SECTION J
DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS
TABLE OF CONTENTS

ATTACHMENT J-1502000-01
DEFINITIONS AND ACRONYMS

DEFINITION	DESCRIPTION
CRANE, CATEGORY 1	Portal cranes, Hammerhead cranes, Locomotive cranes, Derricks, Floating cranes (YD), Tower cranes, Container cranes, Mobile cranes (except those indicated as category 4), including truck, cruiser, crawler, warehouse/industrial cranes, and cranes used for dragline, pile driving, clamshell, magnet, bucket work, and Aircraft crash cranes.
CRANE, CATEGORY 2 & 3	Cranes with rated capacities of 20,000 pounds or greater are category 2. Examples are Over head traveling cranes, Gantry cranes (rail mounted), Wall cranes, Jib cranes, Pillar cranes, Pillar jib cranes, Monorails and associated hoists, Fixed hoists, including chain falls. Pedestal mounted commercial boom assemblies (fixed length, telescoping, and articulating types) attached to stake trucks, trailers, flatbeds, or railcars, or stationary mounted to piers, etc., with OEM rated capacities less than 2,000 pounds.
CRANE, CATEGORY 4	Commercial truck mounted cranes, Truck mounted articulating boom cranes, Pedestal mounted commercial boom assemblies (fixed length, telescoping, and articulating types) attached to stake trucks, trailers, flatbeds, or railcars, or stationary mounted to piers, etc., with OEM rated capacities of 2,000 pounds and greater. Commercial truck mounted cranes and truck mounted articulating boom cranes with OEM capacities of 2,000 pounds and greater require a licensed operator even if the cranes are down rated below 2,000 pounds capacity for administrative purposes.
EQUIPMENT, COLLATERAL	Encompasses built-in and large substantially affixed equipment/property that is normally acquired and installed as part of a facility project.
EQUIPMENT, INSTALLED	Encompasses building-type equipment, built-in equipment, and large, substantially affixed equipment/property, and is normally acquired and installed as part of a facility project. Installed equipment is normally required to make a facility useful and operable. Removing such equipment would impair the usefulness, safety, or environment of the facility or the facility restoration work required after its removal, is substantial.
EQUIPMENT, PERSONAL PROPERTY	Personal property equipment includes all equipment other than collateral equipment. Such equipment, when acquired and used in a facility or a test apparatus, can be severed and removed aster erection or installation without substantial loss of value or damage thereto or to the premises where installed.
FACILITIES LIFE CYCLE	A facilities life cycle is divided into four stages, requirements (planning and design), acquisition (construction and acceptance), stewardship (operations, maintenance and repair), and disposal.
FACILITIES MAINTENANCE MANAGEMENT	The planning, prioritizing, organizing, controlling, reporting, evaluating, and adjusting of facilities maintenance operations to support the CNO/NAVFAC facilities policy and objectives and satisfy customers' facility needs. Defined by the International Facility Management Association as "the practice of coordinating the physical workplace with the people and work of the organization."

ATTACHMENT J-1502000-01
DEFINITIONS AND ACRONYMS

DEFINITION	DESCRIPTION
Integrated Maintenance Program (IMP)	IMP is a recurring state-of-the-art, reliability-centered inspection, testing, maintenance and repair program that determines best practices for managing the functions and consequences of failures of facilities equipment and system components. IMP encompasses accepted commercial practices, including reactive, preventive, predictive and proactive maintenance, into one optimal program. The IMP approach gives the Contractor full responsibility to maintain systems and equipment and perform repairs whenever necessary to ensure equipment and systems are operational and remain in a constant state of readiness. Service calls will not be issued for accomplishment of repairs on systems and equipment maintained under IMP.
LIFE-CYCLE COSTS	A form of economic analysis that considers the total cost of owning, operating, and maintaining a building or system over its useful life.
MAINTENANCE, PREVENTIVE	Maintenance designed to increase the availability of the facilities/equipment by reducing the number of unexpected breakdowns or service interruptions. It is any planned maintenance activity that improves equipment life and avoid any unplanned maintenance requirements.
MANAGEMENT INFORMATION SYSTEMS-MAINTENANCE	A computerized system that will provide sufficient information for management to evaluate differences between budgets and actual costs and evaluate performance.
REPAIR	Repair is the restoration of facilities or equipment to such a condition that it may be effectively utilized for its designated purposes by overhaul, reconstruction, or replacement of constituent parts or materials which have deteriorated by action of the elements or usage, and which have not been corrected through maintenance. This term also applies to replacement of the entire unit or system if beyond economical repair. The intent of repair is to have the equipment at normal working condition.
REPLACEMENT	Replacement, as a distinct work element, is confined to a program of planned replacement of a facility or its components. It may be further limited to major components such as air conditioning compressors, furnaces or hot water heaters. Replacement is performed when the equipment has reached the end of its useful life; when it no longer can perform due to degradation of its internal components and repair is no longer cost effective. Included under the replacement would be the major rebuilding of any component, since rebuilding also restores performance.
RESTORATION	Restoration of real property to such a condition that it can be used for its intended purpose. Includes repair or replacement work to restore facilities damaged by inadequate sustainment, excessive age, natural disaster, fire, accident or other causes.
SUSTAINMENT	Maintenance and repair activities necessary to keep a typical inventory of facilities in “normal working condition”. Sustainment includes regularly scheduled maintenance as well as cyclical major repairs or replacement of components that occur periodically over the expected service life of the facilities.

ATTACHMENT J-1502000-01
DEFINITIONS AND ACRONYMS

DEFINITION	DESCRIPTION
SERVICE ORDER	Any work required to return a facility, system, equipment or component to normal working condition. Service orders are minor facility problem requests or requests for other non-recurring work that is too small to be planned and estimated. The purpose of a service order is to provide the Government with a means of issuing work up to a defined liability limit for requirements occurring outside of the specified recurring work. The Government may utilize service orders to accomplish any work up to the respective liability limit based on the service order classification.
SERVICE ORDER CYCLE	Count down starts when the customer is notified that the work has been accepted to be accomplished to the time when the work chit is turned in by the craftsmen as complete is one complete cycle period for a service order.
SERVICE ORDER, EMERGENCY	Emergency is defined as any facility deficiency that immediately compromises the mission or life, health and safety. Always includes, but is not limited to, failure of any utility, fire protection, environmental control, or security alarm systems.
SERVICE ORDER, URGENT	Urgent is defined as any deficiency that does not immediately endanger personnel or property, but extended delays of repairs could result in damage to Government property, or soon affect the security, health, or well-being of personnel or the continued operation of a service or system.
SERVICE ORDER, ROUTINE	Routine is defined as any work requirement within the defined LOL that does not qualify as emergency or urgent.
WEIGHT HANDLING EQUIPMENT (WHE)	Weight handling equipment consists of cranes (e.g., portal cranes, jib cranes), rigging gear (e.g., slings, shackles), and associated equipment (e.g., portable hoists, dynamometers). For purposes of this technical sub-annex, WHE does not include mobile or transportable truck, crawler, and railway mounted locomotive cranes covered in 1700000 BSVE.

ATTACHMENT J-1502000-02
DEFINITIONS AND ACRONYMS

Acronym	**Title**
BPVC	Boiler and Pressure Vessel Code
HVAC	Heating, Ventilation, and Air Conditioning
RPIE	Real Property Inventory Equipment
SCADA	Supervisory Control And Data Acquisition
SRM	Sustainment, Restoration and Modernization
UFC	Unified Facilities Criteria
UPV	Unfired Pressure Vessel
VTE	Vertical Transportation Equipment

ATTACHMENT J-1502000-02
REFERENCES AND TECHNICAL DOCUMENTS

Refer to PDF Files: **J-1502000-02A UFC 4-860-03** **J-1502000-02B NAVFACINST 11230.1.**

ATTACHMENT J-1502000-03
SITE MAPS

SITE MAPS
Refer to PDF file entitled **J-1502000-03-PNSY SITE MAP**

PM REPORT - RAILROAD SWITCH TURNOUT COMPONENTS

WEEK ENDING: | | | |

CIRCLE ALL SWITCHES WHICH WERE WORKED ***Ensure each switch is returned to its original position upon completion of maintenance***

1 3 6 11 12 15 35 36 37 50 85 105 110 113

Switches

- Clean switch of dirt and debris
- Clean/rod out drains
- Lubricate areas of contact between switch castings and tongue
- Lubricate tongue pivot pin
- Lubricate all switch linkage except handle
- Inspect for proper adjustment and adjust as necessary
- Check condition of cover

General

- Clean all flangeways within the area of the turnout to remove accumulations of dirt and other debris
- Inspect areas adjacent to turnouts and note any drainage deficiencies. (Estimates to correct drainage deficiencies are not required)
- Notify the Government Representative to inspect the work and return to service

SWITCH NUMBER	***DEFICIENCY***	***EST REPAIR COST***	
		LABOR	***MATERIAL***

WORK PERFORMED BY (PLEASE PRINT):

SIGNATURE: DATE:

PM REPORT - CRANE SWITCH AND FROG COMPONENTS
WEEK ENDING: | | | |

CIRCLE ALL SWITCHES AND FROGS WHICH WERE WORKED. ***Ensure each switch and turntable frog is returned to its original position upon completion of maintenance.***

SWITCHES	*TURNTABLE FROGS*
38 55 56 61N 61S 76 77 79 81 83 84 104 106 117 118	F1 F21

Switches

- Disconnect switch linkage
- Remove tongue
- Clean/rod out drains unless solid clogs exist
- Thoroughly clean switch castings and tongue
- Lubricate contact areas between switch castings and tongue
- Lubricate tongue pivot pin
- Lubricate all switch linkage except handle
- Reassemble
- Adjust linkage for proper throw
- Check condition of cover
- Notify the Government Representative to inspect the work and return switch to service

Turntable Frogs

- Remove frog
- Thoroughly clean frog body and casting
- Clean/rod out drains unless solid clogs exist
- Lubricate areas of contact between frog body and casting
- Lubricate pivot pin and throw handle pivot point
- Reassemble
- Notify the Government Representative to inspect the work and return to service

General

- Clean all flange ways within the area of the switch and frog to remove accumulations of dirt and other debris
- Inspect areas adjacent to turnouts and note drainage deficiencies. (Estimates to correct general drainage deficiencies are not required)

SW/FROG NUMBER	***DEFICIENCY***	**EST REPAIR COST**	
		LABOR	***MATERIAL***

WORK PERFORMED BY (PLEASE PRINT):

SIGNATURE: DATE:

ATTACHMENT J-1502000-05
TRACKAGE AND COMPONENT MAPS

Refer to PDF Files:

J-1502000-05A East Crane Map Set

J-1502000-05B West Crane Map Set

J-1502000-05C Combined Trackage Railroad Map Set

J-1502000-05D DD 1 South

ATTACHMENT J-1502000-06
Historical Data

See Attachment J-1502000-06 Historical Data

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0002 Non-Recurring Work Price - Base Period
PROVIDE PRICES FOR FACILITY INVESTMENT - NON-RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 4
ELINs A700 through A706

ELIN	Product Name (120 Characters)	Description Extended	Estimated Quantity	Unit of Issue	Unit Price	Extended Price
A701	Urgent Service Calls	Urgent Service Calls	15	EA	$ -	$ -
A702	Laborer	Laborer Davis Bacon Act	410	LH	$ -	$ -
A703	Equipment Operator - Backhoe	Back Hoe Operator Davis Bacon Act	410	LH	$ -	$ -
A704	Welder	Welder Davis Bacon Act	410	LH	$ -	$ -
A705	Truck Driver	Truck Driver Davis Bacon Act	410	LH	$ -	$ -
A706	Material/ Equipment	Material/Equipment Costs	525,000	LS	$ 1.00	$ 525,000.00
		TOTAL NON-RECURRING PRICE BASE YEAR				***$ 525,000.00***

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0003 Recurring Work Price - First Option Period

PROVIDE PRICES FOR FACILITY INVESTMENT - RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 3 ELINs B001 through B006

ELIN /Sub ELIN	Description	Quantity	Unit of Issue	Unit Price	Total
B001	Urgent Service Orders, Spec item 3.1.1	3	EA	$0.00	$0.00
B002	PM Program, Spec Item 3.2	12	MO	$0.00	$0.00
B003	Emergency Service Orders, Weld Repairs, Spec Item 3.1.2	5	EA	$0.00	$0.00
B004	Urgent Service Orders, Weld Repairs, Spec item 3.1.3	5	EA	$0.00	$0.00
B005	Routine Service Orders, Weld Repairs, Spec item 3.1.4	10	EA	$0.00	$0.00
B006	Rail Flange Way Cleaning, Spec item 3.2	30,000	LF	$0.00	$0.00
	TOTAL RECURRING WORK LINE ITEMS			**TOTAL**	**$0.00**

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0004 Non-Recurring Work Price - First Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - NON-RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 4
ELINs B700 through B706

ELIN	Product Name (120 Characters)	Description Extended	Estimated Quantity	Unit of Issue	Unit Price	Extended Price
B701	Urgent Service Calls	Urgent Service Calls	15	EA	$ -	$ -
B702	Laborer	Laborer Davis Bacon Act	410	LH	$ -	$ -
B703	Equipment Operator -	Back Hoe Operator Davis Bacon Act	410	LH	$ -	$ -
B704	Welder	Welder Davis Bacon Act	410	LH	$ -	$ -
B705	Truck Driver	Truck Driver Davis Bacon Act	410	LH	$ -	$ -
B706	Material/ Equipment	Material/Equipment Costs	525,000	LS	$ 1.00	$ 525,000.00
		NON-RECURRING WORK PRICE OPTION YEAR 1				***$ 525,000.00***

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0005 Recurring Work Price - Second Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 3
ELINs C001 through C006

ELIN /Sub ELIN	Description	Quantity	Unit of Issue	Unit Price	Total
C001	Urgent Service Orders, Spec item 3.1.1	3	EA	$0.00	$0.00
C002	Preventative Maintainence Program Spec Item 3.2	12	MO	$0.00	$0.00
C003	Emergency Service Orders, Weld Repairs, Spec Item 3.1.2	5	EA	$0.00	$0.00
C004	Urgent Service Orders, Weld Repairs, Spec item 3.1.3	5	EA	$0.00	$0.00
C005	Routine Service Orders, Weld Repairs, Spec item 3.1.4	10	EA	$0.00	$0.00
C006	Rail Flange Way Cleaning, Spec item 3.2	30,000	LF	$0.00	$0.00
	TOTAL RECURRING WORK LINE ITEMS			**TOTAL**	**$0.00**

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0006 Non-Recurring Work Price - Second Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - NON-RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 4
ELINs C700 through C706

ELIN	Product Name (120 Characters)	Description Extended	Estimated Quantity	Unit of Issue	Unit Price	Extended Price
C701	Urgent Service Calls	Urgent Service Calls	15	EA	$ -	$ -
C702	Laborer	Laborer Davis Bacon Act	410	LH	$ -	$ -
C703	Equipment Operator -	Back Hoe Operator Davis Bacon Act	410	LH	$ -	$ -
C704	Welder	Welder Davis Bacon Act	410	LH	$ -	$ -
C705	Truck Driver	Truck Driver Davis Bacon Act	410	LH	$ -	$ -
C706	Material/ Equipment	Material/Equipment Costs	525,000	LS	$ 1.00	$ 525,000.00
		TOTALNON_RECURRING WORK PRICE OPTION YEAR 2				***$ 525,000.00***

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0008 Recurring Work Price - Third Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 3
ELINs D001 through D006

ELIN /Sub ELIN	Description	Quantity	Unit of Issue	Unit Price	Total
D001	Urgent Service Orders, Spec item 3.1.1	3	EA	$0.00	$0.00
D002	Preventative Maintainence Program Spec Item 3.2	12	MO	$0.00	$0.00
D003	Emergency Service Orders, Weld Repairs, Spec Item 3.1.2	5	EA	$0.00	$0.00
D004	Urgent Service Orders, Weld Repairs, Spec item 3.1.3	5	EA	$0.00	$0.00
D005	Routine Service Orders, Weld Repairs, Spec item 3.1.4	10	EA	$0.00	$0.00
D006	Rail Flange Way Cleaning, Spec item 3.2	30,000	LF	$0.00	$0.00
	TOTAL RECURRING WORK LINE ITEMS			**TOTAL**	**$0.00**

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0006 Non-Recurring Work Price - Third Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - NON-RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 4
ELINs D700 through D706

ELIN	Product Name (120 Characters)	Description Extended	Estimated Quantity	Unit of Issue	Unit Price	Extended Price
D701	Urgent Service Calls	Urgent Service Calls	15	EA	$ -	$ -
D702	Laborer	Laborer Davis Bacon Act	410	LH	$ -	$ -
D703	Equipment Operator -	Back Hoe Operator Davis Bacon Act	410	LH	$ -	$ -
D704	Welder	Welder Davis Bacon Act	410	LH	$ -	$ -
D705	Truck Driver	Truck Driver Davis Bacon Act	410	LH	$ -	$ -
D706	Material/ Equipment	Material/Equipment Costs	525,000	LS	$ 1.00	$ 525,000.00
		TOTAL NON_RECURRING WORK PRICE OPTION YEAR 3				***$ 525,000.00***

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0009 Recurring Work Price - Fourth Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 3
ELINs E001 through E006

ELIN /Sub ELIN	Description	Quantity	Unit of Issue	Unit Price	Total
E001	Urgent Service Orders, Spec item 3.1.1	3	EA	$0.00	$0.00
E002	Preventative Maintainence Program Spec Item 3.2	12	MO	$0.00	$0.00
E003	Emergency Service Orders, Weld Repairs, Spec Item 3.1.2	5	EA	$0.00	$0.00
E004	Urgent Service Orders, Weld Repairs, Spec item 3.1.3	5	EA	$0.00	$0.00
E005	Routine Service Orders, Weld Repairs, Spec item 3.1.4	10	EA	$0.00	$0.00
E006	Rail Flange Way Cleaning, Spec item 3.2	30,000	LF	$0.00	$0.00
	TOTAL RECURRING WORK LINE ITEMS			**TOTAL**	**$0.00**

ATTACHMENT J-0200000-09
EXHIBIT LINE ITEM NUMBERS
SOLICITATION/CONTRACT #N4008518R9509
EXHIBIT A - CLIN 9000

Line Item 0010 Non- Recurring Work Price - Fourth Option Period
PROVIDE PRICES FOR FACILITY INVESTMENT - NON-RECURRING WORK - IN ACCORDANCE WITH SECTION C, SPEC ITEM 4
ELINs E700 through E706

ELIN	Product Name (120 Characters)	Description Extended	Estimated Quantity	Unit of Issue	Unit Price	Extended Price
E701	Urgent Service Calls	Urgent Service Calls	15	EA	$ -	$ -
E702	Laborer	Laborer Davis Bacon Act	410	LH	$ -	$ -
E703	Equipment Operator -	Back Hoe Operator Davis Bacon Act	410	LH	$ -	$ -
E704	Welder	Welder Davis Bacon Act	410	LH	$ -	$ -
E705	Truck Driver	Truck Driver Davis Bacon Act	410	LH	$ -	$ -
E706	Material/ Equipment	Material/Equipment Costs	525,000	LS	$ 1.00	$ 525,000.00
		TOTAL NON_RECURRING PRICE OPTION YEAR 4				***$ 525,000.00***

AC	Acre
AM	Ampoule
AT	Assortment
AY	Assembly
BA	Ball
BD	Bundle
BE	Bale
BF	Board Foot
BG	Bag
BK	Book
BL	Barrel
BO	Bolt
BQ	Briquet
BR	Bar
BT	Bottle
BX	Box
CA	Cartridge
CB	Carboy
CC	Cubic Centimeter
CD	Cubic Yard
CE	Cone
CF	Cubic Foot
CG	Centigram
CI	Cubic Inch
CK	Cake
CL	Coil
CM	Centimeter
CN	Can
CO	Container
CU	Curie
CY	Cylinder
CZ	Cubic Meter
DA	Days
DC	Decagram
DE	Decimeter
DG	Decigram
DL	Deciliter
DM	Dram
DO	Dollars
DR	Drum
DW	Pennyweight
DZ	Dozen
EA	Each
EN	Each Collection
EX	Exposure
FD	Fold

FR	Frame
FT	Foot
FV	Five
FY	Fifty
GG	Great Gross
GI	Gill
GL	Gallon
GM	Gram
GN	Grain
GP	Group
GR	Gross
HD	Hundred
HF	Hundred Feet
HK	Hank
HP	Hundred Pounds
HR	Hours
HS	Hundred Square Feet
HW	Hundred Weight
HY	Hundred Yards
IN	Inch
JR	Jar
KG	Kilogram
KM	Kilometer
KR	Carat
KT	Kit
LB	Pound
LF	Linear Foot
LG	Length
LH	Labor Hours
LI	Liter
LM	Linear Meter
LO	Lot
LS	Lump Sum
LY	Linear Yard
MC	Thousand Cubic Feet
ME	Meal
MF	Thousand Feet
MG	Milligram
MI	Mile
ML	Milliliter
MM	Millimeter
MO	Months
MR	Meter
MX	Thousand
OT	Outfit
OZ	Ounce

PD	Pad
PG	Package
PI	Pillow
PM	Plate
PR	Pair
PT	Pint
PX	Pellet
PZ	Packet
QT	Quart
RA	Ration
RD	Round
RL	Reel
RM	Ream
RO	Roll
RX	Thousand Rounds
SB	Square Mile
SC	Square Centimeters
SD	Skid
SE	Set
SF	Square Foot
SH	Sheet
SI	Square Inch
SK	Skein
SL	Spool
SM	Square Meter
SO	Shot
SP	Strip
SQ	Square
SX	Stick
SY	Square Yard
TC	Truckload
TD	Twenty-Four
TE	Ten
TF	Twenty-Five
TG	Gross Ton
TN	Ton
TO	Troy Ounce
TS	Thirty-Six
TT	Tablet
TU	Tube
UN	Unit
US	US U.S.P Unit
VI	Vial
WK	Week
YD	Yard
YR	Years

SEG	Equipment	PM	Offset	Station		Aug	Oct	Dec	Feb	Apr	Jun
E Crane						Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending
SEG 1	Switch	SW34	Right	STA 11+032	Removed						
SEG 2	Switch	SW38	Right	STA 20+30		8/30/2021	10/30/2021	12/27/2021	2/23/2022		
	RIGID FROG	C1	LEFT	STA 19+33		X	X	X	X		
	RIGID FROG	C2	LEFT	STA 19+54		X	X	X	X		
SEG 3	Switch	SW83	Left	STA 25+14		8/30/2021	10/26/2021	12/27/2021	2/23/2022		
	Switch	SW84	Right	STA 25+14		8/30/2021	10/26/2021	12/27/2021	2/23/2022		
	Switch	SW56	RIGHT	STA 7+77		8/30/2021	10/27/2021	12/27/2021	2/24/2022		
	Rigid Frog	C1	LEFT	STA 8+59		X	X	X	X		
SEG 3	Switch	SW61N	RIGHT	STA 16+57		8/30/2021	10/26/2021	12/30/2021	**2/24/2022**		
	Switch	SW61S	LEFT	STA 16+57		8/30/2021	10/26/2021	12/30/2021	2/24/2022		
	RIGID FROG	C2	LEFT	STA 17+26		X	X	X	X		
	RIGID FROG	C3	LEFT	STA 17+36		X	X	X	X		
	RIGID FROG	C6	LEFT	STA 17+73		X	X	X	X		
	RIGID FROG	C7	LEFT	STA 17+81		X	X	X	X		
	RIGID FROG	C8	LEFT	STA 19+56		X	X	X	X		
	RIGID FROG	C11	RIGHT	STA 19+69		X	X	X	X		
	RIGID FROG	C12	LEFT	STA 19+84		X	X	X	X		
	RIGID FROG	C13	LEFT	STA 19+93		X	X	X	X		
	RIGID FROG	C14	RIGHT	STA 20+11		X	X	X	X		
	RIGID FROG	C15	RIGHT	STA 20+20		X	X	X	X		
	RIGID FROG	C16	LEFT	STA 20+23		X	X	X	X		
	RIGID FROG	C17	LEFT	STA 20+34		X	X	X	X		
	SWITCH	SW79	LEFT	STA 21+02		8/30/2021	10/26/2021	12/28/2021	2/24/2022		
	SWITCH	SW81	R	STA 21+02		8/30/2021	10/26/2021	12/28/2021	2/24/2022		
BTH 11 SPUR	SWITCH	SW61N	R	STA 0+00		8/30/2021	10/26/2021	12/28/2021	2/24/2022		
	SWITCH	SW61S	L	STA 0+00		8/30/2021	10/26/2021	12/28/2021	2/24/2022		
	RIGID FROG	C3	RIGHT	STA 0+81		X	X	X	X		
BTH 13 SPUR	SWITCH	SW79	RIGHT	STA 0+00		8/30/2021	10/27/2021	12/28/2021	2/23/2022		
	SWITCH	SW81	LEFT	STA 0+00		8/30/2021	10/27/2021	12/28/2021	2/23/2022		
Componenets	RIGID FROG	C16	LEFT	STA 0+80		X	X	X	X		
	RIGID FROG	C22	RIGHT	STA 31+14		X	X	X	X		
	RIGID FROG	C23	RIGHT	STA 31+21		X	X	X	X		
	RIGID FROG	C18	LEFT	STA 30+05		X	X	X	X		
	RIGID FROG	C19	LEFT	STA 30+11		X	X	X	X		
	RIGID FROG	C20	RIGHT	STA 30+16		X	X	X	X		
	RIGID FROG	C21	RIGHT	STA 30+20		X	X	X	X		
	TURNTABLE FROG	F21	RIGHT	STA 31+03		X	X	X	X		
	RIGID FROG	C22	RIGHT	STA 31+14		X	X	X	X		
	RIGID FROG	C23	RIGHT	STA 31+21		X	X	X	X		
	SWITCH	SW76	RIGHT	STA 31+76		8/30/2021	10/27/2021	12/28/2021	2/28/2022		
	SWITCH	SW77	LEFT	STA 31+76		8/30/2021	10/27/2021	12/28/2021	2/28/2022		
DD3 SPUR	SWITCH	SW76	LEFT	STA 0+00		8/30/2021	10/27/2021	12/28/2021	2/28/2022		
	SWITCH	SW77	RIGHT	STA 0+00		8/30/2021	10/27/2021	12/28/2021	2/28/2022		
	TURNTABLE FROG	F21	RIGHT	STA 0+74		8/30/2021	27-Oct	12/28/2021	2/28/2022		
	RIGID FROG	C24	LEFT	STA 0+89		X	X	X	X		
	RIGID FROG	C25	LEFT	STA 0+98		X	X	X	X		

RAIL SEGMENT	START LOCATION	STATION	END	STATION	TOTAL LENGTH	Ultrasonic	Flangeway	Flangeway	Flangeway	Flangeway	Flangeway
EAST CRANE SEGMENTS											
SEG 1	END OF TRACK	0+00	DD2-BERTH 6	14+83	1483	8/25/2018					
SEG 2	DD2-BERTH 6	14+83	SW 83 & 84	25+14	1031	8/24/2018					
SEG 3	SW 83 & 84	25+14	END OF TRACK	32+59	745	8/24/2018					
SPUR	SW 83 & 84	0+00	END OF TRACK	2+81	281	8/24/2018					

RAIL SEGMENT	START LOCATION	STATION	END	STATION	TOTAL LENGTH	Ultrasonic	Flangeway	Flangeway	Flangeway	Flangeway	Flangeway
West Crane											
SEG 1	END OF TRACK	0+00	SW 55 & 5	7+77	777	8/26/2018					
SEG 2	SW 55 & 56	7+77	SW 61S & (	16+57	880	8/26/2018		**Mar-22**			
SEG 3	SW 61S & 61N	16+57	SW 79 & 8	21+02	445	8/26/2018					
SEG 4	SW 79 & 81	21+02	SW 76 & 7	31+76	1074	8/26/2018					
SEG 5	SW 76 + 77	31+76	END OF TR	35+65	389	8/26/2018					
DD1 SPUR	SW 55 & 56	0+00	END OF TR	2+07	207	8/26/2018					
BTH 11 SPUR	SW 61S & 61N	0+00	END OF TR	4+78	478	8/26/2018					
BTH 13 SPUR	SW 79 & 81	0+00	END OF TR	4+71	471	8/26/2018					
DD3 SPUR	SW 76 + 77	0+00	END OF TR	2+56	256	8/26/2018					
Maineline Segment	1-6					8/25/2018					

Mainline Switch Rail Segments							
	Start	4th Week	4th Week	4th Week	4th Week	4th Week	
SEG 3	SW 01	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
SEG 5	SW03	8/30/2021	10/30/2021	12/30/2021	2/28/2022		Cleaned 9/8/21-12/28/21
SEG 6	SW06	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
SEG 8	SW10	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
SEG 9	SW11	8/30/2021	10/30/2021	12/30/2021	2/28/2022		Hinge Repair
	SW03	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
	SW06	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
	SW09	8/30/2021	10/30/2021	12/30/2021	2/28/2022		Removed 3/25/2022
	SW10	8/30/2021	10/30/2021	12/30/2021	2/28/2022		Removed 3/25/2022
	SW11	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
	SW12	8/30/2021	10/30/2021	12/30/2021	2/28/2022		
	SW15	8/30/2021	10/30/2021	12/30/2021	2/28/2022		

Update 3/22/22	
Crane Switches	11
T Frogs	2
Rail Switches	8

OPTION 3	N4008518D9509	MAINE TRACK MAINTENANCE		URGENT SERVICE ORDERS 3.1.1	EMERGENCY WELD REPAIRS 3.1.2	URGENT WELD REPAIRS 3.1.3	ROUTINE WELD REPAIRS 3.1.4	RAIL FLANGE WAY CLEANING 3.2.2
ITEMIZED SERVICE CALL ENTRIES INCLUDE MAXIMO			ELIN	D001	D003	D004	D005	D006
			QUANITY	3	10	10	30	30,000
			UNIT	EA	EA	EA	EA	LF
Start Date	Description	Completed						
9/20/2021	Flangeway cleaning Gate 1 (250Ft)	Completed 9/20/21						250
12/1/2021	Flangeway Main Seg 1-2 Deficiency	Completed 12/28/21						250
12/16/2021	Flangeway Main Seg 6-7 track 11 (500 Ft)	Completed 2/17/21						500
21-Mar	**Main Rail Seg 6. Remove Boxes 9,10,& Guts. Cold Pack. Cut Rods inbetween boxes and level. Hazard. S**	**Pending/Approved**				2		
21-Mar	**Install Springs into Switch 3**	**Pending/Approved**				2		
April 11-15	**Defect # 1222: East Crane: Seg 2 Sta 15+94R. End Batter Breakout**	**Tenative - WK 2nd/April**					**1**	
April 11-15	**Defect #1016 East Crane: Sta 19+77R: Railend Mismatch**						**1**	
April 11-15	**Defect# 1015 East Crane: Sta 20+16R, Crack on Railhead**						**1**	
April 11-15	**Defect#1100: East Crane Seg 1: Sta 3+50R Railhead mismatch**						**1**	
April 11-15	**Defect #1275: East Crane Seg 3: Sta30+37R Small gauges/possible plow damage**						**1**	
April 11-15	**Defect #1138: East Crane. Seg 3: Sta 30+37R Gauge in Rail (measurement)**						**1**	
April 11-15	**Defect#1276: East Crane Spur.Sta 2+50R Several small gauges**						**1**	
April 11-15	**Defect#1307: West Crane Seg 1. Sta. 07+34R Minor Weld repair**						**1**	
April 11-15	**Defect#1300: west Crane Sta. 33+40R. End Batter Breakout**						**1**	
April 11-15	**Defect # 1310: West Crane Seg 2. Sta 16+36R Tread wear At Joint Bar**						**1**	
April 11-15	**Defect #1023: West Crane. Seg 2. Sta 8+59L Crossing Points Worn Down**						**1**	
April 11-15	**Defect# 1113.West Crane Seg 3 . Sta 17+25L Crossing Points Worn down**						**1**	
April 11-15	**Defect #1313. West Crane. Sta 16+92L. Rail Head Breakout at Joint Bar**						**1**	
April 11-15	**Defect#532: Mainline Rail - Seg 6. Sta.43+80**						**1**	
April 11-15	**Defect#545: Mainline Rail - Sta 33+28**							
April 11-15	**Defect #911:**						**1**	
15-Apr	**Replace Spring In Switch 3 Spring Rod replacement is required and necessary for the install. W**	**Pending/Approval**			**4**			
15-Apr	**Defect "New"**	**Pending/Approval**					**1**	
			CALLS USED	0	4	4	16	1000
			CALLS REMAINING	3	6	6	14	29000

Items in Red not completed yet, but scheduled or pending approval

OPTION 2	N4008518D9509	MAINE TRACK MAINTENANCE		URGENT SERVICE ORDERS 3.1.1	EMERGENCY WELD REPAIRS 3.1.2	URGENT WELD REPAIRS 3.1.3	ROUTINE WELD REPAIRS 3.1.4	RAIL FLANGE WAY CLEANING 3.2.2
ITEMIZED SERVICE CALL ENTRIES INCLUDE MAXIMO			ELIN	C001	C003	C004	C005	C006
			QUANITY	3	10	10	30	30,000
			UNIT	EA	EA	EA	EA	LF
Start Date	Description	Completed						
9/25/2020	Frog 21 missing pin. Possible work stoppage			1				
2/4/2021	Flangeway cleaning for DD2							800
4/26/2021	Flangeway cleaning 7,800 Gate 1							7800
5/19/2021	Flangeway cleaning track 6,11,12							2500
6/2/2021	Flangeway cleaning 2,3,5,1,mainline							2920
6/28/2021	Gate 1 weld repair	Def 1128/1129					2	
6/29/2021	Building 154 weld repair	Def1159/1156					2	
6/29/2021	Building 171 weld repair	Def 1095					1	
			CALLS USED	1	0	0	5	14020
			CALLS REMAINING	2	10	10	25	15980

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
1322 PATTERSON AVENUE, SE, SUITE 1000
WASHINGTON NAVY YARD, DC 20374-5065

NAVFACINST 11230.1F
PWBL/FM&S/BSVE
24 February 2012

NAVFAC INSTRUCTION 11230.1F

From: Commander, Naval Facilities Engineering Command

Subj: INSPECTION, CERTIFICATION, AND AUDIT OF CRANE AND RAILROAD TRACKAGE

1. Purpose. To provide procedures for inspection, certification, sustainment and restoration management and audit of crane and railroad trackage. Additional requirements and tests for special purpose/hazardous load carrying trackage may be specified in other documents.

2. Cancellation. Replaces NAVFACINST 11230.1E of 10 Aug 2009 which is cancelled.

3. Background. Crane and railroad trackage is a valuable facility asset that needs to be maintained in a safe operating condition, ready for current use or future mobilization purposes, where required. Review of in-service trackage validates the need for inspection and sustainment criteria to assist in evaluating the physical condition and ensuring the safety of all crane and railroad trackage used in support of naval operations.

4. Action. All naval activities with crane (ground and elevated) and railroad trackage on plant account shall comply with the provisions of this instruction. Activities shall establish an inspection and sustainment program or affirm or modify their existing program to encompass the criteria herein and shall take coordinated action to ensure implementation of this instruction. Naval Facilities Engineering Command (NAVFACENGCOM) shall administer this program for the Chief of Naval Operations (CNO). Activities with Navy owned cranes operating on non-Navy trackage shall inspect and certify the trackage in accordance with this instruction, as required by NAVFAC P-307. NAVFACINST 11230.1F directs, based on RIE and risk based assessment, the audit schedule for 2 year audits, 4 year audits, and 6 year paperwork audits.

5. Scope. Criteria provided in this instruction establish minimum safety standards for track use. Standard operating procedures for track shall be maintained in accordance with criteria in Unified Facilities Criteria (UFC) 4-860-03 and herein to ensure safe use. This instruction is aligned with BMS B15.21, Trackage Audits.

6. Exceptions. Deviations from the standards set forth herein shall be submitted via the activity's region commander or major claimant to NAVFAC ESC for approval. Point of contact is Greg Ramsey, NAVFAC Trackage SME at (805) 982-5251.

J. C. WASHINGTON
Assistant Commander for Public Works

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LOCATOR CROSS-REFERENCE SHEET

Subj: INSPECTION, CERTIFICATION, AND AUDIT OF CRANE AND RAILROAD TRACKAGE

See: (Recipient enter information as to where this instruction is maintained.)

RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE	DATE ENTERED	BY WHOM ENTERED

INSPECTION, CERTIFICATION AND AUDIT
OF CRANE AND RAILROAD TRACKAGE

CONTENTS

ATTACHMENTS

REFERENCED DOCUMENTS

ANSI/ASNT CP189	2001 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel
AREMA Manual	American Railway Engineering and Maintenance-of-Way Association - Manual for Railway Engineering
DOT FRA Standards (CFR)	The Department of Transportation (DOT), Code of Federal Regulations Title 49 Transportation, Chapter II Federal Railroad Administration, Part 213 Track Safety Standards
DOT Highway Standards	The Department of Transportation (DOT), Code of Federal Regulations (CFR) Title 23 Highways, Part 650, Subpart C National Bridge Inspection Standards
NAVFAC MO-104.2	Specialized Underwater Facilities Inspection
NAVFAC MO-312.2	A Field Guide for The Receipt and Inspection of Treated Wood Products by Installation Personnel
NAVFAC MO-321	Facilities Management
NAVFAC MO-322 Vol I	Vol I: Inspection of Shore Facilities
NAVFAC MO-322 Vol II	Vol II: Inspection of Shore Facilities
NAVFAC P-300	Management of Transportation Equipment
NAVFAC P-301	Navy Railway Operating Handbook
NAVFAC P-307	Management of Weight Handling Equipment
OPNAVINST 5102.1D	Navy & Marine Corps Mishap and Safety Investigation, Reporting, and Record Keeping Manual
OPNAVINST 5100.23G	Navy Safety and Occupational Health (SOH) Program Manual
UFC 4-150-07	Maintenance of Waterfront Facilities
UFC 4-860-03	Railroad Track Maintenance & Safety Standards
UFC 4-152-01	Piers and Wharves
UFC 3-320-07N	Weight Handling Equipment
UFGS 05 12 00	Structural Steel
UFGS 34 11 00	Railroad Track and Accessories
UFGS 34 11 19.00 20	Welding Crane and Railroad Rail - Thermite Method
UFGS 41 22 13.33	Portal Crane Track Installation

INSPECTION, CERTIFICATION AND AUDIT OF CRANE AND RAILROAD TRACKAGE

SECTION 1. GENERAL

1.0 Railroad and crane trackage inspections, certifications and audits shall be performed at the frequencies and in the detail specified in this instruction. Where not specifically described in this instruction, the inspection and maintenance management program for trackage shall comply with appropriate NAVFAC Maintenance Manuals, including MO-321, MO-322, MO-103 and UFC 4-860-03 "Railroad Maintenance & Safety Track Standards". In general, inspections shall consist of observing the functioning of the trackage as related to safety, maintenance and design parameters. Examination will be by sight, sound, feel, instrumentation and non-destructive testing. Inspection, certification and audit of trackage includes rails, ties, subgrade, supports, foundations, drainage appendages and accessories. Primary emphasis shall be given to ensuring maximum safety by maintaining all facilities in a safe and sound condition. Since there is a difference in program or procedure, trackage is divided into three Major Trackage Systems as defined below and discussed separately herein.

1.0.1 RAILROAD TRACKAGE. Railroad trackage applies to all track systems used by engines/locomotives, railcars, locomotive cranes, or hi-rail trucks including narrow gage systems.

1.0.2 GROUND-LEVEL CRANE TRACKAGE. Ground-level crane trackage applies to tracks for all weight handling equipment that operates at an activity. This includes but is not limited to trackage systems for portal, gantry, and the ground level rail for semi-gantry cranes.

1.0.3 ELEVATED CRANE TRACKAGE. Elevated crane trackage applies to all trackage systems attached to or suspended from side walls, columns, buildings, roofs or separate superstructures. This includes trackage for overhead or bridge cranes, wall cranes, and semi-gantry cranes.

NOTES: 1. Rail inspections for monorails; jib crane rails; "H" Beam, "I" Beam, or other structural steel shape rail supporting underhung crane systems; and trolley trackage for jib or other type hoists are conducted by the crane inspector in accordance with NAVFAC P-307. Guidelines for inspection, certification and audit for these types of rail systems are not included in this instruction. Top running cranes using rubber tires running directly on I-beam or other steel shapes are also not covered.

2. Top running bridge cranes with single or double flanged steel wheels operating on steel shapes such as square, rectangular or triangular rails shall be inspected and certified in accordance with this instruction, but specific inspection requirements for the rail fastening and joining shall be developed locally based on the engineering design guidance.

3. When there is a Navy crane, that requires certification in accordance with NAVFAC P-307, operating on track that is not on Navy plant account, the trackage system will be inspected and certified in accordance with the provisions of this instruction.

4. Rail systems used for stacker cranes are not included in this program. Stacker cranes and associated runway systems are procured as Class 3 property. Large cab operated stacker cranes are inspected and certified in accordance with MO-118, “Vertical Transportation Equipment”.

5. Rail systems used by fixed load bridge systems, typically X-ray units, may be part of the Class 2 property plant account but the bridge is not a considered weight handling equipment in accordance with P-307. These trackage systems shall be inspected and certified in accordance with this instruction.

1.1 INSPECTION. Inspection and testing of trackage shall be performed by qualified activity personnel or by contract with assistance of Naval Facilities Engineering Service Center (NAVFAC ESC) personnel when requested. The responsibility for providing qualified trackage inspection is typically assigned to a Public Works Department of a Regional Facilities Engineering Command (FEC) or a weight handling department of commands not aligned with NAVFACENGCOM. Inspectors may designate a proposed degree-of-hazard (catastrophic, critical, or marginal) of a section or subsystem based on criteria contained herein and their judgment. Where there is any doubt regarding the seriousness of a defect, or a questionable safety condition, all use shall be stopped over the section of trackage involved until the deficiencies are corrected or until safe use is determined (see paragraph 1.3). Deficiencies designated as "catastrophic" or "critical" by inspection personnel shall be evaluated by the cognizant engineering or facilities management organization to determine corrective action and interim precautionary measures including "non-certification" or "restricted certification." Inspections shall be conducted according to the interval stated herein or more often when deemed necessary by the work supervisor or as directed by the Certifying Official.

1.2 TRACK INSPECTORS QUALIFICATIONS. Track Inspectors are responsible for conducting safety inspections (paragraphs 2.1.3, 3.1.3 and 4.1.3) and detailed inspections (paragraphs 2.1.4, 3.1.4, and 4.1.4) including visual and operational inspections. These inspections are more inclusive and exacting than scheduled maintenance inspections and shall be conducted by trained personnel. The Certifying Official shall designate qualified persons to inspect track for defects. Each person designated must have:

(1) At least -

(a) 1 year of experience as an inspector working under the tutelage of a qualified experienced inspector performing normal track inspection duties at assigned activity.

and

(b) Attended NAVFACENGCOM Trackage Inspector Training Course or any equivalent course offered by the private industry or other government agencies. Activities with local crane training programs may offer an elevated crane trackage inspector training course for their track inspectors, if the course training plan is approved and the instructor is authorized by NAVFAC ESC OP64. The course instructor shall have attended the NAVFACENGCOM

elevated crane trackage course at least every five years. Activities providing local elevated crane track inspector training shall provide a list of attendees (name/position/code/telephone number) at the completion of each course to NAVFAC ESC.

(2) Attend a refresher course in 1b above at least once every five years.
(3) Demonstrates to the Certifying Official that as an inspector -
  (a) Knows and understands the requirements of this instruction and the Federal Railroad Administration (FRA) Track Safety Standards.
  (b) Can detect deviations from those requirements; and
  (c) Can prescribe appropriate remedial action to correct or safely compensate for those deviations.
(4) The designation of the track inspector(s) by the Certifying Official shall be in writing and include the basis for each designation. Basis of designation, as a minimum, shall include number of years of experience and dates the training course was attended to show that qualifications have been met and are current. In addition, the Certifying Official shall provide written authorization to the track inspector to prescribe remedial actions to correct or safely compensate for deviations from the requirements of this instruction.

1.3 CERTIFICATION. All in-service trackage shall have a current certification according to one of the classifications shown herein, signed and dated by the Certifying Official. All out of service trackage shall be documented as non-certified for use or documented by the Certifying Official that it is inactive status. Certification shall be made and documented at intervals not to exceed two years. The two year interval for track certification and operational inspection (paragraph 4.1.4.3) for elevated crane trackage may be based on the crane certification date at the discretion of the Certifying Official as long as it does not exceed the track certification date by over 45 days. The track certification shall indicate the date of crane certification. Also see paragraph 1.3.1 regarding extension of certification. Current and previous certification for each section of trackage shall be readily maintained on file. Restrictions for restricted certification shall be documented and on file. Inspection methods and tests described or referenced herein shall be used as the basis for trackage certification. At any time during the two year period of the certification, the annual visual or two/five year operational inspections become over due, the certification will be cancelled in accordance with paragraph 1.3.4. At which time overdue inspection(s) are accomplished, certification/recertification will be in accordance with paragraph 1.3.4. Attachments (2-2), (3-2) and (4-2) provide minimum requirements for a certification documents for each of the three major trackage systems and may be used; however, activities have the option to use locally developed forms. For inactive trackage or trackage used infrequently, certification may be performed just prior to use. When there is any doubt as to the degree-of-hazard over a given section of trackage, a certification shall not be given until a detailed investigation and engineering evaluation have been completed to determine whether or not the section of trackage involved can be certified safe, or whether or not restricted operations may continue pending restoration.

1.3.1 Extension of Certification. Tracks with a Full Certification may have the certification extended for a period not to exceed 30 days for railroad and ground level crane track and a

period not to exceed 45 days (corresponds with extension allowed for cranes in accordance with the P-307) for elevated crane track. The Certifying Official shall document the length of certification extension in writing. In addition to requiring a full certification for track certification to be extended, the following shall apply:

a. Track shall have a current detailed inspection within two weeks prior to extension;

b. Elevated crane track shall receive a "No load test" in accordance with paragraph 4.1.4.3.2 of this document and Appendix E, NAVFAC P-307.

c. Track shall have been active and seen normal use during the certification period and

d. There shall be no indication of subgrade or support structure degradation.

1.3.2 Certifying Official. The Certifying Official shall:

(1) Be designated as responsible for the sustainment/restoration and inspection of trackage, in writing, by the Commanding Officer of the regional FEC or local activity Commanding Officer. Alternate Certifying Official(s) may also be designated, in writing to act in the absence of the Certifying Official. Routinely, certification shall be made by the Certifying Official. The alternate Certifying Official should only certify track due to lengthy absence of the Certifying Official or when production delays would occur. The Certifying Official shall be made aware of all certifications performed during the Certifying Official's absence

(2) Approve all certifications.

(3) Be responsible for safety and shall insure the visual supervision of each operation over the defective sections when necessary to use non-certified trackage.

(4) Insure a visual examination of the cause of non-certification is accomplished prior to use to determine if the trackage can be used for emergency or temporary traffic.

(5) Indicate, in writing, mandatory precautions and restrictions to be enforced when a section of restricted or non-certified trackage is used.

(6) Delegate the authority to visually supervise movement on noncertified trackage, except for movement of hazardous or nuclear material, provided that defects have been examined to ensure they have not progressed or changed and that occasional movements can be made safely. The Certifying Official shall supervise movement on non-certified trackage of hazardous or nuclear material.

1.3.3 Certification Classifications

1.3.3.1 Full Certification. Trackage systems with minor deficiencies classified as "marginal" (paragraph 1.4.3) or no defect may be fully certified for all operations. These sections shall be repaired, when practical, during regularly scheduled track work operations. Records of un-repaired marginal rail defects and substandard trackage shall be kept current and the trackage

continually observed during all future inspections to identify any further degradation which might result in "critical" defects.

1.3.3.2 Restricted Certification. Trackage systems with "Critical" rail defects (paragraph 1.4.2) or potentially dangerous sections of trackage may be scheduled for restricted operation at the discretion of the Certifying Official, provided FRA Trackage Safety Standards Paragraph 213.113 is complied with or all of the following actions are taken:

(1) Replacement or repair is scheduled.

(2) Deficient areas are clearly and specifically marked with warning signs when practical, or specified in written instructions and restrictions.

(3) Operators are informed to proceed with extreme caution.

(4) Reduced speed operation is approved following an engineering inspection.

(5) Defect or defects are carefully reinspected during safety inspections at intervals prescribed by FRA or intervals of not more than every six months, whichever is less. (For infrequently used trackage, inspections may be made just prior to use.)

1.3.3.3 Non-Certification. Trackage systems which have "catastrophic" rail defects (paragraph 1.4.1) or dangerous sections of trackage shall not be certified. Usage shall be stopped until the section or sections of trackage have been repaired or replaced and certified. Emergency use of non-certified trackage is discussed in paragraph 1.3.2. Sections of trackage that are defective, damaged, misaligned or otherwise failing to meet the standards established in the FRA Track Safety Standards or this instruction shall be barricaded or marked with warning signs when practical and service shall be discontinued. When a catastrophic defect is found which cancels the certification of a specific section of track, service shall be discontinued over the defect and the problem area shall be isolated with barricades when practical. In addition to discontinuing service and isolating the problem area, the following actions shall be done to ensure maximum safety:

(1) Advise all concerned.

(2) When repaired, re-examine the specific section of trackage. An operational inspection is not a mandatory action. (See paragraphs 2.1.4.2.4, 3.1.4.2.3, and 4.1.4.3.3)

(3) Recertify the repaired section. (See paragraph 1.3.4)

(4) Update documentation to reflect defects, repair(s) made, reinspection, and recertification.

1.3.4 Cancelled Certification. Tests or inspections made between certifications that indicate previously unreported catastrophic defects, critical defects or other unsafe conditions shall automatically cancel certification over the specific section of trackage involved. The term "specific section" refers to the immediate area in which a defect occurs and not to the entire section of trackage certified. The certification of trackage on either side of such a defect may remain as classified at the discretion of the Certifying Official. If the new defect does not change the certification classification, the certification should not be changed. For example: If a critical

defect is discovered in a section of trackage with restricted certification, the certification remains the same and is not cancelled. If the defect found would require a more restrictive certification than the entire section of trackage under certification, the certification over the specific section would change and appropriate actions, as discussed above, taken. This change in certification shall be documented and made known to the Certifying Official. The method used to remove the specific section of trackage from service is an activity option, provided all defects are recorded in history files and users of subject trackage are apprised of trackage defects and special precaution to take while using. Upon completion of investigation and temporary or permanent restoration, the specific section shall be reinspected. If the classification of certification is the same as for the entire section, the exception for the specific section involved may be cancelled and the original certification used.

1.4 Trackage Defect Classification. Defect hazards are grouped into three categories - (1) Catastrophic, (2) Critical, and (3) Marginal. These categories are as recommended in MIL-STD 882D. Defects are listed in the hazard category in which they normally occur. Exceptions and variations are expected; therefore, experience or engineering judgment must be used to determine the degree of hazard for each defect. Guidelines to assist inspectors and certifying officials in determining the degree of hazard of a defect are described below and summarized in Attachments (2-1), (3-1) and (4-1).

1.4.1 "Catastrophic". Sections of trackage with catastrophic defects involved shall not be used until repaired, except as noted in paragraph 1.3.3.3. Catastrophic defects include unsafe track conditions based on engineering judgment and experience, and defects requiring immediate change out of rail. The following defects are considered catastrophic and all traffic shall be stopped until repairs are made:

(1) Any breakout in the railhead.
(Exception as detailed in Note 6, Attachment (3-1), for ground level crane rail.)
(2) Rail defects accumulating three feet or more in any l0 feet.
(3) Broken base exceeding six inches.
(4) For railroad trackage any defect exceeding FRA Class 1 Track Safety Standards, catastrophic defects listed in Attachment 2-1, or “no operation” defects listed in UFC 4-860-03.

Specific criteria for evaluating the consequences of defects outside the range designated as critical for crane rail are not available. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience. Temporary or emergency repair of defective rails may reduce the degree-of-hazard to critical, marginal or no defect depending on the severity of the defect.

1.4.2 "Critical". Trackage with critical defects may continue in use provided that all actions addressed in paragraph 1.3.3.2 are complied with. Any defect exceeding FRA Class 2 Track Safety Standards or “restricted operation” defects addressed in UFC 4-860-03 are considered critical. Guidelines for classifying critical defects are provided in Attachments (2-1), (3-1) and (4-1).

1.4.3 "Marginal". Marginal defects are deficiencies that will not cause damage to the trackage system or operating equipment, or endanger personnel safety and that should be scheduled for routine sustainment and restoration. The intent in recording marginal or minor defects is to ensure that defects which may grow are monitored. In accordance with Note 8, Attachment (2-1) and Note 5, Attachments (3-1) and (4-1), certain internal rail defects may be categorized as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing.

1.5 AUDIT. Naval Facilities Engineering Service Center (NAVFAC ESC) shall schedule and conduct audits of maintenance management of trackage at each activity.

1.5.1 Purpose. The audit evaluates the effectiveness of trackage management at each activity, including Sustainment, Restoration, and Modernization (SRM), to ensure the safety and reliability of the facility's trackage and to furnish the activity and claimant with an appraisal of the track management program. The audit team shall review procedures and make recommendations for improving trackage management. Portions of the trackage system shall be inspected and results compared with the activity's inspections. The audit will be directed to affirm that the trackage management, including certification programs, is being conducted in a satisfactory manner and that activity instructions on implementation are adequate.

1.5.2 Frequency and Method,

1.5.2.1 On-site audits shall be conducted at two-year intervals for trackage in any of the following categories:
- Railroad trackage that does not have RAILER implemented and used for trackage management.
- Railroad trackage that handles nuclear material or ordnance.
- Trackage supporting Category 1 cranes with curves.
- Trackage supporting Category 1 cranes with critical or catastrophic defects at the last audit.

1.5.2.2 On-site audits shall be conducted at four-year intervals for trackage in any of the following categories:
- Railroad trackage that does not require audits at two-year intervals under paragraph 1.5.2.1.
- Trackage supporting Category 1 cranes that does not require audits at two-year intervals under paragraph 1.5.2.1.
- Trackage supporting Category 2 cranes.
- Trackage supporting Category 3 cranes handling nuclear material.

1.5.2.3 Paperwork review only audits, shall be scheduled at six-year intervals and conducted at NAVFAC ESC for trackage supporting Category 3 cranes that do not require audits at four-year intervals under paragraph 1.5.2.2. On-site audits shall be scheduled when any of the following criteria are met:
- The activity is new to the trackage program or has never had an audit for any reason.
- The activity has only one inspector and the inspector has not had one year of experience under a designated inspector at that activity.
- The audit records review indicates there are significant documentation errors such as

- 20% of cranes have had a defaulted certification within the last four years.
- 20% of records are missing signatures, inspections are not recorded or similar defects
- The NAVFAC Crane Center notes they have concerns with the rail system.

1.5.2.4 Activities with trackage supporting a mixture of Category 2 and Category 3 cranes shall be audited at the required Category 2 frequency unless their Category 2 inventory is less than 20% of the total inventory, the Category 2 cranes are infrequently used and an activity requests the lower frequency.

1.5.2.5 NAVFAC ESC may conduct audits more frequently when requested by the cognizant Navy Region or systems command, when previous audits recommend additional follow-up, or when any audit reveals that the trackage maintenance management program at an activity is not satisfactory.

1.5.3 Reports. A report on the effectiveness and adequacy of the program shall be forwarded to the cognizant Navy Region, FEC, activity Commanding Officer and system command within 45 calendar days after completion of the audit.

1.5.4 Non-Certification of Trackage. If during the performance of an audit or other track inspection the auditor determines that a serious catastrophic defect exists in any portion of the trackage and the activity is not taking appropriate measures and/or the trackage maintenance and inspection program is so poor that continued operation of the trackage is unsafe, the auditor shall issue a Trackage Audit Non-Certification form covering the affected portion, segment, track or system. The activity shall cease all operation over the identified trackage until repairs are made and the activity certifies to NAVFAC ESC that the track is now safe for use.

1.5.5 Activity Coordination. Schedules of audits will be coordinated with the activity to be audited and the activity formally notified. The activity's cognizant Navy Region, FEC, Commanding Officer and system command shall be advised of the dates that the audit will be conducted. Activities shall submit the following records in PDF format not less than 30 days before the audit to NAVFAC ESC: mishap reports, inventory, inspection reports, certification documents and other related information. Refer to NAVFAC BMS B15.21 Trackage Audits or NAVFAC ESC for the most current and complete list. To establish credibility of documents involving inspections and tests, a representative from the audit team may be present to observe a portion of the activity's operational and visual inspections and tests. The activity’s inspectors shall accompany the track auditor during portions of the field examination. Activities shall ensure that all audit team findings are correct before the team members depart. The activity shall review preliminary recommendations and provide the audit team with reclamas or disagreements prior to the departure conference.

1.5.6 Response. The activity audited shall forward a plan of action to its cognizant Navy Region or systems command within 30 days after receipt of the audit report with a copy to NAVFAC ESC. Reports on the corrective actions taken on the audit report recommendations shall be submitted annually until the actions are complete.

1.5.7 Report Records. The activity shall maintain on file previous audits and activity responses until all actions on findings are complete and shown as complete on a subsequent audit report.

1.6 NON-DESTRUCTIVE TESTING (NDT).

1.6.1 Ultrasonic Testing. Ultrasonic inspection is a non-destructive test method for revealing internal discontinuities in dense homogenous materials by means of acoustic waves of frequencies above the audible range. Ultrasonic testing is the recommended method for non-destructive testing of readily accessible rail. Ultrasonic testing is an economical method of checking long lengths of trackage and rail encased in pavement. Generally ultrasonic testing of elevated crane rails is not required; however, elevated crane rails may be ultrasonically tested at the discretion of the Certifying Official.

1.6.1.1 Ultrasonic Equipment Operators. Operators of the ultrasonic equipment shall be certified to a Level I qualification in accordance with the American Standards Institute (ANSI)/American Society for Nondestructive Testing (ASNT) Standard CP189-2001 "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel"

1.6.1.2 Ultrasonic Equipment. The ultrasonic equipment operated by qualified personnel (para. 1.6.1.1) shall be able to detect, but not be limited to, the following discontinuities in the rail.

Transverse fissures or other centrally located transverse defects representing approximately 10% of the cross-sectional area of the rail head.

Detail fractures representing approximately 15% of the cross-sectional area of the rail head and not masked from above by the shallow horizontal separations sometimes associated with shells.

Engine burn fractures or transverse separations developing from thermal cracks underneath the driver burns representing approximately 20% of the cross-sectional area of the rail head.

Horizontal split heads at least two inches in length, extending at least halfway through the rail head and located one-half inch or more below the running surface of the rail.

Vertical split heads so oriented as to interrupt an ultrasonic signal transmitted centrally through the rail section from above.

Head and web separations and split webs outside the joint bar limits at least two inches in length and progressing entirely through the rail web.

Joint defects (bolt hole cracks and head and web separations inside the joint bar limits) at least one-half inch in length and progressing entirely through the rail web.

Defective welds (plant or field) - with centrally located transverse defects, voids or inclusions in the rail head representing approximately 10% of the cross-sectional area of the rail head; with transverse head defects not centrally located representing approximately 15% of the cross-sectional area of the rail head; and with web defects in a generally horizontal plane at a rail weld approximately two inches in length or longer with penetration more than halfway through the rail web.

1.6.1.3 Calibration. Ultrasonic inspection equipment shall be calibrated to ensure reliable interpretation of responses. The approximate smallest indication that can be consistently detected include, but are not necessarily limited to, the following simulated, "marginal" defects.

(1) A one-quarter (1/4) inch diameter hole drilled horizontally through the rail head.
(2) A bolt hole through the web.
(3) A horizontal one-half (1/2) inch long sawn crack between the head and the web.
(4) A vertical one-half (1/2) inch long sawn crack in the web (optional depending on equipment available).

1.6.2 Sounding. Sounding with a hammer is one of the best and least expensive methods of testing rail, and is a practical way to inspect elevated crane trackage or relatively short sections (1,000 feet or less) of ground level trackage, where it was impractical to perform an ultrasonic inspection or inaccessible during the ultrasonic inspection and other trackage systems where ultrasonic testing is impractical. Light tapping with a 12 - 24 ounce steel hammer about every six inches will reveal looseness between rail and anchor plate, and defects before they become serious. Similar to ultrasonic testing, all non-standard responses should be investigated and recorded for future comparison. If sounding is used, rails shall be tested for defects upon activation and at annual intervals. This interval may be extended to a 2-4 year schedule based on an engineering analysis accomplished by the activity. The engineering analysis shall be in writing and take into account rail usage, age, history, and experience in determining a frequency other than an annual.

1.6.3 Other Non-Destructive Tests. Magnetic particle, dye penetrant, and other non-destructive test methods may be advantageous in investigating potential defects indicated by other inspections. Eddy current, x-ray or other approved, non-destructive test methods brought about by state-of-the-art advances may be used to supplement ultrasonic testing or sounding based on local conditions, availability, economics, experience and engineering judgment.

1.7 MISCELLANEOUS INSPECTIONS AND TESTS. Other inspections may be used to determine the safe condition of trackage under unique or unusual circumstances or to make a detailed engineering investigation of specific, critical components of a trackage system. Prior to use, the availability, limitations and practicability of any special investigation shall be evaluated. Special inspections, such as the following, may assist in determining the condition of trackage.

1.7.1 Seismograph. Under certain conditions seismographic instruments may be beneficial in determining voids in fill material or embankments, level of water tables or location of slippage planes in the foundation below trackage systems.

1.7.2 Increment Bore. Timber trestles, piling and other wood structures should be examined for soundness when deterioration is suspected or when necessary to make an engineering analysis. In addition, this test may be required to help determine adequacy of treatment of new material.

1.7.3 Strain Gages. When the structural analysis for the anticipated maximum loading of a structure indicates certain members may be overstressed or marginal, a load test (duplicating or

exceeding maximum total moment and shear experienced in-service) with stress and strain instrumentation is appropriate.

1.8 UNDERWATER INSPECTION. Underwater inspections of waterfront structures supporting crane or railroad trackage shall be conducted in accordance with guidelines contained in MO-104.2 Specialized Underwater Facilities Inspection, MO-311 Marine Biology Operational Handbook, and MO-322 Vol II Inspection of Shore Facilities. Inspections of piers, wharfs, quaywalls, and bulkheads shall include, but are not limited to: bearing or plumb piles, batter piles, pile caps, stringers, adjacent seawalls, riprap, sheet piling, abutments, and other subcomponents.

1.8.1 Frequency. Underwater and below deck inspections of support structures are required as follows:

(1) At intervals not to exceed six years. In historically polluted waters which are being radically cleaned, all wood structures should be inspected every three years. An engineering analysis of each structure should be made to determine the appropriate inspection interval.
(2) After obvious overload or structural damage
(3) After a major storm.
(4) Following a ship collision.
(5) When recommended by other investigations, evaluations, and engineering judgment based on age of the structure, material condition, deterioration rate, biofouling growth, and suspected damage or deficiencies.

1.8.2 Assistance. The NAVFAC ESC will provide technical guidance, specifications, and assistance when requested for in-house or contract underwater inspections.

1.9 MISHAP INVESTIGATION. Activities shall investigate and keep records of all trackage related accidents, incidents or minor mishaps including derailments, safety violations, personal injury, and property damage. Activities shall keep investigation records for all accidents and incidents related to trackage until data is verified during an audit review. When necessary, investigations and reporting shall be made in accordance with OPNAVINST 5102.1D, Mishap and Safety Investigation, Reporting, and Record Keeping Manual and OPNAVINST 5100.23G, Navy Safety and Occupational Health (SOH) Program Manual and reported to the Naval Safety Center. Additional guidelines for detailed investigation of trackage systems are included in NAVFAC MO-103, Change 1. Completed mishap reports shall be forwarded to NAVFAC ESC (CIFSI) within 30 days of mishap. Based on information learned from mishap reports, recommended sustainment and changed procedures to enhance mishap prevention shall be discussed at track conferences or distributed to all concerned. Investigation records shall include, but are not limited to:

(1) Date and time.
(2) Location and weather.
(3) Description of event.
(4) Type system and property involved.

(5) Type of operation and speed.
(6) Estimated cost of damage.
(7) Reported injuries.
(8) Track conditions.
(9) Factors leading to mishap.
(10) Corrective action(s) taken.
(11) Investigators

1.10 RECORDS.

1.10.1 In order to manage and administer trackage inspections, sustainment/restoration programs, and design, the following information should be available in a usable condition so that it may be referred to easily and readily. Where documents do not exist, a program with milestones for establishing missing data should be initiated to obtain data on trackage systems. Generally, missing information is obtained simultaneously with repairing or upgrading sections of trackage. It is expected that the information required in this section will be obtained routinely with minimal disturbance of operations. Activity needs and priority for production and manpower should be considered prior to scheduling any survey work. In addition, track geometry information should be obtained when any of the conditions noted in paragraphs 2.2.3, 3.2.3 and 4.2.3 exist and when spot check measurements are required to verify the visual observations discussed in paragraphs 2.1.4.3, 3.1.4.3 and 4.1.4.3. Specific requirements for maintaining records of required inspections are addressed in specific paragraphs related to those inspections.

1.10.2 TRACK CHARTS. Track charts, plans, maps or plats shall be maintained as part of the real property records. They shall be kept up to date and used for programming future work, scheduling current work, indicating abnormal conditions and recording maintenance and inspection data. Track charts can be in any format, filed to suit activity needs, and shall be usable as a working document.

1.10.3 PLAN AND PROFILE. Detailed plan and top of rail profile or grades of crane and railroad track systems shall be kept current and may be shown on the track chart or separately. Size and type of rail, switches, degree of curvature for RR trackage alignment, frogs and other rail appurtenances should be indicated on the plan. Structures and other features which control or mandate alignment or grade, and reference points for location and elevation checks should be accurately referenced.

1.10.3.1 Top of Rail Profile. A detailed top of rail profile has a very low priority except where grades approach the allowable limits. In most cases the grade may be determined using a hand level and rod. The resulting estimated profile may be considered adequate until an accurate survey is required. A long range program to accomplish profile surveys is not required provided they are conducted when related problems are investigated or when new rail is installed.

1.10.3.2 Elevated Crane Rail Systems. The profile of elevated crane trackage may be considered level and the plan may be assumed to be a straight line provided the system alignment is straight and none of the conditions listed in paragraph 4.2.3 exist. A long range program to

accomplish surveys is not required; however, when detailed surveys are conducted they shall be recorded.

1.10.3.3 Rail Identification. When rail is encased in pavement or otherwise unidentifiable, the size and type of rail should be estimated based on random uncovering or activities' experience. When positive identification cannot be made, that fact should be documented on the records. When an unidentified rail is repaired or replaced, the size and type of rail should be obtained and recorded on the plan or track chart and in the historical records file.

1.10.4 CROSS SECTION. Cross sections of substructures shall be maintained, when known and available, especially the substructures under tracks around piers, drydocks, trestles, and wet areas.

1.10.5 HISTORICAL DATA. Historical data on each system shall be retained and shall include the following:

(1) Dates that the system was installed.

(2) Weight of rail, gage of track.

(3) History of sustainment, restoration, major replacement and realignment.

(4) Replacement of rail and major tie replacement.

(5) Methods of accomplishing previous work.

(6) Design information, justification and background:

(a) Maximum capacity - where designs do not exist, load limits may be established based on engineering judgments and weight tests.

(b) Engineering calculations to establish maximum loading. When available, original or updated design calculations shall be maintained. If not available, original engineered structural drawing(s) that indicates the capacity/load limit the design was based on may be used. When none of these are available, a statement describing the basis used to determine the maximum load limit should be included in the historical data.

(c) Supporting Structures. Valid structural analysis for all supporting structures based on or exceeding current maximum loading. Structural safety verification shall be on file for supporting substructures. When original or updated design calculations are not available, original engineered structural drawing(s) of the support structure that indicates the capacity/load limit the design was based on may be used. As a minimum, especially for massive structures, an engineering certification based on visual observations, historical performance, and, when necessary, basic calculations on critical components should be available.

(d) For trackage encased in pavement, an accurate as-built description, certification or pictures shall be obtained. Tie spacing including number and pattern of spikes or tie down bolt spacing shall be verified.

(7) NAVFACENGCOMHQ approval of railroad curves and turn-outs.

(8) Justification or exceptions to standards (waivers).

(9) Other pertinent information.

1.10.6 PROPOSED PROJECTS. Maintain a list of pending work including: major sustainment and restoration projects (approved, submitted and needed), minor work to be accomplished with local funding and major replacement projects which are being considered for MCON funding. Use "multi-year" renewal programs for rail or tie replacement when practical.

SECTION 2. RAILROAD TRACKAGE

2.1 INSPECTION.

2.1.1 CONTINUOUS OPERATOR INSPECTION. Daily or prior to use safety checks listed in activity regulations shall be conducted. In addition, on-the-job observations shall be performed in accordance with P-301 at all times when equipment is working. Railroad operations personnel (engineers, brakeman, conductors, trackmen, etc.) shall be encouraged to observe and report track problems, deficiencies, obstructions and the "feel" of the track.

2.1.2 PREVENTIVE MAINTENANCE (PM) - PM SERVICE AND PM INSPECTION.

2.1.2.1 PM is a continuous working inspection, examination of component parts, lubrication, adjustment, and minor repair. NAVFAC manuals MO-103 "Maintenance of Trackage" and MO-322 "Inspection of Shore Facilities" Volumes I and II contain instructions on performing maintenance service and inspection and provide lists of check points. PM service and inspection are normally conducted by the crews assigned to or operating the equipment, by the track walkers, by Maintenance Shop personnel, and/or by contract. The PM Inspections and Services are scheduled as directed by the Public Works Officer or Activity Commander. Flexibility exists in the frequency of PM inspections based on usage, climatic conditions, history, and experience; therefore, the Public Works Officer or Activity Commander shall establish PM schedules. On systems where lubrication of moving parts, adjustments to electrical or mechanical systems, tightening of loose bolts, and other minor repairs are minimal, the PM service requirements may be identified during the safety inspection and annual detailed inspection and PM service and repair work scheduled. When possible, deficiencies are corrected during the inspection and recorded. Uncorrected deficiencies shall be reported to the supervisor for action, inclusion in the repair work schedule, adjustment of operating speed and consideration for closure of a section of trackage. Minimum information to be provided in PM reports is detailed in paragraph 2.1.2.2. PM inspections are visual inspections which include, but are not limited to, such items as loose or missing bolts, broken ties, defective switch points, loose spikes, loose or misaligned plates or rail anchors, inoperative switches, operator reported rough or soft spots, poor drainage, substructure failure, defective rail, and settlement. The most important sections to be checked are the switches, curves and any area where a derailment has occurred.

2.1.2.2 PM Inspection Reports. Local formats in existence may be used. As a minimum PM Inspection reports should include:

(1) Date.
(2) Sections of trackage inspected.
(3) Corrected and uncorrected deficiencies.
(4) Number of and size of broken or missing parts.
(5) Suspected misalignment or defect.
(6) Guides and instructions used for the inspection.

The current PM Inspection report and the one for the preceding period shall be retained. Work Authorization Documents or Shop Repair Orders, usually the action following PM Inspections, shall be kept for five years.

2.1.3 SAFETY INSPECTION. Safety inspection is that inspection of railroad track performed in accordance with paragraphs 213.233, 213.235 and 213.239 of the FRA Track Safety Standards, Attachment (1), paragraph 2-3.c of UFC 4-860-03 and as modified herein. The purpose of this inspection is to identify critical and catastrophic defects affecting the safety of the track being inspected. Safety inspection can be accomplished in conjunction with preventive maintenance if performed by designated inspectors and proper documentation of inspection is performed. The annual detailed inspection can be considered as a safety inspection when accomplished at the specific period of the required safety inspection. See paragraph 2-3.c of UFC 4-860-03 for details on scheduling, inspection methods and documentation.

2.1.3.1 Schedule. Track shall be inspected at the interval determined from category of track and frequency of use in accordance with the table provided in paragraph 2-3.c of UFC 4-860-03. For track infrequently used, the safety inspection may be accomplished just prior to use. Track use should be looked at periodically (at least annually) to determine inspection frequency. Average use rates should be based on the previous six months use. If an inactive track is returned to use, inspection frequency will be established on expected use. Based on the schedule provided in UFC 4-860-093, the following intervals between safety inspections shall apply.

* Interval between inspections will be as follows:

Inspection Frequency	Minimum Interval Between Inspections
Weekly	3 calendar days
Monthly	20 calendar days

Quarterly, semi-annual, and annual inspection will be accomplished in the month scheduled (i.e. Jan, Apr, Jul, Oct).

Note (1) Off-Station track is defined as that track belonging to the Navy that extends outside the main station through residential and/or commercial public areas. If track is infrequently used, safety inspection may be performed just prior to use.

2.1.3.2 Special Safety Inspections. See paragraph 2-3.g of UFC 4-860-03 for requirements on providing special safety inspections for infrequently used tracks, mass rail movements and for unusual occurrences such as derailment, accident, flood, fire, earthquake, hurricane, severe storm, or other occurrence that could have an adverse effect on the track structure.

2.1.4 DETAILED INSPECTION SUPPLEMENTED BY ENGINEERING EVALUATIONS. Inspection checklists and guidelines are contained in UFC 4-860-03 and supplemented in this instruction. Detailed Inspections are to be conducted annually or more frequently when required by climatic conditions or other unusual circumstances. Annual inspection shall mean that sections of trackage are scheduled as part of the facilities inspection program. Inspection for each track section shall be scheduled and accomplished during a specific month each year and routinely scheduled in a 12 month period. Annual inspection exceeding a 13 month period since

the previous annual inspection on the particular track section will cause the existing certification to be default and result in the track section being non-certified for use. Engineering evaluations shall be conducted whenever there is any doubt of physical condition. In addition, Detailed Inspection or Engineering Evaluation criteria shall be used to supplement investigations and evaluations after any derailment. Additional testing or inspection shall be conducted when the condition of any portion of the trackage system is doubtful.

Based on the development over the past 10 years of the railroad safety inspection, the annual detailed inspection in the year between the two year certification inspections may be deferred until the second year. This deferral will be based on one of the two following items:

a. RAILER has been implemented and the TSCI for the specific track is 80 or above and no individual track segment's RJCI, TCI or BSCI is less than 80. No critical or catastrophic defects exist. See paragraph 2.1.6 for full RAILER description.

b. Track has recently been repaired, traffic is light and there are no severe marginal, critical or catastrophic defects in the track.

Deferral will be typically on a whole track basis. If the individual track is very long and has five or more segments, deferral can be on a segment basis. It is not the intent that every other segment be deferred, rather as an example: segments 1-5 require a detailed inspection and segment 6-10 have a safety inspection in lieu of a detailed inspection. All deferrals will be approved in writing by the Certifying Official. In lieu of a detailed inspection, a safety inspection will be performed in accordance with paragraph 2.1.3, except that the inspection will be a walking inspection. No inspection from a vehicle is allowed. Inspection documentation will specifically address that the inspection is "in lieu of a detailed inspection".

2.1.4.1 Visual Inspection. Visual inspections during the detailed inspection should include PM inspection checkpoints and observations of all trackage system components including rails, ties, rail accessories, switches, crossovers, ballast, roadbeds, support structures and appurtenances. Checkpoints for railroad trackage inspection are listed in MO-103, UFC 4-860-03, MO-322 Volume II and FRA Track Safety Standards.

2.1.4.1.1 Piers, Trestles and Other Support Structures. All subgrades, ballast, foundations, and bridges or trestles shall be inspected for signs of settlement or failure. Special attention should be given to looking for openings in quaywalls, bulkheads or other waterfront retaining structures that may permit fill material to wash out and cause trackage settlement and failure. For bridges and trestles spanning roadways open to vehicular traffic see paragraph 2.1.4.1.2. All other bridges, trestles and piers supporting railroad rail shall be inspected in accordance with criteria outlined in MO-322 and the following criteria. The prescribed minimum inspection frequency for piers and trestles is two years. Inspection of the support system for the biennial control inspection shall be performed by facilities planner & estimators or inspectors, as long as they meet the minimum qualifications provided by MO-322. Indicators of settlement, misalignment or deflection shall be recorded. Deflection, movement, or settlement under routine in-service loading exceeding the limits shown in Attachment (2-1) shall be investigated and analyzed, the degree of damage documented, and the classification of hazard determined. Structural

conditions leading to restricted certification of a section of trackage shall be based on a review of the structural analysis and on a condition survey conducted by qualified engineer in sufficient detail to establish the safety of the structure.

2.1.4.1.2 Bridge/Trestle Inspection. Bridges and trestles that span over roadways open to vehicular traffic shall be operated and maintained in accordance with National Bridge Inspection Standards (NBIS) mandated by 23 CFR Section 650, Subpart C. As specified in NBIS, all bridges 20 feet in length or longer are required to be inspected above the waterline at a regular intervals not to exceed two years and below the waterline at a frequency not to exceed five years. NBIS provides minimum qualifications for bridge inspectors for inspection of these types of bridges. This inspection is directed by CNO ltr 11000 Ser N442/9U594244 of 22 Dec 99 and details are provided in NAVFAC ltr of 24 Dec 02. NAVFAC ESC administers this program and assists activities in performing these inspections.

2.1.4.1.3 Program for Inspection of Paved and Covered Areas.

2.1.4.1.3.1 Paved Areas. Inspection of trackage encased in asphalt, concrete, grout or road crossing material shall include visual inspections and operational observations (para 2.1.4.2) for exposed rail defects, trackage movement, and signs of distress in adjacent pavement. To verify visual inspections, activities shall establish a program to remove small sections of pavement and spot check trackage encased in pavement based on indication of defects with consideration taken for age and usage. Types of defects which would require pavement removal would include pumping joints, wide gage, deflecting rail, settlement of track and surrounding area. Pavement shall be maintained so that it does not interfere with railroad operation and to ensure safe vehicle movement.

2.1.4.1.3.2 Covered Areas. In areas where trackage systems (any portion of the track system from the top of the tie up) are covered with ballast, earth, coal or other material and where excess ballast or other material serves no functional purpose, it shall be removed to permit thorough and complete inspections. In areas where ballast or other material is installed to meet operational requirements, sufficient ballast shall be removed to spot check trackage. Spot checks shall be made of areas where suspected defects are indicated and at randomly selected points established by the Certifying Official based on time in service, usage, knowledge of track condition, and visual observations. At U. S. Naval shipyards, spot checks shall be made at randomly selected points such that a minimum of 5 percent of the covered portions of the trackage system shall be inspected each year. A representative portion of the tie plates, spikes, crossties, joints, rail and accessories shall be inspected each year. Ballast may be replaced to permit continuous operations.

2.1.4.1.3.3 Documentation. In order to document the inspection of trackage in paved and covered areas, an inspection report shall be prepared indicating defects noted, as well as description and general condition of track components for future reference. Pictures should be used to document conditions as necessary. Any defects detected affecting the certification of the section of trackage inspected shall be handled in accordance with paragraph 1.3.

2.1.4.2 Operational Inspection. The purpose of an operational inspection is to supplement the detailed inspection and to assist in the identification of problem areas which could develop into unsafe trackage. Conditions which may be discovered include the following:

(1) Soft spots in the ballast.
(2) Weak or disintegrated ties.
(3) Looseness, binding or vibration.

2.1.4.2.1 Frequency. Operational inspections with loads prescribed in paragraph 2.1.4.2.2 shall be performed at intervals not to exceed two years on active trackage systems to ensure that the trackage systems will sustain the prescribed load in a safe manner. Railroad sidings, storage trackage and sections of trackage blocked or seldom used (less than six movements per year) shall have operational inspections within a maximum interval of five years. Operational inspection exceeding the two/five year requirement will cause the existing certification to be default and result in the track section being non-certified for use. All trackage serving hazardous loads, such as ordnance or fuel, shall have had an operational inspection within a period not to exceed two years. See paragraph 1.3.1 regarding 30 day extension of certification.

2.1.4.2.2 Loads. Loads should be moved over track systems slowly enough so that observations can be made. Loads on rails shall be provided by routine rail traffic that normally operates on the track. If a typical train is not observed, the load on the rail may be provided by a locomotive, engine or test car. Certifying Official shall designate loads to be used other than a typical train. When a test car is used, it shall be loaded to give the maximum anticipated load on at least one axle and as close to the total anticipated load as practical. Operational inspection reports shall describe the load used to perform the operational inspection.

2.1.4.2.3 Observations. A Track Inspector shall conduct or supervise the operational inspection. Trackage shall be inspected during load test or while equipment is operating. Observations for looseness, binding, deflection, or vibration shall be made by sight, sound, and feel. In addition, rail joints, ties, tie plates, ballast or grout, general alignment, rail condition, supporting structures (see paragraph 2.1.4.1.1), and other accessories may be observed for deficiencies during and after the load test or operational inspection. There is no requirement for physical measurements of rail or trackage systems under load; however, when practical and accessible, rail systems shall be observed for deflection. Guidelines for maximum allowable deflections as determined by visual judgment are shown on Attachment (2-1). In the event unusual movement is observed or felt, deflections appear to be larger than the guideline limits established, or the cause of deficiency cannot be immediately determined, an investigation and engineering analysis of the immediate vicinity shall be made prior to certification. Results of the investigation and engineering evaluation, not the deflection limit per se, shall determine when use of a section of trackage must be discontinued.

2.1.4.2.4 Long Sections. When the operational inspection is performed on board a train or engine, supplemental observations of passing rail traffic at randomly selected and suspected defective areas shall be made by an inspector walking alongside the trackage system.

2.1.4.2.5 After Repair. Operational Inspection for certification following major restoration or reconstruction is not a mandatory action required by this instruction; however, as a minimum a visual observation of trackage under routine traffic loading during or after repair shall be performed to ensure proper movement. In addition, it is recommended that, when practical, in-house work orders and contract documents require compliance with the following procedures prior to final acceptance. Equipment shall be operated over railroad trackage after major repair or reconstruction and prior to final track surfacing to ensure there are no defects and to stabilize ballast, rail alignment and track surface. Whenever fill material is added and compacted, ties or rails are installed and aligned, preliminary tamping of ballast is completed, or other work is accomplished, the section of trackage involved shall be inspected for safety and compliance with specifications prior to conducting an operational inspection. Rail traffic shall be run over the repaired or reconstructed section several times. Following this operation, defects shall be corrected, the trackage shall be realigned and surfaced, and the ballast shall be retamped. After final track resurfacing, tamping and alignment, gage, elevations, profile, cross level, and other specifications shall be rechecked for compliance in accordance with acceptance criteria for trackage repair or construction (NOT LISTED IN THIS INSTRUCTION) prior to final acceptance, certification and routine operation. Unified Facilities Guide Specification (UFGS) 34 11 00 and UFC 4-860-03 provide acceptance criteria which should be included in the contract specification.

2.1.4.3 Measurements. The Detailed Inspection shall include visual observations and spot check measurements of grade, track gage, cross section elevation, horizontal alignment, vertical mismatch, supports and other features to insure that criteria in this instruction are met. Instrument surveys may be requested by the Certifying Official or his representative to verify visual observations or spot check measurements, establish new alignment, investigate problem areas and determine deviation from the established standards.

2.1.4.4 Detailed Inspection Documentation. All inspections performed under paragraph 2.1.4 shall be properly documented. Inspection records must specify track inspected, date of inspection, location and nature of deviation from requirements and remedial action taken. Detailed inspection documentation should address all marginal, critical and catastrophic deficiencies existing in the track system at the time of inspection. In addition to detailing defects detected during the annual visual inspection, outstanding defects detected during safety inspections, operational inspections, non-destructive test inspection and other inspections and engineering investigations should be included. Deficiencies not exceeding marginal criteria are recorded, as necessary. A blank example record is provided as Attachment (2-3). Instructions for completion and a sample filled in inspection report are provided in Appendix B of UFC 4-860-03. Attachment (2-4) provides a sample of a "Turnout Inspection Checklist" form. The turnout inspection checklist is provided for use, but is not a required document. Instructions for completion and a sample filled in report are provided in Appendix B of UFC 4-860-03. As a minimum, activity track files shall contain the current and previous complete detailed inspection report. Engineering evaluations and all engineering investigation reports shall be retained until invalidated by trackage repair or other actions. Current and previous operational inspection records shall be kept on file.

2.1.5 NON-DESTRUCTIVE TESTING (NDT).

2.1.5.1 Frequency. All active railroad rails shall be tested for defects upon activation and at five year intervals, unless maintenance problems or visual inspection dictate a necessity for more frequent testing. The term "upon activation" refers to sections of trackage which have been inactivated or not used and that have not had a non-destructive test within the preceding five years. Rail shall be tested by ultrasonic inspection in accordance with paragraph 1.6.1, except short section of rail may be tested by hammer sounding as allowed by paragraph 1.6.2. All trackage that has not been non-destructively tested within the five year period from the previous NDT shall have a restricted certification or may be non-certified. Nondestructive testing of relay rail or used rail may be deferred until the next regularly scheduled five year test interval, at the discretion of the Certifying Official, however any such deferral should be based on an engineering evaluation that considers age, expected use, and experience. During the interim period, the rail may be given full certification based on other tests, observations, and inspections required by this instruction. Criteria for unacceptable rails are included in Attachment (2-1) and in UFC 4-860-03. Appendix C, UFC 4-860-03, provides a brief description and illustration of common rail defects. New rail and accessories shall be accepted according to the latest government specifications or standard industry practice. The NDT results shall be used to establish a base line for future inspection and to identify areas requiring observation.

2.1.5.2 Test Results. Rail NDT inspection records must specify the date of inspection, the location and nature of any internal rail defect found, and the remedial action taken and the date thereof. Current rail NDT inspection records shall be retained until after the next NDT inspection is performed or for one year after remedial action is taken, whichever is longer. All discontinuities shall be reported; the nature and size of defect estimated, and responses compared with standards or past test results. Rejection or degree-of-hazard of all potential defects shall be based on assessment of ultrasonic inspection results, visual inspection, experience, engineering judgment, the criteria shown in Attachment (2-1) and the FRA Track Safety Standards. In-place welded joints and welded repairs may have confused or erratic responses when ultrasonically tested; therefore, interpretation requires experience and engineering judgment to preclude an erroneous classification of defect. Data collected from the ultrasonic or induction tests shall be retained as necessary for base line and defect growth comparisons. A narrative report should be included to explain any unusual observations

2.1.6 RAILER.

2.1.6.1 General. The RAILER Engineered Management System (EMS), developed by the U. S. Army Construction Engineering Research Laboratory(CERL) helps inspectors, engineers, certifying officials and managers evaluate railroad track and plan effective, economical railroad track sustainment and restoration (S&R) programs. RAILER provides a computerized database and analysis procedures for storing data on railroad track inventory, inspection results, track conditions, S&R costs and policies, work history and other essential items. Safety, detailed, operational and non-destructive test inspection data can be inputted, stored and utilized by RAILER. Track certifications can be manually or electronically produced for each track segment. All active Navy railroad track shall be inventoried using RAILER and have a baseline inspection within 4 years of the effective date of this instruction. Activities shall ensure that the RAILER database is updated as required to reflect changes in the inventory.

2.1.6.2 Condition Assessment. RAILER utilizes both track condition indexes and track standards for condition assessment.

2.1.6.2.1 Track Condition Indexes. A Track Structure Condition Index (TSCI) based on the Rail and Joints Condition Index (RJCI), Tie Condition Index (TCI) and Ballast and Subgrade Condition Index (BSCI) are developed from the track inspection data. These indexes measure track segment and component "health" on a 0-100 rating scale. The indexes reflect the ability of a track segment to support routine traffic, and they indicate the S&R actions necessary to restore or sustain acceptable track condition. Track indexes (RJCI, TSI, BSCI and TSCI) are developed for each track segment. Track segment indexes are rolled up into a Track Structure Condition Index for individual tracks. Overall Track Structure Condition Index (TSCI) are provided for areas, which include a number of specific tracks (all tracks on a pier or all tracks in a classification yard) and for the total network. The indexes are also used to determine track deterioration rates. In the future, these condition indexes may be used to justify S&R funding requirements.

2.1.6.1.2 Track Standards. Both sustainment and safety standards addressed in the FRA Safety Standards and Attachment (2-1) are used by RAILER. RAILER quickly identifies defects recorded as "Restrict Ops" (Critical) or "Close to Traffic" (Catastrophic). These standards are then used for documenting track certification.

2.1.6.3 Sustainment/Restoration Management. RAILER can be used for both network-level and project-level management. Network-level management includes assessing current overall track network condition and trends, developing S&R strategies, budgeting, developing short and long range S&R plans, and justifying budgets and S&R projects. These tasks involve the use of track standards, Attachment (2-1), and the Track Structure Condition Indexes (TSCI). Project-level management includes the detailed analysis of specific track segments that may be needed for problem diagnosis and typically involve complete track reconstruction, turnout replacement or other major modernization project.

2.2 STANDARDS. The FRA Track Safety Standards; UFC 4-860-03; Summary of Inspection Criteria, Attachment (2-1); and this section provide descriptions of tolerances and defects for guidance in deficiency classification. Deviation from the standards in the FRA Track Safety Standards or in this section may require immediate corrective action to provide for safe operations over the trackage involved. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachment (2-1) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. In general, on heavily used sections of trackage, work planning should start when a deficiency on a section of trackage exceeds one-half (1/2) of the allowable deficiency so that repairs can be accomplished before deficiencies exceed the allowable standards for restricted certification. Additional maintenance standard guidance is provided in UFC 4-860-03. Selection, installation, inspection and maintenance of trackage systems shall be in accordance with documents referenced herein, except where criteria in this instruction provides more stringent or restrictive

criteria. The summary of inspection criteria and defect classifications shown in Attachment (2-1) are guidelines establishing minimum standards allowed based on normal or average conditions.

2.2.1 RAILROAD TRACKAGE. The term "trackage" includes rails, ties, rail accessories, switches, crossovers, ballasts, roadbeds, support structures, subgrade, foundations, cut and fill slopes, ditches, road crossings, culverts, bridges, trestles, overpasses and underpasses, grade separations, tunnels, signals, snow protection, signs, and markings. In accordance with NAVFAC MO-l03 and Department of Defense Standards, all military trackage systems shall be classified using the guidelines established by FRA standards. The FRA Track Safety Standards provide minimum safety requirements that apply to specific track classifications. Changes or additions to the Safety Standards shall apply to Navy trackage when issued by the Federal Railroad Administration.

2.2.1.1 Railroad Classification. Paragraph 213.9 of the FRA Track Safety Standards establishes maximum operating speeds for Class 1 through 5 track based on requirements of the standards. Military railroad trackage systems are generally classified and sustained to Class 2 or better standards; however, if higher speeds are utilized, a corresponding higher classification with better standards may be assigned, provided that the section of track meets all requirements for that classification as shown in the FRA Track Safety Standards. Activities establish speed limits based on industrial density, alignment restrictions, and other local requirements. Reduced maximum speed or slow orders do not reduce or change the track safety standard requirements or the FRA track class. If a section of track does not meet the standard in all requirements for Class 2 track, the section may be temporarily reclassified to a Class 1 track. Infrequently used, dead-end trackage, except trackage used to move nuclear or hazardous materials, may be permanently classified as Class 1 trackage. All Class 1 tracks shall have Restricted Certification, see paragraph 1.3.3.2. Sections of trackage that do not meet the standards for Class 1 tracks shall have a "non-certification" status as described in paragraph 1.3.3.3.

2.2.1.2 Mobilization. Inactive trackage required for immediate mobilization should be sustained at a standard to meet FRA Class 1 Track Safety Standards (Restricted Certification). To support trackage required by M-day plus 30, an adequate stockpile of material (e.g. crossties) should be sustained to bring track up to FRA Class 2 Track Safety Standards, if necessary. Trackage required after M-day plus 30 requires minimum sustainment consisting of vegetation control, sustainment of adjacent drainage areas and sustainment of roadbed right-of-way free of encroachment by new facilities.

2.2.1.3 Railroad Categories. Railroad Trackage systems are divided into six categories according to their principal use. Overall maintenance policies and detailed guidance for maintaining these categories are covered in UFC 4-860-03.

Railroad Categories

Category	Service or Use
Running or Access	Primary line, Industrial and Special Purpose
Classification Yard	Receiving, Sorting and Holding
Sidings	Auxiliary (other than for meeting or passing) and House Trackage (along or entering a building).
Team Tracks	Freight transferred directly to highway vehicles
Storage	Hold Purposes - Low use Spur
Temporary	Generally to facilitate construction

2.2.2 RAIL. Standards for rail type, acceptable defects and replacement are discussed in this section and in paragraph 213.113 of the FRA Track Safety Standard. The identification and terminology of different parts of a typical rail are shown in Appendix (C), UFC 4-860-03.

2.2.2.1 Rail Type - General. In cases of individual rail replacement, where the existing rail does not meet the standard criteria listed herein and where the remaining track is performing satisfactorily, the same size rail may be installed. Rails must be connected at the joints so that the rails will act as a continuous girder with uniform surface and alignment.

2.2.2.2 Rail Size. Existing rail, less than 115 pound rail for mainline and 90 pound for spurs and sidings, shall remain in service if performing satisfactorily. An engineering evaluation should be performed, if necessary, to determine if an upgrade to meet the standard criteria listed is required, based on age, condition and use (present and projected). The use of 115 pound AREA rail is recommended as a minimum for new installations and for major replacement projects. Heavier sections should be used when required by heavy loads or when necessary to meet minimum requirements of the serving railroad, especially if their locomotives are used on the activity track. For individual rail replacements, the same size as existing rail may be used. The use of 90 pound relay or used rail is recommended as a minimum on low use spurs. Requirements for minimum size rail shall be in accordance with the latest issue of UFC 4-860-02N, Chapter 1 "Railroad Trackage".

2.2.2.3 Rail Defects. All irregularities in top or side rail wear, differences in elevation at breaks or joints, deflections, and movement exceeding 1/4 inch should be investigated. Common rail defects are illustrated and described in Appendix C, UFC 4-860-03, described in Enclosure (A) and categorized according to operational hazard or risk in Attachment (2-1). Sustainment and safety standards for rail defects, as well as remedial action, are provided in Chapter 7, UFC 4-860-03.

2.2.2.4 Replacement. Defective rails shall be repaired or replaced according to NAVFAC MO-103 and UFC 4-860-03, as necessary to meet certification criteria, or as required by the FRA Track Safety Standards.

2.2.2.4.1 Jointed Rail. Remedial action for defective rail shall be in accordance with Chapter 7 and Table 7-2 of UFC 4-860-03. The minimum "rail length", when installing new rail or repairing/replacing existing rail, is thirteen (13) feet. The existence of a short piece of rail (less than 13 feet) is not considered a defect. The existing rail should not be shorter than that necessary to allow for proper application of joint bars to adjoining rails on both ends and allow for proper alignment of rail. The condition of the track or defect in the rail would constitute a defect. There may be some instances where it may be economical to reduce the existing rail length; for example: replacing one rail length with two lengths of an old, standard rail before the entire section is replaced. This may be done provided the minimum length of thirteen (13) feet is maintained, and maximum lengths of rail are used when the section is upgraded. In some special cases such as short closure rails and short rails between turnouts and crossovers the rail length may be less than thirteen (13) feet provided only one piece of rail is used between the controlling features.

2.2.2.4.2 Welded Rail. In continuous welded rail, the standard minimum length of ten (l0) feet shall be maintained between welds or joints. This length is required to ensure proper alignment of rails prior to welding. Existing shorter rail lengths between welds will be maintained as is. The thermite welding instruction per UFGS 34 11 19.00 or a welding procedure approved by NAVFAC ATLANTIC (CIENG) should be used. Proper maintenance practice is to crop (remove) the ends of rail with bolt holes prior to welding joints. Existing welded joints with bolt holes for joint bars in either piece of rail are considered no defect unless the weld or bolt holes contain critical defects. Existing rail holes, such as old gage rod holes, may be maintained as is, provided there are no other critical defects in the immediate area.

2.2.3 TRACK GEOMETRY. Horizontal alignment, vertical alignment (grade or profile), cross section elevation and gage shall be investigated when any of the following conditions exist:

(1) There are indications of abnormal wear on the rail heads or on wheel flanges.

(2) New rails are being installed or any portion of a rail is realigned.

(3) Railroad engine binds on trackage, has difficulty in starting or has trouble with movement.

(4) When a potential deficiency of trackage can be observed, heard or felt.

(5) There are indications of substructure settlement, failure or other structural changes.

(6) Visual observations indicate that the acceptable limits may exceed those shown in Attachment (2-1).

(7) Tests, inspection, experience or engineering judgment indicate operation or rail alignment problems.

2.2.3.1 Installation and Realignment. UFC 4-860-02N provides criteria for design and alignment of all trackage systems and shall be used for all new installations and major replacement projects. Existing systems, not conforming to grade and curvature standards, may be maintained as is, provided a record is on file describing each deviation from the standard and necessary operating restrictions are imposed. Restrictions shall be tailored to each specific situation and may include such items as maximum speed, use of auxiliary couplers and maximum car/engine combination. When major replacements are necessary, the new work shall comply with the grade; turnout and curvature standards outlined in UFC 4-860-02N, or shall have an engineering justification and NAVFAC ATLANTIC (CIENG) approval on file for each deviation from the standard.

2.2.3.2 Horizontal Alignment. Maximum out of line limits for railroad trackage shall be according to those shown in Attachment (2-1). All curves shall have a designated degree(s) of curvature. Curves installed prior to November 1981 with radii less than 300 feet (19 degrees or larger) shall have approval by NAVFACENGCOMHQ on file as required by the previous issue of DM-5.6, October 1979. Single rail replacement may be made without obtaining a new approval; however, when replacing a section of trackage, new approval is required prior to awarding a contract or beginning in-house work. For all new construction or major rehabilitation projects with curves of less than 350 feet radius (16 degrees or larger), NAVFAC ATLANTIC (CIENG) approval shall be obtained as required by the current issue of UFC 4-860-2N. The radius established by the activity is the base line, design, theoretical radius, or the radius that best fits the overall existing condition. Curved alignment that deviates from established uniformity more than the amount shown in Attachment (2-1) is considered defective. Spirals, as designated or as developed, shall have a smooth transition.

2.2.3.3 Grade. Profile grades shown on Attachment (2-1) are the maximum allowable, except as noted below. Grades may be spot checked at random intervals with a hand level and rule. Switches may be installed on grade; however, no part of the switch should extend into a vertical curve or grade change.

2.2.3.4 Cross-Section Elevation. Vertical differences between rails shall be within the limits shown herein or in accordance with the FRA Track Safety Standards. On curved trackage in industrial areas traversed at low speeds, superelevation is not required. On all other track, 1/2 - 1 inch of superelevation is recommended as a minimum. Maximum elevation is 4 inches. On curved trackage, the outside rail shall not be more than 1/2 inch lower (reverse superelevation) than the inside rail. Design elevation should be based on the degree of curvature and speed as shown in UFC 4-860-02N. Maximum operating speeds shall be based on the 3-inch unbalanced formula in accordance with FRA "Track Safety Standards", paragraph 213.57(b).

2.2.3.5 Gage. Gage for railroad trackage is measured between the heads of the rails at right angles to the rails in a plane 5/8 inch below the top of the rail head. The standard gage for railroad trackage is 4' - 8 ½” except on sharper curves where the inside rail is widened to allow cars to track properly. The rate of change from standard to widened gage is 1/4 inch in 31 feet

along the spiral curve or tangent adjacent to the curve, unless physical conditions do not permit the normal transition. The 1/4 inch in 31 feet rate of change from standard gage to widened gage for curves is a design standard and not trackage inspection criteria. Variations in gage within the limits shown on Attachment (2-1) are not a defect for Class 2 trackage, provided there are no alignment, surface, or foundation defects which would cause the train to start excessive or abnormal rocking or bouncing. Normally the average gage should not change between the minimum allowable and the maximum allowable, more than one time within two standard rail lengths. Specific criteria for "relatively uniform and constant" gage transition is not available; therefore, the activity shall evaluate each suspected section and shall classify the degree-of-hazard based on engineering judgment and experience.

2.2.4 FROGS AND SWITCHES. Criteria for acceptable frogs and switches are shown in the FRA Track Safety Standards and Attachment (2-1). The maximum horizontal or vertical misalignment between the top or head of frog or switch rail and the stock rail is the same as for rail end mismatch; however, it is recommended that corrective action be taken in the vicinity of frogs and switches on running or access trackage before the critical limits are reached. Existing frogs and switches of types not recommended, which are performing satisfactorily, shall be retained. Replacement of frogs and switches shall be in accordance with UFC 4-860-2N, MO-l03 and the latest specifications.

2.2.4.1 Frogs. The identification and terminology of different parts of typical bolted rigid frogs for railroad trackage are shown in Chapter 8, UFC 4-860-03. The use of number 4 or below frogs is prohibited by UFC 4-806-2N for new construction or major rehabilitation work. Standard rigid frogs are preferred; however, self guarded frogs may be used. Existing frogs number 4 or below and existing spring rail frogs should be replaced as soon as practicable and whenever the entire switch or turnout is being reworked. If the number 5 or larger frogs can not be used, design considerations and justification shall be submitted to NAVFAC ATLANTIC (CIENG) for approval prior to installation. When using standard rigid frogs, guard rails shall be installed to protect the frog point and assist in the prevention of derailments.

2.2.4.2 Switches. The identification and terminology of different parts of a typical switch are shown in Chapter 8, UFC 4-860-03. For selection of proper switches, use UFC 4-860-02 or MO-l03 manual criteria.

2.2.4.3 Cast Switches and Frogs. The following additional criteria are provided for classifying critical defects in cast railroad switches and frogs. For track fixtures fabricated from rail, rail defect classification will apply.

1. Deformation in the head of the switch rail exceeding ¼ inch in depth and cracks in the exterior of the railhead exceeding ½ inch in length will be classified and treated as critical defects. Deformation is defined as flattening or crushing of rail head.

2. Cracks less than ½ inch in length will be punched to mark their location and length and they shall be monitored. Monitoring should start at a 30-day interval and can be increased to 6 months if growth of crack does not occur.

3. Cracks in the casting outside the railhead will be considered marginal defects unless deformation in the casting exceeding ¼ inch in depth occurs. Deformation in this instance is defined as opening of the crack causing a measurable widening of casting.

4. Inspection of the underside of switch tongue casting is not required, as the defect limits classified above will identify the need for further investigation and repair.

2.2.5 MISCELLANEOUS. Classification of defects listed in this section shall be made based on evaluation by the Activity and appropriate action shall be taken.

2.2.5.1 Tie Plates, Joint Bars, Angle Bars, Cleats and Other Accessories. Cracked, broken, loose or otherwise defective accessories that do not permit excessive rail movement and which meet the FRA acceptance criteria may be considered as no defect and repaired according to normal work schedules.

2.2.5.2 Safety Items. Safety features apply to all trackage systems and may also be included in other inspection reports. There shall be no missing, loose or broken components, bad welds, accumulation of debris, heavy corrosion or severe deterioration of the following trackage appurtenances:

(1) Rail Stops/Bumpers. (Rail stops/bumpers are not required where local standards or engineering evaluation preclude use. i.e. rail stop in middle of road or paved area. NAVSEA OP 5 requires wheel stops on railroad track carrying ordnance.)
(2) Guard Rails and Fences.
(3) Crossing Signs and other warning signs or signals.
(4) Any other features that could cause a mishap.

2.2.5.3 Bolts. Missing, broken, deteriorated or worn bolts which permit movement of rails may be considered a marginal defect, provided that the criteria in paragraphs 213.115 and 213.121 of the FRA Track Safety Standards are complied with. All joint bolts loose is considered a critical defect. Track bolts should be oiled when installed and each time they are tightened. The recommended frequency for bolt tightening, for trackage not encased in pavement, is three months after installation and once a year after that. Tightening of loose bolts should be an ongoing task. Loosening of bolts is somewhat directly related to traffic and loading and may also be caused by defects; therefore, a more frequent program for bolt tightening and PM based on usage and experience may be required by the Certifying Official. It is conceivable that where there is a good PM and inspection program, annual tightening of all bolts may be unnecessary. Annual tightening of bolts in paved areas may be waived based on engineering judgment and provided that non-destructive test (paragraph 2.1.5), operational inspection (paragraph 2.1.4.2), and visual inspection in paved areas (paragraph 2.1.4.1.2) are satisfactory. All fasteners in turnouts and track crossings must be intact and maintained so as to keep the components securely in place. All turnout switch and frog bolts and joints connecting rail to switch point and frog will be fully bolted as designed. All switch and operating rod bolts shall be installed with nut on top and cotter pin installed. All switch point bolts shall be in place with cotter pin, if so designed. Missing or improperly installed bolts and cotter pins shall be considered critical defects.

2.2.5.4 Spikes. Missing or loose spikes will cause a tie to be classified as defective. The recommended number of track spikes per rail per tie for Class Two tracks is as follows:

- Tangent Track and Curved Track with not more than 4^{o} of Curvature (Radius 1432 feet or larger) - TWO Spikes
- Curved Track with less than 4^{o} of Curvature (Radius 1432 feet or larger) that has some superelevation and heavy loads operating at slow speeds - THREE Spikes
- Curved Track with more than 4^{o} of Curvature (Radius 1432 feet or smaller) - THREE Spikes
- Curved Track with more than 36^{o} of Curvature (Radius less than 162 feet) that has superelevation or supports heavy loads - FOUR Spikes

Curved track with more than 6^{o} (Radius 955 feet or larger) of curvature which is not spiked per this paragraph shall have a restricted certification. Existing curves more than 4^{o} and less than or equal to 6^{o} that only have 2 spikes per rail per tie shall be upgraded to 3 spikes as ties or rail is replaced.

2.2.5.5 Housekeeping. Keep trackage systems clear of obstructions that could cause derailment. Accumulations of debris, dirt, grease, paint, etc., shall be removed. Flangeways and switches shall be kept reasonably free of debris and silt. Flangeways for road crossing, other paved areas, and frogs that are “full of compacted” dirt, rocks, debris and silt shall be considered a critical defect.

2.2.5.6 Clearances. Impaired clearances shall be recorded and corrective actions taken to insure safety when the minimum clearances shown in MO-103, UFC 4-860-03, or American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering are violated. Clearances less than minimum clearance required shall be considered a critical defect if it presents a clear hazard to rail traffic. New encroachments should be reported by inspectors for further investigation and measurement.

2.2.6 SUBSTRUCTURE. Foundation deficiencies which upon failure could cause dropping, shifting, movement or derailment shall be considered critical or catastrophic.

2.2.6.1 Ballast. Ties shall be fully supported. Ties not fully supported are considered defective. Occasionally, heaving of track in the winter and spring will create deficiencies in track grade or rail levels. This usually indicates poor drainage, dirty ballast, inadequate subgrade or a combination of these conditions. Temporary corrections to this condition shall be accomplished so that the condition of trackage can be considered not defective. The use of track shims should be avoided; however, when shimming is necessary, it should be done in accordance with instructions outlined in NAVFAC MO-103. When weather conditions stabilize, appropriate corrective actions shall be taken to correct any deficiencies in ballast or subgrade.

2.2.6.2 Drainage. Lack of drainage is a major contributing factor in the cause and acceleration of defects. Water on, in, under or anywhere near trackage shall be controlled. Culverts, ditches and drains shall be kept open, free flowing and in good repair. Drainage with restricted or fully blocked flow which could result in a washout in the track shall be considered a critical defect.

2.2.6.3 Utility Lines. Utility lines passing under or adjacent to trackage should be noted on the plans and observed for signs of failure during all inspections. Ballast and subgrade do not have to be removed for inspection unless there is a suspected failure or defect in the distribution line or tunnel. Historical records of material and construction details shall be recorded and maintained when installed, repaired, or dug out for inspection.

2.2.7 CROSSTIES. The identification and terminology of different parts of a typical railroad crosstie system are shown in UFC 4-860-03. Replacement ties should be adequately treated to ensure long, reliable life and to minimize replacement cost. New wood ties should be inspected as discussed in NAVFAC MO-312.2 and MO-103, Appendix G.

2.2.7.1 Tie Spacing. Tie quantity and spacing are based on roadbed conditions, trackage category, rail size, anticipated load and experience or engineering judgment. Installation criteria for new construction and rework trackage should be specified for each section of trackage based on current instructions, design standards, need and economics.

2.2.7.2 Skewed Ties. A skewed tie is one having an axis other than perpendicular to the rails (except turnout rails). Measurements of skew distance may be made while checking gage; however, a visual check at any trackage system is adequate. Spotting ties that are over half the width of the tie out-of-line can be easily done while walking or riding over the trackage system. Single skewed ties are not a defect. Sections of trackage with skewed ties indicate a problem area that should be investigated.

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
"A"	GENERAL		See Note 1 & 2			1.0 and 2.2
213.9	Speed		over 25 MPH			1.3.3 and 2.2.1.1
213.13	OPERATIONAL TEST DEFLECTION Flexible Support (wood ties and gravel ballast)	Note 2	over 1 1/2 inches see Note 3	Over 3 inches	3-1	2.1.4.2 2.1.4.2.2
	Rigid Support (concrete beam or slab - incld. bridges, trestles and buildings	Note 2	over 1/2 inch See Note 3	Over 3 inches		2.1.4.2 and 2.1.4.1.1
"B"	ROADBED					
213.33	Drainage	obstruction to flow	blocked See Note 2	See Note 2	3-2	2.2.6.2
213.37	Vegetation	See UFC 4-860-03 para 3-3	Interferes with track inspection or train operations	See Note 2	3.3	
"C"	TRACK GEOMETRY					
213.53	Gage	Under 56 1/8" 57 1/2"	Over 57 1/2"	Under 56" Over 57 3/4"	12-2	2.2.3.5
213.55	Alignment (per 62')					
	Tangent, Mid-Offset	over 2"	over 3 inches	over 5 inches	12-6	2.2.3.2
	Curve, Mid-Ordinate	over 2"	over 3 inches	over 5 inches	12-6	
	Profile Grade	See Note 2	more than 3%	See Note 2	None	2.2.3.3
213.57	Curve elevation				12-4	
	Outside rail on industrial trackage	See Note 2	over 4 inches See Note 4	See Note 2	12-4.c	2.2.3.4

Attachment (2-1)

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.57	Curve elevation Cont'd Reverse Superelevation	Over 0 inch	Over 1/2 inch	See Note 2	12.4.b	2.2.3.4
	Superelevation - based on degree of curvature and speed	1.5-inch unbalanced formula	3-inch unbalanced formula	See Note 2	12-4.f	2.2.3.4
	Superelevation runoff per 31 feet	exceeds 1 inch	Exceeds 1.75”	See Note 2	12.4.e	
213.63	Trackage Surface					
	Runoff per 31 feet	over 1 1/2"	over 3"	over 3 1/2"	None	2.2.3.3
	Profile @ Mid-ordinate of 62' chord	over 2 1/4"	over 2 3/4"	over 3"	12-7	2.2.3.3
	Cross level deviation	over 1 1/4"	over 2"	over 3"	12-3	2.2.3.4
	Cross level difference in 62 feet	over 1 3/4"	over 2 1/4"	over 3"	12-5	2.2.3.3 and 2.2.3.4
"D"	TRACK STRUCTURES					
213.103	Ballast	Track moves laterally, longitudinally or vertically. See track geometry	See Note 2	See Note 2	4-3	2.2.6

Attachment (2-1)

SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.109	Crossties Quantity - number per 39' of trackage	Less than 20	Less than 18	See Note 2	5-6	2.2.7 2.2.7.3
	Spacing - Face to face distance between two ties	see Note 2	over 18 inches See Note 5	See Note 2	5-6.d	2.2.7.1
	Skew - Deviation of ties from right angles to rails	3 or more consecutive ties skewed greater than 8".	over 8" or standard tie width. See Notes 3, 5 and 7	See Note 2	5-6.f	2.2.7.2
	Missing Ties	1	Greater than 48”	Greater than 48” at joint	5.6.e	
	Condition - number of sound ties per 39 ft Tangent and curves less than 2°	Less than 12.	Less than 8. See Notes 6 and 7.	Less than 7	5-6.c.(1)	2.2.7.3
	Turnout/Curves greater than 2°	Less than 13	Less than 10. See Notes 6 and 7.	Less than 9	5.6.c.(1)	2.2.7.3
	Consecutive defective ties - See Note 6 Tangent and curves less than 2°	3	4	5 or more	5.6.c.(1)	2.2.7.3
	Turnouts/Curves greater than 2°	2	3	4 or more		
	Joint ties - required number of sound ties	Less than 2 sound ties within 24" of joint.	-----	No sound ties within 24" of joint.	5-6.c.(2)	2.2.7.3
213.123	Tie Plates	Indication of more than 1/2 " of movement. See Note 7.	See Note 2	See Note 2	5-2.c	None

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SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.127	Rail Fastenings -				6-3	2.2.5.4
	Spikes per rail per tie					
	on tangent & curves 4° or less	Less than 2. See Note 5.	See Note 2 & 5	See Note 2 & 5		
	on curves over 4°	Less than 3. See Note 5.	See Note 2 & 5	See Note 2 & 5		
	on curves over 6°		Less than 3			
213.133	Defective Rails				7 & Appendix C Table 7-1	2.2.2.4
	Transverse Fissure Compound Fissure Detail Fracture Engine Burn Fracture Ordinary Break Defective Weld	10% - 20% of railhead weakened by defect.	More than 20% of railhead weakened by defect. See Notes 2 & 8	More than 40% of railhead weakened by defect or Breakout in the railhead		
	Horizontal Split Head Vertical Split Head Split Web Piped Rail Head Web Separation	1" - 4" in length	More than 4" See Note 2 & 8	Breakout in the railhead Defects accum-mulating 3 feet or more in any 10 feet.	Table 7-1	
	Bolt Hole Cracks	1/2" - 1 1/2" in length	More than 1 1/2" See Note 8	Breakout in the railhead	Table 7-1	
	Broken Base	0"- 6" in length	See Notes 2 & 8	Exceeding 6"	Table 7-1	
	End batter	Depth over 1/8”	Depth over 3/8”	Depth over 1/2” See Note 2	7-1.e Table 7-1	

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SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.113	**Damaged Rail Cont'd** Shelling, Head Checks, Engine Burns, Mill Defect Flaking-Slivered Corrugated-Corroded	Depth over 1/4"	Depth over 3/8"	Depth over 1/2" See Note 2	Table 7-1	2.2.2.3
	Crushed Head Flowed Rail	Not allowed Exceeding 3/16" from gage face.	Depth over 3/8" Exceeding 5/16" from gage face.	Breakout See Note 2	7 & Appendix C Table 7-1	2.2.2.3
None	**Worn Rail**				7-1.c Table 7-1	2.2.2.4
	Web Thickness Reduction	See Note 2	Over 1/8"	See Note 2		
	Base Width Reduction	1/4" See Note 9	Over 1/4" See Note 9	See Note 2	7-1.d & Table 7-1	
	Vertical head Wear: Rail Section (lbs per yard) up to 90 lb 100 lb - 119 lb above 119 lb	 3/8" 3/8" 1/2"	 Over 3/8" Over 3/8" Over 1/2"	See Note 2	7-1.c & Table 7-1	
	Horizontal Side Wear Rail Section (lbs per yard) up to 90 lb 100 lb - 119 lb above 119 lb	 3/8" 1/2" 5/8"	See Note 10 Over 1/2" Over 5/8" Over 3/4"	See Note 2	7-1.c & Table 7-1	
213.115	**Rail End Mismatch**				6-4.f	None
	On tread or running surface	over 1/8 inch	-----	over 1/4 inch		
	On gage side	over 1/8 inch	over 3/16 inch	over 1/4 inch		

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SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.121	**Joints** Joint gap	over 3/4 inch See Note 11	over 1 1/4" See Note 11	Over 2”	6-4.g	2.2.5.1
	Bolt holes - torched or burned (applies to any torch cut hole in rail)	Not allowed	Not allowed	See Note 2	Table 7-1	None
	Joint bars	Any crack or break	Torch cut/modified	any crack or break btwn the middle two bolt holes	6-4.c	None
	Track Bolts	Loose or damaged	less than two per rail All loose in joint	less than one per rail	6-4.d	2.2.5.3
213.133	**Turnouts and Rail Crossings** Flangeway Width	1 5/8"	less than 1 5/8"	less than 1 1/2"	9-2.6 Table 8-1	2.2.4
213.135	**Switches** Point Closure Gap	Locked with 1/4” spacer or any gap	over 1/4 inch See Note 12	Over 3/8 inch	8-3 Fig 8-1 & 8-3 8-3.b	2.2.4.2
	Point Condition	Broke/worn greater than 1/2 inch down & 6" back from point	Worn/damaged beyond marginal criteria	See Note 2	8-3.c.(1)	
	Switch Point Rail	Metal flow preventing proper closure	Point – higher than stock rail	Point rail beyond taper higher than stock rail See Note 2	8.3.c.(2) & (3)	

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SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.135	Switches					
	Switch Stand	Not fully secured	Not fully secured	Lateral movement of switch stand or point gap	8-3.e	
	Switch stand latches	Loose or Damaged	Loose or Damaged	Missing, damaged , insecure, inoperative	8-3.d	
	Connecting Rod, Switch Rods, and Switch clips	Does no allow unobstructed motion	Improper washers or spacers behind switch clips	Insecurely fastened or damaged	8-3.f	
	Connecting Rod Bolts, Switch Rod Bolts, and Clip Bolts		Improper size or loose. Nut on top and cotter pin in place.	See Note 2	8-3.h	
	Switch Heel		Bolts loose or missing. Heel not secure	Less than one bolt per rail	8-3.i	
	Rail Braces	All tight and secure	Less than 4 – tight and secure		8-3.j	
	Point rail stop		Bent or missing		8-3.k	
	Cast switch					2.2.4.3.1
	Head of switch rail	Cracks less than 1/2 inch in length	Over 1/4 inch deformation and crack exceeding 1/2 inch in length	See Note 2		2.2.4.3.3
	Outside of rail head		Deformation exceeding 1/4 inch	See Note 2		

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SUMMARY OF IN-SERVICE RAILROAD TRACKAGE INSPECTION CRITERIA

FRA Paragraph	TRACK SAFETY STANDARDS	DEFECTS			UFC 4-860-03 Railroad Track Maintenance & Safety Standards	INSTRUCTION Reference
		MARGINAL	CRITICAL	CATASTROPHIC		
213.137	Frogs				8-4	2.2.4.1
	Flangeway depth	Less than 1-5/8"	less than 1-1/2" See Note 13	less than 1-3/8"	8-4.g	
	Flangeway width	1-5/8 ”	less than 1-5/8"	less than 1-1/2"	8-4.f	
	Point	more than 1/2" down and 6" back	more than 5/8" down and 6" back	See Note 2	8-4.a	
	Tread Wear	more than 5/16"	more than 3/8"	See Note 2	8-4.b	
	Cast frog					2.2.4.3.1
	Head of frog point rail	Cracks less than 1/2 inch in length	over 1/4 inch deformation and crack exceeding 1/2 inch in length	See Note 2		
	Outside the rail head		Deformation exceeding ¼ inch	See Note 2		2.2.4.3.3
213.141	Self-guarded frogs Raised guard wear	over 5/16"	over 3/8"	See Note 2	8-4.c	2.2.4.1
213.143	Frog guard rails					None
	Check gage	less than 54 3/8"	less than 54 1/4"	less than 54 1/8"	8-6	
	Face gage	more than 53"	more than 53 1/8"	more than 53 1/4"	Table 8-1	
213.133	Turnout Bolts	Loose or Damaged	Missing, incorrect position/size, missing cotter pins	Less than one per rail. See Note 2		2.2.5.3

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Note l. Criteria shown is based on FRA safety standards for Class Two (2) trackage. If higher or lower standards of trackage are involved, corresponding FRA Track Safety Standards shall apply. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachments (2-1) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. Restricted speed or slow orders do not change or reduce the class of track. The classification of marginal defects is based on maintenance standards for Track Category A, as defined in paragraph 1-5 of UFC 4-860-3. See Appendix E of UFC 4-860-3 for corresponding standards for Track Category B.

Note 2. The following defects are considered catastrophic and all traffic shall be restricted until repairs are made: (l) Any breakout in the railhead, (2) Defects accumulating three feet or more in any l0 feet, (3) Broken base exceeding six inches, (4) Defects exceeding FRA Class 1 Track Safety Standards. Specific criteria for evaluating the consequences of certain defects outside the range designated as critical is not available. However, when the FRA Safety Standards for Class One track are exceeded, the trackage shall be non-certified. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience.

Note 3. Guidelines are for visual observation only. Deviations may be estimated, and measurement is not required unless it is necessary for supplemental investigation. Deviations exceeding the criteria shown shall be investigated to determine cause. Defects for flexible supported rail shall be evaluated according to trackage surface standards (FRA Para 213.63). Defects for rigidly supported rail shall be evaluated based on engineering investigation.

Note 4. Maximum superelevation for high speed mainline or running trackage, with corresponding higher classification and better standards, leading into or passing through the activity is six (6) inches.

Note 5. An individual tie not fully supported, having missing or loose spikes, having excessive spacing, or other type tie defect will cause the tie to be classified as defective. See FRA paragraph 213.109 for handling of defective ties. Track on curves exceeding 6 degrees that do not have the third spike shall have a restricted certification in accordance with para. 1.3.3.2. On track with curves over 4 degrees and equal to 6 degrees, the third spike shall be added as ties or rail are replaced.

Note 6. See FRA Standards for description of defective ties and for tie requirements under joints. Generally the maximum center to center distance between sound ties should not exceed 70 inches; however, the centerline of a sound tie shall be within 24 inches of a rail joint. The criteria for consecutive defective ties is based on 21 ties/39 feet of track or greater. Tie spacing of less than 21 ties/39 feet dictates more restrictive criteria.

Attachment (2-1)

Note 7. Indications on tie plates or ties of movement exceeding one-half (l/2) inch shall be considered a defective tie. "Kicked" tie plate with shoulder under the rail should be considered defective (marginal or critical)

Note 8. Defects smaller than those noted may be classified as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing.

Note 9. Rail shall be scheduled for replacement if the base is corroded such that more than 0.25 inch play is allowed in the rail. See paragraph 7-1.d, UFC 4-860-3

Note 10. Railroad rail may be transposed or interchanged if the horizontal wear on one side does not exceed 3/8 inch.

Note 11. Joint gaps measuring over 3/4 inch when the air temperature is over 30^{o}C (86^{o}F) shall be remeasured when the air temperature drops below 0^{o}C (32^{o}F) to ensure that marginal defects do not exist. Joint gaps over 3/4 inch and less than 1-1/4 inch may be classified as marginal. Joint gaps over 3/8 inch and 3/4 inch or less are not a defect.

Note 12. Switch points must fit stock rails properly. Lateral and vertical movement and any gap that adversely affects the fit of the switch points to the stock rail is considered a defect.

Note 13. Criteria for Railroad or Crane trackage crossings shall be developed locally based on design, float and safety.

Attachment (2-1)

RAILROAD TRACKAGE
CERTIFICATION DOCUMENT

TRACKAGE AREA: _____

Detailed
Inspection Date: _____

Date of current
Operational Inspection: _____

Date of current
Non-Destructive Test: _____

ITEM	COMPONENT	SAT	RESTRICTED	UNSAT	N/A
1.	RAILS				
2.	RAIL JOINTS				
3.	SPIKES/BOLTS/TIE PLATES				
4.	GAGE				
5.	CROSS SECTION				
6.	SWITCHES				
7.	FROGS				
8.	CROSSINGS				
9.	TIES				
10.	BALLAST				
11.	SUPPORT STRUCTURES				
12.	RAIL STOPS				
13.	CLEARANCES				
14.	SIGNS AND APPURTENANCE(S)				

REMARKS:

CERTIFICATION

A. This section of trackage meets the applicable standards and is recommended for _____ certification

INSPECTOR'S SIGNATURE	DATE

B. The section of trackage covered by the attached inspection report is certified as follows:

FULL CERTIFICATION **RESTRICTED CERTIFICATION** **NON-CERTIFICATION**

CERTIFYING OFFICIAL'S SIGNATURE	DATE

Attachment (2-2)

TRACK INSPECTION RECORD			TYPE OF INSPECTION: [ ] PREVENTIVE MAINTENANCE [ ] SAFETY INSPECTION [ ] DETAILED INSPECTION [ ] OPERATIONAL INSPECTION		
ACTIVITY			TRACK NAME OR ID		REPORT DATE
INSPECTOR PRINT OR TYPE & SIGN			INSPECTION ORGANIZATION		
DEGREE OF HAZARD	LOCATION MILEPOST OR STATION	DEFICIENCY DESCRIPTION	PROPOSED CORRECTIVE ACTION AND TIMEFRAME	FOLLOW-UP ACTIONS ACTION TAKEN	 DATE COMPLETED
LEGEND: Degree of Hazard CAT - Catastrophic CRIT - Critical M- Marginal					Page __ of

Attachment (2-3)

TURNOUT INSPECTION CHECKLIST

ACTIVITY		REPORTING ORGANIZATION	INSPECTOR (PRINT OR TYPE/SIGNATURE)	
TRACK IDENTIFICATION	TURNOUT IDENTIFICATION	TURNOUT SIZE	SWITCH POINT LENGTH	DATE

GENERAL

Are All Materials Proper Size?	YES	NO		NOTE____
Is Rail Same Weight and Section?	YES	NO		NOTE____
Are Flangeways Clear of Debris?	YES	NO		NOTE____
Are Crib Areas Clear of Debris?	YES	NO		NOTE____
Surface	GOOD	FAIR	POOR	NOTE____
Alignment	GOOD	FAIR	POOR	NOTE____

FROG

Point	OK	WORN_____"	CHIPPED	BROKEN	NOTE_____
Top Surface	OK	WORN_____"	BROKEN	DAMAGED	NOTE_____
Bolts:	OK	_____ LOOSE	_____ MISSING	_____DAMAGED	NOTE_____
Guarding Face (Self guarded Frog Only):	OK	WORN	BROKEN	DAMAGED	NOTE_____

TIES

Total Number Defective:	_____	NOTE____
Maximum Number of Consecutive Defective:	_____	NOTE____
Number of Occurrences of Defective Joint Ties	_____	NOTE____

GUARD RAILS

Position - Straight	OK	IMPROPER	NOTE ____			
Turnout	OK	IMPROPER	NOTE ____			
Condition - Straight	OK	WORN	INSECURE	BROKEN	DAMAGED	NOTE____
Turnout	OK	WORN	INSECURE	BROKEN	DAMAGED	NOTE____
Clamps/Fillers - Straight	OK	LOOSE		BROKEN	DAMAGED	NOTE____
Turnout	OK	LOOSE		BROKEN	DAMAGED	NOTE____
Bolts - Straight	OK	____ LOOSE	____ MISSING	____ DAMAGED	NOTE____	
Turnout	OK	____ LOOSE	____ MISSING	____ DAMAGED	NOTE____	

SWITCH AND STAND

Switch Operates Without Difficulty?	YES	NO (Describe Problem)				NOTE____
Switch Stand:	OK	INSECURE	DAMAGED			NOTE____
Point Lock/Lever Latches:	OK	MISSING	DAMAGED	LOOSE		NOTE____
Point Gap - Left	NONE	LESS THAN 1/8"	1/8" OR GREATER		1/4" OR GREATER	NOTE____
- Right:	NONE	LESS THAN 1/8"	1/8" OR GREATER		1/4" OR GREATER	NOTE____
Point Condition - Left	OK	WORN	CHIPPED	BROKEN		NOTE____
- Right:	OK	WORN	CHIPPED	BROKEN		NOTE____
Is Point LOWER Than Stock Rail?		Left: YES NO			Right: YES NO	NOTE____
Is Point Rail Beyond Taper HIGHER Than Stock Rail?		Left: YES NO			Right: YES NO	NOTE____
Connecting Rod	OK	BENT	DAMAGED	LOOSE	BINDING	NOTE____
Jam Nut:	OK	NONE	DAMAGED	LOOSE	MISSING	NOTE____
Switch Rods:	OK	__BENT	__DAMAGED	__LOOSE	__BINDING	NOTE____
Switch Clips:	OK	__BENT	__DAMAGED	__LOOSE	__BINDING	NOTE____
Connecting Rod Bolt:	OK	___LOOSE	_____DAMAGED		____MISSING	NOTE____
Nut On Top?	YES	NO	Cotter Key In Place?		YES NO	
Switch Rod Bolts:	OK	___LOOSE	_____DAMAGED		____MISSING	NOTE____
Nut On Top?	YES	NO	Cotter Key In Place?		YES NO	
Slide Plates:	OK	___LOOSE	___DIRTY	____DAMAGED	____MISSING	NOTE____
Rail Braces - Straight Side:	OK	___LOOSE	____DAMAGED	____MISSING	NOTE____	
Turnout Side	OK	___LOOSE	____DAMAGED	____MISSING	NOTE____	
Heel Filler:	OK	____ INSECURE	_____CRACKED/BROKEN		____MISSING	NOTE____
Heel Bolts:	OK	___LOOSE	____DAMAGED	____MISSING	NOTE____	
Heel Joint Bars/Shoulder Bars: :	OK	___LOOSE	____DAMAGED	____MISSING	NOTE____	

MEASUREMENTS (Inches)

	Straight Side	Turnout Side
SWITCH		
Gage Just Ahead of Points:	_____	
Gage @ Switch Heel	_____	_____
CURVED CLOSURE RAILS:		
Gage at Joints:	_____	_____
		_____
FROG:		
Gage at Point:	_____	_____
Flangeway Width:	_____	_____
Flangeway Depth:	_____	_____
GUARD RAILS		
Guard Check Gage:	_____	_____
Guard Face Gage:	_____	_____
Flangeway Width:	_____	_____

NOTES: _____
_____
_____
_____
_____

Attachment (2-4)

SECTION 3. GROUND LEVEL CRANE TRACKAGE

3.1 INSPECTION

3.1.1 CONTINUOUS OPERATOR INSPECTION. Daily or prior to use safety checks listed in activity regulations shall be conducted. In addition, on-the-job observations shall be performed in accordance with P-307 at all times when equipment is working. Crane operations personnel (operators, riggers, etc.) shall be encouraged to observe and report track problems, deficiencies, obstructions and the "feel" of the track.

3.1.2 PREVENTIVE MAINTENANCE (PM) - PM SERVICE AND PM INSPECTION.

3.1.2.1 PM is a continuous working inspection, examination of component parts, lubrication, adjustment, and minor repair. PM service and inspection are normally conducted by the crews assigned to or operating the equipment, by the track walkers, by Maintenance Shop personnel, and/or by contract. The PM Inspections and Services are scheduled as directed by the Public Works Officer or Activity Commander. Flexibility exists in the frequency of PM inspections based on usage, climatic conditions, history, and experience; therefore, the Public Works Officer or Activity Commander shall establish PM schedules. On systems where lubrication of moving parts, adjustments to electrical or mechanical systems, tightening of loose bolts, and other minor repairs are minimal, the PM service requirements may be identified during the annual detailed inspection and PM service and repair work scheduled. When possible, deficiencies are corrected during the inspection and recorded. Uncorrected deficiencies shall be reported to the supervisor for action, inclusion in the repair work schedule, adjustment of operating speed and consideration for closure of a section of trackage. Minimum information to be provided in PM reports is detailed in paragraph 3.1.2.2. PM inspections are visual inspections which include, but are not limited to, such items as loose or missing bolts, defective switch points, loose fasteners, if accessible, inoperative switches, operator reported rough or soft spots, poor drainage, substructure failure, defective rail, and settlement. The most important sections to be checked are the switches, curves and any area where a derailment has occurred.

3.1.2.2 PM Inspection Reports. Local formats in existence may be used. As a minimum PM Inspection reports should include:

(1) Date.
(2) Sections of trackage inspected.
(3) Corrected and uncorrected deficiencies.
(4) Number of and size of broken or missing parts.
(5) Suspected misalignment or defect.
(6) Guides and instructions used for the inspection.

3.1.3 SAFETY INSPECTION. The purpose of this inspection is to identify critical and catastrophic defects affecting the safety of the track being inspected. Scheduled safety inspection of crane trackage is not required due to the rigid support structure involved. If condition(s) prevail in the crane trackage that dictate the need for a more frequent inspection (see paragraph 1.3.3), a scheduled

safety inspection program may be established. If a safety inspection is required, guidance provided in paragraph 2.1.3 shall be followed.

3.1.3.1 Special Safety Inspections. The Certifying Official shall determine the requirements on providing special safety inspections for unusual occurrences such as derailment, accident, flood, fire, earthquake, hurricane, severe storm, or other occurrence that could have an adverse effect on the track structure.

3.1.4 DETAILED INSPECTION SUPPLEMENTED BY ENGINEERING EVALUATIONS. Detailed Inspections are to be conducted annually or more frequently when required by climatic conditions or other unusual circumstances. Annual inspection shall mean that sections of trackage are scheduled as part of the facilities inspection program in accordance with MO-322. Inspection for each track section shall be scheduled and accomplished during a specific month each year and routinely scheduled in a 12 month period. Annual inspection exceeding a 13 month period since the previous annual inspection on the particular track section will cause the existing certification to be default and result in the track section being non-certified for use. Engineering evaluations shall be conducted whenever there is any doubt of physical condition. In addition, Detailed Inspection or Engineering Evaluation criteria shall be used to supplement investigations and evaluations after any derailment. Additional testing or inspection shall be conducted when the condition of any portion of the trackage system is doubtful.

3.1.4.1 Visual Inspection. Visual inspections during the detail inspection should include PM inspection checkpoints and observations of all trackage system components including rails, fasteners, if accessible, rail accessories, switches, support structures and appurtenances.

3.1.4.1.1 Support Structures. All foundations and piers shall be inspected for signs of settlement or failure. Special attention should be given to looking for openings in quaywalls, bulkheads or other waterfront retaining structures that may permit fill material to wash out and cause trackage settlement and failure. Piers supporting ground level rail shall be inspected in accordance with criteria outlined in MO-322 and the following criteria. The prescribed minimum inspection frequency for is two years. Inspection of the support system of the crane for the biennial control inspection shall be performed by facilities planner & estimators or inspectors, as long as they meet the minimum qualifications required in MO-322. Biennial support structure inspection reports shall be reviewed and random observations made of rail supports for indications of movement, deterioration, or stress. Broken and defective components shall be scheduled for repair or replacement. Indicators of settlement, misalignment or deflection shall be recorded. Deflection, movement, or settlement under routine in-service loading exceeding the limits shown in Attachment (3-1) shall be investigated and analyzed, the degree of damage documented, and the classification of hazard determined. Structural conditions leading to restricted certification of a section of trackage shall be based on a review of the structural analysis and on a condition survey conducted by qualified engineer in sufficient detail to establish the safety of the structure.

3.1.4.1.2 Program for Inspection of Paved Areas. Because of the weight of portal cranes used in operational observations and the type of foundation existing, removal of pavement for investigation may be minimal or not required based on engineering judgment and Certifying Official approval. Inspection of trackage encased in asphalt or concrete shall include visual inspections and operational

observations (para 3.1.4.2) for exposed rail defects, trackage movement, and signs of distress in adjacent pavement. To verify visual inspections, if determined to be necessary by the Certifying Official, activities shall establish a program to remove small sections of pavement and spot check trackage encased in pavement based on indication of defects with consideration taken for age and usage. Types of defects which would require pavement removal would include pumping joints, wide gage, deflecting rail, settlement of track and surrounding area. Pavement shall be maintained so that it does not interfere with crane operation and to ensure safe vehicle movement. In order to document the inspection of trackage in paved and covered areas, an inspection report shall be prepared indicating defects noted, as well as description and general condition of track components for future reference. Pictures should be used to document conditions as necessary. Any defects detected affecting the certification of the section of trackage inspected shall be handled in accordance with paragraph 1.3.

3.1.4.2 Operational Inspection. The purpose of an operational inspection is to supplement the detailed inspection and to assist in the identification of problem areas which could develop into unsafe trackage. Conditions which may be discovered include looseness, binding or vibration.

3.1.4.2.1 Frequency. Operational inspections with loads prescribed in paragraph 3.1.4.2.2 shall be performed at intervals not to exceed two years on active trackage systems to ensure that the trackage systems will sustain the prescribed load in a safe manner. Operational inspection exceeding the two year requirement will cause the existing certification to be default and result in the track section being non-certified for use. See paragraph 1.3.1 regarding 30 day extension of certification.

3.1.4.2.2 Loads. Loads should be moved over track systems slowly enough so that observations can be made. Loading of cranes being certified is prescribed in NAVFAC P-307. For trackage systems not inspected during crane certification, an operational inspection shall be conducted by using the heaviest crane or a crane with a wheel load of at least 90 percent of the largest wheel load of cranes that can operate on the track. The inspection may be conducted with no load on the hook. The boom should be elevated to minimum radius when conducting the operational inspection; however, the boom may be parallel to the track except when a defect is suspected. (Note: With the boom elevated to its minimum radius, maximum loading and therefore observation of load is under the counterweight.) If these cranes are not available or wheel loads of lighter cranes are not 90% of the largest wheel load, lighter cranes maybe used by rotating the counterweight over the rail being observed. As such, the crane will have to travel over the section of track twice, each time with the counterweight positioned over a corner of each rail of the section of track being inspected. Where there is possibility of a crane wheel coming off the track or where there is the possibility of settlement, the maximum or minimum loading shall be created by positioning the boom relative to the trackage being tested. Operational inspection reports shall specify the crane used to perform the operational inspection.

3.1.4.2.3 Observations. A Track Inspector shall conduct or supervise the operational inspection. Trackage shall be inspected during load test. Observations for looseness, binding, deflection, or vibration shall be made by sight, sound, and feel. In addition, rail joints, grout, general alignment, rail condition, supporting structures (see paragraph 3.1.4.1.1), and other accessories may be observed for deficiencies during and after the load test or operational inspection. There is no requirement for physical measurements of rail or trackage systems under load; however, when practical and

accessible, rail systems shall be observed for deflection. Guidelines for maximum allowable deflections as determined by visual judgment are shown on Attachment (3-1). In the event unusual movement is observed or felt, deflections appear to be larger than the guideline limits established, or the cause of deficiency cannot be immediately determined, an investigation and engineering analysis of the immediate vicinity shall be made prior to certification. Results of the investigation and engineering evaluation, not the deflection limit per se, shall determine when use of a section of trackage must be discontinued.

3.1.4.2.4 After Repair. Operational Inspection for certification following major restoration or reconstruction is not a mandatory action required by this instruction; however, as a minimum a visual observation of trackage under routine traffic loading during or after repair shall be performed to ensure proper movement. In addition, it is recommended that, when practical, in-house work orders and contract documents require compliance with the following procedures prior to final acceptance. Ground level crane trackage shall have a crane successfully operate over the system repaired prior to encasing in concrete.

3.1.4.3 Measurements. The Detailed Inspection shall include visual observations and spot check measurements of grade, track gage, cross section elevation, horizontal alignment, vertical mismatch, supports and other features to insure that criteria in this instruction are met. Instrument surveys may be requested by the Certifying Official or his representative to verify visual observations or spot check measurements, establish new alignment, investigate problem areas and determine deviation from the established standards.

3.1.4.4 Detailed Inspection Documentation

All inspections performed under paragraph 3.1.4 shall be properly documented. Inspection records must specify track inspected, date of inspection, location and nature of deviation from requirements and remedial action taken. Detailed inspection documentation should address all marginal, critical and catastrophic deficiencies existing in the track system at the time of inspection. In addition to detailing defects detected during the annual visual inspection, outstanding defects detected during safety inspections, operational inspections, non-destructive test inspection and other inspections and engineering investigations should be included. Deficiencies not exceeding marginal criteria are recorded, as necessary. A blank example record is provided as Attachment (3-3). Instructions for completion and a sample filled in inspection report are provided in Appendix B of UFC 4-860-03. As a minimum, activity track files shall contain the current and previous complete detailed inspection report. Engineering evaluations and all engineering investigation reports shall be retained until invalidated by trackage repair or other actions. Current and previous operational inspection records shall be kept on file.

3.1.5 NON-DESTRUCTIVE TESTING (NDT).

3.1.5.1 Frequency: All active ground level crane rails shall be tested for defects upon activation and at five year intervals, unless maintenance problems or visual inspection dictate a necessity for more frequent testing. The term "upon activation" refers to sections of trackage which have been inactivated or not used and that have not had a non-destructive test within the preceding five years.

Rail shall be tested by ultrasonic inspection in accordance with paragraph 1.6.1, except short section of rail may be tested by hammer sounding as allowed by paragraph 1.6.2. All trackage that has not been non-destructively tested within the five year period from the previous NDT shall have a restricted certification or may be non-certified. Non-destructive testing of relay rail or used rail may be deferred until the next regularly scheduled five year test interval, at the discretion of the Certifying Official, however any such deferral should be based on an engineering evaluation that considers age, expected use, and experience. During the interim period, the rail may be given full certification based on other tests, observations, and inspections required by this instruction. Criteria for unacceptable rails are included in Attachment (3-1) and in UFC 4-860-03. Appendix C, UFC 4-860-03, provides a brief description and illustration of common rail defects. New rail and accessories shall be accepted according to the latest government specifications or standard industry practice. The NDT results shall be used to establish a base line for future inspection and to identify areas requiring observation.

3.1.5.2. Test Results. Rail inspection records must specify the date of inspection, the location and nature of any internal rail defect found, and the remedial action taken and the date thereof. Rail inspection records shall be retained until after the next rail inspection is performed or for one year after remedial action is taken, whichever is longer. All discontinuities shall be reported; the nature and size of defect estimated, and responses compared with standards or past test results. Rejection or degree-of-hazard of all potential defects shall be based on assessment of ultrasonic inspection results, visual inspection, experience, engineering judgment, the criteria shown in Attachment (3-1) and the FRA Track Safety Standards. In-place welded joints and welded repairs may have confused or erratic responses when ultrasonically tested; therefore, interpretation requires experience and engineering judgment to preclude an erroneous classification of defect.

3.2 STANDARDS: Summary of Inspection Criteria, Attachment (3-1), and this section provide descriptions of tolerances and defects for guidance in deficiency classification. Deviation from the standards in this section may require immediate corrective action to provide for safe operations over the trackage involved. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachment and (3-1) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. In general, on heavily used sections of trackage, work planning should start when a deficiency on a section of trackage exceeds one-half (1/2) of the allowable deficiency so that repairs can be accomplished before deficiencies exceed the allowable standards for restricted certification. Selection, installation, inspection and maintenance of trackage systems shall be in accordance with documents referenced herein, except where criteria in this instruction provides more stringent or restrictive criteria. The summary of inspection criteria and defect classifications shown in Attachment (3-1) are guidelines establishing minimum standards allowed based on normal or average conditions.

3.2.1 TRACKAGE. The term "trackage" includes rails, rail accessories, switches, frogs, crossovers, support structures, foundations, and signs, and markings. Operating speeds for cranes shall be initiated and promulgated by Activity Commanders to meet local safety requirements. Categories may be assigned by type or limiting size of equipment utilizing the trackage system.

3.2.2 RAIL. Standards for rail type, acceptable defects and replacement are discussed in this section and in paragraph 213.113 of the FRA Track Safety Standard. The identification and terminology of different parts of a typical rail are shown in Appendix (C), UFC 4-860-03.

3.2.2.1 Rail Type - General. In cases of individual rail replacement, where the existing rail does not meet the standard criteria listed herein and where the remaining track is performing satisfactorily, the same size rail may be installed. Rails must be connected at the joints so that the rails will act as a continuous girder with uniform surface and alignment.

3.2.2.2 Rail Size. A minimum of 135 CR rail is recommended when replacing or upgrading 132 pound rail in portal crane track systems. New portal crane systems should be designed considering larger crane rail sections to accommodate crane requirements. Other systems shall use rail specifically designed for the system. Welded joints shall be used whenever possible (see paragraph 3.3.3.2.).

3.2.2.3 Rail Defects. The basic rule of thumb or general guideline for determining the acceptability of a defective rail for continuing use at U.S. naval activities is one-quarter (1/4) inch of alignment variation or movement. All irregularities in top or side rail wear, differences in elevation at breaks or joints, deflections, and movement exceeding 1/4 inch should be investigated. Common rail defects are illustrated and described in Appendix C, UFC 4-860-03, described in FRA Track Safety Standards, and categorized according to operational hazard or risk in Attachments (3-1). Maintenance and safety standards for rail defects, as well as remedial action, are provided in Chapter 7, UFC 4-860-03.

3.2.2.4 Replacement. Defective rails shall be repaired or replaced, as necessary to meet certification criteria.

3.2.2.4.1 Jointed Rail. Remedial action for defective rail shall be in accordance with Chapter 7 and Table 7-2 of UFC 4-860-03. The minimum "rail length", when installing new rail or repairing/replacing existing rail, is thirteen (13) feet. The existence of a short piece of rail (less than 13 feet) is not considered a defect. The existing rail should not be shorter than that necessary to allow for proper application of joint bars to adjoining rails on both ends and allow for proper alignment of rail. The condition of the track or defect in the rail would constitute a defect. There may be some instances where it may be economical to reduce the existing rail length; for example: replacing one rail length with two lengths of an old, standard rail before the entire section is replaced. This may be done provided the minimum length of thirteen (13) feet is maintained, and maximum lengths of rail are used when the section is upgraded. In some special cases such as short closure rails and short rails between turnouts and crossovers the rail length may be less than thirteen (13) feet provided only one piece of rail is used between the controlling features.

3.2.2.4.2 Welded Rail. In continuous welded rail, the standard minimum length of ten (l0) feet shall be maintained between welds or joints. This length is required to ensure proper alignment of rails prior to welding. Existing shorter rail lengths between welds will be maintained as is. The thermite welding process per NAVFACENGCOM specification UFGS-34 11 19.00 or a welding procedure approved by NAVFAC ATLANTIC (CIENG) should be used. Proper maintenance practice is to crop (remove) the ends of rail with bolt holes prior to welding joints. Existing welded joints with bolt

holes for joint bars in either piece of rail are considered no defect unless the weld or bolt holes contain critical defects. Existing rail holes, such as old gage rod holes, may be maintained as is, provided there are no other critical defects in the immediate area.

3.2.3 TRACK GEOMETRY. Horizontal alignment, vertical alignment (grade or profile), cross section elevation and gage shall be investigated when any of the following conditions exist:

(1) There are indications of abnormal wear on the rail heads or on wheel flanges.

(2) New rails are being installed or any portion of a rail is realigned.

(3) Operating crane binds on trackage, has difficulty in starting or has trouble with movement.

(4) When a potential deficiency of trackage can be observed, heard or felt.

(5) There are indications of substructure settlement, failure or other structural changes.

(6) Visual observations indicate that the acceptable limits may exceed those shown in Attachment (3-1).

(7) Tests, inspection, experience or engineering judgment indicate operation or rail alignment problems.

(8) Cranes roll after stopping.

3.2.3.1 Installation and Realignment. UFC 4-860-02N provides criteria for design and alignment of all trackage systems and shall be used for all new installations and major replacement projects. Existing systems, not conforming to grade and curvature standards, may be maintained as is, provided a record is on file describing each deviation from the standard and necessary operating restrictions are imposed. Restrictions shall be tailored to each specific situation and may include such items as maximum speed, no load while moving, and crane boom position during movement. When major replacements are necessary, the new work shall comply with the grade; turnout and curvature standards outlined in UFC 4-860-02N, or shall have an engineering justification and NAVFAC ATLANTIC (CIENG) approval on file for each deviation from the standard.

3.2.3.2 Horizontal Alignment. Maximum out of line limits for tangent ground-level crane trackage shall be according to those shown in Attachment (3-1). Horizontal rail alignment of curved crane trackage shall be analyzed when any of the conditions listed in paragraph 3.2.3 exist. The NAVFACENGCOM computer program entitled "TRACKS" is capable of analyzing portal crane float requirements for traversing curved track. This analysis of required float can be compared to the float capabilities of all cranes and will clearly define the problem areas. The problems may result in limited restriction of crane operation, reworking the running gear on the crane or realigning the trackage. It should be noted that the available design float of a crane may not necessarily be operational. The most appropriate solution will be the responsibility of the Certifying Official. To request assistance with the "TRACKS" Program, contact NAVFAC ATLANTIC (CIENG).

3.2.3.3 Grade. Profile grades shown on Attachment (3-1) are the maximum allowable, except as noted below. On existing trackage with grades in excess of 1%, if cranes do not encounter acceleration or deceleration problems in traversing the tracks, no action is required. However, if problems are apparent or if other deficiencies dictate complete replacement of the track, the criteria of 1% maximum grade shall be followed. Curves, switches and frogs shall be on a near level grade in order to minimize the possibility of derailment. If existing grade is not level or if there is a difference in elevation between the inside rail and the outside rail, the position of the wheel flanges in relation to the top of the rail shall be observed to determine possible defective areas that may require a detailed engineering investigation. The stiffest crane(s) shall be operated over the area and if wheel treads lift from the top of the rail, extreme caution must be taken during operations and immediate action initiated to correct the deficiency. Inspectors should look for areas where wheels spin or try to climb the rail as opposed to normal rubbing. The area in question should be classified as critical and well marked so that all crane operators and crews will be cognizant of the deficiency. If the stiffest crane(s) is operated over the area and no wheel lift, binding or wheel spin occurs, the defect can be reclassified as marginal. If the cross level difference is over one inch, it must remain a marginal defect, it cannot be classified as no defect. It is noted for possible future correction and continued observations for degradation.

3.2.3.4 Cross-Section Elevation. Vertical differences between rails shall be within the limits shown in Attachment (3-1). When the difference in elevation between the elevation of the inside rail and the outside rail exceeds one inch the safety precautions discussed in paragraph 3.2.3.3 shall be made and appropriate action taken.

3.2.3.5 Gage. Gage for two rail crane trackage is measured center to center of railheads. Gage for four rail crane trackage systems is measured from the center points between the two sets of standard railroad tracks that comprise the system. The gage on curved trackage shall under no circumstances require more lateral float than the crane can provide. This can be analyzed using the NAVFACENGCOM computer program called "TRACKS" as described in paragraph 3.2.3.2.

3.2.4 FROGS AND SWITCHES. Criteria for acceptable frogs and switches are shown in Attachment (3-1). The maximum horizontal or vertical misalignment between the top or head of frog or switch rail and the stock rail is the same as for rail end mismatch; however, it is recommended that corrective action be taken in the vicinity of frogs and switches on running or access trackage before the critical limits are reached. Existing frogs and switches of types not recommended, which are performing satisfactorily, shall be retained. Replacement of frogs and switches shall be in accordance with UFC 4-860-02N and the latest specifications.

3.2.4.1 Frogs. The rigid frogs are preferred for all locations because of their maintenance free characteristics; however, the use of the turntable frog is mandatory for certain angles below 30 degrees, depending upon frog angle, curve radius, and flangeway width of crossing rail (see UFC 4-860-02N for details).

3.2.4.2 Switches. The rails in some switches will "bow-up." This is a not a defect unless it causes binding or other difficulty in operation of the switch or the passing of a crane. Insure that ample

flangeway is available in the vicinity of the point of switch and the stock rail, as controlled by flange width of crane wheels using the track system.

3.2.4.3 Cast Switches and Frogs. The following additional criteria are provided for classifying critical defects in cast crane switches and frogs. For track fixtures fabricated from rail, rail defect classification will apply.

1. Deformation in the head of the switch rail exceeding ¼ inch in depth and cracks in the exterior of the railhead exceeding ½ inch in length will be classified and treated as critical defects. Deformation is defined as flattening or crushing of rail head.
2. Cracks less than ½ inch in length will be punched to mark their location and length and they shall be monitored. Monitoring should start at a 30-day interval and can be increased to 6 months if growth of crack does not occur.
3. Cracks in the casting outside the railhead will be considered marginal defects unless deformation in the casting exceeding ¼ inch in depth occurs. Deformation in this instance is defined as opening of the crack causing a measurable widening of casting.
4. Inspection of the underside of switch tongue casting is not required, as the defect limits classified above will identify the need for further investigation and repair.

3.2.5 MISCELLANEOUS. Classification of defects listed in this section shall be made based on evaluation by the Activity and appropriate action shall be taken.

3.2.5.1 Joint Bars, Angle Bars, Cleats and Other Accessories. Cracked, broken, loose or otherwise defective accessories that do not permit excessive rail movement and which meet the FRA criteria may be considered as no defect and repaired according to normal work schedules.

3.2.5.2 Safety Items. Safety features apply to all trackage systems and may also be included in the crane or other inspection reports. There shall be no missing, loose or broken components, bad welds, accumulation of debris, heavy corrosion or severe deterioration of the following trackage appurtenances:

(1) Rail Stops or Bumpers
(2) Warning signs.
(3) Any other features that could cause a mishap.

3.2.5.3 Bolts. Missing, broken, deteriorated or worn bolts which permit movement of rails may be considered a marginal defect, provided that the criteria in paragraphs 213.115 and 213.121 of the FRA Track Safety Standards are complied with. Track bolts should be oiled when installed and each time they are tightened. The recommended frequency for bolt tightening, for trackage not encased in pavement, is 3 months after installation and once a year after that, for exposed ground level crane trackage. Tightening of loose bolts should be an ongoing task. Loosening of bolts is somewhat directly related to traffic and loading and may also be caused by defects; therefore, a more frequent program for bolt tightening and PM based on usage and experience may be required by the Certifying Official. It is conceivable that where there is a good PM and inspection program, annual tightening of all bolts may be unnecessary. Annual tightening of bolts in paved areas may be waived based on engineering judgment and provided that non-destructive test (paragraph 3.1.5), operational inspection

(paragraph 3.1.4.2), and visual inspection in paved areas (paragraph 3.1.4.1.2.1) are satisfactory. All fasteners in turnouts and track crossings must be intact and maintained so as to keep the components securely in place. All switch and frog bolts and joints connecting rail to switch point and frog (if bolted) will be fully bolted as designed. All switch mechanism connecting bolts shall be installed with cotter pin in place. Missing or improperly installed bolts and cotter pins shall be considered critical defects.

3.2.5.4 Housekeeping. Keep trackage systems clear of obstructions that could cause derailment. Accumulations of debris, dirt, grease, paint, etc., shall be removed. Flangeways and switches shall be kept reasonably free of debris and silt.

3.2.5.5 Clearances. Activities will develop and promulgate clearances for ground level cranes to prevent collisions between the crane and materials/equipment stored or parked adjacent to the track. New encroachments should be reported by inspectors for further investigation and measurement.

3.2.6 SUBSTRUCTURE. Foundation deficiencies which upon failure could cause dropping, shifting, movement or derailment shall be considered critical or catastrophic.

3.2.6.1 Drainage. Lack of drainage is a major contributing factor in the cause and acceleration of defects. Water on, in, under or anywhere near trackage shall be controlled. Drains shall be kept open, free flowing and in good repair.

3.2.6.2 Utility Lines. Utility lines passing under or adjacent to trackage should be noted on the plans and observed for signs of failure during all inspections. Pavement does not have to be removed for inspection unless there is a suspected failure or defect in the distribution line or tunnel. Historical records of material and construction details shall be recorded and maintained when installed, repaired, or dug out for inspection.

SUMMARY OF IN-SERVICE
GROUND LEVEL CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
GENERAL	See Note 1	1.0 and 3.0
OPERATIONAL TEST DEFLECTION	Over 1/4 in. See Note 2	3.1.4.1.1 and 3.1.4.2
TRACK GEOMETRY		
ALIGNMENT:		
Tangent, Mid Offset per 62 ft.	Over 1/2 in.	3.2.3.2
Curves	See Note 3	3.2.3.2
Profile, Grade	Over 1%	3.2.3.3
TRACKAGE SURFACE:		
Profile @ Mid-ordinate of 62' chord, Cross level deviation, and Cross level difference in 62'	Over 1". See Note 3	3.2.3.3 3.2.3.4
TRACK STRUCTURES		
SUPPORT STRUCTURE	Deformation, Misalignment or movement exceeding 1/2 in. See Notes 2 and 4	3.1.4.1.1
RAIL FASTENINGS:		
Hold Down Fastenings	The distance between non-defective fastening on either side of the rail is more than 48 in.	
DEFECTIVE RAILS		
Transverse fissure Compound fissure	More than 20% of railhead cross section weakened by defect. See Note 5	3.2.2.3 and Appendix C, UFC 4-860-03
Detail fracture Engine Burn fracture Ordinary Break	Breakout in railhead with over 1/4 in. movement. See Note 6	

Attachment (3-1)

SUMMARY OF IN-SERVICE
GROUND LEVEL CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
DEFECTIVE RAILS (Cont'd)		
Horizontal Split Head Vertical Split Head Split Web, Piped Rail Head Web Separation	More than 4". See Note 5	
Bolt Hole Cracks	More than 1-1/2 in. See Note 5	
Broken Base	More than 6 in.	
DAMAGED RAIL:		
Shelling, Head Checks, Engine Burn, Mill Defect, Flaking-slivered, Corrugated-corroded	Depth over 3/8 in.	3.2.2.3 and Appendix C, UFC 4-860-03
Flowed Rail	Roll exceeding 5/16 in.	
WORN RAIL:		
Rail section (pounds per yd)		3.2.2.2., and
Web-Base Thickness Reduction:		3.2.2.3
Up to 70	Over 1/8 in.	
Over 70	Over 1/4 in.	
Vertical Head Wear:		
Up to 70	Over 1/4 in.	
71 to 134	Over 3/8 in.	
135 and larger	Over 1/2 in.	
Horizontal Side Wear:		
Up to 70	Over 1/2 in.	
71 to 134	Over 5/8 in.	
135 and larger	Over 3/4 in.	
RAIL END MISMATCH:		
On tread or running surface	Over 1/4 in.	
On side of railhead	Over 3/16 in.	
RAIL JOINTS:		3.2.5.1
Gap Rail Joints	Over 1/2 inch, See Note 7	
Gap Expansion Joints	Over 1 inch, See Note 7	
Gap Rail to Switch or Frog Joint	Over 3/4 inch, See Note 7	

Attachment (3-1)

SUMMARY OF IN-SERVICE
GROUND LEVEL CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
RAIL JOINTS: (Cont'd)		
Bolt Holes (applies to any torch cut hole in rail)	Torch cut or Burned	
Joint Bars	Broken between the middle two bolt holes Torch cut or modified	
Joint Bolts	Less than 2 /rail/joint All bolts loose	3.2.5.3
SWITCHES:		
Point/switch rail Closure/Mismatch	Loose over 1/4 in. of movement. See Note 4.	3.2.4.2
Point Condition	Unusually chipped, worn or flawed.	
Cast switch		
Head of switch rail	Over 1/4 inch deformation and crack exceeding 1/2 inch	3.2.4.3.1
Outside the rail head	Deformation exceeding 1/4 inch	3.2.4.3.2
FROGS:		
Flangeway depth and width	Develop locally for safe passage. See Note 3 and 8.	3.2.4.1
Point	More than 5/8 in. down and 6 in. back.	
Tread Wear	Over 3/8 in.	
Cast frogs		
Head of frog rail	Over 1/4 inch deformation in depth and crack exceeding 1/2 inch in length	3.2.4.3.1
Outside the rail head	Deformation exceeding 1/4 inch in depth	3.2.4.3.2
Switch/Frog Bolts	Missing, improper position/size, damaged. Missing cotter pin on connecting bolts.	3.2.5.3

Attachment (3-1)

NOTE 1. Criteria is shown for ground level systems that are rigidly supported, such as rails mounted on steel or concrete beams. If other types of support systems are involved, the severity of defects shall be determined based on local conditions. Specific criteria for evaluating the consequences of defects outside the range designated as critical are not available. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience.

NOTE 2. Guidelines are for visual observation only. Deviations may be estimated and measurement is not required unless it is necessary for supplemental investigation. Deflection for rail systems on flexible supports, such as wood ties and gravel ballast, should not exceed 3/4 inch.

NOTE 3. Determined locally for each specific case based on existing conditions and crane float.

NOTE 4. Building supports, pile foundations, caps, beams, etc. shall be investigated when movement, sag, deformation, or other alignment problems of component members exceeds one-half (1/2) inch. The final classification of defects shall be based on engineering evaluation.

NOTE 5. Defects smaller than those noted may be classified as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing. Defects accumulating three feet or more in any 10 feet are considered catastrophic.

NOTE 6. Fractures or Breaks at right angles to the rail may be classified as marginal provided the rigid foundation is solid; there is very little movement of the rail ends; the nearest joint, weld, or break is more than 6 1/2 feet away; and there is a program for continued surveillance.

NOTE 7. Joint gaps over 1/4 inch and less than 1/2 inch may be classified as no defect provided the joint is tight with no movement. Joint gaps between 1/2 inch and the defect limit indicated shall be classified as marginal or a more serious classification if the joint is loose or if there are other defects present. Gaps measured at defect limits when the air temperature is over 30 degrees C (86 degrees F) shall be remeasured when the air temperature drops below 0 degrees C (32 degrees F).

NOTE 8. For double-flanged wheels, flangeway depths in vicinity of flangeway width or gap of crossing rail are designed to be slightly less than the depth of flange so that wheels ride on flanges through ramped frogs. Flangeway depths equal to wheels' flanges are not a defect, provided wear on the frog point is not excessive. For single-flanged wheels on a 4 track system, requirements are the same as for railroad trackage, i.e., a flangeway depth less than 1 1/2 inches is a critical defect. For turntable frogs, the flangeway depth shall be greater than flange depth of the wheel.

Attachment (3-1)

GROUND LEVEL CRANE TRACKAGE
CERTIFICATION DOCUMENT

TRACKAGE AREA: _____

Detailed
Inspection Date: _____

Date of current
Operational Inspection: _____

Date of current
Non-Destructive Test: _____

ITEM	COMPONENT	SAT	RESTRICTED	UNSAT	N/A
1.	RAILS				
2.	RAIL JOINTS				
3.	SPIKES/BOLTS/TIE PLATES				
4.	GAGE				
5.	CROSS SECTION				
6.	SWITCHES				
7.	FROGS				
8.	CROSSINGS				
9.	TIES				
10.	BALLAST				
11.	SUPPORT STRUCTURES				
12.	RAIL STOPS				
13.	CLEARANCES				
14.	SIGNS AND APPURTENANCE(S)				

REMARKS:

CERTIFICATION

A. This section of trackage meets the applicable standards and is recommended for _____ certification

INSPECTOR'S SIGNATURE	**DATE**

B. The section of trackage covered by the attached inspection report is certified as follows:

FULL CERTIFICATION **RESTRICTED CERTIFICATION** **NON-CERTIFICATION**

CERTIFYING OFFICIAL'S SIGNATURE	**DATE**

Attachment (3-2)

TRACK INSPECTION RECORD			TYPE OF INSPECTION: [ ] PREVENTIVE MAINTENANCE [ ] SAFETY INSPECTION [ ] DETAILED INSPECTION [ ] OPERATIONAL INSPECTION		
ACTIVITY			TRACK NAME OR ID		REPORT DATE
INSPECTOR PRINT OR TYPE & SIGN			INSPECTION ORGANIZATION		
DEGREE OF HAZARD	LOCATION MILEPOST OR STATION	DEFICIENCY DESCRIPTION	PROPOSED CORRECTIVE ACTION AND TIMEFRAME	FOLLOW-UP ACTIONS	
				ACTION TAKEN	DATE COMPLETED
LEGEND: Degree of Hazard CAT - Catastrophic CRIT - Critical M- Marginal					Page __ of

Attachment (3-3)

SECTION 4. ELEVATED CRANE TRACKAGE

4.1 INSPECTION

4.1.1 CONTINUOUS OPERATOR INSPECTION. Daily or prior to use safety checks listed in activity regulations shall be conducted. In addition, on-the-job observations shall be performed in accordance with P-307 at all times when equipment is working. Crane operations personnel (operators, riggers, etc.) shall be encouraged to observe and report track problems, deficiencies, obstructions and the "feel" of the track.

4.1.2 PREVENTIVE MAINTENANCE (PM) - PM SERVICE AND PM INSPECTION.

4.1.2.1 PM is a continuous working inspection, examination of component parts, lubrication, adjustment, and minor repair. PM service and inspection are normally conducted by the crews assigned to or operating the equipment, by the track walkers, by Maintenance Shop personnel, and/or by contract. The PM Inspections and Services are scheduled as directed by the Public Works Officer or Activity Commander. Flexibility exists in the frequency of PM inspections based on usage, climatic conditions, history, and experience; therefore, the Public Works Officer or Activity Commander shall establish PM schedules. On systems where lubrication of moving parts, adjustments to electrical or mechanical systems, tightening of loose bolts, and other minor repairs are minimal, the PM service requirements may be identified during the annual detailed inspection and PM service and repair work scheduled. When possible, deficiencies are corrected during the inspection and recorded. Uncorrected deficiencies shall be reported to the supervisor for action, inclusion in the repair work schedule, adjustment of operating speed and consideration for closure of a section of trackage. Minimum information to be provided in PM reports is detailed in paragraph 4.1.2.2. PM inspections are visual inspections which include, but are not limited to, such items as loose or missing bolts or fasteners, defective rail, settlement, condition of supporting columns and misalignment.

4.1.2.2 PM Inspection Reports. Local formats in existence may be used. As a minimum PM Inspection reports should include:

(1) Date.
(2) Sections of trackage inspected.
(3) Corrected and uncorrected deficiencies.
(4) Number of and size of broken or missing parts.
(5) Suspected misalignment or defect.
(6) Guides and instructions used for the inspection.

4.1.3 SAFETY INSPECTION. The purpose of this inspection is to identify critical and catastrophic defects affecting the safety of the track being inspected. Scheduled safety inspection of crane trackage is not required due to the rigid support structure involved. If condition(s) prevail in the crane trackage that dictate the need for a more frequent inspection (see paragraph 1.3.3), a scheduled safety inspection program may be established. If a safety inspection is required, guidance provided in paragraph 2.1.3 shall be followed.

4.1.3.1 Special Safety Inspections. The Certifying Official shall determine the requirements on providing special safety inspections for unusual occurrences such as accident, flood, fire, earthquake, hurricane, severe storm, or other occurrence that could have an adverse effect on the track structure.

4.1.4 DETAILED INSPECTION SUPPLEMENTED BY ENGINEERING EVALUATIONS. Detailed Inspections are to be conducted annually or more frequently when required by climatic conditions or other unusual circumstances. Annual inspection shall mean that sections of trackage are scheduled as part of the facilities inspection program in accordance with MO-322. Inspection for each track section shall be scheduled and accomplished during a specific month each year and routinely scheduled in a 12 month period. Annual inspection exceeding a 13 month period since the previous annual inspection on the particular track section will cause the existing certification to be default and result in the track section being non-certified for use. The annual inspection during the biennial certification year may be based on the on the crane certification date at the discretion of the Certifying Official as long as it does not exceed the track certification date by over 45 days. The track certification shall indicate the date of crane certification. Engineering evaluations shall be conducted whenever there is any doubt of physical condition. In addition, Detailed Inspection or Engineering Evaluation criteria shall be used to supplement investigations and evaluations after any derailment. Additional testing or inspection shall be conducted when the condition of any portion of the trackage system is doubtful.

4.1.4.1 Visual Inspection. Visual inspections during the detailed inspection should include PM inspection checkpoints and observations of all trackage system components including rails, rail accessories, fasteners, joints, support structures and appurtenances. Checkpoints for elevated crane trackage inspection are provided on Attachment (4-2).

4.1.4.2 Support Structures. All foundations and support structures shall be inspected for signs of settlement or failure. Buildings/support structures for elevated crane rail shall be inspected in accordance with criteria outlined in MO-322 and the following criteria. The prescribed minimum inspection frequency for buildings is two years. In addition to the biennial inspection, supporting structures for elevated cranes shall be inspected when cranes are load tested to exceed the rated capacity of the system. This inspection maybe limited to only that portion of the support system affected by the load test. Inspection of the support system of the crane for both the biennial detailed inspection and crane load test inspection may be performed by facilities planner & estimators or inspectors or crane structural inspectors, as long as they meet the minimum qualifications required by MO-322. At activities where staffing is minimal and no one meets the qualifications required by MO-322, the Certifying Official shall assign the individual with the most structural experience/knowledge to perform the inspection. Biennial support structure inspection reports shall be reviewed and random observations made of rail supports, connections, braces, and beam to column joints for indications of movement, deterioration, or stress. Broken and defective components shall be scheduled for repair or replacement. For wood, steel or concrete columns, beams, braces, girders and other structural members, indicators of settlement, misalignment or deflection shall be recorded. Deflection, movement, or settlement under routine in-service loading exceeding the limits shown in Attachment (4-1) shall be investigated and analyzed, the degree of damage documented, and the classification of hazard

determined. Structural conditions leading to restricted certification of a section of trackage shall be based on a review of the structural analysis and on a condition survey conducted by qualified engineer in sufficient detail to establish the safety of the structure.

4.1.4.3 Operational Inspection/Load Test The purpose of an operational inspection is to supplement the detailed inspection and to assist in the identification of problem areas which could develop into unsafe trackage. Conditions which may be discovered include looseness, binding or vibration.

4.1.4.3.1 Frequency. Operational inspections shall be performed at intervals not to exceed two years on active trackage systems to ensure that the trackage systems will sustain the prescribed load in a safe manner. Every four years, a full load test shall be performed in accordance with paragraph 4.1.4.3.2 and as prescribed in Appendix E, NAVFAC P-307. The interim two year operational inspection shall consist of a "No load test" performed in accordance with paragraph 4.1.4.3.2 and as prescribed in Appendix E, NAVFAC P-307. Operational inspection exceeding the two year requirement will cause the existing certification to be default and result in the track section being non-certified for use. The two year requirement for operational inspection and track certification may be based on the on the crane certification date at the discretion of the Certifying Official as long as it does not exceed the track certification date by over 45 days. The track certification shall indicate the date of crane certification. Also see paragraph 1.3.1 regarding 45 day extension of certification.

4.1.4.3.2 Loads. Loads defined below should be moved over track systems slowly enough so that observations can be made. Loads for crane certification and test procedures are prescribed in Appendix E, NAVFAC P-307. "No load test" procedures are performed prior to the load test and during the two year interim operational inspection and will include operation of the crane on the track with no load on the hook and the trolley positioned adjacent to each rail for the full distance of the runway and slowly contacting the runway rail stops. "Load test" of the crane will include operation of the crane on the track with the test load on the hook and the trolley positioned adjacent to each rail for the full distance of the runway (if space is available). If multiple cranes on the runway, track need only be certified with the heaviest crane. Trackage support systems shall be inspected after completion of the crane load test in accordance with paragraph 4.1.4. Operational inspection reports shall specify the crane used to perform the operational inspection and description of what portion of track system received "Load test" versus "No load test".

4.1.4.3.3 Observations. A Track Inspector shall conduct or supervise the operational inspection. Trackage shall be inspected during load test or while equipment is operating. Observations for looseness, binding, deflection, or vibration shall be made by sight, sound, and feel. In addition, rail joints, general alignment, rail condition, supporting structures (see paragraph 4.1.4.2), and other accessories may be observed for deficiencies during and after the load test or operational inspection. There is no requirement for physical measurements of rail or trackage systems under load; however, when practical and accessible, rail systems shall be observed for deflection. Guidelines for maximum allowable deflections as determined by visual judgment are shown on Attachment (4-1). In the event unusual movement is observed or felt, deflections appear to be larger than the guideline limits established, or the cause of deficiency

cannot be immediately determined, an investigation and engineering analysis of the immediate vicinity shall be made prior to certification. Results of the investigation and engineering evaluation, not the deflection limit per se, shall determine when use of a section of trackage must be discontinued.

4.1.4.3.4 After Repair. Operational Inspection for certification following major repair or reconstruction is not a mandatory action required by this pr; however, as a minimum a visual observation of trackage under routine traffic loading during or after repair shall be performed to ensure proper movement. In addition, it is recommended that, when practical, in-house work orders and contract documents require that elevated crane trackage shall have a crane successfully operate over the system prior to acceptance.

4.1.4.4 Measurements. The Detailed Inspection shall include visual observations and spot check measurements of grade, track gage, cross section elevation, horizontal alignment, vertical mismatch, supports and other features to insure that criteria in this instruction are met. Instrument surveys may be requested by the certifying official or his representative to verify visual observations or spot check measurements, establish new alignment, investigate problem areas and determine deviation from the established standards.

4.1.4.5 Detailed Inspection Documentation

All inspections performed under paragraph 4.1.4 shall be properly documented. Inspection records must specify track inspected, date of inspection, location and nature of deviation from requirements and remedial action taken. Detailed inspection documentation should address all marginal, critical and catastrophic deficiencies existing in the track system at the time of inspection. In addition to detailing defects detected during the annual visual inspection, outstanding defects detected during safety inspections, operational inspections, non-destructive test inspection and other inspections and engineering investigations should be included. Deficiencies not exceeding marginal criteria are recorded, as necessary. As a minimum, the inspection records shall be retained for at least two years after the inspection covered by the report. Inspections may be documented on either Attachment (4-2) or Attachment (3-3). Instructions for completion of Attachment (3-3) and a sample filled in inspection report are provided in Appendix B of UFC 4-860-3.

4.1.5 NON-DESTRUCTIVE TESTING (NDT).

4.1.5.1 Frequency: Routinely, rail shall be tested by hammer sounding in accordance with paragraph 1.6.2. Generally ultrasonic testing of elevated crane rails is not required; however, elevated crane rails may be ultrasonically tested at the discretion of the certifying official in accordance with paragraph 1.6.1. If sounding is used, all active elevated crane rails shall be tested for defects upon activation and at annual intervals or at the interval determined by an engineering analysis as discussed in paragraph 1.6.2. If ultrasonic inspection is used, rails shall be tested for defects upon activation and at five year intervals, unless maintenance problems or visual inspection dictate a necessity for more frequent testing. The term "upon activation" refers to sections of trackage which have been inactivated or not used and that have not had a non-destructive test within the frequency for each procedure stated in paragraph 1.6. All

trackage that has not been non-destructively tested within the appropriate time frame from the previous NDT shall have a restricted certification or may be non-certified. Non-destructive testing of relay rail or used rail may be deferred until the next regularly scheduled interval, at the discretion of the Certifying Official, however any such deferral should be based on an engineering evaluation that considers age, expected use, and experience. During the interim period, the rail may be given full certification based on other tests, observations, and inspections required by this instruction. Criteria for unacceptable rails are included in Attachment (4-1). Appendix C, UFC 4-860-03, provides a brief description and illustration of common rail defects. New rail and accessories shall be accepted according to the latest government specifications or standard industry practice. The NDT results shall be used to establish a base line for future inspection and to identify areas requiring observation.

4.1.5.2. Test Results. Rail inspection records must specify the date of inspection, method of testing (ultrasonic or sounding), the location and nature of any internal rail defect found, and the remedial action taken and the date thereof. Rail inspection records shall be retained until after the next rail inspection is performed or for one year after remedial action is taken, whichever is longer. All discontinuities shall be reported; the nature and size of defect estimated, and responses compared with standards or past test results. Rejection or degree-of-hazard of all potential defects shall be based on assessment of ultrasonic inspection results, visual inspection, experience, engineering judgment, the criteria shown in Attachment (4-1), and the FRA Track Safety Standards.

4.2 STANDARDS

4.2.0 The FRA Track Safety Standards Summary of Inspection Criteria, Attachments (4-1), and this section provide descriptions of tolerances and defects for guidance in deficiency classification. Deviation from the standards in the FRA Track Safety Standards or in this section may require immediate corrective action to provide for safe operations over the trackage involved. In addition, in accordance with paragraph 213.1 of the FRA Safety Standards, the requirements prescribed in the FRA Track Safety Standards and in Attachment (4-1) apply to specific track conditions existing in isolation. Therefore, a combination of track conditions, none of which individually amounts to a deviation from these requirements, may require remedial action to provide for safe operations over that track. In general, on heavily used sections of trackage, work planning should start when a deficiency on a section of trackage exceeds one-half (1/2) of the allowable deficiency so that repairs can be accomplished before deficiencies exceed the allowable standards for restricted certification. Selection, installation, inspection and maintenance of trackage systems shall be in accordance with documents referenced herein, except where criteria in this instruction provides more stringent or restrictive criteria. The summary of inspection criteria and defect classifications shown in Attachments (4-1) are guidelines establishing minimum standards allowed based on normal or average conditions.

4.2.1 TRACKAGE. The term "trackage" includes rails, rail accessories, support structures, stops, signs, and markings. Operating speeds for cranes shall be initiated and promulgated by Activity Commanders to meet local safety requirements. Categories may be assigned by type or limiting size of equipment utilizing the trackage system.

4.2.2 RAIL. Standards for rail type, acceptable defects and replacement are discussed in this section and in paragraph 213.113 of the FRA Track Safety Standard. The identification and terminology of different parts of a typical rail are shown in Appendix (C), UFC 4-860-03.

4.2.2.1 Rail Type and Size. In cases of individual rail replacement, where the existing rail does not meet the standard criteria listed herein and where the remaining track is performing satisfactorily, the same size rail may be installed. Rails must be connected at the joints so that the rails will act as a continuous girder with uniform surface and alignment. The section of rail to be used is that which has been recommended by the crane manufacturer or the equivalent to the existing rail. Rail sections shall accommodate all crane wheels.

4.2.2.2 Rail Defects. The basic rule of thumb or general guideline for determining the acceptability of a defective rail for continuing use at U.S. naval activities is one-quarter (1/4) inch of alignment variation or movement. All irregularities in top or side rail wear, differences in elevation at breaks or joints, deflections, and movement exceeding 1/4 inch should be investigated. Common rail defects are illustrated and described in Appendix C, NAVFAC UFC 4-860-03, and categorized according to operational hazard or risk in Attachment (4-1). Maintenance and safety standards for rail defects, as well as remedial action, is provided in Chapter 7, UFC 4-860-03.

4.2.2.3 Replacement. Defective rails shall be repaired or replaced according, as necessary to meet certification criteria, or as required by the FRA Track Safety Standards.

4.2.2.3.1 Jointed Rail. Remedial action for defective rail shall be in accordance with Chapter 7 and Table 7-2 of UFC 4-860-03. The minimum "rail length", when installing new rail or repairing/replacing existing rail, is ten (10) feet. The existence of a short piece of rail (less than 10 feet) is not considered a defect. The existing rail should not be shorter than that necessary to allow for proper application of joint bars to adjoining rails on both ends and allow for proper alignment of rail. The condition of the track or defect in the rail would constitute a defect. There may be some instances where it may be economical to reduce the existing rail length; for example: replacing one rail length with two lengths of an old, standard rail before the entire section is replaced. This may be done provided the minimum length of ten (10) feet is maintained, and maximum lengths of rail are used when the section is upgraded.

4.2.2.3.2 Welded Rail. In continuous welded rail, the standard minimum length of ten (l0) feet shall be maintained between welds or joints. This length is required to ensure proper alignment of rails prior to welding. Existing shorter rail lengths between welds will be maintained as is. The thermite welding process per NAVFACENGCOM specification UFGS-34 11 19.00 or a welding procedure approved by NAVFACENGCOMHQ should be used. Proper maintenance practice is to crop (remove) the ends of rail with bolt holes prior to welding joints. Existing welded joints with bolt holes for joint bars in either piece of rail are considered no defect unless the weld or bolt holes contain critical defects. Existing rail holes, such as old gage rod holes, may be maintained as is, provided there are no other critical defects in the immediate area.

4.2.3 TRACK GEOMETRY. Horizontal alignment, vertical alignment (grade or profile), cross section elevation and gage shall be investigated when any of the following conditions exist:

(1) There are indications of abnormal wear on the rail heads or on wheel flanges.
(2) New rails are being installed or any portion of a rail is realigned.
(3) Operating crane binds on trackage, has difficulty in starting or has trouble with movement.
(4) When a potential deficiency of trackage can be observed, heard or felt.
(5) There are indications of substructure settlement, failure or other structural changes.
(6) Visual observations indicate that the acceptable limits may exceed those shown in Attachment (4-1).
(7) Tests, inspection, experience or engineering judgment indicate operation or rail alignment problems.
(8) Cranes roll after stopping.

Minimum safety standards provided in Attachment (4-1) in association with tolerances provided for construction/replacement of new crane rail in Crane Manufactures Association of America (CMAA) Specification #70 “Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes” shall be used to assess track geometry.

4.2.3.1 Installation and Realignment. Existing systems, not conforming to grade standards, may be maintained as is, provided a record is on file describing each deviation from the standard and necessary operating restrictions are imposed. Restrictions shall be tailored to each specific situation and may include such items as maximum speed, use of auxiliary couplers and maximum car/engine combination. When major replacements are necessary, the new work shall comply with the standards of the CMAA Specification #70 “Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes”.

4.2.3.2 Horizontal Alignment. Maximum out of line limits for elevated crane trackage shall be according to those shown in Attachment (4-1). Alignment of elevated crane trackage including stops shall be investigated and corrections made when any of the conditions listed in paragraph 4.2.3 exist.

4.2.3.3 Grade. Profile grades shown on Attachment (4-1) are the maximum allowable, except as noted below. The rail should be kept near level grade. The rail gradient must be kept below the slope that will cause the crane to roll freely and present problems in starting or stopping the crane.

4.2.3.4 Cross-Section Elevation. Vertical differences between rails shall be within the limits shown in Attachment (4-1). The cross-sectional difference in elevation of rails shall not exceed the limits established by the activity based on engineering judgment for each specific trackage system or the tolerance recommended by the manufacturer when known. Cross-sectional elevation differences should be checked when the conditions described in paragraph 4.2.3 exist.

4.2.3.5 Span. Span for two rail elevated crane trackage is measured center to center of railheads. The span of trackage shall be held within the tolerances specified by the crane manufacturer or as computed from the existing crane wheel spacing. Span of elevated crane trackage only needs to be measured when circumstances listed in paragraph 4.2.3 are not caused by other problems.

4.2.4 MISCELLANEOUS. Classification of defects listed in this section shall be made based on evaluation by the Activity and appropriate action shall be taken.

4.2.4.1 Joint Bars and Other Accessories. Cracked, broken, loose or otherwise defective accessories that do not permit excessive rail movement may be considered as no defect and repaired according to normal work schedules.

4.2.4.2 Safety Items. Safety features apply to all trackage systems and may also be included in the crane, building, or other inspection reports. There shall be no missing, loose or broken components, bad welds, accumulation of debris, heavy corrosion or severe deterioration of the following trackage appurtenances:

(1) Ladders, Platforms and Hand Rails.
(2) Rail Stops or Bumpers.
(3) Warning signs.
(4) Any other features that could cause a mishap.

4.2.4.3 Bolts. Missing, broken, deteriorated or worn bolts which permit movement of rails may be considered a marginal defect, provided that the criteria in paragraphs 213.115 and 213.121 of the FRA Track Safety Standards are complied with. Track bolts should be oiled when installed and each time they are tightened. The recommended frequency for bolt tightening is once every two years after the three month tightening for elevated cranes. Tightening of loose bolts should be an ongoing task. Loosening of bolts is somewhat directly related to traffic and loading and may also be caused by defects; therefore, a more frequent program for bolt tightening and PM based on usage and experience may be required by the Certifying Official. It is conceivable that where there is a good PM and inspection program, annual tightening of all bolts may be unnecessary. Tightening of bolts will be accomplished, as required, based on condition noted during the annual detailed inspection

4.2.4.4 Housekeeping. Keep trackage systems clear of obstructions that could cause mishap. Accumulations of debris, dirt, grease, paint, etc., shall be removed.

4.2.4.5 Clearances. Impaired clearances shall be recorded and corrective actions taken to insure safety when the minimum clearances (vertical clearance of three inches and horizontal clearance of two inches between the crane and any obstructions) required by Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.179 are violated.

4.2.5 SUBSTRUCTURE. Foundation deficiencies which upon failure could cause dropping, shifting, and movement shall be considered critical or catastrophic.

SUMMARY OF IN-SERVICE
ELEVATED CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
GENERAL	See Note 1	1.0 and 4.0
OPERATIONAL TEST DEFLECTION	Over 1/4 in. See Note 2	4.1.4.2 and 4.1.4.3
TRACK GEOMETRY	See Note 3	
ALIGNMENT:		
Tangent, Mid Offset per 62 ft.	Over 1/2 in.	4.2.3.2
Profile, Grade	Over 1%	4.2.3.3
TRACKAGE SURFACE:		
Profile @ Mid-ordinate of 62' chord, Cross level deviation, and Cross level difference in 62'	Over 1". See Note 3	4.2.3.3 4.2.3.4
TRACK STRUCTURES		
SUPPORT STRUCTURE	Deformation, Misalignment or movement exceeding 1/2 in. See Notes 2 and 4	4.1.4.2
RAIL FASTENINGS:		
Hold Down Fastenings	The distance between non-defective fastening on either side of the rail is more than 48 in.	
DEFECTIVE RAILS		
Transverse fissure Compound fissure	More than 20% of railhead cross section weakened by defect. See Note 5	4.2.2.2 and Appendix C, UFC 4-860-03
Detail fracture Engine Burn fracture Ordinary Break	Breakout in railhead with over 1/4 in. movement.	

Attachment (4-1)

SUMMARY OF IN-SERVICE
ELEVATED CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
DEFECTIVE RAILS (Cont'd)		
Horizontal Split Head Vertical Split Head Split Web, Piped Rail Head Web Separation	More than 4". See Note 5	
Bolt Hole Cracks	More than 1-1/2 in. See Note 5	
Broken Base	More than 6 in.	
DAMAGED RAIL:		
Shelling, Head Checks, Engine Burn, Mill Defect, Flaking-slivered, Corrugated-corroded	Depth over 3/8 in.	4.2.2.2 and Appendix C, UFC 4-860-03
Flowed Rail	Roll exceeding 5/16 in.	
WORN RAIL:		
Rail section (pounds per yd)		4.2.2.1 and 4.2.2.2
Web-Base Thickness Reduction:		
Up to 70	Over 1/8 in.	
Over 70	Over 1/4 in.	
Vertical Head Wear:		
Up to 70	Over 1/4 in.	
71 to 134	Over 3/8 in.	
135 and larger	Over 1/2 in.	
Horizontal Side Wear:		
30 to 50	Over 3/8 in.	
60 to 70	Over 1/2 in.	
71 to 134	Over 5/8 in.	
135 and larger	Over 3/4 in.	
RAIL END MISMATCH:		
On tread or running surface	Over 1/4 in.	
On side of railhead	Over 3/16 in.	
RAIL JOINTS:		4.2.4.1
Gap Rail Joints	Over 1/2 inch, See Note 6	
Gap Expansion Joints	Over 1 inch, See Note 6	

Attachment (4-1)

SUMMARY OF IN-SERVICE
ELEVATED CRANE TRACKAGE INSPECTION CRITERIA

TRACK SAFETY STANDARDS	CRITICAL DEFECTS	INSTRUCTION REFERENCE
RAIL JOINTS: (cont'd)		4.2.4.1
Bolt Holes (applies to any torch cut hole in rail)	Torchcut or Burned	
Joint Bars	Broken between the middle two bolt holes Torch cut or modified	
Rail Joint Bolts	Less than two/rail/joint	

NOTE 1. Criteria is shown for elevated crane rail systems that are rigidly supported, such as rails mounted on steel or concrete beams. If other types of support systems are involved, the severity of defects shall be determined based on local conditions. Specific criteria for evaluating the consequences of defects outside the range designated as critical are not available. The activity shall evaluate the severity of each such defect and shall classify the degree-of-hazard based on engineering judgment and experience.

NOTE 2. Guidelines are for visual observation only. Deviations may be estimated and measurement is not required unless it is necessary for supplemental investigation. Deflection for rail systems on flexible supports, such as wood should not exceed 3/4 inch.

NOTE 3. Tolerances provided in Crane Manufactures Association of America (CMAA) Specification #70 "Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes" for new construction/replacement and minimum safety standards provided herein shall be used to assess geometry condition.

NOTE 4. Building supports, pile foundations, caps, beams, etc. shall be investigated when movement, sag, deformation, or other alignment problems of component members exceeds one-half (1/2) inch. The final classification of defects shall be based on engineering evaluation.

NOTE 5. Defects smaller than those noted may be classified as marginal provided the defect is inspected six months after discovery and annually thereafter to ensure that the defect is not progressing. Defects accumulating three feet or more in any 10 feet are considered catastrophic.

NOTE 6. Joint gaps over 1/4 inch and less than 1/2 inch may be classified as no defect provided the joint is tight with no movement. Joint gaps between 1/2 inch and the defect limit indicated shall be classified as marginal or a more serious classification if the joint is loose or if there are other defects present. Gaps measured at defect limits when the air temperature is over 30 degrees C (86 degrees F) shall be remeasured when the air temperature drops below 0 degrees C (32 degrees F).

Attachment (4-1)

INSPECTION/CERTIFICATION DOCUMENT FOR ELEVATED CRANE TRACKAGE					
Building/Crane No:	Type:		Manufacturer:		Capacity:
Detailed Visual Inspection Date:	Operational (Check appropriate box) Date:	"No Load"	"Load"	Current NDT Date:	Type:

Item No.	Items to be Inspected	Condition			
		Satisfactory	Restricted	Unsatisfactory	Not Applicable
1	Rails				
2	Rail Joints				
3	Rail Bolts				
4	J-Bolts, Clips, Tie Plates, Misc. Fasteners				
5	Gage				
6	Rail Alignment				
7	Cross Section				
8	Rail Stops				
9	Clearances				
10	Signs and Appurtenances				
11	Support Structure				

Remarks (Item No.): Note any deficiencies and level (Marginal, Critical or Catastrophic) or "No defects noted."

This crane trackage support structure has been inspected in accordance with NAVFACINST 11230.1F, Paragraph 4.1.4.2. after 4 year load test and is ☐ Satisfactory ☐ Unsatisfactory (see Remarks)

Structural Inspector (signature)	Date:

This section of trackage covered by the inspection report above meets the applicable standards and is certified as follows:

☐ FULL CERTIFICATION ☐ RESTRICTED CERTIFICATION ☐ NON-CERTIFICATION

		Track Inspector (signature)	Date:
		Certifying Official (signature)	Date:

Attachment (4-2)

UFC 4-860-03
13 FEBRUARY 2008

UNIFIED FACILITIES CRITERIA (UFC)

RAILROAD TRACK MAINTENANCE & SAFETY STANDARDS

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

UNIFIED FACILITIES CRITERIA (UFC)

RAILROAD TRACK MAINTENANCE & SAFETY STANDARDS

U.S. ARMY CORPS OF ENGINEERS (Preparing Activity)

NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEER SUPPORT AGENCY

Record of Changes (changes are indicated by **1**\ ... /**1**/)

Change No.	**Date**	**Location**

_____

This UFC supersedes the TM 5-628/AFR 91-44 dated 1 April 1991, Navy draft MO 103.9 dated 2001, and UFC 4-860-03FA Railroad Track Standards dated 16 January 2004.

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate. All construction outside of the United States is also governed by Status of Forces Agreements (SOFA), Host Nation Funded Construction Agreements (HNFA), and in some instances, Bilateral Infrastructure Agreements (BIA). Therefore, the acquisition team must ensure compliance with the more stringent of the UFC, the SOFA, the HNFA, and the BIA, as applicable.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Support Agency (AFCESA) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request (CCR). The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following source:

- Whole Building Design Guide web site http://dod.wbdg.org/.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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UNIFIED FACILITIES CRITERIA (UFC)
REVISION SUMMARY SHEET

Description of Changes: UFC 4-860-03 unifies the Army/Air Force Handbook of Railroad Track Standards with the Navy's Railroad Trackage Field Assessment Manual the into one Department of Defense UFC manual.

Reasons for Changes:

- Consolidation of DOD railroad track standards into one single document.

- Consolidation of both railroad track maintenance standards and safety standards into a singular technical manual.

Impact: Inspection frequencies remain unchanged and the quality of track required remains nearly the same. These factors reflect a negligible cost impact as a result of the required track maintenance activities. However, the following benefits should be realized:

- Improvement in installation personnel's ability to determine the level of effort required for each track inspection.

- DOD Inspections that will be more consistent with the Federal Railway Administration (FRA) safety standards used for commercial trackage.
- Proper and expanded use of new technology and materials, such as new types of ties that have gained industry acceptance.

- Improvement of railroad track inspections and overall railroad management due to the much greater use of table formats for clarity and understanding.

- Improved inspections since the UFC now differentiates between railroad maintenance requirements and the very minimal FRA safety standards.

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CHAPTER 1

INTENT AND APPLICATION

1-1. INTRODUCTION.

a. The Department of Defense's (DOD) railroad system is a critical asset for both peacetime and mobilization missions.

b. The standards in this UFC are presented to protect investments in track maintenance and rehabilitation and to ensure that DOD's railroad track is maintained at the level needed to support mission requirements. The standards in this UFC provide maintenance standards for each possible type of deficiency addressed in the Federal Railroad Administration (FRA) *Track Safety Standards*. DOD policy is to maintain its railroad track at a standard that exceeds FRA Class 2 safety standards and adhere to additional DOD speed restrictions as stated in this UFC. The following standards specifically identify separate thresholds for safety standards and maintenance standards. If a standard is not specifically listed as a safety standard, it shall be used as a maintenance standard. For Navy installations, NAVFAC Instruction (NAVFACINST) 11230.1, *Inspection, Certification, and Audit of Crane and Railroad Trackage*, shall also be used based on category of track and amount of use.

c. Simply meeting the minimum standard required in this UFC is not necessarily the best, most cost-effective, long-term maintenance policy. The frequent occurrence of substandard or restricted conditions indicates the need for a comprehensive track evaluation to determine if major repair or rehabilitation is warranted.

1-2. DEFINITIONS.

The following standards are discussed in this UFC:

a. ***Safety Standards.*** Based on the degree of hazard, these standards provide minimum safe operating limits for specific defects. FRA and DOD safety standards are addressed in Appendix F for comparison with maintenance standards. When established safety limits are exceeded, speed restrictions or “No Operation” shall be applied and enforced.

b. ***Maintenance Standards.*** These standards provide limits for specific defects and should be used to determine when maintenance is desirable and should be accomplished. This allows for maintenance or repair before the condition exceeding safety standards develops. Each installation shall develop a maintenance policy for additional defects not addressed in this UFC.

1-3. REFERENCES.

Appendix A contains a list of references used in this UFC.

1-4. INTENT.

a. These standards define the minimum required maintenance condition levels for railroad track. These standards shall be used for inspection and routine maintenance of railroad track by in-house or contract personnel.

b. These standards are not intended for, and shall not be used as specifications for, new construction or major track rehabilitation. The guidance given for Navy projects in UFC 4-860-02N, *Design: Trackage*, and for Army and Air Force projects in UFC 4-860-01FA, *Design: Railroad Design and Rehabilitation*, with Unified Facilities Guide Specification (UFGS) 05650, *Railroad Track and Accessories*, and/or host nation industry/government

standards will continue to apply to new construction and the complete reconstruction of segments of existing facilities.

c. Should the commercial carrier serving the installation require a more restrictive FRA standard or criteria not included in these standards, the installation track shall be maintained to meet the carrier's requirements.

d. The judgment of the designated track inspector and the criteria presented in this UFC must supplement each other in the application of these standards.

1-5. TRACK CATEGORIES. All railroad track shall be maintained in accordance with one of the following categories:

Category	Types of Track and Use	Minimum FRA Class of Track Safety Standard
A	All active mainline track, or other active track with speed greater than 10 mph	2
B	Active passing track, sidings, yard tracks, holding track, classification yard or storage track	2
C	Inactive track; no current mobilization requirements	0

1-6. APPLICATION.

a. ***Requirements versus Recommendations.*** In this UFC, the words “shall” and “is required” indicate requirements of the standards that must be met as prescribed by NAVFACINST 11230.1 for the Navy or AR 420-72 for the Army. Recommendations are indicated by the words “may,” “should,” and “it is recommended that….” These recommendations represent good maintenance practice. **DOD policy is to maintain the railroad track at full compliance with these maintenance standards and to restrict operations on any track below the safety standards.**

b. ***Condition Levels*.** These standards establish four levels of track condition. These condition levels indicate relative seriousness of defects, allow comparison of different types of defects, and provide a means for prioritizing repair work. The three track condition levels are as follows:

(1) *Full Compliance:* Track that meets all the requirements of the standards. Track at this level has, at most, only minor defects and should be fully capable of handling all train operations within the operating rules of the installation. Routine maintenance is required to maintain this condition level, and repair work will generally be only minor.

(2) *Restricted Operation:* Track has defects serious enough to make it unsuitable for operations greater than 10 mph, essentially “normal yard speed.” Based on the inspector’s judgment, track which has defects serious enough to make it unsuitable for operations at 10 mph may be reduced to 5 mph. Essentially, a train may be allowed to “crawl” over the track. This level is intended as a warning zone to indicate that the track is approaching a condition that will require removal from service.

(3) *No Operation:* Track has defects serious enough to require removal from service. At this level, the operation of trains over the track is generally considered hazardous. Operations shall not be allowed except as noted in paragraph 1-6.c.(5).

c. ***Operating Restrictions.***

(1) These standards establish minimum required condition levels and also identify track conditions requiring restriction or suspension of train operations. It is intended that a track inspector apply the required restriction or suspension immediately upon discovery of the substandard condition, and that the track be repaired to meet the appropriate condition level as soon as practical. A track restriction shall require the operational speed to be less than posted speed, but not more than 10 mph.

(2) *Notification of Track Restriction.*

(a) Army Track. The certified track inspector shall notify both the train operating personnel first and the director of public works (DPW) immediately upon the discovery of any condition that would warrant any restriction below normal operating practices. The DPW shall notify the installation transportation officer (ITO) verbally and in writing of any condition requiring train operations to be restricted or suspended.

(b) Air Force Track. The track inspector shall notify both the train operating personnel and the base civil engineer (BCE) immediately upon the discovery of any condition that would warrant any restriction below normal operating practices. The BCE shall notify the base traffic management officer (TMO) verbally and in writing of any condition requiring train operations to be restricted or suspended.

(c) Navy Track. The track inspector shall notify both the train operating personnel and the trackage certifying official immediately upon the discovery of any condition that would warrant a restriction beyond normal operating practices or a suspension in operations. Documentation and notification of restricted or non-certification of track shall be performed by the certifying official in accordance with NAVFACINST 11230.1.

(3) *Operations over Restricted Track.* For locations where operating restrictions have been imposed, the speed of the train or other on-track vehicles shall be reduced to the required level before the first wheel reaches the defective area and not increased until the last wheel has passed the defective area.

(4) *Removal of Track Restriction.* A track restriction may be removed after all defects resulting in the restriction have been repaired.

(a) Army Track. The certified track inspector shall notify the DPW upon completion of the repairs. The DPW shall notify the ITO in writing that the restrictions have been lifted.

(b) Air Force Track. The restriction shall not be considered removed until the TMO receives written notification of removal from the BCE.

(c) Navy Track. The trackage certifying official shall recertify the trackage repaired to the level allowed by repairs made. Certification and notification will be in accordance with NAVFACINST 11230.1.

(5) *Track Removed From Service.* Any portion of track where conditions fall below the minimum operable track condition (track condition is at the “No Operation” level) shall be closed to operations until repairs are completed. However, such track may be used under written permit from the track management authority and in the presence of a track inspector. During operations over the closed portion of track, the track inspector shall have visual contact with the train operator at all times and be prepared to signal the train crew to stop. For Navy track, movement of hazardous materials over track removed from service will be in accordance with NAVFACINST 11230.1.

d. Judgment of the track inspector shall govern. A track inspector shall have the authority to impose operating restrictions beyond the minimum required in these standards when conditions warrant.

e. Defective conditions or combinations of conditions may be found which are not directly addressed in these standards. In such cases, a track inspector shall exercise judgment in applying an appropriate operating restriction.

CHAPTER 2

INSPECTION OF TRACK AND RECORD KEEPING

2-1. TRACK INSPECTORS' QUALIFICATIONS. Track inspectors are responsible for conducting safety inspections (paragraph 2-3.c) and detailed track inspections (paragraph 2-3.).

a. ***Army.*** For Army track, the individual who completes the required track inspections shall be a certified track inspector as specified in AR 420-72.

b. ***Air Force.*** For Air Force track, the individual who completes the required track inspections shall be qualified to perform such inspections as designated by the BCE.

c. ***Navy.*** The individual who completes the required track inspections shall meet the requirements of NAVFACINST 11230.1 and be designated by the activity's certifying official.

2-2. RESPONSIBILITY OF THE TRACK INSPECTORS.

a. The designated track inspector is responsible for:

(1) Assuring that inspections are performed in accordance with this chapter and for Navy installations the additional requirements of NAVFACINST 11230.1.

(2) Examining the track to determine whether the track condition complies with the safety requirements and the maintenance standard requirements addressed in this UFC.

(3) Reporting any deficiencies from the full compliance condition level.

2-3. CATEGORIES OF INSPECTIONS.

a. ***Continuous Operator Inspection.*** Safety checks shall be conducted daily or before use. In addition, on-the-job observations shall be going on at all times when equipment is working. Railroad operations personnel shall be encouraged to observe and report track problems, deficiencies, obstructions and the "feel" of the track. Items to be aware of are broken rails and other rail defects, faulty switch point closure, indication of wide gage, poor alignment or surface (profile), loose crossing planks, wheel flanges hitting frog points and joint bars, working spikes and loose joints, rail pull-a-parts, evidence of imminent track buckling, blocked drainage, scour at bridges, and the threat of slides. All these things can contribute to train derailments and should be brought to the attention of the responsible person for correction.

b. ***Preventive Maintenance Inspection.*** Preventive maintenance is a continuous working inspection, examination of component parts, lubrication, adjustment, and minor repair. If not affecting the full compliance level, maintenance defects shall be corrected during the next maintenance cycle.

(1) *Navy Installations Only.* Further discussion of requirements and instructions on performing preventive maintenance are provided in NAVFACINST 11230.1.

c. ***Safety Inspection***. Safety inspection is that inspection of track performed in accordance with paragraphs 213.233, 213.235 and 213.239 of the FRA Track Safety Standards (see Appendix E) and this UFC. The purpose of this inspection is to identify defects that require restricted operations or no operations on the track being inspected.

(1) *Schedule.* As a minimum, track shall be inspected at the following interval:

Track Category	Traffic Frequency	Minimum Required Inspection Frequency
A	Mainline Track – Off-station Navy only*	Weekly
A & B	Two or more movements per week	Monthly
A & B	Greater than one movement per month but less than two movements per week	Quarterly
A & B	One movement or less per month	Semi-annual
C	No movements or inactive	Annual detailed inspection only (See Chapter 15)

***For Navy installation only**: Off-station track is defined as that track belonging to the Navy that extends outside the main station through residential and/or commercial public areas.

(2) *Inspection Method.* Track inspections shall be made on foot or in an on-track vehicle at a speed which is conducive to effective track inspection, but in no case to exceed 5 mph. Turnouts, rail crossings, and bridges shall be inspected on foot.

(3) *Inspection Records.* The inspector shall complete and sign the Track Inspection Record on the day the inspection is made. Inspection records must specify the track inspected, date of inspection, location and nature of any deviation from the requirements, proposed corrective action, and the remedial action taken. Inspection reports which document deficiencies resulting in a track falling below its designated condition level shall be kept on file until all deficiencies have been corrected. As a minimum, inspection records shall be retained for at least one year after the inspection covered by the report. An example record is provided in Figure B-1. A reproducible master of the Track Inspection Record is provided in NAVFACINST 11230.1 or in Appendix B as used in the RAILER software.

d. *Detailed Track Inspection.* A detailed inspection shall be made to support sustainment, restoration and maintenance (SRM). Detailed inspections are conducted annually. Detailed inspections will be supported by engineering evaluations when there is any doubt of physical condition. The Track Inspection Record discussed in paragraph 2-3.c.(3) should be used to document detailed inspections. The purpose of the detailed inspection is to identify all track defects including those exceeding maintenance standards provided in this UFC. Results of this inspection will not only be used to establish urgent repairs, but by using the inspection reports and relating them to the activity's basic trackage requirements, its in-house capabilities, priorities, available funding, and other factors, the annual and long-range trackage maintenance and repair programs are developed and programmed.

e. *Electric/Electromechanical Grade Crossing Signals.* The inspection and testing of electric/ electromechanical signals at road–railroad grade crossings shall be performed at the frequency specified in paragraph 10-6.b and documented in accordance with paragraph 10-6.c.

f. ***Internal Rail Defect Inspection.*** Internal rail defect inspection shall be performed on class A and B railroad tracks at five-year intervals as specified in paragraph 7-2.b.

g. ***Special Safety Inspections.***

(1) *Infrequently Used Track.* Track that has not been used for a period of six months or more shall be inspected prior to the first movement over the track.

(2) *Mass Rail Movement.* For track that has not been inspected within the last two months, a track inspection is recommended before any mass rail movement (15 cars or more).

(3) *Unusual Occurrences.* Track inspections shall be conducted following unusual occurrences such as derailment, accident, flood, fire, earthquake, severe storm, or other occurrence that could have an adverse effect on the track structure. These inspections shall be conducted before the first movement over the track following the unusual occurrence.

2-4. INSPECTION OF PARTIALLY VISIBLE TRACK.

a. At locations where vegetation, dirt, debris, or other undesirable materials cover the ties and/or rail preventing effective track inspection, the undesirable material shall be removed and a thorough track inspection performed. Train operation shall not exceed 10 mph until the undesirable materials are removed and a thorough track safety inspection is performed.

b. At locations where ballast or other material is installed to meet operational requirements, sufficient material shall be removed to spot-check trackage.

c. ***Paved Areas.***

(1) In road crossings and other paved areas where complete inspection of the track is not possible, the track inspector must be alert for external signs of track deterioration. External signs indicating track deterioration are:

(a) Changes in gage and/or crosslevel.

(b) Settlement of the rails (changes in track profile).

(c) Excessive vertical or lateral movement of the rails as a train passes.

(d) Deterioration (cracking or breaking up) of the pavement in the vicinity of the track.

(2) Based on indication of defects with consideration taken for age and usage, activities shall establish a program to spot-check trackage encased in pavement.

(3) *Operating Restrictions for Track in Pavement.* When external signs of track deterioration develop, particular attention should be given to the track geometry measurements through the paved area. Track geometry measurements—combined with visual indications of lateral and vertical movement and the requirements for road crossing flangeways—shall be used to assign operating restrictions for the track through the paved area.

2-5. TRACK MAPS AND TRACK SCHEMATICS.

Track maps are essential in identifying and locating the components of the track network. Installations shall maintain a complete, accurate, and up-to-date set of track maps for use by maintenance and engineering personnel.

a. ***Track Charts.*** As described in the documents below, track charts may be used to supplement track maps.

(1) Army/Air Force: TM 5-627/AFM 91-33, *Maintenance of Trackage*.

(2) Navy: MO-103, *Maintenance of Trackage*, and NAVFACINST 11230.1.

b*. Criteria:*

(1) *Scale.* Track maps should be drawn to a legible scale. The scale should be shown on each page of the map.

(2) *Title.* Track maps should contain a standard title block.

(3) *Legend.* Track maps should contain a legend identifying all symbols used on the track map.

c. *Track Data.* Data presented on track maps should include:

(1) All track, active and inactive.

(2) Track name or identification for each track.

(3) Track category for each track.

(4) Buildings, loading docks, bridges, trestles, culverts, and other structures on or adjacent to the railroad roadway.

(5) Highway and road crossings.

(6) Connections to serving railroads.

(7) Limits of track ownership and maintenance responsibilities.

(8) Installation property lines and railroad right-of-way lines.

(9) Rail weight and section.

(10) Turnout identification number and weight and section.

(11) Degree of curvature for all curves.

(12) Grades and profile information.

(13) Track stationing or mileposts.

d. *Track Schematics.* Non-scaled, condensed track plans describing layout of tracks and turnouts. They are useful in track inspection reporting and record keeping.

CHAPTER 3

ROADWAY

3-1. ROADWAY.

a. ***Inspection.*** The roadway shall be inspected for the following defects:

(1) Ballast/subgrade pumping.

(2) Erosion of embankments and cut slopes.

(3) Embankment sliding or slippage.

(4) Potential slope stability problems.

(5) Settlement at approaches to bridges and road crossings.

(6) Washouts under and adjacent to the track.

If any of these defects are present, remedial action is required within a time frame necessary to prevent damage to the track structure.

b. ***Hazardous Conditions.*** Any condition presenting a hazard to the safe movement of trains shall be corrected before the first movement over that location.

3-2. DRAINAGE.

a. ***General.***

(1) A well-drained roadbed is essential to good track maintenance.

(2) Any attempts to divert water onto the roadway or to obstruct ditches or drainage structures shall be reported immediately to the trackage certifying official.

(3) Drains, ditches, and other open drainage structures shall be protected to prevent hazard to personnel.

b. ***Size and Design.*** Ditches and other drainage structures (culverts, drains, and drop inlets) shall be of sufficient size and construction to handle the expected flow of water.

c. ***Obstructions.*** Ditches and drainage structures shall be maintained to allow the free passage of water. At locations where flow is obstructed or otherwise inadequate, remedial action is required. During construction operations adjacent to the track structure, all ditches and other drainage structures shall be kept unobstructed.

d. ***Inspection.***

(1) Inspection and cleaning of drainage structures and channels shall be performed at least annually, preferably in the fall in anticipation of spring runoffs.

(2) Inspections of ditches and other drainage structures during and after heavy rains are recommended to assure that these structures are adequate to carry the runoff.

(3) Drainage ditches and structures shall be inspected for the presence of:

(a) Brush.

(b) Drift.

(c) Excessive ice and snow.

(d) Other obstructions that may interfere with the flow of water.

If any of these are present, immediate remedial action is required to prevent damage to the roadway and track structure.

(4) Particular attention shall be given to drainage conditions at turnouts, rail crossings, road crossings, bridge ends, and all locations where conditions may restrict adequate drainage.

(5) For obstructed or partially collapsed drainage structures, a safety standard shall be implemented to restrict speeds.

3-3. VEGETATION.

a. Vegetation shall be controlled so that it does not:

(1) Grow within the ballast section or obstruct ballast drainage.

(2) Interfere with adequate visibility (sight distance) at grade crossings.

(3) Obstruct visibility of location markers, switch position indicators, signs, or signals.

(4) Obstruct drainage.

(5) Interfere with the safe operation of trains.

(6) Prevent proper track inspection.

(7) Present a fire hazard to timber structures.

(8) Interfere with personnel walking within 8 feet of the track centerline.

(9) Brush the sides of engine or rolling stock.

b. ***Vegetation Interference.*** At locations where vegetation interferes with the effective inspection of the track or train operations, train operations shall be restricted until the vegetation is removed and a thorough track inspection is performed.

c. ***Vegetation Control.*** Undesirable vegetation growing within the roadway shall be removed by chemical or manual means. Chemical vegetation control shall be accomplished as prescribed in the following manuals:

(1) Army: AR 200-5, *Pest Management Program*, and TM 5-630, *Natural Resources Land Management*.

(2) Air Force: AFI 32-1053, *Pest Management Program*.

(3) Navy: OPNAVINST 6250.4, *Pest Management Program*.

d. ***Desirable Vegetation.*** Vegetation such as crown vetch may be planted and grown on the slopes of cuts and fills and in other locations within the roadway to prevent erosion. The growth of desirable vegetation should be controlled to meet the requirements of paragraph 3-3.a.

CHAPTER 4

BALLAST

4-1. GENERAL. Ballast is a select material placed on the subgrade to:

a. Provide adequate drainage of the track.

b. Restrain the track laterally, longitudinally, and vertically under the dynamic loads imposed by trains and the thermal stresses induced in the rails by changing temperature.

c. Distribute the load of the track and trains to prevent overstressing the subgrade.

4-2. SELECTION CRITERIA.

a. Considerations for selecting materials to be used as ballast include:

(1) Size and gradation.
(2) Shape (angularity).
(3) Weight.
(4) Strength.
(5) Durability.
(6) Cleanliness (no dirt or fines).
(7) Economics.

b. New ballast materials used in the maintenance of track shall meet the requirements specified in the AREMA *Manual For Railway Engineering*, Chapter 1, Part 2.

4-3. MAINTENANCE.

a. The ballast section should be clean, free-draining, and free of vegetation, soil (mud), and other foreign materials.

b. During major maintenance or track rehabilitation, dirty or fouled crushed stone or slag ballast meeting the requirements of paragraph 4-2.b may be cleaned/screened or reconditioned and reused.

c. Ballast materials shall provide a full crib and uniform shoulders, but shall not be allowed to cover or be at a level above the top of the ties. At turnouts, ballast shall not interfere with moveable parts of switches and sufficient clearance shall be maintained around switch rods and connecting rods. See paragraph 8-3.g, “Pocketing Switches.”

CHAPTER 5

TIES

5-1. GENERAL. The functions of a tie are to:

a. Maintain gage.

b. Maintain surface (profile).

c. Maintain alignment.

d. Distribute the load from the rail to the ballast and subgrade.

The inability of a tie to adequately perform any of the above functions constitutes a defective tie.

5-2. WOOD TIES.

a. *Tie Selection, Treatment and Inspection.*

(1) *Tie Selection.* New ties selected for the maintenance of track shall be adequately seasoned and treated and meet the requirements specified in the AREMA *Manual For Railway Engineering*, Chapter 30, Part 1, for 6-inch grade and the preferred 7-inch grade ties. The preferred species for ties are the following hardwoods: red oak, white oak, beech, ash, and hickory ties. Gum ties can also be used if local experience reflects satisfactory service. Where softwoods are used, the southern pine and Douglas fir species are preferred. Southern pine is not recommended for main line track or areas with high humidity. Beech and ash ties can also be used if local experience reflects satisfactory experience.

(2) Treatment. Ties shall be pressure-treated in accordance with the most current version of the American Wood Preserver's Association (AWPA) Standard C6. See UFGS 05650 for tie treatment recommendations.

(3) *Inspection.* It is recommended that all timber ties be inspected by an independent, qualified, professional inspector. Inspections should take place at producing plants where the ties can be inspected in the white (before treatment) and after treatment. Accepted ties are to be branded (stamped) by the inspector responsible for the acceptance.

(4) *Switch Ties & Turnout Ties.* It is recommended that switch ties be mixed oak hardwood.

b. *Installation.* Ties shall be installed perpendicular to the rails and properly tamped and spiked. Ties shall be installed with the top of the tie (or the tie plate) in full contact with the base of the rail and the bottom of the tie near the rail seat in full contact with the ballast.

c. *Identification of Defective Wood Ties.* A wood tie is defective if it is:

(1) Broken through.

(2) Split or otherwise impaired to the extent that it will not hold spikes or other rail fasteners.

(3) So deteriorated that the tie plate can move laterally more than 0.5 inch relative to the crosstie.

(4) Cut by the tie plate more than 2 inches.

(5) Cut by wheel flanges, dragging equipment, fire, etc., to a depth of more than 2 inches within 12 inches of the base of the rail, frog, or load-bearing area.

(6) Rotted, hollow, or generally deteriorated to a point where a substantial amount of the material is decayed or missing.

(7) Ties that are “end-broken.” End-broken ties often can be broken beneath the base plate and the defect is not noticeable except for a small rise in the end of the tie, from a plane of the center portion.
These defects are shown in Figure 5-1.

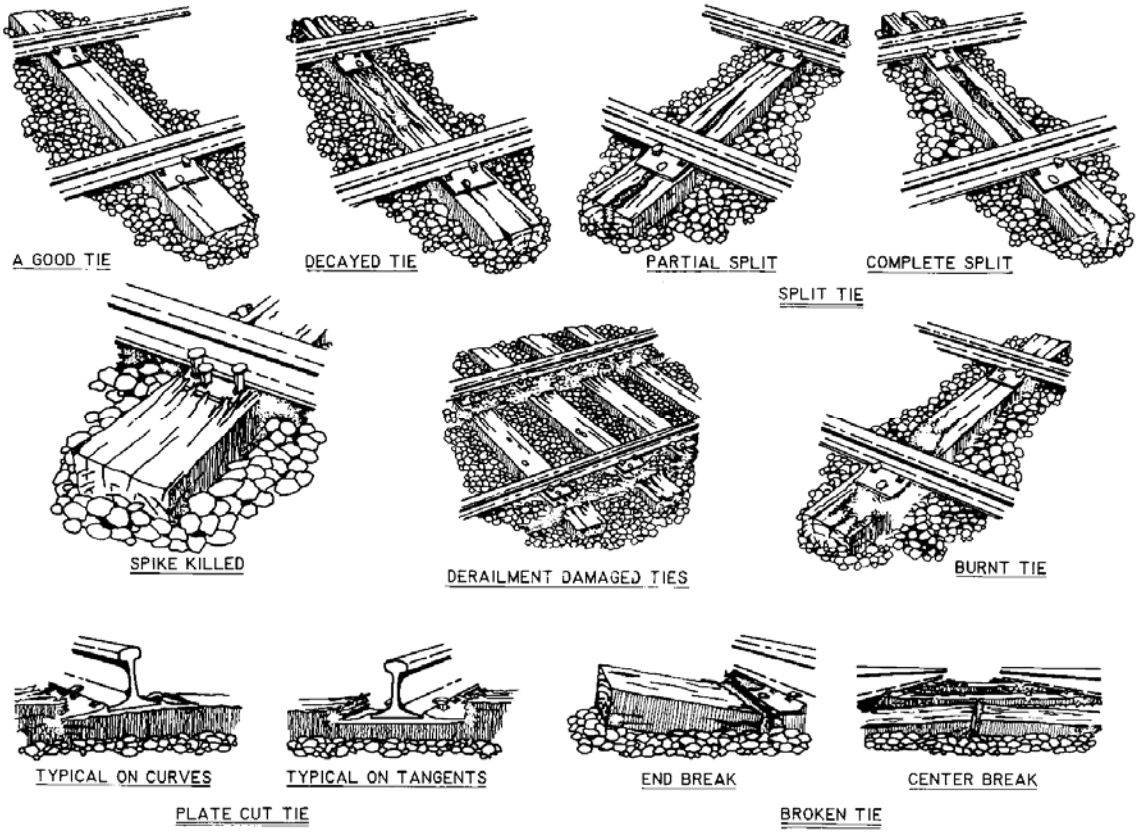


Figure 5-1. Examples of Good and Defective Ties

5-3. CONCRETE TIES.

a. ***Tie Selection.*** New concrete ties selected for the maintenance of track shall meet the requirements specified in AREMA *Manual for Railway Engineering*, Chapter 30, Part 4. Mixing wood and concrete ties in the same track section is not recommended. Concrete ties are very susceptible to impact, leading to premature failure when used in jointed track and require a more substantial ballast section.

b. ***Switch Ties.*** At this time, few concrete switch ties are being manufactured due to weight and difficulty in handling; hardwood switch ties are recommended.

c. ***Installation.*** Ties shall be installed perpendicular to the rails and properly tamped and fastened. Ties shall be installed with the top of the tie in full contact with the base of the rail and the bottom of the tie near the rail seat in full contact with the ballast.

d. ***Identification of Defective Concrete Ties.*** A concrete tie is defective if:

(1) Tie is broken across under one or both rail seats.

(2) Tie is broken across in the center and showing signs of further deterioration, loss of tension in pre-stressing wires, exposure of wires, crumbling, etc.

(3) Tie is broken longitudinally, resulting in loss of ability to hold one or both cast-shoulders in place.

(4) Both cast-shoulders in one rail are loose. (One loose shoulder per rail is not sufficient cause for removal unless it is causing some distress to adjacent ties.)

(5) Tie is damaged by derailment or dragging equipment which, in the opinion of the track inspector, should be replaced. It should be noted that quite serious damage can be done to the tie ends without seriously affecting the performance of the tie.

5-4. PLASTIC TIES

a. ***Tie Selection.*** Various plastic ties have been tested and proven to provide adequate support and low maintenance. Plastic ties shall have textured sides to provide stability. See UFGS 05650 for material requirements. Plastic ties can be cost-effective in areas of high decay. The weight of plastic is similar to wood and mixing wood and plastic ties in the same track section is permissible.

b. ***Installation.*** Ties shall be installed perpendicular to the rails and properly tamped and fastened. Ties shall be installed with the top of the tie in full contact with the base of the rail and the bottom of the tie near the rail seat in full contact with the ballast. Plastic ties can be installed with either cut or screw spikes, with screw spikes recommended.

c. ***Identification of Defective Plastic Ties.*** Plastic ties shall be treated as wood ties for determining defective ties. See paragraph 5-2.c.

5-5. STEEL TIES AND COMPOSITE TIES.

a. Advances in steel tie technology have proven successful and practical and should be considered as a possible alternative in replacing wood ties.

b. One type of composite tie is a hardwood tie treated with borates to prevent decay and rot from fungus, insects, and termites, then encapsulated in a tough plastic covering. Another composite tie is one which includes high-density polyethylene, rubber, and fiberglass with certain proprietary inert filler materials. Yet another composite tie is produced with fiberglass blown foam and molded into various tie sizes and lengths.

5-6. GENERAL.

a. ***Improper Tie Support (Down or Hanging Ties).*** Ties that do not support both rails are considered defective. If these ties are not materially defective, they shall be ballasted, tamped up, and respiked/refastened to fully support the rails.

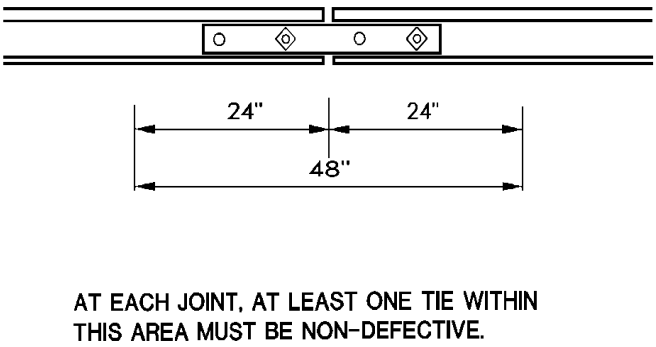


Figure 5-2. Required Tie Support at Joints (Safety Standard)

b. ***Missing Fasteners***. Ties that are installed, but not spiked with a sufficient number of spikes in accordance with paragraph 6-3.c., are considered defective. If these ties are not materially defective, necessary spikes shall be added.

c. ***Tie Requirements***.

(1) Track shall have a minimum number of non-defective ties per 39-foot rail length in combination with a maximum number of consecutive defective ties as specified below:

	Minimum Number of Non-Defective Ties per 39 Feet	
	Tangent & Curves Less Than 2°	**Curves Equal to or Greater Than 2°**
Maintenance		
Category A	12	13
Category B	10	11
Safety		
Restricted	8	10
No Operation	7	9

	Number of Consecutive Defective Ties	
	Tangent and Curves Less Than 2°	**Curves Equal to or Greater Than 2°**
Maintenance	3	2
Safety		
Restricted	4	3
No Operation	5	4

(2) *Joint Ties.* All joints shall be supported by the number of non-defective ties specified below. The centerline of these joint ties shall be within 24 inches of the rail ends as shown in Figure 5-2. Safety standard: Any track without a non-defective tie within 24 inches of the rail ends shall be "No Operations."

	Minimum Number of Non-Defective Ties per Joint
Maintenance	
Category A	2
Category B	1
Safety	
No Operation	0

d. ***Tie Spacing***. The center-to-center distance between adjacent ties usually ranges from 19 to 22 inches. The recommended tie spacing for new track is given below:

Track Category	Tie Spacing (Inches)	Number of Ties per 39-ft Rail
A	19.5	24
B	21	22

Army Criteria: For all track with an average tie spacing greater than 22 inches (less than 22 ties per 39-foot rail), the desired spacing should be established during the next maintenance or rehabilitation cycle.

Navy & Air Force Criteria: The maintenance standards shall require a maximum average center-to-center tie spacing of 24 inches within the distance of a rail length. For track having average tie spacing greater than 24 inches, the desired spacing should be established during the next major maintenance or rehabilitation cycle.

e. ***Missing Ties***. The maintenance standard requires all missing ties to be replaced. The safety standards consider a missing tie a defective tie and any location where the center-to-center tie spacing measured along either rail exceeds 48 inches to be "Restricted Operations," unless at a joint, which will be "No Operations."

f. ***Skewed Ties***. A skewed tie is a tie that is not perpendicular to the rails by more than the tie width. Slightly skewed or individual skewed ties are not serious. A section of track with skewed ties indicates a problem area (possible tight gage) that should be investigated (see Chapter 12, "Track Geometry"). Maintenance standards require that where localized areas have three or more ties skewed greater than 8 inches, the cause of the skewing shall be corrected and the ties straightened.

CHAPTER 6

OTHER TRACK MATERIALS (OTM), TIE PLATES, ANCHORS, RAIL FASTENINGS, ETC.

6-1. GENERAL MAINTENANCE STANDARD

a. All OTM shall be the proper size and type (sections) as specified in Chapters 4 and 5 of the AREMA *Manual For Railway Engineering* and the following:

(1) *Army*: UFC 4-860-01FA and TM 5-627.

(2) *Air Force*: UFC 4-860-01FA and AFM 91-33.

(3) *Navy*: UFC 4-860-02N, Appendix A, Section 5, and MO-103.

b. OTM shall not be flame cut or otherwise altered.

c. OTM that are of improper type, broken, or otherwise defective shall be replaced with the proper size (weight) and type (sections) material.

6-2. TIE PLATES.

a. ***Use.*** Tie plates distribute the applied loads from the rail to the tie as well as assist in keeping the rail in position. Their use is especially important on curves where they provide additional lateral restraint.

b. ***Type.*** Tie plates may be of either the single shoulder type (Figure 6-1) or the double shoulder type (Figure 6-2). Plates may be canted or flat. Canted plates are preferred, particularly in curves; however, canted and flat plates cannot be mixed together.

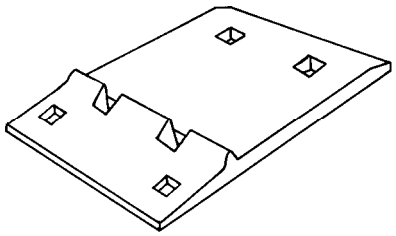


Figure 6-1. Single Shoulder Tie Plate

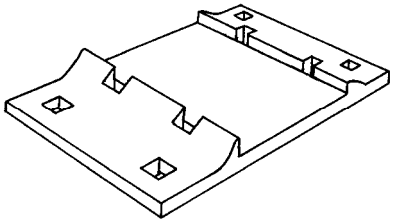


Figure 6-2. Double Shoulder Tie Plate

c. ***Installation.*** For track without tie plates, plates shall be installed on replacement ties during tie renewals or installed during rail replacement.

d. ***Shifted Plates***. Where the shoulder of a tie plate has become lodged beneath the base of the rail, the spikes shall be pulled, the spike holes plugged, the tie plate properly reset, and the rail respiked.

6-3. SPIKES.

a. The rail shall have a sufficient number of fasteners (spikes) to effectively maintain gage and provide sufficient rail restraint. Spikes provide primarily lateral support for the rail.

b. Spikes shall be:

(1) Of proper size for the tie plates used.

(2) Driven vertically and square with the rail.

(3) Either of the cut or screw type.

(4) Driven with approximately 0.125 inch of space remaining between the head of the spike and the base of the rail.

c. ***Spiking Pattern.***

(1) On tangent track and curves of 4 degrees or less, spikes shall be installed as shown in Figure 6-3.

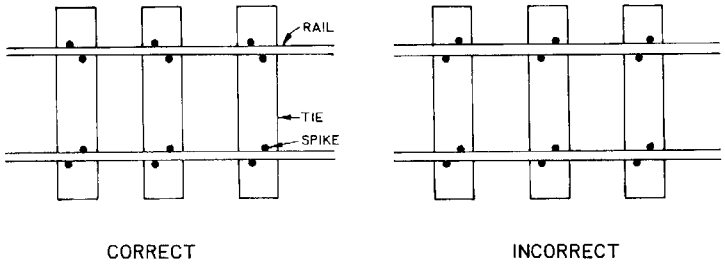
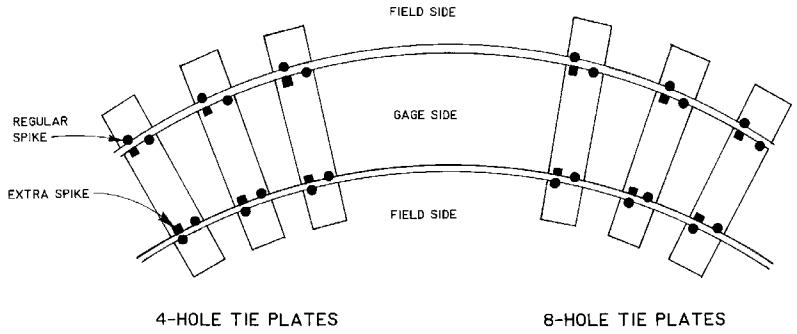


Figure 6-3. Spiking Pattern for Tangents and Curves of 4 Degrees or Less

(2) On curves greater than 4 degrees but less than 36 degrees and on the curved side of turnouts, the use of an additional spike per tie plate as shown in Figure 6-4 is recommended. However, it is acceptable to have the third spike on the field side of the rail. A maximum 12-degree curve is recommended for typical railroad applications.



Note: Extra spike can be on the field side and is preferred by the Army.

Figure 6-4. Spiking Pattern for Curves Greater than 4 Degrees but Less than 36 Degrees

(3) On curves of 36 degrees and greater the use of two additional spikes per tie plate as shown in Figure 6-5 is recommended.

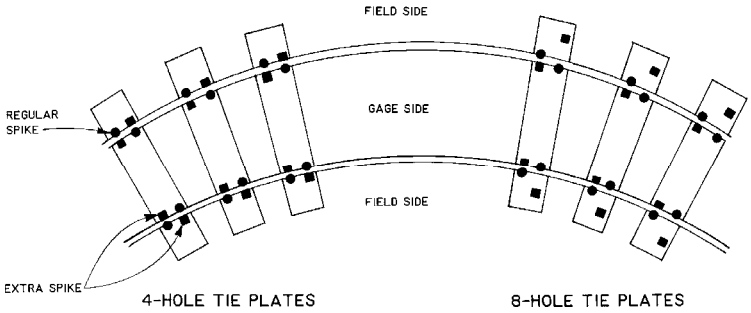


Figure 6-5. Spiking Pattern for Curves 36 Degrees and Greater

(4) Spikes shall not be installed through the slots in skirted-type slotted joint bars (angle bars) as shown in Figure 6-6. Correct spiking is shown in Figure 6-7.

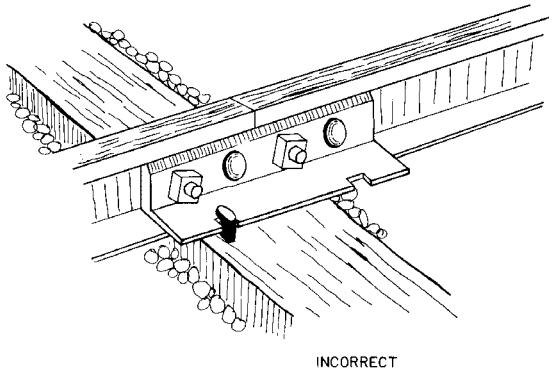


Figure 6-6. Incorrect Spiking of Angle Bars

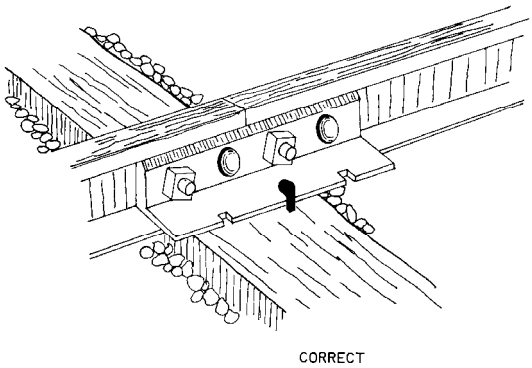


Figure 6-7. Correct Spiking of Angle Bars

(5) Correction of incorrect spiking patterns. An incorrect spiking pattern by itself is not a cause for removing and redriving spikes. However, an incorrect spiking pattern shall be corrected when other maintenance requires the spikes to be removed. Old spike holes shall be plugged to prevent accelerated tie deterioration.

d. ***Missing and Loose Spikes.*** Maintenance standards require missing spikes to be replaced. Old spike holes shall be plugged with a treated tie plug before replacing the

spikes. Loose spikes shall be removed, the holes plugged, and the spikes redriven. Gage shall be checked at these locations. Safety standards permit the track to be restricted at the track inspector's discretion.

e. ***Spikes Beneath Rail Base.*** Maintenance standards require where the head of a spike has become lodged beneath the base of a rail, the spike shall be removed immediately, the hole in the tie plugged, and the spike properly redriven. A spike lodged beneath the rail base is an undesirable condition that can lead to a broken rail base.

f. ***Other Hold-Down Devices.*** Maintenance standards require any defective hold-down device to be replaced. Safety standards permit the track to be restricted at the track inspector's discretion.

6-4. JOINTS.

a. ***Joint Bars.*** Rails shall be joined with proper factory-designed and -constructed joint bars. Joint bars shall not be altered with a flame in any manner, including the bolt holes. Maintenance standards require joint bars not meeting these requirements to be replaced. Safety standards require the track to be restricted until repairs are completed.

b. ***Compromise Joints.*** Rails of different weight and/or section shall be joined with proper factory-designed and -forged compromise bars, taper rails, or offset thermite welds. Safety standards require track to be restricted until all non-factory items are replaced.

c. ***Cracked or Broken Joint Bars.*** Maintenance standards require cracked or broken joint bars to be replaced. Safety standards require:

(1) Track to be "No Operation" when one or both joint bars are cracked or broken between the center bolt holes.

(2) Operations shall not be permitted over any location where both joint bars are broken, or where worn or loose joint bars allow vertical movement of either rail with respect to the other.

d. ***Bolts.*** Maintenance standards require each joint to be bolted with at least two bolts in each rail tightened to approximately 400 foot-pounds of torque which develops between 25,000 and 30,000 pounds of tension in the bolts.

(1) All bolts shall be of proper size and tightly in place. Proper bolt installation is shown in Figure 6-8.

(2) Bolts shall be installed with AREMA spring washers. Nuts shall be installed against the spring washer as shown in Figure 6-8. At least one full bolt thread shall extend past the outside of the nut.

(3) Bolts shall be installed so the nuts will run alternately on the inside and outside of the rail as shown in Figure 6-9.

(4) Whenever bolts and joint bars are removed, the rail in the joint area and the contact surfaces of the joint bar shall be cleaned (wire brushed) and lubrication applied to the joint bar and the bolt threads. New joint bars and bolts shall be lubricated before installation.

(5) Safety standards require a restriction if all bolts are loose or if there is only one bolt through a rail. No operations are permitted over locations where all bolts in one rail are missing or ineffective.

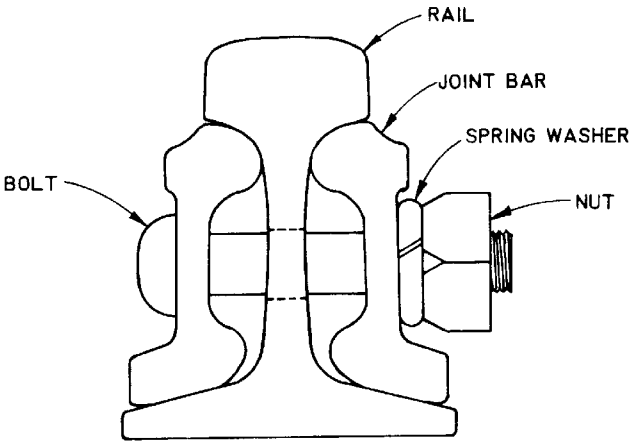


Figure 6-8. Proper Bolt Installation

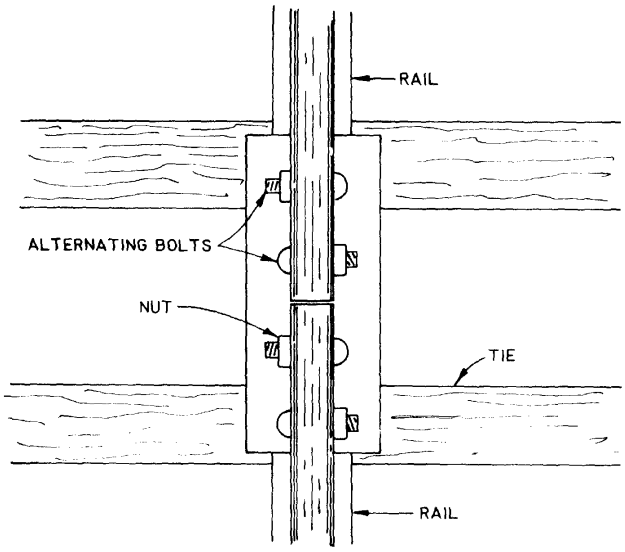


Figure 6-9. Alternating Bolt Pattern

e. ***Loose and Missing Bolts.***

(1) Maintenance standards require loose bolts to be tightened (approximately 400 foot-pounds) during the next maintenance activity. Bolts that cannot be tightened shall be replaced.

(2) Maintenance standards require that missing bolts be replaced.

f. ***Rail End Mismatch.*** Rail end mismatch on the tread portion or the gage side shall not exceed the following:

Rail End Mismatch (Inch*)*

	Tread	Gage Side
Maintenance	GT 0.125	GT 0.125
Safety		
Restriction	N/A	GT 0.1875
No Operation	GT 0.25	GT 0.25

g. ***Joint Gap.*** Standard rail gaps in properly drilled new rails and punched joint bars produce a rail gap of 0.125 to 0.25 inch. As the bolts, bars and rails wear, a gap of 0.5 to 0.625 inch may develop in some rail joints with track usage. Greater gaps indicate a potential problem. Rail joint gap shall not exceed the following:

	Joint Gap (Inch)
Maintenance	GT 0.75
Safety	
Restriction	GT 1.25
No Operation	GT 2

h. ***Joints in Restricted Areas***. It is recommended that the joint be thermite-welded whenever a joint is installed within 20 feet of a road crossing, the outer perimeter of any structure, or any location that restricts access to the joint.

i. ***Shims***. All shims shall be removed from joints. See UFGS 05650 for proper joint gap determination when replacing rails. Failure to compensate for the temperature could result in buckled track or pull-apart.

6-5. RAIL ANCHORS (MAINTENANCE STANDARD).

a. Rail anchors are designed to fit tight on the base of the rail. It is, therefore, extremely important to know the weight and section of the rail when ordering the anchors. Rail anchors help prevent the longitudinal movement of rails commonly known as “running” or “creeping.” Rail anchors should be used at locations where the track is subject to serious longitudinal movement from thermal stresses (rail expansion) or traffic conditions.

b. ***Rules for Anchor Application.*** General rules on the use of rail anchors are:

(1) Anchors shall be applied to the gage side of the rail base against the same tie face on opposite rails.

(2) Anchors shall grip the base of the rail firmly and have full bearing against the face of the tie.

(3) When the bearing of the rail anchor against the tie has been disturbed by removal of the tie, the anchor shall be removed and reapplied to the new tie.

(4) Anchors shall not be moved by driving them along the rail.

(5) Skewed ties shall be straightened before applying rail anchors.

c. Rail anchors not meeting requirements of 6-5.a and 6-5.b should be removed and reapplied.

d. ***Anchor Locations.***

(1) Where used, a minimum of eight anchors (four in each direction [boxed]) per 39-foot rail (or 16 anchors per 80-foot rail) is recommended as shown in Figure 6-10. Steep grades increase the importance of anchors and may justify more than the minimum number shown in Figure 6-10. If additional anchors are required, it is recommended to box-anchor approximately every third tie.

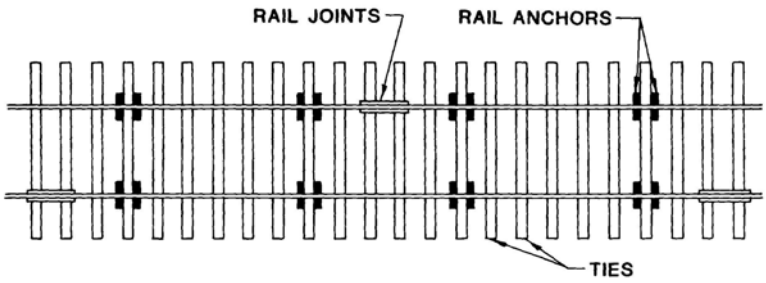


Figure 6-10. Recommended Minimum Anchoring Pattern for 39-foot Rails.

(2) *At Open Deck Bridges.* Where anchors are used on track approaching open deck bridges, every third tie should be box-anchored (four anchors per tie) for at least two rail lengths off each end of the bridge. No anchors shall be applied on the bridge itself.

(3) *At Rail Crossings.* Where anchors are used on track approaching rail crossings, every third tie should be box anchored (four anchors per tie) for at least two rail lengths in all directions from the crossing.

(4) *Turnouts*. Anchoring in turnouts is optional and can be used to correct geometry problems. Where used, every other tie (that can be anchored) should be anchored.

6-6. GAGE RODS.

a. ***Use.*** Gage rods are not required but are sometimes needed to help maintain proper track gage. However, they are **not** a substitute for good track maintenance and good tie conditions. Gage rods are sometimes used at the following locations:

(1) On sharp curves where there is difficulty holding the gage.

(2) In turnouts just ahead of the switch points and on the curved closure rail.

b. ***Spacing***. Where gage rods are used in sharp curves, two to four rods should be installed next to the joint on the outside rail and at evenly spaced intervals along the rail length.

c. ***Application.*** Gage rods should be installed at right angles to the rail with the jaws firmly gripping the base of the rail.

d. ***Maintenance.***

(1) Gage rods shall be kept tight while maintaining the proper track gage; ensure gage is not affected by over-tightening of gage rods.

(2) Bent or broken gage rods shall be replaced where track conditions warrant their continued use.

(3) Gage rods shall not be tightened if spikes are holding the rail from moving. It may be necessary to pull the spikes, plug the tie, tighten the rods to gage, then respike.

CHAPTER 7

RAIL

7-1. DEFECTIVE RAIL AND REMEDIAL ACTIONS.

a. Standards for rail defects are presented in Table 7-1. Remedial actions for rail defects are presented in Table 7-2. Where rail defects have been identified but remedial action has not been completed, the operating restrictions presented in Table 7-1 shall apply. Appendix C provides a glossary of common rail terms and brief descriptions of the common rail defects that may be observed in track.

b. ***Multiple Defects.*** Any individual rail having two or more of the transverse fissure or fracture type defects listed in Table 7-1, whether they are the same or different, shall be removed and replaced in lieu of other remedial actions.

c. ***Worn Rails.*** On rail suspected of being worn more than the allowances provided for in Table 7-1, wear measurements shall be taken at the center and at each end of the rail not more than 1 foot from the end of the joint bar. Rail wear measurements shall consist of a vertical head wear measurement and a horizontal side wear measurement as shown in Figure 7-1. Appendix D presents a table of details and properties for various rail sections and may be used to assist in identifying rail weight and sections for estimating the amount of rail wear.

Table 7-1. Rail Defect Standards

	Maintenance Standard		*Safety Standard*	
	Maximum Defect Category for Track Category		*Restricted (10mph) Operation*	*Close to Traffic*
Defect Type	*A*	*B*		
Bolt hole crack	RI	0.75”	GT 1.5”	BO
Bolt Hole – torch cut (3)	RI	RI	RI	*
Broken base	RI	RI	*	GT 6”
Corrosion (rail base)	0.25”	0.25”	*	*
Complete break	RI	RI	RI	RI
Crushed (flattened) head	RI	RI	GT 0.375”	BO
End Batter	0.25”	0.25”	GT 0.375”	GT 0.5”
Defective weld (1)	20%	20%	GT 20%	GT 40%
Fissure-compound (1)	RI	RI	GT 20%	GT 40%
Fissure-Transverse (1)	RI	RI	GT 20%	GT 40%
Fissure-detail (1)	RI	RI	GT 20%	GT 40%
Fracture-engine burn (1)	RI	RI	GT 20%	GT 40%
Head/web separation	RI	2”	GT 4”	BO (2)
Piped rail	RI	2”	GT 4”	BO (2)
Horizontal split head	RI	2”	GT 4”	BO (2)
Vertical split head	RI	2”	GT 4”	BO (2)
Split web	RI	2”	GT 4”	BO (2)
Flow on gage face	0.1875”	1/4”	GT 0.3125”	*
Running surface damage	0.25”	1/4”	GT 0.375”	GT 0.5”
Short rail	13’	13’	*	*
Torch cut rail	RI	RI	*	*
Wear - up to 90 lb rail				
Horizontal side wear	0.375”	0.375”	GT 0.5”	*

Table 7-1. Rail Defect Standards

Vertical head wear	0.375”	0.375”	GT 0.375”	*
Wear - 100 lb to 119 lb rail				
Horizontal side wear	0.5”	0.5”	GT 0.625”	*
Vertical head	0.375”	0.375”	GT 0.375”	*
Wear - rail above 119 lb				
Horizontal side wear	0.625”	0.625”	GT 0.75”	*
Vertical head wear	0.5”	0.5”	GT 0.5”	*

Notes:

1. Defect testing normally reports these defects as small (S), medium (M), or large (L). General relationship to size is:
   Small: 10–20% of head area.
   Medium: 21–40% of head area.
   Large: 41+% of head area.
Need to request inspector performing ultrasonic rail inspection to provide estimated percent of rail head affected by defect.

2. Rails having longitudinal defects accumulating to 3 feet or more in any 10 feet of rail shall be closed to traffic.

3. Include bolt holes anywhere in the rail.

4. Abbreviations:
   RI = Repair Immediately
   BO = Break Out in railhead
   GT = Greater Than
   LT = Less Than
   N/A = Not Applicable

* The activity shall evaluate the severity of each such defect and shall classify the degree of hazard based on engineering judgment and experience.

Table 7-2. Remedial Action for Rail Defect

Defect Type	Remedial Actions		
	Replace Entire Defective Rail	Crop Defect [2, 3]	Apply Joint Bars (Fully Bolted)
Bolt hole crack	Allowed	Allowed	---
Broken base	Allowed	Allowed	Not Allowed
Corrosion (rail base)	REQUIRED	Not Allowed	Not Allowed
Complete break - clean and square	Preferred	---	Allowed [3]
Complete break - rough or angled	Preferred	Allowed	Not Allowed [4]
Crushed head	Preferred	Allowed	Not Allowed [4]
Defective weld	---	Allowed	Preferred
End Batter	Allowed	Allowed	---
Fissure-compound [5]	Preferred	Allowed	Allowed [3]
Fissure-transverse [5]	Preferred	Allowed	Allowed [3]
Fracture-engine burn [5]	Preferred	Allowed	Allowed
Head/web separation	REQUIRED	Not Allowed	Not Allowed
Piped rail	REQUIRED	Not Allowed	Not Allowed
Running surface damage	Allowed	Allowed	Not Allowed
Short rail	REQUIRED	---	---
Horizontal split head	REQUIRED	Not Allowed	Not Allowed
Vertical split head	REQUIRED	Not Allowed	Not Allowed
Split web	REQUIRED	Not Allowed	Not Allowed
Torch cut rail ends	Allowed	Allowed	Not Allowed
			Not Allowed
Torch cut bolt hole	Allowed	Allowed	
Wear	REQUIRED [6]	---	---
Flow on gage face	Preferred	Allowed	---

Notes:

1. If two or more of these defects are found in any individual rail, that rail shall be replaced.

2. Rails may be cropped by cutting the rail with a rail saw or other appropriate cutting tool at least 6

Table 7-2. Remedial Action for Rail Defect

inches either side of the defect. 3. Not allowed if results in a rail length of less than 13 feet (see "Short Rail" below). 4. May be allowed as an emergency measure until defect is removed, provided train operations are speed-restricted. 5. If broken through or cracked out, rules for rough or angled complete break apply. 6. Rail with wear on only one side may be transposed if the horizontal wear does not exceed 0.375 inch. 7. Short lengths of flow may be ground off.

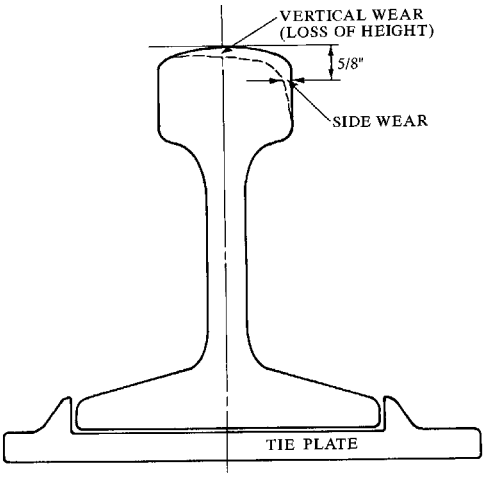


Figure 7-1. Rail Wear Measurement

d. ***Base Corrosion.*** Rail shall be removed from track if the base is corroded such that more than 0.25 inch play is allowed in the rail as shown in Figure 7-2.

e. ***End Batter.*** Rail end batter is measured 0.5 inch from the rail end with an 18-inch straightedge laid only on the rail being measured as shown in Figure 7-3. Table 7-2 presents remedial actions for end batter.

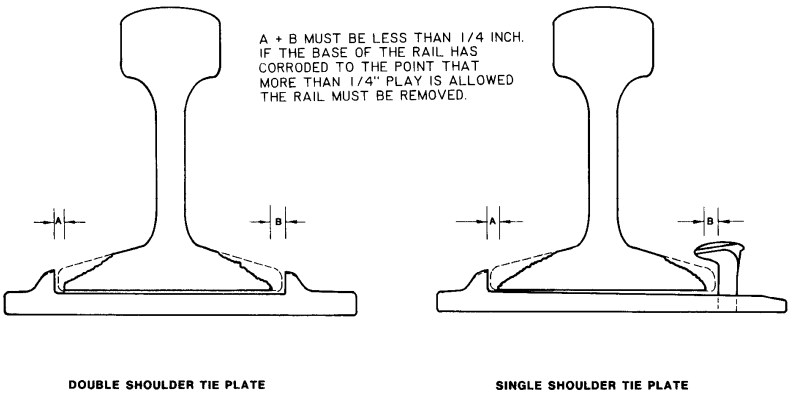


Figure 7-2. Rail Base Corrosion Measurement

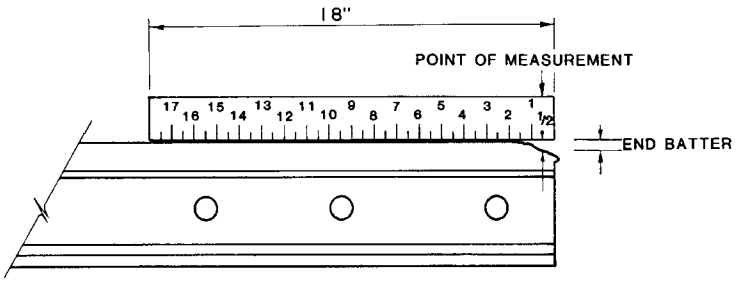


Figure 7-3. End Batter Measurement

f. ***Running Surface Damage.*** Rail running surface damage (e.g., deep engine burns, dents, equipment gouges) is measured at the midpoint of an 18-inch straightedge laid on the railhead over the defect.

7-2. RAIL MAINTENANCE.

a. ***Rail.*** New rail used in the maintenance of track shall meet the requirements specified in the AREMA *Manual For Railway Engineering*, Chapter 4.

b. ***Internal Defect Inspection.*** A "continuous search" internal rail defect inspection shall be performed on all active track. This internal rail defect inspection should be conducted using ultrasonic inspection techniques at a maximum of five-year intervals.

c. ***Torch Cut.*** Rail shall not be flame cut in any manner. This includes cropping the rail end, burning bolt holes, and trimming mismatched ends. Rail shall be cut using a mechanical or abrasive rail saw or other appropriate cutting tool.

d. ***Short Rail.*** Rail less than 13 feet in length shall not be installed in track.

7-3. LIGHTWEIGHT RAIL. Lightweight rail is defined as rail weighing less than 90 pounds/yard. Research has shown that lightweight rail may not be suitable for use in track subjected to heavy wheel loads.

a. Rail weights of 70 pounds/yard or less should be replaced if that rail will experience carloads of more than 50 tons (25,000-pound axle loads.)

b. Rail weighing 75 to 85 pounds/yard may be adequate depending upon tie and ballast support conditions. A structural evaluation and stress analysis is necessary to determine the adequacy of these rail weights. Rail not adequate to support the desired wheel loads should be replaced.

c. The replacement of any lightweight rail in Categories A and B track should be considered when planning major repair and/or rehabilitation projects.

CHAPTER 8

TURNOUTS

8-1. GENERAL. Turnouts are designed to divert trains from one track to another. Good turnout maintenance is essential for the safe and efficient operation of trains. Major components of a turnout are the switch, frog, and guardrails. Figure 8-1 shows a typical split switch turnout with the various parts identified. Tongue and mate switches used in paved areas are also commonly found in Navy trackage.

8-2. GENERAL REQUIREMENTS.

a. ***Materials***. All materials used within the limits of a turnout shall:

(1) Be factory-designed and -constructed.

(2) Be the proper weight and section.

(3) Be properly installed.

(4) Not be flame-cut or otherwise altered.

b. ***Rail.*** All rail used within the limits of a turnout shall be of the same weight and section. Compromise joints are not permitted within the limits of a turnout and shall be removed in the next maintenance cycle.

c. ***Ties.*** The standards in Chapter 5 of this UFC shall apply to ties within the limits of a turnout. Interlaced cross ties are not permitted and shall be removed in the next maintenance cycle.

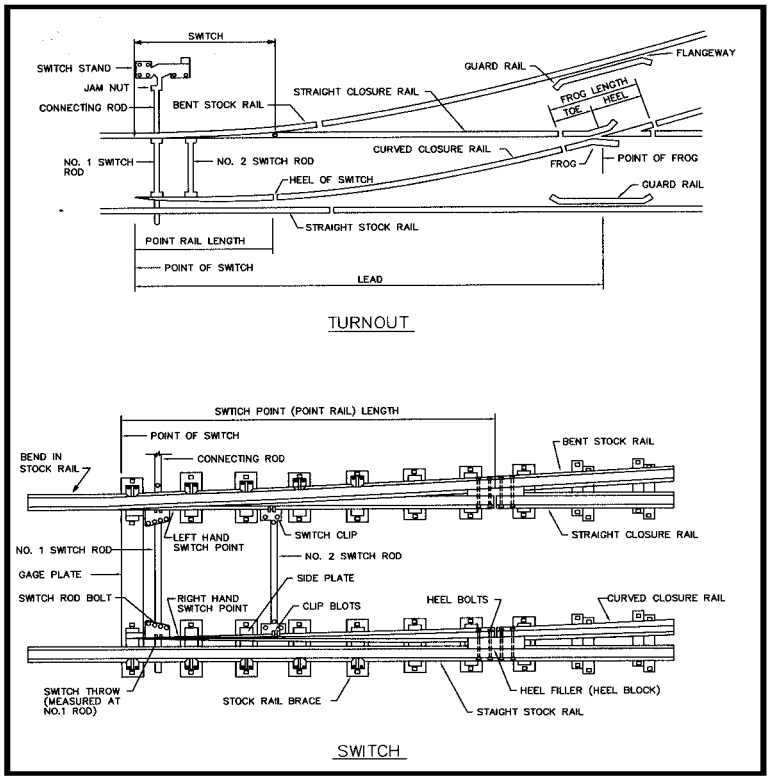


Figure 8-1. Parts of a Turnout

d. ***Track Geometry.*** The track inspector shall rate turnout track geometry as "Full Compliance," "Maintenance Required," "Restricted" or "No Operation" to conform to the standards in Chapter 12 and this chapter.

e. ***Reversing Tangent.*** It is recommended that the tangent between the frog and any reverse curve past the frog be no less than 50 feet in length as shown in Figure 8-2.

f. ***Switch Stand Placement.***

(1) The switch stand shall be installed so that when the switch is lined for the normal (main) route, the connecting rod keeps the points closed with a pulling (rather than a pushing) force. In most cases this will mean installing the stand on the diverging side of the turnout as shown in Figure 8-2.

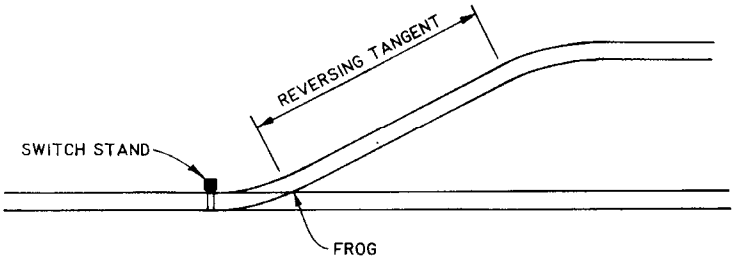


Figure 8-2. Reversing Tangent Length and Switch Stand Placement

(2) When a ground-throw stand is used, the handle shall point toward the frog when the switch is lined for the normal (main) route.

g. ***Cleaning, Lubrication, and Adjustment***. As scheduled, but at least annually, switches and switch stands shall be cleaned, lubricated, and adjusted. For Navy installations see NAVFACINST 11230.1 for additional guidance.

h. ***Plates.*** The proper type and size of tie plates shall be used. Double shoulder plates are preferred.

8-3. SWITCHES AND SWITCH STANDS.

a. Switches shall be inspected for the following defects:

(1) Switch difficult to operate.

(2) Gap between the switch point and the stock rail. Check with points in both positions. (See paragraph 8-3.b.)

(3) Worn or chipped switch points. (See paragraph 8-3.c.)

(4) Point of switch higher than stock rail. (See paragraph 8-3.c.)

(5) Point rail beyond taper lower than stock rail. (See paragraph 8-3.c.)

(6) Damaged or missing switch stand lever latches or switch point lock. (See paragraph 8-3.d)

(7) Loose, damaged, or improperly installed switch stand. (See paragraph 8-3.f and 8-3.g.)

(8) Loose, damaged, or missing jam nut at the end of the connecting rod. (See paragraph 8-3.h.)

(9) Bent, damaged, loose, binding, or improperly installed connecting rod, switch rods, or switch clips. (See paragraph 8-3.h.)

(10) Loose, damaged, or missing switch clip, switch rod, or connecting rod bolts. (See paragraph 8-3.h.)

(11) Loose, damaged, or missing heel bolts; cracked or improper heel joint bars or heel filler. (See paragraph 8-3.i.)

(12) Loose, damaged, or missing rail braces. (See paragraph 8-3.j.)

(13) Loose, damaged, or missing slide plates; dirt and debris buildup on slide plates.

(14) Missing cotter keys on switch rod and switch clip bolts. (See paragraph 8-3.i.)

(15) Debris in flangeways. (See paragraph 8-3.l.)

(16) Debris obstructing switch rods and connecting rod. (See paragraph 8-3.h.)

(17) Loose, damaged or missing point rail stops.

b. ***Switch Point Gap.*** Maintenance standards require an adjustment if the switch can be thrown and locked in either direction with a 0.25-inch spacer between the switch point and the stock rail or if the gap is greater than zero. Safety standards require restricted track at over 0.25-inch up to 0.375-inch gap and no operations if gap is over 0.375 inch.

c. ***Switch Points.***

(1) If the switch point is chipped, broken, or worn more than 0.5 inch down and 6 inches back from the point, maintenance standards require the switch point to be restored or replaced. (See Figure 8-3.)

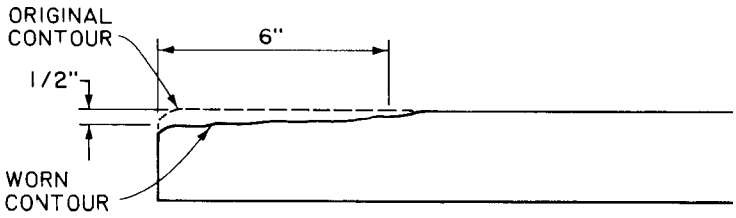


Figure 8-3. Switch Point Contour

(2) If switch point is worn or damaged beyond these limits or the top surface of the switch point is higher than the stock rail, safety standards require operation through the turnout to be restricted.

(3) If the point rail beyond the taper is lower than the top of the stock rail, no operations shall be permitted. Metal flow shall be removed by grinding to ensure proper closure. Figure 8-4 shows the proper elevation of the switch point and point rail with respect to the stock rail.

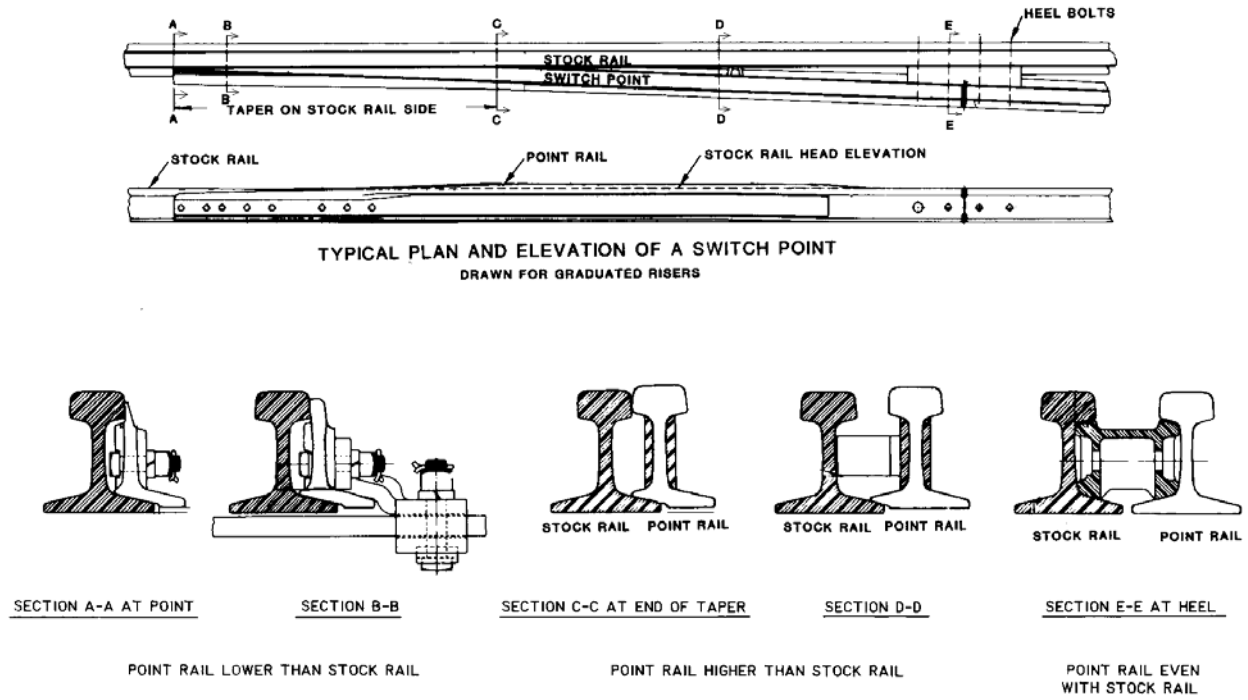


Figure 8-4. Switch Point Plan and Elevation.

d. ***Switch Stand Lever Latches and Point Locks.*** Safety standards require turnouts with latches that are missing, damaged, insecure, or otherwise inoperative, to be "No Operation."

e. ***Switch Stand.*** Maintenance standards require the switch stands to be fully secured to the head block ties to prevent any unintentional movement of the switch points. Where operations through the switch result in visible lateral movement of the switch stand or opening of the switch points (point gap), safety standards require "No Operation."

f. ***Connecting Rod, Switch Rods, and Switch Clips.***

(1) Maintenance standards require that these parts shall be installed and maintained to allow unobstructed motion when the switch is thrown. Rods and clips shall not contact adjacent ties. Damaged parts shall be replaced and improperly installed parts shall be adjusted. Washers or similar spacers shall not be permitted between the switch clip and the switch point. The jam nut at the adjustable end of the connecting rod shall be kept tight against the clevis.

(2) Safety standard is "No Operation" if the connecting rod, switch rod, or switch clip is insecurely fastened or is damaged. Where washers or similar spacers do not have full contact surface areas between the clip and switch point, operations through the turnout shall be restricted. Spacers, if needed, shall be constructed of steel plate with the dimension of the back of the switch clip and thickness, as required.

g. ***Pocketing Switches***. Ballast shall not be allowed at a level that will interfere with the smooth operation of the switch.

(1) The ballast level in cribs beneath the connecting rod, switch point rails, and switch rods should be at least 2 inches below any steel. In regions where the snow and ice accumulate or frost heave is a problem, at least 4 inches of clearance should be provided. This should be checked and performed in the fall.

(2) For switches where this clearance is not provided, the cribs shall be pocketed to provide adequate clearance.

h. ***Connecting Rod Bolts, Switch Rod Bolts, and Clip Bolts.*** Maintenance standards require that connecting rod and switch rod bolts shall be installed with the nut on top and cotter keys in place. Clip bolts shall have cotter keys. If bolts are not tight, safety standards require restricted operation.

i. ***Switch Heel (Bolts, Fillers, and Joint Bars).***

(1) *Maintenance Standards.* The heel of the switch shall be secure and the supporting switch ties solidly tamped. Where there are no existing heel blocks (filler), hook plates shall be used to secure the heel of the switch. The inside joint bar (nearest the track center) should be a bent bar per AREMA design. Remember, this assembly is a hinge allowing the switch rail to pivot in the joint assembly.

(2) Safety standards require restricted operation if any heel bolts are loose or missing, or the heel is otherwise not fully secure.

j. ***Rail Braces.***

(1) *Maintenance Standards.* Rail braces are essential to provide proper lateral support to the stock rails. Rail braces shall be fully secured to the tie and tight against the outside of the stock rail on both sides of the turnout. Rail braces should be installed in accordance with the appropriate plans for a given length point rail found in the AREMA *Portfolio of Track Plans*. It is recommended that non-adjustable rail braces be installed on each switch tie from the point of switch to within two ties of the switch heel. Adjustable rail braces should be installed per the AREMA *Portfolio of Track Plans*.

(2) Safety standards require restricted operation through the turnout if there are less than four rail braces properly secured to the tie and tight against the outside of each stock rail while switch is thrown.

k. ***Point Rail Stops***. Safety standards require track with bent or missing point stops to be "Restricted Operations."

l. ***Debris in Flangeways.*** Flangeways shall be kept clear of debris. Any obstructions, including ice and packed snow, shall be removed.

8-4. FROGS.

a. ***Frog Point.***

(1) Maintenance standards require frogs to be restored if the point is chipped, broken, or worn more than 0.5 inch below the original top surface and 6 inches back from the original point location. (See Figure 8-5)

(2) Safety standards require the track to be restricted for frog points with wear greater than 0.625 inch.

b. ***Frog Tread Surface.***

(1) Maintenance standards require a frog to be restored when the tread surface is worn more than 0.3125 inch below its original contour. Frogs that cannot be rebuilt and restored to a "like new" condition shall be replaced.

(2) Safety standards require the track to be restricted if the frog tread surface is worn greater than 0.375 inch below its original contour. (See Figure 8-5)

(3) If welding repairs are made on the frog, the tread portion of the frog will be restored before restoring the point.

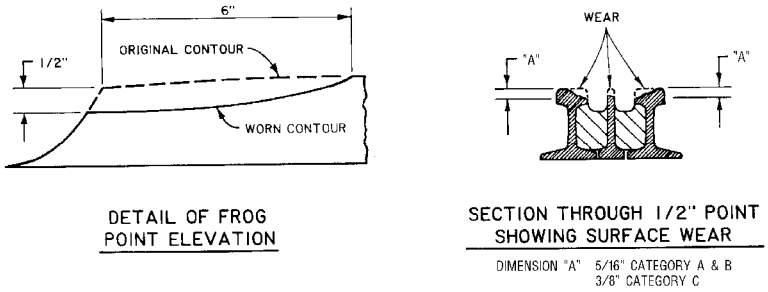


Figure 8-5. Frog Point and Tread Contours

c. ***Guarding Face of Self-Guarded Frogs.***

(1) *Maintenance Standards.* The raised guarding face on a self-guarded frog shall not be worn more than 0.3125 inch. (See Figure 8-6)

(2) Safety standards require the track to be "No Operation" if the raised guarding face on a self-guarded frog is more than 0.375 inch.

d. ***Repairing Self-Guarded Frogs.*** If repairs are made to a self-guarded frog without removing it from service, the raised guarding face and tread portion must be restored before rebuilding the point.

e. ***Frog Bolts***. All frog bolts shall be in place and tight.

f. ***Frog Flangeway Width.*** Standard frog flangeway width is 1.875 inches. Standards for frog flangeway width are presented in Table 8-1. (See Figure 8-7)

g. ***Flangeway Depth.*** Standard frog flangeway depth is 1.875 inches. Standards for frog flangeway depth are presented in Table 8-1. (See Figure 8-7)

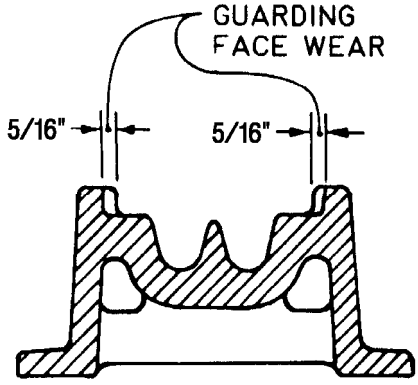


Figure 8-6. Allowable Wear on Guarding Face of Self-Guarded Frog

8-5. GUARD RAILS.

a. Guard rails shall be in place, properly positioned, and fully secured with guard rail plates placed with the shoulder against the guard rail. All guardrail bolts shall be in place and tight.

b. Guard rails shall be installed so the straight guarding face (the portion of the guard rail parallel with the running rail) extends in advance of the frog point a distance at least equal to the values given in Table 8-2.

c. ***Guard Check Gage.*** Standard guard check gage is 54.625 inches. Standards for guard check gage are presented in Table 8-1. (See Figure 8-7) After the measurements are taken and appear satisfactory, if visual observations indicate that the frog point is being hit by the wheel flanges, a careful inspection must be made to determine the cause of the problem. Something may be loose. Remember, these are static measurements that are being taken.

d. ***Guard Face Gage***. Standard guard face gage is 52.75 inches. Standards for guard face gage are presented in Table 8-1. (See Figure 8-7)

e. ***Guardrail Flangeway Width.***

(1) Standard guardrail flangeway width is 1.875 inches. Standards for guardrail flangeway width are presented in Table 8-1. (See Figure 8-7)

(2) Excessive wear on a guardrail is often indicated by a wide guardrail flangeway measurement or by tight guard check gage. Typically, guardrail flangeway widths of 2.125 inches or greater indicate that maintenance or replacement of the guardrail may be needed.

8-6. GAGE MEASUREMENT.

See Chapter 12 for gage measurements.

Table 8-1. Measurements and Operating Restrictions for Frogs and Guard Rails

	Measurement			
	Maintenance Standards		Safety Standard Operating Restrictions	
Parameter	*(New or Fully Restored)*	*Minimum*	*Restriction*	*No Operations*
Frog Flangeways				
Width	1-7/8 in. (1.875 in.)	1-5/8 in (1.625 in.)	LT 1-5/8 in. (1.625 in.)	LT 1-1/2 in. (1.50 in.)
Depth	GE 1-7/8 in. (1.875 in.)	LT 1-5/8 in. (1.625 in.)	LT 1-1/2 in. (1.50 in.)	LT 1-3/8 in. (1.375 in.)
Guard Check Gage	54-5/8 in. (54.625 in.)	LT 54-3/8 in. (54.375 in.)	LT 54-1/4 in. (54.25 in.)	LT 54-1/8 in. (54.125 in.)
Guard Face Gage	52-3/4 in. (52.75 in.)	GT 53 in. (53.00 in.)	GT 53-1/8 in. (53.125 in.)	GT 53-1/4 in. (53.25 in.)
Guard Rail Flangeway:				
Width	1-7/8 in. (1.875 in.)	1-5/8 in. (1.625 in.)	LT 1-5/8 in. (1.625 in.)	LT 1-1/2 in. (1.50 in.)

Note: GE = greater than or equal to, LT = less than, GT = greater than

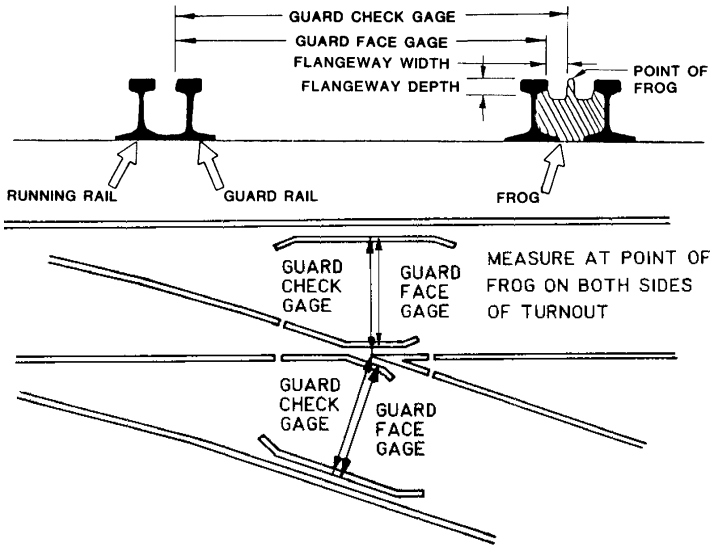


Figure 8-7. Measurement of Flangeway Width, Flangeway Depth, Guard Check Gage, and Guard Face Gage

Table 8-2. Minimum Length of Straight Guarding Face in Advance of Frog Point

Frog Number	Length (Inches)
4, 5, 6, 7, 8, 9, 10	14
11, 12, 14	18
15, 16	26
18, 20	30

CHAPTER 9

RAIL CROSSINGS

9-1. GENERAL. Rail crossings are designed to carry one track across another at grade. Drainage is vital in protecting the subgrade from increased impacts.

9-2. MAINTENANCE REQUIREMENTS.

a. *Size.* Rail crossings shall be the proper weight and section for the rails being joined.

b. *Flangeway Width and Depth*. Standards for rail crossing flangeways are identical to the frog flangeway standards given in Table 8-1 and shall be used.

c. *Debris in Flangeways.* Flangeways shall be kept clear of debris. Any obstructions, including ice and packed snow, shall be removed.

d. *Bolts.* All crossing bolts shall be in place and tight. Loose bolts shall be tightened and bolts that cannot be tightened shall be replaced. Missing bolts shall be replaced.

e. *Special Components.* All broken or damaged components shall be replaced or repaired.

9-3. ANCHORS. Where rail anchors are used on track approaching rail crossings, every third tie should be box-anchored (four anchors per tie) for at least two rail lengths in all directions from the crossing.

CHAPTER 10

ROAD CROSSINGS

10-1. DRAINAGE.

a. Adequate drainage is essential for satisfactory long-term performance of the track and roadway crossing.

b. Water shall not be allowed to pond on or near the track at a road crossing.

c. Catch-basins, gutters, ditches, sub-drains, and culverts should be properly installed and kept free of debris.

10-2. FLANGEWAYS.

a. ***Flangeway Width.*** Maintenance standards require the flangeway width in a road crossing to be no less than 2.5 inches nor greater than 3 inches. Safety standards require "Restricted Operation" for formed flangeway widths less than 1.75 inches.

b. ***Flangeway Depth.*** Maintenance standards require the flangeway depth in a road crossing to be no less than 2 inches. Safety standards require "Restricted Operation" for flangeway depth less than 1.5 inches.

c. ***Debris.*** Flangeways shall be kept clear of debris. Any obstructions, including ice and packed snow, shall be removed immediately.

10-3. TRACK.

a. ***Ties, Tie Plates, and Spikes.*** When crossings are rebuilt, all ties within the crossing limits and for at least 20 feet beyond each end of the crossing shall be replaced, fully tie plated, and spiked with eight rail-holding spikes on each tie (see Figure 10-1). For crossings, the use of hardwood ties is recommended.

b. ***Joints***. Bolted rail joints are not desirable in road crossings. When crossings are rebuilt, it is highly recommended that all joints within the crossing and up to 20 feet outside the crossing be welded.

c. ***Rail Anchors.*** Where the track on either side of the crossing is anchored, it is recommended that the anchoring pattern be continued through the crossing, provided that the crossing panels can accommodate anchors.

10-4. CROSSING SURFACES AND MATERIALS.

a. It is essential that the crossing surface be maintained to provide a smooth crossing for vehicles and to prevent vehicle tires from striking the rails. The crossing surface shall be maintained at an elevation level with the top of the rails. Additionally, there shall be a smooth transition between the crossing surface and the adjoining pavement.

b. During routine track inspections the inspector should take note of the general condition of the crossing materials and report any damage or condition requiring repair or replacement. Any condition observed in a road crossing which would cause a hazard to motor vehicles using the crossing should be corrected immediately.

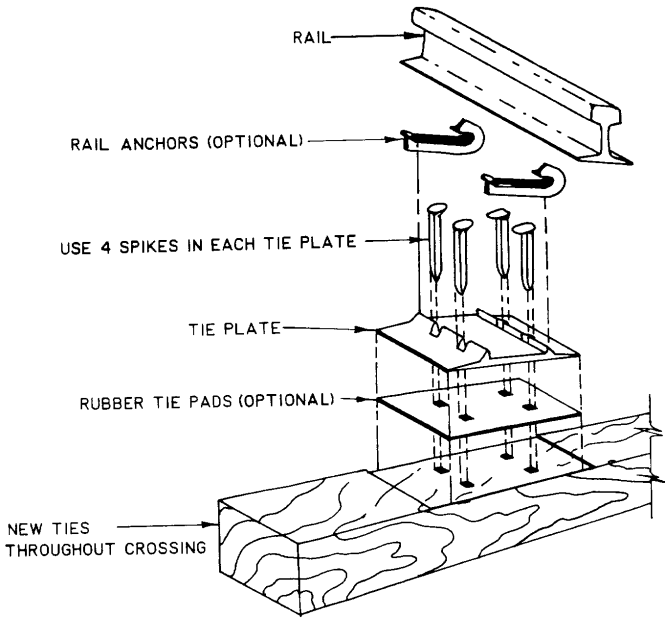


Figure 10-1. Track Construction for Road Crossing

10-5. GRADE CROSSING PROTECTION—SIGNS AND SIGNALS. During routine track inspections, the inspector should observe the condition of all whistle posts, highway warning signs and crossbucks, and signals. Signs and signals should be easily legible and clearly visible to the highway user. Signs and signals shall conform to the requirements of the Federal Highway Administration (FHA) *Manual on Uniform Traffic Control Devices* (MUTCD), Part 8, "Traffic Controls for Highway–Rail Grade Crossings." Additional guidance may be obtained from the FHA *Railroad–Highway Grade Crossing Handbook*.

10-6. ELECTRIC/ELECTROMECHANICAL GRADE CROSSING SIGNALS. Inspection and maintenance of electric and/or electromechanical signals should conform to manufacturer's recommendations, state/local requirements, and the FRA Part 234 "Grade Crossing Signal System Safety." Paragraph 10-6.a and b summarizes the minimum requirements of the FRA standards. The inspections and tests described are performed to determine if the warning system and its component parts are maintained in a condition to perform their intended function. Any electromagnetic device, relay or other electromagnetic device that fails to meet the requirements of the tests shall be removed from service until corrected. All reference to "system" in the remainder of this section shall refer to the grade crossing signal system. The inspector shall meet the qualifications of FRA Part 212.231. Signals shall be inspected once each month.

a. *Maintenance Standards.*

(1) *Location of Plans.* Plans required for proper maintenance and testing shall be kept at each system location (equipment cabinet). Plans shall be legible and correct.

(2) All control circuits shall operate on a fail-safe principle.

(3) Operating characteristics of electromagnetic, electronic, or electrical apparatus shall be maintained in accordance with the limits within which the system is designed to operate.

(4) When any essential component fails to perform its intended function, the cause shall be determined and the faulty component adjusted, repaired, or replaced

immediately. Until repair is completed, comply with appropriate action to flag vehicular traffic in accordance with activity/installation regulations or, for the Navy, paragraph 3.3.f of NAVFAC P-301, *Navy Railway Operating Handbook*.

(5) During testing or performing work on signals or track structure, which affects the integrity of the warning system, alternative methods must be provided to maintain safety for the highway user. Immediately after repairs, adjustments, or replacements have been completed, an appropriate test of the affected equipment must be made to verify that the system is operating as intended.

(6) Highway-rail grade crossing warning system apparatus shall be secured against unauthorized entry (i.e., locked equipment cabinet).

(7) Each circuit that affects the proper functioning of a grade crossing warning system shall be kept free of any ground or combination of grounds that will permit a current flow of 75 percent of more of the release value of any relay or electromagnetic device in the circuit.

(8) A standby source of power shall be provided with sufficient capacity to operate a warning system for a reasonable length of time during a period of primary power interruption. The designated capacity shall be specified on the plans (Paragraph 10-6.a.(1)). Batteries shall be checked as follows:

(a) Keep battery terminals, vent caps and cell casings clean. Keep terminals lightly coated with no-oxide grease.

(b) Keep electrolyte at the correct level in each cell.

(c) Check the charging rate and adjust as necessary.

(d) Measure and record the voltage of each cell.

(9) Flashing light units shall*:*

(a) Be properly positioned and aligned and shall be visible to a highway user approaching the crossing.

(b) Be maintained to prevent dust and moisture from entering the interior of the unit. Roundels and reflectors shall be clean and in good condition.

(c) Flash alternately. The number of flashes per minute for each light unit shall be 35 minimum and 65 maximum.

(10) Each gate arm light shall be maintained in such condition as to be properly visible to approaching highway users. Gates shall be cleaned and lubricated as necessary. Lights and light wire shall be secured to the gate arm.

(11) The voltage at each lamp shall be maintained at no less than 85 percent of the prescribed rating for the lamp.

(12) Each gate arm, when in the downward position, shall extend across each lane of approaching highway traffic and shall be clearly viewable by approaching highway users. Each gate arm shall start its downward motion not less than three seconds after flashing lights begin to operate and shall be in a horizontal position at least five seconds before the train arrives at the crossing.

(13) System must activate at least 20 seconds prior to rail traffic occupying a grade crossing.

(14) Train detection apparatus shall be maintained to detect a train or railcar in any part of a train detection circuit. If the presence of sand, rust, dirt, grease, or other foreign matter is known to prevent effective shunting, flagging of the crossing shall be accomplished.

(15) Each train detection circuit shall detect the application of a shunt of 0.06-ohm resistance when the shunt is connected across the rails of any part of the circuit.

(16) Each set of fouling wires in a train detection circuit shall consist of two discrete conductors, each maintained in such condition to ensure proper operation of detection apparatus when the circuit is shunted.

(17) Each non-insulated rail joint located within the limits of a train detection circuit shall be bonded by means other than joint bars and the bonds shall be maintained in such condition to ensure electrical conductivity.

(18) Each insulated rail joint shall be maintained to prevent current flowing between rails separated by the insulation in an amount sufficient to cause failure of the detection circuit.

(19) A switch, when equipped with a switch circuit controller connected to the point and interconnected with warning system circuitry, shall be maintained so that the warning system can only be cut out when the switch point is within 0.5 inch of full reverse position.

(20) Each wire shall be tagged or otherwise marked so that it can be identified at each terminal. Tags and other marks shall be made of insulating material and so arranged that tags and wires do not interfere with moving parts of the apparatus.

(21) Insulated wire shall be protected from mechanical injury. The insulation shall not be punctured for test purposes. A splice in underground wire shall have insulation resistance at least equal to that of the wire spliced.

(22) Wire on a pole line shall be securely attached to an insulator that is properly fastened to a cross arm or bracket supported by a pole or other support. Wire shall not interfere with other wires on the pole line. An open-wire transmission line operating at 750 volts or more shall be placed not less than 4 feet above the nearest cross arm carrying active warning system circuits.

(23) Each sign mounted on a signal system post shall be in good condition and be visible to the highway user.

b. ***Inspections and Tests.*** Inspection and tests of electric/electromechanical signals shall be performed to determine if the warning system and its component parts are maintained in a condition to perform their intended function. Any electronic device, relay, or other electromagnetic device that fails to meet the requirements of tests required by this UFC shall be removed from service and shall not be restored to service until its operating characteristics are in accordance with the limits within which such device or relay is designed to operate. Additional tests, adjustments, cleaning and lubrication in accordance with the equipment manufacturer shall be accomplished. Proper precautions must be taken to protect highway traffic and safe operation of trains before any changes or tests are initiated on a highway-grade crossing warning system.

(1) *Monthly Inspection and/or Tests.*

(a) Ground Tests: A test of grounds on each energy bus furnishing power to circuits that affect the safety of the warning system operation. (See paragraph 10-6.a.(7))

(b) Standby Power: Standby power shall be tested. (See paragraph 10-6.a.(8))

(c) Flashing Light Units: Each flashing light unit shall be inspected for proper visibility, dirt and damage to roundels and reflectors. Lenses shall be cleaned and bulbs replaced, as necessary. (See paragraph 10-6.a.(9)(b))

(d) Gate Arms and Gate Mechanism: Each gate arm and mechanism shall be inspected and observed for proper operation. (See paragraph 10-6.a.(10) and (12))

(e) Warning System Operation: Each crossing warning system, including warning bells or other stationary audible warning devices, shall be tested to determine that it functions as intended. (See paragraph 10-6.a.(15))

(f) Highway traffic signal pre-emption interconnection shall be tested.

(2) *Quarterly Inspections and/or Tests.*

(a) Cut-out circuits shall be tested at least every three months to determine that the circuit functions as intended. A cutout circuit is any circuit or device that overrides the operation of the automatic warning system. This includes both switch cutout switches and devices that enable personnel to manually override the system operation.

(b) Insulated rail joints, bond wires, and track connections shall be inspected. (See paragraph 10-6.a.(17) and (18))

(3) *Annual Inspection and/or Tests.*

(a) Flashing Light Units and Lamp Voltage:

1. Each flashing light unit shall be inspected for proper alignment and frequency of flashes in accordance with installation specifications. (See paragraph 10-6.a.(9)(a) and (c))

2. Lamp voltage shall be tested. (See paragraph 10-6.a.(11))

(b) Gate mechanism hold-clear devices shall be tested for proper operation.

(c) Each crossing warning system shall be tested for the prescribed warning time. (See paragraph 10.6.a.(13))

(d) Timing Relays and Timing Devices: Each timing relay and timing device shall be tested. The timing shall be maintained at not less than 90 percent nor more than 110 percent of the 41 predetermined time intervals. The predetermined time intervals shall be shown on the plans or marked on the timing relay or timing device.

(4) The following shall be tested at the frequency indicated:

(a) Relays affecting the proper functioning of a crossing warning system:

1. Alternating current centrifugal relays shall be tested every 12 months.

2. Alternating current vane-type relays, direct current polar-type relays and relays with soft iron magnetic structure shall be tested every two years.

3. Other type relays shall be tested at least every four years.

(b) Insulation resistance tests, wires in trunking and cables:

1. Insulation resistance tests shall be made on wires or cables every 10 years.

2. Insulation resistance tests shall be made between all conductors and ground, between conductors in each multiple conductor cable and between conductors in trunking. Insulation resistance tests shall be performed when wires, cables and insulation are dry.

3. When insulation resistance of wire or cable is found to be less than 500,000 ohms, prompt action shall be taken to repair or replace the defective wire or cable. Until replacement is completed, insulation resistance testing shall be made annually. A circuit with a conductor having an insulation resistance of less than 200,000 ohms shall not be used.

c. ***Results of Inspections and Tests.*** Results of inspections and tests made in accordance with paragraph 10-6.b shall be recorded. A sample form is provided in Appendix B, Figure B-3. The inspector shall sign each record. Each record shall be retained for two years or until the next reported inspection, whichever is longer. Each record shall indicate activity name, crossing inventory name, place and date, equipment tested, results of tests, repairs, replacements, adjustment made, and condition in which the apparatus was left.

CHAPTER 11

BRIDGES

11-1. GENERAL.

a. For inspection purposes, track standards are applied to the bridge ties and all the components resting on them. Bridge standards are applied to those components supporting the bridge ties and below.

b. All track bridges shall be equipped with inner guardrails. Guardrails may be an appropriate safety measure for tracks located under bridge overpasses.

c. Rail anchors shall not be installed on track over open deck bridges. Any anchors found on track over an open deck bridge shall be removed immediately.

11-2. BRIDGE INSPECTION AND LOAD RATINGS.

a. Railroad bridges shall be inspected using the procedures and checkpoints described in NAVFAC MO-322, *Inspection of Shore Facilities*, for the Navy; TM 5-600/AFJPAM 32-1088, *Bridge Inspection, Maintenance and Repair*, for the Air Force and Army; and AR 420-72 for the Army. For the Air Force, the BCE is responsible for determining the inspection requirements. The minimum frequency for inspecting railroad bridges is every two years.

b. Structure analysis based on current loading or larger anticipated loadings shall be maintained on file in accordance with NAVFACINST 11230.1 for Navy activities and AR 420-72 for Army garrisons.

11-3. DANGEROUS CONDITIONS. Inspectors shall note any condition of a bridge that might adversely affect train operations. Such conditions shall be reported immediately to the proper authorities. Train operations over the structure shall not be permitted until a damage or in-depth inspection is completed and has documented that the bridge is sufficient for normal operations.

CHAPTER 12

TRACK GEOMETRY

12-1. GENERAL.

a. One rail shall be designated as the line rail. This rail establishes the alignment of the track. Either rail may be used as the line rail on tangent track so long as the same rail is used for the entire length of the tangent. The outside rail in a curve is always the line rail.

b. In curves, the inside rail is designated as the grade rail. The grade rail is the reference from which superelevation is applied to the outside rail of the curve.

c. During routine track inspections, track geometry measurements shall be taken as a minimum at the following locations:

(1) Wherever there are visual indications of track geometry deviations.

(2) Wherever track geometry deviations were previously detected, unless the deviation has been corrected.

(3) Other locations as specified in this chapter.

12-2. GAGE.

a. ***Definition.*** Gage is the distance between the two rail heads, measured at right angles to the rails in a plane 0.625 inch below the top surface of the rail head as shown in Figure 12-1. Gage measurements shall include any evidence of lateral movement under load, such as any space between the field side rail base and tie plate shoulder.

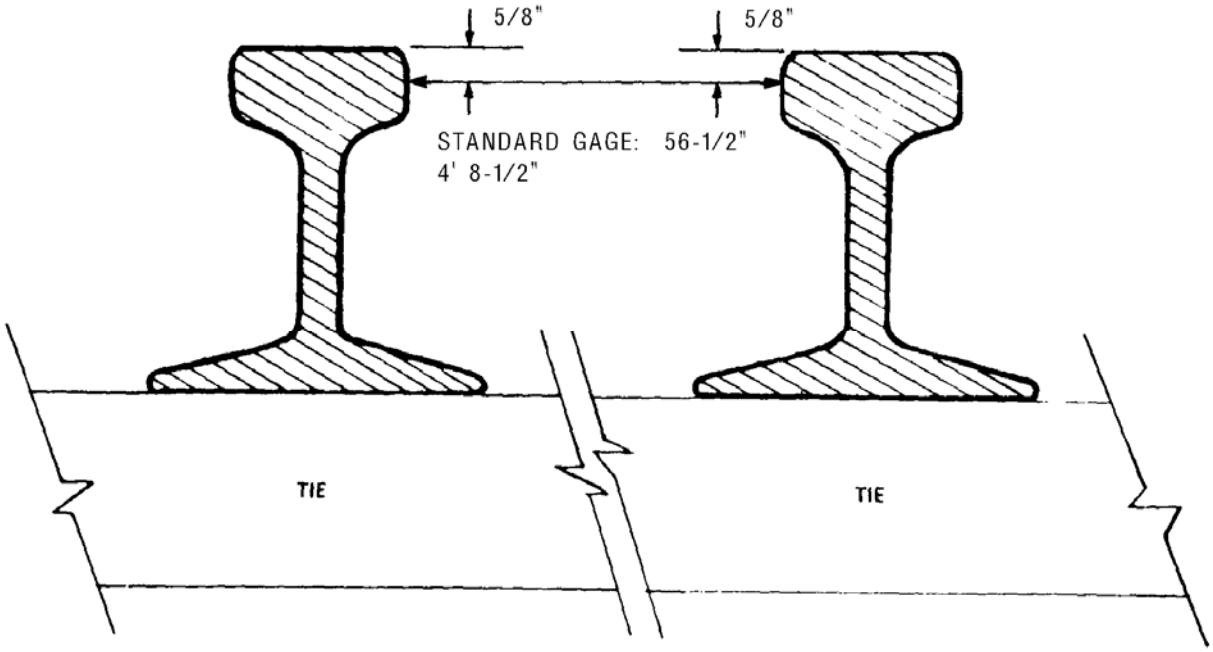


Figure 12-1. Gage Measurement

b. ***Measurement Locations.*** During routine track inspections, gage shall be measured at the following locations:

(1) In turnouts, just ahead of switch points (ahead of the bend in the stockrail) and at the joints in curved closure rails. (See Figure 12-2)

(2) Two measurements at the heel of the switch for the straight rail and the turnout side.

(3) At the point of frog on both sides of turnouts and rail crossings. (See Figure 12-2)

(4) Wherever there is a dark streak running along the field side of the top surface of the railhead.

(5) Wherever wear marks on a tie indicate lateral tie plate movement.

(6) Where a significant gap exists between the rail base and outside shoulder of the tie plate.

(7) At locations where ties are badly skewed.

(8) In road crossings.

(9) Near the beginning and ending of curves.

(10) In curves greater than 6 degrees, gage shall be measured in at least three well-spaced locations within the curve. Outside rail joints should also be observed for gage widening.

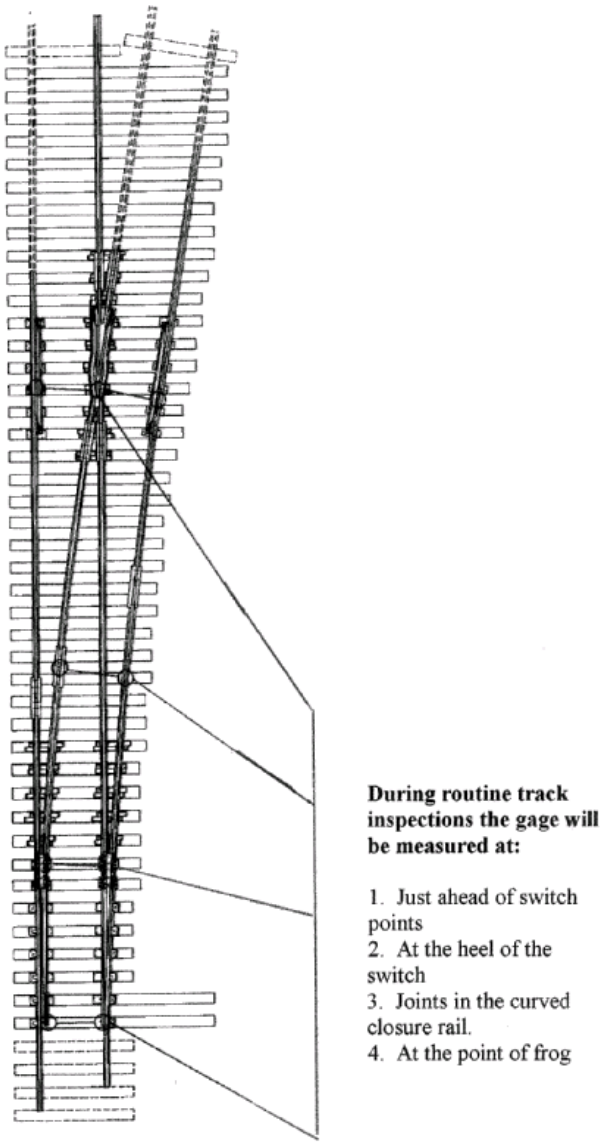


Figure 12-2. Required Gage Measurement Locations Within Turnouts

c. *Standard Gage.* Standard gage is 56.5 inches. Track will be gaged to this standard except in curves with high degrees of curvature (see Table 12-1) or other unusual conditions where the engineer in charge does not recommend standard gage.

Table 12-1a. Recommended Gage for Curved Track (Navy & Air Force)

Degree of Curvature	Recommended Gage (Inches)
Up to 12 degrees	56.5
Over 12 degrees up to 14 degrees	56.625
Over 14 degrees up to 16 degrees	56.75

Over 16 degrees up to 18 degrees	56.875
Over 18 degrees,	57

Table 12-1b. Recommended Gage for Curved Track (Army)

Degree of Curvature	Recommended Gage (Inches)
Up to 22 degrees	56.5
Over 22 degrees up to 26 degrees	56.625
Over 26 degrees up to 30 degrees	56.75
Over 30	56.875

d. Standards for gage are as follows:

Safety Standards Allowable Gage (Inch)				**Maintenance Allowable Gage (Inch)**	
Restriction		*No Operations*		*Min*	*Max*
Min	*Max*	*Min*	*Max*		
56	GT 57.5	LT 56	GT 57.75	56.125	57.5

12-3. CROSSLEVEL.

a. ***Definition.*** Crosslevel is the difference in elevation between the top surfaces of the two rails measured at right angles to the track, as shown in Figure 12-3. Crosslevel measurements shall include any evidence of vertical movement under load.

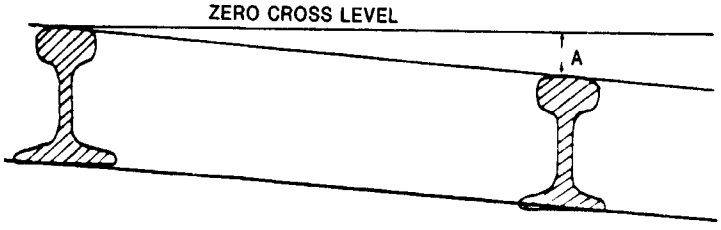


Figure 12-3. Crosslevel Measurement

b. ***Designated Crosslevel.*** On tangent track, the designated crosslevel is zero. On curved track, the designated crosslevel is equal to the designated superelevation.

c. Standards for the allowable deviation from designated elevation for crosslevel are as follows:

Track Category	Safety Standard (Inches)		Maintenance Standard (Inches)
	Restriction	*No Operation*	
A	GT 2	GT 3	GT 1.25
B	GT 2	GT 3	GT 1.5

12-4. SUPERELEVATION.

a. ***Definition.*** Superelevation is the intended increase in elevation of the outer rail above the inner rail in a curve.

b. ***Reverse Superelevation.*** Safety standards require a restriction if the outside rail of a curve is lower than the inside rail by more than 0.5 inch. Maintenance standards require the outside rail of a curve to be at the same elevation or above the inside rail.

c. ***Maximum Superelevation.*** The outside rail of a curve may not be more than 4 inches higher than the inside rail.

d. ***Uniform Superelevation.*** If a curve is superelevated, the superelevation shall be uniform throughout the curve.

e. ***Superelevation Runoff.*** Superelevation runoff shall be at a uniform rate and shall extend at least the full length of the spiral. If no spiral is present, the superelevation runoff shall be accomplished on the tangent track. Safety standards require a restriction if the superelevation runoff exceeds –1.75 inches in any 31 feet of rail. Maintenance standards recommend a target of 1 inch of runoff in 31 feet.

f. ***Recommended Superelevation.*** The recommended superelevation for a given maximum operating speed for curved track can be determined from Table 12-2. Table 12-2 reflects the recommended 0.5 inch of unbalance. Safety standards require a restriction if the curve superelevation exceeds 3 inches of unbalance. Three (3) inches of unbalance would be equal to 2.5 inches less than the recommended values of superelevation in Table 12-2. Maintenance shall be performed during the next maintenance cycle when the superelevation exceeds 1.5 inches of unbalance. One and one-half (1.5) inches of unbalance would be equal to 1 inch less than the recommended values of superelevation in Table 12-2. If reverse superelevation exists see paragraph 12-4.b.

Table 12-2. Recommended Superelevation for Curved Track

Degree of Curvature	*Maximum Operating Speed (mph)*							
	10	*15*	*20*	*25*	*30*	*35*	*40*	*45*
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.75	1.00
1.50	0.50	0.50	0.50	0.50	0.50	0.75	1.25	1.75
2.00	0.50	0.50	0.50	0.50	0.75	1.25	1.75	2.25
2.50	0.50	0.50	0.50	0.50	1.00	1.75	2.25	3.00
3.00	0.50	0.50	0.50	0.75	1.50	2.00	2.75	3.75
3.50	0.50	0.50	0.50	1.00	1.75	2.50	3.50	
4.00	0.50	0.50	0.50	1.25	2.00	3.00	4.00	

Degree of Curvature	*Maximum Operating Speed (mph)*							
	10	*15*	*20*	*25*	*30*	*35*	*40*	*45*
4.50	0.50	0.50	0.75	1.50	2.25	3.25		
5.00	0.50	0.50	1.00	1.75	2.75	3.75		
5.50	0.50	0.50	1.00	2.00	3.00			
6.00	0.50	0.50	1.25	2.25	3.25			
6.50	0.50	0.50	1.25	2.25	3.50			
7.00	0.50	0.75	1.50	2.50	4.00			
7.50	0.50	0.75	1.50	2.75				
8.00	0.50	1.00	1.75	3.00				
8.50	0.50	1.00	2.00	3.25				
9.00	0.50	1.00	2.00	3.50				
9.50	0.50	1.00	2.25	3.75				
10.00	0.50	1.00	2.25	4.00				
10.50	0.50	1.25	2.50	4.00				
11.00	0.50	1.25	2.50					
11.50	0.50	1.25	2.75					
12.00	0.50	1.50	2.75					
13.00	0.50	1.50	3.25					
14.00	0.50	1.75	3.50	TRAINS SHALL NOT BE OPERATED ON CURVES AT SPEEDS WHICH REQUIRE MORE THAN 4 IN. SUPERELEVATION				
15.00	0.75	1.75	3.75					
16.00	0.75	2.00	4.00					
17.00	0.75	2.25						
18.00	1.00	2.25						
19.00	1.00	2.50						
20.00	1.00	2.75						

Notes for Table 12-2:

1. At least 0.5 inch of superelevation is recommended on all curves as indicated to prevent reverse superelevation. On curves that historically do not retain the minimum 0.5 inch of superelevation, the next maintenance cycle should surface the curve with 1 inch of superelevation.
2. Safety standards should use the 3-inch unbalanced formula in accordance with the FRA *Track Safety Standards*.
3. Superelevation calculated using 0.5-inch unbalanced formula, i.e.:

$$E = (0.0007DV^2)-0.5$$

where: E = Superelevation, inches, D = Degree of Curvature V = Speed, mph. All values have been rounded to 0.25-inch increments.

Examples:

To determine superelevation:

-Enter table at maximum operating speed.
-Go down to maximum degree of curvature.
-Read Superelevation.

Known:

-Maximum operating speed: 25 mph.
-Degree of curvature: 8°

Required superelevation is 3.00 inches.

4. Cross-level (paragraph 12-3) shall determine the need for maintenance (related to superelevation) on curves.

12-5. WARP.

a. ***Definition.*** Warp is the difference in crosslevel between any two points less than or equal to 62 feet apart. Warp is determined as follows:

(1) Use the line rail as the reference rail.

(2) Measure the crosslevel at any two points less than 62 feet apart, normally at joints in the rail. If the reference rail is lower than the opposite rail, the sign of the measurement is negative (-). If the reference rail is higher than the opposite rail, the sign of the measurement is positive (+).

(3) *Determining Warp*. If both signs are the same, drop the signs and subtract the smaller measurement from the larger measurement. If the signs are different, drop the signs and add the measurements. Figure 12-4 presents an example of the warp calculation.

b. ***Designated Warp.*** The designated warp on both tangent and curved track is zero.

c. ***Maintenance and Safety Standards.*** Standards for the maximum allowable deviation due to warp are as follows:

Safety Standards (Inches)		Maintenance Standards (Inches)
Restriction	*No Operation*	
GT 2.25	GT 3.0	GT 1.75

d. All measurements taken at joints within the 62-foot distance must be calculated for warp. Assuming 39-foot rails, in addition to calculating warp at AB & AC, warp shall also be checked at AD as shown on Figure 12-4.

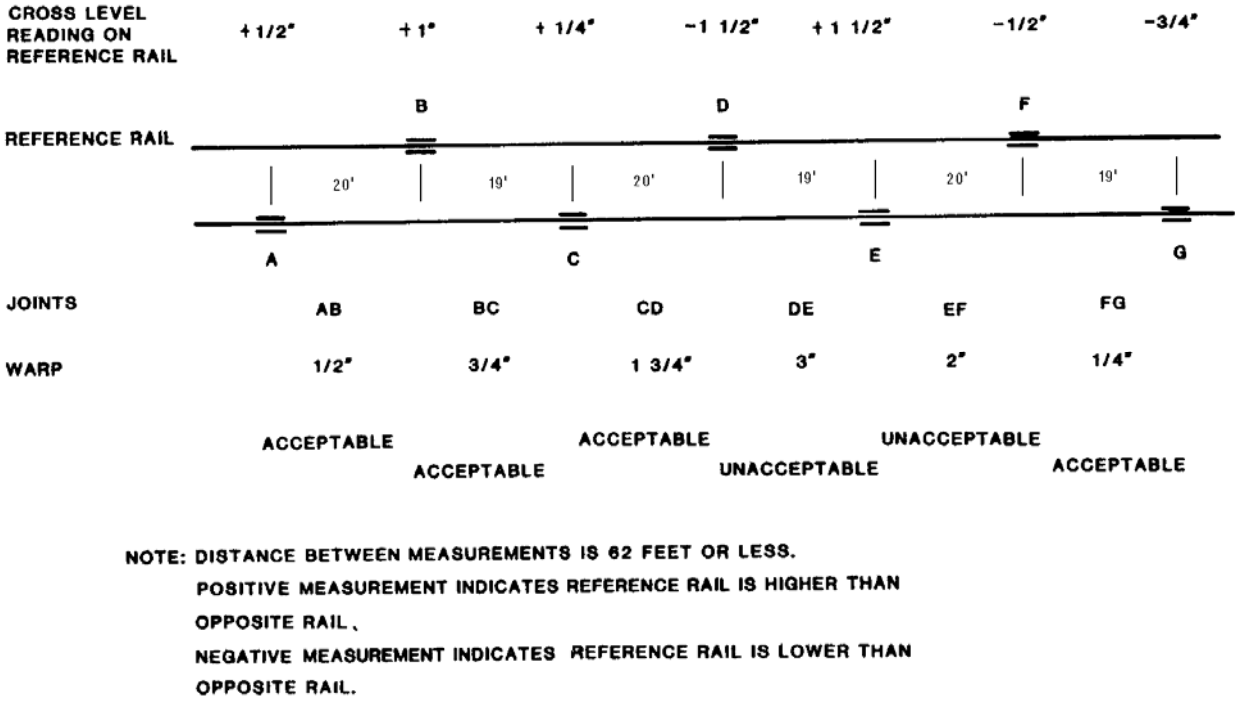


Figure 12-4. Determination of Warp

12-6. ALIGNMENT.

a. ***Definition.*** Alignment is the relative position of the rails in a horizontal plane.

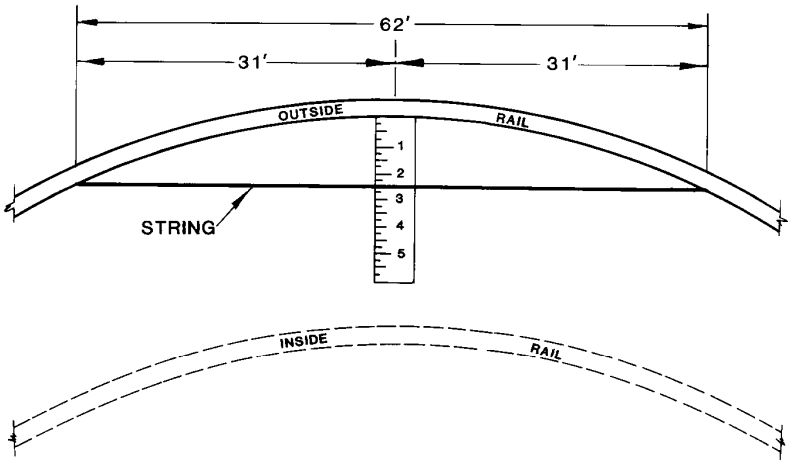
b. ***Measurement.*** Alignment is measured at the midpoint of a 62-foot string line stretched along the gage side of the line rail at a distance of 0.625 inch below the top of the railhead. The alignment measurement is the distance in inches from the midpoint of the string line to the gage side of the line rail. It is measured at right angles to the string line.

c. ***Designated Alignment.*** For tangent track the designated alignment is zero. For curved track the designated alignment is the degree of curvature. In spirals the change in curvature will be at a uniform rate.

d. ***Curvature Measurement.*** On curves, 1-inch distance from the 62-foot string line to the line rail equals approximately 1 degree of curvature, as shown in Figure 12-5. If the degree of curvature is not known, it can be determined as follows:

(1) Beginning at a point near the center of the curve, mark at least two stations spaced 31 feet apart in both directions along the line rail.

(2) Measure the alignment at each station, including the beginning point, and average the measurements. This average measurement is the approximate degree of curvature.



MEASUREMENTS OF ALIGNMENT USING A 62 FOOT STRINGLINE:

1. STRETCH STRING WITH ENDS AGAINST GAGE SIDE OF LINE RAIL 5/8″ BELOW THE SURFACE OF THE RAIL.
2. MEASURE AT THE MID- POINT (31′) FROM STRING TO GAGE SIDE OF RAIL 5/8″ DOWN
3. ONE INCH EQUALS APPROXIMATELY ONE DEGREE OF CURVATURE.

EXAMPLE ILLUSTRATES A MEASUREMENT OF ABOUT 2-1/2″, OR APPROXIMATELY 2 DEGREES 30 MINUTES OF CURVATURE FOR THE ONE ISOLATED SPOT WHERE THE MEASUREMENT WAS TAKEN.

Figure 12-5. Measurement of Curve Alignment

e. ***Safety and Maintenance Standards.*** Standards for the maximum allowable deviations from designated alignment are as follows:

Track Category	Safety Standard (Inch)		Maintenance Standard (Inch)
	Restriction	*No Operation*	
A & B	GT 3	GT 5	GT 2

12-7. PROFILE.

a. ***Definition.*** Profile is the relative elevation of the two rails along the track. Profile deviation is the deviation from uniform profile on either rail at the midpoint of a 62-foot chord.

b. ***Safety and Maintenance Standards.*** When the maintenance standards are exceeded, maintenance shall be performed in the next cycle. Standards for the allowable deviations from uniform profile are as follows:

Track Category	Safety Standards (Inch)		Maintenance Standards (Inch)
	Restriction	*No Operation*	
A & B	GT 2.75	GT 3	GT 2.25

CHAPTER 13

CLEARANCES

13-1. MEASUREMENT. Vertical clearance shall be measured vertically from the top surface of the rail. Side clearance shall be measured horizontally from the centerline of the track.

13-2. CLEARANCE REQUIREMENTS, TANGENT TRACK. Clearances for tangent track shall not be less than those listed in Table 13-1 and shown in Figure 13-1.

13-3. CLEARANCE REQUIREMENTS, CURVED TRACK.

a. For each degree of curvature, side clearances shall be increased 1.5 inches over that required in Table 13-1 and Figure 13-1.

b. When an obstruction is located adjacent to tangent track but the track is curved within 80 feet of the obstruction, the side clearances shall be increased by the following amounts:

Distance from Obstruction to Curved Track (Feet)	Increase per Degree of Curvature (Inches)
0–20	1.5
21–40	1.125
41–60	0.75
61–80	0.375

13-4. TRACK CENTERS. The minimum spacing between the centerlines of adjacent tracks shall be maintained as given below and state department of transportation (DOT) clearance requirements shall also be checked as a minimum:

Type of Tracks	Minimum Center-to-Center Distance
Yard, loading, and storage tracks	13 feet (recommend 14 feet)
Yard track parallel to main or running track	15 feet
Passing track	15 feet

13-5. CHANGES TO CLEARANCES. Whenever changes in alignment or elevation are made, clearances shall be checked for compliance with the criteria given in this chapter. This is especially important in the vicinity of buildings, bridges, overhead structures, platforms, and tunnels. All four vertical clearance points (see Figure 13-1) under bridges/structures shall be measured. The least dimension shall govern for clearance.

Table 13-1. Clearance Requirements for Tangent Tracks

Obstruction	Required Clearance
Vertical Clearances	
Overhead wires: open supply, arc wires, service drops	
0 to 750 volts	27 feet
750 to 15,000	28 feet
Exceeding 15,000 volts	30 feet
Other overhead wires	27 feet
Building entrances (including engine-houses)	18 feet
Overhead	22 feet
Other overhead obstructions	22 feet
Side Clearances	
Buildings	8 feet 6 inches
Buildings without platforms (delivery required)	8 feet
Platforms	
Freight platforms up to 4 feet maximum height	6 feet 2 inches
Refrigerator car platforms up to 3 feet 3 inch	6 feet 2 inches
Refrigerator car platforms 3 feet 3 inch to 4 feet high	8 feet
Low platforms (less than 8 inches high)	5 feet
Engine-house entrances	6 feet-6 inches
Building entrances (other than engine-houses)	8 feet
Canopies over platforms (canopy height 16 feet or less)	8 feet
Fences, retaining walls, utility poles, and other obstructions	8 feet 6 inches
Bridges	8 feet
Signs	8 feet
All loose, palliated, and stacked materials	8 feet
Parked vehicles	8 feet

Note: In curves, side clearances shall be increased 1.5 inches for each degree of curvature.

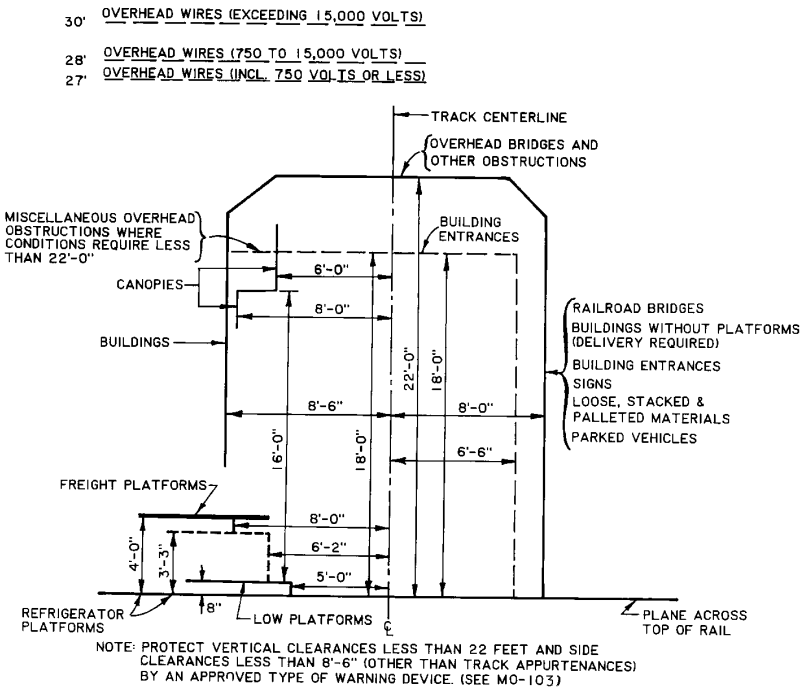


Figure 13-1. Minimum Clearances for Tangent Track

CHAPTER 14

MISCELLANEOUS TRACK APPLIANCES

14-1. TRACK SCALES. The inspection, maintenance, and calibration of railroad track scales are covered in the Association of American Railroads *Scale Handbook*, published annually as a part of the AREMA *Manual for Railway Engineering*. Track scales should be inspected and calibrated periodically in accordance with the recommendations given in the *Scale Handbook*.

14-2. BONDED AND GROUNDED TRACK.

a. Certain tracks used for the loading/unloading of fuels and ordnance are required to be bonded and grounded. Grounding requirements are given in UFC 4-860-01FA for Army and Air Force installations, and NAVSEA OP 5, *Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping*, for the Navy. During maintenance of bonded and grounded track, care shall be taken to maintain the integrity of the rail bonds, ground rods, and connections.

b. During routine track inspections, the general condition of the bonds, ground wires, and connections shall be observed. Loose or missing bonds or connections shall be repaired immediately. The occurrence of excessive corrosion in the terminal areas of the bond wires and ground wires indicates a need for cleaning, repair, or replacement. Bonds and grounds shall be replaced if there is a large difference in electrical potential between the rails.

14-3. DERAILS.

a. Derails shall be maintained in good operating condition.

b. Derails shall be maintained free of lost motion that would allow it to be operated without removing the lock.

c. Derails shall be kept clean and painted in order to be readily visible to operating personnel.

d. Derails, normally supplied in 1-inch increments allowing no more than 0.5 inch of shimming, shall be properly installed for the rail to which it is applied.

14-4. OTHER TRACK APPLIANCES. Other track appliances, like bumper stops and cushion heads, wheel stops, etc., shall be in good working order for their intended use. Wheel stops are not designed for, nor shall they be used as, bumper stops. They are only designed to keep cars from rolling off the end of a track or past a point.

CHAPTER 15

MAINTENANCE ACTIVITIES FOR CATEGORY C TRACK

15-1. GENERAL. The minimum level of maintenance for inactive (Category C) track will be consistent with the anticipated future mission of the activity and the particular track involved. This chapter summarizes the general requirements.

15-2. MAINTENANCE REQUIREMENTS.

a. Maintenance of rail, ties, and ballast shall be discontinued.

b. Drainage shall be maintained in accordance with paragraph 3-2.

c. Damaging vegetation in the ballast, roadbed, and ditches shall be controlled in accordance with paragraph 3-3.

d. Bridges and other track structures shall be maintained in structurally sound condition with respect to their expected loading.

e. Clearances addressed in Chapter 13 shall be maintained to ensure that permanent facilities are not constructed within the railroad right-of-way.

f. If there is a mobilization requirement, switches shall be kept properly adjusted and fully operational.

15-3. INACTIVATION AND DISPOSAL. In accordance with NAVFAC P-73, *Real Estate Procedures Manual*, for Navy activities; AR 420-72 and AR 405-90, *Disposal of Real Estate*, for Army; and AFI 32-9004, *Disposal of Real Estate*, for Air Force installations, action will be taken to dispose of track having no foreseeable need.

APPENDIX A

REFERENCES

A-1. GOVERNMENT PUBLICATIONS.

Departments of the Army, Navy, and Air Force

AR 405-90/AFI 32-9004	Disposal of Real Estate
AR 420-72	Transportation Infrastructure and Dams
AR 200-5/AFI 32-1053/OPNAVINST 6250.4	Pest Management Program
NAVFACINST 11230.1	Inspection, Certification and Audit of Crane and Railroad Trackage
NAVFAC MO-322, Vol I & II	Inspection of Shore Facilities
NAVFAC P-73	Real Estate Procedures Manual
NAVFAC P-301	Navy Railways Operating Handbook
NAVSEA OP 5	Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation and Shipping
TM 5-600/AFJPAM 32-1088	Bridge Inspection, Maintenance, and Repair
TM 5-627/AFM 91-33/MO-103	Maintenance of Trackage
TM 5-629/MO-314	Natural Resources – Weed Control and Plant Growth Regulation
TM 5-630	Natural Resources Land Management
UFC 4-860-01FA	Design: Railroad Design and Rehabilitation
UFC 4-860-02N	Design Trackage
UFC 4-860-01FA	Design: Railroad Design and Rehabilitation
UFGS 05650	Railroad Track and Accessories

Department of Transportation

Federal Highway Administration	Manual on Uniform Traffic Control Devices – Part 8 Traffic Control for Highway-Rail Grade Crossings
	Railroad-Highway Grade Crossing Handbook
Federal Railroad Administration	Track Safety Standards Code of Federal Regulations, Title 49, Chapter II, Part 213
	Grade Crossing Signal System Safety, Code of Federal Regulations, Title 49, Chapter II, Part 234

NON-GOVERNMENT PUBLICATIONS

American Railway Engineering & Maintenance-of-Way Association,
8201 Corporate Drive,
Suite 1125
Landover, MD 20785

Manual for Railway Engineering & Portfolio of Trackwork Plans

American Wood Preservers' Association,
P.O. Box 5690
Granbury, TX 76049

C6	Crossties and Switch Ties - Preservative Treatment by Pressure Process
P2	Standard for Creosote and Creosote Solutions
P3	Standard for Creosote Petroleum Oil Solution

APPENDIX B

TRACK INSPECTION RECORD AND TURNOUT INSPECTION CHECKLIST

B-1. To aid in the inspection of track, the Track Inspection Record, Turnout Inspection Checklist, and Highway Grade Crossing Warning System Inspection/Test Report provided in Figures B-1, B-2, and B-3 are available for use. These forms can also be found in NAVFACINST 11230.1. Figures B-4 through B-10 show the inspection worksheets for use with the RAILER Engineered Management System (EMS). These forms are intended for recording inspection findings in the RAILER software database after returning to the office. Alternatively, an electronic track inspection program, RAILER Remote Entry Database (RED), can be used to collect and record data on a tablet PC for electronic upload to the RAILER software. The RAILER database keeps an electronic record of the inspection defects and automatically reports the current standard condition level for each. Policies can also be created to match each defect up to its corrective work action. Note that, in general, each RAILER inspection form requires information about the inspector name, inspection date, track and segment. In addition, inspection information includes the type of defect, location, length, density, quantity, and other component-specific information. Some forms are formatted as checklists to provide the inspector a list of everything that needs to be verified during an inspection—the Turnout Inspection Worksheet (Figure B-7) is one example of this. Information on RAILER EMS is available at the following website:
http://www.tac.uiuc.edu/software/railer/railer.html

Appendix E provides a summary of the maintenance standards and safety standards.

B-2. TRACK INSPECTION RECORD.

a. ***Intent and Application.*** The Track Inspection Record is intended for use as a record of scheduled maintenance, safety, and special track inspections. This form will be used for each operational and special track inspection to record the type and location of deviations from the standards, degree of hazard, proposed corrective action and time frame for completion, and the actions taken to correct the deviation. For scheduled maintenance inspections, the inspector shall record the location and description of deficiencies. Completed records shall be provided to the appropriate office for action.

b. The form includes identifying information such as installation name, reporting organization, inspector's name (both printed and signed), and the inspection date. The remainder of the form is available for listing deviations observed during the track inspection. In this section one line is normally used to record each deviation, although two or more lines may be required if additional comments are needed. Figure B-1 presents an example of a Track Inspection Record. A description of each of the columns on this form is given below:

Degree of Hazard: The hazard of each defect shall be provided in accordance with NAVFACINST 11230.1 for Navy installations. Army and Air Force Installations shall use local guidance policy. Abbreviations for degree of hazard are provided on the bottom of the Track Inspection Record.

Catastrophic - CAT
Critical - CRIT
Marginal - M

Location Milepost or Station Number: Location of the deviation as referenced to the installations system of track stationing. May be recorded as stations or as Milepost + Feet.

Examples: Stations: 0+00, 6+39, 102+06
Mileposts: 0+0000, 0+639, 1+4926

Deficiency Description: Brief description of the deficiency of deviation observed in the track.

Examples: -Wide gage 57.875 inches
-Small amount of vegetation growing on track

Proposed Corrective Action and Time Frame: What needs to be done to correct the deviation and when. This should include the application of operating restrictions where required.

Examples: -Limit speed to 10 mph, regage, and respike as soon as possible
-Spray for vegetation control within 1 month

Follow-up Actions: Action taken and date completed: what was done to correct the problem and the date repairs were completed.

Examples: 10 mph restriction applied 10/2/00; Repaired 10/15/00;
Herbicide application 6/2/01

B-3. TURNOUT INSPECTION CHECKLIST.

a. *Intent and Application.* The Turnout Inspection Checklist is intended for use in the inspection of turnouts.

b. *Use.* The Turnout Inspection Checklist includes identifying information such as activity name, inspector's name, track identification (track name or number for identifying track), turnout identification (turnout number), and inspection date.

c. Additional sections are provided for the major components of the turnout such as ties, switch and stand, frog, and guard rails and for additional required data such as measurements and general items.

d. To assist in the use of this form and to promote consistent reporting, standard responses are supplied for many of the items. The applicable response should be circled for each item. If the printed response does not cover the situation or if an additional comment is required, a number can be placed in the blank after "Note ___" and the comments written in the "Notes" space provided at the bottom of the form. Blank spaces have been provided where items require a numerical response or a measurement. For multiple items such as rail braces, blanks have been provided before the responses so that a number may be indicated. For example, if two rail braces were loose, one is broken, and one is missing, the response would be:

OK 2 Loose 1 Damaged 1 Missing Note____

e. Some turnouts may be equipped with self-guarded frogs that do not require the presence of guard rails. In cases where there is a self-guarded frog and no guard rails, the entire section of the form titled "Guard Rails" should be crossed out and the words "Self-Guarded" written in the upper-right corner of the section. This will indicate that there are no guard rails in the turnout. If the frog is self-guarded and there are guard rails, the guard rails shall be inspected and the appropriate sections of the form completed.

f. The requirements for turnouts are found in Chapter 8. Figure B-2 presents an example of a completed Turnout Inspection Checklist.

B-4. HIGHWAY GRADE CROSSING WARNING SYSTEM INSPECTION/TEST REPORT (See Figure B-3)

a. *Intent and Application*. The Highway Grade Crossing Warning System Inspection/Test Report is intended for use in the inspection of electric/ electromechanical grade crossing signals as discussed in paragraph 10-6.

b. *Use.* The Highway Grade Crossing Warning System Inspection/Test Report includes identifying information such as activity name, inspector's name, crossing location (track name and highway designation), DOT/AAR Crossing Inventory Number (if applicable), and inspection date.

c. A checklist is provided, divided into Parts A, B, and C. Part A is the monthly requirements, Part B is the quarterly requirements and Part C is the annual requirements. When performing a monthly inspection, Part A is completed. When performing a quarterly inspection, Parts A and B are completed. When performing an annual inspection, Parts A, B and C are completed. Additional space is provided to indicate repairs, replacements, adjustments made and condition in which the apparatus was left. Areas are available for recording standby power battery voltages.

Figure B-1. Example Track Inspection Record

TRACK INSPECTION RECORD

TYPE OF INSPECTION:
[ ] SCHEDULED MAINTENANCE [ ] SAFETY INSPECTION
[✓] CONTROL INSPECTION [ ] OPERATIONAL INSPECTION

ACTIVITY: Anywhere Naval Weapons Station

TRACK NAME OR ID: North Main

REPORT DATE: 9/9/97

INSPECTOR (PRINT OR TYPE & SIGN): John R. Doe John R. Doe

INSPECTION ORGANIZATION: FMED

DEGREE OF HAZARD	LOCATION MILEPOST OR STATION	DEFICIENCY DESCRIPTION	PROPOSED CORRECTIVE ACTION AND TIMEFRAME	FOLLOW-UP ACTIONS: ACTION TAKEN	FOLLOW-UP ACTIONS: DATE COMPLETED
CAT	1+75	4 Consecutive Defective Ties	Close to Traffic	Track closed	9/9/97
			Replace ties; ASAP	Ties Replaced	9/12/97
M	2+35	Vegetation (Brush) growing	Cut Brush Along ROW		
		near track	within 2 months		
CRIT	4+00	Broken Joint Bar (Between	Class 1 Restriction (10mph)	Restriction Applied	9/9/97
		Center Bolt Holes	Replace Bar; within 1 week	Repaired	9/14/97
CRIT	5+80	Wide Gage - 57 7/8"	Class 1 Restriction (10mph)	Restriction Applied	9/9/97
			Regage + Respike (ASAP)	Repaired	9/12/97
		EXAMPLE			

LEGEND: Degree of Hazard CAT - Catastrophic CRIT - Critical M- Marginal

Figure B-2. Example Turnout Inspection Record

Highway Grade Crossing Warning System
INSPECTION/TEST REPORT

TURNOUT INSPECTION CHECKLIST

ACTIVITY: Anywhere Naval Weapons Station | REPORTING ORGANIZATION: FMED | INSPECTOR (PRINT OR TYPE/SIGNATURE): John R. Doe / John R. Doe

TRACK IDENTIFICATION: North Main | TURNOUT IDENTIFICATION: # 11 | TURNOUT SIZE: #8 | SWITCH POINT LENGTH: 16'-6" | DATE: 9/9/97

GENERAL

Are All Materials Proper Size?	YES	(NO)	NOTE 1
Is Rail Same Weight and Section?	(YES)	NO	NOTE___
Are Flangeways Clear of Debris?	(YES)	NO	NOTE___
Are Crib Areas Clear of Debris?	(YES)	NO	NOTE___
Surface (GOOD)	FAIR	POOR	NOTE___
Alignment (GOOD)	FAIR	POOR	NOTE___

FROG

Point	(OK)	WORN ___"	CHIPPED	BROKEN	(NOTE) 6
Top Surface	OK	(WORN) 1/4"	BROKEN	DAMAGED	(NOTE) 6
Bolts:	OK	2 (LOOSE)	1 (MISSING)	___DAMAGED	NOTE___
Guarding Face (Self guarded Frog Only):	OK	WORN	BROKEN	DAMAGED	NOTE___

TIES

Total Number Defective:	3	NOTE___
Maximum Number of Consecutive Defective:	1	NOTE___
Number of Occurrences of Defective Joint Ties	0	NOTE___

GUARD RAILS

Position - Straight	OK	(IMPROPER)	(NOTE) 7			
Turnout	(OK)	IMPROPER	NOTE___			
Condition - Straight	OK	WORN (INSECURE)	BROKEN	(DAMAGED)		(NOTE) 7
Turnout	OK	WORN (INSECURE)	BROKEN	DAMAGED		NOTE___
Clamps/Fillers - Straight	OK	(LOOSE)	BROKEN	DAMAGED		NOTE___
Turnout	OK	(LOOSE)	BROKEN	DAMAGED		NOTE___
Bolts - Straight	OK	1 (LOOSE)	2 (MISSING)	___ DAMAGED		NOTE___
Turnout	OK	3 (LOOSE)	___ MISSING	___ DAMAGED		NOTE___

SWITCH AND STAND

Switch Operates Without Difficulty?	(YES)	NO (Describe Problem)				NOTE___
Switch Stand:	OK	INSECURE	(DAMAGED)			(NOTE) 2
Point Lock/Lever Latches:	OK	MISSING	DAMAGED	LOOSE		(NOTE) 3
Point Gap - Left (NONE)	LESS THAN 1/8"		1/8" OR GREATER	1/4" OR GREATER		NOTE___
- Right: NONE	LESS THAN 1/8"		(1/8" OR GREATER	1/4" OR GREATER		NOTE___
Point Condition - Left	(OK)	WORN	CHIPPED	BROKEN		NOTE___
- Right:	OK	(WORN) ≈ 1/4"	CHIPPED	BROKEN		NOTE___
Is Point LOWER Than Stock Rail?		Left: (YES) NO		Right: (YES) NO		NOTE___
Is Point Rail Beyond Taper HIGHER Than Stock Rail?		Left: (YES) NO		Right: (YES) NO		NOTE___
Connecting Rod	(OK)	BENT	DAMAGED	LOOSE	BINDING	NOTE___
Jam Nut:	(OK)	NONE	DAMAGED	LOOSE	MISSING	NOTE___
Switch Rods:	(OK)	__BENT	__DAMAGED	__LOOSE	__BINDING	NOTE___
Switch Clips:	(OK)	__BENT	__DAMAGED	__LOOSE	__BINDING	NOTE___
Connecting Rod Bolt:	(OK)	___LOOSE	____DAMAGED		___MISSING	NOTE___
Nut On Top?	(YES)	NO	Cotter Key In Place?		YES (NO)	
Switch Rod Bolts:	OK	1 (LOOSE)	____DAMAGED		___MISSING	NOTE___
Nut On Top?	(YES)	NO	Cotter Key In Place?		YES (NO)	
Slide Plates: OK	___LOOSE	4 DIRTY	___DAMAGED		___MISSING	(NOTE) 4
Rail Braces - Straight Side:	OK	4 (LOOSE)	2 (DAMAGED)		___MISSING	NOTE___
Turnout Side	OK	2 (LOOSE)	___DAMAGED		1 (MISSING)	(NOTE) 5
Heel Filler: (OK)	___ INSECURE	___CRACKED/BROKEN			___MISSING	NOTE___
Heel Bolts:	OK	1 (LOOSE)	___DAMAGED		___MISSING	NOTE___
Heel Joint Bars/Shoulder Bars: :	(OK)	___LOOSE	___DAMAGED		___MISSING	NOTE___

MEASUREMENTS (Inches)

	Straight Side	Turnout Side
SWITCH		
Gage Just Ahead of Points:	56 3/4	
Gage @ Switch Heel	56 1/2	57
CURVED CLOSURE RAILS:		
Gage at Joints:	56 5/8	57 1/4
		57 3/8
FROG:		
Gage at Point:	56 1/2	57 1/4
Flangeway Width:	1 3/4	1 3/4
Flangeway Depth:	1 3/4	1 5/8
GUARD RAILS		
Guard Check Gage:	54 5/8	54 3/4
Guard Face Gage:	52 7/8	53
Flangeway Width:	1 3/4	2 1/4

NOTES:
1) Homemade bars, field side of heel
2) Stand cracked
3) Needs oiling
4) Needs cleaning & lubrication
5) Rail braces - Improperly positioned
6) Point worn slightly, surface worn ≈ 1/4"
7) Straight side guard rail has been hit & damaged. New guard rail needed. Reposition existing guard rail, and secure until replacement is available.

Activity _____

Location _____ **Crossing No.** (if any) _____

Monthly (Part A) Check (√) Box for Compliance	Quarterly (Part B) Check (√) Box for Compliance (Perform A + B)	Annual (Part C) Check (√) Box for Compliance (Perform A + B + C)
☐ Observe Relays ☐ Check Voltages / Fuses ☐ Standby Power Test ☐ System Operation ☐ Clean Crossing Roundels ☐ Observe Flasher Operation ☐ Check for Locks ☐ Inspect / Service Batteries ☐ Check AC & DC Grounds ☐ Inspect Pedestrian Bells ☐ Inspect Signs and ***Crossbucks***	☐ Check Flasher Alignment and Focus ☐ Inspect All Track Wires ☐ Inspect Rail Bonds ☐ Check Insulated Joints ☐ Inspect Approach Batteries ☐ Check Push Button Cutouts ☐ Check Main AC Supply ☐ Circuit Plans in Relay Case ☐ Inspect Poles and *Foundations*	☐ Inspect Flasher Relay ☐ Check Lamp Voltages ☐ Check Timing Circuits ☐ Check Warning Time ☐ Verify Equipment ☐ Verify Frequencies ☐ Check Circuit Plans

Battery Bank Name	Cell Type	**Voltage ---- With Charge**
		ON OFF
Main _____	_____	_____ _____
Electronic _____	_____	_____ _____
Island Circuit _____	_____	_____ _____
Approach 1 _____	_____	_____ _____
Approach 2 _____	_____	_____ _____
Approach 3 _____	_____	_____ _____
Approach 4 _____	_____	_____ _____

Repair, Replacements, Adjustments (if none, so state)

_____

_____

_____

Notes: _____

_____

_____

Signature: _____ **Date:** _____

(Signal Maintainer)

Figure B-3 Highway Grade Crossing Warning System Inspection/ Test Report

Figure B-4 Safety Inspection Worksheet

(Used in lieu of Detailed Worksheets

Inspector: _____ Date:_____ Sheet

Track	Segment	Location	Rail	Component	ID*	Defect**	Qty

If no new safety defects are found, state "No New Defects" for each track/segment combination. If a work order is to be issued to correct a defect, check "WO". Use reverse side for comments. *ID refers to Turnout ID, Crossing, etc. ***See Defect List.

Tie Detailed Inspection Worksheet

Track:_____ Segment:_____ Inspector:_____ Date:_____
Begin Location:_____ End Location:_____

Defect Description	Occurrence Tally	Total
Single Defective Tie		
Single Defective Joint Tie		
All Joint Ties Defective (1 Tie)		
Isolated* Defective Tie Cluster (2 Ties)		
Isolated Defective Tie Cluster (3 Ties)		
Isolated Defective Tie Cluster (4 Ties)		
Isolated Defective Tie Cluster (5 Ties)		
Adjacent* Defective Tie Cluster (2 Ties)		
Adjacent Defective Tie Cluster (3 Ties)		
Adjacent Defective Tie Cluster (4 Ties)		
Adjacent Defective Tie Cluster (5 Ties)		
Isolated Cluster with 1 Joint Tie** (2 Ties)		
Isolated Cluster with 1 Joint Tie (3 Ties)		
Isolated Cluster with 1 Joint Tie (4 Ties)		
Isolated Cluster with 1 Joint Tie (5 Ties)		
Defective Joint Tie Cluster** (2 Ties, 1 Joint Tie)		
Defective Joint Tie Cluster (2 Ties, 2 Joint Ties)		
Defective Joint Tie Cluster (3 Ties, 1 Joint Tie)		
Defective Joint Tie Cluster (3 Ties, 2 Joint Ties)		
Defective Joint Tie Cluster (3 Ties, 3 Joint Ties)		
Defective Joint Tie Cluster (4 Ties, 1 Joint Tie)		
Defective Joint Tie Cluster (4 Ties, 2 Joint Ties)		
Defective Joint Tie Cluster (4 Ties, 3 Joint Ties)		
Defective Joint Tie Cluster (4 Ties, 4 Joint Ties)		
Defective Joint Tie Cluster (5 Ties, 1 Joint Tie)		
Defective Joint Tie Cluster (5 Ties, 2 Joint Ties)		
Defective Joint Tie Cluster (5 Ties, 3 Joint Ties)		
Defective Joint Tie Cluster (5 Ties, 4 Joint Ties)		
Defective Joint Tie Cluster (5 Ties, 5 Joint Ties)		
Single Missing Tie		
2 Consecutive Missing Tie Cluster		
3 Consecutive Missing Tie Cluster		
All Joint Ties Missing (1 Tie)		
All Joint Ties Missing (2 Ties)		
Improperly Positioned Ties (Skewed, etc.)		
Center to Center Distance Along Either Rail > 48"		
Center to Center Distance Along Rail At Joint > 48"		

Figure B-5 Tie Detailed Inspection Worksheet

*Isolated: >= two good ties separate; otherwise Adjacent. **Jt Tie Cluster: All jt ties are defective. If a work order is to be issued for a specific item, state location and defect on reverse. Categorize tie clusters on designated curves separately.

Turnout Inspection Worksheet (Components)

Figure B-6 Track Geometry Detailed Inspection Worksheet

Inspector:_____ Date:_____ Sheet _____ of _____

Track	Location	Ref Rail	Type*	BA**	Measurement	Relative***	Length	WO

Record number of defective components in each category. If “Defect Free” check “DF”. If N/A, cross out or ignore. If a work order is to be issued to correct a defect, check “WO”. Use reverse side for comments. *See specific defect in cell.

Turnout Inspection Worksheet (Components)

Track:_____ Turnout:_____ Inspector:_____ Date:_____

Component	DF	Imp. Size	Imp. Type	Loose	Imp. Pos.	Damaged	Worn	Missing	Other*	WO
Switch Stand										
Target/Lamp									Paint Faded	
Ground Throw Lever										
Point Locks/Lever Latches										
Jam Nut										
Connecting Rod										
Switch Rods										
Switch Clips									Imp. Spacer	
Connecting Rod Bolts										
Switch Rod Bolts										
Clip Bolts										
Cotter Keys										
Insulation Filler										
Switch Points (Left)									Metal Flow	
Switch Points (Right)									Metal Flow	
Switch Point Protector										
Point Rail (Left)										
Point Rail (Right)										
Point Stop (Left)										
Point Stop (Right)										
Reinforcing Bar (Left)										
Reinforcing Bar (Right)										
Reinforcing Bolts/Rivets										
Stock Rail									Metal Flow	
Straight Rail									Metal Flow	
Gauge Plate										
Rail Braces - Rigid (Left)									<4 Functional	
Rail Braces - Adjustable (L)									<4 Functional	
Rail Braces - Rigid (Right)									<4 Functional	
Rail Braces - Adjustable (R)									<4 Functional	
Slide Plates										
Turnout Plates										
Twin Tie Plates										
Heel Filler (Left)										
Heel Filler (Right)										
Heel Joint Bolts (Left)										
Heel Joint Bolts (Right)										
Heel Joint Bars (Left)										
Heel Joint Bars (Right)										
Frog (General)										
Frog Point									Metal Flow	
Frog Top Surface									Metal Flow	
SG Frog Guard Faces (Left)										
SG Frog Guard Faces (Right)										
SP Frog Hinged Wing Rail										
SP Frog Springs, etc.										
Frog Bolts										
Frog Plates										
Guard Rails (Left)										
Guard Rails (Right)										
Guard Rail Fillers (Left)										
Guard Rail Fillers (Right)										
Guard Rail Bolts (Left)										
Guard Rail Bolts (Right)										
Guard Rail Clamps (Left)										
Guard Rail Clamps (Right)										
Guard Rail Plates (Left)										
Guard Rail Plates (Right)										

Figure B-7. Turnout Inspection Worksheet (Components)

Record number of defective components in each category. If “Defect Free” check “DF”. If N/A, cross out or ignore. If a work order is to be issued to correct a defect, check “WO”. Use reverse side for comments. *See specific defect in cell.

Grade Crossing Detailed Inspection Worksheet

(Includes Rail Crossings)

Track:_____ Turnout:_____ Inspector:_____ Date:_____

Location:_____

General						**WO**
Switch Difficult to Operate	Y	N				
Rail Weight or Section Change	Y	N				
Debris in Crib Area	Y	N				
Line and Surface	DF	Good	Fair	Marginal	Poor	
Less Than 4 Functional Rail Braces (Left)	Y	N				
Less Than 4 Functional Rail Braces (Right)	Y	N				

Ties	**Tie Size**	**WO**
Defective		
Defective Joint		
Skewed		

Defective Tie Clusters	**2**	**3**	**4**	**5**	**WO**
Isolated					
Adjacent					
Isolated w/1 Joint Tie					
Joint Tie Cluster					

Measurements (Left)		**WO**	**Measurements (Right)**		**WO**
Switch Point Gap (Left)			Switch Point Gap (Right)		
Gauge at Switch Point			Comments:		
Gauge at Switch Heel					
Gauge at Joint in Curved Closure Rail (1st)					
Gauge at Joint in Curved Closure Rail (2nd)					
Gauge at Frog Toe (Left)			Gauge at Frog Toe (Right)		
Gauge at Frog Point (Left)			Gauge at Frog Point (Right)		
Gauge at Frog Heel (Left)			Gauge at Frog Heel (Right)		
Frog Flangeway Width (Left)			Frog Flangeway Width (Right)		
Frog Flangeway Depth (Left)			Frog Flangeway Depth (Right)		
Guard Rail Flangeway Width (Left)			Guard Rail Flangeway Width (Right)		
Guard Check Gauge (Left)			Guard Check Gauge (Right)		
Guard Face Gauge (Left)			Guard Face Gauge (Right)		

Figure B-8. Turnout Inspection Worksheet (General, Ties and Measurements)

If a crossing is “Defect Free,” so state. If a work order is to be issued to correct a defect, check “WO” box. Use reverse side for comments. *See RAILER Defect List. **Record flangeway width/depth and affected length, if improper.

Grade Crossing Detailed Inspection Worksheet

(Includes Rail Crossings)

Inspector:_____ Date:_____ Sheet _____ of _____

Track	Location	Name	Defect* or Measurement**	Qty	UM	WO

Figure B-9. Grade Crossing Detailed Inspection Worksheet (Includes Rail Crossings)

If a crossing is "Defect Free," so state. If a work order is to be issued to correct a defect, check "WO" box. Use reverse side for comments. *See RAILER Defect List. **Record flangeway width/depth and affected length, if improper.

Rail, F+OTM, Ballast, Drainage, and Appliances Detailed Inspection Worksheet
(Includes Inspection Impaired)

Track:_____ Segment:_____ Inspector:_____ Date:_____
Begin Location:_____ End Location:_____ Sheet _____ of _____

Location*	Rail	Component**	Defect***	Length	Density	Qty	UM	WO

Figure B-10. Rail, F+OTM, Ballast, Drainage, and Appliances Detailed Inspection Worksheet
(Includes Inspection Impaired)

If a work order is to be issued, check “WO” box. Use reverse side for comments. *Record multiple rail defects in the same rail as the same location. **Rail, F+OTM, etc. ***See RAILER Defect List. If a component is “Defect Free”, so state..

APPENDIX C

FIELD IDENTIFICATION OF RAIL DEFECTS

C-1. RAIL DEFECTS MAY BE OBSERVED IN TRACK. Table 7-1 presents a listing of rail defects and appropriate maintenance and safety standards. This appendix presents definitions relating to rail and brief descriptions of the common rail defects observed in track. Figure C-1 presents common rail nomenclature, and Figure C-2 shows the relative positions of planes through the rail.

All figures presented in Appendix C are copyrighted by Sperry Rail Services and used by permission.

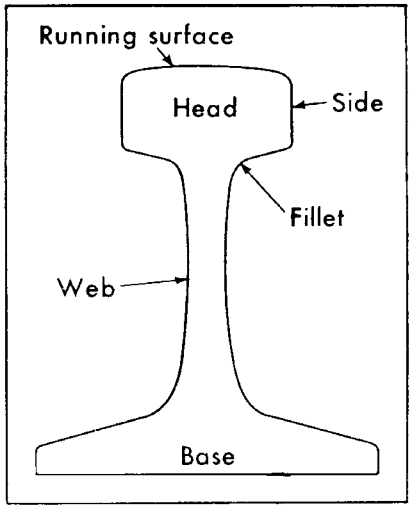


Figure C-1. Rail Nomenclature

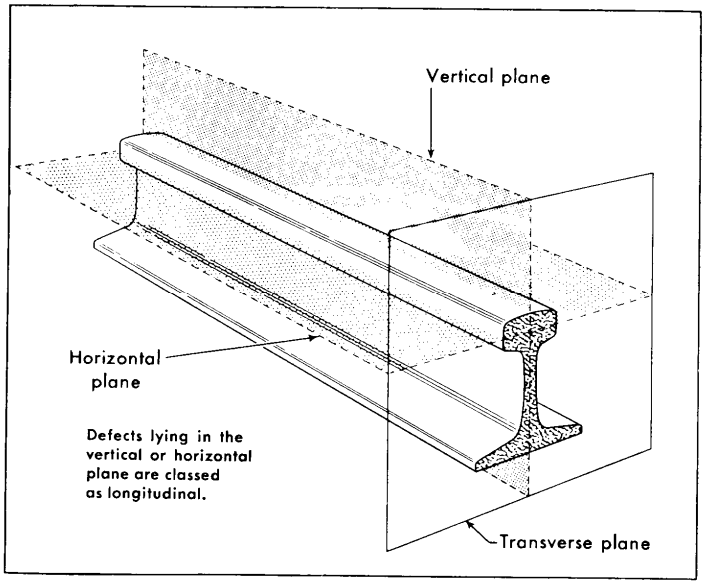


Figure C-2. Relative Positions of Planes Through a Rail

C-2. DEFINITION OF TERMS. The following are common terms related to rail and rail defects. For Navy installations, NAVFAC MO-103 presents additional terms and information.

a. *Bleeding*. Reddish-brown streak on a rail indicating internal rusting.

b. *Field Side*. The side of the rail away from the wheel flange.

c. *Gage Side*. The side of the rail closest to the wheel flange.

d. *Head Checks*. Transverse surface cracks on the gage corner of rails resulting from cold-working the surface metal; sometimes referred to as gage checks.

e. *Percent Size*. The percentage of rail head cross-sectional area weakened by a rail defect. Used only with transverse defects.

f. *Relaid Rail*. Rail that is worn but still usable, taken from track and reused in another location. Sometimes referred to as relayer rail.

g. *Shatter Crack*. Initiation of a transverse fissure resulting from entrapped hydrogen gas present in a steel rail that was cooled too rapidly. Control-cooling the rails and vacuum-degassing the molten steel have practically eliminated the hydrogen problem.

h. *Transposed Rail*. Rail that is moved from one side of the track to the other side without turning the rail so that the gage and field sides are interchanged.

i. *Tread*. The path of wheel in contact with the running surface of the rail.

j. *Turned Rail*. Rail with some wear that has been removed, turned, and replaced in track so the gage and field sides are interchanged.

C-3. FIELD IDENTIFICATION OF RAIL DEFECTS. These descriptions are presented in alphabetical order to assist in identifying defective rails in track. Refer to NAVFAC MO-103 for additional information.

a. *Bolt Hole Crack*.

(1) *Description.* A progressive fracture originating at a bolt hole.

(2) *Appearance in Track.* Bolt hole cracks are not visible until a bolt or a joint bar has been removed unless the defect has progressed beyond the bar. They may be recognized by a hairline crack extending from the bolt hole (Figure C-3).

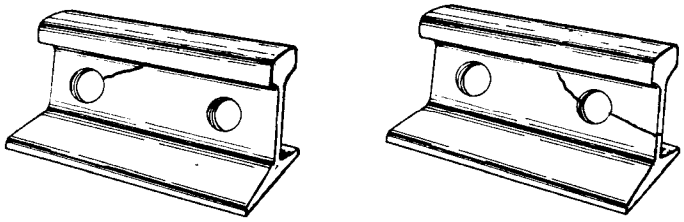


Figure C-3. General Appearance of Bolt Hole Cracks

b. *Broken Base*.

(1) *Description.* Any break in the base of the rail.

(2) *Appearance in Track*. Generally appears as a half-moon crack break in the rail base. Figure C-4 illustrates three different appearances of broken bases.

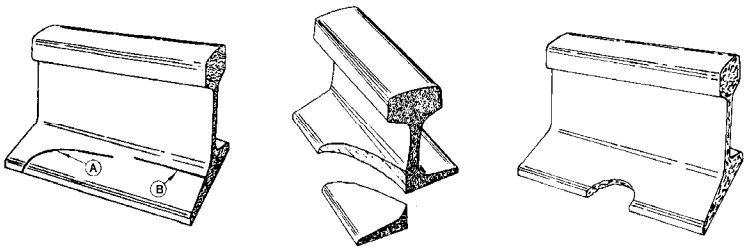


Figure C-4. General Appearance of Broken Base

c. *Complete Break (Broken Rail)*.

(1) *Description.* A complete transverse separation of the head, web, and base of the rail in which there is no sign of a fissure and in which none of the other defects described herein are found.

(2) *Appearance in Track.* May appear as a hairline crack running completely around the rail, usually accompanied by bleeding or a separation of the rail at the break with one or both of the broken ends battered down (Figure C-5).

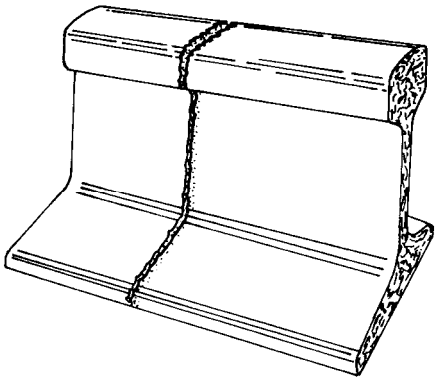


Figure C-5. General Appearance of Broken Rail

d. *Compound Fissure*. See "Transverse Defects," paragraph C-3.z.

e. *Corrosion*.

(1) *Description.* The decaying or corroding of the metal in the web or base of the rail.

(2) *Appearance in Track*. Pits or cavities in the upper base or the web of the rail. In advanced stages, a significant loss of material is evident.

f. *Corrugation*.

(1) *Description.* A repeated wavelike pattern on the running surface of the rail. Corrugations develop over a long period of time. A number of factors contribute to the development of corrugations with the actual cause dependent on the track and operating conditions.

(2) *Appearance in Track.* Small, hard, bright, short-pitch ridges along the running surface of the rail, varying anywhere from 2 to 18 inches apart and usually less than 0.0625 inch deep. Although the individual waves (ridges) are usually only a short distance apart, the corrugations may extend over a considerable distance (Figure C-6).

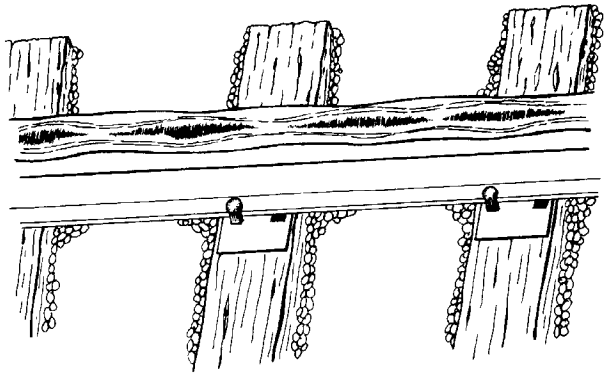


Figure C-6. General Appearance of Corrugation

g. ***Crushed (Flattened) Head*.**

(1) *Description.* The flattening of several inches of the rail head is generally caused by a soft spot in the steel. A crushed head is usually accompanied by a crushing down of the metal but with no signs of cracking in the fillet under the head. The origin of a crushed head is usually a soft spot in the steel of the head, which gives way under heavy wheel loads.

(2) *Appearance in Track.* Generally appears as:

(a) Flattening and widening of the head for several inches with the entire head sagging.

(b) Small cracks in a depression on the running surface.

(c) In advanced stages, a bleeding crack may be present at the fillet under the head (Figure C-7).

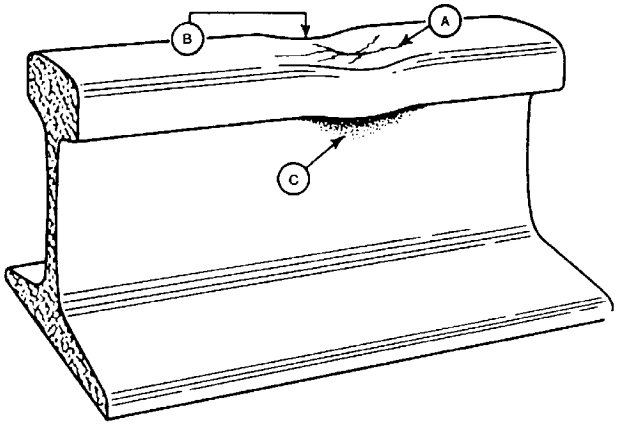


Figure C-7. General Appearance of Crushed Head

h. ***Defective Weld*.**

(1) *Description.* A progressive transverse separation within an area where two rails have been joined by welding or a rupture at a weld due to incomplete penetration of weld metal between the rail ends, lack of fusion, entrainment of slag and sand, or shrinkage cracking or fatigue cracking.

(2) *Appearance in Track.* No outward sign is visible until the separation reaches the rail surface. A defective weld may then be recognized by a vertical bleeding crack at the welded portion of the rail joint where the separation has reached the surface.

i. ***Detail Fracture*****.** See "Transverse Defects," paragraph C-3.z.

j. ***End Batter*****.**

(1) *Description.* Damage caused by wheels striking the rail ends.

(2) *Appearance in Track.* Appears as damage to or a depression in the top surface of the rail head at the ends of the rail (Figure C-8).

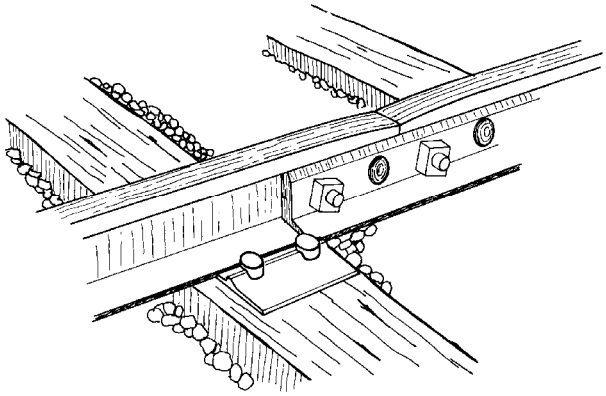


Figure C-8. Rail End Batter

k. ***Engine Burns (Burned Rail)*****.**

(1) *Description.* Rail that has been scarred on the running surface by the friction of a slipping locomotive.

(2) *Appearance in Track.* Round or oval rough spots or holes on the tread of the running surface. Engine burns may be deep (Figure C-9).

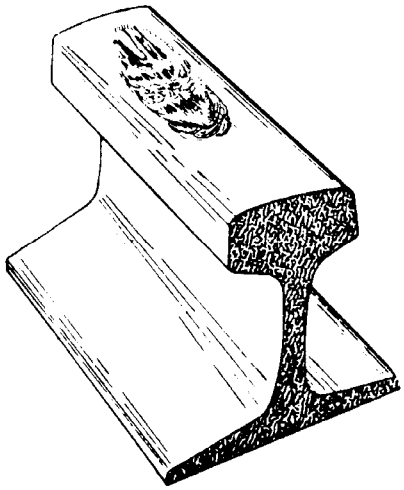


Figure C-9. Typical Appearance of Engine Burn

l. ***Engine Burn Fracture*****.**

(1) *Description.* A progressive fracture in the rail head starting from a point where engine wheels have slipped and burned the rail.

(2) *Appearance in Track.* No sign of transverse separation is visible until the defect reaches the rail surface (cracks out.) An engine burn fracture may then be recognized by one or more of the following characteristics:

(a) A hairline crack on the side of the head in the immediate vicinity of an engine burn and at right angles to the running surface. The crack may be visible on either the field or gage side of the head. An engine burn may lead to an engine burn fracture.

(b) Transverse thermal cracks extending from the burn to the gage corner and down the side of the head for at least 0.125 inch.

(c) A cracked-out horizontal separation on the field side of the rail head under the burned area often accompanied by one or more thermal cracks extending transversely to the gage corner (Figure C-10.)

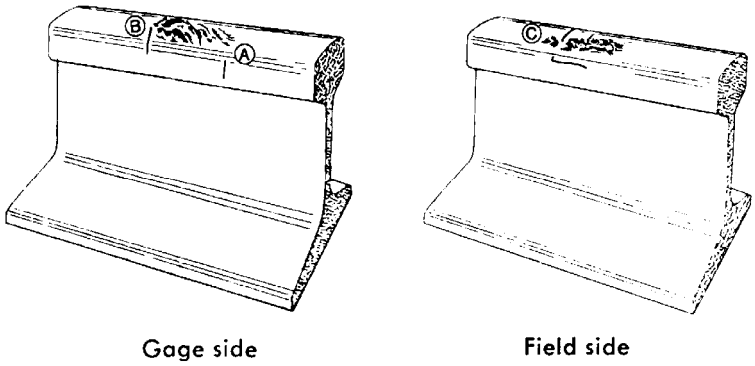


Figure C-10. General Appearance of Engine Burn Fracture

m. *Flaking*.

(1) *Description.* A progressive horizontal separation on the running surface near the gage corner, often accompanied by scaling or chipping. Flaking should not be confused with shelling as flaking occurs only on the running surface near the gage corner and is not as deep as shelling.

(2) *Appearance in Track.* Can be recognized by one or more of the following characteristics:

(a) Shallow depressions with irregular edges occurring on the running surface near the gage corner. Generally, flaking will occur within 0.25 inch of the corner of the rail.

(b) Horizontal hairline cracks along the running surface near the gage corner of the rail head, resembling small slivers (Figure C-11.)

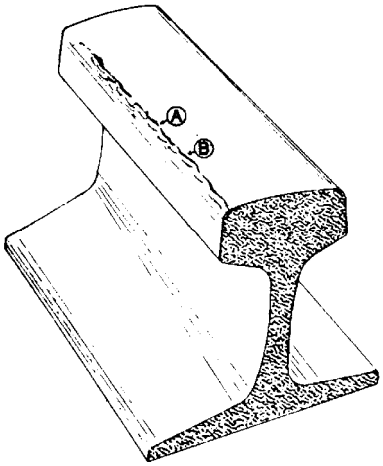


Figure C-11. General Appearance of Flaking

n. *Flowed Rail*.

(1) *Description.* A rolling out of the tread metal beyond the field or gage corner with no breaking down of the underside of the head.

(2) *Appearance in Track.*

(a) Surface metal on the head flowed toward the field side giving a creased appearance on the running surface near the field corner.

(b) A protruding lip extending along the length of the rail.

(c) In the advanced stage, flow becomes blade-like, jagged, or nonuniform and may hang down or separate from the rail head (Figure C-12.)

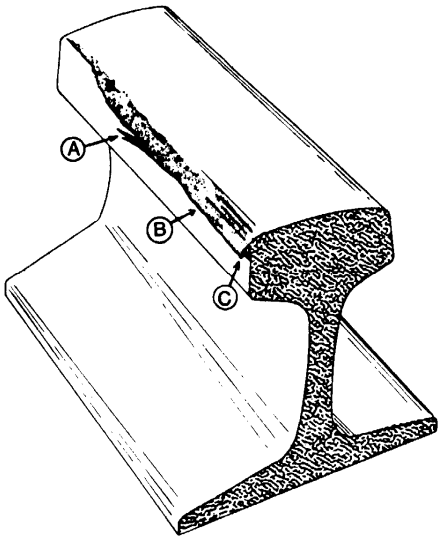


Figure C-12. General Appearance of Flow

o. *Head/Web Separation*.

(1) *Description.* A progressive fracture separating the head and web of the rail at the head fillet area.

(2) *Appearance in Track.* Can be recognized by one or more of the following characteristics:

(a) In earlier stages, wavy lines appearing along the fillet under the head.

(b) As the condition develops, a small crack will appear along the fillet on either side, progressing longitudinally with slight irregular turns upward and downward.

(c) In advanced stages, bleeding cracks will extend downward from the longitudinal separation through the web and may extend through the base (Figure C-13).

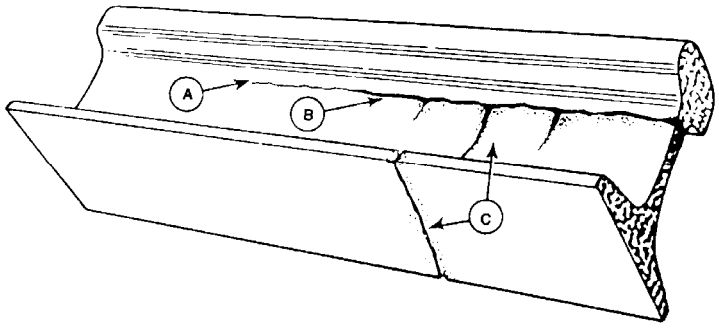


Figure C-13. General Appearance of Head/Web Separation

p. ***Horizontal Split Head*.**

(1) *Description.* A progressive longitudinal fracture in the rail head parallel to the running surface, usually 0.25 inch or more below the running surface.

(2) *Appearance in Track.*

(a) Before cracking out, a moderate size horizontal split head will appear as a flat spot on the running surface, often accompanied by a slight widening or dropping of the rail head. The flat spot will be visible as a dark spot on the bright running surface.

(b) After cracking out, the horizontal split head will appear as a hairline crack in either side or both sides of the rail head, usually 0.25 inch or more below the top of the rail head (Figure C-14).

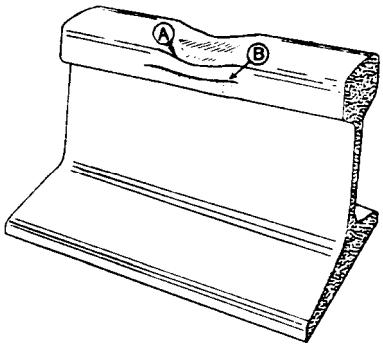


Figure C-14. General Appearance of Horizontal Split Head

q. ***Mill Defects*.**

(1) *Description.* Deformations, cavities, seams, or foreign material found in the head, web, or base of the rail.

(2) *Appearance in Track.* Any deformation in the rail, broken-out area, or inclusion (Figure C-15).

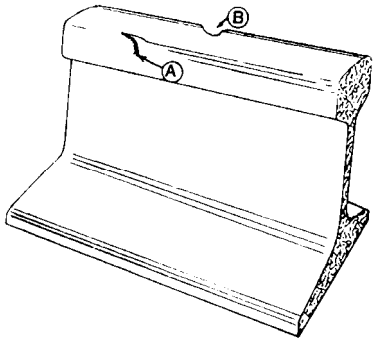


Figure C-15. General Appearance of Mill Defects

r. ***Piped Rail*.**

(1) *Description.* A progressive longitudinal fracture in the web of the rail with a vertical separation or seam, forming a cavity in the advanced stages of development.

(2) *Appearance in Track.*

(a) A bulging of the web on either or both sides. Shallow cracks due to distortion may be found in the bulging surface.

(b) A slight sinking of the rail head may exist above the pipe (Figures C-16 and C-17).

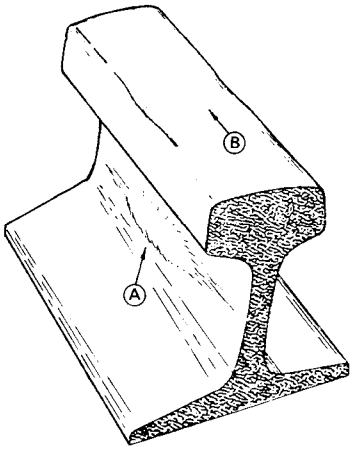


Figure C-16. General Appearance of Piped Rail

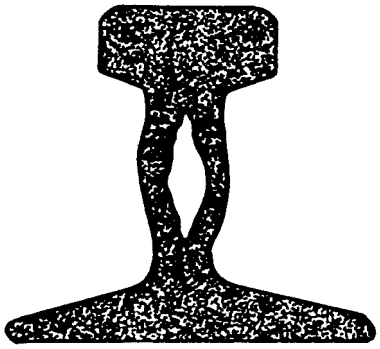


Figure C-17. Cross-sectional View of Piped Rail

s. ***Rail Wear.***

(1) *Description.* The loss of material from the running surface and side of the rail head due to the passage of wheels over the rail.

(2) *Appearance in Track.* Rail wear appears as a rounding of the running surface of the rail head, particularly on the gage side (Figure C-18).

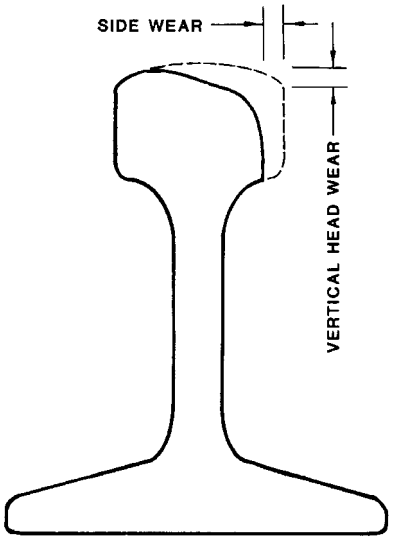


Figure C-18. General Appearance of Vertical Head and Side Wear

t. *Shelling*.

(1) *Description.* A progressive horizontal separation, which may crack out at any level on the gage side but generally at the gage corner. It extends longitudinally not as a true horizontal or vertical crack, but at an angle related to the amount of rail wear.

(2) *Appearance in Track.* Appears as one or more of the following:

(a) Dark spots irregularly spaced on the gage side of the running surface.

(b) Longitudinal separation at one or several levels in the upper gage corner with discoloration from bleeding.

(c) If the rail has been turned, the shelly spots will appear on the field side with an irregular overhanging lip of metal similar to flowed rail (Figure C-19).

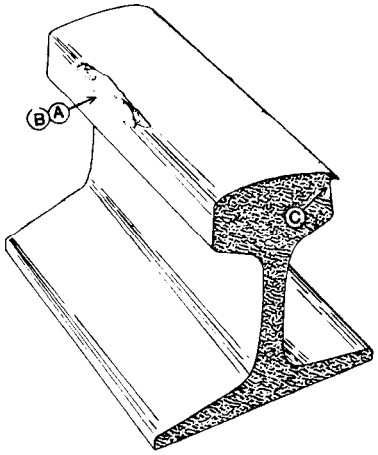


Figure C-19. General Appearance of Shelling

u. *Slivers*.

(1) *Description.* A sliver is the separation of a thin, tapered mass of metal from the surface of the head, web, or base of a rail.

(2) *Appearance in Track.* Thin slivers on the surface of the rail head and parallel to the rail length similar to wood slivers (Figure C-20).

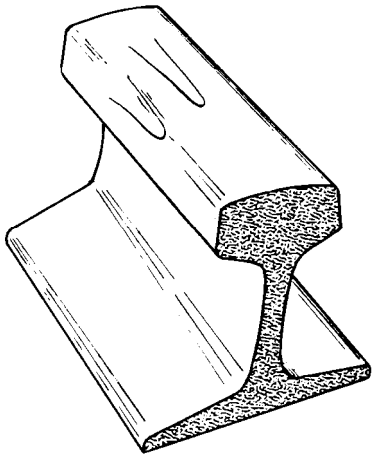


Figure C-20. General Appearance of Slivers

v. *Split Web*.

(1) *Description.* A progressive fracture through the web in a longitudinal and/or transverse direction.

(2) *Appearance in Track.* Horizontal and/or vertical bleeding cracks in the web (Figure C-21).

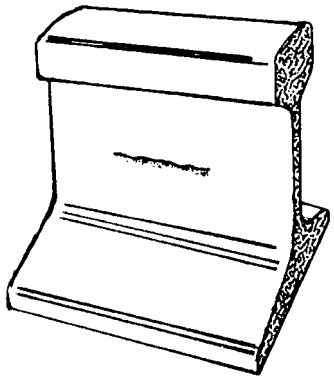


Figure C-21. General Appearance of Split Web

w. *Surface Bent Rail*.

(1) *Description.* The permanent downward bending of the rail ends due to long-term passage of traffic over track with loose or poorly supported joints. Surface bent rail cannot be corrected without replacing the rail.

(2) *Appearance in Track.* A downward bending of the rail head near the rail ends giving the appearance of low joints. When track with surface bent rail is surfaced

(raised and tamped), the rail ends soon return to a lower elevation. In the more serious cases the vertical curve in the rail head is still visible after surfacing.

x. *Surface Damage*.

(1) *Description.* Any damage to the surfaces of the rail, both the running surface and the external surfaces, caused by deep engine burns (running surface) or by striking the rail. Surface damage may lead to detail fractures or engine burn fractures.

(2) *Appearance in Track.* Deep engine burns, dents, nicks, cuts, or other abnormalities on the surface of the rail.

y. *Torch Cut Rail.*

(1) *Description.* Any rail that is cut or otherwise modified (including bolt holes) using an acetylene torch or other open flame.

(2) *Appearance in Track.* Irregular or rough rail ends and/or bolt holes (Figure C-22).

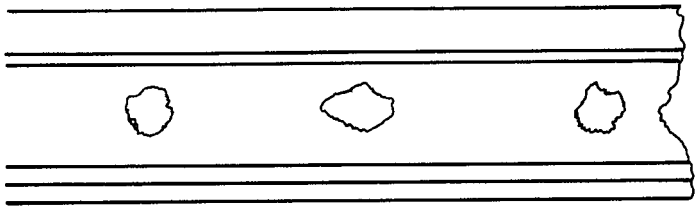


Figure C-22. General Appearance of Torch-Cut Rail

z. *Transverse Defects*. Compound fissure, transverse fissure, and detail fracture.

(1) *Description.* Any progressive fracture occurring in the rail head having a transverse separation, however slight. The exact type of transverse defect cannot be determined until after the rail is broken for examination.

(2) *Appearance in Track.* Not visible until the defect reaches an outer surface. A transverse defect may be recognized by one or more of the following characteristics:

(a) A hairline crack on the side of the head at right angles to the running surface, at the fillet under the head, and occasionally on the running surface.

(b) Bleeding (rust streaking) at the crack.

(c) A hairline crack at the gage corner of the rail head. On turned rail, this condition may occur at the field corner. Numerous small gage cracks or head checks are often present but should not cause suspicion unless a single crack extends much farther down the side and/or across the running surface.

(d) A horizontal hairline crack in the side of the rail head turning upward or downward at one or both ends, usually accompanied by bleeding. Under such conditions a flat spot will generally be present on the running surface.

(e) A hairline crack extending downward at right angles from a horizontal crack caused by shelling of the upper gage corner of the rail head (Figure C-23).

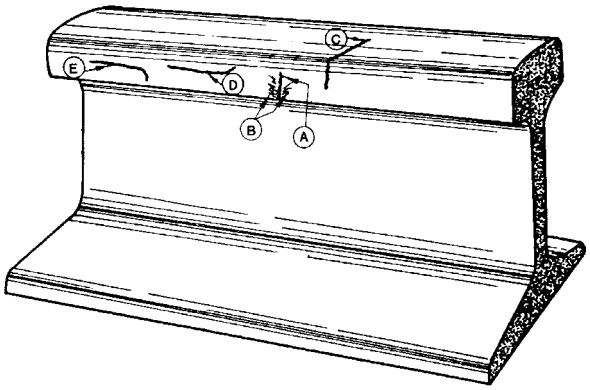


Figure C-23. General Appearance of Transverse Defects

aa. ***Vertical Split Head*****.**

(1) *Description.* A progressive longitudinal fracture in the head of the rail perpendicular to the running surface and is visible to a track inspector.

(2) *Appearance in Track.* Can be recognized by one or more of the following:

(a) A dark streak on the running surface.

(b) Widening of the head for the length of the split. The cracked side of the head may show signs of sagging.

(c) Sagging of the head causing a rust streak to appear on the fillet under the head.

(d) A hairline crack near the middle of the rail head.

(e) In advanced stages, a bleeding crack is apparent on the rail surface and in the fillet under the head (Figure C-24).

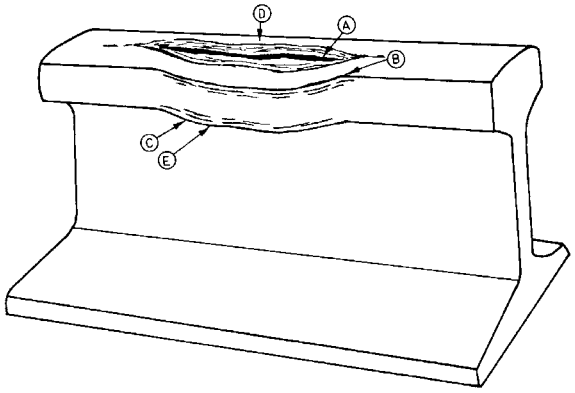
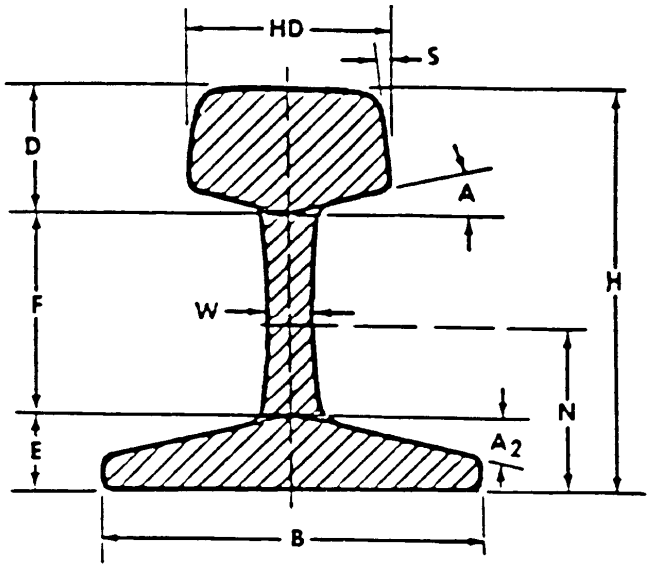


Figure C-24. General Appearance of Vertical Split Head

APPENDIX D

DETAILS OF RAIL SECTIONS

D-1. Table D-1 of this appendix presents a listing of dimensions and properties for various rail sections. This table can be used with Figure D-1 to assist in identifying rail sections and estimating amounts of rail wear.



(See Table D-1 for key)

Figure D-1. Details of T-Rail Section

Table D-1. Details of Rail Sections

		Manufacturer's Brand							Rail Dimensions (Inches)									
Section	Weight Per yard	Ill. Steel Co. Old No.	Ill. Steel Co. Carnegie Steel Co. T C & I Co. Inland steel Co. U. S. Steel Corp.	Midvale Steel Co.	Bethlehem Steel Co. Old No.	Bethlehem Steel Co. New No.	Lackawana Steel Co.	Colorado F & I Co.	Height (H)	Base (B)	Head (HD)	Web (W)	Depth of Head (D)	Fishing Height (F)	Depth Of Base (E)	Head angle (A)	Base angle (A_2)	CL of bolts (N)
AREA	140	--	--	--	--	140RE	--	--	7-5/16	6	3	3/4	2-1/16	4-1/16	1-3/16	3 to 1	4 to 1	4
AREA	136	--	--	--	--	136RE	--	1360	7-5/16	6	2-15/16	11/16	1-15/16	4-3/16	1-3/16	4 to 1	4 to 1	3-3/4
AREA	133	--	13331	--	--	133RE	--	1330	7-1/16	6	3	11/16	1-15/16	3-15/16	1-3/16	3 to 1	4 to 1	3-3/4
AREA	132	--	13225	--	--	132RE	--	1321	7-1/8	6	3	21/32	1-3/4	4-3/16	1-3/16	4 to 1	4 to 1	3-7/8
AREA	131	--	13128	--	--	131RE	--	1311	7-1/8	6	3	21/32	1-3/4	4-3/16	1-3/16	4 to 1	4 to 1	4-1/4
AREA	130	--	13025	--	--	130RE	--	1300	6-3/4	6	2-15/16	21/32	1-27/32	3-11/16	1-7/32	4 to 1	4 to 1	3-3/8
AREA	119	--	--	--	--	119RE	--	1190	6-13/16	5-1/2	2-21/32	5/8	1-7/8	3-13/16	1-1/8	4 to 1	4 to 1	3-1/4
AREA	115	--	11525	--	--	115RE	--	1150	6-5/8	5-1/2	2-23/32	5/8	1-11/16	3-13/16	1-1/8	4 to 1	4 to 1	3-1/4
AREA	112	--	11228	--	--	112RE	--	1121	6-5/8	5-1/2	2-23/32	19/32	1-11/16	3-13/16	1-1/8	4 to 1	4 to 1	3-3/4
AREA	110	--	11025	--	--	110RE	--	1100	6-1/4	5-1/2	2-25/32	19/32	1-23/32	3-13/16	1-1/8	4 to 1	4 to 1	3-1/8
AREA	100	--	10025	--	--	100RE	--	10025	6	5-3/8	2-11/16	9/16	1-21/32	3-9/32	1-1/16	4 to 1	4 to 1	2-31/32
ARA-A	100	10020	10020	565	163	100RA	10031	--	6	5-1/2	2-3/4	9/16	1-9/16	3-3/8	1-1/16	4 to 1	4 to 1	2-3/4
ARA-A	90	9020	9020	563	170	90RA	9031	902	5-5/8	5-1/8	2-9/16	9/16	1-15/32	3-5/32	1	4 to 1	4 to 1	2-37/64
ARA-A	80	8020	8020	--	169	--	8031	801	5-1/8	4-5/8	2-1/2	33/64	1-7/16	2-23/32	31/32	4 to 1	4 to 1	2-21/64
ARA-A	70	7020	7020	--	--	--	--	--	4-3/4	4-1/4	2-3/8	1 / 2	1-11/32	2-1/2	29/32	4 to 1	4 to 1	2-5/32
ARA-A	60	6020	6020	--	--	--	--	--	4-1/2	4	2-1/4	15/32	1-15/64	2-29/64	13/16	4 to 1	4 to 1	2-5/128
ARA-B	100	10030	10030	564	161	100RB	10032	1002	5-41/64	5-9/64	2-31/32	9/16	1-45/64	2-55/64	1-5/64	13°	13°	2-65/128
ARA-B	90	9030	9030	561	162	90RB	9032	905	5-17/64	4-49/64	2-9/16	9/16	1-39/64	2-5/8	1-1/32	13°	13°	2-11/32
ARA-B	80	8030	8030	569	171	--	8032	--	4-15/64	4-7/16	2-7/16	35/64	1-15/32	2-15/32	1	13°	13°	2-15/64
ARA-B	70	7030	7030	--	174	--	--	--	4-35/64	4-3/64	2-3/8	33/64	1-23/64	2-17/64	59/64	13°	13°	2-7/128
ARA-B	60	6030	6030	--	--	--	--	--	4-3/16	3-11/64	2-1/8	31/64	1-1/4	2-1/16	7/8	13°	13°	1-29/32
ASCE	100	10001	10040	536	247	100AS	1000	--	5-3/4	5-3/4	2-3/4	9/16	1-45/64	3-5/64	31/32	13°	13°	2-65/128
ASCE	90	9002	9040	535	245	90AS	900	--	5-3/8	5-3/8	2-5/8	9/16	1-19/32	2-55/64	59/64	13°	13°	2-45/128
ASCE	85	8504	8540	531	235	85AS	850	851	5-3/16	5-3/16	2-9/16	9/16	1-35/64	2-3/4	57/64	13°	13°	2-17/64
ASCE	80	8004	8040	530	251	80AS	800	800	5	5	2-1/2	35/64	1-1/2	2-5/8	7/8	13°	13°	2-3/16
ASCE	75	7506	7540	529	214	75AS	750	753	4-13/16	4-13/16	2-15/32	17/32	1-27/64	2-35/64	27/32	13°	13°	2-15/128
ASCE	70	7010	7040	532	237	70AS	700	701	4-5/8	4-5/8	2-7/16	33/64	1-11/32	2-15/32	13/16	13°	13°	2-3/64
ASCE	65	6507	6540	534	236	65AS	650	653	4-7/16	4-7/16	2-13/32	1 / 2	1-9/32	2-3/8	25/32	13°	13°	1-31/32
ASCE	60	6015	6040	533	244	60AS	600	603	4-1/4	4-1/4	2-3/8	31/64	1-7/32	2-17/64	49/64	13°	13°	1-115/128
ASCE	55	5501	5540	537	130	55AS	550	--	4-1/16	4-1/16	2-1/4	15/32	1-11/64	2-11/64	23/32	13°	13°	1-103/128
ASCE	50	5005	5040	542	129	50AS	500	--	3-7/8	3-7/8	2-1/8	7/16	1-1/8	2-1/16	11/16	13°	13°	1-23/32

Notes: See Figure D-1 for key All dimensions in inches **(Sheet 1 of 3)**

Table D-1 - Details of Rail Sections (Cont'd)

		Manufacturer's Brand							Rail Dimensions (Inches)									
Section	Weight Per yard	Ill. Steel Co. Old No.	Ill. Steel Co. Carnegie Steel Co. T C & I Co. Inland steel Co. U. S. Steel Corp.	Midvale Steel Co.	Bethlehem Steel Co. Old No.	Bethlehem Steel Co. New No.	Lackawana Steel Co.	Colorado F & I Co.	Height (H)	Base (B)	Head (HD)	Web (W)	Depth of Head (D)	Fishing Height (F)	Depth Of Base (E)	Head angle (A)	Base angle (A_2)	CL of bolts (N)
AT&SF	90	9021	9021	--	173	90SF	9033	903	5-5/8	5-3/16	2-9/16	9/16	1-15/32	3-5/32	1	4 to 1	4 to 1	2-37/64
Bang & Aroost.	70	--	--	--	--	--	703	--	4-3/4	4-3/4	2-7/16	1 / 2	1-13/32	2-19/32	3 / 4	12º	12º	2-3/64
Can Nor	80	8010	8010	--	--	--	804	--	5	5	2-9/16	35/64	1-13/32	2-11/16	29/32	13º	13º	2-1/4
Can Pac	85	--	8524	--	176	85CP	856	--	5-1/8	5	2-1/2	9/16	1-7/16	2-11/16	1	4 to 1	4 to 1	2-11/32
Can Pac	65	6508	6508	--	--	--	654	--	4-31/64	4-3/8	2-1/4	15/32	1-9/32	2-11/32	35/64	4 to 1	4 to 1	2-1/32
C of NJ	135	--	--	--	290	--	--	--	6-1/2	6	3-5/32	3 / 4	2	3-9/32	1-7/32	14º	14º	2-55/64
C & A	70	7002	--	--	--	--	--	--	4-3/8	4	2-35/96	35/64	1-17/24	1-11/12	3 / 4	12º	12º	1-17/24
DL & W	105	--	--	--	105-C	105DL	1052	--	6	5-3/8	2-3/4	5/8	1-23/32	3-1/4	1-1/32	13º	13º	2-21/32
DL & W	101	--	10133	--	299	101DL	10130	--	5-7/16	5-3/8	2-3/4	5/8	1-23/32	2-11/16	1-1/32	13º	13º	2-3/8
DL & W	91	--	9133	--	91-B	--	911	--	5-1/4	5-3/8	2-5/8	5/8	1-41/64	2-11/16	59/64	13º	13º	2-17/64
DL & W	75	--	--	--	75-C	--	753	--	4-11/16	5	2-1/2	1 / 2	1-43/64	2-13/64	13/16	18º	12º45'	1-117/128
Dudley	90	--	--	--	--	--	901	--	5-1/2	5	2-21/32	9/16	1-1/2	3-1/32	31/32	4 to 1	4 to 1	2-31/64
EJ & E	100	--	10050	--	--	--	--	--	5-9/16	5	2-21/32	9/16	1-37/64	2-51/64	1-3/16	4 to 1	4 to 1	2-75/128
Frictionless	125-1/2	--	--	--	125.5-F	--	--	--	7	5-1/2	1-13/16	11/16	2-3/8	3-13/32	1-7/32	18º	14º	2-3/4
Frictionless	98	--	--	--	305	--	--	--	5-27/32	5	2-1/2	9/16	1-31/32	2-25/32	1-3/32	15º	13º	2-31/64
Frictionless	97	--	--	--	97-B	--	--	--	5-7/8	5-9/64	2-1/4	9/16	1-15/16	2-55/64	1-5/64	13º	13º	2-65/128
Frictionless	93	--	--	--	--	--	932	--	6-1/8	5-1/2	2-1/8	19/32	1-13/16	3-3/8	15/16	13º	13º	2-5/8
Frictionless	92	--	--	--	304	---	--	--	5-7/16	5-3/8	1-15/16	5/8	2-3/32	2-5/16	1-1/32	13º	13º	2-3/16
Frictionless	90	--	9039	--	--	--	--	--	5-5/8	5-1/8	2-1/4	9/16	2	2-5/8	1	13º	13º	2-5/16
Frictionless	90	--	9029	--	--	--	--	--	6-3/32	5-1/8	1-59/64	9/16	1-15/16	3-5/32	1	4 to 1	4 to 1	2-37/64
Frictionless	79-1/2	--	--	--	79.5-C	--	--	--	5-3/16	5-3/16	1-15/16	9/16	2-1/32	2-9/32	7/8	13º	13º	2-1/64
Grt Nor	110	--	11036	--	--	110GN	--	--	6-1/2	5-1/2	2-3/4	19/32	1-5/8	3-3/4	1-1/8	1 to 4	1 to 4	3-1/4
Grt Nor	100	--	10036	--	--	100GN	1008	--	5-3/4	5	2-3/4	9/16	1-5/8	3	1-1/8	1 to 4	1 to 4	2-5/8
Grt Nor	90	9010	9024	560	160	90GN	9030	904	5-3/8	5	2-5/8	5/8	1-1/2	2-7/8	1	13º	13º	2-7/16
Grt Nor	90	--	9036	--	--	--	--	--	5-3/8	5	2-5/8	19/32	1-15/32	2-7/8	1-1/32	13º	13º	2-13/16
Grt Nor	85	8509	8553	--	--	--	854	--	5	5	2-21/32	21/32	1-19/32	2-1/2	29/32	14º	14º	2-5/32
Grt Nor	80	8009	--	--	--	--	802	--	5	5	2-13/32	5/8	1-5/8	2-1/2	7/8	14º	14º	2-1/8
Grt Nor	77-1/2	77501	--	--	--	--	775	--	5	5	2-3/8	5/8	1-11/16	2-1/2	13/16	14º	14º	2-1/16
Hock Val	80	--	--	540	--	--	--	--	5	4-59/64	2-31/64	29/64	1-95/128	2-25/64	111/128	13º	13º	2-1/16
Interb'g'h	100	10005	10005	--	100-E	100RT	1005	--	5-3/4	5-3/4	2-7/8	9/16	1-45/64	3-5/64	31/32	13º	13º	2-65/128
Interb'g'h	90	--	9050	--	90-E	90RT	902	--	5	5	2-7/8	11/16	1-25/32	2-11/32	7/8	13º	13º	2-3/64
Lehigh Val	136	--	--	--	136-C	136LV	--	--	7	6-1/2	2-15/16	21/32	1-7/8	3-7/8	1-1/4	4 to 1	4 to 1	3-1/16
Lehigh Val	110	--	11033	--	110-B	110LV	--	--	6	5-1/2	2-7/8	19/32	1-7/8	3-1/16	1-1/16	4 to 1	4 to 1	2-3/4
Mo Pac	85	8507	8550	--	--	--	853	--	5-7/32	5-1/4	2-15/32	75/128	1-3/4	2-39/64	55/64	13º	13º	2-21/128
Mo Pac	75	7512	7550	528	289	75MP	754	--	4-3/4	4-3/4	2-9/16	9/16	1-7/16	2-15/32	27/32	13º	13º	2-5/64
Nat Ry Mex	75	--	--	--	128	--	--	--	5	5	2-3/4	1 / 2	1-3/8	2-7/8	3/4	12º	12º	2-3/16

Notes: See Figure D-1 for key All dimensions in inches **(Sheet 2 of 3)**

Table D-1 - Details of Rail Sections (Concluded)

		Manufacturer's Brand							Rail Dimensions (Inches)									
Section	Weight Per yard	Ill. Steel Co. Old No..	Ill. Steel Co. Carnegie Steel Co. T C & I Co. Inland steel Co	Midvale Steel Co.	Bethlehem Steel Co. Old No.	Bethlehem Steel Co. New No.	Lackawana Steel Co.	Colorado F & I Co.	Height (H)	Base (B)	Head (HD)	Web (W)	Depth of Head (D)	Fishing Height (F)	Depth Of Base (E)	Head angle (A)	Base angle (A_2)	CL of bolts (N)
NYC	120	--	--	--	--	--	1201	--	7	6	3	21/32	1-5/8	4-5/16	1-1/16	4 to 1	4 to 1	3-7/32
NYC	105	--	10522	--	105-B	105DY	1051		6	5-1/2	3	5/8	1-5/8	3-13/32	31/32	4 to 1	4 to 1	3-1/8
NYC	100	10003	10022	--	175	--	1001		6	5-1/2	3	19/32	1-5/8	3-13/32	31/32	4 to 1	4 to 1	2-5/8
NYC	95	--	--	--	--	--	951	--	5-1/32	5-1/2	3	5/8	1-9/16	2-15/32	1	4 to 1	4 to 1	2-15/64
NYC	80	8008	8022	543	220	80DY	801	--	5-1/8	5	2-21/32	17/32	1-1/2	2-5/8	1	4 to 1	4 to 1	2-5/8
NYC & St L	85	8521	8521	--	172	--	8531	--	5-3/8	4-7/8	2-17/32	17/32	1-29/64	2-15/16	63/64	4 to 1	4 to 1	2-29/64
NYNH & H	107	--	--	--	172-D	107NH	1072	--	6-1/8	5-1/2	2-3/4	19/32	1-23/32	3-11/32	1-1/16	13°	13°	2-47/64
NYNH & H	100	10004	10034	--	100	100NH	1002	--	6	5-1/2	2-3/4	19/32	1-23/32	3-11/32	1-1/16	13°	13°	2-39/64
Nor Pac	66	6602	6602	547	--	--	--	--	4-17/32	4-1/2	2-5/16	17/32	1-27/64	2-11/32	49/64	13°	13°	1-15/16
PS-Penn	130	--	13031	589	130-B	130PS	13030	--	6-5/8	5-1/2	3	11/16	2	3-13/32	1-7/32	18°	14°	2-3/4
PS-Penn	125	--	12531	584	308	125PS	12530	--	6-1/2	5-1/2	3	21/32	1-7/8	3-13/32	1-7/32	18°	14°	2-59/64
PS-Penn	100	10031	10031	558	96-A	100PS	10030	--	5-11/16	5	2-43/64	9/16	1-13/16	2-25/32	1-3/32	15°	13°	2-31/64
PS-Penn	85	8530	8531	559	67-A	85PS	8530	--	5-1/8	4-5/8	2-1/2	17/32	1-21/32	2-15/32	1	15°	13°	2-15/64
PRR	85	8503	8533	500	67	85PG	852	--	5	5	2-9/16	17/32	1-3/4	2-3/8	7/8	13°	13°	2-1/16
PRR	70	7005	7033	504	--	70PR	--	--	4-1/2	4-1/2	2-7/16	1 / 2	1-19/32	2-1/8	25/32	13°	13°	1-27/32
P & R	100	--	10032	--	165	100RG	1007	--	5-5/8	5-3/8	2-21/32	9/16	1-45/64	2-55/64	1-1/16	13°	13°	2-63/128
RG So	52	--	--	--	--	--	--	521	4	4	2-1/8	25/64	1-23/64	2	41/64	13°	13°	1-41/64
Russian	67-1/2	--	--	587	--	--	--	--	5-3/64	4-21/64	2-23/64	15/32	1-29/64	2-11/16	29/32	1 to 3	1 to 3	2-1/4
Sea A Ln	85	--	8522	--	261	--	851	--	5-1/4	5	2-11/16	17/32	1-5/8	2-3/4	7/8	14°	14°	2-1/4
Sea A Ln	75	--	7522	--	221	--	--	--	5	5	2-9/16	1 / 2	1-3/8	2-3/4	7/8	14°	14°	2-1/4
Soo Ln	85	8520	8520	--	--	--	--	--	5-3/8	4-7/8	2-1/2	9/16	1-15/32	2-29/32	1	14°02'11"	14°02'11"	2-29/64
UP	90	9003	9023	--	--	---	--	901	5-3/4	5-3/8	2-3/4	17/32	1-1/2	3-3/8	7/8	13°	13°	2-9/16
UP	75	7513	7523	--	75-B	--	--	754	5	5	2-9/16	33/64	1-3/8	2-13/16	13/16	13°	13°	2-1/4
UP	75	7524	7524	--	--	75SP	--	757	4-15/16	4-7/16	2-7/16	33/64	1-3/8	2-5/8	15/16	4 to 1	4 to 1	2-1/4
Miscell	75	--	--	--	92	--	--	--	5	5	2-1/2	9/16	1-7/16	2-47/64	53/64	13°	13°	2-1/8
Miscell	70	--	--	--	97	--	703	--	4-3/4	4-3/4	2-7/16	1 / 2	1-13/32	2-19/32	3 / 4	12°	12°	2-3/64
Miscell	67	6704	6704	515	--	--	--	--	4-1/2	4-1/2	2-13/32	1 / 2	1-5/8	2-1/8	3 / 4	13°	13°	1-13/16
Miscell	67	--	6733	--	--	--	--	--	4-1/2	4-1/2	2-13/32	1 / 2	1-5/8	2-1/8	3 / 4	13°	13°	1-13/16
Miscell	65	6501	--	--	--	--	--	--	4-3/8	4-7/16	2-3/8	29/64	1-1/2	2-5/32	23/32	14°30'	12°30'	1-51/64
Miscell	65	6504	--	--	--	--	--	--	4-1/2	4-1/2	2-7/16	1 / 2	1-31/64	2-19/64	23/32	13°	13°	1-7/8
Miscell	60	6001	6051	--	--	--	--	--	4-1/4	4-1/16	2-5/16	1 / 2	1-7/16	2-1/8	11/16	14°	12°50'	1-3/4
Miscell	60	6017	6033	503	--	--	--	--	4-1/4	4-13/64	2-21/64	29/64	1-55/128	2-7/64	91/128	13°	13°	1-49/64
Miscell	56	5610	5610	--	--	--	--	--	4-1/4	3-31/32	2-7/32	13/32	1-7/16	2-1/8	11/16	14°	12°50'	1-13/16
Miscell	56	--	--	511	--	--	--	--	4	3-53/64	2-19/64	29/64	1-51/128	2-59/64	87/128	12°	12°	1-41/64
Miscell	56	5616	5633	--	--	--	--	--	4-1/4	4-1/8	2-1/4	3/8	1-27/64	2-1/8	45/64	13°	13°	1-49/64
Miscell	56	--	--	--	--	--	--	562	4-1/4	4-1/8	2-1/4	58/128	1-7/32	2-17/64	49/64	13°	13°	1-115/128

Notes: See Figure D-1 for key All dimensions in inches **(Sheet 3 of 3)**

APPENDIX E

FAR PART 213

[Code of Federal Regulations]
[Title 49, Volume 4]
[Revised as of October 1, 2003]
From the U.S. Government Printing Office via GPO Access
[CITE: 49CFR213.233]

TITLE 49--TRANSPORTATION

CHAPTER II--FEDERAL RAILROAD ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

PART 213--TRACK SAFETY STANDARDS--Table of Contents

Subpart F--Inspection

Sec. 213.233 Track inspections.

(a) All track shall be inspected in accordance with the schedule prescribed in paragraph (c) of this section by a person designated under Sec. 213.7.
(b) Each inspection shall be made on foot or by riding over the track in a vehicle at a speed that allows the person making the
inspection to visually inspect the track structure for compliance with this part. However, mechanical, electrical, and other track inspection devices may be used to supplement visual inspection. If a vehicle is used for visual inspection, the speed of the vehicle may not be more than 5 miles per hour when passing over track crossings and turnouts, otherwise, the inspection vehicle speed shall be at the sole discretion of the inspector, based on track conditions and inspection requirements. When riding over the track in a vehicle, the inspection will be subject to the following conditions—
(1) One inspector in a vehicle may inspect up to two tracks at one time provided that the inspector's visibility remains unobstructed by any cause and that the second track is not centered more than 30 feet from the track upon which the inspector is riding;
(2) Two inspectors in one vehicle may inspect up to four tracks at a time provided that the inspectors' visibility remains unobstructed by any cause and that each track being inspected is centered within 39 feet from the track upon which the inspectors are riding;
(3) Each main track is actually traversed by the vehicle or inspected on foot at least once every two weeks, and each siding is actually traversed by the vehicle or inspected on foot at least once every month. On high density commuter railroad lines where track time does not permit an on track vehicle inspection, and where track centers are 15 foot or less, the requirements of this paragraph (b)(3) will not apply; and
(4) Track inspection records shall indicate which track(s) are traversed by the vehicle or inspected on foot as outlined in paragraph (b)(3) of this section.
(c) Each track inspection shall be made in accordance with the following schedule--

Class of track	Type of track	Required frequency
Excepted track and Class 1,2,and 3 track	Main track and sidings	Weekly with at least 3 calendar days, interval between inspections, or before use, if the track is used less than once a week, or twice weekly with at least 1 calendar day interval between inspections, if the track carries passenger trains or more than 10 million gross tons of traffic during the preceding calendar year.
Excepted track and Class 1, 2, and 3 track	Other than main track and sidings	Monthly with at least 20 calendar days interval between inspections.
Class 4 and 5 track		Twice weekly with at least 1 calendar day interval between inspections.

(d) If the person making the inspection finds a deviation from the requirements of this part, the inspector shall immediately initiate remedial action.

Note to Sec. 213.233: Except as provided in paragraph (b) of this section, no part of this section will in any way be construed to limit the inspector's discretion as it involves inspection speed and sight distance.

[Code of Federal Regulations]
[Title 49, Volume 4]
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TITLE 49--TRANSPORTATION

CHAPTER II--FEDERAL RAILROAD ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

PART 213--TRACK SAFETY STANDARDS--Table of Contents

Subpart F--Inspection

Sec. 213.235 Inspection of switches, track crossings, and lift rail assemblies or other transition devices on moveable bridges.

(a) Except as provided in paragraph (c) of this section, each switch, turnout, track crossing, and moveable bridge lift rail assembly or other transition device shall be inspected on foot at least monthly.

(b) Each switch in Classes 3 through 5 track that is held in position only by the operating mechanism and one connecting rod shall be operated to all of its positions during one inspection in every 3 month
period.

(c) In the case of track that is used less than once a month, each switch, turnout, track crossing, and moveable bridge lift rail assembly or other transition device shall be inspected on foot before it is used.

Sec. 213.239 Special inspections.

In the event of fire, flood, severe storm, or other occurrence which might have damaged track structure, a special inspection shall be made of the track involved as soon as possible after the occurrence and, if possible, before the operation of any train over that track.

APPENDIX F

SUMMARY OF STANDARDS

Summary of Standards**							
	Maintenance Standards			Safety Standards			
	Deviation for Track Category		Paragraph Reference in UFC 4-860-03	Restricted Operation 10 mph	Close to Traffic	Paragraph Reference in FRA TSS	Construction/ Repair Tolerances
Item	A	B					
Roadway	Pumping Track*		3-1	*		None	Not Present
	Erosion or Washouts*			*			
	Slides, Slippage or Slope Instability *			*			
	Settlement*			*			
	Washouts*			*			
Drainage	Water Diverted onto track*		3-2	*		213.33	
	Hazardous Drainage Structures*			*			
	Inadequate Drainage Structures*			*			
	Obstruction of flow*			*			
Vegetation	Interferes with visibility along Right-of-Way*		3-3	*		213.37	
	And at Highway Crossings						
	Obstructs drainage*			*			
	Interferes with Train Operations and/or Track Inspection*			*			
	Presents Fire Hazard*			*			
	Interferes with Personnel Walking within 8 ft of Track Centerline*			*			
	Brushes Side of Rolling Stock*			*			
Ballast	Fouled Ballast*		4-1	*		213.103	
	Covers Top of Ties*			*			
	Insufficient Ballast*			*			
Ties:						213.109	See 5-4.d.
Min. Nondefective Tie per 39 ft			5-6.c.(1)			213.109 (c) and (d)	
Tangent and LT 2 °	Less than 12	10		Less than 8	Less than 7		
Curves 2 ° or GT	Less than 13	11		Less than 10	Less than 9		

* Operating restrictions may be needed depending on seriousness of the condition.

** Further information regarding classification of defects and operating restrictions is provided in NAVFACINST 11230.1.

Summary of Standards**							
	Maintenance Standards			Safety Standards			
	Deviation for Track Category		Paragraph Reference in UFC 4-860-03	Restricted Operation	Close to Traffic	Paragraph Reference	Construction/ Repair
Item	A	B		10 mph		in FRA TSS	Tolerances
Ties – Cont'd							
Consecutive Defective Tangent and LT 2 ° Curves 2 ° or GT	 3 2	 3 2	5-5.c.(1)	 4 3	 5 or more 4 or more		0
Joint Ties:							213.109(f)
No. of Nondefective Required – 24" C/L	2	1	5-5.c.(2)	1	0		2
Missing/Skewed	Tie missing or skew greater than 8 in. in 3 or more consecutive ties		5-5.d., 5-5.e., 5-5.f.		---	---	See 5-4.d.
Tie Plates	Improper type broken flame cut or defective*		6-1 and 6-2	---	---	213.123	See 6-2.
Spikes	Improper type, broken, flame cut, or defective.		6-1 and 6-3	---	---	213.127	See 6-3
	Insufficient Number*						
	Improper Installation						
	Improper Spiking Pattern through slots in angle bar						
	Loose or missing spikes*						
	Spike beneath rail base						
Joint Bars	Improper type, flame cut or defective*		6-4.a.	---	---	213.121	See 6-4.a.
Compromise Joints	Improper type, design, dimension, home-made, flame cut, or defective*		6-4.b.	---	---	213.121	See 6-4.b.
Joint Bars	Cracked or broken*		6-4.c.	---	Cracked between center bolt holes	213.121	---
Track Bolts	None loose or missing		6-4.e.	LT 2 per rail or All bolts loose	LT1 per rail	213.121	None loose or missing

* Operating restrictions may be needed depending on seriousness of the condition.
** Further information regarding classification of defects and operating restrictions is provided in NAVFACINST 11230.1.

Summary of Standards**								
	Maintenance Standards			Safety Standards				
	Deviation for Track Category		Paragraph Reference in UFC 4-860-03	Restricted Operation	Close to Traffic	Paragraph Reference	Construction/ Repair	
Item	A	B		10 mph		in FRA TSS	Tolerances	
Rail End Mismatch			6-4.f.			213.115		0"
Tread	GT 1/8"	GT 1/8"		---	GT 1/4"			
Gage Side	GT 1/8"	GT 1/8"		GT 3/16"	GT 1/4"			
Rail Joint Gap	GT 3/4"	GT 3/4	6-4.g.	GT 1-1/4"	GT 2"	---	---	---
Rail - Defective	See Table 7-1		7-1	---	---	213.113	---	
Turnouts - General	Improper materials, rail not same weight/ section compromise joint in turnout*		8-1 through 8-2	---	---	213.133	---	
- Switch Point Gap	1/8"	1/8"	8-3.b.	GT 1/4"	GT 3/8"	---	213.135	0"
- Broken/Worn Points	Broken/worn GT 1/2" down & 6 in back from point		8-3.c.	---	---	213.135	---	
- Point Rail Elevation			8-3.c.	Switch point higher than stock rail	Point rail lower than stock rail beyond taper	213.135	---	
- Lever Latches & Point Locks	Missing damaged insecure otherwise inoperative*		8-3.d.	---	---	213.135	---	
- Switch Stand	Not secure*		8-3.e.	---	---	213.135	---	
- Connecting Rod Switch Rod & Clip	Insecure damaged or shimmed		8-3.f. & 8-3.g.	---	---	213.135	---	
- Switch Heel	Heel not fully secure, heel bolts missing		8-3.i.	Bolts loose or missing---	---	213.135	---	
- Rail Braces	Improper materials or installation		8-3.j.	LT 4 per stock rail	---	213.135	---	
- Frog Point Wear/Damage	GT 1/2" down and 6" back all categories		8-4.a	GT 5/8" down and 6" back	---	213.137	1/8" of original contour	
- Frog Surface Wear	GT 5/16"	GT 5/16"	8-4.b.	GT 3/8"	---	213.137	1/8" of original contour	

* Operating restrictions may be needed depending on seriousness of the condition.
** Further information regarding classification of defects and operating restrictions for Navy Installation is provided in NAVFACINST 11230.1

Summary of Standards**

Item	Maintenance Standards			Safety Standards			Construction/ Repair Tolerances
	Deviation for Track Category		Paragraph Reference in UFC 4-860-03	Restricted Operation	Close to Traffic	Paragraph Reference	
	A	B		10 mph		in FRA TSS	
Turnouts - Frog Guarding Face wear	GT 5/16"	GT 5/16"	8-4.c	GT 3/8		213.141	1/8" of original contour
- Frog Flangeway Width	1-5/8"	1-5/8"	8-4.f.	LT 1-5/8"	LT 1-1/2"	213.143	1-7/8"
- Frog Flangeway Depth	LT 1-5/8"	LT 1-5/8"	8-4.g.	LT 1-1/2"	LT 1-3/8"	213.137	1-7/8"
- Guard Check gage	LT 54-3/8"	LT 54-3/8"	8-5.c.	LT 54-1/4"	LT 54-1/8"	213.143	54-5/8"
- Guard Face Gage	GT 53.0"	GT 53.0"	8-5.d.	GT 53-1/8"	GT 53-1/4"	213.143	52-3/4"
- Guard Rail Flangeway Width	1-5/8"	1-5/8"	8-5.e.	LT 1-5/8"	LT 1-1/2"	213.143	1-7/8"
Rail Crossing Flangeway Width	1-5/8"	1-5/8"	9-2.b.	LT 1-5/8"	LT 1-1/2"	213.133	1-7/8"
Rail Crossing Flangeway Depth	1-1/2"	1-1/2"	9-2.b.	LT 1-1/2"	LT 1-3/8"	213.133	1-7/8"
Road Crossing - Formed Flangeway Width	LT 2-1/2"	LT 2-1/2"	10-2.a.	LT 1-3/4”	---	---	21/2 to 3"
Road Crossing Flangeway Depth	LT 2.0"	LT 2.0"	10-2.b.	LT 1-1/2”	---	---	GE 2.0"
Gage - Minimum	LT 56-1/8"	LT 56-1/8"	12-2.d.	---	LT 56.0"	213.53	See 12-2.c.
-Maximum	57-1/2"	57-1/2"		GT 57-1/2	GT 57-3/4		
Cross level - Tangent	GT 1-1/4"	GT 1-1/2"	12-3.	GT 2.0"	GT 3.0"	213.63	0
- Curves	GT 1-1/4"	GT 1-1/2"	12-3.	GT 2.0"	GT 3.0"		Designated Superelevation
Warp	GT 1-3/4"	GT 1-3/4"	12-4.	GT 2.25"	GT 3.0"	213.63	0
Alignment- Tangent	GT 2"	GT 2"	12-6.	GT 3.0"	GT 5.0"	213.55	0
- Curves	GT 2"	GT 2"	12-6.	GT 3.0"	GT 5.0"		Degree of curve
Profile/Surface	GT 2-1/4"	GT 2-1/4"	12-7.	GT 2-3/4"	GT 3.0"	213.63	0

- Operating restrictions may be needed depending on seriousness of the condition.
- ** Further information regarding classification of defects and operating restrictions for Navy Installation is provided in NAVFACINST 11230.1

Form Reset

PWD-ME DIG SAFE UTILITY LOCATE REQUEST FORM

A Utility Locate Form shall be submitted to PWD-ME DSC at least fourteen (14) calendar days prior to excavation, ground penetrating or concrete slab cutting, coring or drilling activity either inside or outside of a building which will penetrate more than 3". *A Utility Locate Form is required for ANY excavation, ground penetrating or concrete slab cutting, coring or drilling on the Shipyard by Shipyard Employees, Contractors or other personnel unless the excavation is an emergency.*

Part I – To be completed by Contractor or Shipyard Personnel performing the Excavation

Today's Date: _____/_____/_____ DIGSAFE Ticket #: (1-888-344-7233) _____

Requested by: _____ Phone #: _____

Code # / Company: _____ E-mail: _____

Contract #: _____ Project Title:_____

Shipyard Project Manager _____ Phone # _____

Excavation Location: _____ Area Pre-Marked: YES ☐ NO ☒

Type of work: _____

Depth: (ft) _____ Anticipated Excavation Date: _____/_____/_____ Time: (military) _____

Attach a map or the contract drawings of the excavation area.

PWD-ME Contractors: Complete Part 1 and Submit Form to PWD-ME CM or ET
Shipyard Personnel: Complete Parts 1 & 2 and Submit Form to PWD-ME DSC
Other Contractors: Complete Part 1 and Submit Form to Project Manager

Part 2 – To be completed by PROJECT MANAGER

(If Shipyard work, Part 2 must be completed by Applicant)

Date: _____/_____/_____ Name: _____ Phone # _____

Locate Priority: Routine(> 14 days) ☐; Urgent(< 14 days) ☒; Emergency(<2 days)_____ (PM&E Approval Req.)

Part 1 Reviewed and Complete: YES ☒ NO ☐ Initial:_____

Submit Completed Form to PWD-ME DSC

Part 3 – To be completed by Utility Locating Company

Approved by Ameresco: Initials _____

Date Utilities marked in the field: _____/_____/_____ Name:_____

Comments: _____

Yard Plate Discrepancies Noted: YES _____ NO _____ CADD Dept. Updated: YES _____ NO _____

Comments: _____

Submit to PWD-ME DSC

Part 4 – To be completed by PWD-ME DSC

Date ____/_____/_____ Logged Into Database: YES _____ NO _____ # _____

Yard Plate Discrepancies: YES _____ NO _____ CADD Dept. Notified: YES _____ NO _____

Comments:_____

PWD-ME DSC to return to Project Manager or Shipyard Personnel

Revision Date 10/28/2009

J-02000000-12

CORPORATE EXPERIENCE DATA SHEET

CORPORATE EXPERIENCE PROJECT DATA SHEET
Project No. (check one) : ☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5
1. Experience for: ☐ Offeror ☐ Joint-Venture ☐ Other (Explain) Firm Name: Address: Phone Number: Point of Contact: Contact Phone Number:
2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other (Explain) Percent of project work performed: If subcontractor, who was prime (Name/Phone #):
3. Contract Number: Delivery/Task Order Number: Title: Location:
4. Award Date (mm/dd/yy): Completion Date (mm/dd/yy): If the contract contains a Base Period with Options, state which contract/option periods have been completed:
5. Type of work: ☐ Maintenance ☐ Repair ☐ Alteration ☐ Minor Construction ☐ Other (explain):
6. Type of Contract/Task Order: (**Check <u>ALL</u> that apply**) ☐ Firm-Fixed Price ☐ Indefinite Delivery/Indefinite Quantity ☐ Other (explain):
7. Award Amount: Final Price: Type of Contract/Task Order: (**Check <u>ALL</u> that apply**) ☐ Delivery/Task Order (IDIQ) ☐ Other (explain):

8. Provide a detailed description of the project and the relevancy to the project requirements of this RFP
9. Provide a detailed description of what work your firm self-performed on this project:
10. Other Information:

J-02000000-14

1. The NAVFAC Form PPQ shall be utilized for all evaluations that require a Past Performance Questionnaire (PPQ).

2. Solicitation Submittal Requirements: IF A COMPLETED CPARS EVALUATION IS AVAILABLE, IT SHALL BE SUBMITTED WITH THE PROPOSAL. IF THERE IS NOT A COMPLETED CPARS EVALUATION, the Past Performance Questionnaire (PPQ) included in the solicitation is provided for the offeror or its team members to submit to the client for each project the offeror includes in its proposal for Factor (insert applicable factor number, usually Factor 1, and insert factor title, usually Corporate Experience). AN OFFEROR SHALL NOT SUBMIT A PPQ WHEN A COMPLETED CPARS IS AVAILABLE.

IF A CPARS EVALUATION IS NOT AVAILABLE, ensure correct phone numbers and email addresses are provided for the client point of contact. Completed PPQs should be submitted with your proposal. If the offeror is unable to obtain a completed PPQ from a client for a project(s) before proposal closing date, the offeror should complete and submit with the proposal the first page of the PPQ (Attachment D), which will provide contract and client information for the respective project(s). Offerors should followup with clients/references to ensure timely submittal of questionnaires. If the client requests, questionnaires may be submitted directly to the Government's point of contact, Quin Conerly-Anderson, via email at quin.s.conerly-anderson.civ@us.navy.mil prior to proposal closing date. Offerors shall not incorporate by reference into their proposal PPQs or CPARS previously submitted for other RFPs. However, this does not preclude the Government from utilizing previously submitted PPQ information in the past performance evaluation."

J-02000000-14

NAVFAC/USACE PAST PERFORMANCE QUESTIONNAIRE (Form PPQ-0)

CONTRACT INFORMATION (Contractor to complete Blocks 1-4)

1. Contractor Information
Firm Name: CAGE Code:
Address: Entity Identifier Number:
Phone Number:
Email Address:
Point of Contact: Contact Phone Number:

2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other (Explain)
Percent of project work performed:
If subcontractor, who was the prime #):

3. Contract Information
Contract Number:
Delivery/Task Order Number (if applicable):
Contract Type: ☐ Firm Fixed Price ☐ Cost Reimbursement ☐ Other (Please specify): Contract
Title:
Contract Location:

Award Date (mm/dd/yy):
Contract Completion Date (mm/dd/yy):
Actual Completion Date (mm/dd/yy):
Explain Differences:

Original Contract Price (Award Amount):
Final Contract Price (*to include all modifications, if applicable*): Explain
Differences:

4. Project Description:
Complexity of Work ☐ High ☐ Med ☐ Routine
How is this project relevant to project of submission? (*Please provide details such as similar equipment, requirements, conditions, etc.*)

CLIENT INFORMATION (Client to complete Blocks 5-8)

5. Client Information
Name:
Title:
Phone Number:
Email Address:

6. Describe the client's role in the project:

7. Date Questionnaire was completed (mm/dd/yy)**:**

8. Client's Signature:

NOTE: NAVFAC REQUESTS THAT THE CLIENT COMPLETES THIS QUESTIONNAIRE AND SUBMITS DIRECTLY BACK TO THE OFFEROR. THE OFFEROR WILL SUBMIT THE COMPLETED QUESTIONNAIRE TO NAVFAC WITH THEIR PROPOSAL, AND MAY DUPLICATE THIS QUESTIONNAIRE FOR FUTURE SUBMISSION ON NAVFAC SOLICITATIONS. CLIENTS ARE HIGHLY ENCOURAGED TO SUBMIT QUESTIONNAIRES DIRECTLY TO THE OFFEROR. HOWEVER, QUESTIONNAIRES MAY BE SUBMITTED DIRECTLY TO NAVFAC. PLEASE CONTACT THE OFFEROR FOR NAVFAC POC INFORMATION. THE GOVERNMENT RESERVES THE RIGHT TO VERIFY ANY AND ALL INFORMATION ON THIS FORM.

ADJECTIVE RATINGS AND DEFINITIONS TO BE USED TO BEST REFLECT YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE

RATING	DEFINITION	NOTE
(E) Exceptional	Performance meets contractual requirements and exceeds many to the Government/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with few minor problems for which corrective actions taken by the contractor was highly effective.	An Exceptional rating is appropriate when the Contractor successfully performed multiple significant events that were of benefit to the Government/Owner. A singular benefit, however, could be of such magnitude that it alone constitutes an Exceptional rating. Also, there should have been NO significant weaknesses identified.
(VG) Very Good	Performance meets contractual requirements and exceeds some to the Government's/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with some minor problems for which corrective actions taken by the contractor were effective.	A Very Good rating is appropriate when the Contractor successfully performed a significant event that was a benefit to the Government/Owner. There should have been no significant weaknesses identified.
(S) Satisfactory	Performance meets minimum contractual requirements. The contractual performance of the element or sub-element contains some minor problems for which corrective actions taken by the contractor appear or were satisfactory.	A Satisfactory rating is appropriate when there were only minor problems, or major problems that the contractor recovered from without impact to the contract. There should have been NO significant weaknesses identified. Per DOD policy, a fundamental principle of assigning ratings is that contractors will not be assessed a rating lower than Satisfactory solely for not performing beyond the requirements of the contract.
(M) Marginal	Performance does not meet some contractual requirements. The contractual performance of the element or sub-element being assessed reflects a serious problem for which the contractor has not yet identified corrective actions. The contractor's proposed actions appear only marginally effective or were not fully implemented.	A Marginal is appropriate when a significant event occurred that the contractor had trouble overcoming which impacted the Government/Owner.
(U) Unsatisfactory	Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance of the element or sub-element contains serious problem(s) for which the contractor's corrective actions appear or were ineffective.	An Unsatisfactory rating is appropriate when multiple significant events occurred that the contractor had trouble overcoming and which impacted the Government/Owner. A singular problem, however, could be of such serious magnitude that it alone constitutes an unsatisfactory rating.
(N) Not Applicable	No information or did not apply to your contract	Rating will be neither positive nor negative.

J-02000000-12

Contractor Information (Firm Name): _____

Client Information (Name): _____

TO BE COMPLETED BY CLIENT

PLEASE CIRCLE THE ADJECTIVE RATING WHICH BEST REFLECTS YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE.

1. QUALITY:						
a) Quality of technical data/report preparation efforts	E	VG	S	M	U	N
b) Ability to meet quality standards specified for technical performance	E	VG	S	M	U	N
c) Timeliness/effectiveness of contract problem resolution without extensive customer guidance	E	VG	S	M	U	N
d) Adequacy/effectiveness of quality control program and adherence to contract quality assurance requirements (without adverse effect on performance)	E	VG	S	M	U	N
2. SCHEDULE/TIMELINESS OF PERFORMANCE:						
a) Compliance with contract delivery/completion schedules including any significant intermediate milestones. *(If liquidated damages were assessed or the schedule was not met, please address below)*	E	VG	S	M	U	N
b) Rate the contractor's use of available resources to accomplish tasks identified in the contract	E	VG	S	M	U	N
3. CUSTOMER SATISFACTION:						
a) To what extent were the end users satisfied with the project?	E	VG	S	M	U	N
b) Contractor was reasonable and cooperative in dealing with your staff (including the ability to successfully resolve disagreements/disputes; responsiveness to administrative reports, businesslike and communication)	E	VG	S	M	U	N
c) To what extent was the contractor cooperative, businesslike, and concerned with the interests of the customer?	E	VG	S	M	U	N
d) Overall customer satisfaction	E	VG	S	M	U	N
4. MANAGEMENT/ PERSONNEL/LABOR						
a) Effectiveness of on-site management, including management of subcontractors, suppliers, materials, and/or labor force?	E	VG	S	M	U	N
b) Ability to hire, apply, and retain a qualified workforce to this effort	E	VG	S	M	U	N

c) Government Property Control	E	VG	S	M	U	N
d) Knowledge/expertise demonstrated by contractor personnel	E	VG	S	M	U	N
e) Utilization of Small Business concerns	E	VG	S	M	U	N
f) Ability to simultaneously manage multiple projects with multiple disciplines	E	VG	S	M	U	N
g) Ability to assimilate and incorporate changes in requirements and/or priority, including planning, execution and response to Government changes	E	VG	S	M	U	N
h) Effectiveness of overall management (including ability to effectively lead, manage and control the program)	E	VG	S	M	U	N
5. COST/FINANCIAL MANAGEMENT						
a) Ability to meet the terms and conditions within the contractually agreed price(s)?	E	VG	S	M	U	N
b) Contractor proposed innovative alternative methods/processes that reduced cost, improved maintainability or other factors that benefited the client	E	VG	S	M	U	N
c) If this is/was a Government cost type contract, please rate the Contractor's timeliness and accuracy in submitting monthly invoices with appropriate back-up documentation, monthly status reports/budget variance reports, compliance with established budgets and avoidance of significant and/or unexplained variances (under runs or overruns)	E	VG	S	M	U	N
d) Is the Contractor's accounting system adequate for management and tracking of costs? *If no, please explain in Remarks section.*		Yes			No	
e) If this is/was a Government contract, has/was this contract been partially or completely terminated for default or convenience or are there any pending terminations? *Indicate if show cause or cure notices were issued, or any default action in comment section below.*		Yes			No	
f) Have there been any indications that the contractor has had any financial problems? *If yes, please explain below.*		Yes			No	
6. SAFETY/SECURITY						
a) To what extent was the contractor able to maintain an environment of safety, adhere to its approved safety plan, and respond to safety issues? (Includes: following the users rules, regulations, and requirements regarding housekeeping, safety, correction of noted deficiencies, etc.)	E	VG	S	M	U	N
b) Contractor complied with all security requirements for the project and personnel security requirements.	E	VG	S	M	U	N

7. GENERAL	
a) Ability to successfully respond to emergency and/or surge situations (including notifying COR, PM or Contracting Officer in a timely manner regarding urgent contractual issues).	E VG S M U N
b) Compliance with contractual terms/provisions *(explain if specific issues)*	E VG S M U N
c) Would you hire or work with this firm again? *(If no, please explain below)*	Yes No
d) In summary, provide an overall rating for the work performed by this contractor.	E VG S M U N

Please provide responses to the questions above (*if applicable*) and/or additional remarks. Furthermore, please provide a brief narrative addressing specific strengths, weaknesses, deficiencies, or other comments which may assist our office in evaluating performance risk *(please attach additional pages if necessary)***:**

J-02000000-11

From:

To: Quin Conerly-Anderson, NAVFAC Mid-Atlantic, Acquisition ACQ32

Subj: Solicitation/Contract No. N40085-23-R-2525

1. In accordance with the provisions of FAR Clause 52.219-14, Limitations on Subcontracting, the Contracting Officer is hereby notified that _____(Company) intends to subcontract the following portion(s) of the requirements of this contract:

SUBCONTRACTOR INFORMATION		TYPE OF WORK TO BE SUBCONTRACTED	PERCENT (%) OF TOTAL CONTRACT VALUE
NAME: ADDRESS: CAGE/DUNS: PRIMARY NAICS: COMPANY SIZE: POC: PHONE: EMAIL:			
NAME: ADDRESS: CAGE/DUNS: PRIMARY NAICS: COMPANY SIZE: POC: PHONE: EMAIL:			

* * Table may be expanded as needed.

2. Furthermore, in accordance with the provisions of FAR 52.219-14, Limitations on Subcontracting (Nov 2011), by submission of an offer and execution of this contract,_____(Company) agrees that in performance of this contract, in the case of a contract for –

(a) Services (except construction) - it will not pay more than 50 percent of the amount paid by the Government for contract performance to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count toward the 50 percent subcontract amount that cannot be exceeded;

(b) Supplies (other than procurement from a non-manufacturer of such supplies), it will not pay more than 50 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count toward the 50 percent subcontract amount that cannot be exceeded;

(c) General construction, it will not pay more than 85 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work

that a similarly situated entity further subcontracts will count toward the 85 percent subcontract amount that cannot be exceeded

3. Additionally, _ _____(Company) certifies that they will self-perform the following work _

Description of Work	Percentage of the Total Contract Value

* * Table may be expanded as needed.

Note: Percentages of subcontracted work plus self-performed work should equal 100%.

4. No changes in subcontractors are allowed without prior written approval of the Contracting Officer and the SBA. The contractor shall notify the Contracting Officer and its SBA servicing center a minimum of 10 business days prior to any needed change. The contractor shall not proceed with any requested change in advance of written approval from the Contracting Officer and the SBA.

CONTRACTOR:

_____ _____
SIGNATURE NAME AND TITLE DATE

CONTRACTING OFFICER APPROVAL:

_____ _____
SIGNATURE NAME AND TITLE DATE

SBA APPROVAL:

_____ _____
SIGNATURE NAME AND TITLE DATE

J-02000000-13

OSHA's Form 300A (Rev. 04/2004)

Summary of Work-Related Injuries and Illnesses

Note: You can type input into this form and save it.
Because the forms in this recordkeeping package are "fillable/writable" PDF documents, you can type into the input form fields and then save your inputs using the free Adobe PDF Reader.

Year 20 __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	0	(4) Poisonings	0
(2) Skin disorders	0	(5) Hearing loss	0
(3) Respiratory conditions	0	(6) All other illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information *(If you don't have these figures, see the Worksheet on the next page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

Phone ____ - ____ - _____ Date ____ / ____ / ____

Save Input

J-02000000-15

CERTIFICATE OF NON-DISCLOSURE AND CONFLICT OF INTEREST STATEMENT

Solicitation/Contract #N40085-23-R-2525

I understand that in the course of my duties and responsibilities, I may have access to information received by the Government in confidence from non-Federal entities in connection with this acquisition including, but not necessarily limited to, technical approaches, past performance information, trade secrets, inventions, discoveries, and reports of a financial or technical nature and cost or pricing-related information. I may also have access to other procurement information such as the names, identities, or numbers of non-Federal entities under consideration or the methods or procedures used in the selection of a contractor, including, but not limited to, the standards and ratings used in the evaluation process. I understand that this and other information gained during the procurement process may constitute "source selection information" and "contractor bid and proposal information" as those terms are defined in FAR 2.101 and 3.104. I understand that federal law prohibits the unauthorized disclosure of such information. I agree not to disclose such information to any individual outside of the acquisition team members and advisors without the express authorization of the Contracting Officer responsible for the acquisition. I understand that my obligation not to disclose the information described above does not terminate with the award of a contract or any other contract action. I further understand that unauthorized disclosure of such information may result in disciplinary action, including termination of employment. If I am a military member, I understand that failure to comply with these conditions may result in disciplinary action under the Uniform Code of Military Justice.

I further affirm that I have reviewed my financial interests, and the interests of my spouse and minor children, and to the best of my knowledge those interests are not likely to create a real or apparent conflict of interest with my participation in this acquisition. In the event a proposal is received from firm in which I have a personal or financial interest of any nature, I will immediately notify the Contracting Officer. I acknowledge that the personal or financial interest may require my removal from further participation in this source selection. (Note that the interest of a spouse, minor child, or other member of an employee's immediate household should be reported in the same manner as an interest of the panel member.)

These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

Member's Name Printed: _____

Member's Signature: _____ **Date**: _____

Section J – 0200000 Management and Administration	
Attachment Number	**Attachment Title**
J-0200000-01	Definitions and Acronyms
J-0200000-02	Wage Determinations
J-0200000-03	Directives, Instructions, and References
J-0200000-04	Invoice Form
J-0200000-05	Forms
J-0200000-06	PNSY Station Regulations
J-0200000-07	PNSY Contractor Crane Operation and Maintenance
J-0200000-08	DBIDS Access Request Form
J-0200000-09	Contractor Hazardous Material Inventory Log
J-0200000-10	Exhibit Line Item Numbers (ELINs)
J-0200000-11	Limitations on Subcontracting
J-0200000-12	Corporate Experience Form
J-0200000-13	OSHA Form
J-0200000-14	Past Performance Questionnaire
J-0200000-15	Contracts Self Performance Certification

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
Assessment	A general term referring to either a survey or inspection of a facility to determine condition.
Asset	A general term used to refer to an item, such as a component, system, building or facility, which is managed by an automated data management program.
Competent Person	A person who has the professional experience and training necessary to identify existing and predictable hazards at a work or service environment, and who has the authority to take prompt and corrective action to eliminate or remove dangers from the environment. One who can identify existing and predictable hazards in the working environment or working conditions that are dangerous to personnel and who has authorization to take prompt corrective measures to eliminate them.
Component Inventory Management Unit (CIMU)	An organization of like-kind real property into manageable maintenance units. CIMU is a building component, group of components or component assemblies, serving a specific purpose in a facility that can be expected to follow a common and predictable lifecycle behavior. This class of non-equipment will include items such as exterior walls, exterior windows, interior finish, and roofs. This class of equipment will include items such as fan coil units, air handling units, lighting, and water closets. CIMUs can include one or more items of installed equipment typically subject to routine scheduled maintenance.
Confined Work Space	A space that is large enough and so configured that a person may bodily enter a space (such as in tanks, vessels, silos, storage bins, hoppers, vaults, pits, and like spaces where there is limited means of entry) and is hindered or restricted from escaping during an emergency.
Construction Equipment	Construction equipment refers to specialized heavy machinery that covers one industry and is specifically designed for executing construction work. Construction equipment requirements shall include a list of equipment establishing the size, quality, number of units, and unit prices. Construction equipment prices provided by the Contractor shall be the lowest price available considering the availability of equipment and the time constraints of the job. The direct equipment price shall be adjusted by all discounts and rebates that accrue to the Contractor. All indirect cost associated with construction equipment, such as: the Contractor's hourly composite trade wage, adjusted to allow for workforce productivity; sub-contractor cost, costs for pre-expended bin materials, shipping and handling, union agreements, crew sizes, hand tools, universal equipment (excluding construction equipment), mobilization, demobilization, payroll burdens and fringes, overtime, job (field) overhead, clerical support, supervision, inspection, fees, taxes, licenses, permits, and insurance, general and administrative (home office) overhead, profit, and all other associated markups shall not be included in the construction equipment price since the cost for these items were included in the labor hour unit price bid. Additionally, time for job preparation, safety standby personnel, and similar indirect labor elements shall not be included.
Contracting Officer (KO)	That individual with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.
Contracting Officer's Representative (COR)	The individual appointed by the KO responsible for monitoring the Contractor's technical compliance and progress, relative to assigned contract(s)/orders(s), based on the contract requirements specified in the PWS and in accordance with the PAP. The COR performs a variety of contract administration duties that includes oversight of PA, documenting and rating Contractor performance, reviewing invoices, and acceptance of work. Assignment as a COR is a collateral duty typically performed by the FSCM or SPAR.

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
Contractor	That entity or its representative responsible for the delivery of the services or materials specified in this contract, as designated by contract award. The term Contractor as used herein refers to both the prime Contractor and any subcontractors. The prime Contractor shall insure that subcontractors comply with the provision of this contract.
Contractor Representative	That individual appointed by the Contractor, either orally or in writing, who has been assigned responsibility for executing the requirements of this contract.
Crane, Category 1	Portal cranes, Hammerhead cranes, Locomotive cranes, Derricks, Floating cranes (YD), Tower cranes, Container cranes, Mobile cranes (except those indicated as category 4), including truck, cruiser, crawler, warehouse/industrial cranes, and cranes used for dragline, pile driving, clamshell, magnet, bucket work, and Aircraft crash cranes.
Crane, Category 2 & 3	Cranes with rated capacities of 20,000 pounds or greater are category 2. Examples are Overhead traveling cranes, Gantry cranes (rail mounted), Wall cranes, Jib cranes, Pillar cranes, Pillar jib cranes, Monorails and associated hoists, Fixed hoists including chain falls. Pedestal mounted commercial boom assemblies (fixed length, telescoping, and articulating types) attached to stake trucks, trailers, flatbeds, or railcars, or stationary mounted to piers, etc., with OEM rated capacities less than 2,000 pounds.
Crane, Category 4	Commercial truck mounted cranes, Truck mounted articulating boom cranes, Pedestal mounted commercial boom assemblies (fixed length, telescoping, and articulating types) attached to stake trucks, trailers, flatbeds, or railcars, or stationary mounted to piers, etc., with OEM rated capacities of 2,000 pounds and greater. Commercial truck mounted cranes and truck mounted articulating boom cranes with OEM capacities of 2,000 pounds and greater require a licensed operator even if the cranes are down rated below 2,000 pounds capacity for administrative purposes.
Direct Material Costs	The actual vendor invoice charges for materials used for performance of work under this contract. Direct material costs shall include sales tax and transportation charges when such charges are included on the invoice by the vendor, as well as any discounts allowed for prompt payment and discounts or rebates for core value or salvage value that accrue to the Contractor. When questions arise concerning the cost of direct materials, direct material costs will be based on the lowest of quotes provided by the Contractor from at least three different commercial vendors for the direct material cost. The Government retains the right to obtain additional quotes in questionable situations. The lowest price will be used. All other cost such as sub-contractor cost, costs for pre-expended bin materials, shipping and handling, union agreements, crew sizes, hand tools, universal equipment, mobilization, demobilization, time for job preparation, safety standby personnel, payroll burdens and fringes, overtime, job (field) overhead, clerical support, supervision, inspection, fees, taxes, licenses, permits, and insurance, general and administrative (home office) overhead, profit, and all other associated markups shall not be included in the direct material price since the cost for these items are included in the UPL Hour unit price bid.
Electronic Operation And Maintenance And Support Information (eOMSI)	A set of consultant-prepared data and document files that contain detailed, as-built technical information that describes the efficient, economical and safe operation, maintenance and repair of a facility, plant, equipment or system throughout its life cycle. Generally, it is prepared during construction and submitted upon completion of a new facility or major facility upgrade. eOMSI's typically include asset information, staffing and budgeting information, supply support including critical spare parts, operating procedures, troubleshooting and diagnostic guides, extended warranty data, maintenance task frequencies and documentation, technical data, repair procedures and manufacturer's product data. eOMSI data and document files are provided in electronic formats.

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
Equipment	Tangible asset that is functionally complete for its intended purpose, durable, and non-expendable.
Facility	A building or structure designed and created to serve a particular function.
Fixed Burden Rate (FBR)	The additional costs (expressed in percent of direct material cost) for ordering, handling, and stockpiling materials and repair parts. For example, if the offeror's Fixed Burden Rate for materials in the Base Period is 10% then: $100,000.00 + ($100,000.00 x 10%) = $110,000.00 The Government will compensate the Contractor for the required parts and materials and not the total amount shown in Schedule of Indefinite Delivery Indefinite Quantity Work.
Frequency Of Service	<<*Note to Spec Writer*: Edit as appropriate>> Annual (A). Services performed once during each 12-month period of the contract at intervals of 335 to 395 days. Biennial (B). Services performed once during each 24-month period of the contract at internals of 670 to 790 days. Daily (D5). Services performed once each calendar day, Monday through Friday, including holidays unless otherwise noted. Daily (D7). Services performed once each calendar day, seven days per week, including weekends and holidays. Monthly (M). Services performed 12 times during each 12-month period of the contract at intervals of 28 to 31 calendar days. Quarterly (Q). Services performed four times during each 12-month period of the contract at intervals of 80 to 100 calendar days. Semiannual (SA). Services performed twice during each 12-month period of the contract at intervals of 160 to 200 calendar days. Semimonthly (SM). Services performed 24 times during each 12-month period of the contract at intervals of 14 to 16 calendar days. Three times weekly (3W). Services performed three times a week, such as Monday, Wednesday, and Friday. Twice weekly (2W). Services performed twice a week, such as Monday and Thursday or Tuesday and Friday. Weekly (W). Services performed 52 times during each 12-month period of the contract at intervals of six to eight calendar days.
Government Furnished Property (GFP)	Property in the possession of, or directly acquired by, the Government and subsequently furnished to the contractor for performance of a contract. Government furnished property includes, but is not limited to, spares and property furnished for repairs, maintenance, overhaul, or modification. Government furnished property also includes contractor acquired property if the contractor acquired property is a deliverable under a cost contract when accepted by the Government for continued use under the contract.
Hazardous Material (HM)	A material that because of its quality, concentration, physical, chemical or infectious nature may pose a threat to human health or the environment if released or spilled into the environment or any material designated by the Department of Transportation (DOT) or any materials that require a SDS form as posing a potential threat while being transported. Hazardous materials are listed in 49 CFR Part 172.
Hazardous Waste (HW)	Any discarded solid waste (liquid, semi-solid, solid, or gaseous) that meets the definition of a hazardous waste by USEPA, state authorities, or the Navy. In accordance with RCRA, a solid waste is a listed hazardous waste if it is specifically listed, or it is a characteristic hazardous waste if it exhibits the characteristics of ignitability, corrosivity, reactivity, or toxicity.

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
Hazardous Waste Management Plan	In accordance with OPNAVINST 5090.1C, every Navy shore activity that generates HW shall develop and use a Hazardous Waste Management Plan or a Hazardous Waste management component in its P2 Plan and EMS. A Hazardous Waste Management Plan shall: • Identify applicable federal, state, and local regulations pertaining to the generation and management of hazardous waste. • Identify training requirements and describe procedures for obtaining training and maintaining training records. • Assign responsibilities for the generation, designation, handling, storage, treatment, disposal, and all documentation. • Describe all hazardous waste generation and management procedures. • Include or reference the hazardous waste minimization plan and goals. • Include or reference contingency plans and emergency response procedures. The plan shall be kept up to date to include changes in hazardous waste generation and management procedures, as well as changes in applicable federal, state, and local hazardous waste regulations. The plan shall include or reference minimization procedures sufficient to achieve DOD minimization goals. Tenant activities are covered by the host CO's Hazardous Waste Management Plan.
Hazardous Waste Manifest	A hazardous waste manifest as defined in 40 CFR 260 is required for the transport of hazardous waste. The installation commanding officer (ICO) or the ICO's designated representative shall retain signature authority for hazardous waste manifests.
Infrastructure Condition Assessment Program (ICAP)	A Navy automated data management program that utilizes historical asset lifecycle data and a structured assessment process to evaluate the condition facilities and their components.
Inspection	A rigorous, detailed assessment of the condition of a facility performed to generate a fundable scope and cost estimate for prioritization and funding of maintenance and repair.
Integrated Maintenance Program (IMP)	IMP is a recurring state-of-the-art, reliability-centered inspection, testing, maintenance and repair program that determines best practices for managing the functions and consequences of failures of facilities equipment and system components. IMP encompasses accepted commercial practices, including reactive, preventive, predictive and proactive maintenance, into one optimal program. The IMP approach gives the Contractor full responsibility to maintain systems and equipment and perform repairs whenever necessary to ensure equipment and systems are operational and remain in a constant state of readiness. Service orders will not be issued for accomplishment of repairs on systems and equipment maintained under IMP.
Job or Work Order	An authorization for work that requires planning and estimating and has an individual line of accounting for financial and performance evaluation.
Life-Cycle Costs	A form of economic analysis that considers the total cost of owning, operating, and maintaining a building or system over its useful life.
Less-than-90-day Accumulation Areas or Storage Facilities	Temporary HW storage areas where HW may be stored for up to 90 days without a RCRA permit.
Maintenance and Repair	The preservation or restoration of a piece of equipment, system, or facility to such condition that it may be effectively used for its designated purposes. Maintenance/repair may be adjustment, overhaul, reprocessing, or replacement of constituent parts or materials that are missing or have deteriorated by action of the elements or usage, or replacement of the entire unit or system if beyond economical repair.
Monthly On-Site Labor Report	A compilation of all Contractor and subcontractor employee-hours involved in delivering contract services on a Government property.

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
NAVFAC MAXIMO	A specially configured software version of MAXIMO®, a commercially available computerized maintenance management system (CMMS), adopted by NAVFAC for enterprise facility asset data management. The terms "MAXIMO", "NAVFAC MAXIMO" or "Government's MAXIMO" shall be used interchangeably in the document.
Non-RCRA Regulated Waste	Waste that is not regulated as a hazardous waste under RCRA; however, is waste may be regulated by other federal, state or local regulations including but not limited to TSCA, Clean Air Act, Clean Water Act or other regulations and statues. Examples include Used Oil, Universal Waste, Oily Water, antifreeze, etc. Non-RCRA regulated waste (while not meeting the definition of a Hazardous Waste) must be managed according to its applicable regulations and may not be discarded into the general trash.
Non-Regulated Solid Waste (Debris and Rubbish)	Waste not associated with an industrial process such as refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food. Non-hazardous construction and demolition wastes such as dimension and non-dimension lumber, plywood, chipboard, and hardboard are included.
Partnering	The terms "partnering" and "partnership" used herein shall mean a relationship of open communication and close cooperation that involves both Government and Contractor personnel working together for the purpose of establishing a mutually beneficial, proactive, cooperative environment within which to achieve contract objectives and resolve issues and implementing actions as required.
Performance Assessment	A method used by the Government to provide some measure of control over the quality of purchased goods and services received.
Performance Assessment Representative (PAR)	The individual(s) assigned as a Technical Point of Contact (TPOC) / Subject Matter Expert (SME) to the COR to perform duties as the on-site representative who assesses Contractor performance. The PAR periodically observes Contractor performance, reviews delivered services, reviews quality management corrective actions, periodically assesses and documents Contractor performance on PAWs and the MPAS, and communicates findings as necessary with the Contractor, SPAR, and COR.
Pre-Expended Bin Materials And Supplies	The minor materials and supplies that are incidental to the job, for which the total direct cost of any one material line item shown on the material estimate is $10.00 or less. Examples of pre-expended bin materials and supplies include, but are not limited to, solder, lead, flux, electrical connectors, electrical tape, fuses, nails, screws, bolts, nuts, washers, spacers, masking tape, sand paper, solvent, cleaners, lubricants, grease, oil, rags, mops, glue, epoxy, spackling compound, joint tape, plumbers tape and compound, clips, welding rods, and touch up paint.
Property Administrator	An authorized representative of the Contracting Officer who is responsible for administering contract property requirements, terms and conditions of the contract
Property Management Program	A Government program established for the purpose of reviewing and approving the Contractor's Property Management Plan and System through performance of a system analysis whenever government property is in the possession of the Contractor.
Quality Assurance (QA)	The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled.
Quality Control (QC)	The observation techniques and activities used to fulfill requirements for quality.
R. S. Means	A data collection and organization system developed by R. S. Means Company which can be used to prepare accurate, dependable construction estimates and budgets in a variety of ways. The Contractor shall use the latest edition. Material prices are based on a national average and computed labor costs are based on a 30-city national average. An estimate prepared using this data is called a "Means estimate"; data may simply be referred to as "Means".

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
Real Property	Land and improvements to land (i.e., facilities). It includes equipment affixed and built into the facility as an integral part of the facility (such as heating systems), but not movable equipment (e.g., plant equipment, industrial equipment, buoys).
Real Property Inventory Equipment (RPIE)	A Government owned or leased individual pieces of equipment, apparatus, or fixture that are essential to the function of the real property (i.e. plumbing, electrical, heating, cooling and elevators). It is physically attached to, integrated into, and built in or on the property. Individual RPIE's can be combined to make a CIMU to facilitate facilities management. An individual RPIE can also be a CIMU if the equipment is complex enough to require its own management planning.
Regulated Waste	Any hazardous, non-hazardous, industrial process waste (aka special waste), e-waste, and/or off-specification HM, which because of its physical characteristics, chemical make-up or biological nature requires either special handling procedures and permitting, or poses an unusual threat to human health, equipment, property, or the environment. Examples include (but are not limited to) liquid sludge, pastes, and/or filter cakes, chemical compounds and/or petroleum products, fine powders or highly dusty materials, spent blast media and/or grit, demolition wastes from industrial facilities, debris and/or residues from spill cleanup work, underground storage tank remediation materials, pollution control wastes, ash from fires, furnaces, boilers or incinerators, off-specification products, other materials that have the potential to be a hazardous waste. All RW may be used or unused excess hazardous materials. Laboratory analysis may be required to verify the waste is not a RCRA-regulated hazardous waste.
Response Time	The time allowed the Contractor after initial notification of a work requirement to be physically on the premises at the work site with appropriate personnel, tools, equipment, and materials, ready to perform the work required.
Restoration	Restoration of real property to such a condition that it can be used for its intended purpose. Includes repair or replacement work to restore facilities damaged by inadequate sustainment, excessive age, natural disaster, fire, accident or other causes.
Sampling Plan	Plan and procedures to conduct sampling, field testing and laboratory analysis for a defined testing objective.
Satellite Accumulation Areas	Designated approved areas, at or near the point of generation and under the control of the operator generating the waste, where no more than 55 gallons (cumulative total) of all types of HW or 1 quart of acutely HW may be accumulated. The 55-gallon limit does not include non RCRA regulated waste, universal waste and used oil etc.
Spill Prevention Control and Countermeasure (SPCC) Plan	The SPCC Plan establishes engineering controls including procedures, methods, equipment and other requirements to prevent the discharge of oil into or upon navigable waters. The Plan includes procedures for oil spill prevention, measures to contain spills and an established spill drill exercises to ensure effective countermeasures in the event of oil spill.
Sustainment	Maintenance and repair activities necessary to keep a typical inventory of facilities in "normal working condition". Sustainment includes regularly scheduled maintenance as well as cyclical major repairs or replacement of components that occur periodically over the expected service life of the facilities.
System	An assemblage of mechanically and/or electrically interlocked parts, equipment and/or components forming a unitary whole.
Unit Priced Labor (UPL) Hour	The fully burdened unit price bid by the Contractor to perform one hour of work-in-place. With the exception of direct material and construction equipment costs, the unit priced labor hour price shall include all indirect and direct costs associated with performing work, such as: the Contractor's hourly composite trade wage, adjusted to allow for workforce productivity; sub-contractor cost, costs for pre-expended bin materials, shipping and handling, wage determinations, union agreements, crew sizes,

Attachment J-0200000-01
Definitions and Acronyms

Definition	Description
	hand tools, equipment, universal equipment (excluding construction equipment), mobilization, demobilization, payroll burdens and fringes, overtime, job (field) overhead, clerical support, supervision, inspection, fees, taxes, licenses, permits, and insurance, general and administrative (home office) overhead, profit, and all other associated markups. Any indirect cost or additional markups not allowed in the definition of direct materials shall be included in the UPL price. Additionally, time for job preparation, safety standby personnel, and similar indirect labor elements are included.
Uniformat Classification	A standard classification of building components established by the National Institute of Standards and Technology.
Universal Equipment	Universal equipment refers to equipment that can cover two or more industries and is commercially employed in execution of operation, maintenance, and repair work, such as: Aerial Work Platforms, Backhoes, Cranes, Dump Trucks, Excavators, Generators, Graders, Lifts, Loaders, Man Lifts, Monitoring and Test Equipment, Pumps, Tractors, Trailers, etc.
Universal Waste (UW)	Universal Waste (UW) (defined in 40 CFR Part 273) means batteries, fluorescent lamps, some pesticides, and mercury-containing equipment formally classified as a HW, but that are now subject to less stringent regulations, when recycled if recycling is available.
Utility Infrastructure Condition Assessment Program (UICAP)	A comprehensive assessment processes for planning, managing, and executing Navy utility infrastructure inspections.

Attachment J-0200000-01 Definitions and Acronyms	
Acronym	**Title**
ACO	Administrative Contracting Officer
AFFF	Aqueous Film Forming Foam
BFR	Basic Facility Requirements
BW	Biweekly
CBMM	Condition Based Maintenance Management Program
CDR	Contract Discrepancy Report
CIA	Controlled Industrial Area
CIMU	Component Inventory Management Unit
CMMS	Computerized Maintenance Management System
CNSSI	Committee on National Security Systems Instruction
COR	Contracting Officer Representative
COR	Condition of Readiness
DBH	Diameter at Breast Height
DCR	Direct Condition Rating
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoN	Department of Navy
DRMO	Defense Reutilization Management Office
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FAR	Federal Acquisition Regulation
FFP	Firm Fixed Price
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSC	Facility Support Contract
FSCM	Facility Support Contract Manager
GIS	Geospatial Information System
GFE	Government-furnished Equipment
GFF	Government-furnished Facilities
GFM	Government-furnished Materials
HCA	Head Contracting Agency
ICAP	Infrastructure Condition Assessment Program
ICP	Integrated Contingency Plan
IDIQ	Indefinite Delivery Indefinite Quantity
iNFADS	Internet Navy Facilities Asst Data Store
IPM	Integrated Pest Management
IPMIS	Integrated Pest Management Information System
IPMP	Integrated Pest Management Plan
KO	Contracting Officer
LAN	Local Area Network
M	Monthly
MAP	Maintenance Action Plan
MDI	Mission Dependency Index
MEP	Mechanical, Electrical and Plumbing
MILCON	Military Construction
MPAS	Monthly Performance Assessment Summary
MRI	Mission Readiness Index
MSDS	Material Safety Data Sheets
NAVFAC	Naval Facilities Engineering Command
NIST	National Institute of Standards and Technology
NIST SP	National Institute of Standards and Technology Special Publication
NMCI	Navy Marine Corps Intranet

Attachment J-0200000-01 Definitions and Acronyms	
Acronym	**Title**
NOSC	Navy-On-Scene Coordinator
PAP	Performance Assessment Plan
PAR	Performance Assessment Representative
PAW	Performance Assessment Worksheet
PEO	Program Executive Officer
PM	Project Manager
PM	Planned Maintenance or Preventative Maintenance
POAM	Plan of Action and Milestones
PRCSP	Permit Required Confined Space Program
PWS	Performance Work Statement
PWO	Public Works Officer
Q	Quarterly
QC	Quality Control
RSIP	Regional Shore Infrastructure Plan
RPIE	Real Property Inventory Equipment
RSL	Remaining Service Life
SC	Security Clearances
SM	Semimonthly
SPAR	Senior Performance Assessment Representative
TE	Technical Exhibit
VIQ	Variation in Quantity
WBS	Work Breakdown Structure

Attachment J-0200000-02 Wage Determinations
Placeholder for Collective Bargaining Agreements, Service Contract Labor Standards and Wage Rate Requirements.

Attachment J-0200000-03 Directives, Instructions, and References	
Reference	**Title**
CNSSI 1253	Security Categorization and Control Selection for National Security Systems
DoD Directive 5200.2	DoD Personnel Security Program (PSP)
DoDI 8582.01	Security of Unclassified DoD Information on Non-DoD Information Systems
DODD 6055.9	DoD Explosives Safety Management and the DoD Explosives Safety Board
EM 385-1-1	U.S. Army Corps of Engineers Safety and Health Requirements
P.L. 91-596	Occupational Safety and Health Act

Attachment J-0200000-04
Invoice Form

1. CONTRACTOR'S INVOICE

From _____ Invoice Date _____

_____ Invoice Number _____

POC/Telephone/email for this invoice: _____

To: Contract Specialist: _____

Below is a Statement of Performance under Contract _____ **Task Order #** _____

for _____ **at** _____

The enclosure provides breakdown of this statement of performance.

A. Total value of contract/task order through change		$
B. Percentage of performance complete	%	%
C. Value of completed performance		$
D. Less total of prior payments		$
E. Amount of this invoice		$

Signature and Title: _____

Date: Signature of Authorized Representative

Taxpayer Identification No. (TIN): _____

Electronic funds transfer (EFT) banking information (if applicable):

2. FIRST ENDORSEMENT

From: Accountable Official

To: Certifying Officer

A. Amount of work completed to (date)		$
B. Less:		
Retention	$	
Other Deductions	$	$
C. Subtotal		$
D. Less previous payments		$
E. Certified amount for payment #	on TO #	$
F. Elapsed contract time (if applicable)		

CONTRACT _____
Sheet _____ of _____
Period Ending _____

LOCATION:

TO BE COMPLETED BY CONTRACTOR						GOVERNMENT USE ONLY			
Cost Category	CLIN #, SLIN #, or ACRN #	Description	Estimated Cost	% Complete	Value	%	Work in Place		
							Value	Prior Report	This Period
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Totals									
							Undistributed Charges-Material		
							Other		
							Grand Totals		

Remarks:

Signature: _____ Date: _____
Signature of Authorized Representative (Contractor)

Name and Title (typed): _____
Phone and address: _____
(iaw FAR 32.905)

ATTACHMENT J-0200000-05 FORMS	
WHE Accident Report	Located on the NAVFAC Safety Shack web site
Digsafe Request	Attachment J-0200000-05 DigSafe Request.pdf

Contractor Incident Report System (CIRS)

Report Type (REQUIRED)			
Injured	Property	Injured & Property	Near Miss

1. Contract Information	**Incident Information**
Prime Contractor:	**Cage Code**:
Contract Number:	**Occurred On Base:** **Yes** **No**
Task Order #:	

Contractor Contact Information	
Last Name **First Name**	**Phone #:**
Email Address:	**Date Notified:** Ex: MM/DD/YYYY

2. Incident Type(REQUIRED)		**(Please Check All That Apply)**
Assault/Violent Act	Extreme Environmental Exposure	Man over the side (No water entry)
Diving	Falls, slip, trip, or bodily exertion	Man Overboard - Water Entry
Electrical Shock/Burns	Fires - All Types	Material Handling Equipment
Equipment Installation/Repair	Hazardous Material (any type)	Ordnance-Related (Explosive)
Explosion, Non-Ordnance	**Industrial (Select Additional Below)**	Vehicle (Government or Private)

Industrial Incident Additional Information		**(Please Check All That Apply)**
Confined Space	Hand and Power Tools	Work Platforms and Scaffolding
Demolition/Renovation	Rigging	Underground Construction, Shafts, and Caissons
Trenching/Entrapment	Cranes and Hoisting Equipment	Concrete, Masonry, Steel Erection and Residential Construction
Traffic Control	Floating Plant and Marine Activities	Tree Maintenance and Removal
Welding and Cutting	Pressurized Equipment and System	Airfield and Aircraft Operations
Control of Hazardous Energy	Fall Protection	

3. General Information	Incident Information
Date of Incident: Ex: MM/DD/YYYY	**Time of Incident:** :
Describe the incident in detail in your words:	
Exact Location of Incident:	
Was Hazardous Material(s) Involved: Yes No If Yes, Explain What Hazardous Materials Were Involved and Why:	
Activity at Time of Incident:	

Personal Protective Equipment:

Available and used | Available and not used | Not Required

Not related to Mishap | Wrong PPE for job | List PPE

List PPE Used: (required only if List PPE checked)

Who Provided Cleanup? Onsite Base Public

4. Fully Explain What Allowed or Caused the Incident — Incident Information

Direct Cause:

Indirect Cause:

Additional Action Taken: (Please Include a Begin Date and Est. End Date in Description)

5. Contributing Factors

Was Visibility Restricted? Yes No

Distance Visibility was restricted:

Unit of Measure: Feet Yards Meters Miles Nautical Miles

Visibility Restricted By:

Fog Smoke Rain Sleet Snow

Mist Dust ☐ Sandstorm ☐ Unknown Object Other:

Lighting Conditions at Incident Site:	**Was Noise Level a Factor:**	**Was Carbon Monoxide (CO) a Factor:**
Adequate Inadequate	Yes No	Yes No
Unknown	Unknown	**If Yes, CO Alarm Manufacturer:**

1. Injured Data **Person** (if applicable)

Age:	**Gender:** Male Female		**Subcontractor Company Name:**

2. General Information

Drug or Alcohol Involved:

None Unknown Alcohol Drugs Alcohol and Drugs

Who Provided First Aid? Onsite Base Public

Was Ergonomics a Factor: Yes No

Type of Ergonomic Injury:

Lifting Equipment Placement Office Repetitive Motion Positioning

Bending Equipment Placement Industrial Impact Strain

3. Injury Illness/Fatality Information

Severity of Injury/Illness:

Fatality Lost Workday Case Involving Days Away From Work

Permanent Total Disability Light/Limited Duty or Restricted Work (No Lost Work Days)

Permanent Partial Disability Other Reportable & Medical Treatment/No Lost Time

First Aid Treatment Only/First Aid Case

Were There Days Lost: Were	**There Days Hospitalized: Were**	**There Days Restricted Duty:**
Yes No Yes	No Yes No	

Part of Body Affected:
Nature of Injury or Illness:
Event or Exposure:
Source of Injury or Illness:
Injury Activity Code:

4. License	**Person** (if applicable)
Are Appropriate License and Certification/Medical Current: Yes No	
If yes, explain:	

5. Training
Was all the contract-required training provided to the employee: Yes No
If yes, explain:

1. Involved Person Data			(if applicable) Property Damage
Age:	**Gender:** Male Female		**Subcontractor Company Name:**

3. Property Damaged

Was Anyone Injured: Yes No	**Was A Government Motor Vehicle Involved:** Yes No

Property Type	Property ID #	Detailed Description	Owned By	Est. Cost USD	Lost Use Days

4. License (if applicable) **Property Damage**

Are Appropriate License and Certification/Medical Current: Yes No

If yes, explain:

5. Training

Was all the contract-required training provided to the employee? Yes No

If yes, explain:

ATTACHMENT J-0200000-05

FORMS

Solid Waste Management Report

Solid Waste Recycled

Description	Amount (lbs./tons)	Cost	Revenue
Glass			
Metal (aluminum, circuit boards, steel)			
Paper & Paper Board			
Plastic			
Food (cooking grease & oil, discarded food)			
Wood (packaging, pallets, plywood)			
Yard/Green Waste (mulch, trees, trimmings)			
Concrete			
Asphalt			

Select Waste

Description	Amount (lbs./tons)	Cost	Revenue
Construction and Demolition Debris			
Used Oil			
Ethylene Glycol Antifreeze			
Lead-Acid Batteries			

Other Waste

Description	Amount (lbs./tons)	Cost	Revenue
Sewage Sludge (land applied)			
Sewage Sludge (disposed)			
Oil Water Separator Liquids			
OWWO Oil			
OWWO Sludge			
Lift Station Grease			
Other Waste (SPECIFY)			

VOC/HAP Tracking Form
Emission Data

CONTRACTOR:						**REPORTING PERIOD (Month):**			
Product Name (Manufacturer's Name & Product Identification Name Or Number)	**Product Type** (I.E. Paint, Solvent, Adhesive) & **Usage** (I.E.	**AUL Unique Identifier Number**	**Quantity Used** (Gal)	**Product Density** (Lb./Gal.)	**VOC Content** (lb./gal.)	**Total VOC Weight** (lbs.)	**HAP Name** (NONE if none present in product)	**% Weight of HAP in Product**	**Weight of HAP (lbs.)** (N/A if NONE present)
Totals:									

ATTACHMENT J-0200000-05

FORMS

ATTACHMENT "A"			
CONTRACTOR CRANE OPERATING CHECKLIST FOR CRITICAL LIFTS		**YES**	**NO**
1	Does the operator know the weight of the load to be lifted?		
2	Is the load to be lifted within the crane manufacturer's rated capacity in its present configuration?		
3	Is the crane level and on firm ground?		
4	Are outriggers required?		
5	If so, are outriggers fully extended and down, and the load off the wheels.		
6	If blocking is required, is **the entire surface** of the outrigger pad supported, and is the blocking material of sufficient strength to safely support the loaded outrigger pad?		
7	If outriggers are not used, is the crane rated for on-rubber lifts by the manufacturer's load chart?		
8	Is the swing radius of the crane counterweight clear of people, obstructions, and accessible areas within the swing area barricaded to prevent injury, damage and unplanned encroachment?		
9	Has the hook been centered over the load in such a manner to prevent swing (deflection, side loading, load-moment)?		
10	Is the load well secured and balanced in the sling or lifting device before it is lifted (free and clear) more than a few inches?		
11	Is the lift swing path clear of obstructions?		
12	If rotation of the load being lifted is hazardous, is tag line or restraint line being used?		
13	Are personnel prevented from standing or passing under a suspended load?		
14	Are personnel prevented from entering the load fall zone?		
15	Is the crane operator's attention diverted?		
16	Are proper signals being used at all times?		
17	If radio communications are used, is the frequency isolated to the crane team.		
18	Do the operations ensure that side and tip loading is prohibited?		
19	Are start and stop motions in a smooth fluid motion (no sudden acceleration or deceleration)?		
20	If operating near electric power lines, are the rules and guidelines understood and adhered to as specified in NAVFAC P-307?		
21	Is the lift a critical lift?		
22	If so, are critical lift regulations understood, check-off sheets initialed and signed off, and was there an interactive brief conducted with associated personnel?		
23	Is Attachment "A" current, filled out completely, and posted in the crane?		
Contractor Name (Print Legibly):			
Contractor Name (Signature):			
Location:			Date:

ATTACHMENT J-0200000-05

FORMS

NAVSHIPYD-PTSMH-6240/3
PTSMHINST

NAVSHIPYD

5090.1 CH-1

(121)
DATE: _____

1 Mar 88

CONTRACT NO: N62472-_____

EXCAVATION/DEMOLITION MATERIAL REMOVAL PASS

EXCAVATED SOIL SHALL NOT BE REMOVED FROM THE PORTSMOUTH NAVAL SHIPYARD

CONTRACTOR/HAULER: _____

_____

MATERIAL DESCRIPTION: _____

SOURCE OF MATERIAL: _____

APPROVED DESTINATION: _____

_____

_____

☐ Permit/Authorization Obtained
Truck Number: _____

The signatures below verify that an on-site visual inspection of the material has been performed, and that this form is a record of the facts agreed upon:

Contractor Signature: _____

Contracting Officer's Representative Signature: _____
Code: _____

Gate Sentry Signature: _____

CODE 1700 RETURN THIS PASS TO CODE 495

Attachment J-0200000-06
PNSY Station Regulations

Attachment J-020000-07 Contractor Crane Operations and Maintentance
See Attachment “J-0200000-07 PNSY Contractor Crane.docx

ATTACHMENT J-0200000-08
DBIDS Access Request Form

DBIDS ACCESS REQUEST FORM (NAVSHIPYD PTSMH 5500)

SUBMISSION INFORMATION

1. Access Requested For(Full Name):

2. Title:

3. Phone Number :

4. COMPANY NAME :

DBIDS INFORMATION

Is the company requesting access to the installation the primary Contractor Yes☐ No☐
If no, who do they subcontract for:

(IF REQUEST IS FOR MORE THAN ONE PERSON PLEASE ATTACH EMPLOYEE LIST)

COMPANY REQUESTING ACCESS INFORMATION

Company Name (Corporate Legal name):

Company Address :

Company Phone Number(Corporate Office):

Company Local POC:

Email and Phone:

Are Any Personnel Foreign Nationals?
Yes ☐ No ☐ (If Yes provide separate list of Names)

For access to: *PORTSMOUTH NAVAL SHIPYARD*

Timeframe of Access Required: ☐ 0600-1800 ☐ 1400-2300 ☐ 24 Hours

☐ All Week ☐ M-F only ☐ Weekends Only

SPONSOR INFORMATION (MUST BE SHIPYARD PERSONNEL)

Sponsor Name:

Sponsor Organization:

Sponsor Title:

Sponsor Phone Number:

Sponsor Email Address:

Contract or project number:

Contract or Project ACCESS EXPIRATION Date:

Only ONE request for Company access should be submitted to; PNSDBIDS@navy.mil (all requests for employees are on the 5512 and are carried by the employee to pass and ID once the company is approved)
Revision 12/16/19

ATTACHMENT J-0200000-09
CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG
(EPCRA 312 & 313 Worksheet)

COMPANY NAME: ______________________________ CONTRACT NO: ______________________

PROJECT TITLE: ____

Product Name or Trade Name	Manufacturer	Max Amount of Product Stored on Site	Amount of Product Used (e.g., Gallons, Pounds)	Specific Gravity (or wt/volume)	Toxic Chemical Ingredient in Product (Refer to MSDS & List Individually)	Toxic Chemical CAS # (Refer to MSDS)	% Toxic Chemical by Weight	Days On Site

( ) Contractor(s) certifies that no hazardous materials will be brought onto the installation and/or used at the project site.
( ) Contractor(s) certifies that no hazardous waste will be generated from this project.

Submitted By: ____________________ Phone: ____________ Fax: ____________ Date: ____________

Contract Administrator: ____________________ Phone: ____________ Fax: ____________

Page ____ of ____

ATTACHMENT J-0200000-10 EXHIBIT LINE ITEM NUMBERS
Refer to file entitled ELINS J-0200000-10

J-02000000-12

CORPORATE EXPERIENCE DATA SHEET

CORPORATE EXPERIENCE PROJECT DATA SHEET
Project No. (check one) : ☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5
1. Experience for: ☐ Offeror ☐ Joint-Venture ☐ Other (Explain) Firm Name: Address: Phone Number: Point of Contact: Contact Phone Number:
2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other (Explain) Percent of project work performed: If subcontractor, who was prime (Name/Phone #):
3. Contract Number: Delivery/Task Order Number: Title: Location:
4. Award Date (mm/dd/yy): Completion Date (mm/dd/yy): If the contract contains a Base Period with Options, state which contract/option periods have been completed:
5. Type of work: ☐ Maintenance ☐ Repair ☐ Alteration ☐ Minor Construction ☐ Other (explain):
6. Type of Contract/Task Order: (**Check <u>ALL</u> that apply**) ☐ Firm-Fixed Price ☐ Indefinite Delivery/Indefinite Quantity ☐ Other (explain):
7. Award Amount: Final Price: Type of Contract/Task Order: (**Check <u>ALL</u> that apply**) ☐ Delivery/Task Order (IDIQ) ☐ Other (explain):

8. Provide a detailed description of the project and the relevancy to the project requirements of this RFP
9. Provide a detailed description of what work your firm self-performed on this project:
10. Other Information:

J-02000000-14

1. The NAVFAC Form PPQ shall be utilized for all evaluations that require a Past Performance Questionnaire (PPQ).

2. Solicitation Submittal Requirements: IF A COMPLETED CPARS EVALUATION IS AVAILABLE, IT SHALL BE SUBMITTED WITH THE PROPOSAL. IF THERE IS NOT A COMPLETED CPARS EVALUATION, the Past Performance Questionnaire (PPQ) included in the solicitation is provided for the offeror or its team members to submit to the client for each project the offeror includes in its proposal for Factor (insert applicable factor number, usually Factor 1, and insert factor title, usually Corporate Experience). AN OFFEROR SHALL NOT SUBMIT A PPQ WHEN A COMPLETED CPARS IS AVAILABLE.

IF A CPARS EVALUATION IS NOT AVAILABLE, ensure correct phone numbers and email addresses are provided for the client point of contact. Completed PPQs should be submitted with your proposal. If the offeror is unable to obtain a completed PPQ from a client for a project(s) before proposal closing date, the offeror should complete and submit with the proposal the first page of the PPQ (Attachment D), which will provide contract and client information for the respective project(s). Offerors should followup with clients/references to ensure timely submittal of questionnaires. If the client requests, questionnaires may be submitted directly to the Government's point of contact, Quin Conerly-Anderson, via email at quin.s.conerly-anderson.civ@us.navy.mil prior to proposal closing date. Offerors shall not incorporate by reference into their proposal PPQs or CPARS previously submitted for other RFPs. However, this does not preclude the Government from utilizing previously submitted PPQ information in the past performance evaluation."

J-02000000-14

NAVFAC/USACE PAST PERFORMANCE QUESTIONNAIRE (Form PPQ-0)

CONTRACT INFORMATION (Contractor to complete Blocks 1-4)

1. Contractor Information
Firm Name: CAGE Code:
Address: Entity Identifier Number:
Phone Number:
Email Address:
Point of Contact: Contact Phone Number:

2. Work Performed as: ☐ Prime Contractor ☐ Sub Contractor ☐ Joint Venture ☐ Other (Explain)
Percent of project work performed:
If subcontractor, who was the prime #):

3. Contract Information
Contract Number:
Delivery/Task Order Number (if applicable):
Contract Type: ☐ Firm Fixed Price ☐ Cost Reimbursement ☐ Other (Please specify): Contract
Title:
Contract Location:

Award Date (mm/dd/yy):
Contract Completion Date (mm/dd/yy):
Actual Completion Date (mm/dd/yy):
Explain Differences:

Original Contract Price (Award Amount):
Final Contract Price (*to include all modifications, if applicable*): Explain
Differences:

4. Project Description:
Complexity of Work ☐ High ☐ Med ☐ Routine
How is this project relevant to project of submission? (*Please provide details such as similar equipment, requirements, conditions, etc.*)

CLIENT INFORMATION (Client to complete Blocks 5-8)

5. Client Information
Name:
Title:
Phone Number:
Email Address:

6. Describe the client's role in the project:

7. Date Questionnaire was completed (mm/dd/yy)**:**

8. Client's Signature:

NOTE: NAVFAC REQUESTS THAT THE CLIENT COMPLETES THIS QUESTIONNAIRE AND SUBMITS DIRECTLY BACK TO THE OFFEROR. THE OFFEROR WILL SUBMIT THE COMPLETED QUESTIONNAIRE TO NAVFAC WITH THEIR PROPOSAL, AND MAY DUPLICATE THIS QUESTIONNAIRE FOR FUTURE SUBMISSION ON NAVFAC SOLICITATIONS. CLIENTS ARE HIGHLY ENCOURAGED TO SUBMIT QUESTIONNAIRES DIRECTLY TO THE OFFEROR. HOWEVER, QUESTIONNAIRES MAY BE SUBMITTED DIRECTLY TO NAVFAC. PLEASE CONTACT THE OFFEROR FOR NAVFAC POC INFORMATION. THE GOVERNMENT RESERVES THE RIGHT TO VERIFY ANY AND ALL INFORMATION ON THIS FORM.

ADJECTIVE RATINGS AND DEFINITIONS TO BE USED TO BEST REFLECT YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE

RATING	DEFINITION	NOTE
(E) Exceptional	Performance meets contractual requirements and exceeds many to the Government/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with few minor problems for which corrective actions taken by the contractor was highly effective.	An Exceptional rating is appropriate when the Contractor successfully performed multiple significant events that were of benefit to the Government/Owner. A singular benefit, however, could be of such magnitude that it alone constitutes an Exceptional rating. Also, there should have been NO significant weaknesses identified.
(VG) Very Good	Performance meets contractual requirements and exceeds some to the Government's/Owner's benefit. The contractual performance of the element or sub-element being assessed was accomplished with some minor problems for which corrective actions taken by the contractor were effective.	A Very Good rating is appropriate when the Contractor successfully performed a significant event that was a benefit to the Government/Owner. There should have been no significant weaknesses identified.
(S) Satisfactory	Performance meets minimum contractual requirements. The contractual performance of the element or sub-element contains some minor problems for which corrective actions taken by the contractor appear or were satisfactory.	A Satisfactory rating is appropriate when there were only minor problems, or major problems that the contractor recovered from without impact to the contract. There should have been NO significant weaknesses identified. Per DOD policy, a fundamental principle of assigning ratings is that contractors will not be assessed a rating lower than Satisfactory solely for not performing beyond the requirements of the contract.
(M) Marginal	Performance does not meet some contractual requirements. The contractual performance of the element or sub-element being assessed reflects a serious problem for which the contractor has not yet identified corrective actions. The contractor's proposed actions appear only marginally effective or were not fully implemented.	A Marginal is appropriate when a significant event occurred that the contractor had trouble overcoming which impacted the Government/Owner.
(U) Unsatisfactory	Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance of the element or sub-element contains serious problem(s) for which the contractor's corrective actions appear or were ineffective.	An Unsatisfactory rating is appropriate when multiple significant events occurred that the contractor had trouble overcoming and which impacted the Government/Owner. A singular problem, however, could be of such serious magnitude that it alone constitutes an unsatisfactory rating.
(N) Not Applicable	No information or did not apply to your contract	Rating will be neither positive nor negative.

J-02000000-12

Contractor Information (Firm Name): _____

Client Information (Name): _____

TO BE COMPLETED BY CLIENT

PLEASE CIRCLE THE ADJECTIVE RATING WHICH BEST REFLECTS YOUR EVALUATION OF THE CONTRACTOR'S PERFORMANCE.

1. QUALITY:						
a) Quality of technical data/report preparation efforts	E	VG	S	M	U	N
b) Ability to meet quality standards specified for technical performance	E	VG	S	M	U	N
c) Timeliness/effectiveness of contract problem resolution without extensive customer guidance	E	VG	S	M	U	N
d) Adequacy/effectiveness of quality control program and adherence to contract quality assurance requirements (without adverse effect on performance)	E	VG	S	M	U	N
2. SCHEDULE/TIMELINESS OF PERFORMANCE:						
a) Compliance with contract delivery/completion schedules including any significant intermediate milestones. *(If liquidated damages were assessed or the schedule was not met, please address below)*	E	VG	S	M	U	N
b) Rate the contractor's use of available resources to accomplish tasks identified in the contract	E	VG	S	M	U	N
3. CUSTOMER SATISFACTION:						
a) To what extent were the end users satisfied with the project?	E	VG	S	M	U	N
b) Contractor was reasonable and cooperative in dealing with your staff (including the ability to successfully resolve disagreements/disputes; responsiveness to administrative reports, businesslike and communication)	E	VG	S	M	U	N
c) To what extent was the contractor cooperative, businesslike, and concerned with the interests of the customer?	E	VG	S	M	U	N
d) Overall customer satisfaction	E	VG	S	M	U	N
4. MANAGEMENT/ PERSONNEL/LABOR						
a) Effectiveness of on-site management, including management of subcontractors, suppliers, materials, and/or labor force?	E	VG	S	M	U	N
b) Ability to hire, apply, and retain a qualified workforce to this effort	E	VG	S	M	U	N

c) Government Property Control	E	VG	S	M	U	N
d) Knowledge/expertise demonstrated by contractor personnel	E	VG	S	M	U	N
e) Utilization of Small Business concerns	E	VG	S	M	U	N
f) Ability to simultaneously manage multiple projects with multiple disciplines	E	VG	S	M	U	N
g) Ability to assimilate and incorporate changes in requirements and/or priority, including planning, execution and response to Government changes	E	VG	S	M	U	N
h) Effectiveness of overall management (including ability to effectively lead, manage and control the program)	E	VG	S	M	U	N
5. COST/FINANCIAL MANAGEMENT						
a) Ability to meet the terms and conditions within the contractually agreed price(s)?	E	VG	S	M	U	N
b) Contractor proposed innovative alternative methods/processes that reduced cost, improved maintainability or other factors that benefited the client	E	VG	S	M	U	N
c) If this is/was a Government cost type contract, please rate the Contractor's timeliness and accuracy in submitting monthly invoices with appropriate back-up documentation, monthly status reports/budget variance reports, compliance with established budgets and avoidance of significant and/or unexplained variances (under runs or overruns)	E	VG	S	M	U	N
d) Is the Contractor's accounting system adequate for management and tracking of costs? *If no, please explain in Remarks section.*		Yes			No	
e) If this is/was a Government contract, has/was this contract been partially or completely terminated for default or convenience or are there any pending terminations? *Indicate if show cause or cure notices were issued, or any default action in comment section below.*		Yes			No	
f) Have there been any indications that the contractor has had any financial problems? *If yes, please explain below.*		Yes			No	
6. SAFETY/SECURITY						
a) To what extent was the contractor able to maintain an environment of safety, adhere to its approved safety plan, and respond to safety issues? (Includes: following the users rules, regulations, and requirements regarding housekeeping, safety, correction of noted deficiencies, etc.)	E	VG	S	M	U	N
b) Contractor complied with all security requirements for the project and personnel security requirements.	E	VG	S	M	U	N

7. GENERAL	
a) Ability to successfully respond to emergency and/or surge situations (including notifying COR, PM or Contracting Officer in a timely manner regarding urgent contractual issues).	E VG S M U N
b) Compliance with contractual terms/provisions *(explain if specific issues)*	E VG S M U N
c) Would you hire or work with this firm again? *(If no, please explain below)*	Yes No
d) In summary, provide an overall rating for the work performed by this contractor.	E VG S M U N

Please provide responses to the questions above (*if applicable*) and/or additional remarks. Furthermore, please provide a brief narrative addressing specific strengths, weaknesses, deficiencies, or other comments which may assist our office in evaluating performance risk *(please attach additional pages if necessary)***:**

J-02000000-11

From:

To: Quin Conerly-Anderson, NAVFAC Mid-Atlantic, Acquisition ACQ32

Subj: Solicitation/Contract No. N40085-23-R-2525

1. In accordance with the provisions of FAR Clause 52.219-14, Limitations on Subcontracting, the Contracting Officer is hereby notified that _____(Company) intends to subcontract the following portion(s) of the requirements of this contract:

SUBCONTRACTOR INFORMATION		TYPE OF WORK TO BE SUBCONTRACTED	PERCENT (%) OF TOTAL CONTRACT VALUE
NAME: ADDRESS: CAGE/DUNS: PRIMARY NAICS: COMPANY SIZE: POC: PHONE: EMAIL:			
NAME: ADDRESS: CAGE/DUNS: PRIMARY NAICS: COMPANY SIZE: POC: PHONE: EMAIL:			

* * Table may be expanded as needed.

2. Furthermore, in accordance with the provisions of FAR 52.219-14, Limitations on Subcontracting (Nov 2011), by submission of an offer and execution of this contract,_____(Company) agrees that in performance of this contract, in the case of a contract for –

(a) Services (except construction) - it will not pay more than 50 percent of the amount paid by the Government for contract performance to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count toward the 50 percent subcontract amount that cannot be exceeded;

(b) Supplies (other than procurement from a non-manufacturer of such supplies), it will not pay more than 50 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count toward the 50 percent subcontract amount that cannot be exceeded;

(c) General construction, it will not pay more than 85 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work

that a similarly situated entity further subcontracts will count toward the 85 percent subcontract amount that cannot be exceeded

3. Additionally, _ _____(Company) certifies that they will self-perform the following work _

Description of Work	Percentage of the Total Contract Value

* * Table may be expanded as needed.

Note: Percentages of subcontracted work plus self-performed work should equal 100%.

4. No changes in subcontractors are allowed without prior written approval of the Contracting Officer and the SBA. The contractor shall notify the Contracting Officer and its SBA servicing center a minimum of 10 business days prior to any needed change. The contractor shall not proceed with any requested change in advance of written approval from the Contracting Officer and the SBA.

CONTRACTOR:

_____ _____
SIGNATURE NAME AND TITLE DATE

CONTRACTING OFFICER APPROVAL:

_____ _____
SIGNATURE NAME AND TITLE DATE

SBA APPROVAL:

_____ _____
SIGNATURE NAME AND TITLE DATE

J-02000000-13

OSHA's Form 300A (Rev. 04/2004)

Summary of Work-Related Injuries and Illnesses

Note: You can type input into this form and save it.
Because the forms in this recordkeeping package are "fillable/writable" PDF documents, you can type into the input form fields and then save your inputs using the free Adobe PDF Reader.

Year 20 __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	0	(4) Poisonings	0
(2) Skin disorders	0	(5) Hearing loss	0
(3) Respiratory conditions	0	(6) All other illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ Zip _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information *(If you don't have these figures, see the Worksheet on the next page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

Phone ____ - ____ - _____ Date ____ / ____ / ____

Save Input

J-02000000-15

CERTIFICATE OF NON-DISCLOSURE AND CONFLICT OF INTEREST STATEMENT

Solicitation/Contract #N40085-23-R-2525

I understand that in the course of my duties and responsibilities, I may have access to information received by the Government in confidence from non-Federal entities in connection with this acquisition including, but not necessarily limited to, technical approaches, past performance information, trade secrets, inventions, discoveries, and reports of a financial or technical nature and cost or pricing-related information. I may also have access to other procurement information such as the names, identities, or numbers of non-Federal entities under consideration or the methods or procedures used in the selection of a contractor, including, but not limited to, the standards and ratings used in the evaluation process. I understand that this and other information gained during the procurement process may constitute "source selection information" and "contractor bid and proposal information" as those terms are defined in FAR 2.101 and 3.104. I understand that federal law prohibits the unauthorized disclosure of such information. I agree not to disclose such information to any individual outside of the acquisition team members and advisors without the express authorization of the Contracting Officer responsible for the acquisition. I understand that my obligation not to disclose the information described above does not terminate with the award of a contract or any other contract action. I further understand that unauthorized disclosure of such information may result in disciplinary action, including termination of employment. If I am a military member, I understand that failure to comply with these conditions may result in disciplinary action under the Uniform Code of Military Justice.

I further affirm that I have reviewed my financial interests, and the interests of my spouse and minor children, and to the best of my knowledge those interests are not likely to create a real or apparent conflict of interest with my participation in this acquisition. In the event a proposal is received from firm in which I have a personal or financial interest of any nature, I will immediately notify the Contracting Officer. I acknowledge that the personal or financial interest may require my removal from further participation in this source selection. (Note that the interest of a spouse, minor child, or other member of an employee's immediate household should be reported in the same manner as an interest of the panel member.)

These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

Member's Name Printed: _____

Member's Signature: _____ **Date**: _____