AMENDMENT 1

4.8 Installation, Maintenance and Partial Removal of Buttress Support System

EI will subcontract the buttress installation work to Edward E. Gillen Company (Gillen). The work scope includes the construction of 41-ea, 42-in. diameter bracing columns for the existing Waterloo steel sheeting as shown on the plans for the project. The work consists of temporary casing the 48-in. dia. hole by 'forcing' the temporary casing pipes into the ground, drill out the inside soil to elevation 547± ft., install a 36-ft. long piece of 42-in. dia., 3/4-in. thick wall steel casing pipe and grout the casing pipe in place up to elevation 570-ft.

Gillen operating personnel will apply a downward pressure on the temporary casing pipes and screw the casings into and out of the ground. No pounding will take place. The inside of the 42-in. drilled caisson will also be filled with 3000-psi concrete to elevation 570-ft. The temporary casing will be removed. Top waler and inclinometers will be installed as the bracing columns are constructed in the locations shown on the plans.

4.8.1 Drilling Procedure

Pipe Pile Buttress Supports Access:

1. Access is provided by EI for on-shore operations;
2. EI and Gillen will operate their equipment and maintain a minimum 6-ft setback from the Waterloo Barrier;
3. EI will prepare a suitable and stable work bench along shoreline for equipment access as required;
4. EI will install 8-in. Timber Mats to reduce ground contact pressure. (Roads, work areas, by-passes and work benches);
5. Gillen will place an additional 12-in. of Timber Mats in areas that Gillen's crane and drill attachment will operate from, while drilling;
6. EI will provide an 8-in. thick mat for their operations and then Gillen will add a 12-in. thick mat beneath the drill rig for a total thickness of 20-in. The total double layer Timber Mat system placed cross-ways, one 8-in. thick and one 20-in. thick mat, will result in a ground contact pressure loading of approximately 250-psf; backup calculations follow this amendment;
7. No excavation or ground penetration is allowed over the existing Waterloo Containment Area, including the set back requirement.

Installation of Pipe Pile Buttress Supports:

1. Pre-excavate rip-rap and slope soils for a flat level working platform. Working platform must be dry, level and have firm access (Elevation 580 ± ft.);

2. Layout center of pipe pile buttress supports and give 5-ft. or 10-ft. offset and supply elevations as needed;
3. Pre-drill hole as needed, then install outer casing 60-in. diameter, twist and drill out casing to needed grade;
4. Impacted drill spoils will be collected, placed and managed on stabilization pad;
5. Hoist and place 54-in. diameter casing into shaft. Push/twist 54in. diameter casing to grade while drilling and cleaning shaft ahead of casing as needed;
6. Hoist and place 48-in. diameter casing (as needed) into shaft. Push/twist 48-in. diameter casing to grade while drilling and cleaning shaft ahead of casing as needed. If hole is maintained open, Gillen will open drill shaft to grade and install 42-in. diameter pile;
7. Gillen will only attempt the direct push/rotate method of 42-in. pipe installation if the hole stays open below the dredge line; Gillen will be prepared to install the 42-in. pipe full depth using temporary casing, if and as needed;
8. If problems are encountered after the 42-in. pipe installation is started using the direct push/rotate method (i.e., if boulders or other obstructions prevent pipe advancement by direct push), Gillen will have and use the tools needed to advance the casing, including: rock augers, core barrels, matrix barrels, and/or digging buckets.

The lower waler will be put in place, shimmed and videotaped by a diver as the soils along the Waterloo sheeting are removed to a depth below elevation 570-ft. EI will coordinate dredging work with Gillen's work very closely when the lower waler is installed.

4.8.2 Buttress system construction summary

The following summarized the salient points with respect to the buttress construction.

1. One mobilization and a continuous work schedule;
2. Location, protection and/or relocation of conflicting utilities. Per the plans, there does not appear to be any utilities in the work area;
3. Removal and replacement of the rip-rap and soils adjacent to the river side of the Waterloo steel sheeting wall;
4. Furnish the labor and equipment to construct the 42-in. dia. Waterloo bracing System, as specified;
5. A 150,000-lb. drill rig will operate on land;
6. Furnish and install the 41-ea, 42-in. dia. steel casing pipe 36-ft. long, temporary casing pipe, concrete grout, waler system, and 4-ea inclinometers;
7. Cut off the 42-in. dia. casing at elevation 581-ft. after dredging is complete and backfill is placed;
8. This work is expected to require 2-1/2 months to 3 months to complete.
9. All workers are HAZWOPER trained;
10. Drill spoils will be removed and managed as all dredge spoils.

CAISSON RIG SURCHARGE EVALUATION
CAMP MARINA MGP CLEAN UP
EWB 06/23/11

EQUIPMENT WEIGHT:

MANITOWOC 3000 W 65 TON CRANE:

WORKING WT: 143,500 LBS

CALDWELL ATTACHMENT ED4:

BARE WT:	15,000 LB
CROWD WT:	2,000 LBS
SUB-FRAME WT:	3,500 LBS
SLIDE BASE WT:	1,500 LBS
CYLINDER WT:	2,500 LBS
	24,500 LBS

TOTAL WT:

MAX LINE PULL*: 21,000 LBS

189,000

* MAX LINE PULL PER T. GAULKE

CRAWLER DIMENSIONS:

W = 2.75'

L = 18'-5" = 18.42'

$A = 2.75' \cdot 18.42' = 50.65\ FT^2$

ESTIMATED TRACK CONTACT STRESS, $\sigma = \frac{189{,}000}{2 \cdot 50.65\ FT^2} = 1866\ PSF$

DESIGN CONTACT STRESS, $\sigma_{DESIGN} = 1866 \cdot 1.3 = 2425 \sim$ SAY 2500 PSF

SOIL CONDITIONS

SAND & SOFT CLAY THROUGH 16' IN B-1 (CONTROLS)

0'-9': SAND WITH N = 5 → E = 7·N = 35 TSF = 70 KSF

9'-16': CLAY W S_u = 0.4 KSF → S_u = 500 S_u = 500 · 0.2 = 100 TSF = 200 KSF

0.2 TSF

$E_{COMPOSITE} = \frac{(9' \cdot 70) + (7' \cdot 200)}{16'} = 126\ KSF$

$126 \cdot \frac{K}{FT^2} \cdot \frac{1\ FT^2}{144\ IN^2} = 0.9\ KSI$

CRANE MATS

ASSUME OAK & 1' THICK = h

$E_{WOOD} = 1800\ \frac{K}{IN^2}$

SURCHARGE EVALUATION (REF.: FIG. 6.1, ELASTIC SOLUTIONS, P. 138)

TRACK FOOT PRINT: 2.75' · 18.42'

EQUIV. RADIUS, $r_s = \sqrt{\frac{a \cdot b}{\pi}} = \sqrt{\frac{2.75 \cdot 18.42}{\pi}} = 4.02 = a$ IN FIG. 6.1

$\frac{E_1}{E_2} = \frac{1800\ ksi}{0.9\ ksi} = 2000$

CONSIDER 2 MATS, SO $\frac{h}{a} = \frac{2'}{4.02} = 0.5$ → ENTER FIG. 6.3:

$\frac{\sigma_z}{p} \cdot 100 = 6$

$\sigma_z = \frac{6 \cdot p}{100} = \frac{6 \cdot 2500}{100}$

$= 150\ psf$

IF $\frac{\sigma_z}{p} \cdot 100 = 8$

$\sigma_z = \frac{8 \cdot 2500}{100} = 200\ psf$

CONSIDER 1 MAT, SO $\frac{h}{a} = \frac{1}{4.02} \approx 0.25$ → ENTER FIG 6.3:

$\frac{\sigma_z}{p} \cdot 100 = 25$

$\sigma_z = \frac{25 \cdot p}{100} = \frac{25 \cdot 2500}{100} = 625\ psf$

>> TOO BIG

USE 2 MATS BELOW TRACKS — RESULTING $\sigma_q \approx 300 psf$, MIN. 1'-8" THICK

TRY A MAT THICKNESS + 20" (1-1' THICK MAT & 1-8" THICK)

$\frac{h}{a} = \frac{1.67}{4.02} = 0.42$ → ENTER FIG. 6.3: SAY $\frac{\sigma_z}{p} \cdot 100 = 10$

$\sigma_z = \frac{10 \cdot p}{100} = \frac{10 \cdot 2500}{100}$

$= 250 psf$

h = 1-8" THICK MATS = 1.3'

$\frac{h}{a} = \frac{1.33}{4.02} = 0.33$ → ENTER FIG. 6.3: SAY $\frac{\sigma_z}{p} \cdot 100 = 20$

$\sigma_z = \frac{20 \cdot p}{100} = \frac{20 \cdot 2500}{100}$

$= 500 psf$

Chapter 6
SURFACE LOADING OF MULTI-LAYER SYSTEMS

6.1 Two-Layer Systems

Unless otherwise stated, the results given in this chapter are for adhesive interfaces between layers.

6.1.1 UNIFORM VERTICAL LOADING ON A CIRCULAR AREA (Fig.6.1)

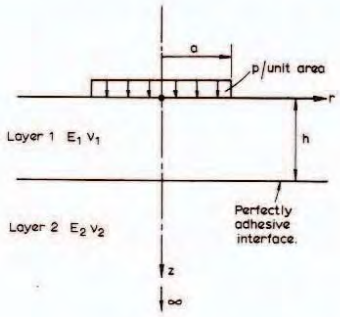

FIG. 6.1

Contours of vertical stress σ_z in a two-layer system, with $E_1/E_2=10$, $\nu_1=\nu_2=0.5$ and $h/a=1$, have been obtained by Fox (1948a) and are shown in Fig. 6.2. These contours are compared with those for the Boussinesq case ($E_1/E_2=1$).

The influence of the ratios E_1/E_2 and h/a on the vertical stress on the interface, obtained by Fox (1948a), are shown in Fig.6.3.

The variation of vertical stress σ_z on the axis at the interface, with E_1/E_2 and r/h, is shown in Fig.6.4.

Values of σ_z and $(\sigma_z-\sigma_r)$ on the axis (Fox, 1948a) are tabulated in Table 6.1. It should be noted that all the above stresses are for a perfectly rough interface between the layers.

Corresponding values of σ_z and $(\sigma_z-\sigma_r)$ for a perfectly smooth interface between the layers are tabulated in Table 6.2 (Fox, 1948a).

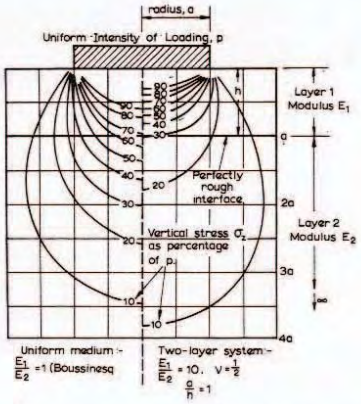

FIG.6.2 Vertical stress in uniform mass and two-layer system (Fox, 1948a).

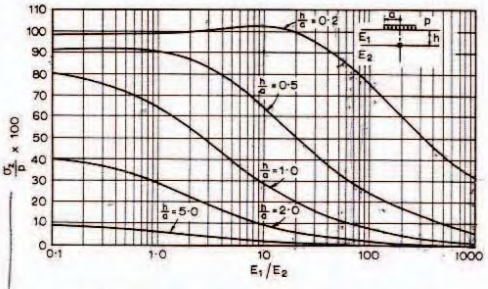

FIG.6.3 Vertical interface stress on axis (Fox, 1948a).

SOLVE FOR σ_z GIVEN P

$\sigma_z = \frac{k \cdot p}{100}$

ELASTIC SOLUTIONS FOR SOIL AND ROCK MECHANICS

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Reader in Civil Engineering,
University of Sydney

E. H. Davis
Professor of Civil Engineering,
(Soil Mechanics)
University of Sydney

JOHN WILEY & SONS, INC.
NEW YORK · LONDON · SYDNEY · TORONTO

GENERAL NOTES:

1. GENERAL
   - A. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE DUE TO IMPROPER INSTALLATION OR EXTRACTION OF THE SHEET PILE, WALES OR PIPE PILE ELEMENTS.
2. FIELD CONDITIONS
   - A. VERIFY DEPTH AND LIMITS OF EXCAVATION PRIOR TO START OF WORK.
   - B. VERIFY UNDERGROUND UTILITY LOCATIONS AND ANY OTHER BURIED OBSTRUCTIONS BEFORE COMMENCING ANY WORK. NOTIFY ENGINEER OF CONFLICTS.
   - C. VERIFY ACCESS TO SITE VIA WATER OR LAND, BRIDGE CLEARANCES, WATER DEPTHS AFFECTING ACCESS OR AFFECTING THE PROPOSED WORK; AND VERIFY OR COORDINATE CLEARING OF SITE AT WORK LOCATIONS.
   - D. WHERE EXISTING WATERLOO BARRIER SHEET PILE TIP ELEVATION IS HIGHER THAN ELEVATION 556.0, LIMIT LENGTH OF EXCAVATION TO 18 FT FOR INSTALLATION OF LOWER WALE MEMBER OF SHEET PILE SUPPORT SYSTEM (APPROXIMATE LOCATIONS SHOWN ON DRAWING NO. 1). NO CONSTRUCTION SURCHARGE LOADS PERMITTED BEHIND THE EXISTING WATERLOO BARRIER SHEET PILE WALL IN THESE LOCATIONS UNTIL LOWER WALE IS IN PLACE.
3. SAFETY
   - A. THE ENGINEER AND THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR CONSTRUCTION SAFETY.
   - B. THE ENGINEER DOES NOT CONTROL THE MEANS AND METHODS OF CONSTRUCTION.
   - C. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING OSHA FALL PROTECTION WHERE REQUIRED AT THE TOPS OF THE SHEET PILE WALLS.
4. USE OF DOCUMENTS
   - A. USE OF THESE DOCUMENTS IS PROHIBITED FOR OTHER PROJECTS, ADDITIONS TO OR EXTENSIONS OF THIS PROJECT OR FOR THE COMPLETION OF THE PROJECT BY OTHERS EXCEPT WITH THE WRITTEN PERMISSION OF ENGINEERING PARTNERS INTERNATIONAL, LLC.

COFFERDAM AND BUTTRESS SUPPORT SYSTEM:

1. LOADS
   - A. LIMIT CONSTRUCTION SURCHARGE PRESSURES TO 600 PSF AT A DISTANCE OF 8 FT FROM EXISTING WATERLOO BARRIER SHEET PILE WALL.
   - B. UNTIL THE LOWER WALE IS IN PLACE, NO CONSTRUCTION SURCHARGE LOADING IS PERMITTED BEHIND AREAS OF THE WATERLOO BARRIER SHEET PILE WALL WHERE THE SHEET PILE TIP ELEVATION IS HIGHER THAN ELEVATION 556.0. THESE AREAS ARE DEPICTED ON DRAWING 1 (SEE ALSO FIELD CONDITIONS NOTE 2.D).
   - C. DO NOT MOOR FLOATING PLANT TO COFFERDAM OR BUTTRESS SUPPORTS OR ALLOW DEBRIS TO ACCUMULATE AGAINST THESE STRUCTURAL ELEMENTS.
2. MATERIALS
   - A. STEEL SHEET PILE SECTIONS SHALL BE ASTM A572 GR 50, F_y = 50 KSI.
   - B. STEEL WALES, STRUTS, AND CHANNEL SHALL BE ASTM A572 GR 50, F_y = 50 KSI.
   - C. STEEL PLATES SHALL BE ASTM A36, F_y = 36 KSI.
   - D. STEEL PIPE SHALL BE ASTM A252, GRADE 3
   - E. CONCRETE IN BUTTRESS SUPPORT SHAFTS SHALL HAVE AN UNCONFINED COMPRESSIVE STRENGTH OF f'_c = 3000 PSI.
   - F. BLOCKING BETWEEN UPPER WALE AND EXISTING SHEET PILE SHALL BE WITH STEEL PLATES, STEEL WEDGES, OR STEEL SHIMS AS APPROVED BY THE ENGINEER. LOWER WALE BLOCKING MAY BE STEEL OR TIMBER.
   - G. STEEL MEMBER SIZES SHOWN ON DRAWINGS ARE MINIMUM REQUIRED FOR STRENGTH AND MAY BE SUBSTITUTED WITH SECTIONS OF LARGER CROSS-SECTIONAL AREA AND SECTION MODULUS.
   - H. SURPLUS AND USED MATERIALS MAY BE USED FOR THE TEMPORARY SUPPORT SYSTEMS. IF MILL CERTIFICATIONS ARE NOT AVAILABLE FOR STEEL MEMBERS PROVIDE TEST DATA AND MEASUREMENTS TO CONFIRM THE ADEQUACY OF THE MATERIALS FOR USE.
3. WELDING
   - A. ALL WELDS SHALL CONFORM TO AWS D1.1 AND SIZED AS SHOWN ON THE DRAWINGS.
4. INSTALLATION
   - A. THE METHOD OF INSTALLATION OF THE SHEET PILE SHALL BE AT THE DISCRETION OF THE CONTRACTOR INSTALLER. HOWEVER, CARE SHOULD BE GIVEN TO NOT DAMAGE ANY PILE DURING THE DRIVING / INSTALLATION PROCESS. IF, IN THE OPINION OF THE ENGINEER, A PILE IS DAMAGED TO THE EXTENT IT WILL NOT SERVE THE INTENDED PURPOSE IN THE TEMPORARY STRUCTURE, IT SHALL BE REMOVED AND A REPLACEMENT PILE INSTALLED.
   - B. VIBRATORY OR IMPACT INSTALLATION OF STEEL SHEET PILE IS PERMITTED FOR THE COFFERDAM.
   - C. STEEL PIPE PILES FOR BUTTRESS SUPPORT SYSTEM MUST BE INSTALLED IN DRILLED SHAFTS. VIBRATORY OR IMPACT INSTALLATION OF THE STEEL PIPE PILES IS PROHIBITED.
   - D. DRILLED SHAFTS FOR THE BUTTRESS SUPPORTS SHALL BE TEMPORARILY CASED TO PREVENT SLOUGH-IN AND FACILITATE INSTALLATION OF PIPE MEMBERS AND CONCRETE PLACEMENT. DRILLING SPOIL SHALL BE HANDLED AND DISPOSED AS CONTAMINATED MATERIAL.

WORK SEQUENCE:

1. PROVIDE ACCESS TO THE WORK LOC
   - A. SUBMIT WORK PLAN DESCRIBIN MOBILIZING TO THE SITE.
   - B. DELIVER BARGES TO WORK LOC AND PIPE PILES.
   - C. PLACE SUITABLE WORK BENCH EQUIPMENT ACCESS AS REQUIR
   - D. CONTRACTOR SHALL MINIMIZE OVER CONTAINMENT AREA. TH 4 PSI (800 PSF) OR LESS ON
   - E. NO PENETRATION OF THE EXIS PENETRATION IS ALLOWED OVE
2. INSTALL PIPE PILE BUTTRESS SUPP
   - A. PRE-EXCAVATE RIPRAP AND S PILES.
   - B. REMOVAL OF RIPRAP MUST BE IT WILL NOT BE POSSIBLE TO
   - C. DRILL AND CASE SHAFTS TO NECESSARY TO PLACE WALES
   - D. INSTALL INCLINOMETERS IN PI SHOWN ON DRAWING 1. COO
3. INSTALL COFFERDAM SHEETPILES I
   - A. PLACE PILING IN RIVER AT PI
   - B. MAKE SHEETPILE COFFERDAM
   - C. NO PENETRATION OF THE EX PENETRATION IS ALLOWED OV
   - D. NO DEWATERING OF CELL IS
4. INSTALL UPPER AND LOWER WALE
   - A. LOOSELY SUPPORT LOWER W
   - B. PLACE CONTINUOUS TOP WAL
   - C. NO PENETRATION OF THE EX PENETRATION IS ALLOWED OV
   - D. RELEASE SUPPORT OF LOWE BELOW LOWER WALE ELEVATI
   - E. CONTACT ENGINEER IF PROP
   - F. REFER ALSO TO FIELD COND WATERLOO BARRIER SHEET P
   - G. CONTRACTOR TO PROVIDE UP CONNECTIONS.
5. DREDGING AND BACKFILLING OF C
   - A. DREDGING OPERATIONS (BY COFFERDAM IS INSTALLED.
   - B. REMOVE CONTAMINATED SED
   - C. IN AREA WHERE EXISTING WA LOCATIONS SHOWN ON DRAW MANNER WITH MAXIMUM 20
   - D. DREDGING SHALL NOT EXTEN
   - E. BACKFILL COFFERDAM CELL
6. REMOVAL OF PIPE PILES
   - A. BACKFILL TO ELEVATION 581
   - B. CUT-OFF PIPE PILES AT ELE
   - C. LOWER WALE AND UPPER WA
   - D. BACKFILL ABOVE TOP OF PIL
7. REMOVAL OF STEEL SHEET PILING
   - A. PULL COFFERDAM SHEETPILI
   - B. TRANSFER SHEET PILE TO L
   - C. DECONTAMINATE MATERIALS
   - D. REMOVE MATERIALS FROM P

NOTES:

1. STEPS 2, 3 AND 4 MAY B

EQUIPMENT RECORDS
EDW. E. GILLEN CO.

CRANE DATA SHEET DK-26

EQUIDK26
REV. 3/85

MAKE: MANITOWOC MODEL: 3000WV SERIAL: 30259

LIFTING

MAX. CAPACITY	65 TONS
BASIC BOOM	50FT.
MAX. BOOM AVAIL.	160 FT.
JIB LENGTH AVAIL.	30FT.

CAPACITY:	POUNDS
80' BOOM 20' RADIUS	63,100
100' BOOM 30' RADIUS	35,600
100' BOOM 40' RADIUS	24.400
120' BOOM 40' RADIUS	23,800
130' BOOM 50' RADIUS	
140' BOOM 60' RADIUS	
150' BOOM 70' RADIUS	

DIMENSIONS

CRAWLER WIDTH - EXTENDED	12'-9"
CRAWLER WIDTH - RETRACTED	11'-1"
PAD WIDTH	33"
CRAWLER LENGTH	18'-5"
CAB HEIGHT	13'-11"
TAILSWING RADIUS	13'-9"

WEIGHTS	POUNDS
WORKING WEIGHT	143,500
* COUNTERWEIGHT	38,000
* CRAWLER WEIGHT / EACH	17,063

*THESE WTS ARE INCLUDED IN THE WORKING WT.

DATA

ENGINE MFG.	CUMMINS
ENGINE MODEL	NHRS-6
ENGINE SERIAL	474883
LAST OVERHAUL	
TORQUE CONVERTER	YES
DRUMS	3
CABLE SIZE	7/8"
POWER LOAD LOWERING	YES (VICON)
AIR CONTROLS	YES
ALL INDEPENDENT	YES
FAIRLEAD	AVAIL.
TYPE OF BOOM	TUBE
AUTOMATIC TAKEUP	YES (VICON)

Jones Island
East Caldwell
Serial # 210A
Model 150CH
Cat engine
Model 63B1110
Serie A
Takes 12" Kelly 15" across keys
West Caldwell
Serial # 255CA
Model 150CH
Cat Engine
63B1841
Series A
Takes 16"+12" Kelly's

ED-3 Vehicle Id	Year	Make	Body Type
606D113363	1960	ZLGSN	Truck

ED 98 Sold 7-12-88
ED 99 Sold 7-12-88

14,350
24,500
168,000

Base - 15,000 #
Crowd - 2,000 #
Stabilizer
Sub Frame 3,500

Clg - 2,500

24,500 lbs
Total