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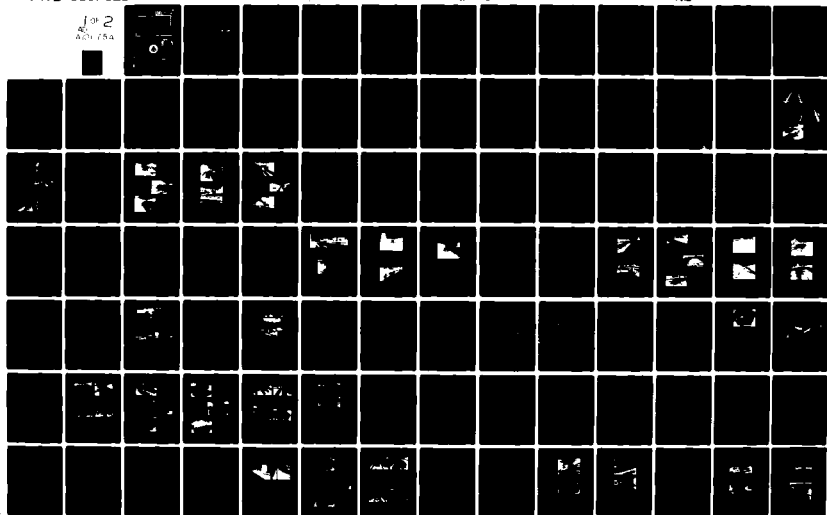
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MTMC REPORT TE 76-36

RAIL AND MOTOR OUTLOADING CAPABILITY STUDY

FORT ORD, CAMP ROBERTS,
AND FORT HUNTER LIGGETT

CALIFORNIA

DECEMBER 1976



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TRANSPORTATION ENGINEERING AGENCY
NEWPORT NEWS, VIRGINIA 23606

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FORT ORD, CAMP ROBERTS, AND FORT HUNTER LIGGETT, CALIFORNIA

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF ILLUSTRATIONS	vi
LIST OF TABLES	x
EXECUTIVE SUMMARY	1
I. INTRODUCTION	6
II. FORT ORD	9
A. Analysis of Rail Outloading Facilities	9
1. General	9
2. Rail Facility Description	9
3. Current Procedures	16
4. Rail System Analysis	20
a. Current Outloading Capability	20
b. Rail Outloading Analysis	21
c. Rail System Outloading Options	25
d. Revised Outloading Capability	29
e. Recommended Physical Improvements	30
f. Summary of Time and Costs	31
B. Analysis of Commercial Rail Facilities Within 25 Miles of Fort Ord	31
1. General	31
2. Findings	31
3. Conclusions Regarding Commercial Rail Facilities	43
C. Special Rail Equipment for Expediting the Outloading of Small Vehicles, Semitrailers, and MILVANS	43

TABLE OF CONTENTS - cont

	<u>Page</u>
D. Analysis of Motor System Outloading Capability at Fort Ord	44
1. General	44
2. Loading Ramps	44
3. Semitrailer Outloading	45
E. Conclusions	47
F. Recommendations	49
III. CAMP ROBERTS AND FORT HUNTER LIGGETT.	50
A. Analysis of Rail Outloading Facilities	50
1. General	50
2. Rail Facility Description	50
a. General	50
b. East Garrison	50
c. Main Garrison	53
3. Current Procedures	54
a. Camp Roberts	54
b. Fort Hunter Liggett	61
4. Rail System Analysis	61
a. Current Outloading Capability	61
b. Rail Outloading Analysis	61
c. Rail System Outloading Options	67
d. Revised Outloading Capability	69
e. Recommended Physical Improvements	69
f. Summary of Time and Costs	69
B. Analysis of Commercial Rail Facilities Within 25 Miles of Camp Roberts and Fort Hunter Liggett	70

TABLE OF CONTENTS - cont

	<u>Page</u>
1. Camp Roberts	70
2. Fort Hunter Liggett	75
C. Analysis of Motor System Outloading Capability at Camp Roberts and Fort Hunter Liggett	75
1. Camp Roberts	75
a. General	75
b. Semitrailer Outloading	79
2. Fort Hunter Liggett	79
D. Conclusions	82
E. Recommendations	83
APPENDIXES	
A - Southern Pacific Transportation Company Track Inspection Report	84
B - Rail Outloading Simulation - Fort Ord	88
C - SPINS - Southern Pacific Industrial Numbering System	92
D - Railcar Supply	94
E - Rail Outloading Simulation - Camp Roberts	97
DISTRIBUTION	102

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
1	Fort Ord, Camp Roberts, and Fort Hunter Liggett	7
2	Fort Ord Rail System	11
3	Track Conditions	14
4	Balloon Spurs 1043 and 1045	15
5	Tracks 1034 and 1036 and Main Installation Line 1032, at the Quartermaster Warehouses	17
6	Spur 1033	18
7	Spurs 1032 and 1037	19
8	Fort Ord Rail System Outloading Options	27
9	Layout of Railroad Yard at Salinas - Site 1	33
10	Salinas Site 1 - Southern Pacific Main Station at Salinas	34
11	Salinas Site 1 - Hardstand at Loading Ramps; Cement Plant in the Background	34
12	Salinas Site 1 - Tracks Leading up to Ramps	35
13	Salinas Site 2 - Produce Company	35
14	Salinas Site 3 - Vacuum Cool - Produce.	36
15	Schematic of the Classification Yard at Watsonville Junction.	37
16	Watsonville Junction - View of Classification Yard	39
17	Watsonville Junction - Milepost 100	39
18	Watsonville Junction - Concrete End-Loading Ramp	40

LIST OF ILLUSTRATIONS - cont

<u>Figure</u>		<u>Page</u>
19	Watsonville Junction - Concrete Side-Loading Ramp . . .	40
20	Watsonville Junction - Area Adjacent to Ramp . . .	40
21	Castroville - Sidings	41
22	Castroville - Graveled Staging Area	41
23	Monterey Sand Company	42
24	Near Municipal Wharf, Monterey	42
25	Timber and Concrete Ramp, 1st Avenue Between 11th and 12th Streets	45
26	Portable Steel Ramp at 2nd Avenue and 11th Street . . .	45
27	Typical Grease Rack	45
28	Grease Rack of Timber Construction, Not Assembled . .	47
29	Drawing of Rail Layout	51
30	Former Location of Removed Switch and Track That Connected Main Garrison Rail System to Main Line of SPTC	53
31	East Garrison, End- and Side-Loading Ramp, Track 2637	54
32	East Garrison, Track 2639	56
33	Track 2670 Leading to Track 2673 and End-/Side- Loading Ramp	56
34	Track 2673 at Ramp	56
35	North End of Concrete Ramp, 40 Feet Wide	57
36	South End of Concrete Ramp, 20 Feet Wide	57
37	Tracks 2671 and 2674	57

LIST OF ILLUSTRATIONS - cont

<u>Figure</u>		<u>Page</u>
38	Rail and Truck Ramp at End of Track 2675	58
39	North End of Tracks 2676 and 2677 With Ramp at Track 2675 in Background	59
40	Tracks 2676 and 2677 Looking North	59
41	Track 2678	59
42	Track 2670, Along E Street	59
43	Tracked Vehicle Approach Trail and Entrance Gate at E Street.	60
44	Rail System Outloading Options	65
45	Cost Effectiveness of Rail System Improvements.	68
46	Henry Siding, South of Atascadero	72
47	Templeton	72
48	Paso Robles - Storage Tracks and Side- and End- Loading Ramp on One Spur	73
49	San Ardo	74
50	San Miguel - Closest Commercial Facility to Camp Roberts, 2 Miles	74
51	San Miguel Tracks 2730 and 2735	75
52	Concrete and Earth Ramp, O Street and 7th Avenue, East Garrison	77
53	Concrete and Earth Ramp Near the South End of B Street	78
54	Fort Hunter Liggett - Lowboy Loading Ramp in the Facilities Engineer Equipment Yard	80

LIST OF ILLUSTRATIONS - cont

<u>Figure</u>		<u>Page</u>
55	Fort Hunter Liggett - Semitrailer Loading Ramp Near an Equipment Yard	81
56	Rail Outloading Simulation - Fort Ord	89
57	Rail Outloading Simulation - Plan 13	99

LIST OF TABLES

<u>Table</u>	<u>Page</u>
I Rail Outloading Facilities on the Installation . . .	13
II Railroad Facilities With 25 Miles of Fort Ord . . .	32
III Motor Outloading Ramps	44
IV Rail Outloading Facilities on the Installation . . .	55
V Commercial Rail Facilities With 25 Miles of Camp Roberts and Fort Hunter Liggett . . .	71
VI Vehicle End-Loading Ramps	76
VII Trailer Train Company Fleet	95

EXECUTIVE SUMMARY

1. SCOPE

At the request of Fort Ord, the Military Traffic Management Command (MTMC) conducted a field survey of the rail and motor facilities at Fort Ord, California, and at the subinstallations of Camp Roberts and Fort Hunter Liggett, California, to determine their station outloading capabilities. The field survey was conducted 1 through 12 March 1976. Rail Facilities within 25 miles of the three installations were included in the survey.

2. FORT ORD

The primary finding at Fort Ord was that rail and motor systems outloading capabilities can support only small-scale operations at present. The rail system is in good condition, but outloading plans, blocking and bracing materials, and other necessary elements are lacking. If these elements were available, current capability would be 116 railcars per day. Existing motor outloading capability is 80 semitrailers per day.

Transportation officials at Fort Ord requested that the analysis consider railcar outloading rates in the range of 160 to 180 railcars per 24-hour day. Due to the configuration of the rail system, the closest figure to the desired range that can be feasibly achieved, as determined by our analysis, is 188 railcars per 24-hour day. Other options producing from 116 to 240 railcars per day were considered and are presented.

Southern Pacific Transportation Company (SPTC) officials assisted the survey team in conducting a detailed survey of their facilities within 25 miles of Fort Ord. The survey revealed that if a supplemental outloading site for roadable vehicles is required, the piggyback outloading facility of the SPTC at Salinas, California, could be used.

The roadway system on the installation is adequate to accommodate the largest highway vehicles. Gate access to State Route 1, a limited access dual highway that serves the installation, is by two grade-separated interchanges, and the highway system in the area is adequate. Therefore, neither access to the highway system nor the system itself restrains motor outloading capability or movement of roadable military vehicles.

3. CAMP ROBERTS

Transportation officials at Fort Ord requested that the analysis assume that an armored brigade is stationed at Camp Roberts. Accordingly, that assumption was used in analyzing the rail and motor outloading facilities.

The primary finding at Camp Roberts was that the garrison rail and motor systems outloading capabilities have the potential to support the deployment of an active Army armored brigade. The motor systems outloading facilities are excellent and could support practically any outloading rate desired. In general, the rail system is in fair condition, but the main garrison track is not connected to the SPTC main line. The rail system situation is the basic limitations at Camp Roberts, although outloading plans and other related actions should follow the activation of the brigade at the installation. Rail outloading rates from 21, current capability, to 260 railcars per 24-hour day are possible. The recommended plan for use of the rail system provides an outloading rate of 140 railcars per 24-hour day. Upgrading the rail system and construction of portable timber ramps for this plan are estimated to cost \$73,850. Necessary elements that are not included but should be planned for are: outloading plans, a training program, bridge plates, blocking and bracing materials, and small hand tools.

SPTC officials assisted the survey team in conducting a detailed survey of their facilities within 25 miles of Camp Roberts. The survey revealed that the SPTC tracks located at San Miguel could be used if a supplemental outloading site for roadable vehicles were required, but portable end-loading ramps and minor grading improvements would be required.

Access to Camp Roberts motor outloading facilities measurably improves their usefulness. The roadway system on the installation can accommodate the largest highway vehicles; and the highway systems, north, south, and east of the area, are entirely adequate. Gate access to US Route 101, a limited access dual highway that serves the installation, is by three grade-separated interchanges. Neither access to the highway systems nor the systems themselves restrain motor outloading capability or movement of roadable military vehicles.

4. FORT HUNTER LIGGETT

There are no rail facilities on this installation or within 25 miles of it, and motor outloading facilities are not suitable for volume

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4. FORT HUNTER LIGGETT

There are no rail facilities on this installation or within 25 miles of it, and motor outloading facilities are not suitable for volume

outloading of equipment. All Fort Hunter Liggett rail shipments should be handled through Camp Roberts.

The roadway system on the installation can accommodate the largest highway vehicles. County Road G18, which serves the installation, is a two-lane paved road with a very low traffic volume. There are no access or restraint problems in highway movement of vehicles into or out of the installation.

5. MAJOR CONCLUSIONS ARE:

a. Fort Ord

- (1) The rail system is in generally good condition, but the current rail outloading capability is severely limited due to a lack of necessary supporting elements, such as outloading plans and blocking and bracing materials.
- (2) Minimal cost to perform the necessary work on the rail system, to achieve a desired outloading rate of 188 railcars per 24-hour day, is estimated to be \$61,625.
- (3) The motor systems outloading capability at Fort Ord is very limited, but it is of minimal need in terms of unit deployment.
- (4) The SPTC has an excellent rail outloading facility at Salinas that could be used in an emergency to supplement roadable vehicular outloading of Fort Ord units.
- (5) The SPTC has adequate railcar storage capacity to support a volume outloading of Fort Ord units and its trackage in the vicinity of Fort Ord is generally in good condition.
- (6) During the peak outloading of farm produce from the area, some of the SPTC and privately owned facilities would not be available to supplement Fort Ord's outloading operations.

b. Camp Roberts

- (1) The rail system is, in general, in fair condition; however, the current rail outloading capability is severely limited since most of the system is not connected to the main line and since other necessary elements, such as outloading plans and materials, are lacking.

- (2) Minimal cost for improvements to the rail system to achieve a desired outloading rate of 140 railcars per 24-hour day is estimated to be \$73,850.
- (3) The motor system outloading facilities at Camp Roberts are excellent and have more potential than is likely to be needed.
- (4) The SPTC has three sites within 25 miles of Camp Roberts that have potential as outloading sites for roadable equipment.
- (5) The SPTC has adequate railcar storage capacity to support volume outloading of Camp Roberts units, and its trackage in the vicinity of Camp Roberts is generally in good condition.

c. Fort Hunter Liggett

There are no rail facilities on this installation or within 25 miles of it, and motor outloading facilities are not suitable for volume outloading of equipment. All Fort Hunter Liggett rail shipments should be handled through Camp Roberts.

6. MAJOR RECOMMENDATIONS ARE:

a. Fort Ord

- (1) Undertake those physical improvements, listed in the report, that will provide for a rail system capability of 188 railcars per day.
- (2) Use the SPTC outloading facility at Salinas as a supplemental loading facility for roadable equipment.

b. Camp Roberts

- (1) Undertake those physical improvements, described in the report, that will satisfy the option desired. Plan 13, which produces 140 railcars per day without night operations, is recommended.
- (2) Use the SPTC tracks at San Miguel as a supplemental loading facility for roadable equipment.

c. For both Fort Ord and Camp Roberts

- (1) Prepare a detailed outloading plan, specifying unit assignments at loadout sites and movement functions, using the simulations in the appendixes as an example.
- (2) Coordinate rail outloading plans with the SPTC at the earliest possible date.
- (3) Initiate and/or continue adequate routine maintenance to insure a continued effective rail system.
- (4) Organize training for blocking and bracing crews; stock materials and small tools, including power saws, bolt and cable cutters, cable tensioning devices, as well as hammers, wrecking bars, and so forth, to provide for future contingency plans.

I. INTRODUCTION

In February 1976, a request from Commander, Fort Ord, California, for a rail and motor system outloading capability study was forwarded to MTMC. The principal objective of the study was to determine the ability of Fort Ord to support the deployment of the 7th Division and the United States Strategic Army Forces (STRAF) deployable units at the post. The scope of the study was subsequently enlarged to include the subordinate commands at Camp Roberts and Fort Hunter Liggett, those commercial facilities within 25 miles of the installations, and any physical improvements to the installations that could significantly increase present capabilities.

To comply with this request, MTMC engineers conducted on-site surveys in California, 1 through 12 March 1976. The major finding of the survey and the ensuing analysis is that while the rail systems at Fort Ord and Camp Roberts are generally in good condition, their outloading capabilities are severely restricted; this is due to a lack of outloading plans, materials, and other necessary elements. Motor outloading capability varied from very limited at Fort Ord to excellent at Camp Roberts. Fort Hunter Liggett has no rail facilities and a negligible motor outloading capability. Commercial rail facilities within 25 miles of Fort Ord and Camp Roberts were in generally good condition with one excellent outloading facility at Salinas, approximately 12 miles from Fort Ord.

Fort Ord is on the coast of California, just off Monterey Bay (Figure 1). Camp Roberts and Fort Hunter Liggett are about 100 highway miles south-east of Fort Ord. Transportation problems at the three posts are completely different even though Camp Roberts and Fort Hunter Liggett are subordinate commands of Fort Ord. Camp Roberts is on a main line of the SPTC, Fort Ord is on the Monterey branch line, and Fort Hunter Liggett has no rail facilities within a 25-mile distance. Neither Camp Roberts nor Fort Hunter Liggett is constantly active; primarily they serve the California National Guard, Fort Ord units on weekend training, and in other exercises. Because of these dissimilarities, Fort Ord has been dealt with separately in Section II, and Camp Roberts and Fort Hunter Liggett have been dealt with in Section III.

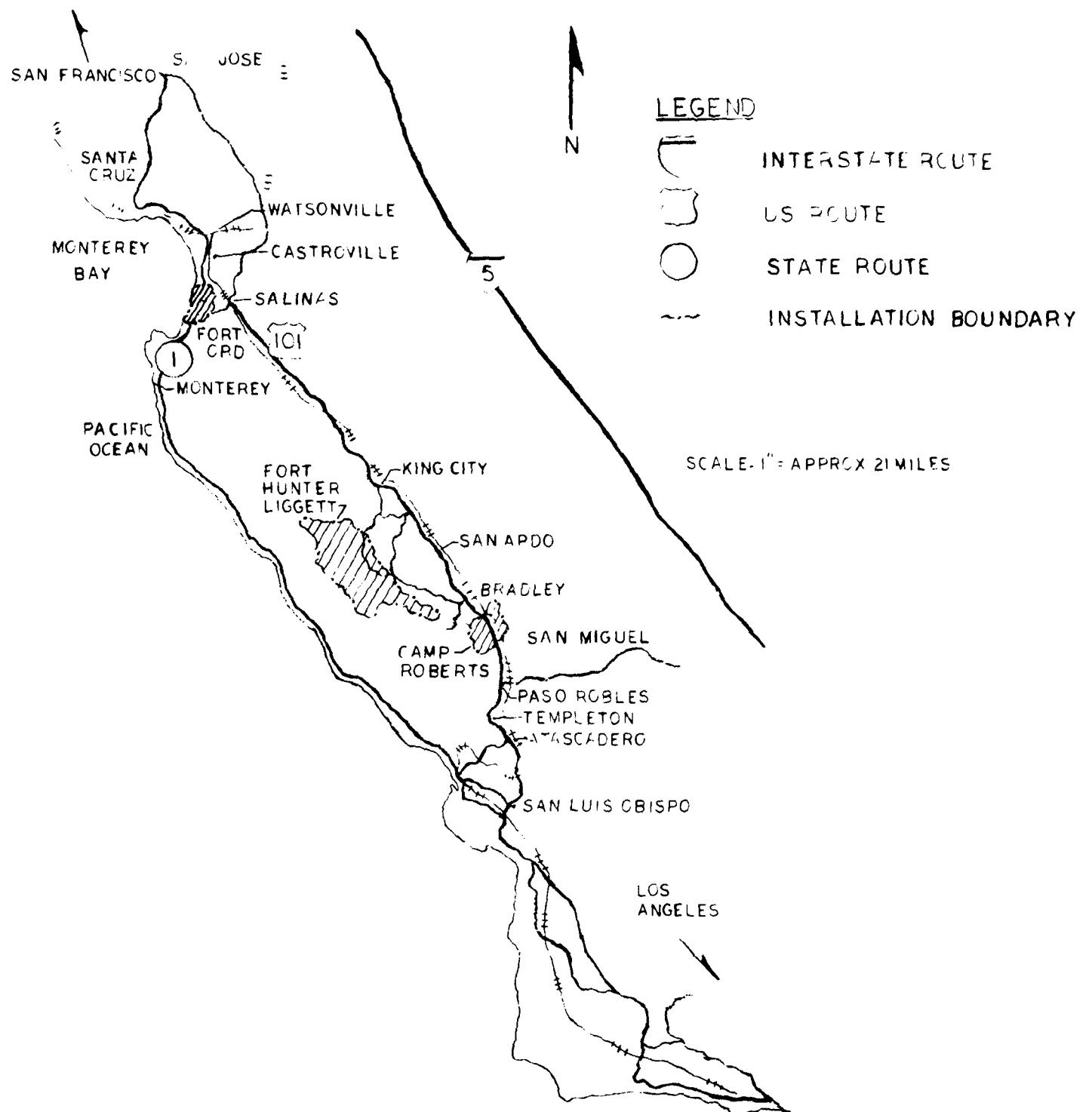


Figure 1. Fort Ord, Camp Roberts, and Fort Hunter Liggett.

II. FORT ORD

A. ANALYSIS OF RAIL OUTLOADING FACILITIES

1. General

Discussions with personnel of the Transportation Office and the 7th Division at Fort Ord and meetings with officials of SPTC concerning rail and motor systems outloading revealed that the last fairly large rail operation at the post occurred in the early sixties. Since then, the post has concentrated on basic training activities, which, by their nature, require little ability to move organized units. Consequently, some of the information furnished by them was notional, based upon varied experience and judgment. Factual data about locomotive operating times and blocking and bracing capabilities have been gathered from other studies. Information obtained by discussion with the rail instructors at the Transportation School at Fort Eustis, Virginia, and with other knowledgeable persons across the country, served as a basis for some of the analysis.

2. Rail Facility Description

The Fort Ord rail system is illustrated in Figure 2, and is described in Table I. The system has three distinct areas for operation: the balloon spurs, the quartermaster (QM) warehouse tracks, and the two spurs near 11th Street. All of these tracks and surrounding facilities are generally in very good condition although some maintenance is required on certain sections (Figure 3). A report by the maintenance division of the Southern Pacific Railroad (Appendix A) details the relatively minor repairs that should be made to bring the post rail system to peak condition and confirms the high quality of Fort Ord's organic system. The balloon tracks consist of two spurs, 1043 and 1045, and a circular track (balloon track), 1040. Each spur is over 1,600 feet long and leads to concrete end- and side-loading ramps. The rail and roadbed are quite serviceable, permanent lighting is in place, and a large staging area is adjacent to the spurs. The only deficiencies noted were: minor drainage and weed problems; the need for routine maintenance on the lighting system to make it operational; and 50 feet of sandy silt covering the direct access from the asphalt road to the ramps that should be stabilized. Overall, the two spurs are in generally good condition, as shown in Figure 4.

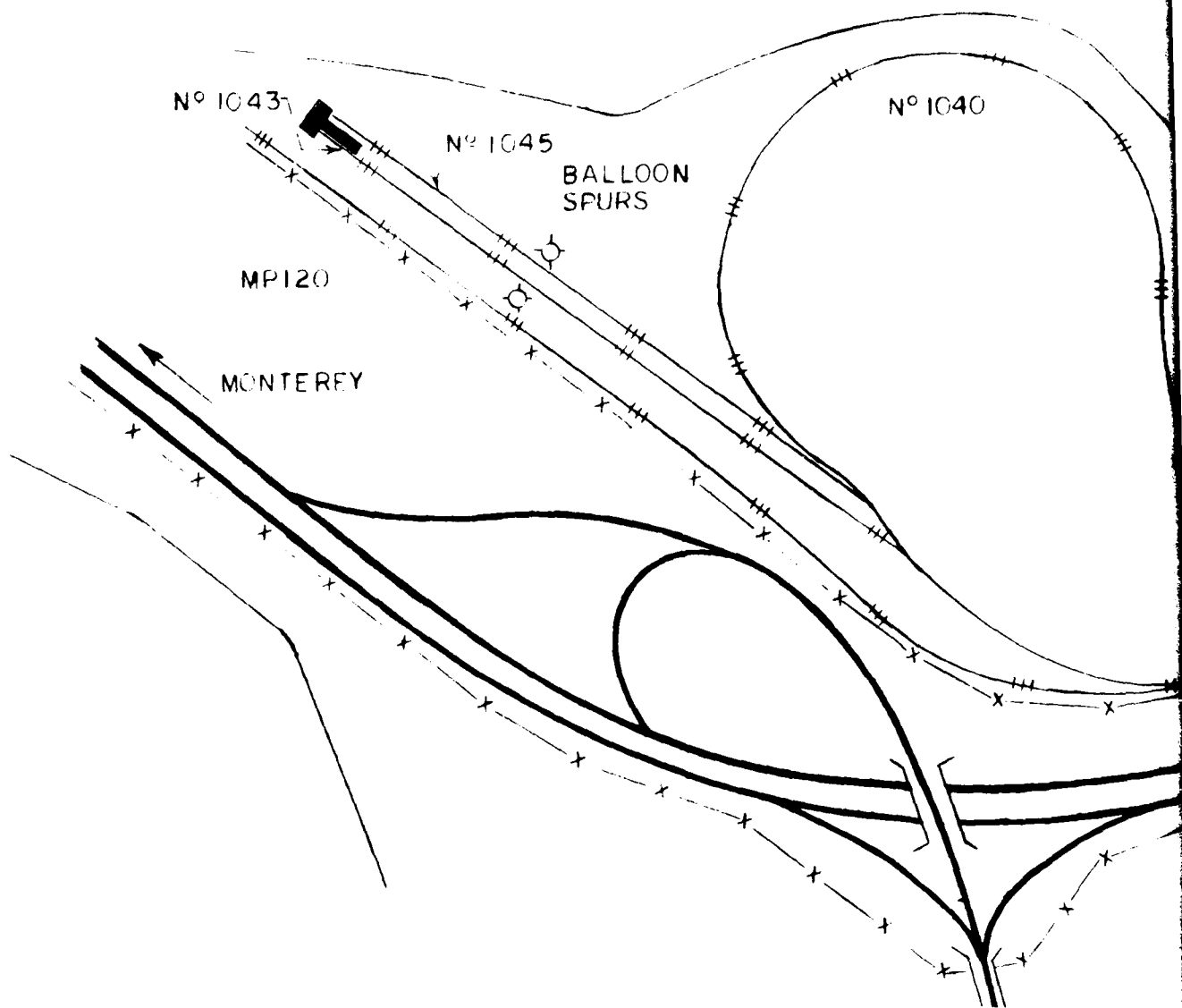


Figure 2. Fort Ord Rail System.

MONTREY

BEACH RANGE ROAD

STATE ①

No 1033

LIMITED ACCESS

QUARTER

FIRST ST

MONTEREY BAY

N

SAN FRANCISCO

MONTEREY BRANCH LINE-

SOUTHERN PACIFIC R

Nº 1030

Nº 1036

Nº 1032

Nº 1034

ACCESS HIGHWAY

GP3

GP2

GP1

QUARTERMASTER WAREHOUSES

ELEVENTH ST

EIGHTH ST

NOT TO S

NCISCO →

PACIFIC RR

MP 119

X X

X

SEVENTH ST

Nº 1037

Nº 1032

LEGEND



PRIMARY ROAD



SECONDARY ROAD



RAILROAD



PAVED AREA ADJACENT
TO RAILROAD TRACK



VEHICLE LOADING RAMP



BUILDING



OVERHEAD LIGHTING

MP

MILE-POST



FENCE



OVERPASS

Nº 103- TRACK NUMBER

NOT TO SCALE

TABLE I
RAIL OUTLOADING FACILITIES ON THE INSTALLATION

Track and Figure Number	End Ramp	Lighting	Surface Conditions	Staging Area	Railcar Capacity (50-foot Lengths Straight Track)	Access Availability	Present Condition of Track ^{a/}
1043 1045 (Fig 4)	Yes Yes Side ramps for 3 cars	Yes Yes Not operable, additional needed	Good, graveled except approach to ramps	Plenty of room, no other function in area	32 32	Good Good	Generally good, minor repairs required.
1033 (Fig 6)	No concrete footings in place from previous ramp	No	Good, paved one side, graveled other side	Plenty of room	8	Good	Generally fair, repairs required.
1034 ^{b/} 1036 (Fig 5)	No No	No No	Excellent, paved	Not adjacent, but close by	26 26	Good ^{b/} Good	Generally good, minor repairs required.
1037 1032 (End 1032) (Fig 7)	Yes Yes	Some, but inadequate	Excellent, paved or graveled	Baseball fields adjacent	16 10	Poor ^{c/} Poor	Generally good, minor repairs required.

^{a/} See Appendix A; see also Federal Railroad Administration, Title 49, Part 213, Track Safety Standards.

^{b/} Not usable while trucks are delivering supplies to the adjacent warehouses.

^{c/} Access to tracks 1032 and 1037 may be blocked depending on the amount of warehouse activity. Access obstructed by small utility shed approximately 6 by 8 foot with an electrical switch for activating gasoline pump, one pole with an electrical box, one tree, and two refill pipes for underground fuel storage.



Figure 3. Track Conditions.
(Most of the track-
age within the
installation is in
good condition as
shown by the top
photograph. The
bottom two were
taken at track 1033,
which is usable but
requires mainte-
nance.)

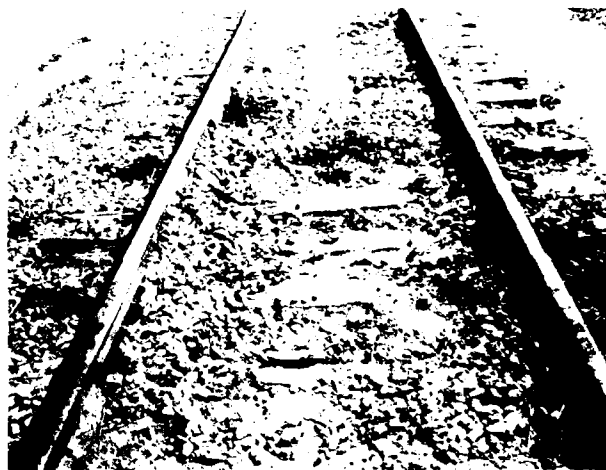
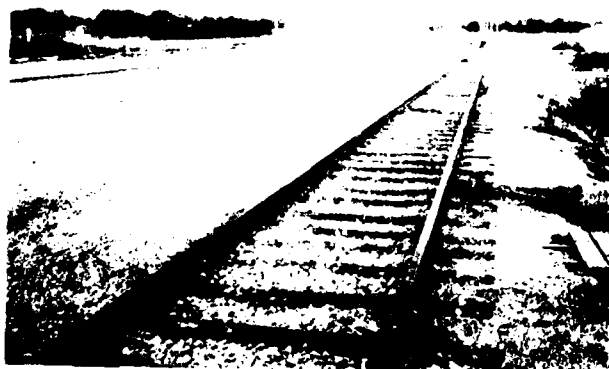




Figure 4. Balloon Spurs 1043
and 1045.
(Concrete end- and
side-loading ramps
with a lighted
working area for
64 railcars, large
graveled staging
areas adjacent.)



The circular balloon track surrounding the target detection range, number 6, is in fair condition. Realignment and tie replacement would bring the existing facility up to a high-quality condition. However, its steep vertical grade and high degree of curvature limit the speed and convenience of operation.

The QM warehouse tracks consist of four parallel lines. Three of the tracks, 1032, 1034, and 1036, run between the Group 2 and Group 3 warehouses. The area between these two groups of warehouses, between 5th and 8th Streets, as well as the area around the tracks, is paved with asphalt; the main lead, track 1032, extends from the Southern Pacific main line to the 11th Street warehouses; track 1034 is a siding; and track 1036 is a spur. All of these tracks appear to be in good condition and are shown in Figure 5.

The fourth track, spur 1033, located on the west side of the Group 3 warehouses, is in fair condition although resurfacing and tie replacement are needed. Asphalt hardstand exists on the warehouse side of the track, but the other side is in need of weed control and tree trimming. Concrete footings that are in place at the end of the spur (Figure 6) could be used as a base for ramp construction.

The 11th Street spurs are two relatively short spurs leading to a concrete end-loading ramp. The working area is confined and the access is somewhat obstructed (Figure 7). Area lighting exists, but is not intense enough for nighttime operations. However, the rail, roadbed, and ramp are in good condition, making these two spurs very serviceable. They are quite suited to vehicle loading except for the miscellaneous obstructions, which should be relocated.

The access to Fort Ord's rail system is good. All vehicles from motor pools and equipment from storage areas can be routed along good asphalt roads to any of the loadout sites. This fact, coupled with the good condition of the rail system, indicates that Fort Ord has a potentially good transportation system for out-loading the division.

3. Current Procedures

Outloading procedures have not been developed as yet, since the 7th Division is still in the formative stage. The Southern Pacific Railroad serves Fort Ord and performs the internal switching of

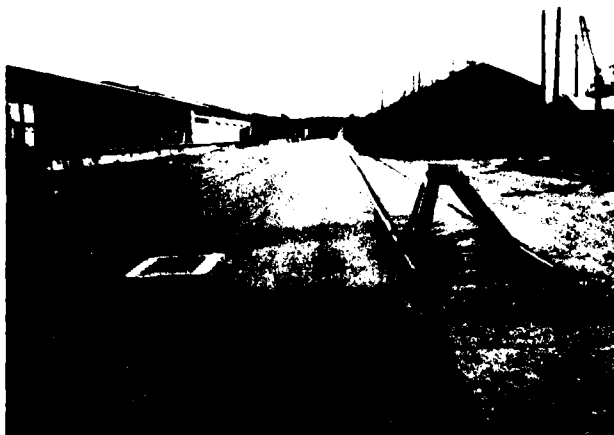


Figure 5. Tracks 1034 and 1036 and Main Installation Line 1032, at the Quartermaster Warehouses.





Figure 6. Spur 1033. (Note the existing concrete footings (arrow) for an end-loading ramp in the bottom photograph; top photograph shows hardstand and adjacent warehouses.)



Figure 7. Spurs 1032 and 1037. (Note the obstructions to access and the very wide spacing of light poles.)



railcars; however, most incoming supplies are delivered by truck, and rail operations are minimal. There were no railcars on the installation during the study period, 1 through 12 March 1976. Plans have been made to train blocking and bracing crews; however, training has not been initiated, and blocking and bracing materials are not currently available. Another major reason for this situation is that the 7th Division is within reasonable driving distance of its two most probable POEs for all of its roadable equipment should the division be deployed to the Pacific theater. Also, as a result of the formation of the 7th Division, the post mission has changed from that of supporting basic training to that of an active division base. Planning and preparations for outloading the division should be pursued until acceptable arrangements have been completed.

- a. The balloon spurs, tracks 1043 and 1045, are situated near the magazines and are therefore used to unload ammunition (see Figure 2). They can also handle vehicles or cargo that requires side loading.
- b. QM warehouse tracks serve the warehouses and a large petroleum, oils, and lubricants station north of Building 2036.
- c. Eleventh Street spurs constitute the primary vehicle unloading sites for the post but also serve several small warehouses.

4. Rail System Analysis

a. Current Outloading Capability

Presently, the ability of Fort Ord to mount a rail outloading operation is limited to small-scale operations. No stockpile of blocking and bracing material exists, none of the troops that would be involved in an outloading operation have received any instruction or training; the post supply of materials-handling equipment (MHE) is insufficient in quantity for a large operation; and a detailed plan for rail outloading operations has not been prepared. The rail system itself has potential. Currently, five loadout sites could be operated in daytime only. Their total capacity, if all were used, would amount to 116 railcars a day. Thus, the current rail outloading capability may be negligible, but it is less restricted by the rail facilities than by the other material and managerial factors that affect outloading operations.

b. Rail Outloading Analysis

The structure of a complex system can be viewed as a series of interconnected subsystems. The limiting subsystem within the system establishes the maximum outloading capability. In ascertaining the maximum rail outloading capability at Fort Ord, the following subsystem separation was used:

(1) Commercial service capabilities.

Commercial service capabilities present no problem to Fort Ord. The common carrier serving the post is the SPTC, and its operations in the vicinity of Fort Ord are well organized. Railroad officials in the Fort Ord district are confident that they can fulfill any task required of them, and a survey of the facilities and equipment confirmed their optimism. Watsonville Junction is a large classification yard. An alternate vehicle-loadout site exists at Salinas. Additional railcar storage exists at Castroville and at other sites very close to Fort Ord. All of the Southern Pacific rail facilities within 25 miles of the post were in generally good condition. First-rate locomotives are available on short notice, and additional train crews and blocking and bracing inspectors can be called in from other nearby districts within a day or two. Fluctuations in the supply of railcars will make that factor in any Fort Ord operation less than concrete, but delays were expected to be no more than a few days. Logging operations claim a majority of the west coast flatcars, except in the winter, and produce shipments utilize large numbers of boxcars during harvest seasons. Concentrations of railcars are usually present at Bakersfield, San Jose, and San Francisco. The only complaint about rail operations at Fort Ord came from the railroad itself. The district trainmaster's experience with Fort Ord during an outloading operation some 10 to 12 years ago was that the lack of central authority for post rail operations, the lack of a clear plan for operations, and the general lack of coordination between the post and the railroad caused time delays and wasted effort. Thus, the common carrier attests to the adequacy of his potential but notes that the utilization of this potential could be in doubt. Transportation personnel should coordinate their future operation plans with SPTC at the earliest possible date.

(2) Movement to and loading on railcars at a particular site.

The movement of cargo to loading sites is relatively quick and efficient since most of the equipment is self-propelled. The locations of the motor pools average about 1 mile from the primary loadout site, and access is along paved roads. Traffic patterns and traffic control would have to be set up, but such measures should be standard for full-scale outloading operations. Staging areas are adequate and any necessary queuing should create no problem. It is assumed that, during loading operations, vehicles move along the flatcars at 1 mile per hour, with only one vehicle moving on a railcar at any one time. The longest string of empty flatcars used by the outloading simulation, assuming 50-foot car lengths, was 32 cars, the length of spur 1043. Using that figure, the first vehicle would reach the end of the last car 18 minutes after driving up the ramp. Driving vehicles on flatcars circus style is dependent upon bridge plates spanning the gap between the cars. At present, Fort Ord has only 29 sets of bridge plates for use in rail operations. According to the simulation employed in our analysis, no fewer than 64 sets are required. This is due to the fact that spurs 1043 and 1045 must be loaded and unloaded consecutively for efficient use of the switching locomotive, and their combined capacity is 64 railcars. When loading is completed at spurs 1043 and 1045, those 64 sets of plates must be picked up and distributed to the other loading sites for their use. The combined total of railcars from the other sites is 60; therefore, rotating the 64 sets of plates between the sites will be adequate only if a crew is specifically tasked with that assignment. The crew must be able to complete the rotation in about 2 hours, but that should be no problem. Once the bridge plates are considered to be in place, a hypothetical load can be simulated - two 2 1/2-ton trucks per flatcar. Thirty-two railcars are assumed to be loaded with 64 2 1/2-ton trucks in approximately 60 minutes; however, blocking and bracing is initiated when the first vehicle is in position, 18 minutes after loading starts. This loading time is not significant in comparison with the time needed for blocking and bracing. Therefore, moving to and loading on the railcars is not the limiting subsystem if 35 additional sets of bridge plates are acquired to bring the total to 64.

(3) Blocking, bracing, and safety inspection.

These times are difficult to project. They depend on a wide variety of variables such as:

- (a) Crew size and experience.
- (b) Extent of the safety inspection.
- (c) Documentation.
- (d) Availability of blocking and bracing material and materials-handling equipment.

Time/motion studies have not been performed to establish definite limits on blocking and bracing times, but the establishment of a 5- to 7-hour time limit for loading, blocking, and bracing at a loading site as a reasonable goal for crews was based upon actual field tests of "circus style" loadings. In addition, the blocking and bracing instructor for the Transportation School at Fort Eustis, Virginia, advises that there should be no more than eight men per crew, regardless of experience, to avoid wasted man-hours. The main problem at Fort Ord is that no blocking and bracing material stockpile exists and no instruction or training for blocking and bracing crews has been initiated. No operation will even get under way without these capabilities. Therefore, blocking and bracing constrain the rail outloading system at present. Even when the material and training needs are taken care of, the lack of adequate lighting will prevent blocking and bracing during night operations.

(4) Interchange of empty and loaded railcars.

Efficient interchange of empty and loaded railcars requires careful planning and good coordination with the common carrier. SPTC can easily supply one locomotive for internal switching duties, and the frequency of pickup and delivery of railcars on the main line can operate on any level the post desires. The Monterey branch line of Southern Pacific Railroad, which Fort Ord is on, experiences very little traffic - three trains per week average. Storage facilities for empty and loaded cars appeared to present a problem at Fort Ord, but SPTC officials stated

that the main line could be blocked for such use during emergency operations with no major problems. Thus, if the interchange of railcars maintains some semblance of the organization presented in the simulation (Appendix B), that subsystem will not limit the capabilities of rail outloading operations at Fort Ord.

Considering all the subsystems together, blocking, bracing, bridge plate supply, and planning and control stand out as the primary factors restraining any large rail outloading operation at Fort Ord. Correcting these deficiencies is the major prerequisite for a successful operation. When the primary hindrances to rail outloading at Fort Ord have been eliminated, the resulting capability needs to be examined in comparison with movement contingency plans.

The desired level of operation that would satisfy transportation officials at the installation is between 160 and 180 railcars per day. Once necessary action has been taken with regard to area lights, ramps, MHE, blocking and bracing capabilities, and planning and coordination for the full operation of all current loadout sites, Fort Ord could outload as many as 240 railcars per day. However, if incoming supply trucks and railcars block tracks 1036, 1032, and 1034, and thus prevent use of spur tracks 1032 and 1037, that maximum capability is reduced to 144 railcars per day. Even in that eventuality, the Southern Pacific facilities at Salinas will provide 144 additional railcars per day of roadable equipment outloading if the post can support two loading operations simultaneously. Another aspect affecting station outloading at Fort Ord is the destination of the unit materiel after it leaves the installation. The two most likely ports of embarkation for the 7th Division (if deployed to the Pacific theater) are the Military Ocean Terminal Bay Area (MOTBA) in Oakland and Travis AFB. MOTBA is 110 miles and Travis is 160 miles from Fort Ord. That means a majority of the 7th Division's equipment could be driven to their POE without external transportation support. This reduces the demand on the installation rail system and further demonstrates its adequacy for the most likely POEs; however, an all-rail move to a gulf or east coast POE would require a maximum effort with consequent higher outloading rates. Thus, Fort

Ord's rail system and the common carrier servicing it has the potential to support the deployment of the 7th Division and STRAF units in a timely manner. The existence of capability at any one time, however, will depend on how much of the supporting deficiencies have been eliminated.

c. Rail System Outloading Options

The options shown in Figure 8 are a presentation of various potential rail outloading capabilities and the cost to attain those capabilities. Fort Ord's track system is identified by various track sections using the Southern Pacific Railroad SPIN numbering system (see Figure 2 for track numbers). The cost estimates used to arrive at the various totals for noted improvements were provided by the facilities engineering personnel at Fort Ord and include a 45-percent contingency markup to account for fluctuations in price, design costs, and contractor profit. Current maintenance needs were estimated using the guidelines presented by the SPTC division engineer. These guidelines should satisfy the standards of California's Public Utilities Commission (PUC) as well as the Federal Railroad Administration (FRA)^{1/}.

The present maximum potential capability has been estimated at 116 railcars per day without spending any additional money. That scheme utilizes track 1036 with the one existing portable ramp and the four other spurs with permanent ramps - 1032, 1037, 1043, and 1045.

The existing lighting is insufficient for night operations; therefore, those five spurs would provide only a daylight capability. This is shown as plan 1 in Figure 8, with the capability in railcars per day at the top and the cost at the bottom. Track 1034 has been left open for incoming supplies and defective railcars, and tracks 1034 and 1036 could be alternated and used for outloading or incoming supplies. Plan 3 is plan 1 maintained.

Plan 2 provides for the possibility that incoming supplies by truck and/or rail for the mobilization of reserve units might block tracks 1034, 1032, and 1036. The result would reduce

^{1/} Federal Railroad Administration, Title 49, Part 213, Track Safety Standards.

FORT ORD, CA - RAIL SYSTEM OUTLOAD						
TRACK SECTIONS *	RAIL CAR CAPACITY 50' LGS	ITEM REPAIR COSTS	PLAN 1 PRESENT POTENTIAL CAPABILITY 116 RCPD	PLAN 2 LIMITED** CAPABILITY 72 RCPD	PLAN 3 PLAN 1 MAINTAINED	PLAN 4 124 RCPD
RAIL SYSTEM MAINT		\$36,250			36,250	•
BALLOON SPURS:						
Nº 1043	32	✓	✓	✓	✓	✓
Nº 1045	32	✓	✓	✓	✓	✓
A) UPGRADE LIGHTING FACILITIES		17,400				
B) IMPROVE DIRECT ACCESS		3,625			3,625	•
QUATERMASTER WAREHOUSE TRACKS						
Nº 1032	26					
Nº 1033	8			✓		✓
Nº 1034	26					
Nº 1036 ***	26		✓		✓	✓
A) IMPROVE LIGHTING AT Nº 1034 & 1036		17,400				
B) PORT RAMP AT Nº 1033		1,450				1,450
C) CONCRETE RAMP AT 1033		10,875				
D) LIGHTING RAMP AT 1033		13,050				
11TH STREET SPURS						
Nº 1032	10		✓		✓	✓
Nº 1037	16		✓		✓	✓
A) ADDITIONAL LIGHTS		8,700				
B) CLEAR OBSTRUCTED ACCESS		2,900				2,900
TOTAL COST					\$39,875	44,225

Figure 8. Fort Ord Rail System Outloading Options.

LOADING OPTIONS

PLAN 4 124 RCPD	PLAN 5 144 RCPD	PLAN 6 188 RCPD	PLAN 7 214 RCPD	PLAN 8 240 RCPD	REMARKS
<u>LEGEND</u>					
✓	✓	✓	✓	✓	✓ TRACK IN USE FOR THAT OPTION
•	•	•	•	•	• PRICE IS CARRIED OVER FROM PREVIOUS C
✓	✓	✓	✓	✓	RCPD RAILCARS PER 24 HR DAY
✓	✓	✓	✓	✓	* COST ESTIMATES AS PROVIDED BY FORT OR
					FACILITIES ENGINEERING PERSONNEL AND I
	17,400	•	•	•	A 45% CONTINGENCY MARK UP MAINTENANCE
•	•	•	•	•	REQUIREMENTS WERE SUPPLIED BY THE SOU
					PACIFIC RAILROADS DIVISION ENGINEER.
					** NOS 1032, 1034, 1036 BLOCKED BY INCOMING S
					*** NO 1036 USES EXISTING PORTABLE RAMP
<u>NOTES</u>					
✓	✓	✓	✓	✓	1. NO 1032 IS THE MAIN LEAD TRACK FOR THE POS
✓		✓	✓	✓	2. NO 1034 IS RESERVED FOR INCOMING SUPPLIES
					DEFECTIVE RAILCARS
				17,400	3. WORKING TIMES LIMITATIONS RULE OUT THE U
450	•	•	•	•	TRACK NO 1033 AT NIGHT EXCEPT IN PLAN 5
	13,050				4. MAINLINE SIDING NO 1030 AND THE MAINLINE A
					119 AND MPI20 ARE USED FOR RAILCAR STORAGE
					(MONTEREY BRANCH LINE HAS ONLY TWO OR T
✓		✓	✓	✓	TRAINS PER WEEK MAKING IT POSSIBLE TO AS
✓		✓	✓	✓	LOADED CARS FOR OUT-BOUND MOVEMENT ON
			8,700	•	BRANCH LINE)
900	•	•	•	•	
225	71,775	61,625	70,325	87,725	

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the maximum attainable output to 72 railcars per day - using tracks 1033, 1043, and 1045. Lighting those tracks doubles the maximum to 144 railcars per day, which is shown as plan 5 in Figure 8.

Plan 6 begins the progression of costs to reach the ultimate potential capability of 240 railcars per day. The daytime maximum is 124 railcars, plan 4, and the decrease in operating times for night operations produces a maximum of 116 railcars (see the simulation in Appendix B).

Plan 6 as recommended will produce 188 railcars per day. It best satisfies the needs of the installation as stated by transportation personnel. Plan 7 would provide for 214 railcars per day and plan 8 would provide for 240 railcars.

d. Revised Outloading Capability

Theoretically, Fort Ord and other sites have a maximum capability of more than 400 railcar loads per 24-hour day. Outloading 188 railcars at Fort Ord, another 144 railcars at Salinas, and use of the bilevel facility at San Jose for small vehicles would easily produce more than 400 railcars per day. Several steps would have to be taken to achieve this rate:

- (1) Increase coverage by supervisory personnel.
- (2) Provide a sufficient number of trained personnel to work at three locations.
- (3) Make available 400 railcars per day.
- (4) Make available sufficient small tools.
- (5) Preclude usage conflicts during a peak farm-produce harvest.
- (6) Provide a mammoth planning effort.

While the 400-car capability is theoretically possible, it does not appear to be practical. The actual rail outloading capability for Fort Ord will depend upon the effort and money officials decide to expend to improve the present system. A range of from 116 to 240 railcars per day illustrates the

latitude of possibilities. The recommended plan should produce 188 railcars per day, which is realistically attainable.

e. Recommended Physical Improvements

Improvements are listed in descending order of importance and priority:

- (1) Acquire a minimum stock of blocking and bracing material needed to supplement the post organic supply for handling nonroadable equipment when a rapid deployment of post units is required.
- (2) Acquire 35 more sets of bridge plates, making a total of 64 sets for volume outloading of vehicles at Fort Ord.
- (3) Comply with the recommended maintenance program submitted by the SPTC division engineer (Appendix A).
- (4) Upgrade spur tracks 1043 and 1045.
 - (a) Perform maintenance on the lighting system, and install four additional light standards in the divider strip between the two spurs.
 - (b) Improve direct access to the concrete ramps from Beach Range Road to an all-weather surface.
 - (c) Improve drainage and weed control.
- (5) Construct at least two portable ramps (Sec II D3). This will permit use of the limited motor capability and allow for concurrent rail outloading.
- (6) Upgrade spur tracks 1032 and 1037.
 - (a) Clear the obstructions from the access to the ramp.
 - (b) Double the present lighting facilities.
- (7) Upgrade spur track 1033, and install sufficient lighting for night outloading.
- (8) Improve the lighting at tracks 1034 and 1036 for operations at night.

f. Summary of Time and Costs

Cost estimates used in this section were supplied by the facilities engineering personnel at Fort Ord. No improvement-completion dates were projected; however, it should be noted that a delay of more than 1 year could force an entire division into a poor contingency position at Fort Ord, without the capability to move in an acceptable time frame. Therefore, 1 year is the recommended target for the projects listed. The realistic goal is to have the improvements completed by the time the 7th Division is fully activated. (See Figure 8 for detailed cost figures.)

B. ANALYSIS OF COMMERCIAL RAIL FACILITIES WITH 25 MILES OF FORT ORD

1. General

All rail facilities within 25 miles of Fort Ord were analyzed to determine the feasibility of their use during full-scale rail out-loading operations at the installation. Factors considered in making the determinations include:

- a. Road access to the facility.
- b. Type of facility available - ramps and lighting.
- c. Equipment staging and queuing areas.
- d. Railcar storage and loading capacities.
- e. Track and facility maintenance conditions.
- f. Main line activity levels.
- g. Added expense of using commercial facilities.
- h. Security problems.
- i. Complication of splitting or relocating operations.

2. Findings

Several considerations narrowed the field of potentially acceptable facilities. Facilities belonging to the main line railroad are

usually best because track belonging to private concerns is generally unavailable and unsuited for military rail outloading operations. Also, those facilities located more than a few miles from the post must have a significant capacity to make their use feasible. The main line representatives from the Southern Pacific Railroad assisted in determining rail capability. Findings of the study are summarized in Table II. Specific conditions and/or deficiencies at the sites are: the rail facilities at Salinas site 1 have an excellent potential for use by Fort Ord; concrete end-loading ramps exist at four spurs whose total capacity is 72 50-foot railcars (Figures 9 through 12); excellent hardstand for staging, queuing, and work materials abuts the ramps and tracks; access and lighting are adequate; storage capacities for railcars within the vicinity of the loadout sites are much more than needed; and track and facility maintenance is excellent. Main line activity is considerable, but railroad representatives assured the study team that in an actual emergency there would be relatively minor problems. Possible complications involving security and splitting of operations are outweighed by the value of this facility. All in

TABLE II
RAILROAD FACILITIES WITHIN 25 MILES OF FORT ORD

Location Site Number	Road Distance From Fort Ord (Miles)	Type of Trackage Available	Type of Ramps	Lighting	Surface Conditions	Staging Area	Storage Capacity (Railcars)	Road Access to Site
Salinas Site 1	12	4 Parallel spurs 900-feet long for end-loading, classification, storage	4 End, 72 50-foot crr lengths	Yes, could be supplemented with Southern Pacific portable lighting	Good, paved or graveled	Large, paved	300	Good through back gate of Fort Ord, good highway access and local streets, all paved
Salinas Site 2 (Gabilan String)	12	4 Parallel spurs, storage	None	No	Poor	None	Included in above	Good, highway and local streets all paved
Salinas Site 3 (Growers Vacuum Cool Co)	12	6 Parallel spurs, storage	None	No	Fair	None	Included in above	Good, highway and local streets all paved
Watsonville Junction	22	Large classification yard, storage	End 3 cars, side 1 car	Some not adequate for night loading	Good, paved or graveled	Large, paved or graveled	500	Good, paved highway
Castroville	10	Small classification yard, storage	None	None	Good, graveled	Small graveled	50	Good, paved highway
Kaiser PG and E Lonestar Monterey Sand Co Municipal Wharf	3 to 8	Storage	None	None	Fair, graveled or sand	None	150 to 200	Poor, in congested areas
Note: Nearest bilevel facility is San Jose. SPIC has portable bilevel, trilevel ramps available, generally on short notice, 2 to 3 days.								

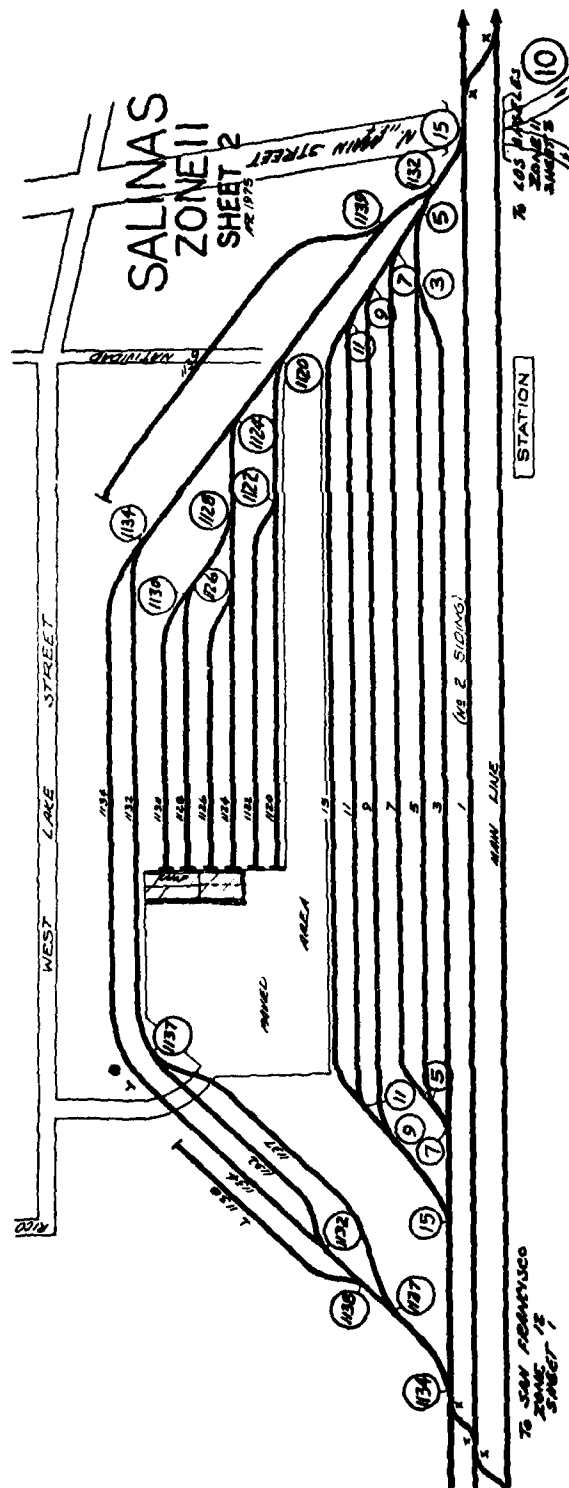


Figure 9. Layout of Railroad Yard at Salinas - Site 1.
 (Tracks 1124, 1126, 1128, and 1130 equipped with concrete end ramps and overhead lighting, good access, paved staging areas, and adequate railcar storage. See Appendix C for track numbering code and legend.)

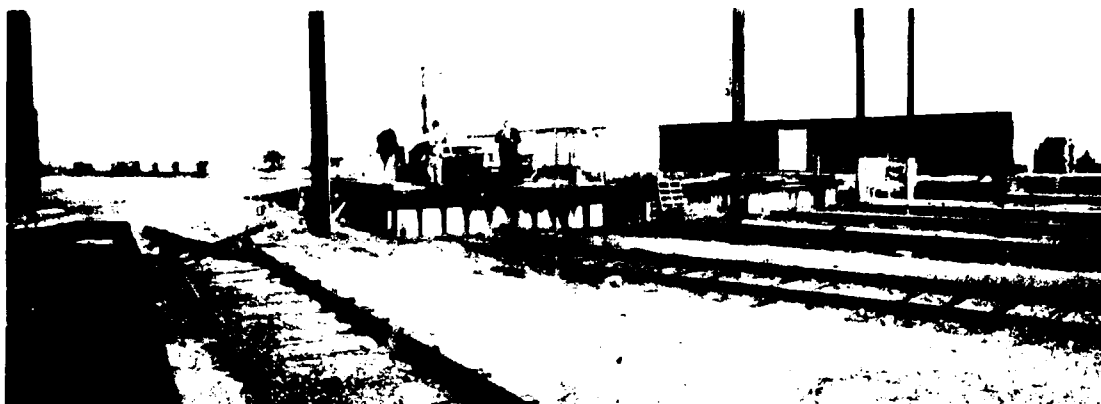


Figure 10. Salinas Site 1 - Southern Pacific Main Station at Salinas. (Four tracks run up to a concrete end-loading ramp, and another is available for a portable ramp. At times during the peak produce season, up to 300 railcars a day are outloaded here.)



Figure 11. Salinas Site 1 - Hardstand at Loading Ramps; Cement Plant in the Background.

all, the Salinas facilities of the Southern Pacific Railroad are considered to be an excellent supplement or alternative to the Fort Ord organic capability. However, at times during the peak produce season up to 300 railcars per day are outloaded here, which means considerable judgment should be exercised in planning for the use of these and other facilities described below.



Figure 12. Salinas Site 1 - Tracks Leading up to Ramps. (Note the light poles - SPTC portable lighting is available also.)

Salinas site 2 (Gabilian String) is privately owned and consists of four parallel tracks. However, there are no end-loading ramps or lights, surface conditions are poor, and there is no staging area. It could be used for car storage (Figure 13).



Figure 13. Salinas Site 2 - Produce Company (Possible Conflict).

Salinas site 3 (Growers Vacuum Cool Company) is privately owned. It consists of six parallel tracks. There are no end-loading ramps or lights, surface conditions are poor, and there is no staging area. This site could also be used for car storage (Figure 14).

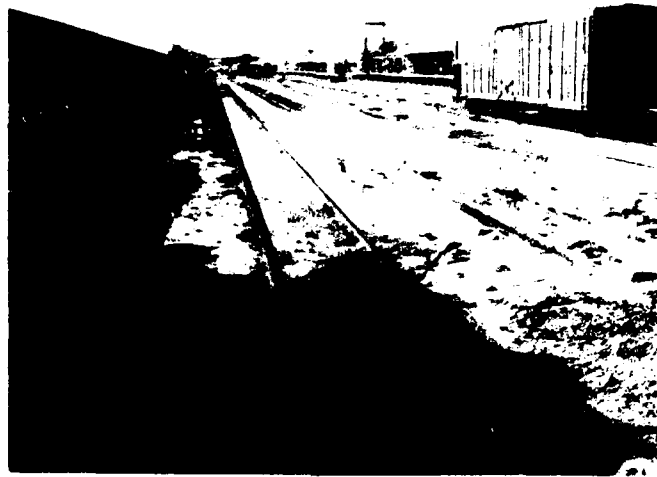


Figure 14. Salinas Site 3 - Vacuum Cool -
Produce (Possible Conflict).

Watsonville Junction is the major classification yard in the area. It is more than adequate to handle classification of railcars for an outloading at Fort Ord and should be used for that purpose. A schematic of the yard is shown in Figure 15, and two views of the yard are shown in Figures 16 and 17. There is an excellent concrete combination end- and side-loading ramp adjacent to the classification yard; however, straight track is sufficient for the end loading of only three railcars and the side loading of only one car. Lighting is inadequate for night operations. Surface conditions in the area are good, consisting of pavement or gravel, and the highway access is excellent (Figures 18 through 20).

Castroville is a small classification yard. There is no end- or side- loading ramp nor lighting; a small, graveled staging area is available; highway access is good. The yard could be used for car storage, and end loading of vehicles could be accomplished with portable ramps (Figures 21 and 22). Other sites in the area are suitable for car storage only. Monterey Sand Company and the Municipal Wharf area at Monterey are typical examples (Figures 23 and 24).

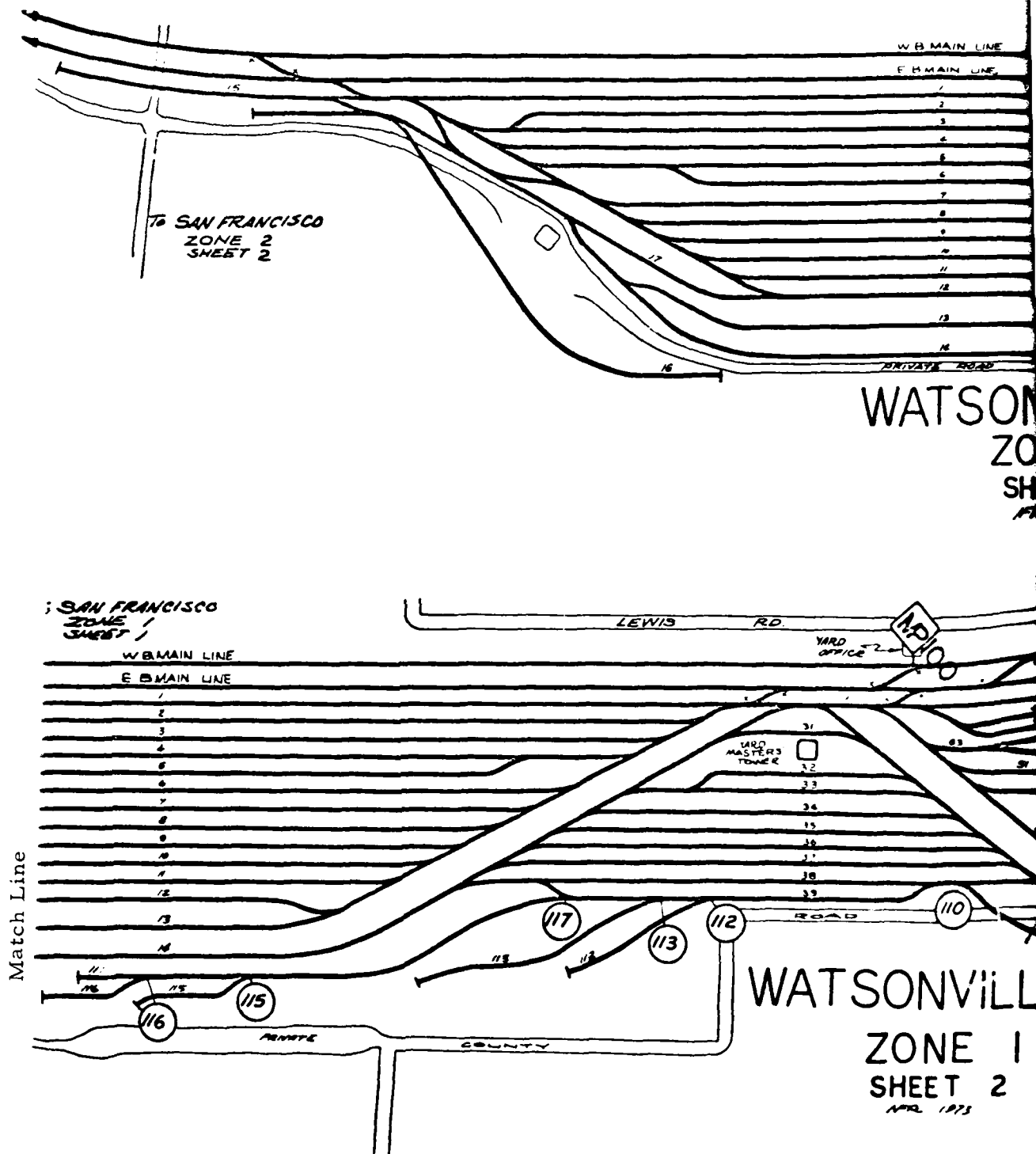


Figure 15. Schematic of the Classification Yard at Watsonville Junction.

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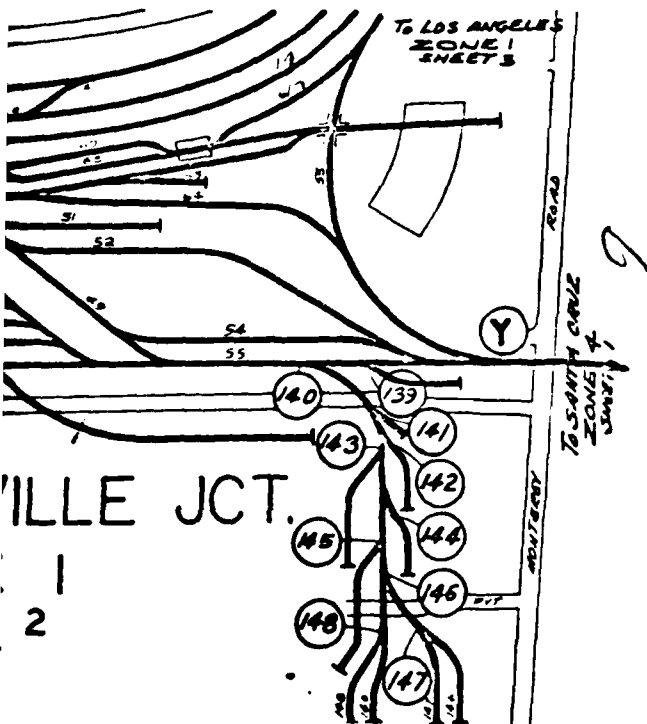




Figure 16. Watsonville Junction - View of Classification Yard.

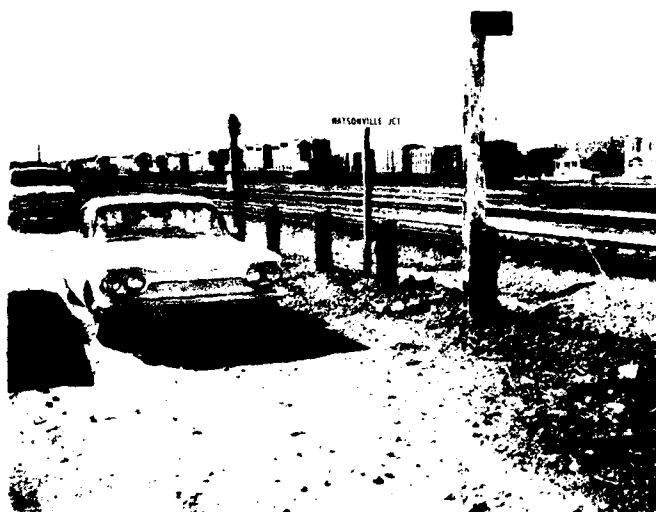


Figure 17. Watsonville Junction - Milepost 100. (Seven locomotives in combination.)



Figure 18. Watsonville Junction - Concrete End-Loading Ramp.



Figure 19. Watsonville Junction - Concrete Side-Loading Ramp.

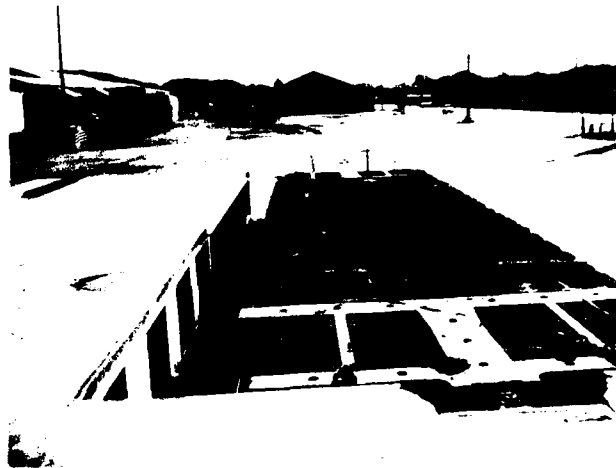


Figure 20. Watsonville Junction - Area Adjacent to Ramp.





Figure 21. Castroville - Sidings - (Could be used for car storage or end loading of vehicles using portable ramps.)



Figure 22. Castroville - Graveled Staging Area.



Figure 23. Monterey Sand Company.



Figure 24. Near Municipal Wharf,
Monterey.

3. Conclusions Regarding Commercial Rail Facilities

- a. The facilities at Salinas have excellent potential to supplement the organic capabilities of Fort Ord.
- b. Watsonville Junction has an excellent classification yard and should be used as the point for classifying post inbound railcars.
- c. Trackage in the area is sufficient to support major outloading operations at Fort Ord.
- d. Limited storage capabilities exist at various private and main line sidings within 5 miles of Fort Ord.
- e. The condition of facilities within 25 miles of Fort Ord is generally good.
- f. Main line activity of the SPTC suggests that commercial facilities should be used only as a supplement to the installation capability, since volume outloadings of farm produce utilize much of the commercial capability during certain periods.

C. SPECIAL EQUIPMENT FOR EXPEDITING THE OUTLOADING OF SMALL VEHICLES, SEMITRAILERS, AND MILVANS

It has been determined that, by using multilevel railcars, labor and material costs are reduced approximately 60 percent, and freight and transportation costs are reduced approximately 40 percent. This is because multilevel railcars are equipped with integral tiedowns for securing vehicles. These tiedowns are used repeatedly; whereas, on standard-type flatcars, blocking, dunnage, and wire or cable are used on a one-time basis. The time needed to secure a vehicle on a multilevel railcar is approximately 15 minutes per vehicle versus approximately 45 minutes per vehicle on a standard-type railcar. There are essentially five methods for loading or unloading multilevel railcars^{2/}.

The SPTC has portable bilevel and trilevel equipment; therefore, it is recommended that Fort Ord transportation personnel contact the SPTC

^{2/} TM 55-625, Transportability Criteria and Guidance, Loading and Unloading Multilevel Railcars at Military Installations in the United States.

to investigate possible use of this equipment in outloading operations. The probable availability of bilevel and trilevel railcars at any given time should be discussed also.

There is usually a large supply of trailer-on-flatcar (TOFC) railcars in the system, and container-on-flatcar (COFC) railcars may be available. These cars, if available, should be used to transport semi-trailers and MILVANS. If COFC or TOFC flatcars are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars for transporting MILVANS. See Appendix D for additional information.

D. ANALYSIS OF MOTOR SYSTEM OUTLOADING CAPABILITY AT FORT ORD

1. General

The roadway system on the installation can accommodate the largest highway vehicles. Gate access to California Route 1, a limited access dual highway serving the installation, is by two relatively new grade-separated interchanges; and the highway system in the area is adequate. Therefore, neither access to the highway system nor the system itself restrains motor outloading capability or movement of roadable military vehicles.

2. Loading Ramps

A survey of the motor pool and other activities likely to have suitable end-loading ramps revealed that only two suitable ramps exist (Table III). One is the fixed timber and concrete ramp at 1st Avenue between 11th and 12th Streets (Figure 25). This ramp

TABLE III
MOTOR OUTLOADING RAMPS

Ramp Number	Location	Type of Ramp	Surface Conditions	Staging	Access
1	2nd Ave and 11th St	Steel portable	Paved	Yes	Good
2	1st Ave between 11th and 12th Sts	Timber and concrete	Paved	Yes	Good for small vehicles



Figure 25. Timber and Concrete Ramp, 1st Avenue Between 11th and 12th Streets.

would be suitable only for small vehicles since some maneuvering will be necessary for a vehicle to mount the ramp. The other is the portable steel ramp at 2nd Avenue and 11th Street (Figure 26). The numerous grease racks in the various motor pools and maintenance shop yards are equipped with ramps on both ends, and thus are not suitable for end-loading vehicles (Figure 27).



Figure 26. Portable Steel Ramp at 2nd Avenue and 11th Street.



Figure 27. Typical Grease Rack.

3. Semitrailer Outloading

The loading procedure could be as follows: A vehicle is driven up the ramp onto the waiting semitrailer, and temporary chocks are placed. After the loaded semitrailer has been driven slowly from the ramp to a designated location where the loaded vehicle

can be secured with tiedown chains, the next semitrailer is backed-up to the ramp, and the procedure is repeated.

This procedure does not tie up the ramp while loaded vehicles are being secured. Using a conservative 30 minutes for each cycle, two semitrailers could be loaded per hour per ramp, or 20 vehicles per ramp per 10-hour shift. The two existing ramps could produce 40 loads in a 10-hour shift, or 80 per 24-hour day, if sufficient lighting were available for night shifts. (Should night operations be required, tiedown operations could be accomplished in a well-lighted area, such as the baseball or football stadium.) Thus, the present capability is 80 semitrailer loads per 24-hour day using the two existing ramps. Concurrent rail operations will reduce the present capability to 40 semitrailer loads per 24-hour day, since the portable ramp will be required for rail loading.

A total of 40 or 80 semitrailer loads per day is not particularly significant for several reasons. First, portable ramps are easily constructed. Timber is the common construction material, but field expedients, such as ditches that trucks can back into for outloading equipment, are very quickly made. Second, semitrailer loading, other than vehicles, is primarily dependent on the amount and capability of materials-handling equipment (MHE). At Fort Ord MHE has not yet reached its peak because the 7th Division is still forming. Finally, the overriding reason that the motor systems outloading capability figure is not considered particularly significant is that it is really not needed for major outloading actions. Fort Ord's most likely POEs, if the division were deployed to the Pacific theater, are the Military Ocean Terminal Bay Area, in Oakland, and Travis AFB. Both are within driving distance of roadable equipment (Oakland, 110 miles and Travis, 160 miles). Fort Ord's unit, the 7th Division, is an infantry division with roadable equipment primarily. The existing nonroadable equipment can be outloaded by rail at Fort Ord without difficulty. Any movement of roadable equipment farther than MOTBA or Travis AFB--to the gulf coast, for instance--would necessarily be by rail. Therefore, the limited motor systems outloading capability that exists is adequate for current and probable requirements.

To maintain the existing limited capability and to provide the two end-loading ramps required for concurrent rail operations of 188 railcars per day, two timber end-loading portable ramps should be constructed. The ramps should be 10 feet 6 inches wide and 4 feet high, with slope and construction similar to the timber

grease rack illustrated in Figure 28, bottom photograph. The high end of the ramp should be designed so that the railcar coupler can protrude under the deck without damaging structural members of the ramp. Estimated cost of these two ramps is \$2,900.

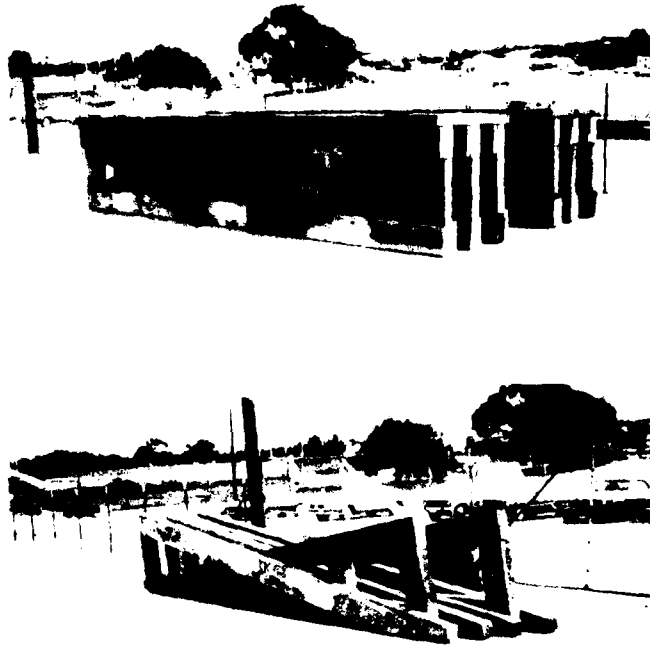


Figure 28. Grease Rack of Timber Construction, Not Assembled.
(End-loading ramps could be constructed similarly.)

E. CONCLUSIONS

1. Generally the rail system at Fort Ord is in good condition; however, current rail outloading capability is severely limited due to a lack of necessary supporting elements, such as outloading plans and blocking and bracing materials.
2. Because of Fort Ord's proximity to ocean and air terminals on the west coast, only nonroadable equipment would have to be outloaded by rail for west coast POEs; however, all equipment would have to be outloaded by rail for gulf or east coast POEs. Necessary supplies should be stocked accordingly.

3. Estimated minimal cost to perform the work necessary to the rail system for a maximum outloading rate of 188 railcars per 24-hour day is \$61,625; for a maximum outloading rate of 240 railcars per day, \$87,725. At these rates, the division could be outloaded by rail in approximately 9.0 days and 7.0 days, respectively, after receipt of sufficient railcars to permit full-scale operations (based on 1,685 USAX and commercial railcars loaded at Fort Ord).
4. The motor system outloading capability at Fort Ord is very limited but is also relatively unneeded in terms of unit deployment. Short-distance moves result in most equipment being driven, while long-distance moves require use of rail transport.
5. Physical improvements to the rail system and other necessities for outloading (see sec II, para A 4e) should be implemented to the level desired to coincide with full activation of the division.
6. The excellent rail outloading facility of the SPTC at Salinas could be used in an emergency to supplement the roadable vehicular outloading of Fort Ord units. This facility should be able to outload 144 railcars of military equipment per 24-hour day if additional support, personnel, and materials were available.
7. The Southern Pacific Railroad's excellent classification yard at Watsonville should be used for classifying incoming empty railcars destined for Fort Ord.
8. The SPTC has adequate railcar storage capacity to support a volume outloading of Fort Ord's units.
9. The SPTC trackage in the vicinity of Fort Ord generally is in good condition.
10. Peak outloading of farm produce from the area will reduce availability of SPTC and privately owned facilities to supplement the Fort Ord outloading operations; however, responsible SPTC personnel believe that the SPTC can handle the outloading of Fort Ord units concurrently with other demands.
11. Fort Ord transportation personnel should coordinate planning of impending outloading operations with the SPTC at the earliest possible date.

F. RECOMMENDATIONS

1. Undertake those items listed in section II, paragraph A 4e, Recommended Physical Improvements, items (1) through (6)a. These improvements will provide a rail system capability of 188 railcars per day.
2. Prepare a detailed unit outloading plan specifying unit assignments at loadout sites and movement functions using the simulation in Appendix B, as an example.
3. Coordinate rail outloading plans with the SPTC at the earliest possible date.
4. Initiate and/or continue facility maintenance to insure a continued effective rail system.
5. Provide advance training for blocking and bracing crews, and stock required materials and small hand tools to provide for future contingency plans.
6. Use the SPTC outloading facility at Salinas as a supplemental loading facility for roadable equipment.
7. Use the SPTC bilevel facility at San Jose, approximately 40 miles distant, to load small vehicles on autorack railcars, or use the SPTC portable bilevel and trilevel ramps at a mutually agreed-upon siding.
8. Use the SPTC classification yard at Watsonville to classify incoming empty railcars.

III. CAMP ROBERTS AND FORT HUNTER LIGGETT

A. ANALYSIS OF RAIL OUTLOADING FACILITIES

1. General

Camp Roberts and Fort Hunter Liggett serve as training bases for National Guard and 7th Division units. There are approximately 40 permanent personnel assigned to Camp Roberts, and Fort Hunter Liggett also has a small staff.

Discussions with personnel of the Transportation and Facilities Engineering office at Camp Roberts revealed that documented data on time/motion studies of actual outloadings were not available. However, engineer personnel did recall that, several years ago, 90 tanks were outloaded during a 2-week period. Eighteen civilians worked 7 hours a day for two 5-day weeks to block and brace the 90 tanks on railcars, which equals 14 man-hours per tank.

The 7th Division transportation officer at Fort Ord requested that an armored brigade be used as the theoretical data base for the analysis at Camp Roberts. Therefore, this section of the report uses that perspective in evaluating the capabilities of the subinstallations.

2. Rail Facility Description

a. General

The rail system at Camp Roberts is illustrated in Figure 29. It consists of two parts: the east garrison tracks, which are currently in use, and the main garrison tracks, which are not connected to the main line because the switch at track 2660 has been removed. Consequently, rail service to the main garrison is not possible at present (Figure 30).

b. East Garrison

One of the two spurs serving east garrison (track 2637 with an end-loading ramp) is used to handle all shipments of vehicular equipment moving by rail into or out of Camp Roberts or Fort Hunter Liggett. This single spur is adequate to handle current requirements.

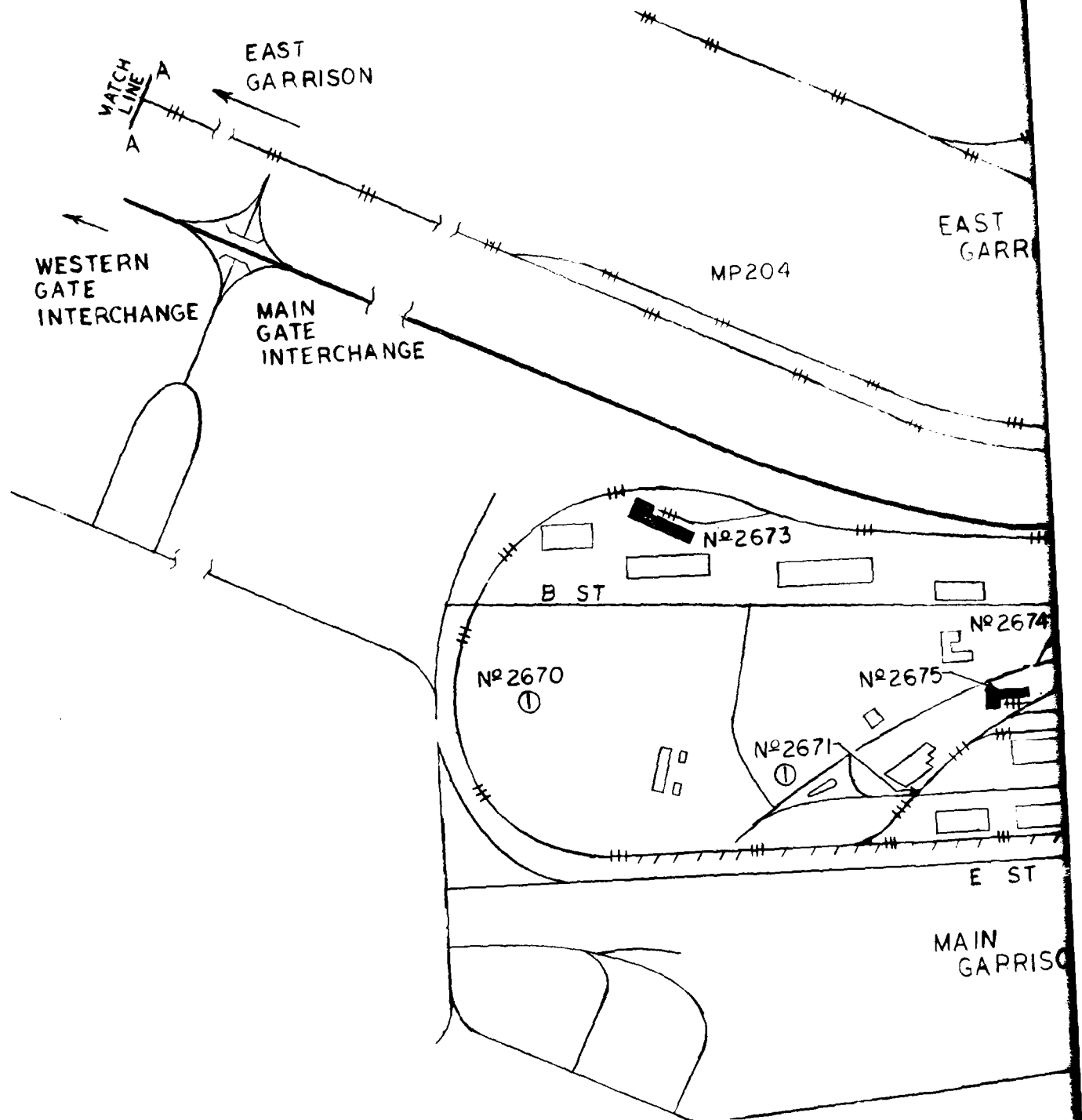


Figure 29. Drawing of Rail Layout.



AST
GARRISON

Nº 2639

Nº 2637

MP
200

MAIN
GARRISON

A
MATCH
LINE

Nº 2650

MP 205

Nº 2660

US 101

Nº 2671 ②

C ST

Nº 2674

Nº 2677

Nº 2676

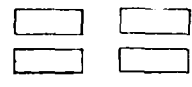
Nº 2678

D ST

ST

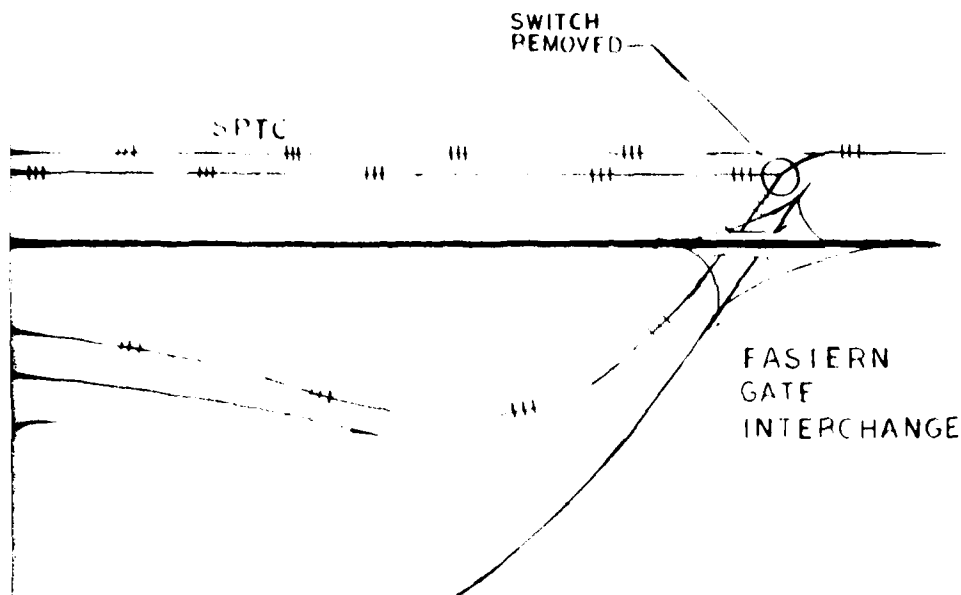
Nº 2670 ②

RRISON



LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- - - - - DIRT ROAD
- ||| RAILROAD TRACK
- ||||| PAVED AREA ADJACENT TO TR
- SIDE & END LOADING RAMP
- () TRACK SECTION DESIGNATOR
- MP MILE-POST
- * POL AREA



NOT TO SCALE

TO TRACK

AMP

WATER



Figure 30. Former Location of Removed Switch and Track That Connected Main Garrison Rail System to Main Line of SPTC.

c. Main Garrison

Two tracks, 2673 and 2675, are equipped with concrete end- and side-loading ramps that can be used for rail or truck loading. Both are in good condition. Neither of these spurs is very long; they have capacities of only 6- and 2-railcar lengths, respectively, and area lighting is not available for night operation.

Track 2670 along E Street and a portion of 2671 combined with 2674 would make excellent outloading sites because of their length, adjacent hardstand areas, and quality of good access. Portable ramps will be required to operate these two sites, and lighting will be required if night operations are planned.

Tracks 2676 and 2677 formerly served the warehouses adjacent to them and are best suited for car storage. These would be difficult to work from the sides since access for much of their length is blocked by the warehouses. However, one track could be worked more conveniently if the other were left open for side access.

Because of poor surrounding conditions, track 2678 can be taken out of service and its usable materials applied elsewhere for repair.

A detailed survey of the system revealed that all tracks are usable but some maintenance is required on each. The estimated cost for the SPTC to upgrade all main garrison trackage, except track 2678, is \$64,850.

Details on all trackage are presented in Table IV and illustrated in Figures 31 through 43.

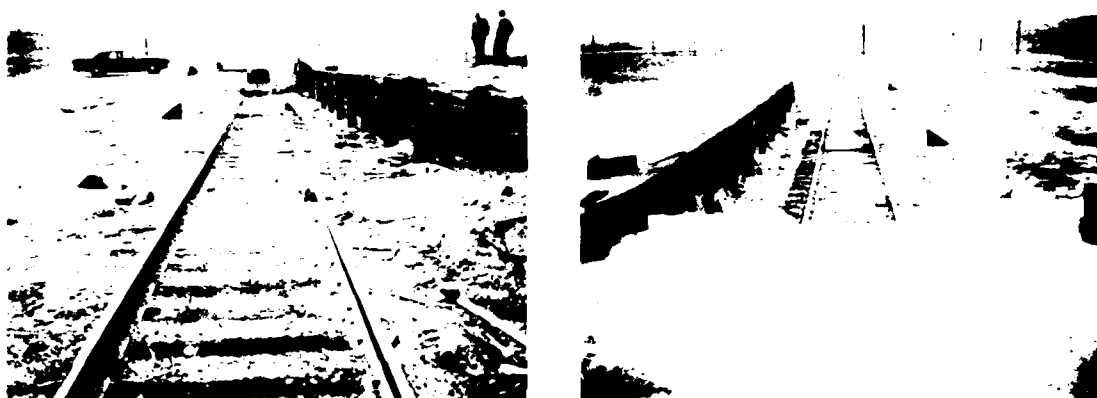


Figure 31. East Garrison, End- and Side-Loading Ramp, Track 2637.

3. Current Procedures

a. Camp Roberts

The SPTC serves Camp Roberts and performs all internal switching. At present, only spur tracks 2637 and 2639 are connected to the main line. The main garrison rail system has no connection to the main line because the switch for lead track 2670 has been removed. Current service is once a day, and all shipping and receiving by rail is handled on spur track 2637. Wheeled vehicles use US Route 101 for access to the main cantonment or training areas, while tracked vehicles go under the bridge spanning the Salinas River and proceed directly to training areas. Vehicles and equipment bound for Fort Hunter Liggett use US 101 and county road G18; tracked vehicles can also travel under their own power over an easement connecting the post with Camp Roberts.

TABLE IV
RAIL OUTLOADING FACILITIES ON THE INSTALLATION

Track Number (Fig 29 and Fig 31 Through 43)	End Ramps	Lighting	Surface Conditions	Staging Area	Railcar Capacity (50-foot Lengths Straight Track)	Access Availability	Present Condi- tion of Track
East Garrison							
2637 (Fig 31)	Yes, and side - one car	No	Fair, sandy-silt	Very small ^{1/}	21	Good, paved	Fair, currently used for load- ing/unloading tanks.
2639 (Fig 32)	No	No	Fair to good	Very small ^{1/}	^{52/}	Good, paved	Fair.
Main Garrison							
2673 (Fig 33, 34, 35, and 36)	Yes, end and side 210 ft ^{3/}	Some not adequate	Excellent, gravel or paved	Large, excellent	6	Good	Cable car requires maintenance.
2671 2674 (Fig 37)	No ^{4/}	Some not adequate	Excellent, paved or graveled	Large	15 (Total)	Excellent	Poor, particu- larly at cross- over shown in Fig 37.
2675 (Fig 38)	Yes, and side - two cars	No	Excellent	Large	^{25/}	Excellent	Good, light maintenance.
2676 2677 (Fig 39 and 40)	No	Some not adequate	Excellent, paved or graveled	Poor ^{6/}	45 ^{456/}	Excellent	Good, requires some maintenance.
2678 (Fig 41)	No	No	Poor	Poor	7	Not available for end loading	Fair, light maintenance.
2670 (Along E Street) (Fig 42 and 43)	No ^{7/}	No	Excellent	Large	45	Excellent	Covered by pavement, might require considerable maintenance.

^{1/} Not a through street, can be blocked if required. No other functions in the area. Large motor pool nearby.

^{2/} Can be extended to increase capacity; room for two additional spurs between track 2637 and main line.

^{3/} Rail - side loading 210 feet by 20 feet wide; end loading on track, six 50-foot car lengths.

Motor - 210 by 20 feet wide, adjoined by 36 by 40 feet wide.

^{4/} Could be used for end loading vehicles with portable or fixed ramps; good out-loading site with paved hardstand adjacent; existing poles could be used for additional area lighting.

^{5/} Excellent concrete ramp; long enough for only two railcars (on straight track).

^{6/} Motor - can be used for truck loading; 125-foot-long deck with a 20-foot-wide ramp at one end and a 40-foot-wide ramp at the other (see Figure 38).

^{7/} Warehouses abut tracks; best used for car storage.

^{8/} Long straight track, paved hardstand full length 50 feet wide, good access; tracked vehicles can approach over tank trails from the west side of the ramp. Portable ramps and area lighting required.



Figure 32. East Garrison, Track 2639. (This could be extended and/or portable ramp used to end load vehicles.)

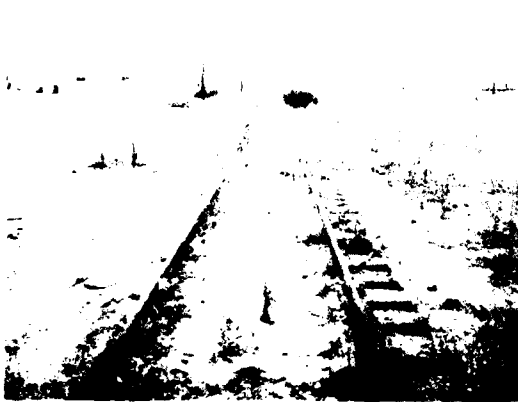


Figure 33. Track 2670 Leading to Track 2673 and End-/ Side-Loading Ramp. (This section requires maintenance.)



Figure 34. Track 2673 at Ramp. (Some maintenance is required.)

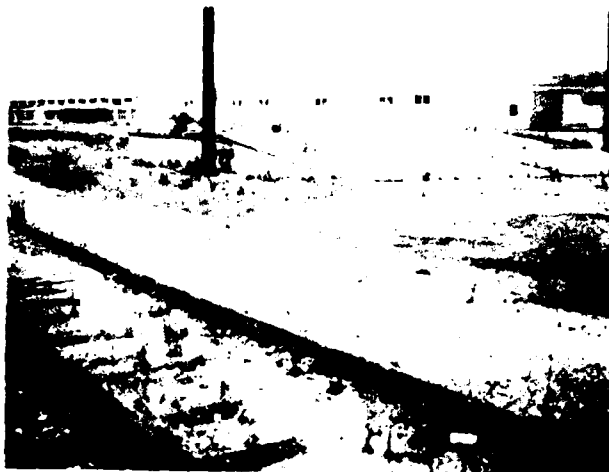


Figure 35. North End of Concrete Ramp, 40 Feet Wide.



Figure 36. South End of Concrete Ramp, 20 Feet Wide.



Figure 37. Tracks 2671 and 2674. (This would be a good outloading site if equipped with end-loading ramp and lighting.)



Figure 38. Rail and Truck
Ramp at End of
Track 2675.





Figure 39. North End of Tracks 2676 and 2677 With Ramp at Track 2675 in Background.



Figure 40. Tracks 2676 and 2677 Looking North. (This is good for car storage.)



Figure 41. Track 2678. (It has no access for end loading; it is blocked by concrete building foundation.)



Figure 42. Track 2670, Along E Street. (This would be the best outloading site if equipped with ramps and overhead lighting.)



Figure 43. Tracked Vehicle Approach Trail
and Entrance Gate at E Street.

Day-to-day procedures are straightforward. Rail traffic is light and used only when required for delivery or pickup of heavy equipment. Installation personnel could foresee no requirement to provide rail service for incoming housekeeping supplies, all of which are currently delivered by truck. Some light equipment is outloaded on commercial semitrailers using one of the four motor outloading ramps.

b. Fort Hunter Liggett

This installation has no rail facilities; therefore, its rail-delivered equipment must be offloaded at Camp Roberts, then hauled over US 101 and County Road G18 to Fort Hunter Liggett. Tracked vehicles can travel under their own power over an easement connecting the two installations. Motor loading/unloading capability is limited to one permanent ramp and one earth ramp.

4. Rail System Analysis

a. Current Outloading Capability

The Camp Roberts existing rail outloading capability is limited to one track, 2637, at east garrison. Current rail service at Camp Roberts would provide for one turnover per 24-hour day, and the capacity of the track is 21 railcars (using 50-foot lengths). Blocking and bracing material sufficient for 30 tanks is available; however, civilian manpower resources are inadequate to perform the necessary tasks. Although Camp Roberts' current rail outloading capability is negligible, it does have potential. For example, the main garrison has five outloading sites, which are inoperable because the main-line switch has been removed. If this switch were replaced, the main garrison could outload 113 railcars per day in daytime operation only.

b. Rail Outloading Analysis

(1) The Camp Roberts rail outloading capability is a partially intangible system in terms of analysis. Although no unit is permanently stationed at the garrison, the analysis assumed that an armored brigade was located there. Many of the factors that would affect the post capabilities could not be fully examined, and the assumptions that were made are delineated as subsequent comments. For the analysis, the system as a whole will be separated into subsystems similar to those at Fort Ord:

(a) Commercial service capabilities.

(b) Movement to an loading on railcars at a particular site.

- (c) Blocking, bracing, and safety inspections.
- (d) Interchange of empty and loaded railcars.

Commercial rail service to Camp Roberts is supplied by SPTC, which could respond to any demands the garrison might place upon it. Sufficient classification capability exists at Paso Robles, and storage facilities exist at numerous locations within a few miles of the garrison. The supply of railcars should be no barrier to operations, because the main line, just outside Camp Roberts, is always active. That activity should be considered when planning operations, because main-line blockage should be limited. The SPTC can also accommodate the number of locomotives and the frequency of service needed to run a rail outloading operation. The movement of cargo and equipment to loadout sites should be easily accomplished at Camp Roberts, because motor pools and storage areas are all close to the two rail areas. Transit between east garrison and main garrison is also available to all types of vehicular equipment.

Loading operations are unsatisfactory at present. Only three sites have ramps, and their total capacity is only 29 railcars. Sufficient hardstand staging and queuing areas exist, as well as several stretches of good straight track, but portable ramps are necessary to utilize their potential. Thus, loading deficiencies do limit rail operations at Camp Roberts. When dealing with cumbersome equipment, such as tanks, the number of railcars that the vehicles must drive across becomes a significant factor. This situation can be alleviated by using additional ramps to break up long strings of cars into more manageable segments.

- (2) Blocking, bracing, and safety inspections cannot be projected accurately for Camp Roberts. They depend on a variety of variables for which no data are available:
 - (a) Crew size and experience.
 - (b) Extent of the safety examination.
 - (c) Number of inspectors.
 - (d) Documentation.

- (e) Availability of blocking and bracing material and material-handling equipment.

Camp Roberts has no active unit. Everything but the safety inspection aspect of this subsystem can be expected to vary widely depending on the type and strength of future garrison residents. Theoretically, every unit should be considered as ready to outload, and the simulation of the Camp Roberts outloading capability should allow 5 to 7 hours per cycle to complete loading, blocking and bracing, and inspection at a typical site. That length of time has been deemed realistic by a large number of experts and experienced persons and proven by field tests for "circus type" loading.

The interchange of railcars at Camp Roberts is definitely a constraining subsystem. First of all, east garrison has the only usable spurs because the entrance to the main garrison rail system has been removed. Even if main garrison were reopened, the configuration of the system would hamper efficient operation. The two excellent concrete side- and end-loading ramps have only very short spurs running to them. If other straight stretches of track were used as improvised loading sites with portable ramps, the possibility of blocking a busy main line would occur. Also, the 5-mile distance between the main garrison tracks and the east garrison tracks creates a situation in which one switching locomotive is overworked while two have idle time during the operation. The rail outloading Plan 13 (Figure 44) provides a suitable solution, but the interchange of railcars significantly hampers operations.

Taken in its entirety, full-scale rail outloading operations at Camp Roberts are hampered primarily by the lack of a connection to the main garrison rail system. Loading problems and cumbersome track configurations create the next significant limitations. Present capabilities are sufficient for current operations, however, if expansion is desired, the main garrison must be reopened. Localized loading problems, such as manpower and materials, can be solved rapidly, but use of the rail configuration itself should be planned at its current capability only; changes involving new track construction would be costly and difficult to justify. A detailed simulation is presented in Appendix E.

CAMP ROBERTS,						
TRACK SECTIONS	RAIL CAR CAPACITY 50 LGS	ITEM REPAIR COSTS	LIGHTING COSTS	PLAN 1 21 RCPD	PLAN 2 27 RCPD	PLAN 54 RCPD
Nº2637	21	**	\$20,000	✓	✓	L20,000
Nº2638*	21	\$30,000	10,000			
Nº2639	6	**	10,000		✓	L10,000
Nº2650	100+	***				
Nº2660	80+	***				
Nº2670:						
ENTRY SWITCH TO "Y"		18,000				
Y TO Nº 2673		1,500				
Nº 2673 TO Nº2671		500				
Nº2671 TO "Y"		30,000	30,000			
Nº 2671	SEE 2674	5,000				
Nº 2673	6	200	15,000			
Nº 2674	15	1,500				
Nº2675	2	150	10,000			
Nº2676	45*	3,000				
Nº2677	45	4,000				
Nº2678	7	6,000				
PORTABLE PAMPS (EA)		1,500			1,500	•
TOTAL COSTS					\$1,500	31,500

Figure 11. Rail System Outloading Options.

RTS, CA - RAIL SYSTEM OUTLOADING OPTIONS

PLAN 3 54 RCPD	PLAN 4 48 RCPD	PLAN 5 96 RCPD	PLAN 6 39 RCPD	PLAN 7 72 RCPD	PLAN 8 114 RCPD	PLAN 9 73 RCPD	PLAN 10 106 RCPD	PLAN 11 95 RCPD	
L20000(2)	✓	L20000(2)	✓	L20000(2)	L20000(2)	✓	L20000(2)	✓	L2
	30000	L40000(2)			L40000(2)				
L10000(2)	✓	L10000(2)	✓	L10000(2)	L10000(2)	✓	L10000(2)	✓	L1
			18,000	•	•	•	•	•	
			1,500	•	•	•	•	•	
			500	•	•	•	•	•	
								30000	L6
						5,000	•	•	
			200 (2)	L15,200 (3)	L15,200(3)	200 (2)	L15,200 (3)	200	L15
						1,500 (2)	• (2)	•	
						150 (2)	• (2)	•	
•	•	•	•	•	•	3,000	3,000	6000	6
31,500	31,500	71,500	21,700	66,700	106,700	29,850	74,850	62,850	135

PLAN 11 95 RCPD	PLAN 12 173 RCPD	PLAN 13 140 RCPD	PLAN 14 161 RCPD	PLAN 15 260 RCPD	<u>LEGEND</u>	
✓	L20000(2)	✓	✓	L20000(2)	✓	CAPABILITY USED WITH NO REHABILITATION
			30000	L40000(2)	•	COST CARRIED OVER FROM PREVIOUS PERIOD
✓	L10,000(2)	✓	✓	L10,000(2)	L	LIGHTING COSTS
					*	THEORETICAL NEW TRACK FOR EAST
					**	ROUTINE MAINTENANCE
					***	MAINLINE SIDING
					(2)	TWO TURNOVERS DURING PERIOD
					(3)	THREE TURNOVERS DURING PERIOD
					RCPD	RAILCARS PER DAY
					<u>NOTES</u>	
					1.	Nº 2670 IS THE BALLOON TRACK
					2.	Nº 2678 IS AN UNFEASIBLE SITE
					3.	Nºs 2676 & 2677 SERVE EXTENSIVE WAREHOUSES
					4.	Nº 2674 UTILIZES PART OF 2671
					5.	Nºs 2637 2673 & 2675 HAVE EXISTING
						AND END LOADING RAMPS
					6.	Nº 2676 USED FOR STORAGE OR ACCESS
						SIDE Nº 2677 FOR BLOCKING AND BRAKING
						OPERATIONS.
2000	L60,000(2)	30,000	30,000	L60,000(2)		
•	•	•	•	5000		
200	L15200(2)	200	200	L15200(2)		
•	•	•	•	1500		
•	•	•	•	150		
		4000	4000	4000		
		4000	4000	4000		
2000	6000	9000	9000	9000		
2850	137,850	73,850	103,850	188,850		

HABILITATION
PREVIOUS COLUMN

EAST GARRISON

RIOD
PERIOD

CK
TE
IVE WAREHOUSES
671
ISTING SIDE

ACCESS ALONG
ND BRACING

c. Rail System Outloading Options

Figure 44 is a tabulation of 15 different options (plans), which involve various combinations of track and area lighting to achieve different levels of rail outloading capability. Most of the options involve rehabilitating the Camp's rail system in a series of steps wherein the cost of repairs increases for various capabilities. Many of the options include the use of lighting to provide a nighttime capability; those without lights concern daytime operation only. The track sections involved are identified on the left side of the chart, with pertinent capacities and rehabilitation costs in the next two columns. Plan numbers and additional outloading capability in railcars per day are shown along the top, specific costs for elements of each plan in their respective columns, and total plan costs at the bottom. It should be noted that Plans 1 through 5 involve only three tracks located at east garrison (two existing and one proposed), and are not concerned with the replacement of the entrance switching. Although the table is self-explanatory, several items are worthy of special mention:

- (1) Plan 1 involves current capability only.
- (2) Eight plans use daytime capability only.
- (3) Rehabilitation costs vary from no cost for Plan 1 to \$188,850 for Plan 15.
- (4) Cost for additional capability varies from \$250 per railcar per day (Plan 2 - 6 additional cars) to \$1,300 per railcar per day (Plan 7 - 51 additional cars).

Figure 45 is a graphical representation of plan costs versus additional capability obtained. The slope of a line from the present capability of 21 railcars per day (Plan 1) to the junction of the coordinates for each of the plans provides a measure of the plan's effectiveness. The steeper the slope of the line, the more it will cost per railcar of additional capability achieved. The line to Plan 15 is shown for general reference purposes. Plan 13 is recommended for implementation at Camp Roberts, since it would be the most cost effective means of providing a total outloading capability of 140 railcars per day without creating conflict with movements on the main line trackage. The

140 railcar-per-day level of operation is that assumed in this analysis as a target requirement. It should be noted also that Plan 13 would provide the best base if expansion of the Camp's capability beyond 140 railcars a day is ever required, in that this expansion could be attained simply by adding lighting for nighttime operations.

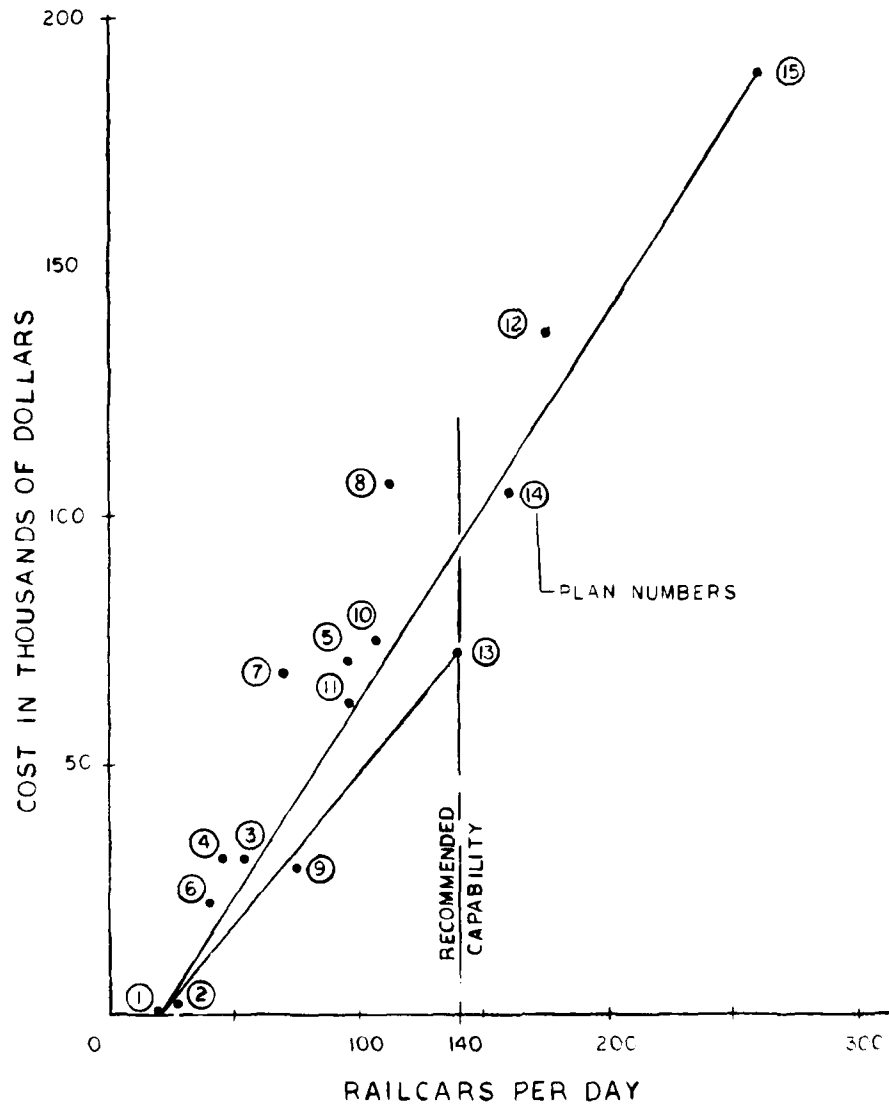


Figure 45. Cost Effectiveness of Rail System Improvements.

d. Revised Outloading Capability

If Plan 13 is implemented, Camp Roberts should be able to outload at least 140 railcars per day. This particular plan is recommended for several reasons. First, 140 railcars per day is quite an adequate capability for the level of operation this analysis assumed. Second, the amount of trackage reopened provides sufficient capacity for handling this number of cars without blocking the busy main line. Finally, the expansion of the Camp's capability beyond 140 railcars per day is best accomplished using Plan 13 as the base. By use of additional lighting for nighttime operations, Camp Roberts' capability can be revised well above what future plans may require; however, the most attractive alternative for probable requirements is Plan 13.

e. Recommended Physical Improvements

Improvement Plan 13 (see Figure 44), which best suits the needs required for rail outloading an armored brigade stationed at Camp Roberts, requires the following:

- (1) Reinstallation of the switch and trackage connecting the Southern Pacific's main line with Camp Roberts main garrison rail system, to include suitable electronic interconnection with the SPTC movement control system.
- (2) Acquisition of at least six 48-inch-high portable ramps of timber construction suitable for both semitrailer and railcar outloading.
- (3) Acquisition of 113 pairs of bridge plates.
- (4) Rehabilitation and maintenance of all the Camp Roberts track, except 2678, to include replacement of rotten ties, repair of surfacing (vertical continuity over short distances), control of weeds, drainage, and so forth.

Any improvement beyond that called for in Plan 13 would require additional lighting and possibly a new track constructed parallel and adjacent to track 2637.

f. Summary of Time and Costs

Costs of improvements presented in this section and listed in Figure 44 are estimates provided by the SPTC maintenance

chief for the Camp Roberts area and were arrived at following a walking inspection of all the track. A more detailed analysis of costs is recommended if real consideration is given to reactivating Camp Roberts. Plan 13 has the following cost elements:

- (1) Reinstall the entrance to the main garrison track - \$12,000 to \$18,000.
- (2) Repair the entire balloon track, 2670 - \$32,000.
- (3) Repair all auxiliary trackage, except 2678:

2671 - \$	5,000
2673 - \$	200
2674 - \$	1,500
2675 - \$	150
2676 - \$	4,000
2677 - \$	<u>4,000</u>
Total-	\$14,850

- (4) Construct six timber ramps for end loading at \$1,500 each - \$9,000. Total cost of Plan 13 - \$73,850.

B. ANALYSIS OF COMMERCIAL RAIL FACILITIES WITHIN 25 MILES OF CAMP ROBERTS AND FORT HUNTER LIGGETT

1. Camp Roberts

Passing tracks and sidings along the Southern Pacific Transportation Company main line within 25 miles of the Camp Roberts main gate were examined for vehicle outloading capabilities. The survey considered loading ramps, lighting, surface conditions near the tracks, possible staging areas, railcar storage capacity, and roadway accessibility. Commercially owned sidings, of which there are several, were not inspected; they are not normally available, they are usually of insufficient length, and their value is minimized by their location in congested areas.

The results of the survey, summarized in Table V, show that five of the eight sites examined are inadequate either to handle high-volume wheeled vehicular traffic effectively or to sustain continuous loadout missions. The use of any of these sites would not significantly improve loadout capabilities. In fact, such use probably would reduce overall loadout efficiency by removing

TABLE V
COMMERCIAL RAIL FACILITIES WITHIN 25 MILES OF CAMP ROBERTS AND FORT HUNTER LIGGETT

Location Fig 1 and Fig 46 Through 51	Road Distance From Camp Roberts (Miles)	Type of Trackage Available	Type of Ramps	Lighting	Surface Condition	Staging Area	Storage Capacity (Railcars 50-foot Lengths)	Road Access to Site and Possible Usage
Henry Fig 46	23	Passing storage	None	None	N/A	None	100	Good, but suitable for car storage only.
Templeton Fig 47	16	Passing storage	None	None	N/A	None	100	Good, but suitable for car storage only.
Paso Robles Fig 48	11	Spur passing storage	End (3 cars) Side (2 cars)	None	Good, graveled	Large, graveled	100+	Good - tanks have been unloaded here but timber ramp should not be relied on for volume loading.
Wellsona	6	Passing storage	None	None	N/A	None	100	Good, but suitable for car storage only.
Bradley	4	Passing	None	None	Good	None	100	Good
WUN Post	10	Storage	None	None	Good	None	100	Poor
San Ardo Fig 49	17	Passing storage	None	None	Good, graveled or paved	Large, graveled or paved	172	Good - west pass- ing track could be used for end load- ing with portable ramp and gravel to level over track access to ramp. Center track (ad- jacent to main line on east side), car storage only; too close to main line for loading. East- ernmost track could be used for end loading with port- able ramp, and gravel leveling course at ramp approach. Could be used in emergency for outloading.
San Miguel Fig 50 and Fig 51	2	Spur passing storage	None	None	Good, graveled or paved	Large, graveled or paved	84	Good - could end load on spur with portable ramp; some rough grading required plus gravel on tracks to level. Could end load on east pass- ing track with portable end ramp and gravel on track to level approach. West passing track too close to main line for loading; could be used for storage. <u>Best site for Camp Roberts in emergency.</u>

supervisory personnel, material-handling equipment, blocking and bracing apparatus, and teams from loadout operations in the Camp Roberts cantonment area. However, these five sites could be used to store approximately 500 railcars. Figures 46 and 47 are typical examples of the above-mentioned sites. The other three sites that were examined in detail have some potential for outloading military vehicles. Specific conditions and/or deficiencies of these three sites are:



Figure 46. Henry Siding, South of Atascadero. (It is used by the Southern Pacific for railcar storage.)

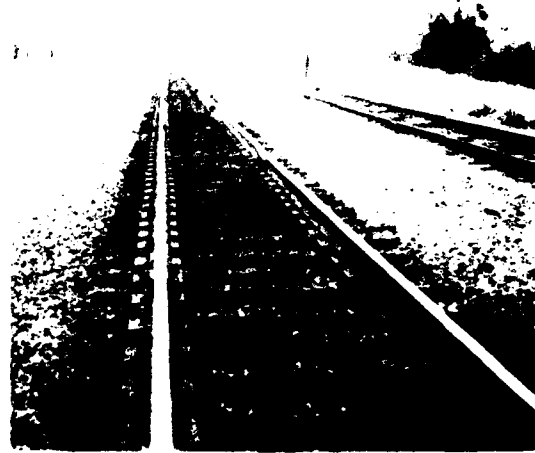
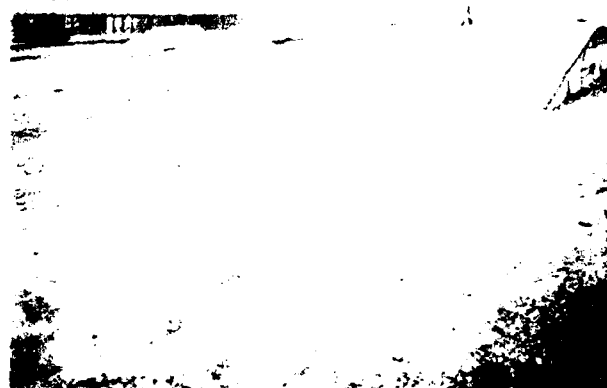


Figure 47. Templeton. (This site has a large storage capacity.)

- a. Paso Robles (Figure 48). Only a small number of vehicles could be outloaded here since the track leading to the ramp can hold only three railcars simultaneously. The timber ramp has been used to unload tanks occasionally; however, it should not be relied on for volume loading of heavy vehicles. No lighting is available, but surface conditions are good and staging areas are near the tracks.
- b. San Ardo (Figure 49). Two of the tracks at this site could be used to end load vehicles if portable ramps and a graveled leveling course at the ramp approach to cover the rails and ties were provided. No lighting is available, but surface conditions are good, access is good, and staging areas are large and are graveled or paved. This site could be used to outload vehicles in an emergency.



Figure 48. Paso Robles -
Storage Tracks and
Side- and End-
Loading Ramp on
One Spur.



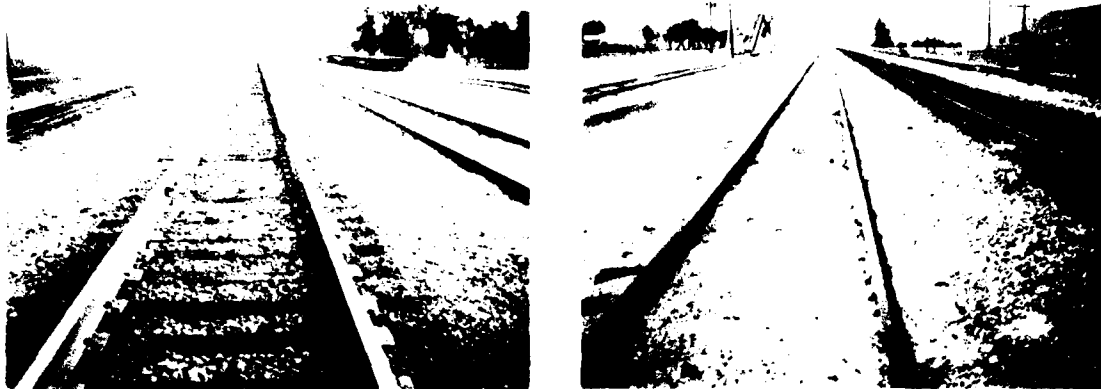


Figure 49. San Ardo. (This site has a large storage capacity; two tracks could be used with portable ramps to end load vehicles.)

- c. San Miguel (Figures 50 and 51). This is the best site for emergency use since it is only 2 miles from Camp Roberts and has two tracks, 2730 and 2735, that can be used with portable ramps to end load vehicles. Some rough grading would be required at the end of the spur, track 2735, and a graveled leveling course would be needed to cover rails and ties at the ramp approaches. No lighting is available, but surface conditions are good, access is good, and staging area is adequate.

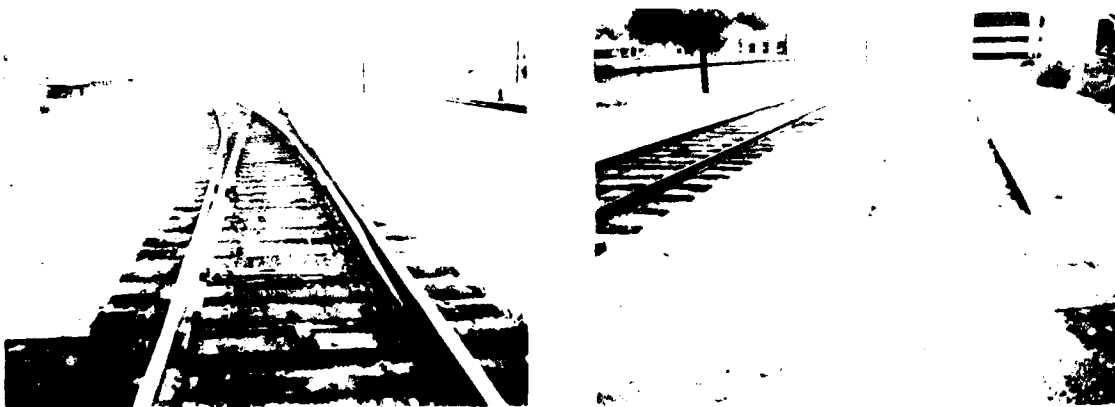


Figure 50. San Miguel - Closest Commercial Facility to Camp Roberts, 2 Miles. (Two tracks in photograph on right could be used with portable ramps to end load vehicles.)



Neither access to the highway system nor the system itself restrains motor outloading capability or movement of roadable military vehicles.

A survey of motor pools and other facilities that might have end-loading ramps for vehicles revealed four suitable ramps (Table VI). Number 1 is a concrete and earth ramp located at O Street and Avenue 70, east garrison, adjacent to the motor pool. This ramp is suitable for all types of vehicles and lowboy or standard height semitrailers; however, surface conditions are very poor (Figure 52). Number 2 (see Figures 35 and 36), a concrete ramp, is at the end of track 2673, main garrison. This is an excellent facility with a dock length of 246 feet (a 20-foot ramp on one end and a 40-foot ramp on the other) so that even large vehicles can be loaded onto semitrailers. This ramp is similar to ramp number 3 at the end of track 2675 (see Figure 38). Note that at ramp 3, shown in the bottom view, a large trailer has just been loaded onto a semitrailer. This dock length is 125 feet (a 20-foot ramp at one end and a 40-foot ramp at the other). Ramp 4, a concrete and earth ramp, is at the south end of B Street (Figure 53).

TABLE VI
VEHICLE END-LOADING RAMPS

Camp Roberts					
Ramp and Figure Number	Location	Type of Ramp	Surface Conditions	Staging	Access
1 Fig 52	East Garrison, O St and Ave 70	Concrete and earth	Sandy-silt, rough	No	Poor
2 Fig 35 and 36	Main Garrison, end of track 2673	Concrete	Excellent, graveled	Yes	Excellent
3 Fig 38	Main Garrison, end of track 2675	Concrete	Excellent, graveled	Yes	Excellent
4 Fig 53	Main Garrison, near south end of B St	Concrete and earth	Excellent, graveled	Yes	Excellent



Figure 52. Concrete and Earth Ramp,
O Street and 7th Avenue,
East Garrison.

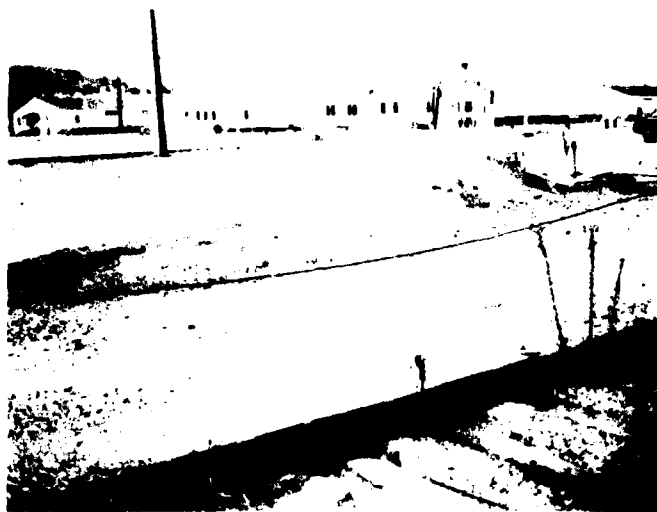


Figure 53. Concrete and Earth Ramp
Near the South End of B
Street.

b. Semitrailer Outloading

The procedure for loading could be as follows: A vehicle is driven up the ramp and onto the waiting semitrailer; temporary chocks are placed, and the loaded truck is driven slowly away from the ramp to a designated location where the loaded vehicle is secured with tiedown chains. The next semitrailer is backed up to the ramp, and the procedure is repeated. This procedure does not occupy the ramp while loaded vehicles are being secured. Using a conservative 60 minutes for each cycle, one semitrailer could be loaded per hour, per ramp or 10 vehicles per ramp per 10-hour shift. In most cases, 60 minutes would not be required; however, at the two large ramps, numbers 2 and 3, which have a total of 30 12-foot-wide positions for semitrailers, some maneuvering would be required for backing into the docks and for vehicles being outloaded. While there are 30 positions at the two large facilities, there are only 4 ramps leading to the load-out positions. The total number of 12-foot-wide semitrailer positions, including ramps 1 and 4, is 33; therefore, the existing motor outloading facilities would produce 330-semitrailer loads per 10-hour shift. It is apparent that Camp Roberts has more than adequate facilities for outloading probable volumes of semitrailers; however, ramps 2 and 3 could not be used concurrently with rail operations. Only three positions are available for concurrent operations, and it can be assumed that ramps 1 and 4 will not experience the same degree of congestion as ramps 2 and 3. Even if activity were to be doubled by use of a 30-minute cycle at these three positions, it would produce 60-semitrailer loads in a 10-hour shift without creating congestion.

It seems highly improbable that 330 commercial semitrailers could be obtained on any day; 60 a day is more reasonable.

Since the assumption has been made that an armored brigade will be stationed at Camp Roberts, semitrailer outloading is not a significant consideration. The brigade's heavy equipment will have to be shipped by rail under most circumstances and the Camp Roberts rail system is potentially capable of supporting major rail outloading operations.

2. Fort Hunter Liggett

The roadway system on this installation can accommodate the largest highway vehicles. County Road G18, which serves the

installation, is a two lane, paved road with a very low traffic volume. There are no access or other problems affecting highway movement of vehicles into or out of the installation.

A survey of the post revealed ramps suitable for end-loading vehicles onto semitrailers. The first (Figure 54), is located in the engineer equipment yard and is used for loading



Figure 54. Fort Hunter Liggett - Lowboy Loading Ramp in the Facilities Engineer Equipment Yard.

construction equipment on lowboy trailers. It is located in a congested area with poor access and, therefore, would not be suitable for volume outloading of equipment. The second (Figure 55), is located near an equipment yard and also is not suitable for volume outloading of equipment.



Figure 55. Fort Hunter Liggett - Semi-trailer Loading Ramp Near an Equipment Yard.

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MILITARY TRAFFIC MANAGEMENT COMMAND TRANSPORTATION EN--ETC F/6 15/5
RAIL AND MOTOR OUTLOADING CAPABILITY STUDY, FORT ORD, CAMP ROBE--ETC(U)
DEC 76 J H GRIER, W R SOMMERMEYER
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No volume outloading of equipment by highway from Fort Hunter Liggett is feasible with current facilities.

D. CONCLUSIONS

1. The Camp Roberts rail system is in generally fair condition. However, current rail outloading capability is severely limited since most of the system is not connected to the main line, and other necessary elements, such as outloading plans, bridge plates, and blocking and bracing materials, are lacking.
2. Due to the proximity of Camp Roberts to ocean and air terminals on the west coast, only nonroadable equipment would have to be outloaded by rail for the west coast POEs. However, all equipment would have to be outloaded by rail for gulf or east coast POEs.
3. Cost to improve the rail system to provide an outloading rate of 140 railcars per 24-hour day is estimated to be \$73,850. The maximum outloading rate achievable is 260 railcars per day, at a cost of \$188,850. At these rates, the brigade could be outloaded by rail in approximately 5 and 3 days, respectively.
4. Motor system outloading facilities at Camp Roberts are excellent and have more potential than is likely to be needed.
5. The actions indicated in section III, paragraph A 4e, "Recommended Physical Improvements," should be implemented at Camp Roberts to coincide with full activation of the brigade.
6. The SPTC has three sites within 25 miles of Camp Roberts that have some potential as outloading sites for roadable equipment.
7. There are no large classification yards within 25 miles of Camp Roberts; however, trackage in the vicinity of Paso Robles should be adequate for this purpose.
8. The SPTC has adequate railcar storage capacity to support a volume outloading of Camp Roberts units.
9. The SPTC trackage in the vicinity of Camp Roberts is in generally good condition.
10. During peak outloading of farm produce from the area, some of the SPTC and privately owned facilities would not be available

to supplement Camp Roberts outloading operations. However, responsible SPTC personnel believe that the SPTC can handle the outloading of Camp Roberts units concurrently with other demands.

11. In the event of an impending outloading operation, Camp Roberts transportation personnel should coordinate their planning with the SPTC at the earliest possible date.

E. RECOMMENDATIONS

1. Undertake those physical improvements described in section III, paragraph A 4c, and indicated in Figure 44, that will satisfy the option desired. Plan 13, which could produce 140 railcars per day without night operation, is recommended.
2. Prepare a detailed outloading plan specifying unit assignments at loadout sites and movement functions, using the simulation in Appendix E as an example, if a brigade is stationed at Camp Roberts.
3. Coordinate rail outloading plans with the Southern Pacific Transportation Company at the earliest possible date.
4. Initiate and/or continue with adequate routine maintenance to insure a continued effective rail system.
5. Arrange training for blocking and bracing crews, as well as stock materials and small hand tools, to provide for future contingency plans.
6. Use the SPTC tracks at San Miguel as a supplemental loading facility for roadable equipment. This site should be relied on only in extreme circumstances; portable ramps will be required.
7. Use the SPTC trackage at Paso Robles to classify incoming empty railcars to eliminate switching problems at Camp Roberts.

APPENDIX A

SOUTHERN PACIFIC TRANSPORTATION COMPANY TRACK INSPECTION REPORT

C
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SOUTHERN PACIFIC
TRANSPORTATION COMPANY
1707 Wood Street - Oakland, California 94607 - (415) 832-2121

C. L. MURDOCK
DIVISION ENGINEER
D. I. O'CALLAGHAN
ASST. DIVISION ENGINEER
J. T. HALL
ASST. DIVISION ENGINEER

February 19, 1976

IN REPLY PLEASE REFER TO
925322/349

Commander
7th Infantry Division
Fort Ord, CA. 93940

ATTN: D.I.O.

Commander:

This is in response to your request for track inspections illustrating actual conditions of all trackage owned by the U. S. Army and operated by Southern Pacific Transportation Company at Fort Ord, California.

Track inspection was made on January 28, 1976 by our Roadmaster, Mr. J. Castaneda, Watsonville, to evaluate all trackage in meeting our standards and of the Federal Railway Administration (F.R.A.).

Walkway, overhead and side clearance inspection was made on February 2, 1976 by Mr. N. F. Reed, Asst. Engineer, Oakland to check for violations of State of California, Public Utilities Commission General Orders 26D and 118.

Combined inspections are as follows:

Track No. 1043:

Switch point on turnout side is slightly open and in need of cleaning and graphiting. Switch target plate is nearly rusted thru and in need of replacement, along with switch headblock tie. Flag on turnout side has tight gauge and in need of regauging.

150' in advance of switch on left side is in need of Standard No. 6 of G. O. 118 level with top of ties. Near end of track on dock side, ballast was removed in spots leaving walkway rough and uneven. Weeds should be removed and controlled.

Track No. 1045:

Bolts on No. 1 rod are upside down and one nut is missing. Switch point is chipped and slightly open. No. 1 rod hits head block tie. Switch is also in need of cleaning and graphiting.

Along most of spur track on ocean side walkway has sloughed off and is in need of Standard No. 6 of G.O. 118 entire length of track. Brush and weeds should also be removed along track. At last power pole, wooden platform should be removed or ramped to eliminate tripping hazard. On left side, near end of track on dockside, walkway is rough and uneven and in need of leveling. Weeds and debris should also be removed from this general area.

Track No. 1040: Balloon Track

Angle bar bolts are missing in several joints and many more should be tightened. Numerous tie plates have rusted thru and must be replaced. Track is out of alignment about one pole length east of troop crossing. Surface is good but approximately forty ties should be changed in various spots.

Walkways on both sides of balloon track near switch No. 1045 at troop crossing has vehicle ruts, creating rough and uneven walkway and must be leveled. Ice plant, weeds and brush at several spots around entire track will have to be removed and controlled. At numerous locations walkways have sloughed away making holes and creating tripping hazards which must be filled to allow for Standard No. 1 of G.O. 118 150' beyond clearance point of easterly mainline switch to 150' in advance of track No. 1043 and 150' beyond clearance point of track No. 1043 to 150' in advance of clearance point of westerly mainline switch. Both sides at West (Compass Direction) troop crossing needs leveling of vehicular ruts. Near gate of westerly mainline switch walkway is rough and uneven and must be leveled.

Track No. 1032: Main Lead Track

In advance of black top, track is low and should be raised and leveled. Cracked angle bar just beyond switch No. 1033 is in need of replacement. A low spot is also evident opposite first pole east (RR) of crossing at 1st. and 11th Streets. Cannot properly evaluate condition of ties in paved areas but due to satisfactory gauge, track appears in generally good condition.

Debris should be removed from the walkways between initial switch and the paved area. Appears light vehicle or motorcycle ruts in same area has disturbed the walkways. Overhead wires near building T-2030 appears to be lower than the required 25' above top of rail. Another overhead wire near 8th St. also appears too low. Left side of main lead near end of paving a Cypress tree is hanging over the rail and should be trimmed back approximately 10' from centerline of curved track. Both sides of track in various spots ice plant should be removed from the walkways and controlled. Weeds in walkway near freeway sign "12th. St." should also be removed and controlled. On the right side near crossing Cypress trees are impaired and must be trimmed back. Left side just beyond crossing a curb was constructed

at impaired clearances and must be cut back to at least 9'6" from centerline on curved track. Left side beyond spot 3 a hole in paved area should be filled and leveled. On right side at building T-2701 a wooden hand rail was constructed on face of dock at impaired clearances and must be removed back at least 8'6" from centerline. Both sides of track from building T-2702 has another possibly impaired overhead communication wire that should be raised to be not lower than 25' above top of rail.

Track No. 1033:

Switch needs cleaning and graphiting. Track surface through curve appears poor and should be resurfaced. Approximately 30 ties should be changed but cannot accurately evaluate condition of ties due to paving.

Beyond paving on left side, a small tree must be removed from the walkway. Also on left side ice plant and weeds in the walkways should be removed and controlled along entire length of track. On the same side a Cypress tree is hanging over rail and must be trimmed back at least 9'6" from centerline of curved track. Both sides, oil has been dumped in walkway and should be screened and the practice stopped. On right side, conex boxes are placed or stored over nearest rail and must be kept back. On the same side two canisters placed in the walkway should be relocated to proper clearances.

Track No. 1034:

Switch mechanisms on both ends needs cleaning and graphiting.

Right side near switch 1036 dirt embankment should be cut down to top of rail and weeds removed to at least 9'6" from centerline of curved track. Right side between spots 6 & 7 wooden docks do not conform, creating a snag for trainmen and should be leveled. At same place a metal dock plate between docks should be secured to the top of the platform eliminating a tripping hazard. Wooden handrail atop dock at spot 26 should be removed.

Track No. 1036:

Switch points are wide but also need cleaning and graphiting.

On West (CD) end of building, platform steps are 8'4½" and should be relocated to at least 8'6" from centerline. Wooden pallets stacked between buildings T-2031 and T-2030 should be moved back to at least 8'6" from centerline of track. Wooden steps near pallets should be relocated back at least 8'6" from centerline, they measure approximately 7'3" at present. Steps at West (CD) end of platform are impaired 2" and should be relocated to at least 8'6" from centerline. Wooden steps on East (CD) end of building T-2034 are impaired 6" and on West (CD) end of platform are impaired 2". Face of concrete platform to building T-2035 is rough from recent concrete breakage and should be repaired. Wooden steps to platform of building T-2035 at its West (CD) end are impaired 1'4" and should be relocated. Packing crates atop dock of building T-2035 are at leading edge of dock and should be relocated and kept back 1' from edge.

NOTE: 3 overhead lights plus 2 additional single overhead wires appeared impaired and should be rechecked to conform to PUC GO 95 and 26D

Crossover between track Nos. 1036 and 1032; both switches need cleaning and graphiting.

Track No. 1037:

Need a new switch stand and target. Switch is very hard to throw. Throw rods need uncovering and switch needs cleaning and graphiting.

On left side between buildings 2712, 2713 & 2714, old landing mat in the walkways is sticking up in several places and should either be secured flat or removed, to eliminate a tripping hazard.

Kindly arrange for correction of above items at your earliest convenience. If problems or questions arise, please do not hesitate to contact this office for assistance.

Yours truly,

/s/ G. L. Murdock
/t/ G. L. Murdock
Division Engineer

APPENDIX B

RAIL OUTLOADING SIMULATION - FORT ORD

Maximum rail outloading operations utilize a simple cyclic schedule to minimize conflicts and improve control. Figure 56 illustrates the maximum outloading capability. All plans shown in the capability matrix work from the same basic idea, with less than maximum utilization requiring less effort and less cost.

The simulation begins with the assumption that it takes several days to accumulate the necessary railcars to start full-scale outloading operations. As these railcars arrive, the switching locomotive positions them at the designated loadout sites according to a preconceived plan. The equipment to be loaded aboard the cars is also being prepared and staged during this period, and loading, blocking, and bracing begins. The cyclic schedule starts when the cars at spurs 1043 and 1045 are ready to be pulled and shipped as shown in Figure 56. Some personnel should be used to throw switches and act as road guards to reduce delays. Using these parameters and the other assumptions in the rail system analysis, the maximum outloading capability has the following steps:

Daytime Schedule

1. The locomotive couples with the loaded railcars at spurs 1043 and 1045.
2. These 64 railcars are then deposited on the main line, south of track 1040, at about mile post 120.
3. The locomotive transits from there to the main line siding, 1030, and draws 64 empty railcars from the north end of the siding.
4. Once the cars are out of siding 1030, the locomotive pushes them south to 1043 and 1045 to replenish those empty spurs.
5. Having replenished the first two spurs, the locomotive then collects all loaded cars from the other sites, 1032, 1037, 1036, and 1033.
6. To push the cars south on the main line again, down to mile post 120, the locomotive now must circle the balloon track, 1040, to get into position.

FORT ORD, CALIFORNIA			
MAINLINE SERVICE			
DAYTIME SWITCHING LOCOMOTIVE			CPL 15, 1043 32
TRACK DESCRIPTION AND NUMBER	RAILCAR CAPACITY (50 LGS)	LIGHTS	
SPUR TRACK N°1043	32	⊙	TIME/H
SPUR TRACK N°1045	32	⊙	
SPUR TRACK N°1033	8	⊙	
SPUR TRACK N° 1036	26	⊙	
SIDING TRACK N°1034	26	⊙	
SPUR TRACK N°1032	16	⊙	
SPUR TRACK N°1037	10	⊙	
SIDING TRACK (EMPTY STORAGE ONLY) N°1030	91		-64-
MAINLINE SOUTH OF MP 120 (LOADED STORAGE ONLY)			- 0 -
MAINLINE NORTH OF MP 119 (EMPTY STORAGE ONLY)			-60-
TURNAROUND TRACK N°1040	88		
NIGHT TIME SWITCHING LOCOMOTIVE			CPL (20) 1043 32
*KEY TO TIME SCALE	OPERATION (TIME EXPENDED) LOCATION NO OF RAILCARS	EXAMPLE	CPL (20) MI 1043 32

Figure 56. Rail Outloading Simulation - Fort Ord.

RAIL OUTLOADING SIMULATION

POSSIBLE CONFLICT PERIOD

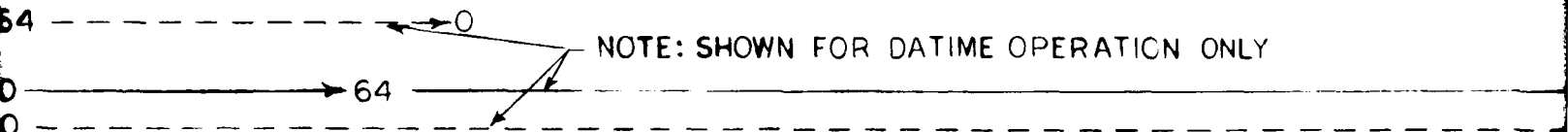
PL	TR	CPL	TR	UC	TR	CPL	TR	UC	TR	UC	TR	CPL	TR	CPL	TR	CPL	TR
(5)	(10)	(15)	(15)	(5)	(10)	(15)	(25)	(5)	(10)	(5)	(10)	(15)	(10)	(15)	(15)	(15)	(10)
43	1045	1045	MP120	20	1030	1030	1043	43	1045	45	1032	1032	1037	1037	1036	1036	1033
32	32	64	64	0	0	64	64	32	32	0	0	16	16	26	26	52	52

LOCOMOTIVE AND RAILCAR MOV

TIME/HRS → 1 2 3

LEFT CLEAR FOR INCOMING SUPPLIES AND DEFECTIVE RAILCARS

LONGEST DE



CPL	TR	CPL	TR	UC	TR	CPL	TR	UC	TR	UC	TR	CPL	TR	CPL
(20)	(10)	(20)	(15)	(5)	(20)	(20)	(25)	(5)	(10)	(5)	(20)	(20)	(10)	(20)
1043	1045	1045	MP120	20	1030	1030	1043	43	1045	45	1032	1032	1037	1037
32	32	64	64	0	0	64	64	32	32	0	0	16	16	26

CPL	LEGEND	CONT	CONT
(20) MIN	CPL COUPLE	DAY DEAD TIME	
1043	UC UNCOUPLE	NIGHT DEAD TIME	
32	TR TRANSIT	LOADED RAILCAR STORAGE	

TION

PLAN 8

CPL (15)	TR (10)	CPL (15)	TR (25)	UC (5)	TR (15)	CPL (15)	TR (35)	UC (5)	TR (10)	UC (5)	TR (10)	UC (5)	TR (10)	UC (5)	TR (10)	CYCLE RE
036 52	1 33 -2	1033 60	1033-40-MPI20 60	20 60	MP119 0	MP119 60	MP119 - 1037 60	37 50	1032 50	32 34	1036 34	32 8	1033 8	33 0	1043 0	

RAILCAR MOVEMENT*

4

5

6

NO NIG

LONGEST DEAD TIME IS 3 HRS 30 MIN-DAYTIME

LONGEST DEAD TIME IS 3 HRS 50

→ 124 116 240 RAILCARS PER DAY FOR \$87,725

→ 0

4

5

6

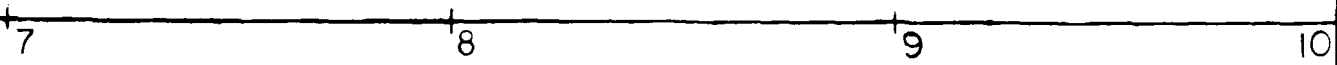
CPL	TR	UC	TR	CPL	TR	UC	TR	UC	TR
20 1037 26	(55) 1037 - 1040 - MP120 26	(5) 120 0	(25) MP 119 0	(20) MP119 26	(50) MP 119 - 1037 26	(5) 37 16	(10) 1032 16	(5) 32 0	(25) 103 0

CONT

EMPTY RAILCAR STORAGE
LIGHTED TRACK

DEAD TIME - TIME THAT CANNOT BE USED FOR LOADING
BLOCKING, BRACING OR INSPECTIONS.

CYCLE REPEATS - THREE HOURS-30 MIN LEEWAY
IN A 10 HOUR SCHEDULE



NO NIGHT TIME OPERATION FOR 1033 WITH ONE SWITCHING LOCOMOTIVE

HRS 50 MIN - NIGHT

7				8	9				10	
UC	TR	CPL	TR		UC	TR	CPL	TR	UC	TR
(5)	(25)	(20)	(50)		(5)	(25)	(20)	(30)	(5)	(15)
1036	1036		MP120		120	MP119	MP119	1036	36	1043
0	0	26	26		0	0	26	26	0	0

R LOADING,
TIONS.

7. After depositing the 60 loaded railcars at mile post 120, the locomotive must transit to the main line north of the siding at about mile post 119 to pick up empty cars.
8. The 60 empties then replenish the idle sites and the locomotive is free to start the cycle again at spurs 1043 and 1045.

This plan calls for temporary blockage of the main line with loaded railcars waiting for pick up. This procedure was approved by the railroad representatives, but it must be understood that it creates a considerable increase in the need for coordination between post and railroad officials.

The minimum time of 6 hours allowed in the simulation for loading, blocking, and bracing should be achieved by post crews even during hours of darkness without undue difficulty.

APPENDIX C

SPINS - SOUTHERN PACIFIC INDUSTRIAL NUMBERING SYSTEM

SPINS is a standard method of identifying industries and switching zones, tracks and consignee loading and unloading spots. By giving zones, tracks and spots certain designated numbers, we are able to print switch lists with the exact location to which a customer's car is to be spotted.

A SPINS number contains up to six digits. The first two digits indicate the zone to which the car is destined; the next two digits indicate the track number within the zone; the last two digits are the actual spot or coded spot.

Procedures listed below must be complied with in filling out the printed lists.

1. Cars properly spotted or placed: opposite each, show the letter "S" and write time placed to the nearest hour.
2. Cars not spotted according to list: opposite each, show "00" for off spot code, actual location-track and or where car was placed, and reason why car could not be spotted.
3. Cars pulled from the industry: opposite each, show the letter "P"; write the time to the nearest hour, if car is left in the industrial area, show track and time.

EXAMPLE: SPINS coded 473701 means that the car is for Zone 47, Track 37, Spot 01 on that track.

Zone and Track numbers appear on switch targets. Spot signs are placed where customers normally load or unload their cars.

Spot signs are 6" x 6" green metal signs with 4" white reflectorized numbers. These signs are placed at center of a car spot for spotting, if possible, from either side of car.

4. Respotted or switched car: opposite each, show the letter "R", new location (Zone, Track and Spot) of car, and write time to closest hour.
5. Write job number, date, name and on-duty time on all lists in space provided.
6. Any cars not shown on the printed lists and are pulled from an industry: write car initial and number, as well as track pulled from, on the Zone-Pull list.
7. Return finished printed spot and pull lists as soon as possible to instructed office.
8. If not furnished a spot and or pull list, then all cars switched must be listed on a Form 16 and turned in at instructed office.

SPOTTING CODES

- (*) Asterisk before and after a spot number indicates preferred spots.

SPECIAL SPOT NUMBER CODED
The last two digits of a SPINS number may convey a special meaning and are listed below:

- 90 Team track spotting
- 91 Storage track
- 92 Denotes industry will either do the switching or furnish a switch list
- 93 Crane spotting
- 94 Hopper dump

- 95 Dock spotting
- 96 Piggyback
- 97 Auto Ramp
- 98 Interchange to other railroads
- 99 Open area where not possible to put up spot signs
- 00 When a car cannot be spotted according to the switch list and is left off spot, 00 will be indicated on the returned list. If car is left on a track other than designated on list, Track number & Spot where car is left will be shown in addition to 00

LANDMARK SYMBOL LEGEND
Sheet 1

Note: Not to be used in place or instead of
Special Instructions or Timetable Bulletins

	Mile Post		Track Number
	Underpass		Gate
	Overpass		Overhead Door
	Bridge		Hopper or Pit
	Signal Bridge		Carpuller
	Loading - Unloading Spout		Proposed or Future Trackage
	Loading Rack		Interlocking Tower
	Ramp		Company Phone
	Overhead Crane		Break. Trackage continues With no diverging switches
	Foreign Railroad or Privately Operated Track		Beet Dump

APPENDIX D

RAILCAR SUPPLY

The following trends in flatcar supply are now operative and have been since the development of modern piggyback service in the mid 1950's:

1. The size of the flatcar fleet has been rising, both absolutely and relative to the size of the car fleet as a whole. This gain has been confined to specialized cars; for example, trailer-on-flatcar (TOFC), container-on-flatcar (COFC), bilevel, trilevel, and bulkhead flatcars.
2. The size of the general-purpose flatcar fleet has decreased, though average length and capacity have increased.
3. A majority of all flatcars are owned by car companies, not by the railroads. This makes for more flexibility in assignment, and this flexibility has resulted in improved utilization. There are fewer idle cars available for short notice use than there would be if railroad had to maintain an adequate supply for its own needs.

Considering these trends, the size of the various components of the specialized flatcar fleet, plus the blocking and bracing requirements of the various types of equipment to be shipped by rail, it does not appear prudent to express the needs and outloading plan of an installation using only general-purpose flatcars. The TOFC fleet, especially, is now large enough to make it likely that military requirements can be accommodated (Table VII). The COFC fleet has also expanded to the point that it could carry most of the military container movements, especially if one considers that COFC cars are used almost exclusively for import/export movements which are likely to be greatly disrupted in a mobilization period.

Accordingly, that portion of the outloading comprised of vans or containers should be planned for movement on TOFC cars. If the movement is to a port where ocean shipment will be by other than RORO vessel, the use of COFC cars should be discussed, though one cannot be confident of obtaining COFC cars in the quantity desired without disrupting civilian container movements.

TABLE VII
TRAILER TRAIN COMPANY FLEET

Trailer Train Company ownership of selected car types as contained in the April 1976 Official Railway Equipment Register. Trailer Train owns in excess of 95 percent of total US ownership of TOFC, COFC, and auto rack cars.

Type	Reporting Marks	Quantity
TOFC	*TTX	29,661
	TTAX	5,033 (see also COFC cars)
	GTTX	2,287
	LTXX	1,876
	XTXX	733
	Total	39,580

These cars each have a capacity of two 40-foot (nominal length) trailers. Some can handle one 40-foot and one 45-foot trailer. The XTXX cars also have the capability of transporting three 28-foot trailers.

COFC	TTAX	5,003 (see also TOFC cars)
	TTXX	708
	Total	5,741

Each car can handle four 20-foot container equivalents. Note that the TTAX cars can handle either containers or trailers and so are counted in both TOFC and COFC totals.

Bilevels	TTBX	4,333
	BTXX	2,776
	Total	7,109

Trilevels	TTXX	6,133
	RTXX	3,500
	KTTX	2,685
	TTRX	2,196
	ETTX	796
	Total	15,310

*Definitions of Trailer Train Company's reporting marks (all are flatcars)

TTX - Equipped with hitches and bridge plates for the transportation of trailers.
 TTAX - Equipped with movable foldaway container pedestals, knock-down hitches and bridge plates for transporting trailers or containers or combinations of both. (A = all).
 GTTX - Equipped with hitches and bridge plates for the transportation of trailers built by General American Transportation Corporation. (G = General)
 LTXX - Low deck (2' 8" or 2' 9" instead of 3' 6"), equipped with hitches and bridge plates. (L = Low)
 XTXX - Equipped with four hitches and bridge plates for the transportation of two trailers; one 45 foot and one 40 foot or three 28 foot trailers.
 TTXX - Equipped with movable foldaway container pedestals for transporting containers. (C = Container)
 BTXX - Equipped with bilevel auto racks furnished by member railroads. (B = bilevel)
 TTBX - Length 89' 4" or over, equipped with bilevel auto racks furnished by member railroads. (B = bilevel)
 TTKX - Length 89' 4" or over, equipped with hinged end trilevel auto racks furnished by member railroads.
 RTTX - Length 89' 4" or over, equipped with fixed trilevel auto racks furnished by member railroads.
 KTTX - Equipped with hinged end trilevel auto racks furnished by member railroads.
 TTRX - Equipped with fixed trilevel auto racks furnished by member railroads.
 ETXX - Equipped with fully enclosed trilevel auto racks furnished by member railroads. (E = enclosed).

Other cars in the specialized flatcar fleet are generally assigned to specific services or to a car pool for one shipper's exclusive use. Therefore, while these cars can save blocking and bracing and should be requested at the time of a specific move to the extent they can be profitably employed, the likelihood of obtaining the cars is not such as to base out-loading requirement on their use.

Factors affecting the use of specialized flatcars include:

1. First priority for use of general-purpose flatcars should be to load tracked vehicles and nonstandard wheeled vehicles-for example, artillery.
2. First priority for requesting specialized flatcars should be for TOFC and COFC cars to load vans and containers that otherwise would require very extensive blocking and bracing if they were moved on general-purpose cars.
3. TOFC and COFC cars require no blocking and bracing.
4. Bilevel and trilevel flatcars will require heavier chains and possibly different hooks to handle other than commercial specification vehicles.
5. Chain tiedown flatcars may require heavier chains depending on the loads for which they were designed.
6. Where TOFC cars must be loaded using a ramp rather than side or overhead loading, the number of cars at a ramp should be limited to about 10 because of the delay involved in backing the trailers down the length of the cars and returning with the tractor.
7. Where sufficient suitable aprons and MHE are available, it may be desirable to load containers directly onto COFC cars rather than place them on bogies and use TOFC cars.
8. If COFC or TOFC flats are not available, some blocking and bracing time and expense can be saved by using bulkhead flatcars to carry containers.
9. Bilevel and trilevel cars require, obviously, bilevel and trilevel ramps or other equipment as indicated in TM 55-625.
10. TOFC, COFC, bilevel, and trilevel cars average 89 feet long. TOFC cars can handle two 40-foot trailers or one 40-foot and one 45-foot trailer. COFC cars can handle four 20-foot container equivalents. Rack cars can accommodate four to seven vehicles per deck, depending on vehicle length and the number of tiedown chain sets.
11. Tracks used to store or load cars over 65 feet long should be reachable without going through curves exceeding 10-degree curvature; tracks used for cars between 55 and 65 feet should be reachable without going through curves exceeding 12-degree curvature.

APPENDIX E

RAIL OUTLOADING SIMULATION - CAMP ROBERTS

Simulation of full-scale rail operations at Camp Roberts revealed several restrictions. Main line activity in the area indicates that blocking this line with loaded or empty railcars would be highly objectionable; storage capacity on main line sidings 2650 and 2660 is limited to about 180 railcars. Spurs that actually have loading ramps, tracks 2637, 2673, and 2675, have a total capacity of 29 railcars only; and two of the long, straight tracks, tracks 2676 and 2677, are constricted in working area by warehouses, limiting their efficiency.

The recommended plan of operation, Plan 13, utilizes track 2670 along E Street, 2671/2674, 2673, 2675, and 2677 from main garrison, and both east garrison tracks, 2637 and 2639. Tracks 2670 along E Street, 2671/2674, 2677, and 2639 require a total of six portable ramps - the longer strings of railcars requiring two ramps each.

Initially all seven loadout sites have loaded cars on them that are ready to be moved off the installation. Using the above-designated loading sites and portable ramps, the simulation picks up operations at the moment when the switching locomotive starts pulling loaded railcars from those sites and proceeds as follows (Figure 57):

1. Railcars on tracks 2673, 2671/2674, and 2675 are pulled first. These 23 railcars are deposited at track 2676 to await main line service.
2. The switching locomotive then moves to track 2670 (1). At this point the main line locomotives have finished filling the main line sidings (2650 and 2660) with empty railcars. While the switching locomotive is picking up the 23 empties at 2670 (1) and refilling 2673, the main line locomotives move on to main garrison and proceed along track 2671 (2), which has not been refilled, to the north end of 2677.
3. The switching locomotive refills 2675 and 2671/2674 and proceeds to the main line sidings to await passage of the main line locomotives. During this period the main line locomotives couple with 113 loaded railcars on 2677, 2676, and 2670 (2).

CAMP ROBERT, CA

RAILROAD AND AIRPORT OPERATIONS ANALYSIS - SUMMARY

MAINLINE TRACKS

TRACK ASSIGNMENT - MAINLINE TRACKS

TRAIN SCHEDULE

TRAIN TRACK (SCHEDULE) N 26 37
TRAIN TRACK (SCHEDULE) N 26 39

MAINTENANCE TRAINS

EMPTY MAINTENANCE TRACK N 26 39
EMPTY MAINTENANCE TRACK N 26 39

MAINTENANCE TRAINS

EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39
EMPTY MAINTENANCE TRACK (SCHEDULE) N 26 39

KEY TO THE TIMING

LOCATION N 26 39
LOCATION N 26 39
LOCATION N 26 39
LOCATION N 26 39

Figure 57 - Rail Outloading Simulation - Plan 13

RAIL OUTLOADING SIMULATION

CPL (10)	TR (10)	CPL (10)	TR (10)	CPL (10)	TR (20)	UC (5)	TR (15)	CPL (15)	TR (10)	UC (5)	TR (10)	UC (5)	TR (10)	UC (5)	TR (15)	CPL (15)	WAITING FOR TO CLEAR T CHING, IN TA QUIRED FOR
2673	2674	2674	2675	2675	2676	76	2670①	2677②	2673	73	2675	75	2674	74	2650	2650	
6	6	21	21	23	23	C	O	23	23	17	17	15	15	C	C	C	

MAINLINE SERVICE FILLS THE SIDINGS
(2673-2676) WITH EMPTIES

TR (15)	CPL (15)	TR (10)	CPL (15)	TR (15)	CPL (15)	EXIT MAIN GARRISON
2677	2677	2676	2676	2670②	2670②	
C	45	45	64	64	13	

RAILCAR
CAPACITY
(CPLS)

TIME/HOURS

2

3

21
6

CC+
60+

100
63

3
5+

23

CNE

6

5

2

5+

5+

23

LONGEST DEAD TIME IS 3 HRS

LEGEND

CPL COUPLE
UC UNCOUPLE
TR TRANSIT

CONT

DEAD TIME (TIME THAT CANNOT BE USED FOR L
LOADED RAILCAR INVENTORY
EMPTY RAILCAR INVENTORY
TRACK SECTION INDICATOR

2

TR
(40)
1673
0

2 HRS 50 MIN LEEWAY BEFORE CYCLE REPEATS. THIS ALLOWS FOR COMPLICATIONS CAUSED BY A LACK OF COMMUNICATIONS OR COORDINATION; SINCE, DURING EACH CYCLE, ARRANGEMENTS MUST BE MADE FOR THE SWITCHING AND MAINLINE LOCOMOTIVES TO PASS EACH OTHER TWICE, ON THE MAIN GARRISON AND ON A MAINLINE PASSING TRACK.

7

8

9

10

4. The main line locomotives push the 113 railcars off the main garrison and then pull them north to the east garrison tracks.
5. The switching locomotive waits for the assembled railcars to pass the main line sidings and then finishes assignments in the main garrison by replenishing the empty sites, tracks 2670 (1) and (2) and 2677.
6. In the meantime, the main line locomotives have coupled with the railcars at east garrison and headed north.
7. The switching locomotive then replenishes the east garrison tracks and the cycle starts again whenever desired.

The overriding concern with rail operations of this type is that timing and coordination are critical and usually end up lacking to some extent. This simulation is one example of how operations can be run. It illustrates the what and how of planning that should be completed before initiating out-loading actions.

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