

SANDBAG COST ESTIMATES

- **HOW MANY SANDBAGS ARE REQUIRED FOR 164 LINEAR FT. WITH A 3 FT. HIGH DIKE?**

$$N = (3 \times H) + (9 \times H \times H) / 2$$

N - Number of bags required per linear foot of dike

H - Dike height (feet)

$$N = (3 \times 3) + (9 \times 3 \times 3) / 2 = 45 \text{ bags}$$

45 x 164 = **7380 sandbags** are needed for a 3 ft dike

Source: <https://www.ag.ndsu.edu/publications/disasters/sandbagging-for-flood-protection>

- **HOW MUCH LABOR IS NEEDED FOR 164 LINEAR FT. WITH A 3 FT. HIGH DIKE?**

26 workers

19.5 hours

507 man hours

Source: <https://www.ag.ndsu.edu/publications/disasters/sandbagging-for-flood-protection>

- **WHAT ARE THE TOTAL ESTIMATED COSTS FOR 164 LINEAR FT. WITH A 3 FT. HIGH DIKE?**

RESPONSE

Sandbags	\$1575
Sand Fills	\$3360
Equipment Rentals	\$1800
Hand Tools	\$3616.2
Material Costs Subtotal	\$10,351.2
Labor	\$10,140
Response Subtotal	\$20,491.2

RECOVERY

Equipment	\$5000
Transport	\$10,000
Dump Fees	\$ 4373
Labor	\$ 1000
Recovery Subtotal	\$ 20,373
TOTAL COSTS:	\$ 40,864.2

Source: <https://www.ag.ndsu.edu/publications/disasters/sandbagging-for-flood-protection>

- **CALCULATIONS**

SANDBAGS= .25 x 7380= \$1575

SANDFILLS= (56 x 3) x 20= \$ 3,360

(Recommended to add additional 2 cy of sand for bags to hold plastic)

EQUIPMENT RENTALS= \$1,800 (source: Geocell)

HAND TOOLS= \$3616.2 (source: Geocell)

LABOR= 20 * 26=

520 * 19.5= \$10,140

- EQUIPMENT= \$5,000

- TRANSPORT= \$10,000

- DUMP FEES= 56 * 3=

168 * 27= \$4373

Source: http://geocellsystems.com/brochures/pdfs/True_Cost_of_Sandbags.pdf

- **HOW MANY SANDBAGS ARE REQUIRED FOR 164 LINEAR FT. WITH A DIKE HEIGHT OF 4FT.?**

$$N = (3 \times H) + (9 \times H \times H) / 2$$

N - Number of bags required per linear foot of dike

H - Dike height (feet)

$$N = (3 \times 4) + (9 \times 4 \times 4) / 2 = 78 \text{ bags}$$

78 * 164= **12792 sandbags** are needed for a 4 ft dike

Source: <https://www.ag.ndsu.edu/publications/disasters/sandbagging-for-flood-protection>

- **HOW MUCH LABOR IS NEEDED FOR 164 LINEAR FT. WITH A DIKE HEIGHT OF 4 FT.?**

* 12792 sandbags

* 44 workers

* 19.5 hours

* **858 man hours**

Source: http://geocellsystems.com/brochures/pdfs/True_Cost_of_Sandbags.pdf



- **WHAT ARE THE ESTIMATED TOTAL COSTS FOR 164 LINEAR FT. WITH A 4 FT. HIGH DIKE??**

RESPONSE

Sandbags	\$3198
Sand Fills	\$ 5820
Equipment Rentals	\$1800
Hand Tools	\$4000
Material Costs Subtotal	\$14,818
Labor	\$ 17,160
Response Subtotal	\$ 31,978

RECOVERY

Equipment	\$5000
Transport	\$10,000
Dump Fees	\$ 7857
Labor	\$ 533.33
Recovery Subtotal	\$ 23,390.33
TOTAL COSTS	\$ 55,368

Source: http://geocellsystems.com/brochures/pdfs/True_Cost_of_Sandbags.pdf

CALCULATIONS

SANDBAGS= .25 x 12792= \$ 3198
SANDFILLS= (97 x 3) x 20= \$ 5,820
 (Recommended to add additional 2 cy of sand for bags to hold plastic)
EQUIPMENT RENTALS= \$1,800 (source: Geocell)
HAND TOOLS= \$4000 (source: Geocell)
LABOR= 20 x 78= 880 x 19.5= \$17,160
EQUIPMENT= \$5,000
TRANSPORT= \$10,000
DUMP FEES= 97 x 3= 291 x 27= \$7857

ASSUMPTIONS:

Sand weight100 lbs/cf
 Sandbag weight.....31 lbs. (.31 cf)
 Sandbag Cost\$0.25 each
 Sand Cost.....\$20.00 per cy
 Loader\$125.00 per hr
 Shovels\$20.00 each
 Laborer.....\$20.00 per hour
 Trucking\$70 per truck per hr
 Dump Fee\$27 per cy
 Recovery Crew Labor and Operator2 laborers and operators

**ESTIMATED CUBIC YARDS OF SAND NEEDED
PER 100 FEET OF DIKE LENGTH FOR VARIOUS HEIGHTS**

		Dike Height (ft.)								
		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Cubic Yards of Sand	Width 3 x H	7	15	25	38	54	73	95	119	145
	Width 2 x H	6	11	18	27	38	50	65	82	100

US ARMY CORPS OF ENGINEERS CALCULATIONS:

3 FT HIGH DIKE (7380 SANBAGS AT \$7/SANDBAG)

Sandbags	\$1,575.00	\$40,864.20	0.038542294	\$51,660	\$1,991.09
Sand Fills	\$3,360.00	\$40,864.20	0.08222356	\$51,660	\$4,247.67
Equipment Rentals	\$1,800.00	\$40,864.20	0.044048336	\$51,660	\$2,275.54
Hand Tools	\$3,616.20	\$40,864.20	0.088493106	\$51,660	\$4,571.55
Labor	\$10,140.00	\$40,864.20	0.248138958	\$51,660	\$12,818.86
Equipment (recovery)	\$5,000.00	\$40,864.20	0.122356488	\$51,660	\$6,320.94
Transport (recovery)	\$10,000.00	\$40,864.20	0.244712976	\$51,660	\$12,641.87
Dump Fees (recovery)	\$4,373.00	\$40,864.20	0.107012984	\$51,660	\$5,528.29
Labor (recovery)	\$1,000.00	\$40,864.20	0.024471298	\$51,660	\$1,264.19
			1		\$51,660.00

4 FT. HIGH DIKE (12792 SANBAGS AT \$7/SANDBAG)

Sandbags	\$3,198.00	\$55,368	0.06	\$89,544.00	\$5,171.97
Sand Fills	\$5,820.00	\$55,368	0.11	\$89,544.00	\$9,412.41
Hand Tools	\$4,000.00	\$55,368	0.07	\$89,544.00	\$6,469.01
Labor	\$17,160.00	\$55,368	0.309926311	\$89,544.00	\$27752.04
Equipment Rentals	\$1,800.00	\$55,368	0.032509753	\$89,544.00	\$2,911.05
Equipment (Recovery)	\$5,000.00	\$55,368	0.090304869	\$89,544.00	\$8,086.26
Transport (Recovery)	\$10,000.00	\$55,368	0.180609738	\$89,544.00	\$16,172.52
Labor (Recovery)	\$533.33	\$55,368	0.009632459	\$89,544.00	\$862.53
Dump Fees (Recovery)	\$7,857.00	\$55,368	0.141905072	\$89,544.00	\$12,706.75
			1		\$89,544.53

SANDBAGS ALTERNATE COST ESTIMATE FOR 164 LINEAR FT.

Helpers, incl. lower command	5
Sandbag requirement [40 x 60 cm, empty]	8259
Installation	
Time per dam (h)	30.94
Costs of helpers	\$7,733.60
Costs of materials, incl. replacements	\$3,351.23
Costs of trucks, incl. fuel	\$364.44
Total installation costs without materials	\$8,098.04
3% sundry costs	\$85.22
Total costs of installation	\$19,632.53
Dismantling	
Time per dam	10.315
Costs of helpers	\$2,577.87
Costs of materials	\$4,687.03
Costs of trucks, incl. fuel	\$364.44
Total dismantling costs without materials	\$2,942.30
3% sundry costs based on total operating costs:	\$75.00
Total costs of dismantling	\$10,646.64
Installation and dismantling	
Total costs	\$40,925.81