

- GENERAL NOTES**
- STRUCTURAL DESIGN BASED ON THE MANITOBA BUILDING CODE 2011 EDITION.
 - SEISMIC SITE CLASSIFICATION: NOT APPLICABLE.
 - DO NOT SCALE DRAWINGS.
 - ALL DIMENSIONS ARE TO BE VERIFIED WITH THE PROJECT DRAWINGS AND EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION.
 - THESE STRUCTURAL DRAWINGS SHOW THE COMPLETED STRUCTURE AND DO NOT INDICATE ALL COMPONENTS NECESSARY FOR SAFETY DURING CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SAFETY ON AND AROUND THE JOBSITE DURING CONSTRUCTION.
 - A COPY OF THE GEOTECHNICAL REPORT COMMISSIONED BY THE OWNER IS AVAILABLE FOR REVIEW AT THE OFFICES OF THE OWNER.

- SHORING**
- LOCATE ALL UNDERGROUND SERVICES BEFORE INSTALLING SHORING.
 - SURVEY TOP OF SOLDIER PILE ELEVATIONS AND LATERAL POSITION OF SHORING IMMEDIATELY AFTER INSTALLATION. RE-SURVEY WEEKLY DURING EXCAVATION AND BUILDING PILING WORK. PROVIDE DATA TO SHORING DESIGNER, SHOWING WEEK-TO-WEEK DISPLACEMENTS AS WELL AS CUMULATIVE DISPLACEMENTS.

- CAST-IN-PLACE CONCRETE**
- CONCRETE
 - ALL CONCRETE IS TO BE MANUFACTURED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF CAN/CSA-A23.1-09 "CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION" AND CAN/CSA-A23.2-09 "METHOD OF TEST FOR CONCRETE".
 - PROVIDE CERTIFICATION THAT MIX PROPORTIONS SELECTED WILL PRODUCE CONCRETE OF QUALITY, YIELD AND STRENGTH AS SPECIFIED IN CONCRETE MIXES, AND WILL COMPLY WITH CAN/CSA-A23.1. CERTIFICATION LETTER TO BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF MANITOBA.
 - PROVIDE CERTIFICATION THAT PLANT, EQUIPMENT, AND MATERIALS TO BE USED IN CONCRETE COMPLY WITH REQUIREMENTS OF CAN/CSA-A23.1. CERTIFICATION LETTER TO BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF MANITOBA.
 - CONCRETE STRENGTHS AT 28 DAYS SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- SOLDIER PILE BASES:** 25 MPA MIN. AT 56 DAYS
CLASS OF EXPOSURE: F-2
ENTRAINED AIR/CATEGORY: NONE
CEMENT TYPE: GU
AGGREGATE: MAX. 20 MM
CURING TYPE: TYPE 1 - BASIC
- SHORING DEADMEN:** 20 MPA MIN. AT 56 DAYS
CLASS OF EXPOSURE: S-2
ENTRAINED AIR/CATEGORY: NONE
AGGREGATE: MAX. 20 MM
CURING TYPE: TYPE 1 - BASIC

- UNLESS INDICATED OTHERWISE THE CONTRACTOR SHALL SPECIFY CONCRETE SLUMP APPROPRIATE WITH PLACEMENT METHODS AND SITE CONDITIONS. THE CONTRACTOR SPECIFIED SLUMP MUST BE SHOWN ON THE CERTIFICATION LETTER AND CONCRETE DELIVERY TICKET.
- UNLESS NOTED OTHERWISE CONCRETE CURING TO CONFORM TO THE LATEST EDITION OF CAN/CSA-A23.1-09 AS FOLLOWS:
 - TYPE 1 - BASIC: 3 DAYS $\geq 10^{\circ}\text{C}$ AND FOR A TIME NECESSARY TO ATTAIN 40% OF THE SPECIFIED STRENGTH.
 - TYPE 2 - ADDITIONAL: 7 DAYS $\geq 10^{\circ}\text{C}$ AND FOR A TIME NECESSARY TO ATTAIN 70% OF THE SPECIFIED STRENGTH.
 - TYPE 3 - EXTENDED: 7 DAYS WET CURING $\geq 10^{\circ}\text{C}$.
 - AIR ENTRAINING ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C260/C260M-10A "STANDARD SPECIFICATION FOR AIR ENTRAINING ADMIXTURES FOR CONCRETE". SUPERPLASTICIZING ADMIXTURES SHALL CONFORM TO ASTM C494/C494M "STANDARD SPECIFICATION FOR CHEMICAL ADMIXTURES FOR CONCRETE" OR ASTM C1017/C1017M "STANDARD SPECIFICATION FOR CHEMICAL ADMIXTURES FOR USE IN PRODUCING FLOWING CONCRETE" WHEN FLOWING CONCRETE IS APPLICABLE. AIR ENTRAINING ADMIXTURES TO HAVE A DURABILITY FACTOR GREATER THAN 75, WHEN TESTED TO ASTM STANDARDS C666/C666M PROCEDURE A. SPACING FACTOR FOR ANY AIR ENTRAINING ADMIXTURE MUST BE 0.17MM OR LESS WHEN TESTED IN ACCORDANCE WITH ASTM C457 "STANDARD TEST METHOD FOR MICROSCOPICAL DETERMINATION OF PARAMETERS OF THE AIR-VOID SYSTEM IN HARDENED CONCRETE".

- STRUCTURAL STEEL**
- STRUCTURAL STEEL TO CONFORM TO CSA-G40.21, "STRUCTURAL QUALITY STEELS" AND CSA-G40.20 "GENERAL REQUIREMENTS FOR ROLLED OR WELDED STRUCTURAL QUALITY STEEL".
 - ALL ROLLED OR STEEL STRUCTURAL SECTIONS SHALL BE G40.21-50W. ALL HOLLOW STRUCTURAL SECTIONS TO BE G40.21-50W CLASS C OR ASTM A500-C. ALL ANGLES, CHANNELS AND PLATES SHALL BE G40.21-44W.
 - FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL BE PERFORMED IN ACCORDANCE WITH CAN/CSA S16-09, "STEEL STRUCTURES FOR BUILDINGS".
 - ALL WELDING SHALL CONFORM TO THE LATEST EDITION OF CSA W59, "WELDED STEEL CONSTRUCTION". FABRICATORS SHALL BE PROPERLY CERTIFIED IN ACCORDANCE WITH CSA W47.1, "CERTIFICATION OF COMPANIES FOR FUSION WELDING OF STEEL STRUCTURES".
 - NO HOLES PERMITTED IN STRUCTURAL STEEL WITH OUT THE EXPRESS WRITTEN PERMISSION OF THE SHORING DESIGNER.
 - FABRICATOR TO NOTIFY ENGINEER OF ANY PROPOSED MEMBER SUBSTITUTIONS AND CHANGED CONNECTION DETAILS.

- PROCEDURE**
- INSTALL STEEL SOLDIERS IN CONCRETE SOLDIER PILES AND BACKFILL PILE HOLES WITH STABILIZED FILL OR CLEAN DRY SAND.
 - EXCAVATE, LEAVING A BERM TO 300mm BELOW WALKER, INSTALLING LAGGING AS EXCAVATION PROCEEDS. REFER TO DRAWING S2.1 FOR TYPICAL DETAIL. WORK TO PROCEED CONTINUOUSLY AND PROGRESSIVELY ALONG THE SHORING LINE AND RAKERS TO BE INSTALLED IMMEDIATELY UPON COMPLETION OF EXCAVATION AT ANY PILE LOCATION.
 - INSTALL AND WELD IN PLACE WALKERS AND RAKERS. END OF RAKERS TO EXTEND 90mm INTO CONCRETE DEADMEN AND CAST IN IMMEDIATELY AFTER EXCAVATION DESCRIBED ABOVE.
 - COMPLETE EXCAVATION AND INSTALL LAGGING.
 - FILL BACK OF LAGGING WITH DRY SAND.

SHORING LOCATION PLAN
1 : 750

NOTE: THE CONTOURS AND SHORING LINES INDICATED ON THIS PLAN ARE INTENDED AS REFERENCE ONLY. REFER TO DRAWINGS S2.1 THROUGH S2.4 FOR EXCAVATION CONTOURS AND SHORING DETAILS.

AS BUILT DRAWINGS

MAINTENANCE & MONITORING
TO FOLLOW



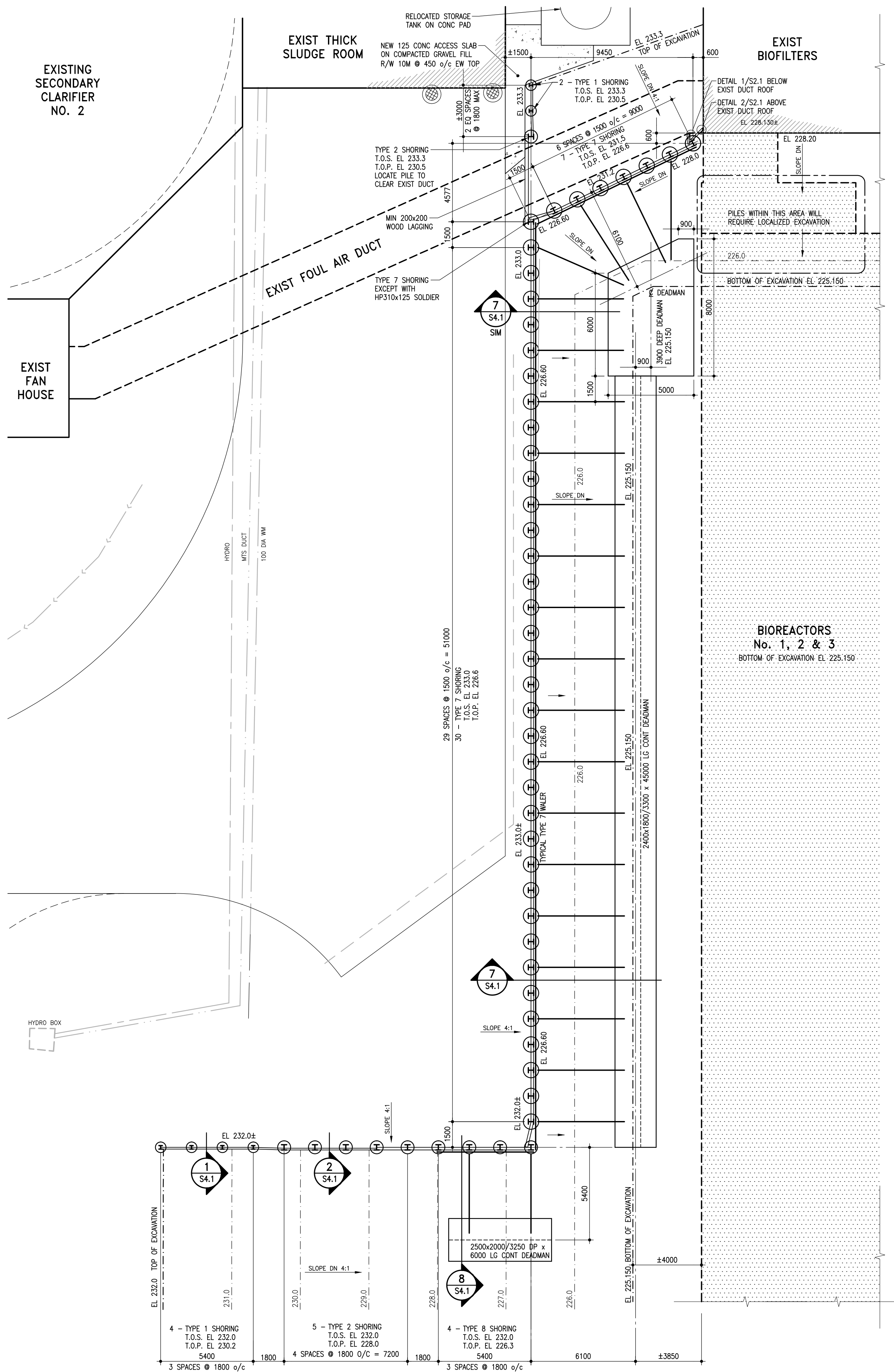
No.	Date	Issue/Revision	By
5	21 AUG 2015	AS-BUILT	BF
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
3	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF
2	16 DEC 2014	ISSUED FOR CONSTRUCTION	BF
1	19 NOV 2014	ISSUED FOR REVIEW	BF

ORIGINAL DRAWING SEALED BY B. FLISAK AND DATED June 25, 2015

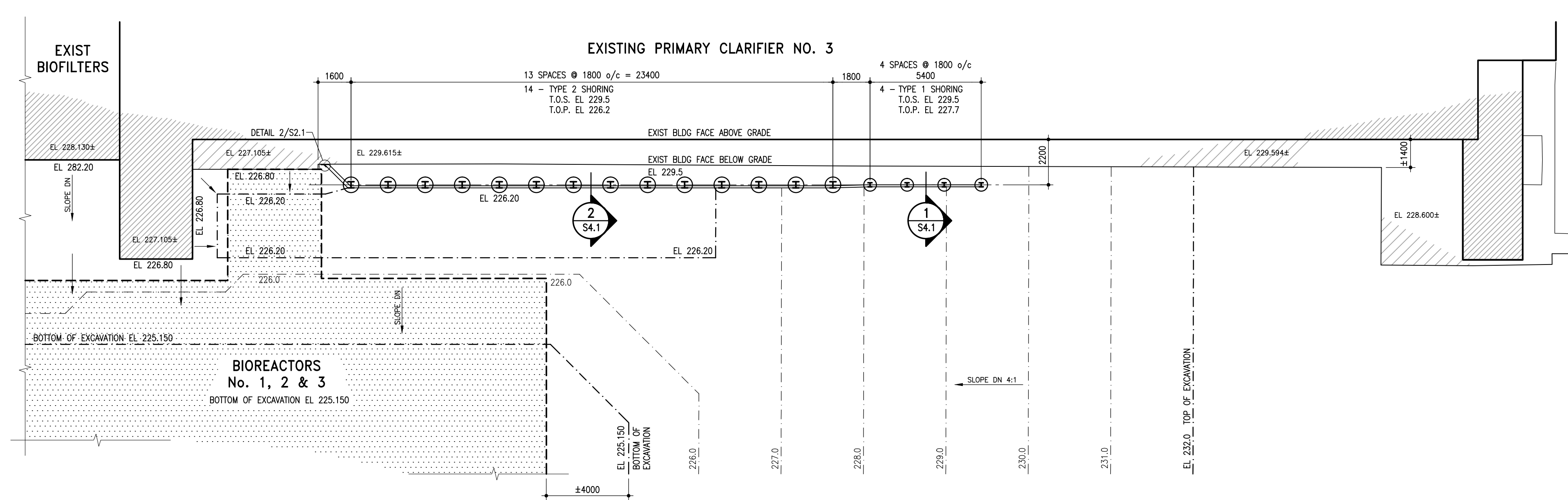
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Winnipeg, Manitoba R3C 5R6
T 204. 943. 7501
F 204. 943. 7507

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Project		THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION			
Sheet Title		SHORING LOCATION PLAN & GENERAL NOTES			
Design		JAL	Drawn	KJL	Checked
Scale		BF	AS NOTED	Date	21 AUG 2015
File		2014-1223		Sheet No.	S1.1



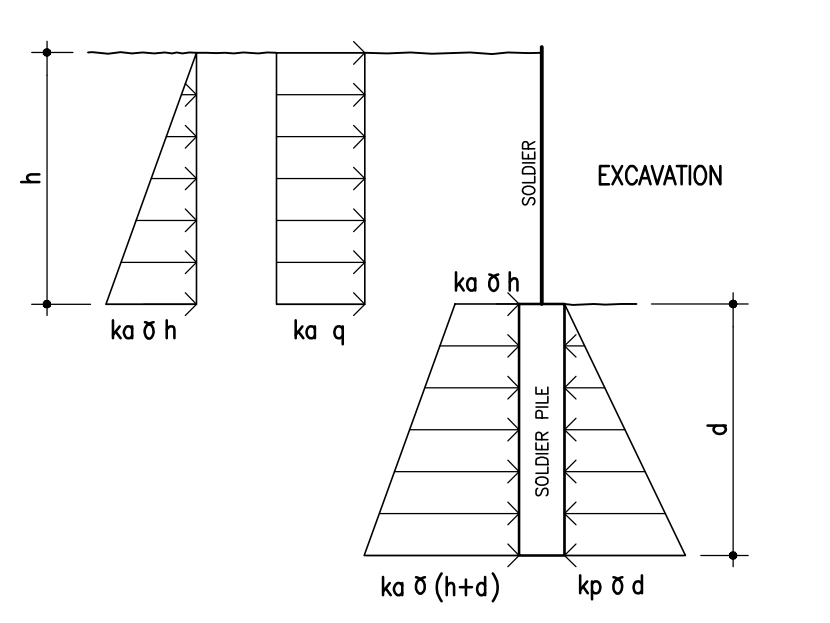
A SHORING LAYOUT
S2.1 1 : 150



B SHORING LAYOUT
S2.1 1 : 150

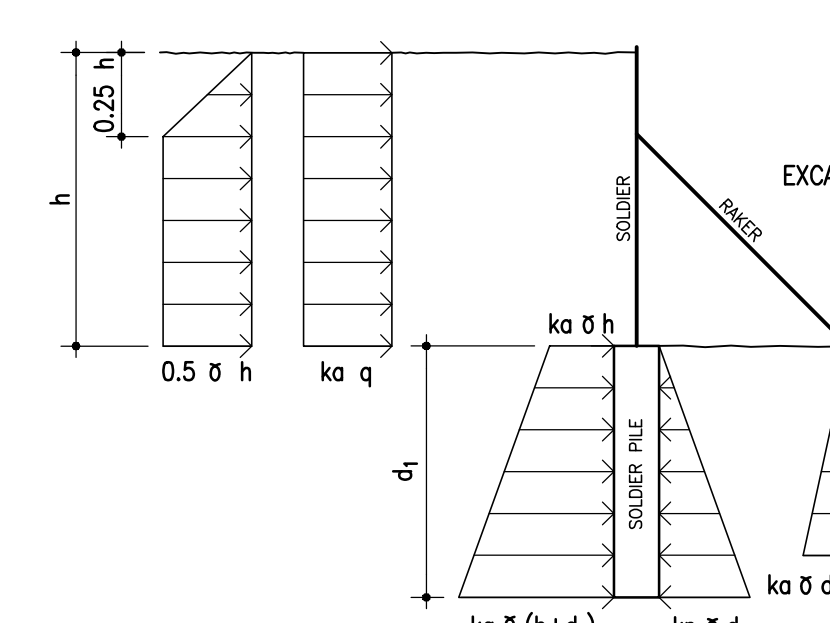
PLAN NOTES
REFER TO SECTIONS FOR SHORING TYPES
T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
T.O.P. EL - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION

TYPICAL CANTILEVER SOLDIER PILE DESIGN LOADS



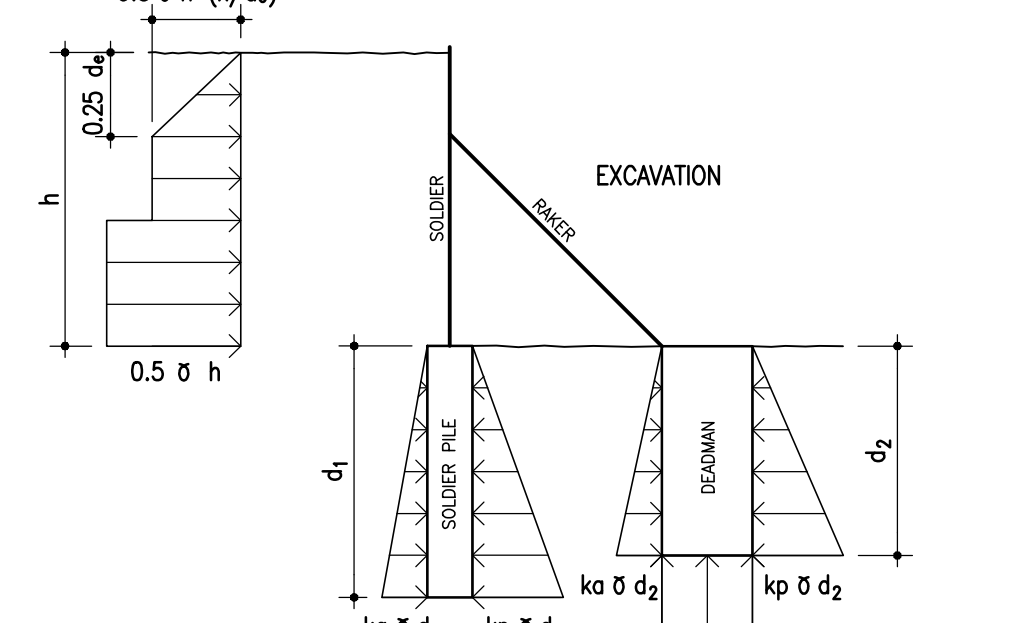
DESIGN PARAMETERS
 $k_a = 0.60$ (ACTIVE PRESSURE COEFFICIENT)
 $k_p = 2.50$ (PASSIVE PRESSURE COEFFICIENT)
 $q = 19.7 \text{ kN/m}^3$ (SOIL UNIT WEIGHT)
 $q = 12.0 \text{ kPa}$ (SURCHARGE)
 $h =$ DEPTH OF EXCAVATION
 $d =$ DEPTH OF EMBEDMENT OF SHORING BELOW UNDISTURBED SOIL

TYPICAL BRACED EXCAVATION DESIGN LOADS

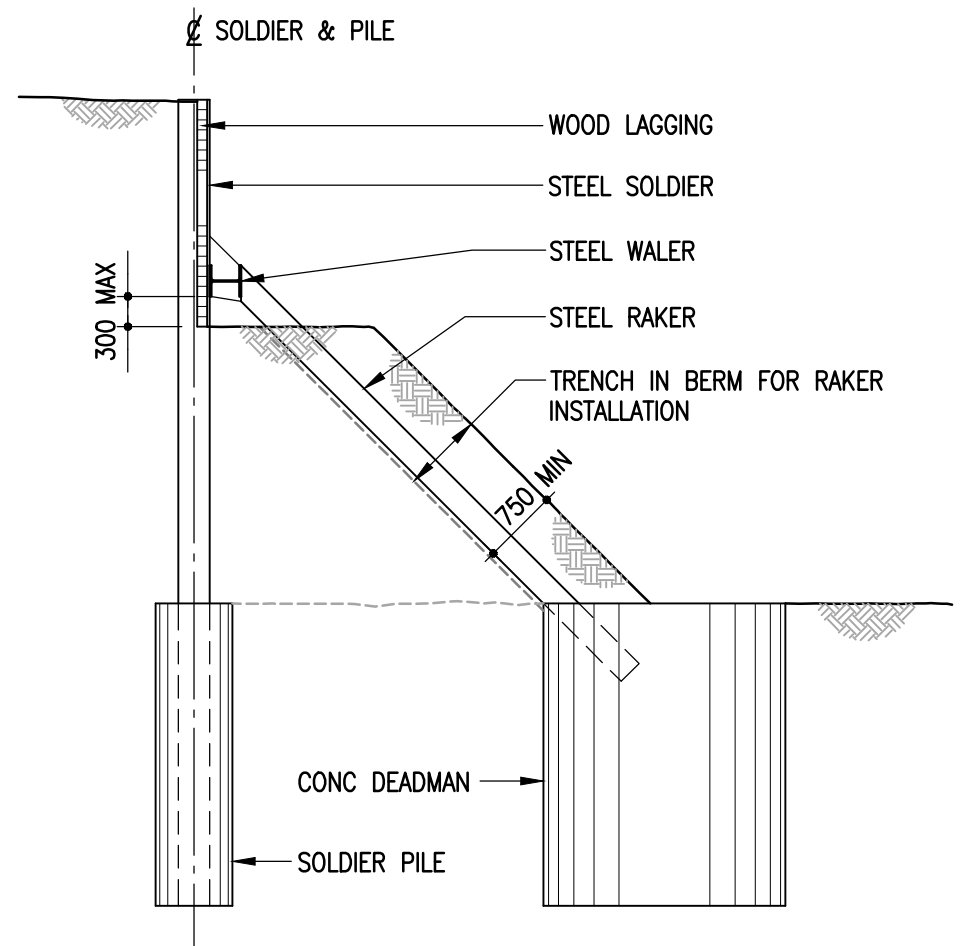


DESIGN PARAMETERS
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 $k_p = 2.50$ (PASSIVE PRESSURE COEFFICIENT)
 $q = 19.7 \text{ kN/m}^3$ (SOIL UNIT WEIGHT)
 $q = 12.0 \text{ kPa}$ (SURCHARGE)
 $\sigma_v = 80 \text{ kPa}$ (BEARING CAPACITY)
 $h =$ DEPTH OF EXCAVATION
 $d_1 =$ DEPTH OF SOLDIER PILE BELOW UNDISTURBED SOIL
 $d_2 =$ DEPTH OF DEADMAN BELOW UNDISTURBED SOIL

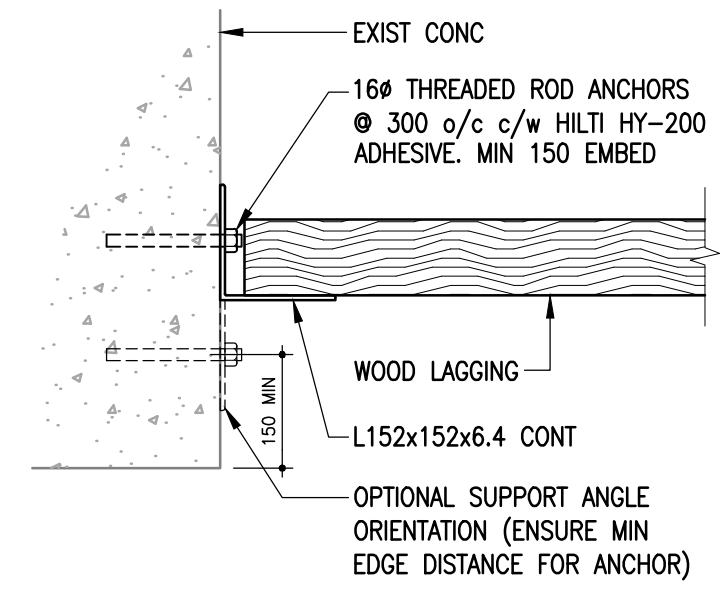
TYPICAL BRACED EXCAVATION AT EXIST BUILDING DESIGN LOADS



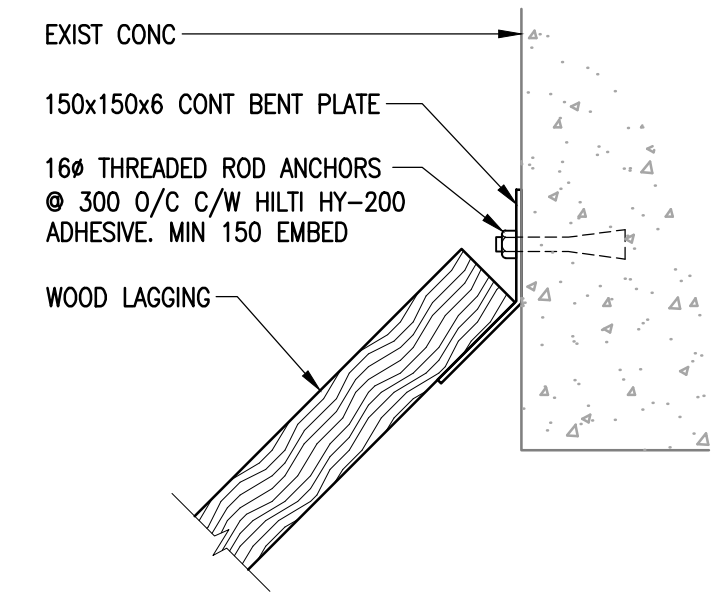
DESIGN PARAMETERS
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 $k_p = 2.50$ (PASSIVE PRESSURE COEFFICIENT)
 $q = 19.7 \text{ kN/m}^3$ (SOIL UNIT WEIGHT)
 $q = 12.0 \text{ kPa}$ (SURCHARGE)
 $\sigma_v = 80 \text{ kPa}$ (BEARING CAPACITY)
 $h =$ DEPTH OF EXCAVATION
 $d_1 =$ DEPTH OF SOLDIER PILE BELOW UNDISTURBED SOIL
 $d_2 =$ DEPTH OF DEADMAN BELOW UNDISTURBED SOIL
 $d_e =$ DEPTH TO UNDERSIDE EXISTING FOUNDATION
 $x =$ DISTANCE BETWEEN EXISTING FOUNDATION WALL & NEW SHORING



TYPICAL SLOPING BERM EXCAVATION DETAIL
1 : 75



1 DETAIL
S2.1 1 : 10



2 DETAIL
S2.1 1 : 10

AS BUILT DRAWINGS

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No. 235 Date: June 25, 2015

No.	Date	Issue/Revision	By
5	21 AUG 2015	AS-BUILT	
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
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2	01 DEC 2014	ISSUED FOR CONSTRUCTION	BF
1	19 NOV 2014	ISSUED FOR REVIEW	BF

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June 25, 2015

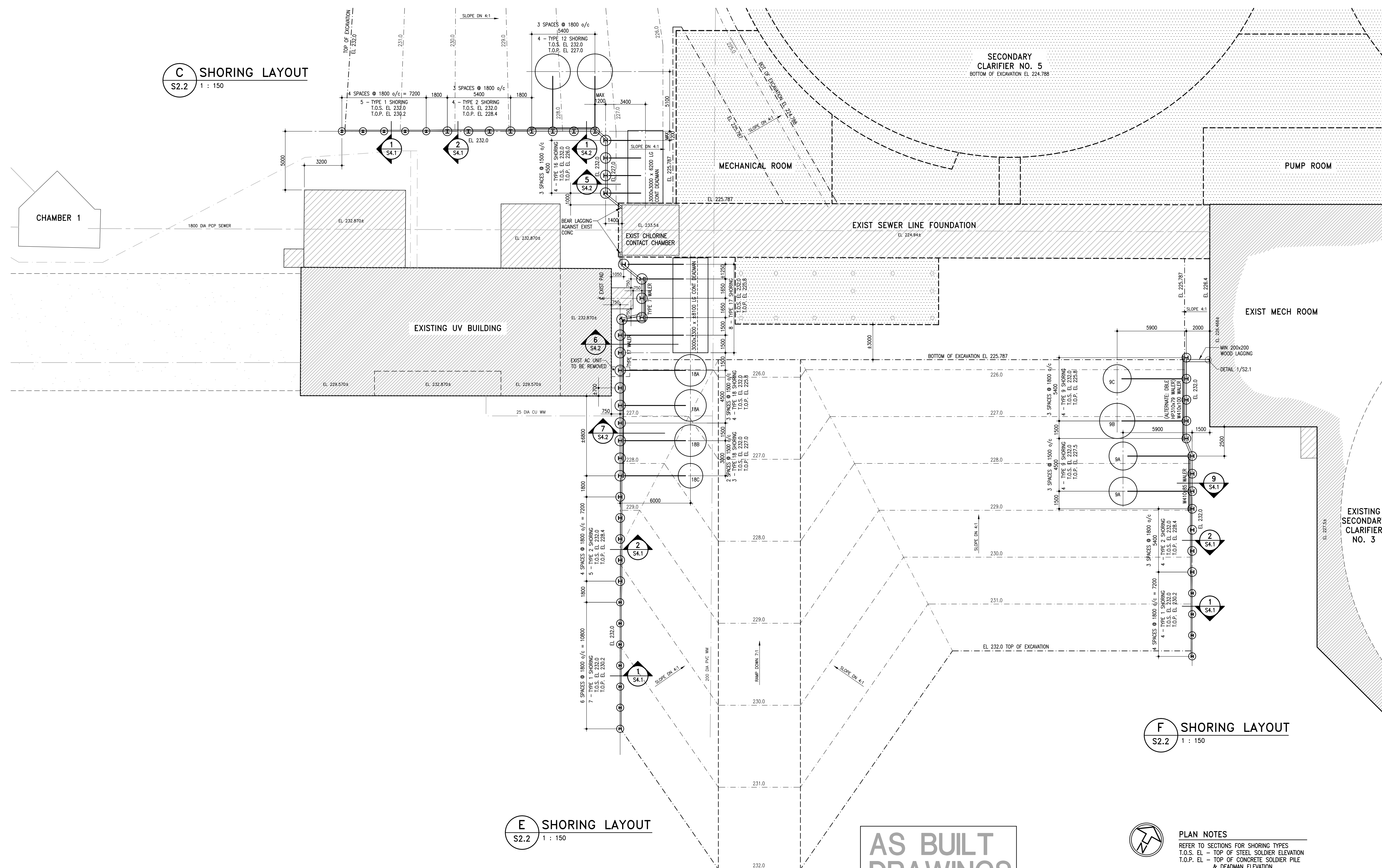
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Winnipeg, Manitoba R3C 5R6
T 204. 943. 7501
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The General Contractor shall check & verify all dimensions and report any errors or omissions to the designers.

Project		THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION			
Sheet Title		BIOREACTOR BUILDING SHORING LAYOUTS			
Design		JAL	Drawn	KJL	Checked
Scale		AS NOTED	Date	21 AUG 2015	File
Sheet No.		S2.1			2014-1223

C SHORING LAYOUT
S2.2 1 : 150



E SHORING LAYOUT
S2.2 1 : 150

F SHORING LAYOUT
S2.2 1 : 150

AS BUILT DRAWINGS

PLAN NOTES
REFER TO SECTIONS FOR SHORING TYPES
T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
T.O.P. EL - TOP OF CONCRETE SOLDIER PILE
& DEADMAN ELEVATION
REFER TO DWG S2.1 FOR SHORING DESIGN
LOADS & TYPICAL SLOPING BERM EXCAVATION
DETAIL.

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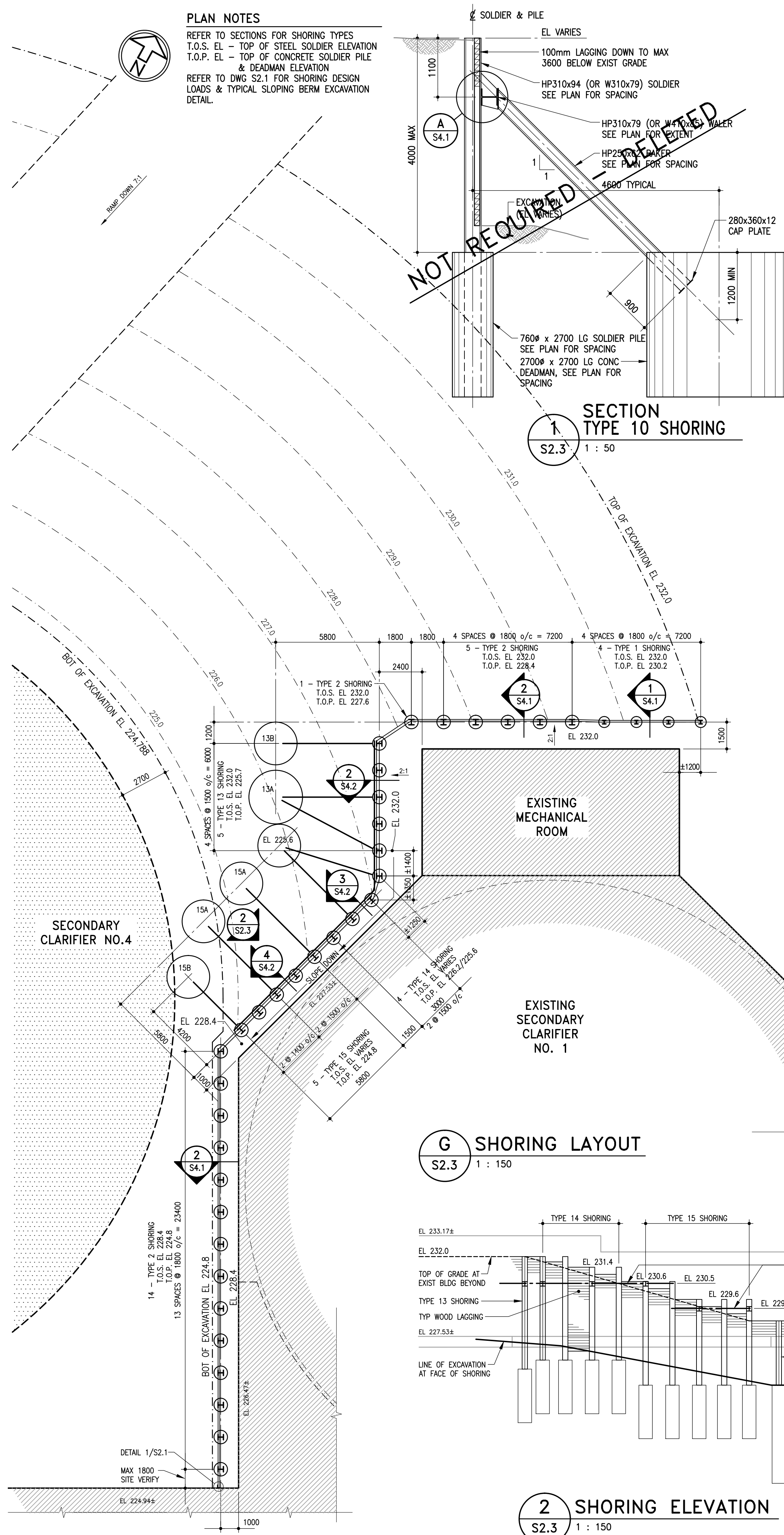
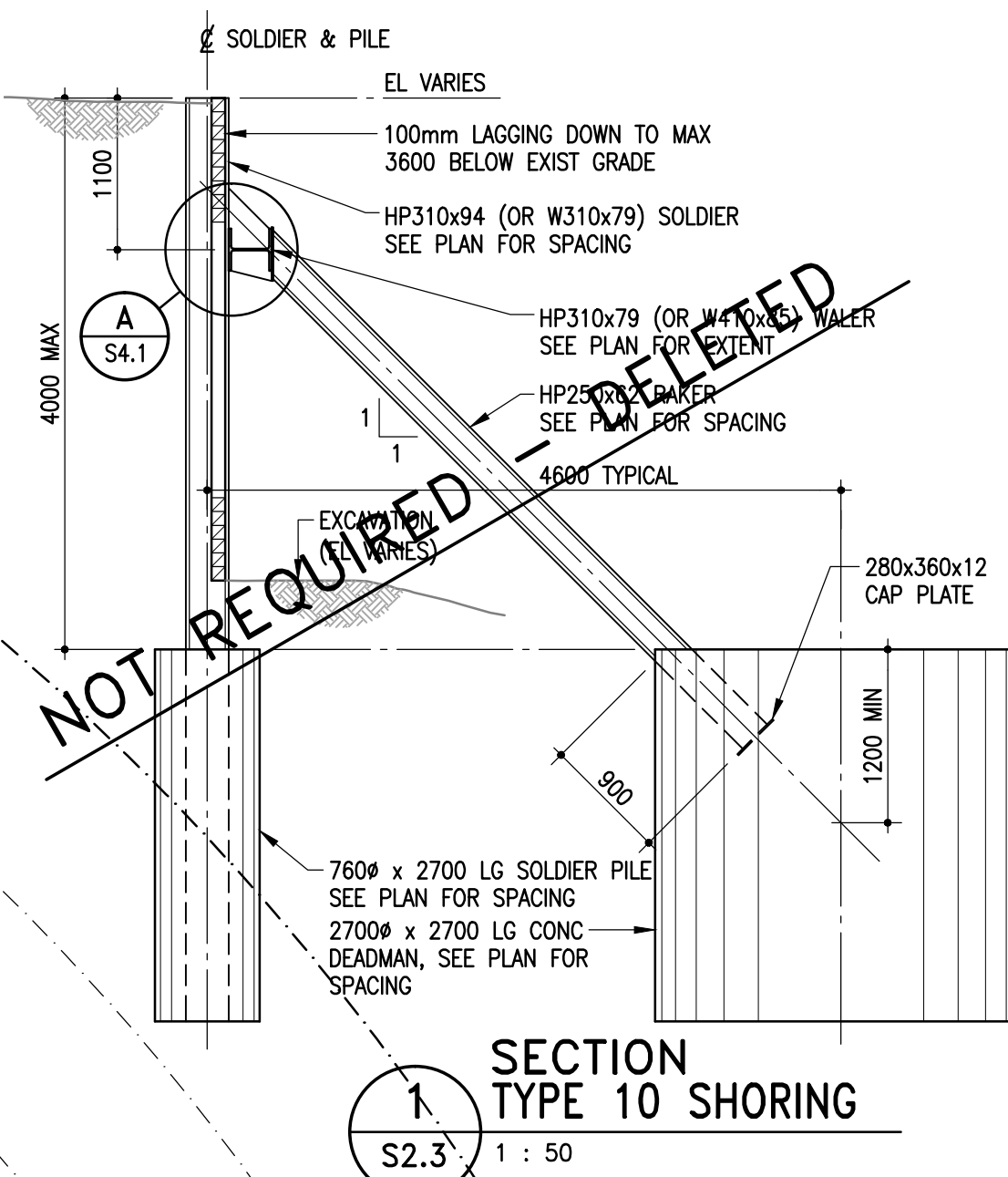
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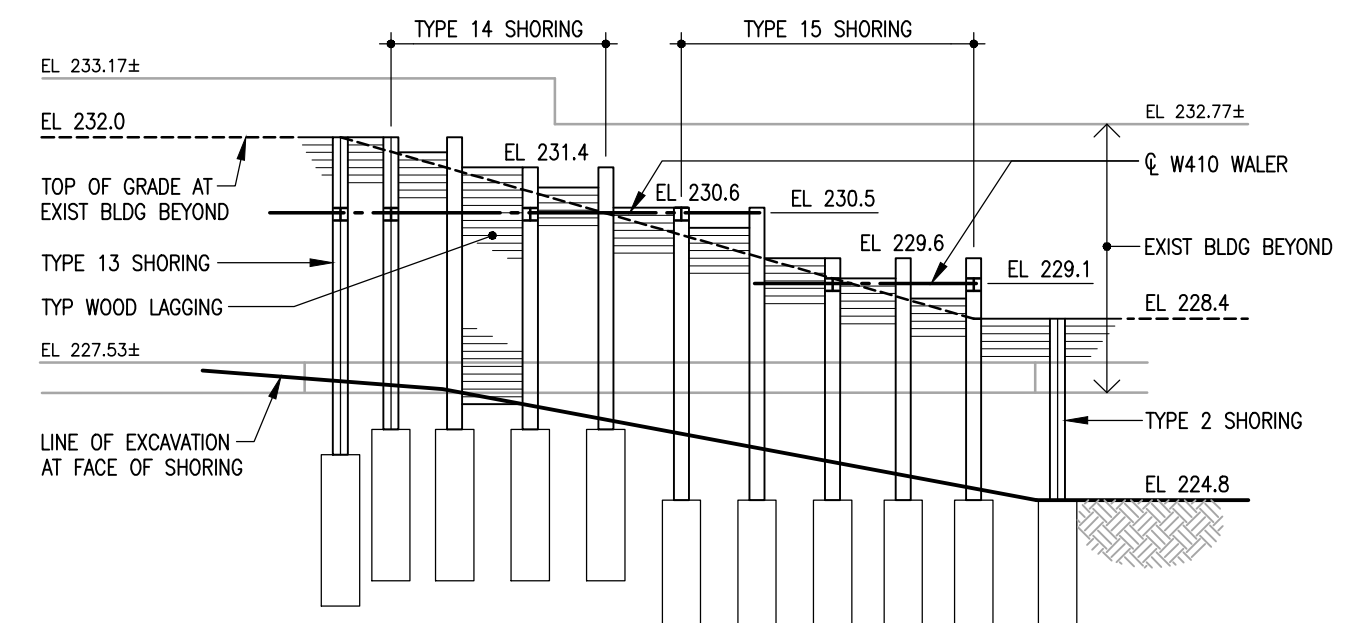
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Sheet Title		UV EXPANSION & SECONDARY CLARIFIER NO. 5 SHORING LAYOUTS			
Design		JAL	Drawn	KJL	Checked
Scale		AS NOTED	Date	21 AUG 2015	File
Sheet No.		S2.2			2014-1223

PLAN NOTES

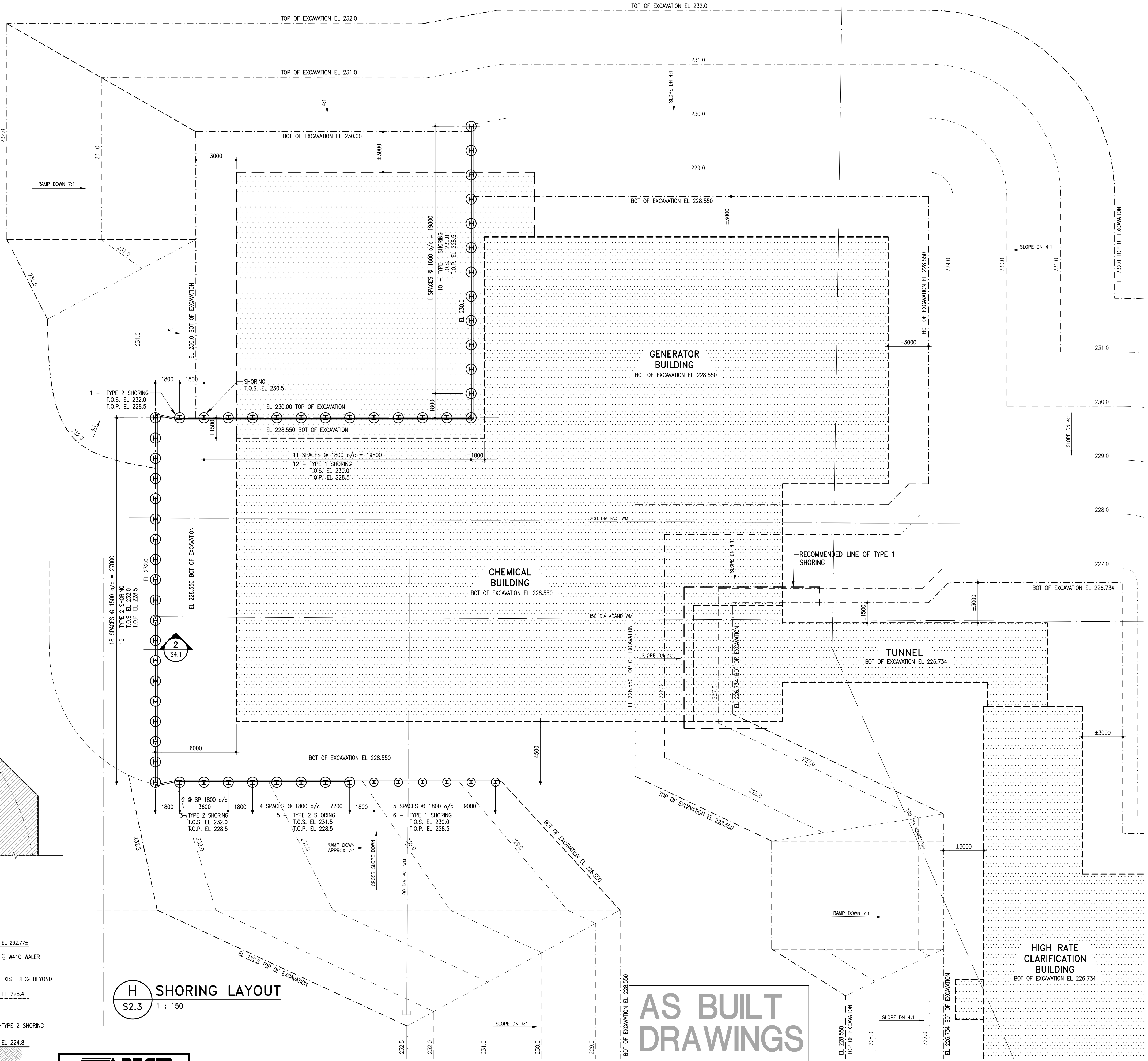
REFER TO SECTIONS FOR SHORING TYPES
 T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
 T.O.P. EL - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION
 REFER TO DWG S2.1 FOR SHORING DESIGN LOADS & TYPICAL SLOPING BERM EXCAVATION DETAIL.



G SHORING LAYOUT
 S2.3 1 : 150



2 SHORING ELEVATION
 S2.3 1 : 150



H SHORING LAYOUT
 S2.3 1 : 150

AS BUILT DRAWINGS

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No.	Date	Issue/Revision	By
5	21 AUG 2015	AS-BUILT	
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
3	7 MAY 2015	ISSUED FOR 'H', 'J' & 'K' SHORING CONSTRUCTION	BF
2	28 JAN 2015	ISSUED FOR EXCAVATION PERMIT	BF
1	16 DEC 2014	ISSUED FOR CONSTRUCTION	BF

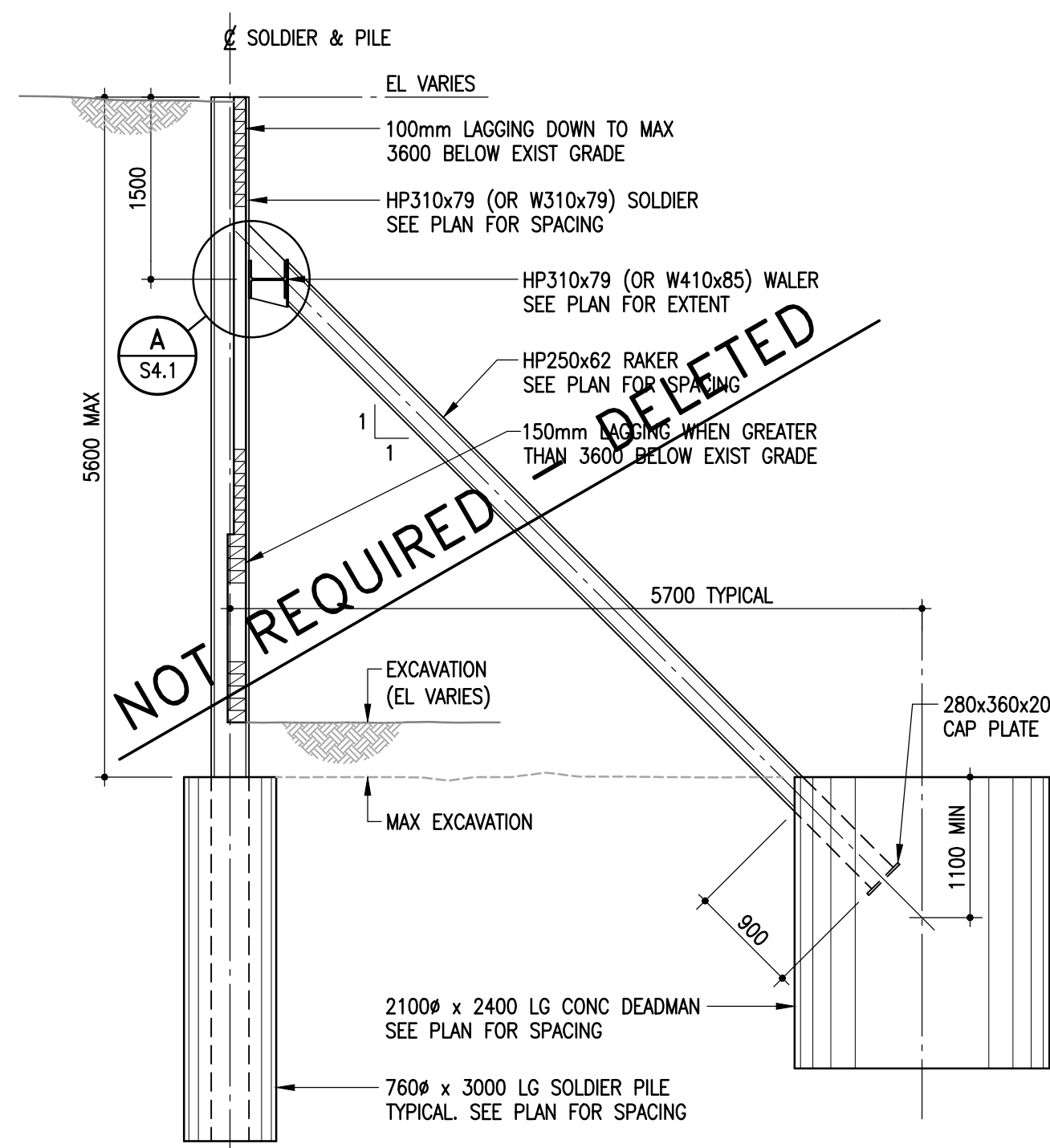
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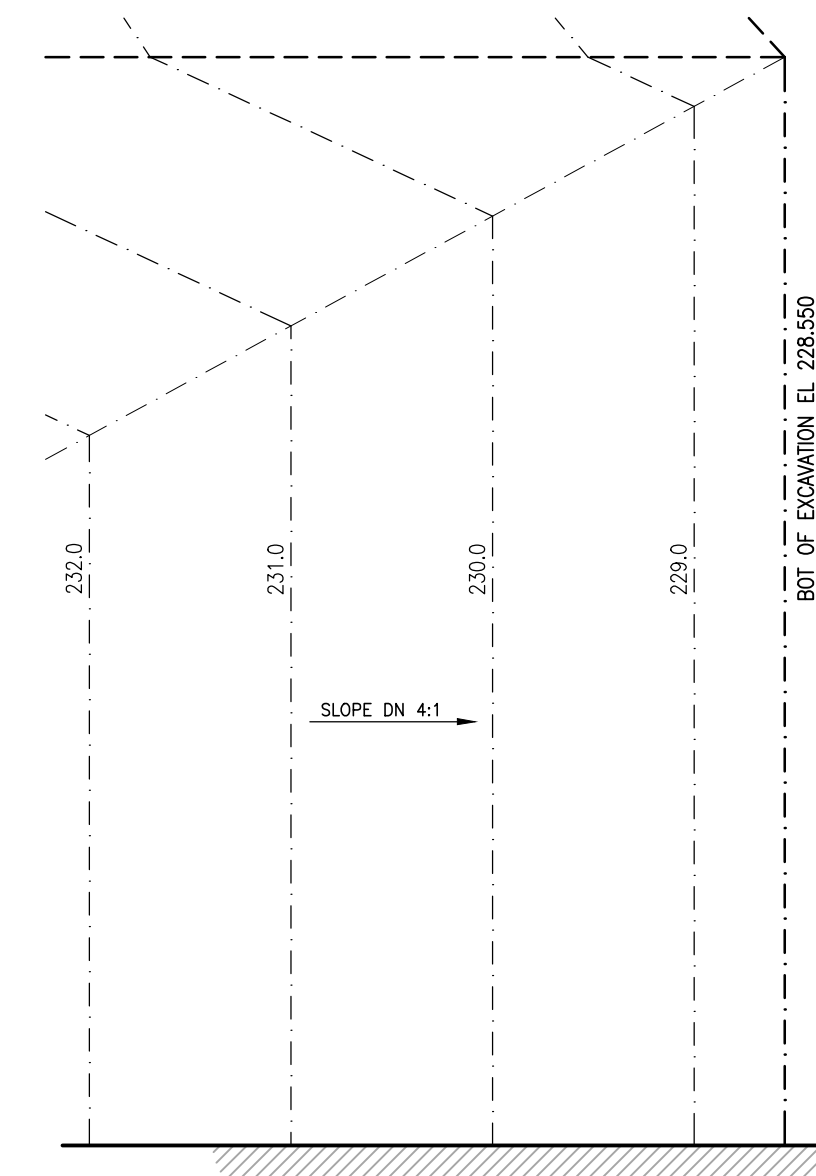
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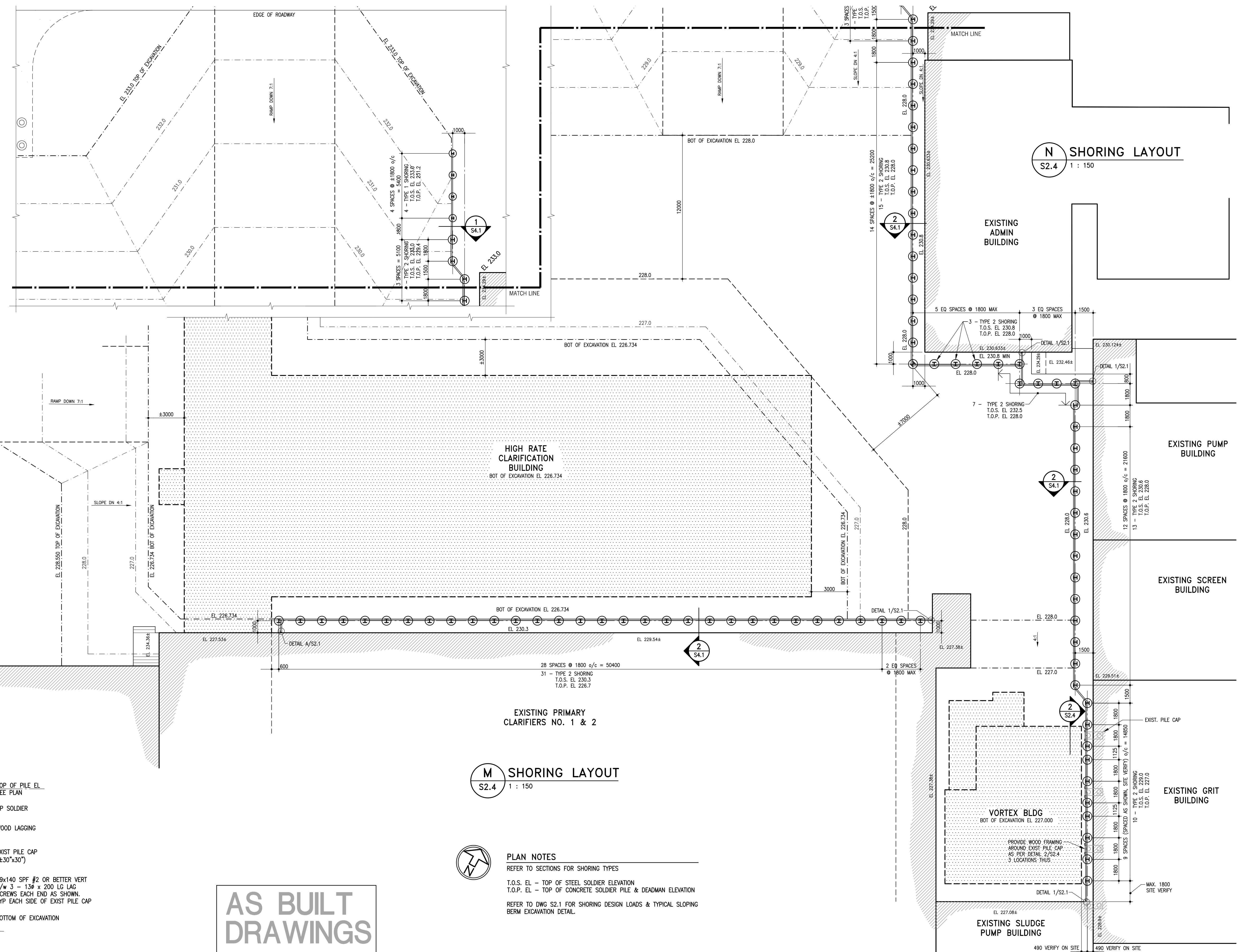
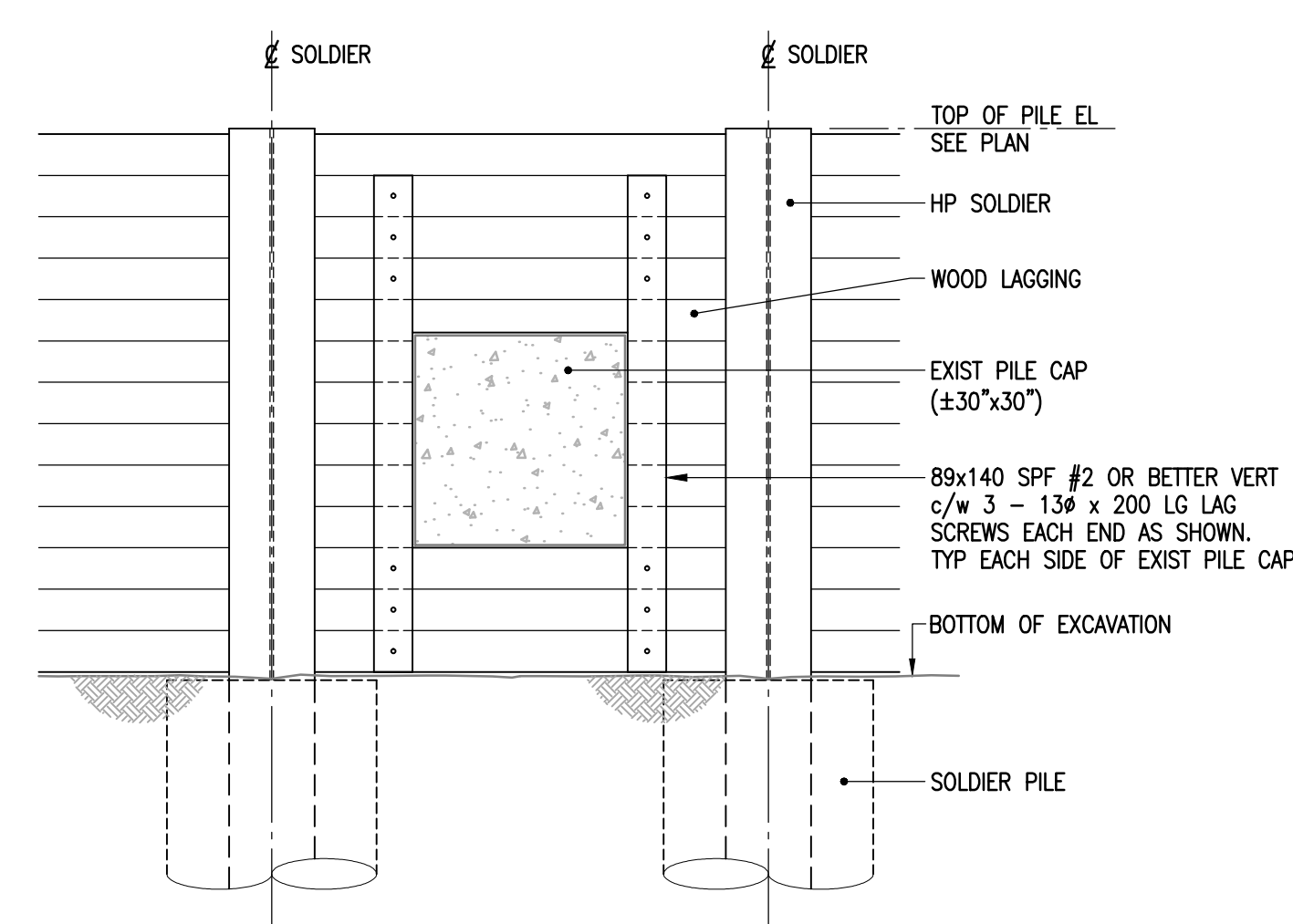
Project		THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION		Sheet No.
Sheet Title		SECONDARY CLARIFIER NO. 4 & CHEMICAL/GENERATOR BLDG SHORING LAYOUTS		S2.3
Design	Drawn	Checked	Scale	Date
JAL	KJL	BF	AS NOTED	21 AUG 2015
File	2014-1223			



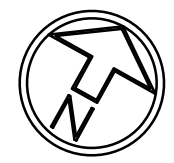
1 SECTION - TYPE 11 SHORING
S2.4 1 : 50



2 DETAIL - SHORING AT EXISTING PILE CAP
S2.4 1 : 25



M SHORING LAYOUT
S2.4 1 : 150



PLAN NOTES
REFER TO SECTIONS FOR SHORING TYPES
T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
T.O.P. EL - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION
REFER TO DWG S2.1 FOR SHORING DESIGN LOADS & TYPICAL SLOPING BERM EXCAVATION DETAIL.

AS BUILT DRAWINGS

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No. 235 Date: June 25, 2015

No.	Date	Issue/Revision	By
7	21 AUG 2015	AS-BUILT	
6	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
5	28 APR 2015	ISSUED FOR 'L' SHORING CONSTRUCTION	BF
4	14 APR 2015	ISSUED FOR 'N' SHORING CONSTRUCTION	BF
3	30 MAR 2015	ISSUED FOR 'M' SHORING CONSTRUCTION	BF
2	28 JAN 2015	ISSUED FOR EXCAVATION PERMIT	BF
1	16 DEC 2014	ISSUED FOR CONSTRUCTION	BF

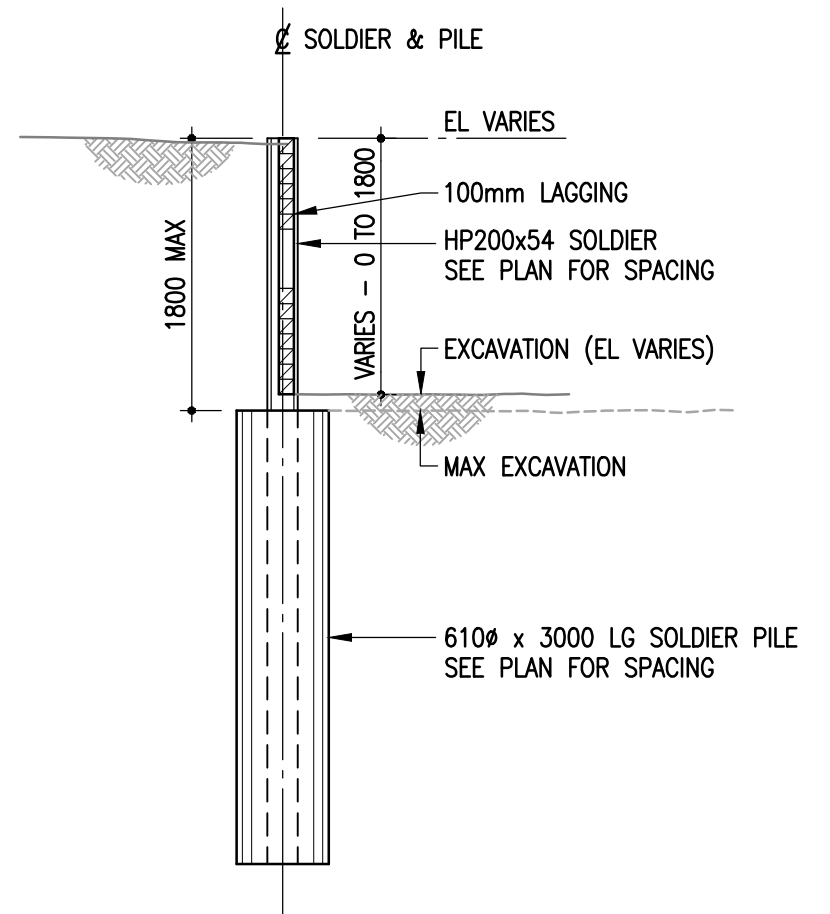
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F 204-943-7507

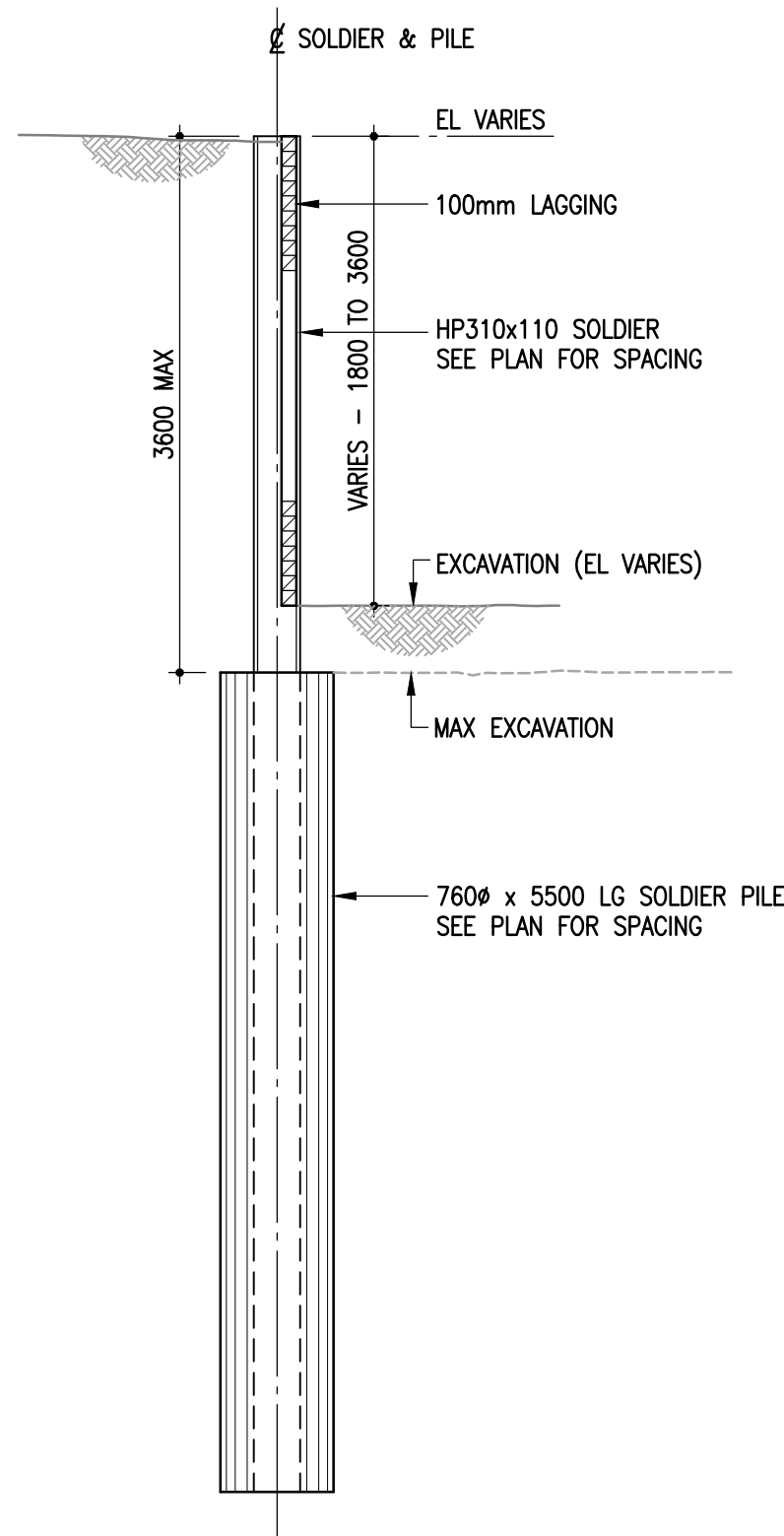
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Project: THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION					Sheet No.
Sheet Title: HIGH RATE CLARIFICATION BLDG & VORTEX BLDG SHORING LAYOUTS					S2.4
Design	Drawn	Checked	Scale	Date	File
JAL	KJL	BF	AS NOTED	21 AUG 2015	2014-1223

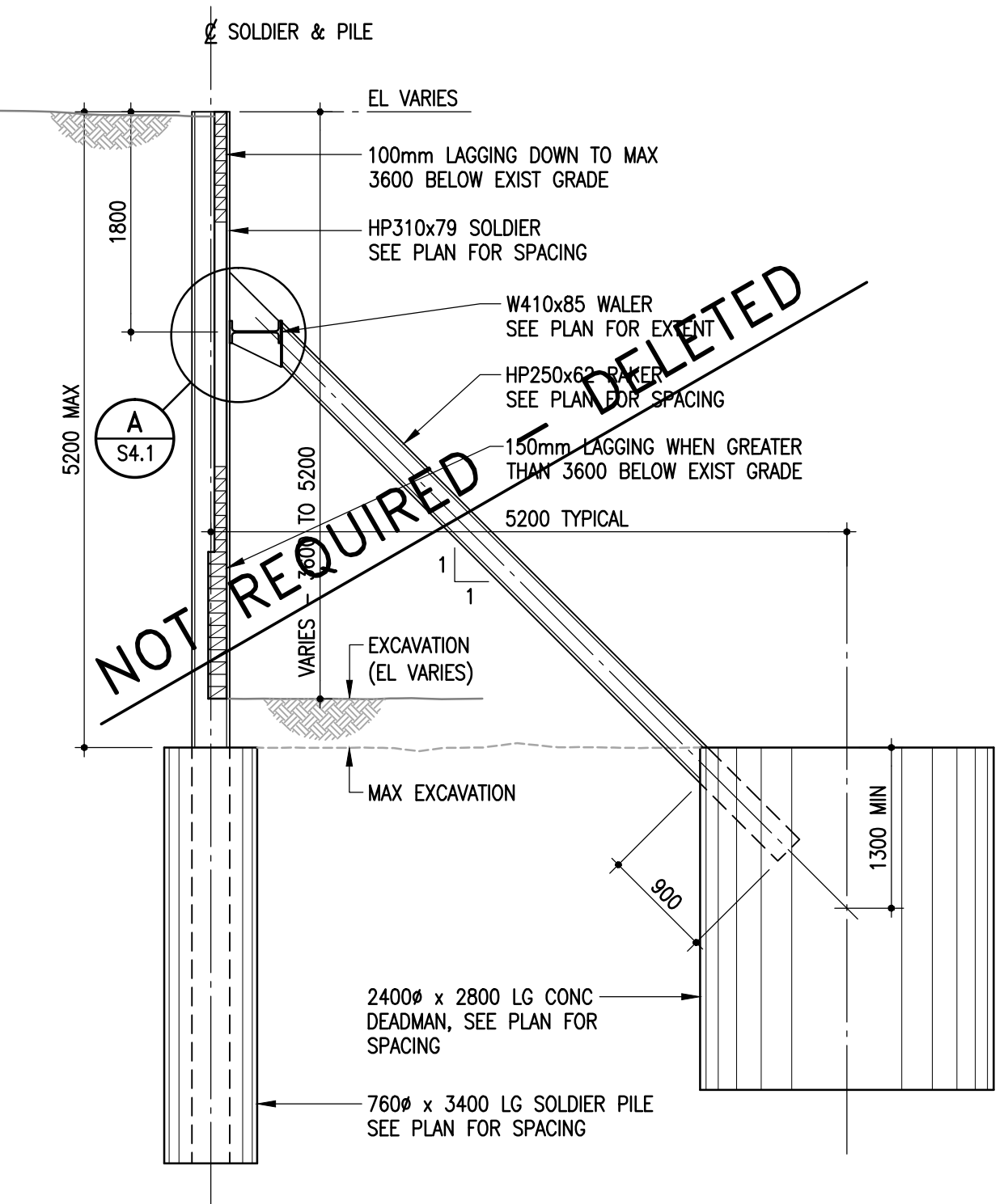
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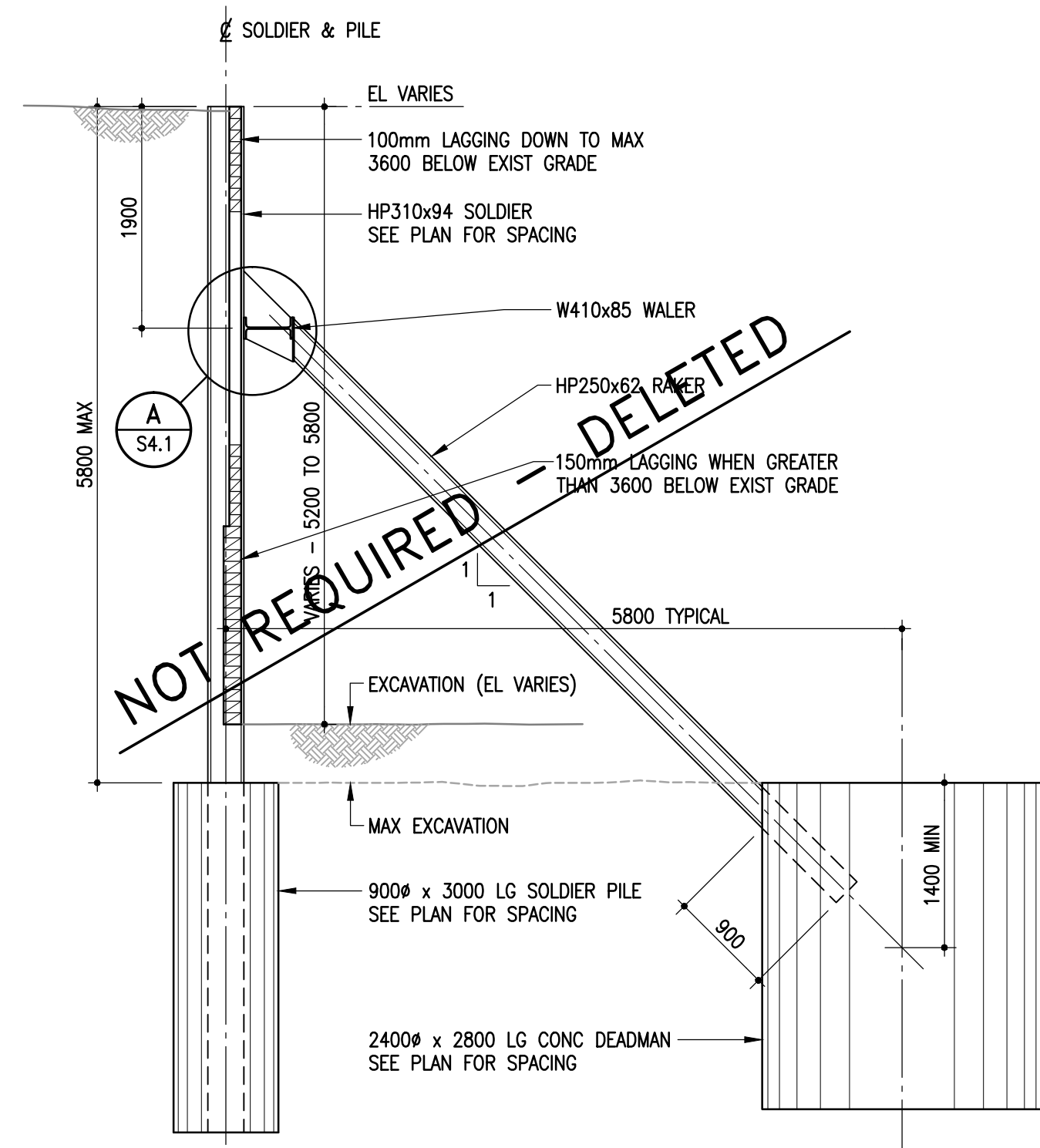
1 SECTION - TYPE 1 SHORING
S4.1 1 : 50



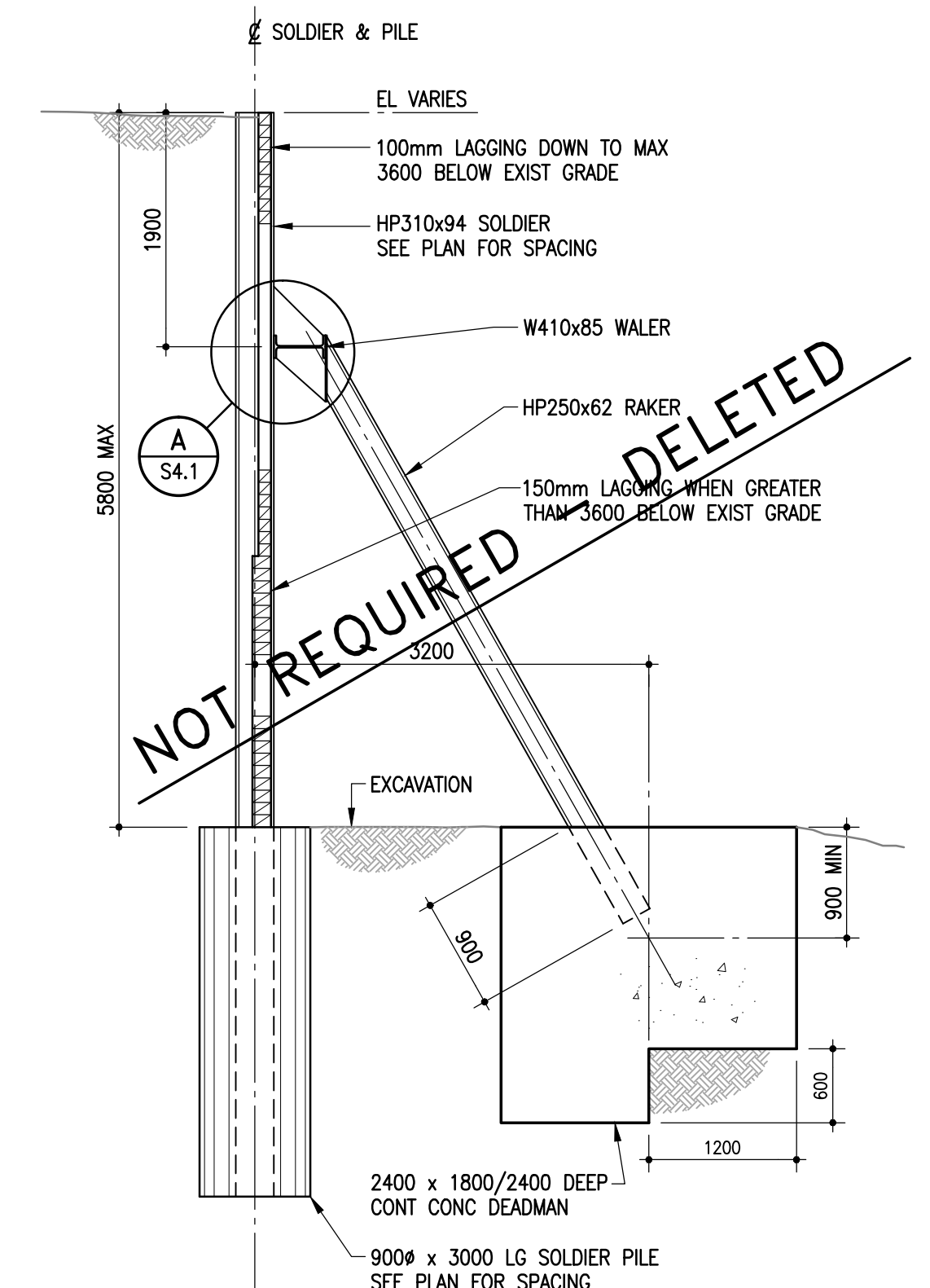
2 SECTION - TYPE 2 SHORING
S4.1 1 : 50



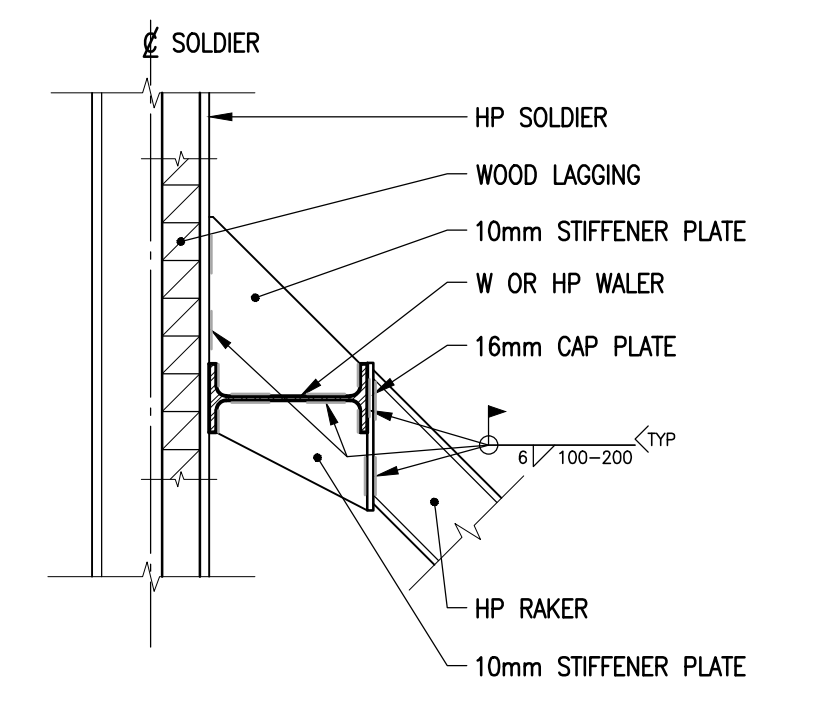
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S4.1 1 : 50



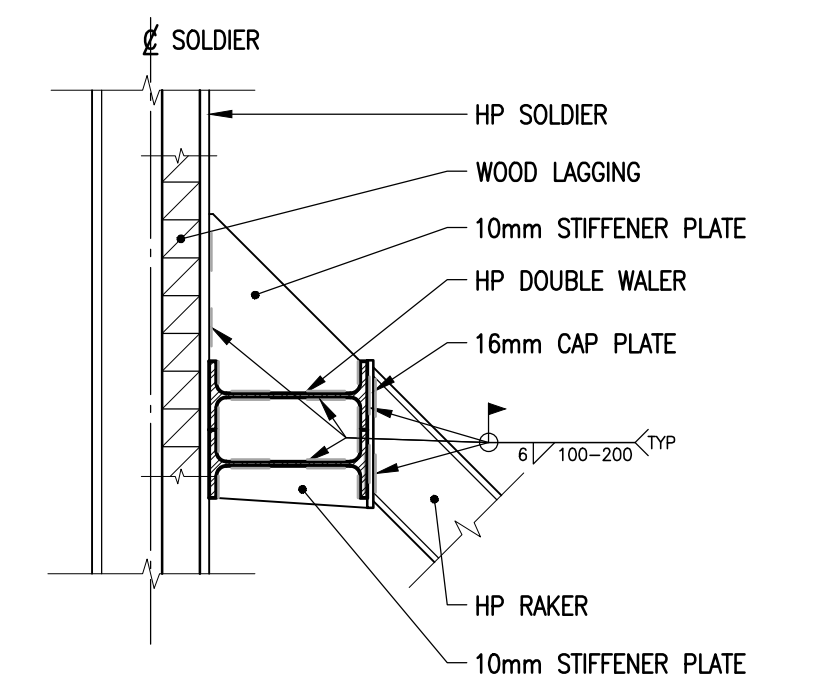
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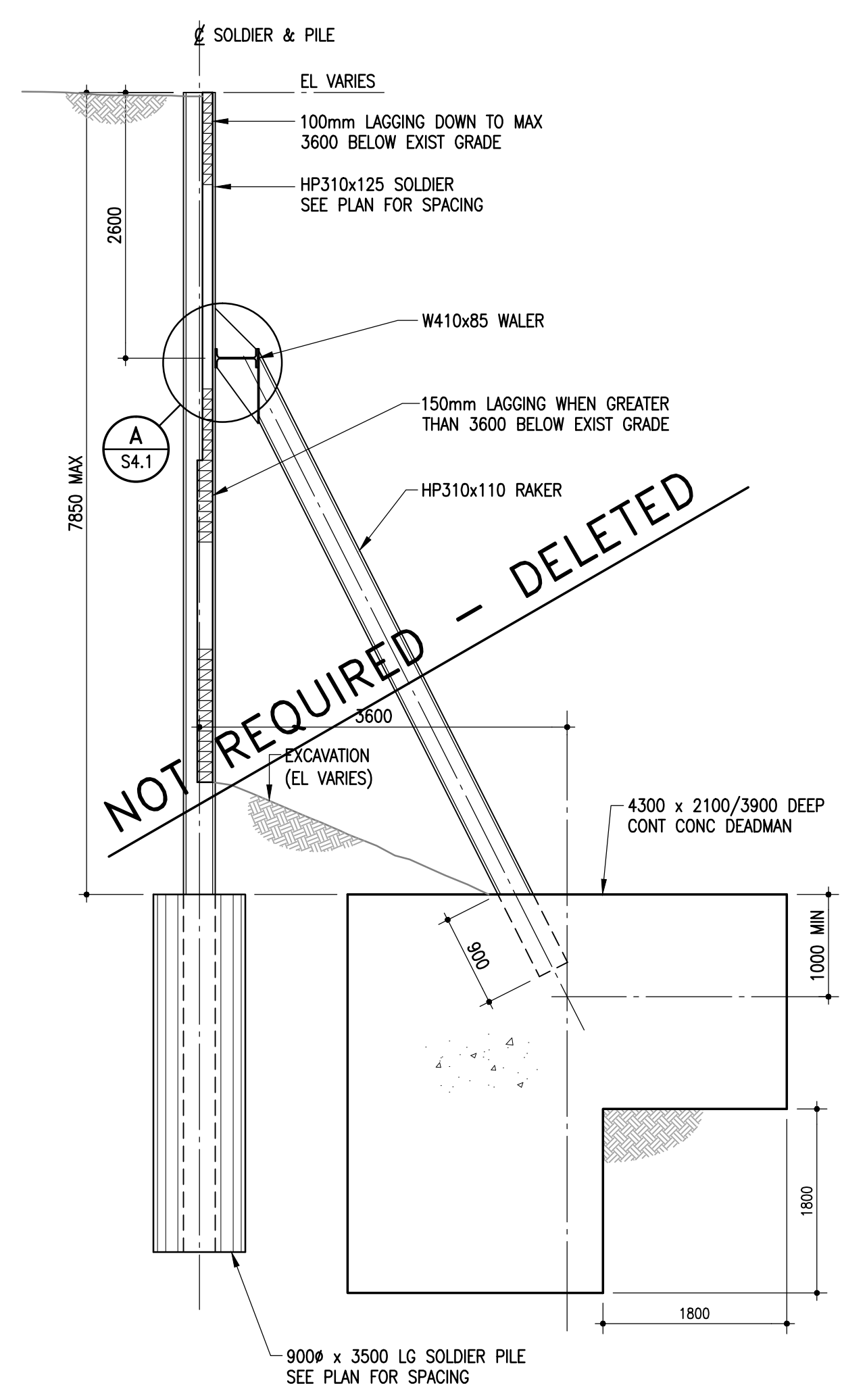
5 SECTION - TYPE 5 SHORING
S4.1 1 : 50



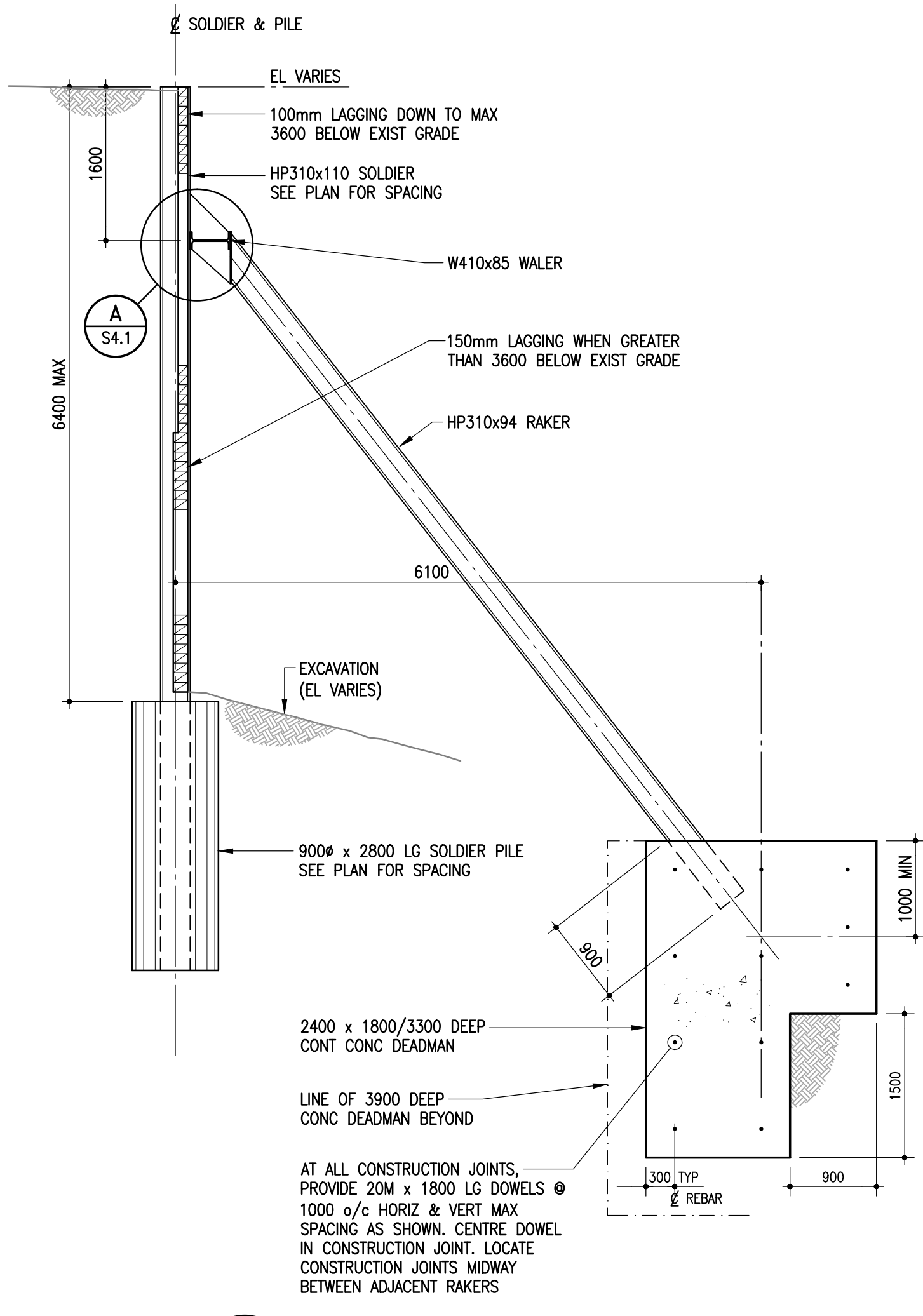
A DETAIL - SINGLE WALER
S4.1 1 : 20



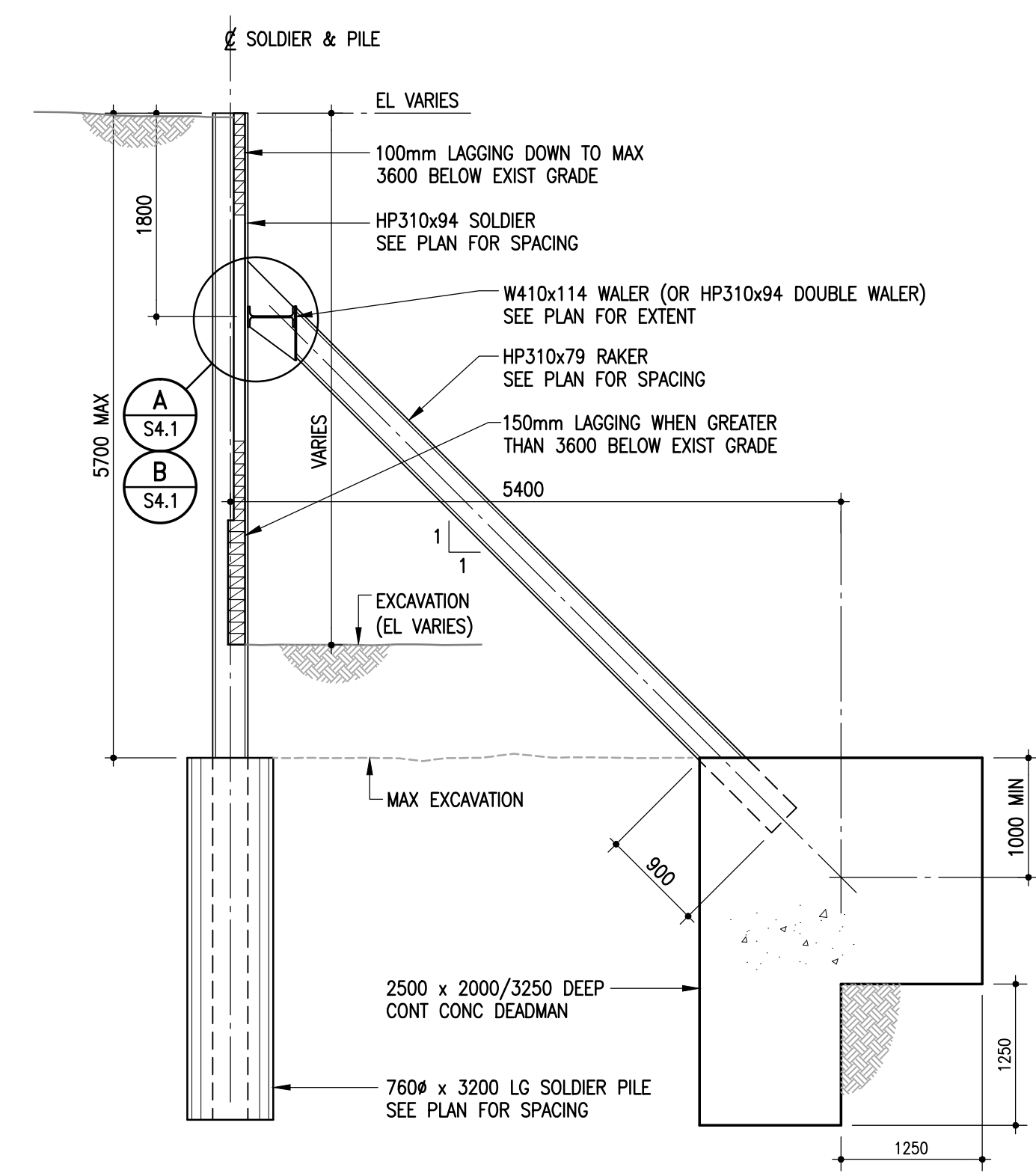
B DETAIL - DOUBLE WALER
S4.1 1 : 20



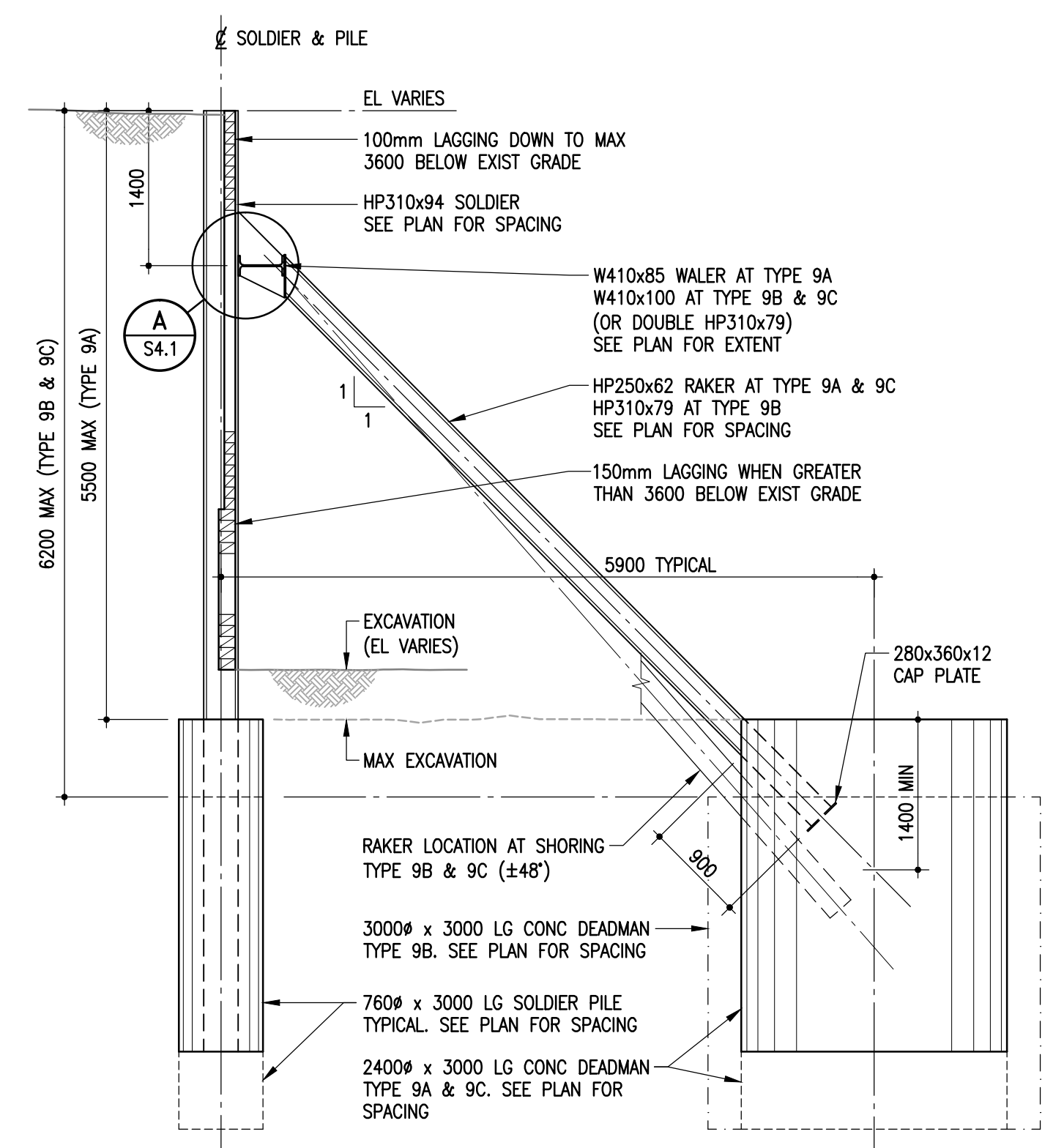
6 SECTION - TYPE 6 SHORING
S4.1 1 : 50



7 SECTION - TYPE 7 SHORING
S4.1 1 : 50



8 SECTION - TYPE 8 SHORING
S4.1 1 : 50



9 SECTION - TYPE 9 SHORING
S4.1 1 : 50

REFER TO SECTION 1/S2.3 FOR TYPE 10 SHORING

REFER TO SECTION 1/S2.4 FOR TYPE 11 SHORING

AS BUILT DRAWINGS



No.	Date	Issue/Revision	By
5	21 AUG 2015	AS-BUILT	
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
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300-275 Carlton Street
Winnipeg, Manitoba R3C 5R6
T 204. 943. 7501
F 204. 943. 7507

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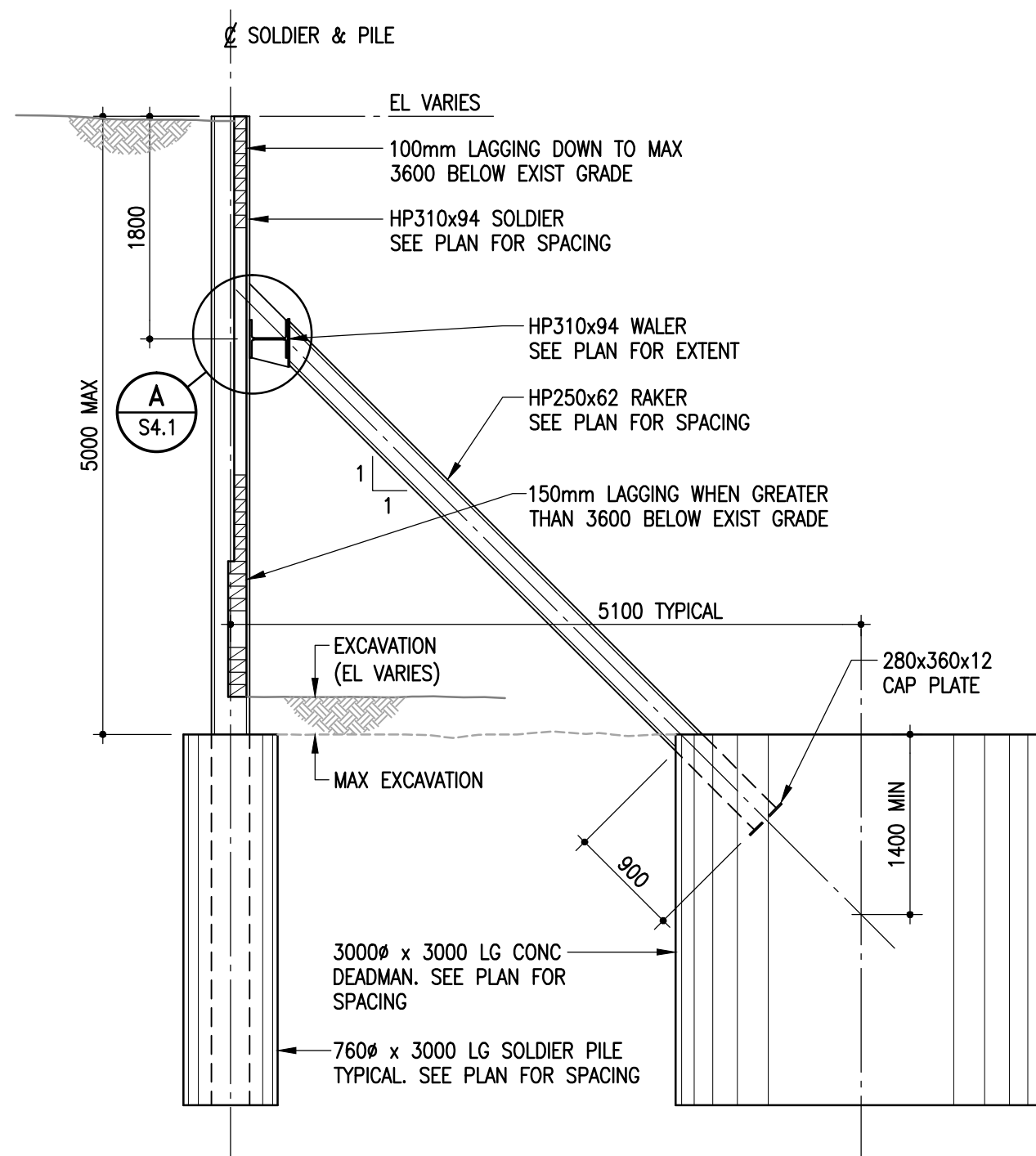
The General Contractor shall check & verify all dimensions and report any errors or omissions to the designers.

Project: THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT
SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION
SHORING AND EXCAVATION

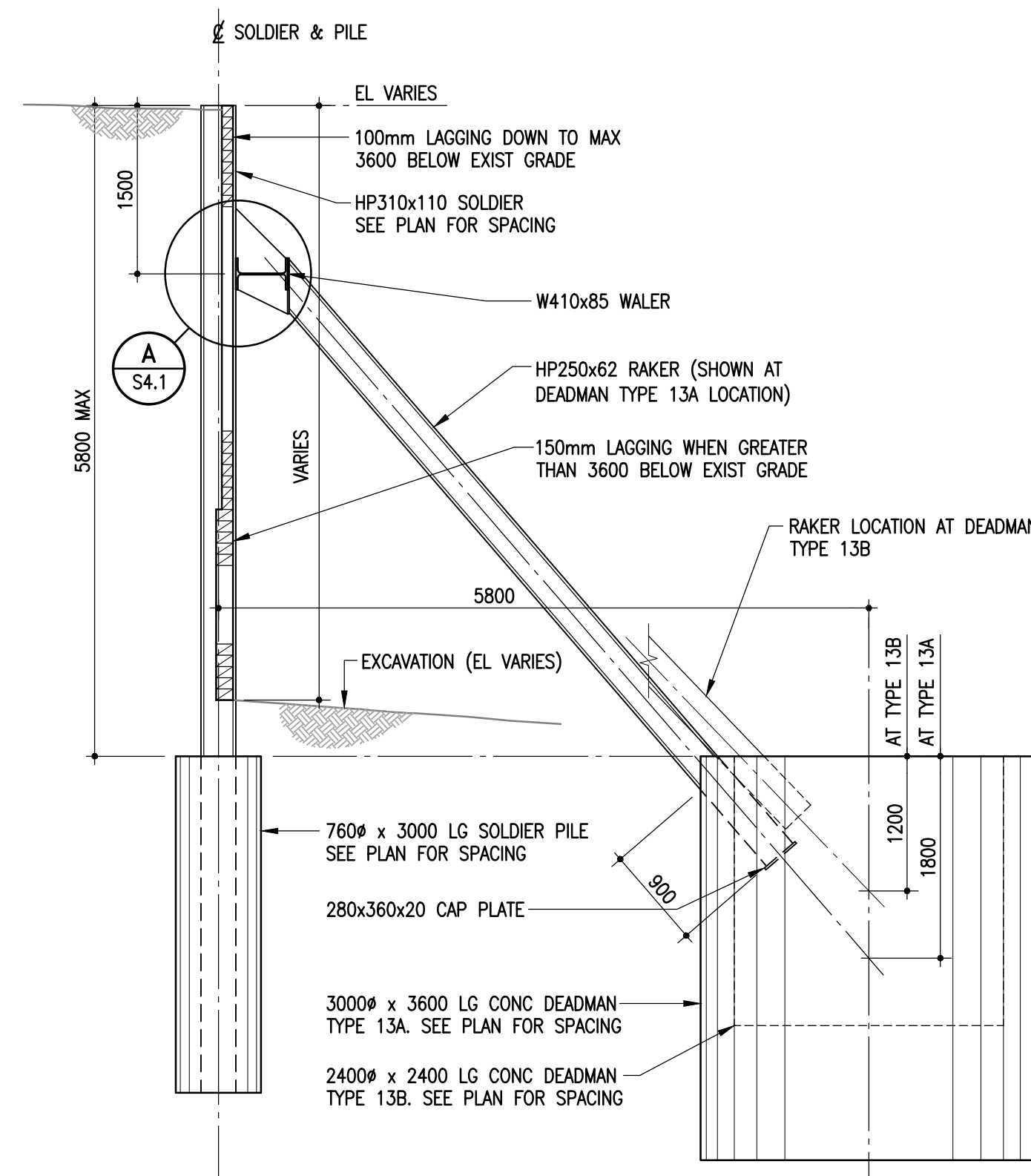
Sheet Title: SHORING SECTIONS

Design: JAL, Drawn: KJL, Checked: BF, Scale: AS NOTED, Date: 21 AUG 2015, File: 2014-1223

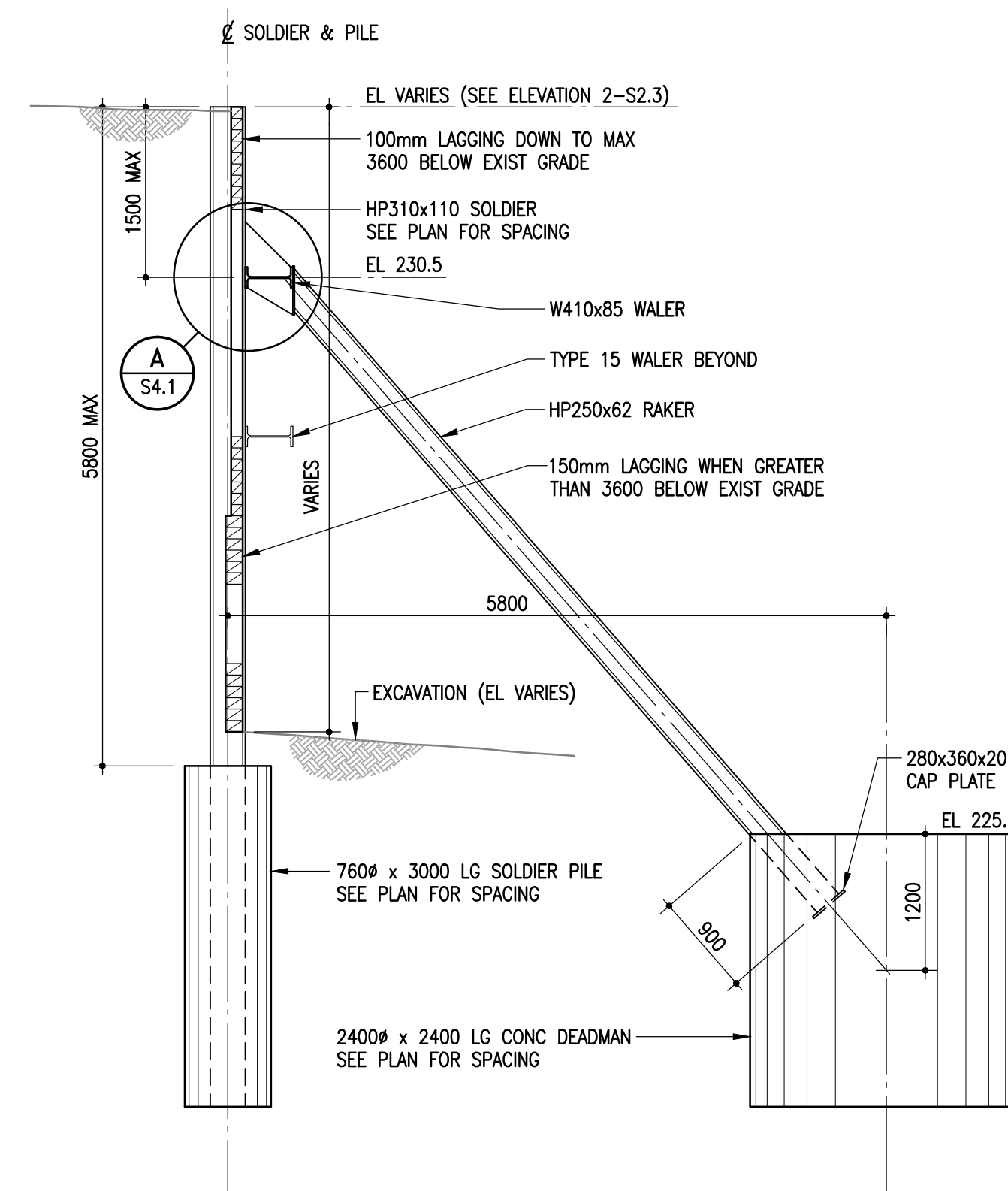
Sheet No. S4.1



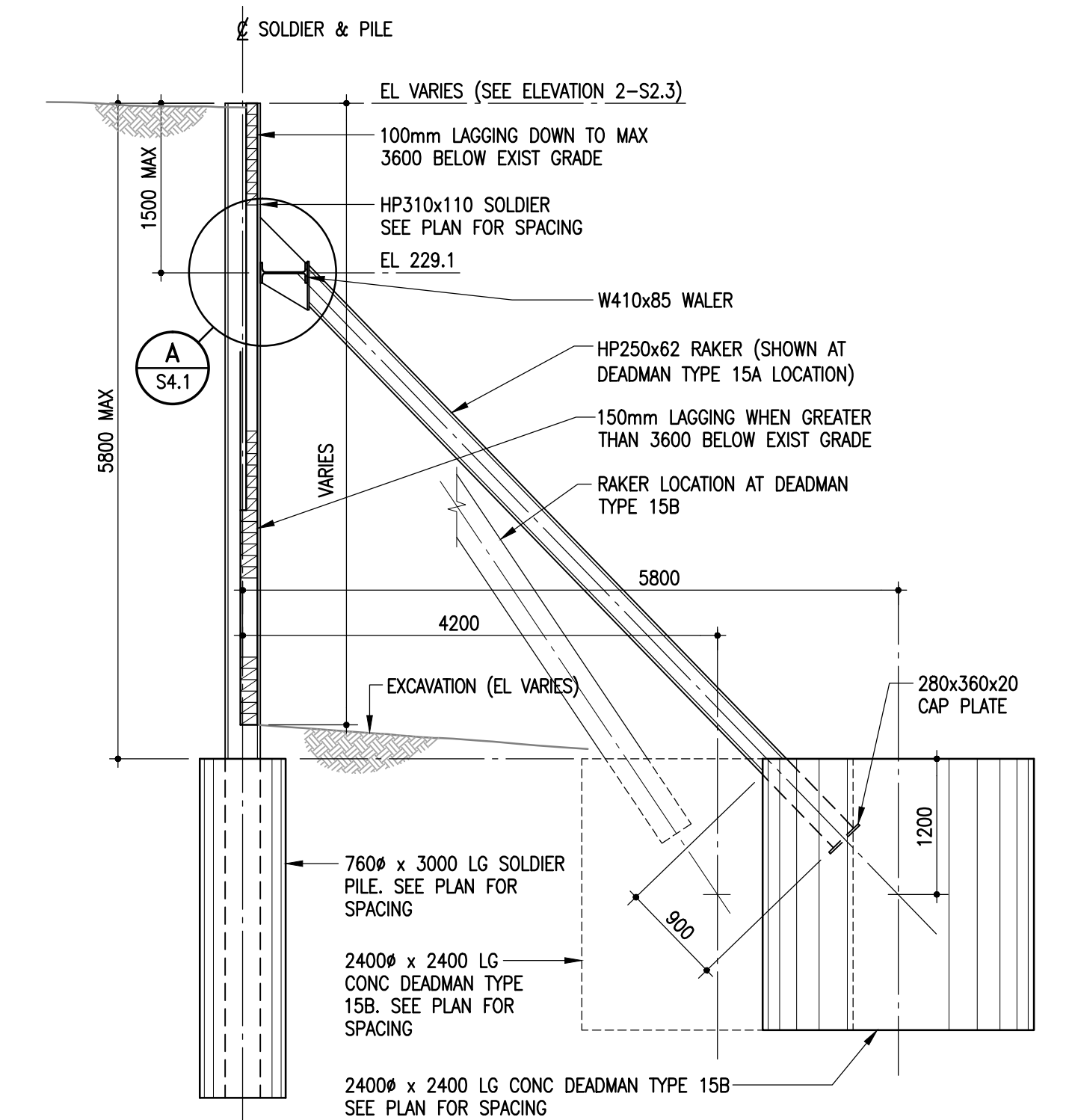
1 SECTION - TYPE 12 SHORING
S4.2 1 : 50



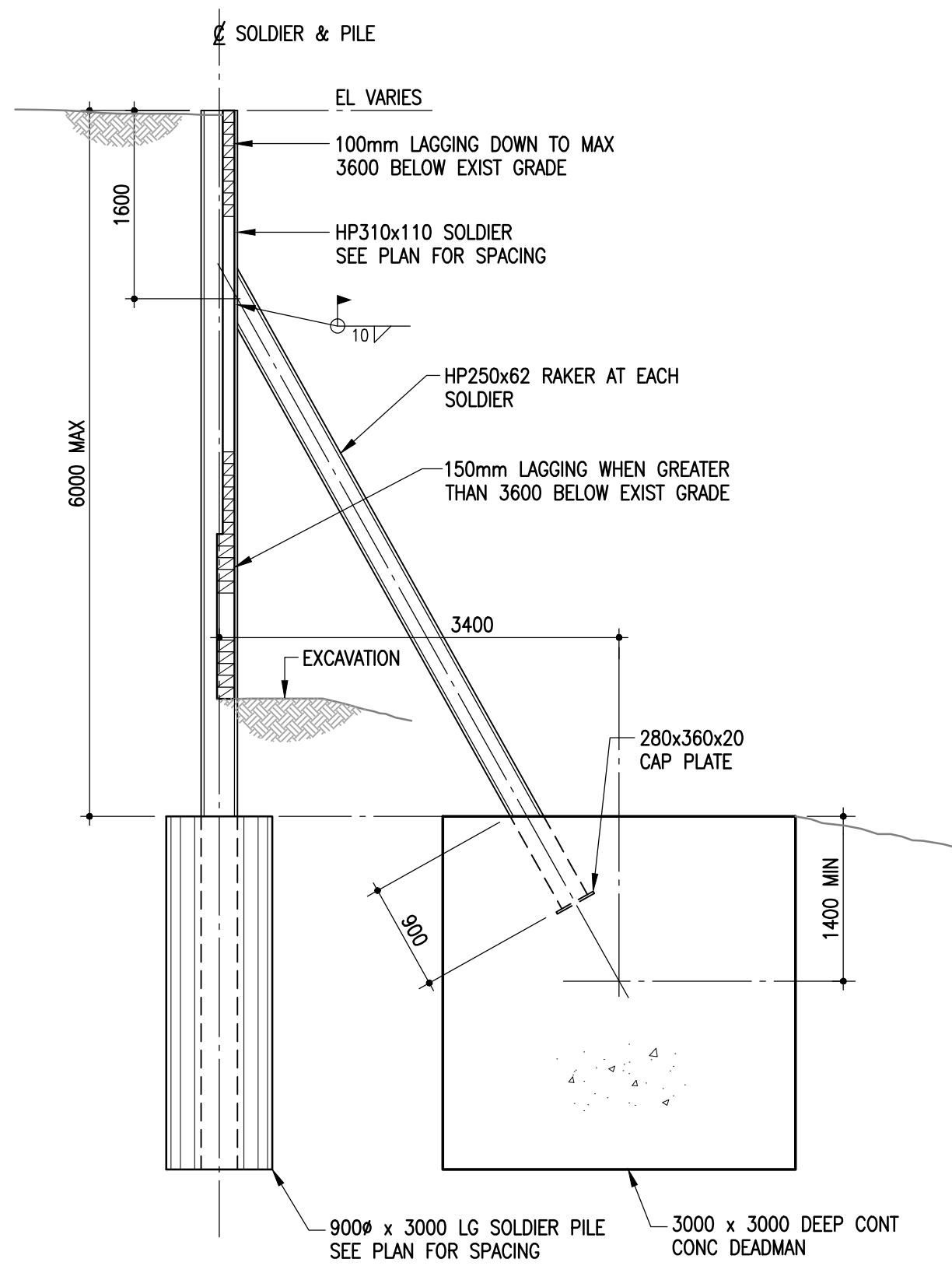
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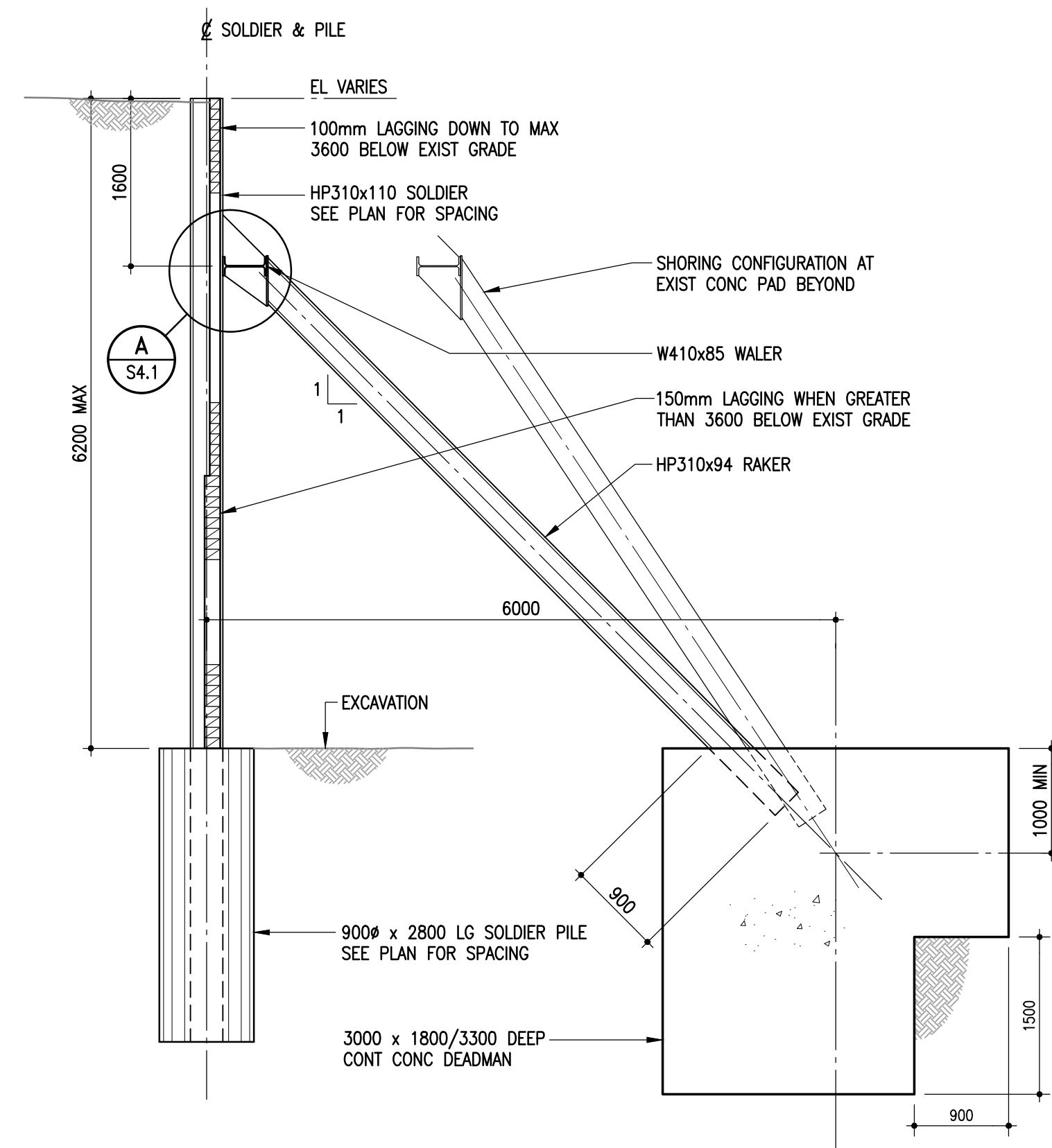
3 SECTION - TYPE 14 SHORING
S4.2 1 : 50



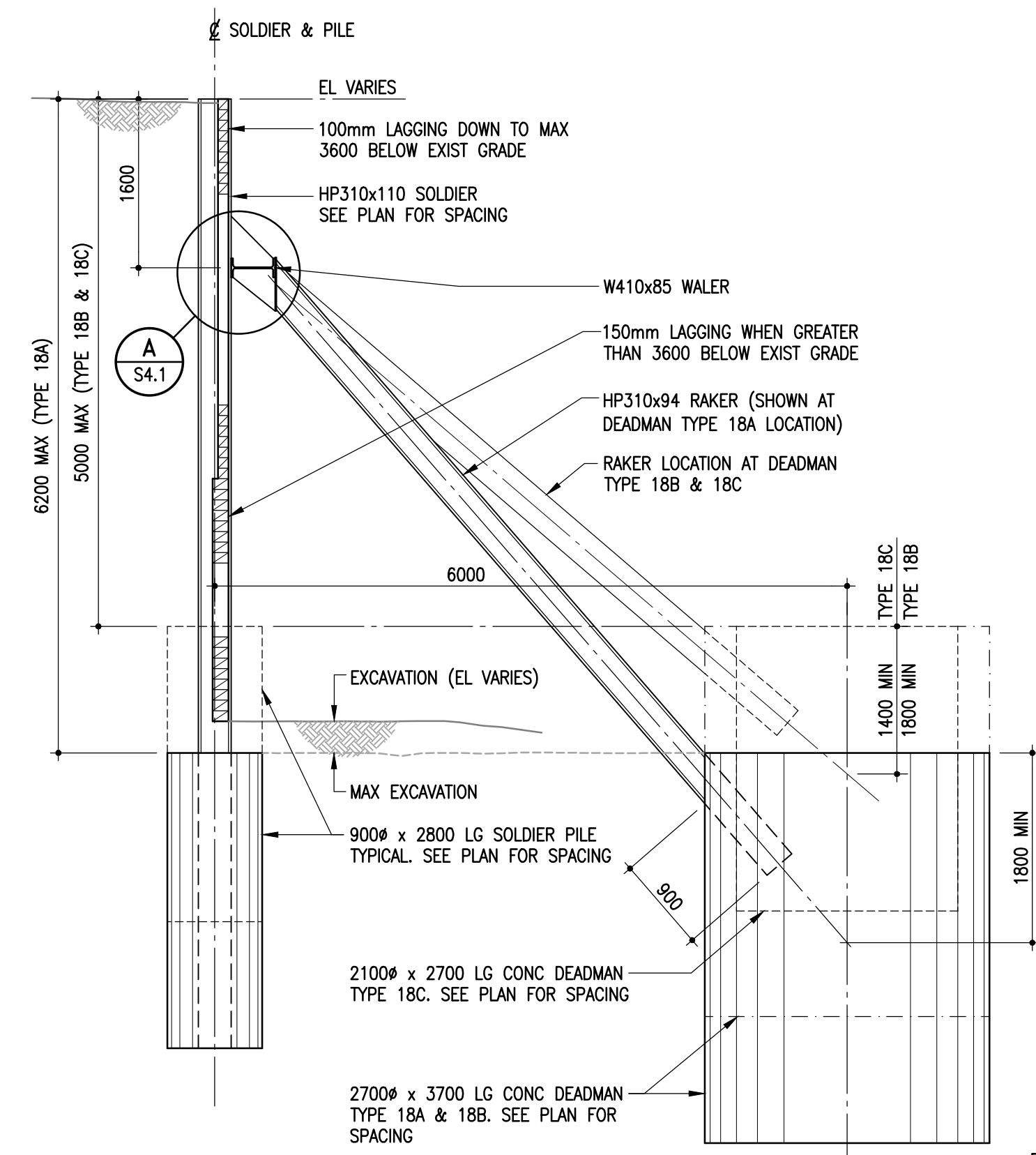
4 SECTION - TYPE 15 SHORING
S4.2 1 : 50



5 SECTION - TYPE 16 SHORING
S4.2 1 : 50



6 SECTION - TYPE 17 SHORING
S4.2 1 : 50



7 SECTION - TYPE 18 SHORING
S4.2 1 : 50

AS BUILT DRAWINGS



No.	Date	Issue/Revision	By
3	21 AUG 2015	AS-BUILT	
2	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
1	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF

ORIGINAL DRAWING SEALED BY B. FLISAK AND DATED June 25, 2015

300-275 Carlton Street
Winnipeg, Manitoba R3C 5R6
T 204. 943. 7501
F 204. 943. 7507

Crosier Kilgour & Partners Ltd.
CONSULTING STRUCTURAL ENGINEERS

Project THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION						Sheet No.
Sheet Title SHORING SECTIONS						S4.2
Design	Drawn	Checked	Scale	Date	File	
JAL	KJL	BF	AS NOTED	21 AUG 2015	2014-1223	

The General Contractor shall check & verify all dimensions and report any errors or omissions to the designers.