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OCT - 1 2003

Part of
Public Record October 1, 2003



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Via: Hand Delivery

The Honorable Vernon A. Williams
Secretary
Surface Transportation Board - Case Control Unit
1925 K Street, N.W.
Washington, D. C. 20423

Re: Docket No. 42070, Duke Energy Corporation
v. CSX Transportation, Inc.

Dear Mr. Secretary:

Complainant Duke writes to object to Defendant CSXT's efforts in the above-captioned proceeding to introduce new -- and unfounded -- "evidence" in post-evidentiary oral argument materials and briefs in violation of the Board's proscriptions on the introduction of such new evidence in its orders in the proceeding served August 11, 2003, at 1, and December 13, 2002, at 2, respectively.

The violations have become particularly acute. After the September 10, 2003 oral argument, CSXT submitted to the Board the PowerPoint slides for its oral argument, including nine slides, Nos. 6, 14-7, 20, and 27-29, that CSXT did not present at all during its argument, and at least one slide, No. 26, that CSXT displayed briefly, but did not really address. Duke had no opportunity to respond to those slides, especially considering the constraints Duke faced for its oral rebuttal. Any reliance by the Board on such materials is plainly improper for that reason alone.

Moreover, CSXT's materials are substantively misleading and unfounded. One example is particularly instructive. CSXT Slide Nos. 12-14 (attached hereto as

The Honorable Vernon A. Williams
October 1, 2003
Page No. 2

Exhibit I), building upon a vague criticism in CSXT's April 14, 2003 Brief at 11 n.21, falsely depict Duke as having based its rebuttal earthmoving expense on equipment classified as a "dragline" in Chapter 29 of Means Heavy Construction Handbook ("Means") (attached hereto as Exhibit II, not in evidence). Reliance on Means data is common in rate cases, especially when, as here, railroads fail to present data concerning the equipment they actually use in construction and the associated costs, and Duke thus relied on Means for earthmoving cost data, as shown in Duke Rebuttal III-F-46 and Rebuttal Workpapers Vol. 1, pp. 0152-0155 (both attached hereto as Exhibit III) and electronic workpaper "\iiiF2Roadbed\III-F_Grading ACW Rebuttal.XLS" tab "IIIF Unit Costs." However, Duke plainly specified that its rebuttal equipment was a 3 cubic yard power shovel, which is described and depicted in Chapter 27 of Means (attached hereto as Exhibit IV, not in evidence). CSXT's claim that Duke advocated the use of a dragline is a fabrication.

CSXT introduced other new and unfounded "evidence" in its slides and brief, including allegations regarding turning distances (see CSXT Slide No. 17 and CSXT Brief at 11). Additionally, CSXT's efforts to project costs under previous stand-alone cost decisions (CSXT Slide Nos. 23-24) rest on confidential data not included in reported agency decisions.

Duke brings these matters to the Board's attention so that the Board may issue a decision that rests upon evidence of record, as distinguished from unfounded and misleading assertions presented for the first time in post-evidentiary submissions.

Sincerely,

A handwritten signature in black ink, appearing to read "William L. Slover", written in a cursive style.

William L. Slover

WLS:kfm
Enclosures
cc: G. Paul Moates, Esq.

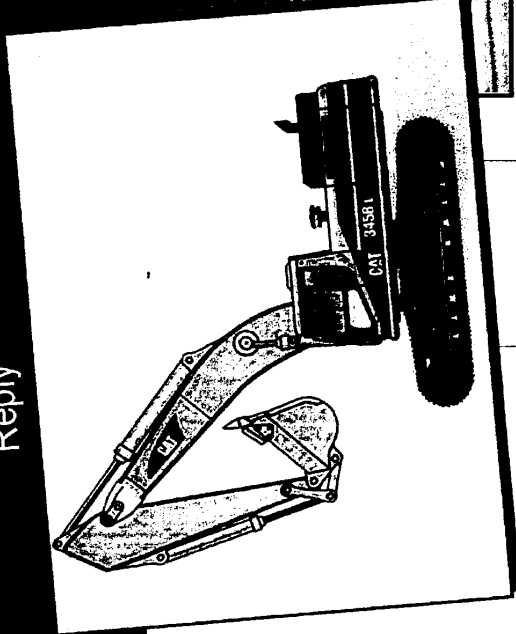
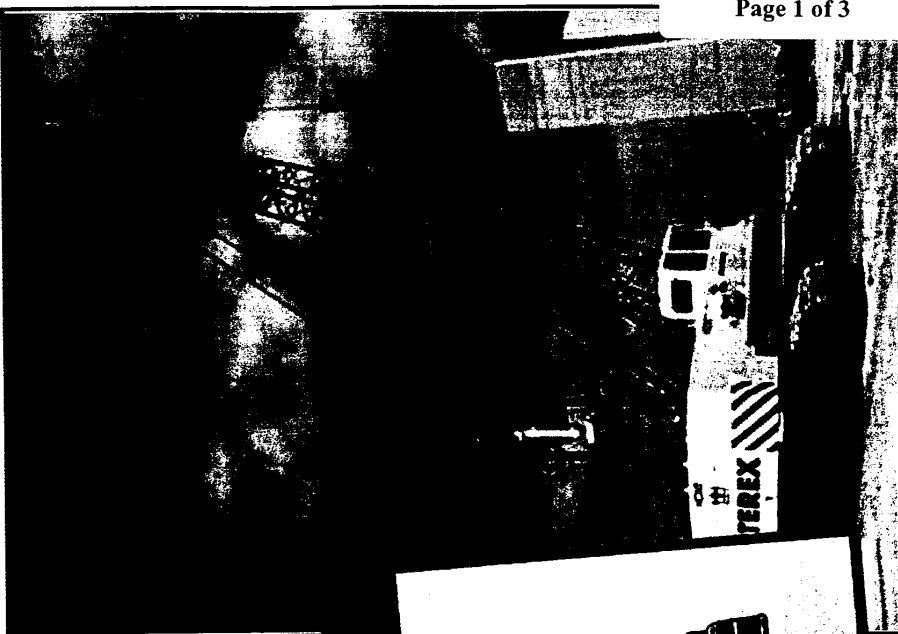
Cranes/Excavators

Opening

Rebuttal



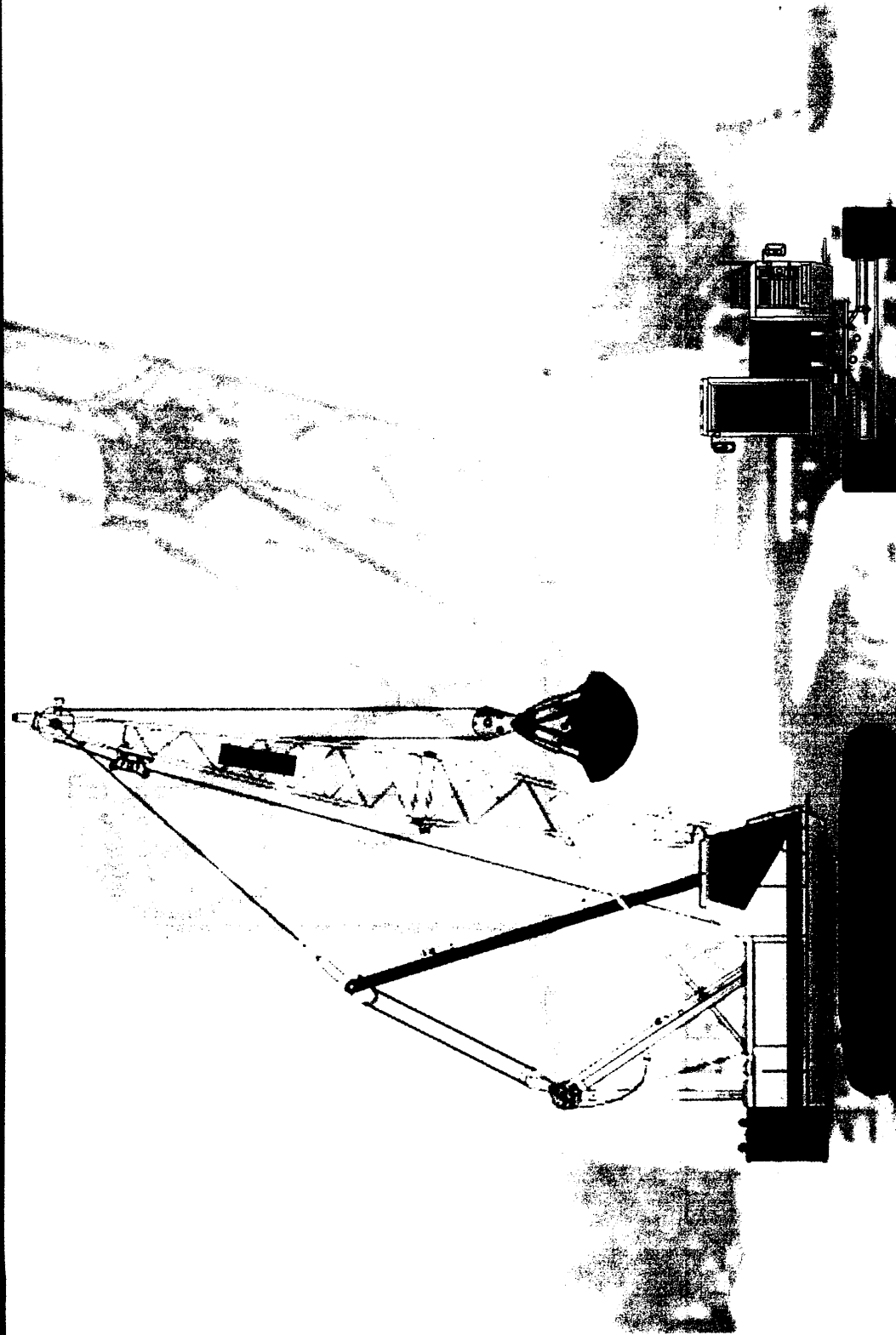
Reply



Duke's Rebuttal Excavator

EXHIBIT I
Page 2 of 3

13



Three Tractor Trailers Are Required to Transport Duke's Excavator



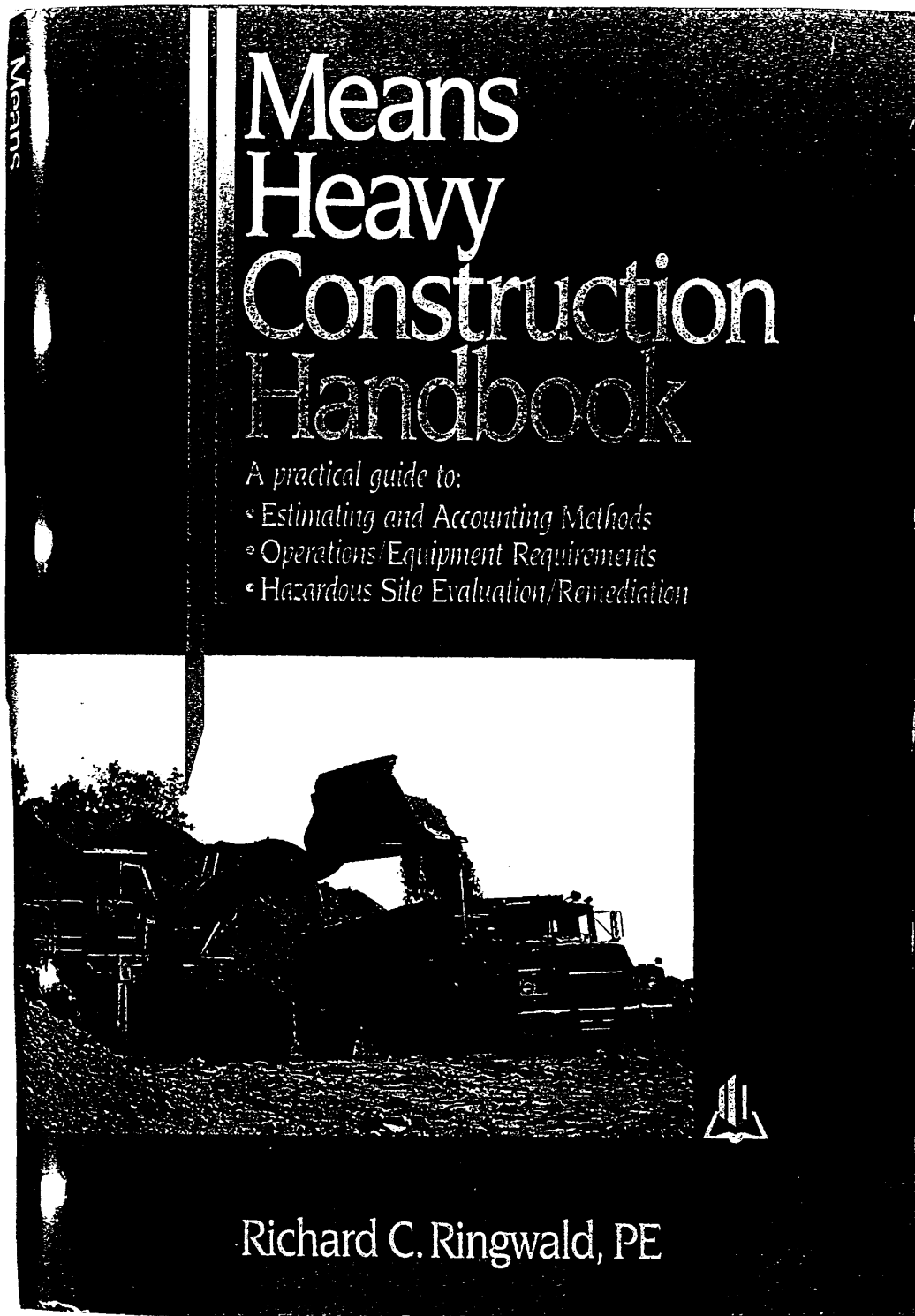
Load #1 - under 90,000 lbs (40 823 kg)



Load #2 - under 36,000 lbs (16 329 kg)



Load #3 - under 33,000 lbs (14 968 kg)





Means Heavy Construction Handbook

A practical guide to:

- *Estimating and Accounting Methods*
- *Operations/Equipment Requirements*
- *Hazardous Site Evaluation/Remediation*

Richard C. Ringwald, PE

Contributing Author: Francis J. Hopcroft, PE

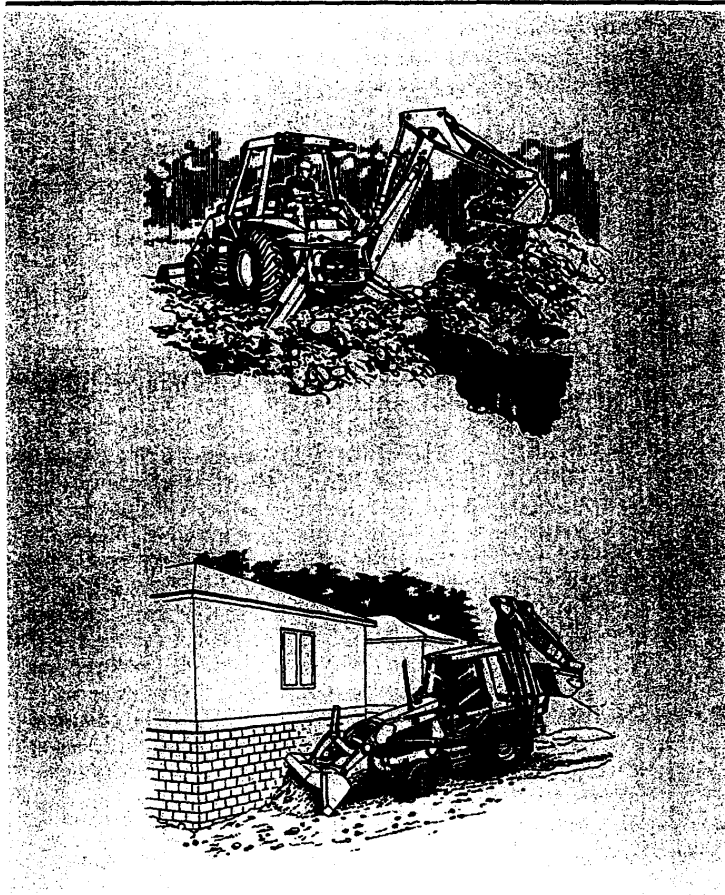
Chapter 29 Backhoes, Draglines, Gradalls, and Trenchers

These excavators usually dig below their sitting plane, although the backhoe and gradall do have a limited capability of reaching above that surface. All can be either wheel- or crawler-mounted. All operate by pulling their buckets toward themselves rather than pushing, as is done by shovels and loaders.

Backhoes The backhoe (Figure 29.1) is the most commonly used, and horsepower for horsepower, can move the most CY/HR. It is used to cut trenches for pipe or other longitudinal structures, to dig foundations, or to do other digging that permits pulling the bucket close to the chassis. It can reach high enough to dump the bucket into many types of hauling machines (though not as efficiently as shovels/loaders). Narrow compacting devices (vibratory and impact) can be mounted in lieu of a bucket for consolidation of trench backfill or similar small area jobs. Some small endloaders can be equipped with a rear backhoe to become a versatile, small odd-job machine. A backhoe is generally rated by bucket LCY size, usually the same size as the shovel to which it can be converted. (See Chapter 16, "Trenching and Pipes," for further information on the backhoe's role in pipe work.)

Draglines The dragline is essentially a crane with cables contrived such that a dragline bucket can be used. The long reach, plus the rotation on the undercarriage, means that a large area can be excavated from one position. This feature is an

advantage in excavating swampy areas or lake/stream bottoms because the dragline can rest in a stable area and reach out to excavate around itself. Scrapers



Backhoe Loaders

(Courtesy Caterpillar Corporation)

Figure 29.1

– with the sometimes exception of crawler-pulled – would bog down in such conditions, and backhoes or gradalls lack the needed reach. The dragline can either load haul units with excavated material, or pile it up for future removal. Like the shovel, the dragline has an optimum face area in which it works best, as shown in the illustration. The operator can throw ("cast") the bucket beyond the point beneath the boom tip, but this practice is hard on the bucket, and reduces the CY/HR of production. (See Figure 29.2.)

Gradalls The "gradall" (Figure 29.3) is a very versatile machine combining features of the backhoe, dragline, and motor grader. Like all versatile machines, however, its

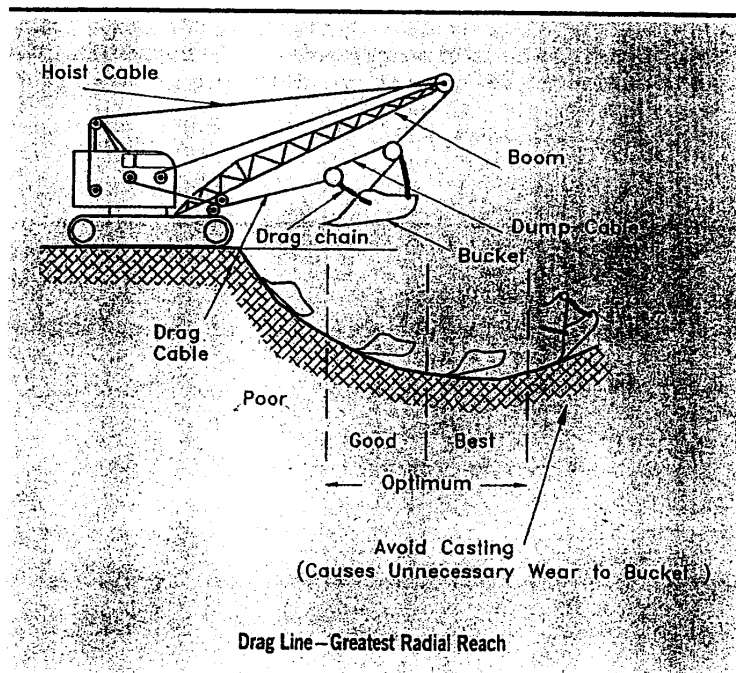


Figure 29.2

**BEFORE THE
SURFACE TRANSPORTATION BOARD**

DUKE ENERGY CORPORATION,	)	
	)	
Complainant,	)	
	)	
v.	)	Docket No. 42070
	)	
CSX TRANSPORTATION, INC.	)	
	)	
Defendant.	)	

**COMPLAINANT DUKE ENERGY CORPORATION'S
REBUTTAL EVIDENCE**

**NARRATIVE
VOLUME 2 OF 2**

**HIGHLY CONFIDENTIAL -- FILED UNDER SEAL
CONTAINS INFORMATION SUBJECT TO PROTECTIVE ORDER**

DUKE ENERGY CORPORATION

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Date Due: November 12, 2002

Attorneys for Complainant

that can be used in this territory or even that grading in the ACW's territory has ever been done with such high-cost equipment. Duke's experts have reviewed CSXT's evidence and concur that equipment other than that used by Duke could be used to accomplish the earthwork requirements for the ACW north of Bostic. However, based on a review of the Means Handbook, Duke's experts conclude that the more appropriate equipment to use for this operation is not the high-cost equipment selected by CSXT but rather a 3 CY shovel at \$1.07 per cubic yard and an off highway 42 CY rear/bottom dump at \$1.94 per cubic yard.³⁵ This equipment is equivalent to the equipment selected by CSXT, but, in keeping with the least cost premise of the SARR, this equipment is more suitable and results in a lower cost per cubic yard for excavation. More specifically, the shovel is the type of equipment used for the economical movement of excavated material from the embankment to the haulers both in heavy construction projects and in rock quarries. A hydraulic excavator is more useful in digging a trench for a sewer or water line. As an example, in the Means Handbook Reference Section under Site Preparation - Excavating Equipment, the 3 CY power shovel, compared to the 3 CY hydraulic excavator, has a

³⁵ Substitution of this equipment (combined with the need for a bulldozer to spread the waste material) increases the cost per cubic yard for common excavation north of Bostic from \$3.10 per cubic yard to \$3.24 per cubic yard (after application of the Means Handbook location factor and the index from 2002 to 1Q02), less than a five percent increase. See Duke Rebuttal electronic workpapers, file "III-F-Grading ACW Rebuttal.123," sheet "IIIF Unit Cost" for the calculation of rebuttal earthwork unit costs.

BEFORE THE
SURFACE TRANSPORTATION BOARD

DUKE ENERGY CORPORATION,	)	
	)	
Complainant,	)	
	)	
v.	)	Docket No. 42070
	)	
CSX TRANSPORTATION, INC.	)	
	)	
Defendant.	)	
	)	

COMPLAINANT DUKE ENERGY CORPORATION'S
REBUTTAL EVIDENCE

WORKPAPERS
VOLUME 1 OF 5

HIGHLY CONFIDENTIAL -- FILED UNDER SEAL
CONTAINS INFORMATION SUBJECT TO PROTECTIVE ORDER

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Date Due: November 12, 2002

Attorneys for Complainant

02300 | Earthwork

02315 Excavation and Fill						2002 BARE COSTS				TOTAL		
	CREW	DAILY OUTPUT	LABOR HOURS	UNIT		MAT.	LABOR	EQUIP.	TOTAL	INCL O&P		
340	2200	Trenches, up to 1500 C.Y.	B-47	22	1.091	C.Y.	5.20	28.50	37.50	71.20	91.50	340
	2300	Over 1500 C.Y.		26	.923		5.20	24	32	61.20	78.50	
	2500	Pier holes, up to 1500 C.Y.		22	1.091		1.80	28.50	37.50	67.80	87.50	
	2600	Over 1500 C.Y.		31	.774		1.80	20.50	27	49.30	63	
	2800	Boulders under 1/2 C.Y., loaded on truck, no hauling	B-100	80	.150			4.29	6.25	10.54	13.40	
	2900	Boulders, drilled, blasted	B-47	100	.240		1.80	6.30	8.30	16.40	21	
	3100	Jackhammer operators with foreman compressor, air tools	B-9	1	40	Day		955	178	1,133	1,675	
	3300	Track drill, compressor, operator and foreman	B-47	1	24			630	830	1,460	1,875	
	3500	Blasting caps				Ea.	3.27			3.27	3.60	
	3700	Explosives					.28			.28	.30	
	3900	Blasting mats, rent, for first day					90			90	99	
	4000	Per added day					30			30	33	
	4200	Preblast survey for 6 room house, individual lot, minimum	A-6	2.40	6.667			224		224	350	
	4300	Maximum		1.35	11.852			400		400	625	
	4500	City block within zone of influence, minimum	A-8	25,200	.001	S.F.		.04		.04	.06	
	4600	Maximum		15,100	.002			.07		.07	.10	
	5000	Excavate and load boulders, less than 0.5 C.Y.	B-10T	80	.150	C.Y.		4.29	4.63	8.92	11.65	
	5020	0.5 C.Y. to 1 C.Y.	B-10U	100	.120			3.43	7.80	11.23	13.80	
	5200	Excavate and load blasted rock, 3 C.Y. power shovel	B-12T	1,530	.010			.31	.85	1.16	1.40	
	5400	Haul boulders, 25 Ton off-highway dump, 1 mile round trip	B-34E	330	.024			.61	2.81	3.42	4.01	
	5420	2 mile round trip		275	.029			.73	3.37	4.10	4.82	
	5440	3 mile round trip		225	.036			.89	4.12	5.01	5.90	
	5460	4 mile round trip		200	.040			1	4.64	5.64	6.60	
	5600	Bury boulders on site, less than 0.5 C.Y., 300 H.P. dozer										
	5620	150' haul	B-10M	310	.039	C.Y.		1.11	3.34	4.45	5.35	
	5640	300' haul		210	.057			1.64	4.92	6.56	7.90	
	5800	0.5 to 1 C.Y., 300 H.P. dozer, 150' haul		300	.040			1.14	3.45	4.59	5.55	
	5820	300' haul		200	.060			1.72	5.15	6.87	8.30	
345	0010	DRILLING ONLY 2" hole for rock bolts, average	B-47	316	.076	LF		1.99	2.62	4.61	5.95	345
	0080	2 1/2" hole for pre-splitting, average		600	.040			1.05	1.38	2.43	3.14	
	1600	Quarry operations, 2 1/2" to 3 1/2" diameter		715	.034			.88	1.16	2.04	2.64	
	1610	6" diameter drill holes	B-47A	1,350	.018			.50	.59	1.09	1.41	
400	0010	EXCAVATING, BULK BANK MEASURE Common earth piled	R02315									400
	0020	For loading onto trucks, add	-400							15%	15%	
	0050	For mobilization and demobilization, see division 02305-250	R02315									
	0100	For hauling, see division 02320-200	-450									
	0200	Backhoe, hydraulic, crawler mtd., 1 C.Y. cap. = 75 C.Y./hr.	B-12A	600	.027	C.Y.		.79	.94	1.73	2.22	
	0250	1 1/2 C.Y. cap. = 100 C.Y./hr.	B-12B	800	.020			.59	.88	1.47	1.86	
	0260	2 C.Y. cap. = 130 C.Y./hr.	B-12C	1,040	.015			.45	.93	1.38	1.71	
	0300	3 C.Y. cap. = 160 C.Y./hr.	B-12D	1,280	.013			.37	1.64	2.01	2.36	
	0310	Wheel mounted, 1/2 C.Y. cap. = 30 C.Y./hr.	B-12E	240	.067			1.97	1.33	3.30	4.44	
	0360	3/4 C.Y. cap. = 45 C.Y./hr.	B-12F	360	.044			1.31	1.27	2.58	3.38	
	0500	Clamshell, 1/2 C.Y. cap. = 20 C.Y./hr.	B-12G	160	.100			2.95	2.21	5.16	6.90	
	0550	1 C.Y. cap. = 35 C.Y./hr.	B-12H	280	.057			1.69	2.51	4.20	5.30	
	0950	Dragline, 1/2 C.Y. cap. = 30 C.Y./hr.	B-12I	240	.067			1.97	2.17	4.14	5.35	
	1000	3/4 C.Y. cap. = 35 C.Y./hr.		280	.057			1.69	1.86	3.55	4.59	
	1050	1 1/2 C.Y. cap. = 65 C.Y./hr.	B-12P	520	.031			.91	1.61	2.52	3.14	
	1100	3 C.Y. cap. = 112 C.Y./hr.	B-12V	900	.018			.52	1.30	1.82	2.22	
	1200	Front end loader, track mtd., 1 1/2 C.Y. cap. = 70 C.Y./hr.	B-10N	560	.021			.61	.47	1.08	1.45	
	1250	2 1/2 C.Y. cap. = 95 C.Y./hr.	B-10O	760	.016			.45	.66	1.11	1.41	
	1300	3 C.Y. cap. = 130 C.Y./hr.	B-10P	1,040	.012			.33	.66	.99	1.23	
	1350	5 C.Y. cap. = 160 C.Y./hr.	B-10Q	1,280	.009			.27	.76	1.03	1.25	
	1500	Wheel mounted, 3/4 C.Y. cap. = 45 C.Y./hr.	B-10R	360	.033			.95	.60	1.55	2.10	
	1550	1 1/2 C.Y. cap. = 80 C.Y./hr.	B-10S	640	.019			.54	.43	.97	1.30	
	1600	2 1/4 C.Y. cap. = 100 C.Y./hr.	B-10T	800	.015			.43	.46	.89	1.16	
	1601	3 C.Y. cap. = 140 C.Y./hr.		1,120	.011			.31	.33	.64	.83	

SITE CONSTRUCTION 2

02300 | Earthwork

02315 | Excavation and Fill

	CREW	DAILY OUTPUT	LABOR HOURS	UNIT	2002 BIDDING COSTS				TOTAL INCL. O&P
					MAT.	LABOR	EQUIP.	TOTAL	
1650	5 C.Y. cap. = 185 C.Y./hr.	B-10U	1,480	.008		.23	.53	.76	93
1800	Hydraulic excavator, truck mtd, 1/2 C.Y. = 30 C.Y./hr.	B-12J	240	.067		1.97	3.07	5.04	6.35
1850	48 inch bucket, 1 C.Y. = 45 C.Y./hr.	B-12K	360	.044		1.31	2.41	3.72	4.63
3700	Shovel, 1/2 C.Y. capacity = 55 C.Y./hr.	B-12L	440	.036		1.07	.80	1.87	2.50
3750	3/4 C.Y. capacity = 85 C.Y./hr.	B-12M	680	.024		.69	.80	1.49	1.93
3800	1 C.Y. capacity = 120 C.Y./hr.	B-12N	960	.017		.49	.72	1.21	1.53
3850	1-1/2 C.Y. capacity = 160 C.Y./hr.	B-12O	1,280	.013		.37	.72	1.09	1.35
3900	3 C.Y. cap. = 250 C.Y./hr.	B-12T	2,000	.008		.24	.65	.89	1.07
4000	For soft soil or sand, deduct							15%	15%
4100	For heavy soil or stiff clay, add							60%	60%
4200	For wet excavation with clamshell or dragline, add							100%	100%
4250	All other equipment, add							50%	50%
4400	Clamshell in sheet pile or cofferdam, minimum	B-12H	160	.100		2.95	4.39	7.34	9.30
4450	Maximum		60	.267		7.85	11.70	19.55	25
8000	For hauling excavated material, see div. 02320-200								
10010	EXCAVATING, BULK, DOZER Open site	B-10L	460	.026		.75	.53	1.38	1.84
2000	75 H.P., 50' haul, sand & gravel		400	.030		.86	.73	1.59	2.11
2020	Common earth		250	.048		1.37	1.17	2.54	3.37
2040	Clay		230	.052		1.49	1.27	2.76	3.66
2200	150' haul, sand & gravel		200	.060		1.72	1.46	3.18	4.22
2220	Common earth		125	.096		2.75	2.33	5.08	6.75
2240	Clay		120	.100		2.86	2.43	5.29	7.05
2400	300' haul, sand & gravel		100	.120		3.43	2.91	6.34	8.45
2420	Common earth		65	.185		5.30	4.48	9.78	13
3000	105 H.P., 50' haul, sand & gravel	B-10W	700	.017		.49	.62	1.11	1.43
3020	Common earth		610	.020		.56	.71	1.27	1.64
3040	Clay		385	.031		.89	1.12	2.01	2.60
3200	150' haul, sand & gravel		310	.039		1.11	1.40	2.51	3.23
3220	Common earth		270	.044		1.27	1.60	2.87	3.70
3240	Clay		170	.071		2.02	2.54	4.56	5.90
3300	300' haul, sand & gravel		140	.086		2.45	3.09	5.54	7.15
3320	Common earth		120	.100		2.86	3.61	6.47	8.35
3340	Clay		100	.120		3.43	4.33	7.76	10
4000	200 H.P., 50' haul, sand & gravel	B-10B	1,400	.009		.25	.59	.84	1.02
4020	Common earth		1,230	.010		.28	.67	.95	1.17
4040	Clay		770	.016		.45	1.07	1.52	1.86
4200	150' haul, sand & gravel		595	.020		.58	1.38	1.96	2.40
4220	Common earth		516	.023		.67	1.60	2.27	2.77
4240	Clay		325	.037		1.06	2.53	3.59	4.40
4400	300' haul, sand & gravel		310	.039		1.11	2.66	3.77	4.61
4420	Common earth		270	.044		1.27	3.05	4.32	5.30
4440	Clay		170	.071		2.02	4.84	6.86	8.45
5000	300 H.P., 50' haul, sand & gravel	B-10M	1,900	.006		.18	.54	.72	.88
5020	Common earth		1,650	.007		.21	.63	.84	1.01
5040	Clay		1,025	.012		.34	1.01	1.35	1.62
5200	150' haul, sand & gravel		920	.013		.37	1.12	1.49	1.81
5220	Common earth		800	.015		.43	1.29	1.72	2.07
5240	Clay		500	.024		.69	2.07	2.76	3.32
5400	300' haul, sand & gravel		470	.026		.73	2.20	2.93	3.53
5420	Common earth		410	.029		.84	2.52	3.36	4.05
5440	Clay		250	.048		1.37	4.14	5.51	6.65
5600	460 H.P., 50' haul, sand & gravel	B-10K	1,930	.006		.18	.71	.89	1.05
5610	Common earth		1,680	.007		.20	.82	1.02	1.21
5620	Clay		1,050	.011		.33	1.31	1.64	1.94

2 SITE CONSTRUCTION

DUKE/CSXT 0153

02300 | Earthwork

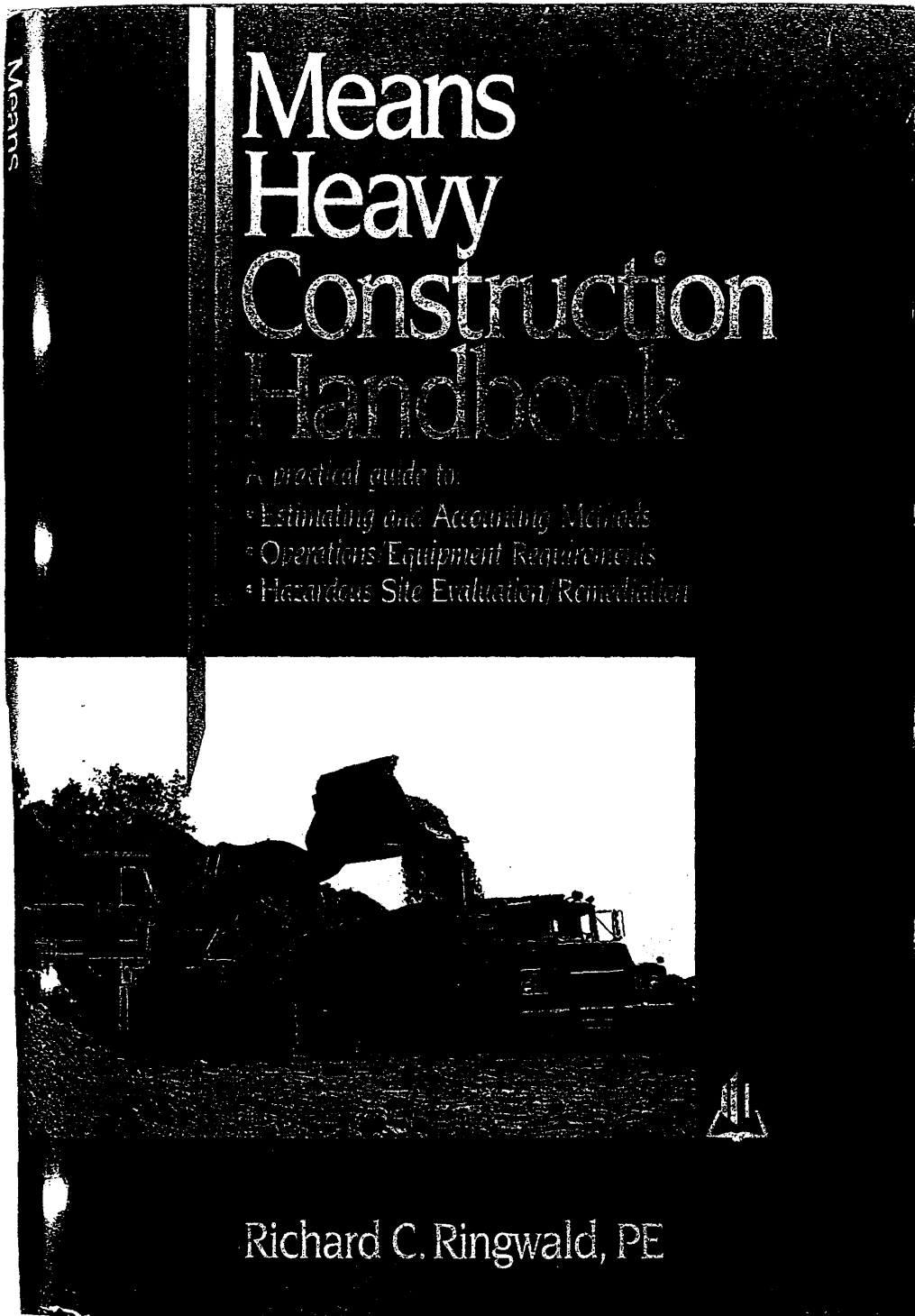
02315 Excavation and Fill			CREW	DAILY OUTPUT	LABOR HOURS	UNIT	2002 BARE COSTS				TOTAL INCL O&P	
							MAT.	LABOR	EQUIP.	TOTAL		
140	3040	2 C.Y. bucket	B-12C	175	.091	C.Y.		2.70	5.50	8.20	10.15	440
	9010	For mobilization or demobilization, see div. 02305-250										
	9020	For dewatering, see div. 02240-500										
	9022	For larger structures, see Bulk Excavation, div. 02315-400										
	9024	For loading onto trucks, add							15%			
	9026	For hauling, see div. 02320-200										
	9030	For sheeting or soldier beams/lagging, see div. 02250 & 02260										
	9040	For trench excavation of strip footings, see div. 02315-900										
505	0010	FILL Spread dumped material, by dozer, no compaction	B-10B	1,000	.012	C.Y.		.34	.82	1.16	1.43	505
	0100	By hand	1 Clab	12	.667	"		15.65		15.65	24.50	
	0150	Spread fill, from stockpile with 2-1/2 C.Y. F.E. loader										
	0170	130 H.P., 300' haul	B-10P	600	.020	C.Y.		.57	1.15	1.72	2.14	
	0190	With dozer 300 H.P., 300' haul	B-10M	600	.020	"		.57	1.72	2.29	2.77	
	0400	For compaction of embankment, see div. 02315-300										
	0500	Gravel fill, compacted, under floor slabs, 4" deep	B-37	10,000	.005	S.F.	.16	.12	.01	.29	.36	
	0600	6" deep		8,600	.006	"	.24	.14	.01	.39	.49	
	0700	9" deep		7,200	.007	"	.40	.17	.02	.59	.72	
	0800	12" deep		6,000	.008	"	.55	.20	.02	.77	.94	
	1000	Alternate pricing method, 4" deep		120	.400	C.Y.	11.90	9.95	.98	22.83	29.50	
	1100	6" deep		160	.300	"	11.90	7.45	.73	20.08	25.50	
	1200	9" deep		200	.240	"	11.90	5.95	.59	18.44	23	
	1300	12" deep		220	.218	"	11.90	5.40	.53	17.83	22	
	1500	For fill under exterior paving, see division 02720-200										
	1600	For flowable fill, see division 03310-220										
800	0010	RIPPING Trap rock, soft, 200 HP dozer, ideal conditions	B-10B	710	.017	C.Y.		.48	1.16	1.64	2.02	800
	1500	Adverse conditions	"	660	.018	"		.52	1.25	1.77	2.16	
	1600	Medium hard, 300 HP dozer, ideal conditions	B-10M	600	.020	"		.57	1.72	2.29	2.77	
	1700	Adverse conditions	"	540	.022	"		.64	1.91	2.55	3.08	
	2000	Very hard, 460 HP dozer, ideal conditions	B-10X	300	.040	"		1.14	4.58	5.72	6.80	
	2100	Adverse conditions	"	270	.044	"		1.27	5.10	6.37	7.55	
	2200	Shale, soft, 200 HP dozer, ideal conditions	B-10B	850	.014	"		.40	.97	1.37	1.69	
	2300	Adverse conditions	"	790	.015	"		.43	1.04	1.47	1.81	
	2310	Grader rear ripper, 180 H.P. ideal conditions	B-11L	740	.022	"		.59	.58	1.17	1.54	
	2320	Adverse conditions	"	630	.025	"		.69	.69	1.38	1.81	
	2400	Medium hard, 300 HP dozer, ideal conditions	B-10M	720	.017	"		.48	1.44	1.92	2.31	
	2500	Adverse conditions	"	650	.018	"		.53	1.59	2.12	2.55	
	2510	Grader rear ripper, 180 H.P. ideal conditions	B-11L	625	.026	"		.70	.69	1.39	1.83	
	2520	Adverse conditions	"	530	.030	"		.83	.81	1.64	2.16	
	2600	Very hard, 460 HP dozer, ideal conditions	B-10X	360	.033	"		.95	3.82	4.77	5.65	
	2700	Adverse conditions	"	320	.037	"		1.07	4.29	5.36	6.35	
	2800	Till, boulder clay/hardpan, soft, 200 H.P. dozer, ideal conditions	B-10B	1,400	.009	"		.25	.59	.84	1.02	
	2810	Adverse conditions	"	1,315	.009	"		.26	.63	.89	1.09	
	2815	Grader rear ripper, 180 H.P. ideal conditions	B-11L	1,500	.011	"		.29	.29	.58	.77	
	2816	Adverse conditions	"	1,275	.013	"		.34	.34	.68	.90	
	2820	Medium hard, 300 H.P. dozer, ideal conditions	B-10M	1,200	.010	"		.29	.86	1.15	1.39	
	2830	Adverse conditions	"	1,080	.011	"		.32	.96	1.28	1.53	
	2835	Grader rear ripper, 180 H.P. ideal conditions	B-11L	1,300	.012	"		.34	.33	.67	.88	
	2836	Adverse conditions	"	1,100	.015	"		.40	.39	.79	1.04	
	2840	Very hard, 460 H.P. dozer, ideal conditions	B-10X	600	.020	"		.57	2.29	2.86	3.39	
	2850	Adverse conditions	"	530	.023	"		.65	2.59	3.24	3.84	
	3000	Dozing ripped material, 200 HP, 100' haul	B-10B	700	.017	"		.49	1.18	1.67	2.04	
	3050	300' haul	"	250	.048	"		1.37	3.29	4.66	5.70	
	3200	300 HP, 100' haul	B-10M	1,150	.010	"		.30	.90	1.20	1.44	
	3250	300' haul	"	400	.030	"		.86	2.59	3.45	4.15	
	3400	460 HP, 100' haul	B-10X	1,680	.007	"		.20	.82	1.02	1.21	
	3450	300' haul	"	600	.020	"		.57	2.29	2.86	3.39	

SITE CONSTRUCTION 2

02300 | Earthwork

2 SITE CONSTRUCTION

02320 Hauling		CREW	DAILY OUTPUT	LABOR HOURS	UNIT	2002 BARE COSTS				TOTAL INCL O&P
						MAT	LABOR	EQUIP.	TOTAL	
200	0450 3 mile round trip, 1.0 load/hr	B-34B	176	947	C.Y.		1.18	2.77	3.95	4.84
	0500 4 mile round trip, 1.0 load/hr		125	064			1.60	3.77	5.37	6.60
	0540 5 mile round trip, 1 load/hr		78	103			2.56	6.05	8.61	10.55
	0550 10 mile round trip, 0.60 load/hr		58	138			3.45	8.10	11.55	14.20
	0560 20 mile round trip, 0.4 load/hr		39	205			5.15	12.05	17.20	21
	0600 16.5 C.Y. dump trailer, 1 mile round trip, 2.6 loads/hr	B-34C	280	029			.71	1.80	2.51	3.07
	0700 2 mile round trip, 2.1 loads/hr		225	036			.89	2.24	3.13	3.81
	1000 3 mile round trip, 1.8 loads/hr		193	041			1.04	2.61	3.65	4.45
	1100 4 mile round trip, 1.6 loads/hr		172	047			1.16	2.92	4.08	4.99
	1110 5 mile round trip, 1 load/hr		108	074			1.85	4.66	6.51	7.90
	1120 10 mile round trip, .60 load/hr		80	100			2.50	6.30	8.80	10.70
	1130 20 mile round trip, .4 load/hr		54	148			3.70	9.30	13	15.90
	1150 20 C.Y. dump trailer, 1 mile round trip, 2.5 loads/hr	B-34D	325	025			.62	1.58	2.20	2.68
	1200 2 mile round trip, 2 loads/hr		260	031			.77	1.97	2.74	3.34
	1220 3 mile round trip, 1.7 loads/hr		221	036			.91	2.32	3.23	3.93
	1240 4 mile round trip, 1.5 loads/hr		195	041			1.03	2.63	3.66	4.45
	1245 5 mile round trip, 1.1 load/hr		143	056			1.40	3.58	4.98	6.05
	1250 10 mile round trip, .75 load/hr		110	073			1.82	4.66	6.48	7.90
	1255 20 mile round trip, .5 load/hr		78	103			2.56	6.55	9.11	11.15
	1300 Hauling in medium traffic, add								20%	20%
	1400 Heavy traffic, add								30%	30%
	1600 Grading at dump, or embankment if required, by dozer	B-10B	1,000	012			.34	.82	1.16	1.43
	1800 Spotter at fill or cut, if required	1 Clab	8	1	Hr		23.50		23.50	36.50
	2000 Off highway haulers									
	2010 22 C.Y. rear/bottom dump, 1000' round trip, 4.5 loads/hr	B-34F	645	012	C.Y.		.31	1.50	1.81	2.12
	2020 1/2 mile round trip, 4.2 loads/hr		600	013			.33	1.61	1.94	2.28
	2030 1 mile round trip, 3.9 loads/hr		555	014			.36	1.74	2.10	2.46
	2040 2 mile round trip, 3.3 loads/hr		470	017			.43	2.05	2.48	2.91
	2050 34 C.Y. rear or bottom dump, 1000' round trip, 4 loads/hr	B-34G	885	009			.23	1.54	1.77	2.04
	2060 1/2 mile round trip, 3.8 loads/hr		840	010			.24	1.62	1.86	2.15
	2070 1 mile round trip, 3.5 loads/hr		775	010			.26	1.76	2.02	2.33
	2080 2 mile round trip, 3.0 loads/hr		665	012			.30	2.05	2.35	2.72
	2090 42 C.Y. rear or bottom dump, 1000' round trip, 3.8 loads/hr	B-34H	1,040	008			.19	1.40	1.59	1.83
	2100 1/2 mile round trip, 3.6 loads/hr		980	008			.20	1.48	1.68	1.94
	2110 1 mile round trip, 3.3 loads/hr		900	009			.22	1.61	1.83	2.12
	2120 2 mile round trip, 2.8 loads/hr		765	010			.26	1.90	2.16	2.49
	2130 60 C.Y. rear or bottom dump, 1000' round trip, 3.6 loads/hr	B-34J	1,400	006			.14	1.48	1.62	1.85
	2140 1/2 mile round trip, 3.4 loads/hr		1,325	006			.15	1.56	1.71	1.95
	2150 1 mile round trip, 3.1 loads/hr		1,200	007			.17	1.73	1.90	2.15
	2160 2 mile round trip, 2.6 loads/hr		1,015	008			.20	2.04	2.24	2.55
	3000 Rough terrain or steep grades, add to above								100%	
	4500 Dust control, light	B-59	1	8	Day		200	455	655	805
	4501 Heavy		.50	16			400	910	1,310	1,600
	4600 Haul road maintenance	B-86A	1	8			250	430	680	850
	4700 Highway hauling beyond 20 miles, per loaded mile, minimum				Mile					1
	4750 Maximum									2
02325 Dredging										
250	0010 DREDGING Mobilization and demobilization, add to below, minimum	B-8	.53	120	Total		3,200	4,450	7,650	9,775
	0100 Maximum		.10	640			16,900	23,600	40,500	52,000
	0300 Barge mounted clamshell excavation into scows,									
	0310 Dumped 20 miles at sea, minimum	B-57	310	155	C.Y.		4.16	4.09	8.25	10.85
	0400 Maximum		213	225			6.05	5.95	12	15.80
	0500 Barge mounted dragline or clamshell, hopper dumped,									
	0510 pumped 1000' to shore dump, minimum	B-57	340	141	C.Y.		3.79	3.73	7.52	9.90
	0525 All pumping uses 2000 gallons of water per cubic yard									





Means Heavy Construction Handbook

A practical guide to:

- *Estimating and Accounting Methods*
- *Operations/Equipment Requirements*
- *Hazardous Site Evaluation/Remediation*

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Chapter 27 Power Shovels and Off-Road Haulers

Shovels Certainly scrapers are the dominant method of moving earth on larger jobs, but there are other special situation earthmovers with which the heavy construction manager must also be familiar. Among these, the power shovel is the most used.

Scrapers could be considered *surface* excavators since they fill their bowls from the surface of an earth mass. In Chapter 29, subsurface excavators, like the familiar backhoe, are discussed. That leaves *above surface* machines, like the shovel and endloader, that reach for a load above the surface they rest on.

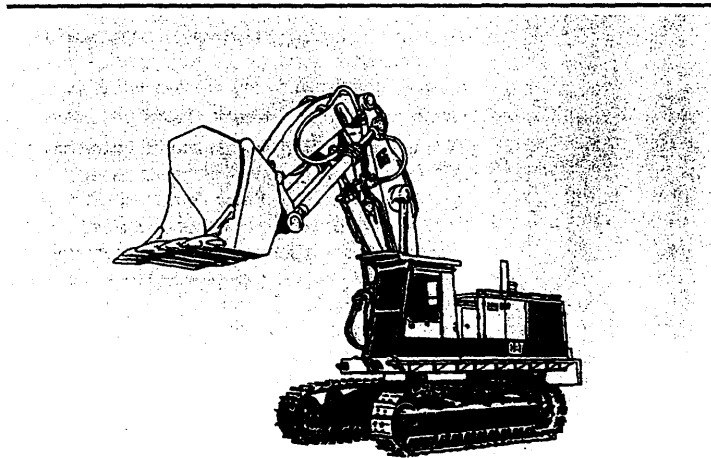
Power shovels are primarily used for earth, sidehill cuts; unrippable, blasted, solid rock cuts; and mixed rock/large boulder/earth cuts, none of which lend themselves to efficient scraper loading.

The power shovel (Figure 27.1) almost always has a crawler undercarriage plus two front arms and a digging bucket which is thrust ("crowded") into a near vertical face of soil or blasted rock pile. Ideally, the working face is of "optimum depth," whereby the bucket will be 100% filled by one complete, vertical pass through the face without undue crowding. If the face is higher than optimum, a shelf will develop above the machine reach which will eventually collapse onto the surface and retard, or even endanger, the operation. Similarly, if the cut is too shallow, the shovel will have to make more than one pass to get a bucketful. (Note: optimum depth does not apply to blasted rock.)

The shovel swings the bucket, and dumps it into the target hauler, usually an off-road hauler or – an ordinary dump truck. The greater the swing angle traversed by the bucket, the greater the swing time needed.

Shovel size ratings are based on the LCY (struck and heaped) capacity of the bucket that the machine can handle efficiently. As with many other types of heavy equipment, there is a transportability problem once a certain size is exceeded. Shovels over 3/4 to 1 LCY in size are too wide and/or too heavy to be hauled on trailers over public highways, and therefore, have to be partially dismantled first, then reassembled at the destination. This process is too costly for short duration projects.

Most shovels have the same engine, cab, and undercarriages as a similarly-rated crane or backhoe.



(Courtesy Caterpillar Corporation)

Power Shovel

Figure 27.1

Thus, the front arms and bucket can be removed, and a crane boom or backhoe front-mounted in its place.

Off-Road Haulers

Off-road haulers serve shovels, endloaders, or other loading machines when standard dump trucks are too small or too lightly built to do the job. Most large excavation projects require the use of rough, unpaved, job-site roads and loading of large rock, and thus are too much for ordinary dump trucks to handle. There are two types of off-road haulers. The rear-dump, (Figure 27.2) essentially a very heavy dump truck, is best-suited for rock and sticky soils. The bottom-dump (or "belly" dump) (Figure 27.3) discharges its load by opening under-mounted, longitudinal gates. It is best suited for dry, fast-moving materials. It leaves a longer, lower pile than a rear-dump.

Off-road haulers are rated by capacity in tons, LCY struck, and LCY heaped. The volumetric capacity can be increased by mounting side-boards, but this should not be done except to haul super-light materials such as coal. The excessive wear and tear costs, plus slower haul time engendered by exceeding the weight capacity, will not be compensated for by the extra load.



Figure 27.2