Appendices

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Appendix 5-A

FS (USEPA, 2000) Remedial Areas and Depths

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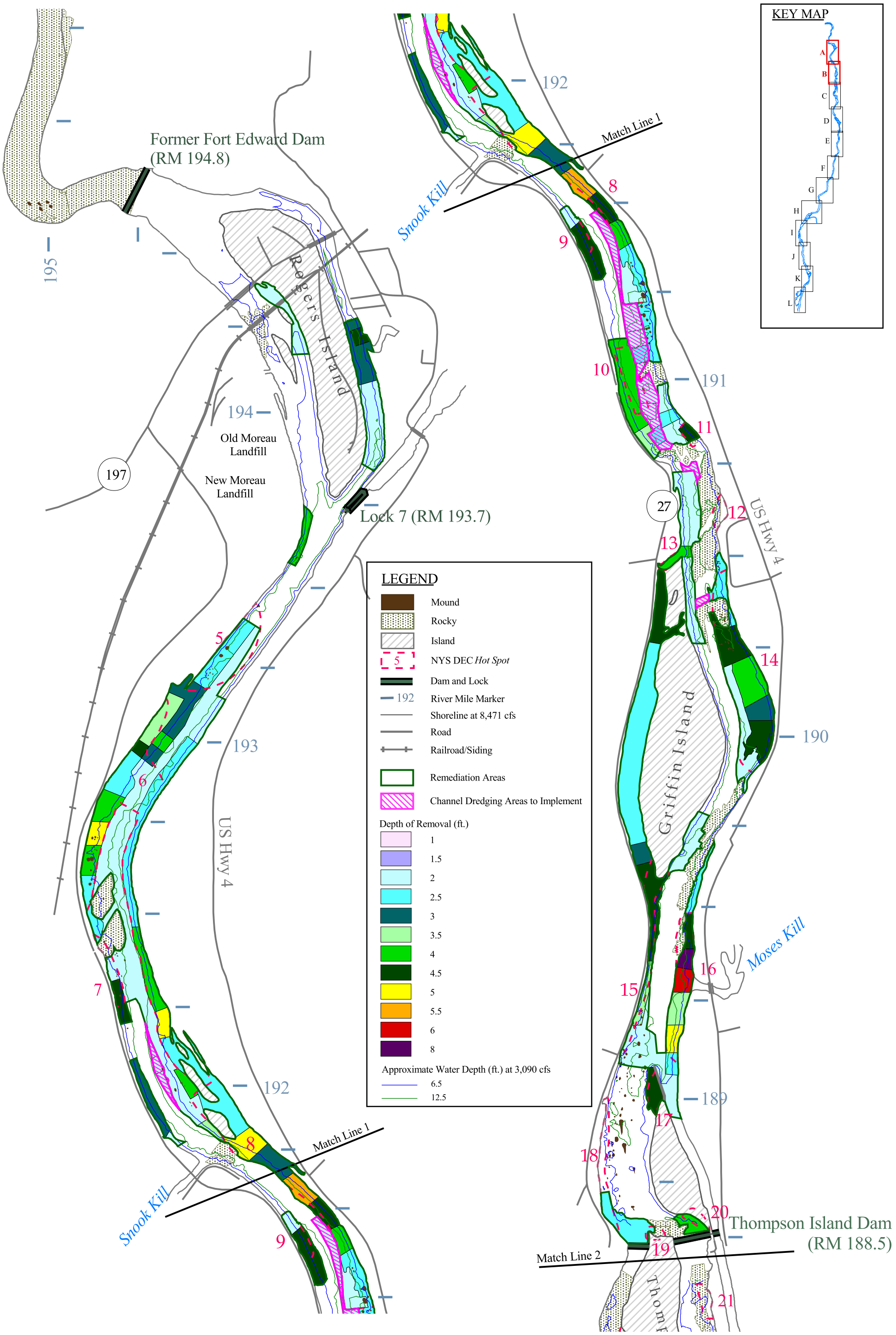


TAMS
TAMS Consultants, Inc.

Hudson River PCBs Reassessment Feasibility Study	Plate 17 Alternative REM - 3/10/Select Removal Areas and Depths	Sheet 1 of 7 RM 194.8 - 188.5

Thompson Island Dam
(RM 188.5)

Match Line 2

Match Line 3

Lock 6 (RM 186.2)

Lock 5
(RM 182.6)

Match Line 3

Match Line 4

Thompson Island

Batten Kill

188

187

184

182

181

19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

KEY MAP

A B C D E F G H I J K L

LEGEND

- Mound
- Rocky
- Island
- 5 — NYS DEC *Hot Spot*
- Dam and Lock
- 192 — River Mile Marker
- Shoreline at 8,471 cfs
- Road
- Railroad/Siding
- Remediation Areas
- Channel Dredging Areas to Implement

Depth of Removal (ft.)

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6
- 8

Approximate Water Depth (ft.) at 3,090 cfs

- 6.5 or 6 (Below Lock 5)
- 12.5 or 12 (Below Lock 5)

TAMS Consultants, Inc.

N W E S

1000 0 1000
Scale in Feet

300 0 300
Scale in Meters

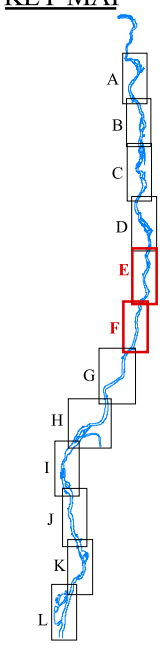
Hudson River PCBs
Reassessment
Feasibility Study

Plate 17

Alternative REM - 3/10/Select
Removal Areas and Depths

Sheet 2 of 7
RM 188.5 - 181.0

KEY MAP



Match Line 4

181

180

179

178

Match Line 5

LEGEND

- Mound
- Rocky
- Island
- 5 — NYS DEC *Hot Spot*
- Dam and Lock
- 192 — River Mile Marker
- Shoreline at 8,471 cfs
- Road
- Railroad/Siding
- Remediation Areas
- Channel Dredging Areas to Implement

Depth of Removal (ft.)

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6
- 8

Approximate Water Depth (ft.) at 3,090 cfs

- 6
- 12

Match Line 5

177

176

175

Match Line 6

174

TAMS

TAMS Consultants, Inc.

N W E S

1000 0 1000
Scale in Feet

300 0 300
Scale in Meters

Hudson River PCBs Reassessment Feasibility Study

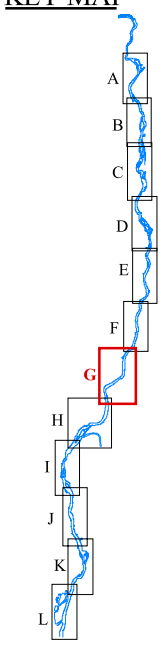
Plate 17

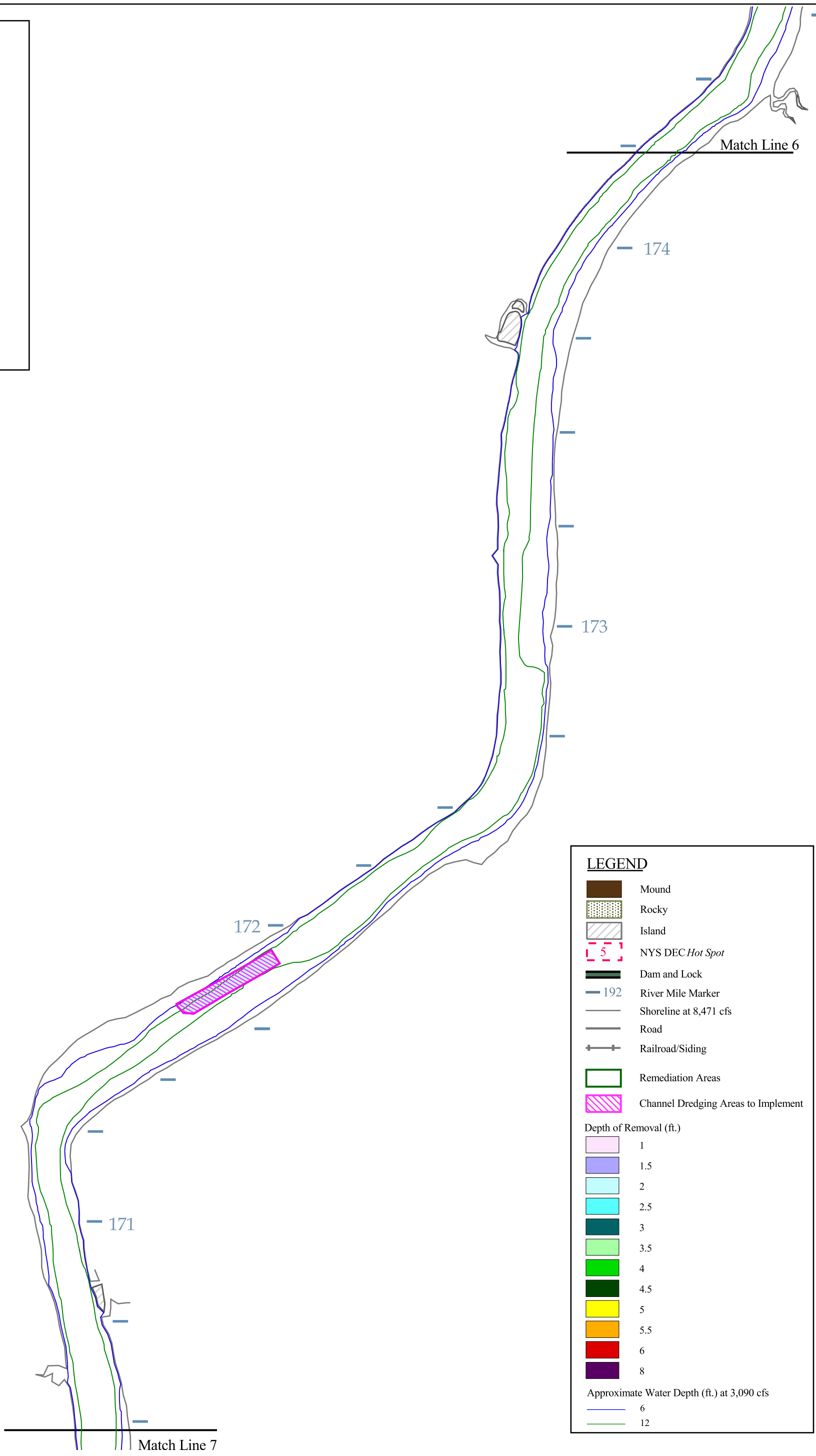
Alternative REM - 3/10/Select Removal Areas and Depths

Sheet 3 of 7

RM 181.0 - 174.0

KEY MAP





LEGEND

- Mound
- Rocky
- Island
- 5 — NYS DEC *Hot Spot*
- Dam and Lock
- 192 — River Mile Marker
- Shoreline at 8,471 cfs
- Road
- Railroad/Siding
- Remediation Areas
- Channel Dredging Areas to Implement

Depth of Removal (ft.)

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6
- 8

Approximate Water Depth (ft.) at 3,090 cfs

- 6
- 12

TAMS

TAMS Consultants, Inc.

N W E S

1000 0 1000
Scale in Feet

300 0 300
Scale in Meters

Hudson River PCBs Reassessment Feasibility Study

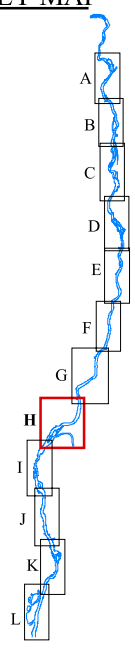
Plate 17

Alternative REM - 3/10/Select Removal Areas and Depths

Sheet 4 of 7

RM 174.5 - 170.5

KEY MAP



LEGEND

- Mound
- Rocky
- Island
- 5 — NYS DEC *Hot Spot*
- Dam and Lock
- 192 — River Mile Marker
- Shoreline at 8,471 cfs
- Road
- Railroad/Siding
- Remediation Areas
- Channel Dredging Areas to Implement

Depth of Removal (ft.)

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6
- 8

Approximate Water Depth (ft.) at 3,090 cfs

- 6
- 12

Match Line 7

170

36

169

Lock 4/Stillwater Dam
(RM 168.2)

168

Hoosic River

167

Match Line 8

N

W E

S

1000 0 1000
Scale in Feet

300 0 300
Scale in Meters

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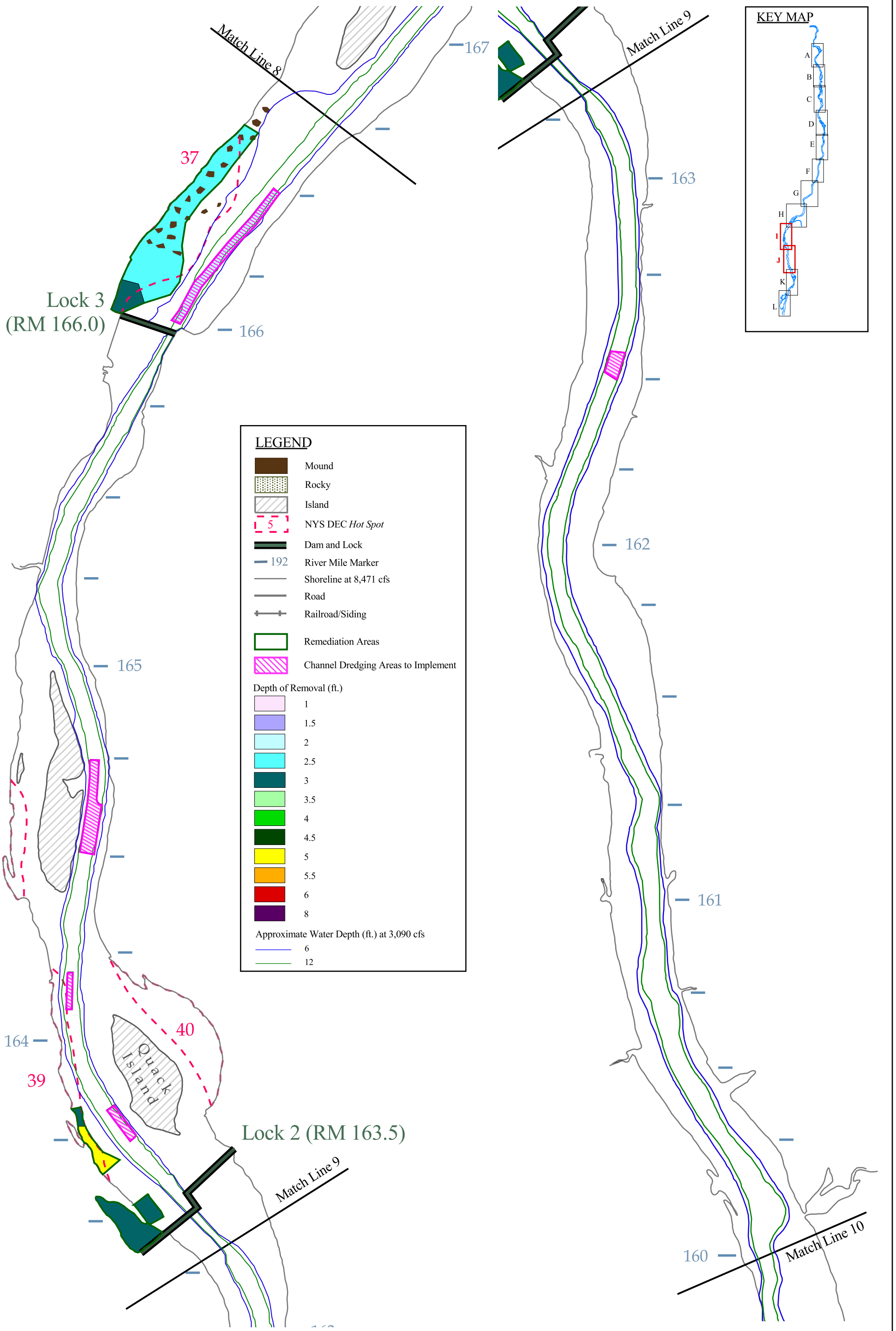
Hudson River PCBs
Reassessment
Feasibility Study

Plate 17

Alternative REM - 3/10/Select
Removal Areas and Depths

Sheet 5 of 7

RM 170.5 - 166.5



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Hudson River PCBs Reassessment Feasibility Study

Plate 17

Alternative REM - 3/10/Select Removal Areas and Depths

Sheet 6 of 7

RM 167.0 - 160.0

Match Line 10

160

159

158

157

156

155

Lock 1 (RM 159.4)

Peebles Island

Campbell Island

Van Schaick Island

Federal Dam (RM 153.9)

LEGEND

- Mound
- Rocky
- Island
- 5 — NYS DEC *Hot Spot*
- Dam and Lock
- 192 — River Mile Marker
- Shoreline at 8,471 cfs
- Road
- Railroad/Siding
- Remediation Areas
- Channel Dredging Areas to Implement

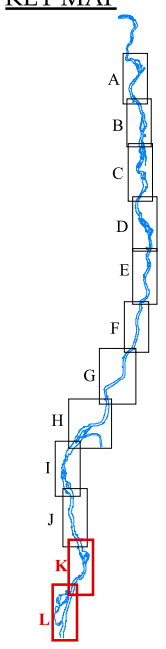
Depth of Removal (ft.)

- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6
- 8

Approximate Water Depth (ft.) at 3,090 cfs

- 6
- 12

KEY MAP



TAMS

TAMS Consultants, Inc.

N W E S

1000 0 1000
Scale in Feet

300 0 300
Scale in Meters

Hudson River PCBs Reassessment Feasibility Study

Plate 17

Alternative REM - 3/10/Select Removal Areas and Depths

Sheet 7 of 7

RM 160.0 - 153.9

Appendix 5-B

Dredge Equipment Vendor Information

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Appendix 5-B – Dredge Equipment Vendor Information

Cable Arm Dredge Bucket

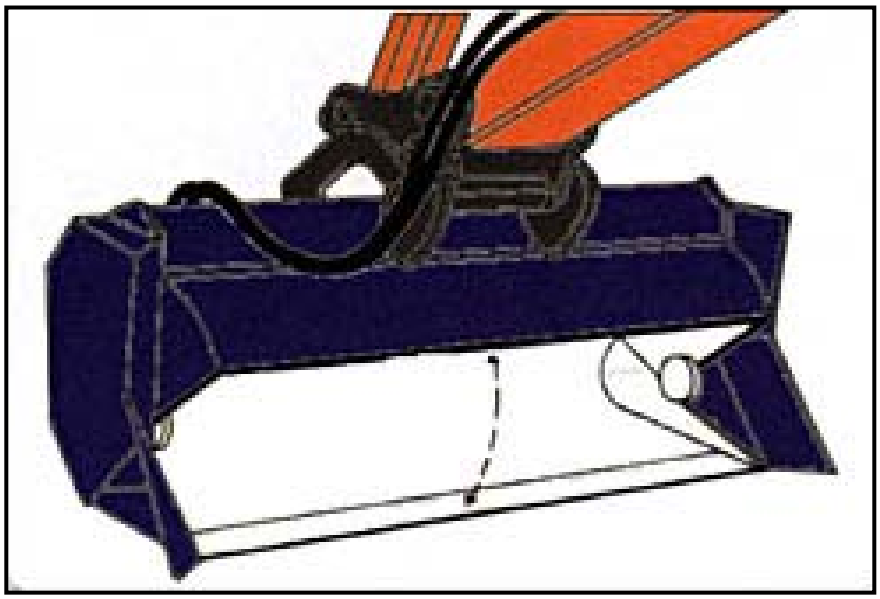
Source: http://www.cablearm.com

Horizontal Profiling Grab (HPG) Bucket Dredge

Source: Bean Environmental

Ham Visor Grab Dredge

Source: http://www.aboutremediation.com/a_visorgrab.asp

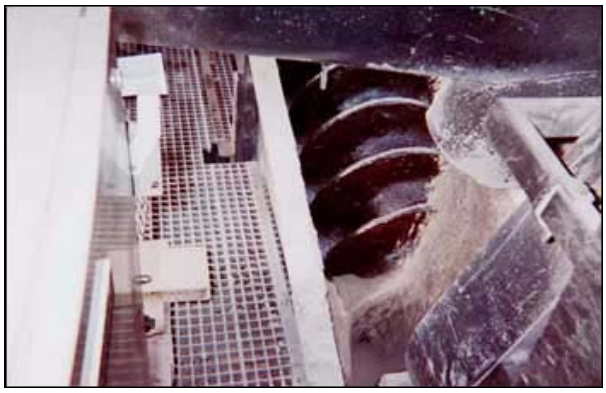


Seaway Contaminated Sediment Excavator

Source: http://seawaytech.com

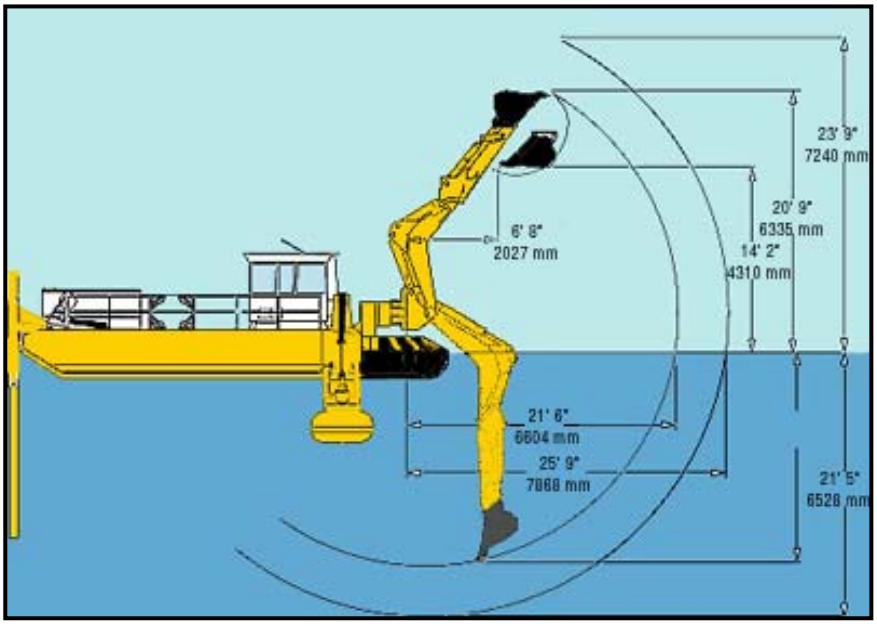
Dry Dredge

Source: http://www.drydredge.com



Amphibious Dredge

Source: http://www.normrock.ca



Cutterhead Hydraulic Dredge

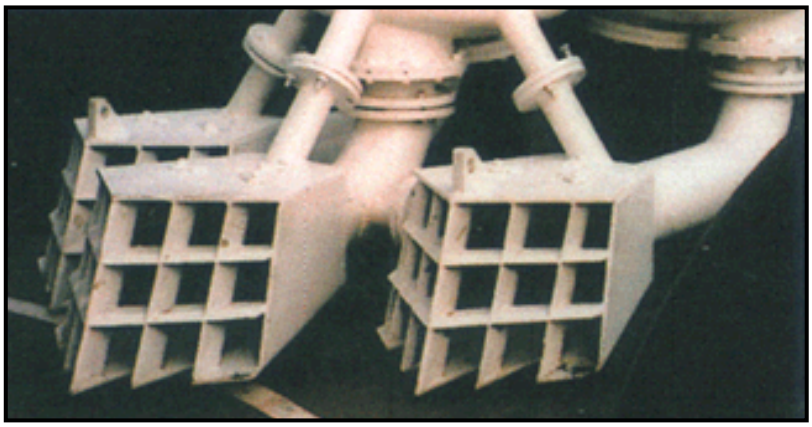
Source: http://ww.dscdredge.com

Horizontal Auger Dredge

Source: http://www.dredge.com

“Pneuma” Pneumatic Dredge

Source: http://www.pneuma.i



Tornado Motion Technology (Tornado) Dredge

Source: Dow, 2002

Eddy Pump Dredge

Source: http://www.lrc.usace.army.mil/eddypump/frame.htm

Toyo High Solids Pump

Source: http://www.sandandgravel.com

Appendix 6-A

Resuspension Control Process Project Examples

BLASLAND, BOUCK & LEE, INC.
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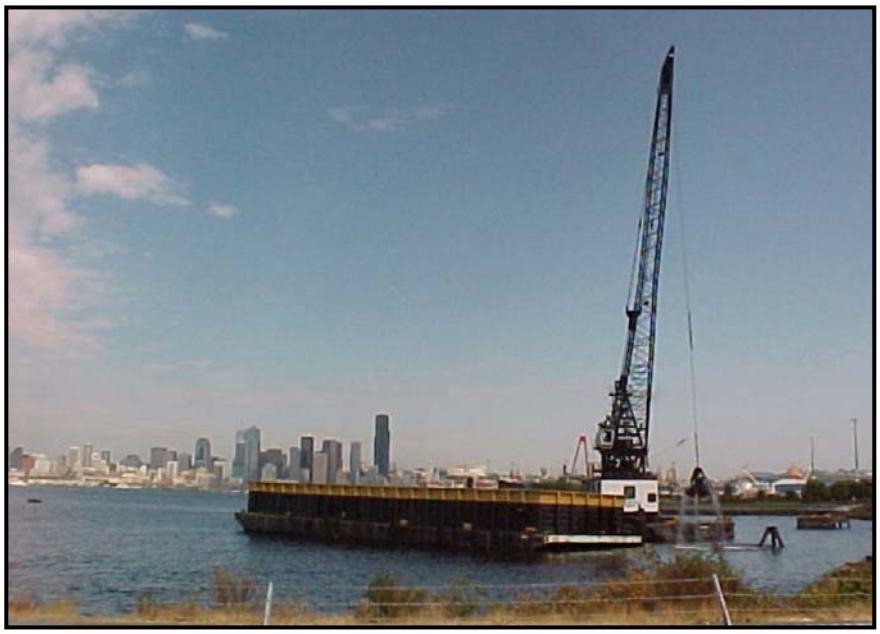
Appendix 6-A – Resuspension Control Process Project Examples

Hydraulic Dredging with No Containment

Source: Dow, 2002

Mechanical Dredging with No Containment

Source: Pacific Sound Resources Superfund Site



Typical Dredging Project Using Silt Curtains

Source: US Steel Remediation, San Francisco

Typical Dredging Project Using Sheetpile Containment

Source: Sevenson 2003

Appendix 6-B

Resuspension Control Process Options Vendor Information

BLASLAND, BOUCK & LEE, INC.
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Appendix 6-B – Resuspension Control Process Options Vendor Information

Company Name	Main Product	Contact Info	Website
Silt Curtain Systems			
Elastec/American Marine, Inc.	Oil spill booms, floating baffles and nets, tarpaulins	401 Shearer Blvd. Cocoa, FL 32922 Phone: 321-636-5783 Fax: 321-636-5787	www.elastec.com
Brockton Equipment/Spilldam Inc.	Oil containment booms, turbidity barriers, and secondary containment tarpaulins	P.O. Box 3219 Brockton, MA 02304 Fax: 508-583-5231 Toll Free: 800-699-2374	www.spilldam.com
Aer-Flo Canvas Products, Inc.	Fumigation covers, truck tarpaulins, turbidity barriers, liners, curtains	P.O. Box 20186 Bradenton, FL 34203 Phone: 941-747-4151 Fax: 941-747-2489	www.aerflo.com
American Boom & Barrier Corp.	Oil containment booms, skimmers/oil spill recovery equipment	7077-T N. Atlantic Ave. Cape Canaveral, FL 32920 Phone: 321-784-2110 Fax: 321-783-7598	www.ABBCOBOOM.COM
Parker Systems, Inc.	Oil pollution control and removal equipment	P.O. Box 6380-T Chesapeake, VA 23323 Phone: 757-485-2955 Fax: 757-487-5872 Toll Free: 800-959-0540	www.ParkerSystemsInc.com
Boom® Environmental Products, Div. of Geotechnical Supply, Inc.	Oil spill containment booms, spill kits, geotextiles, turbidity barriers, oil and chemical absorbents, and related environmental and geotechnical products	32-T Scotland Blvd. Bridgewater, MA 02324 Fax: 508-697-5888 Toll Free: 800-770-BOOM	www.boomenviro.com
DGI Industries	Silt fence, safety fence, safety vests, and grade stakes	Phone: 603-641-2850 Fax: 603-669-6991 Toll Free: 1-888-SILT-DGI (745-8344)	www.dgiindustries.com

Appendix 6-B – Resuspension Control Process Options Vendor Information

Company Name	Main Product	Contact Info	Website
Gunderboom, Inc.	Engineered aquatic filter barrier systems	9401 King Street, Suite A Anchorage, Alaska 99515 Phone: 907-644-5000 Fax: 907-646-1107 Toll Free: 866-396-5100	www.gunderboom.com
Cape Canaveral Marine Services, Inc.	Spill and natural catastrophic management and consulting, emergency spill response, and site remediation	350-T Imperial Blvd. Cape Canaveral, FL 32920 Phone: 321-868-0670 Fax: 321-799-2762 Toll Free: 800-248-0670	www.ccmsusa.com
OMS Environmental Corporation	Crisis management, consultant services, training programs and pollution control equipment recommendations to the petroleum industry, government organizations and advanced technology industries worldwide	One Air Cargo Place, Unit 4 Melbourne, FL USA 32901 Phone: 321-726-9898 Fax: 321-777-3830	www.omsenv.com
Sheetpile Systems			
Foster Piling	Hot rolled steel sheetpiling sections	1525 Valley Center Parkway Suite 160 Bethlehem, PA 18017 Phone: 610-954-8111 Fax: 610-954-8112	www.lbfoster.com/piling
Atlantic Sheet Pile, Inc.	Sheetpile driving contracting and supplier	142 Bamm Hollow Rd. Middletown NJ 07748 Phone: 732-957-0818 Fax: 732-957-1951	
Crane Materials International	Manufacturer of C-LOC® and ShoreGuard® steel and vinyl sheetpiling systems	4501 Circle 75 Parkway, Suite E-5370 Atlanta GA. 30339 Phone: 770-933-8166 Fax: 770-933-8363 Toll Free: 800-256-8857	www.cmilc.com

Appendix 6-B – Resuspension Control Process Options Vendor Information

Company Name	Main Product	Contact Info	Website
Shoreline Steel, Inc.	Cold-formed interlocking steel sheetpiling	58315 Main Street New Haven, Michigan 48048 Phone: 586-749-9550 Fax: 586-749-6653 Toll Free: 800-522-9550	www.shorelinesteel.com
Hammer & Steel, Inc.	Piling and pile driving equipment	St. Louis, MO Phone: 314-895-4600 Fax: 314-895-4070 Toll Free: 800-325-PILE (7453)	www.hammersteel.com
Pilebuck, Inc.	Informational source for sheetpiling systems and manufacturers	P.O Box 64-3929 Vero Beach, Florida 32964 Phone: 772-231-5200 Fax: 772-231-8400	www.pilebuck.com
Pilequip Australia Pty Ltd	Steel and vinyl sheetpiling supplier	PO Box 976 Windsor NSW Australia 2756 Phone: 61-(0)2-9838-3144 Fax: 61-(0)2-9838-3150	www.pilequip.com.au

Appendix 7-A

Dredged Material Transport Vendor Information

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Appendix 7-A – Dredged Material/Transport Vendor Information

Booster Pumps

Diesel Booster Pump

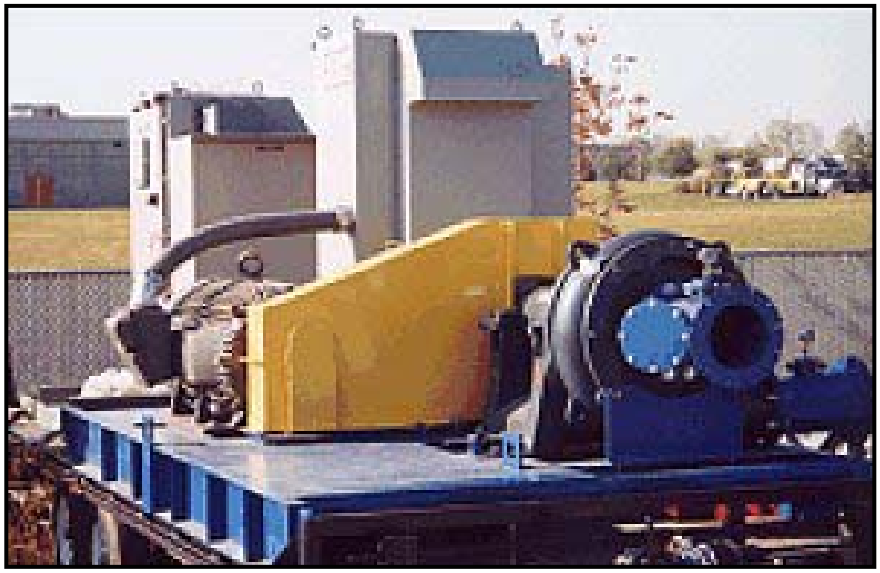
Source: www.imsdredge.com

Equipment Information: Diesel Booster Pump		
Dimensions	Length	13 feet, 13/16 inch
	Width	8 feet, 15/16 inch
	Height	7 feet, ½ inch
	Weight	approximately 13,500 lbs
Engine	Type	Cummins Diesel Model 6CTA8.3, 6-cylinder turbo charged
	Rated Performance	**ABS-174**: 174 HP @ 2,200 rpm
		ABS-260: 260 HP @ 2,500 rpm
		ABS-350: 350HP @ 2,100 rpm
	Fuel Capacity	180 gallons
	Max. Fuel Consumption	12 gph
	Drive Type	Gear-belt
	Instrumentation	Gauges include: coolant temperature, oil pressure, tachometer, volt and hour meters and fuel gauge. Safety shutdown controls are furnished for low engine oil pressure and high coolant temperature.
Pump	Type	GIW Model LCC-M 200-610
	Discharge Diameter	8 inches
	Suction Diameter	10 inches
	Impeller Diameter	24 inches
	Sphere Passage	4 inches
	Pump Performance	**ABS-174**: 3,000 pgm @ 180 feet TDH (water) @ 950 rpm
		ABS-260: 3,000 gpm @ 260 feet TDH (water) @ 950 rpm
		ABS-350: 4, 000 gpm @ 280 feet TDH (water) @ 950 rpm
	Construction	Case impeller cast from abrasive resistant high chrome gasite iron and further protected by plate liners. Bearings oil lubricated are open double ball, oil lubricated.

Booster Pumps (cont'd)

IMS Electric Booster Pump

Source: www.imsdredge.com



Equipment Information: IMS Electric Booster Pump		
Dimensions	Length	80 1/4 inches
	Width	97 inches
	Height	90 1/4 inches
	Weight	Approximately 14,800 lbs
Motor	Type	Toshiba Quarry Duty TIKK
	Volts	460V
	RPM	1780 @ 60Hz
	Amps	408 continuous
	HP	350 @ 1780 rpm
	Service Factor	1.15
	Motor Housing	Totally Enclosed Fan Cooled
Drive	Type	Toshiba G-3 Tosvert-130 Variable Frequency
	Rating	390 KVA, 460V, 469AMP with CB, DCL, and Lightning Arrestor
	Cooling	Internal air conditioner
	Speed Control	Minimum 1,000 rpm to Maximum 1,800 rpm, variably controlled by pump inlet pressure.
	Enclosure	NEMA-4
Pump	Type	GIW Model LCC-M 200-610
	Discharge Diameter	8 inches
	Suction Diameter	10 inches
	Impeller Diameter	24 inches
	Sphere Passage	4 inches
	Drive Type	Synchronized Gear-belt with 1.5 reduction
	Pump Performance	3,000 gpm @ 310 TDH (water) @ 1,200 rpm
	Construction	Case impeller cast from abrasive resistant high chrome gasite iron and further protected by plate liners. Bearings oil lubricated are open double ball, oil lubricated
Electrical Service Req.	Volts	480V
	Amps	600 Amps

Booster Pumps (cont'd)

Ellicott Mud Cat™ B-8 Booster CATSTOCK#47

Source: http://www.dredge.com/used/CST47.html

Equipment Information: Ellicott Mud Cat™ B-8 Booster CATSTOCK#47	
Size	8 inches
Model	B-8 Booster
Total HP	175
Year	1994
Ref No.	CATSTOCK#47
Type	Standard
Location	Baltimore
Condition	Good

Booster Pumps (cont'd)

110' x 34' Booster Pump Barge

Source: http://www.scrutonmarine.com/Dredges.htm

Equipment Information: 110' x 34' Booster Pump Barge	
Size	110 feet x 34 feet
Pump	3,200 hp dredge pump
Dredge Pump Engines	Two 16 – 278A Cleveland 1,600 hp each
Reduction Gear	Farrel Birmingham twin input single output Ratio 1.81:1
Dredge Pump	GM-20-inch Morris pump 72-inch impeller Ni hard wear parts
Generators	(2) 150 KW powered by GM 6-110 engines (3) 25 hp service pumps (1) 20 hp service pump (2) 600 psi air compressors (2) Fuel oil transfer pumps (2) Lube oil priming pumps (2) 10 hp reduction gear oil pumps
Other Information	Kingsbury thrust bearing

Booster Pumps (cont'd)

14" x 20" CAT Powered Booster Pump

Source: http://www.scrutonmarine.com/Dredges.htm

Equipment Information: 14" x 20" CAT Powered Booster Pump	
Model and Size	14-inch x 20-inch Karhula model Z-V50X pump
Engine	Powered by CAT D398T Diesel engine
Production	This pump will do up to 5,000 gpm at 180 feet of dynamic head
Other Information	All mounted on a 40-foot flat rack

Material Barges

MEMCO Material Barges

Source: http://www.memcobarge.com/

Equipment Information: MEMCO Material Barges												
Hull Size	Cubic Capacity (cf)	Coaming Height (ft)	Light Draft	Estimated Tons at Indicated draft								
				2'0"	8'6"	9'0"	9'6"	10'0"	10'6"	11'0"	11'6"	12'0"
175x26x11	27,955	0.00	1'-8.0"	41	908	978	1049	1119	1190			
195x35x12	71,050	4.00	1'-'7.0"	81	1394	1498	1602					Do NOT Load over 9' 6"
195x35x12	62,205	2.50	1'-7.1"	79	1401	1505	1606	1699	1792			
195x35x12	60,393	2.25	1'-5.0'	99	1417	1521	1625	1730	1836			
195x35x13	65,466	2.50	1'-7.3"	76	1393	1497	1602	1706	1812	1917	2023	
200x35x12	78,860		1-'4.0"		1559	1669	1778	1887	1997			

32’ x 88’ x 11’ Deck Barge

Source: http://www.smithbarge.com/russell.html

Material Barges (cont'd)

Weeks 28
110' x 34' x 9' Barge with Steel Rails with Openings

Source: http://www.weeksmarine.com/Barges/weeks

Weeks 203
120' x 40' x 11.25' Barge with Rails

Source: http://www.weeksmarine.com/Barges/weeks

Material Barges (cont'd)

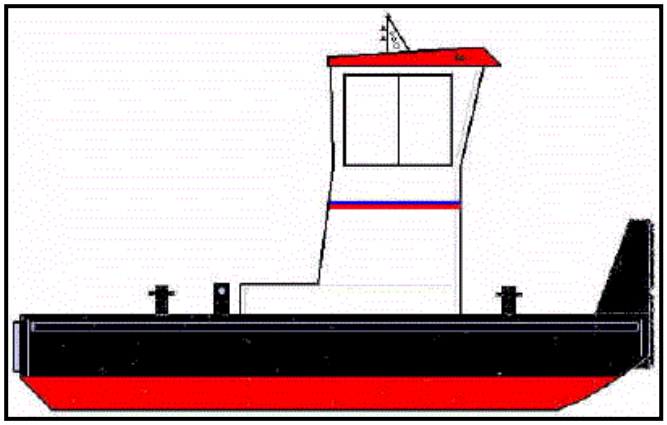
40' x 10' x 5' Sectional Barge

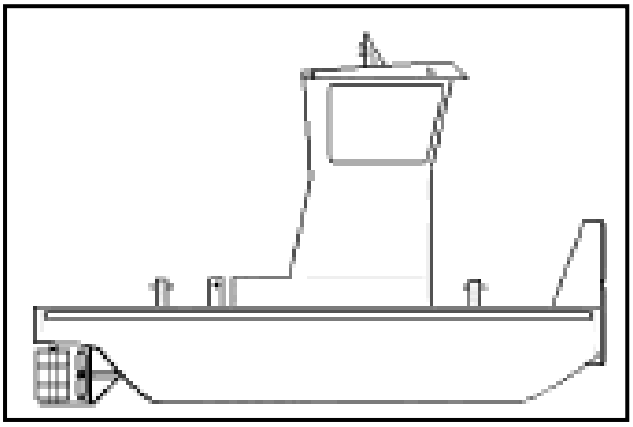
Source: http://www.tmt-llc.com/

Tow Boats/Pushboats

Truckable Pushboat Model A083P-OB & A083P

Source: http://www.ahoymarine.com/pushboats/A083P-OB.htm





Equipment Information: Truckable Pushboat Model A083P-OB & A083P	
Size	20' x 8' x 3' Outboard or Inboard
Other Information	This pushboat is fully truckable without the need for a permit. It can be set up for outboard engine or single diesel engine with 250 maximum horse power. Eye levels from 8' to 11' available.

Tow Boats/Pushboats (cont'd)

Truckable Pushboat Model A545P

Source: http://www.ahoymarine.com/pushboats/A545P.htm

Equipment Information: Truckable Pushboat Model A545P	
Size	25'10" x 14' x 5'
Other Information	A workhorse vessel designed and built to handle the toughest of jobs (weighs over 40,000 lbs.). The vessel shown has the company's standard elevated pilot house. It is designed to fold down for trucking without the need for disconnecting any control cables, wiring, etc. This model is available with numerous options including large house, hydraulic powered pilot house, 6' hull depth, and more.

Tow Boats/Pushboats (cont'd)

70' Pushboat

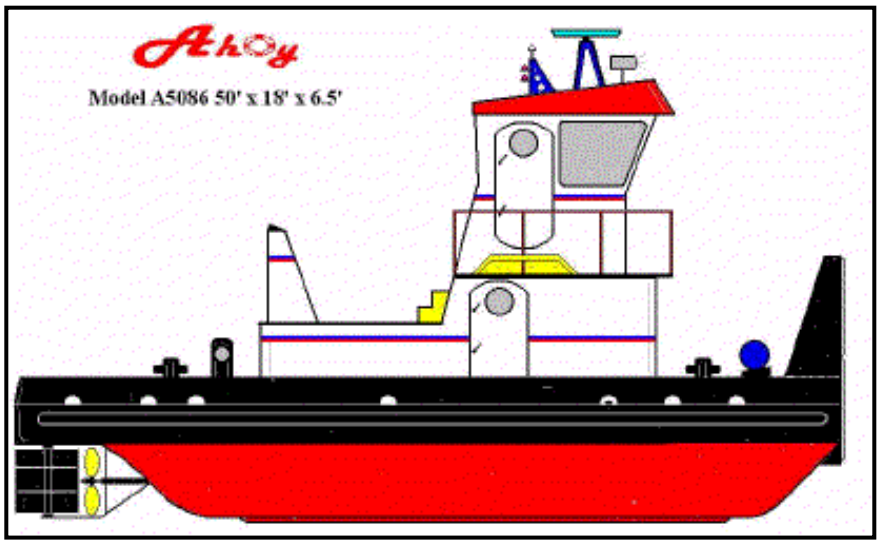
Source: http://www.bendership.com/NewConstruction/StockDesigns/70Pushboat/70Pushboat.htm

Equipment Information: 70' Pushboat			
L.O.A.:	70'	**Cargo holding gear:**	Two each 40 ton electric over hydraulic connector winches
Beam:	26'		Two each 8" button chocks
Draft:	9'	**Fuel oil:**	18,000 U.S. Gallons
Depth:	11'	**Lube oil:**	350 U.S. Gallons
Gross tonnage:	161	**Freshwater:**	9,400 U.S. Gallons
Speed:	8 Knots	**Accommodations:**	8/9 Persons
Main engines:	Two each GM 12V149	**Electronics:**	To Owner's Selection
Horsepower:	1350 Total	**Heating:**	208 V, 1500 watt wall heater with fan
Bollard pull:	40,000 lbs	**Ventilation:**	Two electric engine room blowers, electric vent fans in galley and heads
Marine gear:	Twin Disc MG 530 7.27:1	**Air conditioning:**	Six window type mounted in bulkheads
Generators:	Two each Perkins 40 KW 120/208 V	**Class:**	None this vessel
Kortnozzles:	Optional		
Steering gear:	Electro-Hydraulic		
Rudders:	Two steering and four flanking		

Tow Boats/Pushboats (cont'd)

Pushboat Model A5018P

Source: http://www.ahoymarine.com/pushboats/A5018P.htm

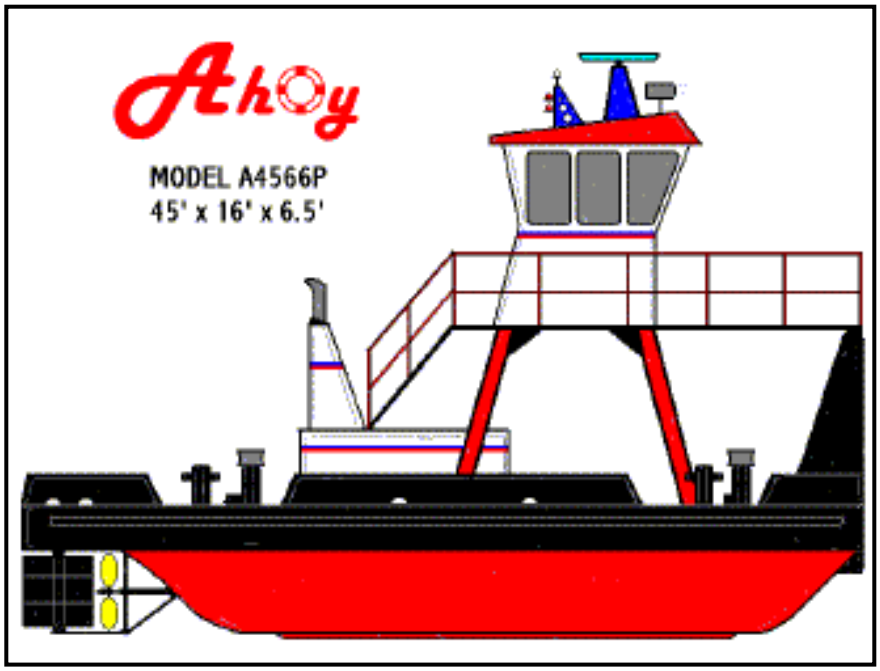


Equipment Information: Pushboat Model A5018P	
Size	50' x 18' x 6.5' Live Aboard or Day Boat
Other Information	Model shown is a specialty built pushboat. It is available in single or twin screw with a maximum horse power of 800. The vessel can be built to suit project-specific needs. Available in day-boat or live-aboard. The vessel shown has the standard pilot house and living quarters. Additional eye level is available with elevated pilot house.

Tow Boats/Pushboats (cont'd)

Pushboat Model A4566P

Source: http://www.ahoymarine.com/pushboats/A4566P.htm



Equipment Information: Pushboat Model A4566P	
Size	45' x 16' x 6.5' Live Aboard or Day Boat
Other Information	Model shown is a specialty built pushboat. It is available in single or twin screw with a maximum horse power of 900. The vessel can be built to suit project-specific needs. Available in day-boat or live-aboard. The vessel shown is our Fleet Boat Style with a raised pilot house and is fully truckable.

Tow Boats/Pushboats (cont'd)

Don David (454)

Source: http://www.weeksmarine.com/Boats/Don%20David61.jpg

Equipment Information: Don David (454)	
Size	40' x 14' x 4'
Other Information	Twin screw 500 hp (2) Detroit 8V-71 engines

Appendix 8-A

Barge Transportation/Berth Layout Logistics

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Appendix 8-A – Barge Transportation/Berth Layout Logistics

This appendix presents the waterfront access requirements for barge unloading operations and stand-by barge staging (space needed, desired berthing such as bulkhead or dolphins, draft required, etc.) required for the Hudson River dredging program. The information presented herein is based on the following two alternatives:

- Alternative 1: Dredged material is unloaded from barges at the processing site and processed material is loaded into barges in bulk form for delivery to a transfer station.
- Alternative 2: Dredged material is unloaded from barges at the processing site and processed material is loaded into 20-foot containers. The containers are then loaded onto barges for delivery to a transfer station.

It is assumed that the barge unloading rate will be 400 tons per hour (tph) (or greater). At this rate, the barge unloading and loading operations can be combined at the same berth. It is recommended that the barge bulk loading/unloading position be fixed with a barge haul system to move a single barge back and forth under the loader and unloader to reach all of the material in the barge. The minimum berth length for one standard river barge (195 feet x 35 feet) plus a 75-foot pushboat is 515 feet.

The typical unloading berth will consist of the following equipment and facilities:

- Sheetpile bulkhead;
- Six mooring cleats;
- One unloader with dribble plate and wind screens (see Figure 8-A-1, below);
- One barge loader with hood covers over the conveyor belt;
- Loader/unloader foundation;
- Hopper to receive unloaded dredged sediment;
- Hopper foundation;
- Dribble plate around hopper to divert any spillage back to the barge;
- Barge haul system; and
- Pump to remove water from the barge.

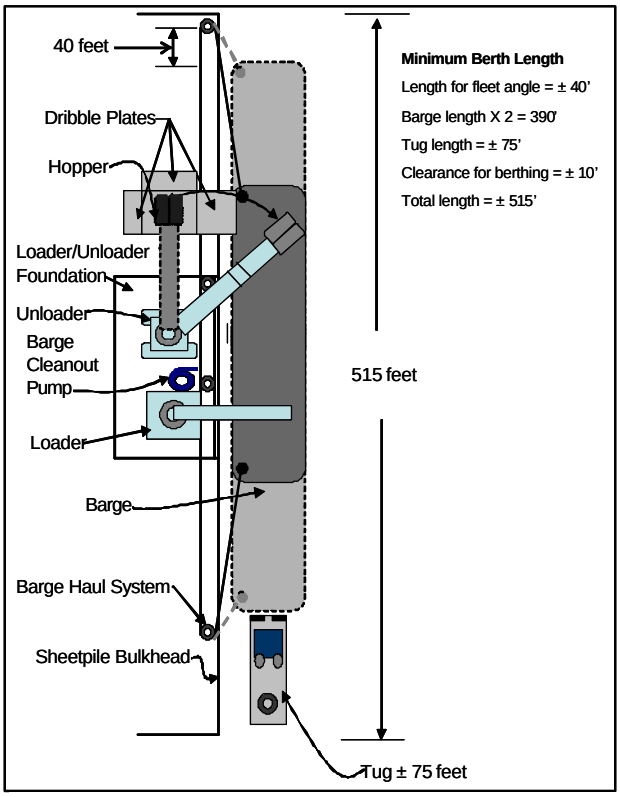


Figure 8-A-2
Basic Barge Berth

Figure 8-A-1
Unloader with Hopper and Dribble Pan

The space requirement shown is for the bulk loading/unloading berth only. Boats used by management, inspectors, etc., will also require facilities to berth. Simple floating docks similar to that commonly used at small marinas could be used for this purpose.

The typical sheetpile berth will be located near the water's edge. A minimum of 12 feet water depth is required at the barge berths. Timber fendering will be required on the face of the steel sheetpiling, as shown on Figures 8-A-3 and 8-A-4, below.

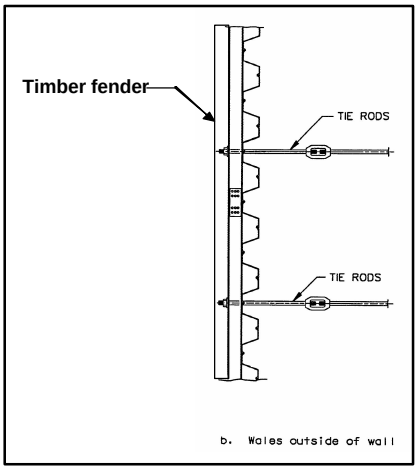


Figure 8-A-3
Timber Fendering

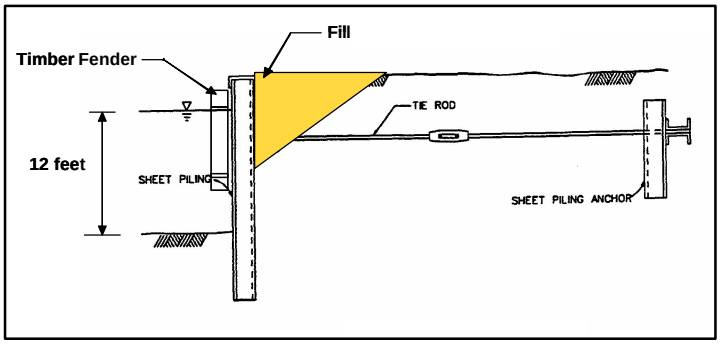


Figure 8-A-4
Timber Fendering

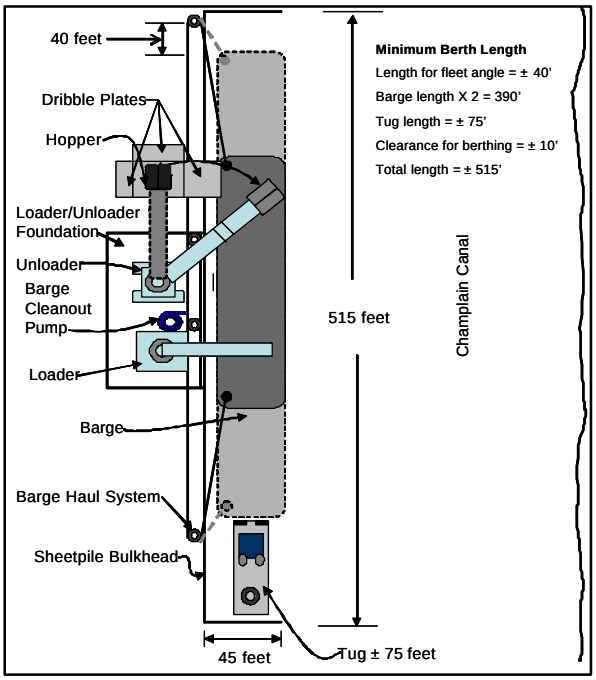


Figure 8-A-5
Load/Unload Schematic

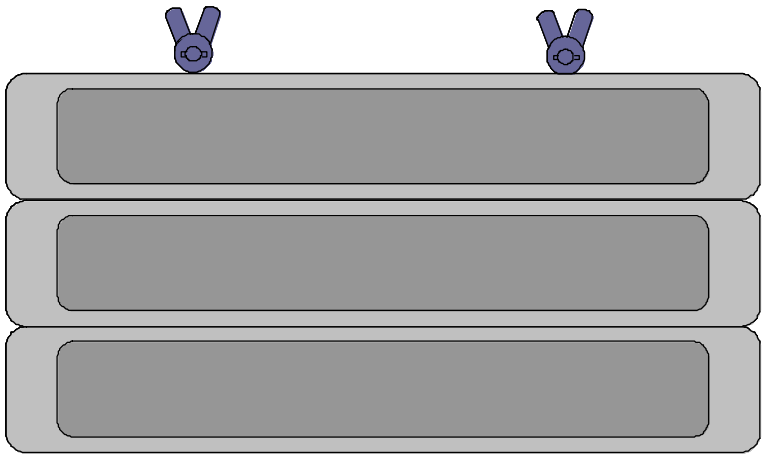


Figure 8-A-6
Schematic Plan – Barge Tug Staging Area

A staging area will be required to berth barges and tugs when they are not in use. This staging area does not have to be located at the unloading berth. Steel pipe pile mooring dolphins could be used for this purpose. For example, two mooring dolphins could be used to berth three barges. Therefore, for this project, four mooring dolphins will be required to moor six barges. Tugs can moor alongside of the barges.

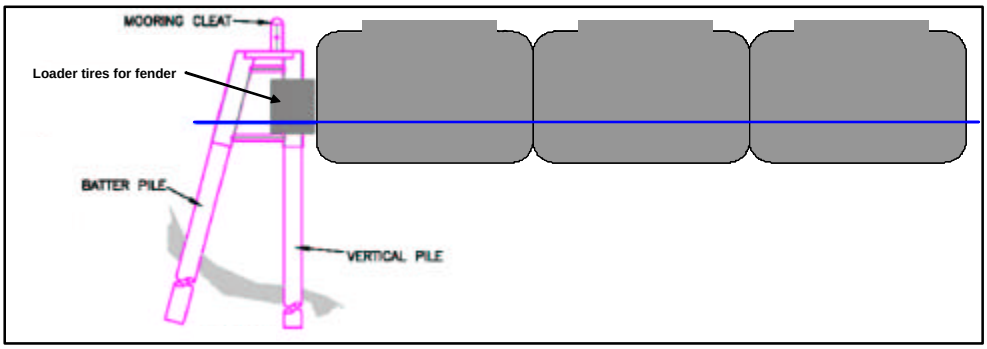


Figure 8-A-7
Schematic Section – Barge/Tug Staging Area

To construct the sheetpile bulkhead, a combination of dredging and filling will most likely be required and will depend on the site selected for the sediment processing facility. An alternative that would eliminate the need to dredge is to place the unloader and hopper on a pile supported platform in water deep enough for the barges to berth. This alternative may prove to be a more economical solution at some of the Final Candidate Sites. Platforms will also be required to support the winches. These platforms could also serve as mooring dolphins. Pipe pile mooring dolphins can be used to provide additional mooring points.

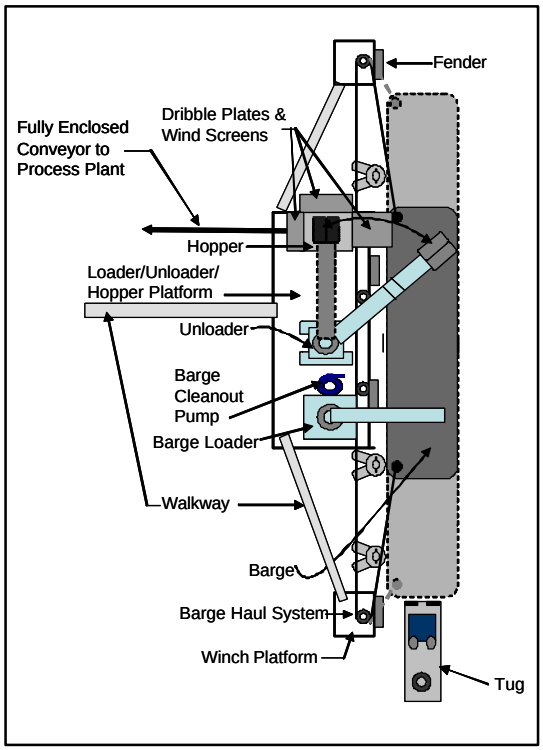


Figure 8-A-8
Pile-Supported Barge Berth

The typical pile-supported barge berth will consist of:

- Pile-supported loader/unloader/hopper platform (approx. 110 ft x 35 ft);
- Three-pipe pile mooring dolphins;
- Pile-supported barge haul winch platform (approx. 20 ft x 20 ft);
- Walkways to winch platforms and to shore;
- One unloader with dribble plate and wind screens (see photo below);
- One barge loader with hood covers over the conveyor belt;
- One hopper to receive unloaded dredged sediment;
- Dribble plate around hopper to divert any spillage back to the barge;
- Barge haul system; and
- Pump to remove water from the barge.

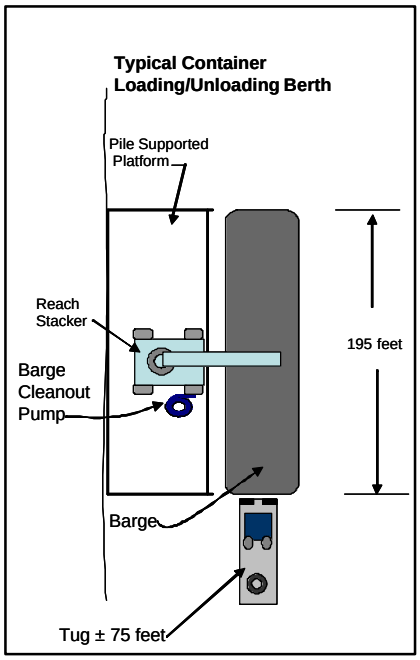


Figure 8-A-9
Schematic of Pile-Supported
Container Barge Berth

A mobile "reach stacker" will be required for Alternative 2, where processed material is loaded into containers and transported to a transloading facility by barge. A separate berth located near shore will be required for this operation.

Appendix 9-A

Overview of Conceptual Rail Yard Types and Layouts

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engineers & scientists

Appendix 9-A
Overview of Conceptual Rail Yard Types and Layouts

This appendix presents information regarding basic rail yard types and layouts to assist in designing the final transport element of the remedial design (RD) for the Hudson River dredging project. As such, this appendix is organized into the following sub-sections:

1. Introduction;
2. Basic Rail Yard Types;
3. Rules of Rail Yard Design;
4. Rail Yard Operations Analysis;
5. Key Rail Yard Footprint Drivers; and
6. Preliminary Layouts Developed.

1. Introduction

A rail yard is a facility designed to receive, depart, store, and sort rail cars. Rail yards may be built on railroad property to support a region or division of the railroad where numerous customers are located, or may be built off railroad property for an industry or consignee to support on-site activities of the site owner or manager. The need for an on-site rail yard is typically driven by the number of railcars that are handled on a daily basis.

For example, paper mills often build rail yards on their property so that raw materials received can be stored on site until required at a specific building or facility within the site. The rail yard serves as a warehouse on wheels where materials are inserted into the manufacturing process on an as-needed or "just-in-time" basis. Likewise, finished goods are then loaded into specific types of railcars that are driven by commodity type and are held and dispatched in single car lots or in groups of one or more cars or "blocks" to their final destination. Consignee yards are designed so that inbound trains can be broken down and cars spotted where needed. Outbound cars are built into blocks and/or trains so that the connecting railroad can efficiently move railcars off site to their final destination.

For the Hudson River Project, an on-site rail yard will be needed to support the activities in and around the land-based sediment processing/transfer facility (hereinafter referred to as "processing facility"). The processing facility will have the potential to treat 4,500 to 6,000 tons of dredged material per day for approximately six months each year over a six-year period. This daily production rate may be in the form of one or more material streams. After treatment, the processed material will be transported via rail to its final destination. A rail yard is required to ensure that the transfer of outbound material to approved landfills will meet the aggressive schedule

mandated by the United States Environmental Protection Agency (USEPA). In addition, the rail yard may support the outbound movement of materials identified for beneficial use, as well as the inbound movement of approved backfill materials that will be unloaded at the processing facility, loaded onto barges, and placed in the Hudson River.

Rail yards are typically called "classification yards" as they provide a means to classify or sort inbound or outbound cars to support the needs of the local industry in the manufacture of a particular item or goods in an effective and efficient manner. The classification or sorting of cars may be particularly important at the processing facility where inbound cars may have to be sorted and placed at specific locations within the plant to receive Toxic Substances Control Act (TSCA) materials, non-TSCA materials, debris materials, and materials designated for beneficial use. The efficient placement and removal of railcars will ensure that the processing facility is able to meet its daily rate of 4,500 to 6,000 tons.

2. Basic Rail Yard Types

Three types of classification yards are being considered for the Hudson River project. The numbers of cars that must pass through the yard on a daily basis usually drives the type and size of a classification yard. Examples of these classification yards and the maximum daily freight car throughput for each type are shown below:

- Flat Switching Yards: Up to 800 cars per day.
- Mini Hump Yards: 800 to 1,500 cars per day.
- Major Retarder Hump Yards: More than 1,500 cars per day.

Each type of yard is described in more detail below.

Flat Switching Yards

Flat switching yards, as represented on Figure 9-A-1 below, are built when the expected volumes are less than 800 cars per day. The flat switching yard is the simplest type of classification yard to build and more of these yards are built in North America than any other type.

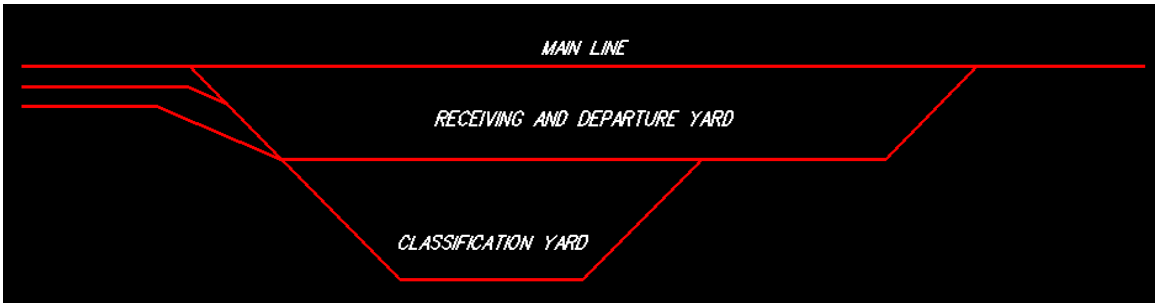


Figure 9-A-1 – Typical Flat Switching Yard

In a flat switching yard, tracks receive trains that are to be broken down and spotted at the industry. These tracks should be long enough to hold an entire train or several blocks of cars. In addition, the yard should have departure tracks where outbound blocks of cars or whole trains are assembled in anticipation of the serving railroad picking up and moving these cars to their final destination.

For the Hudson River project, empty trains will be received at the processing facility. A number of tracks will be needed to classify cars for loading by material type, equipment type, and even by final destination. Inbound cars will be spotted in anticipation of loading once they have been pulled off the receiving tracks. After loading, outbound cars will be assembled into blocks or trains on the departure tracks.

The typical flat switching yard is rectangular in shape, double-ended and, in general, usually runs parallel to the serving railroad. The yard's track lengths will be sized to meet the needs of the processing facility; typically, yards will have minimum track lengths that hold significant numbers of cars so that an inbound train does not have to be broken into many small pieces while the cars are classified. Similarly, it is more efficient to build a block of cars or an entire train from a few longer tracks rather than many very short tracks. In addition, switching cars to break down or make up blocks of cars or trains takes time, requires fuel, and creates noise. Therefore, to support the high volumes of material treated at the processing facility and to minimize the associated environmental impacts, the rail yard should be designed with the longest and fewest number of tracks possible.

In a flat switching yard, cars are switched into tracks by the locomotive pushing the cars through the turnouts at the end of the tracks into the main bodies of the tracks. The turnouts form a ladder where the engine can place or pull cars out from any of the tracks. Typically, the horizontal spacing of freight yard tracks measures 15 feet or greater on center. And, unlike trucks, trains require a gradual transition when moving from the ladder track through a switch to a yard track. Therefore, most ladder tracks are on at least a 10:1 slope. The distance along the ladder track between tracks that are on 15-foot track centers is approximately 150 feet. If the flat yard has many switches and tracks, the yard will be long and rectangular because of the slope (angle) of the ladder and length of yard track.

As with other types of rail yards, flat switching yards fit better on long and narrow rectangular parcels that are somewhat parallel to the serving railroad.

Since the flat switching yard does not require much sophisticated control equipment to operate efficiently, these yards are less costly to construct than the hump yard (which is discussed in the next sub-section). The rolling speed of cars and the coupling speed of the cars are controlled by the designed grades and by the skill and competence of the yard switching crew.

Hump Yards

Hump yards are usually required when the daily car throughput increases above the 800 car per day threshold. Hump yards can be classified into two primary types: mini hump and major retarder. Mini hump yards can

handle 800 to 1,500 cars per day, while major retarder hump yards can handle more than 1,500 cars per day. Within these categories, hump yards can be designed as in-line or side-by-side hump yards, as shown on Figures 9-A-2 and 9-A-3, below. The hump yard has the same basic elements as the flat switching yard: receiving yard, departure yard, and classification yard. Hump yards, however, have some unique features because of the increased hourly output required. Hump yards are required as the volume of cars and number of originations or destination of cars increases.

In a hump yard, cars are not pushed into the classification tracks by a locomotive. Instead, cars are pushed over a hump crest and then released, where they accelerate by gravity to a predetermined velocity. The cars have their speed adjusted or retarded as necessary so that they roll to their final destination in the classification yard at a speed of approximately 3 to 5 miles per hour (mph). The increased velocity over the hump and numerous tracks in the classification yard allows the yard operator to build blocks of cars that have specific destinations and which are then built into outbound trains.

Trains on the single hump lead continuously move along as cars are pushed up and over the hump to their final destination on one of the many classification tracks in the classification yard. The train does not have to stop and start as a train does that is switching cars onto different tracks in a flat yard. Therefore, the throughput of a hump yard is higher than that of a flat switching yard.

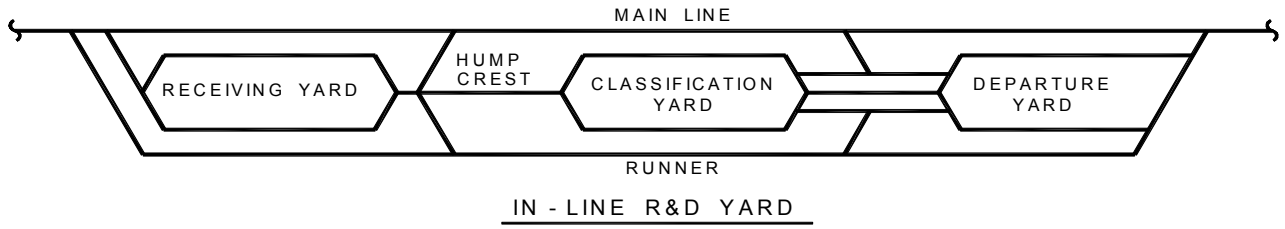


Figure 9-A-2 – In-Line Receiving and Departure Yard

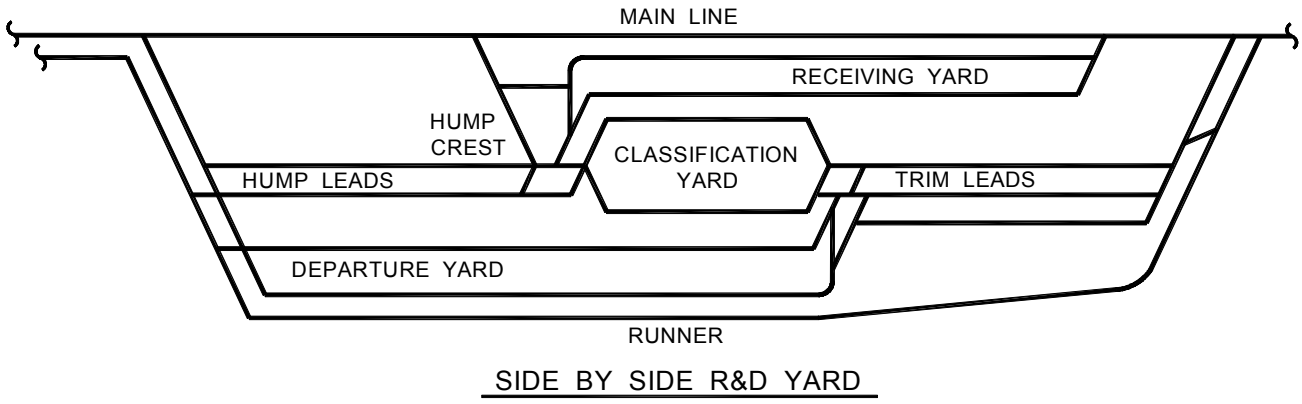


Figure 9-A-3 – Side-By-Side Receiving and Departure Yard

As shown on Figures 9-A-2 and 9-A-3, a side-by-side hump yard with a receiving yard and a departure yard on either side of the classification yard has a somewhat wider footprint then the in-line hump yard. However, again the general shape of any hump yard is more rectangular in nature with its long axis generally parallel to the track of the serving railroad.

Hump yards are more capital intensive and require sophisticated control equipment to control the speed of freight cars so that they couple at speeds of 3 to 5 mph in the classification yard.

3. Rules of Rail Yard Design

The overall shape of a rail yard is generally rectangular, because of the low angle of the yard ladder and desirable minimum length of yard tracks. Therefore, a rectangular parcel is preferred when selecting a site and planning a rail yard. There are several general rules that apply to rail yard design; these are discussed below.

Rule #1 - Avoid reverse curves when possible; Yard design needs to take into account in-train forces.
Rail yards must be designed to take into account and accommodate in train forces. The tracks in a yard must be designed to sustain the loading of a freight train that weighs several thousand tons. For example, if 6,000 tons of material is produced daily and loaded into a train, the total weight of the train including cars and locomotives will be in excess of 7,500 tons.

In addition, the general shape of the yard ladder should be as shown on Figure 9-A-4, below, so that as the train proceeds into or out of the yard turning or steering movements are kept in the same direction whenever possible. This design reduces the forces in the train between cars and will provide for a route that can be more easily navigated by a train; especially one that has longer cars with increased spacing between the tracks.

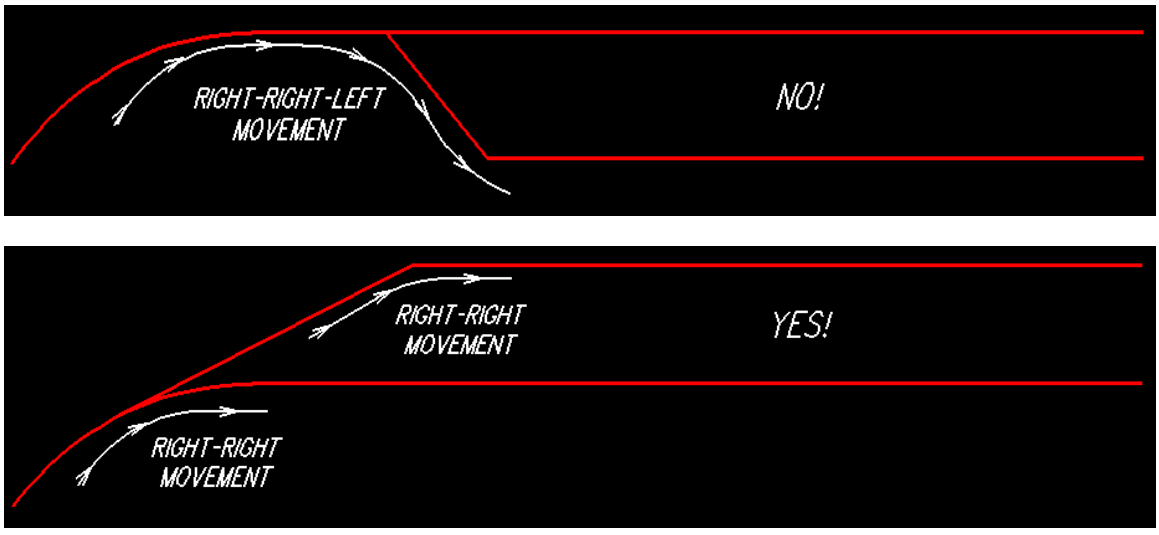


Figure 9-A-4 – General Shape of Yard Ladder

Rule #2 – Maximize number of parallel moves allowable; Avoid blocking entire yard with one train.
Whenever possible, it is desirable to design and lay out a rail yard that will accommodate more than one parallel move within the yard at any time. Therefore, if an engine is moving along the yard ladder and serving one track, the other tracks should be designed so that a second engine may be working or moving trains in and out of the yard area at the same time.

This aspect of the design is important in a yard that handles a significant amount of cars on a daily basis to support a facility, such as the processing facility for the Hudson River project. It will be necessary to spot cars at the processing facility while building outbound trains or breaking down incoming trains.

As shown on Figure 9-A-5, engines or trains can access this rail yard from more than one track. It is possible to make more than one parallel move without tying up the entire end of the rail yard.

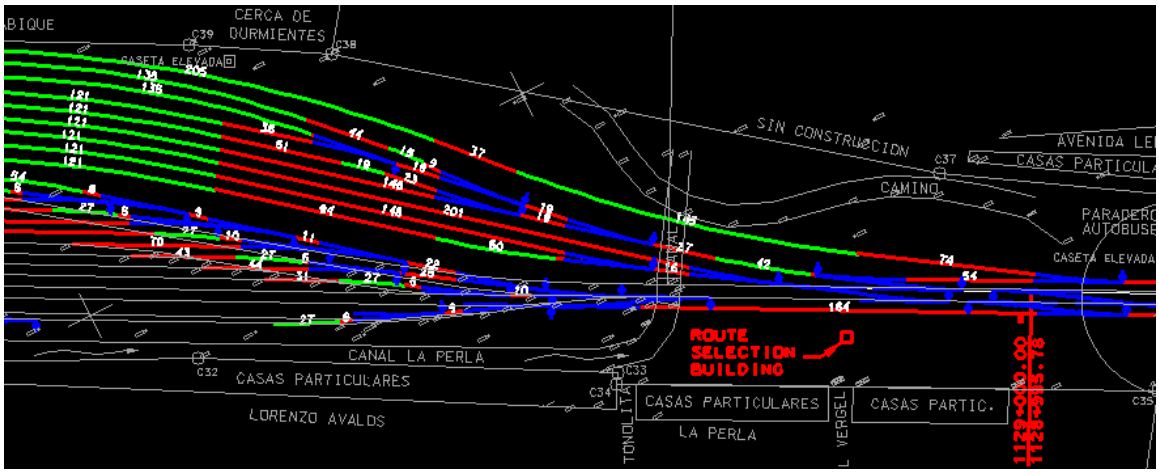


Figure 9-A-5 – General Design of an Efficient Rail Yard

Rule #3 – Design the rail yard to allow for efficient operation of trains and short switching moves.
Rail yards must be designed to efficiently sort and classify rail cars, as trains are being broken down or built up. The efficient movement of rail cars minimizes the quality of life issues associated with rail yard operations (e.g., noise, light, etc.). Therefore, an efficient design accounts for switching from one track to another as quickly as possible.

When designing a rail yard, the distance between tracks in the yard and major components within the yard should be minimized. By reducing these critical distances, the rail yard becomes more compact, reducing the amount of property required for the rail yard footprint. Then, the time to move between any two points in the yard is reduced because the distance between the two points is minimized.

As can be seen from Figure 9-A-6, below, a rail yard can have several major components, including a departure yard, classification yard, and receiving yard. The mainline of the serving railroad is at the top of the figure. The horizontal and vertical scales are the same; the centerline of the classification yard is located approximately 1 mile from the railroad mainlines and the centerline of the receiving yard is located approximately 1.7 miles away. If the distance was shortened between both the yards and the mainline, the amount of time switching cars between yards could be decreased.

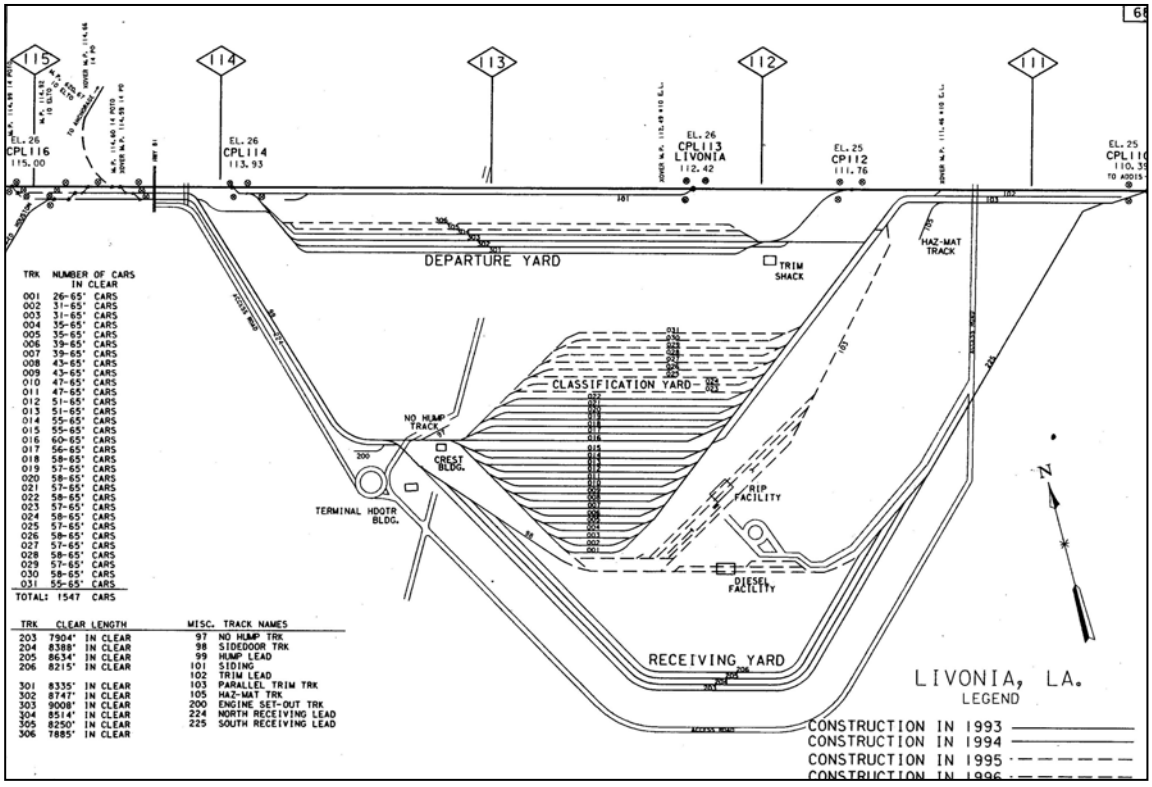


Figure 9-A-6 – Major Components of a Rail Yard

Rule #4 – Avoid split rail yards, since working between yards becomes inefficient and time-consuming.
Designing a rail yard with its components located on either side of the mainlines of the serving railroad will degrade the performance of the yard once in operation. Figure 9-A-7, below, shows the two main lines that are also switching leads (used to switch cars). If one railcar needs to move from the "eastbound traffic" yard to the "westbound traffic" yard, then the locomotive and railcar will have to cross the two mainlines of the serving railroad. On the railroad, yard-switching moves sometimes have a low priority, and the switching engine often has to wait for other freight, commuter and intercity passenger trains before making a switch. Therefore, the efficiency of moving cars between yards is sufficiently reduced.

For the Hudson River project, the rail yard that supports the processing facility must operate efficiently to meet the daily, weekly and seasonal goals for transporting processed materials. A yard layout as shown on Figure 9-

A-7, below, where the support rail yard is split by the serving railroad, would jeopardize the operation of the entire rail support yard.

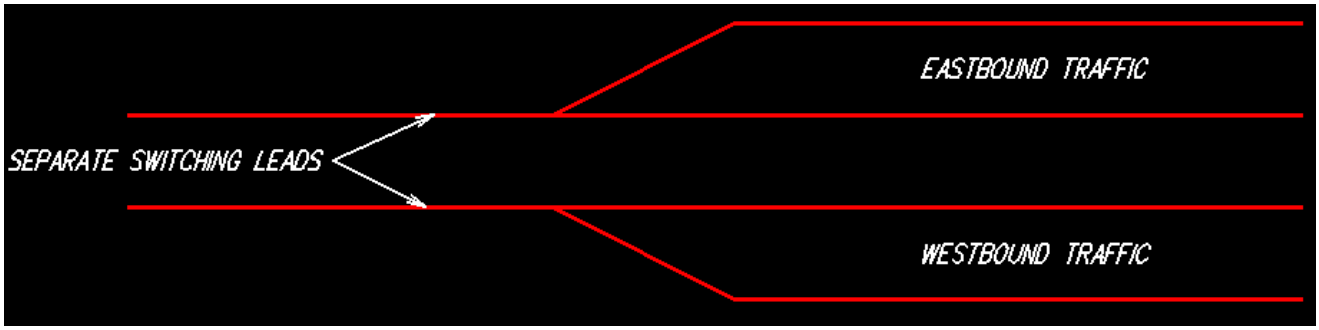


Figure 9-A-7 – Example of Split Rail Yard Leads

Rule #5 – In all rail yards, grades are important.

Rail yards are designed to store railcars and to support the loading and unloading of railcars. To ensure that cars stay stationary while cars are being stored, unloaded or loaded, the air brakes are left on. The flat switching yard is made as flat as possible to ensure that cars do not move or "run away" while they are left unattended. Most flat switching yards are shaped like a saucer so that cars cannot roll out of the yard or move while being loaded.

The entering and leaving grades to and from a rail yard are critical as well. Trucks and automobiles can readily negotiate grades of about 10%. Locomotives and trains cannot readily negotiate grades in excess of 2%. Entrance and exit grades to a yard and the length of vertical curves connecting these grades must be designed accordingly.

The requirement to control and have relatively flat grades connected by vertical curves when designing a rail yard is extremely important. Limiting grades can potentially increase the length of both the rail yard and the connecting tracks to the serving railroads. Thus grades have an affect on the overall shape and size of a rail yard.

While grades are important in designing all rail yards, they are critical when designing flat yards. In flat yards, profile grades must be controlled. Car retardation is accomplished with "bowl" geometry or by placement of cars with locomotive. Cross grades provide positive drainage within the rail yard.

4. Rail Yard Operations Analysis

To properly design a rail yard, it is important to understand how the rail yard will support proposed rail operations and what types of railcars will be needed. Some of the functions of a rail yard include:

- Classification of rail cars;
- Storage of active rail cars;
- Assembly of trains;
- Breakdown of trains;
- Storage of spare rail cars;
- Inspection of rail cars; and
- Minor repair of rail cars.

The rail yard should be designed to support the processing facility for the outward movement of materials. In addition, it may have to support the import of clean materials to the site for loading into barges and final placement in the Hudson River.

The key to designing a rail yard is to understand all of its basic functions. For the Hudson River Project, the rail yard will be used for the following functions:

- Supply sufficient numbers of rail cars at the desired interval so that processed materials may be removed, loaded and delivered to final destination upon demand.
- Serve as an area where empty or loaded cars can be inspected and minor repairs made as necessary so rail cars can make as many trips to designated landfill destinations per month as possible.
- Support the assembly of loaded trains and the breakdown of empty trains in preparation of loading.
- Serve as an area where cars can be sorted or classified by material type or destination before being made up into blocks of cars or whole trains for movement to final destination.
- Provide a space to store spare cars, so when equipment problems are discovered that cannot be corrected quickly, new equipment can be placed in the line up to ensure the continued, uninterrupted car supply to meet the demands of the processing facility.

For the Hudson River project, a flat yard has been selected as the type of yard that will best fit the needs of the project. This selection is based on a preliminary review of daily tonnages to be processed, numbers of material streams, potential types of equipment to be used, numbers of railcars to be switched daily, and number of potential landfill destinations.

The flat yard arrangement being considered for the Hudson River project is shown generically below on Figure 9–A-8. This type of rail yard configuration typically contains the following major components:

- Switch lead(s);
- Receiving track(s);
- Departure track(s); and
- Running track.

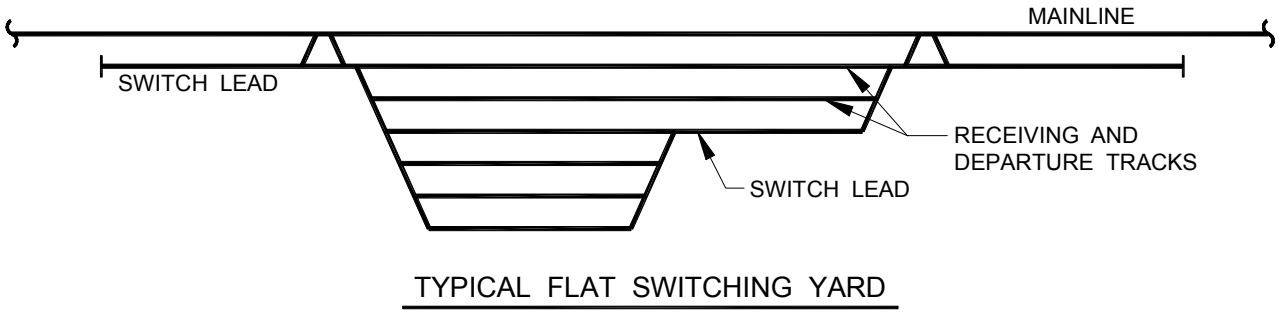


Figure 9-A-8 – Typical Flat Yard Arrangement

The receiving tracks are required to receive inbound empty trains or trains loaded with clean backfill for loading into barges. Outbound loaded trains or clean fill empties are built on departure tracks. In general, the receiving and departure tracks are the longest tracks in the yard as they are designed, if possible, to hold an entire train. Trains on the receiving and departure (R&D) tracks are broken down or built up from cars on the classification tracks in the flat yard. These tracks may be shorter than the R&D tracks.

In an efficient flat yard design, a running track is desirable. While not designated on Figure 9-A-8, a running track connects both ends of the yard so the trains and engines can move freely at all times from one end of the yard to the other. Therefore, the running track is an additional track that is required, above and beyond the tracks that hold and sort cars, and can be left open at all times.

In addition to the basic analysis presented in this appendix, a more detailed railroad operations analysis needs to be performed to develop the requirements and drivers that will determine the type, size, and arrangement of the rail yard to be designed for the Hudson River project. Specifically, this analysis is performed to:

- Understand traffic patterns and volumes;
- Identify the equipment types that will use the rail yard;
- Identify proposed operations required in the rail yard; and
- Design a rail yard that considers all of the above and meets the output requirements of the processing facility.

To successfully design a rail yard that will support the Hudson River Project, several steps must be followed, including:

- Develop a rail yard concept;
- Design the rail yard for transportation/operational requirements;
- Test the rail yard design for flexibility if operational or load out conditions change;

- Make any necessary design adjustments to meet project requirements; and
- Address quality of life issues.

5. Key Rail Yard Footprint Drivers

Upon completion of the operations analysis and identification of the type of rail yard to be built, the next step is to understand the overall shape and size of the rail yard. The rail yard design is started by:

- Formulating a list of footprint drivers; i.e., the variables that most effect the size and shape of the rail yard;
- Calculating the track length requirements in the rail yard;
- Producing conceptual rail yard footprints for analysis and review;
- Comparing footprints to candidate sites; and
- Making footprint modifications as required.

Preliminary assumptions are made about the identified key drivers. Once the key drivers are identified, a sensitivity analysis is run to see how the driver affects the general size and shape of the yard. Then, a possible range of yard sizes is developed by comparing the results of this analysis.

As the design is developed and more information is obtained about the actual design parameters required, the relative importance of each driver becomes clearer and an overall size and shape of the yard can be selected and defined in the Intermediate and Final Design.

Some examples of footprint drivers that should be taken into account during design are illustrated below. Key factors that influence the footprint drivers are also included.

Processing Facility Characteristics

The processing facility is a key driver as the rail yard is being constructed to support this facility. Items that are related to the processing facility and drive rail yard size and shape include:

- Processing facility output
- Daily and weekly production schedule
- Material types loaded onto railcars at plant or at rail yard
- Integration of the processing facility and rail yard wherever possible
- Shape of processing facility and rail yard sites as they relate to available property
- Topography of processing facility site.

Material Type

The material type is a key driver as the rail yard is being constructed to load and transport processed materials. Items that are related to the material types and streams of materials that drive rail yard size and shape include:

- Texture of processed materials
- Processed material type as it relates to railcar type
- Streams of material, production rates, and times of production
  - Number of streams, daily production rate, days per week produced, etc.
- Back haul of clean fill materials as it relates to car type and number of cars
- On-site material handing protocol
  - Conveyors, front end loaders, bins, etc.
  - Materials loading location (processing plant, rail yard, etc.)
- Material handling protocol for loading and final transit by railcar
  - Canvas covers, lids, etc. for rail cars
  - Covers for conveying systems

Landfill Location

The landfill(s) location is a key driver as the rail yard is being constructed to transport processed materials to one or more designated landfills. Items that are related to the landfill location that drive rail yard size and shape include:

- Destination of different material streams
  - Number of destination sites
  - Can more than one stream of material move to any site?
- Transit times
- Unloading time at landfill
- Rail availability and equipment compatibility at potential landfill sites

Type of Rail Equipment

The selected equipment is a key driver as the rail yard is being constructed to load and transport processed materials in rail cars and to deliver these materials to one or more designated landfills. Rail car types have to be compatible with loading operations at the processing facility and with unloading operations at the landfill(s). Items that are related to equipment type that drive rail yard size and shape include:

- Type of equipment selected (e.g., gondola cars versus intermodal containers on flat cars)
- Amount of equipment required
  - Processing and conveyance cycle time at processing site
  - Cycle time in transit

  - Number of material streams from processing plant
- Whether standard industry equipment is to be used for loading and/or unloading
- Material handing protocols
- Available equipment types
- Railcar capacity and volume
  - 263,000 pounds (100 ton)
  - 286,000 pounds (110 ton)
- Actual railroad conditions may provide opportunity for the higher capacity (heavier) equipment (weakest rail route link determines car maximum weight)

Serving Railroad Operations

Serving railroad operational requirements are key drivers as the rail yard is being constructed to load and transport processed materials in rail cars and to deliver these materials in railcars to one or more designated landfills. Trains and cars handled by the serving railroad(s) have to be compatible with loading operations at the processing facility and with unloading operations at the landfill(s). Items that are related to the serving railroads ability to handle cars and train include:

- Optimum size train for serving railroads (length and tonnage)
- Train size to be determined by railroad(s) physical constraints (grades, bridges, etc.)
- Size of train that can be reasonably handled at landfill disposal site(s)

Rail and Civil Design

Established and accepted rail and civil design guidelines and practices are key drivers as the rail yard is being constructed to load and transport processed materials in rail cars and trains. The yard design must make the necessary provisions to accommodate typical railcars, locomotives and trains that visit the processing facility. Items that are related to the basic rail and civil design parameters used in rail yard design are:

- Shape of yard (double-ended or stub-ended)
- Minimum length of track
- Size of turnouts
- Turnout ladder angle
- Track centers
- Aisle ways required for container transport, inspection and minor repair
- Distance and relationship to existing rail lines

6. Preliminary Rail Yard Layouts

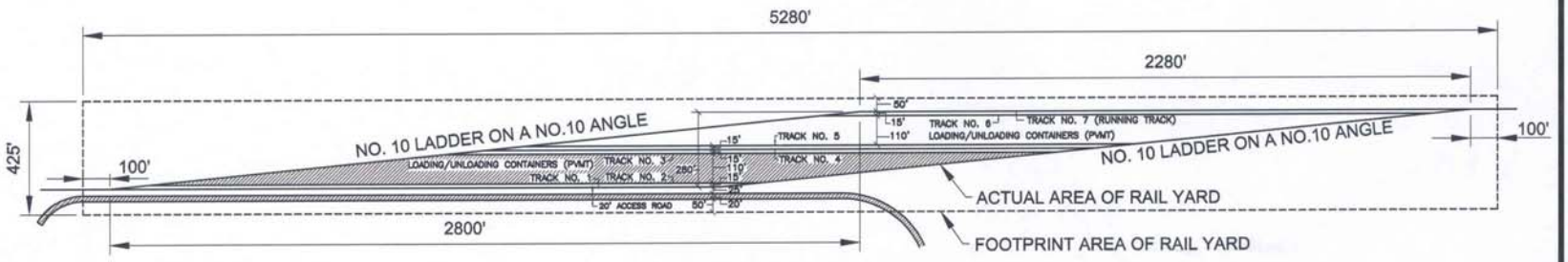
Once a list of potential rail yard drivers is developed, then an evaluation is conducted to determine the influence of a particular driver on rail yard length, width, overall shape, and size. To do this, a matrix with driver

information and other engineering design requirements is assembled. Once the input data are supplied, the matrix computes the total length and number of tracks required to satisfy a particular set of operating conditions.

Then, a series of typical yard arrangements that meet the requirements of the project can be laid out in a schematic format. These schematics, which have been developed for the Hudson River project and are included at the end of this sub-section, are particularly useful in understanding the size and shape of rail yard required. Once the acreage of the rail yard footprint is determined, a comparison of candidate site parcels with the rail yard footprint schematics can be made. This comparison results in an initial analysis regarding the site's ability and suitability to support both the processing facility and rail yard.

Each of the following track layout schematics was developed using a certain processing facility output, minimum yard track length, and designated car type. The size and shape of the yard schematic are particularly sensitive to those drivers.

Rail yard Schemes "A" through "J" have been developed that reflect a number of different track layouts and track arrangements. As can be expected, the various schematics create very different footprints that have very different land requirements. Estimated footprint acreages that are associated with each schematic are given in notes in that schematic along with other design assumptions used to develop that particular yard layout.



SCHEME A

4,500 TONS PER DAY WITH 95' FLAT CARS - 2,000' MINIMUM TRACK LENGTH

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 15,960 FEET

SELECTED YARD TRACK LENGTH = 2,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 95 FOOT FLATCARS WITH 4 CONTAINERS PER CAR

NO. OF CARS IN YARD = 104
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 14.65 ACRES

FOOTPRINT AREA OF RAIL YARD = 51.51 ACRES

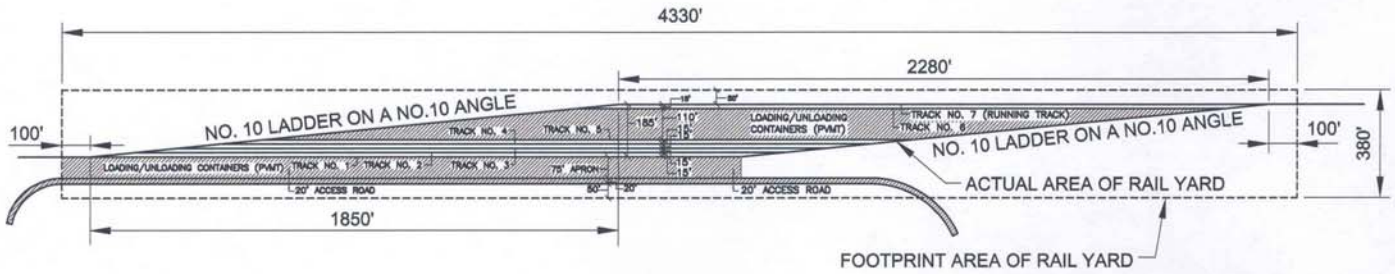
LEGEND:

- UNLOADING RAMP/ROADWAY
- FOOTPRINT BORDER
- CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

	DATE: 7-18-03
	SCALE: 1" = 400'
	SK - 2000 - 1
	RAIL YARD - SCHEME A

S:/ACAD14/GENERAL ELECTRIC/SCHEME_A.DWG



SCHEME B

4,500 TONS PER DAY WITH 95' FLAT CARS - 2,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_B.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 15,960 FEET

SELECTED YARD TRACK LENGTH = 2,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 95 FOOT FLATCARS WITH 4 CONTAINERS PER CAR

NO. OF CARS IN YARD = 104
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 9.68 ACRES

FOOTPRINT AREA OF RAIL YARD = 37.77 ACRES

LEGEND:

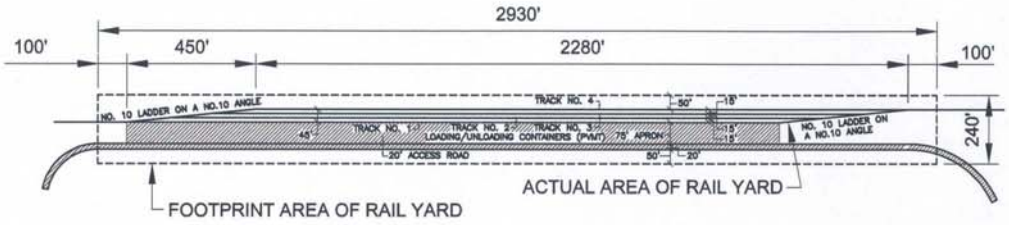
UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

	DATE: 7-18-03
	SCALE: 1" = 400'
	SK - 2000 - 2
	RAIL YARD - SCHEME B



SCHEME C

4,500 TONS PER DAY WITH 45' HOPPER CARS - 2,000' MINIMUM TRACK LENGTH

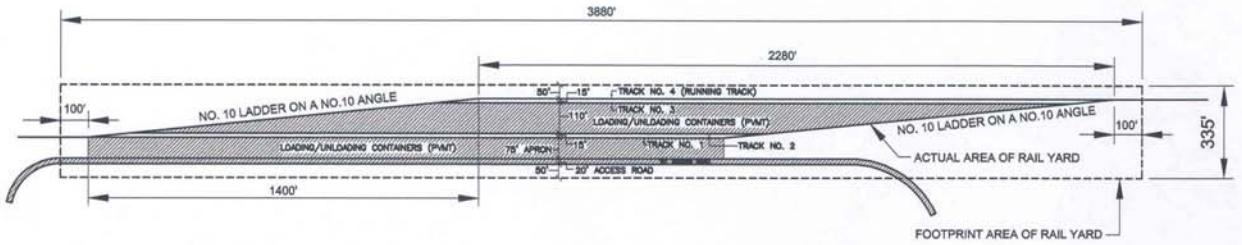
LEGEND:

- UNLOADING RAMP/ROADWAY
- FOOTPRINT BORDER
- CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

	DATE: 7-18-03
	SCALE: 1" = 400'
	SK - 2000 - 3
	RAIL YARD - SCHEME C

S:/ACAD14/GENERAL ELECTRIC/SCHEME_C.DWG



SCHEME D
2,250 TONS PER DAY WITH 95' FLAT CARS - 2,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_D.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 2,250 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 9,120 FEET

SELECTED YARD TRACK LENGTH = 2,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 95 FOOT FLATCARS WITH 4 CONTAINERS PER CAR

NO. OF CARS IN YARD = 52
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 7.33 ACRES

FOOTPRINT AREA OF RAIL YARD = 29.84 ACRES

LEGEND:

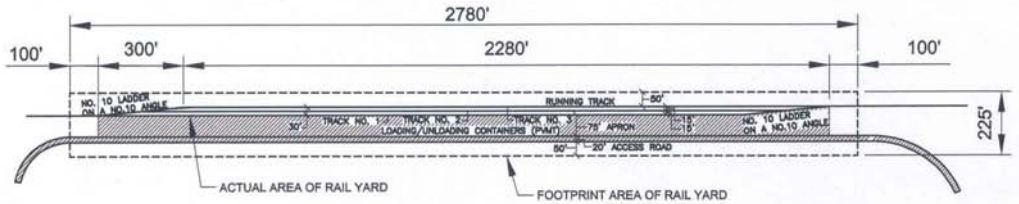
UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

GE / BBL / HDR	DATE: 7-18-03
	SCALE: 1" = 400'
	SK - 2000 - 4
	RAIL YARD - SCHEME D



SCHEME E

2,250 TONS PER DAY WITH 45' HOPPER CARS - 2,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_E.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 2,250 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 6,840 FEET

SELECTED YARD TRACK LENGTH = 2,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 45 FOOT AGGREGATE HOPPER CARS

NO. OF CARS IN YARD = 46
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 1.57 ACRES

FOOTPRINT AREA OF RAIL YARD = 14.36 ACRES

LEGEND:

UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

BBL

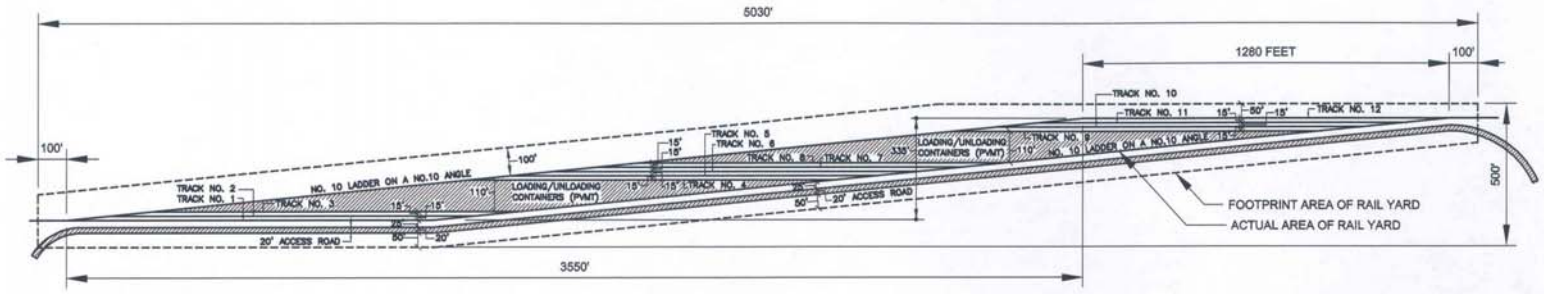
HDR

DATE: 7-18-03

SCALE: 1" = 400'

SK - 2000 - 5

RAIL YARD - SCHEME E



SCHEME F

4,500 TONS PER DAY WITH 95' FLAT CARS - 1,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_F.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 15,360 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 95 FOOT FLATCARS WITH 4 CONTAINERS PER CAR

NO. OF CARS IN YARD = 104
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 10.43 ACRES

FOOTPRINT AREA OF RAIL YARD = 31.17 ACRES

LEGEND:

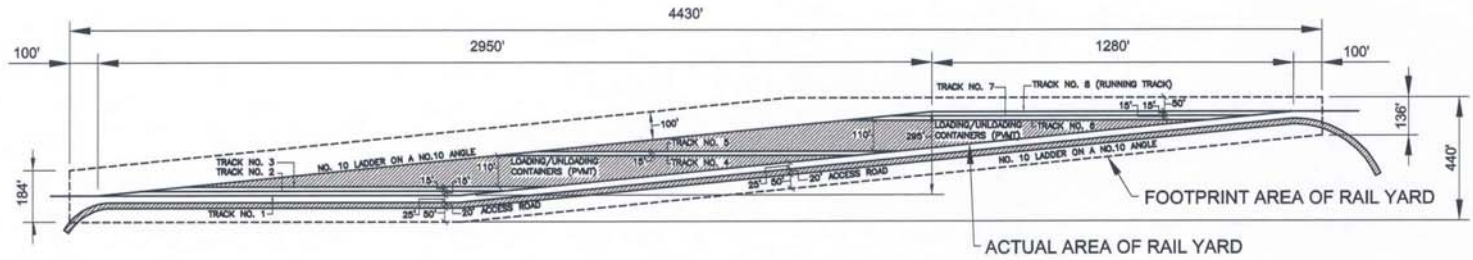
UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

DATE: 7-18-03
SCALE: 1" = 400'
SK - 2000 - 6
RAIL YARD - SCHEME F



SCHEME G

4,500 TONS PER DAY WITH 90' ABCC - 1,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_G.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 10,240 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90 FOOT ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 8.67 ACRES

FOOTPRINT AREA OF RAIL YARD = 26.67 ACRES

LEGEND:

UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

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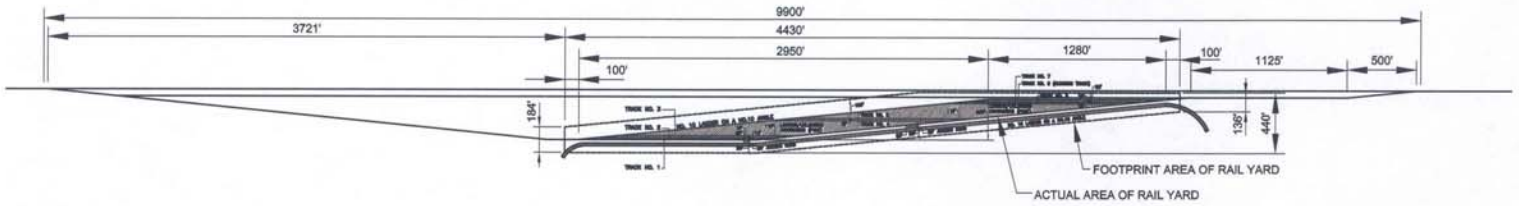
	SCALE: 1" = 400'
	SK - 2000 - 7
	RAIL YARD - SCHEME G



SCHEME G-1

4,500 TONS PER DAY WITH 90' ABCC - 1,000' MINIMUM TRACK LENGTH

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 10,240 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90 FOOT ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 8.67 ACRES

FOOTPRINT AREA OF RAIL YARD = 26.67 ACRES

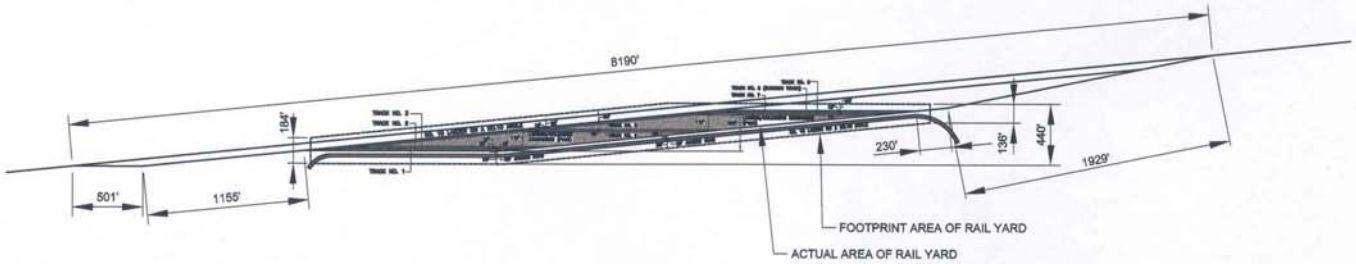
LEGEND:

- UNLOADING RAMP/ROADWAY
- FOOTPRINT BORDER
- CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

BBL / HDR	DATE: 7-18-03
	SCALE: 1" = 800'
	SK - 2000 - 10
	RAIL YARD - SCHEME G-1

S:/ACAD14/GENERAL ELECTRIC/SCHEME_G



SCHEME G-2

4,500 TONS PER DAY WITH 90' ABCC - 1,000' MINIMUM TRACK LENGTH

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 10,240 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90 FOOT ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 8.67 ACRES

FOOTPRINT AREA OF RAIL YARD = 26.67 ACRES

LEGEND:

UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

BBL

HDR

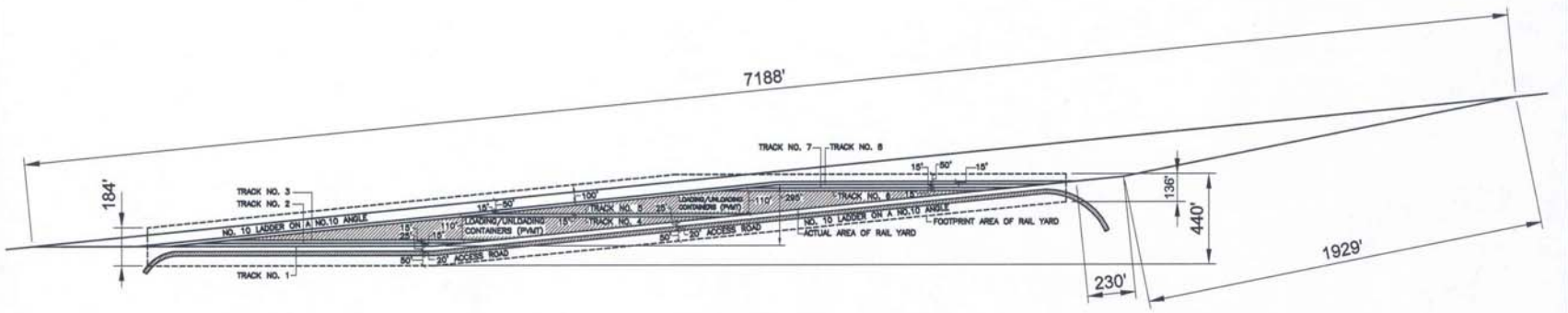
DATE: 7-18-03

SCALE: 1" = 800'

SK - 2000 - 11

RAIL YARD - SCHEME G-2

S:/ACAD14/GENERAL ELECTRIC/SCHEME_G



SCHEME G-3

4,500 TONS PER DAY WITH 90' ABCC - 1,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_G

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 10,240 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90 FOOT ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 8.67 ACRES

FOOTPRINT AREA OF RAIL YARD = 26.67 ACRES

LEGEND:

UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

BBL

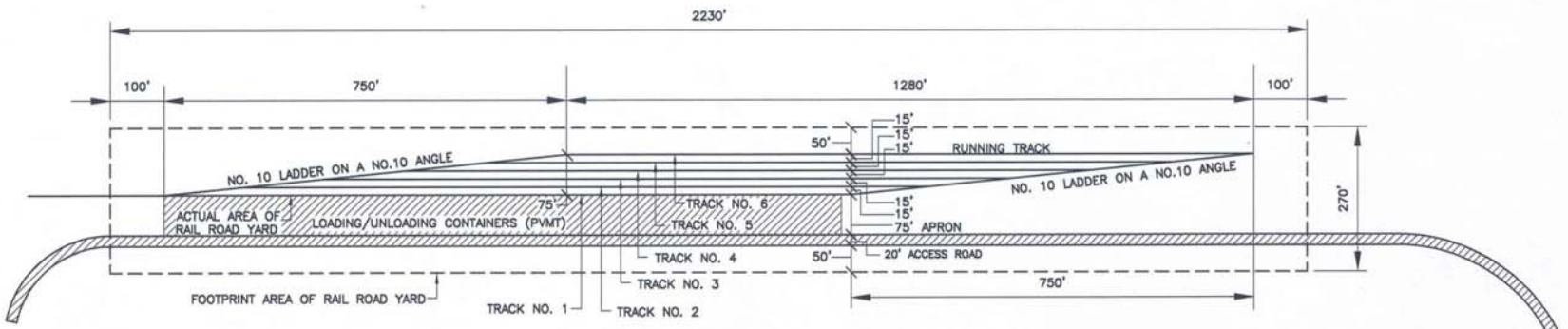
HDR

DATE: 7-18-03

SCALE: 1" = 500'

SK - 2000 - 12

RAIL YARD - SCHEME G-3



SCHEME H

4,500 TONS PER DAY WITH 45' HOPPER CARS - 1,000' MINIMUM LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_H.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 7,680 FEET

SELECTED YARD TRACK LENGTH = 1,000 FEET
(AT CLEARANCE)

TYPE OF CARS HANDLED = 45 FOOT AGGREGATE HOPPER CARS

NO. OF CARS IN YARD = 90
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 2.20 ACRES

FOOTPRINT AREA OF RAIL YARD = 13.82 ACRES

LEGEND:

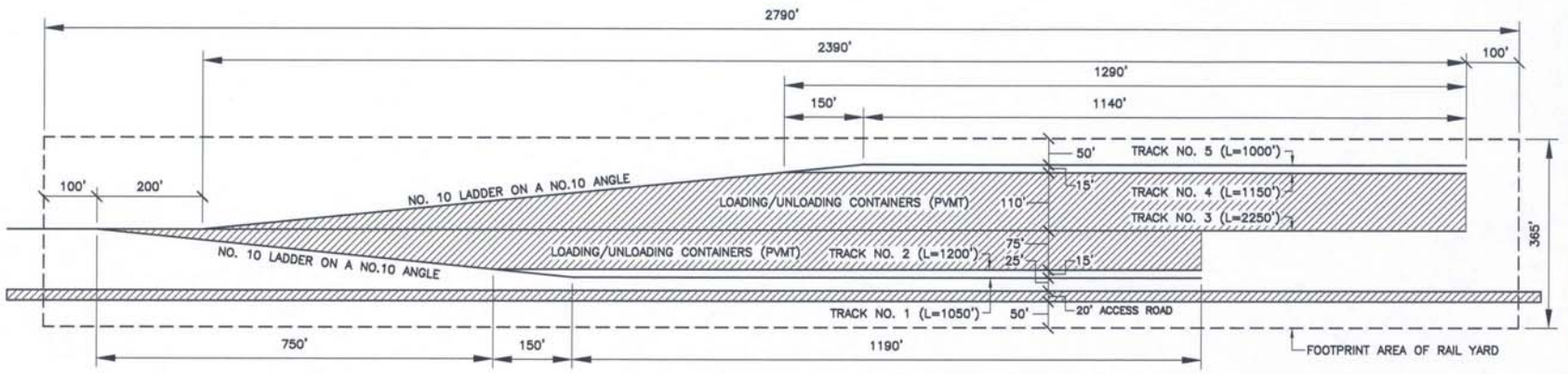
UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

	DATE: 7-18-03
	SCALE: 1" = 200'
	SK - 2000 - 8
	RAIL YARD - SCHEME H



STUBB YARD (NO RUNNING TRACK) - SCHEME I

4,500 TONS PER DAY WITH 90' ABCC - 1,000' MINIMUM TRACK LENGTH

S:/ACAD14/GENERAL ELECTRIC/SCHEME_I.DWG

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 6615' FOR TRAIN OPERATIONS ONLY. ACTUAL YARD TRACK = 6650'

SELECTED YARD TRACK LENGTH = VARIES (MINIMUM 1000')
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90' ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 8.50 ACRES

FOOTPRINT AREA OF RAIL YARD = 23.06 ACRES

LEGEND:

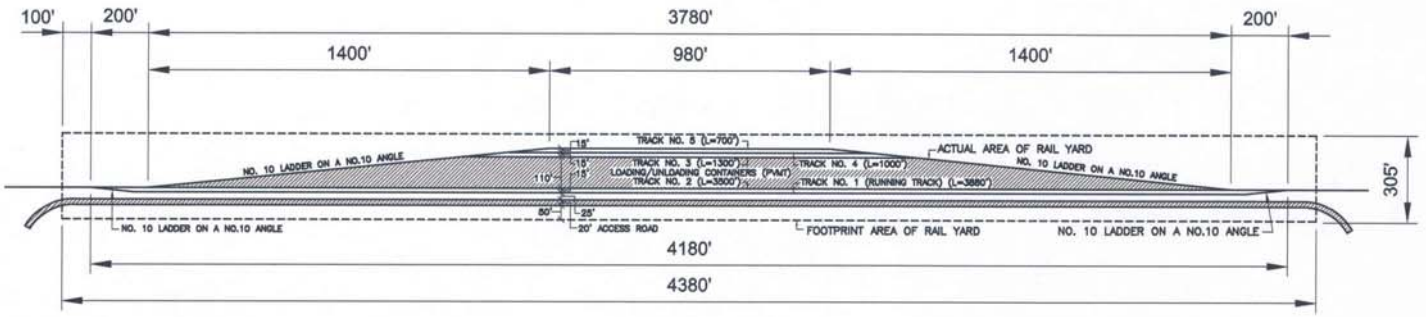
UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

	DATE: 7-18-03
	SCALE: 1" = 200'
	SK - 2000 - 9A
	RAIL YARD - SCHEME I



DOUBLE ENDED YARD (OPPOSING LADDERS) - SCHEME J

4,500 TONS PER DAY WITH 90' ABCC - 700' MINIMUM TRACK LENGTH

NOTES : ASSUMPTIONS

TRANSFER FACILITY OUTPUT = 4,500 TONS PER DAY

TOTAL TRACK LENGTH REQUIRED = 6615' FOR TRAIN OPERATIONS ONLY. ACTUAL YARD TRACK = 6650'

SELECTED YARD TRACK LENGTH = VARIES (MINIMUM 700')
(AT CLEARANCE)

TYPE OF CARS HANDLED = 90' ARTICULATED BULK CONTAINER CARS WITH 6 CONTAINERS PER CAR

NO. OF CARS IN YARD = 70
(LOADS AND EMPTIES)

ACTUAL AREA OF RAIL YARD = 9.04 ACRES

FOOTPRINT AREA OF RAIL YARD = 30.17 ACRES

LEGEND:

UNLOADING RAMP/ROADWAY

FOOTPRINT BORDER

CENTERLINE OF TRACK

PRIVILEGED AND CONFIDENTIAL

GE / BBL / HDR	DATE: 7-18-03
	SCALE: 1" = 400'
	SK - 2000 - 9B
	RAIL YARD - SCHEME J

S:/ACAD14/GENERAL ELECTRIC/SCHEME_J.DWG

Appendix 14-A

Preliminary List of Materials and Performance Specifications

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Appendix 14-A – Preliminary List of Materials and Performance Specifications

This appendix provides a preliminary list of materials and performance specifications, as part of the *Preliminary Design Report*. Note that this will be further developed during the Intermediate and Final Design stages, including the addition of custom and/or performance specifications for water-based equipment and facilities (e.g., barges, scows, tugs, navigation, navigation aides, mechanical and hydraulic dredges).

General Requirements
01040 Summary of Work
01330 Submittals
01350 Environmental Protection
01351 Hazardous Materials Procedures
01450 Quality Control
01550 Traffic Regulation and Control
01901 Field Office Trailer
01903 Project Photographs
01906 Critical Path Schedule
01999 Truck Route Signs

Site Construction
02013 Geomembrane - HDPE Liner
02020 Chlorination
02110 Demolition
02200 Subsurface Investigations
02201 Earthwork
02202 Rock Removal
02203 Structural Excavation, Backfill, and Compacting
02204 Trenching, Backfilling, and Compacting
02205 Selected Fill
02206 Embankment
02207 Restoration of Surfaces
02208 Clearing
02209 Topsoil and Seeding
02211 Leakage Tests
02212 Ductile Iron Pipe
02214 Corrugated Steel Pipe
02216 Embankment
02218 Underground Piping
02219 Pipeline Installation
02220 Earthwork
02270 Geotextile
02290 Off-Site Aggregates
02311 Wood Piles and Pile Driving
02315 Structural Steel H Piles and Pile Driving
02406 Soil Stockpile
02411 Steel Sheeting
02412 Wood Sheeting
02500 Sewage and Drainage Piping Installation
02513 Manholes
02514 Precast Concrete Manholes
02525 Reinforced Concrete Pipe (RCP)
02526 High Density Polyethylene Pipe
02528 Ductile Iron Pipe
02645 Bituminuous Concrete Pavements
02666 Gabion Retaining Walls
02711 Galvanized Chain Link Fence
02800 Site Restoration
02821 Topsoil and Seeding
02850 Wetland Planting
02855 Backfill/Capping
02870 Habitat Replacement and Reconstruction
02900 Dredging
02920 Resuspension Control

Concrete
03001 Concrete
03002 Reinforced Concrete
03100 Concrete Formwork
03200 Concrete Reinforcement
03251 Joints for Concrete
03400 Precast Concrete

Masonry
04215 Brick and Block Masonry

Metals
05120 Structural Steel

05210 Steel Joists
05311 Metal Roof Deck
05500 Miscellaneous Metal
05520 Handrails and Railing

Wood and Plastics
06100 Rough Carpentry

Thermal and Moisture Protection
07110 Waterproofing
07242 Perimeter Insulation
07910 Joint Fillers and Gaskets
07920 Sealants

Finishes
09150 Gypsum Wallboard System
09900 Painting
09901 Mechanical Painting

Specialties
10200 Aluminum Louvers
10800 Toilet and Bath Accessories

Equipment
11010 Above Ground Pump Station

Special Construction
13046 Pre-Engineered Modular Office Enclosure
13100 Sediment and Water Processing
13200 Dredged Material Transport
13300 Final Transport
13400 Disposal
13600 Pre-Engineered Buildings

Conveying Devices
14100 Sediment Storage Hoppers and Live-Bottom Conveyors
14200 Dewatered Sediment Transfer Conveyors
14300 Hoisting Equipment
14301 Portable Aluminum Frame Gantry Cranes

Mechanical
15000 General Equipment Requirements
15050 Pipe Insulation
15051 Heat Tracing
15052 Process Piping
15060 Welded Steel Pipe and Fittings
15061 Black Steel Piping
15062 Ductile Iron Pipe
15063 Copper Tubing/Piping
15064 Polyvinyl Chloride (PVC) Pressure Pipe
15065 Fiberglass Reinforced Plastic Pipe and Fittings
15067 PVC Non-Pressure Pipe
15075 Compressed Air System
15076 Air Lines
15080 Flexible Hose and Connectors
15094 Pipe Hangers and Supports
15096 Flexible Pipe Couplings
15100 Miscellaneous Valves
15102 Gate Valves
15103 Check Valves
15104 Plug Valves
15105 High Pressure Ball Valves
15110 Pump Control Valve
15140 Supports and Anchors
15141 Pumps - General
15143 Sediment & Sludge Mixing Pumps
15144 Dewatered Sediment & Sludge Pumps
15146 Flexible Pipe Couplings
15160 Variable Frequency Drive Equipment
15170 Miscellaneous Electrical Motors
15172 Pressure Gauges
15173 Flow Meters
15174 Magnetic Flow Meters
15175 Tanks
15176 Ultrasonic Level Sensor
15190 Mechanical Identification
15242 Vibration Isolation
15249 Chlorination Equipment
15250 Mechanical Insulation
15291 Bolted Steel Tank
15292 Welded Steel Tank
15300 Fire Protection
15401 Plumbing
15410 Plumbing Piping
15430 Plumbing Specialties
15440 Plumbing Fixtures
15450 Plumbing Equipment
15500 Heating, Ventilating, and Air Conditioning - General
15501 Heating and Ventilating
15505 HVAC Equipment
15540 HVAC Pumps
15545 Chemical (Water) Treatment
15850 Fans

15885 Air Cleaning
15890 Ductwork
15950 Controls and Instrumentation for HVAC System
15985 Sequence of Operations
15990 Testing, Adjusting, and Balancing

Electrical

16100 Electrical Work
16101 Electrical General
16111 Conduit
16120 Wires and Cables
16123 Primary Medium Voltage Cable
16133 Enclosures
16141 Wiring Devices
16160 Motor Controllers
16161 Motor Control Centers
16162 Automatic Transfer Switch
16180 Circuit Protective Devices
16261 Manual Transfer Switches
16262 Non-Automatic Transfer Switches
16330 Dry Type Transformers
16331 Pad Mounted Transformers
16370 Overhead Power Distribution
16420 Electric Service
16425 Outdoor Unit Substation
16450 Electrical Grounding
16465 Medium Voltage Metal-Clad Switchgear
16470 Distribution Switchboards
16471 Circuit Breaker Panelboards
16510 Lighting Equipment
16610 Lightning Protection Equipment
16720 Fire Detention System
16900 Instrumentation
16905 Programmable Controllers
16910 Panels
16911 Variable Frequency Drive Equipment
16960 Miscellaneous Electrical Control