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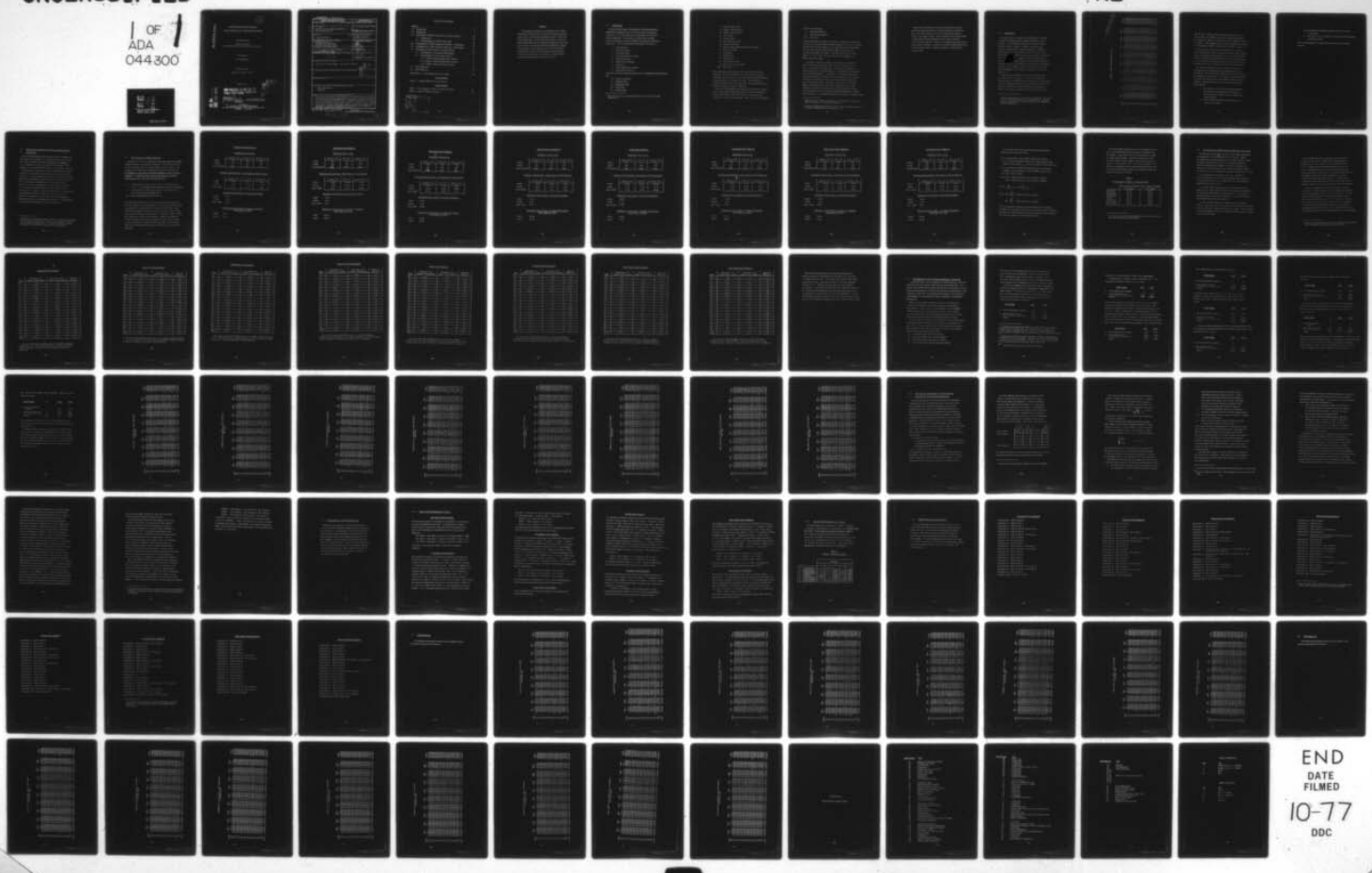

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DEPOT MAINTENANCE MATRIX DEVELOPMENT FOR UNSCHEDULED WORK

Prepared for the

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Naval Ship Research and Development Center

Prepared by

Jay Mandelbaum

Under Contract

N00600-72-D-0306, FD77

August 1977

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This report documents the development of the Depot Maintenance Planning and Programming System projection matrices for 1) unscheduled shipwork and for 2) all other unscheduled work. It describes the process by which the total unscheduled work was split into shipwork and all other on the basis of Productive Workload Employment Reports. The extraction and development of their matrices from shipyard data in terms of real shops is also presented. Finally the methodology for converting the real shops to functional shops within the matrices is given.

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Abstract

This report documents the development of the Depot Maintenance Planning and Programming System projection matrices for 1) unscheduled shipwork and for 2) all other unscheduled work. It describes the process by which the total unscheduled work was split into shipwork and all other on the basis of Productive Workload Employment Reports. The extraction and development of their matrices from shipyard data in terms of real shops is also presented. Finally the methodology for converting the real shops to functional shops within the matrices is given.

1.0 Background

The Depot Maintenance Planning and Programming System (DMPPS) is designed in part to make five year workload projections for U.S. Navy depot level maintenance at Naval and private shipyards. Projections are made at the one-digit ship work breakdown structure (SWBS) and shipyard production shop level.* The one-digit SWBS breakdown is as follows:

1. Hull Structure
2. Propulsion Plant
3. Electrical Plant
4. Command and Surveillance
5. Auxiliary Systems
6. Outfit and Furnishings
7. Armament
8. Direct Maintenance Support
9. Ship Support Services

The production shop categories (along with corresponding shop numbers) are:

06 Central Tool Shop
11 Shipfitter Shop
17 Sheetmetal Shop
23 Forge Shop
26 Welding Shop

---

* The projections for private shipyards are only at the one-digit SWBS level.

31	Inside Machine Shop
36	Weapon Systems Shop
38	Marine Machine Shop
41	Boiler Shop
51	Electric Shop
56	Pipe and Copper Shop
64	Woodworking Shop
65	Module Repair and Maintenance Facilities
67	Electronics Shop
71	Paint Shop
72	Rigging Shop
81	Foundry Shop
94	Patternmaker Shop
99	Temporary Services Shop
OTH	Other Direct

These production shops exist for the most part in all Naval shipyards. All of the shipyards generally perform the same functions, but the actual (or real) shop within which the functions are performed are not always the same. Thus functional production shops (of the same name) have been defined which are entirely consistent across all shipyards.

The form of the DMPPS workload projections will be a matrix whose rows designate SWBS and whose columns correspond to the functional shops. There will be such a matrix for each "category" of work at the shipyards. This work can be classified

into three broad areas:

i) scheduled shipwork

ii) unscheduled shipwork

iii) other work

Scheduled shipwork consists of all regular overhauls, conversions, refuelings for nuclear powered ships, Naval reserve force overhauls, Military Aid Program (MAP) work at Philadelphia Naval Shipyard, and selected restricted availabilities (SRA) for ships on an extended operating cycle (EOC). The EOC ships types are SSN, SSBN, CV, CVN, CGN, FF 1052 Class, DDG 37 Class, CG 16 Class, and CG 26 Class.

Unscheduled shipwork consists of all technical availabilities (TA), restricted availabilities (RA) for those ships which are not on an extended operating cycle, restricted availabilities for EOC ships that are not planned SRA's,* and MAP work at shipyards other than Philadelphia.** If a ship has a restricted availability, work is being done on it while it is in the shipyard. In the case of technical availabilities, the ship is not in the shipyard while the work is being performed. The nature of the work is usually the repair of equipment that is sent to the shipyard from the ship, assistance provided by a team sent from the shipyard to do work on the ship wherever it is located, or general engineering, research and development, or manufacturing/fabrication done for a specific ship.

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* Within this report SRA's will always be considered as scheduled shipwork and RA's as unscheduled shipwork.

** Because Philadelphia performs the bulk of the Navy MAP work, it is considered scheduled there but nowhere else.

Other work consists of all other miscellaneous activities done by the shipyard which is not associated with a particular ship. The bulk of this is rework of components and equipment for the supply system. Also included is any manufacturing or fabrication that the shipyard does for itself or for any other non-ship customer. Finally, any engineering, research and development, planning, or design work that the shipyard performs for a particular class or classes of ships is considered part of other work.

2.0 Introduction

The basic driver or input to the DMPPS is the NAVSEA Long Range Planning System (LRPS) generated overhaul schedule. By considering the Program Objective Memorandum overhaul schedule, overhaul cycles, nuclear refueling requirements, shipyard capabilities, shipyard specializations, homeport policy, priority of work, Navy/private split, etc., a ten year overhaul schedule is produced. The overhaul schedule contains a unique shipyard assignment and man-day requirement for every scheduled shipwork availability and for a combination of the unscheduled shipwork and other work (UNOS). There are twenty non-overlapping UNOS availabilities, six months in length, for each Naval shipyard.*

It was said previously that a projection matrix will be developed for each "category" of work at the shipyards. More precisely, a distinct projection matrix will be developed for each availability in the ten year LRPS overhaul schedule that falls within the five year DMPPS projection period. Figure 1 presents an example of such a projection matrix.

---

* UNOS availabilities are only for Naval shipyards. The LRPS does not normally generate such availabilities for private shipyards and there are no current plans for the DMPPS to project UNOS there.

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Figure 1 - Sample DMPPS Projection Matrix

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11	.013700	.034600	.001200	.006000	.014610	.015600	.002500	.000110	.005300	.051000
17	.000300	.035700	.000300	.001700	.010610	.006300	.001100	0.000000	.000500	.027300
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	.005700	.033800	.001900	.003900	.021100	.003200	.001300	0.000000	.002300	.068200
31	.000200	.058100	.006400	.004800	.030810	.011100	.003000	0.000700	.002700	.116000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	.001200	.052600	.005000	.004800	.018700	.010700	.026600	0.000000	.007100	.117600
41	.000300	.104300	.000100	.000100	.003600	.013000	0.000000	0.000000	.000300	.112800
51	.000400	.003300	.000400	.023500	.012810	.002500	.002600	0.000000	.000500	.057100
56	.001200	.050700	.002800	.006800	.032710	.001300	.004700	0.000000	.004400	.164100
64	.001400	.004700	.000400	.002300	.003810	.013700	.001500	0.000000	.001300	.019300
66	0.000000	0.000000	0.000000	0.000000	0.000010	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	.035300	0.000010	.000200	.015900	0.000000	.003400	.057800
71	.001000	.002300	.000700	.004010	.003700	.016600	.002200	0.000000	.001100	.032100
72	.001200	.020600	.002100	.003400	.014610	.012000	.002700	0.000000	.013000	.069600
81	0.000000	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	0.000000	0.000000	.000100
84	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	.001200	.001100	.000200	.000700	.001400	.022700	.000200	0.000000	.000300	.026300
OTH	.001600	.015500	.001200	.014400	.009700	.002600	.007800	.000400	.015400	.077700
TOTAL	.026400	.354400	.031300	.111600	.247200	.042100	.025700	.000400	.061300	1.000000

The ij^{th} entry of the matrix represents the fraction of work done in shop j for SWBS i for its corresponding availability. For example in Figure 1, the matrix entry for SWBS 5, shop 17 is .010600. This implies that 1.06% of the work for the matrix's corresponding availability is performed in SWBS 5, shop 17.

The procedure being used by the DMPPS is to multiply, in the mathematical sense, a projection matrix by the mandays of its corresponding availability to form a workload projection matrix. Once such workload projection matrices are formed for every LRPS availability in the five year projection period, the information can be summarized and reported as desired.

For scheduled shipwork, projection matrices are constructed for both the alteration and repair portions of the availability. The methodology behind the development will not be considered in this report. The purpose of this document is to describe the development of the DMPPS UNOS projection matrices. This development can be characterized by four distinct stages:

i) the subdivision of the LRPS UNOS availabilities into separate availabilities for unscheduled shipwork (termed UNSW) and for all other work (termed UNOW)

ii) development of UNOW projection matrices in terms of real shops

iii) development of UNSW projection matrices in terms of real shops

iv) conversion of the real shops of UNOW and UNSW matrices to functional shops

Each of these stages will be discussed in detail in the following sections.

3.0 Subdivision of LRPS Unscheduled and Other Shipwork

3.1 Background

All work performed in Naval shipyards can be classified as either direct or overhead. For purposes of this report, direct work will be defined as all work chargeable to a customer; i.e., chargeable to a non-overhead job order number. The DMPPS is concerned with the projection of total direct workload.

Shipyard direct workload can also be divided into two parts--production shop productive and other direct. Production shop productive workload consists of all work performed in productive shops and other direct workload consists of all other direct work. The relationship to the DMPPS production shops listed in Section 1.0 is very straightforward. Those shops mentioned are the productive shops with the exception of the last one, "Other Direct", which is a catch-all category for all non-productive shipyard shops and hence contains all other direct work.* Appendix A contains a complete listing of all Naval shipyard standard shops and corresponding shop numbers. LRPS mandays are production shop productive and not total direct.

---

* DMPPS shop 65 actually contains workload for shop 65 and shop 68, both of which are productive. Hence work performed in shop 68 is not considered other direct. The functions defined by these shops are only performed at Charleston Naval Shipyard.

3.2 Determination of UNSW/UNOW split

NAVSEA 071 receives a Productive Workload Employment Report (PWER) monthly from each Naval shipyard. This report includes, for the reported month, the total productive men per day for each scheduled availability and unscheduled restricted availability in the shipyard, for all other unscheduled shipwork, and for the entire shipyard. The following data has been extracted from PWER's from January 1975, July 1975, and January 1976:

i) UNSW productive men per day (as the sum of the men per day of every unscheduled restricted and technical availability)

ii) UNOW productive men per day (as the sum of the men per day for all other unscheduled work)

iii) total shipyard productive men per day

The UNSW and UNOW men per day were divided by the figures for the total shipyard to yield percentages for each of the months. These percentages were assumed to give a value for total UNOS. Each of these percentages was then averaged across the months to yield an average percentage of the productive workload for UNSW, UNOW, and UNOS (their sum) for each shipyard. Finally the UNSW and UNOW percentage factors were normalized to 100% thus giving the average percentage of UNOS for UNSW and UNOW. The following eight pages present the data and calculations for each of the Naval shipyards.

Long Beach Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	307	474	405
UNOW	339	204	247
Total Shipyard	3636	3028	3610

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	8.44	15.65	11.22
UNOW	9.32	6.74	6.84
Total UNOS	17.76	22.39	18.06

Productive Men per Day - Average Percentages

UNSW	11.77
UNOW	7.63
Total UNOS	19.40

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	60.67
UNOW	39.33

Charleston Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	173	339	165
UNOW	233	244	218
Total Shipyard	2591	2278	2344

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	6.68	14.88	7.04
UNOW	8.99	10.71	9.30
Total UNOS	15.67	25.59	16.34

Productive Men per Day - Average Percentages

UNSW	9.53
UNOW	9.67
Total UNOS	19.20

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	49.64
UNOW	50.36

Philadelphia Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	220	437	196
UNOW	329	226	310
Total Shipyard	3182	2704	2849

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	6.91	16.16	6.88
UNOW	10.34	8.36	10.88
Total UNOS	17.25	24.52	17.76

Productive Men per Day - Average Percentages

UNSW	9.98
UNOW	9.86
Total UNOS	19.84

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	50.30
UNOW	49.70

Puget Sound Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	121	126	166
UNOW	337	230	274
Total Shipyard	3912	4503	4586

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	3.09	2.80	3.62
UNOW	8.61	5.11	5.97
Total UNOS	11.70	7.91	9.59

Productive Men per Day - Average Percentages

UNSW	3.17
UNOW	6.56
Total UNOS	9.73

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	32.58
UNOW	67.42

Norfolk Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	977	912	871
UNOW	247	288	292
Total Shipyard	4388	4433	4336

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	22.27	20.57	20.09
UNOW	5.63	6.50	6.73
Total UNOS	27.90	27.07	26.82

Productive Men per Day - Average Percentages

UNSW	20.98
UNOW	6.29
Total UNOS	27.26

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	76.93
UNOW	23.07

Portsmouth Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	30	57	58
UNOW	181	223	192
Total Shipyard	2365	2105	2137

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	1.27	2.71	2.71
UNOW	7.65	10.59	8.98
Total UNOS	8.92	13.30	11.69

Productive Men per Day - Average Percentages

UNSW	2.23
UNOW	9.07
Total UNOS	11.30

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	19.73
UNOW	80.27

Pearl Harbor Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	330	335	421
UNOW	138	127	100
Total Shipyard	2318	2337	2318

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	14.24	14.33	18.16
UNOW	5.95	5.43	4.31
Total UNOS	20.19	19.76	22.47

Productive Men per Day - Average Percentages

UNSW	15.58
UNOW	5.23
Total UNOS	20.81

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	74.87
UNOW	25.13

Mare Island Naval Shipyard

Productive Men per Day

	January 1975	July 1975	January 1976
UNSW	205	147	223
UNOW	367	278	349
Total Shipyard	4526	3947	4349

Productive Men per Day - Percentages of Total Shipyard

	January 1975	July 1975	January 1976
UNSW	4.53	3.72	5.13
UNOW	8.11	7.04	8.02
Total UNOS	12.64	10.76	13.15

Productive Men per Day - Average Percentages

UNSW	4.46
UNOW	7.72
Total UNOS	12.18

Productive Men per Day - Average (Normalized) Percentages of UNOS

UNSW	36.62
UNOW	63.38

No accuracy is lost by using production shop productive mandays rather than total direct.

Let $\underline{A}$ represent the correct UNOW matrix with elements $a_{i,j}$ for a given shipyard and $\underline{B}$ be the corresponding UNSW matrix with elements $b_{i,j}$. These will both be 9 by 20 matrices.

Let M represent the LRPS UNOS production shop productive mandays, f_1 be the fraction of M for UNOW, and f_2 be the fraction of M for UNSW.

Then, $f_1 M$ = UNOW production shop productive mandays

$f_2 M$ = UNSW production shop productive mandays

Now let $\sum_{i=1}^{9} a_{i,20} = a$ and $\sum_{i=1}^{9} b_{i,20} = b$

Then, $OW = \frac{f_1 M}{1-a}$ = UNOW total direct mandays

$SW = \frac{f_2 M}{1-b}$ = UNSW total direct mandays.

The corresponding manday projection matrices will be $(OW) \cdot \underline{A}$ and $(SW) \cdot \underline{B}$. Note that in both cases, the production shop productive mandays will be distributed over the first nineteen columns and the other direct mandays over the twentieth column.

The LRPS UNOS mandays were very comparable with the sum of the UNSW and UNOW men per day* obtained from the PWER's. Thus there was no recommendation to update the LRPS UNOS mandays. Since the productive men per day when shown as a percentage of the total was fairly consistent over the January 1975, July 1976, and January 1976 data for each shipyard, the normalized averages were used to split the LRPS UNOS mandays into UNSW and UNOW components as summarized below.

Table 1

Percentages of UNOS for UNOW and UNSW

	Percentage of UNOS for UNOW	Percentage of UNOS for UNSW
Long Beach	39.33	60.67
Charleston	50.36	49.64
Philadelphia	49.70	50.30
Puget Sound	67.42	32.58
Norfolk	23.07	76.93
Portsmouth	80.27	19.73
Pearl Harbor	25.13	74.87
Mare Island	63.38	36.62

* The men per day when multiplied by the number of days in the availability yields the LRPS mandays.

4.0 Development of UNOW Projection Matrices - Real Shops

As was previously stated, all direct work at Naval shipyards is chargeable to a non-overhead job order number. Within the shipyard's accounting system, all job order numbers contain ten digits, the first five of which are termed the customer order accounting record (COAR). The first two digits of the COAR are termed the work category and the next three identify the customer. Non-overhead work categories range from 10 to 89.

From September 1974 through June 1976, NAVSEA 071 received data tapes from the Naval shipyards which contained a cumulative spread of work by COAR to the one-digit SWBS and standard shipyard shop level.

In actuality, the work was spread by shop and by the sixth digit of the job order number which in most cases corresponded to the first digit of the SWBS numbering scheme. However there were exceptions as will be discussed later where this sixth digit represented other numbering systems.

All of the UNOW workload is contained in work categories 60 to 89. Matrices of all work in these work categories were made from the November 1974 and November 1975 tapes. These matrices were then compared to develop the DMPPS UNOW projection matrices in terms of real shops.

The DMPPS has not been designed to project UNOW in quite the same way as UNSW and scheduled shipwork. Projections are to be made only at the production shop level.* Scheduled and unscheduled shipwork is to be projected by SWBS since there is an interest in the planning and programming community as to what ship systems require the highest investment in depot maintenance resources. UNOW does not fall under that category. UNOW is being considered in that it affects demand for skilled trades at the shipyard and hence the shop requirements must be projected.

Thus the comparison between the November 1974 and November 1975 UNOW matrices for each shipyard presented in the following pages is made in terms of vectors. For each shipyard, the percentage of manhours expended in each of the real shops listed in Section 1.0 for November 1974 and November 1975 is shown as well as the number of manhours on which these percentages were based. For each of the percentages, the absolute difference is obtained and the mean and standard deviation of the absolute differences are calculated.

---

* Thus those shipyards which did not use SWBS as the sixth digit of the job order number posed no special problem.

Long Beach Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	.50	.59	.09
11	7.02	3.90	3.12
17	5.40	5.59	.19
23	.00	.00	.00
26	2.20	3.47	1.27
31	13.45	14.25	.80
36	.84	1.80	.96
38	4.07	4.79	.72
41	2.13	2.04	.09
51	8.21	10.34	2.13
56	10.38	6.12	4.26
64	1.51	2.87	1.36
65	.00	.00	.00
67	14.54	16.34	1.80
71	2.16	3.19	1.03
72	2.53	2.98	.45
81	.00	.00	.00
94	.00	.00	.00
99	.15	.29	.14
OTH	24.90	21.45	3.45

The mean of the absolute differences is 1.09 and the standard deviation is 1.27. The November 1975 data is based upon 903637 manhours and the November 1974 data is based upon 1041618 manhours.

Charleston Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	.53	.39	.14
11	1.50	.97	.53
17	1.29	.61	.68
23	.00	.00	.00
26	1.77	1.45	.32
31	7.29	7.02	.27
36	.00	.00	.00
38	1.84	1.13	.71
41	.04	.44	.40
51	1.89	2.48	.59
56	1.76	1.54	.22
64	.25	.32	.07
65	39.55	40.03	.48
67	2.67	3.64	.97
71	.74	.66	.08
72	1.15	1.34	.19
81	.82	.83	.01
94	.00	.00	.00
99	.19	.18	.01
OTH	36.72	36.96	.24

The mean of the absolute differences is .30 and the standard deviation is .28. The November 1975 data is based upon 866074 manhours and the November 1974 data is based upon 628985 manhours.

Philadelphia Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	1.30	1.04	.26
11	3.46	5.21	1.75
17	2.70	3.72	1.02
23	.00	.00	.00
26	1.60	2.45	.85
31	14.36	16.61	2.25
36	.00	.00	.00
38	3.75	2.51	1.24
41	2.17	1.57	.60
51	2.50	4.60	2.10
56	2.46	1.44	1.02
64	1.61	1.73	.12
65	.00	.00	.00
67	4.95	6.04	1.09
71	.90	2.32	1.42
72	2.47	3.33	.86
81	5.26	6.32	1.06
94	.86	1.48	.62
99	.37	.45	.08
OTH	49.28	39.18	10.10

The mean of the absolute differences is 1.32 and the standard deviation is 2.17. The November 1975 data is based upon 850597 manhours and the November 1974 data is based upon 730846 manhours.

Puget Sound Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	1.33	1.36	.03
11	3.22	2.91	.31
17	1.36	2.31	.95
23	.76	.51	.25
26	4.70	4.13	.57
31	20.91	11.72	9.19
36	.00	.00	.00
38	1.54	1.62	.08
41	.18	1.27	1.09
51	3.36	3.36	.00
56	1.04	2.04	1.00
64	.77	.62	.15
65	.00	.00	.00
67	3.69	3.09	.60
71	.99	1.16	.17
72	2.07	3.21	1.14
81	1.85	1.54	.31
94	.54	.32	.22
99	.21	.46	.25
OTH	51.30	58.35	7.05

The mean of the absolute differences is 1.17 and the standard deviation 2.43. The November 1975 data is based upon 1141130 manhours and the November 1974 data is based upon 1316970 manhours.

Norfolk Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	1.47	1.26	.21
11	1.73	1.74	.01
17	1.18	.58	.60
23	.00	.00	.00
26	2.15	2.19	.04
31	6.13	8.59	2.46
36	.00	.00	.00
38	3.15	3.94	.79
41	.82	.77	.05
51	5.12	5.19	.07
56	2.56	2.70	.14
64	1.82	1.57	.25
65	.00	.00	.00
67	20.59	25.78	5.19
71	2.65	2.30	.35
72	3.54	2.81	.73
81	1.43	1.34	.09
94	.00	.00	.00
99	.16	.20	.04
OTH	45.50	39.04	6.46

The mean of the absolute differences is .87 and the standard deviation is 1.80. The November 1975 data is based upon 1420706 manhours and the November 1974 data is based upon 1514247 manhours.

Portsmouth Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	.68	.54	.14
11	1.83	1.82	.01
17	1.75	2.97	1.22
23	.93	.75	.18
26	2.09	8.26	6.17
31	20.83	18.32	2.51
36	.00	.01	.01
38	.75	.45	.30
41	.00	.00	.00
51	.74	.84	.10
56	.96	1.86	.90
64	1.94	1.62	.32
65	.00	.00	.00
67	3.75	1.87	1.88
71	1.66	2.53	.87
72	1.39	1.71	.32
81	.00	.00	.00
94	1.09	1.11	.02
99	.35	.12	.23
OTH	59.25	55.22	4.03

The mean of the absolute differences is .96 and the standard deviation is 1.61. The November 1975 data is based upon 1846081 manhours and the November 1974 data is based upon 2295901 manhours.

Pearl Harbor Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	.86	.79	.07
11	.48	1.53	1.05
17	.98	1.09	.11
23	1.62	1.28	.34
26	2.74	3.15	.41
31	6.35	6.84	.49
36	.00	.00	.00
38	.25	.46	.21
41	.12	.00	.12
51	1.77	1.54	.23
56	1.29	1.56	.27
64	1.30	1.34	.04
65	.00	.00	.00
67	12.59	13.56	.97
71	.68	.53	.15
72	1.47	2.04	.57
81	10.27	5.45	4.82
94	.00	.00	.00
99	.83	1.00	.17
OTH	56.41	57.81	1.40

The mean of the absolute differences is .57 and the standard deviation is 1.07. The November 1975 data is based upon 892435 manhours and the November 1974 is based upon 882479 manhours.

Mare Island Naval Shipyard

Shop	November 1975 Manhour Percentages	November 1974 Manhour Percentages	Absolute Difference
06	.42	.31	.11
11	3.36	2.11	1.25
17	1.38	1.55	.17
23	.84	.96	.12
26	2.58	1.69	.89
31	5.64	5.24	.40
36	2.25	1.75	.50
38	1.65	.93	.72
41	.70	.59	.11
51	2.30	2.18	.12
56	1.37	.81	.56
64	1.19	1.00	.19
65	.00	.00	.00
67	8.40	13.40	5.00
71	2.86	2.37	.49
72	2.14	1.68	.46
81	.01	.01	.00
94	.00	.00	.00
99	.41	.27	.14
OTH	62.47	63.15	.68

The mean of the absolute differences is .60 and the standard deviation is 1.09. The November 1975 data is based upon 1794464 manhours and the November 1974 data is based upon 2131773 manhours.

The conclusion derived from the preceding analysis was that there was very little difference in the data from November 1974 and November 1975. The means of the absolute differences ranged from .30 to 1.32 with an average of .86 and a standard deviation of .35. Thus the average difference was less than one percent. In all cases, the November 1975 data was chosen for the UNOW projection matrices since this data was more current. To maintain a consistent format for the entire DMPPS, real shop UNOW matrices were created from the preceding vectors by using the vectors for SWBS 9 and having zero for all other matrix entries.

5.0 Development of UNSW Projection Matrices - Real Shops

As was the case in the development of UNOW matrices, data was extracted from the magnetic tapes from the Naval shipyards. As a general rule, MAP and restricted availabilities are designated by work categories (see page 22) in the 20's and technical availabilities by work categories in the 50's. By identifying the customer, the restricted availabilities can be identified as either scheduled or unscheduled (see page 4).

Matrices were made from the November 1975 data tapes to include all unscheduled restricted availabilities and technical availabilities. These matrices were intended to be the DMPPS UNSW real shop projection matrices, however, some changes were necessary due to the fact that the sixth digit of the job order number was not always part of the SWBS numbering scheme.

The most common problem was caused by the use of Ships System Index (SSI) instead of SWBS for work on nuclear submarines. In these cases, a special technique was used to generate the matrices that attempted to take into account the use of SSI in lieu of SWBS. The procedure was basically as follows:

i) No changes were made to the shops.

ii) Any work in SSI 0 was moved to SWBS 9.

iii) Any work is SSI 8 was moved to SWBS 2.

iv) In all other cases, SSI was treated as SWBS.

The major error resulting from the use of this procedure was to show no work in SWBS 8. The error is primarily due to shifting the entire work for SSI 0 to SWBS 9. More correctly, SSI 0 should have been moved to both SWBS 8 and 9. Thus adjustments to compensate for the error had to be made.

Norfolk Naval Shipyard was used as the model for adjusting the SSI generated matrices from Charleston,* Mare Island, and Pearl Harbor.** Norfolk was chosen since its UNSW matrix did not need adjustment and its mix of unscheduled shipwork was somewhat similar to these other shipyards. The Norfolk UNSW projection matrix is in part***:

SWBS/Shops	OTH	Total
⋮	⋮	⋮
8. Direct Maintenance Support	.0865	.0871
9. Ship Support Services	.0197	.0751
Totals	.2930	1.0000

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* Charleston uses industrial priority numbers (IPN) for all its work instead of either SWBS or SSI. At a one-digit level, however, IPN is very closely correlated with SSI. Thus, UNSW matrices were generated for Charleston as if the sixth digit of the job number were SSI.

** Mare Island and Pearl Harbor use SSI for nuclear submarine work and SWBS for all other shipwork. However, since the bulk of the work in these shipyards is performed on nuclear submarines, the UNSW matrices were generated as if SSI were used for all work.

*** Four digit accuracy will be used in this section.

Note that 99.31% of the work in SWBS 8 is in other direct.

Adjustments to Charleston will be considered first. The unadjusted Charleston UNSW matrix is in part:

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	0	0
9. Ship Support Services	.1259	.2715
Totals	.3999	1.0000

Of the total Norfolk work in SWBS 8 and 9, 53.7% is in SWBS 8. If this were the case in Charleston, 53.7% of .2715 or .1458 should be transferred from SWBS 9 (total) to SWBS 8 (total), and 99.31% of .1458 or .1448 should be transferred from SWBS 9 (other direct) to SWBS 8 (other direct). This is clearly impossible since at most .1259 can be transferred. It was decided simply to move .0871 so that the SWBS 8 (total) would be the same as Norfolk. Thus the revised Charleston matrix appears in part as shown below.

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	.0871	.0871
9. Ship Support Services	.0388	.1844
Totals	.3999	1.0000

The unadjusted Mare Island matrix is in part:

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	0	0
9. Ship Support Services	.1622	.5429
Totals	.2390	1.0000

As was the case in Charleston, 53.7% of .5429 is too much to transfer. The final decision was also to shift .0871 to align SWBS 8 with Norfolk. Thus the revised Mare Island matrix is in part:

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	.0871	.0871
9. Ship Support Services	.0751	.4558
Totals	.2390	1.0000

Since the overall workload is similar, the same procedure used for Charleston and Mare Island was also used for Pearl Harbor. The original matrix is in part:

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	0	0
9. Ship Support Services	.1166	.1873
Totals	.2222	1.0000

The final decision was as before to shift .0871 yielding the following:

SWBS/Shops	OTH	Total
8. Direct Maintenance Support	.0871	.0871
9. Ship Support Services	.0295	.1002
Totals	.2222	1.0000

The SSI procedure was also used to generate the Portsmouth matrix, but the adjustments did not follow the same pattern as Charleston, Mare Island, and Pearl Harbor. The unadjusted matrix in part is:

SWBS/Shops	65	OTH	Total
8. Direct Maintenance Support	0	0	0
9. Ship Support Services	.2020	.0388	.6821
Totals	.4229	.1357	1.0000

Shop number 65 was used inaccurately by Portsmouth in that all entries should have been part of other direct. The manhours from the data tape for shop 65 were all under SSI 0 and were expended for planning and estimating-- a form of direct maintenance support. Thus the .2020 was shifted from shop 65, SWBS 9 to OTH, SWBS 8.

The .0388 in OTH, SWBS 9 was not changed. Thus the revised matrix is in part:

SWBS/Shops	65	⋮	OTH	Total
8. Direct Maintenance Support	0	. . .	.2020	.2020
9. Ship Support Services	0		.0388	.4801
Totals	.2209		.3377	1.0000

The remainder of the work for shop 65 was shifted to OTH when real shops were converted to function shops as described in Section 6.2.3.

No adjustments were made to the real shop UNSW matrices from Norfolk, Long Beach, and Philadelphia. The sixth digit of the Puget Sound job order number was neither SSI or SWBS. Hence no meaningful UNSW real shop matrix could be generated. The Mare Island matrix was chosen to represent Puget Sound. The following eight pages show the adjusted UNSW real shop projection matrices.

LONG BEACH NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	.000500	0.000000	0.000000	.000100	0.000000	.000100	0.000000	0.000000	.000700
11	.006200	.016300	.000800	.011800	.004900	.005300	.001100	0.000000	.002200	.048500
17	.000700	.006100	.001000	.008500	.003500	.002100	.000600	0.000000	.000500	.023100
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	.003700	.026500	.000900	.007300	.004300	.002500	.000600	.000100	.001500	.047400
31	.004000	.046300	.003300	.005300	.009100	.000100	.001200	.000200	.003400	.072900
36	.000200	0.000000	.000800	.028200	0.000000	0.000000	.019600	0.000000	.003000	.051800
38	.003200	.044900	.007900	.000800	.010700	.000200	.001000	.000500	.004000	.073200
41	.000700	.036400	.000300	.000500	.001400	.000100	.000100	0.000000	.000400	.039900
51	.003500	.012400	.012000	.075700	.006900	.000700	.004700	0.000000	.002100	.117900
56	.001800	.034400	.001500	.013500	.022200	.000900	.001000	.000100	.002000	.077400
64	.003300	.010500	.000300	.006600	.002900	.007200	.000800	.001400	.003500	.036500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000700	.001900	.002200	.036300	.000300	0.000000	0.000000	0.000000	.002900	.044300
71	.001600	.006300	.000200	.005100	.002500	.014900	.000500	0.000000	.000700	.031800
72	.005500	.020300	.001600	.004100	.007700	.009100	.001300	.000500	.018400	.068500
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	.000800	.007700	.000100	.000600	.000700	.000100	0.000000	.000100	.015900	.025500
OTH	.004300	.012700	.001100	.022300	.072900	.003800	.002000	.100700	.020800	.240600
TOTAL	.040200	.283200	.034000	.226600	.149500	.047900	.034600	.103500	.081300	1.000000

CHARLESTON NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.000400	0.000000	.000100	.001000	.000300	0.000000	0.000000	.000600	.003200
11	.014300	.012700	.002200	.023900	.017500	.001600	.003400	0.000000	.015900	.091500
17	.001200	.004300	.001000	.008300	.006200	.003600	.001100	0.000000	.020400	.046100
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	.007000	.013000	.001000	.011700	.011700	.000900	.001400	0.000000	.016800	.063500
31	.009500	.017800	.000500	.006600	.003600	.000300	.000300	0.000000	.009100	.047700
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	.000500	.032100	.001600	.005100	.009400	.000600	.004600	0.000000	.001600	.055500
41	.000300	.008500	0.000000	0.000000	.000600	.000400	0.000000	0.000000	0.000000	.009800
51	.001000	.007600	.002600	.008000	.011300	.001800	.000700	0.000000	.010800	.043800
56	.004500	.019500	.000900	.007000	.006000	.001400	.000200	0.000000	.016900	.056400
64	.001300	.010200	.000500	.002700	.002600	.001300	.000400	0.000000	.010700	.029700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.002200	.005500	.001700	.021400	.016400	.009200	.000100	0.000000	.010400	.066900
71	.000700	.001600	.000100	.001700	.002700	.005600	0.000000	0.000000	.004600	.017000
72	.001700	.016000	.000900	.003200	.008400	.003400	.000600	0.000000	.016900	.051100
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	.000400	.003900	.000100	.000900	.001000	.000200	.000400	0.000000	.010900	.017800
OTH	.092100	.077500	.047500	.025300	.015800	.006900	.009000	.087100	.038800	.400000
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TOTAL	.137500	.230600	.060600	.125900	.114200	.037500	.022200	.087100	.184400	1.000000

PHILADELPHIA NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000200	.000200	0.000000	.000100	.000100	.000100	0.000000	0.000000	.000700	.001400
11	.042700	.005000	.000300	.002900	.013100	.002200	.001600	0.000000	.004100	.071900
17	.001000	.001900	.001600	.001300	.005800	.013700	.000500	0.000000	.002800	.028600
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	.022400	.010400	.001600	.002200	.011100	.005000	.000500	0.000000	.004100	.057300
31	.002700	.044100	.001500	.000900	.029600	0.000000	.004700	0.000000	.009600	.092100
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	.007400	.035000	.003500	.004700	.020700	.001200	.007400	.003600	.015400	.095900
41	.001300	.049000	0.000000	.000100	.001600	.004800	0.000000	0.000000	.001200	.058000
51	.001900	.000900	.016700	.017900	.007900	.001500	.001100	.000100	.010100	.057900
56	.004600	.027500	.001200	.003000	.075100	.004300	.002100	0.000000	.010900	.128700
64	.004000	.001800	.000900	.001800	.002500	.007700	.000700	.000200	.013000	.032700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000700	0.000000	0.000000	.027200	0.000000	0.000000	.005000	0.000000	.000800	.033700
71	.010700	.004900	.001100	.003200	.006700	.015300	.001900	0.000000	.003800	.047200
72	.007800	.011600	.001800	.002700	.023000	.007100	.001400	.000200	.033300	.088900
81	0.000000	.000200	0.000000	0.000000	.000300	0.000000	0.000000	0.000000	0.000000	.000500
94	0.000000	.000200	0.000000	0.000000	.000100	0.000000	.000100	0.000000	.000100	.000500
99	.002100	.000600	.000300	0.000000	.007900	.002300	.000100	.000100	.017700	.031100
OTH	.032600	.039200	.027700	.016400	.005700	.002200	.001500	.035700	.012500	.173600
TOTAL	.142100	.232500	.058200	.084300	.210800	.067400	.028700	.036300	.139100	1.000000

PUGET SOUND NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.001000	0.000000	0.000000	.000700	0.000000	0.000000	0.000000	.001100	.003600
11	.001300	.016900	0.000000	0.000000	.001700	.000800	0.000000	0.000000	.007400	.028100
17	.000100	.001400	0.000000	0.000000	.004900	.000600	0.000000	0.000000	.014400	.021400
23	.001200	.001900	0.000000	0.000000	.002400	.000200	.000500	0.000000	.002800	.009000
26	.000300	.024500	0.000000	.000200	.006800	.000300	.000200	0.000000	.010900	.043000
31	.025900	.034100	0.000000	.001000	.051400	.003900	.007500	0.000000	.038400	.162200
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004300	.004300
38	.001100	.003100	0.000000	.000300	.003500	0.000000	.000100	0.000000	.011800	.019900
41	.000600	.007100	0.000000	.000100	.000600	.000100	0.000000	0.000000	.000700	.009200
51	0.000000	.000800	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.116800	.117700
56	.000900	.017700	0.000000	0.000000	.026300	.000900	.001900	0.000000	.030700	.078400
64	.005400	.011500	0.000000	0.000000	.039900	.001300	.000200	0.000000	.039600	.097800
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	.000200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.052100	.052300
71	.001300	.002000	0.000000	0.000000	.000900	0.000000	0.000000	0.000000	.005700	.009900
72	0.000000	.026100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016600	.042700
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	0.000000	.034200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.027300	.061500
OTH	.004600	.055800	0.000000	.000200	.014400	.001100	.000600	.087100	.075200	.239000
TOTAL	.043500	.238300	0.000000	.001800	.153300	.009200	.011000	.087100	.455800	1.000000

NORFOLK NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	.000300	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.000400
11	.015500	.013900	.003400	.003900	.013400	.008000	.001900	0.000000	.005100	.065000
17	.000100	.002000	.001100	.000600	.001700	.002700	.000400	0.000000	.000200	.008800
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
26	.008400	.011500	.002100	.001800	.008300	.006200	.001000	0.000000	.001500	.040800
31	.003300	.029000	.005200	.016900	.023000	.008600	.000500	.000500	.000400	.087400
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	.003300	.041700	.009300	.011100	.026100	.017000	.003500	0.000000	.000600	.112600
41	.000200	.007700	.000200	0.000000	.001400	.002000	0.000000	0.000000	0.000000	.011500
51	.000900	.004100	.022500	.014300	.004100	.010800	.002000	0.000000	.000600	.059300
56	.002400	.023800	.006100	.001500	.017000	.011700	.000600	0.000000	.000600	.063700
64	.007300	.005900	.000700	.002700	.007000	.018400	.000700	0.000000	.012000	.054700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000200	.000500	0.000000	.020500	.000200	.010100	.000100	.000100	0.000000	.031700
71	.003700	.001300	.000600	.003300	.002000	.028600	.000300	0.000000	.001000	.040800
72	.010200	.020900	.005400	.007200	.019800	.023300	.003200	0.000000	.019400	.109400
81	.000100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000100
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	.001600	.001000	.000300	.000300	.000900	.002900	0.000000	0.000000	.013900	.020800
OTH	.032500	.033700	.022700	.047300	.029200	.015900	.005300	.086500	.019900	.293000
TOTAL	.099700	.197000	.079900	.131400	.154000	.166300	.019400	.087100	.075200	1.000000

PORTSMOUTH NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000500	.000500
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.023100	.023100
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005300	.005300
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002200	.002200
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011400	.011400
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.318000	.318000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016600	.016600
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005000	.005000
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018500	.018500
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.013100	.013100
65	.008600	.186400	.017500	.000800	.005900	.001400	.000200	0.000000	0.000000	.220800
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008600	.008600
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002500	.002500
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.006200	.006200
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008400	.008400
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002000	.002000
OTH	.045500	.034700	.011800	.002300	.002100	.000500	0.000000	.202000	.038900	.337800
TOTAL	.054100	.221100	.029300	.003100	.008000	.001900	.000200	.202000	.480300	1.000000

PEARL HARBOR NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.001300	.001600	.000300	.000700	.000900	.000300	.000300	0.000000	.001200	.006600
11	.022100	.005000	.001300	.005100	.004500	.004000	.001000	0.000000	.005800	.048800
17	.000700	.002900	.006600	.001800	.001900	.001000	.000500	0.000700	.001800	.017200
23	.000800	.001800	.000200	.000400	.001100	.000100	.000200	0.000000	.002000	.006600
26	.013100	.007300	.001300	.003100	.005900	.001800	.000500	0.000000	.005900	.038900
31	.006800	.039700	.005900	.011800	.031800	.000800	.005100	0.000000	.039000	.140900
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
38	.002400	.032400	.005700	.018200	.029500	.002200	.013900	0.000000	.014200	.118600
41	.000300	.015200	.000200	.001900	.007500	.000300	0.000000	0.000000	.005400	.030800
51	.000800	.030600	.006000	.012200	.004700	.009000	.000400	0.000000	.007000	.070700
56	.001700	.015800	.003700	.009500	.025900	.000700	.000700	0.000300	.010600	.068500
64	.006500	.010900	.004700	.001800	.003100	.005800	.000500	0.000000	.014400	.047700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.001300	.000300	.000200	.019300	.000300	.002800	.003500	0.000000	.002400	.030100
71	.009500	.003100	.000400	.001800	.002100	.016800	.000500	0.000300	.003500	.037700
72	.011100	.012300	.001800	.007500	.008600	.012400	.001900	0.000000	.030600	.086200
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	.003800	.002600	.000400	.001800	.003200	.002500	.000200	0.000000	.013900	.028400
OTH	.014000	.048700	.003300	.016300	.014400	.005400	.003500	.087100	.029600	.222300
TOTAL	.096200	.230200	.042000	.113200	.145400	.065900	.032700	.087100	.187300	1.000000

MARE ISLAND NAVAL SHIPYARD - FINAL UNSW MATRIX
REAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.001000	0.000000	0.000000	.000700	0.000000	0.000000	0.000000	.001100	.003600
11	.001300	.016900	0.000000	0.000000	.001700	.000800	0.000000	0.000000	.007400	.028100
17	.000100	.001400	0.000000	0.000000	.004900	.000600	0.000000	0.000000	.014400	.021400
23	.001200	.001900	0.000000	0.000000	.002400	.000200	.000500	0.000000	.002800	.009000
26	.000300	.024500	0.000000	.000200	.006600	.000300	.000200	0.000000	.010900	.043000
31	.025900	.034100	0.000000	.001000	.051400	.003900	.007500	0.000000	.038400	.162200
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004300	.004300
38	.001100	.003100	0.000000	.000300	.003500	0.000000	.000100	0.000000	.011800	.019900
41	.000600	.007100	0.000000	.000100	.000500	.000100	0.000000	0.000000	.000700	.009200
51	0.000000	.000800	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.116800	.117700
56	.000900	.017700	0.000000	0.000000	.026300	.000900	.001900	0.000000	.030700	.078400
64	.005400	.011500	0.000000	0.000000	.039800	.001300	.000200	0.000000	.039600	.097800
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	.000200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.052100	.052300
71	.001300	.002000	0.000000	0.000000	.000900	0.000000	0.000000	0.000000	.005700	.009900
72	0.000000	.026100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016600	.042700
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	0.000000	.034200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.027300	.061500
OTH	.004600	.055800	0.000000	.000200	.014400	.001100	.000600	.087100	.075200	.239000
TOTAL	.043500	.238300	0.000000	.001800	.153300	.009200	.011000	.087100	.455800	1.000000

6.0 Conversion of Real Shops to Functional Shops

6.1 Development of Conversion Methodology

Functional shops have been defined wherein all shipyards consistently perform the same functions. Functional shops are in actuality developed from functional work groups. NAVSEA 070, in the creation of the Shipyard Modernization System for the projection of shipyard facility and industrial plant equipment requirements, found it necessary to establish a standard means of measuring resources common across all shipyards -- the functional work group. The functional work group is a combination of resources needed to make a product or group of products, or provide a service unique among all other work. The conversion from real shops to functional shops is developed from the relationship of functional shops to functional work groups.

Functional work groups include:

i) all production shop productive functions with the exception of the work performed in shop 65 (the module maintenance and repair facilities in Charleston)

ii) a small part of the other direct work

All functional work groups in i) above are the same within all shipyards. There exists a unique combination of the functional work groups which comprise the functional shops; i.e., each functional work group is in one and only one functional shop.

All Naval shipyard real shops are composed of work centers. As was the case for functional work groups, there exists within each shipyard * a unique combination of work centers within the real shops; i.e., every work center is in one and only one real shop. For each shipyard a relationship between real shops and functional work groups has been developed. NAVSEA 070T currently receives a quarterly report from each of the Naval shipyards which shows, in matrix form, manning by work center/ functional work group (FWG). The format is shown below.

	FWG 1	FWG 2	. . .	FWG K
Work Center 1	M_{11}	M_{12}		M_{1M}
Work Center 2			.	
.			.	
.			.	
.				
Work Center N				

Note that only those work centers where functions are covered within the functional work group structure are included.

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* The work center breakdown is different for each shipyard.

This report is used to develop ratios in the following manner. Consider an arbitrary work center i. Assume there are K functional work groups and the manning in functional work group j ($1 \leq j \leq K$) for work center i is M_{ij}. Then, the fraction of work in functional work group j for work center i is the ratio $M_{ij} \Big/ \sum_{r=1}^{K} M_{ir}$. Such a ratio can be calculated for every work center/functional work group combination.

From a shipyard Management Information System (MIS) report, actual mandays expended quarterly by work center are obtained. These mandays are then multiplied by their corresponding ratios. For example, let W_i be the mandays expended in work center i, then the products

$$\frac{W_i M_{ij}}{\sum_{r=1}^{K} M_{ir}} \qquad j = 1, 2, \ldots, K$$

are formed which show the workload for work center i in functional work group j. One may think of these products in matrix form where the rows are work centers, columns are functional work groups, and whose ij^{th} entry is as above.

The DMPPS conversion from real shops to functional shops begins with such a matrix. The following refinements are made.

i) All functional work group columns for other direct work are eliminated. It turns out that work centers in which

other direct work is performed contain only an insignificant amount of productive work. Hence this column elimination implies the elimination of other direct work center rows, and the remaining matrix describes the totality of production shop productive work with the exception of shop 65.

ii) The remaining functional work group columns are combined* (added) to form the functional shop columns.

iii) The remaining work center rows are combined** (added) to form real shop rows.

iv) Each row of the reduced matrix is then normalized so that the sum of its elements is unity.

The result of the above manipulations is a matrix whose rows are real shops, columns are functional shops, and whose ij^{th} entry is the fraction of the total real shop i workload that belongs in functional shop j-- or in other words, a mechanism for conversion of real shops to functional shops within the production department. As far as shop 65 is concerned, the real shop was equated to the functional shop. In the case of other direct, all other direct shops were included in the other direct functional shops.

Using the above scheme, conversion factors for Long Beach and Norfolk were developed. These factors were then applied to the repair portion of two similar DDG overhauls, one in each of the shipyards.

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* Each functional work group belongs to one and only one functional shop.

** For each shipyard, each work center belongs to one and only one real shop.

The effectiveness of the factors was then evaluated by comparing the closeness of the two DDG matrices after the conversion of real shops to functional shops. By and large, both matrices were somewhat similar with two exceptions.

i) Other direct was consistently higher in Long Beach for all SWBS categories with the exception of SWBS 8 for which Norfolk was higher. Overall, total other direct was similar in the two shipyards.

ii) Shop 36 was considerably different in all individual SWBS categories-- Norfolk was higher in SWBS 1, 2, 3, 5, and 6, lower in SWBS 4, 7, and 9, and both shipyards showed near zero for SWBS 8. As was the case for other direct, the total of shop 36 summed over all SWBS was similar.

The difference in other direct turned out to be unreconcilable. The discrepancy was attributed to different philosophies in writing job order numbers. In Norfolk, most design work was done under an 830 SWBS element. In Long Beach, if the design work were for the propulsion system for example, a SWBS element beginning with 2 was used. Hence although both shipyards did the same amount of design work, Long Beach packaged it with the system for which the work was performed and Norfolk did not. Thus Long Beach showed more other direct on all SWBS categories with the exception of 8. No evaluation of the validity of either approach was made. The differences were simply recorded.

The shop 36 discrepancy was however caused by a fundamental problem with the conversion approach being used. Although the conversion factors developed were accurate for an average of all work performed in the shipyards, the factors were quite inaccurate for the individual SWBS. Shop 36 is the weapon systems shop. It is responsible for the repair, overhaul, alignment, installation, check out, testing, and calibration of all weapon systems, integrated systems, and their components. Hence shop 36 impacts primarily on SWBS 4, 7, and 9. There is a real shop 36 in Long Beach (which is nearly equivalent to the functional shop 36) and there is no real shop 36 in Norfolk. The Norfolk conversion factors indicated that the functional shop 36 is composed of 4% of shop 31, 24% of shop 38, and 15% of shop 67. Shop 31 is the inside machine shop, Shop 38 is the marine machine shop, and shop 67 is the electronics shop. One or more of these shops usually makes a sizable contribution to all SWBS with the exception of SWBS 8. Thus the differences between Long Beach and Norfolk can be explained. Both showed no shop 36 work in SWBS 8-- Long Beach because no shop 36 work was performed and Norfolk because no shop 31, 38, or 67 work was performed. Norfolk was too high in shop 36 work in SWBS 1, 2, 3, 5, and 6 because work was performed in shops 31, 38, and 67 for these SWBS even though this work did not consist of shop 36 functions as evidenced by the lack of such work in the Long Beach matrix. Norfolk was too low in SWBS 4, 7, and 9 since within these SWBS's, factors

proportionally higher than the 4%, 24%, and 15% should have been used to transfer the shop 36 work.

The fundamental problem with the approach is the conversion of real shops to functional shops rather than the conversion of work centers to functional work groups. Work centers in shops 31, 38, and 67 which contribute to functional shop 36 do not contribute significantly to any other functional shop. Thus the errors were created by the aggregation of the data to the real shop level. Such an error will almost always occur when a real shop is lacking from a particular shipyard. Shop 36 is the worst case since it formally exists in only two shipyards and hence a method of compensation was developed. If major errors persist in other shops which affect the usefulness of projections, serious consideration should be given to the adoption of a finer level of detail for DMPPS to accomodate work centers.*

The compensation methodology consisted of the creation of a functional shop 36 prior to any other conversions. The same conversion factors would be used; e.g., 4% of shop 31, 24% of shop 38, and 15% of shop 67 for Norfolk. These factors would only be used in SWBS 4, 7, and 9 and would be multiplied by a separate constant for each SWBS. For example, if the Norfolk multiplicative constants were 2.54, 4.00, and 1.00 for SWBS 4, 7, and 9 respectively then the conversion factors would be:

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* It is unlikely that functional work groups will have to be considered explicitly. Conversion of work centers to functional shops should be sufficient.

SWBS 4: 10% of shop 31, 61% of shop 38, 38% of shop 67

SWBS 7: 16% of shop 31, 96% of shop 38, 60% of shop 67

SWBS 9: 4% of shop 31, 24% of shop 38, 15% of shop 67

Using these conversion factors, matrix entries would be created in shop 36 for SWBS 4, 7, and 9, and shops 31, 38, and 67 would be correspondingly reduced in these SWBS. Once these changes were made, then and only then, would the standard real to functional shop conversion be carried out.

6.2 Documentation of Conversion Factors

This section presents the conversion factors used to convert real shop UNOW and UNSW matrices to functional shop matrices. The data used for the conversion as is given in the following pages was developed in early 1976. This was before the formal shipyard reporting to 070T was initiated. Hence the data on which the factors are based is old and unreliable. Thus a revision of the factors based on current information is recommended. Matrix entries referred to in the following pages are taken from the real shop UNSW matrices on pages 39 through 46. Four digits of accuracy are used.

6.2.1 Shop 36 UNSW Multiplicative Factors

Long Beach Naval Shipyard

Since functional shop 36 is equivalent to real shop 36 at Long Beach, no special adjustments were made. Information was, however, derived from the Long Beach real shop UNSW matrix which was used in the development of multiplicative factors for the other shipyards:

The SWBS 4, real shop 36 fraction of the SWBS 4 total is .1244

The SWBS 7, real shop 36 fraction of the SWBS 7 total is .5665

The SWBS 9, real shop 36 fraction of the SWBS 9 total is .0369

The shop 36 contribution to SWBS 1 and 3 were considered negligible.

Charleston Naval Shipyard

The standard conversion factors from the NAVSEA 070T data are 21% of shop 38 and 20% of shop 67. If shop 36, SWBS 4 were to be 12.44% of the SWBS 4 total as was the case in Long Beach, the shop 36, SWBS 4 matrix entry should be .0156. However, by applying the conversion factors to the real shop 38 and 67 entries for SWBS 4, the resultant shop 36, SWBS 4 value is only .0054. It is necessary to multiply .0054 by 2.89 to achieve the desired value of .0156. The value 2.89 is, thus, the SWBS 4 multiplicative factor for shop 36. Similarly, for shop 36, SWBS 7 to be 56.65% of the SWBS 7 total (.0126), the required multiplicative factor is 12.6 and for shop 36, SWBS 9 to be 3.69% of the SWBS 9 total (.0068), a 2.81 multiplicative factor is needed. 12.6 is infeasible however since 12.6 times 21% is greater

than 100%. A factor of 4.75 was chosen to shift most of the work from the target shops. Hence the shop 36 conversion is

SWBS 4: 61% of shop 38, 58% of shop 67

SWBS 7: 100% of shop 38, 95% of shop 67

SWBS 9: 59% of shop 38, 56% of shop 67

The matrix entries for shops 38 and 67 were correspondingly reduced when the above percentages were shifted to shop 36.

Philadelphia Naval Shipyard

The standard conversion factors from the NAVSEA 070T data are 17% of shop 38, 1% of shop 51, and 17% of shop 67. If shop 36, SWBS 4 were to be 12.44% of the SWBS 4 total as was the case in Long Beach, the shop 36, SWBS 4 matrix entry should be .0105. This implies a SWBS 4 multiplicative factor of 1.88. Similarly for shop 36, SWBS 7 to be 56.65% of the SWBS 7 total (.0161), the required multiplicative factor is 7.67 and for shop 36, SWBS 9 to be 3.69% of the SWBS 9 total (.0051), a 1.76 multiplicative factor is needed. 7.67 is infeasible however since 7.67 times 17% is greater than 100%. A factor of 5.0 was chosen since it removed most of the shop 67 and 38 entries. Hence the shop 36 conversion is:

SWBS 4: 32% of shop 38, 2% of shop 51, 32% of shop 67

SWBS 7: 30% of shop 38, 2% of shop 51, 30% of shop 67

SWBS 9: 85% of shop 38, 5% of shop 51, 85% of shop 67

The matrix entries for shops 38, 51, and 67 were correspondingly reduced when the above percentages were shifted to shop 36.

Puget Sound Naval Shipyard

Since no separate UNSW matrix was generated, no multiplicative factors were developed.

Norfolk Naval Shipyard

The standard conversion factors from the NAVSEA 070T data are 4% of shop 31, 24% of shop 38, and 15% of shop 67. If shop 36, SWBS 4 were to be 12.44% of the SWBS 4 total as was the case in Long Beach, the shop 36, SWBS 4 matrix entry should be .0163. This implies a SWBS 4 multiplicative factor of 2.54. Similarly for shop 36, SWBS 7 to be 56.65% of the SWBS 7 total (.0110), the required multiplicative factor is 12.57 and for shop 36, SWBS 9 to be 3.69% of the SWBS 9 total (.0028), a multiplicative factor of 17.5 is needed. However, the largest factor permitted is 100/24 or 4.17. A factor of 4.0 was chosen for SWBS 7 since this transferred nearly all shops 31, 38, and 67 entries to shop 36. Since SWBS 9 contained almost no work in the three target shops, a factor of 0.0 was used. Hence the shop 36 conversion is:

SWBS 4: 10% of shop 31, 61% of shop 38, 38% of shop 67

SWBS 7: 16% of shop 31, 96% of shop 38, 60% of shop 67

The matrix entries for shops 31, 38, and 67 were correspondingly reduced when the above percentages were shifted to shop 36.

Portsmouth Naval Shipyard

The standard conversion factors from the NAVSEA 070T data are 3% of shop 31, 18% of shop 38, and 19% of shop 67. Portsmouth only contains UNSW in shops 31, 38 and 67 for SWBS 9. If shop 36, SWBS 9 were to be 3.69% of the SWBS 9 total as was the case in Long Beach, the shop 36 conversion is:

SWBS 9: 4% of shop 31, 23% of shop 38, 24% of shop 67

The matrix entries for shops 31, 38 and 67 were correspondingly reduced when the above percentages were shifted to shop 36.

Pearl Harbor Naval Shipyard

The standard conversion from factors from the NAVSEA 070T data are 16% of shop 38, 1% of shop 51, and 18% of shop 67. If shop 36, SWBS 4 were to be 12.44% of the SWBS 4 total as was the case in Long Beach, the shop 36 SWBS 4 matrix entry should be .0141. This implies a SWBS 4 multiplicative factor of 2.17. Similarly for shop 36, SWBS 7 to be 56.65% of the SWBS 7 total (.0186), the required multiplicative factor is 6.41 and for shop 36, SWBS 9 to be 3.69% of the SWBS 9 total (.0069), a 2.46 multiplicative factor is needed. 6.41 is infeasible however since 6.41 times 18% is greater than 100%. A factor of 5.5 was chosen. Hence the shop 36 conversion is:

SWBS 4: 35% of shop 38, 2% of shop 51, 39% of shop 67

SWBS 7: 88% of shop 38, 6% of shop 51, 99% of shop 67

SWBS 9: 39% of shop 38, 2% of shop 51, 44% of shop 67

The matrix entries for shops 38, 51, and 67 were correspondingly reduced when the above percentages were shifted to shop 36.

Mare Island Naval Shipyard

Mare Island is the only shipyard other than Long Beach to have a real shop 36. The standard conversion factors from the NAVSEA 070T data are 100% of shop 36 and 2% of shop 38. Since the Mare Island UNSW matrix contained only an insignificant entry for shop 38, SWBS 4 and 7 (and no real shop 36, SWBS 4 and 7 work) factors of 0.0 were used. For SWBS 9 a factor of 1.0 was used. Hence the shop 36 conversion is:

SWBS 9: 100% of shop 36, 2% of shop 38.

The shop 38 matrix entry was correspondingly reduced when the above percentage was shifted to shop 36.

6.2.2 Shop 36 UNOW Multiplicative Factors

Although SWBS is not projected for UNOW, it was still necessary for the purposes of consistency to use matrix format for UNOW. These matrices showed all values in SWBS 9. The computer program which converted real shop to functional shop matrices required that shop 36 be converted via the use of multiplicative factors. For all shipyards, the multiplicative factor used is unity. The following table displays the conversion factors for each shipyard:

Table 2

Shop 36 UNOW Conversion

		real shop				
		31	36	38	51	67
Functional 36	Long Beach		100%			
	Charleston			21%		20%
	Philadelphia			17%	1%	17%
	Puget Sound			22%	1%	16%
	Norfolk	4%		24%		15%
	Portsmouth	3%		18%		19%
	Pearl Harbor			16%	1%	18%
	Mare Island		100%	2%		

6.2.3 UNSW/UNOW Conversion Factors

The following pages present the factors used to convert both UNOW and UNSW real shop to functional shop matrices. Only in the case of Long Beach Naval Shipyard is shop 36 included. In all other cases (including Mare Island) the multiplicative factors presented in the previous section were applied. No other manipulations to shop 36 were made.

Also the conversion factors for the real shops whose matrix entries were shifted in part to shop 36, are applied to the reduced figures.

Long Beach Naval Shipyard

functional 06 = 100% of real 06

functional 11 = 100% of real 11

functional 17 = 100% of real 17

functional 23 = 100% of real 23 + 8% of real 41

functional 26 = 100% of real 26

functional 31 = 100% of real 31 + 5% of real 51

functional 36 = 100% of real 36

functional 38 = 100% of real 38

functional 41 = 89% of real 41

functional 51 = 95% of real 51 + 3% of real 67

functional 56 = 100% of real 56 + 1% of real 67

functional 64 = 96% of real 64

functional 65 = 100% of real 65

functional 67 = 96% of real 67

functional 71 = 100% of real 71

functional 72 = 100% of real 72

functional 81 = 100% of real 81 + 3% of real 41

functional 94 = 100% of real 94 + 4% of real 64

functional 99 = 100% of real 99

functional OTH = 100% of real OTH

Charleston Naval Shipyard

functional 06 = 100% of real 06

functional 11 = 95% of real 11

functional 17 = 98% of real 17

functional 23 = 100% of real 23 + 4% of real 11

functional 26 = 100% of real 26

functional 31 = 96% of real 31 + 1% real 11 + 2% of real 17

functional 38 = 100% of real 38 + 4% of real 31

functional 41 = 100% of real 41

functional 51 = 100% of real 51

functional 56 = 100% of real 56

functional 64 = 99% of real 64 + 14% of real 71

functional 65 = 100% of real 65

functional 67 = 100% of real 67

functional 71 = 86% of real 71

functional 72 = 100% of real 72 + 1% of real 99

functional 81 = 100% of real 81

functional 94 = 100% of real 94 + 1% of real 64

functional 99 = 99% of real 99

functional OTH = 100% of real OTH

Philadelphia Naval Shipyard

functional 06 = 100% of real 06

functional 11 = 98% of real 11

functional 17 = 97% of real 17

functional 23 = 100% of real 23 + 4% of real 41

functional 26 = 99% of real 26

functional 31 = 94% of real 31 + 2% of real 17

functional 38 = 85% of real 38 + 6% of real 31

functional 41 = 96% of real 41

functional 51 = 99% of real 51

functional 56 = 100% of real 56 + 1% of real 17 + 15% of real 38 + 1% of real 51 + 3% of real 64

functional 64 = 96% of real 64 + 2% of real 71 + 1% of real 72 + 14% of real 94

functional 65 = 100% of real 65

functional 67 = 100% of real 67

functional 71 = 98% of real 71 + 1% of real 64

functional 72 = 99% of real 72 + 5% of real 99

functional 81 = 100% of real 81

functional 94 = 86% of real 94

functional 99 = 95% of real 99 + 2% of real 11 + 1% of real 26

functional OTH = 100% of real OTH

Puget Sound Naval Shipyard*

functional 06 = 100% of real 06

functional 11 = 100% of real 11

functional 17 = 100% of real 17

functional 23 = 94% of real 23 + 1% of real 41

functional 26 = 100% of real 26

functional 31 = 96% of real 31 + 6% of real 23 + 1% of real 41 + 3% of real 51 + 1% of real 67

functional 38 = 92% of real 38

functional 41 = 98% of real 41

functional 51 = 93% of real 51 + 10% of real 67

functional 56 = 100% of real 56 + 8% of real 38

functional 64 = 100% of real 64 + 1% of real 71

functional 65 = 100% of real 65

functional 67 = 89% of real 67 + 4% of real 51

functional 71 = 98% of real 71

functional 72 = 100% of real 72 + 1% of real 71 + 1% of real 99

functional 81 = 100% of real 81

functional 94 = 100% of real 94

functional 99 = 99% of real 99 + 4% of real 31

functional OTH = 100% of real OTH

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* Since the Mare Island UNSW matrix was used for the Puget Sound UNSW matrix, these factors were only applied to UNOW.

Norfolk Naval Shipyard

functional 06 = 100% of real 06

functional 11 = 93% of real 11

functional 17 = 100% of real 17

functional 23 = 100% of real 23 + 6% of real 11

functional 26 = 100% of real 26

functional 31 = 96% of real 31 + 2% of real 56

functional 38 = 100% of real 38 + 2% of real 31

functional 41 = 100% of real 41

functional 51 = 98% of real 51 + 8% of real 67

functional 56 = 98% of real 56

functional 64 = 100% of real 64

functional 65 = 100% of real 65

functional 67 = 92% of real 67

functional 71 = 100% of real 71

functional 72 = 100% of real 72

functional 81 = 100% of real 81

functional 94 = 100% of real 94 + 2% of real 31

functional 99 = 100% of real 99 + 1% of real 11 + 2% of real 51

functional OTH = 100% of real OTH

Portsmouth Naval Shipyard

functional 06 = 100% of real 06 + 12% of real 31

functional 11 = 99% of real 11

functional 17 = 100% of real 17

functional 23 = 100% of real 23 + 1% of real 11

functional 26 = 100% of real 26

functional 31 = 83% of real 31

functional 38 = 100% of real 38 + 5% of real 31

functional 41 = 100% of real 41

functional 51 = 100% of real 51 + 5% of real 67

functional 56 = 100% of real 56

functional 64 = 90% of real 64

functional 65 = 0*

functional 67 = 95% of real 67

functional 71 = 52% of real 71

functional 72 = 100% of real 72 + 48% of real 71 + 7% of real 99

functional 81 = 100% of real 81

functional 94 = 100% of real 94 + 4% of real 64

functional 99 = 93% of real 99 + 6% of real 64

functional OTH = 100% of real OTH + 100% of real 65*

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* Portsmouth Naval Shipyard uses the shop number 65 for other direct work. The functions of shop 65 are not performed in Portsmouth.

Pearl Harbor Naval Shipyard

functional 06 = 98% of real 06

functional 11 = 100% of real 11

functional 17 = 100% of real 17

functional 23 = 100% of real 23

functional 26 = 100% of real 26

functional 31 = 87% of real 31 + 1% of real 51

functional 38 = 100% of real 38 + 13% of real 31

functional 41 = 100% of real 41

functional 51 = 99% of real 51

functional 56 = 100% of real 56

functional 64 = 92% of real 64

functional 65 = 100% of real 65

functional 67 = 100% of real 67

functional 71 = 100% of real 71

functional 72 = 100% of real 72

functional 81 = 100% of real 81

functional 94 = 100% of real 94 + 8% of real 64

functional 99 = 100% of real 99 + 2% of real 06

functional OTH = 100% of real OTH

Mare Island Naval Shipyard

functional 06 = 100% of real 06

functional 11 = 99% of real 11

functional 17 = 100% of real 17

functional 23 = 93% of real 23

functional 26 = 100% of real 26

functional 31 = 100% of real 31 + 1% of real 11 + 3% of real 51

functional 38 = 100% of real 38

functional 41 = 100% of real 41

functional 51 = 97% of real 51

functional 56 = 100% of real 56 + 28% of real 64

functional 64 = 65% of real 64

functional 65 = 100% of real 65

functional 67 = 100% of real 67

functional 71 = 100% of real 71

functional 72 = 100% of real 72

functional 81 = 100% of real 81

functional 94 = 100% of real 94 + 7% of real 23

functional 99 = 100% of real 99 + 7% of real 64

functional OTH = 100% of real OTH

7.0 UNOW Matrices

The following eight pages present the final DMPPS UNOW functional shop projection matrices.

LONG BEACH NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000090	.000500	0.000000	0.000000	.000100	0.000000	.000100	0.000000	0.000000	.000700
11	.006200	.016300	.000800	.011800	.004900	.005300	.001100	0.000000	.002200	.048500
17	.000700	.006100	.001000	.008500	.003600	.002100	.000600	0.000000	.000500	.023100
23	.000100	.002900	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	0.000000	.003100
26	.003700	.026500	.000900	.007300	.004300	.002500	.000600	.000100	.001500	.047400
31	.004200	.046900	.003900	.009100	.009400	.000100	.001400	.000200	.003500	.078700
36	.000200	0.000000	.000800	.028200	0.000000	0.000000	.019600	0.000000	.003000	.051800
38	.003200	.044900	.007900	.000800	.010700	.000200	.001000	.000500	.004000	.073200
41	.000600	.032400	.000300	.000400	.001200	.000100	.000100	0.000000	.000400	.035500
51	.003300	.011800	.011500	.073000	.006500	.000700	.004500	0.000100	.002100	.113400
56	.001800	.034400	.001500	.013900	.022200	.000900	.001000	.000100	.002000	.077800
64	.003200	.010100	.000300	.006300	.002800	.006900	.000900	.001300	.003400	.035100
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000700	.001800	.002100	.034800	.000300	0.000000	0.000000	0.000000	.002800	.042500
71	.001600	.006300	.000200	.005100	.002500	.014900	.000500	0.000000	.000700	.031800
72	.005500	.020300	.001600	.004100	.007200	.009100	.001300	.000500	.018400	.068500
81	0.000000	.001100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001100
94	.000100	.000400	0.000000	.000300	.000100	.000300	0.000000	.000100	.000100	.001400
99	.000800	.007700	.000100	.000600	.000200	.000100	0.000000	.000100	.015900	.025500
OTH	.004300	.012700	.001100	.022300	.072900	.003900	.002000	.109700	.021100	.240900
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TOTAL	.040200	.283100	.034000	.226500	.149400	.047000	.034600	.103600	.081600	1.000000

CHARLESTON NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.000400	0.000000	.000100	.001000	.000300	0.000000	0.000000	.000600	.003200
11	.013600	.012100	.002100	.022700	.016800	.001500	.003200	0.000000	.015100	.086900
17	.001200	.004200	.001000	.008100	.006100	.003500	.001100	0.000000	.020000	.045200
23	.000600	.000500	.000100	.001000	.000700	.000100	.000100	0.000000	.000600	.003700
26	.007000	.013000	.001000	.011700	.011700	.000900	.001400	0.000000	.016800	.063500
31	.009300	.017300	.000500	.006700	.003800	.000400	.000300	0.000000	.009300	.047600
36	0.000000	0.000000	0.000000	.015500	0.000000	0.000000	.004700	0.000000	.006800	.027000
38	.000900	.032800	.001600	.002300	.009500	.000600	0.000000	0.000000	.001000	.048700
41	.000300	.008500	0.000000	0.000000	.000600	.000400	0.000000	0.000000	0.000000	.009800
51	.001000	.007600	.002600	.008000	.011300	.001800	.000700	0.000000	.010800	.043800
56	.004500	.019500	.000900	.007000	.006000	.001400	.000200	0.000000	.016900	.056400
64	.001400	.010300	.000500	.002900	.003000	.002100	.000400	0.000000	.011200	.031800
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.002200	.005500	.001700	.009000	.016400	.009200	0.000000	0.000000	.004600	.048600
71	.000600	.001400	.000100	.001500	.002300	.004800	0.000000	0.000000	.004000	.014700
72	.001700	.016000	.000900	.003200	.008400	.003400	.000600	0.000000	.017000	.051200
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	.000100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000100	.000200
99	.000400	.003900	.000100	.000900	.001000	.000200	.000400	0.000000	.010800	.017700
OTH	.092100	.077500	.047500	.025300	.015900	.006900	.009000	.087100	.038800	.400000
TOTAL	.137600	.230600	.060600	.125900	.114200	.037500	.022100	.087100	.184400	1.000000

PHILADELPHIA NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000200	.000200	0.000000	.000100	.000100	.000100	0.000000	0.000000	.000700	.001400
11	.041800	.004900	.000300	.002800	.012800	.002200	.001600	0.000000	.004000	.070400
17	.001000	.001800	.001600	.001300	.005500	.013300	.000500	0.000000	.002700	.027800
23	.000100	.002000	0.000000	0.000000	.000100	.000200	0.000000	0.000000	0.000000	.002400
26	.022200	.010300	.001600	.002200	.011000	.004900	.000500	0.000000	.004100	.056800
31	.002600	.041500	.001400	.000900	.027900	.000300	.004400	0.000000	.008100	.087100
36	0.000000	0.000000	0.000000	.010500	0.000300	0.000000	.010600	0.000000	.005000	.026100
38	.006500	.032400	.003100	.002800	.019400	.001000	.001200	.000500	.009700	.076600
41	.001200	.047000	0.000000	.000100	.001500	.004600	0.000000	0.000000	.001200	.055600
51	.001900	.000900	.016500	.017300	.007700	.001500	.001000	.000100	.009800	.056700
56	.005900	.032800	.001900	.003700	.078400	.004900	.002300	.000100	.013000	.143000
64	.004100	.002000	.000900	.001800	.002900	.007800	.000700	.000200	.012900	.033300
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000700	0.000000	0.000000	.018500	0.000000	0.000000	.000700	0.000000	.000600	.020500
71	.010500	.004800	.001100	.003200	.006200	.015100	.001300	0.000000	.003900	.046700
72	.007800	.011500	.001800	.002700	.023200	.007100	.001400	.000200	.033900	.089600
81	0.000000	.000200	0.000000	0.000000	.000300	0.000000	0.000000	0.000000	0.000000	.000500
94	0.000000	.000200	0.000000	0.000000	.000100	0.000000	.000100	0.000000	.000100	.000500
99	.003100	.000800	.000300	.000100	.007900	.002300	.000100	.000100	.016900	.031600
OTH	.032600	.039200	.027700	.016400	.005700	.002200	.001500	.035700	.012300	.173400
TOTAL	.142200	.232500	.058200	.084400	.210800	.067500	.028500	.036300	.138900	1.000000

PUGET SOUND NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.001000	0.000000	0.000000	.000700	0.000000	0.000000	0.000000	.001100	.003600
11	.001300	.016700	0.000000	0.000000	.001700	.000800	0.000000	0.000000	.007300	.027800
17	.000100	.001400	0.000000	0.000000	.004900	.000600	0.000000	0.000000	.014400	.021400
23	.001100	.001800	0.000000	0.000000	.002200	.000200	.000500	0.000000	.002600	.008400
26	.000300	.024500	0.000000	.000200	.006600	.000300	.000200	0.000000	.010900	.043000
31	.025900	.034300	0.000000	.001000	.051400	.003900	.007500	0.000000	.042000	.166000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004500	.004500
38	.001100	.003100	0.000000	.000300	.003500	0.000000	.000100	0.000000	.011600	.019700
41	.000600	.007100	0.000000	.000100	.000600	.000100	0.000000	0.000000	.000700	.009200
51	0.000000	.000800	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.113300	.114200
56	.002400	.020900	0.000000	0.000000	.037400	.001300	.002000	0.000000	.041800	.105800
64	.003500	.007500	0.000000	0.000000	.025900	.000800	.000100	0.000000	.025700	.063500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	.000200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.052100	.052300
71	.001300	.002000	0.000000	0.000000	.000900	0.000000	0.000000	0.000000	.005700	.009900
72	0.000000	.026100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016600	.042700
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	.000100	.000100	0.000000	0.000000	.000200	0.000000	0.000000	0.000000	.000200	.000600
99	.000400	.035000	0.000000	0.000000	.002900	.000100	0.000000	0.000000	.030100	.068400
OTH	.004600	.055800	0.000000	.000200	.014400	.001100	.000600	.087100	.075200	.239000
TOTAL	.043500	.238300	0.000000	.001800	.153300	.009200	.011000	.087100	.455800	1.000000

NORFOLK NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	.000300	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.000400
11	.014400	.012900	.003200	.003600	.012500	.007400	.001700	0.000000	.004700	.060400
17	.000100	.002000	.001100	.000600	.001700	.002700	.000400	0.000000	.000200	.008800
23	.000900	.000800	.000200	.000200	.000900	.000500	.000100	0.000000	.000300	.003800
26	.008400	.011500	.002100	.001800	.008300	.006200	.001000	0.000000	.001500	.040800
31	.003200	.028300	.005100	.014600	.022400	.008500	.000400	.000500	.000400	.083400
36	0.000000	0.000000	0.000000	.016300	0.000000	0.000000	.003500	0.000000	0.000000	.019800
38	.003400	.042300	.009400	.004600	.026500	.017200	.000100	0.000000	.000600	.104200
41	.000200	.007700	.000200	0.000000	.001400	.002000	0.000000	0.000000	0.000000	.011500
51	.000900	.004100	.022100	.015000	.004000	.011400	.002000	0.000000	.000600	.060100
56	.002400	.023300	.006000	.001500	.015700	.011500	.000600	0.000000	.000600	.062600
64	.007300	.005900	.000700	.002700	.007000	.018400	.000700	0.000000	.012000	.054700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.000200	.000500	0.000000	.011700	.000700	.009300	0.000000	.001100	0.000000	.022000
71	.003700	.001300	.000600	.003300	.002000	.028600	.000300	0.000000	.001000	.040800
72	.010200	.020900	.005400	.007200	.019900	.023300	.003200	0.000000	.019400	.109400
81	.000100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000100
94	.000100	.000600	.000100	.000300	.000500	.000200	0.000000	0.000000	0.000000	.001800
99	.001800	.001200	.000800	.000600	.001000	.003200	.000100	0.000000	.014000	.022700
OTH	.032500	.033700	.022700	.047300	.029200	.015900	.005300	.086500	.019600	.292700
TOTAL	.089800	.197000	.080000	.131300	.154100	.166400	.019400	.087100	.074900	1.000000

PORTSMOUTH NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.037200	.037200
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.022900	.022900
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005300	.005300
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002400	.002400
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011400	.011400
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.254000	.254000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017700	.017700
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.028200	.028200
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005300	.005300
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018500	.018500
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011800	.011800
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.006200	.006200
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001300	.001300
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007500	.007500
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008900	.008900
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002600	.002600
OTH	.054100	.221100	.029300	.003100	.008000	.001900	.000200	.202000	.039100	.558800
TOTAL	.054100	.221100	.029300	.003100	.008000	.001900	.000200	.202000	.480300	1.000000

PEARL HARBOR NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.001300	.001600	.000300	.000700	.000900	.000300	.000300	0.000000	.001200	.006600
11	.022100	.005000	.001300	.005100	.004500	.004000	.001000	0.000000	.005800	.048800
17	.000700	.002900	.006600	.001800	.001900	.001000	.000500	0.000000	.001800	.017200
23	.000900	.001800	.000200	.000400	.001100	.000100	.000200	0.000000	.002000	.006600
26	.013100	.007300	.001300	.003100	.005900	.001800	.000500	0.000000	.005900	.038900
31	.005900	.034800	.005200	.010400	.027700	.000800	.004400	0.000000	.034000	.123200
36	0.000000	0.000000	0.000000	.014100	0.000000	0.000000	.015700	0.000000	.006800	.036600
38	.003300	.037600	.006500	.013400	.033700	.002300	.002300	0.000000	.013700	.112800
41	.000300	.015200	.000200	.001900	.007500	.000300	0.000000	0.000000	.005400	.030800
51	.000900	.030300	.005900	.011800	.004700	.008900	.000400	0.000000	.006800	.069600
56	.001700	.015800	.003700	.009500	.025900	.000700	.000700	0.000000	.010600	.068500
64	.006000	.010000	.004300	.001700	.002900	.005300	.000500	0.000000	.013200	.043900
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	.001300	.000300	.000200	.011800	.000300	.002800	0.000000	0.000000	.001300	.018000
71	.009500	.003100	.000400	.001800	.002100	.016800	.000500	0.000000	.003500	.037700
72	.011100	.012300	.001800	.007500	.008600	.012400	.001900	0.000000	.030600	.086200
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	.000500	.000900	.000400	.000100	.000200	.000500	0.000000	0.000000	.001200	.003800
99	.003800	.002600	.000400	.001800	.003200	.002500	.000200	0.000000	.013900	.028400
OTH	.014000	.048700	.003300	.016300	.014400	.005400	.003500	.087100	.029700	.222400
TOTAL	.096200	.230200	.042000	.113200	.145400	.065900	.032600	.087100	.187400	1.000000

MARE ISLAND NAVAL SHIPYARD - FINAL UNSW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	.000800	.001000	0.000000	0.000000	.000700	0.000000	0.000000	0.000000	.001100	.003600
11	.001300	.016700	0.000000	0.000000	.001700	.000800	0.000000	0.000000	.007300	.027800
17	.000100	.001400	0.000000	0.000000	.004900	.000600	0.000000	0.000000	.014400	.021400
23	.001100	.001800	0.000000	0.000000	.002200	.000200	.000500	0.000000	.002600	.008400
26	.000300	.024500	0.000000	.000200	.006500	.000300	.000200	0.000000	.010900	.043000
31	.025900	.034300	0.000000	.001000	.051400	.003900	.007500	0.000000	.042000	.166000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004500	.004500
38	.001100	.003100	0.000000	.000300	.003500	0.000000	.000100	0.000000	.011500	.019700
41	.000600	.007100	0.000000	.000100	.000600	.000100	0.000000	0.000000	.000700	.009200
51	0.000000	.000800	0.000000	0.000000	.000100	0.000000	0.000000	0.000000	.113300	.114200
56	.002400	.020900	0.000000	0.000000	.037400	.001300	.002000	0.000000	.041800	.105800
64	.003500	.007500	0.000000	0.000000	.025900	.000800	.000100	0.000000	.025700	.063500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	.000200	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.052100	.052300
71	.001300	.002000	0.000000	0.000000	.000900	0.000000	0.000000	0.000000	.005700	.009900
72	0.000000	.026100	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016600	.042700
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	.000100	.000100	0.000000	0.000000	.000200	0.000000	0.000000	0.000000	.000200	.000600
99	.000400	.035000	0.000000	0.000000	.002800	.000100	0.000000	0.000000	.030100	.068400
OTH	.004600	.055800	0.000000	.000200	.014400	.001100	.000600	.087100	.075200	.239300
TOTAL	.043500	.238300	0.000000	.001800	.153300	.009200	.011000	.087100	.455800	1.000000

8.0 UNSW Matrices

The following eight pages present the final DMPPS UNSW functional shop projection matrices.

LONG BEACH NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005000	.005000
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.070200	.070200
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.054000	.054000
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001700	.001700
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.022000	.022000
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.138600	.138600
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008400	.008400
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.040700	.040700
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.019000	.019000
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.082400	.082400
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.105300	.105300
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014500	.014500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.139600	.139600
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.021600	.021600
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.025300	.025300
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000600	.000600
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000600	.000600
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001500	.001500
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.249000	.249000
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

CHARLESTON NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005300	.005300
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014200	.014200
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.012600	.012600
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000600	.000600
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017700	.017700
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.070400	.070400
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009200	.009200
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017500	.017500
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000400	.000400
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018900	.018900
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017600	.017600
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.003500	.003500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.395500	.395500
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.021400	.021400
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.006400	.006400
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011500	.011500
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008200	.008200
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001900	.001900
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.367200	.367200
---	-------	-------	-------	-------	-------	-------	-------	-------	-------	--------
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

PHILADELPHIA NAVAL SHIPYARD - FINAL UNCW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.013000	.013000
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.033900	.033900
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.026200	.026200
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000900	.000900
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.015800	.015800
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.135500	.135500
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.015000	.015000
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.035100	.035100
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.020800	.020800
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.024500	.024500
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.030300	.030300
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017100	.017100
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.041100	.041100
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009000	.009000
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.024600	.024600
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.052600	.052600
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007400	.007400
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004400	.004400
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.492800	.492800
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

PUGET SOUND NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.013300	.013300
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.032200	.032200
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.013600	.013600
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007200	.007200
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.047000	.047000
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.202500	.202500
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009900	.009900
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011100	.011100
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001800	.001800
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.034200	.034200
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011400	.011400
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007800	.007800
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.030400	.030400
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009700	.009700
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.020800	.020800
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018500	.018500
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.005400	.005400
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.010400	.010400
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.512800	.512800
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

NORFOLK NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014700	.014700
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016100	.016100
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011800	.011800
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001000	.001000
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.021500	.021500
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.057000	.057000
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.040900	.040900
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.025100	.025100
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008200	.008200
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.064200	.064200
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.025100	.025100
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018200	.018200
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.161000	.161000
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.026500	.026500
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.035400	.035400
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014300	.014300
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001200	.001200
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.002800	.002800
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.455000	.455000
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

PORTSMOUTH NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.031000	.031000
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.018100	.018100
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017500	.017500
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009500	.009500
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.020900	.020900
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.167700	.167700
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014700	.014700
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016300	.016300
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008900	.008900
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009600	.009600
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017500	.017500
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.028900	.028900
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008600	.008600
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.022100	.022100
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.011700	.011700
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004400	.004400
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.592600	.592600
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

PEARL HARBOR NAVAL SHIPYARD - FINAL UNOW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008400	.008400
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004800	.004800
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.009800	.009800
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016200	.016200
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.027400	.027400
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.055400	.055400
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.023200	.023200
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.010400	.010400
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001200	.001200
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017300	.017300
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.012900	.012900
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.012000	.012000
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.103200	.103200
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.006800	.006800
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.014700	.014700
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.102700	.102700
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.001000	.001000
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.008500	.008500
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.564100	.564100
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

MARE ISLAND NAVAL SHIPYARD - FINAL UNCW MATRIX
FUNCTIONAL SHOPS

SHOP	SWBS 1	SWBS 2	SWBS 3	SWBS 4	SWBS 5	SWBS 6	SWBS 7	SWBS 8	SWBS 9	TOTAL
06	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004200	.004200
11	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.033300	.033300
17	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.013800	.013800
23	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007800	.007800
26	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.025800	.025800
31	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.057400	.057400
36	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.022800	.022800
38	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.016200	.016200
41	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007000	.007000
51	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.022300	.022300
56	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.017000	.017000
64	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.007700	.007700
65	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
67	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.084000	.084000
71	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.028600	.028600
72	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.021400	.021400
81	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000100	.000100
94	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.000600	.000600
99	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.004900	.004900
OTH	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	.625100	.625100
TOTAL	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	1.000000

APPENDIX A

Naval Shipyard Standard Shops

Shop Number	Title
01	Shipyard Commander's Office
02	Transportation Shop
03	Utilities Shop
04	Unassigned
05	Radiological Control Office
06	Central Tool Shop
07	Maintenance Shop
08	Unassigned
09	Unassigned
10	Data Processing Office
11	Shipfitters' Shop
12	Ship Management Officers
13	Quality Assurance Office
14	Management Engineering Office
15	Industrial Relations Office
16	Steel Preservation
17	Sheetmetal Shop
18	PERA Office
19	Combat Systems Office
20	Planning Department
21	Availability Planning
22	Work Specification Division
23	Forge Shop
24	Design Division
25	Gas Manufacturing Shop
26	Welding Shop
27	Galvanizing Shop
28	Design Reproduction
29	Cost Engineering and Evaluation Division
30	Production Department
31	Inside Machine Shop
32	Nuclear Engineering Department
33	Non-Nuclear Inspection Division
34	Laboratory Division
35	Non-Destructive Test Division
36	Weapons Shop
37	Unassigned
38	Outside Machine Shop
39	Nuclear Inspection Division
40	Public Works Department

Shop Number	Title
41	Boiler Shop
42	Unassigned
43	Unassigned
44	Unassigned
45	Shops Division - Public Works
46	Unassigned
47	Unassigned
48	Unassigned
49	Unassigned
50	Supply Department
51	Electrical Shop
52	Material Disposal Operation
53	Other Direct Effort - Supply
54	Unassigned
55	Unassigned
56	Pipe Shop
57	Unassigned
58	Unassigned
59	Unassigned
60	Comptroller Department
61	Unassigned
62	Unassigned
63	Unassigned
64	Woodworking Shop
65	Module Repair Facility (SS) (Charleston only)
66	Unassigned
67	Electronics Shop
68	Module Maintenance Facility (Charleston only)
69	Shipyard pilots
70	Medical Department
71	Paint Shop
72	Riggers and Laborers' Shop
73	Shipbuilding Scheduling Office (Philadelphia only)
74	Unassigned
75	Dental Department
76	Laminated placards (Philadelphia only)
77	Severance pay
78	Unassigned
79	Unassigned
80	Administrative Department

Shop Number	Title
81	Foundry
82	Fire protection
83	Police protection
84	Reserved for Satellite Activities
85	
86	
87	
88	
89	
90	
91	Youth Opportunity
92	Structural Shop Group
93	Mechanical Shop Group
94	Pattern Shop
95	Electrical/Electronics Shop Group
96	CASDO (Portsmouth only)
97	Service Shop Group
98	Ship's Force
99	Temporary Services Shop

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