7,671	8,767	10,228	12,274	15,343	20,457	30,685	61,370					
113	4,325	8,649													
114	5,072	6,763	10,145	20,289											
115	4,914	5,405	6,006	6,757	7,722	9,009	10,810	13,513	18,017	27,026	54,052				
116	5,368	5,752	6,194	6,710	7,320	8,052	8,947	10,065	11,503	13,421	16,105	20,131	26,841	40,262	80,523
117	5,476	5,933	6,472	7,119	7,910	8,899	10,170	11,865	14,238	17,798	23,730	35,596	71,191		
118	494														
119	4,004	4,405	4,894	5,506	6,292	7,341	8,809	11,011	14,682	22,023	44,045				
120	4,235	5,082	6,353	8,470	12,705	25,410									
121	5,846	6,496	7,308	8,352	9,744	11,693	14,616	19,488	29,232	58,463					
122	4,880	6,507	9,761	19,521											
123	8,163														
124	4,263	4,567	4,919	5,329	5,813	6,394	7,105	7,993	9,135	10,657	12,788	15,986	21,314	31,971	63,942
125															
126	3,090	3,371	3,709	4,121	4,636	5,298	6,181	7,417	9,271	12,362	18,543	37,085			
127	3,818	4,773	6,364	9,546	19,091										
128	3,680	4,416	5,520	7,360	11,041	22,081									
129	5,659	7,545	11,317	22,634											
130	3,955	4,260	4,615	5,034	5,538	6,153	6,922	7,911	9,229	11,075	13,844	18,458	27,688	55,375	
131	5,758	6,334	7,038	7,918	9,049	10,557	12,668	15,835	21,113	31,670	63,340				
132	4,736	5,101	5,526	6,028	6,631	7,368	8,289	9,473	11,052	13,262	16,578	22,103	33,155	66,310	
133	6,283	7,540	9,425	12,567	18,850	37,700									
134	4,252	4,579	4,960	5,411	5,952	6,614	7,440	8,503	9,920	11,904	14,881	19,841	29,761	59,522	
135	6,150	9,226	18,451												
136	4,776	5,174	5,644	6,208	6,898	7,760	8,869	10,347	12,417	15,521	20,694	31,042	62,083		
137	6,681	8,017	10,022	13,362	20,044	40,087									
138	1,832	3,664													

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
139	3,472	3,968	4,629	5,555	6,944	9,258	13,887	27,774							
140	3,844	4,271	4,805	5,491	6,407	7,688	9,610	12,813	19,220	38,439					
141	5,054	6,065	7,581	10,108	15,162	30,323									
142	3,969	4,252	4,579	4,961	5,412	5,953	6,614	7,441	8,504	9,921	11,906	14,882	19,843	29,764	59,528
143	4,020	4,329	4,690	5,117	5,628	6,254	7,035	8,040	9,381	11,257	14,071	18,761	28,142	56,283	
144	3,693	4,616	6,155	9,233	18,465										
145	5,109	5,748	6,569	7,664	9,197	11,496	15,328	22,992	45,983						
146	5,127	5,593	6,152	6,835	7,690	8,788	10,253	12,304	15,380	20,506	30,759	61,518			
147															
148	6,267	8,356	12,535	25,069											
149	5,616	8,425	16,849												
150	5,894	7,073	8,842	11,789	17,683	35,366									
151															
152	4,453	5,566	7,421	11,132	22,263										
153	5,383	6,729	8,971	13,457	26,914										
154	3,888	4,861	6,481	9,721	19,442										
155	5,319	5,699	6,137	6,649	7,253	7,979	8,865	9,973	11,398	13,298	15,957	19,947	26,595	39,893	79,786
156	4,436	4,990	5,703	6,654	7,984	9,980	13,307	19,961	39,921						
157	7,728	15,455													
158	5,603	6,537	7,844	9,805	13,073	19,610	39,219								
159	5,501	6,287	7,335	8,802	11,002	14,670	22,005	44,009							
160	9,039														
161	4,218	5,062	6,327	8,436	12,654	25,308									
162	3,710	4,047	4,452	4,946	5,564	6,359	7,419	8,903	11,129	14,838	22,258	44,515			
163															
164	3,457	3,802	4,225	4,753	5,432	6,337	7,604	9,506	12,674	19,011	38,022				
165	4,266	8,531													
166	2,900	3,222	3,625	4,143	4,834	5,800	7,250	9,667	14,501	29,001					
167	5,668	11,335													
168	6,206	7,240	8,688	10,860	14,480	21,720	43,440								
169	4,682	5,073	5,534	6,087	6,763	7,609	8,696	10,145	12,174	15,218	20,290	30,436	60,871		
170	4,291	4,597	4,951	5,364	5,851	6,436	7,151	8,045	9,195	10,727	12,873	16,091	21,454	32,182	64,363
171															
172	3,571														
173	6,250	7,813	10,417	15,625	31,250										
174	5,456	6,236	7,275	8,730	10,913	14,550	21,825	43,650							
175	4,733	5,258	5,916	6,761	7,888	9,465	11,831	15,775	23,663	47,325					
176	6,768	9,024	13,536	27,072											
177	3,562	4,749	7,124	14,248											
178															
179	5,082	5,544	6,099	6,776	7,624	8,713	10,165	12,198	15,247	20,329	30,494	60,988			
180	5,669	6,236	6,929	7,796	8,909	10,394	12,473	15,591	20,788	31,182	62,364				

APPENDIX D: KEEP FACTORS

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1															
2	0.4759														
3	0.3580	0.3766	0.3983	0.4239	0.4546	0.4921	0.5391	0.5994	0.6799	0.7926	0.9616	1.2432	1.8066	3.4965	
4	0.5580														
5	0.2223	0.2464	0.2748	0.3089	0.3505	0.4026	0.4695	0.5588	0.6837	0.8711	1.1835	1.8083	3.6825		
6	0.4992	0.5313	0.5740	0.6338	0.7236	0.8731	1.1723	2.0696							
7	0.5128	0.5439	0.5839	0.6372	0.7119	0.8239	1.0105	1.3838	2.5037						
8	0.4585	0.4778	0.5018	0.5326	0.5738	0.6314	0.7178	0.8619	1.1499	2.0142					
9	0.4376	0.4741	0.5210	0.5836	0.6713	0.8027	1.0218	1.4599	2.7743						
10	0.5390	0.5632	0.5918	0.6262	0.6681	0.7206	0.7880	0.8779	1.0038	1.1926	1.5073	2.1368	4.0250		
11	0.6688														
12	0.7325	1.1764													
13	0.5313	0.5878	0.6725	0.8137	1.0960	1.9430									
14	0.7197	1.1499													
15	0.5184	0.5442	0.5765	0.6181	0.6734	0.7509	0.8672	1.0609	1.4484	2.6110					
16															
17	0.4859	0.5646	0.7219	1.1937											
18	0.4768	0.4990	0.5261	0.5600	0.6035	0.6616	0.7429	0.8649	1.0682	1.4749	2.6947				
19	0.5045	0.5262	0.5528	0.5861	0.6289	0.6859	0.7657	0.8854	1.0849	1.4840	2.6812				
20	0.5590	0.5800	0.6045	0.6334	0.6681	0.7104	0.7634	0.8316	0.9224	1.0496	1.2404	1.5583	2.1943	4.1020	
21	0.5295	0.5481	0.5699	0.5956	0.6265	0.6642	0.7113	0.7720	0.8528	0.9660	1.1357	1.4186	1.9844	3.6818	
22	0.7252														
23	0.4801	0.5283	0.6088	0.7697	1.2523										
24															
25	0.6860	1.1223													
26	0.5692	0.6000	0.6384	0.6878	0.7536	0.8458	0.9841	1.2145	1.6754	3.0581					
27	0.5036	0.5543	0.6304	0.7572	1.0108	1.7716									
28	0.5610	0.5839	0.6109	0.6433	0.6828	0.7323	0.7960	0.8808	0.9996	1.1778	1.4747	2.0687	3.8504		
29	0.4857	0.5053	0.5286	0.5565	0.5906	0.6332	0.6881	0.7612	0.8635	1.0170	1.2728	1.7845	3.3195		
30	0.5982	0.6365	0.6843	0.7458	0.8278	0.9426	1.1148	1.4017	1.9756	3.6974					
31	0.2787	0.3129	0.3584	0.4222	0.5179	0.6773	0.9961	1.9527							
32	0.2604	0.2989	0.3528	0.4337	0.5685	0.8381	1.6469								
33	0.2228	0.4224													
34	0.3134	0.4028	0.5817	1.1185											
35	0.3916	0.5052	0.7323	1.4137											
36	0.3369	0.4016	0.5093	0.7249	1.3716										
37	0.3423	0.4308	0.6079	1.1391											
38	0.2753	0.3899	0.7336												
39	0.2778	0.3828	0.6976												
40	0.3475	0.3729	0.4041	0.4430	0.4930	0.5597	0.6531	0.7931	1.0266	1.4935	2.8942				
41	0.3249	0.3761	0.4530	0.5811	0.8373	1.6059									
42	0.2818	0.5112													
43	0.4069	0.4291	0.4548	0.4848	0.5202	0.5627	0.6146	0.6795	0.7630	0.8743	1.0300	1.2637	1.6532	2.4322	4.7690
44	0.4328	0.6004	1.1035												
45	0.3336	0.3694	0.4172	0.4841	0.5845	0.7517	1.0862	2.0897							
46															

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
47	0.3937	0.4668	0.5886	0.8322	1.5630										
48	0.3693	0.3984	0.4340	0.4784	0.5356	0.6117	0.7184	0.8784	1.1451	1.6784	3.2785				
49	0.5032	0.5325	0.5683	0.6131	0.6706	0.7474	0.8548	1.0159	1.2845	1.8217	3.4332				
50	0.3253	0.3986	0.5451	0.9847											
51															
52	0.4364														
53	0.2626	0.3393	0.5693												
54	0.4948	0.8689													
55	0.3777	0.4155	0.4660	0.5367	0.6427	0.8194	1.1728	2.2331							
56	0.3434														
57	0.3860	0.4264	0.4802	0.5556	0.6686	0.8571	1.2339	2.3644							
58	0.4032	0.4255	0.4515	0.4822	0.5191	0.5642	0.6206	0.6931	0.7897	0.9250	1.1279	1.4661	2.1424	4.1716	
59	0.2390														
60	0.2920	0.3053	0.3207	0.3387	0.3600	0.3855	0.4166	0.4556	0.5057	0.5724	0.6659	0.8062	1.0399	1.5073	2.9096
61	0.3902	0.4374	0.5036	0.6028	0.7681	1.0988	2.0910								
62	0.3171	0.3338	0.3533	0.3764	0.4041	0.4380	0.4803	0.5347	0.6072	0.7087	0.8610	1.1149	1.6225	3.1456	
63															
64															
65	0.3302	0.5001													
66	0.4882	0.5274	0.5779	0.6453	0.7395	0.8809	1.1165	1.5878	3.0015						
67	0.4042	0.4415	0.4895	0.5534	0.6430	0.7773	1.0012	1.4489	2.7921						
68	0.2890	0.3531	0.4812	0.8655											
69	0.4524	0.6111	1.0871												
70	0.3310	0.3513	0.3763	0.4074	0.4474	0.5008	0.5756	0.6877	0.8746	1.2483	2.3695				
71	0.3250	0.3611	0.4117	0.4876	0.6140	0.8668	1.6253								
72	0.3178	0.3450	0.3814	0.4323	0.5086	0.6358	0.8902	1.6533							
73	0.3706	0.4773	0.7975												
74	0.2391	0.2859	0.3562	0.4732	0.7073	1.4097									
75	0.2596	0.3118	0.3988	0.5729	1.0951										
76	0.3153	0.4035	0.5800	1.1095											
77	0.1955	0.3357													
78	0.3149	0.3362	0.3609	0.3897	0.4236	0.4644	0.5143	0.5766	0.6568	0.7636	0.9132	1.1376	1.5115	2.2594	4.5031
79															
80	0.2197	0.2402	0.2651	0.2963	0.3363	0.3898	0.4646	0.5768	0.7639	1.1380	2.2602				
81	0.3332	0.3681	0.4117	0.4678	0.5425	0.6472	0.8041	1.0657	1.5889	3.1586					
82	0.3506	0.3691	0.3904	0.4153	0.4447	0.4800	0.5231	0.5770	0.6464	0.7388	0.8682	1.0623	1.3858	2.0327	3.9737
83	0.3499	0.3722	0.3987	0.4304	0.4692	0.5176	0.5799	0.6630	0.7793	0.9537	1.2445	1.8260	3.5704		
84	0.5322	0.9828													
85	0.3978	0.4286	0.4661	0.5130	0.5733	0.6537	0.7663	0.9352	1.2166	1.7796	3.4683				
86	0.3636	0.3849	0.4097	0.4391	0.4743	0.5174	0.5712	0.6404	0.7327	0.8618	1.0556	1.3785	2.0244	3.9619	
87	0.2982	0.3138	0.3319	0.3529	0.3778	0.4077	0.4441	0.4898	0.5484	0.6266	0.7360	0.9002	1.1738	1.7211	3.3629
88	0.4124	0.4858	0.6081	0.8528	1.5868										
89	0.2992	0.3129	0.3287	0.3475	0.3700	0.3975	0.4319	0.4762	0.5352	0.6177	0.7416	0.9480	1.3609	2.5995	
90	0.4081	0.4762	0.5899	0.8172	1.4991										
91															
92	0.4432	0.5215	0.6520	0.9129	1.6959										

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
93	0.3458	0.5145													
94	0.3811	0.4004	0.4232	0.4506	0.4840	0.5258	0.5795	0.6511	0.7514	0.9019	1.1526	1.6540	3.1583		
95	0.6869														
96	0.4254	0.4402	0.4578	0.4788	0.5046	0.5367	0.5781	0.6332	0.7104	0.8261	1.0191	1.4050	2.5627		
97	0.2549	0.2848	0.3231	0.3743	0.4460	0.5535	0.7327	1.0910	2.1660						
98	0.3161	0.3358	0.3585	0.3850	0.4163	0.4539	0.4998	0.5572	0.6310	0.7294	0.8672	1.0739	1.4184	2.1073	4.1741
99	0.3184	0.3400	0.3653	0.3952	0.4310	0.4749	0.5296	0.6001	0.6939	0.8254	1.0226	1.3512	2.0084	3.9802	
100															
101	0.4597	0.4824	0.5100	0.5446	0.5891	0.6483	0.7313	0.8558	1.0633	1.4782	2.7230				
102	0.3405	0.3663	0.3967	0.4333	0.4780	0.5339	0.6057	0.7014	0.8355	1.0366	1.3718	2.0421	4.0532		
103	0.2722	0.2905	0.3118	0.3370	0.3673	0.4043	0.4505	0.5099	0.5892	0.7002	0.8666	1.1440	1.6988	3.3632	
104	0.2865	0.3075	0.3324	0.3622	0.3986	0.4441	0.5026	0.5807	0.6899	0.8538	1.1269	1.6732	3.3120		
105	0.4155	0.4551	0.5045	0.5682	0.6530	0.7718	0.9499	1.2468	1.8406	3.6220					
106	0.2677	0.3011	0.3455	0.4077	0.5011	0.6566	0.9678	1.9011							
107															
108															
109	0.3844	0.5504	1.0485												
110	0.3209	0.3670	0.4316	0.5284	0.6898	1.0126	1.9811								
111	0.4097	0.4936	0.6334	0.9131	1.7521										
112	0.3553	0.3893	0.4320	0.4868	0.5598	0.6621	0.8155	1.0712	1.5827	3.1169					
113	0.2844	0.5007													
114	0.3147	0.3993	0.5683	1.0756											
115	0.3027	0.3273	0.3573	0.3948	0.4431	0.5074	0.5975	0.7327	0.9579	1.4083	2.7596				
116	0.3462	0.3654	0.3875	0.4133	0.4438	0.4804	0.5252	0.5811	0.6530	0.7488	0.8830	1.0843	1.4199	2.0909	4.1040
117	0.3696	0.3924	0.4194	0.4518	0.4913	0.5407	0.6043	0.6891	0.8077	0.9857	1.2823	1.8756	3.6554		
118	0.1024														
119	0.2899	0.3099	0.3344	0.3650	0.4043	0.4567	0.5302	0.6403	0.8238	1.1908	2.2920				
120	0.3080	0.3503	0.4138	0.5197	0.7315	1.3667									
121	0.3787	0.4112	0.4518	0.5040	0.5736	0.6710	0.8172	1.0608	1.5480	3.0096					
122	0.3168	0.3982	0.5608	1.0489											
123	0.5771														
124	0.3923	0.4076	0.4251	0.4456	0.4698	0.4989	0.5344	0.5788	0.6359	0.7121	0.8186	0.9785	1.2449	1.7778	3.3763
125															
126	0.3479	0.3620	0.3788	0.3994	0.4252	0.4583	0.5024	0.5643	0.6570	0.8115	1.1205	2.0477			
127	0.3889	0.4366	0.5162	0.6753	1.1526										
128	0.2294	0.2662	0.3214	0.4134	0.5974	1.1495									
129	0.3509	0.4452	0.6339	1.1997											
130	0.2633	0.2785	0.2962	0.3172	0.3424	0.3731	0.4116	0.4610	0.5270	0.6193	0.7577	0.9884	1.4499	2.8343	
131	0.3559	0.3847	0.4199	0.4639	0.5204	0.5958	0.7014	0.8598	1.1237	1.6515	3.2350				
132	0.2808	0.2990	0.3203	0.3454	0.3756	0.4124	0.4584	0.5176	0.5966	0.7071	0.8729	1.1492	1.7018	3.3595	
133	0.3677	0.4305	0.5248	0.6818	0.9960	1.9385									
134	0.2563	0.2726	0.2917	0.3143	0.3413	0.3744	0.4157	0.4689	0.5397	0.6389	0.7877	1.0357	1.5318	3.0198	
135	0.3791	0.5329	0.9942												
136	0.2871	0.3070	0.3305	0.3587	0.3932	0.4363	0.4918	0.5657	0.6691	0.8243	1.0830	1.6004	3.1525		
137	0.3778	0.4446	0.5448	0.7118	1.0459	2.0481									
138	0.1355	0.2271													

Site No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
139	0.1929	0.2177	0.2508	0.2970	0.3665	0.4822	0.7137	1.4080							
140	0.2616	0.2830	0.3096	0.3440	0.3897	0.4538	0.5499	0.7101	1.0304	1.9914					
141	0.3292	0.3797	0.4555	0.5819	0.8346	1.5927									
142	0.2819	0.2961	0.3125	0.3315	0.3541	0.3811	0.4142	0.4556	0.5087	0.5796	0.6788	0.8276	1.0756	1.5717	3.0599
143	0.3029	0.3184	0.3364	0.3577	0.3833	0.4146	0.4537	0.5039	0.5709	0.6647	0.8054	1.0400	1.5030	2.9161	
144	0.2696	0.3157	0.3927	0.5465	1.0082										
145	0.3502	0.3821	0.4232	0.4779	0.5545	0.6695	0.8611	1.2443	2.3939						
146	0.3894	0.4127	0.4407	0.4749	0.5176	0.5725	0.6458	0.7483	0.9021	1.1584	1.6711	3.2090			
147															
148	0.5059	0.6103	0.8192	1.4460											
149	0.4858	0.6262	1.0475												
150	0.4718	0.5308	0.6192	0.7665	1.0613	1.9454									
151															
152	0.3982	0.4539	0.5467	0.7322	1.2888										
153	0.5042	0.5715	0.6837	0.9080	1.5808										
154	0.3728	0.4214	0.5024	0.6645	1.1505										
155	0.4231	0.4421	0.4640	0.4895	0.5198	0.5560	0.6004	0.6558	0.7270	0.8220	0.9550	1.1544	1.4869	2.1518	4.1464
156	0.3794	0.4071	0.4428	0.4903	0.5568	0.6566	0.8230	1.1556	2.1537						
157	0.5479	0.9343													
158	0.4844	0.5311	0.5965	0.6945	0.8580	1.1848	2.1653								
159	0.4548	0.4941	0.5464	0.6198	0.7298	0.9132	1.2799	2.3802							
160	0.6098														
161	0.3849	0.4271	0.4904	0.5958	0.8067	1.4394									
162	0.4166	0.4334	0.4537	0.4784	0.5093	0.5491	0.6021	0.6763	0.7875	0.9730	1.3440	2.4569			
163															
164	0.2176	0.2349	0.2560	0.2824	0.3164	0.3617	0.4250	0.5201	0.6785	0.9954	1.9459				
165	0.2777	0.4910													
166	0.1907	0.2068	0.2270	0.2529	0.2874	0.3357	0.4082	0.5291	0.7707	1.4958					
167	0.3298	0.6132													
168	0.3642	0.4159	0.4883	0.5969	0.7779	1.1399	2.2259								
169	0.2871	0.3066	0.3297	0.3574	0.3912	0.4334	0.4878	0.5603	0.6617	0.8139	1.0675	1.5748	3.0966		
170	0.2840	0.2994	0.3171	0.3377	0.3621	0.3913	0.4271	0.4718	0.5292	0.6059	0.7131	0.8740	1.1422	1.6786	3.2877
171															
172	0.3527														
173	0.4916	0.5697	0.6999	0.9604	1.7416										
174	0.4418	0.4808	0.5328	0.6055	0.7146	0.8965	1.2603	2.3515							
175	0.4219	0.4482	0.4811	0.5233	0.5797	0.6586	0.7769	0.9741	1.3684	2.5516					
176	0.4178	0.5306	0.7562	1.4330											
177	0.2551	0.3145	0.4332	0.7894											
178															
179	0.3620	0.3851	0.4128	0.4467	0.4891	0.5435	0.6161	0.7178	0.8703	1.1244	1.6326	3.1573			
180	0.3844	0.4127	0.4474	0.4907	0.5464	0.6206	0.7245	0.8805	1.1403	1.6600	3.2191				

APPENDIX E: VEHICLE SELECTION SEQUENCE

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
1	118	0.102400	47	140	0.282950	93	144	0.315713	139	134	0.341310
2	138	0.135500	48	170	0.284043	94	98	0.316070	140	37	0.342288
3	166	0.190705	49	113	0.284425	95	164	0.316386	141	130	0.342375
4	139	0.192888	50	97	0.284750	96	122	0.316813	142	56	0.343400
5	77	0.195450	51	74	0.285930	97	170	0.317050	143	140	0.343964
6	166	0.206817	52	104	0.286519	98	62	0.317075	144	72	0.345043
7	164	0.217627	53	136	0.287081	99	130	0.317205	145	132	0.345409
8	139	0.217686	54	169	0.287119	100	72	0.317788	146	106	0.345517
9	80	0.219745	55	166	0.287375	101	143	0.318373	147	93	0.345775
10	5	0.222346	56	68	0.289038	102	99	0.318375	148	116	0.346210
11	33	0.222825	57	119	0.289905	103	132	0.320292	149	40	0.347468
12	166	0.226956	58	103	0.290462	104	60	0.320738	150	89	0.347495
13	138	0.227100	59	134	0.291708	105	110	0.320893	151	126	0.347921
14	128	0.229408	60	60	0.291973	106	128	0.321413	152	83	0.349877
15	164	0.234910	61	142	0.296100	107	97	0.323143	153	145	0.350161
16	59	0.239000	62	130	0.296229	108	41	0.324892	154	120	0.350300
17	74	0.239108	63	80	0.296263	109	71	0.325014	155	5	0.350500
18	80	0.240150	64	139	0.297040	110	50	0.325300	156	82	0.350590
19	5	0.246375	65	87	0.298207	111	115	0.327260	157	129	0.350925
20	139	0.250750	66	32	0.298892	112	89	0.328729	158	70	0.351335
21	166	0.252850	67	132	0.299038	113	141	0.329192	159	172	0.352650
22	97	0.254889	68	89	0.299239	114	169	0.329686	160	32	0.352810
23	177	0.255100	69	170	0.299368	115	167	0.329775	161	87	0.352933
24	164	0.256033	70	106	0.301071	116	65	0.330175	162	68	0.353083
25	134	0.256279	71	115	0.302691	117	136	0.330495	163	62	0.353338
26	75	0.259570	72	143	0.302911	118	70	0.330950	164	142	0.354082
27	32	0.260379	73	60	0.305329	119	142	0.331533	165	112	0.355250
28	140	0.261595	74	169	0.306629	120	87	0.331885	166	131	0.355909
29	53	0.262617	75	136	0.306979	121	104	0.332359	167	74	0.356163
30	130	0.263268	76	104	0.307529	122	81	0.333225	168	115	0.357289
31	80	0.265089	77	120	0.307950	123	45	0.333575	169	169	0.357355
32	128	0.266210	78	5	0.308850	124	62	0.333812	170	143	0.357732
33	106	0.267738	79	140	0.309644	125	119	0.334394	171	3	0.358021
34	144	0.269550	80	119	0.309925	126	77	0.335700	172	31	0.358442
35	103	0.272171	81	75	0.311788	127	166	0.335710	173	98	0.358465
36	134	0.272631	82	103	0.311800	128	98	0.335754	174	136	0.358715
37	5	0.274773	83	142	0.312454	129	78	0.336229	175	60	0.359964
38	38	0.275333	84	89	0.312850	130	80	0.336343	176	78	0.360885
39	165	0.277675	85	31	0.312893	131	143	0.336413	177	71	0.361133
40	39	0.277800	86	34	0.313363	132	36	0.336880	178	164	0.361650
41	130	0.278481	87	87	0.313843	133	103	0.337018	179	126	0.361968
42	31	0.278731	88	134	0.314255	134	170	0.337679	180	179	0.362017
43	132	0.280821	89	177	0.314467	135	60	0.338717	181	170	0.362059
44	42	0.281750	90	114	0.314713	136	53	0.339275	182	104	0.362155
45	142	0.281927	91	78	0.314860	137	99	0.340042	183	86	0.363593
46	164	0.282438	92	76	0.315250	138	102	0.340488	184	168	0.364186

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
185	119	0.364981	231	179	0.385118	277	119	0.404307	323	164	0.425020
186	99	0.365321	232	60	0.385460	278	43	0.406880	324	124	0.425131
187	116	0.365382	233	57	0.386019	279	156	0.407106	325	126	0.425181
188	102	0.366271	234	116	0.387504	280	70	0.407394	326	96	0.425404
189	139	0.366475	235	127	0.388910	281	124	0.407564	327	58	0.425473
190	110	0.367008	236	112	0.389344	282	87	0.407660	328	57	0.426393
191	103	0.367280	237	146	0.389425	283	106	0.407740	329	170	0.427072
192	133	0.367667	238	78	0.389650	284	90	0.408050	330	161	0.427080
193	81	0.368106	239	147	0.389725	285	166	0.408213	331	85	0.428550
194	82	0.369075	240	80	0.389783	286	111	0.409690	332	43	0.429136
195	48	0.369314	241	38	0.389900	287	86	0.409725	333	83	0.430390
196	45	0.369414	242	61	0.390164	288	121	0.411194	334	133	0.430500
197	117	0.369612	243	82	0.390404	289	130	0.411594	335	37	0.430817
198	89	0.370015	244	169	0.391172	290	71	0.411700	336	99	0.431045
199	73	0.370617	245	170	0.391315	291	81	0.411706	337	110	0.431570
200	83	0.372242	246	35	0.391588	292	132	0.412389	338	89	0.431944
201	154	0.372820	247	124	0.392340	293	88	0.412390	339	112	0.431963
202	40	0.372935	248	117	0.392429	294	180	0.412720	340	72	0.432260
203	130	0.373139	249	144	0.392650	295	146	0.412727	341	44	0.432750
204	97	0.374333	250	136	0.393206	296	179	0.412840	342	177	0.433200
205	134	0.374378	251	47	0.393720	297	116	0.413313	343	102	0.433305
206	132	0.375550	252	115	0.394825	298	128	0.413417	344	162	0.433441
207	41	0.376130	253	99	0.395195	299	120	0.413825	345	169	0.433444
208	70	0.376250	254	102	0.396741	300	142	0.414211	346	32	0.433688
209	62	0.376414	255	89	0.397539	301	143	0.414583	347	48	0.433961
210	3	0.376592	256	85	0.397845	302	82	0.415288	348	136	0.436319
211	55	0.377656	257	122	0.398150	303	105	0.415475	349	52	0.436400
212	137	0.377758	258	152	0.398230	304	55	0.415521	350	127	0.436638
213	87	0.377809	259	3	0.398258	305	134	0.415713	351	61	0.437408
214	121	0.378715	260	48	0.398405	306	168	0.415900	352	9	0.437589
215	126	0.378825	261	50	0.398567	307	98	0.416277	353	62	0.437950
216	135	0.379117	262	104	0.398572	308	162	0.416579	354	86	0.439082
217	156	0.379383	263	83	0.398673	309	60	0.416622	355	96	0.440246
218	141	0.379730	264	75	0.398817	310	45	0.417200	356	146	0.440690
219	94	0.381131	265	114	0.399250	311	176	0.417800	357	67	0.441500
220	142	0.381140	266	126	0.399428	312	117	0.419395	358	174	0.441813
221	72	0.381383	267	94	0.400417	313	131	0.419889	359	155	0.442050
222	145	0.382094	268	36	0.401550	314	154	0.421425	360	156	0.442750
223	39	0.382750	269	5	0.402563	315	175	0.421925	361	40	0.442969
224	143	0.383315	270	34	0.402817	316	31	0.422210	362	115	0.443086
225	109	0.384367	271	58	0.403175	317	33	0.422350	363	92	0.443170
226	180	0.384373	272	76	0.403500	318	155	0.423053	364	116	0.443814
227	131	0.384700	273	40	0.404061	319	145	0.423150	365	104	0.444094
228	86	0.384885	274	62	0.404105	320	94	0.423209	366	87	0.444144
229	161	0.384900	275	67	0.404189	321	78	0.423645	367	137	0.444570
230	98	0.384963	276	103	0.404267	322	3	0.423864	368	82	0.444695

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
369	129	0.445233	415	150	0.471817	461	161	0.490350	507	78	0.514300
370	124	0.445625	416	74	0.473217	462	180	0.490675	508	93	0.514450
371	97	0.446000	417	9	0.474100	463	165	0.490950	509	127	0.516183
372	179	0.446722	418	86	0.474310	464	117	0.491306	510	86	0.517367
373	180	0.447367	419	99	0.474861	465	173	0.491600	511	146	0.517588
374	70	0.447436	420	146	0.474867	466	136	0.491750	512	83	0.517613
375	175	0.448217	421	2	0.475850	467	3	0.492144	513	132	0.517643
376	103	0.450500	422	89	0.476179	468	40	0.492993	514	31	0.517863
377	94	0.450560	423	90	0.476238	469	111	0.493588	515	15	0.518405
378	58	0.451488	424	18	0.476791	470	159	0.494050	516	58	0.519125
379	117	0.451755	425	73	0.477325	471	54	0.494825	517	120	0.519700
380	121	0.451794	426	8	0.477750	472	124	0.498910	518	155	0.519764
381	69	0.452367	427	145	0.477892	473	18	0.498970	519	164	0.520075
382	41	0.452988	428	102	0.477994	474	6	0.499238	520	43	0.520182
383	143	0.453669	429	162	0.478406	475	98	0.499783	521	131	0.520429
384	162	0.453675	430	48	0.478406	476	65	0.500050	522	9	0.521043
385	140	0.453790	431	96	0.478835	477	113	0.500650	523	92	0.521462
386	98	0.453855	432	82	0.479985	478	70	0.500825	524	82	0.523117
387	152	0.453888	433	23	0.480060	479	106	0.501075	525	175	0.523336
388	3	0.454590	434	57	0.480225	480	8	0.501756	526	133	0.524750
389	159	0.454756	435	62	0.480256	481	154	0.502433	527	116	0.525150
390	43	0.454815	436	116	0.480415	482	126	0.502442	528	94	0.525775
391	105	0.455061	437	174	0.480786	483	104	0.502621	529	18	0.526078
392	141	0.455538	438	175	0.481081	484	49	0.503195	530	19	0.526235
393	142	0.455550	439	68	0.481175	485	61	0.503550	531	130	0.526958
394	60	0.455575	440	139	0.482200	486	27	0.503600	532	66	0.527438
395	119	0.456742	441	58	0.482232	487	143	0.503921	533	23	0.528325
396	96	0.457786	442	101	0.482360	488	121	0.503993	534	110	0.528413
397	126	0.458293	443	94	0.483989	489	153	0.504240	535	29	0.528586
398	132	0.458438	444	45	0.484100	490	19	0.504468	536	166	0.529050
399	8	0.458545	445	158	0.484436	491	105	0.504544	537	170	0.529236
400	101	0.459727	446	43	0.484775	492	96	0.504561	538	21	0.529482
401	130	0.461036	447	29	0.485650	493	35	0.505150	539	99	0.529631
402	131	0.463875	448	88	0.485788	494	29	0.505329	540	119	0.530150
403	155	0.463969	449	149	0.485817	495	60	0.505657	541	176	0.530600
404	78	0.464440	450	17	0.485925	496	148	0.505863	542	150	0.530760
405	80	0.464600	451	112	0.486757	497	115	0.507433	543	158	0.531125
406	55	0.466008	452	71	0.487550	498	72	0.508575	544	6	0.531286
407	85	0.466078	453	169	0.487793	499	142	0.508700	545	13	0.531325
408	47	0.466800	454	66	0.488167	500	162	0.509319	546	84	0.532225
409	81	0.467764	455	168	0.488300	501	36	0.509333	547	49	0.532495
410	134	0.468857	456	179	0.489075	502	103	0.509943	548	8	0.532621
411	83	0.469156	457	67	0.489471	503	101	0.510022	549	174	0.532750
412	5	0.469500	458	155	0.489542	504	42	0.511200	550	135	0.532875
413	124	0.469845	459	87	0.489750	505	7	0.512767	551	102	0.533856
414	170	0.471769	460	156	0.490275	506	85	0.512988	552	124	0.534433

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
553	62	0.534650	599	10	0.563208	645	45	0.584450	691	15	0.618050
554	89	0.535158	600	58	0.564217	646	19	0.586094	692	150	0.619175
555	48	0.535550	601	126	0.564250	647	13	0.587790	693	130	0.619250
556	55	0.536690	602	17	0.564567	648	47	0.588600	694	159	0.619790
557	96	0.536719	603	136	0.565658	649	101	0.589057	695	58	0.620581
558	10	0.539000	604	105	0.568164	650	103	0.589200	696	180	0.620600
559	3	0.539088	605	49	0.568306	651	90	0.589883	697	10	0.626150
560	134	0.539717	606	114	0.568325	652	29	0.590606	698	149	0.626225
561	117	0.540744	607	32	0.568483	653	10	0.591818	699	21	0.626475
562	81	0.542508	608	26	0.569240	654	21	0.595614	700	87	0.626567
563	179	0.543529	609	53	0.569250	655	161	0.595800	701	19	0.628850
564	7	0.543875	610	173	0.569725	656	131	0.595833	702	27	0.630400
565	15	0.544239	611	21	0.569896	657	158	0.596490	703	98	0.631007
566	101	0.544600	612	143	0.570925	658	132	0.596583	704	8	0.631390
567	137	0.544788	613	86	0.571188	659	168	0.596900	705	96	0.633192
568	50	0.545100	614	153	0.571525	660	128	0.597425	706	29	0.633244
569	180	0.546357	615	60	0.572433	661	115	0.597520	707	20	0.633364
570	159	0.546442	616	146	0.572514	662	30	0.598245	708	111	0.633417
571	144	0.546525	617	75	0.572875	663	3	0.599443	709	6	0.633840
572	152	0.546650	618	85	0.573300	664	26	0.599967	710	129	0.633850
573	157	0.547875	619	121	0.573592	665	99	0.600050	711	72	0.635767
574	21	0.548135	620	6	0.573775	666	155	0.600356	712	124	0.635929
575	87	0.548386	621	6	0.574017	667	44	0.600425	713	30	0.636506
576	162	0.549064	622	70	0.575570	668	162	0.602058	714	7	0.637200
577	140	0.549888	623	15	0.576531	669	61	0.602763	715	26	0.638375
578	109	0.550400	624	78	0.576625	670	18	0.603529	716	134	0.638920
579	19	0.552839	625	80	0.576825	671	117	0.604307	717	119	0.640263
580	67	0.553433	626	82	0.577031	672	20	0.604458	718	86	0.640386
581	97	0.553500	627	123	0.577050	673	174	0.605500	719	55	0.642713
582	27	0.554320	628	66	0.577929	674	102	0.605679	720	67	0.642980
583	145	0.554530	629	96	0.578064	675	170	0.605858	721	28	0.643250
584	57	0.555590	630	124	0.578838	676	62	0.607175	722	66	0.645250
585	155	0.556030	631	94	0.579500	677	37	0.607875	723	146	0.645750
586	29	0.556495	632	142	0.579567	678	88	0.608117	724	82	0.646350
587	156	0.556810	633	175	0.579675	679	23	0.608767	725	81	0.647150
588	98	0.557194	634	83	0.579914	680	160	0.609750	726	101	0.648333
589	4	0.558000	635	20	0.580000	681	148	0.610317	727	94	0.651133
590	5	0.558750	636	76	0.580000	682	28	0.610855	728	92	0.651950
591	20	0.559036	637	104	0.580658	683	69	0.611050	729	116	0.652964
592	40	0.559692	638	116	0.581069	684	48	0.611742	730	105	0.652992
593	112	0.559817	639	41	0.581083	685	49	0.613069	731	40	0.653070
594	18	0.559963	640	34	0.581725	686	167	0.613150	732	85	0.653717
595	169	0.560258	641	141	0.581883	687	71	0.613967	733	155	0.655763
596	122	0.560825	642	9	0.583633	688	43	0.614600	734	156	0.656613
597	28	0.561015	643	28	0.583858	689	179	0.616133	735	106	0.656633
598	43	0.562670	644	7	0.583871	690	89	0.617730	736	78	0.656757

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
737	126	0.656963	783	173	0.699933	829	49	0.747358	875	90	0.817175
738	175	0.658550	784	103	0.700160	830	146	0.748280	876	121	0.817188
739	18	0.661617	785	131	0.701400	831	116	0.748825	877	124	0.818620
740	169	0.661710	786	102	0.701442	832	15	0.750910	878	148	0.819225
741	112	0.662100	787	132	0.707100	833	94	0.751420	879	55	0.819417
742	83	0.662983	788	74	0.707325	834	45	0.751700	880	155	0.821983
743	21	0.664194	789	62	0.708710	835	26	0.753600	881	156	0.822950
744	154	0.664450	790	140	0.710050	836	176	0.756200	882	119	0.823783
745	143	0.664730	791	96	0.710370	837	27	0.757200	883	7	0.823850
746	60	0.665920	792	20	0.710444	838	130	0.757688	884	136	0.824338
747	20	0.668050	793	21	0.711344	839	29	0.761158	885	99	0.825390
748	10	0.668111	794	137	0.711817	840	43	0.762971	886	96	0.826138
749	57	0.668638	795	7	0.711860	841	20	0.763438	887	142	0.827600
750	11	0.668800	796	124	0.712050	842	78	0.763600	888	30	0.827808
751	136	0.669130	797	170	0.713130	843	80	0.763867	889	20	0.831571
752	145	0.669488	798	139	0.713650	844	19	0.765670	890	47	0.832200
753	49	0.670621	799	174	0.714625	845	85	0.766300	891	141	0.834575
754	121	0.671030	800	179	0.717780	846	150	0.766533	892	102	0.835510
755	9	0.671260	801	8	0.717813	847	61	0.768117	893	41	0.837275
756	13	0.672488	802	48	0.718410	848	23	0.769650	894	32	0.838075
757	15	0.673408	803	14	0.719725	849	166	0.770725	895	26	0.845780
758	127	0.675275	804	10	0.720563	850	105	0.771750	896	88	0.852775
759	162	0.676250	805	17	0.721850	851	21	0.771964	897	21	0.852792
760	31	0.677283	806	6	0.723575	852	175	0.776863	898	104	0.853788
761	164	0.678500	807	180	0.724540	853	67	0.777300	899	49	0.854790
762	142	0.678780	808	36	0.724900	854	168	0.777900	900	101	0.855800
763	43	0.679513	809	22	0.725150	855	83	0.779280	901	57	0.857050
764	3	0.679917	810	155	0.727000	856	162	0.787538	902	158	0.857950
765	133	0.681833	811	98	0.729425	857	134	0.787725	903	131	0.859750
766	28	0.682844	812	159	0.729813	858	10	0.788000	904	62	0.861013
767	153	0.683667	813	101	0.731320	859	177	0.789400	905	145	0.861083
768	5	0.683700	814	120	0.731450	860	58	0.789675	906	86	0.861820
769	30	0.684331	815	152	0.732175	861	3	0.792580	907	8	0.861850
770	19	0.685858	816	35	0.732275	862	40	0.793138	908	29	0.863490
771	25	0.686025	817	28	0.732338	863	28	0.795971	909	18	0.864925
772	95	0.686850	818	12	0.732450	864	73	0.797450	910	68	0.865450
773	70	0.687688	819	86	0.732650	865	9	0.802700	911	103	0.866600
774	26	0.687757	820	115	0.732650	866	81	0.804113	912	71	0.866800
775	29	0.688064	821	97	0.732667	867	143	0.805438	913	15	0.867163
776	117	0.689058	822	38	0.733600	868	60	0.806150	914	98	0.867210
777	110	0.689817	823	87	0.736020	869	161	0.806700	915	82	0.868170
778	104	0.689910	824	82	0.738775	870	117	0.807710	916	54	0.868850
779	58	0.693050	825	66	0.739500	871	126	0.811483	917	179	0.870250
780	99	0.693942	826	89	0.741588	872	13	0.813650	918	5	0.871125
781	158	0.694538	827	18	0.742940	873	169	0.813888	919	132	0.872875
782	39	0.697600	828	30	0.745821	874	112	0.815525	920	6	0.873133

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
921	170	0.874038	967	28	0.999600	1013	44	1.103450	1059	3	1.243233
922	43	0.874250	968	67	1.001167	1014	76	1.109500	1060	145	1.244275
923	70	0.874550	969	10	1.003800	1015	30	1.114763	1061	83	1.244467
924	10	0.877917	970	144	1.008150	1016	62	1.114850	1062	124	1.244900
925	48	0.878413	971	7	1.010500	1017	66	1.116500	1063	105	1.246783
926	180	0.880450	972	27	1.010800	1018	34	1.118450	1064	70	1.248275
927	28	0.880817	973	110	1.012625	1019	126	1.120525	1065	23	1.252300
928	66	0.880875	974	49	1.015938	1020	25	1.122250	1066	174	1.260250
929	116	0.883030	975	29	1.016988	1021	131	1.123667	1067	43	1.263725
930	19	0.885388	976	96	1.019083	1022	179	1.124367	1068	29	1.272817
931	72	0.890150	977	9	1.021767	1023	104	1.126917	1069	159	1.279925
932	174	0.896500	978	39	1.022563	1024	58	1.127863	1070	117	1.282317
933	87	0.900200	979	40	1.026583	1025	21	1.135688	1071	49	1.284517
934	94	0.901850	980	43	1.030040	1026	78	1.137550	1072	152	1.288750
935	146	0.902075	981	140	1.030375	1027	80	1.137950	1073	162	1.343975
936	153	0.907950	982	134	1.035733	1028	37	1.139050	1074	99	1.351183
937	92	0.912925	983	102	1.036613	1029	168	1.139900	1075	89	1.360875
938	111	0.913075	984	60	1.039867	1030	180	1.140300	1076	120	1.366700
939	78	0.913180	985	143	1.039950	1031	170	1.142217	1077	175	1.368425
940	159	0.913183	986	137	1.045875	1032	103	1.144000	1078	36	1.371600
941	20	0.922417	987	149	1.047450	1033	48	1.145083	1079	102	1.371783
942	58	0.924950	988	109	1.048500	1034	132	1.149167	1080	86	1.378500
943	157	0.934250	989	122	1.048850	1035	128	1.149450	1081	7	1.383800
944	85	0.935175	990	20	1.049600	1036	14	1.149850	1082	82	1.385750
945	30	0.942590	991	86	1.055575	1037	8	1.149925	1083	30	1.401717
946	89	0.948017	992	121	1.060783	1038	154	1.150500	1084	96	1.404975
947	105	0.949888	993	15	1.060917	1039	127	1.152550	1085	139	1.408000
948	83	0.953725	994	150	1.061250	1040	94	1.152567	1086	115	1.408300
949	155	0.954960	995	82	1.062263	1041	155	1.154425	1087	74	1.409650
950	115	0.957867	996	101	1.063267	1042	156	1.155625	1088	35	1.413650
951	173	0.960350	997	81	1.065717	1043	146	1.158400	1089	98	1.418350
952	3	0.961575	998	169	1.067517	1044	6	1.172250	1090	21	1.418583
953	21	0.965950	999	18	1.068233	1045	55	1.172825	1091	116	1.419850
954	106	0.967750	1000	112	1.071233	1046	87	1.173833	1092	176	1.433000
955	162	0.973017	1001	98	1.073888	1047	12	1.176400	1093	161	1.439400
956	175	0.974050	1002	114	1.075550	1048	28	1.177775	1094	148	1.445950
957	124	0.978475	1003	142	1.075633	1049	5	1.183500	1095	15	1.448425
958	84	0.982750	1004	136	1.083017	1050	158	1.184775	1096	67	1.448900
959	26	0.984050	1005	116	1.084338	1051	119	1.190825	1097	130	1.449875
960	50	0.984700	1006	19	1.084917	1052	10	1.192625	1098	9	1.459900
961	117	0.985688	1007	45	1.086200	1053	17	1.193700	1099	58	1.466050
962	130	0.988417	1008	69	1.087100	1054	129	1.199700	1100	28	1.474733
963	135	0.994150	1009	97	1.091000	1055	26	1.214500	1101	18	1.474850
964	164	0.995350	1010	75	1.095050	1056	85	1.216633	1102	101	1.478200
965	133	0.996000	1011	13	1.095975	1057	57	1.233875	1103	19	1.483975
966	31	0.996125	1012	61	1.098825	1058	20	1.240375	1104	155	1.486867

Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor	Pull No.	Site No.	Keep Factor
1105	40	1.493475	1151	5	1.808250	1197	162	2.456850	1243	5	3.682500
1106	166	1.495750	1152	49	1.821675	1198	7	2.503700	1244	30	3.697350
1107	90	1.499050	1153	83	1.825950	1199	175	2.551550	1245	28	3.850400
1108	60	1.507300	1154	105	1.840575	1200	96	2.562650	1246	86	3.961900
1109	10	1.507333	1155	117	1.875575	1201	89	2.599450	1247	82	3.973650
1110	143	1.508975	1156	106	1.901100	1202	15	2.610950	1248	99	3.980150
1111	78	1.511500	1157	133	1.938500	1203	19	2.681150	1249	10	4.025000
1112	134	1.531750	1158	13	1.942950	1204	18	2.694700	1250	102	4.053150
1113	121	1.547975	1159	150	1.945400	1205	101	2.723000	1251	20	4.102000
1114	20	1.558333	1160	164	1.945900	1206	115	2.759600	1252	116	4.103950
1115	47	1.563000	1161	31	1.952650	1207	9	2.774300	1253	155	4.146400
1116	142	1.571700	1162	30	1.975625	1208	67	2.792100	1254	58	4.171550
1117	169	1.574775	1163	110	1.981050	1209	130	2.834250	1255	98	4.174050
1118	153	1.580800	1164	21	1.984375	1210	40	2.894150	1256	78	4.503100
1119	112	1.582650	1165	140	1.991350	1211	60	2.909600	1257	43	4.769000
1120	88	1.586750	1166	99	2.008425	1212	143	2.916050			
1121	66	1.587750	1167	8	2.014150	1213	66	3.001500			
1122	81	1.588925	1168	86	2.024350	1214	121	3.009550			
1123	141	1.592650	1169	82	2.032725	1215	134	3.019800			
1124	136	1.600375	1170	102	2.042125	1216	26	3.058100			
1125	41	1.605850	1171	126	2.047650	1217	142	3.059900			
1126	62	1.622525	1172	137	2.048050	1218	169	3.096550			
1127	71	1.625300	1173	28	2.068650	1219	112	3.116900			
1128	179	1.632600	1174	6	2.069600	1220	62	3.145550			
1129	32	1.646850	1175	45	2.089700	1221	136	3.152450			
1130	131	1.651500	1176	116	2.090875	1222	179	3.157300			
1131	43	1.653200	1177	61	2.090950	1223	94	3.158300			
1132	72	1.653300	1178	98	2.107275	1224	81	3.158550			
1133	94	1.654000	1179	10	2.136750	1225	146	3.209000			
1134	180	1.660000	1180	58	2.142425	1226	180	3.219100			
1135	146	1.671050	1181	155	2.151750	1227	131	3.235000			
1136	104	1.673175	1182	156	2.153650	1228	48	3.278450			
1137	26	1.675400	1183	158	2.165250	1229	170	3.287650			
1138	46	1.678425	1184	97	2.166000	1230	104	3.311950			
1139	170	1.678575	1185	20	2.194250	1231	29	3.319450			
1140	92	1.695850	1186	168	2.225900	1232	132	3.359500			
1141	103	1.698800	1187	55	2.233050	1233	87	3.362900			
1142	132	1.701750	1188	78	2.259400	1234	103	3.363200			
1143	87	1.721100	1189	80	2.260200	1235	124	3.376300			
1144	173	1.741600	1190	119	2.291950	1236	49	3.433150			
1145	111	1.752050	1191	174	2.351500	1237	85	3.468300			
1146	27	1.771600	1192	57	2.364350	1238	3	3.496500			
1147	124	1.777750	1193	70	2.369450	1239	83	3.570400			
1148	85	1.779550	1194	159	2.380150	1240	105	3.621950			
1149	29	1.784475	1195	145	2.393850	1241	117	3.655350			
1150	3	1.806550	1196	43	2.432150	1242	21	3.681750			

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