

REMEDIATION TARGET AREA (RTA 1) DESIGN

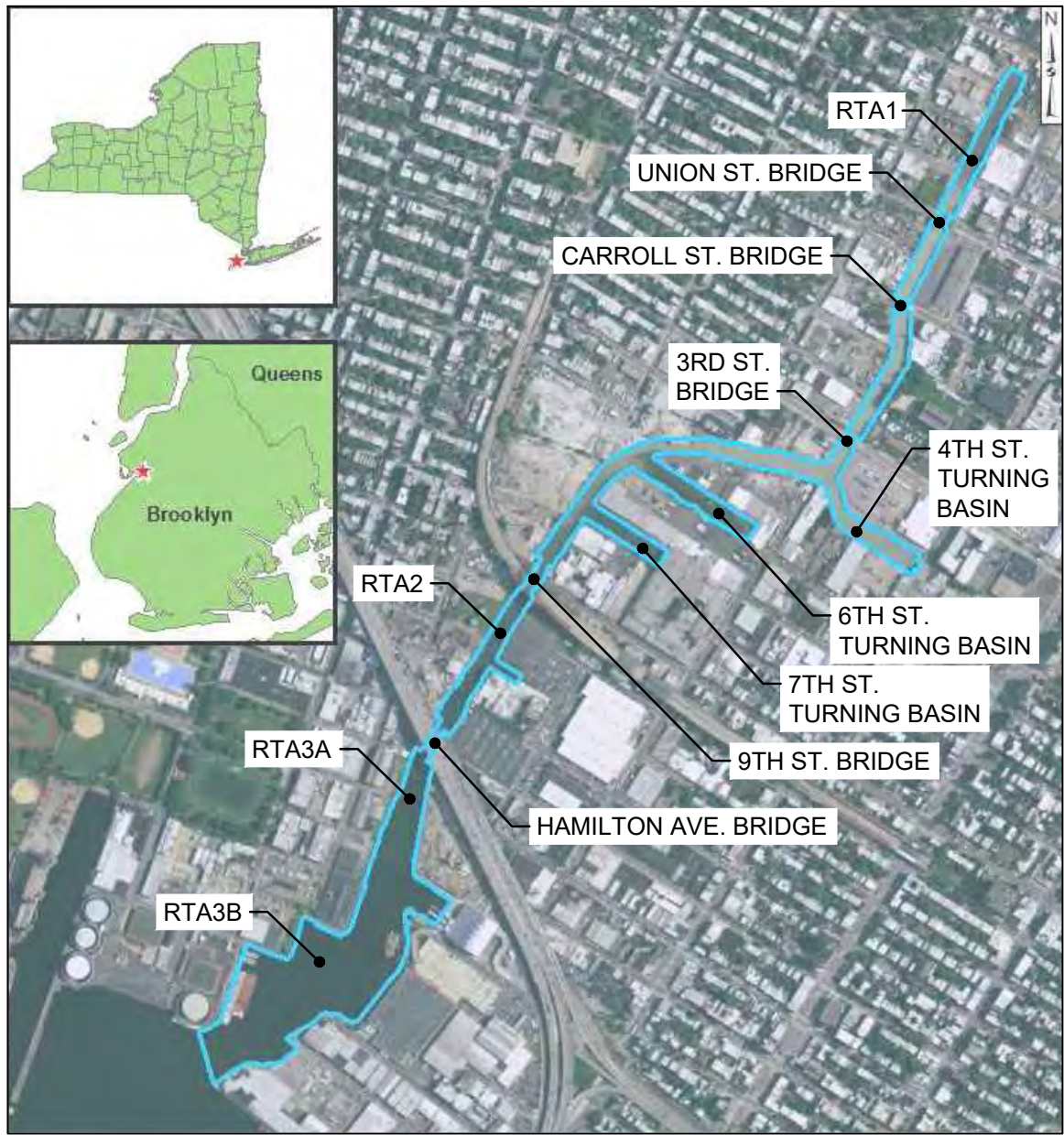
GOWANUS CANAL SUPERFUND SITE

BROOKLYN, NEW YORK

BLOCK 411 LOT 14 BUTLER STREET

100% DESIGN PACKAGE

FEBRUARY 2020

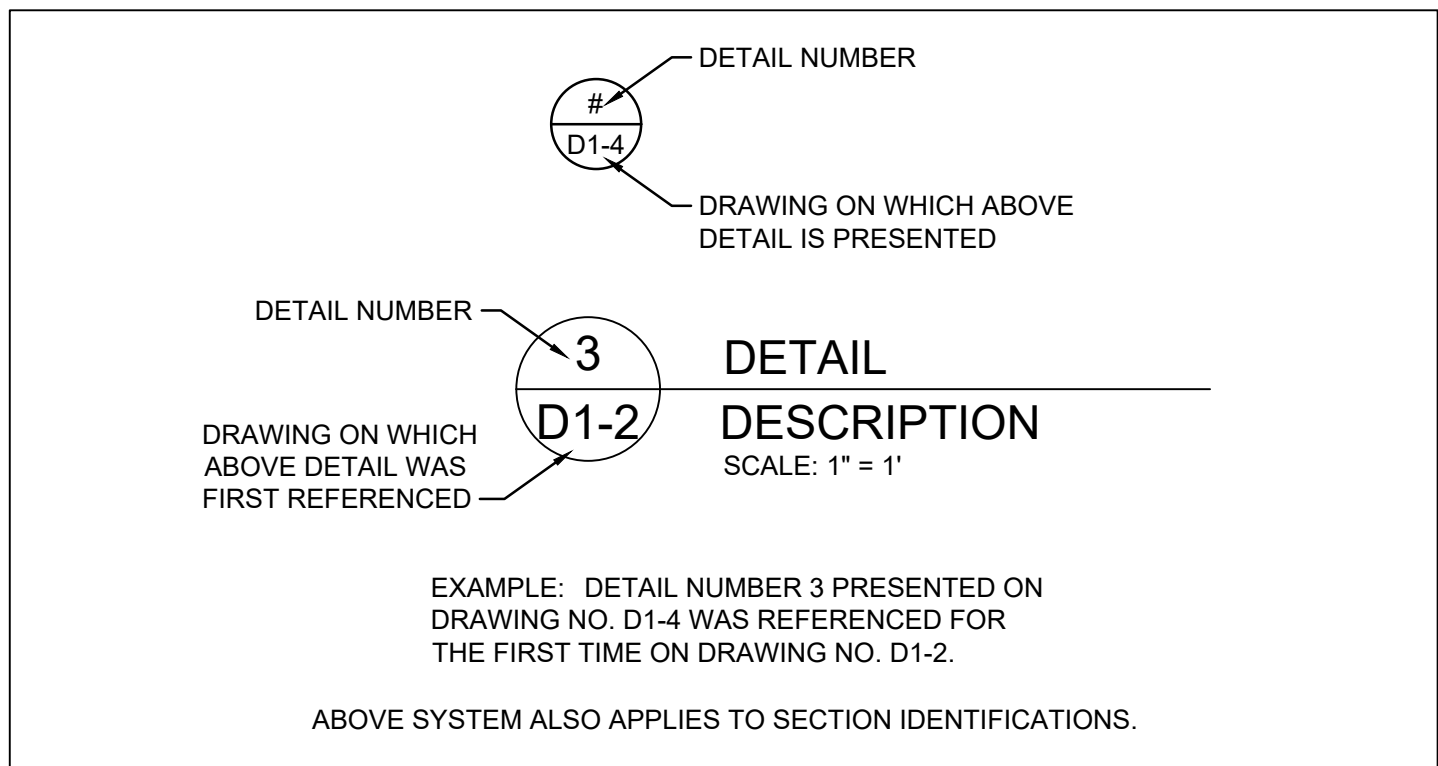


VICINITY MAP
NOT TO SCALE



LOCATION MAP
SCALE: 1" = 400'

INDEX OF DRAWINGS	
DRAWING NO.	DRAWING TITLE
D1-1	COVER SHEET
D1-2	BULKHEAD SUPPORT PLAN - BLOCK 411 LOT 14 BUTLER STREET
D1-3	BULKHEAD PLAN & ELEVATION - BLOCK 411 LOT 14 BUTLER STREET
D1-4	BULKHEAD PLAN & ELEVATION - BUTLER STREET WEST SIDE
S1-1	WALL SECTIONS - BLOCK 411 LOT 14 BUTLER STREET



ABBREVIATIONS

AVE.	AVENUE
CPT	CONE PENETRATION TESTING
CSO	COMBINED SEWER OVERFLOW
DIA	DIAMETER
E	EAST
EL.	ELEVATION
EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY
FT.	FEET
IN.	INCHES
ISS	IN SITU STABILIZATION/SOLIDIFICATION
INV.	INVERT
LF	LINEAR FEET
MLW	MEAN LOW WATER
MHW	MEAN HIGH WATER
MIN	MINIMUM
NAD83	NORTH AMERICAN DATUM OF 1983

NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NTS	NOT TO SCALE
NYCDEP	NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
NYCDOT	NEW YORK CITY DEPARTMENT OF TRANSPORTATION
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
OD	OUTSIDE DIAMETER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PD	PRE-DESIGN
PE	PROFESSIONAL ENGINEER
OSI	OCEAN SURVEY, INC.
RTA	REMEDIAL TARGET AREA
SPDES	STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM
ST.	STREET
STA.	STATION
TYP	TYPICAL
W	WEST

GENERAL NOTES:

- THIS DRAWING SET IS FOR THE TEMPORARY BULKHEAD SUPPORT SYSTEM PROPOSED FOR REMEDIATION TARGET AREA (RTA) 1 ALONG THE GOWANUS CANAL SUPERFUND SITE. DREDGING, REMEDIATION, AND CAPPING PHASES OF WORK ARE PROVIDED IN A SEPARATE DRAWING SET.
- ELEVATIONS (EL.) ARE IN FEET (FT) BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). THE GRID COORDINATE SYSTEM CORRESPONDS TO NEW YORK STATE PLANE, EAST ZONE (3101). HORIZONTAL REFERENCE DATUM IS NORTH AMERICAN DATUM OF 1983 (NAD83).
- TIDAL EPOCHS WERE BASED ON THE TIDAL EPOCH FROM 1983 TO 2001 AT THE BATTERY STATION (NO. 8518750) MAINTAINED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA). MEAN LOW WATER (MLW) IS -2.57-FT AND MEAN HIGH WATER (MHW) IS 1.96-FT NAVD88.
- ADDRESSES AND BLOCK AND LOT NUMBERS WERE GENERALLY OBTAINED FROM THE NEW YORK CITY TAX LOT DIGITAL MAP AS ACCESSED ON 1 JULY 2015 (OR LATER) AND/OR DIRECT DISCUSSIONS WITH THE PROPERTY OWNER, TENANT, AND/OR REPRESENTATIVE.
- CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SAFETY OF WORK AREAS AND LIMITING PUBLIC ACCESS INTO WORK AREAS. WORK SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REQUIREMENTS AND WITH ENVIRONMENTAL HEALTH AND SAFETY/TRAINING REQUIREMENTS IN ACCORDANCE WITH THE APPROVED HEALTH AND SAFETY PLAN AND SECTION 01 35 29 OF THE SPECIFICATIONS.
- CONTRACTOR SHALL CONTACT NEW YORK 811 (I.E., CALL BEFORE YOU DIG) 2 TO 10 WORKING DAYS (EXCLUDING HOLIDAYS AND WEEKENDS) PRIOR TO THE START OF CONSTRUCTION TO VERIFY THE LOCATION OF ANY POTENTIAL UTILITIES IN THE PUBLIC RIGHT OF WAY. CONTRACTOR IS RESPONSIBLE FOR LOCATING UNDERGROUND UTILITIES WITHIN EXCAVATION AREAS WITHIN THE PROPERTY LIMITS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE OR DISRUPTION OF UTILITY SERVICE DURING CONSTRUCTION. DO NOT MODIFY OR REMOVE ANY EXISTING UTILITIES WITHOUT THE PERMISSION OF THE UTILITY OWNER.
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING A USCG LOCAL NOTICE TO MARINERS TWO WEEKS PRIOR TO THE COMMENCEMENT OF MARINE CONSTRUCTION ACTIVITIES INVOLVING VESSEL ACTIVITY IN THE CANAL. REQUIREMENTS FOR SUBMITTING THE LOCAL NOTICE TO MARINERS ARE LISTED IN SECTION 01 41 00 OF THE SPECIFICATIONS.
- CONTRACTOR SHALL VERIFY ACTUAL FIELD CONDITIONS AND CONFIRM THE ACCURACY OF THE PROPOSED DESIGN PRIOR TO COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE AND DESIGNER OF RECORD.
- WATER ELEVATIONS AND QUALITY IN THE CANAL MAY BE AFFECTED BY CSO DISCHARGE. CONTRACTOR SHALL BE PREPARED TO ENCOUNTER OCCASIONAL PERIODS OF HIGHER FLOWS.
- CONTRACTOR IS RESPONSIBLE FOR ASCERTAINING THAT THEIR TUGS, BARGES, AUXILIARY WATERCRAFT, AND OTHER VESSELS HAVE ADEQUATE DRAFT AND CLEARANCE. VESSELS SHOULD NOT BE ALLOWED TO RUN AGROUND AND SHOULD BE SELECTED WITH A GOAL OF MINIMIZING THE GENERATION OF TURBIDITY WHERE POSSIBLE. VESSELS SHALL BE IN PROPER WORKING CONDITION AND ROUTINELY INSPECTED.
- THE BRIDGE OPENING WIDTHS (FOR VESSEL TRAFFIC) AT THE HAMILTON AVENUE (AVE.), 9TH STREET (ST.), AND 3RD ST. BRIDGES ARE APPROXIMATELY 47, 60, AND 42 FT, RESPECTIVELY BASED ON PHYSICAL MEASUREMENTS COMPLETED BY OSI IN OCTOBER 2014. THE BRIDGE OPENING WIDTH AT CARROLL ST. AND UNION ST. WAS ESTIMATED TO BE 36 FT AND 43 FT, RESPECTIVELY BASED ON UNITED STATES COAST GUARD "BRIDGE OVER NAVIGABLE WATERS REPORT"(1986). VERTICAL BRIDGE CLEARANCES ARE SUMMARIZED IN THE DOCUMENT "RESTRICTIONS TO NAVIGATION ANALYSIS" (GEOSYNTEC, 2016).
- CONTRACTOR IS RESPONSIBLE FOR PROVIDING A MINIMUM OF TWO HOURS OF ADVANCED NOTIFICATION TO NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYCDOT) PRIOR TO THE 9TH ST., 3RD ST., CARROLL ST., AND UNION ST. BRIDGES BEING OPENED. THE FOLLOWING NUMBERS MAY BE USED TO CONTACT NYCDOT [(212) 839-3740 (WEEKDAYS), (718) 885-0805 (WEEKENDS AND HOLIDAYS), AND 718-254-8726 (ALTERNATIVE PHONE NUMBER)]. THE NYCDOT BRIDGE OPERATOR CAN ALSO BE REACHED ON MARINE RADIO CHANNEL 13. THE HAMILTON AVE. BRIDGE DOES NOT REQUIRE ADVANCED NOTIFICATION.
- SEDIMENT AND EROSION CONTROL REQUIREMENTS IMPLEMENTED AS PART OF THE RTA1 DREDGING WORK WILL BE IN EFFECT AND SHALL BE MAINTAINED BY THE CONTRACTOR THROUGHOUT BULKHEAD SUPPORT AND INSTALLATION.
- SHEET PILING IS TO BE INSTALLED USING THE PRESS-IN-METHOD. VIBRATORY AND IMPACT METHODS SHALL ONLY BE USED WHERE PRESS-IN-METHODS ARE NOT PRACTICAL. SUCH AS INSTALLATION OF DRIVE TEMPLATES. BEGINNING SHEET PILE SECTIONS, CLOSURE PIECES, AND LOCATIONS WHERE THE PRESS-IN EQUIPMENT IS OBSTRUCTED.

PRELIMINARY
NOT FOR CONSTRUCTION

WARNING

IT IS A VIOLATION OF NYS
EDUCATION LAW ARTICLE 145
FOR ANY PERSON, UNLESS HE
IS ACTING UNDER THE
DIRECTION OF A LICENSED
PROFESSIONAL ENGINEER, TO
ALTER AN ITEM IN ANY WAY.

PROFESSIONAL SEAL

GOWANUS TRUST

APTIM ENGINEERING NEW YORK, P.C.
150 ROYALL STREET, SUITE 103
CANTON, MA 02021

CLIENT DWG NO.

COVER SHEET

BLOCK 411 LOT 14 BUTLER STREET

FOR:

PROJECT NO: 749237266

DWG NO: D1-1

REV: F

NOTES

A 65% DESIGN

PAR

AKF

CAM

6/12/19

B 90% DESIGN

PAR

AKF

CAM

07/25/19

C 90% DESIGN REVISED

PAR

AKF

CAM

08-08-19

D 90% DESIGN FOR EPA REVIEW

PAR

AKF

CAM

09-30-19

E UPDATED 90% DESIGN

PAR

AKF

CAM

01-31-2020

F 100% DESIGN - NOT ISSUED FOR CONSTRUCTION

PAR

AKF

CAM

02-18-2020

REFERENCE DRAWINGS

NO.

REVISION

DRAWN

CKD

APPD

DATE

DRAWN: PAR

CKD: AKF

APPD: CAM

DATE:

SCALE:



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- DESIGN CRITERIA
- GROUND SURFACE - EL. 6.0 (DESIGN)
 - UPLAND SURCHARGE
 - SERVICE CONDITIONS / VEHICLE LOADING -250 PSF
 - ADJACENT BULKHEAD (DEAD LOAD) 1,546 PSF AT CSO, 1,422 PSF WITHIN 24' OF FLUSHING TUNNEL OUTLET, 1,230 PSF EVERYWHERE ELSE
 - WATER LEVEL CONDITIONS
 - UPLAND GROUNDWATER TABLE - EL. 3.5 FT (INCLUDES 2.5 FT. MOUNDING)
 - CANAL WATER TABLE (MEAN LOW WATER) - EL. -2.57 FT
 - CANAL MUDLINE CONDITIONS
 - PHASE III DREDGE - EL. -18.83 FT BUTLER STREET WEST (SEE TABLE 3)
 - PHASE III DREDGE EL. -22.0 FT' TO NORTHERN EDGE OF FLUSHING TUNNEL OUTFALL TO 5 FEET FROM TUNNEL OUTFALL
 - PHASE III DREDGE ELEVATION SLOPES UPWARD FROM EL. -22.0 FT AT A 6H TO 1V SLOPE STARTING AT A DISTANCE OF 5 FEET FROM THE EDGE OF THE FLUSHING TUNNEL TO EL. -15.0 FT
 - PHASE III DREDGE - EL. -15.0 CSO OUTFALL (SEE TABLE 3)
 - PHASE III DREDGE - EL. -16.0 FT CSO SIDE BULKHEADS (SEE TABLE 3)
 - ADDITIONAL OVER-DREDGE ALLOWANCE - 0.5 FT
 - FINAL TOP OF ENVIRONMENTAL CAP VARIES:
ALONG END WALL EL. -10.5 FT
ALONG WEST WALL EL. -10.5 FT TO 3.66 FT ABOVE PHASE III DREDGE ELEVATIONS.

- GEOTECHNICAL INFORMATION:
- PD-5 BLOCK 417, LOT 21 FACTUAL REPORT, GOWANUS CANAL SUPERFUND SITE BROOKLYN, NEW YORK, DATED APRIL 2016, FINAL, PREPARED BY GEOSYNTEC CONSULTANTS AND BEECH AND BONAPARTE ENGINEERING P.C.
 - PD-5 BLOCK DOUGLASS STREET, DEGRAW STREET, SACKETT STREET - FACTUAL REPORT, GOWANUS CANAL SUPERFUND SITE BROOKLYN, NEW YORK, DATED APRIL 2016, FINAL, PREPARED BY GEOSYNTEC CONSULTANTS AND BEECH AND BONAPARTE ENGINEERING P.C.



1
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DETAIL
BULKHEAD SUPPORT
SCALE: 1" = 30'

WALL STATIONING / OFFSET	PROPERTY	SHEET PILE NO.	SECTION	TOP OF PILE EL. (FT)	MIN. TIP EL. (FT)	SHEET PILE LENGTH (FT)	NO. PILES
BSA-1 TO BSA-2 TO BSA-3 TO BSA-4	BUTLER ST. WEST SIDE	UNKNOWN	AZ 36-700N	4.5	-41.0	45.5	21
BSA-0 TO 0+8.80 26.43' (L)	CSO FULTON SIDE BULKHEAD	UNKNOWN	AZ 52-700N	4.5	-46.0	50.5	5.5
0+8.80 26.43' (L) TO 0+8.36 26.54' (R)	AT CSO	UNKNOWN	AZ 36-700N	-7.57	-30.0	22.43	11
0+8.36 26.54' (R) TO BSA-1	CSO BUTLER SIDE BULKHEAD	UNKNOWN	AZ 52-700N	4.5	-46.0	50.5	4

3
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TABLE
SHEET PILE SCHEDULE

POINT ID	NORTHING	EASTING	STATION / OFFSET
BSA-0	673627.40	634476.40	0+09.16 / 50.64' (L)
BSA-1	673671.66	634389.85	0+8.25 / 46.55' (R)
BSA-2	673633.25	634371.42	0+50.86 / 45.85' (R)
BSA-3	673596.34	634353.02	0+92.10 / 45.89' (R)
BSA-4	673584.90	634346.19	1+05.97 / 46.67' (R)

4
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TABLE
SHEET PILE ALIGNMENT CONTROL DATA

IDENTIFICATION NO.	ADDRESS	BLOCK	LOT	SPDES PERMIT STATUS (NOTE 2)	NEW YORK EAST FIPS ZONE 3101		PIPE SIZE (SEE NOTES 1 & 3)	PIPE MATERIAL (SEE NOTES 1 & 3)	INVERT ELEVATION (FT) (SEE NOTE 3)	DISPOSITION (SEE DETAILS ON S1-1)	IS THE OUTFALL SUBMERGED? (SEE NOTE 1)	OUTFALL STATIONING / OFFSET ALONG BULKHEAD (TO BE FIELD VERIFIED)
					NORTH	EAST						
GC-OF-194	BUTLER STREET	411	14	UNKNOWN	673668.2	634391.6	6" (CH2MHILL, 2011)	STEEL / METAL	TBD	SEAL	TIDAL TRANSITION ZONE	0+10.46 / 43.352' (R)
GC-OF-195	BUTLER STREET	411	14	UNKNOWN	673668.7	634390.9	6" (CH2MHILL, 2011)	STEEL / METAL	TBD	SEAL	TIDAL TRANSITION ZONE	0+10.46 / 44.293' (R)
GC-CF-N-002	BUTLER STREET	411	14	UNKNOWN	673657.5	634418.7	10' x 10'	CONCRETE	3.46' (TOP)	NO ACTION	TIDAL TRANSITION ZONE	0+8.03 / 14.470' (R)
GC-CF-N-003	BUTLER STREET	411	14	UNKNOWN	673651.8	634428.8	10' x 10'	CONCRETE	3.42' (TOP)	NO ACTION	TIDAL TRANSITION ZONE	0+8.62 / 2.888' (R)
GC-CF-N-004	BUTLER STREET	411	14	UNKNOWN	673646.1	634439.2	10' x 10'	CONCRETE	3.51' (TOP)	NO ACTION	TIDAL TRANSITION ZONE	0+9.07 / 8.963' (L)
GC-CF-N-005	BUTLER STREET	411	14	UNKNOWN	673639.3	634449.9	10' x 10'	CONCRETE	3.52' (TOP)	NO ACTION	TIDAL TRANSITION ZONE	0+10.37 / 21.575' (L)
GC-CF-N-001	BUTLER STREET	411	14	UNKNOWN	673667.4	634391.6	TBD	TBD	TBD	SEAL		0+11.33 / 43.227' (R)
GC-CF-N-001A	BUTLER STREET	411	14	UNKNOWN	673665.1	634404.1	TBD	TBD	TBD	SEAL		0+07.76 / 30.928' (R)
GC-CF-N-001B	BUTLER STREET	411	14	UNKNOWN	673665.5	634403.2	TBD	TBD	TBD	SEAL		0+07.80 / 31.911' (R)
GC-CF-W-001	BUTLER STREET	411	14	UNKNOWN	673636.8	634378.2	TBD	TBD	TBD	SEAL		0+44.65 / 41.447' (R)

NOTES:

- THE OUTFALL AND COMBINED SEWER OVERFLOW DATA WAS GENERALLY OBTAINED FROM A DATABASE COMPLETED BY CH2M (2011) AND SUPPLEMENTED BY INFORMATION FROM NYCDEP (2007, 2015) AND NYSDEC.
 - (NYCDEP, 2007) - NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF ENGINEERING DESIGN AND CONSTRUCTION. GOWANUS CANAL WATERBODY/WATERSHED FACILITY PLAN REPORT, SEPTEMBER, 2007.
 - (CH2MHILL, 2011) - CH2MHILL, GRB ENVIRONMENTAL SERVICES, INC. APPENDIX G - SURVEY OF OUTFALL FEATURES TO THE GOWANUS CANAL, GOWANUS CANAL REMEDIAL INVESTIGATION REPORT. PREPARED FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY, JANUARY, 2011.
 - (NYCDEP, 2015) - NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF WASTEWATER TREATMENT. COMBINED SEWER OVERFLOW LONG TERM CONTROL PLAN FOR GOWANUS CANAL. PREPARED BY AECOM USA, INC., JUNE, 2015.
 - (NYSDEC - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION. OUTFALL PERMIT INFORMATION OBTAINED FROM STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) DATABASE. DOWNLOADED ON MAY 23, 2017.
- THE STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) PERMIT STATUS FOR THE OUTFALL IN RTA 1 ARE UNKNOWN BY GEOSYNTEC AS OF SEPTEMBER 15, 2017. THE RD GROUP WILL WORK WITH EPA AND OTHER APPROPRIATE PARTIES TO VERIFY THE PERMIT STATUS.
- OUTFALL LOCATIONS, SIZE, MATERIAL TYPE AND INVERT ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR IN THE FIELD.

2
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TABLE
OUTFALL DATA AND IDENTIFICATION

NOTES:

- CONTINGENT WORK TO BE PERFORMED IN ACCORDANCE WITH SECTION 31 41 16.
- SEE TABLE 2 FOR OUTFALL PIPE LOCATIONS, SIZES, AND DISPOSITION.
- NEW BULKHEAD WALLS BEING ADDED ARE CONSIDERED TO BE TEMPORARY FOR THE SUPPORT OF EXISTING BULKHEADS DURING RTA-1 DREDGING AND REMEDIATION AND SHALL NOT BE CONSIDERED A PERMANENT BULKHEAD. UPON COMPLETION OF RTA-1 WORK, THE TEMPORARY BULKHEADS ARE TO BE LEFT IN PLACE.
- CONSTRUCTION SEQUENCE: THE FOLLOWING CONSTRUCTION SEQUENCE IS PROPOSED FOR RTA 1 REMEDIATION.
 - PHASE I DREDGING: DREDGING PERFORMED TO FACILITATE BARGE ACCESS FOR BULKHEAD SUPPORT CONSTRUCTION.
 - PRIOR TO INSTALLING THE SHEETING WITH THE GIKEN, SURFACE DEBRIS AND SHALLOW OBSTRUCTIONS (UP TO ELEVATION -10 FT) WILL BE REMOVED FROM THE BULKHEAD FOOT PRINT WITH AN EXCAVATOR WITH BUCKET OR GRAPPLE. A REVERSE FLIGHT AUGER WILL THEN BE USED TO PROBE THE AREA DOWN TO ELEVATION -20 FT FOR DEEPER OBSTRUCTIONS. IDENTIFIED OBSTRUCTIONS WILL BE REMOVED IMMEDIATELY WITH THE AUGER IF ONLY MINOR DISPLACEMENT OF MATERIAL IS REQUIRED. LARGER OBSTRUCTIONS WILL BE DUG OUT WITH AN EXCAVATOR BUCKET AND RESULTING HOLES IMMEDIATELY BACKFILLED WITH CLEAN MATERIAL. LIMITS OF POTENTIAL EXCAVATION TO REMOVE THESE OBSTRUCTIONS WILL BE REVIEWED WITH THE ENGINEER ON A CASE BY CASE BASIS TO CONFIRM THAT EXISTING BULKHEADS WILL NOT BE COMPROMISED OR IF REQUIRED, TO DEVELOP AN ENGINEERED SOLUTION FOR REMOVAL OF THE OBSTRUCTION. CONTRACTOR'S DREDGING WORK PLAN SHALL ADDRESS THE PROCEDURE OF THE PRE SHEETING OBSTRUCTION PROBING AND REMOVAL.
 - SEAL PIPES TO BE SEALED AS NOTED IN TABLE 2. SURVEY PIPES TO REMAIN IN USE THAT WILL PENETRATE THE TEMPORARY BULKHEAD.
 - BULKHEAD SUPPORT CONSTRUCTION: CONTRACTOR SHALL INSTALL BULKHEAD SUPPORT DESIGNED TO PROVIDE TEMPORARY STABILITY TO THE EXISTING BULKHEADS THROUGHOUT DREDGING, REMEDIATION, AND CAPPING CONSTRUCTION IF APPLICABLE.

INSTALLATION OF THE SHEETING WILL BE DONE WITH AUGER ASSISTANCE AS NEEDED IN ACCORDANCE WITH GIKEN'S HARD GROUND PRESS-IN METHOD' INSTALLATION TECHNIQUE. THE GIKEN SUPPLIED AUGERS CAN BE FITTED WITH SPECIALIZED HEADS FOR PENETRATING COBBLE AND BOULDER OBSTRUCTIONS.

AT THE CSO: CONTRACTOR SHALL SCHEDULE BULKHEAD INSTALLATON IN FRONT OF THE CSO DURING A FORESEEABLE STRETCH OF FAVORABLE DRY WEATHER CONDITIONS. WORK SHALL BE CONTINUOUS 24/7 PENDING APPROVAL BY NEW YORK CITY. SHEETPILES SHALL BE DRIVEN 3 PAIRS BEYOND THE EDGE OF THE CSO SO AS TO SUPPORT THE GIKEN PRESS EQUIPMENT. SHEETPILES IN FRONT OF THE CSO WILL THEN BE CUT OFF AT THE CSO INVERT ELEVATION AS SHOWN ON THE DRAWINGS.

- CONTRACTOR SHALL INSTALL PINE FILLERS AND CONTINUOUS STEEL ANGLES ON BOTH SIDES OF THE CSO TUNNEL FROM 2' BELOW INVERT TO ELEVATION 4.5' AS SHOWN ON THE DRAWINGS. FINAL LOCATION OF THE ANGLE WILL BE ADJUSTED AS REQUIRED TO ACCOUNT FOR THE AS-BUILT LOCATION OF THE SHEETS LEADING TO END CLOSURE LOCATION.
- CONTRACTOR SHALL INSTALL PLATE ON BOTH SIDES OF CSO TUNNEL OPENING TO CLOSE GAP BETWEEN SHEETPILE AND CONCRETE TUNNEL STRUCTURE DOWN TO 2' BELOW THE INVERT ELEVATION AND UP TO ELEVATION 4.5' PER THE DETAILS ON DRAWING D1-3. PLATE WILL BE ANCHORED AT TOP WITH ANGLE BOLTED TO TIMBER TO HOLD PLATE IN PLACE UNTIL BACKFILLED.
- PHASE II DREDGING: BULK DREDGING PERFORMED TO REMOVE CONTAMINATED SEDIMENTS AND IN PREPARATION OF (IN SITU STABILIZATION / SOLDIFICATION) ISS INSTALLATION.
- REMEDATION: SELECT AREAS WILL BE TREATED WITH (IN SITU STABILIZATION / SOLDIFICATION) ISS ZONES. THE TARGET ISS ZONES ARE MIXED AND THEN ALLOWED TO CURE.
- PHASE III DREDGING: PROPOSED TARGET DREDGE DEPTH TO BE PERFORMED AFTER THE ISS ZONES HAVE ACHIEVED TARGET UNCONFINED COMPRESSIVE STRENGTH.
- LEVELING BACKFILL: SAND PLACED TO CREATE LEVEL PLATFORMS IN PREPARATION FOR CAP INSTALLATION.
- CAP INSTALLATION: PLACEMENT OF TREATMENT LAYER AND ARMOR CAP

LEGEND

- CANAL BOUNDARY
- PROPERTY LINE
- CANAL STATIONING
- PROPOSED STEEL SHEET PILE BULKHEAD SUPPORT
- NEW BULKHEAD SUPPORT ALIGNMENT CONTROL POINT

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WARNING

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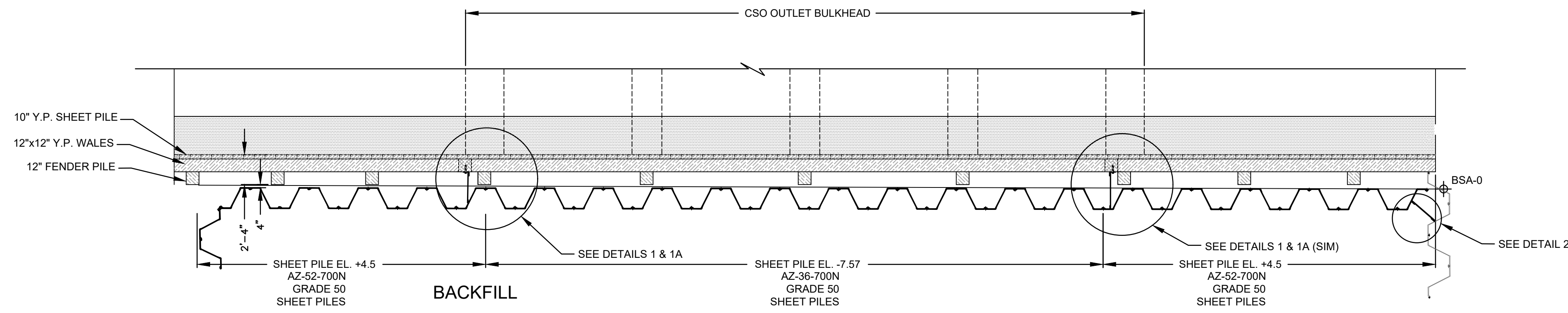
PROFESSIONAL SEAL

GOWANUS TRUST

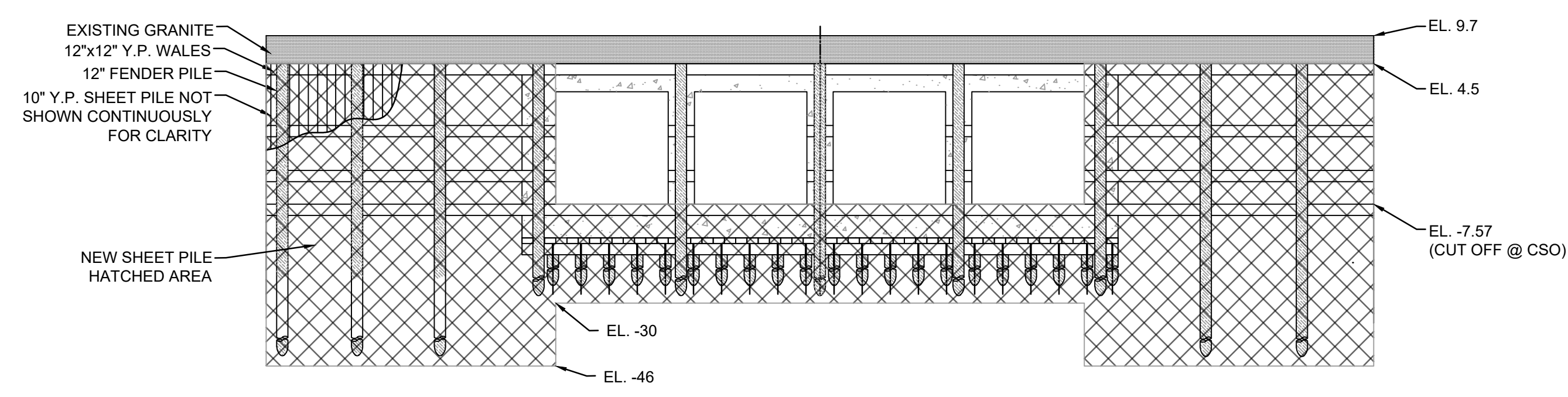
APTIM ENGINEERING NEW YORK, P.C.
150 ROYALL STREET, SUITE 103
CANTON, MA 02021

CLIENT DWG NO: CAM

NOTES		A	65% DESIGN	PAR	AKF	CAM	6/12/19	 	BULKHEAD SUPPORT PLAN BLOCK 411 LOT 14 BUTLER STREET						
		B	90% DESIGN	PAR	AKF	CAM	07/25/19								
		C	90% DESIGN REVISED	PAR	AKF	CAM	08/08/19								
		D	90% DESIGN FOR EPA REVIEW	PAR	AKF	CAM	09/30/19								
		E	UPDATED 90% DESIGN	PAR	AKF	CAM	01-31-2020								
		F	100% DESIGN – NOT ISSUED FOR CONSTRUCTION	PAR	AKF	CAM	02-18-2020								
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REFERENCE DRAWINGS	NO.	REVISION		DRAWN	CKD	APPD	DATE	DRAWN: PAR	CKD: AKF	APPD: CAM	DATE:	SCALE:	PROJECT NO: 749237266	DWG NO: D1-2	REV: F

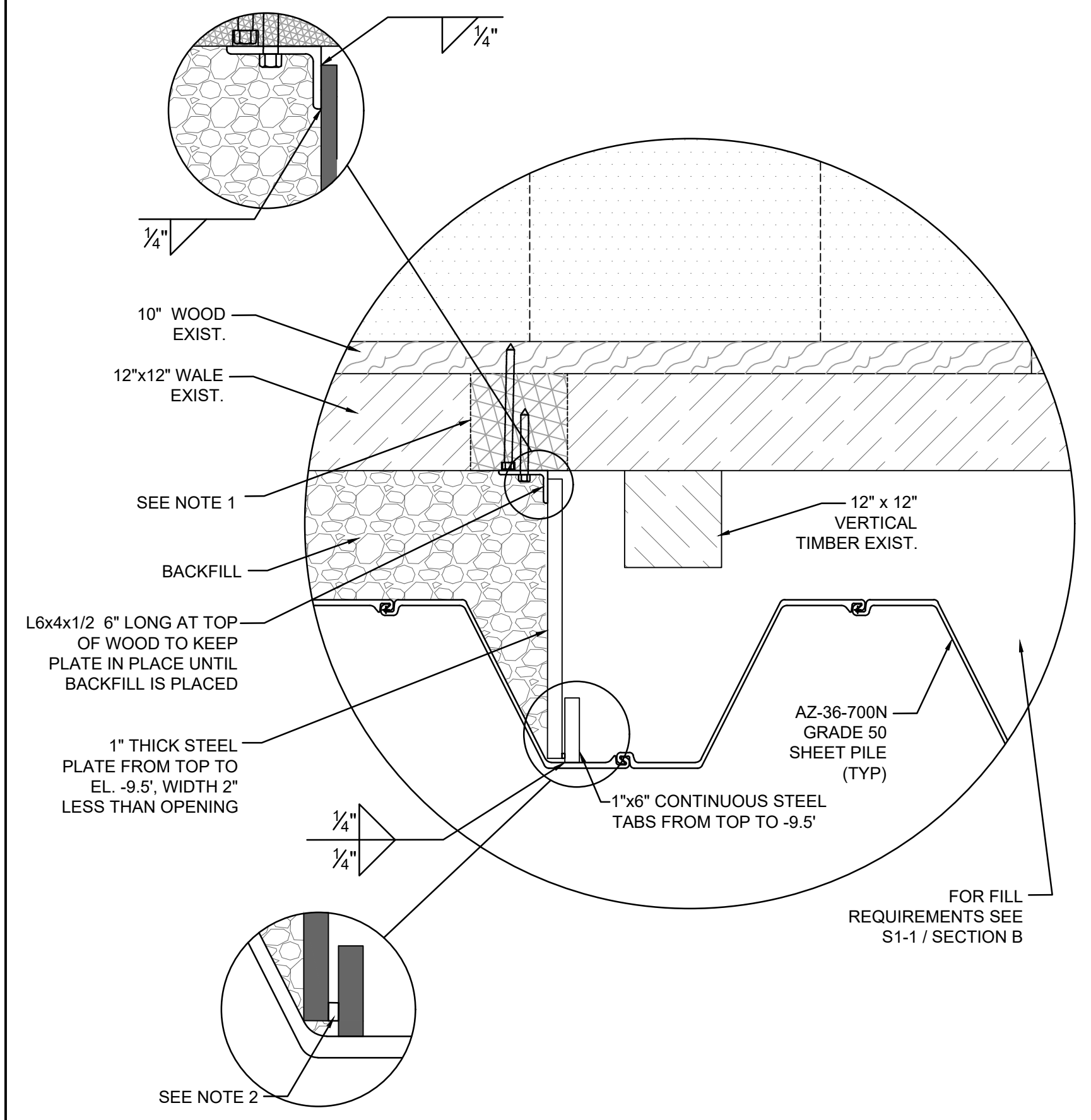


1 NORTH WALL PLAN
- BULKHEAD SUPPORT
SCALE: 1" = 6'

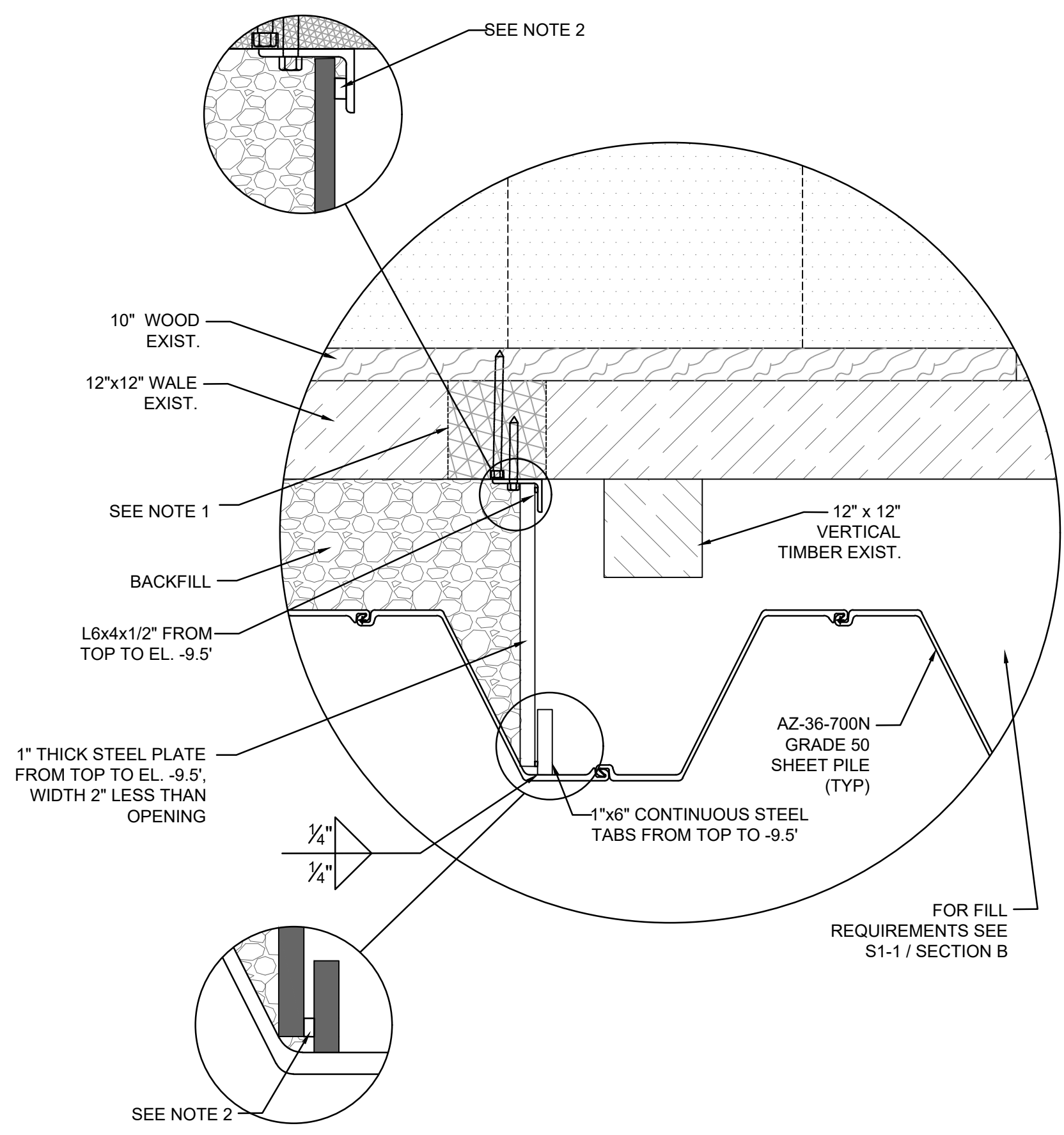


2 NORTH WALL ELEVATION
- BULKHEAD SUPPORT
SCALE: NOT TO SCALE

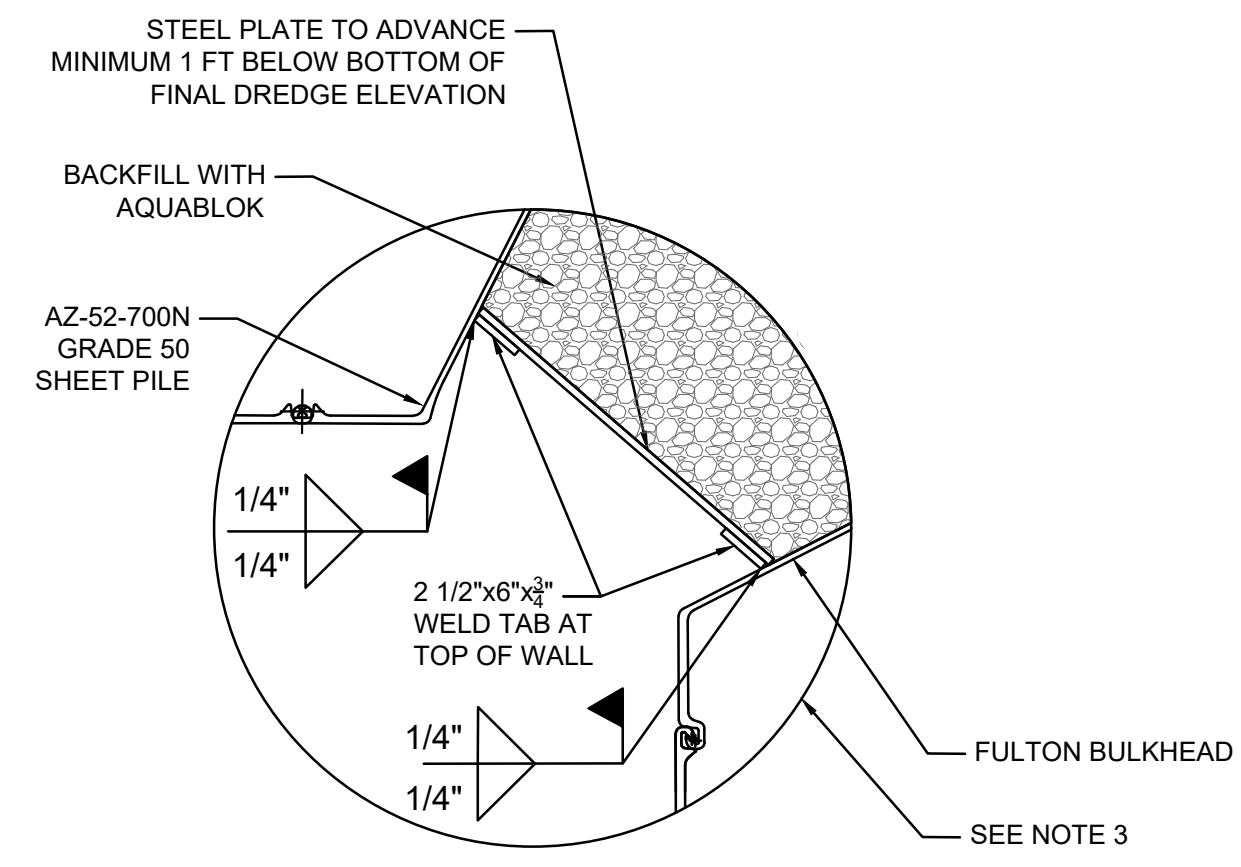
- NOTES:
- 12"x12" SOUTHERN PINE FILLER BETWEEN EXISTING 12" WALES. EXTEND FROM TOP OF WALL TO EL. -9.5. USE COUNTERSUNK 3/4" DIA LAG SCREWS @ 2.0' O.C. TO LAG FILLER TO 10" WOOD, AND 3/4" DIA. LAG SCREWS @ 2.0' O.C. TO SECURE L6x4x1/2" TO FILLER.
 - INSTALL SIKA HYDROTITE CJ-1020 NON-BENTONITE MODIFIED CHLOROPRENE RUBBER HYDROPHILIC WATERSTOP (39" X .79") AS SHOWN AT PLATE ENDS, PER MANUFACTURERS INSTALLATION INSTRUCTIONS. WATERSTOP SHALL BE ADHERED TO THE 1" PLATE.
 - CONTRACTOR TO COORDINATE WORK WITH ADJACENT PROPERTY PROJECT TO FACILITATE CLOSURE DETAIL. PREFERABLY USE SHEET PILE INTERLOCKS AS AN ALTERNATIVE TO DETAIL 2.



1 DETAIL
- SHEETPILE CLOSURE (EL. 4.5' TO EL. 4.0')
NOT TO SCALE



1A DETAIL
- SHEETPILE CLOSURE (EL. 4.0' TO EL. -9.5')
NOT TO SCALE



2 DETAIL
- SHEETPILE WALL CLOSURE
NOT TO SCALE

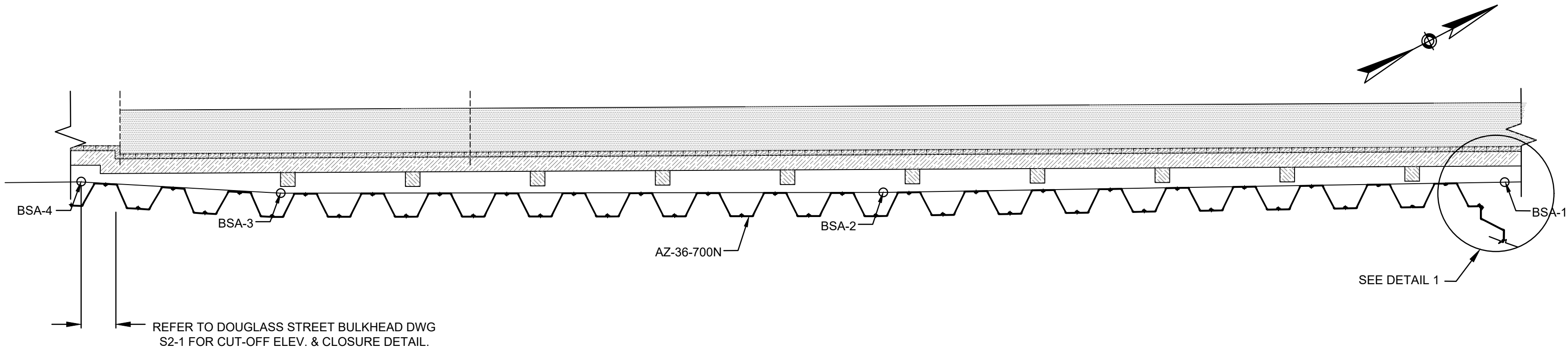
LEGEND	
	CANAL BOUNDARY
	PROPERTY LINE
	CANAL STATIONING
	PROPOSED STEEL SHEET PILE BULKHEAD SUPPORT
	NEW BULKHEAD SUPPORT ALIGNMENT CONTROL POINT

PRELIMINARY
NOT FOR CONSTRUCTION

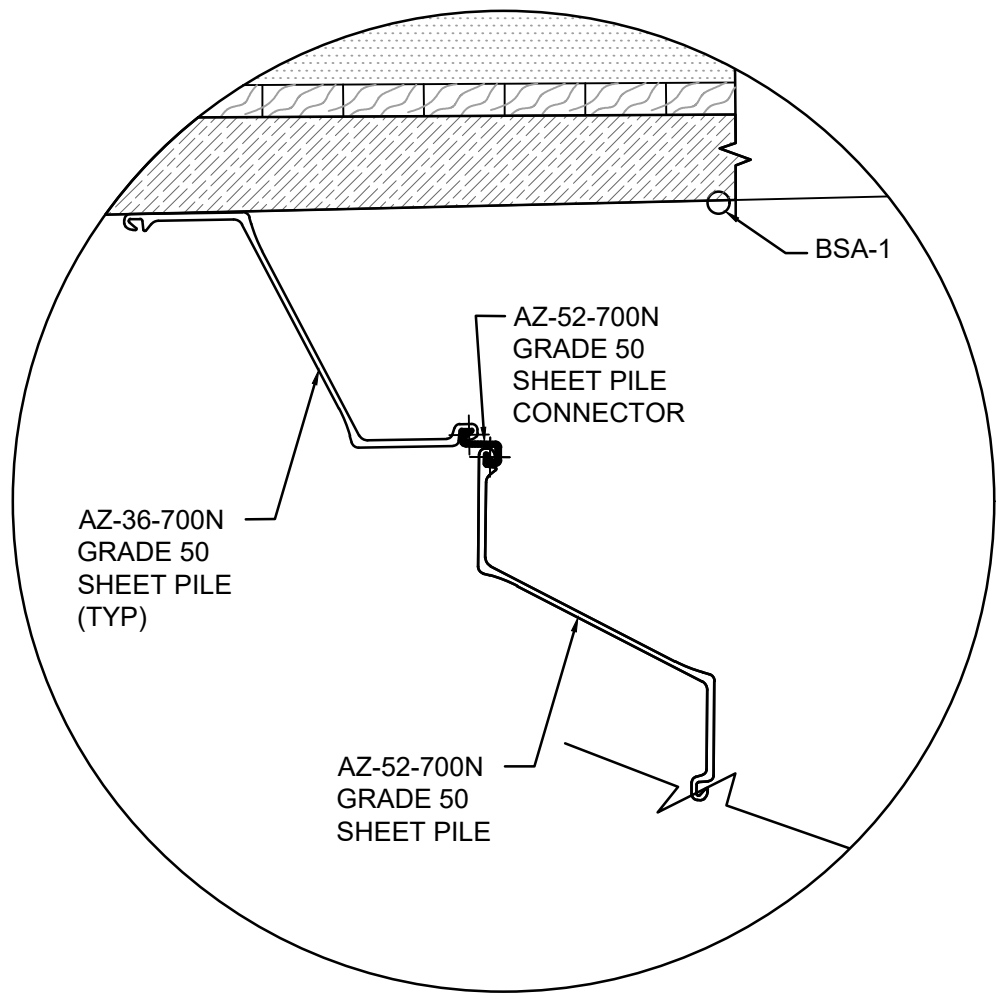
WARNING
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	PROFESSIONAL SEAL	

NOTES		A	90% DESIGN	PAR	AKF	CAM	07/25/19	 	BULKHEAD PLAN & ELEVATION BLOCK 411 LOT 14 BUTLER STREET					
		B	90% DESIGN FOR EPA REVIEW	PAR	AKF	CAM	09/30/19							
		C	UPDATED 90% DESIGN	PAR	AKF	CAM	01-31-2020							
		D	100% DESIGN - NOT ISSUED FOR CONSTRUCTION	PAR	AKF	CAM	02-18-2020							
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								FOR:						
REFERENCE DRAWINGS	NO.	REVISION	DRAWN	CKD	APPD	DATE	DRAWN: PAR	CKD: AKF	APPD: CAM	DATE:	SCALE:		PROJECT NO: 749237266	DWG NO: D1-3



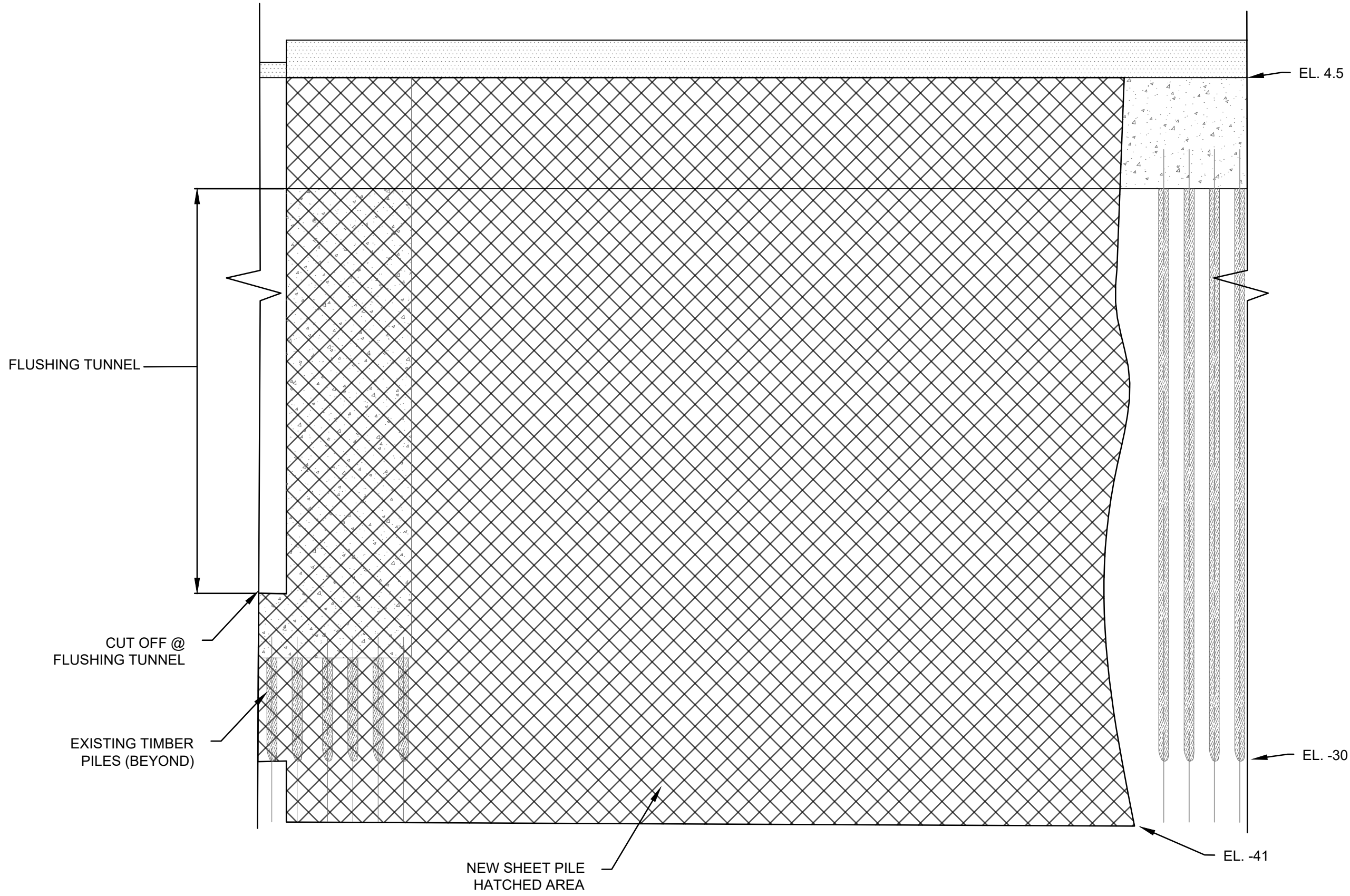
1
-
WEST WALL PLAN
BULKHEAD SUPPORT
SCALE: 1" = 6'



1
-
DETAIL
SHEETPILE CONNECTION
NOT TO SCALE

NOTES:

1. INSTALL SIKAHYDROTITE CJ-1020 NON-BENTONITE MODIFIED CHLOROPRENE RUBBER HYDROPHILIC WATERSTOP (39" X .79") AS SHOWN. PER MANUFACTURERS INSTALLATION INSTRUCTIONS, WATERSTOPS SHALL BE ADHERED TO THE 1" PLATE AND L3x3 AS SHOWN.



2
-
WEST WALL ELEVATION
BULKHEAD SUPPORT
SCALE: NOT TO SCALE

LEGEND

- CANAL BOUNDARY
- - - PROPERTY LINE
4+00 CANAL STATIONING
~ ~ ~ PROPOSED STEEL SHEET PILE BULKHEAD SUPPORT
⊕ NEW BULKHEAD SUPPORT ALIGNMENT CONTROL POINT

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CLIENT DWG NO.

NOTES

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C	UPDATED 90% DESIGN	PAR	AKF	CAM	01-31-2020
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REFERENCE DRAWINGS

NO.	REVISION	DRAWN	CKD	APPD	DATE
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DRAWN: PAR	CKD: AKF	APPD: CAM	DATE:	SCALE:
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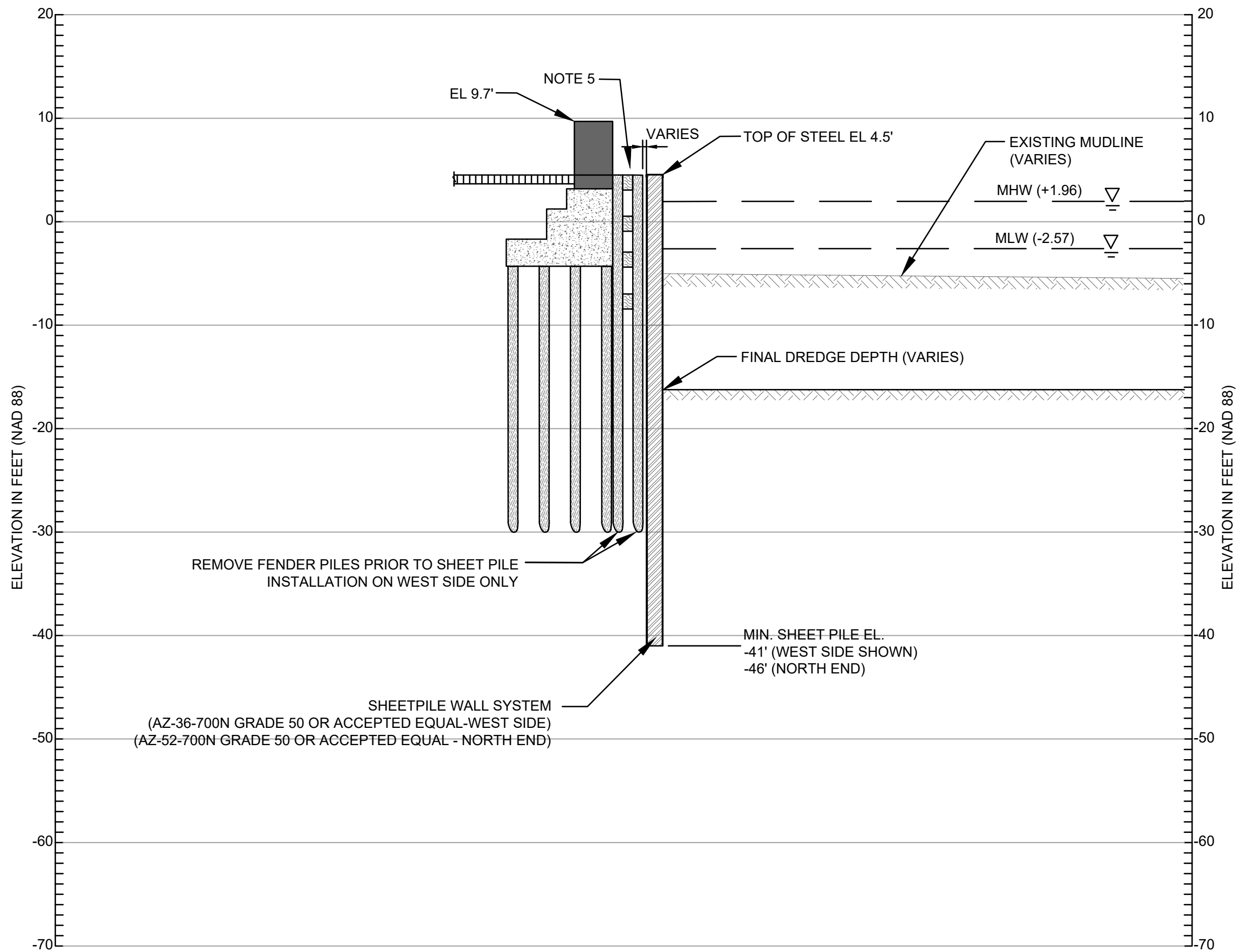
BULKHEAD PLAN & ELEVATION
BUTLER STREET WEST SIDE

FOR:

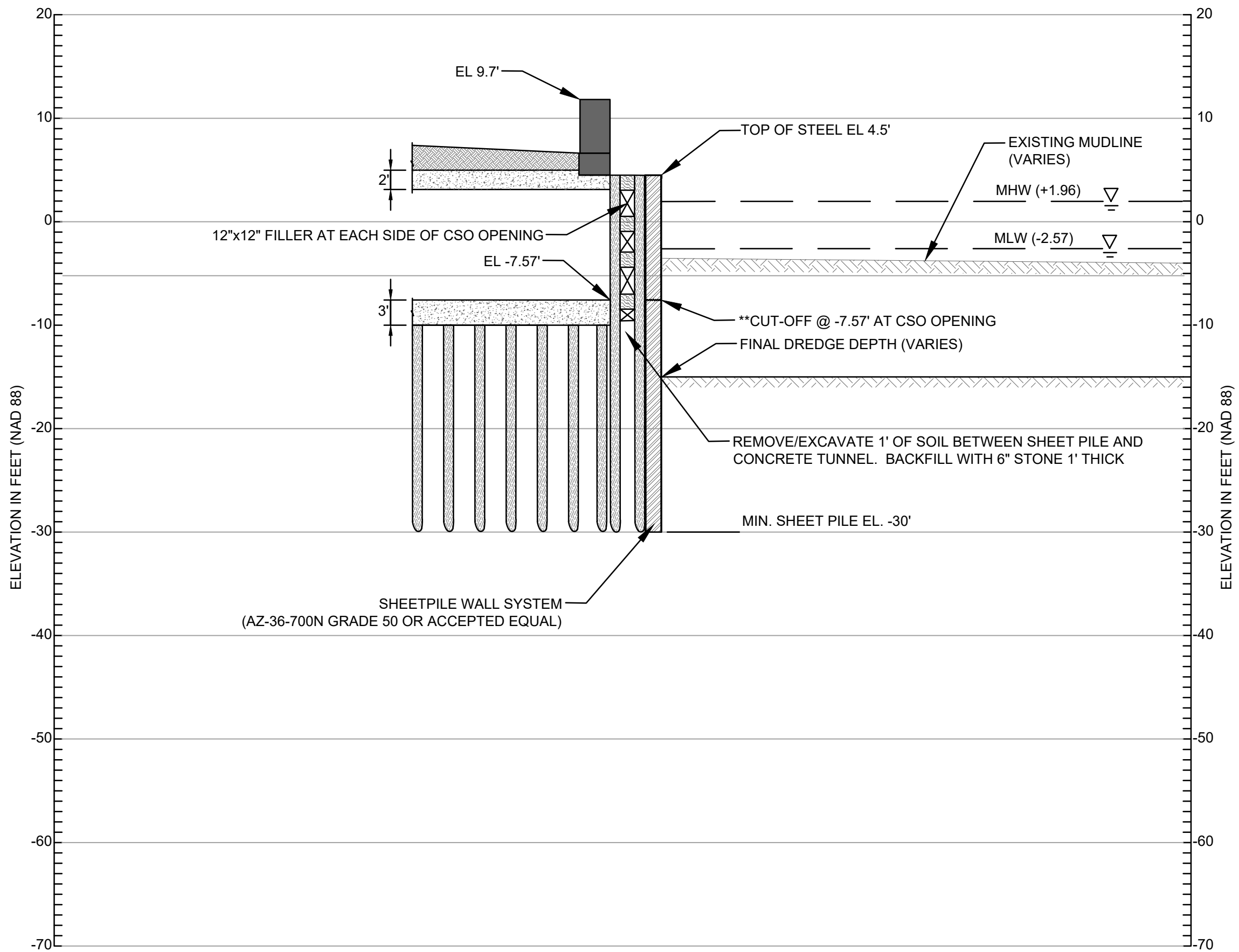
PROJECT NO: 749237266

DWG NO: D1-4

REV: D

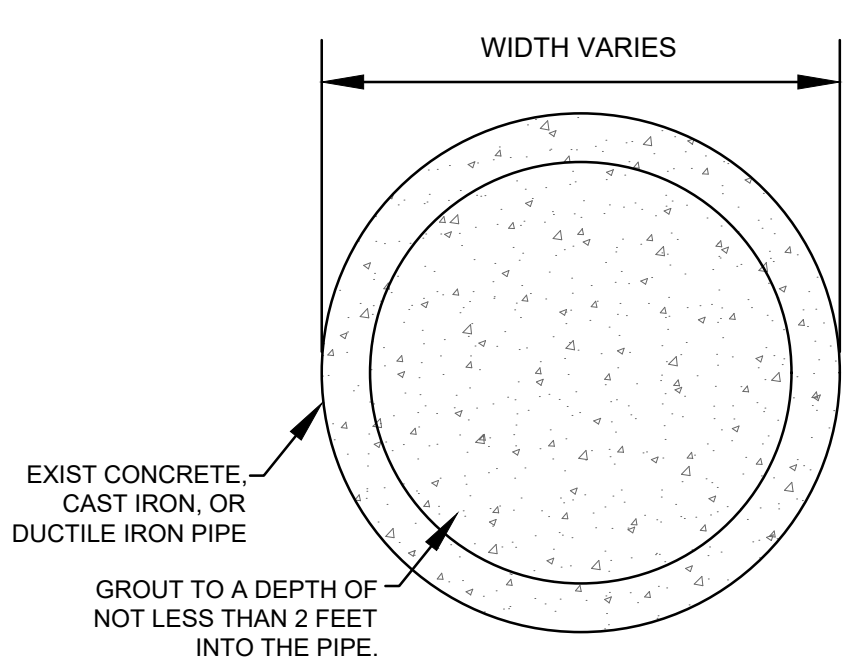


A
D1-2
SECTION @ BUTLER STREET
SCALE: 1" = 30'

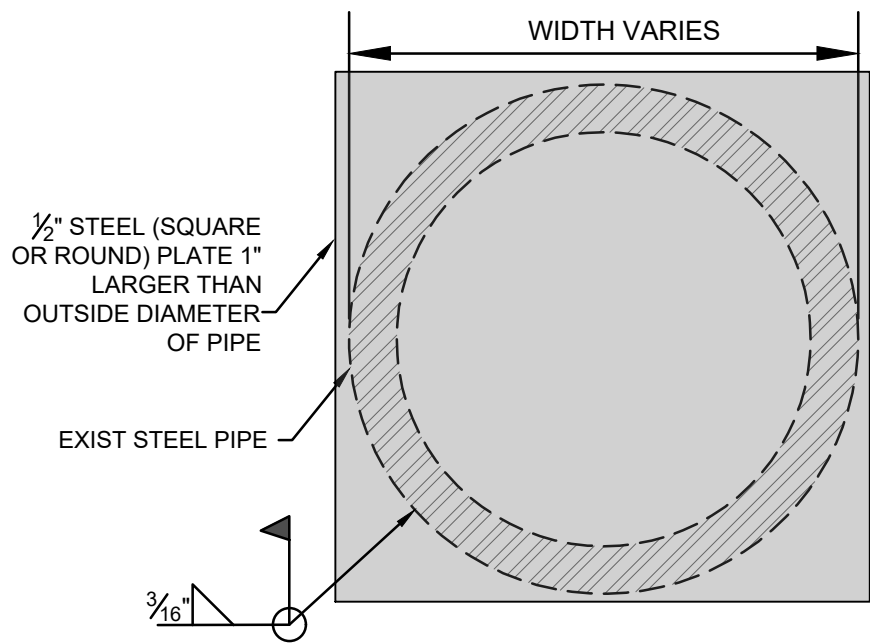


B
D1-2
SECTION @ BUTLER STREET
SCALE: 1" = 30'

- ** NOTES:**
- FOR CSO PIPE TO REMAIN AND PENETRATE SHEET PILE, INVERT ELEVATION TO BE FIELD VERIFIED PRIOR TO DRIVING SHEET PILES.
 - ALL IDENTIFIED PVC PIPES TO BE SEALED WITH A PVC CEMENTED CAP.
 - ALL PIPES TO BE SEALED, MUST BE SEALED PRIOR TO INSTALLING SHEET PILES, PER THE DETAILS ON THIS DRAWING.
 - PIPES THAT WILL REMAIN IN USE MUST BE SURVEYED TO OBTAIN VERTICAL AND HORIZONTAL LOCATION. AFTER SHEET PILING IS INSTALLED, SHEET PILE SHALL BE CUT, THE PIPE EXTENDED, AND THE OPENING SEALED AROUND THE PIPE, PER THE DETAILS ON THIS DRAWING.
 - FOR BACKFILL DETAILS BEHIND THE SHEET PILE BULKHEAD, REFER TO THE DREDGING, REMEDIATION, AND CAPPING DRAWINGS PROVIDED BY OTHERS.



1
-
DETAIL - PIPE CLOSURE
SCALE: NOT TO SCALE



2
-
DETAIL - STEEL PIPE CLOSURE
SCALE: NOT TO SCALE

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NOTES

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E	100% DESIGN - NOT ISSUED FOR CONSTRUCTION

PAR	AKF	CAM	6/12/19
PAR	AKF	CAM	07/25/19
PAR	AKF	CAM	09/30/19
PAR	AKF	CAM	01-31-2020
PAR	AKF	CAM	02-18-2020



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REFERENCE DRAWINGS

NO. REVISION

DRAWN CKD APPD DATE

DRAWN: PAR CKD: AKF APPD: CAM DATE: SCALE:

PROJECT NO: 749237266 DWG NO: S1-1

REV: E

WALL SECTIONS
BLOCK 411 LOT 14 BUTLER STREET

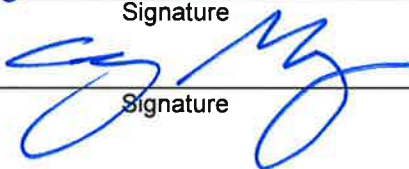
FOR:



CALCULATION NUMBER					
Project No.	Sys/Fun Code	Discipline Code	Document Type	Sequence No.	Revision No.
749237266	- BH	- S	- CAL	- 004	- D

Project Number: 749237266
Project Name / Client Name: Gowanus Canal – RTA 1
Calculation Title: Butler Street
Calculation Identification Number: 749237266-BH-S-CAL-004

CONFIRMATION REQUIRED: YES ☒ NO ☐

Preparer:	Gregory E. Brown		21 Jan 2020
	Name	Signature	Date
Reviewer:	Alan F. Brown		21 Jan 2020
	Name	Signature	Date
Lead Engineer:	Craig Morgan		21 Jan 2020
	Name	Signature	Date

Record of Changes	
Revision	Changes
A	65% Design
B	90% Design
C	90% Design – Update for RTA-1 90% Design Info
D	90% Design – Update for EPA & Client Comments

Confirmation Required Status

Calculation Reference Page	Input/Assumption Summary That Requires Confirmation	Preparer and Date Input/Assumption Confirmed	Reviewer and Date Input/Assumption Approved
6	Final Phase III dredge depths		
6	Final Remediation Cap data		
6	Groundwater Mounding Height		

	Title: Bulkhead Analysis – Butler Street				Page 2 of 50					
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8. Conclusions	7
9. Calculation	9
Attachment A: Phase III Dredge Analyses – Sections A1, A2, B & C	A1
Attachment B: Global Slope Stability Analyses – Sections A1, A2, B & C	B1
Attachment C: LPILE Analyses – Section A1	C1

Revision History:

Revision A	65% Design
Revision B	Calculation updated for Phase III dredge elevations specified in RFI-012. Surcharge values updated. Revised analysis of Phase III dredging at Section A (Bulkhead along western wall) due to RFI-012 impacts – this revision resulted in the addition of an analysis adjacent to the Flushing Tunnel. Additionally included an additional soil loading case for the north (endwall) bulkheads that are located to the east and west of the CSO outfall that considered the no piles beneath the bulkhead condition. Soil profiles, passive loading conditions, analysis summaries and results tables updated in body of calculation. Added Global Slope Stability Analyses for all sections evaluated. Attachments A & B updated for revised analyses.
Revision C	Calculation updated for Phase III dredge elevations (in the vicinity of the Flushing Tunnel) as updated in the 90% RTA-1 Design Drawings (as issued on August 30, 2019). Revised and refined soil parameters (g, Kp & R x Kp) based on EPA comments on other RTA-1 analyses. Attachments A, B and C updated for revised analyses.
Revision D	Calculation updated to incorporate EPA & Client comments. Changes included addition of additional surcharge acting behind existing bulkhead walls at west side of canal and on each side of the CSO outlet, increased water levels due to mounding effects, inclusion of undrained analyses, inclusion of additional slope stability analysis and an LPILE analysis (to study expected movement of existing pile-supported bulkhead along west side of the canal) included as Attachment C. Overall summary of analysis results (previously included as Attachment A) removed.

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CALCULATION NUMBER

1. OBJECTIVE

The objective of this calculation is to provide a temporary bulkhead design for Butler Street (Block 411, Lot 14) to be installed along Gowanus Canal (Canal) to facilitate implementation of the remedy outlined in the Record of Decision (ROD). The design will minimize the need for mitigation to nearby properties, structures and utilities, and at the same time preserving the existing bulkheads during the dredging and capping operations.

2. METHODOLOGY

A static analysis will be performed for all wall sections. The static design of the bulkhead wall is controlled by forces and moments acting on the wall, deflection of the wall, and toe embedment. The following methods will be used, and will be used, for the static analyses of both the cantilevered and anchored wall sections:

- The wall will be designed as either a cantilevered wall or an anchored wall system depending on structural requirements and system stability, see Reference 1.
- A maximum design deflection and maximum design allowable bending moment will be designed in accordance with the AISC Steel Construction Manual, see Reference 2.
- Static analyses will be performed utilizing CivilTech Shoring Suite software (Version 8.18c).
- Soil will be modeled using the Mohr-Coulomb method.
- Surcharge pressures will be modeled as uniform surcharge loads.
- For analysis purposes, the soil profiles will be assumed to extend to a depth of 100 feet below the top of the bulkhead.
- The analyses will consider the worst case conditions only. Typically, the Phase III conditions will be the worst case conditions as these locations include the deepest dredge depths. However, where in-situ soil stabilization (ISS) is employed, the analysis will consider the Phase II dredge conditions with fresh ISS as well. As the Post-Remediation, in-canal material elevations are above the Phase II and Phase III dredge elevations, and because the replacement materials have significantly more strength than the materials that were removed, Post-Remediation analyses are not required as they will be governed by the Phase II and Phase III analyses.

The analysis will first consider the use of a cantilever bulkhead. If the deflections exceed the allowable deflections, or steel stresses exceed the allowable stresses, a design employing tie-backs will be considered.

Anchored wall sections, if required, will be designed using the Free Earth and/or Fixed Earth methods in accordance with the USS Steel Sheet Pile Manual, see Reference 3. The Free Earth Support method assumes that the soil into which the lower end of the piling is driven is incapable of producing effective restraint from passive pressure to the extent necessary to induce negative bending moments. The sheet piling is assumed to be inflexible and that no pivot point exists below the mudline. Therefore, no passive resistance develops on the backside of the piling. The Free Earth method will be used to calculate the maximum tie-back load that would be transferred into the bracing system, if required.

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3. REFERENCES

1. File: M.5cRTA1 Bulkhead Drawings
2. American Institute of Steel Construction (AISC), Steel Construction Manual 14th Edition, 2011.
3. United States Steel (USS), Steel Sheet Piling Design Manual, July 1984.
4. Remediation Target Area 1 (RTA-1) Design, Gowanus Canal Superfund Site, Brooklyn, New York, 90% Design Package, September 2019, distributed August 30, 2019 ("Gowanus RTA1 - 90% Design.pdf") - as modified by additional direction relating to in-canal soil profiles in the vicinity of the Flushing Tunnel
5. File: M.1b 65% RTA1 Calculations_Appendix B23-65% Design_ISS Layout and Thickness_Rev. C
6. PD-5 Douglas Street, DeGraw Street, Sackett Street Factual Report
7. File: Fulton RDWP Report January 2016 (Groundwater)
8. RTA1 Gowanus Canal Basis of Design, Rev. B, 07.25.19
9. NAVFAC Design Manual 7.2 Foundations and Earth Structures
10. File: M.1b_65% RTA1 Calculations_AppendixB3-65% Design Geotech Parameters
11. Gowanus Facilities Upgrade Geotechnical Data Report, February 2008, Gannett Fleming
12. RTA 1 – Gowanus Canal Bulkhead Support Concepts for Douglas Street and Butler Street Properties, April 2019, Geosyntec Consultants
13. File: M.5f3_Butler Street - Flushing Tunnel (Gowanus1.pdf and Gowanus 4.pdf)
14. File: M.5j_Butler and Douglass St Presentation
15. Remedial Design Work Plan (RDWP) – Near Term Remedial Actions Fulton Municipal Works Former Gas Plant, Brooklyn, New York, GZANY, January 2016
16. Spencer, E. 1973. "Thrust line criterion in embankment stability analysis." Geotechnique 23, No. 1: 85-100.
17. Rocscience. 2009. "SLIDE – 2-D Limit Equilibrium Slope Stability for Soil and Rock Slopes," User's Guide, Rocscience Software, Inc., Toronto, Ontario, Canada.
18. Geosyntec Calculation – "Geotechnical and Structural Stability of Cap and ISS Soils" dated August 2019.
19. Geosyntec Calculation - "Geotechnical Properties of Treated Sediment" dated September 2019
20. Geosyntec Calculation – "Appendix B18 - 90% RTA1 Design_Simulated Vertical Specific Discharge Rate after Capping_RevD", August 2019 (as modified by RFI-017)

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CALCULATION NUMBER

4. INPUTS

1. Upland geotechnical information modeled from Factual Report, Reference 6, modified as required based on borings taken in the vicinity of the section analyzed in this calculation from Reference 10.
2. Canal side geotechnical information obtained from an interpretation of the canal profile included in Reference 4.
3. Updated In-situ Stabilization (ISS) limits included in Reference 4.
4. Updated Phase III dredge limits included in Reference 4.

5. ASSUMPTIONS

1. CivilTech Shoring Suite software models active and passive pressures to complete the analysis. For temporary dredge conditions a safety factor of 1.3 (divider) was applied to all calculated passive pressures.
2. Active and passive earth pressure coefficients determined using Figure 5 of Reference 9.
3. The ultimate friction factor and adhesion for the steel sheet pile and soil interface was determined from Table 1 in Reference 9. From this table (based on the observed soil types and properties) an interface friction angle, δ , 10 degrees was selected for native alluvial and organic ISS materials; 14 degrees was selected for soft sediment and mature ISS materials; for fill and glacial sand, and remediation cap materials, an interface friction angle of 17 degrees was selected. Note: Not all materials and soil interface angles are applicable to this analysis.
4. Passive earth pressure coefficients were reduced using the reduction factor, R, in Table 5 (Reference 9) for various interface friction and slope configurations.
5. To show the benefit of water on the passive Gowanus Canal side of the sheet pile water was netted out of the active side above the final dredge. Modeling the water level as a fluid on the passive side would have been subject to the passive safety factors described in (1) above; this was considered to over-estimate the amount of passive resistance in the analysis.
6. For undrained analyses, to be consistent with typical industry practice, the upland soils will be modelled using soil friction angles, ignoring the contributions of undrained shear strengths and/or cohesion (which act to reduce the active pressure on the wall) to ensure a conservative analysis. Thus, the undrained strength parameters noted in Reference 10 will only be used to model the in-canal soils that provide passive resistance.
7. The groundwater elevation differential due to mounding is assumed to be 2.5 feet above the groundwater elevations noted within the relevant factual report (per Reference 20).
8. For purposes of this design, it was assumed that at a minimum, the sheet piles would consist of ASTM A572, Grade 50 steel.
9. CSO Outlet and all existing bulkheads (west side of Butler Street north of the Flushing Tunnel and north end of canal adjacent to the CSO outlet) are founded on end bearing

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timber piles at El. -30. However, for a conservative analysis, the north end bulkhead will consider the no pile support case.

10. Surcharges Loadings on bulkhead walls (calculated unless noted otherwise):

- a. Vehicular Loads – 250 psf (assumed)
- b. CSO Outlet Surcharge – 1,546 psf
- c. Existing Bulkhead (West Wall) Adjacent to Flushing Tunnel – 1,422 psf
- d. Existing Bulkhead (North Walls & Typical West Wall) Surcharge – 1,230 psf
- e. Combined Soil and Vehicular Surcharge Loads (behind existing bulkheads) - As noted within the calculation

11. Freshly mixed ISS (where required) will be modeled as soil/fluid with no shear strength ($\phi = 0$) with a total unit weight of 120 pcf.

12. Compressive strength of mature ISS assumed to be 12 psi; the shear strength is assumed to be half the value at 6 psi (860 psf). This is an extremely conservative assumption as Reference 19 indicates that the 7-day strength of ISS (using 8 percent cement is 62.1 psi).

13. No seismic analysis is required for temporary sheet pile bulkheads.

14. No corrosion loss is assumed in this calculation.

15. The sheet piling is assumed to be inflexible and that no pivot point exists below the mudline.

16. Final cap condition assumes a 30-inch (or as noted in Reference 4) sand cap with a friction angle, ϕ , of 30 degrees.

6. CONFIRMATIONS REQUIRED

1. Final Phase III dredge depths
2. Final Remediation Cap thickness and elevations
3. Final groundwater elevation/elevation differential due to mounding (RFI-017).

7. COMPUTER CODE IDENTIFICATION

1. CivilTech Shoring Suite Software, Version 8.18c, 2019.
2. Rocscience Software - Slide, Version 7.038

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8. CONCLUSIONS

Analysis Results

<i>Section/Surcharge Loading/Analysis Type</i>	<i>Surcharge (psf)</i>	<i>M_{max} (k-ft/ft)</i>	<i>Δ_{max} (in)</i>	<i>Min Pile Length (ft)</i>
Sect A1 - Phase III Dredge to El. -19.33 AZ 36-700N Cantilever Analysis - Drained	1,480	56.52	0.93 (vs 2.03 allowable)	42.58
Sect A1 - Phase III Dredge to El. -19.33 AZ 36-700N Cantilever Analysis - Undrained	1,480	55.79	0.93 (vs 2.03 allowable)	42.48
Sect A2 - Phase III Dredge to El. -22.5 AZ 36-700N Cantilever Analysis – Drained/Undrained	1,672	0.26	1.53 (vs 2.28 allowable)	31.69
Sect B - Phase III Dredge to El. -15.5 AZ 36-700N Cantilever Analysis - Drained	1,796	4.45	0.23 (vs 1.72 allowable)	29.70
Sect B - Phase III Dredge to El. -15.5 AZ 36-700N Cantilever Analysis - Undrained	1,796	4.14	0.24 (vs 1.72 allowable)	29.83
Sect C - Phase III Dredge to El. -16.5 AZ 36-700N Cantilever Analysis - Drained	1,480	135.99	2.04 (vs 1.80 allowable)	46.51
Sect C - Phase III Dredge to El. -16.50 AZ 36-700N Cantilever Analysis - Undrained	1,480	135.71	2.03 (vs 1.80 allowable)	46.50
Sect C - Phase III Dredge to El. -16.5 AZ 52-700N Cantilever Analysis - Drained	1,480	135.99	1.40 (vs 1.80 allowable)	46.51
Sect C - Phase III Dredge to El. -16.5 AZ 52-700N Cantilever Analysis - Undrained	1,480	135.71	1.40 (vs 1.80 allowable)	46.50

Dredge Elevations noted above include 6-inch overdredge allowance (where applicable)

Note A: See discussion of required sheet pile depths and deflections on Page 40.

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Recommendations:

Section A1 (Butler Street West Side): Use AZ 36-700N sheet pile Bulkheads

Bottom Elevation of Sheet Pile: El. -41.0 (see discussion on Page 46)

Specified Sheet Pile Length 47.0 feet

Section A2 (Butler Street West Side): Use AZ 36-700N sheet pile Bulkheads

Bottom Elevation of Sheet Pile: El. -30.0

Specified Sheet Pile Length 36.0 feet

Section B (At CSO): Use AZ 36-700N Sheet Pile Bulkheads

Bottom Elevation of Sheet Pile: El. -30.00

Top of Sheet Pile Elevation El. -7.57 (+/- 6" below CSO Invert)

Specified Sheet Pile Length 36.0 feet

Section C (Sides of CSO Outlet): Use AZ 52-700N Sheet Pile Bulkheads

Bottom Elevation of Sheet Pile: El. -46.0 (see discussion on Page 46)

Specified Sheet Pile Length 52.0 feet

Note: The sheet pile lengths specified above have been increased at least 10% to provide an additional factor of safety.

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9. CALCULATION

9.1 Design Sections

There are two different soil profiles on the Butler Street property. Along the west side of the property (which overlies the Flushing Tunnel), the soils are expected to be consistent with those of the adjacent Douglass Street parcel. At the north end of the canal, there is a second soil profile that is associated with the area that contains the CSO outlet. In addition, based on the drawings include in Reference 13, including the CSO outlet structure, there are four different types of bulkheads on the Butler Street property.

Along the western side of the canal, the Reference 13 information indicates that the bulkhead is constructed in a similar fashion as the bulkhead that extends to the south of the Flushing Tunnel outlet. This bulkhead is comprised of concrete blocks that are supported on timber piles that extend to El. -30. The drawings indicate that there are three different types of bulkhead structures along the north end of the canal. One portion of the endwall included the Butler Street CSO Outlet Bulkhead. This portion of the endwall includes the reinforced concrete discharge tunnels that are founded on a network of timber piles (Reference 12 and 13). The drawings indicate that the top of pile elevations are at approximately El -11.75 and the pile tips have been presumed to be at El -30 (based on drawings for the Flushing Tunnel where similar construction techniques used).

Additionally, the Reference 13 drawings indicate that there are two other bulkhead designs that are employed to the sides of the CSO outlet. These two bulkhead designs employ tiebacks to resist the upland soil loads. However, we note that dimensions of the bulkhead structures are not provided and the spacing of the tie-back anchorages are not specified on the drawings. In addition, although the drawings do not indicate that these bulkheads are supported by timber piles, based on the comparisons with the adjacent western canal wall, as well as other property data in the vicinity of the canal, it is not unreasonable to consider these structures to be pile supported, as noted in Reference 14. However, for this analysis, the bulkheads in this location will be evaluated based on the worst case condition which assumes that no pile support exists for these bulkheads.

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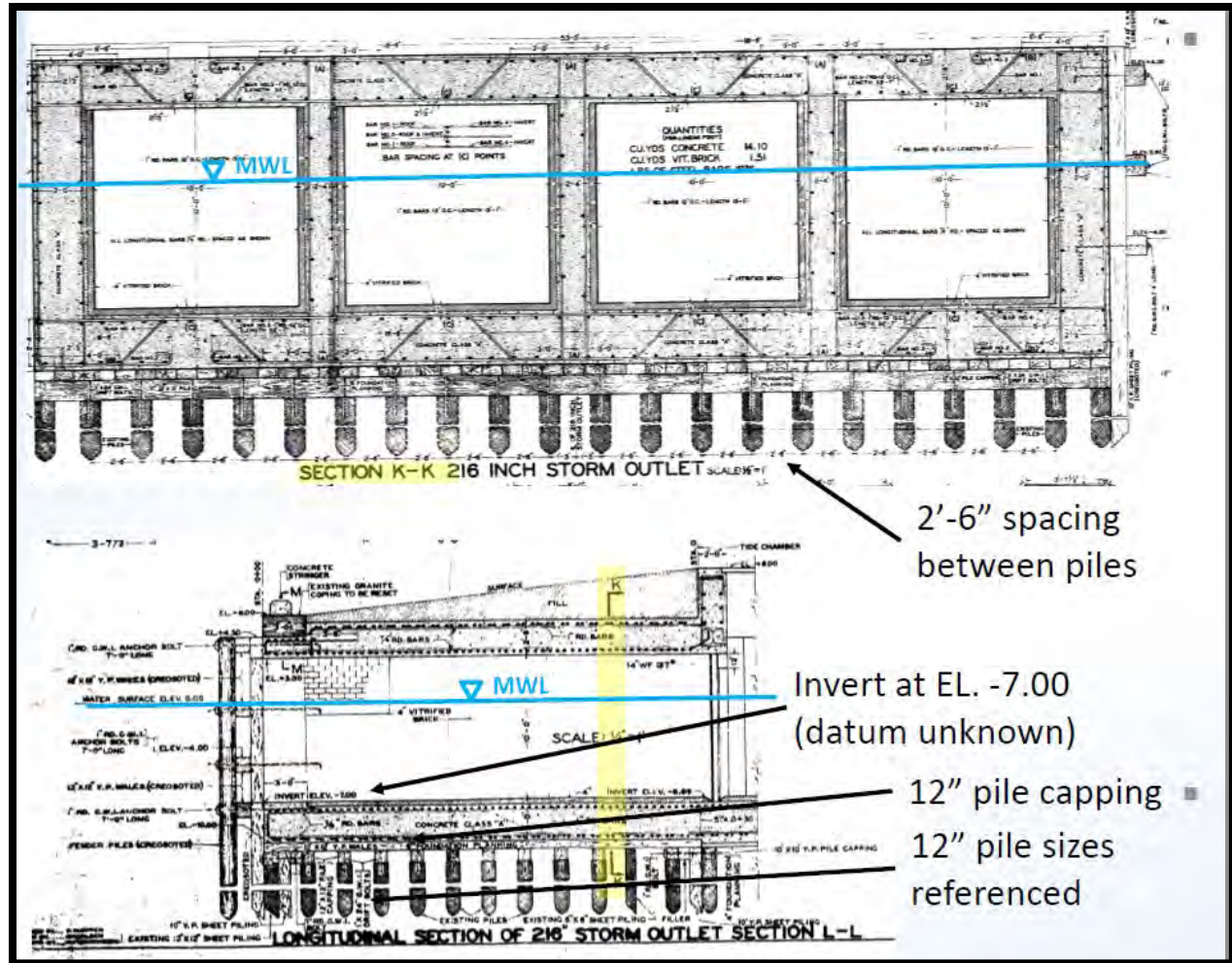


Figure 1- Butler Street CSO Outlet Bulkhead (Reference 12)

As noted above, based on field observations in 2014 Geosyntec concluded the construction was concrete mass on timber piles similar to the Butler CSO Outlet Bulkhead. Sections considered in this calculation are included in Figure 2. For each of the sections noted, the location shown below correspond to the deepest portion of the Phase III dredging each of the bulkhead conditions noted. Section A corresponds to the western Butler Street bulkhead; Section B corresponds to the location of the CSO outfall; and Section C corresponds to the northern bulkheads adjacent to the

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CSO outfall. There is no ISS that needs to be considered in the analysis of the Butler street bulkheads.

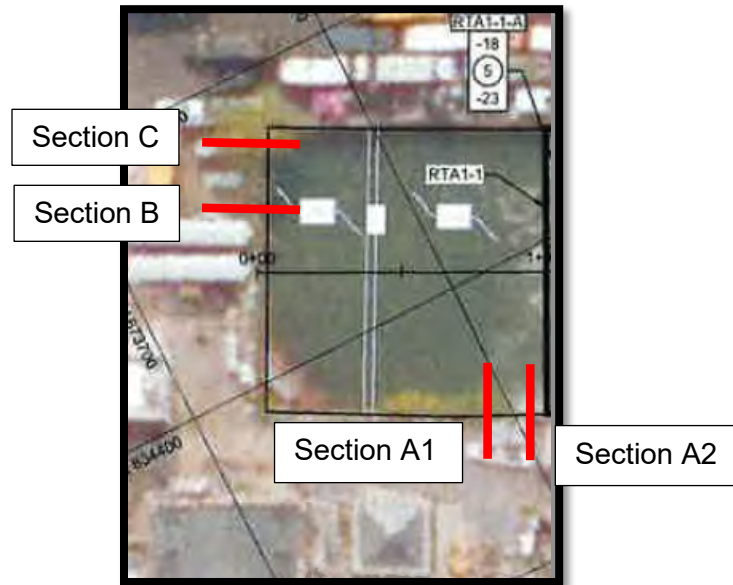


Figure 2 – No ISS in Proximity to Butler Street (Reference 4)

9.2 Critical Design Scenario

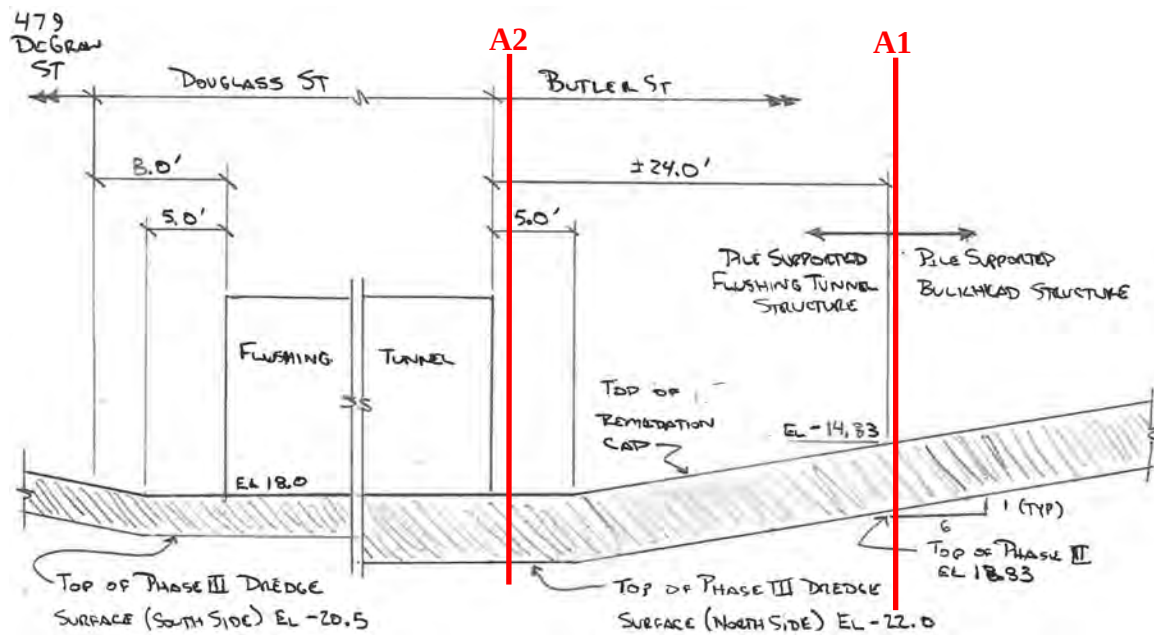


Figure 3 - Soil Profile at Face of Flushing Tunnel (per Reference 4)

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Section A1 (Butler Street West) - Phase III Dredge to El. -18.83

Dredging to the deepest section of the proposed Phase III dredge depth of El -18.83 that occurs along the length of the western canal wall. This dredging will occur beyond the limits of the ISS columns. The analysis assumes 6 inches of over-dredging to the analyzed depth of El. -19.33.

Section A2 (Butler Street West) - Phase III Dredge to El. -22.0

Section A2 is located adjacent to the north side of the Flushing Tunnel and is impacted by the dredging requirements at that location. This dredging will occur just beyond the limits of the ISS which ends at the northern end of the Flushing Tunnel. The analysis assumes 6 inches of over-dredging to the analyzed depth of El. -22.5.

Section B (CSO Outfall) - Phase III Dredge to El. -15.0

Dredging to the deepest section of the proposed Phase III dredge depth of El -15.0 that occurs near the eastern side of the CSO outfall. This dredging will occur beyond the limits of the ISS columns. The analysis assumes 6 inches of over-dredging to the analyzed depth of El. -15.50.

Section C (CSO Side Bulkheads) - Phase III Dredge to El. -16.0

Dredging to the deepest section of the proposed Phase III dredge depth of El -16.0 that occurs near the eastern side of the canal wall (near the 226 Nevins Street property). This dredging will occur beyond the limits of the ISS columns. The analysis assumes 6 inches of over-dredging to the analyzed depth of El. -16.5. As noted above, the analysis of this Section will consider the worst case condition of bulkheads without piles.

Post Remediation Conditions

Based on the data related to the post-remediation cap materials and elevations included in the remediation design package (Reference 4) we note that the final post remediation cap elevations will be several feet above the Phase II and Phase III dredge elevations. Therefore, as the cap will be comprised of materials that provide significantly more passive resistance than the materials employed in the Phase II and Phase III analyses, it can be determined by inspection that there is no need for post-remediation analyses provided that the Phase II and Phase III bulkhead wall design can adequately resist the postulated loadings.

9.3 Subgrade Profiles

9.3.1 Upland Side (Active Side)

See Reference 6 – No Factual Report was completed for this Butler Street Property, therefore, the adjacent Douglass Street (West) property was used as a base and the information compared with geotechnical borings taken on the Butler Street Property from the Gowanus Facilities Upgrade Report by Gannett Fleming, Reference 10. Bulkheads described in the RTA 1 – Gowanus Canal Bulkhead Support Concepts for the Douglass and Butler Street Properties Presentation, April 2019 by Geosyntec Consultants were incorporated into the developed profiles, as required.

See Reference 15 – At the north end of the canal GZA identified a “meadow mat” soil layer below placed fill. GZA generally defines the layer as a “sandy organic silt.” For the purposes of this

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calculation an approximately 10 foot layer of organic silt was assumed below fill layers in profiles analyzed (the average thickness of the layer in the vicinity of the profiles analyzed).

Random Fill: Beneath the asphalt/concrete pavement, a stratum of fill material was observed to be approximately 7.4 ft thick, from the ground surface, Elev. 5.9, to Elev. - 1.5. Samples of this material were observed to consist of silty sand and sandy gravel, fine to medium grained sand and small to large gravel. The consistency of the material was characterized as loose based on observed N-values of 2 blows per foot (bpf). The material is classified as NYC Building Code (NYCBC) Class 7 material. Native Alluvial Sediments: This stratum was observed to be 27.5 ft thick, from Elev. -1.5 to Elev.-29, and was encountered below the Random Fill. The material consists of dark gray, elastic silt to sandy silt, and trace fibrous organics. Its consistency was characterized as very loose/very soft to medium dense based on the observed N-values between weight of hammer (WOH) and 13 bpf. The material is predominately classified as NYCBC Class 6 material.

Glacial Deposits: This material was encountered below the Native Alluvial Sediments, below Elev. -29. The Glacial Deposits consist of dark gray to grayish brown gravelly sand/poorly graded sand/ well graded sand, fine to coarse grained sand and small to large subangular gravel. The consistency of the stratum was characterized as very loose to very dense, densifying with depth. The observed N-values were between 3 and 10 bpf down to Elev. -49 and between 29 and 50+ bpf for the remainder of the layer. The material is classified as NYCBC Class 6 down to Elev. - 49, and predominately NYCBC Class 2a for the remainder of the layer.

Assumed upland (active) soil profile:

Strata	Symbol	Elevation Range	Thickness, feet
Fill	[FILL]	EI 5.9 to EI -4.0	9.9
Organic Sediment	[OS]	EI -4.0 to EI -14.0	10.0
Native Alluvial Sediment	[NAS]	EI -14.0 to EI -19.0	5.0
Glacial Deposits	[GLACIAL DEPOSITS]	EI -19.0 to End of Boring	

Assumed canal (passive) soil profile:

Strata	Symbol	Elevation Range	Thickness, feet
Native Alluvial Sediment	[NAS]	EI -18 to EI -20	2
Glacial Deposits	[GLACIAL DEPOSITS]	EI -20 to End of Boring	

Canal side geotechnical interpretation from Section 9.3.2 below.

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9.3.2 Canal Side

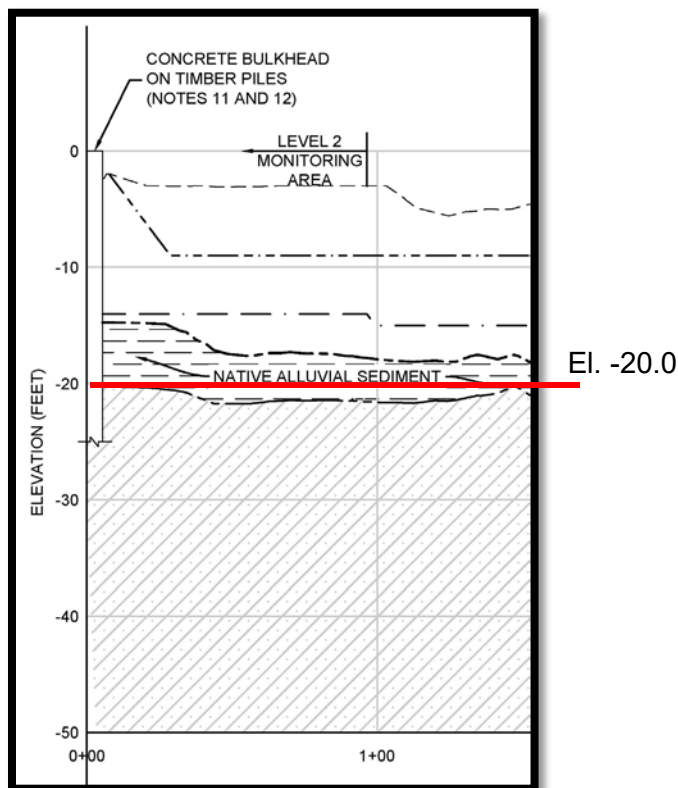


Figure 4 – Butler Street Canal Side (Centerline) Profile (See Reference 4 Sheet DR-11)

10 Geotechnical Design Parameters

See Reference 8

10.1 Sediments (Canal Soil)

Total Unit Weight

CANAL SOIL		
Soil Type	Soil Symbol	Total Unit Weight, pcf
Soft Sediment	[SS]	80
Native Alluvial Sediment	[NAS]	115
Glacial Deposit	[GD-S]	125

Drained Shear Strength

CANAL SOIL		
Soil Type	Soil Symbol	Drained Shear Strength, degrees
Soft Sediment	[SS]	28
Native Alluvial Sediment	[NAS]	28

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CANAL SOIL		
Soil Type	Soil Symbol	Drained Shear Strength, degrees
Glacial Deposit	[GD-S]	34

Undrained Shear Strength

CANAL SOIL		
Soil Type	Soil Symbol	Undrained Shear Strength, psf
To Elevation -20	-	250
Below Elevation -20	-	500

10.2 ISS Soil (Canal Soil)

Total Unit Weight	Unconfined Compression Strength	Tensile Strength	Youngs Modulus	Allowable Compressive Strain,
pcf	Psi	psi	tsf	%
120	20	2	100-430	0.75

10.3 Upland Soil

Total Unit Weight

UPLAND SOIL		
Soil Type	Soil Symbol	Total Unit Weight, pcf
Fill	[FILL]	120
Organic Sediment	[OS]	95
Native Alluvial Sediment	[NAS]	115
Glacial Deposit with Fines	[GD-S]	125
Glacial Deposit with Sand	[GD-S]	125

Drained Shear Strength

UPLAND SOIL		
Soil Type	Soil Symbol	Drained Shear Strength, degrees
Fill	[FILL]	34
Organic Sediment	[OS]	23
Native Alluvial Sediment	[NAS]	28
Glacial Deposit with Fines	[GD-S]	28
Glacial Deposit with Sand	[GD-S]	34

Undrained Shear Strength

UPLAND SOIL		
Soil Type	Soil Symbol	Undrained Shear Strength, psf
Organic Sediment	[OS]	250
Native Alluvial Sediment	[NAS]	250
Glacial Deposit with Fines	[GD-S]	500



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10.4 Soil Properties Used in the Design

Soil	Unit Weight, pcf	Friction Angle, Φ	Undrained Shear Strength, psf
[FILL]	120	34	-
[OS]	95	23	-
[NAS]	115	28	250 (El. > El. -20.0) 500 (El. < El. -20.0)
[GD-S]	125	34	-
[SS]	80	28	-
[FILL] Cap	110	30	-

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10.5 Active and Passive Earth Pressure Coefficients

Active and passive earth pressure coefficients were determined using Figure 6 from Reference 9, Active and Passive Coefficients with Wall Friction (sloping Backfill).

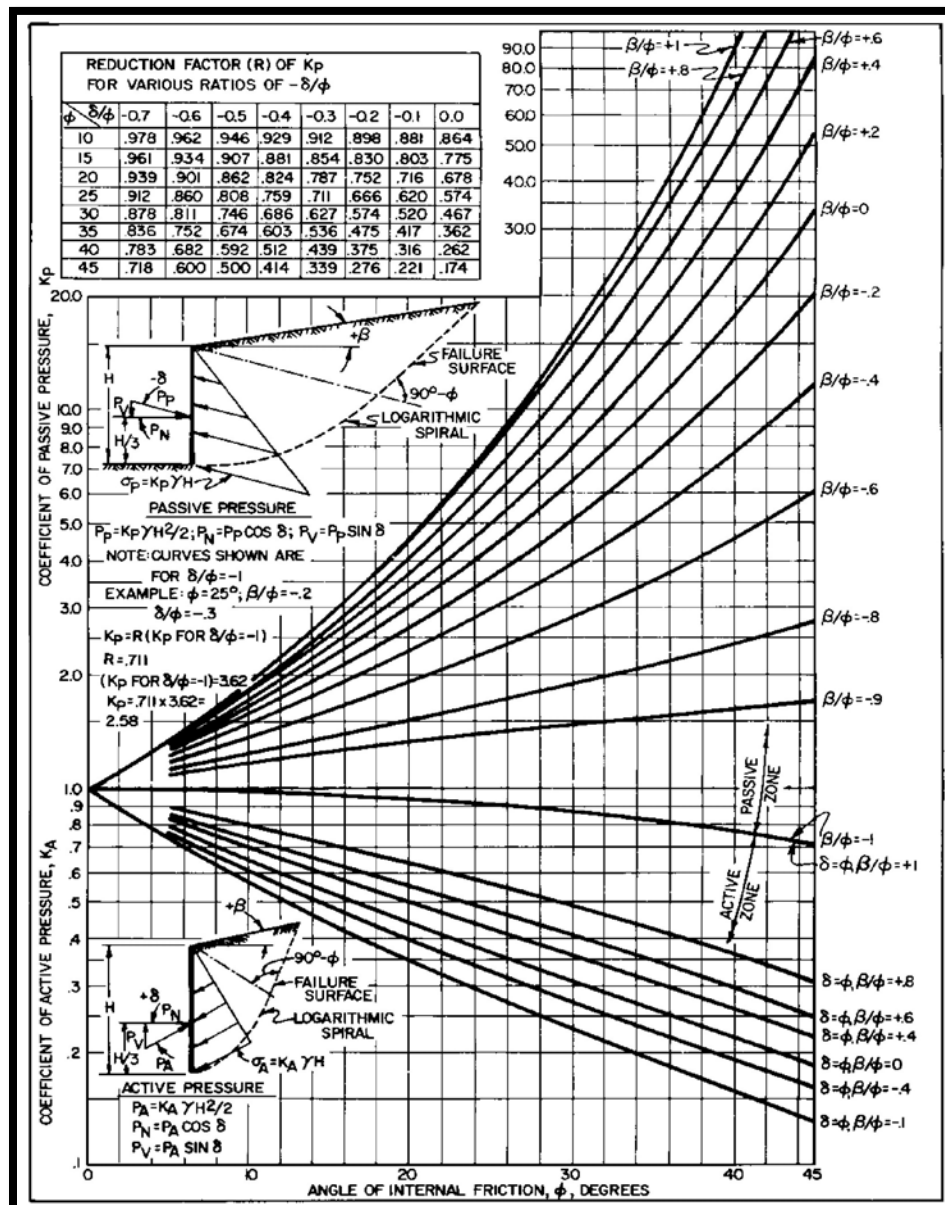


Figure 5 - Active and Passive Coefficients with Wall Friction (Reference 9 – Figure 6)

Assume wall friction, $\delta = 10$ degrees, for Native Alluvial, & Organic materials

Assume wall friction, $\delta = 14$ degrees, for Soft Sediment materials

Assume wall friction, $\delta = 17$ degrees, for Fill, Glacial Sand & Remediation Cap materials

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From Figure 5, read:

Soil	Ka	Kp	δ/Φ
[FILL]	0.26	9.0	0.50
[OS]	0.39	3.6	0.74
[NAS]	0.33	5.5	0.36
[GD-S]	0.26	9.2	0.50
[SS]	0.33	5.5	0.50
ISS (Fresh & Mature)	-	-	-
[FILL] Cap	0.30	6.8	0.57

10.6 Passive Coefficient Reduction Factors

Passive earth pressure reduction factors were obtained using the table in Figure 5, read:

Soil	R	R-Kp
[FILL]	-	-
[OS]	-	-
[NAS]	0.685	3.77
[GD-S]	0.71	6.77
[SS]	0.685	3.77
ISS (Fresh & Mature)	-	-
[FILL] Cap	0.79	5.39

11 Groundwater

The Factual Report for adjacent Douglass Street (West) states groundwater was encountered between 2.7 and 4.5 ft bgs, approximately Elev. 0 to Elev. 3.2. Groundwater fluctuations were observed throughout drilling as the water level changed between high and low tide conditions. The average groundwater level is anticipated to be at Elev. 1 (Reference 6). This groundwater level was confirmed for the Butler Street property using the Fulton Street Project RDWP Report (Reference 7) showing groundwater contours on the property at Elev. 1 near the canal (Reference 7). The water level in the canal is taken at a low tide condition. With the water level at Elev. -2.57, Reference 7.

In addition, per Reference 20, mounding of groundwater on the upland side of the bulkhead wall is expected to increase the groundwater level by approximately 2.5 feet. Therefore, for the analysis of the sheet pile bulkhead, the groundwater level on the upland side will be taken as Elev. 3.5.

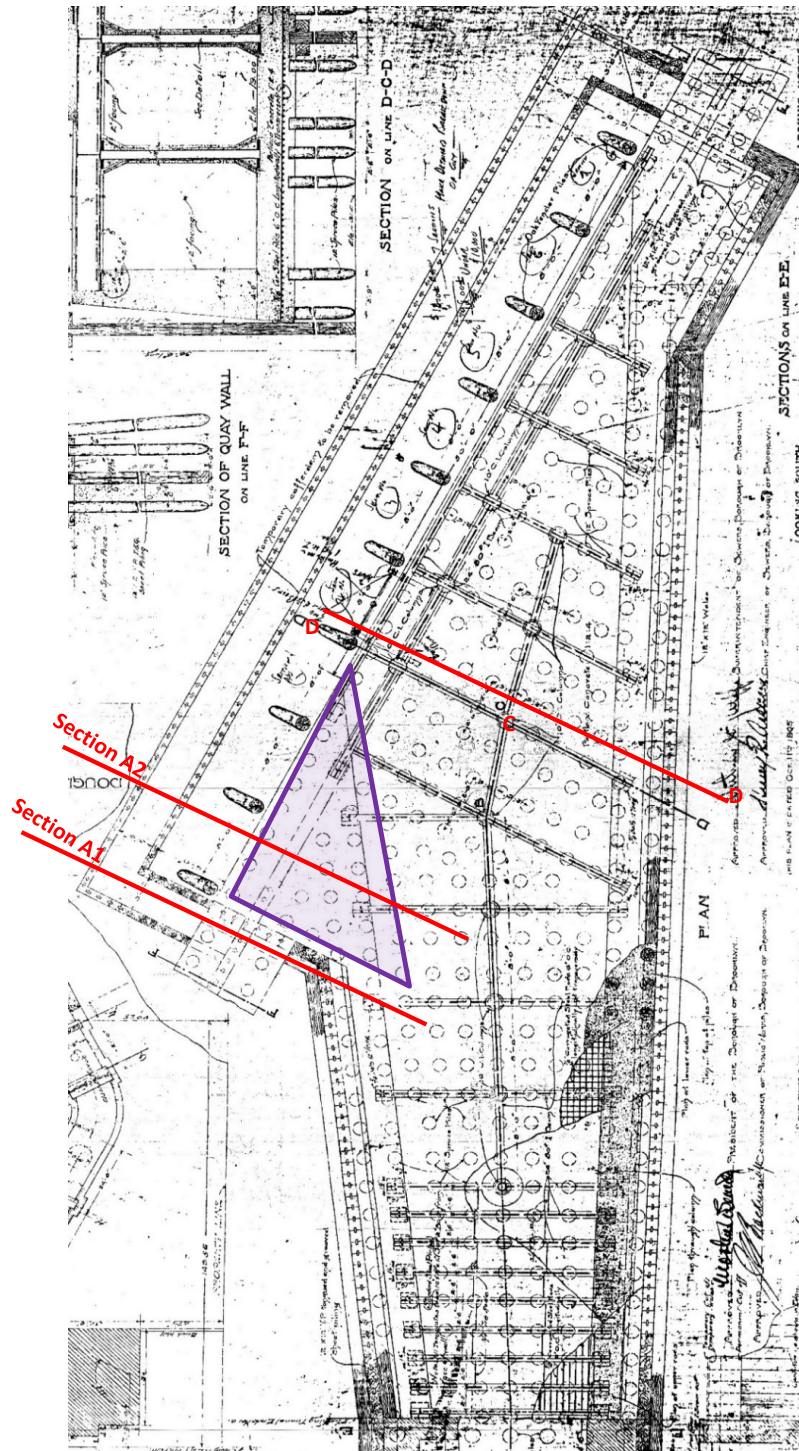
12 Surcharges

- 250 psf Vehicular Surcharge
- 1,230 psf Bulkhead Surcharge (Typical @ North and West Walls – Sections A1 & C)
- 1,422 psf West Wall Surcharge (Adjacent to Flushing Tunnel Outlet – Section A2)
- 1,546 psf CSO Outlet Surcharge (Section C)
- Combined Soil and Vehicular Surcharge Loads (behind existing bulkheads) - As noted within the calculation

The calculation of the surcharge loadings is included on the following pages.

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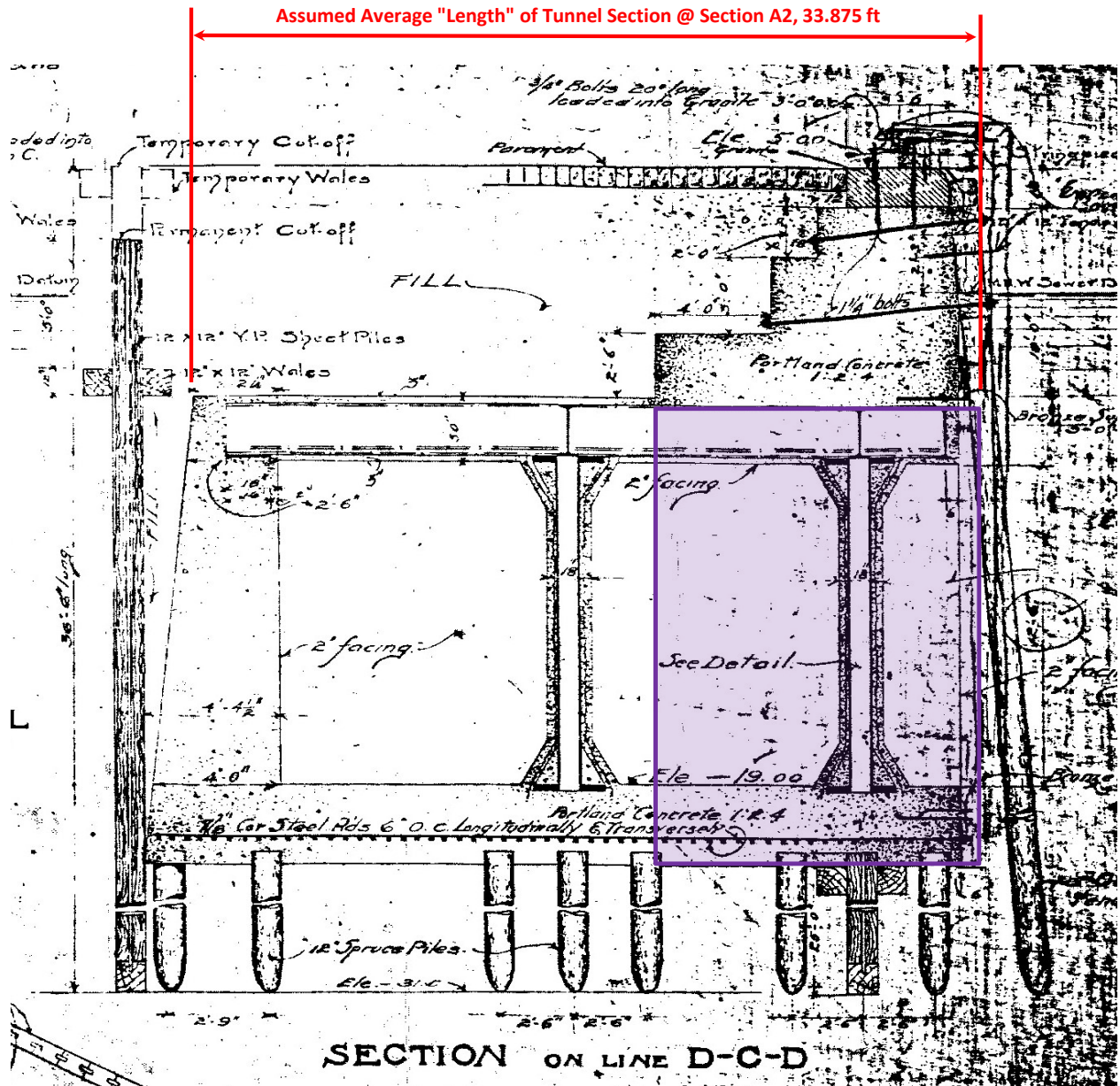
Calculate Total Weight & Surcharge of West Wall and Bulkhead Near Flushing Tunnel (Based on Sect D-C-D)



Plan - Flushing Tunnel

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Calculate Total Weight & Surcharge at West Wall and Bulkhead Near Flushing Tunnel (Section A2)

Analysis will consider the a section through the Flushing Tunnel directly north of the opening for the tunnel outfall. This section is a triangular concrete section that extends approximately 22 feet north, towards the head end of the canal with a portion of the tunnel beyond the solid concrete corner wall. For ease of analysis, this section will be assumed to be a retangular concrete section that is the average width (33.875 feet) of the combined solid concrete and tunnel section that lies just to the north of the Flushing Tunnel outfall.

L = 33.88 ft, Average Width of Upper Bulkhead @ Sect A2

W = 22.00 ft, Width at Face of Flushing Tunnel Structure

10" CI Columns - Area = 16.1 in² (Assumed same as Sched 80 piping)

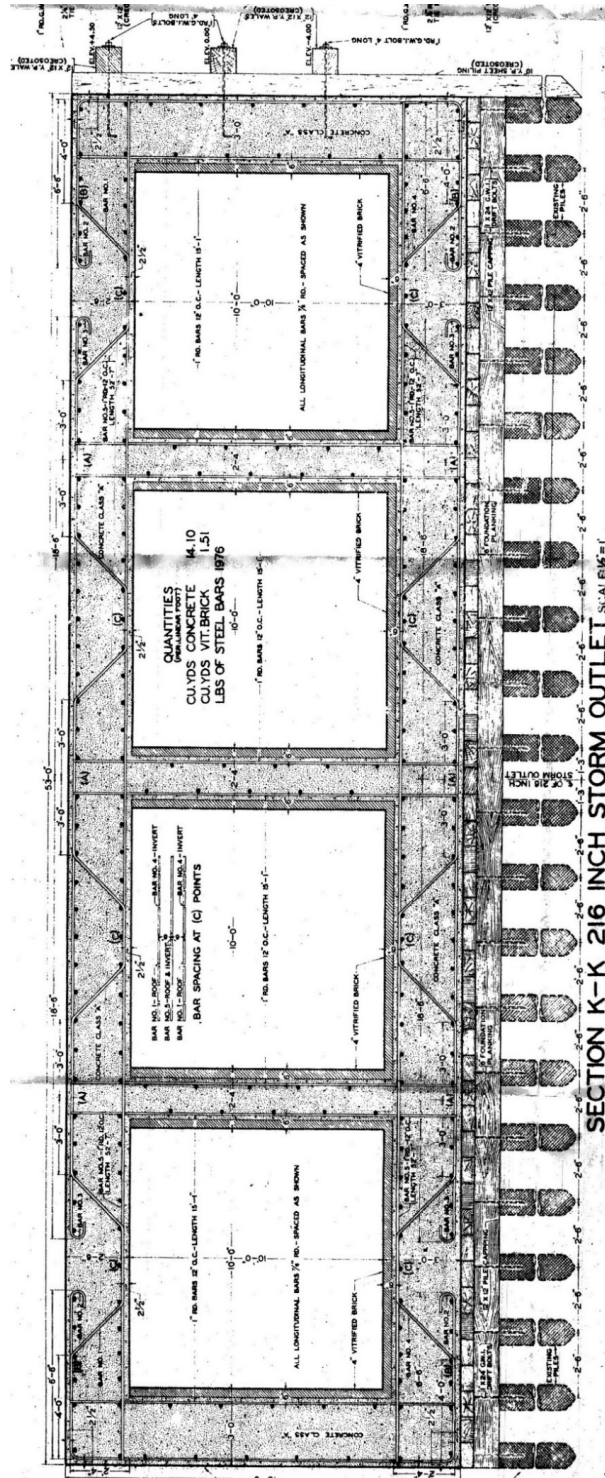
	No.	Unit Weight pcf	L ft	W ft	H ft	Total Weight kips	
Granite Cap	1	175	3.50	22.00	1.50	20.2	
Conc Bulkhead 1st Level	1	150	4.50	22.00	2.00	29.7	
Conc Bulkhead 2nd Level	1	150	6.00	22.00	3.00	59.4	
Conc Bulkhead 3rd Level	1	150	10.00	22.00	2.50	82.5	
Brick Paving	1	140	30.38	22.00	0.33	31.2	
Fill - Level 1	1	120	29.38	22.00	2.00	155.1	
Fill - Level 2	1	120	27.88	22.00	3.00	220.8	
Fill - Level 3	1	120	23.88	22.00	2.50	157.6	
Tapered Concrete Wall	1	87.6	5.88	22.00	18.00	203.8	(Bouyant Unit Weight)
Concrete Base	1	87.6	28.00	0.00	3.00	0.0	(Bouyant Unit Weight)
Concrete Top	1	87.6	28.00	0.00	2.50	0.0	(Bouyant Unit Weight)
Concrete Side Walls	1	87.6	28.00	3.25	12.50	99.6	(Bouyant Unit Weight)
24" x 90 I-Beams	6	90 plf	0.00	1.00	1.00	0.0	
10" Hollow CI COLUMNS	3	4.19 plf	1.00	1.00	12.50	0.2	
Total Weight (kips):						1060.0	
Surcharge due to Outfall and Existing Bulkhead (ksf):						1.422	
Surcharge due to Vehicle Loads (ksf):						0.250	
Total Surcharge transferred to piles (ksf):						1.672	

Note: "Length" is measured from face of canal

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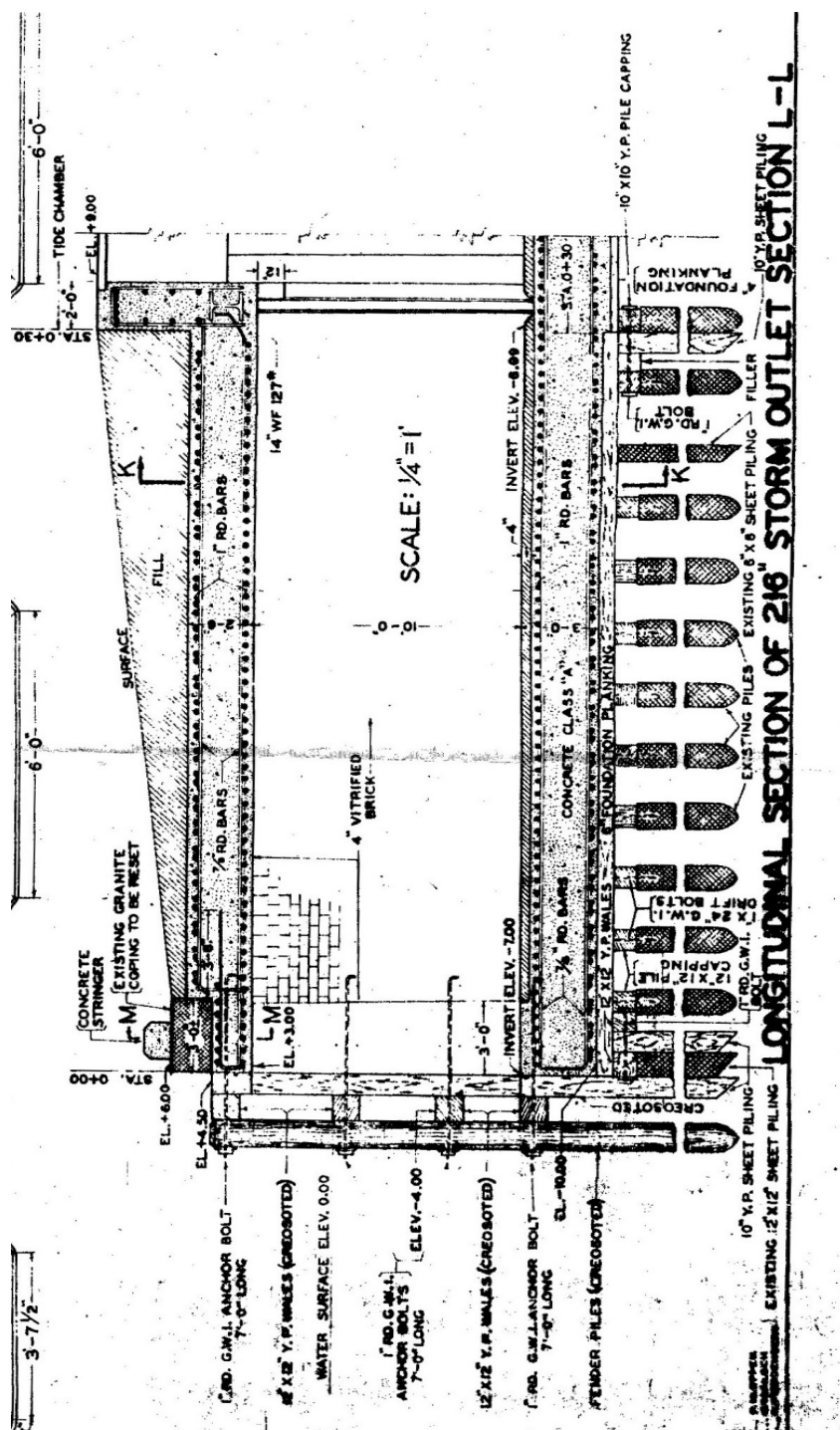
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Calculate Total Weight & Surcharge of 216-Inch CSO Storm Outlet (Section B)



Elevation - CSO Outlet

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Cross Section - CSO Outlet

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Calculate Total Weight & Surcharge of 216-Inch CSO Storm Outlet (Section B)

Outlet Section Plan Dimensions

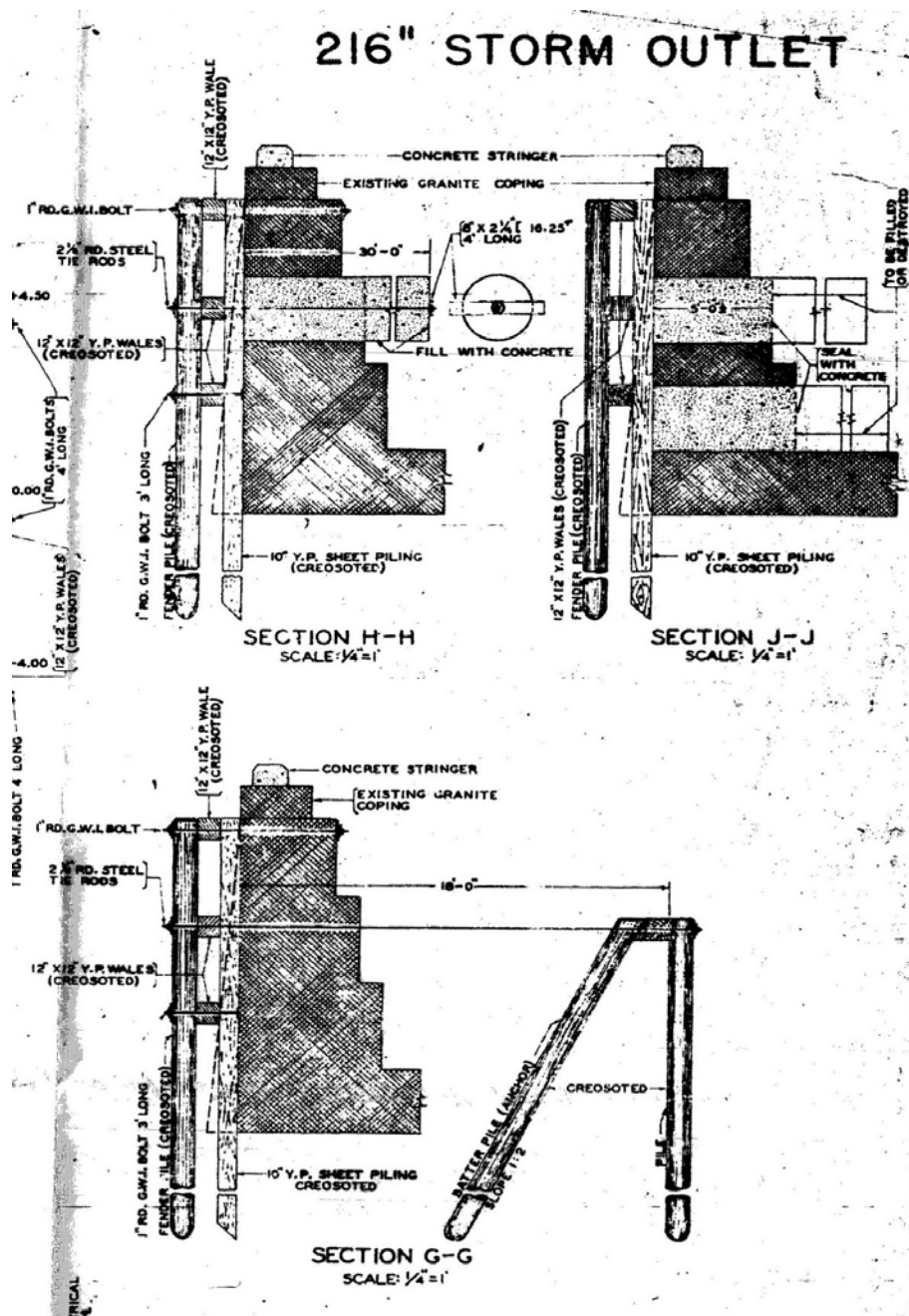
L = 32.00 ft, Distance Outlet to Start of Tide Chamber
W = 53.00 ft, Width at Face of CSO Outlet Structure

Foundation Planking and Pile Capping assumed to be Eastern Spruce (27.9 pcf)

	No.	Unit Weight pcf	L ft	W ft	H ft	Total Weight kips
Granite Coping	1	175	3.00	53.00	1.50	41.7
Fill	1	120	27.00	53.00	2.50	429.3
Concrete Endwall	1	150	2.00	53.00	4.00	63.6
Concrete Base	1	150	32.00	53.00	2.50	636.0
Concrete Top	1	150	32.00	53.00	2.50	636.0
Side Walls	2	150	32.00	2.50	11.50	276.0
Center Walls	3	150	32.00	1.33	11.50	220.8
Brick Lining (Sides)	8	140	32.00	0.50	10.00	179.2
Brick Lining (Bottom)	4	140	32.00	11.00	0.50	98.6
Timber Foundation Planking	1	27.9	32.00	53.00	0.50	23.7
12x12 Timber Pile Capping	12	27.9	1.00	53.00	1.00	17.7
Total Weight (kips):						2622.6
Surcharge due to Outfall (ksf):						1.546
Surcharge due to Vehicle Loads (ksf):						0.250
Total Surcharge transferred to piles (ksf):						1.796

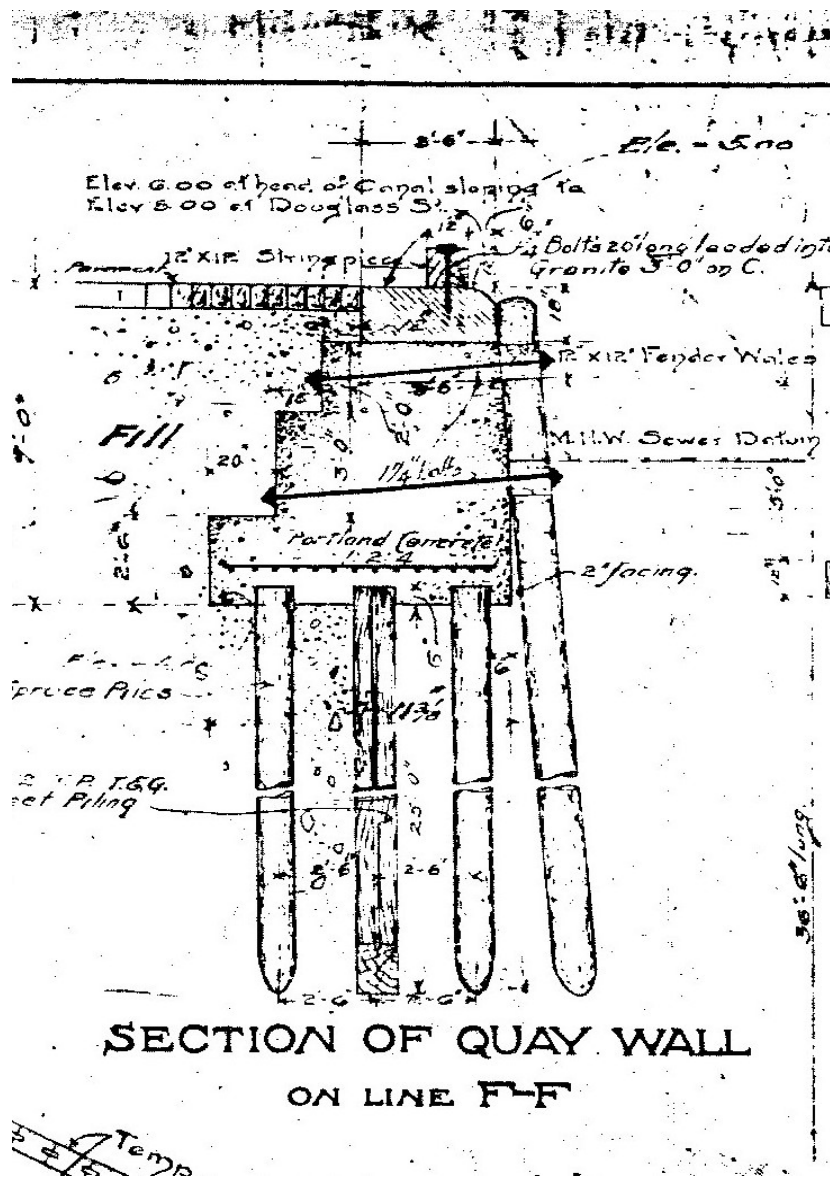
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Calculate Total Weight & Surcharge of Douglass Street Bulkhead (Per Unit Width)



CSO Outlet Bulkhead Sections (Undimensioned)

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Bulkhead Section - Butler Street West Side

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Calculate Total Weight & Surcharge of Douglass Street Bulkhead (Sections A1 & C)

As no dimensions are available for tied-back bulkhead sections along the CSO wall, the bulkhead dimensions from the Butler Street (west wall) will be used to determine the surcharge loads for both locations.

Bulkhead Section Plan Dimensions

L = 7.42 ft, Distance Outlet to Start of Back Wall @ Sect F-F
W = 1.00 ft, Width at Face of Bulkhead Structure

	No.	Unit Weight pcf	L ft	W ft	H ft	Total Weight kips
Granite Cap	1	175	3.50	1.00	1.50	0.9
Conc Bulkhead 1st Level	1	150	4.50	1.00	2.00	1.4
Conc Bulkhead 2nd Level	1	150	5.75	1.00	3.00	2.6
Conc Bulkhead 3rd Level	1	150	7.42	1.00	2.50	2.8
Brick Paving	1	140	3.92	1.00	0.33	0.2
Fill - Level 1	1	120	2.92	1.00	2.00	0.7
Fill - Level 2	1	120	1.67	1.00	3.00	0.6
Fill - Level 3	1	120	0.00	1.00	2.50	0.0
Total Weight (kips):						9.1
Surcharge due to Existing Bulkhead (ksf):						1.230
Surcharge due to Vehicle Loads (ksf):						0.250
Total Surcharge transferred to piles (ksf):						1.480

Calculate Additional Lateral Pressures that are expected to act on the temporary bulkheads

Lateral Pressure Due to Surcharge of Soils Behind the Existing Structures

γ_{H2O} = 62.4 pcf Unit Weight of Water
 Q_{veh} = 250 psf Vehicle Surcharge
GWT = 3.50 ft Elevation of Groundwater Table
CWT = -2.57 ft Canal Water Table

Sections A1 & C (West Side Typical Section & Sides of CSO)

L_{top} = 6.00 ft Top of Bulkhead Elevation
 EL_{Fill} = -1.50 ft Bottom of Fill Stratum
 EL_{Bulk} = -9.00 ft Bottom of Bulkhead Concrete



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$$\gamma_{Fill} = 120.0 \text{ pcf}$$

$$\gamma'_{Fill} = \gamma_{Fill} - \gamma_{H2O}$$

$$= 57.6 \text{ pcf}$$

$$\gamma_{NAS} = 115.0 \text{ pcf}$$

$$\gamma'_{NAS} = \gamma_{NAS} - \gamma_{H2O}$$

$$= 52.6 \text{ pcf}$$

$$Q_{Fill1} = (L_{top} - GWT) \times \gamma_{Fill} \quad \text{Fill above GWT}$$

$$= 300.0 \text{ psf}$$

$$Q_{Fill2} = (GWT - EL_{Fill}) \times \gamma'_{Fill} \quad \text{Fill below GWT}$$

$$= 288.0 \text{ psf}$$

$$Q_{NAS} = (EL_{Fill} - EL_{Bulk}) \times \gamma'_{NAS}$$

$$= 395 \text{ psf}$$

$$Q_{H2O} = (GWT - EL_{Bulk}) \times \gamma_{H2O}$$

$$780 \text{ psf}$$

$$\Sigma Q_{AC1} = Q_{veh} + Q_{fill1} + Q_{fill2} + Q_{NAS} + Q_{H2O} \quad \text{Total Surcharge Loading}$$

$$= 2013 \text{ psf}$$

$$\Sigma P_{AC2} = Q_{fill1} + Q_{fill2} + Q_{NAS} + Q_{H2O} \quad \text{Total Surcharge Loading Less Vehicle Loads}$$

$$= 1763 \text{ psf}$$

$$k_{a_{NAS}} = 0.33$$

$$H_{AC1} = k_{a_{NAS}} \times \Sigma Q_{AC1} \quad \text{Add'l Soil Surcharge acting below base of Bulkhead}$$

$$664.1 \text{ psf}$$

$$H_{AC2} = k_{a_{NAS}} \times \Sigma Q_{AC2} \quad \text{Add'l Soil Surcharge acting below base of Bulkhead (No Vehicles)}$$

$$581.6 \text{ psf}$$

For ShoringSuite Analysis, H_{AC1} will be applied as a Strip Load, 40-feet wide, 7.42 feet from the face of the sheet pile bulkhead, at a depth of 9.0 feet (bottom of existing bulkhead). The loading will be applied using a Boussinesq distribution.

		Title: Bulkhead Analysis - Butler Street				Page 29 of 50					
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At Section A2 (North of Flushing Tunnel)

$$EL_{NAS} = -21.00 \text{ ft} \quad \text{Bottom of NAS / Flushing Tunnel Concrete}$$

$$Q_{fill1} = (L_{top} - GWT) \times \gamma_{Fill} \quad \text{Fill above GWT}$$

$$= 300.0 \text{ psf}$$

$$Q_{fill2} = (GWT - EL_{Fill}) \times \gamma'_{Fill} \quad \text{Fill below GWT}$$

$$= 288.0 \text{ psf}$$

$$Q_{NAS} = (EL_{Fill} - EL_{NAS}) \times \gamma'_{NAS}$$

$$= 1026 \text{ psf}$$

$$Q_{H2O} = (GWT - EL_{NAS}) \times \gamma_{H2O}$$

$$= 1529 \text{ psf}$$

$$\Sigma Q_{A21} = Q_{veh} + Q_{fill1} + Q_{fill2} + Q_{NAS} + Q_{H2O} \quad \text{Total Surcharge Loading}$$

$$= 3393 \text{ psf}$$

$$\Sigma Q_{A22} = Q_{fill1} + Q_{fill2} + Q_{NAS} + Q_{H2O} \quad \text{Total Surcharge Loading Less Vehicle Loads}$$

$$= 3143 \text{ psf}$$

$$ka_{GD-S} = 0.26$$

$$H_{A21} = ka_{GD-S} \times \Sigma Q_{A21} \quad \text{Add'l Soil Surcharge acting below base of Flushing Tunnel}$$

$$= 882.1 \text{ psf}$$

$$H_{A22} = ka_{GD-S} \times \Sigma Q_{A22} \quad \text{Add'l Soil Surcharge acting below base of Flushing Tunnel (No Vehicles)}$$

$$= 817.1 \text{ psf}$$

For ShoringSuite Analysis, H_{A1} will be applied as a Strip Load, 40-feet wide, 33.875 feet from the face of the sheet pile bulkhead, at a depth of 27.0 feet (bottom of Flushing Tunnel). The loading will be applied using a Boussinesq distribution.

At Section B (CSO Outfall)

As the pile supported CSO outfall structure extends beyond Butler Street, there are no additional soil or vehicular surcharge loads that act on the temporary bulkhead structures.

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Active (Upland) Side								
		Strata						
Depth	Soil	Thickness	Ka	γ_T	γ_w	P ₂ (pcf)	P ₂ (kcf)	P ₂ Cum (kcf)
0								
9	BULKHEAD							0
20	Organic Silt	11	0.39	95	62.4	139.85	0.140	0.140
25	Native Alluvial	5	0.34	115	62.4	89.42	0.089	0.229
100	Glacial	75	0.26	125	62.4	5,900.70	5.901	6.130

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Passive Pressure Data - Drained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-19.33	25.33	Canal Bottom	25.33	0.00	0	0	0
-20.00	26.00	Native Alluvial	0.67	3.77	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Drained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-19.33	25.33	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	35.2	41.8	0.0	0.0	0.261	0.175	0.000	0.175
-94.00	100.00	Glacial	4667.6	4659.4	280.4		0.486	35.979	0.280	36.259

Passive Pressure Data - Undrained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-19.33	25.33	Canal Bottom	25.33	0.00	0	0	0
-20.00	26.00	Native Alluvial	0.67	0.00	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Undrained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-19.33	25.33	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	35.2	41.8	0.0	250.0	0.115	0.077	0.250	0.327
-94.00	100.00	Glacial	4667.6	4659.4	280.4		0.486	35.979	0.280	36.259

CALCULATION NUMBER

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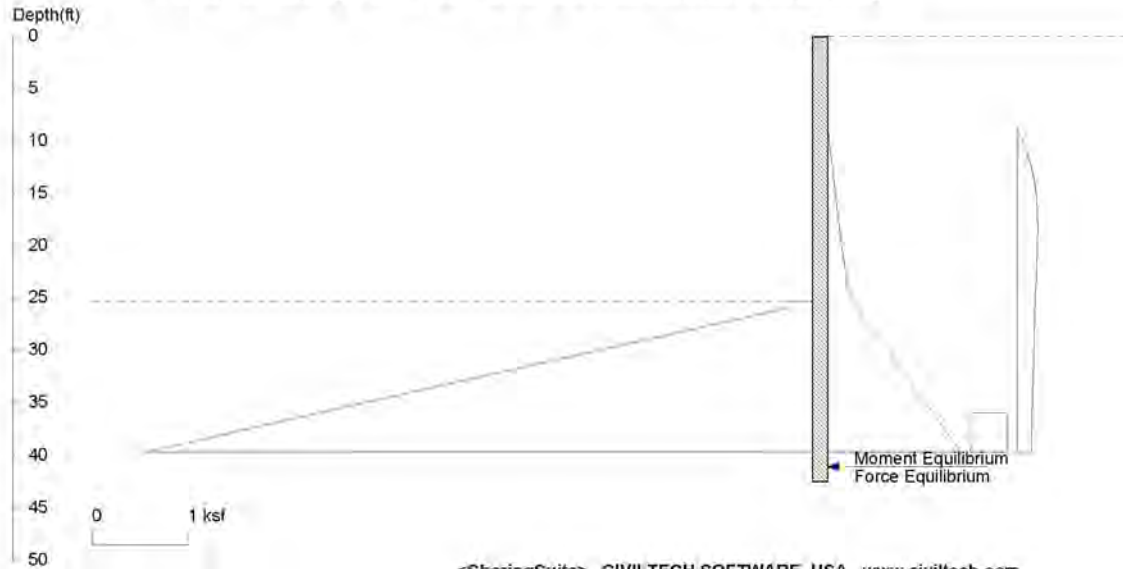
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Analysis Summary – Section A1 (Butler Street West) - Cantilever Analysis Undrained Analysis

Butler Street (West) Section A1 Phase III Dredge EI -19.33 UNDRAINED Revised Mounding



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Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION A1 - Butler Street (West) (EI -19.33) UNDRAINED

Wall Height=25.3

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=17.15 Min. Pile Length=42.48

MOMENT IN PILE: Max. Moment=55.79 per Pile Spacing=1.0 at Depth=32.67

PILE SELECTION:

Request Min. Section Modulus = 20.3 in³/ft=1090.67 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.93(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

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Passive Pressure Data - Drained / Undrained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-22.50	28.50	Canal Bottom	28.50	0.00	0	0	0
-22.50	28.50	Native Alluvial	0.00	3.77	115	62.4	52.6
-94.00	100.00	Glacial	71.50	6.77	125	62.4	62.6

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Passive Pressure Data - Drained / Undrained Analysis

Elev.	Depth	Soil	Soil σ_v Cum (ksf)	H ₂ O σ_v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-22.50	28.50	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-22.50	28.50	Native Alluvial	0.0	0.0	0.0	0.0	0.261	0.000	0.000	0.000
-94.00	100.00	Glacial	4475.9	4461.6	0.0		0.486	34.763	0.000	34.763

Note: A separate undrained analysis is not required as only Glacial materials are present on the passive (canal) side of the bulkhead, and (per Reference 10) these materials are to be modelled without the use of cohesion or undrained shear strength values.

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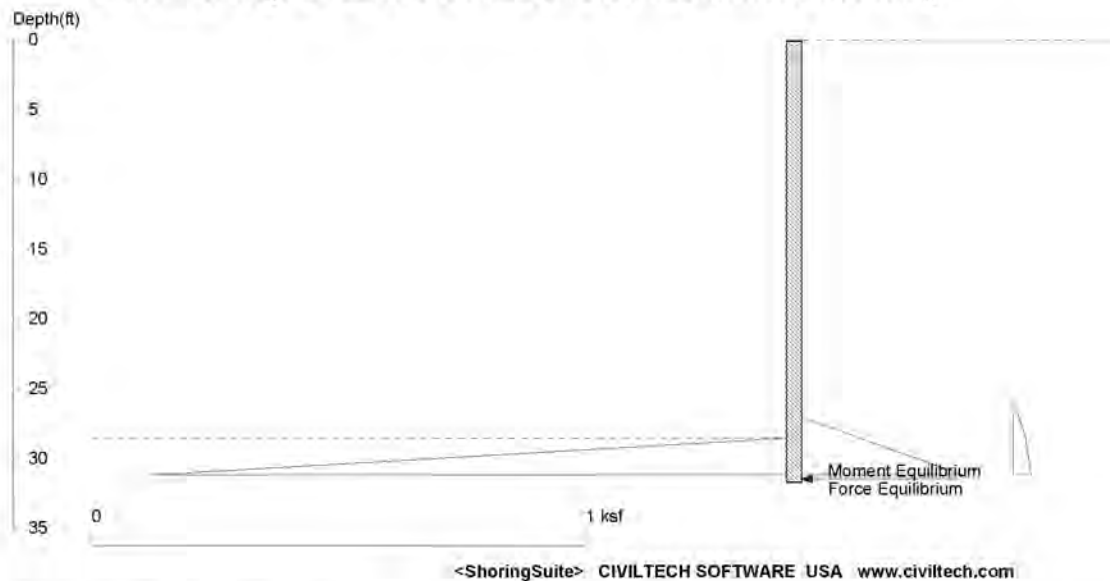
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Analysis Summary – Section A2 (Butler Street West) - Cantilever Analysis

Butler Street (West) Section A2 Phase III Dredge El -22.58 DRAINED/UNDRAINED Revised Mounding



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Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION A2 - Butler Street (West) (El -22.58).sh8

Wall Height=28.5 Pile Diameter=1.0 Pile Spacing=1.0 Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=3.19 (5~10ft is recommended!!!) Min. Pile Length=31.69

MOMENT IN PILE: Max. Moment=0.26 per Pile Spacing=1.0 at Depth=30.06

PILE SELECTION:

Request Min. Section Modulus = 0.1 in³/ft=5.16 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.53(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

Note:

The results of the ShoringSuite analysis indicate that the minimum recommended pile length is 31.69 feet, with an embedment depth of 3.19 feet. As this indicates that there is a minimal need for a bulkhead at this location, the recommended pile length is increased to 36.0 feet. This will result in an embedment depth of approximately 7,5 (at the worst case location) and a final tip elevation of El. -30.0.

Revision No.

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Active (Upland) Side								
		Strata						
Depth	Soil	Thickness	Ka	γ_T	γ_w	P ₂ (pcf)	P ₂ (kcf)	P ₂ Cum (kcf)
0								
		0	0.26	120		0.00	0	0
17	BULKHEAD		0.26	120		0.00	0.000	0.000
19.5	Organic Silt	2.5	0.39	95	62.4	31.79	0.032	0.032
25	Native Alluvial	5.5	0.34	115	62.4	98.36	0.098	0.130
100	Glacial	75	0.26	125	62.4	5,900.70	5.901	6.031

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Passive Pressure Data - Drained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-15.50	21.50	Canal Bottom	21.50	0.00	0	0	0
-20.00	26.00	Native Alluvial	4.50	3.77	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Drained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-15.50	21.50	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	236.7	280.8	0.0	0.0	0.261	1.173	0.000	1.173
-94.00	100.00	Glacial	4869.1	4898.4	1883.3		0.486	35.979	1.883	37.862

Passive Pressure Data - Undrained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-15.50	21.50	Canal Bottom	21.50	0.00	0	0	0
-20.00	26.00	Native Alluvial	4.50	0.00	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Undrained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-15.50	21.50	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	236.7	280.8	0.0	250.0	0.115	0.518	0.250	0.768
-94.00	100.00	Glacial	4869.1	4898.4	1883.3		0.486	35.979	1.883	37.862

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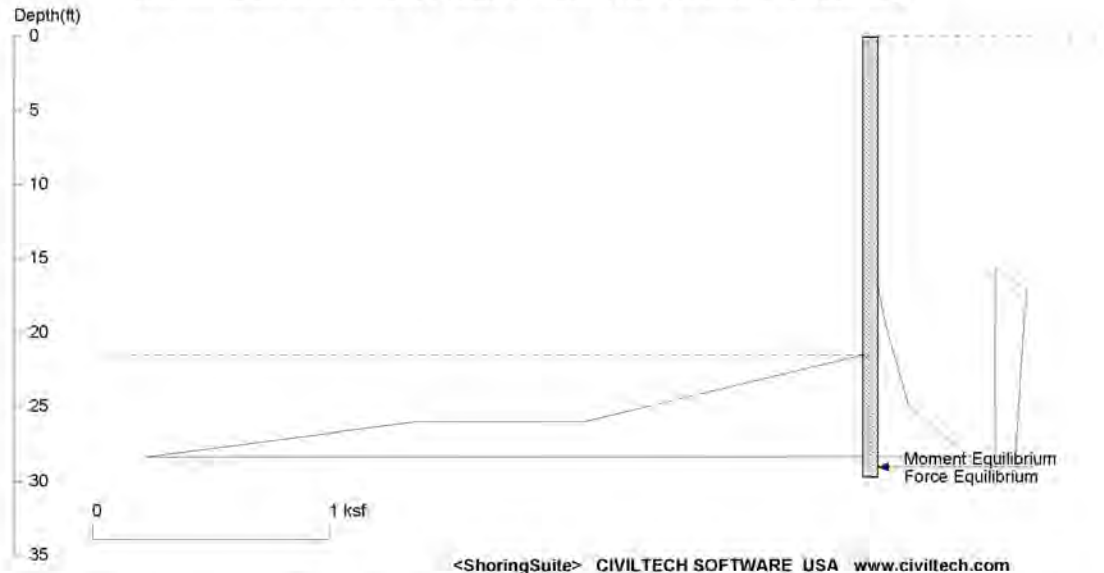
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**Analysis Summary – Section B (CSO Outfall) – Cantilever Analysis
Drained Analysis**

Butler Street

Section B at CSO Outlet Phase III DRAINED Revised Mounding



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Date: 1/14/2020

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Wall Height=21.5 Pile Diameter=1.0 Pile Spacing=1.0 Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=8.20 Min. Pile Length=29.70

MOMENT IN PILE: Max. Moment=4.45 per Pile Spacing=1.0 at Depth=25.53

PILE SELECTION:

Request Min. Section Modulus = 1.6 in³/ft=86.95 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.23(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

CALCULATION NUMBER

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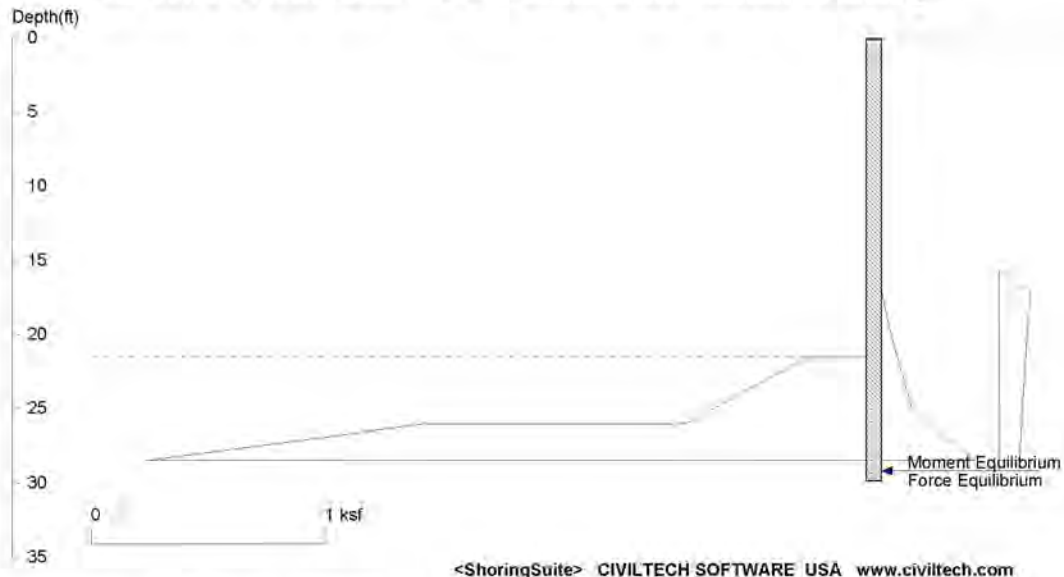
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Analysis Summary – Section B (CSO Outfall) – Cantilever Analysis Drained Analysis

Butler Street

Section B at CSO Outlet Phase III UNDRAINED Revised Mounding



Licensed to 4324324234 3424343

Date: 1/14/2020

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Wall Height=21.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=8.33 Min. Pile Length=29.83

MOMENT IN PILE: Max. Moment=4.14 per Pile Spacing=1.0 at Depth=25.98

PILE SELECTION:

Request Min. Section Modulus = 1.5 in³/ft=80.90 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.24(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

Note:

The results of the ShoringSuite analysis indicate that the minimum recommended pile length is 29.70 feet, with an embedment depth of 8.20 feet. As this indicates that there is a minimal need for a bulkhead at this location, the recommended pile length is increased to 36.0 feet. This will result in an embedment depth of approximately 14.5 (at the worst case location) and a final tip elevation of El. -30.0. Additionally, since the CSO outlet cannot be blocked by the sheet pile bulkheads, the recommended top cut-off elevation is approximately El. -7.5 (to allow the 6-inch armored layer of the remediation cap to be placed flush with the outfall invert).

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Section C (CSO Side Bulkheads) - Phase III Dredge to El. -16.0

Soil Profile Analyzed							
Elev. (Depth)							Elev. (Depth)
6 (0)							
	BULKHEAD						
3.5 (2.5)	GWT						
-3 (9)							
-4 (10)	FILL						
-14 (20)	ORGANIC SILT						
	NATIVE						
							-16.5 (22.5)
-19 (25)	ALLUVIAL				NATIVE ALLUVIAL		
							-20 (26)
	GLACIAL				GLACIAL		

Active (Upland) Side									
Depth	Soil	Strata Thickness	Ka	γ_T	γ_w	P ₂ (pcf)	P ₂ (kcf)	P ₂ Cum (kcf)	
0									
9	BULKHEAD	0	0	0	0	0.00	0.000	0.000	
10	Fill	1	0.26	120	62.4	14.98	0.015	0.015	
20	Organic Silt	10	0.39	95	62.4	127.14	0.127	0.142	
25	Native Alluvial	5	0.34	115	62.4	89.42	0.089	0.232	
100	Glacial	75	0.26	125	62.4	5,900.70	5.901	6.132	

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Passive Pressure Data - Drained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-16.50	22.50	Canal Bottom	22.50	0.00	0	0	0
-20.00	26.00	Native Alluvial	3.50	3.77	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Drained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-16.50	22.50	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	184.1	218.4	0.0	0.0	0.261	0.912	0.000	0.912
-94.00	100.00	Glacial	4816.5	4836.0	1464.8		0.486	35.979	1.465	37.444

Passive Pressure Data - Undrained Analysis							
Elev.	Depth	Soil	Strata Thickness	R x K _p	γ _T	γ _w	γ'
6.00	0.00	Ground Surface					
-16.50	22.50	Canal Bottom	22.50	0.00	0	0	0
-20.00	26.00	Native Alluvial	3.50	0.00	115	62.4	52.6
-94.00	100.00	Glacial	74.00	6.77	125	62.4	62.6

Passive Pressure Data - Undrained Analysis										
Elev.	Depth	Soil	Soil σ _v Cum (ksf)	H ₂ O σ _v Cum (ksf)	Surcharge (psf)	Su (psf)	Gradient (kcf)	ΔP (ksf)	P ₁ (Ksf)	P ₂ (ksf)
6.00	0.00	Ground Surface	0.0	0.0					0.000	0.000
-16.50	22.50	Canal Bottom	0.0	0.0			0.000	0.000	0.000	0.000
-20.00	26.00	Native Alluvial	184.1	218.4	0.0	250.0	0.115	0.403	0.250	0.653
-94.00	100.00	Glacial	4816.5	4836.0	1464.8		0.486	35.979	1.465	37.444

Revision No.

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Top Deflection = 2.04(in) based on E (ksi)=29000.00 and I (in4)/foot=656.2

CALCULATION NUMBER

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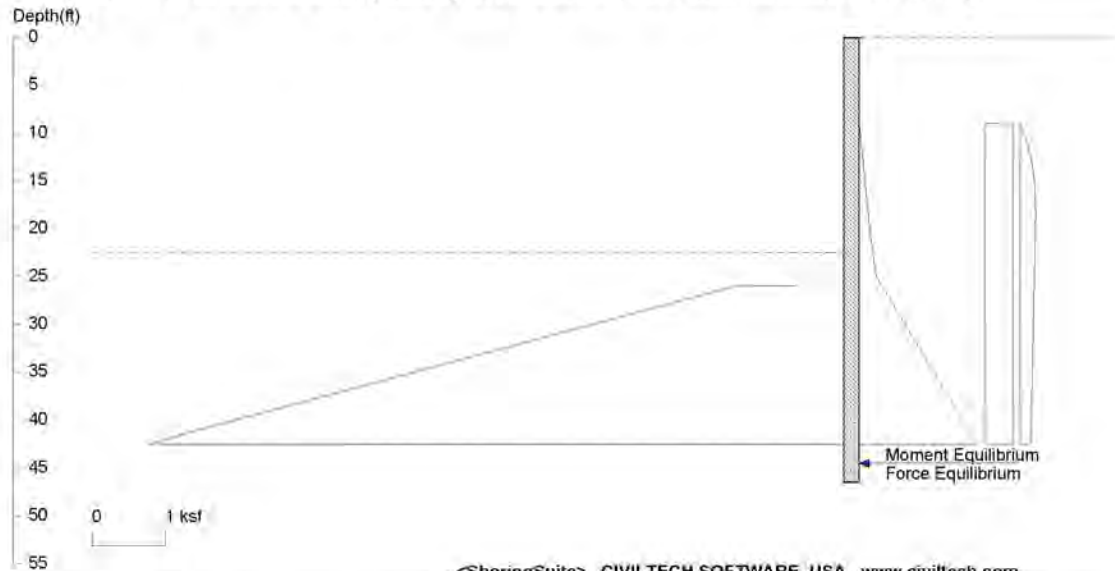
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**Analysis Summary – Section C (CSO Side Bulkheads) – Cantilever Analysis
No Pile Support Assumed – Undrained Analysis (AZ 36-700)**

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding



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Date: 1/14/2020

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Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.00 Min. Pile Length=46.50

MOMENT IN PILE: Max. Moment=135.71 per Pile Spacing=1.0 at Depth=33.52

PILE SELECTION:

Request Min. Section Modulus = 49.3 in³/ft=2652.98 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 2.03(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

CALCULATION NUMBER

Project No.

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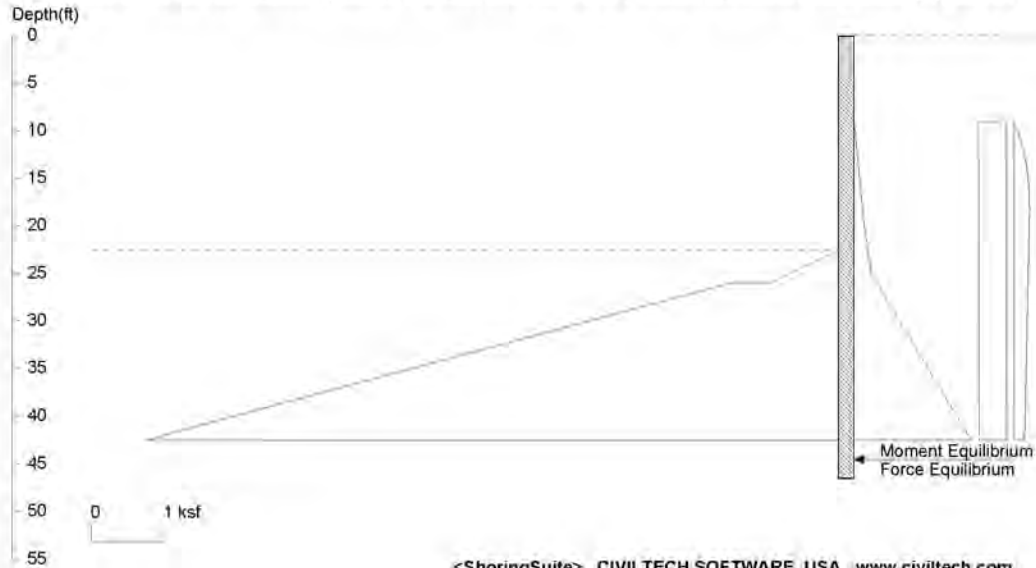
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Analysis Summary – Section C (CSO Side Bulkheads) – Cantilever Analysis No Pile Support Assumed – Drained Analysis (AZ 52-700)

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



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Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides DRAINED (AZ52)

Wall Height=22.5 Pile Diameter=1.0 Pile Spacing=1.0 Wall Type: 1, Sheet Pile

PILE LENGTH: Min. Embedment=24.01 Min. Pile Length=46.51

MOMENT IN PILE: Max. Moment=135.99 per Pile Spacing=1.0 at Depth=33.53

PILE SELECTION:

Request Min. Section Modulus = 49.5 in³/ft=2658.54 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.40(in) based on E (ksi)=29000.00 and I (in⁴)/foot=953.0

CALCULATION NUMBER

Project No.

Sys/Fun
Code

Discipline
Code

Document
Type

Sequence No.

Revision No.

749237266

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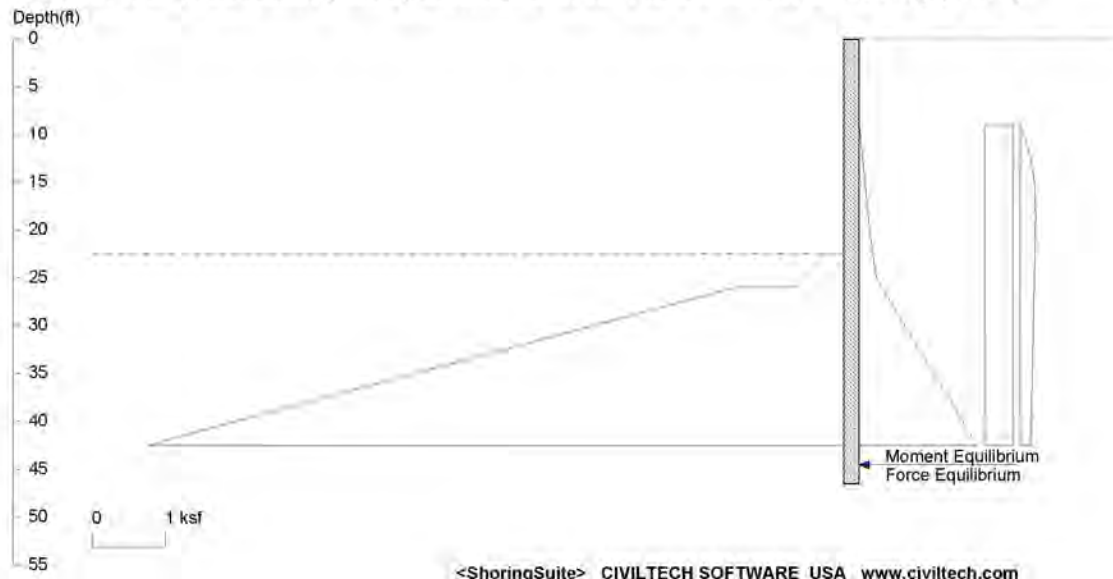
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D

Analysis Summary – Section C (CSO Side Bulkheads) – Cantilever Analysis No Pile Support Assumed – Undrained Analysis (AZ 52-700)

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



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Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides UNDRAINED (A

Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.00 Min. Pile Length=46.50

MOMENT IN PILE: Max. Moment=135.71 per Pile Spacing=1.0 at Depth=33.52

PILE SELECTION:

Request Min. Section Modulus = 49.3 in³/ft=2652.98 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.40(in) based on E (ksi)=29000.00 and I (in⁴)/foot=953.0

Note: APTIM reviewed the soil borings in the Fulton Street RDWP (Reference 15) taken in the canal in the vicinity of Butler Street. The average SPT N-value between EI -30 (tip of timber piles) and EI -50 (20 feet below the timber pile tip elevation) is 30 which is considered a dense granular soil. With the planned use of the Giken push method of installation, APTIM does not consider installing sheet pile 16 feet below the Butler Street bulkhead timber pile tip elevations a settlement concern. APTIM also believes this method of installation will minimize if not eliminate the potential for exposing the tops of the Butler Street timber piles, another potential settlement concern

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Bulkhead Structural Analysis Check

Check Results of Bulkhead Analysis to ensure that Sheet Pile Stresses and Deflections are within allowable limits.

Allowable deflections will be based upon a maximum deflection criteria of $L / 150$ where L is equivalent to the distance from the mudline to the top of the bulkhead. Stresses in the sheetpile bulkheads due to moment will be checked against AISC criteria which calls for an allowable bending stress of $0.66 \times F_y$.

Input Data

$$\begin{aligned}
 F_y &= 50.0 \text{ ksi} && \text{ASTM A572, Grade 50 Steel} \\
 F_b &= 0.66 \times F_y \\
 &= 33.0 \text{ ksi}
 \end{aligned}$$

$$\begin{aligned}
 L_{\text{top}} &= 6.00 && \text{Top of Bulkhead Elevation} \\
 (L_{\text{bot}})_{A1} &= -19.33 && \text{Mudline Elevation, Section A1} \\
 (L_{\text{wall}})_{A1} &= L_{\text{top}} - (L_{\text{bot}})_{A1} && \text{Wall Height, Section A1} \\
 &= 25.33 \text{ ft}
 \end{aligned}$$

$$\begin{aligned}
 (\Delta_{\text{allow}})_{A1} &= (L_{\text{wall}})_{A1} / 150 \\
 &= 2.03 \text{ in}
 \end{aligned}$$

$$\begin{aligned}
 (L_{\text{bot}})_{A2} &= -22.50 && \text{Mudline Elevation, Section A2} \\
 (L_{\text{wall}})_{A2} &= L_{\text{top}} - (L_{\text{bot}})_{A2} && \text{Wall Height, Section A2} \\
 &= 28.50 \text{ ft}
 \end{aligned}$$

$$\begin{aligned}
 (\Delta_{\text{allow}})_{A2} &= (L_{\text{wall}})_{A2} / 150 \\
 &= 2.28 \text{ in}
 \end{aligned}$$

$$\begin{aligned}
 (L_{\text{bot}})_B &= -15.50 && \text{Mudline Elevation, Section B} \\
 (L_{\text{wall}})_B &= L_{\text{top}} - (L_{\text{bot}})_B && \text{Wall Height, Section B} \\
 &= 21.50 \text{ ft}
 \end{aligned}$$

$$\begin{aligned}
 (\Delta_{\text{allow}})_B &= (L_{\text{wall}})_B / 150 \\
 &= 1.72 \text{ in}
 \end{aligned}$$



Title:

Bulkhead Analysis - Butler Street

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$$(L_{\text{bot}})_C = -16.50 \quad \text{Mudline Elevation, Section C}$$

$$(L_{\text{wall}})_C = L_{\text{top}} - (L_{\text{bot}})_C \quad \text{Wall Height, Section C}$$

$$= 22.50 \text{ ft}$$

$$(\Delta_{\text{allow}})_C = (L_{\text{wall}})_C / 150$$

$$= 1.80 \text{ in}$$

Section A1 (Butler Street West) Analysis

For Cantilever Bulkhead Analysis

$$\Delta_{\text{cant}} = 0.93 \text{ in} \leq (\Delta_{\text{allow}})_{A1} \quad - \text{OK}$$

$$S_{\text{cant}} = 66.8 \text{ in}^3 \quad \text{Elastic Section Modulus, AZ 36-700N}$$

$$M_{\text{cant}} = 56.52 \text{ k-ft}$$

$$f_b = M_{\text{cant}} / S_{\text{cant}}$$

$$10.15 \text{ ksi} \leq F_b \quad - \text{OK}$$

Section A2 (Butler Street West - Near Flushing Tunnel) Analysis

For Cantilever Bulkhead Analysis

$$\Delta_{\text{cant}} = 1.53 \text{ in} \leq (\Delta_{\text{allow}})_{A2} \quad - \text{OK}$$

$$S_{\text{cant}} = 66.8 \text{ in}^3 \quad \text{Elastic Section Modulus, AZ 36-700N}$$

$$M_{\text{cant}} = 0.26 \text{ k-ft}$$

$$f_b = M_{\text{cant}} / S_{\text{cant}}$$

$$0.05 \text{ ksi} \leq F_b \quad - \text{OK}$$

Section B (CSO Outlet) Analysis

For Cantilever Bulkhead Analysis

$$\Delta_{\text{cant}} = 0.24 \text{ in} \leq (\Delta_{\text{allow}})_B \quad - \text{OK}$$

$$S_{\text{cant}} = 66.8 \text{ in}^3 \quad \text{Elastic Section Modulus, AZ 36-700N}$$

$$M_{\text{cant}} = 4.45 \text{ k-ft}$$

$$f_b = M_{\text{cant}} / S_{\text{cant}}$$

$$0.80 \text{ ksi} \leq F_b \quad - \text{OK}$$

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Section C (CSO Side Bulkheads) Analysis

For Cantilever Bulkhead Analysis (No Pile Support of Bulkhead Assumed)

For AZ 36-700N Sheet Pile Section

$$\Delta_{cant} = 2.04 \text{ in} > (\Delta_{allow})_B - \text{NO GOOD}$$

$$S_{cant} = 66.8 \text{ in}^3 \quad \text{Elastic Section Modulus, AZ 36-700N}$$

$$M_{cant} = 136.0 \text{ k-ft}$$

$$f_b = M_{cant} / S_{cant} = 24.43 \text{ ksi} \leq F_b - \text{OK}$$

For AZ 52-700N Sheet Pile Section

$$\Delta_{cant} = 1.40 \text{ in} \leq (\Delta_{allow})_B - \text{OK}$$

$$S_{cant} = 95.9 \text{ in}^3 \quad \text{Elastic Section Modulus, AZ 52-700N}$$

$$M_{cant} = 136.0 \text{ k-ft}$$

$$f_b = M_{cant} / S_{cant} = 17.02 \text{ ksi} \leq F_b - \text{OK}$$

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14 Global Slope Stability Analysis

Limit Equilibrium global slope stability analyses were performed using Spencer's Method as implemented in the Rocscience, Inc. computer program Slide. The program generates circular and non-circular potential failure surfaces and evaluates the factor of safety for each surface. The failure surface that has the lowest factor of safety is deemed by the program to be the controlling case.

The following assumptions are made in the Slide analysis:

1. Steel sheet piles are modelled as a 1-foot thick material with a 100 pcf unit weight and infinite strength.
2. Failure surface entry points are limited to the upland side of the bulkhead, and exit points are limited to the canal side of the bulkhead.

The target factor of safety for global slope stability was selected to be 1.3 for all cross sections as they are considered to be temporary conditions, consistent with the stability analysis of the bulkhead sections.

The factors of safety (FOS) that were the results of the Global Slope Stability Analyses for each loading condition and subsurface condition are summarized in the table below (and are included in Attachment B):

<i>Section</i>	<i>Location</i>	<i>Circular Failure</i>		<i>Non-Circular Failure</i>	
		<i>Drained</i>	<i>Undrained</i>	<i>Drained</i>	<i>Undrained</i>
A1	West Canal Wall Typical Section	2.091	2.078	1.530	1.503
A2	West Canal Wall Near Flushing Tunnel	1.872	1.854	1.512	1.483
B	North Wall (Head End of Canal) At CSO Outfall	4.782	4.742	1.357	1.432
C	North Wall (Head End of Canal) At Sides of CSO Outfall	3.558	3.571	2.568	2.571

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ATTACHMENT A: PHASE III DREDGE ANALYSES –
SECTIONS A1, A2, B & C

Z1	P1	Z2	P2	Slope
9	0	20	0.140	0.012727
20	0.140	25	0.229	0.017800
25	0.229	100	6.130	0.078675
36	0.385	100	0.385	0.000000
*	Sur-	charge		
8.855	0.000	10.120	0.059	0.046991
10.120	0.059	11.385	0.112	0.041168
11.385	0.112	12.650	0.152	0.031957
12.650	0.152	13.915	0.180	0.022287
13.915	0.180	15.180	0.198	0.013999
15.180	0.198	16.445	0.208	0.007667
16.445	0.208	17.710	0.212	0.003134
17.710	0.212	18.975	0.212	0.000006
18.975	0.212	20.240	0.209	-0.002107
20.240	0.209	21.505	0.204	-0.003511
21.505	0.204	22.770	0.199	-0.004429
22.770	0.199	24.035	0.192	-0.005010
24.035	0.192	25.300	0.186	-0.005358

25.300	0.186	27.830	0.179	-0.002772
27.830	0.179	30.360	0.172	-0.002808
30.360	0.172	32.890	0.164	-0.002803
32.890	0.164	35.420	0.157	-0.002769
35.420	0.157	37.950	0.151	-0.002714
37.950	0.151	40.480	0.144	-0.002645
40.480	0.144	43.010	0.137	-0.002565

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
25.33	0	26	0.175	0.2612
26	0.280	100	36.25	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	25.33	1.00

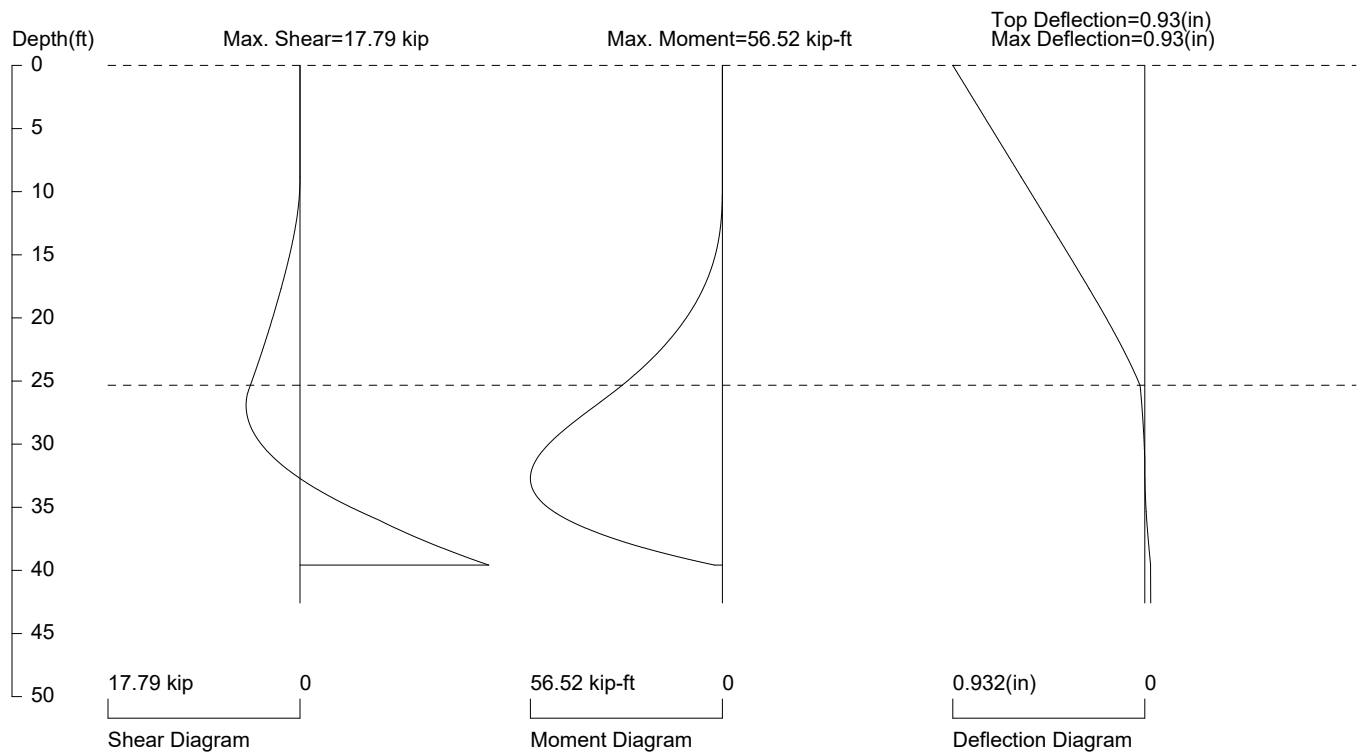
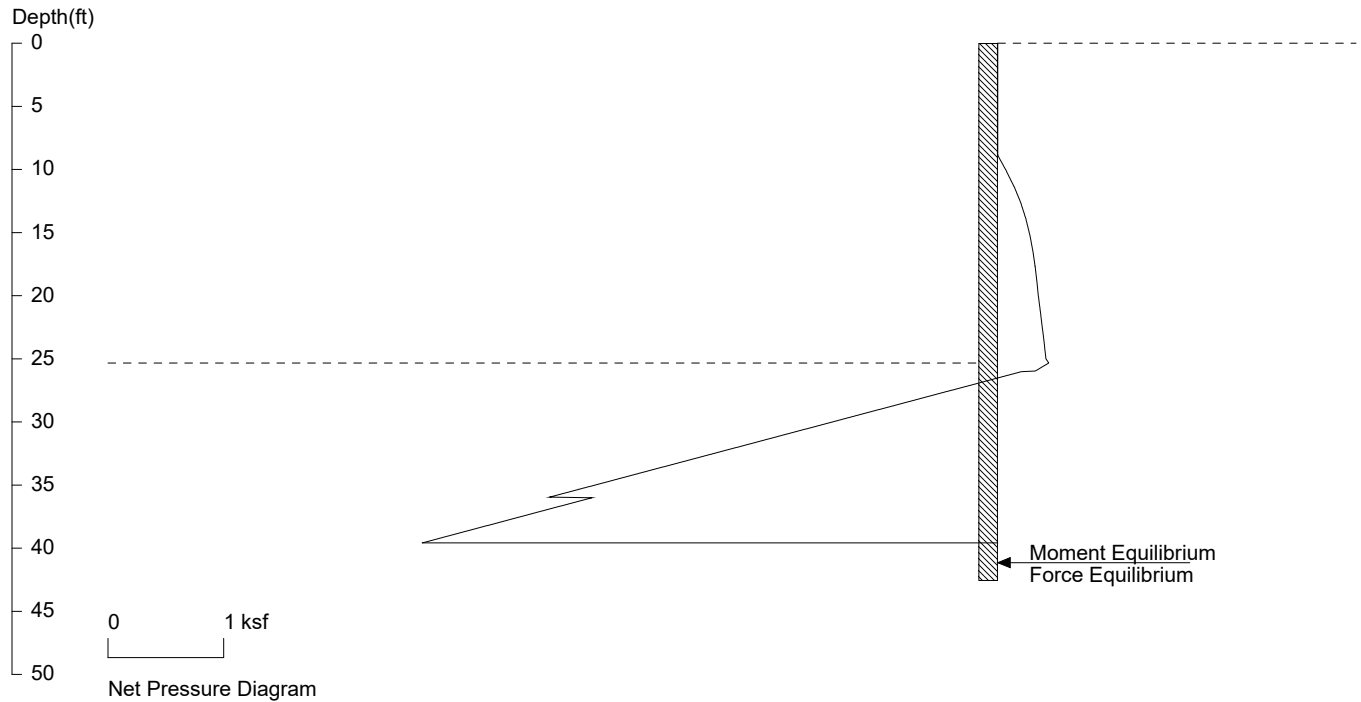
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street (West) Section A1

Phase III Dredge EI -19.33 DRAINED Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltech.com

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. Temporary Structures in Construction, Robert T. Ratay (Co-author of Chapter 7: John J. Peirce), McGraw-Hill. 2012
9. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft³, Deflection - in

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Street\SECTION A1 - Butler Street (West) (El -19.33)DRAINED Revised Mounding.sh8

Title: Butler Street (West) Section A1
Subtitle: Phase III Dredge El -19.33 DRAINED Revised Mounding

*****INPUT DATA*****

Wall Type: 1. Sheet Pile
Wall Height: 25.33
Pile Diameter: 1.00
Pile Spacing: 1.00
Factor of Safety (F.S.): 1.30
Lateral Support Type (Braces): 1. No
Top Brace Increase (Multi-Bracing): Add 15%*
Embedment Option: 1. Yes
Friction at Pile Tip: No
Pile Properties:
Steel Strength, Fy: 50 ksi = 345 MPa
Allowable Fb/Fy: 0.66
Elastic Module, E: 29000.00
Moment of Inertia, I: 656.2
User Input Pile:

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	9	0	20	0.140	0.012727
2	20	0.140	25	0.229	0.017800
3	25	0.229	100	6.130	0.078675
4	36	0.385	100	0.385	0.000000
5	*	Sur-	charge		
6	8.855	0.000	10.120	0.059	0.046991
7	10.120	0.059	11.385	0.112	0.041168
8	11.385	0.112	12.650	0.152	0.031957
9	12.650	0.152	13.915	0.180	0.022287
10	13.915	0.180	15.180	0.198	0.013999
11	15.180	0.198	16.445	0.208	0.007667
12	16.445	0.208	17.710	0.212	0.003134
13	17.710	0.212	18.975	0.212	0.000006
14	18.975	0.212	20.240	0.209	-0.002107
15	20.240	0.209	21.505	0.204	-0.003511
16	21.505	0.204	22.770	0.199	-0.004429
17	22.770	0.199	24.035	0.192	-0.005010
18	24.035	0.192	25.300	0.186	-0.005358
19	25.300	0.186	27.830	0.179	-0.002772
20	27.830	0.179	30.360	0.172	-0.002808
21	30.360	0.172	32.890	0.164	-0.002803
22	32.890	0.164	35.420	0.157	-0.002769
23	35.420	0.157	37.950	0.151	-0.002714
24	37.950	0.151	40.480	0.144	-0.002645
25	40.480	0.144	43.010	0.137	-0.002565
26	43.010	0.137	45.540	0.125	-0.004865
27	45.540	0.125	48.070	0.114	-0.004493
28	48.070	0.114	50.600	0.103	-0.004117
29	50.600	0.103	55.660	0.094	-0.001875
30	55.660	0.094	60.720	0.085	-0.001701
31	60.720	0.085	65.780	0.077	-0.001539
32	65.780	0.077	70.840	0.070	-0.001389
33	70.840	0.070	75.900	0.064	-0.001252
34	75.900	0.064	80.960	0.058	-0.001127
35	80.960	0.058	86.020	0.053	-0.001015
36	86.020	0.053	91.080	0.044	-0.001735
37	91.080	0.044	96.140	0.037	-0.001408
38	96.140	0.037	101.200	0.032	-0.001146

* PASSIVE PRESSURE *

The pressures below will be divided by a Factor of Safety =1.3

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	25.33	0	26	0.175	0.2612
2	26	0.280	100	36.25	0.4862

* ACTIVE SPACE *

No.	Z depth	Spacing
1	0.00	1.00
2	25.33	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
1	0.00	1.00

*For Tieback: Input1 = Diameter; Input2 = Bond Strength

*For Plate: Input1 = Diameter; Input2 = Allowable Pressure

*For Deadman: Input1 = Horz. Width; Input2 = Passive Pressure;

*For Sheet Pile Anchor: Input1 = Horz. Width; Input2 = Passive Slope;

*****CALCULATION*****

The calculated moment and shear are per pile spacing. Sheet piles are per one foot or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

```

      |      D1=0.00
      |
      |
==  ==  D2=25.33
      |
      |
      |      D3=42.58

```

D1 - TOP DEPTH

D2 - EXCAVATION BASE

D3 - PILE TIP

MOMENT equilibrium AT DEPTH=39.71 WITH EMBEDMENT OF 14.38

FORCE equilibrium AT DEPTH=42.58 WITH EMBEDMENT OF 17.25

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

*****RESULTS*****

* EMBEDMENT Notes *

Based on USS Design Manual, first calculate embedment for moment equilibrium, then increased the embedment to get the design depth.

The embedment for moment equilibrium is 14.38

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

The total design embedment is 17.25

Embedment Information:

If 20% increased, the total design embedment is 17.25

If 30% increased, the total design embedment is 18.69

If 40% increased, the total design embedment is 20.13

If 50% increased, the total design embedment is 21.56

* MOMENT IN PILE (per pile spacing)*

Pile Spacing: sheet piles are one foot or one meter; soldier piles are one pile.

Overall Maximum Moment = 56.52 at 32.73

Maximum Shear = 17.79

Moment and Shear are per pile spacing: 1.0 foot or meter

* VERTICAL LOADING *

Vertical Loading from Braces = 0.00

Vertical Loading from External Load = 0.00

Total Vertical Loading = 0.00

* DEFLECTION *

I (in⁴)/foot=656.20

Top deflection = 0.932(in)

Max. deflection = 0.932(in)

*****PRESSURE, LOAD, SHEAR, MOMENT, AND DEFLECTION v.s. DEPTH*****

The shear and moment are per single soldier pile (secant/tangent pile) or one foot of sheet pile (concrete wall). The deflection is based on users input pile below:

User Input I (Moment of Inertia)

Elastic Module, E (ksi)= 29000.00

Moment of Inertia, I (in⁴)/foot= 656.2

PRESS. - Sum of all pressures (Net pressure). (Active) direction is positive

LOAD - Liner load (force per unit depth) = Pressures multiply by acting space

No	DEPTH ft	PRESS. ksf	LOAD kip/ft	SHEAR kip	MOMENT kip-ft	DEFLECTION in
1	0.00	0.00	0.00	0.00	0.00	0.932

2	0.04	0.00	0.00	0.00	0.00	0.931
3	0.09	0.00	0.00	0.00	0.00	0.929
4	0.13	0.00	0.00	0.00	0.00	0.927
5	0.18	0.00	0.00	0.00	0.00	0.926
6	0.22	0.00	0.00	0.00	0.00	0.924
7	0.27	0.00	0.00	0.00	0.00	0.922
8	0.31	0.00	0.00	0.00	0.00	0.921
9	0.35	0.00	0.00	0.00	0.00	0.919
10	0.40	0.00	0.00	0.00	0.00	0.917
11	0.44	0.00	0.00	0.00	0.00	0.916
12	0.49	0.00	0.00	0.00	0.00	0.914
13	0.53	0.00	0.00	0.00	0.00	0.912
14	0.57	0.00	0.00	0.00	0.00	0.911
15	0.62	0.00	0.00	0.00	0.00	0.909
16	0.66	0.00	0.00	0.00	0.00	0.907
17	0.71	0.00	0.00	0.00	0.00	0.906
18	0.75	0.00	0.00	0.00	0.00	0.904
19	0.80	0.00	0.00	0.00	0.00	0.903
20	0.84	0.00	0.00	0.00	0.00	0.901
21	0.88	0.00	0.00	0.00	0.00	0.899
22	0.93	0.00	0.00	0.00	0.00	0.898
23	0.97	0.00	0.00	0.00	0.00	0.896
24	1.02	0.00	0.00	0.00	0.00	0.894
25	1.06	0.00	0.00	0.00	0.00	0.893
26	1.10	0.00	0.00	0.00	0.00	0.891
27	1.15	0.00	0.00	0.00	0.00	0.889
28	1.19	0.00	0.00	0.00	0.00	0.888
29	1.24	0.00	0.00	0.00	0.00	0.886
30	1.28	0.00	0.00	0.00	0.00	0.884
31	1.33	0.00	0.00	0.00	0.00	0.883
32	1.37	0.00	0.00	0.00	0.00	0.881
33	1.41	0.00	0.00	0.00	0.00	0.879
34	1.46	0.00	0.00	0.00	0.00	0.878
35	1.50	0.00	0.00	0.00	0.00	0.876
36	1.55	0.00	0.00	0.00	0.00	0.874
37	1.59	0.00	0.00	0.00	0.00	0.873
38	1.63	0.00	0.00	0.00	0.00	0.871
39	1.68	0.00	0.00	0.00	0.00	0.869
40	1.72	0.00	0.00	0.00	0.00	0.868
41	1.77	0.00	0.00	0.00	0.00	0.866
42	1.81	0.00	0.00	0.00	0.00	0.864
43	1.86	0.00	0.00	0.00	0.00	0.863
44	1.90	0.00	0.00	0.00	0.00	0.861
45	1.94	0.00	0.00	0.00	0.00	0.859
46	1.99	0.00	0.00	0.00	0.00	0.858
47	2.03	0.00	0.00	0.00	0.00	0.856
48	2.08	0.00	0.00	0.00	0.00	0.854
49	2.12	0.00	0.00	0.00	0.00	0.853
50	2.16	0.00	0.00	0.00	0.00	0.851
51	2.21	0.00	0.00	0.00	0.00	0.849

52	2.25	0.00	0.00	0.00	0.00	0.848
53	2.30	0.00	0.00	0.00	0.00	0.846
54	2.34	0.00	0.00	0.00	0.00	0.844
55	2.39	0.00	0.00	0.00	0.00	0.843
56	2.43	0.00	0.00	0.00	0.00	0.841
57	2.47	0.00	0.00	0.00	0.00	0.839
58	2.52	0.00	0.00	0.00	0.00	0.838
59	2.56	0.00	0.00	0.00	0.00	0.836
60	2.61	0.00	0.00	0.00	0.00	0.835
61	2.65	0.00	0.00	0.00	0.00	0.833
62	2.69	0.00	0.00	0.00	0.00	0.831
63	2.74	0.00	0.00	0.00	0.00	0.830
64	2.78	0.00	0.00	0.00	0.00	0.828
65	2.83	0.00	0.00	0.00	0.00	0.826
66	2.87	0.00	0.00	0.00	0.00	0.825
67	2.92	0.00	0.00	0.00	0.00	0.823
68	2.96	0.00	0.00	0.00	0.00	0.821
69	3.00	0.00	0.00	0.00	0.00	0.820
70	3.05	0.00	0.00	0.00	0.00	0.818
71	3.09	0.00	0.00	0.00	0.00	0.816
72	3.14	0.00	0.00	0.00	0.00	0.815
73	3.18	0.00	0.00	0.00	0.00	0.813
74	3.22	0.00	0.00	0.00	0.00	0.811
75	3.27	0.00	0.00	0.00	0.00	0.810
76	3.31	0.00	0.00	0.00	0.00	0.808
77	3.36	0.00	0.00	0.00	0.00	0.806
78	3.40	0.00	0.00	0.00	0.00	0.805
79	3.45	0.00	0.00	0.00	0.00	0.803
80	3.49	0.00	0.00	0.00	0.00	0.801
81	3.53	0.00	0.00	0.00	0.00	0.800
82	3.58	0.00	0.00	0.00	0.00	0.798
83	3.62	0.00	0.00	0.00	0.00	0.796
84	3.67	0.00	0.00	0.00	0.00	0.795
85	3.71	0.00	0.00	0.00	0.00	0.793
86	3.75	0.00	0.00	0.00	0.00	0.791
87	3.80	0.00	0.00	0.00	0.00	0.790
88	3.84	0.00	0.00	0.00	0.00	0.788
89	3.89	0.00	0.00	0.00	0.00	0.786
90	3.93	0.00	0.00	0.00	0.00	0.785
91	3.98	0.00	0.00	0.00	0.00	0.783
92	4.02	0.00	0.00	0.00	0.00	0.781
93	4.06	0.00	0.00	0.00	0.00	0.780
94	4.11	0.00	0.00	0.00	0.00	0.778
95	4.15	0.00	0.00	0.00	0.00	0.776
96	4.20	0.00	0.00	0.00	0.00	0.775
97	4.24	0.00	0.00	0.00	0.00	0.773
98	4.28	0.00	0.00	0.00	0.00	0.771
99	4.33	0.00	0.00	0.00	0.00	0.770
100	4.37	0.00	0.00	0.00	0.00	0.768
101	4.42	0.00	0.00	0.00	0.00	0.766

102	4.46	0.00	0.00	0.00	0.00	0.765
103	4.51	0.00	0.00	0.00	0.00	0.763
104	4.55	0.00	0.00	0.00	0.00	0.762
105	4.59	0.00	0.00	0.00	0.00	0.760
106	4.64	0.00	0.00	0.00	0.00	0.758
107	4.68	0.00	0.00	0.00	0.00	0.757
108	4.73	0.00	0.00	0.00	0.00	0.755
109	4.77	0.00	0.00	0.00	0.00	0.753
110	4.81	0.00	0.00	0.00	0.00	0.752
111	4.86	0.00	0.00	0.00	0.00	0.750
112	4.90	0.00	0.00	0.00	0.00	0.748
113	4.95	0.00	0.00	0.00	0.00	0.747
114	4.99	0.00	0.00	0.00	0.00	0.745
115	5.04	0.00	0.00	0.00	0.00	0.743
116	5.08	0.00	0.00	0.00	0.00	0.742
117	5.12	0.00	0.00	0.00	0.00	0.740
118	5.17	0.00	0.00	0.00	0.00	0.738
119	5.21	0.00	0.00	0.00	0.00	0.737
120	5.26	0.00	0.00	0.00	0.00	0.735
121	5.30	0.00	0.00	0.00	0.00	0.733
122	5.34	0.00	0.00	0.00	0.00	0.732
123	5.39	0.00	0.00	0.00	0.00	0.730
124	5.43	0.00	0.00	0.00	0.00	0.728
125	5.48	0.00	0.00	0.00	0.00	0.727
126	5.52	0.00	0.00	0.00	0.00	0.725
127	5.57	0.00	0.00	0.00	0.00	0.723
128	5.61	0.00	0.00	0.00	0.00	0.722
129	5.65	0.00	0.00	0.00	0.00	0.720
130	5.70	0.00	0.00	0.00	0.00	0.718
131	5.74	0.00	0.00	0.00	0.00	0.717
132	5.79	0.00	0.00	0.00	0.00	0.715
133	5.83	0.00	0.00	0.00	0.00	0.713
134	5.88	0.00	0.00	0.00	0.00	0.712
135	5.92	0.00	0.00	0.00	0.00	0.710
136	5.96	0.00	0.00	0.00	0.00	0.708
137	6.01	0.00	0.00	0.00	0.00	0.707
138	6.05	0.00	0.00	0.00	0.00	0.705
139	6.10	0.00	0.00	0.00	0.00	0.703
140	6.14	0.00	0.00	0.00	0.00	0.702
141	6.18	0.00	0.00	0.00	0.00	0.700
142	6.23	0.00	0.00	0.00	0.00	0.698
143	6.27	0.00	0.00	0.00	0.00	0.697
144	6.32	0.00	0.00	0.00	0.00	0.695
145	6.36	0.00	0.00	0.00	0.00	0.694
146	6.41	0.00	0.00	0.00	0.00	0.692
147	6.45	0.00	0.00	0.00	0.00	0.690
148	6.49	0.00	0.00	0.00	0.00	0.689
149	6.54	0.00	0.00	0.00	0.00	0.687
150	6.58	0.00	0.00	0.00	0.00	0.685
151	6.63	0.00	0.00	0.00	0.00	0.684

152	6.67	0.00	0.00	0.00	0.00	0.682
153	6.71	0.00	0.00	0.00	0.00	0.680
154	6.76	0.00	0.00	0.00	0.00	0.679
155	6.80	0.00	0.00	0.00	0.00	0.677
156	6.85	0.00	0.00	0.00	0.00	0.675
157	6.89	0.00	0.00	0.00	0.00	0.674
158	6.94	0.00	0.00	0.00	0.00	0.672
159	6.98	0.00	0.00	0.00	0.00	0.670
160	7.02	0.00	0.00	0.00	0.00	0.669
161	7.07	0.00	0.00	0.00	0.00	0.667
162	7.11	0.00	0.00	0.00	0.00	0.665
163	7.16	0.00	0.00	0.00	0.00	0.664
164	7.20	0.00	0.00	0.00	0.00	0.662
165	7.24	0.00	0.00	0.00	0.00	0.660
166	7.29	0.00	0.00	0.00	0.00	0.659
167	7.33	0.00	0.00	0.00	0.00	0.657
168	7.38	0.00	0.00	0.00	0.00	0.655
169	7.42	0.00	0.00	0.00	0.00	0.654
170	7.47	0.00	0.00	0.00	0.00	0.652
171	7.51	0.00	0.00	0.00	0.00	0.650
172	7.55	0.00	0.00	0.00	0.00	0.649
173	7.60	0.00	0.00	0.00	0.00	0.647
174	7.64	0.00	0.00	0.00	0.00	0.645
175	7.69	0.00	0.00	0.00	0.00	0.644
176	7.73	0.00	0.00	0.00	0.00	0.642
177	7.77	0.00	0.00	0.00	0.00	0.640
178	7.82	0.00	0.00	0.00	0.00	0.639
179	7.86	0.00	0.00	0.00	0.00	0.637
180	7.91	0.00	0.00	0.00	0.00	0.635
181	7.95	0.00	0.00	0.00	0.00	0.634
182	8.00	0.00	0.00	0.00	0.00	0.632
183	8.04	0.00	0.00	0.00	0.00	0.630
184	8.08	0.00	0.00	0.00	0.00	0.629
185	8.13	0.00	0.00	0.00	0.00	0.627
186	8.17	0.00	0.00	0.00	0.00	0.626
187	8.22	0.00	0.00	0.00	0.00	0.624
188	8.26	0.00	0.00	0.00	0.00	0.622
189	8.30	0.00	0.00	0.00	0.00	0.621
190	8.35	0.00	0.00	0.00	0.00	0.619
191	8.39	0.00	0.00	0.00	0.00	0.617
192	8.44	0.00	0.00	0.00	0.00	0.616
193	8.48	0.00	0.00	0.00	0.00	0.614
194	8.53	0.00	0.00	0.00	0.00	0.612
195	8.57	0.00	0.00	0.00	0.00	0.611
196	8.61	0.00	0.00	0.00	0.00	0.609
197	8.66	0.00	0.00	0.00	0.00	0.607
198	8.70	0.00	0.00	0.00	0.00	0.606
199	8.75	0.00	0.00	0.00	0.00	0.604
200	8.79	0.00	0.00	0.00	0.00	0.602
201	8.83	0.00	0.00	0.00	0.00	0.601

202	8.88	0.00	0.00	0.00	0.00	0.599
203	8.92	0.00	0.00	0.00	0.00	0.597
204	8.97	0.01	0.01	0.00	0.00	0.596
205	9.01	0.01	0.01	0.00	0.00	0.594
206	9.06	0.01	0.01	0.00	0.00	0.592
207	9.10	0.01	0.01	0.00	0.00	0.591
208	9.14	0.02	0.02	0.00	0.00	0.589
209	9.19	0.02	0.02	0.00	0.00	0.587
210	9.23	0.02	0.02	0.00	0.00	0.586
211	9.28	0.02	0.02	0.00	0.00	0.584
212	9.32	0.03	0.03	0.01	0.00	0.582
213	9.36	0.03	0.03	0.01	0.00	0.581
214	9.41	0.03	0.03	0.01	0.00	0.579
215	9.45	0.03	0.03	0.01	0.00	0.577
216	9.50	0.04	0.04	0.01	0.00	0.576
217	9.54	0.04	0.04	0.01	0.00	0.574
218	9.59	0.04	0.04	0.01	0.00	0.572
219	9.63	0.04	0.04	0.02	0.00	0.571
220	9.67	0.05	0.05	0.02	0.00	0.569
221	9.72	0.05	0.05	0.02	0.01	0.567
222	9.76	0.05	0.05	0.02	0.01	0.566
223	9.81	0.05	0.05	0.03	0.01	0.564
224	9.85	0.06	0.06	0.03	0.01	0.562
225	9.89	0.06	0.06	0.03	0.01	0.561
226	9.94	0.06	0.06	0.03	0.01	0.559
227	9.98	0.07	0.07	0.04	0.01	0.557
228	10.03	0.07	0.07	0.04	0.01	0.556
229	10.07	0.07	0.07	0.04	0.02	0.554
230	10.12	0.07	0.07	0.05	0.02	0.553
231	10.16	0.08	0.08	0.05	0.02	0.551
232	10.20	0.08	0.08	0.05	0.02	0.549
233	10.25	0.08	0.08	0.06	0.03	0.548
234	10.29	0.08	0.08	0.06	0.03	0.546
235	10.34	0.08	0.08	0.06	0.03	0.544
236	10.38	0.09	0.09	0.07	0.03	0.543
237	10.42	0.09	0.09	0.07	0.04	0.541
238	10.47	0.09	0.09	0.07	0.04	0.539
239	10.51	0.09	0.09	0.08	0.04	0.538
240	10.56	0.10	0.10	0.08	0.05	0.536
241	10.60	0.10	0.10	0.09	0.05	0.534
242	10.65	0.10	0.10	0.09	0.05	0.533
243	10.69	0.10	0.10	0.10	0.06	0.531
244	10.73	0.11	0.11	0.10	0.06	0.529
245	10.78	0.11	0.11	0.11	0.07	0.528
246	10.82	0.11	0.11	0.11	0.07	0.526
247	10.87	0.11	0.11	0.12	0.08	0.524
248	10.91	0.12	0.12	0.12	0.08	0.523
249	10.95	0.12	0.12	0.13	0.09	0.521
250	11.00	0.12	0.12	0.13	0.09	0.519
251	11.04	0.12	0.12	0.14	0.10	0.518

252	11.09	0.13	0.13	0.14	0.11	0.516
253	11.13	0.13	0.13	0.15	0.11	0.514
254	11.18	0.13	0.13	0.15	0.12	0.513
255	11.22	0.13	0.13	0.16	0.13	0.511
256	11.26	0.13	0.13	0.16	0.13	0.509
257	11.31	0.14	0.14	0.17	0.14	0.508
258	11.35	0.14	0.14	0.18	0.15	0.506
259	11.40	0.14	0.14	0.18	0.16	0.504
260	11.44	0.14	0.14	0.19	0.16	0.503
261	11.49	0.15	0.15	0.20	0.17	0.501
262	11.53	0.15	0.15	0.20	0.18	0.499
263	11.57	0.15	0.15	0.21	0.19	0.498
264	11.62	0.15	0.15	0.22	0.20	0.496
265	11.66	0.15	0.15	0.22	0.21	0.494
266	11.71	0.16	0.16	0.23	0.22	0.493
267	11.75	0.16	0.16	0.24	0.23	0.491
268	11.79	0.16	0.16	0.24	0.24	0.489
269	11.84	0.16	0.16	0.25	0.25	0.488
270	11.88	0.16	0.16	0.26	0.26	0.486
271	11.93	0.17	0.17	0.27	0.27	0.485
272	11.97	0.17	0.17	0.27	0.29	0.483
273	12.02	0.17	0.17	0.28	0.30	0.481
274	12.06	0.17	0.17	0.29	0.31	0.480
275	12.10	0.17	0.17	0.30	0.32	0.478
276	12.15	0.18	0.18	0.30	0.34	0.476
277	12.19	0.18	0.18	0.31	0.35	0.475
278	12.24	0.18	0.18	0.32	0.36	0.473
279	12.28	0.18	0.18	0.33	0.38	0.471
280	12.32	0.18	0.18	0.33	0.39	0.470
281	12.37	0.19	0.19	0.34	0.41	0.468
282	12.41	0.19	0.19	0.35	0.42	0.466
283	12.46	0.19	0.19	0.36	0.44	0.465
284	12.50	0.19	0.19	0.37	0.45	0.463
285	12.55	0.19	0.19	0.38	0.47	0.461
286	12.59	0.20	0.20	0.39	0.49	0.460
287	12.63	0.20	0.20	0.39	0.51	0.458
288	12.68	0.20	0.20	0.40	0.52	0.456
289	12.72	0.20	0.20	0.41	0.54	0.455
290	12.77	0.20	0.20	0.42	0.56	0.453
291	12.81	0.20	0.20	0.43	0.58	0.451
292	12.85	0.21	0.21	0.44	0.60	0.450
293	12.90	0.21	0.21	0.45	0.62	0.448
294	12.94	0.21	0.21	0.46	0.64	0.446
295	12.99	0.21	0.21	0.47	0.66	0.445
296	13.03	0.21	0.21	0.48	0.68	0.443
297	13.08	0.21	0.21	0.48	0.70	0.441
298	13.12	0.21	0.21	0.49	0.72	0.440
299	13.16	0.22	0.22	0.50	0.74	0.438
300	13.21	0.22	0.22	0.51	0.77	0.436
301	13.25	0.22	0.22	0.52	0.79	0.435

302	13.30	0.22	0.22	0.53	0.81	0.433
303	13.34	0.22	0.22	0.54	0.84	0.432
304	13.38	0.22	0.22	0.55	0.86	0.430
305	13.43	0.23	0.23	0.56	0.88	0.428
306	13.47	0.23	0.23	0.57	0.91	0.427
307	13.52	0.23	0.23	0.58	0.93	0.425
308	13.56	0.23	0.23	0.59	0.96	0.423
309	13.61	0.23	0.23	0.60	0.99	0.422
310	13.65	0.23	0.23	0.61	1.01	0.420
311	13.69	0.23	0.23	0.62	1.04	0.418
312	13.74	0.24	0.24	0.63	1.07	0.417
313	13.78	0.24	0.24	0.64	1.10	0.415
314	13.83	0.24	0.24	0.65	1.13	0.413
315	13.87	0.24	0.24	0.67	1.15	0.412
316	13.91	0.24	0.24	0.68	1.18	0.410
317	13.96	0.24	0.24	0.69	1.21	0.408
318	14.00	0.24	0.24	0.70	1.25	0.407
319	14.05	0.25	0.25	0.71	1.28	0.405
320	14.09	0.25	0.25	0.72	1.31	0.403
321	14.14	0.25	0.25	0.73	1.34	0.402
322	14.18	0.25	0.25	0.74	1.37	0.400
323	14.22	0.25	0.25	0.75	1.41	0.398
324	14.27	0.25	0.25	0.76	1.44	0.397
325	14.31	0.25	0.25	0.77	1.47	0.395
326	14.36	0.25	0.25	0.79	1.51	0.393
327	14.40	0.26	0.26	0.80	1.54	0.392
328	14.44	0.26	0.26	0.81	1.58	0.390
329	14.49	0.26	0.26	0.82	1.61	0.389
330	14.53	0.26	0.26	0.83	1.65	0.387
331	14.58	0.26	0.26	0.84	1.69	0.385
332	14.62	0.26	0.26	0.85	1.72	0.384
333	14.67	0.26	0.26	0.87	1.76	0.382
334	14.71	0.26	0.26	0.88	1.80	0.380
335	14.75	0.26	0.26	0.89	1.84	0.379
336	14.80	0.27	0.27	0.90	1.88	0.377
337	14.84	0.27	0.27	0.91	1.92	0.375
338	14.89	0.27	0.27	0.92	1.96	0.374
339	14.93	0.27	0.27	0.94	2.00	0.372
340	14.97	0.27	0.27	0.95	2.04	0.370
341	15.02	0.27	0.27	0.96	2.09	0.369
342	15.06	0.27	0.27	0.97	2.13	0.367
343	15.11	0.27	0.27	0.98	2.17	0.365
344	15.15	0.28	0.28	1.00	2.21	0.364
345	15.20	0.28	0.28	1.01	2.26	0.362
346	15.24	0.28	0.28	1.02	2.30	0.361
347	15.28	0.28	0.28	1.03	2.35	0.359
348	15.33	0.28	0.28	1.05	2.40	0.357
349	15.37	0.28	0.28	1.06	2.44	0.356
350	15.42	0.28	0.28	1.07	2.49	0.354
351	15.46	0.28	0.28	1.08	2.54	0.352

352	15.50	0.28	0.28	1.10	2.58	0.351
353	15.55	0.28	0.28	1.11	2.63	0.349
354	15.59	0.29	0.29	1.12	2.68	0.347
355	15.64	0.29	0.29	1.13	2.73	0.346
356	15.68	0.29	0.29	1.15	2.78	0.344
357	15.73	0.29	0.29	1.16	2.83	0.342
358	15.77	0.29	0.29	1.17	2.88	0.341
359	15.81	0.29	0.29	1.18	2.94	0.339
360	15.86	0.29	0.29	1.20	2.99	0.338
361	15.90	0.29	0.29	1.21	3.04	0.336
362	15.95	0.29	0.29	1.22	3.10	0.334
363	15.99	0.29	0.29	1.24	3.15	0.333
364	16.03	0.29	0.29	1.25	3.21	0.331
365	16.08	0.29	0.29	1.26	3.26	0.329
366	16.12	0.30	0.30	1.27	3.32	0.328
367	16.17	0.30	0.30	1.29	3.37	0.326
368	16.21	0.30	0.30	1.30	3.43	0.324
369	16.26	0.30	0.30	1.31	3.49	0.323
370	16.30	0.30	0.30	1.33	3.55	0.321
371	16.34	0.30	0.30	1.34	3.61	0.320
372	16.39	0.30	0.30	1.35	3.66	0.318
373	16.43	0.30	0.30	1.37	3.72	0.316
374	16.48	0.30	0.30	1.38	3.79	0.315
375	16.52	0.30	0.30	1.39	3.85	0.313
376	16.56	0.30	0.30	1.41	3.91	0.311
377	16.61	0.31	0.31	1.42	3.97	0.310
378	16.65	0.31	0.31	1.43	4.03	0.308
379	16.70	0.31	0.31	1.45	4.10	0.307
380	16.74	0.31	0.31	1.46	4.16	0.305
381	16.79	0.31	0.31	1.47	4.23	0.303
382	16.83	0.31	0.31	1.49	4.29	0.302
383	16.87	0.31	0.31	1.50	4.36	0.300
384	16.92	0.31	0.31	1.52	4.43	0.298
385	16.96	0.31	0.31	1.53	4.49	0.297
386	17.01	0.31	0.31	1.54	4.56	0.295
387	17.05	0.31	0.31	1.56	4.63	0.294
388	17.09	0.31	0.31	1.57	4.70	0.292
389	17.14	0.31	0.31	1.58	4.77	0.290
390	17.18	0.31	0.31	1.60	4.84	0.289
391	17.23	0.32	0.32	1.61	4.91	0.287
392	17.27	0.32	0.32	1.63	4.98	0.285
393	17.32	0.32	0.32	1.64	5.05	0.284
394	17.36	0.32	0.32	1.65	5.13	0.282
395	17.40	0.32	0.32	1.67	5.20	0.281
396	17.45	0.32	0.32	1.68	5.27	0.279
397	17.49	0.32	0.32	1.70	5.35	0.277
398	17.54	0.32	0.32	1.71	5.42	0.276
399	17.58	0.32	0.32	1.72	5.50	0.274
400	17.63	0.32	0.32	1.74	5.57	0.273
401	17.67	0.32	0.32	1.75	5.65	0.271

402	17.71	0.32	0.32	1.77	5.73	0.269
403	17.76	0.32	0.32	1.78	5.81	0.268
404	17.80	0.32	0.32	1.80	5.89	0.266
405	17.85	0.32	0.32	1.81	5.97	0.265
406	17.89	0.33	0.33	1.82	6.05	0.263
407	17.93	0.33	0.33	1.84	6.13	0.261
408	17.98	0.33	0.33	1.85	6.21	0.260
409	18.02	0.33	0.33	1.87	6.29	0.258
410	18.07	0.33	0.33	1.88	6.37	0.257
411	18.11	0.33	0.33	1.90	6.46	0.255
412	18.16	0.33	0.33	1.91	6.54	0.253
413	18.20	0.33	0.33	1.93	6.63	0.252
414	18.24	0.33	0.33	1.94	6.71	0.250
415	18.29	0.33	0.33	1.96	6.80	0.249
416	18.33	0.33	0.33	1.97	6.89	0.247
417	18.38	0.33	0.33	1.98	6.97	0.245
418	18.42	0.33	0.33	2.00	7.06	0.244
419	18.46	0.33	0.33	2.01	7.15	0.242
420	18.51	0.33	0.33	2.03	7.24	0.241
421	18.55	0.33	0.33	2.04	7.33	0.239
422	18.60	0.33	0.33	2.06	7.42	0.237
423	18.64	0.33	0.33	2.07	7.51	0.236
424	18.69	0.34	0.34	2.09	7.60	0.234
425	18.73	0.34	0.34	2.10	7.69	0.233
426	18.77	0.34	0.34	2.12	7.79	0.231
427	18.82	0.34	0.34	2.13	7.88	0.230
428	18.86	0.34	0.34	2.15	7.98	0.228
429	18.91	0.34	0.34	2.16	8.07	0.226
430	18.95	0.34	0.34	2.18	8.17	0.225
431	18.99	0.34	0.34	2.19	8.26	0.223
432	19.04	0.34	0.34	2.21	8.36	0.222
433	19.08	0.34	0.34	2.22	8.46	0.220
434	19.13	0.34	0.34	2.24	8.56	0.219
435	19.17	0.34	0.34	2.25	8.66	0.217
436	19.22	0.34	0.34	2.27	8.76	0.215
437	19.26	0.34	0.34	2.28	8.86	0.214
438	19.30	0.34	0.34	2.30	8.96	0.212
439	19.35	0.34	0.34	2.31	9.06	0.211
440	19.39	0.34	0.34	2.33	9.16	0.209
441	19.44	0.34	0.34	2.34	9.26	0.208
442	19.48	0.34	0.34	2.36	9.37	0.206
443	19.52	0.34	0.34	2.37	9.47	0.205
444	19.57	0.35	0.35	2.39	9.58	0.203
445	19.61	0.35	0.35	2.40	9.68	0.201
446	19.66	0.35	0.35	2.42	9.79	0.200
447	19.70	0.35	0.35	2.43	9.90	0.198
448	19.75	0.35	0.35	2.45	10.01	0.197
449	19.79	0.35	0.35	2.46	10.11	0.195
450	19.83	0.35	0.35	2.48	10.22	0.194
451	19.88	0.35	0.35	2.50	10.33	0.192

452	19.92	0.35	0.35	2.51	10.44	0.191
453	19.97	0.35	0.35	2.53	10.55	0.189
454	20.01	0.35	0.35	2.54	10.67	0.188
455	20.05	0.35	0.35	2.56	10.78	0.186
456	20.10	0.35	0.35	2.57	10.89	0.184
457	20.14	0.35	0.35	2.59	11.01	0.183
458	20.19	0.35	0.35	2.60	11.12	0.181
459	20.23	0.35	0.35	2.62	11.24	0.180
460	20.28	0.35	0.35	2.63	11.35	0.178
461	20.32	0.35	0.35	2.65	11.47	0.177
462	20.36	0.36	0.36	2.67	11.59	0.175
463	20.41	0.36	0.36	2.68	11.71	0.174
464	20.45	0.36	0.36	2.70	11.82	0.172
465	20.50	0.36	0.36	2.71	11.94	0.171
466	20.54	0.36	0.36	2.73	12.06	0.169
467	20.58	0.36	0.36	2.75	12.18	0.168
468	20.63	0.36	0.36	2.76	12.31	0.166
469	20.67	0.36	0.36	2.78	12.43	0.165
470	20.72	0.36	0.36	2.79	12.55	0.163
471	20.76	0.36	0.36	2.81	12.68	0.162
472	20.81	0.36	0.36	2.82	12.80	0.160
473	20.85	0.36	0.36	2.84	12.92	0.159
474	20.89	0.36	0.36	2.86	13.05	0.157
475	20.94	0.36	0.36	2.87	13.18	0.156
476	20.98	0.36	0.36	2.89	13.30	0.154
477	21.03	0.36	0.36	2.90	13.43	0.153
478	21.07	0.37	0.37	2.92	13.56	0.151
479	21.11	0.37	0.37	2.94	13.69	0.150
480	21.16	0.37	0.37	2.95	13.82	0.148
481	21.20	0.37	0.37	2.97	13.95	0.147
482	21.25	0.37	0.37	2.99	14.08	0.145
483	21.29	0.37	0.37	3.00	14.21	0.144
484	21.34	0.37	0.37	3.02	14.35	0.142
485	21.38	0.37	0.37	3.03	14.48	0.141
486	21.42	0.37	0.37	3.05	14.62	0.140
487	21.47	0.37	0.37	3.07	14.75	0.138
488	21.51	0.37	0.37	3.08	14.89	0.137
489	21.56	0.37	0.37	3.10	15.02	0.135
490	21.60	0.37	0.37	3.12	15.16	0.134
491	21.64	0.37	0.37	3.13	15.30	0.132
492	21.69	0.37	0.37	3.15	15.44	0.131
493	21.73	0.37	0.37	3.17	15.58	0.129
494	21.78	0.37	0.37	3.18	15.72	0.128
495	21.82	0.38	0.38	3.20	15.86	0.127
496	21.87	0.38	0.38	3.22	16.00	0.125
497	21.91	0.38	0.38	3.23	16.14	0.124
498	21.95	0.38	0.38	3.25	16.29	0.122
499	22.00	0.38	0.38	3.27	16.43	0.121
500	22.04	0.38	0.38	3.28	16.57	0.119
501	22.09	0.38	0.38	3.30	16.72	0.118

502	22.13	0.38	0.38	3.32	16.87	0.117
503	22.17	0.38	0.38	3.33	17.01	0.115
504	22.22	0.38	0.38	3.35	17.16	0.114
505	22.26	0.38	0.38	3.37	17.31	0.112
506	22.31	0.38	0.38	3.38	17.46	0.111
507	22.35	0.38	0.38	3.40	17.61	0.109
508	22.40	0.38	0.38	3.42	17.76	0.108
509	22.44	0.38	0.38	3.43	17.91	0.107
510	22.48	0.38	0.38	3.45	18.06	0.105
511	22.53	0.38	0.38	3.47	18.21	0.104
512	22.57	0.39	0.39	3.48	18.37	0.102
513	22.62	0.39	0.39	3.50	18.52	0.101
514	22.66	0.39	0.39	3.52	18.68	0.100
515	22.70	0.39	0.39	3.54	18.83	0.098
516	22.75	0.39	0.39	3.55	18.99	0.097
517	22.79	0.39	0.39	3.57	19.15	0.096
518	22.84	0.39	0.39	3.59	19.30	0.094
519	22.88	0.39	0.39	3.60	19.46	0.093
520	22.93	0.39	0.39	3.62	19.62	0.091
521	22.97	0.39	0.39	3.64	19.78	0.090
522	23.01	0.39	0.39	3.66	19.94	0.089
523	23.06	0.39	0.39	3.67	20.11	0.087
524	23.10	0.39	0.39	3.69	20.27	0.086
525	23.15	0.39	0.39	3.71	20.43	0.085
526	23.19	0.39	0.39	3.73	20.60	0.083
527	23.23	0.39	0.39	3.74	20.76	0.082
528	23.28	0.39	0.39	3.76	20.93	0.081
529	23.32	0.40	0.40	3.78	21.09	0.079
530	23.37	0.40	0.40	3.79	21.26	0.078
531	23.41	0.40	0.40	3.81	21.43	0.077
532	23.46	0.40	0.40	3.83	21.60	0.075
533	23.50	0.40	0.40	3.85	21.77	0.074
534	23.54	0.40	0.40	3.86	21.94	0.073
535	23.59	0.40	0.40	3.88	22.11	0.071
536	23.63	0.40	0.40	3.90	22.28	0.070
537	23.68	0.40	0.40	3.92	22.45	0.069
538	23.72	0.40	0.40	3.94	22.63	0.068
539	23.77	0.40	0.40	3.95	22.80	0.066
540	23.81	0.40	0.40	3.97	22.98	0.065
541	23.85	0.40	0.40	3.99	23.15	0.064
542	23.90	0.40	0.40	4.01	23.33	0.062
543	23.94	0.40	0.40	4.02	23.50	0.061
544	23.99	0.40	0.40	4.04	23.68	0.060
545	24.03	0.40	0.40	4.06	23.86	0.059
546	24.07	0.40	0.40	4.08	24.04	0.057
547	24.12	0.40	0.40	4.10	24.22	0.056
548	24.16	0.41	0.41	4.11	24.40	0.055
549	24.21	0.41	0.41	4.13	24.59	0.054
550	24.25	0.41	0.41	4.15	24.77	0.052
551	24.30	0.41	0.41	4.17	24.95	0.051

552	24.34	0.41	0.41	4.19	25.14	0.050
553	24.38	0.41	0.41	4.20	25.32	0.049
554	24.43	0.41	0.41	4.22	25.51	0.047
555	24.47	0.41	0.41	4.24	25.69	0.046
556	24.52	0.41	0.41	4.26	25.88	0.045
557	24.56	0.41	0.41	4.28	26.07	0.044
558	24.60	0.41	0.41	4.29	26.26	0.043
559	24.65	0.41	0.41	4.31	26.45	0.041
560	24.69	0.41	0.41	4.33	26.64	0.040
561	24.74	0.41	0.41	4.35	26.83	0.039
562	24.78	0.41	0.41	4.37	27.03	0.038
563	24.83	0.41	0.41	4.38	27.22	0.037
564	24.87	0.41	0.41	4.40	27.41	0.035
565	24.91	0.41	0.41	4.42	27.61	0.034
566	24.96	0.42	0.42	4.44	27.80	0.033
567	25.00	0.42	0.42	4.46	28.00	0.032
568	25.05	0.42	0.42	4.48	28.20	0.031
569	25.09	0.42	0.42	4.50	28.40	0.030
570	25.13	0.43	0.43	4.51	28.59	0.028
571	25.18	0.43	0.43	4.53	28.79	0.027
572	25.22	0.43	0.43	4.55	28.99	0.026
573	25.27	0.44	0.44	4.57	29.20	0.025
574	25.31	0.44	0.44	4.59	29.40	0.024
575	25.36	0.44	0.44	4.61	29.60	0.023
576	25.40	0.43	0.43	4.63	29.81	0.022
577	25.44	0.42	0.42	4.65	30.01	0.022
578	25.49	0.41	0.41	4.67	30.22	0.022
579	25.53	0.40	0.40	4.69	30.42	0.022
580	25.58	0.40	0.40	4.70	30.63	0.021
581	25.62	0.39	0.39	4.72	30.84	0.021
582	25.66	0.38	0.38	4.74	31.05	0.021
583	25.71	0.37	0.37	4.76	31.26	0.021
584	25.75	0.36	0.36	4.77	31.47	0.020
585	25.80	0.35	0.35	4.79	31.68	0.020
586	25.84	0.35	0.35	4.81	31.89	0.020
587	25.89	0.34	0.34	4.82	32.10	0.020
588	25.93	0.33	0.33	4.84	32.32	0.020
589	25.97	0.32	0.32	4.86	32.53	0.019
590	26.02	0.20	0.20	4.87	32.75	0.019
591	26.06	0.19	0.19	4.88	32.96	0.019
592	26.11	0.17	0.17	4.89	33.18	0.019
593	26.15	0.15	0.15	4.90	33.39	0.018
594	26.19	0.13	0.13	4.91	33.61	0.018
595	26.24	0.11	0.11	4.92	33.83	0.018
596	26.28	0.10	0.10	4.93	34.05	0.018
597	26.33	0.08	0.08	4.94	34.26	0.017
598	26.37	0.06	0.06	4.95	34.48	0.017
599	26.42	0.04	0.04	4.96	34.70	0.017
600	26.46	0.02	0.02	4.96	34.92	0.017
601	26.50	0.01	0.01	4.97	35.14	0.017

602	26.55	-0.01	-0.01	4.97	35.36	0.016
603	26.59	-0.03	-0.03	4.98	35.58	0.016
604	26.64	-0.05	-0.05	4.98	35.80	0.016
605	26.68	-0.07	-0.07	4.99	36.02	0.016
606	26.72	-0.09	-0.09	4.99	36.24	0.015
607	26.77	-0.10	-0.10	4.99	36.46	0.015
608	26.81	-0.12	-0.12	4.99	36.68	0.015
609	26.86	-0.14	-0.14	4.99	36.90	0.015
610	26.90	-0.16	-0.16	4.99	37.12	0.015
611	26.95	-0.18	-0.18	4.99	37.34	0.014
612	26.99	-0.19	-0.19	4.99	37.56	0.014
613	27.03	-0.21	-0.21	4.99	37.78	0.014
614	27.08	-0.23	-0.23	4.99	38.00	0.014
615	27.12	-0.25	-0.25	4.99	38.22	0.014
616	27.17	-0.27	-0.27	4.99	38.44	0.013
617	27.21	-0.28	-0.28	4.98	38.66	0.013
618	27.25	-0.30	-0.30	4.98	38.88	0.013
619	27.30	-0.32	-0.32	4.97	39.10	0.013
620	27.34	-0.34	-0.34	4.97	39.32	0.013
621	27.39	-0.36	-0.36	4.96	39.54	0.012
622	27.43	-0.38	-0.38	4.96	39.76	0.012
623	27.48	-0.39	-0.39	4.95	39.98	0.012
624	27.52	-0.41	-0.41	4.94	40.20	0.012
625	27.56	-0.43	-0.43	4.93	40.42	0.012
626	27.61	-0.45	-0.45	4.92	40.63	0.011
627	27.65	-0.47	-0.47	4.92	40.85	0.011
628	27.70	-0.48	-0.48	4.91	41.07	0.011
629	27.74	-0.50	-0.50	4.90	41.29	0.011
630	27.78	-0.52	-0.52	4.88	41.50	0.011
631	27.83	-0.54	-0.54	4.87	41.72	0.010
632	27.87	-0.56	-0.56	4.86	41.93	0.010
633	27.92	-0.57	-0.57	4.85	42.15	0.010
634	27.96	-0.59	-0.59	4.83	42.36	0.010
635	28.01	-0.61	-0.61	4.82	42.57	0.010
636	28.05	-0.63	-0.63	4.81	42.79	0.009
637	28.09	-0.65	-0.65	4.79	43.00	0.009
638	28.14	-0.67	-0.67	4.78	43.21	0.009
639	28.18	-0.68	-0.68	4.76	43.42	0.009
640	28.23	-0.70	-0.70	4.74	43.63	0.009
641	28.27	-0.72	-0.72	4.73	43.84	0.009
642	28.31	-0.74	-0.74	4.71	44.05	0.008
643	28.36	-0.76	-0.76	4.69	44.25	0.008
644	28.40	-0.77	-0.77	4.67	44.46	0.008
645	28.45	-0.79	-0.79	4.65	44.67	0.008
646	28.49	-0.81	-0.81	4.63	44.87	0.008
647	28.54	-0.83	-0.83	4.61	45.08	0.008
648	28.58	-0.85	-0.85	4.59	45.28	0.007
649	28.62	-0.86	-0.86	4.56	45.48	0.007
650	28.67	-0.88	-0.88	4.54	45.68	0.007
651	28.71	-0.90	-0.90	4.52	45.88	0.007

652	28.76	-0.92	-0.92	4.50	46.08	0.007
653	28.80	-0.94	-0.94	4.47	46.28	0.007
654	28.84	-0.96	-0.96	4.45	46.48	0.006
655	28.89	-0.97	-0.97	4.42	46.67	0.006
656	28.93	-0.99	-0.99	4.39	46.87	0.006
657	28.98	-1.01	-1.01	4.37	47.06	0.006
658	29.02	-1.03	-1.03	4.34	47.25	0.006
659	29.07	-1.05	-1.05	4.31	47.44	0.006
660	29.11	-1.06	-1.06	4.28	47.63	0.006
661	29.15	-1.08	-1.08	4.25	47.82	0.005
662	29.20	-1.10	-1.10	4.23	48.01	0.005
663	29.24	-1.12	-1.12	4.20	48.20	0.005
664	29.29	-1.14	-1.14	4.16	48.38	0.005
665	29.33	-1.15	-1.15	4.13	48.56	0.005
666	29.37	-1.17	-1.17	4.10	48.75	0.005
667	29.42	-1.19	-1.19	4.07	48.93	0.005
668	29.46	-1.21	-1.21	4.04	49.11	0.004
669	29.51	-1.23	-1.23	4.00	49.28	0.004
670	29.55	-1.25	-1.25	3.97	49.46	0.004
671	29.60	-1.26	-1.26	3.93	49.63	0.004
672	29.64	-1.28	-1.28	3.90	49.81	0.004
673	29.68	-1.30	-1.30	3.86	49.98	0.004
674	29.73	-1.32	-1.32	3.82	50.15	0.004
675	29.77	-1.34	-1.34	3.79	50.32	0.004
676	29.82	-1.35	-1.35	3.75	50.48	0.003
677	29.86	-1.37	-1.37	3.71	50.65	0.003
678	29.90	-1.39	-1.39	3.67	50.81	0.003
679	29.95	-1.41	-1.41	3.63	50.97	0.003
680	29.99	-1.43	-1.43	3.59	51.13	0.003
681	30.04	-1.44	-1.44	3.55	51.29	0.003
682	30.08	-1.46	-1.46	3.51	51.44	0.003
683	30.13	-1.48	-1.48	3.47	51.60	0.003
684	30.17	-1.50	-1.50	3.43	51.75	0.003
685	30.21	-1.52	-1.52	3.38	51.90	0.002
686	30.26	-1.54	-1.54	3.34	52.05	0.002
687	30.30	-1.55	-1.55	3.30	52.20	0.002
688	30.35	-1.57	-1.57	3.25	52.34	0.002
689	30.39	-1.59	-1.59	3.21	52.48	0.002
690	30.44	-1.61	-1.61	3.16	52.62	0.002
691	30.48	-1.63	-1.63	3.11	52.76	0.002
692	30.52	-1.64	-1.64	3.07	52.90	0.002
693	30.57	-1.66	-1.66	3.02	53.03	0.002
694	30.61	-1.68	-1.68	2.97	53.17	0.001
695	30.66	-1.70	-1.70	2.92	53.30	0.001
696	30.70	-1.72	-1.72	2.87	53.42	0.001
697	30.74	-1.73	-1.73	2.82	53.55	0.001
698	30.79	-1.75	-1.75	2.77	53.67	0.001
699	30.83	-1.77	-1.77	2.72	53.79	0.001
700	30.88	-1.79	-1.79	2.67	53.91	0.001
701	30.92	-1.81	-1.81	2.62	54.03	0.001

702	30.97	-1.83	-1.83	2.56	54.14	0.001
703	31.01	-1.84	-1.84	2.51	54.26	0.001
704	31.05	-1.86	-1.86	2.46	54.37	0.000
705	31.10	-1.88	-1.88	2.40	54.47	0.000
706	31.14	-1.90	-1.90	2.35	54.58	0.000
707	31.19	-1.92	-1.92	2.29	54.68	0.000
708	31.23	-1.93	-1.93	2.23	54.78	0.000
709	31.27	-1.95	-1.95	2.18	54.88	0.000
710	31.32	-1.97	-1.97	2.12	54.97	0.000
711	31.36	-1.99	-1.99	2.06	55.07	0.000
712	31.41	-2.01	-2.01	2.00	55.16	0.000
713	31.45	-2.02	-2.02	1.94	55.24	0.000
714	31.50	-2.04	-2.04	1.88	55.33	0.000
715	31.54	-2.06	-2.06	1.82	55.41	0.000
716	31.58	-2.08	-2.08	1.76	55.49	0.000
717	31.63	-2.10	-2.10	1.70	55.56	0.000
718	31.67	-2.12	-2.12	1.64	55.64	0.000
719	31.72	-2.13	-2.13	1.58	55.71	0.000
720	31.76	-2.15	-2.15	1.51	55.78	0.000
721	31.80	-2.17	-2.17	1.45	55.84	0.000
722	31.85	-2.19	-2.19	1.38	55.91	0.000
723	31.89	-2.21	-2.21	1.32	55.97	0.000
724	31.94	-2.22	-2.22	1.25	56.02	0.000
725	31.98	-2.24	-2.24	1.19	56.08	0.000
726	32.03	-2.26	-2.26	1.12	56.13	0.000
727	32.07	-2.28	-2.28	1.05	56.17	0.000
728	32.11	-2.30	-2.30	0.98	56.22	0.000
729	32.16	-2.31	-2.31	0.92	56.26	0.000
730	32.20	-2.33	-2.33	0.85	56.30	0.000
731	32.25	-2.35	-2.35	0.78	56.34	0.000
732	32.29	-2.37	-2.37	0.71	56.37	0.000
733	32.33	-2.39	-2.39	0.64	56.40	0.000
734	32.38	-2.41	-2.41	0.56	56.43	0.000
735	32.42	-2.42	-2.42	0.49	56.45	0.000
736	32.47	-2.44	-2.44	0.42	56.47	0.000
737	32.51	-2.46	-2.46	0.35	56.49	0.000
738	32.56	-2.48	-2.48	0.27	56.50	0.000
739	32.60	-2.50	-2.50	0.20	56.51	0.000
740	32.64	-2.51	-2.51	0.12	56.52	0.000
741	32.69	-2.53	-2.53	0.05	56.52	0.000
742	32.73	-2.55	-2.55	-0.03	56.52	0.000
743	32.78	-2.57	-2.57	-0.11	56.52	0.000
744	32.82	-2.59	-2.59	-0.18	56.51	-0.001
745	32.86	-2.60	-2.60	-0.26	56.50	-0.001
746	32.91	-2.62	-2.62	-0.34	56.49	-0.001
747	32.95	-2.64	-2.64	-0.42	56.47	-0.001
748	33.00	-2.66	-2.66	-0.50	56.45	-0.001
749	33.04	-2.68	-2.68	-0.58	56.43	-0.001
750	33.09	-2.70	-2.70	-0.66	56.40	-0.001
751	33.13	-2.71	-2.71	-0.74	56.37	-0.001

752	33.17	-2.73	-2.73	-0.82	56.34	-0.001
753	33.22	-2.75	-2.75	-0.90	56.30	-0.001
754	33.26	-2.77	-2.77	-0.99	56.26	-0.001
755	33.31	-2.79	-2.79	-1.07	56.21	-0.001
756	33.35	-2.81	-2.81	-1.16	56.16	-0.001
757	33.39	-2.82	-2.82	-1.24	56.11	-0.001
758	33.44	-2.84	-2.84	-1.33	56.05	-0.001
759	33.48	-2.86	-2.86	-1.41	55.99	-0.002
760	33.53	-2.88	-2.88	-1.50	55.93	-0.002
761	33.57	-2.90	-2.90	-1.59	55.86	-0.002
762	33.62	-2.91	-2.91	-1.67	55.79	-0.002
763	33.66	-2.93	-2.93	-1.76	55.71	-0.002
764	33.70	-2.95	-2.95	-1.85	55.63	-0.002
765	33.75	-2.97	-2.97	-1.94	55.55	-0.002
766	33.79	-2.99	-2.99	-2.03	55.46	-0.002
767	33.84	-3.00	-3.00	-2.12	55.37	-0.002
768	33.88	-3.02	-3.02	-2.21	55.27	-0.002
769	33.92	-3.04	-3.04	-2.31	55.17	-0.002
770	33.97	-3.06	-3.06	-2.40	55.07	-0.003
771	34.01	-3.08	-3.08	-2.49	54.96	-0.003
772	34.06	-3.10	-3.10	-2.58	54.85	-0.003
773	34.10	-3.11	-3.11	-2.68	54.73	-0.003
774	34.15	-3.13	-3.13	-2.77	54.61	-0.003
775	34.19	-3.15	-3.15	-2.87	54.49	-0.003
776	34.23	-3.17	-3.17	-2.97	54.36	-0.003
777	34.28	-3.19	-3.19	-3.06	54.22	-0.003
778	34.32	-3.20	-3.20	-3.16	54.09	-0.003
779	34.37	-3.22	-3.22	-3.26	53.95	-0.004
780	34.41	-3.24	-3.24	-3.35	53.80	-0.004
781	34.45	-3.26	-3.26	-3.45	53.65	-0.004
782	34.50	-3.28	-3.28	-3.55	53.49	-0.004
783	34.54	-3.29	-3.29	-3.65	53.33	-0.004
784	34.59	-3.31	-3.31	-3.75	53.17	-0.004
785	34.63	-3.33	-3.33	-3.86	53.00	-0.004
786	34.68	-3.35	-3.35	-3.96	52.83	-0.004
787	34.72	-3.37	-3.37	-4.06	52.65	-0.005
788	34.76	-3.39	-3.39	-4.16	52.47	-0.005
789	34.81	-3.40	-3.40	-4.27	52.29	-0.005
790	34.85	-3.42	-3.42	-4.37	52.10	-0.005
791	34.90	-3.44	-3.44	-4.47	51.90	-0.005
792	34.94	-3.46	-3.46	-4.58	51.70	-0.005
793	34.98	-3.48	-3.48	-4.69	51.50	-0.005
794	35.03	-3.49	-3.49	-4.79	51.29	-0.006
795	35.07	-3.51	-3.51	-4.90	51.07	-0.006
796	35.12	-3.53	-3.53	-5.01	50.85	-0.006
797	35.16	-3.55	-3.55	-5.11	50.63	-0.006
798	35.21	-3.57	-3.57	-5.22	50.40	-0.006
799	35.25	-3.58	-3.58	-5.33	50.17	-0.006
800	35.29	-3.60	-3.60	-5.44	49.93	-0.007
801	35.34	-3.62	-3.62	-5.55	49.69	-0.007

802	35.38	-3.64	-3.64	-5.66	49.44	-0.007
803	35.43	-3.66	-3.66	-5.78	49.19	-0.007
804	35.47	-3.68	-3.68	-5.89	48.93	-0.007
805	35.51	-3.69	-3.69	-6.00	48.67	-0.007
806	35.56	-3.71	-3.71	-6.11	48.40	-0.008
807	35.60	-3.73	-3.73	-6.23	48.13	-0.008
808	35.65	-3.75	-3.75	-6.34	47.85	-0.008
809	35.69	-3.77	-3.77	-6.46	47.57	-0.008
810	35.74	-3.78	-3.78	-6.57	47.28	-0.008
811	35.78	-3.80	-3.80	-6.69	46.99	-0.008
812	35.82	-3.82	-3.82	-6.81	46.69	-0.009
813	35.87	-3.84	-3.84	-6.92	46.38	-0.009
814	35.91	-3.86	-3.86	-7.04	46.08	-0.009
815	35.96	-3.87	-3.87	-7.16	45.76	-0.009
816	36.00	-3.51	-3.51	-7.28	45.44	-0.009
817	36.05	-3.53	-3.53	-7.38	45.12	-0.009
818	36.09	-3.54	-3.54	-7.49	44.79	-0.010
819	36.13	-3.56	-3.56	-7.59	44.46	-0.010
820	36.18	-3.58	-3.58	-7.70	44.12	-0.010
821	36.22	-3.60	-3.60	-7.80	43.78	-0.010
822	36.27	-3.62	-3.62	-7.91	43.43	-0.010
823	36.31	-3.63	-3.63	-8.01	43.08	-0.011
824	36.35	-3.65	-3.65	-8.12	42.72	-0.011
825	36.40	-3.67	-3.67	-8.23	42.36	-0.011
826	36.44	-3.69	-3.69	-8.33	42.00	-0.011
827	36.49	-3.71	-3.71	-8.44	41.62	-0.011
828	36.53	-3.72	-3.72	-8.55	41.25	-0.012
829	36.58	-3.74	-3.74	-8.66	40.87	-0.012
830	36.62	-3.76	-3.76	-8.77	40.48	-0.012
831	36.66	-3.78	-3.78	-8.88	40.09	-0.012
832	36.71	-3.80	-3.80	-9.00	39.70	-0.012
833	36.75	-3.82	-3.82	-9.11	39.30	-0.013
834	36.80	-3.83	-3.83	-9.22	38.89	-0.013
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836	36.88	-3.87	-3.87	-9.45	38.07	-0.013
837	36.93	-3.89	-3.89	-9.56	37.65	-0.014
838	36.97	-3.91	-3.91	-9.68	37.23	-0.014
839	37.02	-3.92	-3.92	-9.79	36.80	-0.014
840	37.06	-3.94	-3.94	-9.91	36.36	-0.014
841	37.11	-3.96	-3.96	-10.03	35.92	-0.014
842	37.15	-3.98	-3.98	-10.14	35.47	-0.015
843	37.19	-4.00	-4.00	-10.26	35.02	-0.015
844	37.24	-4.01	-4.01	-10.38	34.57	-0.015
845	37.28	-4.03	-4.03	-10.50	34.11	-0.015
846	37.33	-4.05	-4.05	-10.62	33.64	-0.016
847	37.37	-4.07	-4.07	-10.74	33.17	-0.016
848	37.41	-4.09	-4.09	-10.86	32.69	-0.016
849	37.46	-4.11	-4.11	-10.98	32.21	-0.016
850	37.50	-4.12	-4.12	-11.10	31.72	-0.016
851	37.55	-4.14	-4.14	-11.22	31.23	-0.017

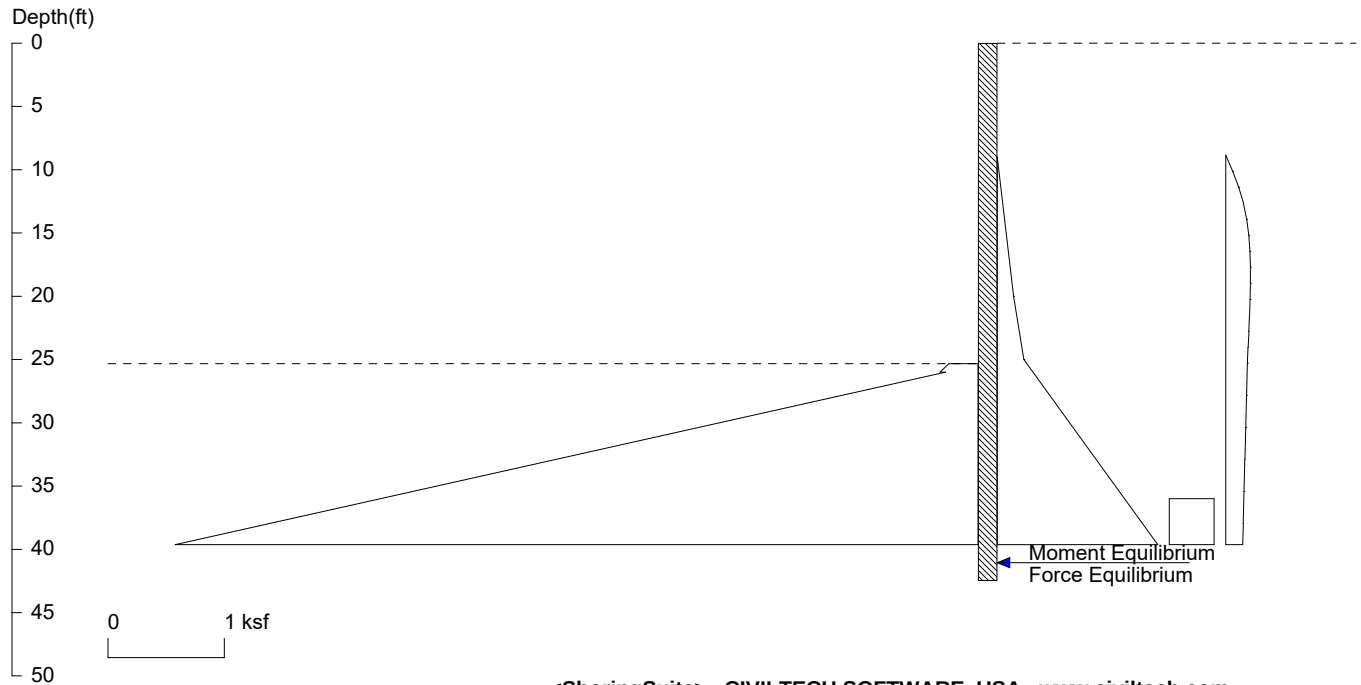
852	37.59	-4.16	-4.16	-11.35	30.73	-0.017
853	37.64	-4.18	-4.18	-11.47	30.23	-0.017
854	37.68	-4.20	-4.20	-11.60	29.72	-0.017
855	37.72	-4.21	-4.21	-11.72	29.20	-0.018
856	37.77	-4.23	-4.23	-11.85	28.68	-0.018
857	37.81	-4.25	-4.25	-11.97	28.15	-0.018
858	37.86	-4.27	-4.27	-12.10	27.62	-0.018
859	37.90	-4.29	-4.29	-12.23	27.09	-0.019
860	37.94	-4.30	-4.30	-12.35	26.54	-0.019
861	37.99	-4.32	-4.32	-12.48	25.99	-0.019
862	38.03	-4.34	-4.34	-12.61	25.44	-0.019
863	38.08	-4.36	-4.36	-12.74	24.88	-0.020
864	38.12	-4.38	-4.38	-12.87	24.31	-0.020
865	38.17	-4.39	-4.39	-13.00	23.74	-0.020
866	38.21	-4.41	-4.41	-13.13	23.17	-0.020
867	38.25	-4.43	-4.43	-13.27	22.58	-0.021
868	38.30	-4.45	-4.45	-13.40	21.99	-0.021
869	38.34	-4.47	-4.47	-13.53	21.40	-0.021
870	38.39	-4.49	-4.49	-13.66	20.80	-0.021
871	38.43	-4.50	-4.50	-13.80	20.19	-0.022
872	38.47	-4.52	-4.52	-13.93	19.58	-0.022
873	38.52	-4.54	-4.54	-14.07	18.96	-0.022
874	38.56	-4.56	-4.56	-14.20	18.34	-0.022
875	38.61	-4.58	-4.58	-14.34	17.71	-0.023
876	38.65	-4.59	-4.59	-14.48	17.07	-0.023
877	38.70	-4.61	-4.61	-14.62	16.43	-0.023
878	38.74	-4.63	-4.63	-14.75	15.78	-0.023
879	38.78	-4.65	-4.65	-14.89	15.12	-0.024
880	38.83	-4.67	-4.67	-15.03	14.46	-0.024
881	38.87	-4.68	-4.68	-15.17	13.80	-0.024
882	38.92	-4.70	-4.70	-15.31	13.12	-0.024
883	38.96	-4.72	-4.72	-15.45	12.44	-0.025
884	39.00	-4.74	-4.74	-15.60	11.76	-0.025
885	39.05	-4.76	-4.76	-15.74	11.06	-0.025
886	39.09	-4.78	-4.78	-15.88	10.37	-0.025
887	39.14	-4.79	-4.79	-16.02	9.66	-0.026
888	39.18	-4.81	-4.81	-16.17	8.95	-0.026
889	39.23	-4.83	-4.83	-16.31	8.23	-0.026
890	39.27	-4.85	-4.85	-16.46	7.51	-0.026
891	39.31	-4.87	-4.87	-16.60	6.78	-0.027
892	39.36	-4.88	-4.88	-16.75	6.04	-0.027
893	39.40	-4.90	-4.90	-16.90	5.30	-0.027
894	39.45	-4.92	-4.92	-17.04	4.55	-0.028
895	39.49	-4.94	-4.94	-17.19	3.79	-0.028
896	39.53	-4.96	-4.96	-17.34	3.03	-0.028
897	39.58	-4.97	-4.97	-17.49	2.26	-0.028
898	39.62	-4.99	-4.99	-17.64	1.48	-0.029
899	39.67	-5.01	-5.01	-17.79	0.70	-0.029

The above data can be selected using mouse, then copy and paste into Excel to

create graphics

Butler Street (West) Section A1

Phase III Dredge EI -19.33 UNDRAINED Revised Mounding



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Date: 1/14/2020

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Wall Height=25.3

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=17.15 Min. Pile Length=42.48

MOMENT IN PILE: Max. Moment=55.79 per Pile Spacing=1.0 at Depth=32.67

PILE SELECTION:Request Min. Section Modulus = 20.3 in³/ft=1090.67 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.93(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
9	0	20	0.140	0.012727
20	0.140	25	0.229	0.017800
25	0.229	100	6.130	0.078675
36	0.385	100	0.385	0.000000
*	Sur-	charge		
8.855	0.000	10.120	0.059	0.046991
10.120	0.059	11.385	0.112	0.041168
11.385	0.112	12.650	0.152	0.031957
12.650	0.152	13.915	0.180	0.022287
13.915	0.180	15.180	0.198	0.013999
15.180	0.198	16.445	0.208	0.007667
16.445	0.208	17.710	0.212	0.003134
17.710	0.212	18.975	0.212	0.000006
18.975	0.212	20.240	0.209	-0.002107
20.240	0.209	21.505	0.204	-0.003511
21.505	0.204	22.770	0.199	-0.004429
22.770	0.199	24.035	0.192	-0.005010
24.035	0.192	25.300	0.186	-0.005358

25.300	0.186	27.830	0.179	-0.002772
27.830	0.179	30.360	0.172	-0.002808
30.360	0.172	32.890	0.164	-0.002803
32.890	0.164	35.420	0.157	-0.002769
35.420	0.157	37.950	0.151	-0.002714
37.950	0.151	40.480	0.144	-0.002645
40.480	0.144	43.010	0.137	-0.002565

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
25.33	0.250	26	0.327	0.1149
26	0.280	100	36.259	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	25.33	1.00

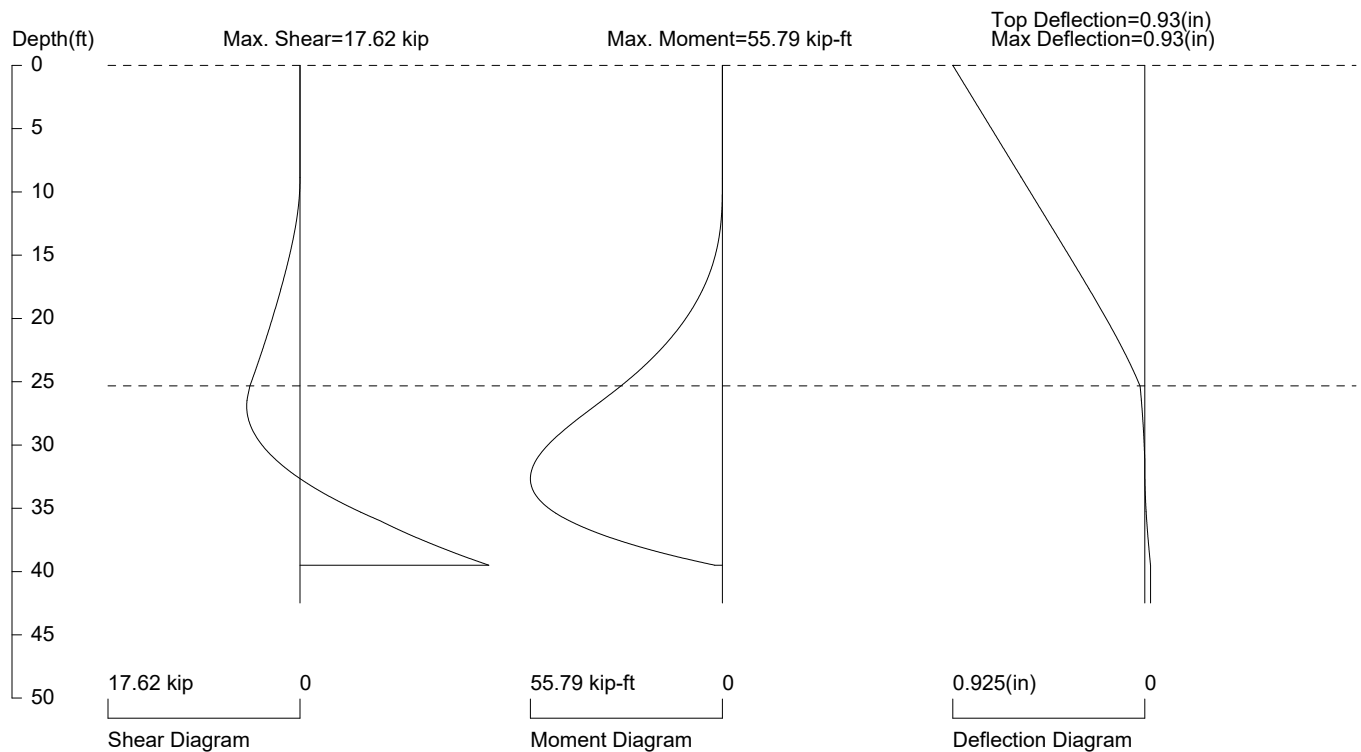
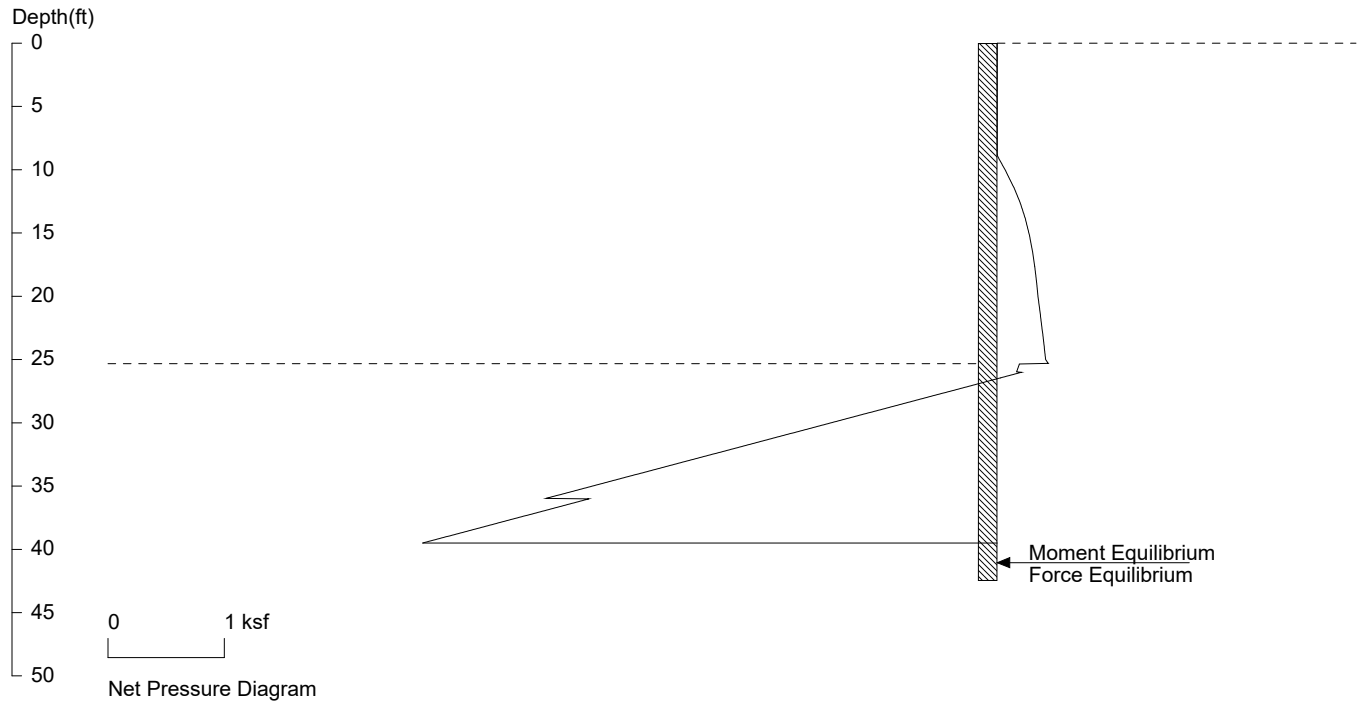
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street (West) Section A1

Phase III Dredge EI -19.33 UNDRAINED Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltech.com

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. Temporary Structures in Construction, Robert T. Ratay (Co-author of Chapter 7: John J. Peirce), McGraw-Hill. 2012
9. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft³, Deflection - in

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Street\SECTION A1 - Butler Street (West) (El -19.33) UNDRAINED Revised
Mounding.sh8

Title: Butler Street (West) Section A1
Subtitle: Phase III Dredge El -19.33 UNDRAINED Revised Mounding

*****INPUT DATA*****

Wall Type: 1. Sheet Pile
Wall Height: 25.33
Pile Diameter: 1.00
Pile Spacing: 1.00
Factor of Safety (F.S.): 1.30
Lateral Support Type (Braces): 1. No
Top Brace Increase (Multi-Bracing): Add 15%*
Embedment Option: 1. Yes
Friction at Pile Tip: No
Pile Properties:
Steel Strength, Fy: 50 ksi = 345 MPa
Allowable Fb/Fy: 0.66
Elastic Module, E: 29000.00
Moment of Inertia, I: 656.2

User Input File:

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	9	0	20	0.140	0.012727
2	20	0.140	25	0.229	0.017800
3	25	0.229	100	6.130	0.078675
4	36	0.385	100	0.385	0.000000
5	*	Sur-	charge		
6	8.855	0.000	10.120	0.059	0.046991
7	10.120	0.059	11.385	0.112	0.041168
8	11.385	0.112	12.650	0.152	0.031957
9	12.650	0.152	13.915	0.180	0.022287
10	13.915	0.180	15.180	0.198	0.013999
11	15.180	0.198	16.445	0.208	0.007667
12	16.445	0.208	17.710	0.212	0.003134
13	17.710	0.212	18.975	0.212	0.000006
14	18.975	0.212	20.240	0.209	-0.002107
15	20.240	0.209	21.505	0.204	-0.003511
16	21.505	0.204	22.770	0.199	-0.004429
17	22.770	0.199	24.035	0.192	-0.005010
18	24.035	0.192	25.300	0.186	-0.005358
19	25.300	0.186	27.830	0.179	-0.002772
20	27.830	0.179	30.360	0.172	-0.002808
21	30.360	0.172	32.890	0.164	-0.002803
22	32.890	0.164	35.420	0.157	-0.002769
23	35.420	0.157	37.950	0.151	-0.002714
24	37.950	0.151	40.480	0.144	-0.002645
25	40.480	0.144	43.010	0.137	-0.002565
26	43.010	0.137	45.540	0.125	-0.004865
27	45.540	0.125	48.070	0.114	-0.004493
28	48.070	0.114	50.600	0.103	-0.004117
29	50.600	0.103	55.660	0.094	-0.001875
30	55.660	0.094	60.720	0.085	-0.001701
31	60.720	0.085	65.780	0.077	-0.001539
32	65.780	0.077	70.840	0.070	-0.001389
33	70.840	0.070	75.900	0.064	-0.001252
34	75.900	0.064	80.960	0.058	-0.001127
35	80.960	0.058	86.020	0.053	-0.001015
36	86.020	0.053	91.080	0.044	-0.001735
37	91.080	0.044	96.140	0.037	-0.001408
38	96.140	0.037	101.200	0.032	-0.001146

* PASSIVE PRESSURE *

The pressures below will be divided by a Factor of Safety =1.3

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	25.33	0.250	26	0.327	0.1149

2	26	0.280	100	36.259	0.4862
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* ACTIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
2	25.33	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
---	------	------

*For Tieback: Input1 = Diameter; Input2 = Bond Strength

*For Plate: Input1 = Diameter; Input2 = Allowable Pressure

*For Deadman: Input1 = Horz. Width; Input2 = Passive Pressure;

*For Sheet Pile Anchor: Input1 = Horz. Width; Input2 = Passive Slope;

*****CALCULATION*****

The calculated moment and shear are per pile spacing. Sheet piles are per one foot or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

	D1=0.00
== ==	D2=25.33
	D3=42.48

D1 - TOP DEPTH

D2 - EXCAVATION BASE

D3 - PILE TIP

MOMENT equilibrium AT DEPTH=39.63 WITH EMBEDMENT OF 14.30

FORCE equilibrium AT DEPTH=42.48 WITH EMBEDMENT OF 17.15

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

*****RESULTS*****

* EMBEDMENT Notes *

Based on USS Design Manual, first calculate embedment for moment equilibrium, then increased the embedment to get the design depth.

The embedment for moment equilibrium is 14.30

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

The total design embedment is 17.15

Embedment Information:

If 20% increased, the total design embedment is 17.15

If 30% increased, the total design embedment is 18.58

If 40% increased, the total design embedment is 20.01

If 50% increased, the total design embedment is 21.44

* MOMENT IN PILE (per pile spacing)*

Pile Spacing: sheet piles are one foot or one meter; soldier piles are one pile.

Overall Maximum Moment = 55.79 at 32.67

Maximum Shear = 17.62

Moment and Shear are per pile spacing: 1.0 foot or meter

* VERTICAL LOADING *

Vertical Loading from Braces = 0.00

Vertical Loading from External Load = 0.00

Total Vertical Loading = 0.00

* DEFLECTION *

I (in4)/foot=656.20

Top deflection = 0.925(in)

Max. deflection = 0.925(in)

*****PRESSURE, LOAD, SHEAR, MOMENT, AND DEFLECTION v.s. DEPTH*****

The shear and moment are per single soldier pile (secant/tangent pile) or one foot of sheet pile (concrete wall). The deflection is based on users input pile below:

User Input I (Moment of Inertia)

Elastic Module, E (ksi)= 29000.00

Moment of Inertia, I (in4)/foot= 656.2

PRESS. - Sum of all pressures (Net pressure). (Active) direction is positive

LOAD - Liner load (force per unit depth) = Pressures multiply by acting space

No	DEPTH ft	PRESS. ksf	LOAD kip/ft	SHEAR kip	MOMENT kip-ft	DEFLECTION in
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1	0.00	0.00	0.00	0.00	0.00	0.925
2	0.04	0.00	0.00	0.00	0.00	0.924
3	0.09	0.00	0.00	0.00	0.00	0.922
4	0.13	0.00	0.00	0.00	0.00	0.920
5	0.18	0.00	0.00	0.00	0.00	0.919
6	0.22	0.00	0.00	0.00	0.00	0.917
7	0.26	0.00	0.00	0.00	0.00	0.915
8	0.31	0.00	0.00	0.00	0.00	0.914
9	0.35	0.00	0.00	0.00	0.00	0.912
10	0.40	0.00	0.00	0.00	0.00	0.911
11	0.44	0.00	0.00	0.00	0.00	0.909
12	0.48	0.00	0.00	0.00	0.00	0.907
13	0.53	0.00	0.00	0.00	0.00	0.906
14	0.57	0.00	0.00	0.00	0.00	0.904
15	0.62	0.00	0.00	0.00	0.00	0.902
16	0.66	0.00	0.00	0.00	0.00	0.901
17	0.71	0.00	0.00	0.00	0.00	0.899
18	0.75	0.00	0.00	0.00	0.00	0.897
19	0.79	0.00	0.00	0.00	0.00	0.896
20	0.84	0.00	0.00	0.00	0.00	0.894
21	0.88	0.00	0.00	0.00	0.00	0.892
22	0.93	0.00	0.00	0.00	0.00	0.891
23	0.97	0.00	0.00	0.00	0.00	0.889
24	1.01	0.00	0.00	0.00	0.00	0.888
25	1.06	0.00	0.00	0.00	0.00	0.886
26	1.10	0.00	0.00	0.00	0.00	0.884
27	1.15	0.00	0.00	0.00	0.00	0.883
28	1.19	0.00	0.00	0.00	0.00	0.881
29	1.23	0.00	0.00	0.00	0.00	0.879
30	1.28	0.00	0.00	0.00	0.00	0.878
31	1.32	0.00	0.00	0.00	0.00	0.876
32	1.37	0.00	0.00	0.00	0.00	0.874
33	1.41	0.00	0.00	0.00	0.00	0.873
34	1.45	0.00	0.00	0.00	0.00	0.871
35	1.50	0.00	0.00	0.00	0.00	0.869
36	1.54	0.00	0.00	0.00	0.00	0.868
37	1.59	0.00	0.00	0.00	0.00	0.866
38	1.63	0.00	0.00	0.00	0.00	0.864
39	1.68	0.00	0.00	0.00	0.00	0.863
40	1.72	0.00	0.00	0.00	0.00	0.861
41	1.76	0.00	0.00	0.00	0.00	0.860
42	1.81	0.00	0.00	0.00	0.00	0.858
43	1.85	0.00	0.00	0.00	0.00	0.856
44	1.90	0.00	0.00	0.00	0.00	0.855
45	1.94	0.00	0.00	0.00	0.00	0.853
46	1.98	0.00	0.00	0.00	0.00	0.851
47	2.03	0.00	0.00	0.00	0.00	0.850
48	2.07	0.00	0.00	0.00	0.00	0.848
49	2.12	0.00	0.00	0.00	0.00	0.846
50	2.16	0.00	0.00	0.00	0.00	0.845

51	2.20	0.00	0.00	0.00	0.00	0.843
52	2.25	0.00	0.00	0.00	0.00	0.841
53	2.29	0.00	0.00	0.00	0.00	0.840
54	2.34	0.00	0.00	0.00	0.00	0.838
55	2.38	0.00	0.00	0.00	0.00	0.837
56	2.42	0.00	0.00	0.00	0.00	0.835
57	2.47	0.00	0.00	0.00	0.00	0.833
58	2.51	0.00	0.00	0.00	0.00	0.832
59	2.56	0.00	0.00	0.00	0.00	0.830
60	2.60	0.00	0.00	0.00	0.00	0.828
61	2.64	0.00	0.00	0.00	0.00	0.827
62	2.69	0.00	0.00	0.00	0.00	0.825
63	2.73	0.00	0.00	0.00	0.00	0.823
64	2.78	0.00	0.00	0.00	0.00	0.822
65	2.82	0.00	0.00	0.00	0.00	0.820
66	2.87	0.00	0.00	0.00	0.00	0.818
67	2.91	0.00	0.00	0.00	0.00	0.817
68	2.95	0.00	0.00	0.00	0.00	0.815
69	3.00	0.00	0.00	0.00	0.00	0.814
70	3.04	0.00	0.00	0.00	0.00	0.812
71	3.09	0.00	0.00	0.00	0.00	0.810
72	3.13	0.00	0.00	0.00	0.00	0.809
73	3.17	0.00	0.00	0.00	0.00	0.807
74	3.22	0.00	0.00	0.00	0.00	0.805
75	3.26	0.00	0.00	0.00	0.00	0.804
76	3.31	0.00	0.00	0.00	0.00	0.802
77	3.35	0.00	0.00	0.00	0.00	0.800
78	3.39	0.00	0.00	0.00	0.00	0.799
79	3.44	0.00	0.00	0.00	0.00	0.797
80	3.48	0.00	0.00	0.00	0.00	0.795
81	3.53	0.00	0.00	0.00	0.00	0.794
82	3.57	0.00	0.00	0.00	0.00	0.792
83	3.61	0.00	0.00	0.00	0.00	0.791
84	3.66	0.00	0.00	0.00	0.00	0.789
85	3.70	0.00	0.00	0.00	0.00	0.787
86	3.75	0.00	0.00	0.00	0.00	0.786
87	3.79	0.00	0.00	0.00	0.00	0.784
88	3.84	0.00	0.00	0.00	0.00	0.782
89	3.88	0.00	0.00	0.00	0.00	0.781
90	3.92	0.00	0.00	0.00	0.00	0.779
91	3.97	0.00	0.00	0.00	0.00	0.777
92	4.01	0.00	0.00	0.00	0.00	0.776
93	4.06	0.00	0.00	0.00	0.00	0.774
94	4.10	0.00	0.00	0.00	0.00	0.772
95	4.14	0.00	0.00	0.00	0.00	0.771
96	4.19	0.00	0.00	0.00	0.00	0.769
97	4.23	0.00	0.00	0.00	0.00	0.768
98	4.28	0.00	0.00	0.00	0.00	0.766
99	4.32	0.00	0.00	0.00	0.00	0.764
100	4.36	0.00	0.00	0.00	0.00	0.763

101	4.41	0.00	0.00	0.00	0.00	0.761
102	4.45	0.00	0.00	0.00	0.00	0.759
103	4.50	0.00	0.00	0.00	0.00	0.758
104	4.54	0.00	0.00	0.00	0.00	0.756
105	4.58	0.00	0.00	0.00	0.00	0.754
106	4.63	0.00	0.00	0.00	0.00	0.753
107	4.67	0.00	0.00	0.00	0.00	0.751
108	4.72	0.00	0.00	0.00	0.00	0.749
109	4.76	0.00	0.00	0.00	0.00	0.748
110	4.80	0.00	0.00	0.00	0.00	0.746
111	4.85	0.00	0.00	0.00	0.00	0.745
112	4.89	0.00	0.00	0.00	0.00	0.743
113	4.94	0.00	0.00	0.00	0.00	0.741
114	4.98	0.00	0.00	0.00	0.00	0.740
115	5.03	0.00	0.00	0.00	0.00	0.738
116	5.07	0.00	0.00	0.00	0.00	0.736
117	5.11	0.00	0.00	0.00	0.00	0.735
118	5.16	0.00	0.00	0.00	0.00	0.733
119	5.20	0.00	0.00	0.00	0.00	0.731
120	5.25	0.00	0.00	0.00	0.00	0.730
121	5.29	0.00	0.00	0.00	0.00	0.728
122	5.33	0.00	0.00	0.00	0.00	0.726
123	5.38	0.00	0.00	0.00	0.00	0.725
124	5.42	0.00	0.00	0.00	0.00	0.723
125	5.47	0.00	0.00	0.00	0.00	0.721
126	5.51	0.00	0.00	0.00	0.00	0.720
127	5.55	0.00	0.00	0.00	0.00	0.718
128	5.60	0.00	0.00	0.00	0.00	0.717
129	5.64	0.00	0.00	0.00	0.00	0.715
130	5.69	0.00	0.00	0.00	0.00	0.713
131	5.73	0.00	0.00	0.00	0.00	0.712
132	5.77	0.00	0.00	0.00	0.00	0.710
133	5.82	0.00	0.00	0.00	0.00	0.708
134	5.86	0.00	0.00	0.00	0.00	0.707
135	5.91	0.00	0.00	0.00	0.00	0.705
136	5.95	0.00	0.00	0.00	0.00	0.703
137	6.00	0.00	0.00	0.00	0.00	0.702
138	6.04	0.00	0.00	0.00	0.00	0.700
139	6.08	0.00	0.00	0.00	0.00	0.698
140	6.13	0.00	0.00	0.00	0.00	0.697
141	6.17	0.00	0.00	0.00	0.00	0.695
142	6.22	0.00	0.00	0.00	0.00	0.694
143	6.26	0.00	0.00	0.00	0.00	0.692
144	6.30	0.00	0.00	0.00	0.00	0.690
145	6.35	0.00	0.00	0.00	0.00	0.689
146	6.39	0.00	0.00	0.00	0.00	0.687
147	6.44	0.00	0.00	0.00	0.00	0.685
148	6.48	0.00	0.00	0.00	0.00	0.684
149	6.52	0.00	0.00	0.00	0.00	0.682
150	6.57	0.00	0.00	0.00	0.00	0.680

151	6.61	0.00	0.00	0.00	0.00	0.679
152	6.66	0.00	0.00	0.00	0.00	0.677
153	6.70	0.00	0.00	0.00	0.00	0.675
154	6.74	0.00	0.00	0.00	0.00	0.674
155	6.79	0.00	0.00	0.00	0.00	0.672
156	6.83	0.00	0.00	0.00	0.00	0.671
157	6.88	0.00	0.00	0.00	0.00	0.669
158	6.92	0.00	0.00	0.00	0.00	0.667
159	6.97	0.00	0.00	0.00	0.00	0.666
160	7.01	0.00	0.00	0.00	0.00	0.664
161	7.05	0.00	0.00	0.00	0.00	0.662
162	7.10	0.00	0.00	0.00	0.00	0.661
163	7.14	0.00	0.00	0.00	0.00	0.659
164	7.19	0.00	0.00	0.00	0.00	0.657
165	7.23	0.00	0.00	0.00	0.00	0.656
166	7.27	0.00	0.00	0.00	0.00	0.654
167	7.32	0.00	0.00	0.00	0.00	0.652
168	7.36	0.00	0.00	0.00	0.00	0.651
169	7.41	0.00	0.00	0.00	0.00	0.649
170	7.45	0.00	0.00	0.00	0.00	0.648
171	7.49	0.00	0.00	0.00	0.00	0.646
172	7.54	0.00	0.00	0.00	0.00	0.644
173	7.58	0.00	0.00	0.00	0.00	0.643
174	7.63	0.00	0.00	0.00	0.00	0.641
175	7.67	0.00	0.00	0.00	0.00	0.639
176	7.71	0.00	0.00	0.00	0.00	0.638
177	7.76	0.00	0.00	0.00	0.00	0.636
178	7.80	0.00	0.00	0.00	0.00	0.634
179	7.85	0.00	0.00	0.00	0.00	0.633
180	7.89	0.00	0.00	0.00	0.00	0.631
181	7.93	0.00	0.00	0.00	0.00	0.629
182	7.98	0.00	0.00	0.00	0.00	0.628
183	8.02	0.00	0.00	0.00	0.00	0.626
184	8.07	0.00	0.00	0.00	0.00	0.625
185	8.11	0.00	0.00	0.00	0.00	0.623
186	8.16	0.00	0.00	0.00	0.00	0.621
187	8.20	0.00	0.00	0.00	0.00	0.620
188	8.24	0.00	0.00	0.00	0.00	0.618
189	8.29	0.00	0.00	0.00	0.00	0.616
190	8.33	0.00	0.00	0.00	0.00	0.615
191	8.38	0.00	0.00	0.00	0.00	0.613
192	8.42	0.00	0.00	0.00	0.00	0.611
193	8.46	0.00	0.00	0.00	0.00	0.610
194	8.51	0.00	0.00	0.00	0.00	0.608
195	8.55	0.00	0.00	0.00	0.00	0.606
196	8.60	0.00	0.00	0.00	0.00	0.605
197	8.64	0.00	0.00	0.00	0.00	0.603
198	8.68	0.00	0.00	0.00	0.00	0.602
199	8.73	0.00	0.00	0.00	0.00	0.600
200	8.77	0.00	0.00	0.00	0.00	0.598

201	8.82	0.00	0.00	0.00	0.00	0.597
202	8.86	0.00	0.00	0.00	0.00	0.595
203	8.90	0.00	0.00	0.00	0.00	0.593
204	8.95	0.00	0.00	0.00	0.00	0.592
205	8.99	0.01	0.01	0.00	0.00	0.590
206	9.04	0.01	0.01	0.00	0.00	0.588
207	9.08	0.01	0.01	0.00	0.00	0.587
208	9.13	0.01	0.01	0.00	0.00	0.585
209	9.17	0.02	0.02	0.00	0.00	0.583
210	9.21	0.02	0.02	0.00	0.00	0.582
211	9.26	0.02	0.02	0.00	0.00	0.580
212	9.30	0.02	0.02	0.01	0.00	0.578
213	9.35	0.03	0.03	0.01	0.00	0.577
214	9.39	0.03	0.03	0.01	0.00	0.575
215	9.43	0.03	0.03	0.01	0.00	0.574
216	9.48	0.04	0.04	0.01	0.00	0.572
217	9.52	0.04	0.04	0.01	0.00	0.570
218	9.57	0.04	0.04	0.01	0.00	0.569
219	9.61	0.04	0.04	0.02	0.00	0.567
220	9.65	0.05	0.05	0.02	0.00	0.565
221	9.70	0.05	0.05	0.02	0.01	0.564
222	9.74	0.05	0.05	0.02	0.01	0.562
223	9.79	0.05	0.05	0.02	0.01	0.560
224	9.83	0.06	0.06	0.03	0.01	0.559
225	9.87	0.06	0.06	0.03	0.01	0.557
226	9.92	0.06	0.06	0.03	0.01	0.555
227	9.96	0.06	0.06	0.03	0.01	0.554
228	10.01	0.07	0.07	0.04	0.01	0.552
229	10.05	0.07	0.07	0.04	0.02	0.551
230	10.09	0.07	0.07	0.04	0.02	0.549
231	10.14	0.07	0.07	0.05	0.02	0.547
232	10.18	0.08	0.08	0.05	0.02	0.546
233	10.23	0.08	0.08	0.05	0.02	0.544
234	10.27	0.08	0.08	0.06	0.03	0.542
235	10.32	0.08	0.08	0.06	0.03	0.541
236	10.36	0.09	0.09	0.06	0.03	0.539
237	10.40	0.09	0.09	0.07	0.03	0.537
238	10.45	0.09	0.09	0.07	0.04	0.536
239	10.49	0.09	0.09	0.08	0.04	0.534
240	10.54	0.10	0.10	0.08	0.04	0.532
241	10.58	0.10	0.10	0.08	0.05	0.531
242	10.62	0.10	0.10	0.09	0.05	0.529
243	10.67	0.10	0.10	0.09	0.06	0.528
244	10.71	0.11	0.11	0.10	0.06	0.526
245	10.76	0.11	0.11	0.10	0.06	0.524
246	10.80	0.11	0.11	0.11	0.07	0.523
247	10.84	0.11	0.11	0.11	0.07	0.521
248	10.89	0.11	0.11	0.12	0.08	0.519
249	10.93	0.12	0.12	0.12	0.08	0.518
250	10.98	0.12	0.12	0.13	0.09	0.516

251	11.02	0.12	0.12	0.13	0.10	0.514
252	11.06	0.12	0.12	0.14	0.10	0.513
253	11.11	0.13	0.13	0.14	0.11	0.511
254	11.15	0.13	0.13	0.15	0.11	0.509
255	11.20	0.13	0.13	0.16	0.12	0.508
256	11.24	0.13	0.13	0.16	0.13	0.506
257	11.29	0.14	0.14	0.17	0.14	0.505
258	11.33	0.14	0.14	0.17	0.14	0.503
259	11.37	0.14	0.14	0.18	0.15	0.501
260	11.42	0.14	0.14	0.19	0.16	0.500
261	11.46	0.15	0.15	0.19	0.17	0.498
262	11.51	0.15	0.15	0.20	0.18	0.496
263	11.55	0.15	0.15	0.21	0.19	0.495
264	11.59	0.15	0.15	0.21	0.19	0.493
265	11.64	0.15	0.15	0.22	0.20	0.491
266	11.68	0.16	0.16	0.23	0.21	0.490
267	11.73	0.16	0.16	0.23	0.22	0.488
268	11.77	0.16	0.16	0.24	0.23	0.486
269	11.81	0.16	0.16	0.25	0.24	0.485
270	11.86	0.16	0.16	0.25	0.26	0.483
271	11.90	0.17	0.17	0.26	0.27	0.482
272	11.95	0.17	0.17	0.27	0.28	0.480
273	11.99	0.17	0.17	0.28	0.29	0.478
274	12.03	0.17	0.17	0.28	0.30	0.477
275	12.08	0.17	0.17	0.29	0.32	0.475
276	12.12	0.18	0.18	0.30	0.33	0.473
277	12.17	0.18	0.18	0.31	0.34	0.472
278	12.21	0.18	0.18	0.31	0.36	0.470
279	12.25	0.18	0.18	0.32	0.37	0.468
280	12.30	0.18	0.18	0.33	0.38	0.467
281	12.34	0.19	0.19	0.34	0.40	0.465
282	12.39	0.19	0.19	0.35	0.41	0.463
283	12.43	0.19	0.19	0.35	0.43	0.462
284	12.48	0.19	0.19	0.36	0.45	0.460
285	12.52	0.19	0.19	0.37	0.46	0.459
286	12.56	0.20	0.20	0.38	0.48	0.457
287	12.61	0.20	0.20	0.39	0.50	0.455
288	12.65	0.20	0.20	0.40	0.51	0.454
289	12.70	0.20	0.20	0.41	0.53	0.452
290	12.74	0.20	0.20	0.42	0.55	0.450
291	12.78	0.20	0.20	0.42	0.57	0.449
292	12.83	0.20	0.20	0.43	0.59	0.447
293	12.87	0.21	0.21	0.44	0.60	0.445
294	12.92	0.21	0.21	0.45	0.62	0.444
295	12.96	0.21	0.21	0.46	0.64	0.442
296	13.00	0.21	0.21	0.47	0.67	0.440
297	13.05	0.21	0.21	0.48	0.69	0.439
298	13.09	0.21	0.21	0.49	0.71	0.437
299	13.14	0.22	0.22	0.50	0.73	0.436
300	13.18	0.22	0.22	0.51	0.75	0.434

301	13.22	0.22	0.22	0.52	0.77	0.432
302	13.27	0.22	0.22	0.53	0.80	0.431
303	13.31	0.22	0.22	0.54	0.82	0.429
304	13.36	0.22	0.22	0.55	0.84	0.427
305	13.40	0.22	0.22	0.56	0.87	0.426
306	13.45	0.23	0.23	0.57	0.89	0.424
307	13.49	0.23	0.23	0.58	0.92	0.422
308	13.53	0.23	0.23	0.59	0.94	0.421
309	13.58	0.23	0.23	0.60	0.97	0.419
310	13.62	0.23	0.23	0.61	1.00	0.418
311	13.67	0.23	0.23	0.62	1.02	0.416
312	13.71	0.24	0.24	0.63	1.05	0.414
313	13.75	0.24	0.24	0.64	1.08	0.413
314	13.80	0.24	0.24	0.65	1.11	0.411
315	13.84	0.24	0.24	0.66	1.14	0.409
316	13.89	0.24	0.24	0.67	1.17	0.408
317	13.93	0.24	0.24	0.68	1.19	0.406
318	13.97	0.24	0.24	0.69	1.23	0.404
319	14.02	0.25	0.25	0.70	1.26	0.403
320	14.06	0.25	0.25	0.71	1.29	0.401
321	14.11	0.25	0.25	0.72	1.32	0.399
322	14.15	0.25	0.25	0.73	1.35	0.398
323	14.19	0.25	0.25	0.75	1.38	0.396
324	14.24	0.25	0.25	0.76	1.42	0.395
325	14.28	0.25	0.25	0.77	1.45	0.393
326	14.33	0.25	0.25	0.78	1.48	0.391
327	14.37	0.25	0.25	0.79	1.52	0.390
328	14.42	0.26	0.26	0.80	1.55	0.388
329	14.46	0.26	0.26	0.81	1.59	0.386
330	14.50	0.26	0.26	0.82	1.63	0.385
331	14.55	0.26	0.26	0.83	1.66	0.383
332	14.59	0.26	0.26	0.85	1.70	0.382
333	14.64	0.26	0.26	0.86	1.74	0.380
334	14.68	0.26	0.26	0.87	1.77	0.378
335	14.72	0.26	0.26	0.88	1.81	0.377
336	14.77	0.27	0.27	0.89	1.85	0.375
337	14.81	0.27	0.27	0.90	1.89	0.373
338	14.86	0.27	0.27	0.92	1.93	0.372
339	14.90	0.27	0.27	0.93	1.97	0.370
340	14.94	0.27	0.27	0.94	2.01	0.368
341	14.99	0.27	0.27	0.95	2.06	0.367
342	15.03	0.27	0.27	0.96	2.10	0.365
343	15.08	0.27	0.27	0.98	2.14	0.364
344	15.12	0.27	0.27	0.99	2.18	0.362
345	15.16	0.28	0.28	1.00	2.23	0.360
346	15.21	0.28	0.28	1.01	2.27	0.359
347	15.25	0.28	0.28	1.02	2.32	0.357
348	15.30	0.28	0.28	1.04	2.36	0.355
349	15.34	0.28	0.28	1.05	2.41	0.354
350	15.38	0.28	0.28	1.06	2.45	0.352

351	15.43	0.28	0.28	1.07	2.50	0.351
352	15.47	0.28	0.28	1.09	2.55	0.349
353	15.52	0.28	0.28	1.10	2.60	0.347
354	15.56	0.28	0.28	1.11	2.65	0.346
355	15.61	0.29	0.29	1.12	2.70	0.344
356	15.65	0.29	0.29	1.14	2.75	0.342
357	15.69	0.29	0.29	1.15	2.80	0.341
358	15.74	0.29	0.29	1.16	2.85	0.339
359	15.78	0.29	0.29	1.17	2.90	0.338
360	15.83	0.29	0.29	1.19	2.95	0.336
361	15.87	0.29	0.29	1.20	3.00	0.334
362	15.91	0.29	0.29	1.21	3.06	0.333
363	15.96	0.29	0.29	1.23	3.11	0.331
364	16.00	0.29	0.29	1.24	3.16	0.329
365	16.05	0.29	0.29	1.25	3.22	0.328
366	16.09	0.30	0.30	1.26	3.27	0.326
367	16.13	0.30	0.30	1.28	3.33	0.325
368	16.18	0.30	0.30	1.29	3.39	0.323
369	16.22	0.30	0.30	1.30	3.44	0.321
370	16.27	0.30	0.30	1.32	3.50	0.320
371	16.31	0.30	0.30	1.33	3.56	0.318
372	16.35	0.30	0.30	1.34	3.62	0.316
373	16.40	0.30	0.30	1.36	3.68	0.315
374	16.44	0.30	0.30	1.37	3.74	0.313
375	16.49	0.30	0.30	1.38	3.80	0.312
376	16.53	0.30	0.30	1.40	3.86	0.310
377	16.58	0.30	0.30	1.41	3.92	0.308
378	16.62	0.31	0.31	1.42	3.99	0.307
379	16.66	0.31	0.31	1.44	4.05	0.305
380	16.71	0.31	0.31	1.45	4.11	0.304
381	16.75	0.31	0.31	1.46	4.18	0.302
382	16.80	0.31	0.31	1.48	4.24	0.300
383	16.84	0.31	0.31	1.49	4.31	0.299
384	16.88	0.31	0.31	1.51	4.37	0.297
385	16.93	0.31	0.31	1.52	4.44	0.296
386	16.97	0.31	0.31	1.53	4.51	0.294
387	17.02	0.31	0.31	1.55	4.57	0.292
388	17.06	0.31	0.31	1.56	4.64	0.291
389	17.10	0.31	0.31	1.57	4.71	0.289
390	17.15	0.31	0.31	1.59	4.78	0.287
391	17.19	0.31	0.31	1.60	4.85	0.286
392	17.24	0.32	0.32	1.62	4.92	0.284
393	17.28	0.32	0.32	1.63	4.99	0.283
394	17.32	0.32	0.32	1.64	5.07	0.281
395	17.37	0.32	0.32	1.66	5.14	0.279
396	17.41	0.32	0.32	1.67	5.21	0.278
397	17.46	0.32	0.32	1.69	5.29	0.276
398	17.50	0.32	0.32	1.70	5.36	0.275
399	17.54	0.32	0.32	1.71	5.44	0.273
400	17.59	0.32	0.32	1.73	5.51	0.271

401	17.63	0.32	0.32	1.74	5.59	0.270
402	17.68	0.32	0.32	1.76	5.67	0.268
403	17.72	0.32	0.32	1.77	5.74	0.267
404	17.77	0.32	0.32	1.78	5.82	0.265
405	17.81	0.32	0.32	1.80	5.90	0.264
406	17.85	0.32	0.32	1.81	5.98	0.262
407	17.90	0.33	0.33	1.83	6.06	0.260
408	17.94	0.33	0.33	1.84	6.14	0.259
409	17.99	0.33	0.33	1.86	6.22	0.257
410	18.03	0.33	0.33	1.87	6.31	0.256
411	18.07	0.33	0.33	1.88	6.39	0.254
412	18.12	0.33	0.33	1.90	6.47	0.252
413	18.16	0.33	0.33	1.91	6.56	0.251
414	18.21	0.33	0.33	1.93	6.64	0.249
415	18.25	0.33	0.33	1.94	6.73	0.248
416	18.29	0.33	0.33	1.96	6.81	0.246
417	18.34	0.33	0.33	1.97	6.90	0.245
418	18.38	0.33	0.33	1.99	6.99	0.243
419	18.43	0.33	0.33	2.00	7.07	0.241
420	18.47	0.33	0.33	2.02	7.16	0.240
421	18.51	0.33	0.33	2.03	7.25	0.238
422	18.56	0.33	0.33	2.05	7.34	0.237
423	18.60	0.33	0.33	2.06	7.43	0.235
424	18.65	0.33	0.33	2.07	7.52	0.234
425	18.69	0.34	0.34	2.09	7.61	0.232
426	18.74	0.34	0.34	2.10	7.71	0.230
427	18.78	0.34	0.34	2.12	7.80	0.229
428	18.82	0.34	0.34	2.13	7.89	0.227
429	18.87	0.34	0.34	2.15	7.99	0.226
430	18.91	0.34	0.34	2.16	8.08	0.224
431	18.96	0.34	0.34	2.18	8.18	0.223
432	19.00	0.34	0.34	2.19	8.27	0.221
433	19.04	0.34	0.34	2.21	8.37	0.219
434	19.09	0.34	0.34	2.22	8.47	0.218
435	19.13	0.34	0.34	2.24	8.57	0.216
436	19.18	0.34	0.34	2.25	8.67	0.215
437	19.22	0.34	0.34	2.27	8.77	0.213
438	19.26	0.34	0.34	2.28	8.87	0.212
439	19.31	0.34	0.34	2.30	8.97	0.210
440	19.35	0.34	0.34	2.31	9.07	0.209
441	19.40	0.34	0.34	2.33	9.17	0.207
442	19.44	0.34	0.34	2.34	9.27	0.206
443	19.48	0.34	0.34	2.36	9.38	0.204
444	19.53	0.34	0.34	2.37	9.48	0.202
445	19.57	0.35	0.35	2.39	9.59	0.201
446	19.62	0.35	0.35	2.40	9.69	0.199
447	19.66	0.35	0.35	2.42	9.80	0.198
448	19.70	0.35	0.35	2.44	9.91	0.196
449	19.75	0.35	0.35	2.45	10.01	0.195
450	19.79	0.35	0.35	2.47	10.12	0.193

451	19.84	0.35	0.35	2.48	10.23	0.192
452	19.88	0.35	0.35	2.50	10.34	0.190
453	19.93	0.35	0.35	2.51	10.45	0.189
454	19.97	0.35	0.35	2.53	10.56	0.187
455	20.01	0.35	0.35	2.54	10.67	0.186
456	20.06	0.35	0.35	2.56	10.79	0.184
457	20.10	0.35	0.35	2.57	10.90	0.183
458	20.15	0.35	0.35	2.59	11.01	0.181
459	20.19	0.35	0.35	2.60	11.13	0.180
460	20.23	0.35	0.35	2.62	11.24	0.178
461	20.28	0.35	0.35	2.64	11.36	0.177
462	20.32	0.35	0.35	2.65	11.48	0.175
463	20.37	0.36	0.36	2.67	11.59	0.174
464	20.41	0.36	0.36	2.68	11.71	0.172
465	20.45	0.36	0.36	2.70	11.83	0.171
466	20.50	0.36	0.36	2.71	11.95	0.169
467	20.54	0.36	0.36	2.73	12.07	0.168
468	20.59	0.36	0.36	2.75	12.19	0.166
469	20.63	0.36	0.36	2.76	12.31	0.165
470	20.67	0.36	0.36	2.78	12.43	0.163
471	20.72	0.36	0.36	2.79	12.56	0.162
472	20.76	0.36	0.36	2.81	12.68	0.160
473	20.81	0.36	0.36	2.83	12.80	0.159
474	20.85	0.36	0.36	2.84	12.93	0.157
475	20.90	0.36	0.36	2.86	13.05	0.156
476	20.94	0.36	0.36	2.87	13.18	0.154
477	20.98	0.36	0.36	2.89	13.31	0.153
478	21.03	0.36	0.36	2.91	13.44	0.151
479	21.07	0.37	0.37	2.92	13.56	0.150
480	21.12	0.37	0.37	2.94	13.69	0.148
481	21.16	0.37	0.37	2.95	13.82	0.147
482	21.20	0.37	0.37	2.97	13.95	0.145
483	21.25	0.37	0.37	2.99	14.08	0.144
484	21.29	0.37	0.37	3.00	14.22	0.143
485	21.34	0.37	0.37	3.02	14.35	0.141
486	21.38	0.37	0.37	3.03	14.48	0.140
487	21.42	0.37	0.37	3.05	14.62	0.138
488	21.47	0.37	0.37	3.07	14.75	0.137
489	21.51	0.37	0.37	3.08	14.89	0.135
490	21.56	0.37	0.37	3.10	15.02	0.134
491	21.60	0.37	0.37	3.12	15.16	0.132
492	21.64	0.37	0.37	3.13	15.30	0.131
493	21.69	0.37	0.37	3.15	15.44	0.130
494	21.73	0.37	0.37	3.17	15.58	0.128
495	21.78	0.37	0.37	3.18	15.72	0.127
496	21.82	0.38	0.38	3.20	15.86	0.125
497	21.86	0.38	0.38	3.22	16.00	0.124
498	21.91	0.38	0.38	3.23	16.14	0.122
499	21.95	0.38	0.38	3.25	16.28	0.121
500	22.00	0.38	0.38	3.26	16.43	0.120

501	22.04	0.38	0.38	3.28	16.57	0.118
502	22.09	0.38	0.38	3.30	16.72	0.117
503	22.13	0.38	0.38	3.31	16.86	0.115
504	22.17	0.38	0.38	3.33	17.01	0.114
505	22.22	0.38	0.38	3.35	17.16	0.113
506	22.26	0.38	0.38	3.37	17.30	0.111
507	22.31	0.38	0.38	3.38	17.45	0.110
508	22.35	0.38	0.38	3.40	17.60	0.108
509	22.39	0.38	0.38	3.42	17.75	0.107
510	22.44	0.38	0.38	3.43	17.90	0.106
511	22.48	0.38	0.38	3.45	18.05	0.104
512	22.53	0.38	0.38	3.47	18.21	0.103
513	22.57	0.39	0.39	3.48	18.36	0.101
514	22.61	0.39	0.39	3.50	18.51	0.100
515	22.66	0.39	0.39	3.52	18.67	0.099
516	22.70	0.39	0.39	3.53	18.82	0.097
517	22.75	0.39	0.39	3.55	18.98	0.096
518	22.79	0.39	0.39	3.57	19.14	0.095
519	22.83	0.39	0.39	3.59	19.29	0.093
520	22.88	0.39	0.39	3.60	19.45	0.092
521	22.92	0.39	0.39	3.62	19.61	0.091
522	22.97	0.39	0.39	3.64	19.77	0.089
523	23.01	0.39	0.39	3.65	19.93	0.088
524	23.06	0.39	0.39	3.67	20.09	0.087
525	23.10	0.39	0.39	3.69	20.26	0.085
526	23.14	0.39	0.39	3.71	20.42	0.084
527	23.19	0.39	0.39	3.72	20.58	0.083
528	23.23	0.39	0.39	3.74	20.75	0.081
529	23.28	0.39	0.39	3.76	20.91	0.080
530	23.32	0.40	0.40	3.78	21.08	0.079
531	23.36	0.40	0.40	3.79	21.25	0.077
532	23.41	0.40	0.40	3.81	21.41	0.076
533	23.45	0.40	0.40	3.83	21.58	0.075
534	23.50	0.40	0.40	3.85	21.75	0.073
535	23.54	0.40	0.40	3.86	21.92	0.072
536	23.58	0.40	0.40	3.88	22.09	0.071
537	23.63	0.40	0.40	3.90	22.26	0.070
538	23.67	0.40	0.40	3.92	22.44	0.068
539	23.72	0.40	0.40	3.93	22.61	0.067
540	23.76	0.40	0.40	3.95	22.78	0.066
541	23.80	0.40	0.40	3.97	22.96	0.064
542	23.85	0.40	0.40	3.99	23.13	0.063
543	23.89	0.40	0.40	4.00	23.31	0.062
544	23.94	0.40	0.40	4.02	23.49	0.061
545	23.98	0.40	0.40	4.04	23.66	0.059
546	24.03	0.40	0.40	4.06	23.84	0.058
547	24.07	0.40	0.40	4.08	24.02	0.057
548	24.11	0.40	0.40	4.09	24.20	0.056
549	24.16	0.41	0.41	4.11	24.38	0.054
550	24.20	0.41	0.41	4.13	24.56	0.053

551	24.25	0.41	0.41	4.15	24.75	0.052
552	24.29	0.41	0.41	4.17	24.93	0.051
553	24.33	0.41	0.41	4.18	25.11	0.049
554	24.38	0.41	0.41	4.20	25.30	0.048
555	24.42	0.41	0.41	4.22	25.48	0.047
556	24.47	0.41	0.41	4.24	25.67	0.046
557	24.51	0.41	0.41	4.26	25.86	0.045
558	24.55	0.41	0.41	4.27	26.04	0.043
559	24.60	0.41	0.41	4.29	26.23	0.042
560	24.64	0.41	0.41	4.31	26.42	0.041
561	24.69	0.41	0.41	4.33	26.61	0.040
562	24.73	0.41	0.41	4.35	26.80	0.039
563	24.77	0.41	0.41	4.36	27.00	0.037
564	24.82	0.41	0.41	4.38	27.19	0.036
565	24.86	0.41	0.41	4.40	27.38	0.035
566	24.91	0.41	0.41	4.42	27.58	0.034
567	24.95	0.42	0.42	4.44	27.77	0.033
568	24.99	0.42	0.42	4.46	27.97	0.032
569	25.04	0.42	0.42	4.47	28.17	0.030
570	25.08	0.42	0.42	4.49	28.36	0.029
571	25.13	0.43	0.43	4.51	28.56	0.028
572	25.17	0.43	0.43	4.53	28.76	0.027
573	25.22	0.43	0.43	4.55	28.96	0.026
574	25.26	0.43	0.43	4.57	29.16	0.025
575	25.30	0.44	0.44	4.59	29.36	0.024
576	25.35	0.19	0.19	4.60	29.57	0.023
577	25.39	0.19	0.19	4.61	29.77	0.022
578	25.44	0.19	0.19	4.62	29.97	0.022
579	25.48	0.19	0.19	4.64	30.18	0.022
580	25.52	0.18	0.18	4.65	30.38	0.022
581	25.57	0.18	0.18	4.66	30.59	0.021
582	25.61	0.18	0.18	4.67	30.79	0.021
583	25.66	0.18	0.18	4.68	31.00	0.021
584	25.70	0.18	0.18	4.69	31.20	0.021
585	25.74	0.17	0.17	4.70	31.41	0.020
586	25.79	0.17	0.17	4.71	31.62	0.020
587	25.83	0.17	0.17	4.72	31.83	0.020
588	25.88	0.17	0.17	4.73	32.04	0.020
589	25.92	0.17	0.17	4.74	32.24	0.019
590	25.96	0.17	0.17	4.75	32.45	0.019
591	26.01	0.21	0.21	4.76	32.66	0.019
592	26.05	0.19	0.19	4.78	32.87	0.019
593	26.10	0.17	0.17	4.79	33.08	0.018
594	26.14	0.15	0.15	4.80	33.30	0.018
595	26.19	0.14	0.14	4.81	33.51	0.018
596	26.23	0.12	0.12	4.82	33.72	0.018
597	26.27	0.10	0.10	4.83	33.93	0.018
598	26.32	0.08	0.08	4.84	34.15	0.017
599	26.36	0.06	0.06	4.84	34.36	0.017
600	26.41	0.05	0.05	4.85	34.57	0.017

601	26.45	0.03	0.03	4.86	34.79	0.017
602	26.49	0.01	0.01	4.86	35.00	0.016
603	26.54	-0.01	-0.01	4.87	35.22	0.016
604	26.58	-0.03	-0.03	4.87	35.43	0.016
605	26.63	-0.05	-0.05	4.88	35.64	0.016
606	26.67	-0.06	-0.06	4.88	35.86	0.016
607	26.71	-0.08	-0.08	4.88	36.08	0.015
608	26.76	-0.10	-0.10	4.89	36.29	0.015
609	26.80	-0.12	-0.12	4.89	36.51	0.015
610	26.85	-0.14	-0.14	4.89	36.72	0.015
611	26.89	-0.15	-0.15	4.89	36.94	0.015
612	26.93	-0.17	-0.17	4.89	37.15	0.014
613	26.98	-0.19	-0.19	4.89	37.37	0.014
614	27.02	-0.21	-0.21	4.89	37.58	0.014
615	27.07	-0.23	-0.23	4.89	37.80	0.014
616	27.11	-0.24	-0.24	4.89	38.01	0.013
617	27.15	-0.26	-0.26	4.88	38.23	0.013
618	27.20	-0.28	-0.28	4.88	38.45	0.013
619	27.24	-0.30	-0.30	4.88	38.66	0.013
620	27.29	-0.32	-0.32	4.87	38.87	0.013
621	27.33	-0.33	-0.33	4.87	39.09	0.012
622	27.38	-0.35	-0.35	4.86	39.30	0.012
623	27.42	-0.37	-0.37	4.85	39.52	0.012
624	27.46	-0.39	-0.39	4.85	39.73	0.012
625	27.51	-0.41	-0.41	4.84	39.95	0.012
626	27.55	-0.42	-0.42	4.83	40.16	0.011
627	27.60	-0.44	-0.44	4.82	40.37	0.011
628	27.64	-0.46	-0.46	4.81	40.58	0.011
629	27.68	-0.48	-0.48	4.81	40.80	0.011
630	27.73	-0.50	-0.50	4.79	41.01	0.011
631	27.77	-0.52	-0.52	4.78	41.22	0.011
632	27.82	-0.53	-0.53	4.77	41.43	0.010
633	27.86	-0.55	-0.55	4.76	41.64	0.010
634	27.90	-0.57	-0.57	4.75	41.85	0.010
635	27.95	-0.59	-0.59	4.74	42.06	0.010
636	27.99	-0.61	-0.61	4.72	42.27	0.010
637	28.04	-0.62	-0.62	4.71	42.47	0.009
638	28.08	-0.64	-0.64	4.69	42.68	0.009
639	28.12	-0.66	-0.66	4.68	42.89	0.009
640	28.17	-0.68	-0.68	4.66	43.09	0.009
641	28.21	-0.70	-0.70	4.64	43.30	0.009
642	28.26	-0.71	-0.71	4.63	43.50	0.009
643	28.30	-0.73	-0.73	4.61	43.71	0.008
644	28.35	-0.75	-0.75	4.59	43.91	0.008
645	28.39	-0.77	-0.77	4.57	44.11	0.008
646	28.43	-0.79	-0.79	4.55	44.31	0.008
647	28.48	-0.80	-0.80	4.53	44.51	0.008
648	28.52	-0.82	-0.82	4.51	44.71	0.008
649	28.57	-0.84	-0.84	4.49	44.91	0.007
650	28.61	-0.86	-0.86	4.47	45.11	0.007

651	28.65	-0.88	-0.88	4.45	45.30	0.007
652	28.70	-0.90	-0.90	4.42	45.50	0.007
653	28.74	-0.91	-0.91	4.40	45.69	0.007
654	28.79	-0.93	-0.93	4.38	45.89	0.007
655	28.83	-0.95	-0.95	4.35	46.08	0.007
656	28.87	-0.97	-0.97	4.33	46.27	0.006
657	28.92	-0.99	-0.99	4.30	46.46	0.006
658	28.96	-1.00	-1.00	4.27	46.65	0.006
659	29.01	-1.02	-1.02	4.25	46.84	0.006
660	29.05	-1.04	-1.04	4.22	47.02	0.006
661	29.09	-1.06	-1.06	4.19	47.21	0.006
662	29.14	-1.08	-1.08	4.16	47.39	0.005
663	29.18	-1.09	-1.09	4.13	47.58	0.005
664	29.23	-1.11	-1.11	4.10	47.76	0.005
665	29.27	-1.13	-1.13	4.07	47.94	0.005
666	29.31	-1.15	-1.15	4.04	48.12	0.005
667	29.36	-1.17	-1.17	4.01	48.30	0.005
668	29.40	-1.18	-1.18	3.98	48.47	0.005
669	29.45	-1.20	-1.20	3.94	48.65	0.005
670	29.49	-1.22	-1.22	3.91	48.82	0.004
671	29.54	-1.24	-1.24	3.88	48.99	0.004
672	29.58	-1.26	-1.26	3.84	49.16	0.004
673	29.62	-1.28	-1.28	3.81	49.33	0.004
674	29.67	-1.29	-1.29	3.77	49.50	0.004
675	29.71	-1.31	-1.31	3.73	49.66	0.004
676	29.76	-1.33	-1.33	3.70	49.83	0.004
677	29.80	-1.35	-1.35	3.66	49.99	0.004
678	29.84	-1.37	-1.37	3.62	50.15	0.003
679	29.89	-1.38	-1.38	3.58	50.31	0.003
680	29.93	-1.40	-1.40	3.54	50.46	0.003
681	29.98	-1.42	-1.42	3.50	50.62	0.003
682	30.02	-1.44	-1.44	3.46	50.77	0.003
683	30.06	-1.46	-1.46	3.42	50.92	0.003
684	30.11	-1.47	-1.47	3.38	51.07	0.003
685	30.15	-1.49	-1.49	3.34	51.22	0.003
686	30.20	-1.51	-1.51	3.30	51.37	0.003
687	30.24	-1.53	-1.53	3.25	51.51	0.002
688	30.28	-1.55	-1.55	3.21	51.66	0.002
689	30.33	-1.56	-1.56	3.17	51.80	0.002
690	30.37	-1.58	-1.58	3.12	51.94	0.002
691	30.42	-1.60	-1.60	3.08	52.07	0.002
692	30.46	-1.62	-1.62	3.03	52.21	0.002
693	30.51	-1.64	-1.64	2.98	52.34	0.002
694	30.55	-1.65	-1.65	2.93	52.47	0.002
695	30.59	-1.67	-1.67	2.89	52.60	0.002
696	30.64	-1.69	-1.69	2.84	52.72	0.001
697	30.68	-1.71	-1.71	2.79	52.85	0.001
698	30.73	-1.73	-1.73	2.74	52.97	0.001
699	30.77	-1.75	-1.75	2.69	53.09	0.001
700	30.81	-1.76	-1.76	2.64	53.21	0.001

701	30.86	-1.78	-1.78	2.59	53.32	0.001
702	30.90	-1.80	-1.80	2.54	53.44	0.001
703	30.95	-1.82	-1.82	2.48	53.55	0.001
704	30.99	-1.84	-1.84	2.43	53.65	0.001
705	31.03	-1.85	-1.85	2.38	53.76	0.000
706	31.08	-1.87	-1.87	2.32	53.86	0.000
707	31.12	-1.89	-1.89	2.27	53.96	0.000
708	31.17	-1.91	-1.91	2.21	54.06	0.000
709	31.21	-1.93	-1.93	2.16	54.16	0.000
710	31.25	-1.94	-1.94	2.10	54.25	0.000
711	31.30	-1.96	-1.96	2.04	54.34	0.000
712	31.34	-1.98	-1.98	1.98	54.43	0.000
713	31.39	-2.00	-2.00	1.93	54.52	0.000
714	31.43	-2.02	-2.02	1.87	54.60	0.000
715	31.47	-2.03	-2.03	1.81	54.68	0.000
716	31.52	-2.05	-2.05	1.75	54.76	0.000
717	31.56	-2.07	-2.07	1.69	54.84	0.000
718	31.61	-2.09	-2.09	1.63	54.91	0.000
719	31.65	-2.11	-2.11	1.56	54.98	0.000
720	31.70	-2.13	-2.13	1.50	55.05	0.000
721	31.74	-2.14	-2.14	1.44	55.11	0.000
722	31.78	-2.16	-2.16	1.38	55.18	0.000
723	31.83	-2.18	-2.18	1.31	55.24	0.000
724	31.87	-2.20	-2.20	1.25	55.29	0.000
725	31.92	-2.22	-2.22	1.18	55.35	0.000
726	31.96	-2.23	-2.23	1.12	55.40	0.000
727	32.00	-2.25	-2.25	1.05	55.44	0.000
728	32.05	-2.27	-2.27	0.98	55.49	0.000
729	32.09	-2.29	-2.29	0.91	55.53	0.000
730	32.14	-2.31	-2.31	0.85	55.57	0.000
731	32.18	-2.32	-2.32	0.78	55.60	0.000
732	32.22	-2.34	-2.34	0.71	55.64	0.000
733	32.27	-2.36	-2.36	0.64	55.67	0.000
734	32.31	-2.38	-2.38	0.57	55.69	0.000
735	32.36	-2.40	-2.40	0.50	55.72	0.000
736	32.40	-2.41	-2.41	0.42	55.74	0.000
737	32.44	-2.43	-2.43	0.35	55.75	0.000
738	32.49	-2.45	-2.45	0.28	55.77	0.000
739	32.53	-2.47	-2.47	0.21	55.78	0.000
740	32.58	-2.49	-2.49	0.13	55.79	0.000
741	32.62	-2.50	-2.50	0.06	55.79	0.000
742	32.67	-2.52	-2.52	-0.02	55.79	0.000
743	32.71	-2.54	-2.54	-0.09	55.79	0.000
744	32.75	-2.56	-2.56	-0.17	55.78	0.000
745	32.80	-2.58	-2.58	-0.25	55.77	-0.001
746	32.84	-2.60	-2.60	-0.32	55.76	-0.001
747	32.89	-2.61	-2.61	-0.40	55.75	-0.001
748	32.93	-2.63	-2.63	-0.48	55.73	-0.001
749	32.97	-2.65	-2.65	-0.56	55.70	-0.001
750	33.02	-2.67	-2.67	-0.64	55.68	-0.001

751	33.06	-2.69	-2.69	-0.72	55.65	-0.001
752	33.11	-2.70	-2.70	-0.80	55.61	-0.001
753	33.15	-2.72	-2.72	-0.88	55.58	-0.001
754	33.19	-2.74	-2.74	-0.96	55.54	-0.001
755	33.24	-2.76	-2.76	-1.05	55.49	-0.001
756	33.28	-2.78	-2.78	-1.13	55.44	-0.001
757	33.33	-2.80	-2.80	-1.21	55.39	-0.001
758	33.37	-2.81	-2.81	-1.30	55.34	-0.001
759	33.41	-2.83	-2.83	-1.38	55.28	-0.001
760	33.46	-2.85	-2.85	-1.47	55.21	-0.002
761	33.50	-2.87	-2.87	-1.56	55.15	-0.002
762	33.55	-2.89	-2.89	-1.64	55.08	-0.002
763	33.59	-2.90	-2.90	-1.73	55.00	-0.002
764	33.64	-2.92	-2.92	-1.82	54.92	-0.002
765	33.68	-2.94	-2.94	-1.91	54.84	-0.002
766	33.72	-2.96	-2.96	-1.99	54.76	-0.002
767	33.77	-2.98	-2.98	-2.08	54.67	-0.002
768	33.81	-2.99	-2.99	-2.17	54.57	-0.002
769	33.86	-3.01	-3.01	-2.27	54.48	-0.002
770	33.90	-3.03	-3.03	-2.36	54.37	-0.002
771	33.94	-3.05	-3.05	-2.45	54.27	-0.003
772	33.99	-3.07	-3.07	-2.54	54.16	-0.003
773	34.03	-3.08	-3.08	-2.63	54.04	-0.003
774	34.08	-3.10	-3.10	-2.73	53.93	-0.003
775	34.12	-3.12	-3.12	-2.82	53.80	-0.003
776	34.16	-3.14	-3.14	-2.92	53.68	-0.003
777	34.21	-3.16	-3.16	-3.01	53.55	-0.003
778	34.25	-3.18	-3.18	-3.11	53.41	-0.003
779	34.30	-3.19	-3.19	-3.21	53.27	-0.003
780	34.34	-3.21	-3.21	-3.30	53.13	-0.004
781	34.38	-3.23	-3.23	-3.40	52.98	-0.004
782	34.43	-3.25	-3.25	-3.50	52.83	-0.004
783	34.47	-3.27	-3.27	-3.60	52.67	-0.004
784	34.52	-3.28	-3.28	-3.70	52.51	-0.004
785	34.56	-3.30	-3.30	-3.80	52.35	-0.004
786	34.60	-3.32	-3.32	-3.90	52.18	-0.004
787	34.65	-3.34	-3.34	-4.00	52.00	-0.004
788	34.69	-3.36	-3.36	-4.10	51.82	-0.005
789	34.74	-3.37	-3.37	-4.20	51.64	-0.005
790	34.78	-3.39	-3.39	-4.31	51.45	-0.005
791	34.83	-3.41	-3.41	-4.41	51.26	-0.005
792	34.87	-3.43	-3.43	-4.51	51.06	-0.005
793	34.91	-3.45	-3.45	-4.62	50.86	-0.005
794	34.96	-3.46	-3.46	-4.72	50.66	-0.005
795	35.00	-3.48	-3.48	-4.83	50.45	-0.005
796	35.05	-3.50	-3.50	-4.94	50.23	-0.006
797	35.09	-3.52	-3.52	-5.04	50.01	-0.006
798	35.13	-3.54	-3.54	-5.15	49.79	-0.006
799	35.18	-3.55	-3.55	-5.26	49.56	-0.006
800	35.22	-3.57	-3.57	-5.37	49.32	-0.006

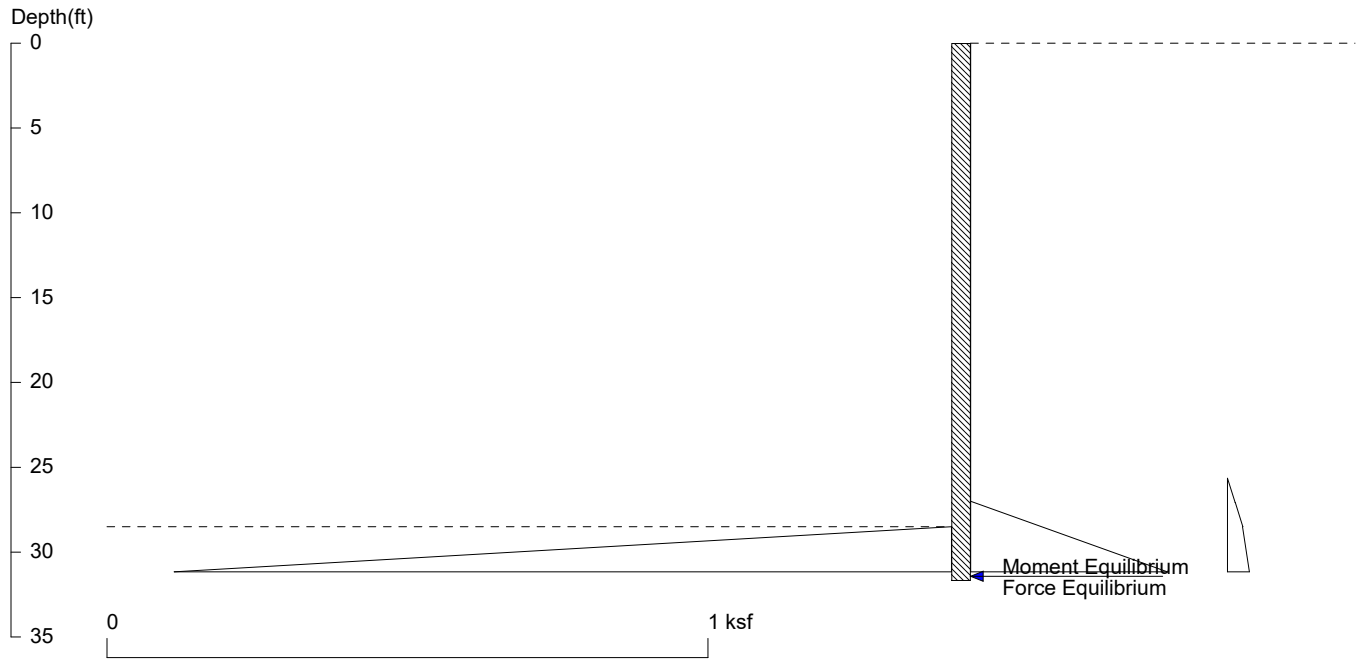
801	35.27	-3.59	-3.59	-5.48	49.08	-0.006
802	35.31	-3.61	-3.61	-5.59	48.84	-0.007
803	35.35	-3.63	-3.63	-5.70	48.59	-0.007
804	35.40	-3.65	-3.65	-5.81	48.34	-0.007
805	35.44	-3.66	-3.66	-5.92	48.08	-0.007
806	35.49	-3.68	-3.68	-6.03	47.82	-0.007
807	35.53	-3.70	-3.70	-6.14	47.55	-0.007
808	35.57	-3.72	-3.72	-6.26	47.27	-0.008
809	35.62	-3.74	-3.74	-6.37	47.00	-0.008
810	35.66	-3.75	-3.75	-6.49	46.71	-0.008
811	35.71	-3.77	-3.77	-6.60	46.42	-0.008
812	35.75	-3.79	-3.79	-6.72	46.13	-0.008
813	35.80	-3.81	-3.81	-6.83	45.83	-0.008
814	35.84	-3.83	-3.83	-6.95	45.53	-0.009
815	35.88	-3.84	-3.84	-7.07	45.22	-0.009
816	35.93	-3.86	-3.86	-7.19	44.90	-0.009
817	35.97	-3.88	-3.88	-7.30	44.59	-0.009
818	36.02	-3.51	-3.51	-7.42	44.26	-0.009
819	36.06	-3.53	-3.53	-7.52	43.93	-0.009
820	36.10	-3.55	-3.55	-7.62	43.60	-0.010
821	36.15	-3.57	-3.57	-7.73	43.26	-0.010
822	36.19	-3.59	-3.59	-7.83	42.92	-0.010
823	36.24	-3.60	-3.60	-7.94	42.57	-0.010
824	36.28	-3.62	-3.62	-8.04	42.22	-0.010
825	36.32	-3.64	-3.64	-8.15	41.86	-0.011
826	36.37	-3.66	-3.66	-8.26	41.50	-0.011
827	36.41	-3.68	-3.68	-8.36	41.13	-0.011
828	36.46	-3.69	-3.69	-8.47	40.76	-0.011
829	36.50	-3.71	-3.71	-8.58	40.38	-0.011
830	36.54	-3.73	-3.73	-8.69	40.00	-0.012
831	36.59	-3.75	-3.75	-8.80	39.62	-0.012
832	36.63	-3.77	-3.77	-8.91	39.23	-0.012
833	36.68	-3.78	-3.78	-9.02	38.83	-0.012
834	36.72	-3.80	-3.80	-9.13	38.43	-0.012
835	36.76	-3.82	-3.82	-9.24	38.03	-0.013
836	36.81	-3.84	-3.84	-9.36	37.62	-0.013
837	36.85	-3.86	-3.86	-9.47	37.20	-0.013
838	36.90	-3.88	-3.88	-9.58	36.78	-0.013
839	36.94	-3.89	-3.89	-9.70	36.36	-0.013
840	36.99	-3.91	-3.91	-9.81	35.93	-0.014
841	37.03	-3.93	-3.93	-9.93	35.49	-0.014
842	37.07	-3.95	-3.95	-10.04	35.05	-0.014
843	37.12	-3.97	-3.97	-10.16	34.61	-0.014
844	37.16	-3.98	-3.98	-10.28	34.16	-0.015
845	37.21	-4.00	-4.00	-10.40	33.70	-0.015
846	37.25	-4.02	-4.02	-10.52	33.24	-0.015
847	37.29	-4.04	-4.04	-10.63	32.77	-0.015
848	37.34	-4.06	-4.06	-10.75	32.30	-0.015
849	37.38	-4.07	-4.07	-10.87	31.83	-0.016
850	37.43	-4.09	-4.09	-10.99	31.34	-0.016

851	37.47	-4.11	-4.11	-11.12	30.86	-0.016
852	37.51	-4.13	-4.13	-11.24	30.36	-0.016
853	37.56	-4.15	-4.15	-11.36	29.87	-0.017
854	37.60	-4.16	-4.16	-11.48	29.36	-0.017
855	37.65	-4.18	-4.18	-11.61	28.85	-0.017
856	37.69	-4.20	-4.20	-11.73	28.34	-0.017
857	37.73	-4.22	-4.22	-11.86	27.82	-0.018
858	37.78	-4.24	-4.24	-11.98	27.29	-0.018
859	37.82	-4.25	-4.25	-12.11	26.76	-0.018
860	37.87	-4.27	-4.27	-12.23	26.23	-0.018
861	37.91	-4.29	-4.29	-12.36	25.68	-0.018
862	37.96	-4.31	-4.31	-12.49	25.14	-0.019
863	38.00	-4.33	-4.33	-12.62	24.58	-0.019
864	38.04	-4.34	-4.34	-12.75	24.02	-0.019
865	38.09	-4.36	-4.36	-12.88	23.46	-0.019
866	38.13	-4.38	-4.38	-13.00	22.89	-0.020
867	38.18	-4.40	-4.40	-13.14	22.31	-0.020
868	38.22	-4.42	-4.42	-13.27	21.73	-0.020
869	38.26	-4.43	-4.43	-13.40	21.14	-0.020
870	38.31	-4.45	-4.45	-13.53	20.55	-0.021
871	38.35	-4.47	-4.47	-13.66	19.95	-0.021
872	38.40	-4.49	-4.49	-13.80	19.34	-0.021
873	38.44	-4.51	-4.51	-13.93	18.73	-0.021
874	38.48	-4.53	-4.53	-14.07	18.12	-0.022
875	38.53	-4.54	-4.54	-14.20	17.49	-0.022
876	38.57	-4.56	-4.56	-14.34	16.86	-0.022
877	38.62	-4.58	-4.58	-14.47	16.23	-0.022
878	38.66	-4.60	-4.60	-14.61	15.59	-0.023
879	38.70	-4.62	-4.62	-14.75	14.94	-0.023
880	38.75	-4.63	-4.63	-14.89	14.29	-0.023
881	38.79	-4.65	-4.65	-15.02	13.63	-0.023
882	38.84	-4.67	-4.67	-15.16	12.96	-0.024
883	38.88	-4.69	-4.69	-15.30	12.29	-0.024
884	38.92	-4.71	-4.71	-15.44	11.61	-0.024
885	38.97	-4.72	-4.72	-15.58	10.93	-0.024
886	39.01	-4.74	-4.74	-15.73	10.24	-0.025
887	39.06	-4.76	-4.76	-15.87	9.54	-0.025
888	39.10	-4.78	-4.78	-16.01	8.84	-0.025
889	39.15	-4.80	-4.80	-16.15	8.13	-0.025
890	39.19	-4.81	-4.81	-16.30	7.42	-0.026
891	39.23	-4.83	-4.83	-16.44	6.70	-0.026
892	39.28	-4.85	-4.85	-16.59	5.97	-0.026
893	39.32	-4.87	-4.87	-16.73	5.23	-0.026
894	39.37	-4.89	-4.89	-16.88	4.49	-0.027
895	39.41	-4.91	-4.91	-17.03	3.74	-0.027
896	39.45	-4.92	-4.92	-17.17	2.99	-0.027
897	39.50	-4.94	-4.94	-17.32	2.23	-0.027
898	39.54	-4.96	-4.96	-17.47	1.46	-0.028
899	39.59	-4.98	-4.98	-17.62	0.69	-0.028

The above data can be selected using mouse, then copy and paste into Excel to create graphics

Butler Street (West) Section A2

Phase III Dredge EI -22.58 DRAINED/UNDRAINED Revised Mounding



<ShoringSuite> CIVILTECH SOFTWARE USA www.civiltech.com

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Date: 1/14/2020

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Wall Height=28.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=3.19 (5~10ft is recommended!!!) Min. Pile Length=31.69

MOMENT IN PILE: Max. Moment=0.26 per Pile Spacing=1.0 at Depth=30.06

PILE SELECTION:

Request Min. Section Modulus = 0.1 in³/ft=5.16 cm³/m, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.53(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2

DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):

Z1	P1	Z2	P2	Slope
0	0	27	0	0.000000
27	0	100	5.743	0.078671
*	Sur-	charge		
25.650	0.000	27.075	0.013	0.008958
27.075	0.013	28.500	0.025	0.008853
28.500	0.025	31.350	0.038	0.004323
31.350	0.038	34.200	0.050	0.004173

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
28.5	0	100	34.763	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	28.50	1.00

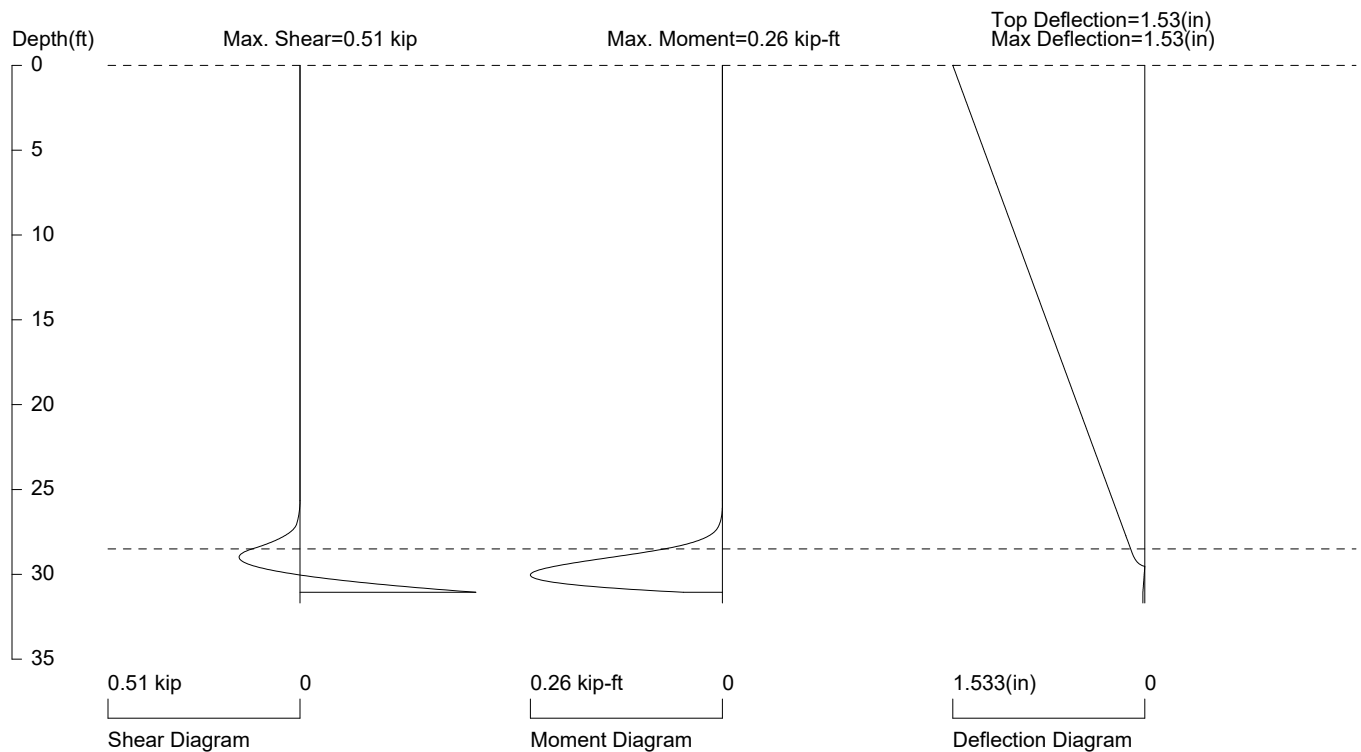
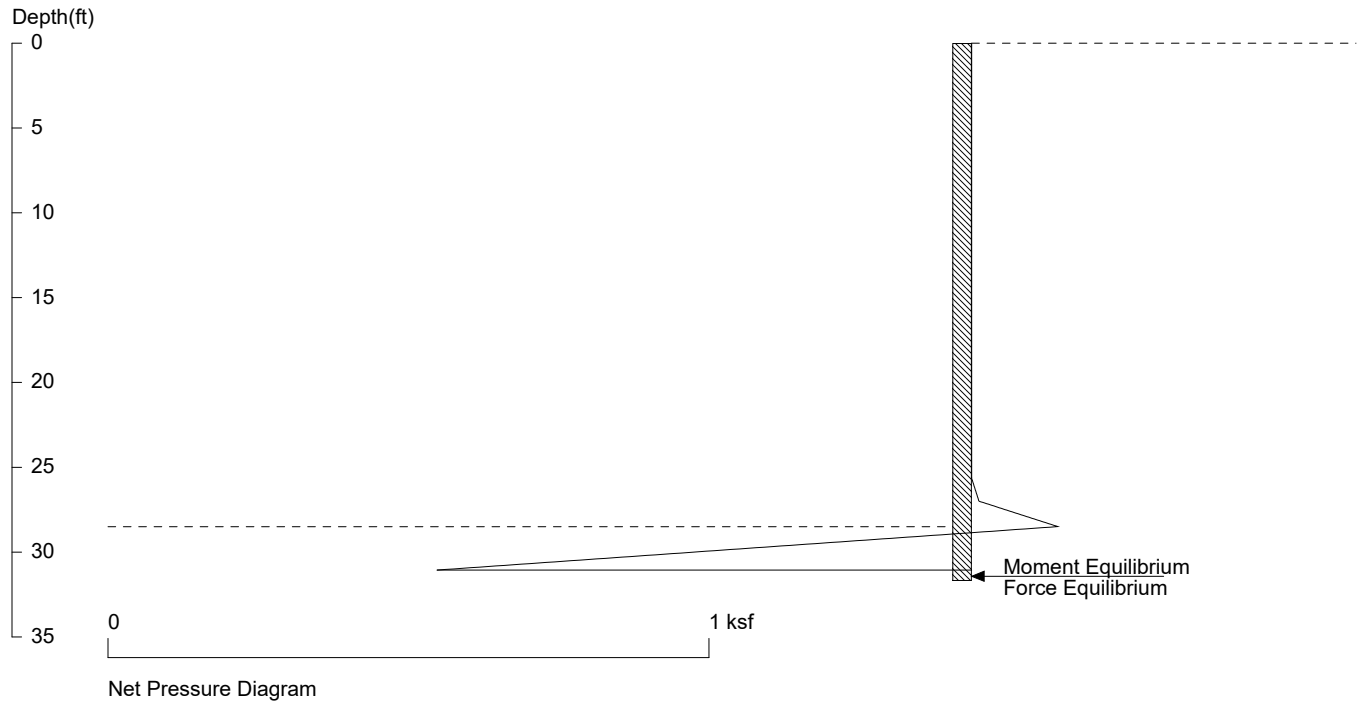
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width, Spacing, Diameter, Length, and Depth - ft; Force - kip; Moment - kip-ft
Friction, Bearing, and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street (West) Section A2

Phase III Dredge EI -22.58 DRAINED/UNDRAINED Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltech.com

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. Temporary Structures in Construction, Robert T. Ratay (Co-author of Chapter 7: John J. Peirce), McGraw-Hill. 2012
9. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft³, Deflection - in

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Street\SECTION A2 - Butler Street (West) (El -22.58).sh8

Title: Butler Street (West) Section A2
Subtitle: Phase III Dredge El -22.58 DRAINED/UNDRAINED Revised Mounding

*****INPUT DATA*****

Wall Type: 1. Sheet Pile
Wall Height: 28.50
Pile Diameter: 1.00
Pile Spacing: 1.00
Factor of Safety (F.S.): 1.30
Lateral Support Type (Braces): 1. No
Top Brace Increase (Multi-Bracing): Add 15%*
Embedment Option: 1. Yes
Friction at Pile Tip: No
Pile Properties:
Steel Strength, Fy: 50 ksi = 345 MPa
Allowable Fb/Fy: 0.66
Elastic Module, E: 29000.00
Moment of Inertia, I: 656.2
User Input Pile:

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	0	0	27	0	0.000000
2	27	0	100	5.743	0.078671
3	36	0.435	100	0.435	0.000000
4	*	Sur-	charge		
5	25.650	0.000	27.075	0.013	0.008958
6	27.075	0.013	28.500	0.025	0.008853
7	28.500	0.025	31.350	0.038	0.004323
8	31.350	0.038	34.200	0.050	0.004173
9	34.200	0.050	37.050	0.061	0.003980
10	37.050	0.061	39.900	0.072	0.003750
11	39.900	0.072	42.750	0.082	0.003491
12	42.750	0.082	45.600	0.091	0.003209
13	45.600	0.091	48.450	0.099	0.002911
14	48.450	0.099	51.300	0.106	0.002605
15	51.300	0.106	54.150	0.113	0.002296
16	54.150	0.113	57.000	0.119	0.001991
17	57.000	0.119	62.700	0.123	0.000846
18	62.700	0.123	68.400	0.127	0.000703
19	68.400	0.127	74.100	0.131	0.000567
20	74.100	0.131	79.800	0.133	0.000440
21	79.800	0.133	85.500	0.135	0.000321
22	85.500	0.135	91.200	0.136	0.000212
23	91.200	0.136	96.900	0.137	0.000113
24	96.900	0.137	102.600	0.137	0.000023
25	102.600	0.137	108.300	0.136	-0.000187
26	108.300	0.136	114.000	0.133	-0.000440

* PASSIVE PRESSURE *

The pressures below will be divided by a Factor of Safety =1.3

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	28.5	0	100	34.763	0.4862

* ACTIVE SPACE *

No.	Z depth	Spacing
1	0.00	1.00
2	28.50	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
1	0.00	1.00

```

-----
*For Tieback:  Input1 = Diameter;  Input2 = Bond Strength
*For Plate:    Input1 = Diameter;  Input2 = Allowable Pressure
*For Deadman:  Input1 = Horz. Width;  Input2 = Passive Pressure;
*For Sheet Pile Anchor:  Input1 = Horz. Width;  Input2 = Passive Slope;

```

*****CALCULATION*****

The calculated moment and shear are per pile spacing. Sheet piles are per one foot or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

```

      |      D1=0.00
      |
==|==      D2=28.50
      |
      |      D3=31.69

```

D1 - TOP DEPTH
D2 - EXCAVATION BASE
D3 - PILE TIP

MOMENT equilibrium AT DEPTH=31.16 WITH EMBEDMENT OF 2.66
FORCE equilibrium AT DEPTH=31.69 WITH EMBEDMENT OF 3.19

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

*****RESULTS*****

* EMBEDMENT Notes *

Based on USS Design Manual, first calculate embedment for moment equilibrium, then increased the embedment to get the design depth.

The embedment for moment equilibrium is 2.66

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

The total design embedment is 3.19

5~10ft minimum embedment is recommended!!!

Embedment Information:

If 20% increased, the total design embedment is 3.19

If 30% increased, the total design embedment is 3.46

If 40% increased, the total design embedment is 3.72

If 50% increased, the total design embedment is 3.99

* MOMENT IN PILE (per pile spacing)*

Pile Spacing: sheet piles are one foot or one meter; soldier piles are one pile.

Overall Maximum Moment = 0.26 at 30.06

Maximum Shear = 0.51

Moment and Shear are per pile spacing: 1.0 foot or meter

* VERTICAL LOADING *

Vertical Loading from Braces = 0.00

Vertical Loading from External Load = 0.00

Total Vertical Loading = 0.00

* DEFLECTION *

I (in4)/foot=656.20

Top deflection = 1.533(in)

Max. deflection = 1.533(in)

*****PRESSURE, LOAD, SHEAR, MOMENT, AND DEFLECTION v.s. DEPTH*****

The shear and moment are per single soldier pile (secant/tangent pile) or one foot of sheet pile (concrete wall). The deflection is based on users input pile below:

User Input I (Moment of Inertia)

Elastic Module, E (ksi)= 29000.00

Moment of Inertia, I (in4)/foot= 656.2

PRESS. - Sum of all pressures (Net pressure). (Active) direction is positive

LOAD - Liner load (force per unit depth) = Pressures multiply by acting space

No	DEPTH ft	PRESS. ksf	LOAD kip/ft	SHEAR kip	MOMENT kip-ft	DEFLECTION in
1	0.00	0.00	0.00	0.00	0.00	1.533
2	0.03	0.00	0.00	0.00	0.00	1.531
3	0.07	0.00	0.00	0.00	0.00	1.529
4	0.10	0.00	0.00	0.00	0.00	1.527
5	0.14	0.00	0.00	0.00	0.00	1.526
6	0.17	0.00	0.00	0.00	0.00	1.524
7	0.21	0.00	0.00	0.00	0.00	1.522
8	0.24	0.00	0.00	0.00	0.00	1.520
9	0.28	0.00	0.00	0.00	0.00	1.519
10	0.31	0.00	0.00	0.00	0.00	1.517
11	0.35	0.00	0.00	0.00	0.00	1.515
12	0.38	0.00	0.00	0.00	0.00	1.514
13	0.42	0.00	0.00	0.00	0.00	1.512

14	0.45	0.00	0.00	0.00	0.00	1.510
15	0.49	0.00	0.00	0.00	0.00	1.508
16	0.52	0.00	0.00	0.00	0.00	1.507
17	0.55	0.00	0.00	0.00	0.00	1.505
18	0.59	0.00	0.00	0.00	0.00	1.503
19	0.62	0.00	0.00	0.00	0.00	1.501
20	0.66	0.00	0.00	0.00	0.00	1.500
21	0.69	0.00	0.00	0.00	0.00	1.498
22	0.73	0.00	0.00	0.00	0.00	1.496
23	0.76	0.00	0.00	0.00	0.00	1.495
24	0.80	0.00	0.00	0.00	0.00	1.493
25	0.83	0.00	0.00	0.00	0.00	1.491
26	0.87	0.00	0.00	0.00	0.00	1.489
27	0.90	0.00	0.00	0.00	0.00	1.488
28	0.94	0.00	0.00	0.00	0.00	1.486
29	0.97	0.00	0.00	0.00	0.00	1.484
30	1.01	0.00	0.00	0.00	0.00	1.482
31	1.04	0.00	0.00	0.00	0.00	1.481
32	1.07	0.00	0.00	0.00	0.00	1.479
33	1.11	0.00	0.00	0.00	0.00	1.477
34	1.14	0.00	0.00	0.00	0.00	1.476
35	1.18	0.00	0.00	0.00	0.00	1.474
36	1.21	0.00	0.00	0.00	0.00	1.472
37	1.25	0.00	0.00	0.00	0.00	1.470
38	1.28	0.00	0.00	0.00	0.00	1.469
39	1.32	0.00	0.00	0.00	0.00	1.467
40	1.35	0.00	0.00	0.00	0.00	1.465
41	1.39	0.00	0.00	0.00	0.00	1.463
42	1.42	0.00	0.00	0.00	0.00	1.462
43	1.46	0.00	0.00	0.00	0.00	1.460
44	1.49	0.00	0.00	0.00	0.00	1.458
45	1.53	0.00	0.00	0.00	0.00	1.457
46	1.56	0.00	0.00	0.00	0.00	1.455
47	1.59	0.00	0.00	0.00	0.00	1.453
48	1.63	0.00	0.00	0.00	0.00	1.451
49	1.66	0.00	0.00	0.00	0.00	1.450
50	1.70	0.00	0.00	0.00	0.00	1.448
51	1.73	0.00	0.00	0.00	0.00	1.446
52	1.77	0.00	0.00	0.00	0.00	1.444
53	1.80	0.00	0.00	0.00	0.00	1.443
54	1.84	0.00	0.00	0.00	0.00	1.441
55	1.87	0.00	0.00	0.00	0.00	1.439
56	1.91	0.00	0.00	0.00	0.00	1.438
57	1.94	0.00	0.00	0.00	0.00	1.436
58	1.98	0.00	0.00	0.00	0.00	1.434
59	2.01	0.00	0.00	0.00	0.00	1.432
60	2.05	0.00	0.00	0.00	0.00	1.431
61	2.08	0.00	0.00	0.00	0.00	1.429
62	2.11	0.00	0.00	0.00	0.00	1.427
63	2.15	0.00	0.00	0.00	0.00	1.425

64	2.18	0.00	0.00	0.00	0.00	1.424
65	2.22	0.00	0.00	0.00	0.00	1.422
66	2.25	0.00	0.00	0.00	0.00	1.420
67	2.29	0.00	0.00	0.00	0.00	1.419
68	2.32	0.00	0.00	0.00	0.00	1.417
69	2.36	0.00	0.00	0.00	0.00	1.415
70	2.39	0.00	0.00	0.00	0.00	1.413
71	2.43	0.00	0.00	0.00	0.00	1.412
72	2.46	0.00	0.00	0.00	0.00	1.410
73	2.50	0.00	0.00	0.00	0.00	1.408
74	2.53	0.00	0.00	0.00	0.00	1.406
75	2.57	0.00	0.00	0.00	0.00	1.405
76	2.60	0.00	0.00	0.00	0.00	1.403
77	2.63	0.00	0.00	0.00	0.00	1.401
78	2.67	0.00	0.00	0.00	0.00	1.400
79	2.70	0.00	0.00	0.00	0.00	1.398
80	2.74	0.00	0.00	0.00	0.00	1.396
81	2.77	0.00	0.00	0.00	0.00	1.394
82	2.81	0.00	0.00	0.00	0.00	1.393
83	2.84	0.00	0.00	0.00	0.00	1.391
84	2.88	0.00	0.00	0.00	0.00	1.389
85	2.91	0.00	0.00	0.00	0.00	1.387
86	2.95	0.00	0.00	0.00	0.00	1.386
87	2.98	0.00	0.00	0.00	0.00	1.384
88	3.02	0.00	0.00	0.00	0.00	1.382
89	3.05	0.00	0.00	0.00	0.00	1.381
90	3.09	0.00	0.00	0.00	0.00	1.379
91	3.12	0.00	0.00	0.00	0.00	1.377
92	3.15	0.00	0.00	0.00	0.00	1.375
93	3.19	0.00	0.00	0.00	0.00	1.374
94	3.22	0.00	0.00	0.00	0.00	1.372
95	3.26	0.00	0.00	0.00	0.00	1.370
96	3.29	0.00	0.00	0.00	0.00	1.368
97	3.33	0.00	0.00	0.00	0.00	1.367
98	3.36	0.00	0.00	0.00	0.00	1.365
99	3.40	0.00	0.00	0.00	0.00	1.363
100	3.43	0.00	0.00	0.00	0.00	1.362
101	3.47	0.00	0.00	0.00	0.00	1.360
102	3.50	0.00	0.00	0.00	0.00	1.358
103	3.54	0.00	0.00	0.00	0.00	1.356
104	3.57	0.00	0.00	0.00	0.00	1.355
105	3.61	0.00	0.00	0.00	0.00	1.353
106	3.64	0.00	0.00	0.00	0.00	1.351
107	3.67	0.00	0.00	0.00	0.00	1.349
108	3.71	0.00	0.00	0.00	0.00	1.348
109	3.74	0.00	0.00	0.00	0.00	1.346
110	3.78	0.00	0.00	0.00	0.00	1.344
111	3.81	0.00	0.00	0.00	0.00	1.343
112	3.85	0.00	0.00	0.00	0.00	1.341
113	3.88	0.00	0.00	0.00	0.00	1.339

114	3.92	0.00	0.00	0.00	0.00	1.337
115	3.95	0.00	0.00	0.00	0.00	1.336
116	3.99	0.00	0.00	0.00	0.00	1.334
117	4.02	0.00	0.00	0.00	0.00	1.332
118	4.06	0.00	0.00	0.00	0.00	1.330
119	4.09	0.00	0.00	0.00	0.00	1.329
120	4.13	0.00	0.00	0.00	0.00	1.327
121	4.16	0.00	0.00	0.00	0.00	1.325
122	4.19	0.00	0.00	0.00	0.00	1.324
123	4.23	0.00	0.00	0.00	0.00	1.322
124	4.26	0.00	0.00	0.00	0.00	1.320
125	4.30	0.00	0.00	0.00	0.00	1.318
126	4.33	0.00	0.00	0.00	0.00	1.317
127	4.37	0.00	0.00	0.00	0.00	1.315
128	4.40	0.00	0.00	0.00	0.00	1.313
129	4.44	0.00	0.00	0.00	0.00	1.311
130	4.47	0.00	0.00	0.00	0.00	1.310
131	4.51	0.00	0.00	0.00	0.00	1.308
132	4.54	0.00	0.00	0.00	0.00	1.306
133	4.58	0.00	0.00	0.00	0.00	1.305
134	4.61	0.00	0.00	0.00	0.00	1.303
135	4.65	0.00	0.00	0.00	0.00	1.301
136	4.68	0.00	0.00	0.00	0.00	1.299
137	4.71	0.00	0.00	0.00	0.00	1.298
138	4.75	0.00	0.00	0.00	0.00	1.296
139	4.78	0.00	0.00	0.00	0.00	1.294
140	4.82	0.00	0.00	0.00	0.00	1.292
141	4.85	0.00	0.00	0.00	0.00	1.291
142	4.89	0.00	0.00	0.00	0.00	1.289
143	4.92	0.00	0.00	0.00	0.00	1.287
144	4.96	0.00	0.00	0.00	0.00	1.286
145	4.99	0.00	0.00	0.00	0.00	1.284
146	5.03	0.00	0.00	0.00	0.00	1.282
147	5.06	0.00	0.00	0.00	0.00	1.280
148	5.10	0.00	0.00	0.00	0.00	1.279
149	5.13	0.00	0.00	0.00	0.00	1.277
150	5.17	0.00	0.00	0.00	0.00	1.275
151	5.20	0.00	0.00	0.00	0.00	1.273
152	5.23	0.00	0.00	0.00	0.00	1.272
153	5.27	0.00	0.00	0.00	0.00	1.270
154	5.30	0.00	0.00	0.00	0.00	1.268
155	5.34	0.00	0.00	0.00	0.00	1.267
156	5.37	0.00	0.00	0.00	0.00	1.265
157	5.41	0.00	0.00	0.00	0.00	1.263
158	5.44	0.00	0.00	0.00	0.00	1.261
159	5.48	0.00	0.00	0.00	0.00	1.260
160	5.51	0.00	0.00	0.00	0.00	1.258
161	5.55	0.00	0.00	0.00	0.00	1.256
162	5.58	0.00	0.00	0.00	0.00	1.254
163	5.62	0.00	0.00	0.00	0.00	1.253

164	5.65	0.00	0.00	0.00	0.00	1.251
165	5.69	0.00	0.00	0.00	0.00	1.249
166	5.72	0.00	0.00	0.00	0.00	1.248
167	5.75	0.00	0.00	0.00	0.00	1.246
168	5.79	0.00	0.00	0.00	0.00	1.244
169	5.82	0.00	0.00	0.00	0.00	1.242
170	5.86	0.00	0.00	0.00	0.00	1.241
171	5.89	0.00	0.00	0.00	0.00	1.239
172	5.93	0.00	0.00	0.00	0.00	1.237
173	5.96	0.00	0.00	0.00	0.00	1.235
174	6.00	0.00	0.00	0.00	0.00	1.234
175	6.03	0.00	0.00	0.00	0.00	1.232
176	6.07	0.00	0.00	0.00	0.00	1.230
177	6.10	0.00	0.00	0.00	0.00	1.229
178	6.14	0.00	0.00	0.00	0.00	1.227
179	6.17	0.00	0.00	0.00	0.00	1.225
180	6.21	0.00	0.00	0.00	0.00	1.223
181	6.24	0.00	0.00	0.00	0.00	1.222
182	6.27	0.00	0.00	0.00	0.00	1.220
183	6.31	0.00	0.00	0.00	0.00	1.218
184	6.34	0.00	0.00	0.00	0.00	1.217
185	6.38	0.00	0.00	0.00	0.00	1.215
186	6.41	0.00	0.00	0.00	0.00	1.213
187	6.45	0.00	0.00	0.00	0.00	1.211
188	6.48	0.00	0.00	0.00	0.00	1.210
189	6.52	0.00	0.00	0.00	0.00	1.208
190	6.55	0.00	0.00	0.00	0.00	1.206
191	6.59	0.00	0.00	0.00	0.00	1.204
192	6.62	0.00	0.00	0.00	0.00	1.203
193	6.66	0.00	0.00	0.00	0.00	1.201
194	6.69	0.00	0.00	0.00	0.00	1.199
195	6.73	0.00	0.00	0.00	0.00	1.198
196	6.76	0.00	0.00	0.00	0.00	1.196
197	6.79	0.00	0.00	0.00	0.00	1.194
198	6.83	0.00	0.00	0.00	0.00	1.192
199	6.86	0.00	0.00	0.00	0.00	1.191
200	6.90	0.00	0.00	0.00	0.00	1.189
201	6.93	0.00	0.00	0.00	0.00	1.187
202	6.97	0.00	0.00	0.00	0.00	1.185
203	7.00	0.00	0.00	0.00	0.00	1.184
204	7.04	0.00	0.00	0.00	0.00	1.182
205	7.07	0.00	0.00	0.00	0.00	1.180
206	7.11	0.00	0.00	0.00	0.00	1.179
207	7.14	0.00	0.00	0.00	0.00	1.177
208	7.18	0.00	0.00	0.00	0.00	1.175
209	7.21	0.00	0.00	0.00	0.00	1.173
210	7.25	0.00	0.00	0.00	0.00	1.172
211	7.28	0.00	0.00	0.00	0.00	1.170
212	7.31	0.00	0.00	0.00	0.00	1.168
213	7.35	0.00	0.00	0.00	0.00	1.166

214	7.38	0.00	0.00	0.00	0.00	1.165
215	7.42	0.00	0.00	0.00	0.00	1.163
216	7.45	0.00	0.00	0.00	0.00	1.161
217	7.49	0.00	0.00	0.00	0.00	1.160
218	7.52	0.00	0.00	0.00	0.00	1.158
219	7.56	0.00	0.00	0.00	0.00	1.156
220	7.59	0.00	0.00	0.00	0.00	1.154
221	7.63	0.00	0.00	0.00	0.00	1.153
222	7.66	0.00	0.00	0.00	0.00	1.151
223	7.70	0.00	0.00	0.00	0.00	1.149
224	7.73	0.00	0.00	0.00	0.00	1.147
225	7.77	0.00	0.00	0.00	0.00	1.146
226	7.80	0.00	0.00	0.00	0.00	1.144
227	7.83	0.00	0.00	0.00	0.00	1.142
228	7.87	0.00	0.00	0.00	0.00	1.141
229	7.90	0.00	0.00	0.00	0.00	1.139
230	7.94	0.00	0.00	0.00	0.00	1.137
231	7.97	0.00	0.00	0.00	0.00	1.135
232	8.01	0.00	0.00	0.00	0.00	1.134
233	8.04	0.00	0.00	0.00	0.00	1.132
234	8.08	0.00	0.00	0.00	0.00	1.130
235	8.11	0.00	0.00	0.00	0.00	1.128
236	8.15	0.00	0.00	0.00	0.00	1.127
237	8.18	0.00	0.00	0.00	0.00	1.125
238	8.22	0.00	0.00	0.00	0.00	1.123
239	8.25	0.00	0.00	0.00	0.00	1.122
240	8.29	0.00	0.00	0.00	0.00	1.120
241	8.32	0.00	0.00	0.00	0.00	1.118
242	8.35	0.00	0.00	0.00	0.00	1.116
243	8.39	0.00	0.00	0.00	0.00	1.115
244	8.42	0.00	0.00	0.00	0.00	1.113
245	8.46	0.00	0.00	0.00	0.00	1.111
246	8.49	0.00	0.00	0.00	0.00	1.109
247	8.53	0.00	0.00	0.00	0.00	1.108
248	8.56	0.00	0.00	0.00	0.00	1.106
249	8.60	0.00	0.00	0.00	0.00	1.104
250	8.63	0.00	0.00	0.00	0.00	1.103
251	8.67	0.00	0.00	0.00	0.00	1.101
252	8.70	0.00	0.00	0.00	0.00	1.099
253	8.74	0.00	0.00	0.00	0.00	1.097
254	8.77	0.00	0.00	0.00	0.00	1.096
255	8.81	0.00	0.00	0.00	0.00	1.094
256	8.84	0.00	0.00	0.00	0.00	1.092
257	8.87	0.00	0.00	0.00	0.00	1.090
258	8.91	0.00	0.00	0.00	0.00	1.089
259	8.94	0.00	0.00	0.00	0.00	1.087
260	8.98	0.00	0.00	0.00	0.00	1.085
261	9.01	0.00	0.00	0.00	0.00	1.084
262	9.05	0.00	0.00	0.00	0.00	1.082
263	9.08	0.00	0.00	0.00	0.00	1.080

264	9.12	0.00	0.00	0.00	0.00	1.078
265	9.15	0.00	0.00	0.00	0.00	1.077
266	9.19	0.00	0.00	0.00	0.00	1.075
267	9.22	0.00	0.00	0.00	0.00	1.073
268	9.26	0.00	0.00	0.00	0.00	1.071
269	9.29	0.00	0.00	0.00	0.00	1.070
270	9.33	0.00	0.00	0.00	0.00	1.068
271	9.36	0.00	0.00	0.00	0.00	1.066
272	9.39	0.00	0.00	0.00	0.00	1.065
273	9.43	0.00	0.00	0.00	0.00	1.063
274	9.46	0.00	0.00	0.00	0.00	1.061
275	9.50	0.00	0.00	0.00	0.00	1.059
276	9.53	0.00	0.00	0.00	0.00	1.058
277	9.57	0.00	0.00	0.00	0.00	1.056
278	9.60	0.00	0.00	0.00	0.00	1.054
279	9.64	0.00	0.00	0.00	0.00	1.052
280	9.67	0.00	0.00	0.00	0.00	1.051
281	9.71	0.00	0.00	0.00	0.00	1.049
282	9.74	0.00	0.00	0.00	0.00	1.047
283	9.78	0.00	0.00	0.00	0.00	1.046
284	9.81	0.00	0.00	0.00	0.00	1.044
285	9.85	0.00	0.00	0.00	0.00	1.042
286	9.88	0.00	0.00	0.00	0.00	1.040
287	9.91	0.00	0.00	0.00	0.00	1.039
288	9.95	0.00	0.00	0.00	0.00	1.037
289	9.98	0.00	0.00	0.00	0.00	1.035
290	10.02	0.00	0.00	0.00	0.00	1.033
291	10.05	0.00	0.00	0.00	0.00	1.032
292	10.09	0.00	0.00	0.00	0.00	1.030
293	10.12	0.00	0.00	0.00	0.00	1.028
294	10.16	0.00	0.00	0.00	0.00	1.027
295	10.19	0.00	0.00	0.00	0.00	1.025
296	10.23	0.00	0.00	0.00	0.00	1.023
297	10.26	0.00	0.00	0.00	0.00	1.021
298	10.30	0.00	0.00	0.00	0.00	1.020
299	10.33	0.00	0.00	0.00	0.00	1.018
300	10.37	0.00	0.00	0.00	0.00	1.016
301	10.40	0.00	0.00	0.00	0.00	1.014
302	10.43	0.00	0.00	0.00	0.00	1.013
303	10.47	0.00	0.00	0.00	0.00	1.011
304	10.50	0.00	0.00	0.00	0.00	1.009
305	10.54	0.00	0.00	0.00	0.00	1.008
306	10.57	0.00	0.00	0.00	0.00	1.006
307	10.61	0.00	0.00	0.00	0.00	1.004
308	10.64	0.00	0.00	0.00	0.00	1.002
309	10.68	0.00	0.00	0.00	0.00	1.001
310	10.71	0.00	0.00	0.00	0.00	0.999
311	10.75	0.00	0.00	0.00	0.00	0.997
312	10.78	0.00	0.00	0.00	0.00	0.995
313	10.82	0.00	0.00	0.00	0.00	0.994

314	10.85	0.00	0.00	0.00	0.00	0.992
315	10.89	0.00	0.00	0.00	0.00	0.990
316	10.92	0.00	0.00	0.00	0.00	0.989
317	10.95	0.00	0.00	0.00	0.00	0.987
318	10.99	0.00	0.00	0.00	0.00	0.985
319	11.02	0.00	0.00	0.00	0.00	0.983
320	11.06	0.00	0.00	0.00	0.00	0.982
321	11.09	0.00	0.00	0.00	0.00	0.980
322	11.13	0.00	0.00	0.00	0.00	0.978
323	11.16	0.00	0.00	0.00	0.00	0.976
324	11.20	0.00	0.00	0.00	0.00	0.975
325	11.23	0.00	0.00	0.00	0.00	0.973
326	11.27	0.00	0.00	0.00	0.00	0.971
327	11.30	0.00	0.00	0.00	0.00	0.970
328	11.34	0.00	0.00	0.00	0.00	0.968
329	11.37	0.00	0.00	0.00	0.00	0.966
330	11.41	0.00	0.00	0.00	0.00	0.964
331	11.44	0.00	0.00	0.00	0.00	0.963
332	11.47	0.00	0.00	0.00	0.00	0.961
333	11.51	0.00	0.00	0.00	0.00	0.959
334	11.54	0.00	0.00	0.00	0.00	0.957
335	11.58	0.00	0.00	0.00	0.00	0.956
336	11.61	0.00	0.00	0.00	0.00	0.954
337	11.65	0.00	0.00	0.00	0.00	0.952
338	11.68	0.00	0.00	0.00	0.00	0.951
339	11.72	0.00	0.00	0.00	0.00	0.949
340	11.75	0.00	0.00	0.00	0.00	0.947
341	11.79	0.00	0.00	0.00	0.00	0.945
342	11.82	0.00	0.00	0.00	0.00	0.944
343	11.86	0.00	0.00	0.00	0.00	0.942
344	11.89	0.00	0.00	0.00	0.00	0.940
345	11.93	0.00	0.00	0.00	0.00	0.938
346	11.96	0.00	0.00	0.00	0.00	0.937
347	11.99	0.00	0.00	0.00	0.00	0.935
348	12.03	0.00	0.00	0.00	0.00	0.933
349	12.06	0.00	0.00	0.00	0.00	0.932
350	12.10	0.00	0.00	0.00	0.00	0.930
351	12.13	0.00	0.00	0.00	0.00	0.928
352	12.17	0.00	0.00	0.00	0.00	0.926
353	12.20	0.00	0.00	0.00	0.00	0.925
354	12.24	0.00	0.00	0.00	0.00	0.923
355	12.27	0.00	0.00	0.00	0.00	0.921
356	12.31	0.00	0.00	0.00	0.00	0.919
357	12.34	0.00	0.00	0.00	0.00	0.918
358	12.38	0.00	0.00	0.00	0.00	0.916
359	12.41	0.00	0.00	0.00	0.00	0.914
360	12.45	0.00	0.00	0.00	0.00	0.913
361	12.48	0.00	0.00	0.00	0.00	0.911
362	12.51	0.00	0.00	0.00	0.00	0.909
363	12.55	0.00	0.00	0.00	0.00	0.907

364	12.58	0.00	0.00	0.00	0.00	0.906
365	12.62	0.00	0.00	0.00	0.00	0.904
366	12.65	0.00	0.00	0.00	0.00	0.902
367	12.69	0.00	0.00	0.00	0.00	0.900
368	12.72	0.00	0.00	0.00	0.00	0.899
369	12.76	0.00	0.00	0.00	0.00	0.897
370	12.79	0.00	0.00	0.00	0.00	0.895
371	12.83	0.00	0.00	0.00	0.00	0.894
372	12.86	0.00	0.00	0.00	0.00	0.892
373	12.90	0.00	0.00	0.00	0.00	0.890
374	12.93	0.00	0.00	0.00	0.00	0.888
375	12.97	0.00	0.00	0.00	0.00	0.887
376	13.00	0.00	0.00	0.00	0.00	0.885
377	13.03	0.00	0.00	0.00	0.00	0.883
378	13.07	0.00	0.00	0.00	0.00	0.882
379	13.10	0.00	0.00	0.00	0.00	0.880
380	13.14	0.00	0.00	0.00	0.00	0.878
381	13.17	0.00	0.00	0.00	0.00	0.876
382	13.21	0.00	0.00	0.00	0.00	0.875
383	13.24	0.00	0.00	0.00	0.00	0.873
384	13.28	0.00	0.00	0.00	0.00	0.871
385	13.31	0.00	0.00	0.00	0.00	0.869
386	13.35	0.00	0.00	0.00	0.00	0.868
387	13.38	0.00	0.00	0.00	0.00	0.866
388	13.42	0.00	0.00	0.00	0.00	0.864
389	13.45	0.00	0.00	0.00	0.00	0.863
390	13.49	0.00	0.00	0.00	0.00	0.861
391	13.52	0.00	0.00	0.00	0.00	0.859
392	13.55	0.00	0.00	0.00	0.00	0.857
393	13.59	0.00	0.00	0.00	0.00	0.856
394	13.62	0.00	0.00	0.00	0.00	0.854
395	13.66	0.00	0.00	0.00	0.00	0.852
396	13.69	0.00	0.00	0.00	0.00	0.850
397	13.73	0.00	0.00	0.00	0.00	0.849
398	13.76	0.00	0.00	0.00	0.00	0.847
399	13.80	0.00	0.00	0.00	0.00	0.845
400	13.83	0.00	0.00	0.00	0.00	0.844
401	13.87	0.00	0.00	0.00	0.00	0.842
402	13.90	0.00	0.00	0.00	0.00	0.840
403	13.94	0.00	0.00	0.00	0.00	0.838
404	13.97	0.00	0.00	0.00	0.00	0.837
405	14.01	0.00	0.00	0.00	0.00	0.835
406	14.04	0.00	0.00	0.00	0.00	0.833
407	14.07	0.00	0.00	0.00	0.00	0.831
408	14.11	0.00	0.00	0.00	0.00	0.830
409	14.14	0.00	0.00	0.00	0.00	0.828
410	14.18	0.00	0.00	0.00	0.00	0.826
411	14.21	0.00	0.00	0.00	0.00	0.825
412	14.25	0.00	0.00	0.00	0.00	0.823
413	14.28	0.00	0.00	0.00	0.00	0.821

414	14.32	0.00	0.00	0.00	0.00	0.819
415	14.35	0.00	0.00	0.00	0.00	0.818
416	14.39	0.00	0.00	0.00	0.00	0.816
417	14.42	0.00	0.00	0.00	0.00	0.814
418	14.46	0.00	0.00	0.00	0.00	0.812
419	14.49	0.00	0.00	0.00	0.00	0.811
420	14.53	0.00	0.00	0.00	0.00	0.809
421	14.56	0.00	0.00	0.00	0.00	0.807
422	14.59	0.00	0.00	0.00	0.00	0.806
423	14.63	0.00	0.00	0.00	0.00	0.804
424	14.66	0.00	0.00	0.00	0.00	0.802
425	14.70	0.00	0.00	0.00	0.00	0.800
426	14.73	0.00	0.00	0.00	0.00	0.799
427	14.77	0.00	0.00	0.00	0.00	0.797
428	14.80	0.00	0.00	0.00	0.00	0.795
429	14.84	0.00	0.00	0.00	0.00	0.793
430	14.87	0.00	0.00	0.00	0.00	0.792
431	14.91	0.00	0.00	0.00	0.00	0.790
432	14.94	0.00	0.00	0.00	0.00	0.788
433	14.98	0.00	0.00	0.00	0.00	0.787
434	15.01	0.00	0.00	0.00	0.00	0.785
435	15.05	0.00	0.00	0.00	0.00	0.783
436	15.08	0.00	0.00	0.00	0.00	0.781
437	15.11	0.00	0.00	0.00	0.00	0.780
438	15.15	0.00	0.00	0.00	0.00	0.778
439	15.18	0.00	0.00	0.00	0.00	0.776
440	15.22	0.00	0.00	0.00	0.00	0.774
441	15.25	0.00	0.00	0.00	0.00	0.773
442	15.29	0.00	0.00	0.00	0.00	0.771
443	15.32	0.00	0.00	0.00	0.00	0.769
444	15.36	0.00	0.00	0.00	0.00	0.768
445	15.39	0.00	0.00	0.00	0.00	0.766
446	15.43	0.00	0.00	0.00	0.00	0.764
447	15.46	0.00	0.00	0.00	0.00	0.762
448	15.50	0.00	0.00	0.00	0.00	0.761
449	15.53	0.00	0.00	0.00	0.00	0.759
450	15.57	0.00	0.00	0.00	0.00	0.757
451	15.60	0.00	0.00	0.00	0.00	0.755
452	15.63	0.00	0.00	0.00	0.00	0.754
453	15.67	0.00	0.00	0.00	0.00	0.752
454	15.70	0.00	0.00	0.00	0.00	0.750
455	15.74	0.00	0.00	0.00	0.00	0.749
456	15.77	0.00	0.00	0.00	0.00	0.747
457	15.81	0.00	0.00	0.00	0.00	0.745
458	15.84	0.00	0.00	0.00	0.00	0.743
459	15.88	0.00	0.00	0.00	0.00	0.742
460	15.91	0.00	0.00	0.00	0.00	0.740
461	15.95	0.00	0.00	0.00	0.00	0.738
462	15.98	0.00	0.00	0.00	0.00	0.736
463	16.02	0.00	0.00	0.00	0.00	0.735

464	16.05	0.00	0.00	0.00	0.00	0.733
465	16.09	0.00	0.00	0.00	0.00	0.731
466	16.12	0.00	0.00	0.00	0.00	0.730
467	16.15	0.00	0.00	0.00	0.00	0.728
468	16.19	0.00	0.00	0.00	0.00	0.726
469	16.22	0.00	0.00	0.00	0.00	0.724
470	16.26	0.00	0.00	0.00	0.00	0.723
471	16.29	0.00	0.00	0.00	0.00	0.721
472	16.33	0.00	0.00	0.00	0.00	0.719
473	16.36	0.00	0.00	0.00	0.00	0.717
474	16.40	0.00	0.00	0.00	0.00	0.716
475	16.43	0.00	0.00	0.00	0.00	0.714
476	16.47	0.00	0.00	0.00	0.00	0.712
477	16.50	0.00	0.00	0.00	0.00	0.711
478	16.54	0.00	0.00	0.00	0.00	0.709
479	16.57	0.00	0.00	0.00	0.00	0.707
480	16.61	0.00	0.00	0.00	0.00	0.705
481	16.64	0.00	0.00	0.00	0.00	0.704
482	16.67	0.00	0.00	0.00	0.00	0.702
483	16.71	0.00	0.00	0.00	0.00	0.700
484	16.74	0.00	0.00	0.00	0.00	0.698
485	16.78	0.00	0.00	0.00	0.00	0.697
486	16.81	0.00	0.00	0.00	0.00	0.695
487	16.85	0.00	0.00	0.00	0.00	0.693
488	16.88	0.00	0.00	0.00	0.00	0.692
489	16.92	0.00	0.00	0.00	0.00	0.690
490	16.95	0.00	0.00	0.00	0.00	0.688
491	16.99	0.00	0.00	0.00	0.00	0.686
492	17.02	0.00	0.00	0.00	0.00	0.685
493	17.06	0.00	0.00	0.00	0.00	0.683
494	17.09	0.00	0.00	0.00	0.00	0.681
495	17.13	0.00	0.00	0.00	0.00	0.679
496	17.16	0.00	0.00	0.00	0.00	0.678
497	17.19	0.00	0.00	0.00	0.00	0.676
498	17.23	0.00	0.00	0.00	0.00	0.674
499	17.26	0.00	0.00	0.00	0.00	0.673
500	17.30	0.00	0.00	0.00	0.00	0.671
501	17.33	0.00	0.00	0.00	0.00	0.669
502	17.37	0.00	0.00	0.00	0.00	0.667
503	17.40	0.00	0.00	0.00	0.00	0.666
504	17.44	0.00	0.00	0.00	0.00	0.664
505	17.47	0.00	0.00	0.00	0.00	0.662
506	17.51	0.00	0.00	0.00	0.00	0.660
507	17.54	0.00	0.00	0.00	0.00	0.659
508	17.58	0.00	0.00	0.00	0.00	0.657
509	17.61	0.00	0.00	0.00	0.00	0.655
510	17.65	0.00	0.00	0.00	0.00	0.654
511	17.68	0.00	0.00	0.00	0.00	0.652
512	17.71	0.00	0.00	0.00	0.00	0.650
513	17.75	0.00	0.00	0.00	0.00	0.648

514	17.78	0.00	0.00	0.00	0.00	0.647
515	17.82	0.00	0.00	0.00	0.00	0.645
516	17.85	0.00	0.00	0.00	0.00	0.643
517	17.89	0.00	0.00	0.00	0.00	0.641
518	17.92	0.00	0.00	0.00	0.00	0.640
519	17.96	0.00	0.00	0.00	0.00	0.638
520	17.99	0.00	0.00	0.00	0.00	0.636
521	18.03	0.00	0.00	0.00	0.00	0.635
522	18.06	0.00	0.00	0.00	0.00	0.633
523	18.10	0.00	0.00	0.00	0.00	0.631
524	18.13	0.00	0.00	0.00	0.00	0.629
525	18.17	0.00	0.00	0.00	0.00	0.628
526	18.20	0.00	0.00	0.00	0.00	0.626
527	18.23	0.00	0.00	0.00	0.00	0.624
528	18.27	0.00	0.00	0.00	0.00	0.622
529	18.30	0.00	0.00	0.00	0.00	0.621
530	18.34	0.00	0.00	0.00	0.00	0.619
531	18.37	0.00	0.00	0.00	0.00	0.617
532	18.41	0.00	0.00	0.00	0.00	0.616
533	18.44	0.00	0.00	0.00	0.00	0.614
534	18.48	0.00	0.00	0.00	0.00	0.612
535	18.51	0.00	0.00	0.00	0.00	0.610
536	18.55	0.00	0.00	0.00	0.00	0.609
537	18.58	0.00	0.00	0.00	0.00	0.607
538	18.62	0.00	0.00	0.00	0.00	0.605
539	18.65	0.00	0.00	0.00	0.00	0.603
540	18.69	0.00	0.00	0.00	0.00	0.602
541	18.72	0.00	0.00	0.00	0.00	0.600
542	18.75	0.00	0.00	0.00	0.00	0.598
543	18.79	0.00	0.00	0.00	0.00	0.597
544	18.82	0.00	0.00	0.00	0.00	0.595
545	18.86	0.00	0.00	0.00	0.00	0.593
546	18.89	0.00	0.00	0.00	0.00	0.591
547	18.93	0.00	0.00	0.00	0.00	0.590
548	18.96	0.00	0.00	0.00	0.00	0.588
549	19.00	0.00	0.00	0.00	0.00	0.586
550	19.03	0.00	0.00	0.00	0.00	0.584
551	19.07	0.00	0.00	0.00	0.00	0.583
552	19.10	0.00	0.00	0.00	0.00	0.581
553	19.14	0.00	0.00	0.00	0.00	0.579
554	19.17	0.00	0.00	0.00	0.00	0.578
555	19.21	0.00	0.00	0.00	0.00	0.576
556	19.24	0.00	0.00	0.00	0.00	0.574
557	19.27	0.00	0.00	0.00	0.00	0.572
558	19.31	0.00	0.00	0.00	0.00	0.571
559	19.34	0.00	0.00	0.00	0.00	0.569
560	19.38	0.00	0.00	0.00	0.00	0.567
561	19.41	0.00	0.00	0.00	0.00	0.566
562	19.45	0.00	0.00	0.00	0.00	0.564
563	19.48	0.00	0.00	0.00	0.00	0.562

564	19.52	0.00	0.00	0.00	0.00	0.560
565	19.55	0.00	0.00	0.00	0.00	0.559
566	19.59	0.00	0.00	0.00	0.00	0.557
567	19.62	0.00	0.00	0.00	0.00	0.555
568	19.66	0.00	0.00	0.00	0.00	0.553
569	19.69	0.00	0.00	0.00	0.00	0.552
570	19.73	0.00	0.00	0.00	0.00	0.550
571	19.76	0.00	0.00	0.00	0.00	0.548
572	19.79	0.00	0.00	0.00	0.00	0.547
573	19.83	0.00	0.00	0.00	0.00	0.545
574	19.86	0.00	0.00	0.00	0.00	0.543
575	19.90	0.00	0.00	0.00	0.00	0.541
576	19.93	0.00	0.00	0.00	0.00	0.540
577	19.97	0.00	0.00	0.00	0.00	0.538
578	20.00	0.00	0.00	0.00	0.00	0.536
579	20.04	0.00	0.00	0.00	0.00	0.534
580	20.07	0.00	0.00	0.00	0.00	0.533
581	20.11	0.00	0.00	0.00	0.00	0.531
582	20.14	0.00	0.00	0.00	0.00	0.529
583	20.18	0.00	0.00	0.00	0.00	0.528
584	20.21	0.00	0.00	0.00	0.00	0.526
585	20.25	0.00	0.00	0.00	0.00	0.524
586	20.28	0.00	0.00	0.00	0.00	0.522
587	20.31	0.00	0.00	0.00	0.00	0.521
588	20.35	0.00	0.00	0.00	0.00	0.519
589	20.38	0.00	0.00	0.00	0.00	0.517
590	20.42	0.00	0.00	0.00	0.00	0.515
591	20.45	0.00	0.00	0.00	0.00	0.514
592	20.49	0.00	0.00	0.00	0.00	0.512
593	20.52	0.00	0.00	0.00	0.00	0.510
594	20.56	0.00	0.00	0.00	0.00	0.509
595	20.59	0.00	0.00	0.00	0.00	0.507
596	20.63	0.00	0.00	0.00	0.00	0.505
597	20.66	0.00	0.00	0.00	0.00	0.503
598	20.70	0.00	0.00	0.00	0.00	0.502
599	20.73	0.00	0.00	0.00	0.00	0.500
600	20.76	0.00	0.00	0.00	0.00	0.498
601	20.80	0.00	0.00	0.00	0.00	0.496
602	20.83	0.00	0.00	0.00	0.00	0.495
603	20.87	0.00	0.00	0.00	0.00	0.493
604	20.90	0.00	0.00	0.00	0.00	0.491
605	20.94	0.00	0.00	0.00	0.00	0.490
606	20.97	0.00	0.00	0.00	0.00	0.488
607	21.01	0.00	0.00	0.00	0.00	0.486
608	21.04	0.00	0.00	0.00	0.00	0.484
609	21.08	0.00	0.00	0.00	0.00	0.483
610	21.11	0.00	0.00	0.00	0.00	0.481
611	21.15	0.00	0.00	0.00	0.00	0.479
612	21.18	0.00	0.00	0.00	0.00	0.477
613	21.22	0.00	0.00	0.00	0.00	0.476

614	21.25	0.00	0.00	0.00	0.00	0.474
615	21.28	0.00	0.00	0.00	0.00	0.472
616	21.32	0.00	0.00	0.00	0.00	0.471
617	21.35	0.00	0.00	0.00	0.00	0.469
618	21.39	0.00	0.00	0.00	0.00	0.467
619	21.42	0.00	0.00	0.00	0.00	0.465
620	21.46	0.00	0.00	0.00	0.00	0.464
621	21.49	0.00	0.00	0.00	0.00	0.462
622	21.53	0.00	0.00	0.00	0.00	0.460
623	21.56	0.00	0.00	0.00	0.00	0.458
624	21.60	0.00	0.00	0.00	0.00	0.457
625	21.63	0.00	0.00	0.00	0.00	0.455
626	21.67	0.00	0.00	0.00	0.00	0.453
627	21.70	0.00	0.00	0.00	0.00	0.452
628	21.74	0.00	0.00	0.00	0.00	0.450
629	21.77	0.00	0.00	0.00	0.00	0.448
630	21.80	0.00	0.00	0.00	0.00	0.446
631	21.84	0.00	0.00	0.00	0.00	0.445
632	21.87	0.00	0.00	0.00	0.00	0.443
633	21.91	0.00	0.00	0.00	0.00	0.441
634	21.94	0.00	0.00	0.00	0.00	0.439
635	21.98	0.00	0.00	0.00	0.00	0.438
636	22.01	0.00	0.00	0.00	0.00	0.436
637	22.05	0.00	0.00	0.00	0.00	0.434
638	22.08	0.00	0.00	0.00	0.00	0.433
639	22.12	0.00	0.00	0.00	0.00	0.431
640	22.15	0.00	0.00	0.00	0.00	0.429
641	22.19	0.00	0.00	0.00	0.00	0.427
642	22.22	0.00	0.00	0.00	0.00	0.426
643	22.26	0.00	0.00	0.00	0.00	0.424
644	22.29	0.00	0.00	0.00	0.00	0.422
645	22.32	0.00	0.00	0.00	0.00	0.420
646	22.36	0.00	0.00	0.00	0.00	0.419
647	22.39	0.00	0.00	0.00	0.00	0.417
648	22.43	0.00	0.00	0.00	0.00	0.415
649	22.46	0.00	0.00	0.00	0.00	0.414
650	22.50	0.00	0.00	0.00	0.00	0.412
651	22.53	0.00	0.00	0.00	0.00	0.410
652	22.57	0.00	0.00	0.00	0.00	0.408
653	22.60	0.00	0.00	0.00	0.00	0.407
654	22.64	0.00	0.00	0.00	0.00	0.405
655	22.67	0.00	0.00	0.00	0.00	0.403
656	22.71	0.00	0.00	0.00	0.00	0.401
657	22.74	0.00	0.00	0.00	0.00	0.400
658	22.78	0.00	0.00	0.00	0.00	0.398
659	22.81	0.00	0.00	0.00	0.00	0.396
660	22.84	0.00	0.00	0.00	0.00	0.395
661	22.88	0.00	0.00	0.00	0.00	0.393
662	22.91	0.00	0.00	0.00	0.00	0.391
663	22.95	0.00	0.00	0.00	0.00	0.389

664	22.98	0.00	0.00	0.00	0.00	0.388
665	23.02	0.00	0.00	0.00	0.00	0.386
666	23.05	0.00	0.00	0.00	0.00	0.384
667	23.09	0.00	0.00	0.00	0.00	0.382
668	23.12	0.00	0.00	0.00	0.00	0.381
669	23.16	0.00	0.00	0.00	0.00	0.379
670	23.19	0.00	0.00	0.00	0.00	0.377
671	23.23	0.00	0.00	0.00	0.00	0.376
672	23.26	0.00	0.00	0.00	0.00	0.374
673	23.30	0.00	0.00	0.00	0.00	0.372
674	23.33	0.00	0.00	0.00	0.00	0.370
675	23.36	0.00	0.00	0.00	0.00	0.369
676	23.40	0.00	0.00	0.00	0.00	0.367
677	23.43	0.00	0.00	0.00	0.00	0.365
678	23.47	0.00	0.00	0.00	0.00	0.363
679	23.50	0.00	0.00	0.00	0.00	0.362
680	23.54	0.00	0.00	0.00	0.00	0.360
681	23.57	0.00	0.00	0.00	0.00	0.358
682	23.61	0.00	0.00	0.00	0.00	0.357
683	23.64	0.00	0.00	0.00	0.00	0.355
684	23.68	0.00	0.00	0.00	0.00	0.353
685	23.71	0.00	0.00	0.00	0.00	0.351
686	23.75	0.00	0.00	0.00	0.00	0.350
687	23.78	0.00	0.00	0.00	0.00	0.348
688	23.82	0.00	0.00	0.00	0.00	0.346
689	23.85	0.00	0.00	0.00	0.00	0.344
690	23.88	0.00	0.00	0.00	0.00	0.343
691	23.92	0.00	0.00	0.00	0.00	0.341
692	23.95	0.00	0.00	0.00	0.00	0.339
693	23.99	0.00	0.00	0.00	0.00	0.338
694	24.02	0.00	0.00	0.00	0.00	0.336
695	24.06	0.00	0.00	0.00	0.00	0.334
696	24.09	0.00	0.00	0.00	0.00	0.332
697	24.13	0.00	0.00	0.00	0.00	0.331
698	24.16	0.00	0.00	0.00	0.00	0.329
699	24.20	0.00	0.00	0.00	0.00	0.327
700	24.23	0.00	0.00	0.00	0.00	0.325
701	24.27	0.00	0.00	0.00	0.00	0.324
702	24.30	0.00	0.00	0.00	0.00	0.322
703	24.34	0.00	0.00	0.00	0.00	0.320
704	24.37	0.00	0.00	0.00	0.00	0.319
705	24.40	0.00	0.00	0.00	0.00	0.317
706	24.44	0.00	0.00	0.00	0.00	0.315
707	24.47	0.00	0.00	0.00	0.00	0.313
708	24.51	0.00	0.00	0.00	0.00	0.312
709	24.54	0.00	0.00	0.00	0.00	0.310
710	24.58	0.00	0.00	0.00	0.00	0.308
711	24.61	0.00	0.00	0.00	0.00	0.306
712	24.65	0.00	0.00	0.00	0.00	0.305
713	24.68	0.00	0.00	0.00	0.00	0.303

714	24.72	0.00	0.00	0.00	0.00	0.301
715	24.75	0.00	0.00	0.00	0.00	0.300
716	24.79	0.00	0.00	0.00	0.00	0.298
717	24.82	0.00	0.00	0.00	0.00	0.296
718	24.86	0.00	0.00	0.00	0.00	0.294
719	24.89	0.00	0.00	0.00	0.00	0.293
720	24.92	0.00	0.00	0.00	0.00	0.291
721	24.96	0.00	0.00	0.00	0.00	0.289
722	24.99	0.00	0.00	0.00	0.00	0.287
723	25.03	0.00	0.00	0.00	0.00	0.286
724	25.06	0.00	0.00	0.00	0.00	0.284
725	25.10	0.00	0.00	0.00	0.00	0.282
726	25.13	0.00	0.00	0.00	0.00	0.281
727	25.17	0.00	0.00	0.00	0.00	0.279
728	25.20	0.00	0.00	0.00	0.00	0.277
729	25.24	0.00	0.00	0.00	0.00	0.275
730	25.27	0.00	0.00	0.00	0.00	0.274
731	25.31	0.00	0.00	0.00	0.00	0.272
732	25.34	0.00	0.00	0.00	0.00	0.270
733	25.38	0.00	0.00	0.00	0.00	0.269
734	25.41	0.00	0.00	0.00	0.00	0.267
735	25.44	0.00	0.00	0.00	0.00	0.265
736	25.48	0.00	0.00	0.00	0.00	0.263
737	25.51	0.00	0.00	0.00	0.00	0.262
738	25.55	0.00	0.00	0.00	0.00	0.260
739	25.58	0.00	0.00	0.00	0.00	0.258
740	25.62	0.00	0.00	0.00	0.00	0.256
741	25.65	0.00	0.00	0.00	0.00	0.255
742	25.69	0.00	0.00	0.00	0.00	0.253
743	25.72	0.00	0.00	0.00	0.00	0.251
744	25.76	0.00	0.00	0.00	0.00	0.250
745	25.79	0.00	0.00	0.00	0.00	0.248
746	25.83	0.00	0.00	0.00	0.00	0.246
747	25.86	0.00	0.00	0.00	0.00	0.244
748	25.90	0.00	0.00	0.00	0.00	0.243
749	25.93	0.00	0.00	0.00	0.00	0.241
750	25.96	0.00	0.00	0.00	0.00	0.239
751	26.00	0.00	0.00	0.00	0.00	0.237
752	26.03	0.00	0.00	0.00	0.00	0.236
753	26.07	0.00	0.00	0.00	0.00	0.234
754	26.10	0.00	0.00	0.00	0.00	0.232
755	26.14	0.00	0.00	0.00	0.00	0.231
756	26.17	0.00	0.00	0.00	0.00	0.229
757	26.21	0.00	0.00	0.00	0.00	0.227
758	26.24	0.01	0.01	0.00	0.00	0.225
759	26.28	0.01	0.01	0.00	0.00	0.224
760	26.31	0.01	0.01	0.00	0.00	0.222
761	26.35	0.01	0.01	0.00	0.00	0.220
762	26.38	0.01	0.01	0.00	0.00	0.218
763	26.42	0.01	0.01	0.00	0.00	0.217

764	26.45	0.01	0.01	0.00	0.00	0.215
765	26.48	0.01	0.01	0.00	0.00	0.213
766	26.52	0.01	0.01	0.00	0.00	0.212
767	26.55	0.01	0.01	0.00	0.00	0.210
768	26.59	0.01	0.01	0.00	0.00	0.208
769	26.62	0.01	0.01	0.00	0.00	0.206
770	26.66	0.01	0.01	0.00	0.00	0.205
771	26.69	0.01	0.01	0.00	0.00	0.203
772	26.73	0.01	0.01	0.01	0.00	0.201
773	26.76	0.01	0.01	0.01	0.00	0.199
774	26.80	0.01	0.01	0.01	0.00	0.198
775	26.83	0.01	0.01	0.01	0.00	0.196
776	26.87	0.01	0.01	0.01	0.00	0.194
777	26.90	0.01	0.01	0.01	0.00	0.193
778	26.94	0.01	0.01	0.01	0.00	0.191
779	26.97	0.01	0.01	0.01	0.00	0.189
780	27.00	0.01	0.01	0.01	0.00	0.187
781	27.04	0.02	0.02	0.01	0.00	0.186
782	27.07	0.02	0.02	0.01	0.00	0.184
783	27.11	0.02	0.02	0.01	0.00	0.182
784	27.14	0.02	0.02	0.01	0.01	0.180
785	27.18	0.03	0.03	0.01	0.01	0.179
786	27.21	0.03	0.03	0.01	0.01	0.177
787	27.25	0.03	0.03	0.01	0.01	0.175
788	27.28	0.04	0.04	0.02	0.01	0.174
789	27.32	0.04	0.04	0.02	0.01	0.172
790	27.35	0.04	0.04	0.02	0.01	0.170
791	27.39	0.05	0.05	0.02	0.01	0.168
792	27.42	0.05	0.05	0.02	0.01	0.167
793	27.46	0.05	0.05	0.02	0.01	0.165
794	27.49	0.06	0.06	0.02	0.01	0.163
795	27.52	0.06	0.06	0.03	0.01	0.161
796	27.56	0.06	0.06	0.03	0.01	0.160
797	27.59	0.06	0.06	0.03	0.01	0.158
798	27.63	0.07	0.07	0.03	0.01	0.156
799	27.66	0.07	0.07	0.04	0.02	0.155
800	27.70	0.07	0.07	0.04	0.02	0.153
801	27.73	0.08	0.08	0.04	0.02	0.151
802	27.77	0.08	0.08	0.04	0.02	0.149
803	27.80	0.08	0.08	0.05	0.02	0.148
804	27.84	0.09	0.09	0.05	0.02	0.146
805	27.87	0.09	0.09	0.05	0.03	0.144
806	27.91	0.09	0.09	0.06	0.03	0.142
807	27.94	0.09	0.09	0.06	0.03	0.141
808	27.98	0.10	0.10	0.06	0.03	0.139
809	28.01	0.10	0.10	0.07	0.03	0.137
810	28.04	0.10	0.10	0.07	0.04	0.136
811	28.08	0.11	0.11	0.07	0.04	0.134
812	28.11	0.11	0.11	0.08	0.04	0.132
813	28.15	0.11	0.11	0.08	0.04	0.130

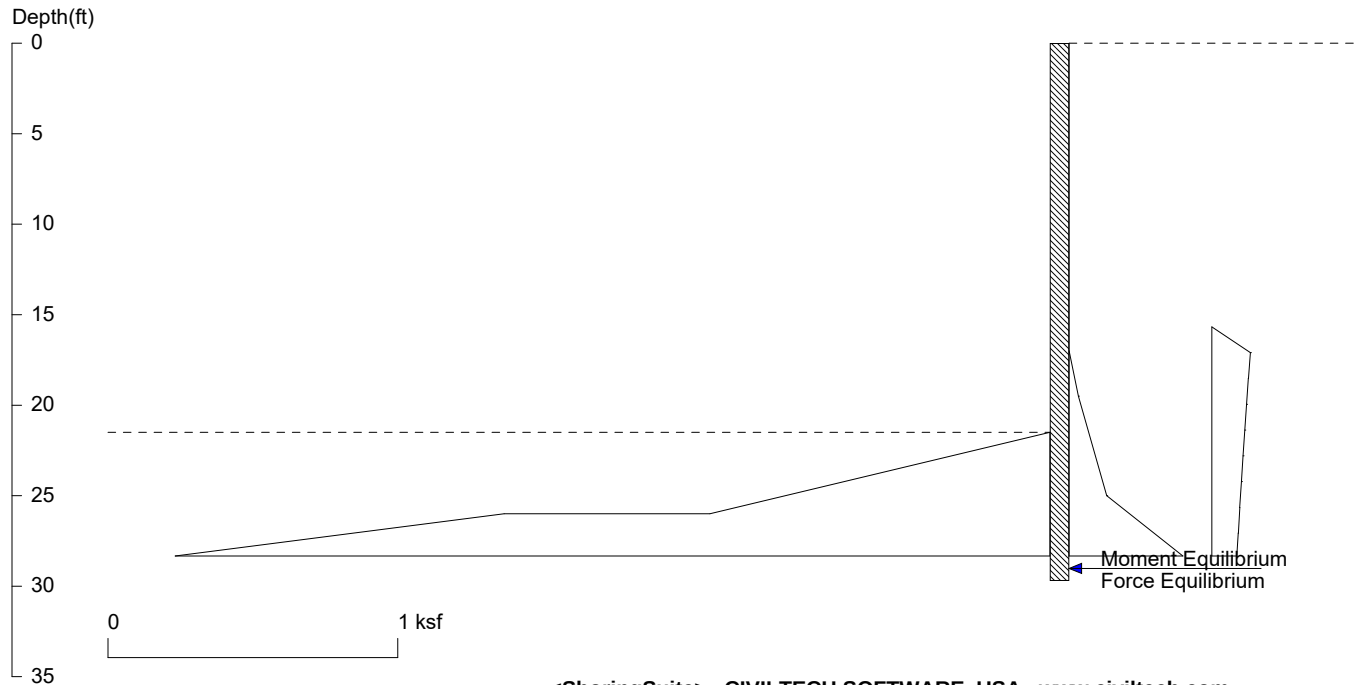
814	28.18	0.12	0.12	0.08	0.05	0.129
815	28.22	0.12	0.12	0.09	0.05	0.127
816	28.25	0.12	0.12	0.09	0.05	0.125
817	28.29	0.13	0.13	0.10	0.06	0.123
818	28.32	0.13	0.13	0.10	0.06	0.122
819	28.36	0.13	0.13	0.11	0.06	0.120
820	28.39	0.13	0.13	0.11	0.07	0.118
821	28.43	0.14	0.14	0.11	0.07	0.117
822	28.46	0.14	0.14	0.12	0.07	0.115
823	28.50	0.14	0.14	0.12	0.08	0.113
824	28.53	0.13	0.13	0.13	0.08	0.111
825	28.56	0.12	0.12	0.13	0.09	0.110
826	28.60	0.10	0.10	0.14	0.09	0.108
827	28.63	0.09	0.09	0.14	0.10	0.107
828	28.67	0.07	0.07	0.15	0.10	0.105
829	28.70	0.06	0.06	0.15	0.11	0.103
830	28.74	0.05	0.05	0.15	0.11	0.101
831	28.77	0.03	0.03	0.15	0.12	0.100
832	28.81	0.02	0.02	0.16	0.12	0.098
833	28.84	0.01	0.01	0.16	0.13	0.096
834	28.88	-0.01	-0.01	0.16	0.13	0.094
835	28.91	-0.02	-0.02	0.16	0.14	0.091
836	28.95	-0.04	-0.04	0.16	0.14	0.089
837	28.98	-0.05	-0.05	0.16	0.15	0.087
838	29.02	-0.06	-0.06	0.16	0.16	0.084
839	29.05	-0.08	-0.08	0.16	0.16	0.082
840	29.08	-0.09	-0.09	0.16	0.17	0.079
841	29.12	-0.11	-0.11	0.16	0.17	0.076
842	29.15	-0.12	-0.12	0.16	0.18	0.073
843	29.19	-0.13	-0.13	0.15	0.18	0.070
844	29.22	-0.15	-0.15	0.15	0.19	0.066
845	29.26	-0.16	-0.16	0.15	0.19	0.062
846	29.29	-0.18	-0.18	0.15	0.20	0.058
847	29.33	-0.19	-0.19	0.14	0.20	0.053
848	29.36	-0.20	-0.20	0.14	0.21	0.048
849	29.40	-0.22	-0.22	0.14	0.21	0.042
850	29.43	-0.23	-0.23	0.13	0.22	0.035
851	29.47	-0.25	-0.25	0.13	0.22	0.026
852	29.50	-0.26	-0.26	0.12	0.23	0.015
853	29.54	-0.27	-0.27	0.12	0.23	0.000
854	29.57	-0.29	-0.29	0.11	0.24	0.000
855	29.60	-0.30	-0.30	0.11	0.24	0.001
856	29.64	-0.32	-0.32	0.10	0.24	0.001
857	29.67	-0.33	-0.33	0.09	0.25	0.001
858	29.71	-0.34	-0.34	0.09	0.25	0.002
859	29.74	-0.36	-0.36	0.08	0.25	0.002
860	29.78	-0.37	-0.37	0.07	0.25	0.002
861	29.81	-0.39	-0.39	0.06	0.26	0.003
862	29.85	-0.40	-0.40	0.05	0.26	0.003
863	29.88	-0.41	-0.41	0.04	0.26	0.003

864	29.92	-0.43	-0.43	0.04	0.26	0.004
865	29.95	-0.44	-0.44	0.03	0.26	0.004
866	29.99	-0.46	-0.46	0.02	0.26	0.004
867	30.02	-0.47	-0.47	0.01	0.26	0.005
868	30.06	-0.48	-0.48	0.00	0.26	0.005
869	30.09	-0.50	-0.50	-0.02	0.26	0.006
870	30.12	-0.51	-0.51	-0.03	0.26	0.006
871	30.16	-0.53	-0.53	-0.04	0.26	0.006
872	30.19	-0.54	-0.54	-0.05	0.26	0.007
873	30.23	-0.55	-0.55	-0.06	0.26	0.007
874	30.26	-0.57	-0.57	-0.08	0.26	0.007
875	30.30	-0.58	-0.58	-0.09	0.25	0.008
876	30.33	-0.60	-0.60	-0.10	0.25	0.008
877	30.37	-0.61	-0.61	-0.12	0.25	0.008
878	30.40	-0.62	-0.62	-0.13	0.24	0.009
879	30.44	-0.64	-0.64	-0.14	0.24	0.009
880	30.47	-0.65	-0.65	-0.16	0.23	0.009
881	30.51	-0.67	-0.67	-0.17	0.23	0.010
882	30.54	-0.68	-0.68	-0.19	0.22	0.010
883	30.58	-0.69	-0.69	-0.20	0.21	0.010
884	30.61	-0.71	-0.71	-0.22	0.21	0.011
885	30.64	-0.72	-0.72	-0.24	0.20	0.011
886	30.68	-0.74	-0.74	-0.25	0.19	0.011
887	30.71	-0.75	-0.75	-0.27	0.18	0.012
888	30.75	-0.76	-0.76	-0.29	0.17	0.012
889	30.78	-0.78	-0.78	-0.31	0.16	0.012
890	30.82	-0.79	-0.79	-0.33	0.15	0.013
891	30.85	-0.81	-0.81	-0.34	0.14	0.013
892	30.89	-0.82	-0.82	-0.36	0.13	0.013
893	30.92	-0.83	-0.83	-0.38	0.11	0.014
894	30.96	-0.85	-0.85	-0.40	0.10	0.014
895	30.99	-0.86	-0.86	-0.42	0.08	0.014
896	31.03	-0.88	-0.88	-0.44	0.07	0.015
897	31.06	-0.89	-0.89	-0.46	0.05	0.015
898	31.10	-0.90	-0.90	-0.48	0.04	0.016
899	31.13	-0.92	-0.92	-0.51	0.02	0.016

 The above data can be selected using mouse, then copy and paste into Excel to
 create graphics

Butler Street

Section B at CSO Outlet Phase III DRAINED Revised Mounding



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Date: 1/14/2020

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Wall Height=21.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=8.20 Min. Pile Length=29.70

MOMENT IN PILE: Max. Moment=4.45 per Pile Spacing=1.0 at Depth=25.53

PILE SELECTION:Request Min. Section Modulus = 1.6 in³/ft=86.95 cm³/m, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.23(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	17	0	0.000000
17	0	19.5	0.032	0.012800
19.5	0.032	25	0.130	0.017818
25	0.130	100	6.031	0.078680
*	Sur-	charg		
15.67	0.000	17.10	0.133	0.093123
17.10	0.133	18.52	0.126	-0.00439
18.52	0.126	19.95	0.120	-0.00435
19.95	0.120	21.37	0.114	-0.00428
21.37	0.114	22.80	0.108	-0.00420
22.80	0.108	24.22	0.102	-0.00410
24.22	0.102	25.65	0.097	-0.00398
25.65	0.097	27.07	0.091	-0.00385
27.07	0.091	28.50	0.086	-0.00371
28.50	0.086	31.35	0.081	-0.00178

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
21.5	0	26	1.173	0.2607

26 1.883 100 37.862 0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	21.50	1.00

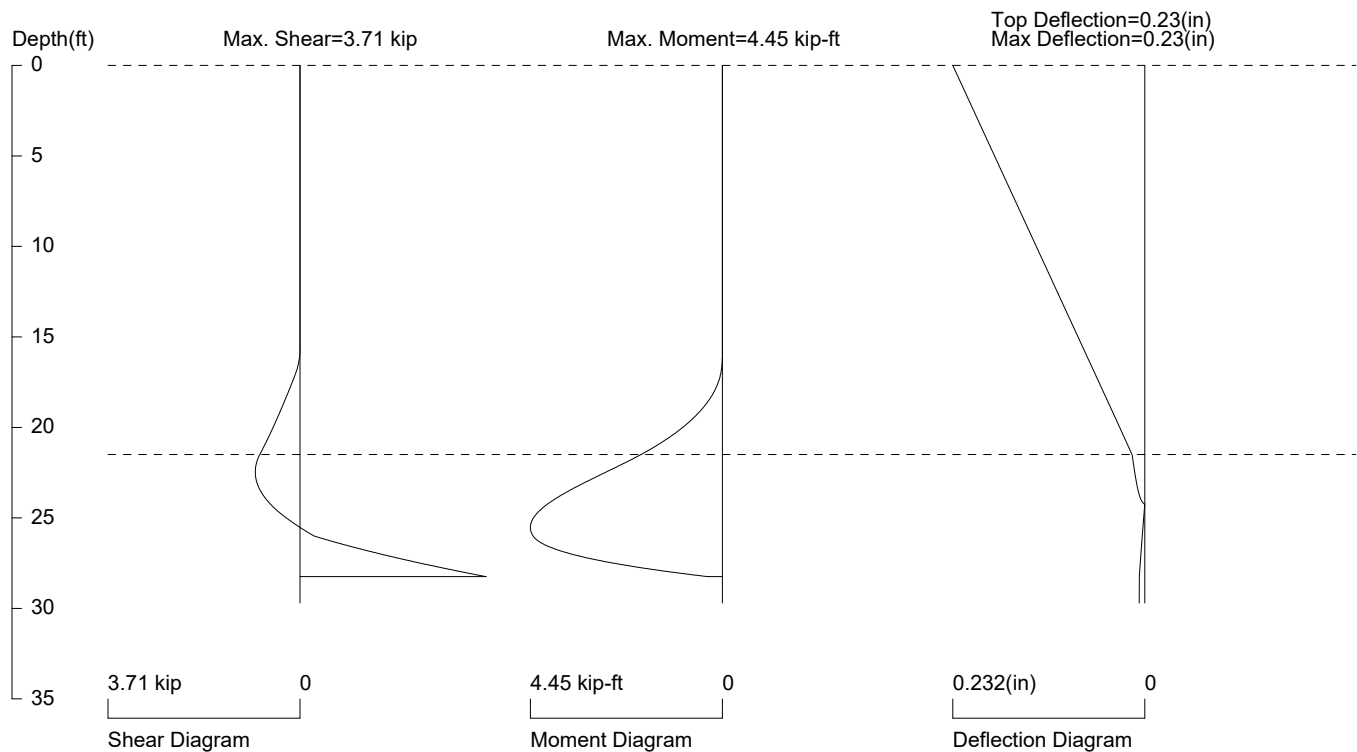
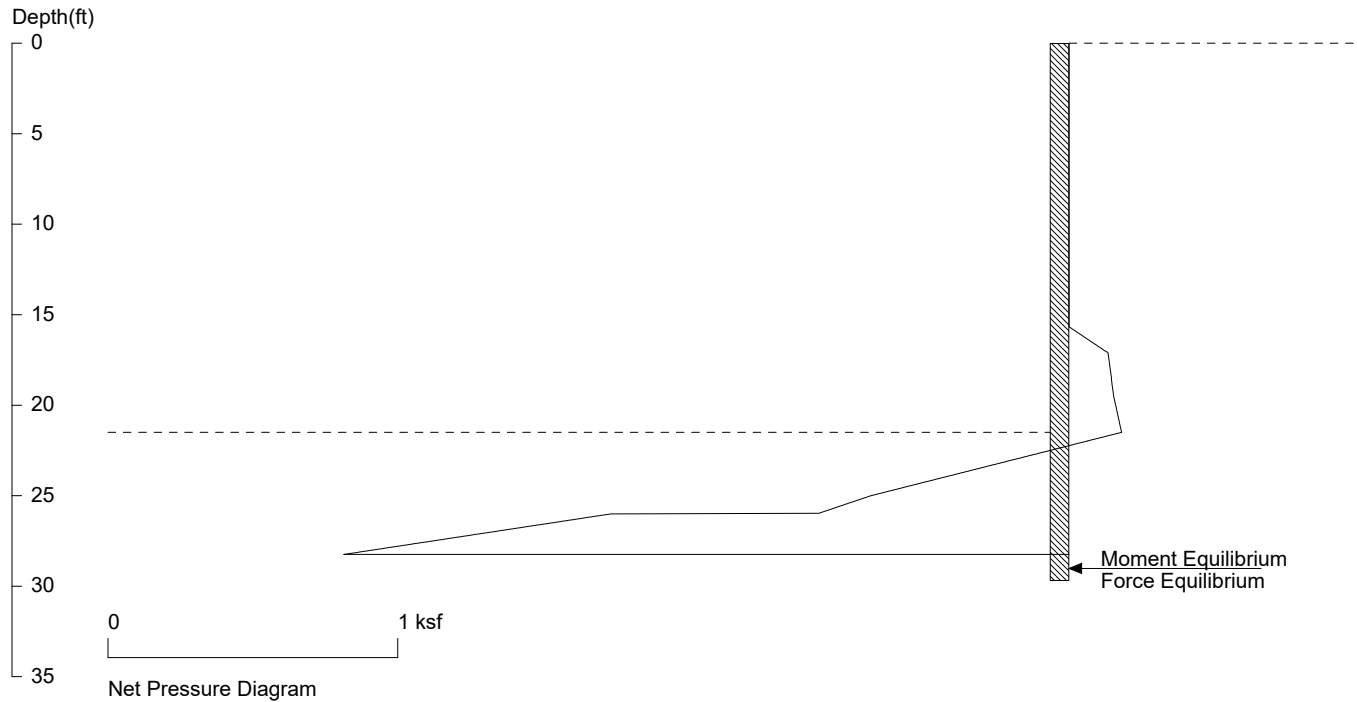
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft3; Deflection - in

Butler Street

Section B at CSO Outlet Phase III DRAINED Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltech.com

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. Temporary Structures in Construction, Robert T. Ratay (Co-author of Chapter 7: John J. Peirce), McGraw-Hill. 2012
9. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft³, Deflection - in

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Date: 1/14/2020 File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler
Street\SECTION B - Butler Street (CSO) Below DRAINED DRAINED Revised Mounding.sh8

Title: Butler Street

Subtitle: Section B at CSO Outlet Phase III DRAINED Revised Mounding

*****INPUT DATA*****

Wall Type: 1. Sheet Pile

Wall Height: 21.50

Pile Diameter: 1.00

Pile Spacing: 1.00

Factor of Safety (F.S.): 1.30

Lateral Support Type (Braces): 7. Sheet Pile

Top Brace Increase (Multi-Bracing): No

No-Load Zone:

Vertical Depth for No-Load Zone: 21.50

H-Distance (Input H/V ratio) for No-Load Zone: 0.25

Angle from H. Line for No-Load Zone: 60.00

Embedment Option: 1. Yes

Friction at Pile Tip: No

Pile Properties:

Steel Strength, Fy: 50 ksi = 345 MPa

Allowable Fb/Fy: 0.66
 Elastic Module, E: 29000.00
 Moment of Inertia, I: 656.2
 User Input Pile:

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	0	0	17	0	0.000000
2	17	0	19.5	0.032	0.012800
3	19.5	0.032	25	0.130	0.017818
4	25	0.130	100	6.031	0.078680
5	36	0.467	100	0.467	0.000000
6	*	Sur-	charg		
7	15.67	0.000	17.10	0.133	0.093123
8	17.10	0.133	18.52	0.126	-0.00439
9	18.52	0.126	19.95	0.120	-0.00435
10	19.95	0.120	21.37	0.114	-0.00428
11	21.37	0.114	22.80	0.108	-0.00420
12	22.80	0.108	24.22	0.102	-0.00410
13	24.22	0.102	25.65	0.097	-0.00398
14	25.65	0.097	27.07	0.091	-0.00385
15	27.07	0.091	28.50	0.086	-0.00371
16	28.50	0.086	31.35	0.081	-0.00178
17	31.35	0.081	34.20	0.076	-0.00170
18	34.20	0.076	37.05	0.071	-0.00162
19	37.05	0.071	39.90	0.067	-0.00154
20	39.90	0.067	42.75	0.063	-0.00145
21	42.75	0.063	45.60	0.059	-0.00137
22	45.60	0.059	48.45	0.055	-0.00129
23	48.45	0.055	51.30	0.052	-0.00122
24	51.30	0.052	54.15	0.048	-0.00114
25	54.15	0.048	57.00	0.045	-0.00107
26	57.00	0.045	62.70	0.042	-0.00050
27	62.70	0.042	68.40	0.037	-0.00091
28	68.40	0.037	74.10	0.033	-0.00079
29	74.10	0.033	79.80	0.029	-0.00068
30	79.80	0.029	85.50	0.025	-0.00059
31	85.50	0.025	91.20	0.022	-0.00051
32	91.20	0.022	96.90	0.020	-0.00044
33	96.90	0.020	102.6	0.018	-0.00039
34	102.6	0.018	108.3	0.016	-0.00033
35	108.3	0.016	114.0	0.014	-0.00029

* PASSIVE PRESSURE *

The pressures below will be divided by a Factor of Safety =1.3

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	21.5	0	26	1.173	0.2607

2	26	1.883	100	37.862	0.4862
---	----	-------	-----	--------	--------

* ACTIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
2	21.50	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
---	------	------

*For Tieback: Input1 = Diameter; Input2 = Bond Strength

*For Plate: Input1 = Diameter; Input2 = Allowable Pressure

*For Deadman: Input1 = Horz. Width; Input2 = Passive Pressure;

*For Sheet Pile Anchor: Input1 = Horz. Width; Input2 = Passive Slope;

*****CALCULATION*****

The calculated moment and shear are per pile spacing. Sheet piles are per one foot or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

	D1=0.00
== ==	D2=21.50
	D3=29.70

D1 - TOP DEPTH

D2 - EXCAVATION BASE

D3 - PILE TIP

MOMENT equilibrium AT DEPTH=28.33 WITH EMBEDMENT OF 6.83

FORCE equilibrium AT DEPTH=29.70 WITH EMBEDMENT OF 8.20

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

*****RESULTS*****

* EMBEDMENT Notes *

Based on USS Design Manual, first calculate embedment for moment equilibrium, then increased the embedment to get the design depth.

The embedment for moment equilibrium is 6.83

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

The total design embedment is 8.20

Embedment Information:

If 20% increased, the total design embedment is 8.20

If 30% increased, the total design embedment is 8.88

If 40% increased, the total design embedment is 9.57

If 50% increased, the total design embedment is 10.25

* MOMENT IN PILE (per pile spacing)*

Pile Spacing: sheet piles are one foot or one meter; soldier piles are one pile.

Overall Maximum Moment = 4.45 at 25.53

Maximum Shear = 3.71

Moment and Shear are per pile spacing: 1.0 foot or meter

* VERTICAL LOADING *

Vertical Loading from Braces = 0.00

Vertical Loading from External Load = 0.00

Total Vertical Loading = 0.00

* DEFLECTION *

I (in4)/foot=656.20

Top deflection = 0.232(in)

Max. deflection = 0.232(in)

*****PRESSURE, LOAD, SHEAR, MOMENT, AND DEFLECTION v.s. DEPTH*****

The shear and moment are per single soldier pile (secant/tangent pile) or one foot of sheet pile (concrete wall). The deflection is based on users input pile below:

User Input I (Moment of Inertia)

Elastic Module, E (ksi)= 29000.00

Moment of Inertia, I (in4)/foot= 656.2

PRESS. - Sum of all pressures (Net pressure). (Active) direction is positive

LOAD - Liner load (force per unit depth) = Pressures multiply by acting space

No	DEPTH ft	PRESS. ksf	LOAD kip/ft	SHEAR kip	MOMENT kip-ft	DEFLECTION in
----	-------------	---------------	----------------	--------------	------------------	------------------

1	0.00	0.00	0.00	0.00	0.00	0.232
2	0.03	0.00	0.00	0.00	0.00	0.232
3	0.06	0.00	0.00	0.00	0.00	0.232
4	0.09	0.00	0.00	0.00	0.00	0.231
5	0.13	0.00	0.00	0.00	0.00	0.231
6	0.16	0.00	0.00	0.00	0.00	0.231
7	0.19	0.00	0.00	0.00	0.00	0.231
8	0.22	0.00	0.00	0.00	0.00	0.230
9	0.25	0.00	0.00	0.00	0.00	0.230
10	0.28	0.00	0.00	0.00	0.00	0.230
11	0.32	0.00	0.00	0.00	0.00	0.229
12	0.35	0.00	0.00	0.00	0.00	0.229
13	0.38	0.00	0.00	0.00	0.00	0.229
14	0.41	0.00	0.00	0.00	0.00	0.228
15	0.44	0.00	0.00	0.00	0.00	0.228
16	0.47	0.00	0.00	0.00	0.00	0.228
17	0.50	0.00	0.00	0.00	0.00	0.227
18	0.54	0.00	0.00	0.00	0.00	0.227
19	0.57	0.00	0.00	0.00	0.00	0.227
20	0.60	0.00	0.00	0.00	0.00	0.226
21	0.63	0.00	0.00	0.00	0.00	0.226
22	0.66	0.00	0.00	0.00	0.00	0.226
23	0.69	0.00	0.00	0.00	0.00	0.225
24	0.73	0.00	0.00	0.00	0.00	0.225
25	0.76	0.00	0.00	0.00	0.00	0.225
26	0.79	0.00	0.00	0.00	0.00	0.224
27	0.82	0.00	0.00	0.00	0.00	0.224
28	0.85	0.00	0.00	0.00	0.00	0.224
29	0.88	0.00	0.00	0.00	0.00	0.224
30	0.91	0.00	0.00	0.00	0.00	0.223
31	0.95	0.00	0.00	0.00	0.00	0.223
32	0.98	0.00	0.00	0.00	0.00	0.223
33	1.01	0.00	0.00	0.00	0.00	0.222
34	1.04	0.00	0.00	0.00	0.00	0.222
35	1.07	0.00	0.00	0.00	0.00	0.222
36	1.10	0.00	0.00	0.00	0.00	0.221
37	1.13	0.00	0.00	0.00	0.00	0.221
38	1.17	0.00	0.00	0.00	0.00	0.221
39	1.20	0.00	0.00	0.00	0.00	0.220
40	1.23	0.00	0.00	0.00	0.00	0.220
41	1.26	0.00	0.00	0.00	0.00	0.220
42	1.29	0.00	0.00	0.00	0.00	0.219
43	1.32	0.00	0.00	0.00	0.00	0.219
44	1.36	0.00	0.00	0.00	0.00	0.219
45	1.39	0.00	0.00	0.00	0.00	0.218
46	1.42	0.00	0.00	0.00	0.00	0.218
47	1.45	0.00	0.00	0.00	0.00	0.218
48	1.48	0.00	0.00	0.00	0.00	0.217
49	1.51	0.00	0.00	0.00	0.00	0.217
50	1.54	0.00	0.00	0.00	0.00	0.217

51	1.58	0.00	0.00	0.00	0.00	0.216
52	1.61	0.00	0.00	0.00	0.00	0.216
53	1.64	0.00	0.00	0.00	0.00	0.216
54	1.67	0.00	0.00	0.00	0.00	0.216
55	1.70	0.00	0.00	0.00	0.00	0.215
56	1.73	0.00	0.00	0.00	0.00	0.215
57	1.77	0.00	0.00	0.00	0.00	0.215
58	1.80	0.00	0.00	0.00	0.00	0.214
59	1.83	0.00	0.00	0.00	0.00	0.214
60	1.86	0.00	0.00	0.00	0.00	0.214
61	1.89	0.00	0.00	0.00	0.00	0.213
62	1.92	0.00	0.00	0.00	0.00	0.213
63	1.95	0.00	0.00	0.00	0.00	0.213
64	1.99	0.00	0.00	0.00	0.00	0.212
65	2.02	0.00	0.00	0.00	0.00	0.212
66	2.05	0.00	0.00	0.00	0.00	0.212
67	2.08	0.00	0.00	0.00	0.00	0.211
68	2.11	0.00	0.00	0.00	0.00	0.211
69	2.14	0.00	0.00	0.00	0.00	0.211
70	2.18	0.00	0.00	0.00	0.00	0.210
71	2.21	0.00	0.00	0.00	0.00	0.210
72	2.24	0.00	0.00	0.00	0.00	0.210
73	2.27	0.00	0.00	0.00	0.00	0.209
74	2.30	0.00	0.00	0.00	0.00	0.209
75	2.33	0.00	0.00	0.00	0.00	0.209
76	2.36	0.00	0.00	0.00	0.00	0.209
77	2.40	0.00	0.00	0.00	0.00	0.208
78	2.43	0.00	0.00	0.00	0.00	0.208
79	2.46	0.00	0.00	0.00	0.00	0.208
80	2.49	0.00	0.00	0.00	0.00	0.207
81	2.52	0.00	0.00	0.00	0.00	0.207
82	2.55	0.00	0.00	0.00	0.00	0.207
83	2.58	0.00	0.00	0.00	0.00	0.206
84	2.62	0.00	0.00	0.00	0.00	0.206
85	2.65	0.00	0.00	0.00	0.00	0.206
86	2.68	0.00	0.00	0.00	0.00	0.205
87	2.71	0.00	0.00	0.00	0.00	0.205
88	2.74	0.00	0.00	0.00	0.00	0.205
89	2.77	0.00	0.00	0.00	0.00	0.204
90	2.81	0.00	0.00	0.00	0.00	0.204
91	2.84	0.00	0.00	0.00	0.00	0.204
92	2.87	0.00	0.00	0.00	0.00	0.203
93	2.90	0.00	0.00	0.00	0.00	0.203
94	2.93	0.00	0.00	0.00	0.00	0.203
95	2.96	0.00	0.00	0.00	0.00	0.202
96	2.99	0.00	0.00	0.00	0.00	0.202
97	3.03	0.00	0.00	0.00	0.00	0.202
98	3.06	0.00	0.00	0.00	0.00	0.202
99	3.09	0.00	0.00	0.00	0.00	0.201
100	3.12	0.00	0.00	0.00	0.00	0.201

101	3.15	0.00	0.00	0.00	0.00	0.201
102	3.18	0.00	0.00	0.00	0.00	0.200
103	3.22	0.00	0.00	0.00	0.00	0.200
104	3.25	0.00	0.00	0.00	0.00	0.200
105	3.28	0.00	0.00	0.00	0.00	0.199
106	3.31	0.00	0.00	0.00	0.00	0.199
107	3.34	0.00	0.00	0.00	0.00	0.199
108	3.37	0.00	0.00	0.00	0.00	0.198
109	3.40	0.00	0.00	0.00	0.00	0.198
110	3.44	0.00	0.00	0.00	0.00	0.198
111	3.47	0.00	0.00	0.00	0.00	0.197
112	3.50	0.00	0.00	0.00	0.00	0.197
113	3.53	0.00	0.00	0.00	0.00	0.197
114	3.56	0.00	0.00	0.00	0.00	0.196
115	3.59	0.00	0.00	0.00	0.00	0.196
116	3.63	0.00	0.00	0.00	0.00	0.196
117	3.66	0.00	0.00	0.00	0.00	0.195
118	3.69	0.00	0.00	0.00	0.00	0.195
119	3.72	0.00	0.00	0.00	0.00	0.195
120	3.75	0.00	0.00	0.00	0.00	0.195
121	3.78	0.00	0.00	0.00	0.00	0.194
122	3.81	0.00	0.00	0.00	0.00	0.194
123	3.85	0.00	0.00	0.00	0.00	0.194
124	3.88	0.00	0.00	0.00	0.00	0.193
125	3.91	0.00	0.00	0.00	0.00	0.193
126	3.94	0.00	0.00	0.00	0.00	0.193
127	3.97	0.00	0.00	0.00	0.00	0.192
128	4.00	0.00	0.00	0.00	0.00	0.192
129	4.03	0.00	0.00	0.00	0.00	0.192
130	4.07	0.00	0.00	0.00	0.00	0.191
131	4.10	0.00	0.00	0.00	0.00	0.191
132	4.13	0.00	0.00	0.00	0.00	0.191
133	4.16	0.00	0.00	0.00	0.00	0.190
134	4.19	0.00	0.00	0.00	0.00	0.190
135	4.22	0.00	0.00	0.00	0.00	0.190
136	4.26	0.00	0.00	0.00	0.00	0.189
137	4.29	0.00	0.00	0.00	0.00	0.189
138	4.32	0.00	0.00	0.00	0.00	0.189
139	4.35	0.00	0.00	0.00	0.00	0.188
140	4.38	0.00	0.00	0.00	0.00	0.188
141	4.41	0.00	0.00	0.00	0.00	0.188
142	4.44	0.00	0.00	0.00	0.00	0.188
143	4.48	0.00	0.00	0.00	0.00	0.187
144	4.51	0.00	0.00	0.00	0.00	0.187
145	4.54	0.00	0.00	0.00	0.00	0.187
146	4.57	0.00	0.00	0.00	0.00	0.186
147	4.60	0.00	0.00	0.00	0.00	0.186
148	4.63	0.00	0.00	0.00	0.00	0.186
149	4.67	0.00	0.00	0.00	0.00	0.185
150	4.70	0.00	0.00	0.00	0.00	0.185

151	4.73	0.00	0.00	0.00	0.00	0.185
152	4.76	0.00	0.00	0.00	0.00	0.184
153	4.79	0.00	0.00	0.00	0.00	0.184
154	4.82	0.00	0.00	0.00	0.00	0.184
155	4.85	0.00	0.00	0.00	0.00	0.183
156	4.89	0.00	0.00	0.00	0.00	0.183
157	4.92	0.00	0.00	0.00	0.00	0.183
158	4.95	0.00	0.00	0.00	0.00	0.182
159	4.98	0.00	0.00	0.00	0.00	0.182
160	5.01	0.00	0.00	0.00	0.00	0.182
161	5.04	0.00	0.00	0.00	0.00	0.181
162	5.08	0.00	0.00	0.00	0.00	0.181
163	5.11	0.00	0.00	0.00	0.00	0.181
164	5.14	0.00	0.00	0.00	0.00	0.180
165	5.17	0.00	0.00	0.00	0.00	0.180
166	5.20	0.00	0.00	0.00	0.00	0.180
167	5.23	0.00	0.00	0.00	0.00	0.180
168	5.26	0.00	0.00	0.00	0.00	0.179
169	5.30	0.00	0.00	0.00	0.00	0.179
170	5.33	0.00	0.00	0.00	0.00	0.179
171	5.36	0.00	0.00	0.00	0.00	0.178
172	5.39	0.00	0.00	0.00	0.00	0.178
173	5.42	0.00	0.00	0.00	0.00	0.178
174	5.45	0.00	0.00	0.00	0.00	0.177
175	5.49	0.00	0.00	0.00	0.00	0.177
176	5.52	0.00	0.00	0.00	0.00	0.177
177	5.55	0.00	0.00	0.00	0.00	0.176
178	5.58	0.00	0.00	0.00	0.00	0.176
179	5.61	0.00	0.00	0.00	0.00	0.176
180	5.64	0.00	0.00	0.00	0.00	0.175
181	5.67	0.00	0.00	0.00	0.00	0.175
182	5.71	0.00	0.00	0.00	0.00	0.175
183	5.74	0.00	0.00	0.00	0.00	0.174
184	5.77	0.00	0.00	0.00	0.00	0.174
185	5.80	0.00	0.00	0.00	0.00	0.174
186	5.83	0.00	0.00	0.00	0.00	0.173
187	5.86	0.00	0.00	0.00	0.00	0.173
188	5.89	0.00	0.00	0.00	0.00	0.173
189	5.93	0.00	0.00	0.00	0.00	0.173
190	5.96	0.00	0.00	0.00	0.00	0.172
191	5.99	0.00	0.00	0.00	0.00	0.172
192	6.02	0.00	0.00	0.00	0.00	0.172
193	6.05	0.00	0.00	0.00	0.00	0.171
194	6.08	0.00	0.00	0.00	0.00	0.171
195	6.12	0.00	0.00	0.00	0.00	0.171
196	6.15	0.00	0.00	0.00	0.00	0.170
197	6.18	0.00	0.00	0.00	0.00	0.170
198	6.21	0.00	0.00	0.00	0.00	0.170
199	6.24	0.00	0.00	0.00	0.00	0.169
200	6.27	0.00	0.00	0.00	0.00	0.169

201	6.30	0.00	0.00	0.00	0.00	0.169
202	6.34	0.00	0.00	0.00	0.00	0.168
203	6.37	0.00	0.00	0.00	0.00	0.168
204	6.40	0.00	0.00	0.00	0.00	0.168
205	6.43	0.00	0.00	0.00	0.00	0.167
206	6.46	0.00	0.00	0.00	0.00	0.167
207	6.49	0.00	0.00	0.00	0.00	0.167
208	6.53	0.00	0.00	0.00	0.00	0.166
209	6.56	0.00	0.00	0.00	0.00	0.166
210	6.59	0.00	0.00	0.00	0.00	0.166
211	6.62	0.00	0.00	0.00	0.00	0.166
212	6.65	0.00	0.00	0.00	0.00	0.165
213	6.68	0.00	0.00	0.00	0.00	0.165
214	6.71	0.00	0.00	0.00	0.00	0.165
215	6.75	0.00	0.00	0.00	0.00	0.164
216	6.78	0.00	0.00	0.00	0.00	0.164
217	6.81	0.00	0.00	0.00	0.00	0.164
218	6.84	0.00	0.00	0.00	0.00	0.163
219	6.87	0.00	0.00	0.00	0.00	0.163
220	6.90	0.00	0.00	0.00	0.00	0.163
221	6.94	0.00	0.00	0.00	0.00	0.162
222	6.97	0.00	0.00	0.00	0.00	0.162
223	7.00	0.00	0.00	0.00	0.00	0.162
224	7.03	0.00	0.00	0.00	0.00	0.161
225	7.06	0.00	0.00	0.00	0.00	0.161
226	7.09	0.00	0.00	0.00	0.00	0.161
227	7.12	0.00	0.00	0.00	0.00	0.160
228	7.16	0.00	0.00	0.00	0.00	0.160
229	7.19	0.00	0.00	0.00	0.00	0.160
230	7.22	0.00	0.00	0.00	0.00	0.159
231	7.25	0.00	0.00	0.00	0.00	0.159
232	7.28	0.00	0.00	0.00	0.00	0.159
233	7.31	0.00	0.00	0.00	0.00	0.159
234	7.34	0.00	0.00	0.00	0.00	0.158
235	7.38	0.00	0.00	0.00	0.00	0.158
236	7.41	0.00	0.00	0.00	0.00	0.158
237	7.44	0.00	0.00	0.00	0.00	0.157
238	7.47	0.00	0.00	0.00	0.00	0.157
239	7.50	0.00	0.00	0.00	0.00	0.157
240	7.53	0.00	0.00	0.00	0.00	0.156
241	7.57	0.00	0.00	0.00	0.00	0.156
242	7.60	0.00	0.00	0.00	0.00	0.156
243	7.63	0.00	0.00	0.00	0.00	0.155
244	7.66	0.00	0.00	0.00	0.00	0.155
245	7.69	0.00	0.00	0.00	0.00	0.155
246	7.72	0.00	0.00	0.00	0.00	0.154
247	7.75	0.00	0.00	0.00	0.00	0.154
248	7.79	0.00	0.00	0.00	0.00	0.154
249	7.82	0.00	0.00	0.00	0.00	0.153
250	7.85	0.00	0.00	0.00	0.00	0.153

251	7.88	0.00	0.00	0.00	0.00	0.153
252	7.91	0.00	0.00	0.00	0.00	0.152
253	7.94	0.00	0.00	0.00	0.00	0.152
254	7.98	0.00	0.00	0.00	0.00	0.152
255	8.01	0.00	0.00	0.00	0.00	0.152
256	8.04	0.00	0.00	0.00	0.00	0.151
257	8.07	0.00	0.00	0.00	0.00	0.151
258	8.10	0.00	0.00	0.00	0.00	0.151
259	8.13	0.00	0.00	0.00	0.00	0.150
260	8.16	0.00	0.00	0.00	0.00	0.150
261	8.20	0.00	0.00	0.00	0.00	0.150
262	8.23	0.00	0.00	0.00	0.00	0.149
263	8.26	0.00	0.00	0.00	0.00	0.149
264	8.29	0.00	0.00	0.00	0.00	0.149
265	8.32	0.00	0.00	0.00	0.00	0.148
266	8.35	0.00	0.00	0.00	0.00	0.148
267	8.39	0.00	0.00	0.00	0.00	0.148
268	8.42	0.00	0.00	0.00	0.00	0.147
269	8.45	0.00	0.00	0.00	0.00	0.147
270	8.48	0.00	0.00	0.00	0.00	0.147
271	8.51	0.00	0.00	0.00	0.00	0.146
272	8.54	0.00	0.00	0.00	0.00	0.146
273	8.57	0.00	0.00	0.00	0.00	0.146
274	8.61	0.00	0.00	0.00	0.00	0.145
275	8.64	0.00	0.00	0.00	0.00	0.145
276	8.67	0.00	0.00	0.00	0.00	0.145
277	8.70	0.00	0.00	0.00	0.00	0.144
278	8.73	0.00	0.00	0.00	0.00	0.144
279	8.76	0.00	0.00	0.00	0.00	0.144
280	8.79	0.00	0.00	0.00	0.00	0.144
281	8.83	0.00	0.00	0.00	0.00	0.143
282	8.86	0.00	0.00	0.00	0.00	0.143
283	8.89	0.00	0.00	0.00	0.00	0.143
284	8.92	0.00	0.00	0.00	0.00	0.142
285	8.95	0.00	0.00	0.00	0.00	0.142
286	8.98	0.00	0.00	0.00	0.00	0.142
287	9.02	0.00	0.00	0.00	0.00	0.141
288	9.05	0.00	0.00	0.00	0.00	0.141
289	9.08	0.00	0.00	0.00	0.00	0.141
290	9.11	0.00	0.00	0.00	0.00	0.140
291	9.14	0.00	0.00	0.00	0.00	0.140
292	9.17	0.00	0.00	0.00	0.00	0.140
293	9.20	0.00	0.00	0.00	0.00	0.139
294	9.24	0.00	0.00	0.00	0.00	0.139
295	9.27	0.00	0.00	0.00	0.00	0.139
296	9.30	0.00	0.00	0.00	0.00	0.138
297	9.33	0.00	0.00	0.00	0.00	0.138
298	9.36	0.00	0.00	0.00	0.00	0.138
299	9.39	0.00	0.00	0.00	0.00	0.137
300	9.43	0.00	0.00	0.00	0.00	0.137

301	9.46	0.00	0.00	0.00	0.00	0.137
302	9.49	0.00	0.00	0.00	0.00	0.137
303	9.52	0.00	0.00	0.00	0.00	0.136
304	9.55	0.00	0.00	0.00	0.00	0.136
305	9.58	0.00	0.00	0.00	0.00	0.136
306	9.61	0.00	0.00	0.00	0.00	0.135
307	9.65	0.00	0.00	0.00	0.00	0.135
308	9.68	0.00	0.00	0.00	0.00	0.135
309	9.71	0.00	0.00	0.00	0.00	0.134
310	9.74	0.00	0.00	0.00	0.00	0.134
311	9.77	0.00	0.00	0.00	0.00	0.134
312	9.80	0.00	0.00	0.00	0.00	0.133
313	9.84	0.00	0.00	0.00	0.00	0.133
314	9.87	0.00	0.00	0.00	0.00	0.133
315	9.90	0.00	0.00	0.00	0.00	0.132
316	9.93	0.00	0.00	0.00	0.00	0.132
317	9.96	0.00	0.00	0.00	0.00	0.132
318	9.99	0.00	0.00	0.00	0.00	0.131
319	10.02	0.00	0.00	0.00	0.00	0.131
320	10.06	0.00	0.00	0.00	0.00	0.131
321	10.09	0.00	0.00	0.00	0.00	0.130
322	10.12	0.00	0.00	0.00	0.00	0.130
323	10.15	0.00	0.00	0.00	0.00	0.130
324	10.18	0.00	0.00	0.00	0.00	0.130
325	10.21	0.00	0.00	0.00	0.00	0.129
326	10.24	0.00	0.00	0.00	0.00	0.129
327	10.28	0.00	0.00	0.00	0.00	0.129
328	10.31	0.00	0.00	0.00	0.00	0.128
329	10.34	0.00	0.00	0.00	0.00	0.128
330	10.37	0.00	0.00	0.00	0.00	0.128
331	10.40	0.00	0.00	0.00	0.00	0.127
332	10.43	0.00	0.00	0.00	0.00	0.127
333	10.47	0.00	0.00	0.00	0.00	0.127
334	10.50	0.00	0.00	0.00	0.00	0.126
335	10.53	0.00	0.00	0.00	0.00	0.126
336	10.56	0.00	0.00	0.00	0.00	0.126
337	10.59	0.00	0.00	0.00	0.00	0.125
338	10.62	0.00	0.00	0.00	0.00	0.125
339	10.65	0.00	0.00	0.00	0.00	0.125
340	10.69	0.00	0.00	0.00	0.00	0.124
341	10.72	0.00	0.00	0.00	0.00	0.124
342	10.75	0.00	0.00	0.00	0.00	0.124
343	10.78	0.00	0.00	0.00	0.00	0.123
344	10.81	0.00	0.00	0.00	0.00	0.123
345	10.84	0.00	0.00	0.00	0.00	0.123
346	10.88	0.00	0.00	0.00	0.00	0.123
347	10.91	0.00	0.00	0.00	0.00	0.122
348	10.94	0.00	0.00	0.00	0.00	0.122
349	10.97	0.00	0.00	0.00	0.00	0.122
350	11.00	0.00	0.00	0.00	0.00	0.121

351	11.03	0.00	0.00	0.00	0.00	0.121
352	11.06	0.00	0.00	0.00	0.00	0.121
353	11.10	0.00	0.00	0.00	0.00	0.120
354	11.13	0.00	0.00	0.00	0.00	0.120
355	11.16	0.00	0.00	0.00	0.00	0.120
356	11.19	0.00	0.00	0.00	0.00	0.119
357	11.22	0.00	0.00	0.00	0.00	0.119
358	11.25	0.00	0.00	0.00	0.00	0.119
359	11.29	0.00	0.00	0.00	0.00	0.118
360	11.32	0.00	0.00	0.00	0.00	0.118
361	11.35	0.00	0.00	0.00	0.00	0.118
362	11.38	0.00	0.00	0.00	0.00	0.117
363	11.41	0.00	0.00	0.00	0.00	0.117
364	11.44	0.00	0.00	0.00	0.00	0.117
365	11.47	0.00	0.00	0.00	0.00	0.116
366	11.51	0.00	0.00	0.00	0.00	0.116
367	11.54	0.00	0.00	0.00	0.00	0.116
368	11.57	0.00	0.00	0.00	0.00	0.116
369	11.60	0.00	0.00	0.00	0.00	0.115
370	11.63	0.00	0.00	0.00	0.00	0.115
371	11.66	0.00	0.00	0.00	0.00	0.115
372	11.70	0.00	0.00	0.00	0.00	0.114
373	11.73	0.00	0.00	0.00	0.00	0.114
374	11.76	0.00	0.00	0.00	0.00	0.114
375	11.79	0.00	0.00	0.00	0.00	0.113
376	11.82	0.00	0.00	0.00	0.00	0.113
377	11.85	0.00	0.00	0.00	0.00	0.113
378	11.88	0.00	0.00	0.00	0.00	0.112
379	11.92	0.00	0.00	0.00	0.00	0.112
380	11.95	0.00	0.00	0.00	0.00	0.112
381	11.98	0.00	0.00	0.00	0.00	0.111
382	12.01	0.00	0.00	0.00	0.00	0.111
383	12.04	0.00	0.00	0.00	0.00	0.111
384	12.07	0.00	0.00	0.00	0.00	0.110
385	12.10	0.00	0.00	0.00	0.00	0.110
386	12.14	0.00	0.00	0.00	0.00	0.110
387	12.17	0.00	0.00	0.00	0.00	0.109
388	12.20	0.00	0.00	0.00	0.00	0.109
389	12.23	0.00	0.00	0.00	0.00	0.109
390	12.26	0.00	0.00	0.00	0.00	0.108
391	12.29	0.00	0.00	0.00	0.00	0.108
392	12.33	0.00	0.00	0.00	0.00	0.108
393	12.36	0.00	0.00	0.00	0.00	0.108
394	12.39	0.00	0.00	0.00	0.00	0.107
395	12.42	0.00	0.00	0.00	0.00	0.107
396	12.45	0.00	0.00	0.00	0.00	0.107
397	12.48	0.00	0.00	0.00	0.00	0.106
398	12.51	0.00	0.00	0.00	0.00	0.106
399	12.55	0.00	0.00	0.00	0.00	0.106
400	12.58	0.00	0.00	0.00	0.00	0.105

401	12.61	0.00	0.00	0.00	0.00	0.105
402	12.64	0.00	0.00	0.00	0.00	0.105
403	12.67	0.00	0.00	0.00	0.00	0.104
404	12.70	0.00	0.00	0.00	0.00	0.104
405	12.74	0.00	0.00	0.00	0.00	0.104
406	12.77	0.00	0.00	0.00	0.00	0.103
407	12.80	0.00	0.00	0.00	0.00	0.103
408	12.83	0.00	0.00	0.00	0.00	0.103
409	12.86	0.00	0.00	0.00	0.00	0.102
410	12.89	0.00	0.00	0.00	0.00	0.102
411	12.92	0.00	0.00	0.00	0.00	0.102
412	12.96	0.00	0.00	0.00	0.00	0.101
413	12.99	0.00	0.00	0.00	0.00	0.101
414	13.02	0.00	0.00	0.00	0.00	0.101
415	13.05	0.00	0.00	0.00	0.00	0.101
416	13.08	0.00	0.00	0.00	0.00	0.100
417	13.11	0.00	0.00	0.00	0.00	0.100
418	13.15	0.00	0.00	0.00	0.00	0.100
419	13.18	0.00	0.00	0.00	0.00	0.099
420	13.21	0.00	0.00	0.00	0.00	0.099
421	13.24	0.00	0.00	0.00	0.00	0.099
422	13.27	0.00	0.00	0.00	0.00	0.098
423	13.30	0.00	0.00	0.00	0.00	0.098
424	13.33	0.00	0.00	0.00	0.00	0.098
425	13.37	0.00	0.00	0.00	0.00	0.097
426	13.40	0.00	0.00	0.00	0.00	0.097
427	13.43	0.00	0.00	0.00	0.00	0.097
428	13.46	0.00	0.00	0.00	0.00	0.096
429	13.49	0.00	0.00	0.00	0.00	0.096
430	13.52	0.00	0.00	0.00	0.00	0.096
431	13.55	0.00	0.00	0.00	0.00	0.095
432	13.59	0.00	0.00	0.00	0.00	0.095
433	13.62	0.00	0.00	0.00	0.00	0.095
434	13.65	0.00	0.00	0.00	0.00	0.094
435	13.68	0.00	0.00	0.00	0.00	0.094
436	13.71	0.00	0.00	0.00	0.00	0.094
437	13.74	0.00	0.00	0.00	0.00	0.094
438	13.78	0.00	0.00	0.00	0.00	0.093
439	13.81	0.00	0.00	0.00	0.00	0.093
440	13.84	0.00	0.00	0.00	0.00	0.093
441	13.87	0.00	0.00	0.00	0.00	0.092
442	13.90	0.00	0.00	0.00	0.00	0.092
443	13.93	0.00	0.00	0.00	0.00	0.092
444	13.96	0.00	0.00	0.00	0.00	0.091
445	14.00	0.00	0.00	0.00	0.00	0.091
446	14.03	0.00	0.00	0.00	0.00	0.091
447	14.06	0.00	0.00	0.00	0.00	0.090
448	14.09	0.00	0.00	0.00	0.00	0.090
449	14.12	0.00	0.00	0.00	0.00	0.090
450	14.15	0.00	0.00	0.00	0.00	0.089

451	14.19	0.00	0.00	0.00	0.00	0.089
452	14.22	0.00	0.00	0.00	0.00	0.089
453	14.25	0.00	0.00	0.00	0.00	0.088
454	14.28	0.00	0.00	0.00	0.00	0.088
455	14.31	0.00	0.00	0.00	0.00	0.088
456	14.34	0.00	0.00	0.00	0.00	0.087
457	14.37	0.00	0.00	0.00	0.00	0.087
458	14.41	0.00	0.00	0.00	0.00	0.087
459	14.44	0.00	0.00	0.00	0.00	0.087
460	14.47	0.00	0.00	0.00	0.00	0.086
461	14.50	0.00	0.00	0.00	0.00	0.086
462	14.53	0.00	0.00	0.00	0.00	0.086
463	14.56	0.00	0.00	0.00	0.00	0.085
464	14.60	0.00	0.00	0.00	0.00	0.085
465	14.63	0.00	0.00	0.00	0.00	0.085
466	14.66	0.00	0.00	0.00	0.00	0.084
467	14.69	0.00	0.00	0.00	0.00	0.084
468	14.72	0.00	0.00	0.00	0.00	0.084
469	14.75	0.00	0.00	0.00	0.00	0.083
470	14.78	0.00	0.00	0.00	0.00	0.083
471	14.82	0.00	0.00	0.00	0.00	0.083
472	14.85	0.00	0.00	0.00	0.00	0.082
473	14.88	0.00	0.00	0.00	0.00	0.082
474	14.91	0.00	0.00	0.00	0.00	0.082
475	14.94	0.00	0.00	0.00	0.00	0.081
476	14.97	0.00	0.00	0.00	0.00	0.081
477	15.00	0.00	0.00	0.00	0.00	0.081
478	15.04	0.00	0.00	0.00	0.00	0.080
479	15.07	0.00	0.00	0.00	0.00	0.080
480	15.10	0.00	0.00	0.00	0.00	0.080
481	15.13	0.00	0.00	0.00	0.00	0.080
482	15.16	0.00	0.00	0.00	0.00	0.079
483	15.19	0.00	0.00	0.00	0.00	0.079
484	15.23	0.00	0.00	0.00	0.00	0.079
485	15.26	0.00	0.00	0.00	0.00	0.078
486	15.29	0.00	0.00	0.00	0.00	0.078
487	15.32	0.00	0.00	0.00	0.00	0.078
488	15.35	0.00	0.00	0.00	0.00	0.077
489	15.38	0.00	0.00	0.00	0.00	0.077
490	15.41	0.00	0.00	0.00	0.00	0.077
491	15.45	0.00	0.00	0.00	0.00	0.076
492	15.48	0.00	0.00	0.00	0.00	0.076
493	15.51	0.00	0.00	0.00	0.00	0.076
494	15.54	0.00	0.00	0.00	0.00	0.075
495	15.57	0.00	0.00	0.00	0.00	0.075
496	15.60	0.00	0.00	0.00	0.00	0.075
497	15.64	0.00	0.00	0.00	0.00	0.074
498	15.67	0.00	0.00	0.00	0.00	0.074
499	15.70	0.00	0.00	0.00	0.00	0.074
500	15.73	0.01	0.01	0.00	0.00	0.073

501	15.76	0.01	0.01	0.00	0.00	0.073
502	15.79	0.01	0.01	0.00	0.00	0.073
503	15.82	0.01	0.01	0.00	0.00	0.072
504	15.86	0.02	0.02	0.00	0.00	0.072
505	15.89	0.02	0.02	0.00	0.00	0.072
506	15.92	0.02	0.02	0.00	0.00	0.072
507	15.95	0.03	0.03	0.00	0.00	0.071
508	15.98	0.03	0.03	0.00	0.00	0.071
509	16.01	0.03	0.03	0.01	0.00	0.071
510	16.05	0.03	0.03	0.01	0.00	0.070
511	16.08	0.04	0.04	0.01	0.00	0.070
512	16.11	0.04	0.04	0.01	0.00	0.070
513	16.14	0.04	0.04	0.01	0.00	0.069
514	16.17	0.05	0.05	0.01	0.00	0.069
515	16.20	0.05	0.05	0.01	0.00	0.069
516	16.23	0.05	0.05	0.01	0.00	0.068
517	16.27	0.06	0.06	0.02	0.00	0.068
518	16.30	0.06	0.06	0.02	0.00	0.068
519	16.33	0.06	0.06	0.02	0.00	0.067
520	16.36	0.06	0.06	0.02	0.01	0.067
521	16.39	0.07	0.07	0.02	0.01	0.067
522	16.42	0.07	0.07	0.03	0.01	0.066
523	16.45	0.07	0.07	0.03	0.01	0.066
524	16.49	0.08	0.08	0.03	0.01	0.066
525	16.52	0.08	0.08	0.03	0.01	0.065
526	16.55	0.08	0.08	0.04	0.01	0.065
527	16.58	0.08	0.08	0.04	0.01	0.065
528	16.61	0.09	0.09	0.04	0.01	0.065
529	16.64	0.09	0.09	0.04	0.01	0.064
530	16.68	0.09	0.09	0.05	0.02	0.064
531	16.71	0.10	0.10	0.05	0.02	0.064
532	16.74	0.10	0.10	0.05	0.02	0.063
533	16.77	0.10	0.10	0.06	0.02	0.063
534	16.80	0.11	0.11	0.06	0.02	0.063
535	16.83	0.11	0.11	0.06	0.02	0.062
536	16.86	0.11	0.11	0.07	0.03	0.062
537	16.90	0.11	0.11	0.07	0.03	0.062
538	16.93	0.12	0.12	0.07	0.03	0.061
539	16.96	0.12	0.12	0.08	0.03	0.061
540	16.99	0.12	0.12	0.08	0.04	0.061
541	17.02	0.13	0.13	0.09	0.04	0.060
542	17.05	0.13	0.13	0.09	0.04	0.060
543	17.09	0.13	0.13	0.09	0.04	0.060
544	17.12	0.13	0.13	0.10	0.05	0.059
545	17.15	0.13	0.13	0.10	0.05	0.059
546	17.18	0.13	0.13	0.11	0.05	0.059
547	17.21	0.14	0.14	0.11	0.06	0.058
548	17.24	0.14	0.14	0.11	0.06	0.058
549	17.27	0.14	0.14	0.12	0.06	0.058
550	17.31	0.14	0.14	0.12	0.07	0.058

551	17.34	0.14	0.14	0.13	0.07	0.057
552	17.37	0.14	0.14	0.13	0.08	0.057
553	17.40	0.14	0.14	0.14	0.08	0.057
554	17.43	0.14	0.14	0.14	0.08	0.056
555	17.46	0.14	0.14	0.14	0.09	0.056
556	17.50	0.14	0.14	0.15	0.09	0.056
557	17.53	0.14	0.14	0.15	0.10	0.055
558	17.56	0.14	0.14	0.16	0.10	0.055
559	17.59	0.14	0.14	0.16	0.11	0.055
560	17.62	0.14	0.14	0.17	0.11	0.054
561	17.65	0.14	0.14	0.17	0.12	0.054
562	17.68	0.14	0.14	0.18	0.12	0.054
563	17.72	0.14	0.14	0.18	0.13	0.053
564	17.75	0.14	0.14	0.18	0.14	0.053
565	17.78	0.14	0.14	0.19	0.14	0.053
566	17.81	0.14	0.14	0.19	0.15	0.052
567	17.84	0.14	0.14	0.20	0.15	0.052
568	17.87	0.14	0.14	0.20	0.16	0.052
569	17.91	0.14	0.14	0.21	0.17	0.051
570	17.94	0.14	0.14	0.21	0.17	0.051
571	17.97	0.14	0.14	0.22	0.18	0.051
572	18.00	0.14	0.14	0.22	0.19	0.051
573	18.03	0.14	0.14	0.22	0.19	0.050
574	18.06	0.14	0.14	0.23	0.20	0.050
575	18.09	0.14	0.14	0.23	0.21	0.050
576	18.13	0.14	0.14	0.24	0.22	0.049
577	18.16	0.14	0.14	0.24	0.22	0.049
578	18.19	0.14	0.14	0.25	0.23	0.049
579	18.22	0.14	0.14	0.25	0.24	0.048
580	18.25	0.14	0.14	0.26	0.25	0.048
581	18.28	0.14	0.14	0.26	0.25	0.048
582	18.31	0.14	0.14	0.26	0.26	0.047
583	18.35	0.14	0.14	0.27	0.27	0.047
584	18.38	0.15	0.15	0.27	0.28	0.047
585	18.41	0.15	0.15	0.28	0.29	0.046
586	18.44	0.15	0.15	0.28	0.30	0.046
587	18.47	0.15	0.15	0.29	0.31	0.046
588	18.50	0.15	0.15	0.29	0.32	0.045
589	18.54	0.15	0.15	0.30	0.32	0.045
590	18.57	0.15	0.15	0.30	0.33	0.045
591	18.60	0.15	0.15	0.31	0.34	0.044
592	18.63	0.15	0.15	0.31	0.35	0.044
593	18.66	0.15	0.15	0.32	0.36	0.044
594	18.69	0.15	0.15	0.32	0.37	0.044
595	18.72	0.15	0.15	0.32	0.38	0.043
596	18.76	0.15	0.15	0.33	0.39	0.043
597	18.79	0.15	0.15	0.33	0.40	0.043
598	18.82	0.15	0.15	0.34	0.41	0.042
599	18.85	0.15	0.15	0.34	0.43	0.042
600	18.88	0.15	0.15	0.35	0.44	0.042

601	18.91	0.15	0.15	0.35	0.45	0.041
602	18.95	0.15	0.15	0.36	0.46	0.041
603	18.98	0.15	0.15	0.36	0.47	0.041
604	19.01	0.15	0.15	0.37	0.48	0.040
605	19.04	0.15	0.15	0.37	0.49	0.040
606	19.07	0.15	0.15	0.38	0.50	0.040
607	19.10	0.15	0.15	0.38	0.52	0.039
608	19.13	0.15	0.15	0.39	0.53	0.039
609	19.17	0.15	0.15	0.39	0.54	0.039
610	19.20	0.15	0.15	0.39	0.55	0.038
611	19.23	0.15	0.15	0.40	0.57	0.038
612	19.26	0.15	0.15	0.40	0.58	0.038
613	19.29	0.15	0.15	0.41	0.59	0.037
614	19.32	0.15	0.15	0.41	0.60	0.037
615	19.36	0.15	0.15	0.42	0.62	0.037
616	19.39	0.15	0.15	0.42	0.63	0.037
617	19.42	0.15	0.15	0.43	0.64	0.036
618	19.45	0.15	0.15	0.43	0.66	0.036
619	19.48	0.15	0.15	0.44	0.67	0.036
620	19.51	0.15	0.15	0.44	0.69	0.035
621	19.54	0.15	0.15	0.45	0.70	0.035
622	19.58	0.15	0.15	0.45	0.71	0.035
623	19.61	0.16	0.16	0.46	0.73	0.034
624	19.64	0.16	0.16	0.46	0.74	0.034
625	19.67	0.16	0.16	0.47	0.76	0.034
626	19.70	0.16	0.16	0.47	0.77	0.033
627	19.73	0.16	0.16	0.48	0.79	0.033
628	19.76	0.16	0.16	0.48	0.80	0.033
629	19.80	0.16	0.16	0.49	0.82	0.032
630	19.83	0.16	0.16	0.49	0.83	0.032
631	19.86	0.16	0.16	0.50	0.85	0.032
632	19.89	0.16	0.16	0.50	0.86	0.031
633	19.92	0.16	0.16	0.51	0.88	0.031
634	19.95	0.16	0.16	0.51	0.90	0.031
635	19.99	0.16	0.16	0.52	0.91	0.031
636	20.02	0.16	0.16	0.52	0.93	0.030
637	20.05	0.16	0.16	0.53	0.95	0.030
638	20.08	0.16	0.16	0.53	0.96	0.030
639	20.11	0.16	0.16	0.54	0.98	0.029
640	20.14	0.16	0.16	0.54	1.00	0.029
641	20.17	0.16	0.16	0.55	1.01	0.029
642	20.21	0.16	0.16	0.55	1.03	0.028
643	20.24	0.16	0.16	0.56	1.05	0.028
644	20.27	0.16	0.16	0.56	1.07	0.028
645	20.30	0.16	0.16	0.57	1.08	0.027
646	20.33	0.17	0.17	0.57	1.10	0.027
647	20.36	0.17	0.17	0.58	1.12	0.027
648	20.40	0.17	0.17	0.58	1.14	0.026
649	20.43	0.17	0.17	0.59	1.16	0.026
650	20.46	0.17	0.17	0.59	1.18	0.026

651	20.49	0.17	0.17	0.60	1.19	0.025
652	20.52	0.17	0.17	0.61	1.21	0.025
653	20.55	0.17	0.17	0.61	1.23	0.025
654	20.58	0.17	0.17	0.62	1.25	0.025
655	20.62	0.17	0.17	0.62	1.27	0.024
656	20.65	0.17	0.17	0.63	1.29	0.024
657	20.68	0.17	0.17	0.63	1.31	0.024
658	20.71	0.17	0.17	0.64	1.33	0.023
659	20.74	0.17	0.17	0.64	1.35	0.023
660	20.77	0.17	0.17	0.65	1.37	0.023
661	20.81	0.17	0.17	0.65	1.39	0.022
662	20.84	0.17	0.17	0.66	1.41	0.022
663	20.87	0.17	0.17	0.66	1.43	0.022
664	20.90	0.17	0.17	0.67	1.45	0.021
665	20.93	0.17	0.17	0.68	1.48	0.021
666	20.96	0.17	0.17	0.68	1.50	0.021
667	20.99	0.17	0.17	0.69	1.52	0.020
668	21.03	0.17	0.17	0.69	1.54	0.020
669	21.06	0.18	0.18	0.70	1.56	0.020
670	21.09	0.18	0.18	0.70	1.58	0.020
671	21.12	0.18	0.18	0.71	1.61	0.019
672	21.15	0.18	0.18	0.71	1.63	0.019
673	21.18	0.18	0.18	0.72	1.65	0.019
674	21.21	0.18	0.18	0.72	1.67	0.018
675	21.25	0.18	0.18	0.73	1.70	0.018
676	21.28	0.18	0.18	0.74	1.72	0.018
677	21.31	0.18	0.18	0.74	1.74	0.017
678	21.34	0.18	0.18	0.75	1.77	0.017
679	21.37	0.18	0.18	0.75	1.79	0.017
680	21.40	0.18	0.18	0.76	1.81	0.016
681	21.44	0.18	0.18	0.76	1.84	0.016
682	21.47	0.18	0.18	0.77	1.86	0.016
683	21.50	0.18	0.18	0.78	1.89	0.016
684	21.53	0.17	0.17	0.78	1.91	0.015
685	21.56	0.17	0.17	0.79	1.94	0.015
686	21.59	0.16	0.16	0.79	1.96	0.015
687	21.62	0.15	0.15	0.80	1.99	0.015
688	21.66	0.14	0.14	0.80	2.01	0.015
689	21.69	0.13	0.13	0.81	2.04	0.015
690	21.72	0.13	0.13	0.81	2.06	0.015
691	21.75	0.12	0.12	0.82	2.09	0.015
692	21.78	0.11	0.11	0.82	2.11	0.014
693	21.81	0.10	0.10	0.82	2.14	0.014
694	21.85	0.10	0.10	0.83	2.17	0.014
695	21.88	0.09	0.09	0.83	2.19	0.014
696	21.91	0.08	0.08	0.83	2.22	0.014
697	21.94	0.07	0.07	0.84	2.24	0.014
698	21.97	0.06	0.06	0.84	2.27	0.014
699	22.00	0.06	0.06	0.84	2.30	0.014
700	22.03	0.05	0.05	0.85	2.32	0.014

701	22.07	0.04	0.04	0.85	2.35	0.014
702	22.10	0.03	0.03	0.85	2.38	0.013
703	22.13	0.03	0.03	0.85	2.40	0.013
704	22.16	0.02	0.02	0.85	2.43	0.013
705	22.19	0.01	0.01	0.86	2.46	0.013
706	22.22	0.00	0.00	0.86	2.48	0.013
707	22.26	-0.01	-0.01	0.86	2.51	0.013
708	22.29	-0.01	-0.01	0.86	2.54	0.013
709	22.32	-0.02	-0.02	0.86	2.57	0.013
710	22.35	-0.03	-0.03	0.86	2.59	0.013
711	22.38	-0.04	-0.04	0.86	2.62	0.013
712	22.41	-0.04	-0.04	0.86	2.65	0.012
713	22.44	-0.05	-0.05	0.86	2.67	0.012
714	22.48	-0.06	-0.06	0.86	2.70	0.012
715	22.51	-0.07	-0.07	0.86	2.73	0.012
716	22.54	-0.08	-0.08	0.86	2.76	0.012
717	22.57	-0.08	-0.08	0.86	2.78	0.012
718	22.60	-0.09	-0.09	0.86	2.81	0.012
719	22.63	-0.10	-0.10	0.86	2.84	0.012
720	22.66	-0.11	-0.11	0.86	2.87	0.012
721	22.70	-0.11	-0.11	0.86	2.89	0.011
722	22.73	-0.12	-0.12	0.86	2.92	0.011
723	22.76	-0.13	-0.13	0.86	2.95	0.011
724	22.79	-0.14	-0.14	0.85	2.97	0.011
725	22.82	-0.15	-0.15	0.85	3.00	0.011
726	22.85	-0.15	-0.15	0.85	3.03	0.011
727	22.89	-0.16	-0.16	0.85	3.05	0.011
728	22.92	-0.17	-0.17	0.84	3.08	0.011
729	22.95	-0.18	-0.18	0.84	3.11	0.010
730	22.98	-0.18	-0.18	0.84	3.13	0.010
731	23.01	-0.19	-0.19	0.84	3.16	0.010
732	23.04	-0.20	-0.20	0.83	3.19	0.010
733	23.07	-0.21	-0.21	0.83	3.21	0.010
734	23.11	-0.22	-0.22	0.83	3.24	0.010
735	23.14	-0.22	-0.22	0.82	3.26	0.010
736	23.17	-0.23	-0.23	0.82	3.29	0.010
737	23.20	-0.24	-0.24	0.81	3.32	0.009
738	23.23	-0.25	-0.25	0.81	3.34	0.009
739	23.26	-0.25	-0.25	0.80	3.37	0.009
740	23.30	-0.26	-0.26	0.80	3.39	0.009
741	23.33	-0.27	-0.27	0.79	3.42	0.009
742	23.36	-0.28	-0.28	0.79	3.44	0.009
743	23.39	-0.29	-0.29	0.78	3.47	0.009
744	23.42	-0.29	-0.29	0.78	3.49	0.008
745	23.45	-0.30	-0.30	0.77	3.52	0.008
746	23.48	-0.31	-0.31	0.77	3.54	0.008
747	23.52	-0.32	-0.32	0.76	3.56	0.008
748	23.55	-0.32	-0.32	0.75	3.59	0.008
749	23.58	-0.33	-0.33	0.75	3.61	0.008
750	23.61	-0.34	-0.34	0.74	3.64	0.007

751	23.64	-0.35	-0.35	0.73	3.66	0.007
752	23.67	-0.36	-0.36	0.73	3.68	0.007
753	23.71	-0.36	-0.36	0.72	3.70	0.007
754	23.74	-0.37	-0.37	0.71	3.73	0.007
755	23.77	-0.38	-0.38	0.71	3.75	0.006
756	23.80	-0.39	-0.39	0.70	3.77	0.006
757	23.83	-0.39	-0.39	0.69	3.79	0.006
758	23.86	-0.40	-0.40	0.68	3.82	0.006
759	23.89	-0.41	-0.41	0.67	3.84	0.006
760	23.93	-0.42	-0.42	0.67	3.86	0.005
761	23.96	-0.43	-0.43	0.66	3.88	0.005
762	23.99	-0.43	-0.43	0.65	3.90	0.005
763	24.02	-0.44	-0.44	0.64	3.92	0.004
764	24.05	-0.45	-0.45	0.63	3.94	0.004
765	24.08	-0.46	-0.46	0.62	3.96	0.004
766	24.11	-0.46	-0.46	0.61	3.98	0.003
767	24.15	-0.47	-0.47	0.60	4.00	0.003
768	24.18	-0.48	-0.48	0.59	4.02	0.002
769	24.21	-0.49	-0.49	0.58	4.04	0.001
770	24.24	-0.50	-0.50	0.57	4.05	0.000
771	24.27	-0.50	-0.50	0.56	4.07	0.000
772	24.30	-0.51	-0.51	0.55	4.09	0.000
773	24.34	-0.52	-0.52	0.54	4.11	0.000
774	24.37	-0.53	-0.53	0.53	4.12	0.000
775	24.40	-0.54	-0.54	0.52	4.14	0.000
776	24.43	-0.54	-0.54	0.50	4.15	0.000
777	24.46	-0.55	-0.55	0.49	4.17	0.000
778	24.49	-0.56	-0.56	0.48	4.19	0.000
779	24.52	-0.57	-0.57	0.47	4.20	0.001
780	24.56	-0.57	-0.57	0.46	4.22	0.001
781	24.59	-0.58	-0.58	0.44	4.23	0.001
782	24.62	-0.59	-0.59	0.43	4.24	0.001
783	24.65	-0.60	-0.60	0.42	4.26	0.001
784	24.68	-0.61	-0.61	0.41	4.27	0.001
785	24.71	-0.61	-0.61	0.39	4.28	0.001
786	24.75	-0.62	-0.62	0.38	4.29	0.001
787	24.78	-0.63	-0.63	0.37	4.31	0.001
788	24.81	-0.64	-0.64	0.35	4.32	0.001
789	24.84	-0.64	-0.64	0.34	4.33	0.001
790	24.87	-0.65	-0.65	0.32	4.34	0.001
791	24.90	-0.66	-0.66	0.31	4.35	0.001
792	24.93	-0.67	-0.67	0.30	4.36	0.001
793	24.97	-0.68	-0.68	0.28	4.37	0.001
794	25.00	-0.68	-0.68	0.27	4.38	0.001
795	25.03	-0.69	-0.69	0.25	4.38	0.001
796	25.06	-0.69	-0.69	0.24	4.39	0.001
797	25.09	-0.70	-0.70	0.22	4.40	0.002
798	25.12	-0.71	-0.71	0.21	4.41	0.002
799	25.16	-0.71	-0.71	0.19	4.41	0.002
800	25.19	-0.72	-0.72	0.17	4.42	0.002

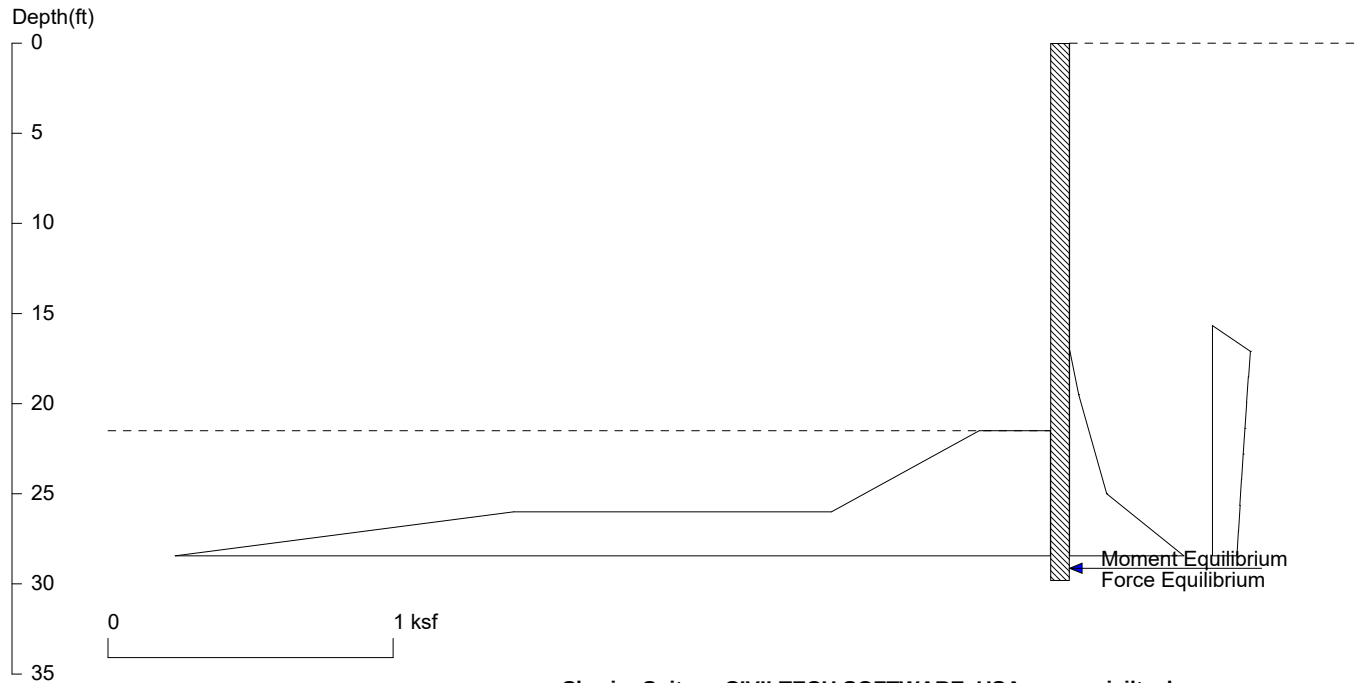
801	25.22	-0.72	-0.72	0.16	4.42	0.002
802	25.25	-0.73	-0.73	0.14	4.43	0.002
803	25.28	-0.74	-0.74	0.13	4.43	0.002
804	25.31	-0.74	-0.74	0.11	4.44	0.002
805	25.34	-0.75	-0.75	0.09	4.44	0.002
806	25.38	-0.75	-0.75	0.08	4.44	0.002
807	25.41	-0.76	-0.76	0.06	4.44	0.002
808	25.44	-0.77	-0.77	0.05	4.45	0.002
809	25.47	-0.77	-0.77	0.03	4.45	0.002
810	25.50	-0.78	-0.78	0.01	4.45	0.002
811	25.53	-0.78	-0.78	-0.01	4.45	0.002
812	25.57	-0.79	-0.79	-0.02	4.45	0.002
813	25.60	-0.79	-0.79	-0.04	4.45	0.002
814	25.63	-0.80	-0.80	-0.06	4.44	0.002
815	25.66	-0.81	-0.81	-0.07	4.44	0.002
816	25.69	-0.81	-0.81	-0.09	4.44	0.003
817	25.72	-0.82	-0.82	-0.11	4.44	0.003
818	25.75	-0.82	-0.82	-0.13	4.43	0.003
819	25.79	-0.83	-0.83	-0.15	4.43	0.003
820	25.82	-0.83	-0.83	-0.16	4.42	0.003
821	25.85	-0.84	-0.84	-0.18	4.42	0.003
822	25.88	-0.85	-0.85	-0.20	4.41	0.003
823	25.91	-0.85	-0.85	-0.22	4.41	0.003
824	25.94	-0.86	-0.86	-0.24	4.40	0.003
825	25.97	-0.86	-0.86	-0.26	4.39	0.003
826	26.01	-1.58	-1.58	-0.28	4.38	0.003
827	26.04	-1.59	-1.59	-0.31	4.37	0.003
828	26.07	-1.61	-1.61	-0.35	4.36	0.003
829	26.10	-1.62	-1.62	-0.39	4.35	0.003
830	26.13	-1.63	-1.63	-0.42	4.34	0.003
831	26.16	-1.65	-1.65	-0.46	4.32	0.003
832	26.20	-1.66	-1.66	-0.50	4.31	0.003
833	26.23	-1.67	-1.67	-0.54	4.29	0.003
834	26.26	-1.69	-1.69	-0.58	4.28	0.003
835	26.29	-1.70	-1.70	-0.62	4.26	0.004
836	26.32	-1.71	-1.71	-0.65	4.24	0.004
837	26.35	-1.72	-1.72	-0.69	4.22	0.004
838	26.38	-1.74	-1.74	-0.73	4.19	0.004
839	26.42	-1.75	-1.75	-0.77	4.17	0.004
840	26.45	-1.76	-1.76	-0.81	4.14	0.004
841	26.48	-1.78	-1.78	-0.85	4.12	0.004
842	26.51	-1.79	-1.79	-0.89	4.09	0.004
843	26.54	-1.80	-1.80	-0.94	4.06	0.004
844	26.57	-1.81	-1.81	-0.98	4.03	0.004
845	26.61	-1.83	-1.83	-1.02	4.00	0.004
846	26.64	-1.84	-1.84	-1.06	3.97	0.004
847	26.67	-1.85	-1.85	-1.10	3.93	0.004
848	26.70	-1.87	-1.87	-1.14	3.90	0.004
849	26.73	-1.88	-1.88	-1.19	3.86	0.004
850	26.76	-1.89	-1.89	-1.23	3.82	0.004

851	26.79	-1.91	-1.91	-1.27	3.78	0.004
852	26.83	-1.92	-1.92	-1.32	3.74	0.004
853	26.86	-1.93	-1.93	-1.36	3.70	0.004
854	26.89	-1.94	-1.94	-1.41	3.66	0.005
855	26.92	-1.96	-1.96	-1.45	3.61	0.005
856	26.95	-1.97	-1.97	-1.50	3.57	0.005
857	26.98	-1.98	-1.98	-1.54	3.52	0.005
858	27.02	-2.00	-2.00	-1.59	3.47	0.005
859	27.05	-2.01	-2.01	-1.63	3.42	0.005
860	27.08	-2.02	-2.02	-1.68	3.37	0.005
861	27.11	-2.04	-2.04	-1.72	3.31	0.005
862	27.14	-2.05	-2.05	-1.77	3.26	0.005
863	27.17	-2.06	-2.06	-1.82	3.20	0.005
864	27.20	-2.07	-2.07	-1.87	3.14	0.005
865	27.24	-2.09	-2.09	-1.91	3.08	0.005
866	27.27	-2.10	-2.10	-1.96	3.02	0.005
867	27.30	-2.11	-2.11	-2.01	2.96	0.005
868	27.33	-2.13	-2.13	-2.06	2.89	0.005
869	27.36	-2.14	-2.14	-2.11	2.83	0.005
870	27.39	-2.15	-2.15	-2.16	2.76	0.005
871	27.42	-2.17	-2.17	-2.20	2.69	0.005
872	27.46	-2.18	-2.18	-2.25	2.62	0.005
873	27.49	-2.19	-2.19	-2.30	2.55	0.005
874	27.52	-2.20	-2.20	-2.35	2.48	0.006
875	27.55	-2.22	-2.22	-2.41	2.40	0.006
876	27.58	-2.23	-2.23	-2.46	2.33	0.006
877	27.61	-2.24	-2.24	-2.51	2.25	0.006
878	27.65	-2.26	-2.26	-2.56	2.17	0.006
879	27.68	-2.27	-2.27	-2.61	2.09	0.006
880	27.71	-2.28	-2.28	-2.66	2.00	0.006
881	27.74	-2.29	-2.29	-2.71	1.92	0.006
882	27.77	-2.31	-2.31	-2.77	1.83	0.006
883	27.80	-2.32	-2.32	-2.82	1.74	0.006
884	27.83	-2.33	-2.33	-2.87	1.65	0.006
885	27.87	-2.35	-2.35	-2.93	1.56	0.006
886	27.90	-2.36	-2.36	-2.98	1.47	0.006
887	27.93	-2.37	-2.37	-3.04	1.37	0.006
888	27.96	-2.39	-2.39	-3.09	1.28	0.006
889	27.99	-2.40	-2.40	-3.14	1.18	0.006
890	28.02	-2.41	-2.41	-3.20	1.08	0.006
891	28.06	-2.42	-2.42	-3.25	0.98	0.006
892	28.09	-2.44	-2.44	-3.31	0.87	0.006
893	28.12	-2.45	-2.45	-3.37	0.77	0.006
894	28.15	-2.46	-2.46	-3.42	0.66	0.007
895	28.18	-2.48	-2.48	-3.48	0.55	0.007
896	28.21	-2.49	-2.49	-3.54	0.44	0.007
897	28.24	-2.50	-2.50	-3.59	0.33	0.007
898	28.28	-2.52	-2.52	-3.65	0.22	0.007
899	28.31	-2.53	-2.53	-3.71	0.10	0.007

The above data can be selected using mouse, then copy and paste into Excel to create graphics

Butler Street

Section B at CSO Outlet Phase III UNDRAINED Revised Mounding



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Date: 1/14/2020

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Wall Height=21.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=8.33 Min. Pile Length=29.83

MOMENT IN PILE: Max. Moment=4.14 per Pile Spacing=1.0 at Depth=25.98

PILE SELECTION:Request Min. Section Modulus = 1.5 in³/ft=80.90 cm³/m, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

User Input I (Moment of Inertia):

Top Deflection = 0.24(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	17	0	0.000000
17	0	19.5	0.032	0.012800
19.5	0.032	25	0.130	0.017818
25	0.130	100	6.031	0.078680
*	Sur-	charg		
15.67	0.000	17.10	0.133	0.093123
17.10	0.133	18.52	0.126	-0.00439
18.52	0.126	19.95	0.120	-0.00435
19.95	0.120	21.37	0.114	-0.00428
21.37	0.114	22.80	0.108	-0.00420
22.80	0.108	24.22	0.102	-0.00410
24.22	0.102	25.65	0.097	-0.00398
25.65	0.097	27.07	0.091	-0.00385
27.07	0.091	28.50	0.086	-0.00371
28.50	0.086	31.35	0.081	-0.00178

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
21.5	0.250	26	0.768	0.1151

26 1.883 100 37.862 0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	21.50	1.00

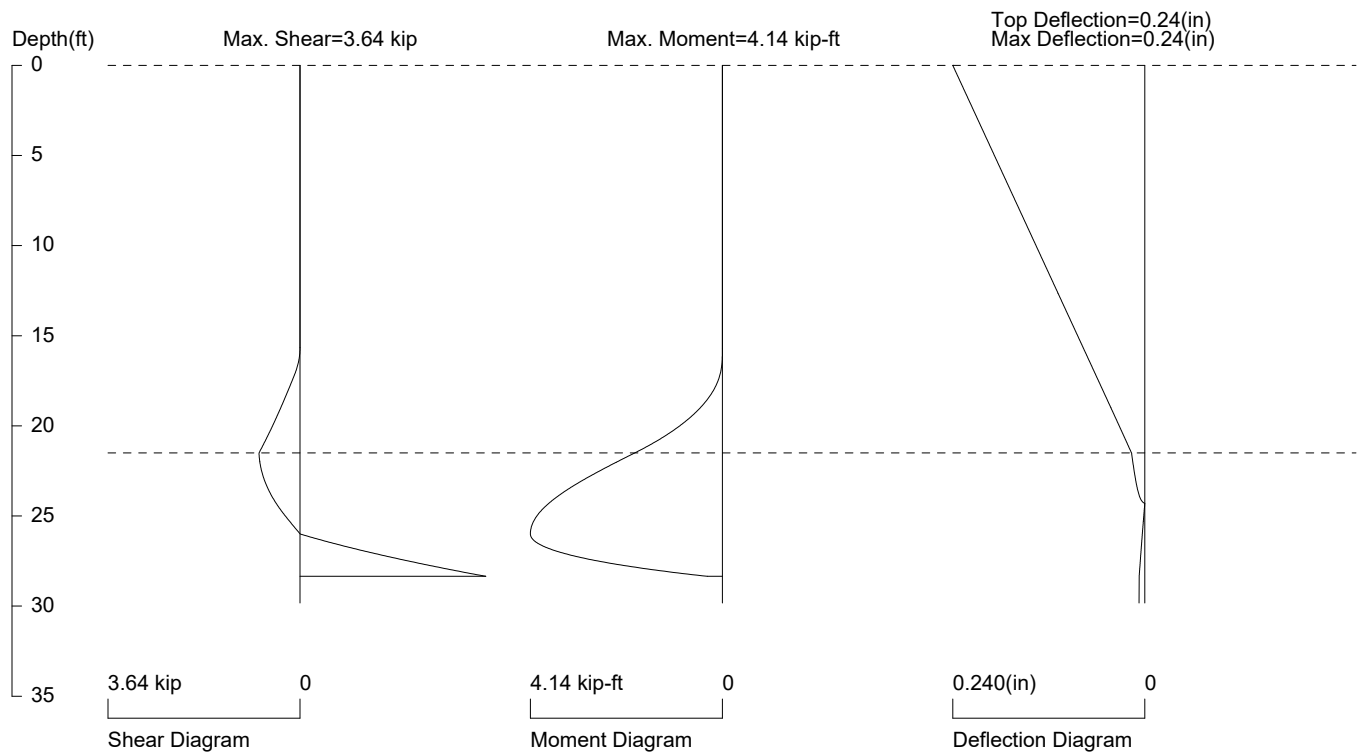
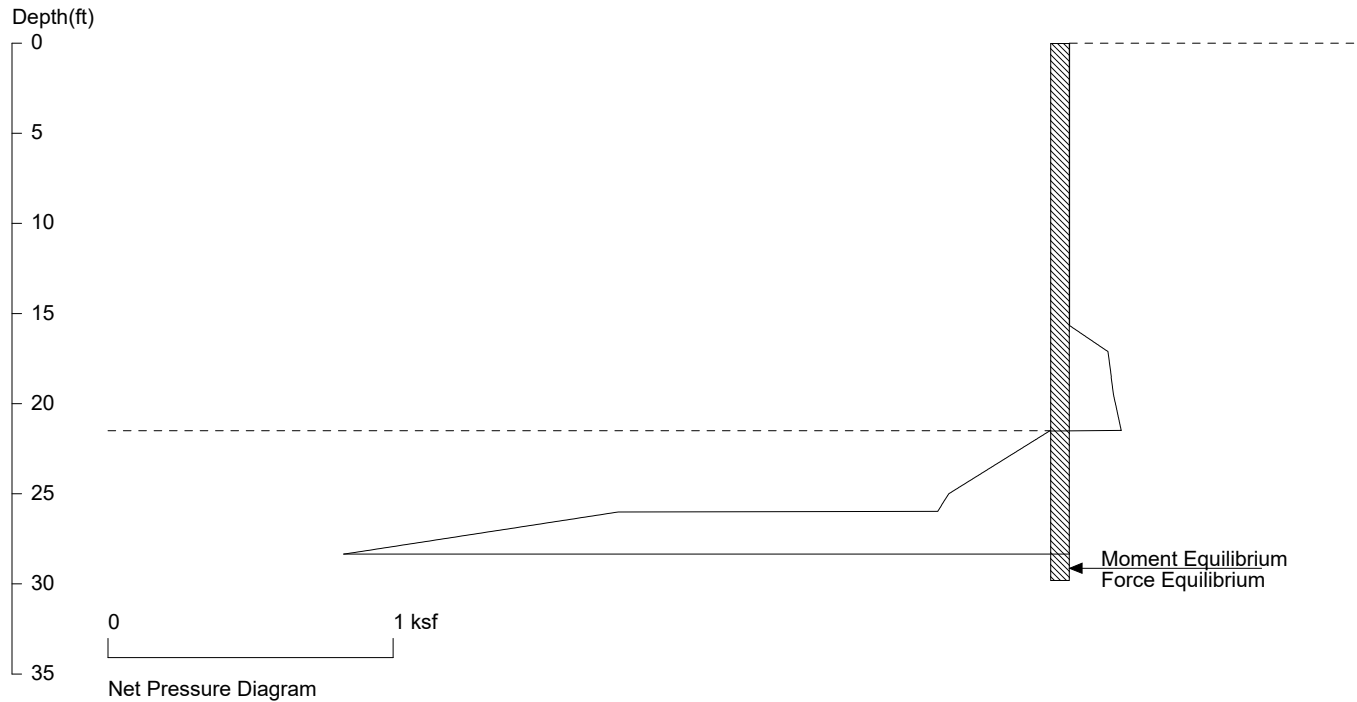
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft3; Deflection - in

Butler Street

Section B at CSO Outlet Phase III UNDRAINED Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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SHORING WALL CALCULATION SUMMARY
The leading shoring design and calculation software
Software Copyright by CivilTech Software
www.civiltech.com

ShoringSuite Software is developed by CivilTech Software, Bellevue, WA, USA.
The calculation method is based on the following references:

1. FHWA 98-011, FHWA-RD-97-130, FHWA SA 96-069, FHWA-IF-99-015
2. STEEL SHEET PILING DESIGN MANUAL by Pile Buck Inc., 1987
3. DESIGN MANUAL DM-7 (NAVFAC), Department of the Navy, May 1982
4. TRENCHING AND SHORING MANUAL Revision 12, California Department of Transportation, January 2000
6. EARTH SUPPORT SYSTEM & RETAINING STRUCTURES, Pile Buck Inc. 2002
5. DESIGN OF SHEET PILE WALLS, EM 1110-2-2504, U.S. Army Corps of Engineers, 31 March 1994
7. EARTH RETENTION SYSTEMS HANDBOOK, Alan Macnab, McGraw-Hill. 2002
8. Temporary Structures in Construction, Robert T. Ratay (Co-author of Chapter 7: John J. Peirce), McGraw-Hill. 2012
9. AASHTO HB-17, American Association of State and Highway Transportation Officials, 2 September 2002

UNITS: Width/Spacing/Diameter/Length/Depth - ft, Force - kip, Moment - kip-ft,
Friction/Bearing/Pressure - ksf, Pres. Slope - kip/ft³, Deflection - in

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Street\SECTION B - Butler Street (CSO) Below UNDRAINED Revised Mounding.sh8

Title: Butler Street
Subtitle: Section B at CSO Outlet Phase III UNDRAINED Revised Mounding

*****INPUT DATA*****

Wall Type: 1. Sheet Pile
Wall Height: 21.50
Pile Diameter: 1.00
Pile Spacing: 1.00
Factor of Safety (F.S.): 1.30
Lateral Support Type (Braces): 7. Sheet Pile
Top Brace Increase (Multi-Bracing): No
No-Load Zone:
Vertical Depth for No-Load Zone: 21.50
H-Distance (Input H/V ratio) for No-Load Zone: 0.25
Angle from H. Line for No-Load Zone: 60.00
Embedment Option: 1. Yes
Friction at Pile Tip: No
Pile Properties:
Steel Strength, Fy: 50 ksi = 345 MPa

Allowable Fb/Fy: 0.66
 Elastic Module, E: 29000.00
 Moment of Inertia, I: 656.2
 User Input Pile:

* DRIVING PRESSURE (ACTIVE, WATER, & SURCHARGE) *

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	0	0	17	0	0.000000
2	17	0	19.5	0.032	0.012800
3	19.5	0.032	25	0.130	0.017818
4	25	0.130	100	6.031	0.078680
5	36	0.467	100	0.467	0.000000
6	*	Sur-	charg		
7	15.67	0.000	17.10	0.133	0.093123
8	17.10	0.133	18.52	0.126	-0.00439
9	18.52	0.126	19.95	0.120	-0.00435
10	19.95	0.120	21.37	0.114	-0.00428
11	21.37	0.114	22.80	0.108	-0.00420
12	22.80	0.108	24.22	0.102	-0.00410
13	24.22	0.102	25.65	0.097	-0.00398
14	25.65	0.097	27.07	0.091	-0.00385
15	27.07	0.091	28.50	0.086	-0.00371
16	28.50	0.086	31.35	0.081	-0.00178
17	31.35	0.081	34.20	0.076	-0.00170
18	34.20	0.076	37.05	0.071	-0.00162
19	37.05	0.071	39.90	0.067	-0.00154
20	39.90	0.067	42.75	0.063	-0.00145
21	42.75	0.063	45.60	0.059	-0.00137
22	45.60	0.059	48.45	0.055	-0.00129
23	48.45	0.055	51.30	0.052	-0.00122
24	51.30	0.052	54.15	0.048	-0.00114
25	54.15	0.048	57.00	0.045	-0.00107
26	57.00	0.045	62.70	0.042	-0.00050
27	62.70	0.042	68.40	0.037	-0.00091
28	68.40	0.037	74.10	0.033	-0.00079
29	74.10	0.033	79.80	0.029	-0.00068
30	79.80	0.029	85.50	0.025	-0.00059
31	85.50	0.025	91.20	0.022	-0.00051
32	91.20	0.022	96.90	0.020	-0.00044
33	96.90	0.020	102.6	0.018	-0.00039
34	102.6	0.018	108.3	0.016	-0.00033
35	108.3	0.016	114.0	0.014	-0.00029

* PASSIVE PRESSURE *

The pressures below will be divided by a Factor of Safety =1.3

No.	Z1 top	Top Pres.	Z2 bottom	Bottom Pres.	Slope
1	21.5	0.250	26	0.768	0.1151

2	26	1.883	100	37.862	0.4862
---	----	-------	-----	--------	--------

* ACTIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
2	21.50	1.00

* PASSIVE SPACE *

No.	Z depth	Spacing
-----	---------	---------

1	0.00	1.00
---	------	------

*For Tieback: Input1 = Diameter; Input2 = Bond Strength

*For Plate: Input1 = Diameter; Input2 = Allowable Pressure

*For Deadman: Input1 = Horz. Width; Input2 = Passive Pressure;

*For Sheet Pile Anchor: Input1 = Horz. Width; Input2 = Passive Slope;

*****CALCULATION*****

The calculated moment and shear are per pile spacing. Sheet piles are per one foot or meter; Soldier piles are per pile.

Top Pressures start at depth = 0.00

	D1=0.00
== ==	D2=21.50
	D3=29.83

D1 - TOP DEPTH

D2 - EXCAVATION BASE

D3 - PILE TIP

MOMENT equilibrium AT DEPTH=28.44 WITH EMBEDMENT OF 6.94

FORCE equilibrium AT DEPTH=29.83 WITH EMBEDMENT OF 8.33

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

*****RESULTS*****

* EMBEDMENT Notes *

Based on USS Design Manual, first calculate embedment for moment equilibrium, then increased the embedment to get the design depth.

The embedment for moment equilibrium is 6.94

The program calculates an embedment for moment equilibrium, then increase the embedment by 1.2

The total design embedment is 8.33

Embedment Information:

If 20% increased, the total design embedment is 8.33

If 30% increased, the total design embedment is 9.02

If 40% increased, the total design embedment is 9.72

If 50% increased, the total design embedment is 10.41

* MOMENT IN PILE (per pile spacing)*

Pile Spacing: sheet piles are one foot or one meter; soldier piles are one pile.

Overall Maximum Moment = 4.14 at 25.98

Maximum Shear = 3.64

Moment and Shear are per pile spacing: 1.0 foot or meter

* VERTICAL LOADING *

Vertical Loading from Braces = 0.00

Vertical Loading from External Load = 0.00

Total Vertical Loading = 0.00

* DEFLECTION *

I (in4)/foot=656.20

Top deflection = 0.240(in)

Max. deflection = 0.240(in)

*****PRESSURE, LOAD, SHEAR, MOMENT, AND DEFLECTION v.s. DEPTH*****

The shear and moment are per single soldier pile (secant/tangent pile) or one foot of sheet pile (concrete wall). The deflection is based on users input pile below:

User Input I (Moment of Inertia)

Elastic Module, E (ksi)= 29000.00

Moment of Inertia, I (in4)/foot= 656.2

PRESS. - Sum of all pressures (Net pressure). (Active) direction is positive

LOAD - Liner load (force per unit depth) = Pressures multiply by acting space

No	DEPTH ft	PRESS. ksf	LOAD kip/ft	SHEAR kip	MOMENT kip-ft	DEFLECTION in
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1	0.00	0.00	0.00	0.00	0.00	0.240
2	0.03	0.00	0.00	0.00	0.00	0.240
3	0.06	0.00	0.00	0.00	0.00	0.239
4	0.09	0.00	0.00	0.00	0.00	0.239
5	0.13	0.00	0.00	0.00	0.00	0.239
6	0.16	0.00	0.00	0.00	0.00	0.238
7	0.19	0.00	0.00	0.00	0.00	0.238
8	0.22	0.00	0.00	0.00	0.00	0.238
9	0.25	0.00	0.00	0.00	0.00	0.237
10	0.28	0.00	0.00	0.00	0.00	0.237
11	0.32	0.00	0.00	0.00	0.00	0.237
12	0.35	0.00	0.00	0.00	0.00	0.236
13	0.38	0.00	0.00	0.00	0.00	0.236
14	0.41	0.00	0.00	0.00	0.00	0.236
15	0.44	0.00	0.00	0.00	0.00	0.235
16	0.47	0.00	0.00	0.00	0.00	0.235
17	0.51	0.00	0.00	0.00	0.00	0.235
18	0.54	0.00	0.00	0.00	0.00	0.234
19	0.57	0.00	0.00	0.00	0.00	0.234
20	0.60	0.00	0.00	0.00	0.00	0.234
21	0.63	0.00	0.00	0.00	0.00	0.234
22	0.66	0.00	0.00	0.00	0.00	0.233
23	0.70	0.00	0.00	0.00	0.00	0.233
24	0.73	0.00	0.00	0.00	0.00	0.233
25	0.76	0.00	0.00	0.00	0.00	0.232
26	0.79	0.00	0.00	0.00	0.00	0.232
27	0.82	0.00	0.00	0.00	0.00	0.232
28	0.85	0.00	0.00	0.00	0.00	0.231
29	0.89	0.00	0.00	0.00	0.00	0.231
30	0.92	0.00	0.00	0.00	0.00	0.231
31	0.95	0.00	0.00	0.00	0.00	0.230
32	0.98	0.00	0.00	0.00	0.00	0.230
33	1.01	0.00	0.00	0.00	0.00	0.230
34	1.04	0.00	0.00	0.00	0.00	0.229
35	1.08	0.00	0.00	0.00	0.00	0.229
36	1.11	0.00	0.00	0.00	0.00	0.229
37	1.14	0.00	0.00	0.00	0.00	0.228
38	1.17	0.00	0.00	0.00	0.00	0.228
39	1.20	0.00	0.00	0.00	0.00	0.228
40	1.23	0.00	0.00	0.00	0.00	0.227
41	1.27	0.00	0.00	0.00	0.00	0.227
42	1.30	0.00	0.00	0.00	0.00	0.227
43	1.33	0.00	0.00	0.00	0.00	0.226
44	1.36	0.00	0.00	0.00	0.00	0.226
45	1.39	0.00	0.00	0.00	0.00	0.226
46	1.42	0.00	0.00	0.00	0.00	0.225
47	1.46	0.00	0.00	0.00	0.00	0.225
48	1.49	0.00	0.00	0.00	0.00	0.225
49	1.52	0.00	0.00	0.00	0.00	0.224
50	1.55	0.00	0.00	0.00	0.00	0.224

51	1.58	0.00	0.00	0.00	0.00	0.224
52	1.61	0.00	0.00	0.00	0.00	0.223
53	1.65	0.00	0.00	0.00	0.00	0.223
54	1.68	0.00	0.00	0.00	0.00	0.223
55	1.71	0.00	0.00	0.00	0.00	0.222
56	1.74	0.00	0.00	0.00	0.00	0.222
57	1.77	0.00	0.00	0.00	0.00	0.222
58	1.80	0.00	0.00	0.00	0.00	0.221
59	1.84	0.00	0.00	0.00	0.00	0.221
60	1.87	0.00	0.00	0.00	0.00	0.221
61	1.90	0.00	0.00	0.00	0.00	0.220
62	1.93	0.00	0.00	0.00	0.00	0.220
63	1.96	0.00	0.00	0.00	0.00	0.220
64	1.99	0.00	0.00	0.00	0.00	0.219
65	2.03	0.00	0.00	0.00	0.00	0.219
66	2.06	0.00	0.00	0.00	0.00	0.219
67	2.09	0.00	0.00	0.00	0.00	0.218
68	2.12	0.00	0.00	0.00	0.00	0.218
69	2.15	0.00	0.00	0.00	0.00	0.218
70	2.18	0.00	0.00	0.00	0.00	0.217
71	2.21	0.00	0.00	0.00	0.00	0.217
72	2.25	0.00	0.00	0.00	0.00	0.217
73	2.28	0.00	0.00	0.00	0.00	0.216
74	2.31	0.00	0.00	0.00	0.00	0.216
75	2.34	0.00	0.00	0.00	0.00	0.216
76	2.37	0.00	0.00	0.00	0.00	0.215
77	2.40	0.00	0.00	0.00	0.00	0.215
78	2.44	0.00	0.00	0.00	0.00	0.215
79	2.47	0.00	0.00	0.00	0.00	0.214
80	2.50	0.00	0.00	0.00	0.00	0.214
81	2.53	0.00	0.00	0.00	0.00	0.214
82	2.56	0.00	0.00	0.00	0.00	0.213
83	2.59	0.00	0.00	0.00	0.00	0.213
84	2.63	0.00	0.00	0.00	0.00	0.213
85	2.66	0.00	0.00	0.00	0.00	0.212
86	2.69	0.00	0.00	0.00	0.00	0.212
87	2.72	0.00	0.00	0.00	0.00	0.212
88	2.75	0.00	0.00	0.00	0.00	0.211
89	2.78	0.00	0.00	0.00	0.00	0.211
90	2.82	0.00	0.00	0.00	0.00	0.211
91	2.85	0.00	0.00	0.00	0.00	0.210
92	2.88	0.00	0.00	0.00	0.00	0.210
93	2.91	0.00	0.00	0.00	0.00	0.210
94	2.94	0.00	0.00	0.00	0.00	0.209
95	2.97	0.00	0.00	0.00	0.00	0.209
96	3.01	0.00	0.00	0.00	0.00	0.209
97	3.04	0.00	0.00	0.00	0.00	0.208
98	3.07	0.00	0.00	0.00	0.00	0.208
99	3.10	0.00	0.00	0.00	0.00	0.208
100	3.13	0.00	0.00	0.00	0.00	0.207

101	3.16	0.00	0.00	0.00	0.00	0.207
102	3.20	0.00	0.00	0.00	0.00	0.207
103	3.23	0.00	0.00	0.00	0.00	0.206
104	3.26	0.00	0.00	0.00	0.00	0.206
105	3.29	0.00	0.00	0.00	0.00	0.206
106	3.32	0.00	0.00	0.00	0.00	0.206
107	3.35	0.00	0.00	0.00	0.00	0.205
108	3.39	0.00	0.00	0.00	0.00	0.205
109	3.42	0.00	0.00	0.00	0.00	0.205
110	3.45	0.00	0.00	0.00	0.00	0.204
111	3.48	0.00	0.00	0.00	0.00	0.204
112	3.51	0.00	0.00	0.00	0.00	0.204
113	3.54	0.00	0.00	0.00	0.00	0.203
114	3.58	0.00	0.00	0.00	0.00	0.203
115	3.61	0.00	0.00	0.00	0.00	0.203
116	3.64	0.00	0.00	0.00	0.00	0.202
117	3.67	0.00	0.00	0.00	0.00	0.202
118	3.70	0.00	0.00	0.00	0.00	0.202
119	3.73	0.00	0.00	0.00	0.00	0.201
120	3.77	0.00	0.00	0.00	0.00	0.201
121	3.80	0.00	0.00	0.00	0.00	0.201
122	3.83	0.00	0.00	0.00	0.00	0.200
123	3.86	0.00	0.00	0.00	0.00	0.200
124	3.89	0.00	0.00	0.00	0.00	0.200
125	3.92	0.00	0.00	0.00	0.00	0.199
126	3.96	0.00	0.00	0.00	0.00	0.199
127	3.99	0.00	0.00	0.00	0.00	0.199
128	4.02	0.00	0.00	0.00	0.00	0.198
129	4.05	0.00	0.00	0.00	0.00	0.198
130	4.08	0.00	0.00	0.00	0.00	0.198
131	4.11	0.00	0.00	0.00	0.00	0.197
132	4.15	0.00	0.00	0.00	0.00	0.197
133	4.18	0.00	0.00	0.00	0.00	0.197
134	4.21	0.00	0.00	0.00	0.00	0.196
135	4.24	0.00	0.00	0.00	0.00	0.196
136	4.27	0.00	0.00	0.00	0.00	0.196
137	4.30	0.00	0.00	0.00	0.00	0.195
138	4.33	0.00	0.00	0.00	0.00	0.195
139	4.37	0.00	0.00	0.00	0.00	0.195
140	4.40	0.00	0.00	0.00	0.00	0.194
141	4.43	0.00	0.00	0.00	0.00	0.194
142	4.46	0.00	0.00	0.00	0.00	0.194
143	4.49	0.00	0.00	0.00	0.00	0.193
144	4.52	0.00	0.00	0.00	0.00	0.193
145	4.56	0.00	0.00	0.00	0.00	0.193
146	4.59	0.00	0.00	0.00	0.00	0.192
147	4.62	0.00	0.00	0.00	0.00	0.192
148	4.65	0.00	0.00	0.00	0.00	0.192
149	4.68	0.00	0.00	0.00	0.00	0.191
150	4.71	0.00	0.00	0.00	0.00	0.191

151	4.75	0.00	0.00	0.00	0.00	0.191
152	4.78	0.00	0.00	0.00	0.00	0.190
153	4.81	0.00	0.00	0.00	0.00	0.190
154	4.84	0.00	0.00	0.00	0.00	0.190
155	4.87	0.00	0.00	0.00	0.00	0.189
156	4.90	0.00	0.00	0.00	0.00	0.189
157	4.94	0.00	0.00	0.00	0.00	0.189
158	4.97	0.00	0.00	0.00	0.00	0.188
159	5.00	0.00	0.00	0.00	0.00	0.188
160	5.03	0.00	0.00	0.00	0.00	0.188
161	5.06	0.00	0.00	0.00	0.00	0.187
162	5.09	0.00	0.00	0.00	0.00	0.187
163	5.13	0.00	0.00	0.00	0.00	0.187
164	5.16	0.00	0.00	0.00	0.00	0.186
165	5.19	0.00	0.00	0.00	0.00	0.186
166	5.22	0.00	0.00	0.00	0.00	0.186
167	5.25	0.00	0.00	0.00	0.00	0.185
168	5.28	0.00	0.00	0.00	0.00	0.185
169	5.32	0.00	0.00	0.00	0.00	0.185
170	5.35	0.00	0.00	0.00	0.00	0.184
171	5.38	0.00	0.00	0.00	0.00	0.184
172	5.41	0.00	0.00	0.00	0.00	0.184
173	5.44	0.00	0.00	0.00	0.00	0.183
174	5.47	0.00	0.00	0.00	0.00	0.183
175	5.51	0.00	0.00	0.00	0.00	0.183
176	5.54	0.00	0.00	0.00	0.00	0.182
177	5.57	0.00	0.00	0.00	0.00	0.182
178	5.60	0.00	0.00	0.00	0.00	0.182
179	5.63	0.00	0.00	0.00	0.00	0.181
180	5.66	0.00	0.00	0.00	0.00	0.181
181	5.70	0.00	0.00	0.00	0.00	0.181
182	5.73	0.00	0.00	0.00	0.00	0.180
183	5.76	0.00	0.00	0.00	0.00	0.180
184	5.79	0.00	0.00	0.00	0.00	0.180
185	5.82	0.00	0.00	0.00	0.00	0.179
186	5.85	0.00	0.00	0.00	0.00	0.179
187	5.89	0.00	0.00	0.00	0.00	0.179
188	5.92	0.00	0.00	0.00	0.00	0.179
189	5.95	0.00	0.00	0.00	0.00	0.178
190	5.98	0.00	0.00	0.00	0.00	0.178
191	6.01	0.00	0.00	0.00	0.00	0.178
192	6.04	0.00	0.00	0.00	0.00	0.177
193	6.08	0.00	0.00	0.00	0.00	0.177
194	6.11	0.00	0.00	0.00	0.00	0.177
195	6.14	0.00	0.00	0.00	0.00	0.176
196	6.17	0.00	0.00	0.00	0.00	0.176
197	6.20	0.00	0.00	0.00	0.00	0.176
198	6.23	0.00	0.00	0.00	0.00	0.175
199	6.26	0.00	0.00	0.00	0.00	0.175
200	6.30	0.00	0.00	0.00	0.00	0.175

201	6.33	0.00	0.00	0.00	0.00	0.174
202	6.36	0.00	0.00	0.00	0.00	0.174
203	6.39	0.00	0.00	0.00	0.00	0.174
204	6.42	0.00	0.00	0.00	0.00	0.173
205	6.45	0.00	0.00	0.00	0.00	0.173
206	6.49	0.00	0.00	0.00	0.00	0.173
207	6.52	0.00	0.00	0.00	0.00	0.172
208	6.55	0.00	0.00	0.00	0.00	0.172
209	6.58	0.00	0.00	0.00	0.00	0.172
210	6.61	0.00	0.00	0.00	0.00	0.171
211	6.64	0.00	0.00	0.00	0.00	0.171
212	6.68	0.00	0.00	0.00	0.00	0.171
213	6.71	0.00	0.00	0.00	0.00	0.170
214	6.74	0.00	0.00	0.00	0.00	0.170
215	6.77	0.00	0.00	0.00	0.00	0.170
216	6.80	0.00	0.00	0.00	0.00	0.169
217	6.83	0.00	0.00	0.00	0.00	0.169
218	6.87	0.00	0.00	0.00	0.00	0.169
219	6.90	0.00	0.00	0.00	0.00	0.168
220	6.93	0.00	0.00	0.00	0.00	0.168
221	6.96	0.00	0.00	0.00	0.00	0.168
222	6.99	0.00	0.00	0.00	0.00	0.167
223	7.02	0.00	0.00	0.00	0.00	0.167
224	7.06	0.00	0.00	0.00	0.00	0.167
225	7.09	0.00	0.00	0.00	0.00	0.166
226	7.12	0.00	0.00	0.00	0.00	0.166
227	7.15	0.00	0.00	0.00	0.00	0.166
228	7.18	0.00	0.00	0.00	0.00	0.165
229	7.21	0.00	0.00	0.00	0.00	0.165
230	7.25	0.00	0.00	0.00	0.00	0.165
231	7.28	0.00	0.00	0.00	0.00	0.164
232	7.31	0.00	0.00	0.00	0.00	0.164
233	7.34	0.00	0.00	0.00	0.00	0.164
234	7.37	0.00	0.00	0.00	0.00	0.163
235	7.40	0.00	0.00	0.00	0.00	0.163
236	7.44	0.00	0.00	0.00	0.00	0.163
237	7.47	0.00	0.00	0.00	0.00	0.162
238	7.50	0.00	0.00	0.00	0.00	0.162
239	7.53	0.00	0.00	0.00	0.00	0.162
240	7.56	0.00	0.00	0.00	0.00	0.161
241	7.59	0.00	0.00	0.00	0.00	0.161
242	7.63	0.00	0.00	0.00	0.00	0.161
243	7.66	0.00	0.00	0.00	0.00	0.160
244	7.69	0.00	0.00	0.00	0.00	0.160
245	7.72	0.00	0.00	0.00	0.00	0.160
246	7.75	0.00	0.00	0.00	0.00	0.159
247	7.78	0.00	0.00	0.00	0.00	0.159
248	7.82	0.00	0.00	0.00	0.00	0.159
249	7.85	0.00	0.00	0.00	0.00	0.158
250	7.88	0.00	0.00	0.00	0.00	0.158

251	7.91	0.00	0.00	0.00	0.00	0.158
252	7.94	0.00	0.00	0.00	0.00	0.157
253	7.97	0.00	0.00	0.00	0.00	0.157
254	8.01	0.00	0.00	0.00	0.00	0.157
255	8.04	0.00	0.00	0.00	0.00	0.156
256	8.07	0.00	0.00	0.00	0.00	0.156
257	8.10	0.00	0.00	0.00	0.00	0.156
258	8.13	0.00	0.00	0.00	0.00	0.155
259	8.16	0.00	0.00	0.00	0.00	0.155
260	8.20	0.00	0.00	0.00	0.00	0.155
261	8.23	0.00	0.00	0.00	0.00	0.154
262	8.26	0.00	0.00	0.00	0.00	0.154
263	8.29	0.00	0.00	0.00	0.00	0.154
264	8.32	0.00	0.00	0.00	0.00	0.153
265	8.35	0.00	0.00	0.00	0.00	0.153
266	8.38	0.00	0.00	0.00	0.00	0.153
267	8.42	0.00	0.00	0.00	0.00	0.152
268	8.45	0.00	0.00	0.00	0.00	0.152
269	8.48	0.00	0.00	0.00	0.00	0.152
270	8.51	0.00	0.00	0.00	0.00	0.151
271	8.54	0.00	0.00	0.00	0.00	0.151
272	8.57	0.00	0.00	0.00	0.00	0.151
273	8.61	0.00	0.00	0.00	0.00	0.151
274	8.64	0.00	0.00	0.00	0.00	0.150
275	8.67	0.00	0.00	0.00	0.00	0.150
276	8.70	0.00	0.00	0.00	0.00	0.150
277	8.73	0.00	0.00	0.00	0.00	0.149
278	8.76	0.00	0.00	0.00	0.00	0.149
279	8.80	0.00	0.00	0.00	0.00	0.149
280	8.83	0.00	0.00	0.00	0.00	0.148
281	8.86	0.00	0.00	0.00	0.00	0.148
282	8.89	0.00	0.00	0.00	0.00	0.148
283	8.92	0.00	0.00	0.00	0.00	0.147
284	8.95	0.00	0.00	0.00	0.00	0.147
285	8.99	0.00	0.00	0.00	0.00	0.147
286	9.02	0.00	0.00	0.00	0.00	0.146
287	9.05	0.00	0.00	0.00	0.00	0.146
288	9.08	0.00	0.00	0.00	0.00	0.146
289	9.11	0.00	0.00	0.00	0.00	0.145
290	9.14	0.00	0.00	0.00	0.00	0.145
291	9.18	0.00	0.00	0.00	0.00	0.145
292	9.21	0.00	0.00	0.00	0.00	0.144
293	9.24	0.00	0.00	0.00	0.00	0.144
294	9.27	0.00	0.00	0.00	0.00	0.144
295	9.30	0.00	0.00	0.00	0.00	0.143
296	9.33	0.00	0.00	0.00	0.00	0.143
297	9.37	0.00	0.00	0.00	0.00	0.143
298	9.40	0.00	0.00	0.00	0.00	0.142
299	9.43	0.00	0.00	0.00	0.00	0.142
300	9.46	0.00	0.00	0.00	0.00	0.142

301	9.49	0.00	0.00	0.00	0.00	0.141
302	9.52	0.00	0.00	0.00	0.00	0.141
303	9.56	0.00	0.00	0.00	0.00	0.141
304	9.59	0.00	0.00	0.00	0.00	0.140
305	9.62	0.00	0.00	0.00	0.00	0.140
306	9.65	0.00	0.00	0.00	0.00	0.140
307	9.68	0.00	0.00	0.00	0.00	0.139
308	9.71	0.00	0.00	0.00	0.00	0.139
309	9.75	0.00	0.00	0.00	0.00	0.139
310	9.78	0.00	0.00	0.00	0.00	0.138
311	9.81	0.00	0.00	0.00	0.00	0.138
312	9.84	0.00	0.00	0.00	0.00	0.138
313	9.87	0.00	0.00	0.00	0.00	0.137
314	9.90	0.00	0.00	0.00	0.00	0.137
315	9.94	0.00	0.00	0.00	0.00	0.137
316	9.97	0.00	0.00	0.00	0.00	0.136
317	10.00	0.00	0.00	0.00	0.00	0.136
318	10.03	0.00	0.00	0.00	0.00	0.136
319	10.06	0.00	0.00	0.00	0.00	0.135
320	10.09	0.00	0.00	0.00	0.00	0.135
321	10.13	0.00	0.00	0.00	0.00	0.135
322	10.16	0.00	0.00	0.00	0.00	0.134
323	10.19	0.00	0.00	0.00	0.00	0.134
324	10.22	0.00	0.00	0.00	0.00	0.134
325	10.25	0.00	0.00	0.00	0.00	0.133
326	10.28	0.00	0.00	0.00	0.00	0.133
327	10.32	0.00	0.00	0.00	0.00	0.133
328	10.35	0.00	0.00	0.00	0.00	0.132
329	10.38	0.00	0.00	0.00	0.00	0.132
330	10.41	0.00	0.00	0.00	0.00	0.132
331	10.44	0.00	0.00	0.00	0.00	0.131
332	10.47	0.00	0.00	0.00	0.00	0.131
333	10.50	0.00	0.00	0.00	0.00	0.131
334	10.54	0.00	0.00	0.00	0.00	0.130
335	10.57	0.00	0.00	0.00	0.00	0.130
336	10.60	0.00	0.00	0.00	0.00	0.130
337	10.63	0.00	0.00	0.00	0.00	0.129
338	10.66	0.00	0.00	0.00	0.00	0.129
339	10.69	0.00	0.00	0.00	0.00	0.129
340	10.73	0.00	0.00	0.00	0.00	0.128
341	10.76	0.00	0.00	0.00	0.00	0.128
342	10.79	0.00	0.00	0.00	0.00	0.128
343	10.82	0.00	0.00	0.00	0.00	0.127
344	10.85	0.00	0.00	0.00	0.00	0.127
345	10.88	0.00	0.00	0.00	0.00	0.127
346	10.92	0.00	0.00	0.00	0.00	0.126
347	10.95	0.00	0.00	0.00	0.00	0.126
348	10.98	0.00	0.00	0.00	0.00	0.126
349	11.01	0.00	0.00	0.00	0.00	0.125
350	11.04	0.00	0.00	0.00	0.00	0.125

351	11.07	0.00	0.00	0.00	0.00	0.125
352	11.11	0.00	0.00	0.00	0.00	0.124
353	11.14	0.00	0.00	0.00	0.00	0.124
354	11.17	0.00	0.00	0.00	0.00	0.124
355	11.20	0.00	0.00	0.00	0.00	0.124
356	11.23	0.00	0.00	0.00	0.00	0.123
357	11.26	0.00	0.00	0.00	0.00	0.123
358	11.30	0.00	0.00	0.00	0.00	0.123
359	11.33	0.00	0.00	0.00	0.00	0.122
360	11.36	0.00	0.00	0.00	0.00	0.122
361	11.39	0.00	0.00	0.00	0.00	0.122
362	11.42	0.00	0.00	0.00	0.00	0.121
363	11.45	0.00	0.00	0.00	0.00	0.121
364	11.49	0.00	0.00	0.00	0.00	0.121
365	11.52	0.00	0.00	0.00	0.00	0.120
366	11.55	0.00	0.00	0.00	0.00	0.120
367	11.58	0.00	0.00	0.00	0.00	0.120
368	11.61	0.00	0.00	0.00	0.00	0.119
369	11.64	0.00	0.00	0.00	0.00	0.119
370	11.68	0.00	0.00	0.00	0.00	0.119
371	11.71	0.00	0.00	0.00	0.00	0.118
372	11.74	0.00	0.00	0.00	0.00	0.118
373	11.77	0.00	0.00	0.00	0.00	0.118
374	11.80	0.00	0.00	0.00	0.00	0.117
375	11.83	0.00	0.00	0.00	0.00	0.117
376	11.87	0.00	0.00	0.00	0.00	0.117
377	11.90	0.00	0.00	0.00	0.00	0.116
378	11.93	0.00	0.00	0.00	0.00	0.116
379	11.96	0.00	0.00	0.00	0.00	0.116
380	11.99	0.00	0.00	0.00	0.00	0.115
381	12.02	0.00	0.00	0.00	0.00	0.115
382	12.06	0.00	0.00	0.00	0.00	0.115
383	12.09	0.00	0.00	0.00	0.00	0.114
384	12.12	0.00	0.00	0.00	0.00	0.114
385	12.15	0.00	0.00	0.00	0.00	0.114
386	12.18	0.00	0.00	0.00	0.00	0.113
387	12.21	0.00	0.00	0.00	0.00	0.113
388	12.25	0.00	0.00	0.00	0.00	0.113
389	12.28	0.00	0.00	0.00	0.00	0.112
390	12.31	0.00	0.00	0.00	0.00	0.112
391	12.34	0.00	0.00	0.00	0.00	0.112
392	12.37	0.00	0.00	0.00	0.00	0.111
393	12.40	0.00	0.00	0.00	0.00	0.111
394	12.44	0.00	0.00	0.00	0.00	0.111
395	12.47	0.00	0.00	0.00	0.00	0.110
396	12.50	0.00	0.00	0.00	0.00	0.110
397	12.53	0.00	0.00	0.00	0.00	0.110
398	12.56	0.00	0.00	0.00	0.00	0.109
399	12.59	0.00	0.00	0.00	0.00	0.109
400	12.62	0.00	0.00	0.00	0.00	0.109

401	12.66	0.00	0.00	0.00	0.00	0.108
402	12.69	0.00	0.00	0.00	0.00	0.108
403	12.72	0.00	0.00	0.00	0.00	0.108
404	12.75	0.00	0.00	0.00	0.00	0.107
405	12.78	0.00	0.00	0.00	0.00	0.107
406	12.81	0.00	0.00	0.00	0.00	0.107
407	12.85	0.00	0.00	0.00	0.00	0.106
408	12.88	0.00	0.00	0.00	0.00	0.106
409	12.91	0.00	0.00	0.00	0.00	0.106
410	12.94	0.00	0.00	0.00	0.00	0.105
411	12.97	0.00	0.00	0.00	0.00	0.105
412	13.00	0.00	0.00	0.00	0.00	0.105
413	13.04	0.00	0.00	0.00	0.00	0.104
414	13.07	0.00	0.00	0.00	0.00	0.104
415	13.10	0.00	0.00	0.00	0.00	0.104
416	13.13	0.00	0.00	0.00	0.00	0.103
417	13.16	0.00	0.00	0.00	0.00	0.103
418	13.19	0.00	0.00	0.00	0.00	0.103
419	13.23	0.00	0.00	0.00	0.00	0.102
420	13.26	0.00	0.00	0.00	0.00	0.102
421	13.29	0.00	0.00	0.00	0.00	0.102
422	13.32	0.00	0.00	0.00	0.00	0.101
423	13.35	0.00	0.00	0.00	0.00	0.101
424	13.38	0.00	0.00	0.00	0.00	0.101
425	13.42	0.00	0.00	0.00	0.00	0.100
426	13.45	0.00	0.00	0.00	0.00	0.100
427	13.48	0.00	0.00	0.00	0.00	0.100
428	13.51	0.00	0.00	0.00	0.00	0.099
429	13.54	0.00	0.00	0.00	0.00	0.099
430	13.57	0.00	0.00	0.00	0.00	0.099
431	13.61	0.00	0.00	0.00	0.00	0.098
432	13.64	0.00	0.00	0.00	0.00	0.098
433	13.67	0.00	0.00	0.00	0.00	0.098
434	13.70	0.00	0.00	0.00	0.00	0.097
435	13.73	0.00	0.00	0.00	0.00	0.097
436	13.76	0.00	0.00	0.00	0.00	0.097
437	13.80	0.00	0.00	0.00	0.00	0.096
438	13.83	0.00	0.00	0.00	0.00	0.096
439	13.86	0.00	0.00	0.00	0.00	0.096
440	13.89	0.00	0.00	0.00	0.00	0.096
441	13.92	0.00	0.00	0.00	0.00	0.095
442	13.95	0.00	0.00	0.00	0.00	0.095
443	13.99	0.00	0.00	0.00	0.00	0.095
444	14.02	0.00	0.00	0.00	0.00	0.094
445	14.05	0.00	0.00	0.00	0.00	0.094
446	14.08	0.00	0.00	0.00	0.00	0.094
447	14.11	0.00	0.00	0.00	0.00	0.093
448	14.14	0.00	0.00	0.00	0.00	0.093
449	14.18	0.00	0.00	0.00	0.00	0.093
450	14.21	0.00	0.00	0.00	0.00	0.092

451	14.24	0.00	0.00	0.00	0.00	0.092
452	14.27	0.00	0.00	0.00	0.00	0.092
453	14.30	0.00	0.00	0.00	0.00	0.091
454	14.33	0.00	0.00	0.00	0.00	0.091
455	14.37	0.00	0.00	0.00	0.00	0.091
456	14.40	0.00	0.00	0.00	0.00	0.090
457	14.43	0.00	0.00	0.00	0.00	0.090
458	14.46	0.00	0.00	0.00	0.00	0.090
459	14.49	0.00	0.00	0.00	0.00	0.089
460	14.52	0.00	0.00	0.00	0.00	0.089
461	14.55	0.00	0.00	0.00	0.00	0.089
462	14.59	0.00	0.00	0.00	0.00	0.088
463	14.62	0.00	0.00	0.00	0.00	0.088
464	14.65	0.00	0.00	0.00	0.00	0.088
465	14.68	0.00	0.00	0.00	0.00	0.087
466	14.71	0.00	0.00	0.00	0.00	0.087
467	14.74	0.00	0.00	0.00	0.00	0.087
468	14.78	0.00	0.00	0.00	0.00	0.086
469	14.81	0.00	0.00	0.00	0.00	0.086
470	14.84	0.00	0.00	0.00	0.00	0.086
471	14.87	0.00	0.00	0.00	0.00	0.085
472	14.90	0.00	0.00	0.00	0.00	0.085
473	14.93	0.00	0.00	0.00	0.00	0.085
474	14.97	0.00	0.00	0.00	0.00	0.084
475	15.00	0.00	0.00	0.00	0.00	0.084
476	15.03	0.00	0.00	0.00	0.00	0.084
477	15.06	0.00	0.00	0.00	0.00	0.083
478	15.09	0.00	0.00	0.00	0.00	0.083
479	15.12	0.00	0.00	0.00	0.00	0.083
480	15.16	0.00	0.00	0.00	0.00	0.082
481	15.19	0.00	0.00	0.00	0.00	0.082
482	15.22	0.00	0.00	0.00	0.00	0.082
483	15.25	0.00	0.00	0.00	0.00	0.081
484	15.28	0.00	0.00	0.00	0.00	0.081
485	15.31	0.00	0.00	0.00	0.00	0.081
486	15.35	0.00	0.00	0.00	0.00	0.080
487	15.38	0.00	0.00	0.00	0.00	0.080
488	15.41	0.00	0.00	0.00	0.00	0.080
489	15.44	0.00	0.00	0.00	0.00	0.079
490	15.47	0.00	0.00	0.00	0.00	0.079
491	15.50	0.00	0.00	0.00	0.00	0.079
492	15.54	0.00	0.00	0.00	0.00	0.078
493	15.57	0.00	0.00	0.00	0.00	0.078
494	15.60	0.00	0.00	0.00	0.00	0.078
495	15.63	0.00	0.00	0.00	0.00	0.077
496	15.66	0.00	0.00	0.00	0.00	0.077
497	15.69	0.00	0.00	0.00	0.00	0.077
498	15.73	0.01	0.01	0.00	0.00	0.076
499	15.76	0.01	0.01	0.00	0.00	0.076
500	15.79	0.01	0.01	0.00	0.00	0.076

501	15.82	0.01	0.01	0.00	0.00	0.075
502	15.85	0.02	0.02	0.00	0.00	0.075
503	15.88	0.02	0.02	0.00	0.00	0.075
504	15.92	0.02	0.02	0.00	0.00	0.074
505	15.95	0.03	0.03	0.00	0.00	0.074
506	15.98	0.03	0.03	0.00	0.00	0.074
507	16.01	0.03	0.03	0.01	0.00	0.073
508	16.04	0.03	0.03	0.01	0.00	0.073
509	16.07	0.04	0.04	0.01	0.00	0.073
510	16.11	0.04	0.04	0.01	0.00	0.072
511	16.14	0.04	0.04	0.01	0.00	0.072
512	16.17	0.05	0.05	0.01	0.00	0.072
513	16.20	0.05	0.05	0.01	0.00	0.071
514	16.23	0.05	0.05	0.01	0.00	0.071
515	16.26	0.06	0.06	0.02	0.00	0.071
516	16.30	0.06	0.06	0.02	0.00	0.070
517	16.33	0.06	0.06	0.02	0.00	0.070
518	16.36	0.06	0.06	0.02	0.01	0.070
519	16.39	0.07	0.07	0.02	0.01	0.069
520	16.42	0.07	0.07	0.03	0.01	0.069
521	16.45	0.07	0.07	0.03	0.01	0.069
522	16.49	0.08	0.08	0.03	0.01	0.069
523	16.52	0.08	0.08	0.03	0.01	0.068
524	16.55	0.08	0.08	0.04	0.01	0.068
525	16.58	0.08	0.08	0.04	0.01	0.068
526	16.61	0.09	0.09	0.04	0.01	0.067
527	16.64	0.09	0.09	0.04	0.01	0.067
528	16.67	0.09	0.09	0.05	0.02	0.067
529	16.71	0.10	0.10	0.05	0.02	0.066
530	16.74	0.10	0.10	0.05	0.02	0.066
531	16.77	0.10	0.10	0.06	0.02	0.066
532	16.80	0.11	0.11	0.06	0.02	0.065
533	16.83	0.11	0.11	0.06	0.02	0.065
534	16.86	0.11	0.11	0.07	0.03	0.065
535	16.90	0.11	0.11	0.07	0.03	0.064
536	16.93	0.12	0.12	0.07	0.03	0.064
537	16.96	0.12	0.12	0.08	0.03	0.064
538	16.99	0.12	0.12	0.08	0.04	0.063
539	17.02	0.13	0.13	0.09	0.04	0.063
540	17.05	0.13	0.13	0.09	0.04	0.063
541	17.09	0.13	0.13	0.09	0.04	0.062
542	17.12	0.13	0.13	0.10	0.05	0.062
543	17.15	0.13	0.13	0.10	0.05	0.062
544	17.18	0.13	0.13	0.11	0.05	0.061
545	17.21	0.14	0.14	0.11	0.06	0.061
546	17.24	0.14	0.14	0.11	0.06	0.061
547	17.28	0.14	0.14	0.12	0.06	0.060
548	17.31	0.14	0.14	0.12	0.07	0.060
549	17.34	0.14	0.14	0.13	0.07	0.060
550	17.37	0.14	0.14	0.13	0.08	0.059

551	17.40	0.14	0.14	0.14	0.08	0.059
552	17.43	0.14	0.14	0.14	0.08	0.059
553	17.47	0.14	0.14	0.14	0.09	0.058
554	17.50	0.14	0.14	0.15	0.09	0.058
555	17.53	0.14	0.14	0.15	0.10	0.058
556	17.56	0.14	0.14	0.16	0.10	0.057
557	17.59	0.14	0.14	0.16	0.11	0.057
558	17.62	0.14	0.14	0.17	0.11	0.057
559	17.66	0.14	0.14	0.17	0.12	0.056
560	17.69	0.14	0.14	0.18	0.12	0.056
561	17.72	0.14	0.14	0.18	0.13	0.056
562	17.75	0.14	0.14	0.18	0.14	0.055
563	17.78	0.14	0.14	0.19	0.14	0.055
564	17.81	0.14	0.14	0.19	0.15	0.055
565	17.85	0.14	0.14	0.20	0.15	0.054
566	17.88	0.14	0.14	0.20	0.16	0.054
567	17.91	0.14	0.14	0.21	0.17	0.054
568	17.94	0.14	0.14	0.21	0.17	0.053
569	17.97	0.14	0.14	0.22	0.18	0.053
570	18.00	0.14	0.14	0.22	0.19	0.053
571	18.04	0.14	0.14	0.22	0.19	0.052
572	18.07	0.14	0.14	0.23	0.20	0.052
573	18.10	0.14	0.14	0.23	0.21	0.052
574	18.13	0.14	0.14	0.24	0.22	0.051
575	18.16	0.14	0.14	0.24	0.22	0.051
576	18.19	0.14	0.14	0.25	0.23	0.051
577	18.23	0.14	0.14	0.25	0.24	0.050
578	18.26	0.14	0.14	0.26	0.25	0.050
579	18.29	0.14	0.14	0.26	0.26	0.050
580	18.32	0.14	0.14	0.27	0.26	0.049
581	18.35	0.14	0.14	0.27	0.27	0.049
582	18.38	0.15	0.15	0.27	0.28	0.049
583	18.42	0.15	0.15	0.28	0.29	0.048
584	18.45	0.15	0.15	0.28	0.30	0.048
585	18.48	0.15	0.15	0.29	0.31	0.048
586	18.51	0.15	0.15	0.29	0.32	0.047
587	18.54	0.15	0.15	0.30	0.33	0.047
588	18.57	0.15	0.15	0.30	0.34	0.047
589	18.61	0.15	0.15	0.31	0.35	0.046
590	18.64	0.15	0.15	0.31	0.36	0.046
591	18.67	0.15	0.15	0.32	0.37	0.046
592	18.70	0.15	0.15	0.32	0.38	0.045
593	18.73	0.15	0.15	0.33	0.39	0.045
594	18.76	0.15	0.15	0.33	0.40	0.045
595	18.79	0.15	0.15	0.33	0.41	0.044
596	18.83	0.15	0.15	0.34	0.42	0.044
597	18.86	0.15	0.15	0.34	0.43	0.044
598	18.89	0.15	0.15	0.35	0.44	0.043
599	18.92	0.15	0.15	0.35	0.45	0.043
600	18.95	0.15	0.15	0.36	0.46	0.043

601	18.98	0.15	0.15	0.36	0.47	0.043
602	19.02	0.15	0.15	0.37	0.48	0.042
603	19.05	0.15	0.15	0.37	0.50	0.042
604	19.08	0.15	0.15	0.38	0.51	0.042
605	19.11	0.15	0.15	0.38	0.52	0.041
606	19.14	0.15	0.15	0.39	0.53	0.041
607	19.17	0.15	0.15	0.39	0.54	0.041
608	19.21	0.15	0.15	0.40	0.56	0.040
609	19.24	0.15	0.15	0.40	0.57	0.040
610	19.27	0.15	0.15	0.41	0.58	0.040
611	19.30	0.15	0.15	0.41	0.60	0.039
612	19.33	0.15	0.15	0.42	0.61	0.039
613	19.36	0.15	0.15	0.42	0.62	0.039
614	19.40	0.15	0.15	0.43	0.63	0.038
615	19.43	0.15	0.15	0.43	0.65	0.038
616	19.46	0.15	0.15	0.43	0.66	0.038
617	19.49	0.15	0.15	0.44	0.68	0.037
618	19.52	0.15	0.15	0.44	0.69	0.037
619	19.55	0.15	0.15	0.45	0.70	0.037
620	19.59	0.15	0.15	0.45	0.72	0.036
621	19.62	0.16	0.16	0.46	0.73	0.036
622	19.65	0.16	0.16	0.46	0.75	0.036
623	19.68	0.16	0.16	0.47	0.76	0.035
624	19.71	0.16	0.16	0.47	0.78	0.035
625	19.74	0.16	0.16	0.48	0.79	0.035
626	19.78	0.16	0.16	0.48	0.81	0.034
627	19.81	0.16	0.16	0.49	0.82	0.034
628	19.84	0.16	0.16	0.49	0.84	0.034
629	19.87	0.16	0.16	0.50	0.85	0.033
630	19.90	0.16	0.16	0.50	0.87	0.033
631	19.93	0.16	0.16	0.51	0.89	0.033
632	19.97	0.16	0.16	0.51	0.90	0.032
633	20.00	0.16	0.16	0.52	0.92	0.032
634	20.03	0.16	0.16	0.52	0.93	0.032
635	20.06	0.16	0.16	0.53	0.95	0.031
636	20.09	0.16	0.16	0.53	0.97	0.031
637	20.12	0.16	0.16	0.54	0.99	0.031
638	20.16	0.16	0.16	0.54	1.00	0.030
639	20.19	0.16	0.16	0.55	1.02	0.030
640	20.22	0.16	0.16	0.56	1.04	0.030
641	20.25	0.16	0.16	0.56	1.05	0.029
642	20.28	0.16	0.16	0.57	1.07	0.029
643	20.31	0.16	0.16	0.57	1.09	0.029
644	20.35	0.17	0.17	0.58	1.11	0.028
645	20.38	0.17	0.17	0.58	1.13	0.028
646	20.41	0.17	0.17	0.59	1.15	0.028
647	20.44	0.17	0.17	0.59	1.16	0.027
648	20.47	0.17	0.17	0.60	1.18	0.027
649	20.50	0.17	0.17	0.60	1.20	0.027
650	20.54	0.17	0.17	0.61	1.22	0.027

651	20.57	0.17	0.17	0.61	1.24	0.026
652	20.60	0.17	0.17	0.62	1.26	0.026
653	20.63	0.17	0.17	0.62	1.28	0.026
654	20.66	0.17	0.17	0.63	1.30	0.025
655	20.69	0.17	0.17	0.63	1.32	0.025
656	20.72	0.17	0.17	0.64	1.34	0.025
657	20.76	0.17	0.17	0.65	1.36	0.024
658	20.79	0.17	0.17	0.65	1.38	0.024
659	20.82	0.17	0.17	0.66	1.40	0.024
660	20.85	0.17	0.17	0.66	1.42	0.023
661	20.88	0.17	0.17	0.67	1.44	0.023
662	20.91	0.17	0.17	0.67	1.46	0.023
663	20.95	0.17	0.17	0.68	1.49	0.022
664	20.98	0.17	0.17	0.68	1.51	0.022
665	21.01	0.17	0.17	0.69	1.53	0.022
666	21.04	0.17	0.17	0.69	1.55	0.021
667	21.07	0.18	0.18	0.70	1.57	0.021
668	21.10	0.18	0.18	0.71	1.59	0.021
669	21.14	0.18	0.18	0.71	1.62	0.020
670	21.17	0.18	0.18	0.72	1.64	0.020
671	21.20	0.18	0.18	0.72	1.66	0.020
672	21.23	0.18	0.18	0.73	1.69	0.019
673	21.26	0.18	0.18	0.73	1.71	0.019
674	21.29	0.18	0.18	0.74	1.73	0.019
675	21.33	0.18	0.18	0.74	1.76	0.018
676	21.36	0.18	0.18	0.75	1.78	0.018
677	21.39	0.18	0.18	0.76	1.80	0.018
678	21.42	0.18	0.18	0.76	1.83	0.017
679	21.45	0.18	0.18	0.77	1.85	0.017
680	21.48	0.18	0.18	0.77	1.88	0.017
681	21.52	-0.07	-0.07	0.78	1.90	0.017
682	21.55	-0.07	-0.07	0.78	1.92	0.016
683	21.58	-0.08	-0.08	0.77	1.95	0.016
684	21.61	-0.08	-0.08	0.77	1.97	0.016
685	21.64	-0.08	-0.08	0.77	2.00	0.016
686	21.67	-0.09	-0.09	0.77	2.02	0.016
687	21.71	-0.09	-0.09	0.77	2.05	0.016
688	21.74	-0.09	-0.09	0.77	2.07	0.016
689	21.77	-0.10	-0.10	0.77	2.10	0.016
690	21.80	-0.10	-0.10	0.77	2.12	0.016
691	21.83	-0.10	-0.10	0.77	2.14	0.016
692	21.86	-0.11	-0.11	0.77	2.17	0.015
693	21.90	-0.11	-0.11	0.77	2.19	0.015
694	21.93	-0.11	-0.11	0.76	2.22	0.015
695	21.96	-0.12	-0.12	0.76	2.24	0.015
696	21.99	-0.12	-0.12	0.76	2.27	0.015
697	22.02	-0.12	-0.12	0.76	2.29	0.015
698	22.05	-0.13	-0.13	0.76	2.31	0.015
699	22.09	-0.13	-0.13	0.76	2.34	0.015
700	22.12	-0.13	-0.13	0.75	2.36	0.015

701	22.15	-0.13	-0.13	0.75	2.39	0.015
702	22.18	-0.14	-0.14	0.75	2.41	0.014
703	22.21	-0.14	-0.14	0.75	2.43	0.014
704	22.24	-0.14	-0.14	0.75	2.46	0.014
705	22.28	-0.15	-0.15	0.74	2.48	0.014
706	22.31	-0.15	-0.15	0.74	2.50	0.014
707	22.34	-0.15	-0.15	0.74	2.53	0.014
708	22.37	-0.16	-0.16	0.74	2.55	0.014
709	22.40	-0.16	-0.16	0.74	2.57	0.014
710	22.43	-0.16	-0.16	0.73	2.60	0.014
711	22.47	-0.17	-0.17	0.73	2.62	0.013
712	22.50	-0.17	-0.17	0.73	2.64	0.013
713	22.53	-0.17	-0.17	0.72	2.67	0.013
714	22.56	-0.18	-0.18	0.72	2.69	0.013
715	22.59	-0.18	-0.18	0.72	2.71	0.013
716	22.62	-0.18	-0.18	0.72	2.73	0.013
717	22.66	-0.19	-0.19	0.71	2.76	0.013
718	22.69	-0.19	-0.19	0.71	2.78	0.013
719	22.72	-0.19	-0.19	0.71	2.80	0.013
720	22.75	-0.20	-0.20	0.70	2.82	0.012
721	22.78	-0.20	-0.20	0.70	2.85	0.012
722	22.81	-0.20	-0.20	0.70	2.87	0.012
723	22.84	-0.21	-0.21	0.69	2.89	0.012
724	22.88	-0.21	-0.21	0.69	2.91	0.012
725	22.91	-0.21	-0.21	0.69	2.93	0.012
726	22.94	-0.22	-0.22	0.68	2.96	0.012
727	22.97	-0.22	-0.22	0.68	2.98	0.012
728	23.00	-0.22	-0.22	0.67	3.00	0.011
729	23.03	-0.22	-0.22	0.67	3.02	0.011
730	23.07	-0.23	-0.23	0.67	3.04	0.011
731	23.10	-0.23	-0.23	0.66	3.06	0.011
732	23.13	-0.23	-0.23	0.66	3.08	0.011
733	23.16	-0.24	-0.24	0.65	3.10	0.011
734	23.19	-0.24	-0.24	0.65	3.12	0.011
735	23.22	-0.24	-0.24	0.65	3.14	0.011
736	23.26	-0.25	-0.25	0.64	3.17	0.010
737	23.29	-0.25	-0.25	0.64	3.19	0.010
738	23.32	-0.25	-0.25	0.63	3.21	0.010
739	23.35	-0.26	-0.26	0.63	3.23	0.010
740	23.38	-0.26	-0.26	0.62	3.25	0.010
741	23.41	-0.26	-0.26	0.62	3.26	0.010
742	23.45	-0.27	-0.27	0.61	3.28	0.009
743	23.48	-0.27	-0.27	0.61	3.30	0.009
744	23.51	-0.27	-0.27	0.60	3.32	0.009
745	23.54	-0.28	-0.28	0.60	3.34	0.009
746	23.57	-0.28	-0.28	0.59	3.36	0.009
747	23.60	-0.28	-0.28	0.59	3.38	0.009
748	23.64	-0.29	-0.29	0.58	3.40	0.008
749	23.67	-0.29	-0.29	0.58	3.42	0.008
750	23.70	-0.29	-0.29	0.57	3.43	0.008

751	23.73	-0.30	-0.30	0.56	3.45	0.008
752	23.76	-0.30	-0.30	0.56	3.47	0.008
753	23.79	-0.30	-0.30	0.55	3.49	0.007
754	23.83	-0.30	-0.30	0.55	3.50	0.007
755	23.86	-0.31	-0.31	0.54	3.52	0.007
756	23.89	-0.31	-0.31	0.54	3.54	0.007
757	23.92	-0.31	-0.31	0.53	3.56	0.007
758	23.95	-0.32	-0.32	0.52	3.57	0.006
759	23.98	-0.32	-0.32	0.52	3.59	0.006
760	24.02	-0.32	-0.32	0.51	3.61	0.006
761	24.05	-0.33	-0.33	0.50	3.62	0.005
762	24.08	-0.33	-0.33	0.50	3.64	0.005
763	24.11	-0.33	-0.33	0.49	3.65	0.005
764	24.14	-0.34	-0.34	0.48	3.67	0.004
765	24.17	-0.34	-0.34	0.48	3.68	0.004
766	24.21	-0.34	-0.34	0.47	3.70	0.003
767	24.24	-0.35	-0.35	0.46	3.71	0.002
768	24.27	-0.35	-0.35	0.46	3.73	0.001
769	24.30	-0.35	-0.35	0.45	3.74	0.000
770	24.33	-0.36	-0.36	0.44	3.76	0.000
771	24.36	-0.36	-0.36	0.44	3.77	0.000
772	24.40	-0.36	-0.36	0.43	3.78	0.000
773	24.43	-0.37	-0.37	0.42	3.80	0.000
774	24.46	-0.37	-0.37	0.41	3.81	0.000
775	24.49	-0.37	-0.37	0.41	3.82	0.000
776	24.52	-0.38	-0.38	0.40	3.84	0.000
777	24.55	-0.38	-0.38	0.39	3.85	0.000
778	24.59	-0.38	-0.38	0.38	3.86	0.001
779	24.62	-0.39	-0.39	0.38	3.87	0.001
780	24.65	-0.39	-0.39	0.37	3.89	0.001
781	24.68	-0.39	-0.39	0.36	3.90	0.001
782	24.71	-0.39	-0.39	0.35	3.91	0.001
783	24.74	-0.40	-0.40	0.35	3.92	0.001
784	24.78	-0.40	-0.40	0.34	3.93	0.001
785	24.81	-0.40	-0.40	0.33	3.94	0.001
786	24.84	-0.41	-0.41	0.32	3.95	0.001
787	24.87	-0.41	-0.41	0.31	3.96	0.001
788	24.90	-0.41	-0.41	0.30	3.97	0.001
789	24.93	-0.42	-0.42	0.30	3.98	0.001
790	24.96	-0.42	-0.42	0.29	3.99	0.001
791	25.00	-0.42	-0.42	0.28	4.00	0.001
792	25.03	-0.43	-0.43	0.27	4.01	0.001
793	25.06	-0.43	-0.43	0.26	4.02	0.001
794	25.09	-0.43	-0.43	0.25	4.02	0.001
795	25.12	-0.43	-0.43	0.24	4.03	0.002
796	25.15	-0.43	-0.43	0.24	4.04	0.002
797	25.19	-0.43	-0.43	0.23	4.05	0.002
798	25.22	-0.43	-0.43	0.22	4.05	0.002
799	25.25	-0.43	-0.43	0.21	4.06	0.002
800	25.28	-0.44	-0.44	0.20	4.07	0.002

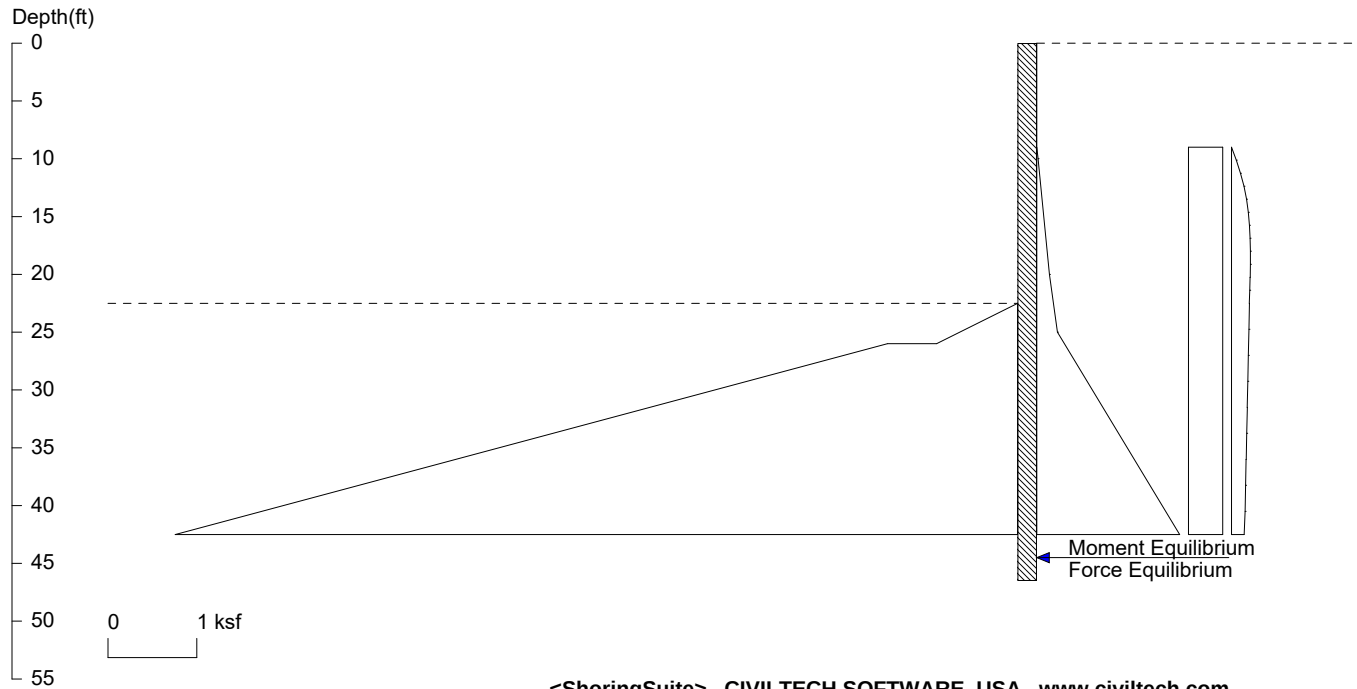
801	25.31	-0.44	-0.44	0.19	4.07	0.002
802	25.34	-0.44	-0.44	0.18	4.08	0.002
803	25.38	-0.44	-0.44	0.17	4.08	0.002
804	25.41	-0.44	-0.44	0.17	4.09	0.002
805	25.44	-0.44	-0.44	0.16	4.09	0.002
806	25.47	-0.44	-0.44	0.15	4.10	0.002
807	25.50	-0.44	-0.44	0.14	4.10	0.002
808	25.53	-0.45	-0.45	0.13	4.11	0.002
809	25.57	-0.45	-0.45	0.12	4.11	0.002
810	25.60	-0.45	-0.45	0.11	4.12	0.002
811	25.63	-0.45	-0.45	0.10	4.12	0.002
812	25.66	-0.45	-0.45	0.09	4.12	0.002
813	25.69	-0.45	-0.45	0.09	4.13	0.003
814	25.72	-0.45	-0.45	0.08	4.13	0.003
815	25.76	-0.45	-0.45	0.07	4.13	0.003
816	25.79	-0.46	-0.46	0.06	4.13	0.003
817	25.82	-0.46	-0.46	0.05	4.13	0.003
818	25.85	-0.46	-0.46	0.04	4.14	0.003
819	25.88	-0.46	-0.46	0.03	4.14	0.003
820	25.91	-0.46	-0.46	0.02	4.14	0.003
821	25.95	-0.46	-0.46	0.01	4.14	0.003
822	25.98	-0.46	-0.46	0.00	4.14	0.003
823	26.01	-1.58	-1.58	-0.01	4.14	0.003
824	26.04	-1.60	-1.60	-0.05	4.14	0.003
825	26.07	-1.61	-1.61	-0.09	4.14	0.003
826	26.10	-1.62	-1.62	-0.12	4.13	0.003
827	26.14	-1.63	-1.63	-0.16	4.13	0.003
828	26.17	-1.65	-1.65	-0.20	4.12	0.003
829	26.20	-1.66	-1.66	-0.24	4.11	0.003
830	26.23	-1.67	-1.67	-0.27	4.11	0.003
831	26.26	-1.69	-1.69	-0.31	4.10	0.004
832	26.29	-1.70	-1.70	-0.35	4.09	0.004
833	26.33	-1.71	-1.71	-0.39	4.08	0.004
834	26.36	-1.73	-1.73	-0.43	4.06	0.004
835	26.39	-1.74	-1.74	-0.47	4.05	0.004
836	26.42	-1.75	-1.75	-0.51	4.03	0.004
837	26.45	-1.76	-1.76	-0.55	4.02	0.004
838	26.48	-1.78	-1.78	-0.59	4.00	0.004
839	26.52	-1.79	-1.79	-0.63	3.98	0.004
840	26.55	-1.80	-1.80	-0.67	3.96	0.004
841	26.58	-1.82	-1.82	-0.71	3.94	0.004
842	26.61	-1.83	-1.83	-0.76	3.91	0.004
843	26.64	-1.84	-1.84	-0.80	3.89	0.004
844	26.67	-1.86	-1.86	-0.84	3.86	0.004
845	26.71	-1.87	-1.87	-0.88	3.83	0.004
846	26.74	-1.88	-1.88	-0.93	3.81	0.004
847	26.77	-1.89	-1.89	-0.97	3.78	0.004
848	26.80	-1.91	-1.91	-1.01	3.74	0.004
849	26.83	-1.92	-1.92	-1.06	3.71	0.005
850	26.86	-1.93	-1.93	-1.10	3.68	0.005

851	26.89	-1.95	-1.95	-1.15	3.64	0.005
852	26.93	-1.96	-1.96	-1.19	3.61	0.005
853	26.96	-1.97	-1.97	-1.24	3.57	0.005
854	26.99	-1.99	-1.99	-1.28	3.53	0.005
855	27.02	-2.00	-2.00	-1.33	3.49	0.005
856	27.05	-2.01	-2.01	-1.37	3.44	0.005
857	27.08	-2.03	-2.03	-1.42	3.40	0.005
858	27.12	-2.04	-2.04	-1.47	3.35	0.005
859	27.15	-2.05	-2.05	-1.51	3.31	0.005
860	27.18	-2.06	-2.06	-1.56	3.26	0.005
861	27.21	-2.08	-2.08	-1.61	3.21	0.005
862	27.24	-2.09	-2.09	-1.66	3.16	0.005
863	27.27	-2.10	-2.10	-1.70	3.10	0.005
864	27.31	-2.12	-2.12	-1.75	3.05	0.005
865	27.34	-2.13	-2.13	-1.80	2.99	0.005
866	27.37	-2.14	-2.14	-1.85	2.93	0.005
867	27.40	-2.16	-2.16	-1.90	2.87	0.005
868	27.43	-2.17	-2.17	-1.95	2.81	0.006
869	27.46	-2.18	-2.18	-2.00	2.75	0.006
870	27.50	-2.19	-2.19	-2.05	2.69	0.006
871	27.53	-2.21	-2.21	-2.10	2.62	0.006
872	27.56	-2.22	-2.22	-2.15	2.55	0.006
873	27.59	-2.23	-2.23	-2.20	2.49	0.006
874	27.62	-2.25	-2.25	-2.25	2.42	0.006
875	27.65	-2.26	-2.26	-2.30	2.34	0.006
876	27.69	-2.27	-2.27	-2.36	2.27	0.006
877	27.72	-2.29	-2.29	-2.41	2.19	0.006
878	27.75	-2.30	-2.30	-2.46	2.12	0.006
879	27.78	-2.31	-2.31	-2.51	2.04	0.006
880	27.81	-2.32	-2.32	-2.57	1.96	0.006
881	27.84	-2.34	-2.34	-2.62	1.88	0.006
882	27.88	-2.35	-2.35	-2.67	1.79	0.006
883	27.91	-2.36	-2.36	-2.73	1.71	0.006
884	27.94	-2.38	-2.38	-2.78	1.62	0.006
885	27.97	-2.39	-2.39	-2.84	1.53	0.006
886	28.00	-2.40	-2.40	-2.89	1.44	0.006
887	28.03	-2.42	-2.42	-2.95	1.35	0.007
888	28.07	-2.43	-2.43	-3.00	1.25	0.007
889	28.10	-2.44	-2.44	-3.06	1.16	0.007
890	28.13	-2.45	-2.45	-3.12	1.06	0.007
891	28.16	-2.47	-2.47	-3.17	0.96	0.007
892	28.19	-2.48	-2.48	-3.23	0.86	0.007
893	28.22	-2.49	-2.49	-3.29	0.76	0.007
894	28.26	-2.51	-2.51	-3.34	0.65	0.007
895	28.29	-2.52	-2.52	-3.40	0.54	0.007
896	28.32	-2.53	-2.53	-3.46	0.44	0.007
897	28.35	-2.55	-2.55	-3.52	0.33	0.007
898	28.38	-2.56	-2.56	-3.58	0.21	0.007
899	28.41	-2.57	-2.57	-3.64	0.10	0.007

The above data can be selected using mouse, then copy and paste into Excel to create graphics

Butler Street

Section C at CSO Outlet (Sides) DRAINED No Piles Revised Mounding



Licensed to 4324324234 3424343

Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides DRAINED.sh8

Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.01 Min. Pile Length=46.51

MOMENT IN PILE: Max. Moment=135.99 per Pile Spacing=1.0 at Depth=33.53

PILE SELECTION:Request Min. Section Modulus = 49.5 in³/ft=2658.54 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 2.04(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	9	0	0.000000
9	0	10	0.015	0.015000
10	0.015	20	0.142	0.012700
20	0.142	25	0.232	0.018000
25	0.232	100	6.132	0.078667
9	0.385	100	0.385	0.000000
*	Sur-	charge		
9.000	0.000	10.125	0.053	0.047211
10.125	0.053	11.250	0.101	0.042488
11.250	0.101	12.375	0.140	0.034673
12.375	0.140	13.500	0.169	0.025929
13.500	0.169	14.625	0.189	0.017877
14.625	0.189	15.750	0.202	0.011270
15.750	0.202	16.875	0.209	0.006213
16.875	0.209	18.000	0.212	0.002503
18.000	0.212	19.125	0.212	-0.000153
19.125	0.212	20.250	0.209	-0.002024
20.250	0.209	21.375	0.205	-0.003326

21.375	0.205	22.500	0.201	-0.004220
22.500	0.201	24.750	0.195	-0.002411
24.750	0.195	27.000	0.189	-0.002606
27.000	0.189	29.250	0.183	-0.002725
29.250	0.183	31.500	0.177	-0.002788
31.500	0.177	33.750	0.171	-0.002810
33.750	0.171	36.000	0.164	-0.002802
36.000	0.164	38.250	0.158	-0.002771
38.250	0.158	40.500	0.152	-0.002724
40.500	0.152	42.750	0.140	-0.005261
42.750	0.140	45.000	0.129	-0.004964
45.000	0.129	49.500	0.119	-0.002319

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
22.5	0	26	0.912	0.2606
26	1.465	100	37.44	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	22.50	1.00

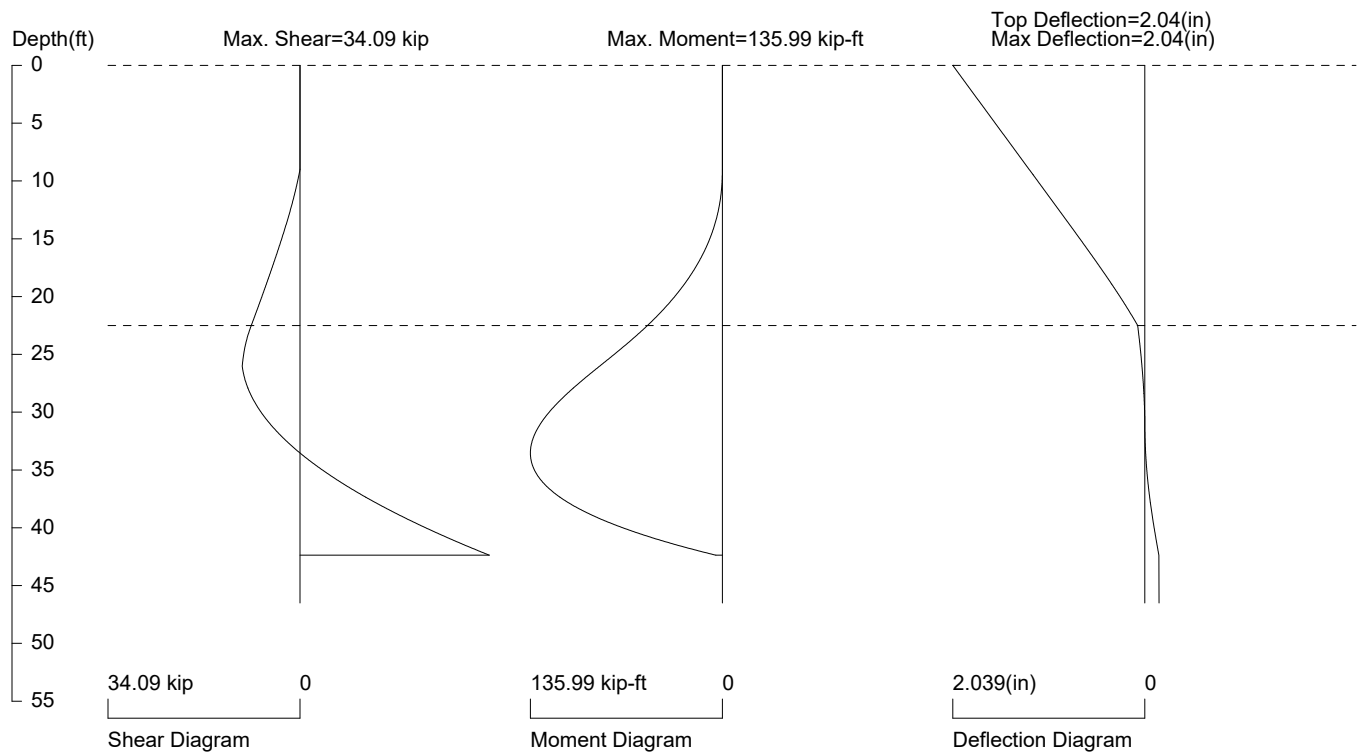
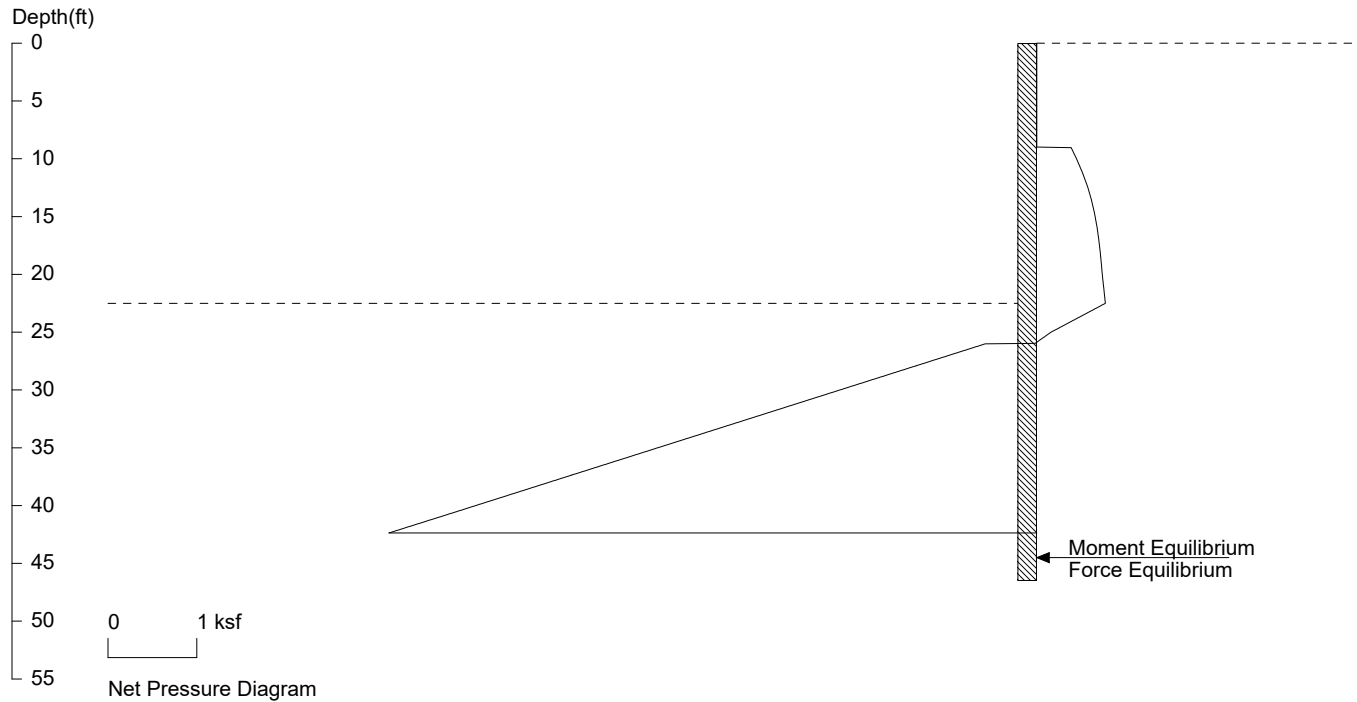
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street

Section C at CSO Outlet (Sides) DRAINED No Piles Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

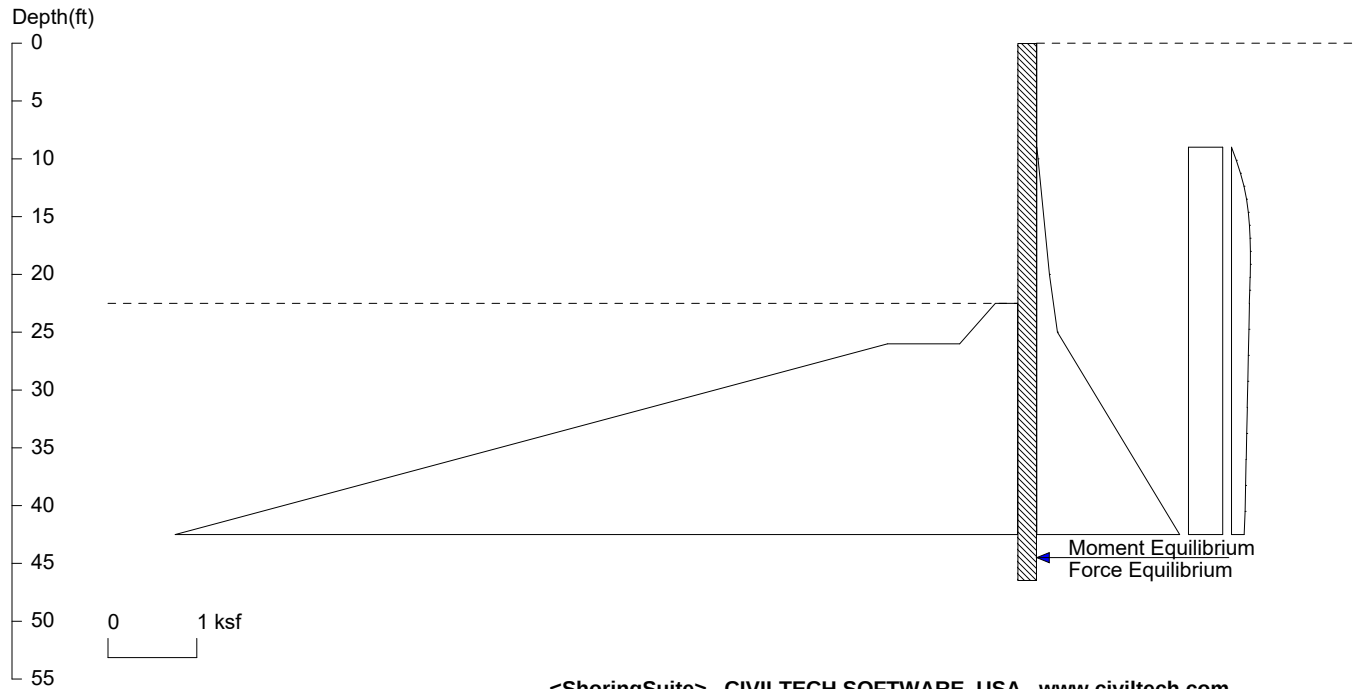
Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding



Licensed to 4324324234 3424343

Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides UNDRAINED.sh8

Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.00 Min. Pile Length=46.50

MOMENT IN PILE: Max. Moment=135.71 per Pile Spacing=1.0 at Depth=33.52

PILE SELECTION:Request Min. Section Modulus = 49.3 in³/ft=2652.98 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 2.03(in) based on E (ksi)=29000.00 and I (in⁴)/foot=656.2**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	9	0	0.000000
9	0	10	0.015	0.015000
10	0.015	20	0.142	0.012700
20	0.142	25	0.232	0.018000
25	0.232	100	6.132	0.078667
9	0.385	100	0.385	0.000000
*	Sur-	charge		
9.000	0.000	10.125	0.053	0.047211
10.125	0.053	11.250	0.101	0.042488
11.250	0.101	12.375	0.140	0.034673
12.375	0.140	13.500	0.169	0.025929
13.500	0.169	14.625	0.189	0.017877
14.625	0.189	15.750	0.202	0.011270
15.750	0.202	16.875	0.209	0.006213
16.875	0.209	18.000	0.212	0.002503
18.000	0.212	19.125	0.212	-0.000153
19.125	0.212	20.250	0.209	-0.002024
20.250	0.209	21.375	0.205	-0.003326

21.375	0.205	22.500	0.201	-0.004220
22.500	0.201	24.750	0.195	-0.002411
24.750	0.195	27.000	0.189	-0.002606
27.000	0.189	29.250	0.183	-0.002725
29.250	0.183	31.500	0.177	-0.002788
31.500	0.177	33.750	0.171	-0.002810
33.750	0.171	36.000	0.164	-0.002802
36.000	0.164	38.250	0.158	-0.002771
38.250	0.158	40.500	0.152	-0.002724
40.500	0.152	42.750	0.140	-0.005261
42.750	0.140	45.000	0.129	-0.004964
45.000	0.129	49.500	0.119	-0.002319

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
22.5	0.250	26	0.653	0.1151
26	1.465	100	37.444	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	22.50	1.00

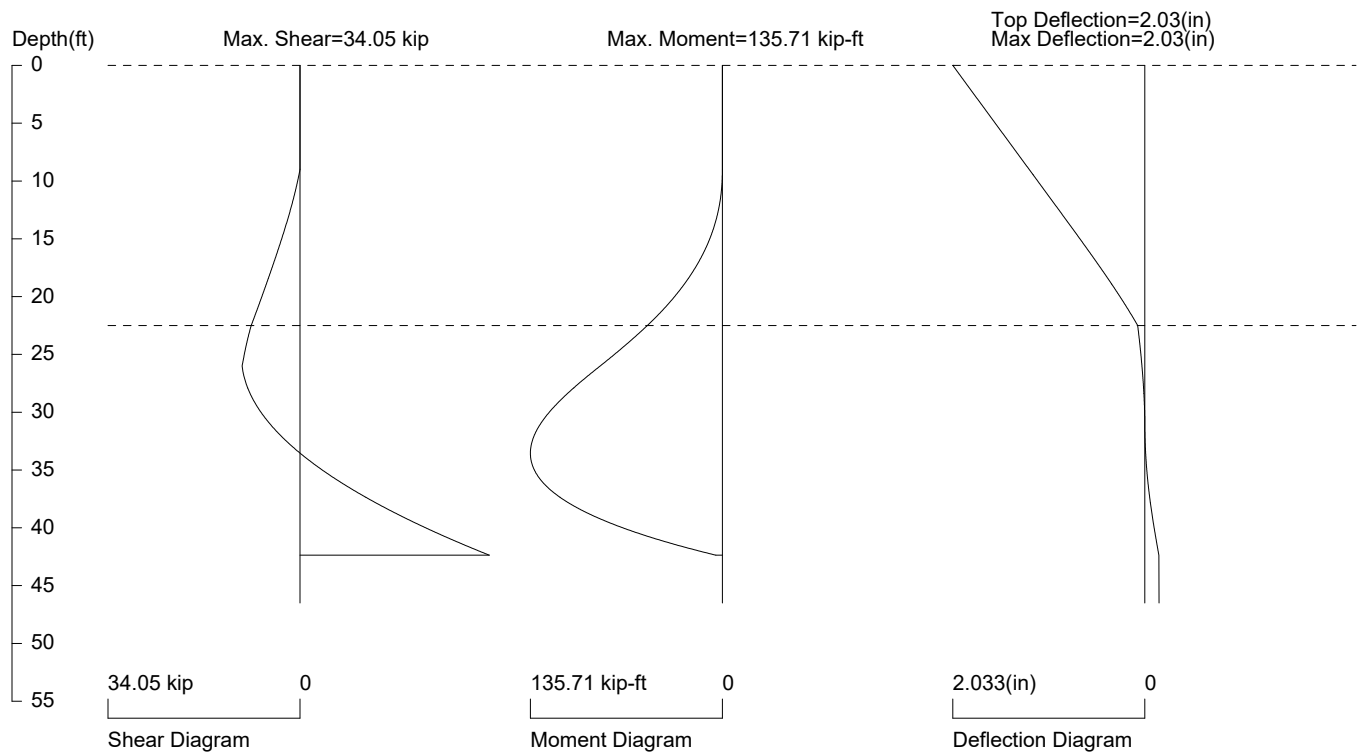
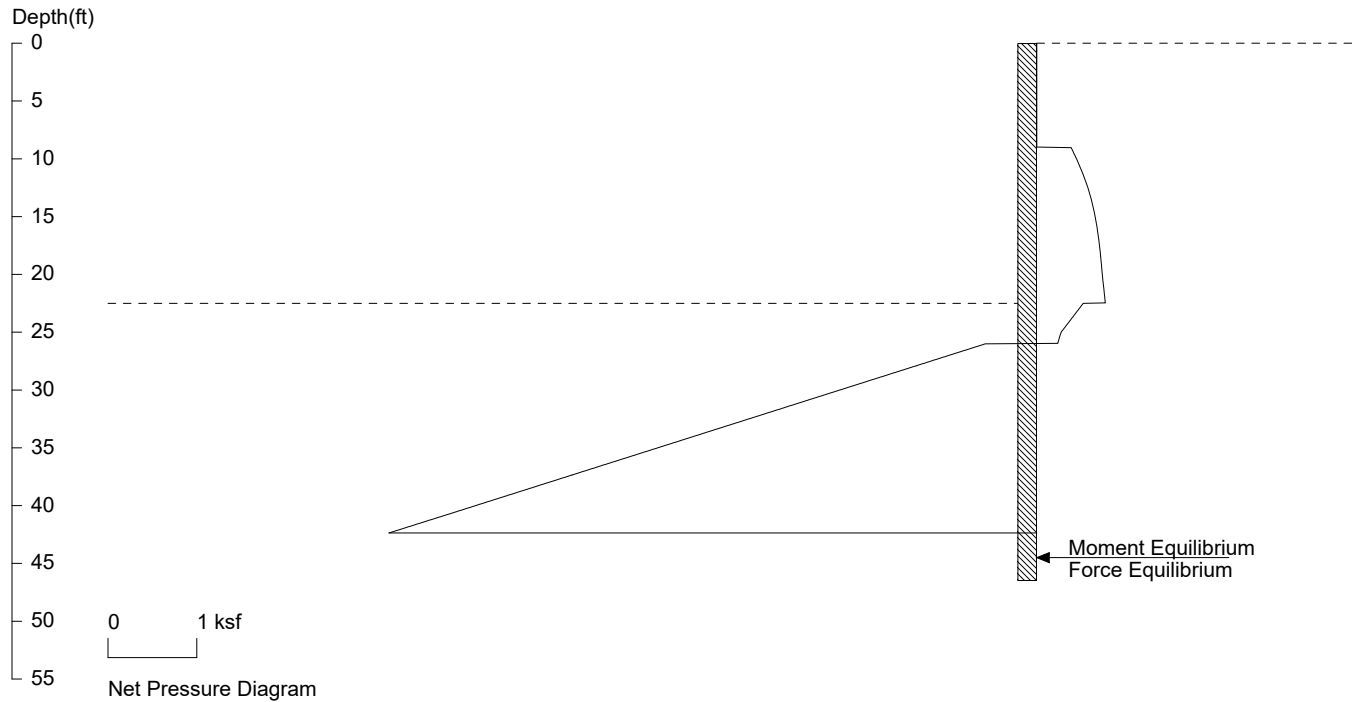
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

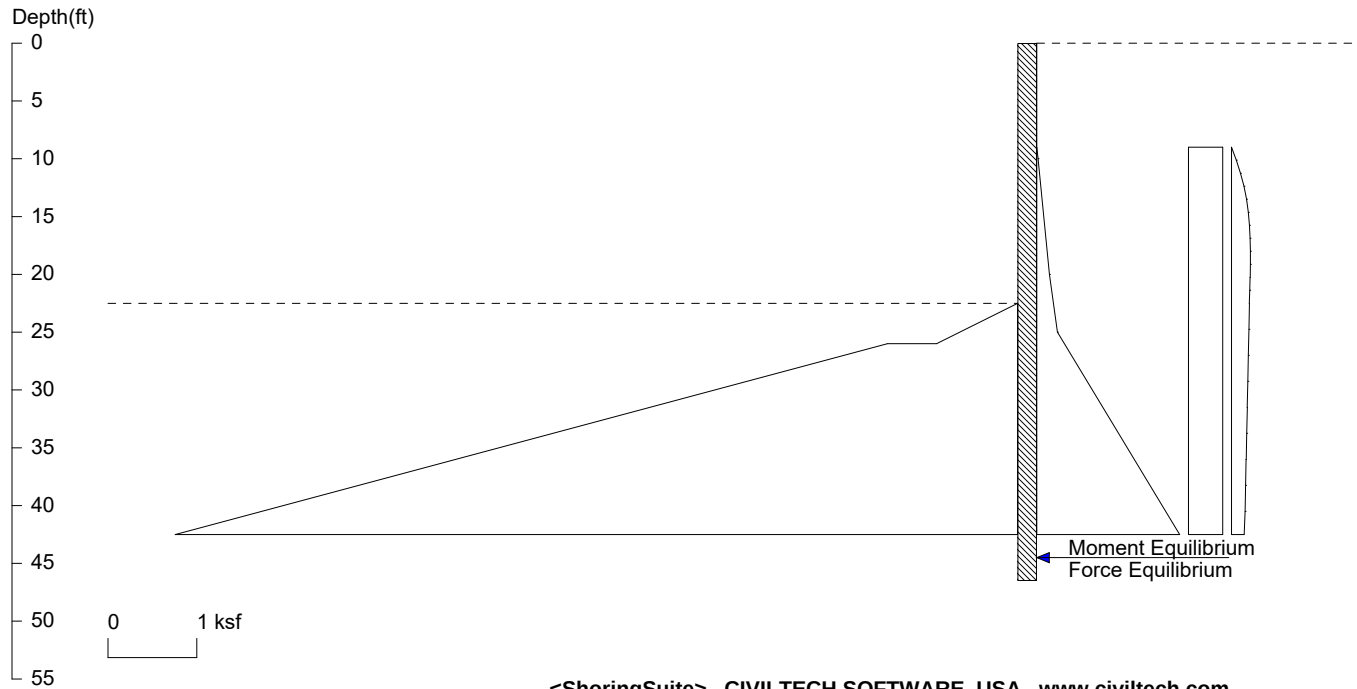
Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=656.2

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Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



Licensed to 4324324234 3424343

Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides DRAINED (AZ52)

Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.01 Min. Pile Length=46.51

MOMENT IN PILE: Max. Moment=135.99 per Pile Spacing=1.0 at Depth=33.53

PILE SELECTION:Request Min. Section Modulus = 49.5 in³/ft=2658.54 cm³/m, F_y= 50 ksi = 345 MPa, F_b/F_y=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.40(in) based on E (ksi)=29000.00 and I (in⁴)/foot=953.0**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	9	0	0.000000
9	0	10	0.015	0.015000
10	0.015	20	0.142	0.012700
20	0.142	25	0.232	0.018000
25	0.232	100	6.132	0.078667
9	0.385	100	0.385	0.000000
*	Sur-	charge		
9.000	0.000	10.125	0.053	0.047211
10.125	0.053	11.250	0.101	0.042488
11.250	0.101	12.375	0.140	0.034673
12.375	0.140	13.500	0.169	0.025929
13.500	0.169	14.625	0.189	0.017877
14.625	0.189	15.750	0.202	0.011270
15.750	0.202	16.875	0.209	0.006213
16.875	0.209	18.000	0.212	0.002503
18.000	0.212	19.125	0.212	-0.000153
19.125	0.212	20.250	0.209	-0.002024
20.250	0.209	21.375	0.205	-0.003326

21.375	0.205	22.500	0.201	-0.004220
22.500	0.201	24.750	0.195	-0.002411
24.750	0.195	27.000	0.189	-0.002606
27.000	0.189	29.250	0.183	-0.002725
29.250	0.183	31.500	0.177	-0.002788
31.500	0.177	33.750	0.171	-0.002810
33.750	0.171	36.000	0.164	-0.002802
36.000	0.164	38.250	0.158	-0.002771
38.250	0.158	40.500	0.152	-0.002724
40.500	0.152	42.750	0.140	-0.005261
42.750	0.140	45.000	0.129	-0.004964
45.000	0.129	49.500	0.119	-0.002319

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
22.5	0	26	0.912	0.2606
26	1.465	100	37.444	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	22.50	1.00

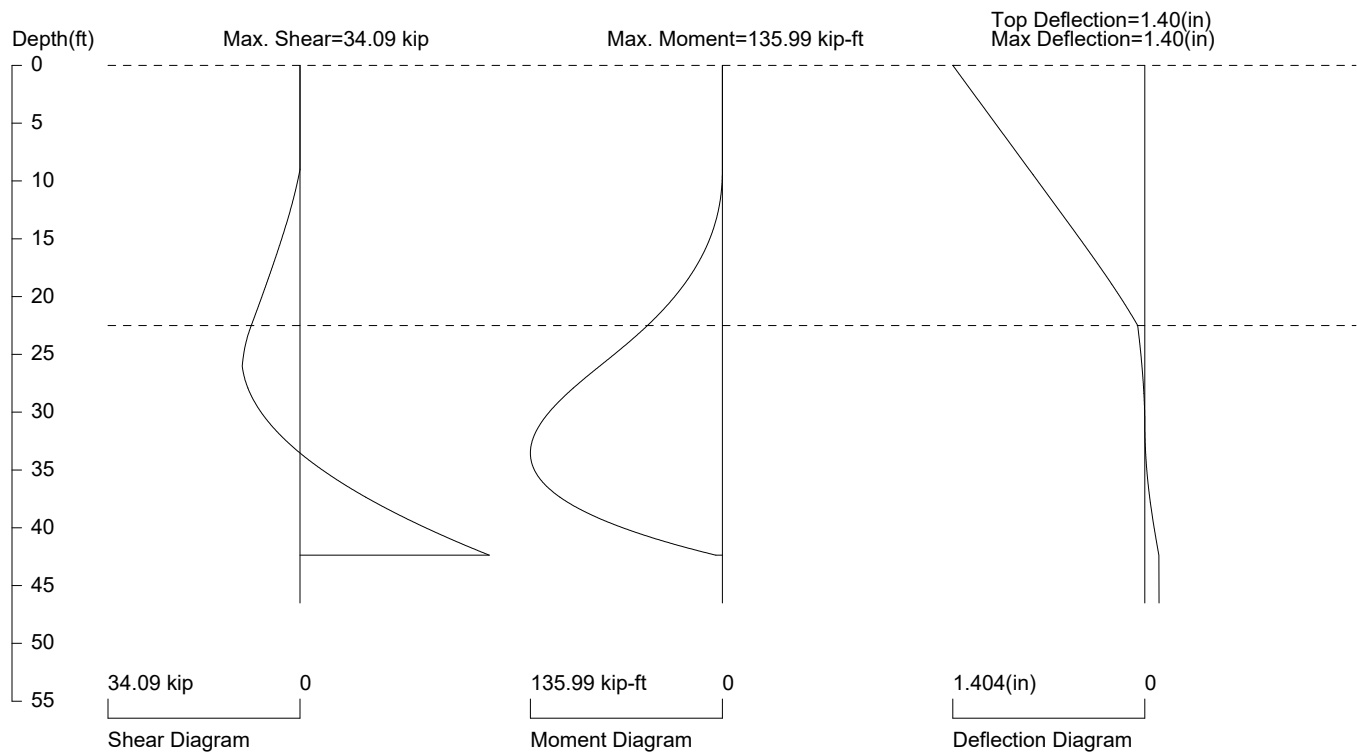
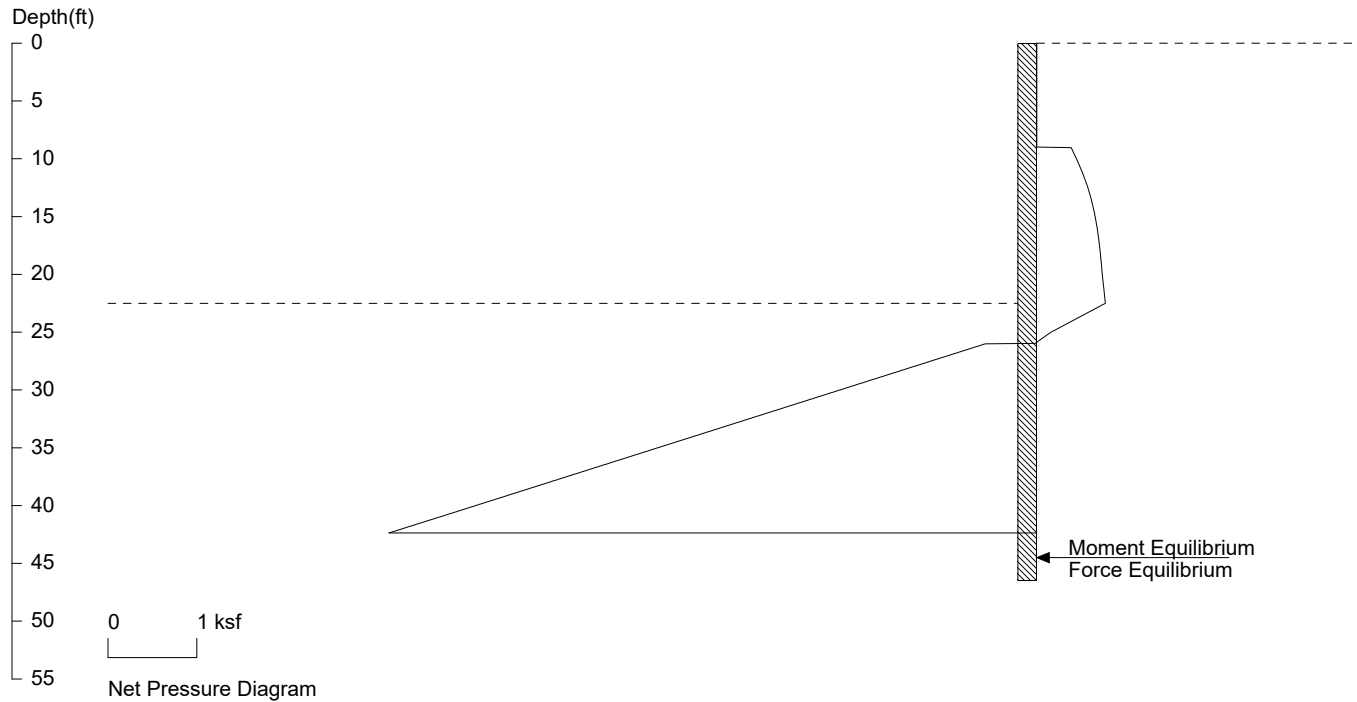
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

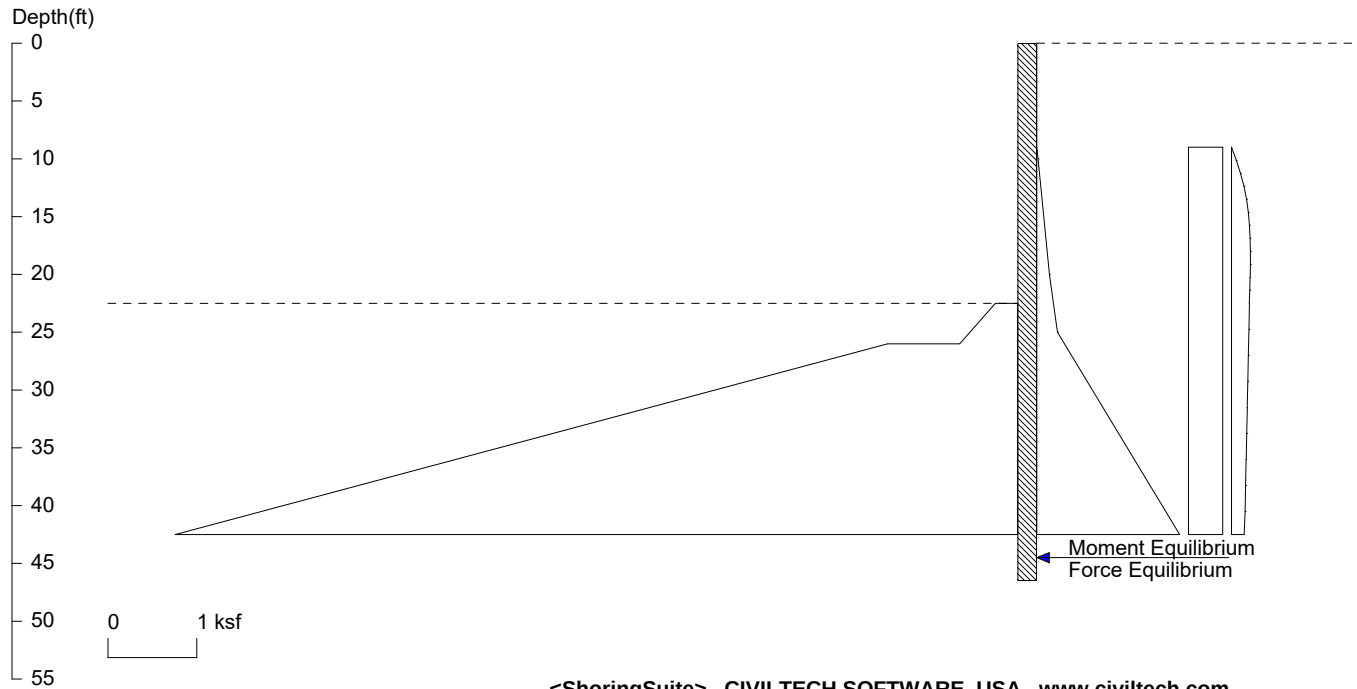
Based on pile spacing: 1.0 foot or meter

User Input I: E (ksi)=29000.0, I (in⁴)/foot=953.0

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Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



Licensed to 4324324234 3424343

Date: 1/14/2020

File: C:\Users\afb58\OneDrive\Desktop\EPA Review\Butler Street\SECTION C Butler Street (CSO) Sides UNDRAINED (AZ52)

Wall Height=22.5

Pile Diameter=1.0

Pile Spacing=1.0

Wall Type: 1. Sheet Pile

PILE LENGTH: Min. Embedment=24.00 Min. Pile Length=46.50

MOMENT IN PILE: Max. Moment=135.71 per Pile Spacing=1.0 at Depth=33.52

PILE SELECTION:Request Min. Section Modulus = 49.3 in³/ft=2652.98 cm³/m, Fy= 50 ksi = 345 MPa, Fb/Fy=0.66

User Input I (Moment of Inertia):

Top Deflection = 1.40(in) based on E (ksi)=29000.00 and I (in⁴)/foot=953.0**DRIVING PRESSURES (ACTIVE, WATER, & SURCHARGE):**

Z1	P1	Z2	P2	Slope
0	0	9	0	0.000000
9	0	10	0.015	0.015000
10	0.015	20	0.142	0.012700
20	0.142	25	0.232	0.018000
25	0.232	100	6.132	0.078667
9	0.385	100	0.385	0.000000
*	Sur-	charge		
9.000	0.000	10.125	0.053	0.047211
10.125	0.053	11.250	0.101	0.042488
11.250	0.101	12.375	0.140	0.034673
12.375	0.140	13.500	0.169	0.025929
13.500	0.169	14.625	0.189	0.017877
14.625	0.189	15.750	0.202	0.011270
15.750	0.202	16.875	0.209	0.006213
16.875	0.209	18.000	0.212	0.002503
18.000	0.212	19.125	0.212	-0.000153
19.125	0.212	20.250	0.209	-0.002024
20.250	0.209	21.375	0.205	-0.003326

21.375	0.205	22.500	0.201	-0.004220
22.500	0.201	24.750	0.195	-0.002411
24.750	0.195	27.000	0.189	-0.002606
27.000	0.189	29.250	0.183	-0.002725
29.250	0.183	31.500	0.177	-0.002788
31.500	0.177	33.750	0.171	-0.002810
33.750	0.171	36.000	0.164	-0.002802
36.000	0.164	38.250	0.158	-0.002771
38.250	0.158	40.500	0.152	-0.002724
40.500	0.152	42.750	0.140	-0.005261
42.750	0.140	45.000	0.129	-0.004964
45.000	0.129	49.500	0.119	-0.002319

PASSIVE PRESSURES: Pressures below will be divided by a Factor of Safety =1.3

Z1	P1	Z2	P2	Slope
22.5	0.250	26	0.653	0.1151
26	1.465	100	37.444	0.4862

ACTIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00
2	22.50	1.00

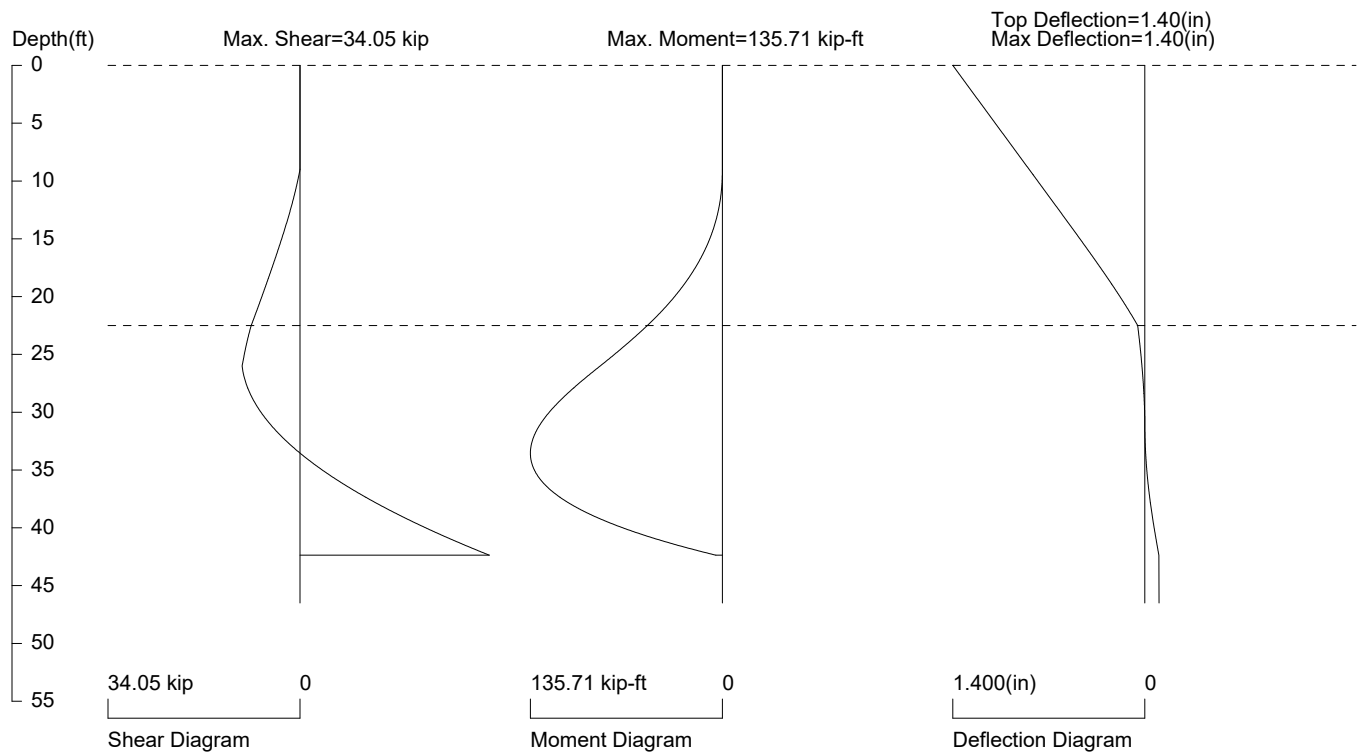
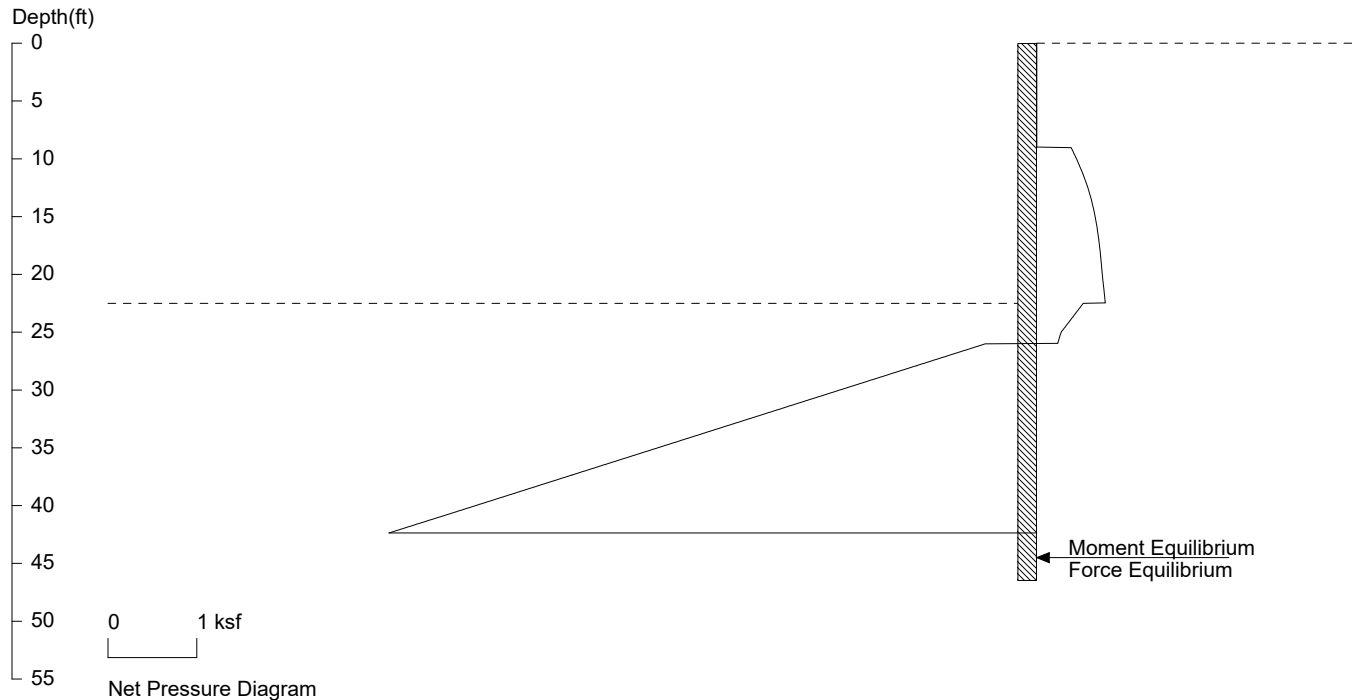
PASSIVE SPACING:

No.	Z depth	Spacing
1	0.00	1.00

UNITS: Width,Spacing,Diameter,Length,and Depth - ft; Force - kip; Moment - kip-ft
Friction,Bearing,and Pressure - ksf; Pres. Slope - kip/ft³; Deflection - in

Butler Street

Section C at CSO Outlet (Sides) UNDRAINED No Piles Revised Mounding (AZ52)



PRESSURE, SHEAR, MOMENT, AND DEFLECTION DIAGRAMS

Based on pile spacing: 1.0 foot or meter

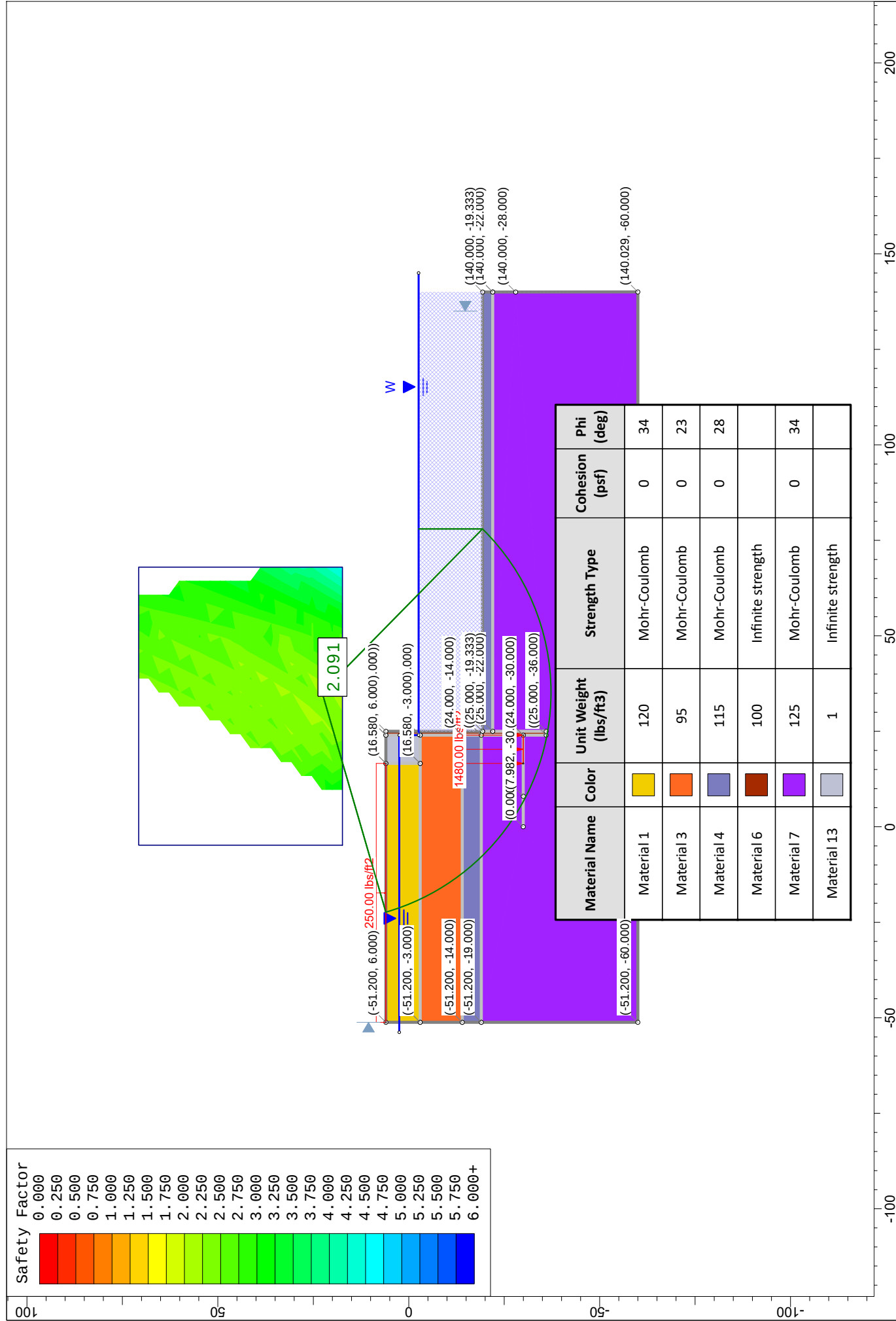
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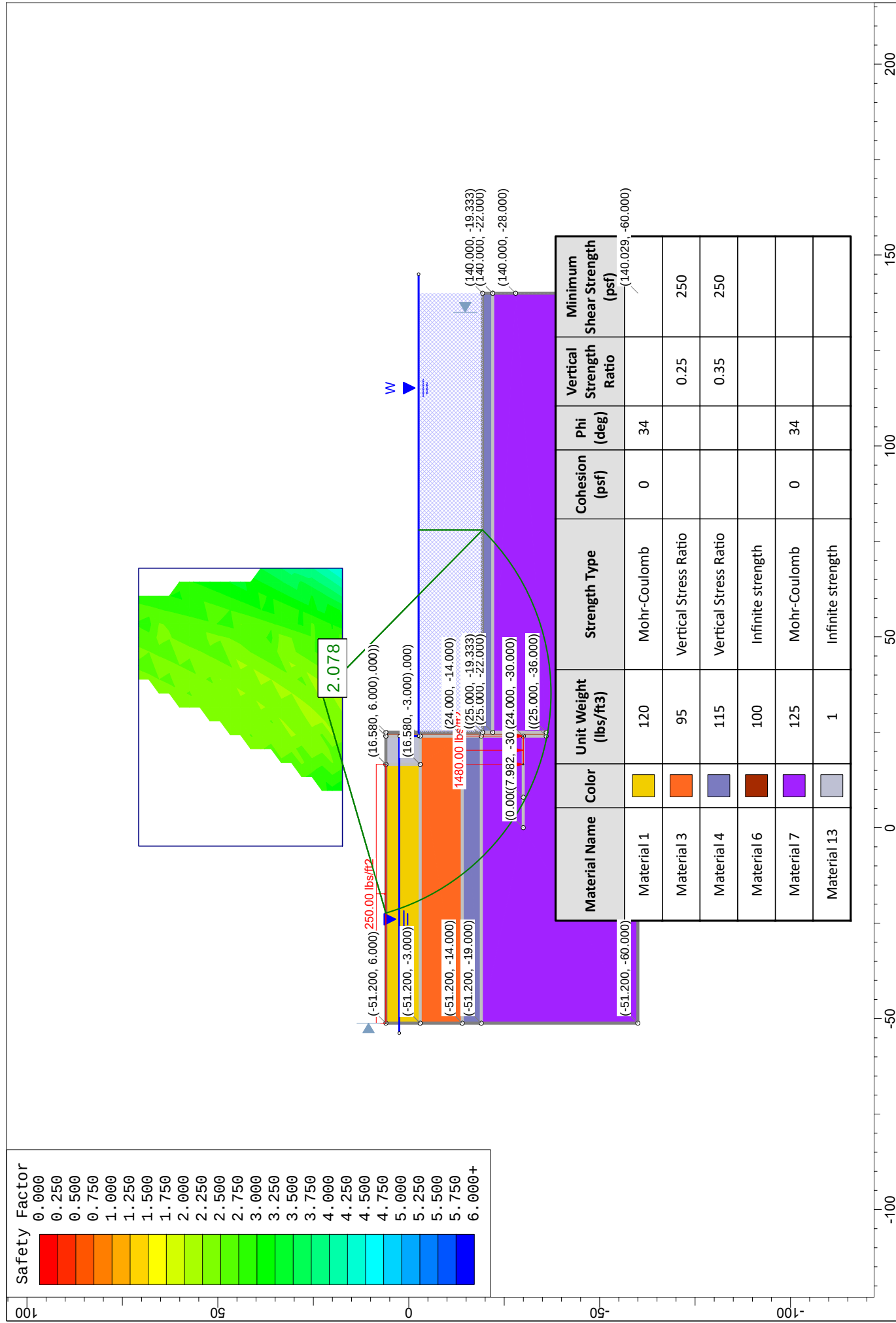
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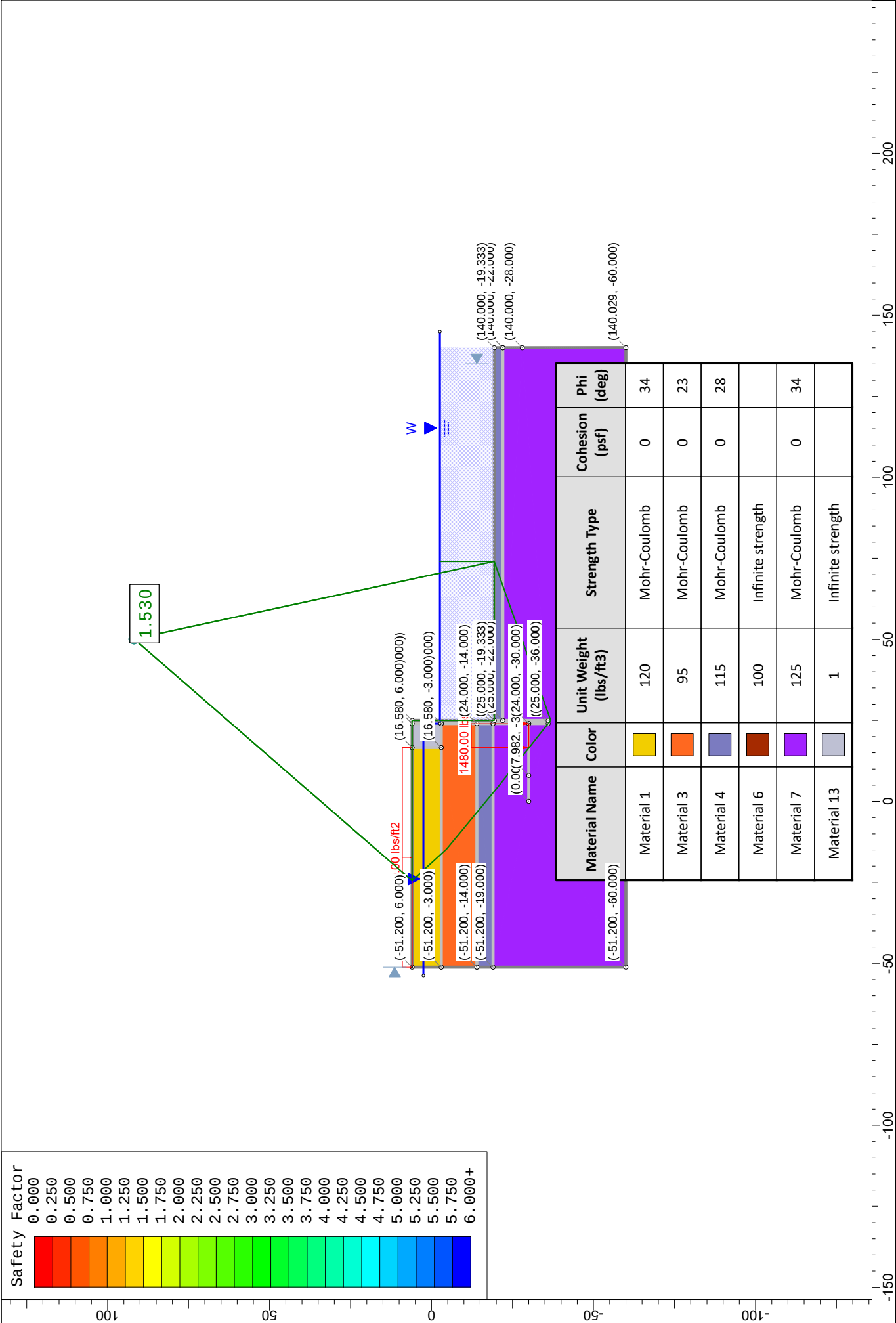
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Project No.	Sys/Fun Code	Discipline Code	Document Type	Sequence No.	Revision No.
749237266	- BH	- S	- CAL	- 004	- D

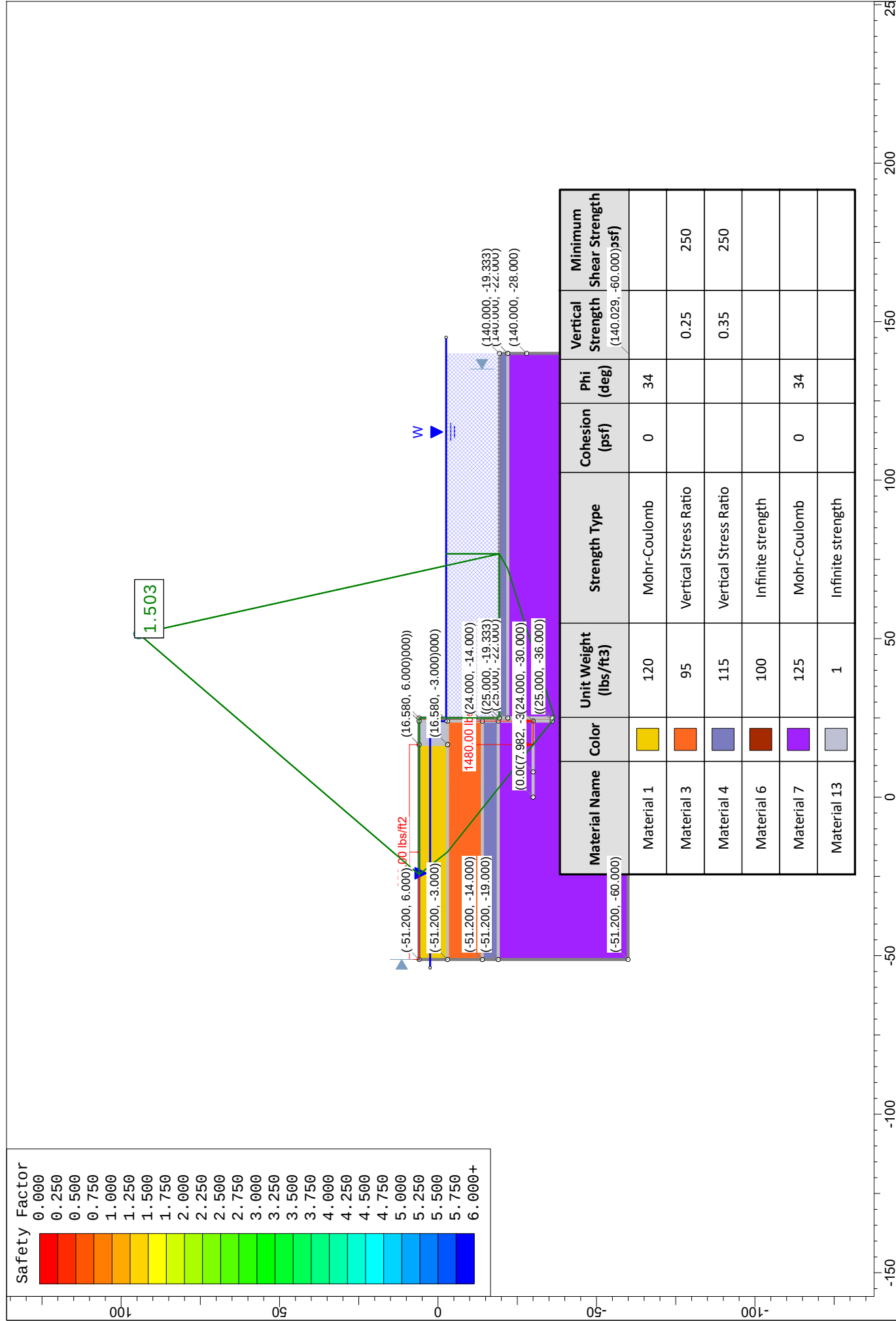
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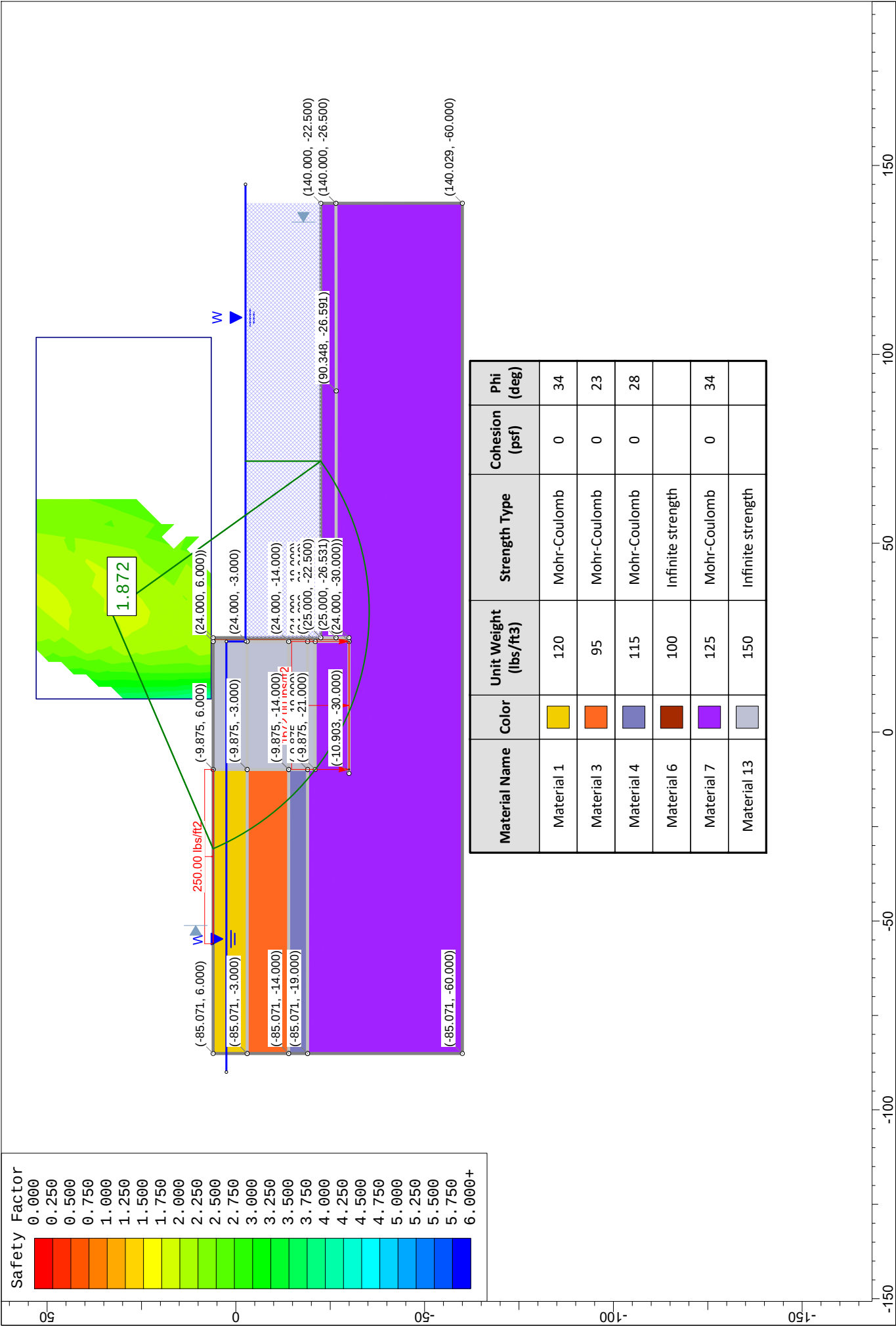
**ATTACHMENT B: GLOBAL SLOPE STABILITY ANALYSES –
SECTIONS A1, A2, B & C**

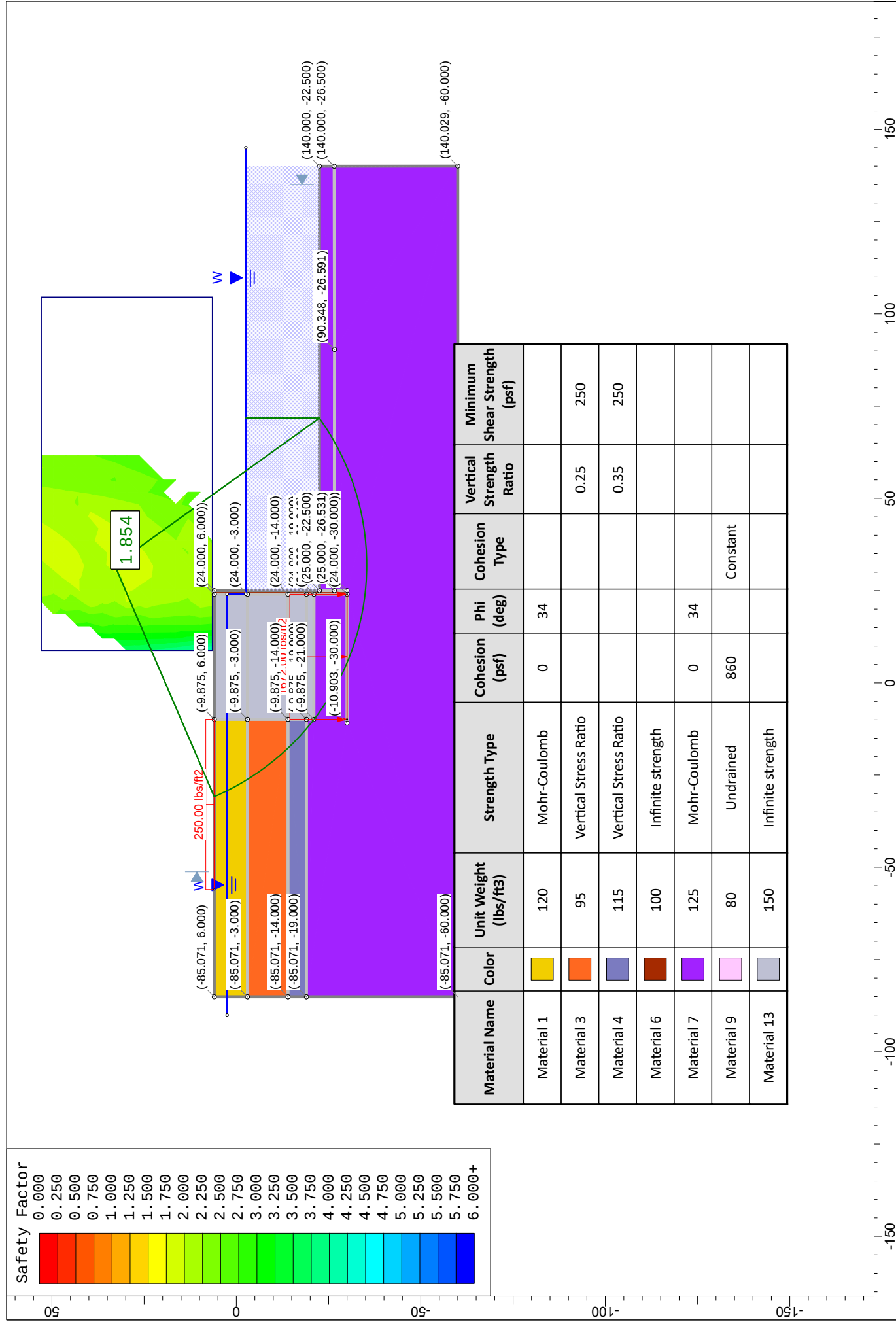


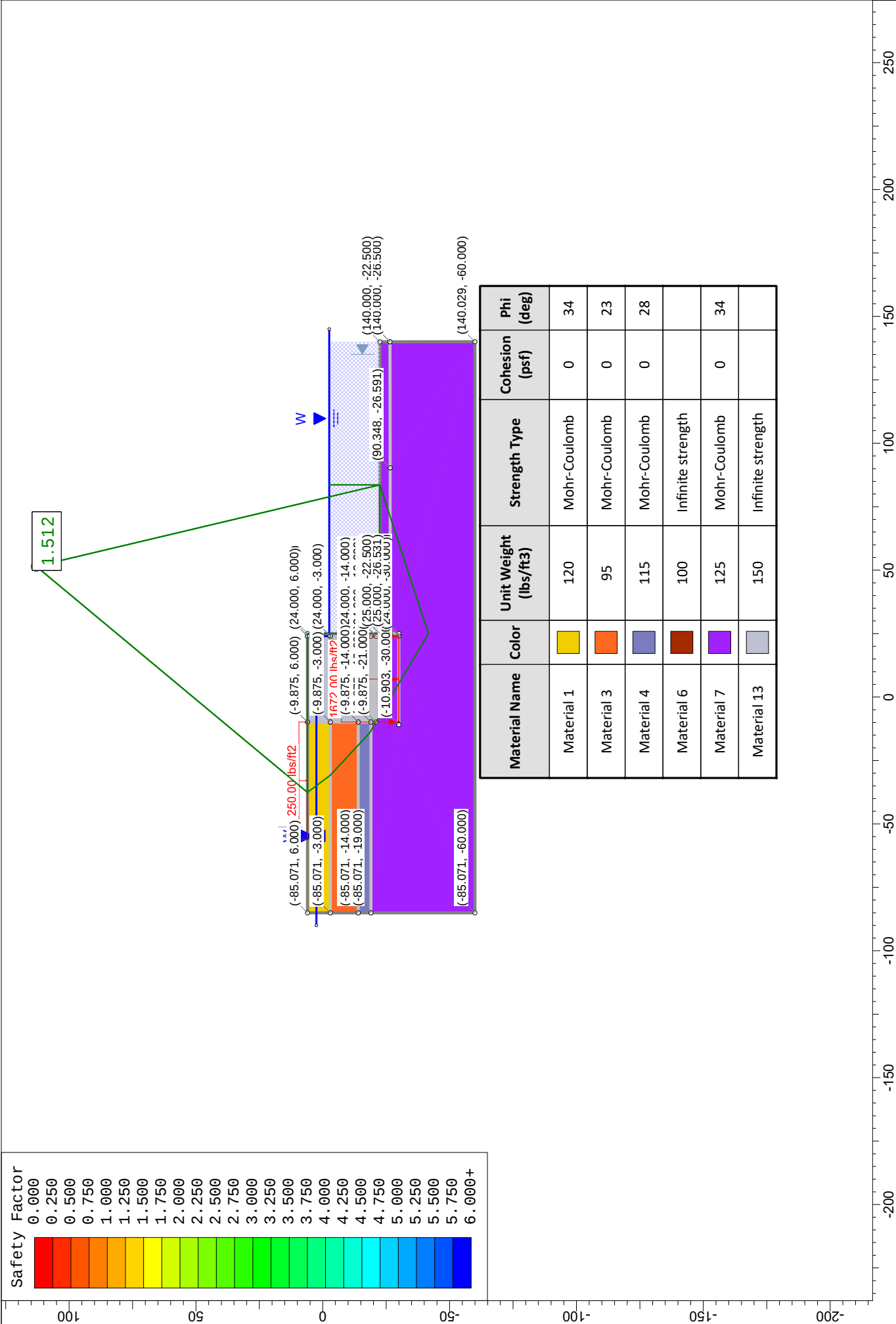


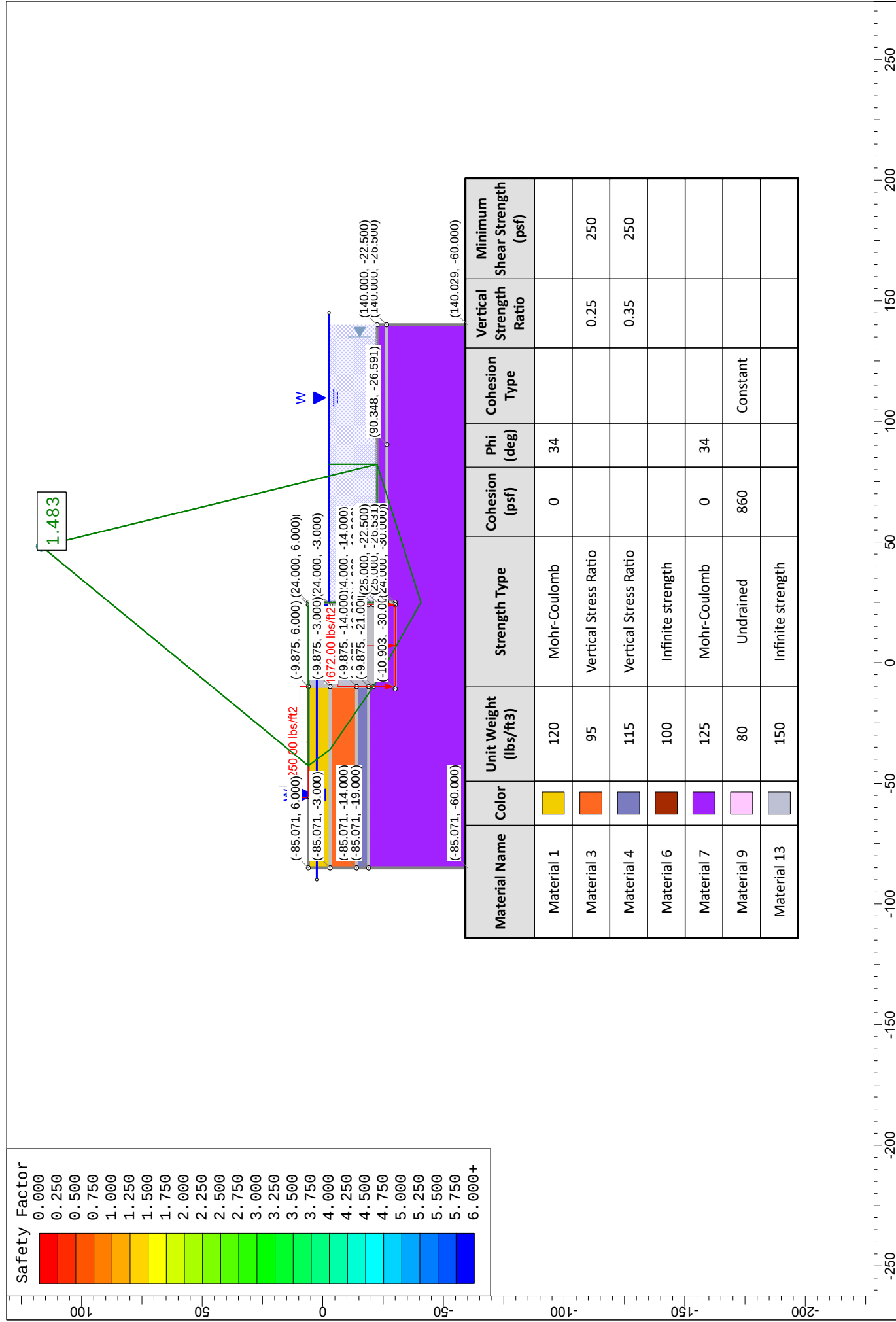


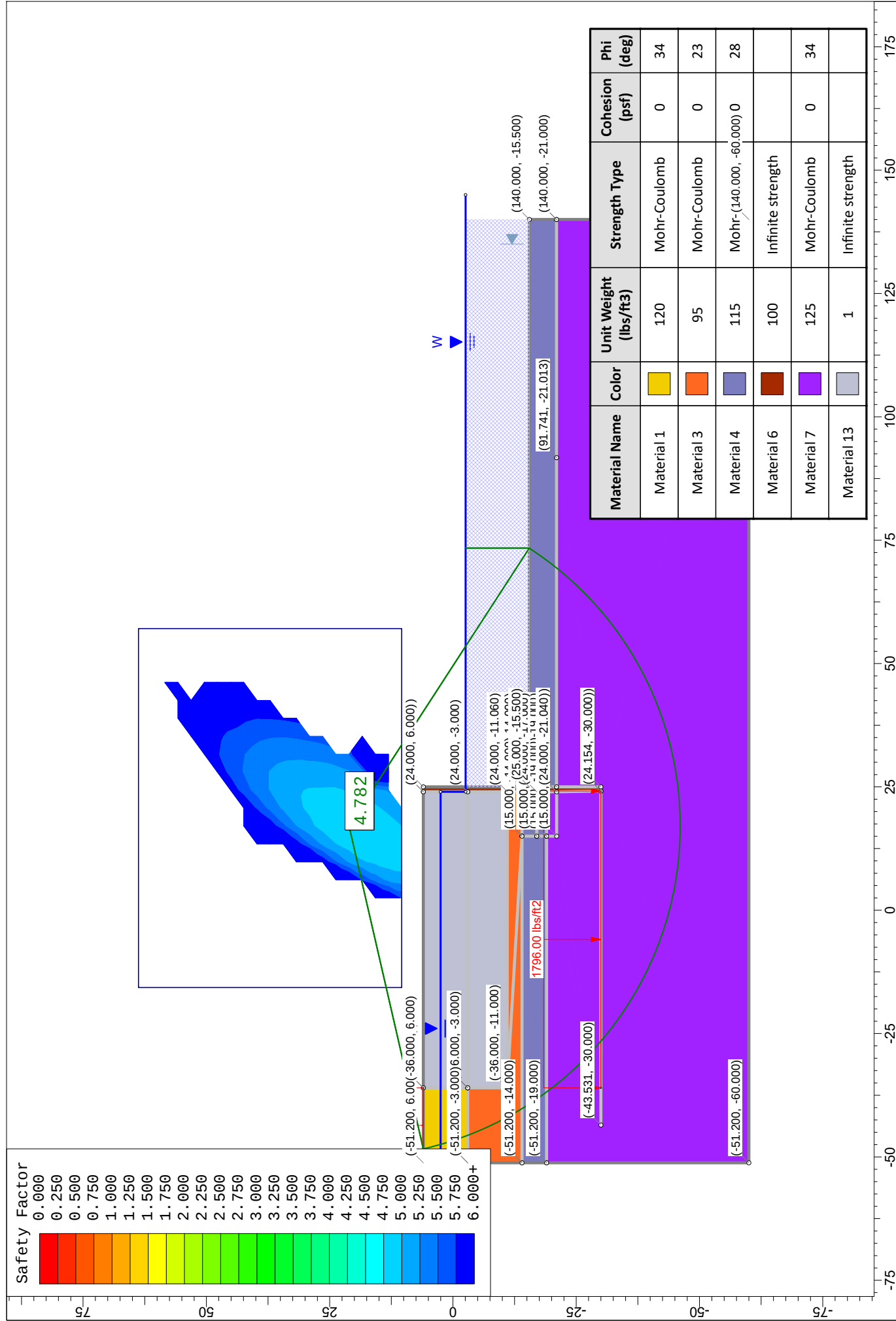


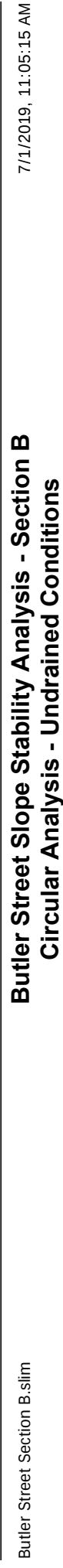


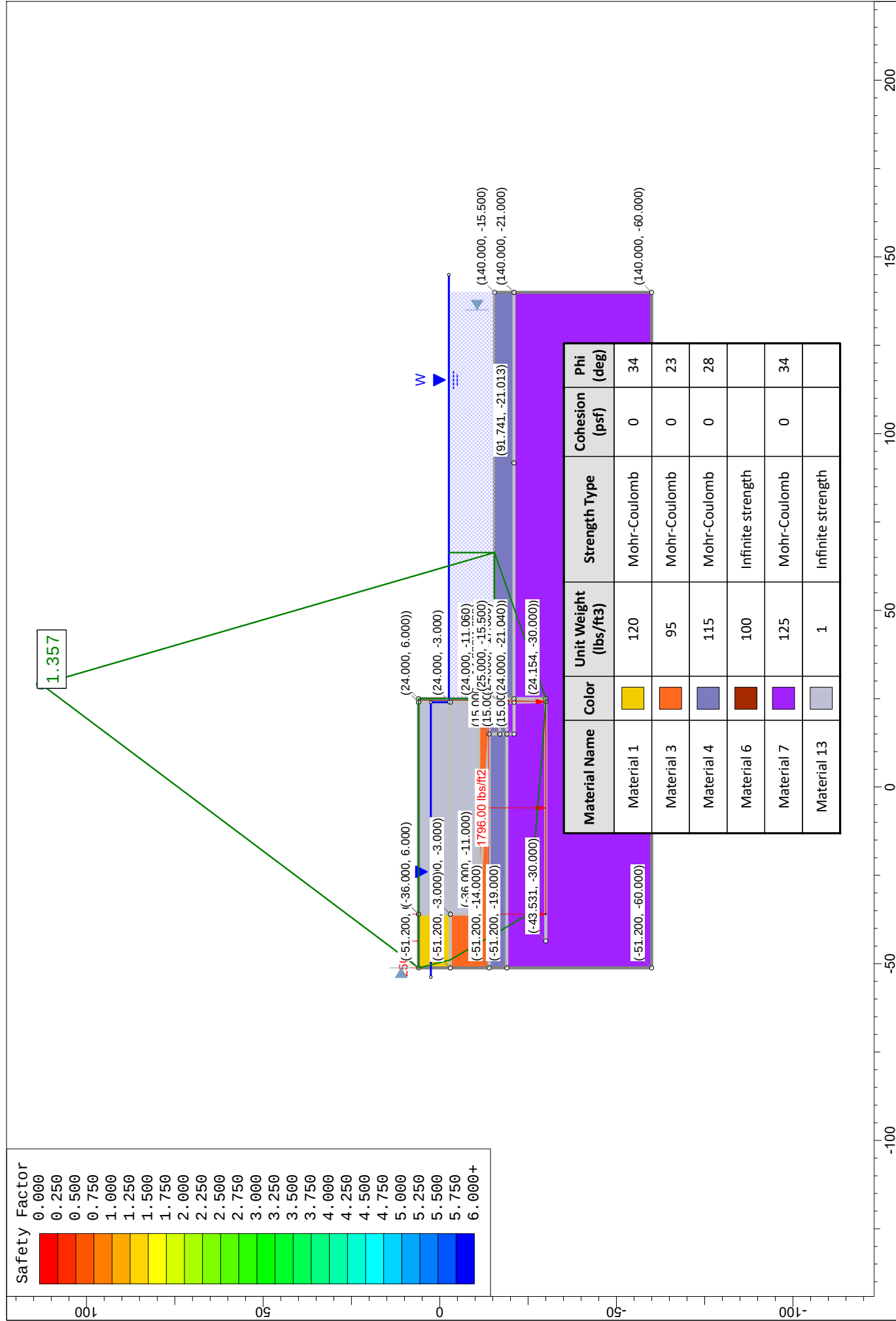




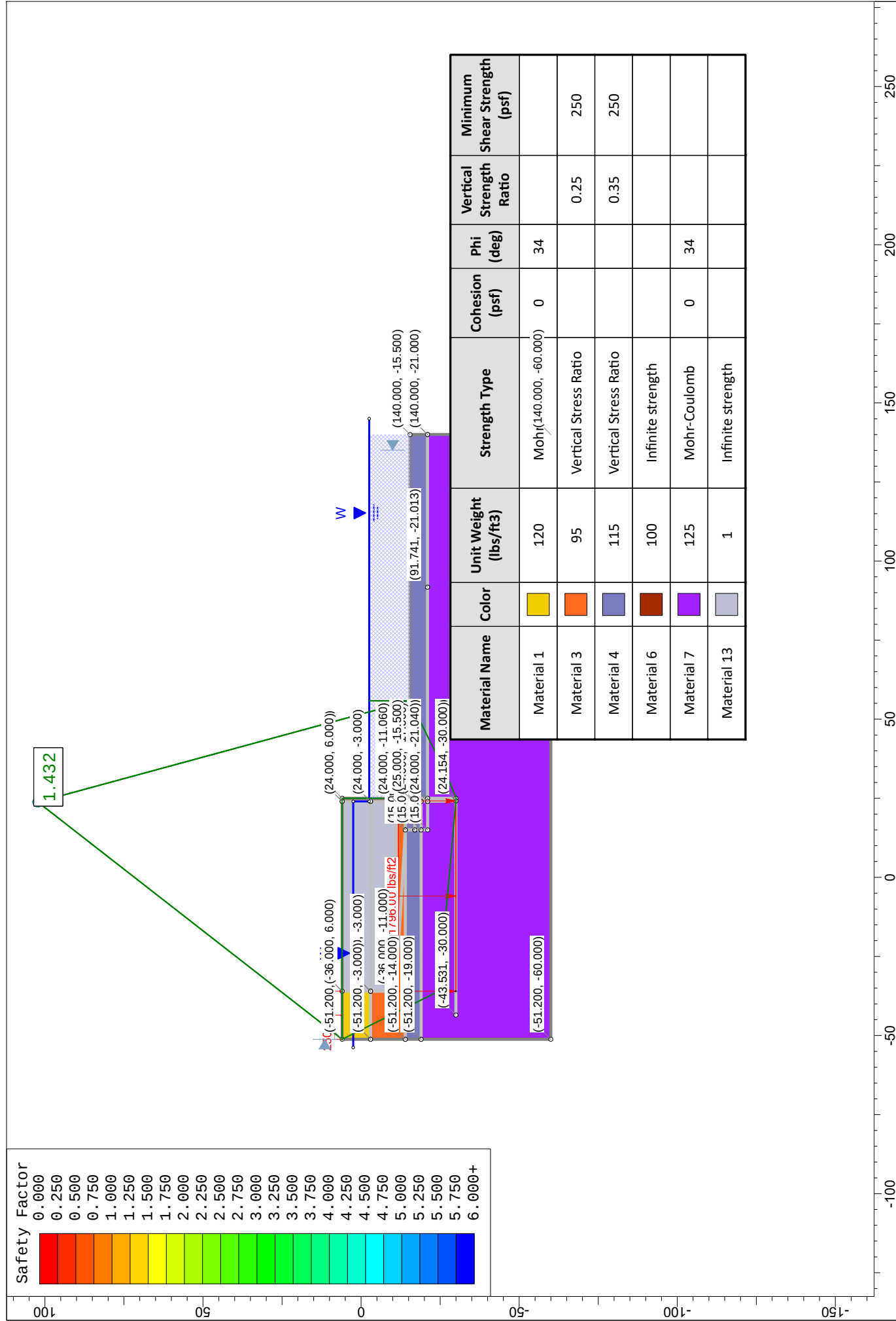




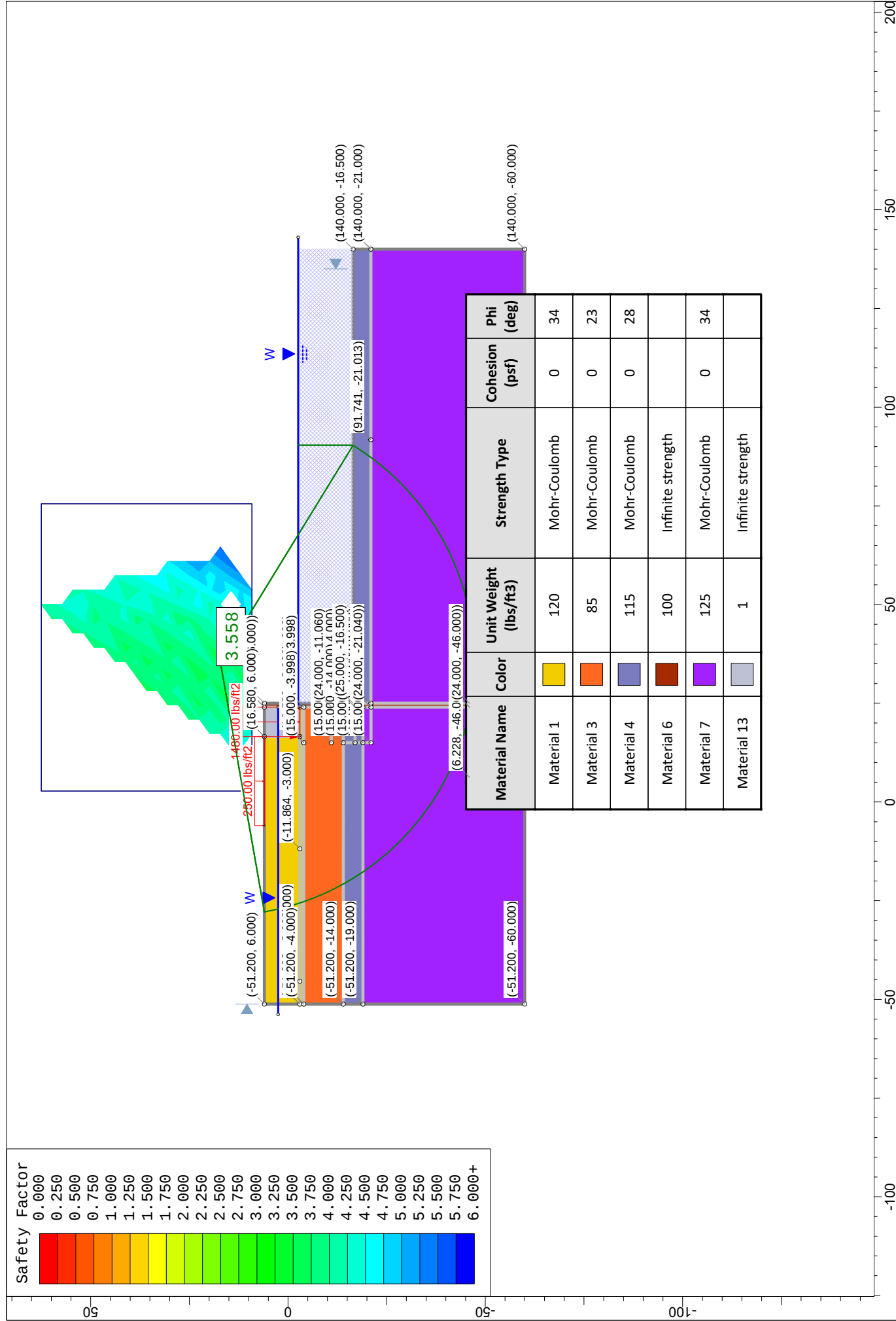




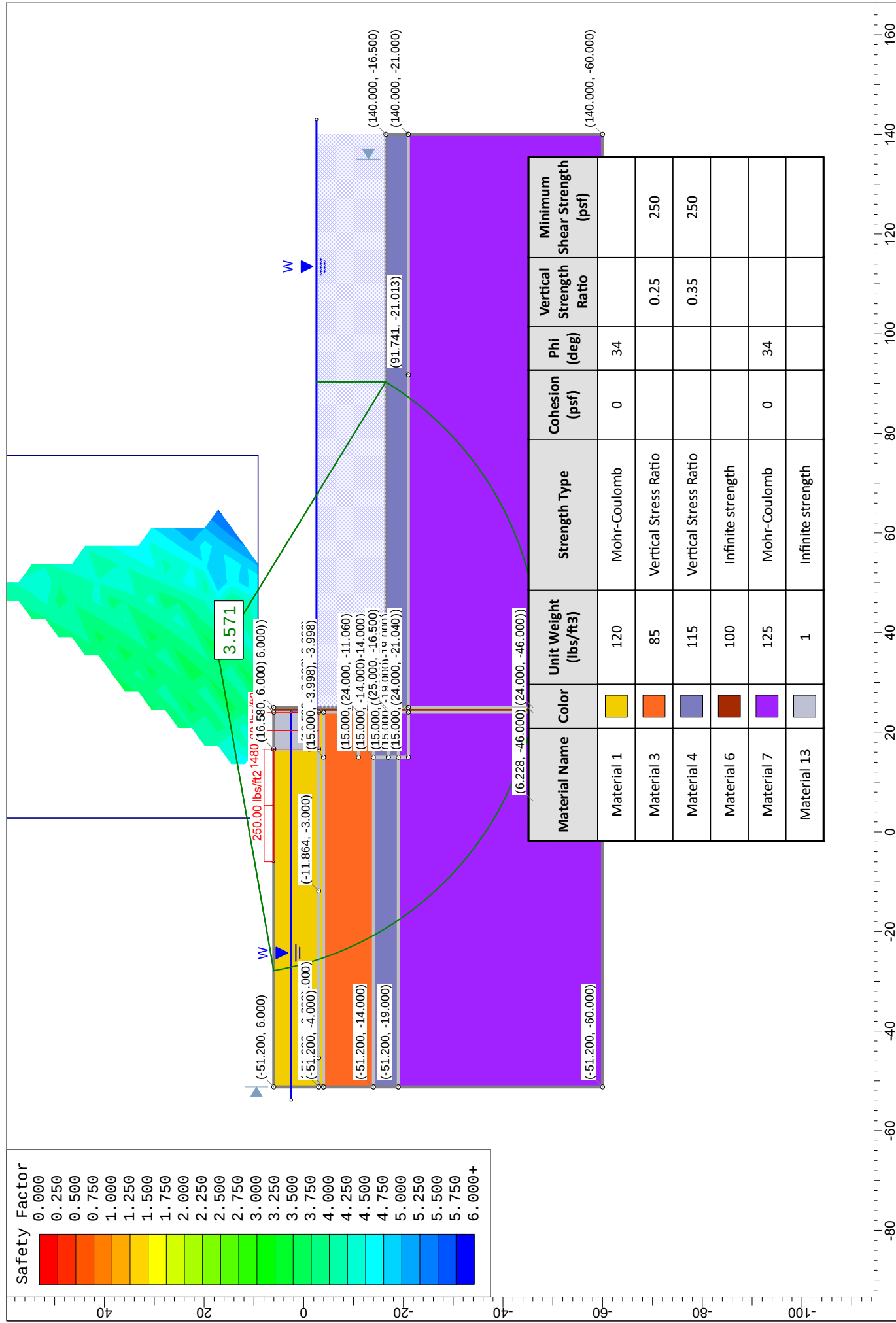
Butler Street Slope Stability Analysis - Section B
Non-Circular Analysis - Drained Conditions



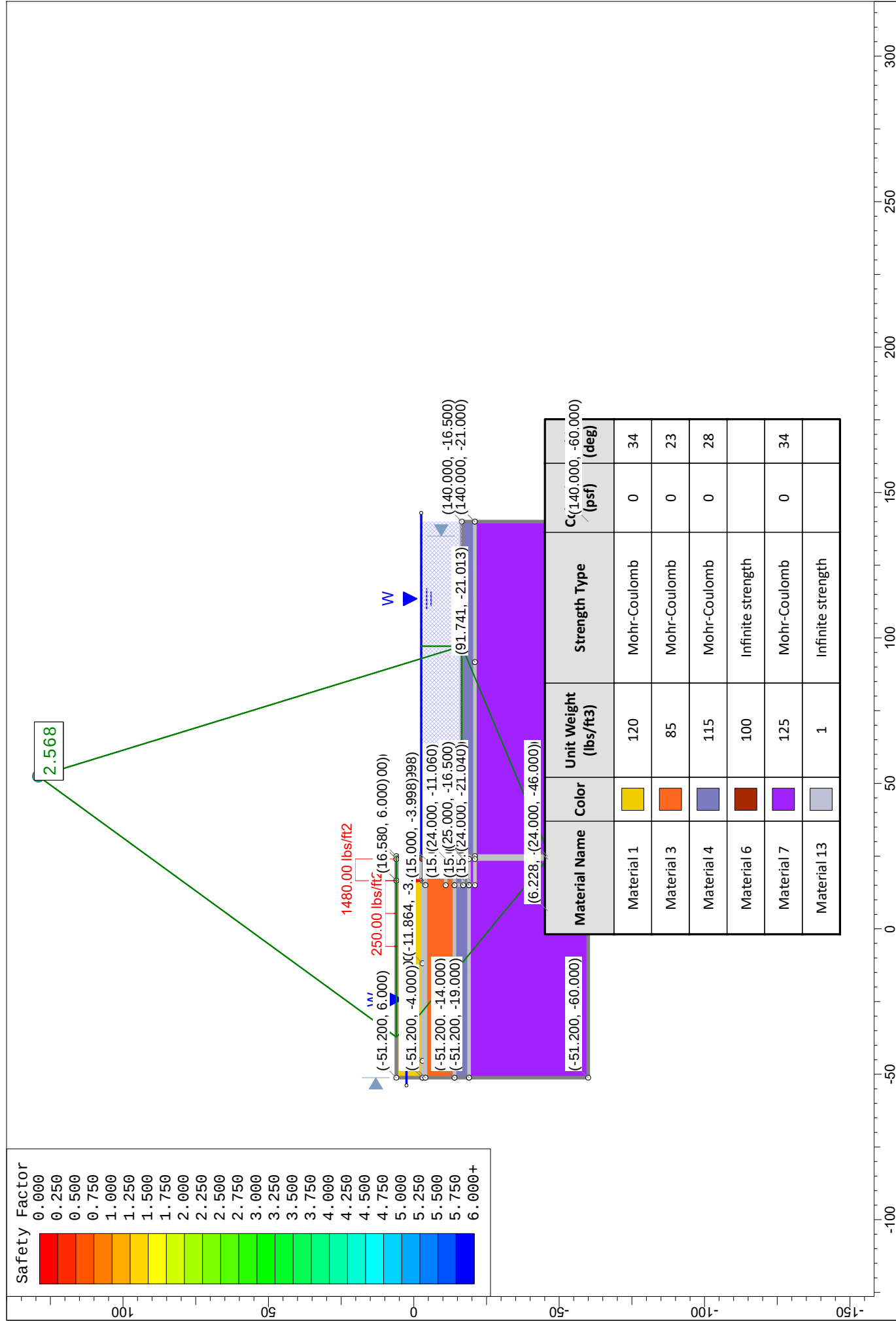
Butler Street Slope Stability Analysis - Section B Non-Circular Analysis - Undrained Conditions



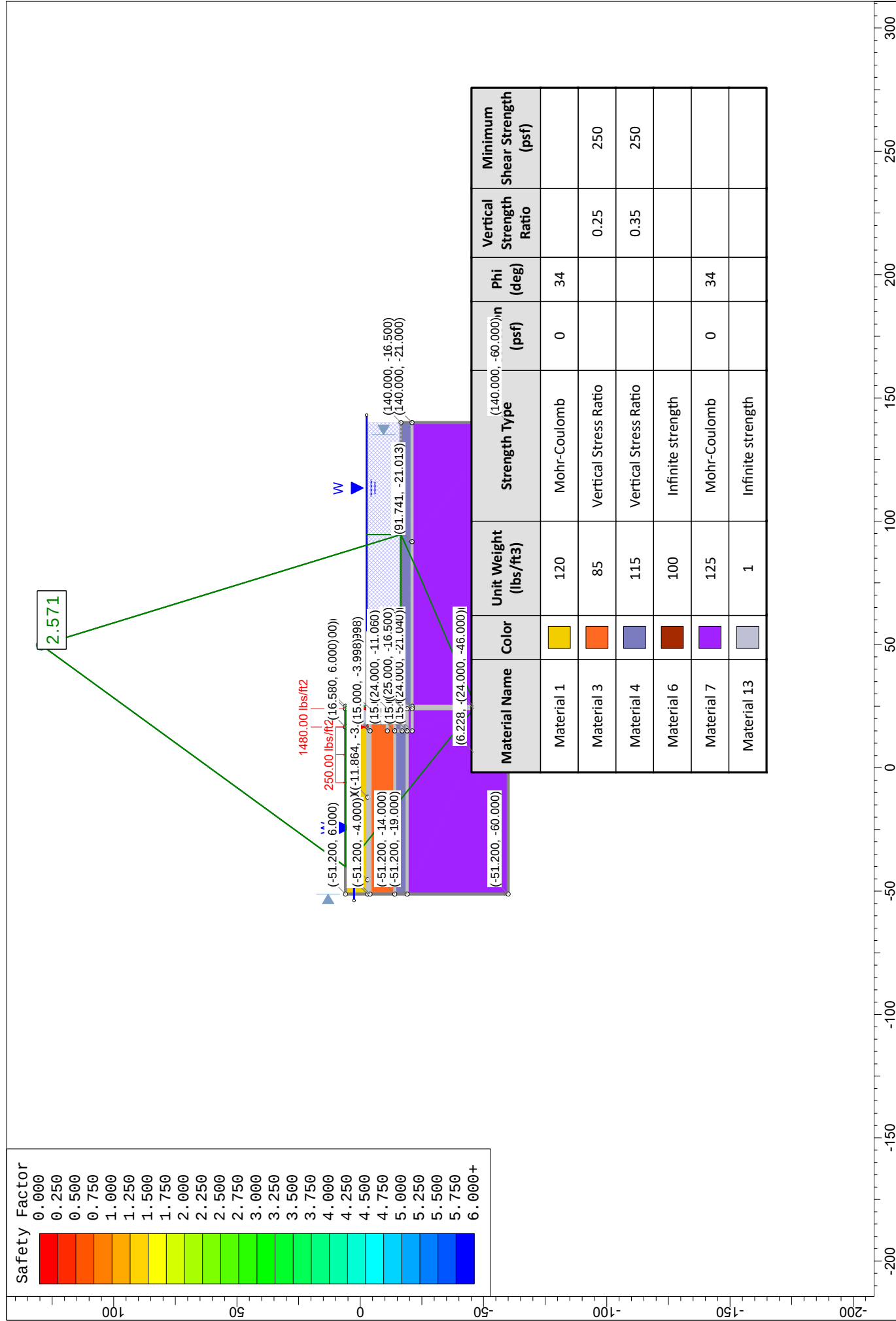
Butler Street Slope Stability Analysis - Section C
Circular Analysis - Drained Conditions



Butler Street Slope Stability Analysis - Section C
Circular Analysis - Undrained Conditions



Butler Street Slope Stability Analysis - Section C
Non-Circular Analysis - Drained Conditions



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		Revision No. D

ATTACHMENT C: LPILE ANALYSES – SECTION A1

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LPILE Analysis

In order to determine whether or not the removal of soil from the canal-side of the existing pile-supported bulkheads (Section A1) will impact the sheet pile bulkhead analyses, LPILE analyses will be performed to determine the approximate amount of lateral deflection that is expected to occur due to the dredging operations. LPILE analyses are not required at Sections A2 & B as the bulkhead structures are supported by (and restrained by) the Flushing Tunnel and the CSO outfall, respectively. An LPILE analysis is not required at Section C (the sides of the CSO outfall as these bulkheads are not assumed to be supported on piles).

In order to simulate the removal of soil from the canal-side of the temporary bulkheads the analyses will include "boundary" and soil conditions which are considered to approximate the postulated weakened soil conditions (due to lack of confinement). These conditions are described below:

Piles & Plank with Weak Soil Layers: This analysis assumes that the two piles and timber plank remain fully effective. However, because of the dredging operations, all of the soils above the Phase III dredge elevation will be modelled as weak soils (due to the loss of confining pressure) by reducing the total unit weight of the effected soils to 80 pcf (the total unit weight of Soft Sediment) as noted in Reference 10.

Soil properties that were not stated in References 10 and 12 were derived using Table 1 (Section 2) of Reference 9.

The analysis results are included below.

LPILE Input Data

Organic Silts (Butler Street)

$$\begin{array}{llllll}
\gamma_{\text{tot}} & = & 95.0 \text{ pcf} & \gamma' & = & 32.6 \text{ pcf} & \phi & = & 23.0 \text{ degrees} \\
\gamma_{\text{red}} & = & 80.0 \text{ pcf} & \gamma'_{\text{red}} & = & 17.6 \text{ pcf} & k & = & 75.0 \text{ pci} \\
c & = & 1.0 \text{ psf} & & & & & & \text{(undrained cohesion conservatively assumed to be negligible)}
\end{array}$$

Depth Range

El. -3.00 feet to El. -14.00 feet ==> 0.00 feet to 11.00 feet below the top of pile/bottom of bulkhead (all analyses)

Natural Alluvial Soils

$$\begin{array}{llllll}
\gamma_{\text{tot}} & = & 115.0 \text{ pcf} & \gamma' & = & 52.6 \text{ pcf} & \phi & = & 28.0 \text{ degrees} \\
\gamma_{\text{red}} & = & 80.0 \text{ pcf} & \gamma'_{\text{red}} & = & 17.6 \text{ pcf} & k & = & 65.0 \text{ pci}
\end{array}$$

Depth Range

El. -14.00 feet to El. -19.00 feet ==> 11.00 feet to 16.00 feet below the top of pile/bottom of bulkhead (full properties)

El. -14.00 feet to El. -19.33 feet ==> 11.00 feet to 16.33 feet below the top of pile/bottom of bulkhead (weak layer)

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Glacial Deposits

$$\begin{aligned} \gamma_{\text{tot}} &= 125.0 \text{ pcf} & \gamma' &= 62.6 \text{ pcf} & \phi &= 34.0 \text{ degrees} \\ \gamma_{\text{red}} &= \text{N/A} & \gamma'_{\text{red}} &= \text{N/A pcf} & k &= 174.0 \text{ pci} \end{aligned}$$

Depth Range

El. -19.00 feet to El. -53.00 feet ==> 16.00 feet to 50.00 feet below the top of pile/bottom of bulkhead (full properties)

El. -19.33 feet to El. -53.00 feet ==> 16.33 feet to 50.00 feet below the top of pile/bottom of bulkhead (weak layer)

Pile Properties

$$\begin{aligned} d &= 12 \text{ in} & \text{Pile Diameter} \\ \\ C_D &= 0.90 & \text{Load Duration Factor (Permanent, Dead Load)} \\ C_t &= 1.00 & \text{Temperature Factor} \\ C_{ct} &= 1.00 & \text{Condition Treatment Factor} \\ C_F &= 1.00 & \text{Size Factor} \\ C_{ls} &= 1.06 & \text{Load Sharing Factor (2 Piles)} \\ C_M &= 1.00 & \text{Wet Service } F_\epsilon \text{ (per Sect 6.3.3)} \\ \\ F_b &= 850 \text{ psi} & \text{Per Table 4D - Use Spruce-Pine-Fir, No. 1 Post \& Timbers (Note: Table 6A is for ASTM-graded timber piles and does not include a listing for spruce)} \\ F'_b &= F_b C_D C_t C_F C_{ls} C_M & \\ &= 810.9 \text{ psi} & \\ E &= 1,300,000 \text{ psi} & \text{Per Table 4D - Use Spruce-Pine-Fir, No. 1 Post \& Timbers (Note: Table 6A is for ASTM-graded timber piles and does not include a listing for spruce)} \\ E' &= E C_t C_M & \\ &= 1,300,000 \text{ psi} & \\ s &= 2.5 \text{ ft} & \text{Pile spacing} \end{aligned}$$

Timber Plank Properties

$$\begin{aligned} t &= 11.38 \text{ in} & \text{Specified plank thickness} \\ b &= 2.50 \text{ ft} & \text{Continuous plank, thus width = pile spacing} \\ &= 30.00 \text{ in} & \\ \\ F'_b &= 810.9 \text{ psi} & \text{Use same values as above} \\ E' &= 1,300,000 \text{ psi} & \text{Use same values as above} \end{aligned}$$



Title:

Bulkhead Analysis - Butler Street

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Single Pile Properties

$$\begin{aligned} A_1 &= (\pi d^2/4) / s \\ &= 45.24 \text{ in}^2 / \text{ft} \end{aligned}$$

$$\begin{aligned} S_1 &= (\pi d^3/32) / s \\ &= 67.86 \text{ in}^3 / \text{ft} \end{aligned}$$

$$\begin{aligned} I_1 &= (\pi d^4/64) / s \\ &= 407.15 \text{ in}^4 / \text{ft} \end{aligned}$$

Timber Plank Properties

$$\begin{aligned} A_p &= b \times t / s \\ &= 136.50 \text{ in}^2 / \text{ft} \end{aligned}$$

$$\begin{aligned} S_p &= (bt^2/6) / s \\ &= 258.78 \text{ in}^3 / \text{ft} \end{aligned}$$

$$\begin{aligned} I_p &= (bt^3/12) / s \\ &= 1471.82 \text{ in}^4 / \text{ft} \end{aligned}$$

Calculate Properties of the Combined Section (2 Piles & Continuous Plank)

$$\begin{aligned} A_{\text{tot}} &= 2A_1 + A_p \\ &= 226.98 \text{ in}^2 / \text{ft} \end{aligned}$$

$$\begin{aligned} S_{\text{tot}} &= 2S_1 + S_p \\ &= 394.50 \text{ in}^3 / \text{ft} \end{aligned}$$

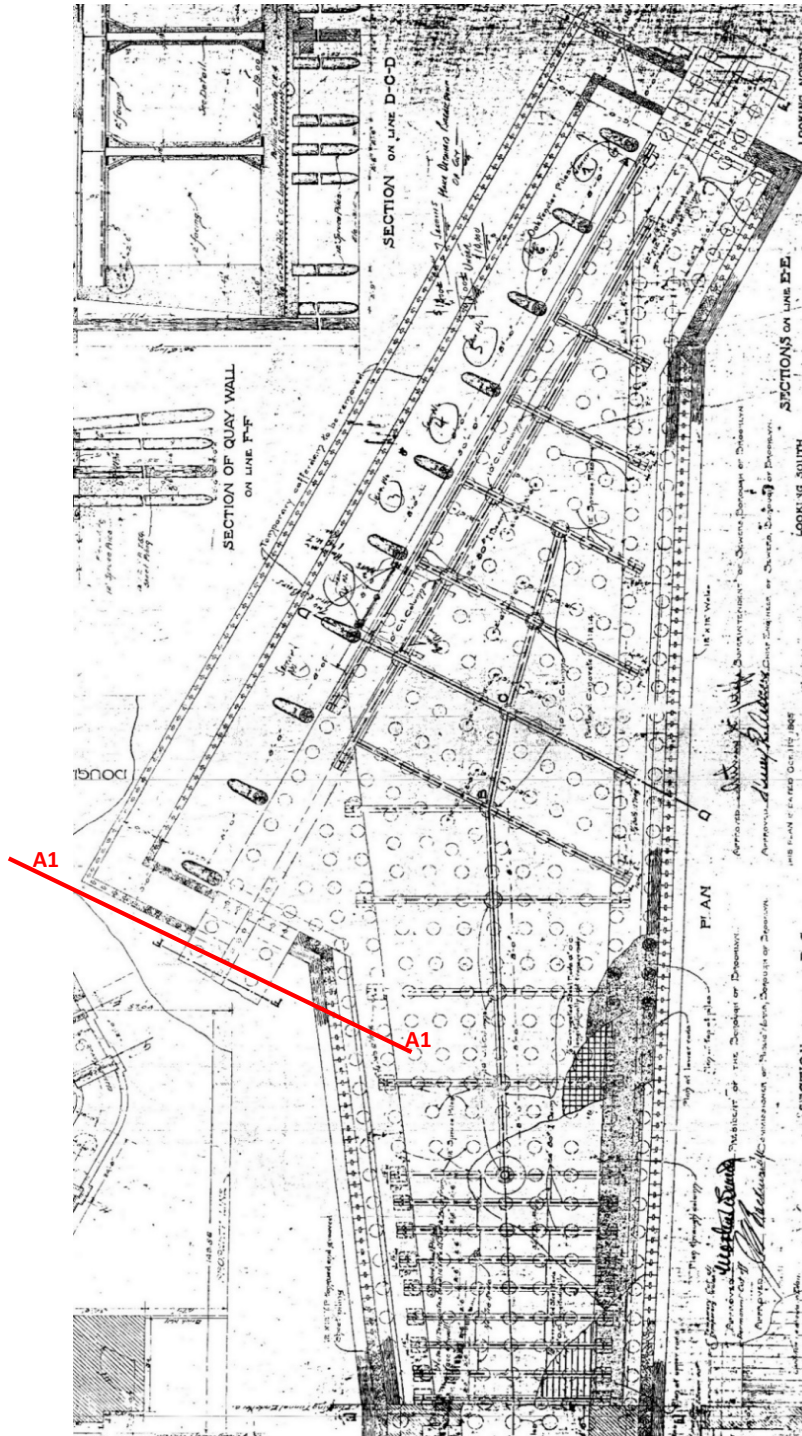
$$\begin{aligned} I_{\text{tot}} &= 2I_1 + I_p \\ &= 2286.12 \text{ in}^4 / \text{ft} \end{aligned}$$

$$\begin{aligned} M_{\text{max}} &= F'_b \times S_{\text{tot}} \\ &= 319,898 \text{ in-lbs} / \text{ft} \end{aligned}$$

CALCULATION NUMBER

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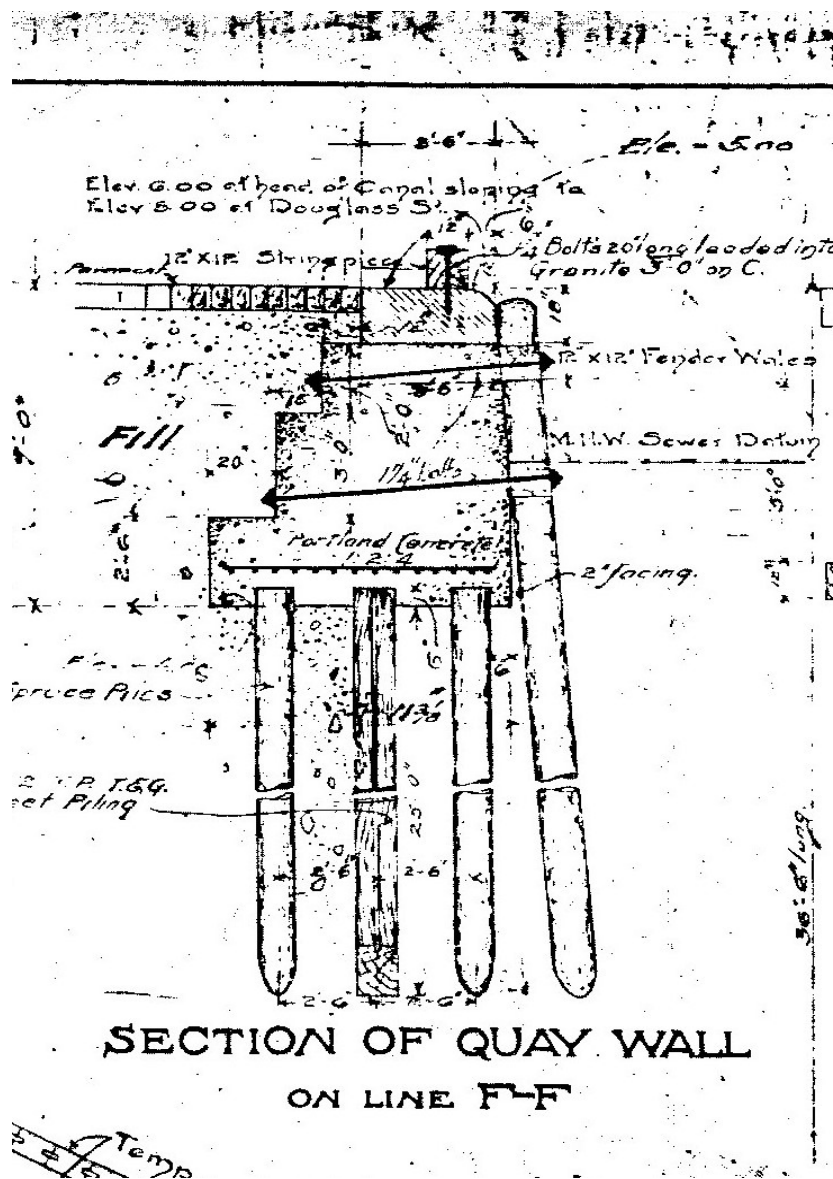
Calculate Total Weight & Surcharge of Butler Street Bulkhead @ Sect A1-A1 (Per Unit Width)



Plan - Flushing Tunnel

		CALCULATION NUMBER								
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Calculate Total Weight & Surcharge of Douglass Street Bulkhead (Per Unit Width)



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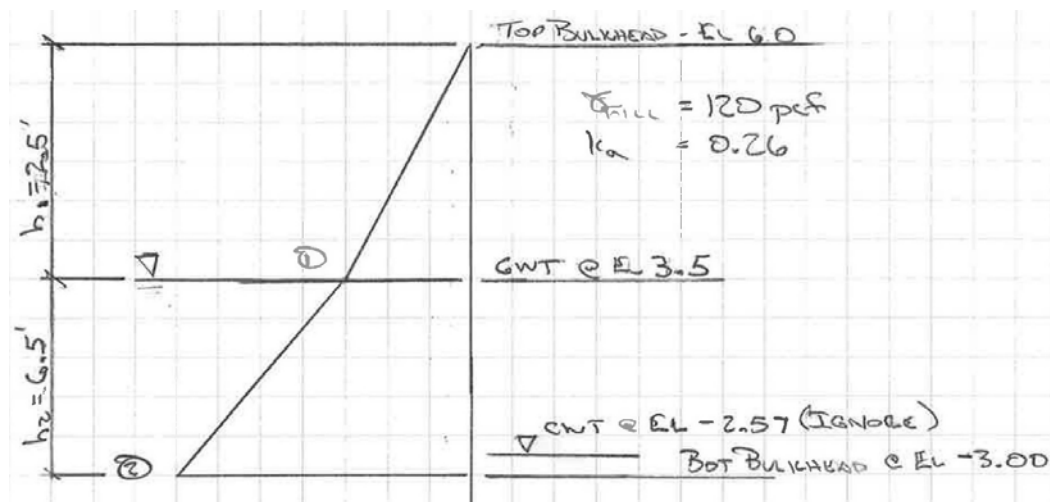
Bulkhead Section Plan Dimensions

L = 7.42 ft, Distance Outlet to Start of Back Wall @ Sect F-F
 W = 1.00 ft, Width at Face of Bulkhead Structure

	No.	Unit Weight	L	W	H	Total Weight
		pcf	ft	ft	ft	kips
Granite Cap	1	175	3.50	1.00	1.50	0.9
Conc Bulkhead 1st Level	1	150	4.50	1.00	2.00	1.4
Conc Bulkhead 2nd Level	1	150	5.75	1.00	3.00	2.6
Conc Bulkhead 3rd Level	1	150	7.42	1.00	2.50	2.8
Brick Paving	1	140	3.92	1.00	0.33	0.2
Fill - Level 1	1	120	2.92	1.00	2.00	0.7
Fill - Level 2	1	120	1.67	1.00	3.00	0.6
Fill - Level 3	1	120	0.00	1.00	2.50	0.0
Total Weight (kips):						9.1

Calculate Lateral Pressures on Bulkhead Due to Soil

Conservatively assume fill to be present behind full depth of bulkhead wall, and ignore beneficial effects of canal water.



Elev.	Depth	Soil	Strata Thickness	K _a	γ _T	γ _w	γ'	γ _{w-canal}	Gradient (kcf)	ΔP ₂ (ksf)	P ₂ Cum (ksf)
6.0	0.0	Ground Surface									0.000
3.5	2.5	Fill (Above GWT)	2.50	0.26	120	0	120	0	0.031	0.078	0.078
-3.0	9.0	Fill (Below GWT)	6.50	0.26	120	62.4	57.6	0	0.077	0.503	0.581

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Project No.		Sys/Fun Code		Discipline Code		Document Type		Sequence No.		Revision No.	
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Calculate Total Pressure on Wall using Data from Table above

$$\begin{aligned}
h_1 &= 2.5 \text{ ft} \\
h_2 &= 6.5 \text{ ft} \\
p_1 &= 0.078 \text{ ksf} \\
p_2 &= 0.581 \text{ ksf}
\end{aligned}$$

$$\begin{aligned}
k_a &= 0.26 && \text{Active pressure coefficient for fill} \\
q &= 0.250 \text{ ksf} && \text{vehicular surcharge} \\
q_h &= k_a \times q && \text{horizontal component of vehicular surcharge} \\
&= 0.065
\end{aligned}$$

$$\begin{aligned}
H_{\text{tot}} &= (0.5 \times h_1 \times p_1) + [0.5 \times (p_1 + p_2) \times h_2] + [q_h \times (h_1 + h_2)] \\
&= 2.824 \text{ klf}
\end{aligned}$$

$$P_{\text{tot}} = 9.1 \text{ klf} \quad (\text{from above})$$

Comparison of LPile Results vs Design Deflections

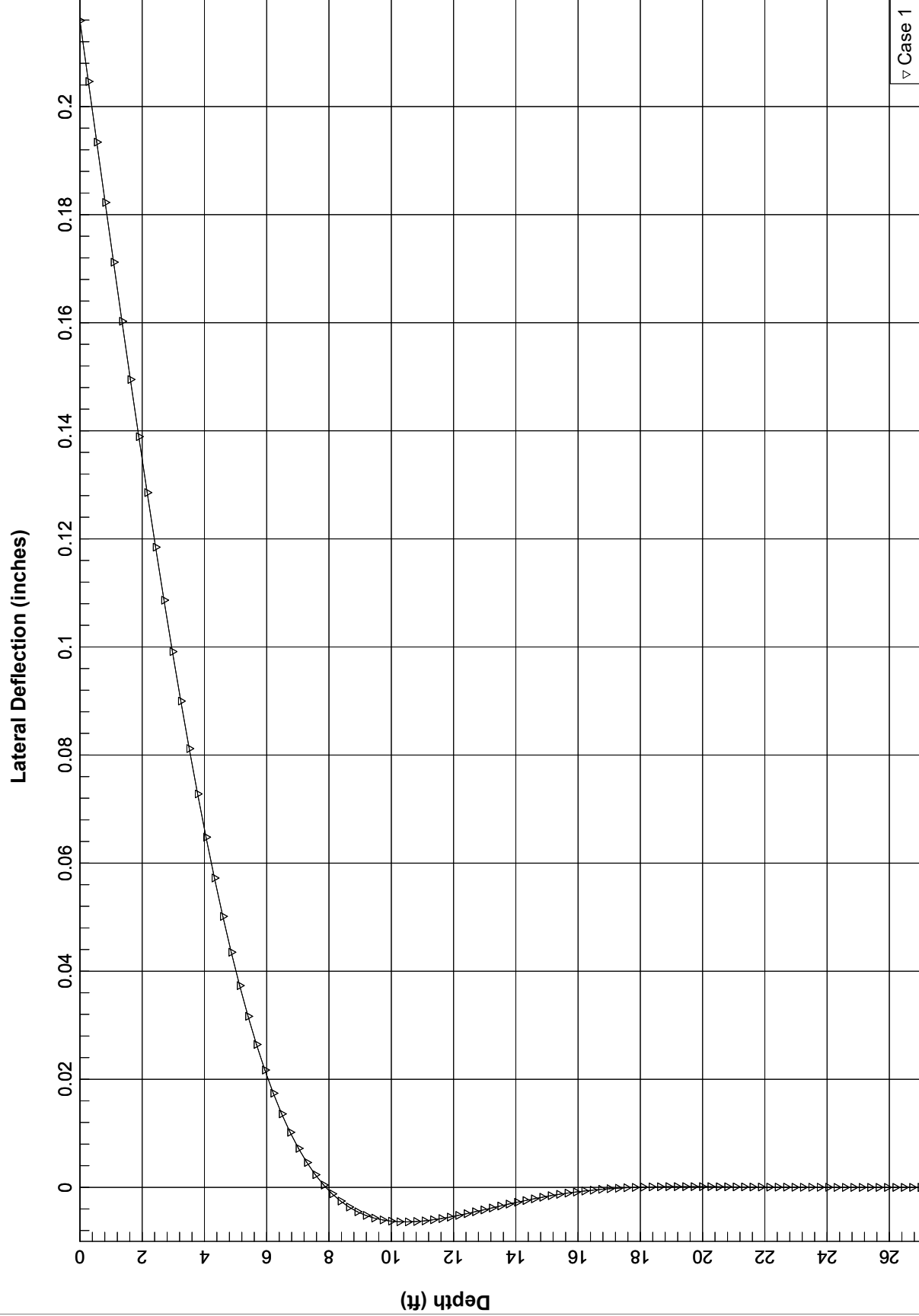
	Sheet Pile Bulkhead Deflection (ShoringSuite)	Exist Bulkhead Deflection (LPile)
Butler Street Section A1 Weak Layer Analysis	0.596 in	0.216 in

See Shoring Suite Analysis Report for Section A1, Phase III, Drained Conditions (Depth = 8.97 ft) in Attachment A.

Conclusion:

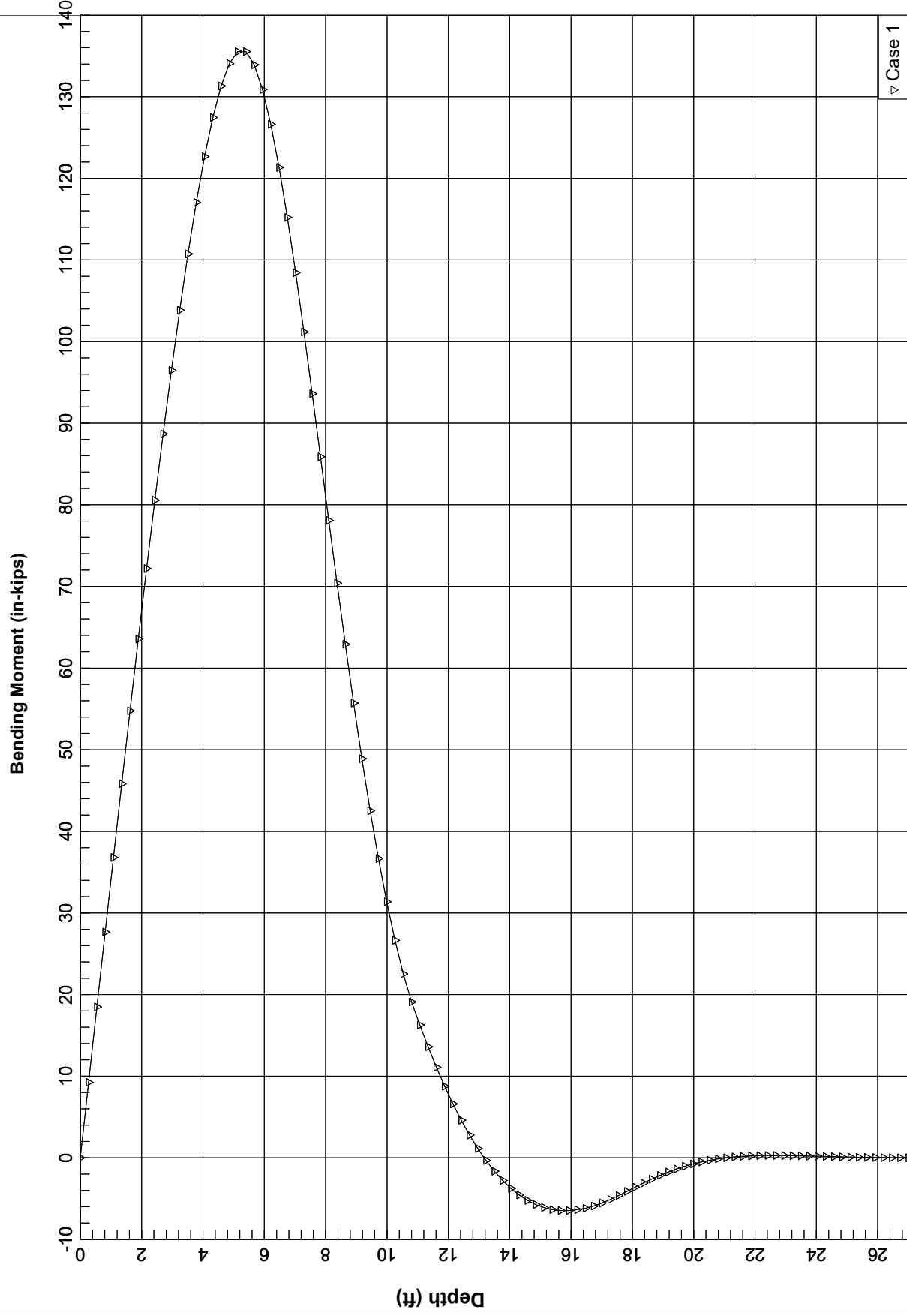
As the deflections of the existing bulkhead due to soil loads behind the structure are less than the expected sheet pile bulkhead deflections, it can be concluded that the potential movement of the existing bulkhead will not result in additional load being applied to the sheet pile bulkhead wall.

Butler St Section A1 - Phase III - Weak Layer Analysis



▽ Case 1

Butler St Section A1 - Phase III - Weak Layer Analysis



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LPile Plus for Windows, Version 2012-06.037

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Gregory E Brown
APTIM

Serial Number of Security Device: 164279214
Company Name Stored in Security Device: Chicago Bridge & Iron Company

Files Used for Analysis

Path to file locations: C:\Users\Gregory.Brown\Desktop\LPile Analyses\
Name of input data file: Butler St Section A1 (Piles & Plank-Weak Ph III Layer)-2020.01.14.lp6d
Name of output report file: Butler St Section A1 (Piles & Plank-Weak Ph III Layer)-2020.01.14.lp6o
Name of plot output file: Butler St Section A1 (Piles & Plank-Weak Ph III Layer)-2020.01.14.lp6p
Name of runtime message file: Butler St Section A1 (Piles & Plank-Weak Ph III Layer)-2020.01.14.lp6r

Date and Time of Analysis

Date: January 14, 2020 Time: 14:38:01

Problem Title

Project Name: Gowanus RTA-1

Job Number: Douglass Street - Section B

Client: Gowanus RTA Trust

Engineer:

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for section types with nonlinear properties.

Computation Options:

- Analysis does not use p-y multipliers (individual pile or shaft only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix values
- Report pile response for full length of pile
- Analysis assumes no loading by soil movements acting on pile
- No p-y curves to be computed and reported for user-specified depths

Solution Control Parameters:

- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:

- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total number of pile sections = 1

Total length of pile = 27.00 ft

Depth of ground surface below top of pile = 0.00 ft

Pile diameter values used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	12.0000000
2	27.000000	12.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type	= Elastic with Specified Moment Capacity
Cross-sectional Shape	= Embedded Circular Pole
Section Length	= 27.00000000 ft
Top Width	= 12.00000000 in
Bottom Width	= 12.00000000 in
Top Area	= 226.98000000 Sq. in
Bottom Area	= 226.98000000 Sq. in
Moment of Inertia at Top	= 2286.12000000 in^4
Moment of Inertia at Bottom	= 2286.12000000 in^4
Drilled Hole Diameter	= 12.00000000 in
Elastic Modulus	= 130000. lbs/in^2
Top Plastic Moment Capacity	= 319898. in-lb
Bot Plastic Moment Capacity	= 319898. in-lb

Ground Slope and Pile Batter Angles

Ground Slope Angle	= 0.000 degrees
	= 0.000 radians
Pile Batter Angle	= 0.000 degrees
	= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is cemented silt with cohesion and friction

Distance from top of pile to top of layer	= 0.0000 ft
Distance from top of pile to bottom of layer	= 11.00000 ft
Effective unit weight at top of layer	= 17.60000 pcf
Effective unit weight at bottom of layer	= 17.60000 pcf

Undrained cohesion at top of layer	=	1.00000	psf
Undrained cohesion at bottom of layer	=	1.00000	psf
Friction angle at top of layer	=	23.00000	deg.
Friction angle at bottom of layer	=	23.00000	deg.
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	
Subgrade k at top of layer	=	75.00000	pci
Subgrade k at bottom of layer	=	75.00000	pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	11.00000	ft
Distance from top of pile to bottom of layer	=	16.33000	ft
Effective unit weight at top of layer	=	17.60000	pcf
Effective unit weight at bottom of layer	=	17.60000	pcf
Friction angle at top of layer	=	28.00000	deg.
Friction angle at bottom of layer	=	28.00000	deg.
Subgrade k at top of layer	=	65.00000	pci
Subgrade k at bottom of layer	=	65.00000	pci

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	16.33000	ft
Distance from top of pile to bottom of layer	=	50.00000	ft
Effective unit weight at top of layer	=	62.60000	pcf
Effective unit weight at bottom of layer	=	62.60000	pcf
Friction angle at top of layer	=	34.00000	deg.
Friction angle at bottom of layer	=	34.00000	deg.
Subgrade k at top of layer	=	174.00000	pci
Subgrade k at bottom of layer	=	174.00000	pci

(Depth of lowest soil layer extends 23.00 ft below pile tip)

**** Warning - Possible Input Data Error ****

Values entered for effective unit weights of soil were outside

the limits of 0.0111574 pci (20 pcf) or 0.0810019 pci (140 pcf)
This data may be erroneous. Please check your data.

Summary of Soil Properties

Layer Num.	Layer Soil Type (p-y Curve Criteria)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	Strain Factor Epsilon 50	kpy pci
1	Cemented Silt	0.00	17.600	1.000	23.000	default	75.000
2	Sand (Reese, et al.)	11.000	17.600	1.000	23.000	default	75.000
		11.000	17.600	--	28.000	--	65.000
		16.330	17.600	--	28.000	--	65.000
3	Sand (Reese, et al.)	16.330	62.600	--	34.000	--	174.000
		50.000	62.600	--	34.000	--	174.000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 2824.00000 lbs	M = 0.0000 in-lbs	9100.00000000	Yes

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic-plastic section properties

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 2824.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 9100.000 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es* lb/inch	Distrib. Lat. Load lb/inch
0.00	0.2159	-3.929E-08	2824.0000	-0.003475	40.0916	2.972E+09	0.000	0.000	0.000

0.270	0.2047	9252.2199	2820.3462	-0.003470	64.3744	2.972E+09	-2.2554	35.7071	0.000
0.540	0.1934	18480.	2810.3307	-0.003455	88.5943	2.972E+09	-3.9270	65.7802	0.000
0.810	0.1823	27667.	2794.6951	-0.003430	112.7043	2.972E+09	-5.7246	101.7622	0.000
1.080	0.1712	36792.	2772.7325	-0.003395	136.6544	2.972E+09	-7.8326	148.2339	0.000
1.350	0.1603	45834.	2743.3287	-0.003350	160.3855	2.972E+09	-10.3178	208.5885	0.000
1.620	0.1495	54767.	2705.1409	-0.003295	183.8285	2.972E+09	-13.2549	287.2732	0.000
1.890	0.1389	63558.	2656.5772	-0.003230	206.9017	2.972E+09	-16.7227	390.0286	0.000
2.160	0.1286	72172.	2595.6940	-0.003156	229.5088	2.972E+09	-20.8596	525.6975	0.000
2.430	0.1185	80564.	2520.0327	-0.003073	251.5351	2.972E+09	-25.8449	706.8606	0.000
2.700	0.1086	88683.	2426.8873	-0.002981	272.8426	2.972E+09	-31.6523	943.8939	0.000
2.970	0.0991	96466.	2313.1519	-0.002880	293.2705	2.972E+09	-38.5547	1259.9013	0.000
3.240	0.0900	103842.	2175.9505	-0.002771	312.6280	2.972E+09	-46.1376	1661.1739	0.000
3.510	0.0812	110730.	2012.1938	-0.002654	330.7056	2.972E+09	-54.9468	2192.6106	0.000
3.780	0.0728	117037.	1817.2951	-0.002530	347.2600	2.972E+09	-65.3610	2909.2454	0.000
4.050	0.0648	122655.	1585.9275	-0.002399	362.0038	2.972E+09	-77.4585	3872.7520	0.000
4.320	0.0572	127456.	1314.5679	-0.002263	374.6031	2.972E+09	-90.0474	5096.3874	0.000
4.590	0.0501	131307.	999.4489	-0.002122	384.7108	2.972E+09	-104.4705	6750.5822	0.000
4.860	0.0435	134057.	634.0666	-0.001977	391.9291	2.972E+09	-121.0741	9017.9926	0.000
5.130	0.0373	135532.	211.1580	-0.001830	395.8003	2.972E+09	-139.9806	12149.	0.000
5.400	0.0316	135533.	-264.7336	-0.001682	395.8034	2.972E+09	-153.7796	15746.	0.000
5.670	0.0264	133916.	-732.3586	-0.001535	391.5583	2.972E+09	-134.8778	16534.	0.000
5.940	0.0217	130878.	-1138.7358	-0.001391	383.5858	2.972E+09	-115.9723	17321.	0.000
6.210	0.0174	126619.	-1484.3147	-0.001251	372.4071	2.972E+09	-97.3480	18108.	0.000
6.480	0.0136	121334.	-1770.4101	-0.001115	358.5357	2.972E+09	-79.2541	18896.	0.000
6.750	0.0102	115212.	-1999.0850	-0.000986	342.4704	2.972E+09	-61.9033	19683.	0.000
7.020	0.007197	108438.	-2173.0320	-0.000865	324.6899	2.972E+09	-45.4714	20470.	0.000
7.290	0.004587	101182.	-2295.4544	-0.000750	305.6475	2.972E+09	-30.0980	21258.	0.000
7.560	0.002335	93607.	-2369.9519	-0.000644	285.7673	2.972E+09	-15.8881	22045.	0.000
7.830	0.000413	85863.	-2400.4106	-0.000546	265.4415	2.972E+09	-2.9136	22832.	0.000
8.100	-0.001205	78085.	-2390.9006	-0.000457	245.0281	2.972E+09	8.7839	23620.	0.000
8.370	-0.002547	70397.	-2345.5824	-0.000376	224.8502	2.972E+09	19.1903	24407.	0.000
8.640	-0.003641	62908.	-2268.6230	-0.000303	205.1950	2.972E+09	28.3155	25194.	0.000
8.910	-0.004513	55714.	-2164.1232	-0.000239	186.3147	2.972E+09	36.1906	25982.	0.000
9.180	-0.005188	48898.	-2036.0558	-0.000182	168.4268	2.972E+09	42.8633	26769.	0.000
9.450	-0.005690	42531.	-1888.2171	-0.000132	151.7156	2.972E+09	48.3952	27556.	0.000
9.720	-0.006042	36670.	-1724.1888	-8.864E-05	136.3343	2.972E+09	52.8568	28344.	0.000
9.990	-0.006265	31363.	-1547.3143	-5.156E-05	122.4061	2.972E+09	56.3250	29131.	0.000
10.260	-0.006376	26647.	-1360.6851	-1.994E-05	110.0271	2.972E+09	58.8783	29918.	0.000
10.530	-0.006394	22547.	-1167.1404	6.881E-06	99.2681	2.972E+09	60.5938	30705.	0.000
10.800	-0.006332	19083.	-969.2775	2.957E-05	90.1765	2.972E+09	61.5437	31493.	0.000

11.070	-0.006202	16265.	-845.4239	4.884E-05	82.7790	2.972E+09	14.9091	7788.5357	0.000
11.340	-0.006015	13602.	-796.2947	6.512E-05	75.7909	2.972E+09	15.4176	8304.4922	0.000
11.610	-0.005780	11101.	-745.6689	7.859E-05	69.2263	2.972E+09	15.8329	8874.9485	0.000
11.880	-0.005506	8765.5460	-693.8523	8.942E-05	63.0971	2.972E+09	16.1527	9505.1507	0.000
12.150	-0.005201	6599.4693	-641.1574	9.779E-05	57.4122	2.972E+09	16.3750	10201.	0.000
12.420	-0.004872	4605.0793	-587.9018	0.000104	52.1778	2.972E+09	16.4988	10972.	0.000
12.690	-0.004527	2783.7389	-534.4060	0.000108	47.3977	2.972E+09	16.5233	11825.	0.000
12.960	-0.004173	1135.7643	-480.9913	0.000110	43.0725	2.972E+09	16.4487	12772.	0.000
13.230	-0.003814	-339.5747	-427.9775	0.000110	40.9829	2.972E+09	16.2758	13825.	0.000
13.500	-0.003457	-1644.0456	-375.6806	0.000109	44.4065	2.972E+09	16.0062	15002.	0.000
13.770	-0.003105	-2780.4373	-324.4107	0.000107	47.3890	2.972E+09	15.6420	16321.	0.000
14.040	-0.002763	-3752.5366	-274.4691	0.000103	49.9403	2.972E+09	15.1862	17805.	0.000
14.310	-0.002435	-4565.0968	-226.1468	9.891E-05	52.0729	2.972E+09	14.6424	19484.	0.000
14.580	-0.002123	-5223.8004	-179.7221	9.357E-05	53.8017	2.972E+09	14.0148	21393.	0.000
14.850	-0.001829	-5735.2138	-135.4586	8.760E-05	55.1439	2.972E+09	13.3083	23581.	0.000
15.120	-0.001555	-6106.7375	-93.6036	8.114E-05	56.1190	2.972E+09	12.5281	26106.	0.000
15.390	-0.001303	-6346.5500	-54.3869	7.436E-05	56.7484	2.972E+09	11.6797	29048.	0.000
15.660	-0.001073	-6463.5494	-18.0199	6.737E-05	57.0554	2.972E+09	10.7690	32516.	0.000
15.930	-0.000866	-6467.2920	15.0098	6.033E-05	57.0653	2.972E+09	9.6197	35983.	0.000
16.200	-0.000682	-6369.8429	43.2242	5.333E-05	56.8095	2.972E+09	7.7966	37032.	0.000
16.470	-0.000521	-6190.3440	70.7899	4.648E-05	56.3384	2.972E+09	9.2193	57376.	0.000
16.740	-0.000381	-5913.8651	99.1122	3.988E-05	55.6128	2.972E+09	8.2635	70283.	0.000
17.010	-0.000262	-5550.4488	123.9735	3.363E-05	54.6590	2.972E+09	7.0830	87535.	0.000
17.280	-0.000163	-5112.4998	142.7307	2.782E-05	53.5096	2.972E+09	4.4955	89362.	0.000
17.550	-8.188E-05	-4627.1942	153.7469	2.251E-05	52.2359	2.972E+09	2.3045	91188.	0.000
17.820	-1.711E-05	-4117.5477	158.2761	1.775E-05	50.8983	2.972E+09	0.4913	93015.	0.000
18.090	3.311E-05	-3602.6116	157.5018	1.354E-05	49.5468	2.972E+09	-0.9693	94841.	0.000
18.360	7.061E-05	-3097.7344	152.5187	9.885E-06	48.2217	2.972E+09	-2.1068	96668.	0.000
18.630	9.717E-05	-2614.8735	144.3204	6.772E-06	46.9545	2.972E+09	-2.9539	98495.	0.000
18.900	0.000114	-2162.9376	133.7921	4.167E-06	45.7683	2.972E+09	-3.5450	100321.	0.000
19.170	0.000124	-1748.1464	121.7072	2.035E-06	44.6797	2.972E+09	-3.9148	102148.	0.000
19.440	0.000128	-1374.3951	108.7275	3.332E-07	43.6988	2.972E+09	-4.0973	103974.	0.000
19.710	0.000126	-1043.6119	95.4068	-9.849E-07	42.8306	2.972E+09	-4.1253	105801.	0.000
19.980	0.000121	-756.1011	82.1963	-1.966E-06	42.0761	2.972E+09	-4.0293	107627.	0.000
20.250	0.000114	-510.8640	69.4522	-2.657E-06	41.4324	2.972E+09	-3.8374	109454.	0.000
20.520	0.000104	-305.8941	57.4444	-3.102E-06	40.8945	2.972E+09	-3.5748	111281.	0.000
20.790	9.349E-05	-138.4416	46.3657	-3.344E-06	40.4550	2.972E+09	-3.2638	113107.	0.000
21.060	8.242E-05	-5.2471	36.3422	-3.422E-06	40.1054	2.972E+09	-2.9235	114934.	0.000
21.330	7.132E-05	97.2575	27.4425	-3.372E-06	40.3469	2.972E+09	-2.5701	116760.	0.000
21.600	6.056E-05	172.7791	19.6879	-3.225E-06	40.5451	2.972E+09	-2.2167	118587.	0.000

21.870	5.042E-05	225.0253	13.0612	-3.008E-06	40.6822	2.972E+09	-1.8739	120413.	0.000
22.140	4.107E-05	257.5933	7.5153	-2.745E-06	40.7677	2.972E+09	-1.5496	122240.	0.000
22.410	3.263E-05	273.8861	2.9806	-2.455E-06	40.8105	2.972E+09	-1.2496	124067.	0.000
22.680	2.516E-05	277.0526	-0.6275	-2.155E-06	40.8188	2.972E+09	-0.9777	125893.	0.000
22.950	1.867E-05	269.9468	-3.4036	-1.857E-06	40.8001	2.972E+09	-0.7359	127720.	0.000
23.220	1.313E-05	255.1070	-5.4462	-1.571E-06	40.7612	2.972E+09	-0.5250	129546.	0.000
23.490	8.491E-06	234.7481	-6.8544	-1.304E-06	40.7077	2.972E+09	-0.3443	131373.	0.000
23.760	4.682E-06	210.7673	-7.7240	-1.061E-06	40.6448	2.972E+09	-0.1925	133200.	0.000
24.030	1.618E-06	184.7589	-8.1451	-8.451E-07	40.5765	2.972E+09	-0.0674	135026.	0.000
24.300	-7.939E-07	158.0368	-8.2000	-6.583E-07	40.5064	2.972E+09	0.0335	136853.	0.000
24.570	-2.648E-06	131.6616	-7.9621	-5.003E-07	40.4372	2.972E+09	0.1133	138679.	0.000
24.840	-4.036E-06	106.4718	-7.4950	-3.705E-07	40.3711	2.972E+09	0.1750	140506.	0.000
25.110	-5.049E-06	83.1160	-6.8521	-2.672E-07	40.3098	2.972E+09	0.2218	142332.	0.000
25.380	-5.768E-06	62.0857	-6.0771	-1.881E-07	40.2546	2.972E+09	0.2566	144159.	0.000
25.650	-6.267E-06	43.7474	-5.2039	-1.304E-07	40.2065	2.972E+09	0.2824	145986.	0.000
25.920	-6.612E-06	28.3720	-4.2578	-9.105E-08	40.1661	2.972E+09	0.3017	147812.	0.000
26.190	-6.857E-06	16.1625	-3.2560	-6.678E-08	40.1341	2.972E+09	0.3167	149639.	0.000
26.460	-7.045E-06	7.2771	-2.2094	-5.400E-08	40.1107	2.972E+09	0.3293	151465.	0.000
26.730	-7.207E-06	1.8488	-1.1235	-4.902E-08	40.0965	2.972E+09	0.3410	153292.	0.000
27.000	-7.363E-06	0.000	0.000	-4.802E-08	40.0916	2.972E+09	0.3525	77559.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial and bending stress in elastic sections and do not equal actual stresses in concrete and steel in the range of nonlinear bending.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.2159114 inches
Computed slope at pile head	=	-0.0034751 radians
Maximum bending moment	=	135533. inch-lbs
Maximum shear force	=	2824.000000 lbs
Depth of maximum bending moment	=	64.8000000 inches below pile head
Depth of maximum shear force	=	0.0000000 inches below pile head
Number of iterations	=	19
Number of zero deflection points	=	3

Pile-head Deflection vs. Pile Length for Load Case 1

Boundary Condition Type 1, Shear and Moment

Shear = 2824. lbs
Moment = 0. in-lbs
Axial Load = 9100. lbs

Pile Length feet	Pile Head Deflection inches	Maximum Moment In-lbs	Maximum Shear lbs
27.0000	0.2159125	135534.	2824.0000000
25.6500	0.2159432	135562.	2824.0000000
24.3000	0.2152974	135597.	2824.0000000
22.9500	0.2160558	135692.	2824.0000000
21.6000	0.2159475	135602.	2824.0000000
20.2500	0.2156937	135647.	2824.0000000
18.9000	0.2157419	135625.	2824.0000000
17.5500	0.2163558	135655.	2824.0000000
16.2000	0.2163529	135568.	2824.0000000
14.8500	0.2161596	135571.	2824.0000000
13.5000	0.2206117	135917.	2824.0000000
12.1500	0.2317147	136616.	-2858.6890200
10.8000	0.2521433	137783.	-3207.2444834

Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian

Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Pile-head Condition 1		Pile-head Condition 2		Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in Pile in-lbs	Maximum Shear in Pile lbs	Pile-head Rotation radians
		V(lbs) or y(inches)		in-lb, rad., or in-lb/rad.						
1	1	V = 2824.0000	M =	0.000	0.000	9100.000000000	0.21591139	135533.	2824.0000	-0.00347510

The analysis ended normally.