

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

1 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.

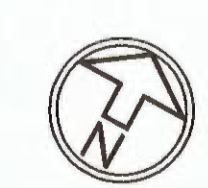
PROCEDURE

- 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 WALLER, 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 WALERS AND RAKERS. END OF RAKERS TO EXTEND 900mm 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.



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Certificate of Authorization
Crosier Kilgour & Partners Ltd.
No. 235 Date: June 25, 2015

No.	Date	Issue/Revision	By
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

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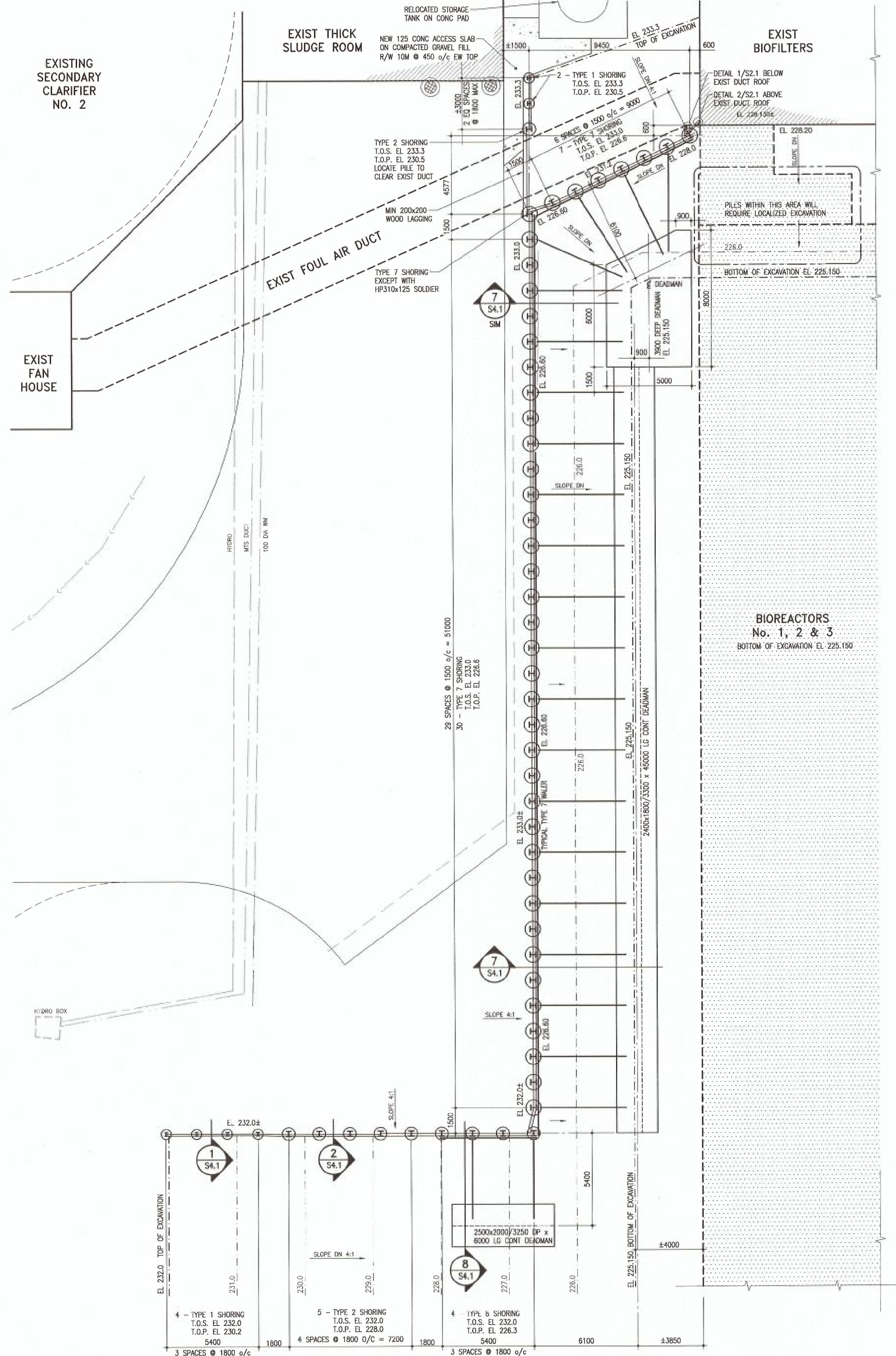
Project: THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT
SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION
SHORING AND EXCAVATION

Sheet Title: SHORING LOCATION PLAN & GENERAL NOTES

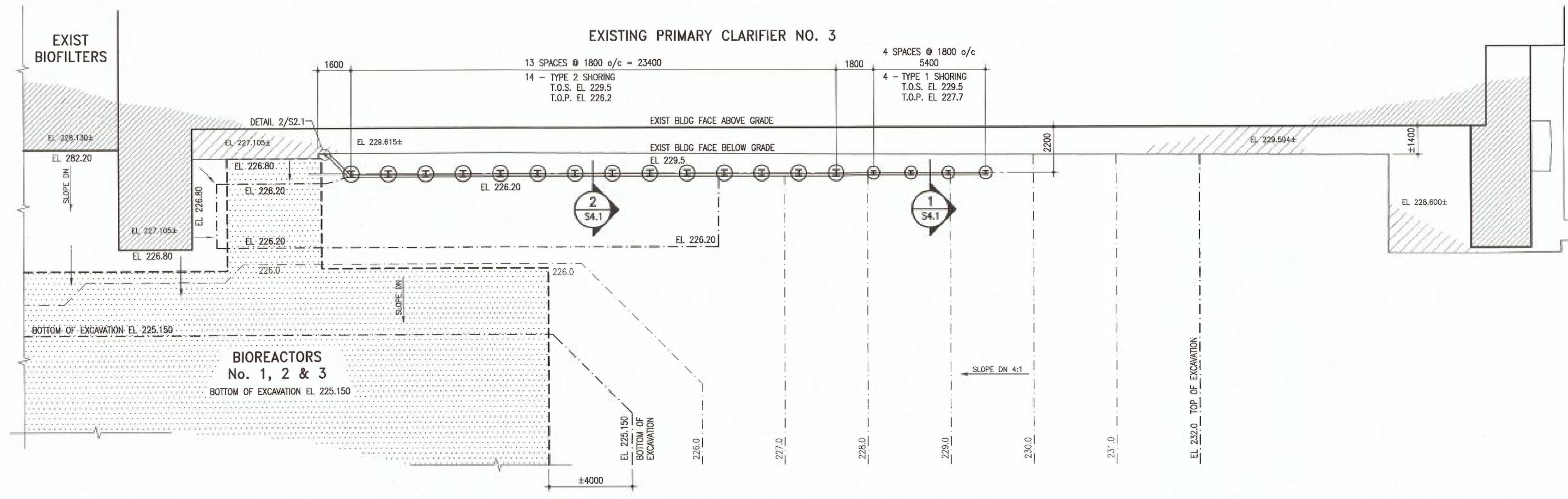
Design: JAL Drawn: KJL Checked: BF Scale: AS NOTED Date: 19 NOV 2014 File: 2014-1223

Sheet No. **S1.1**

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



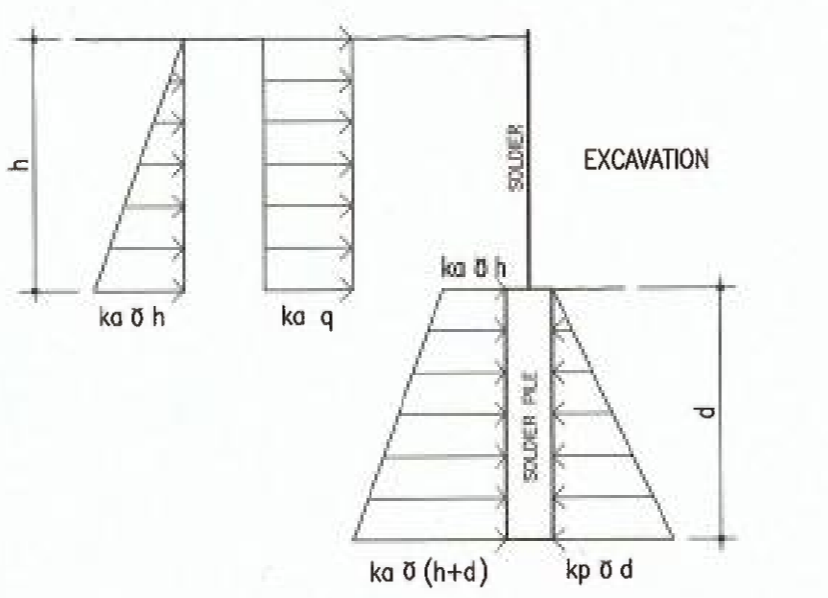
A SHORING LAYOUT
S2.1 1 : 150



B SHORING LAYOUT
S2.1 1 : 150

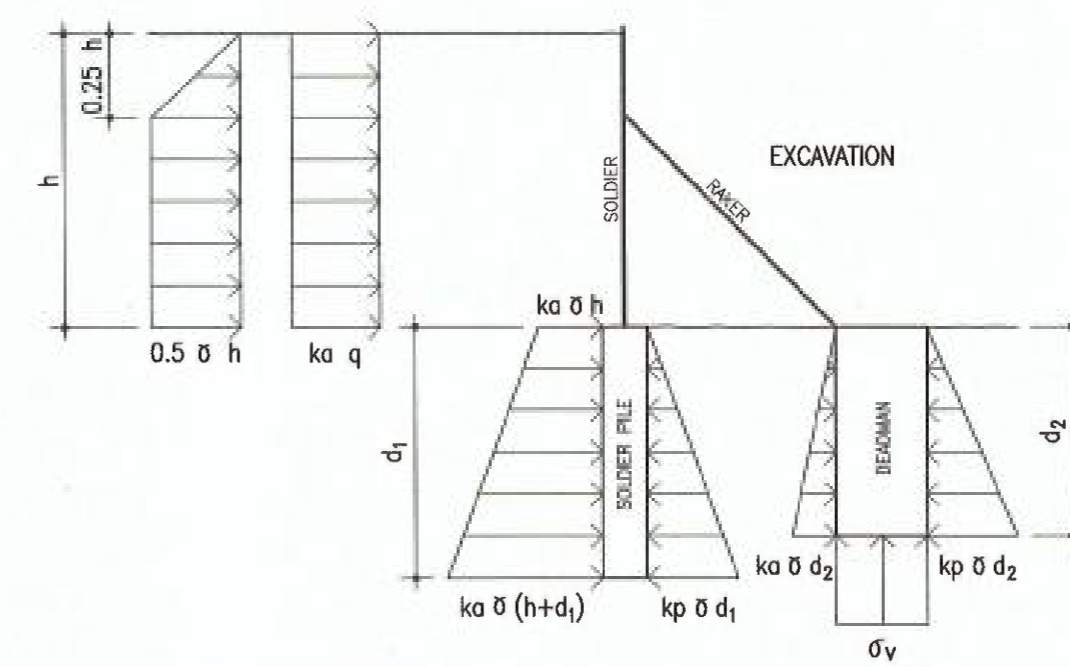
PLAN NOTES
REFER TO SECTIONS FOR SHORING TYPES
T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
T.O.P. EL - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION

TYPICAL CANTILEVER SOLDIER PILE DESIGN LOADS



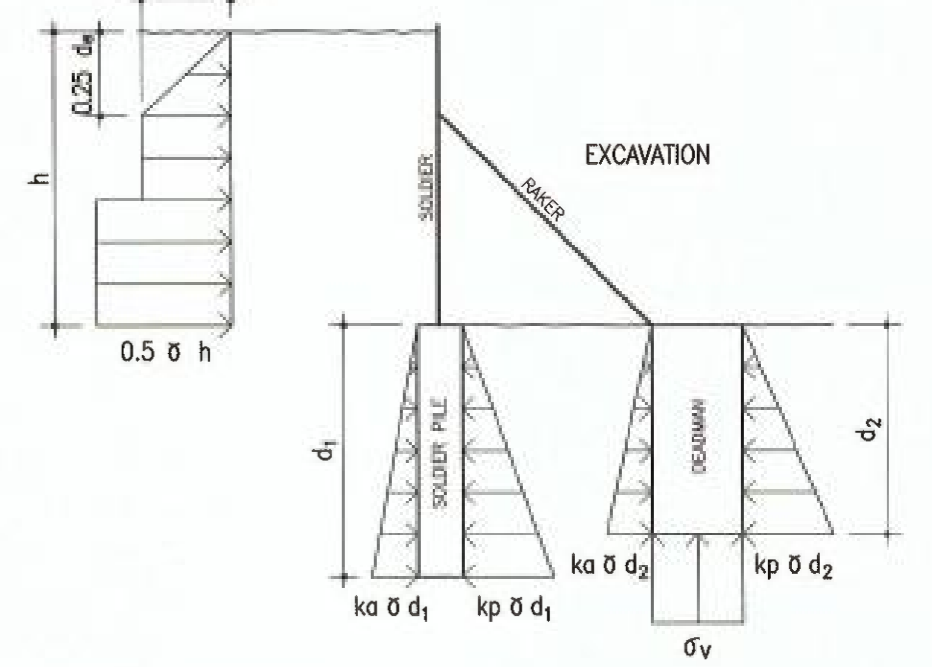
DESIGN PARAMETERS
ka = 0.60 (ACTIVE PRESSURE COEFFICIENT)
kp = 2.50 (PASSIVE PRESSURE COEFFICIENT)
delta = 19.7 kN/m³ (SOIL UNIT WEIGHT)
q = 12.0 kPa (SURCHARGE)
h = DEPTH OF EXCAVATION
d = DEPTH OF EMBEDMENT OF SHORING BELOW UNDISTURBED SOIL

TYPICAL BRACED EXCAVATION DESIGN LOADS

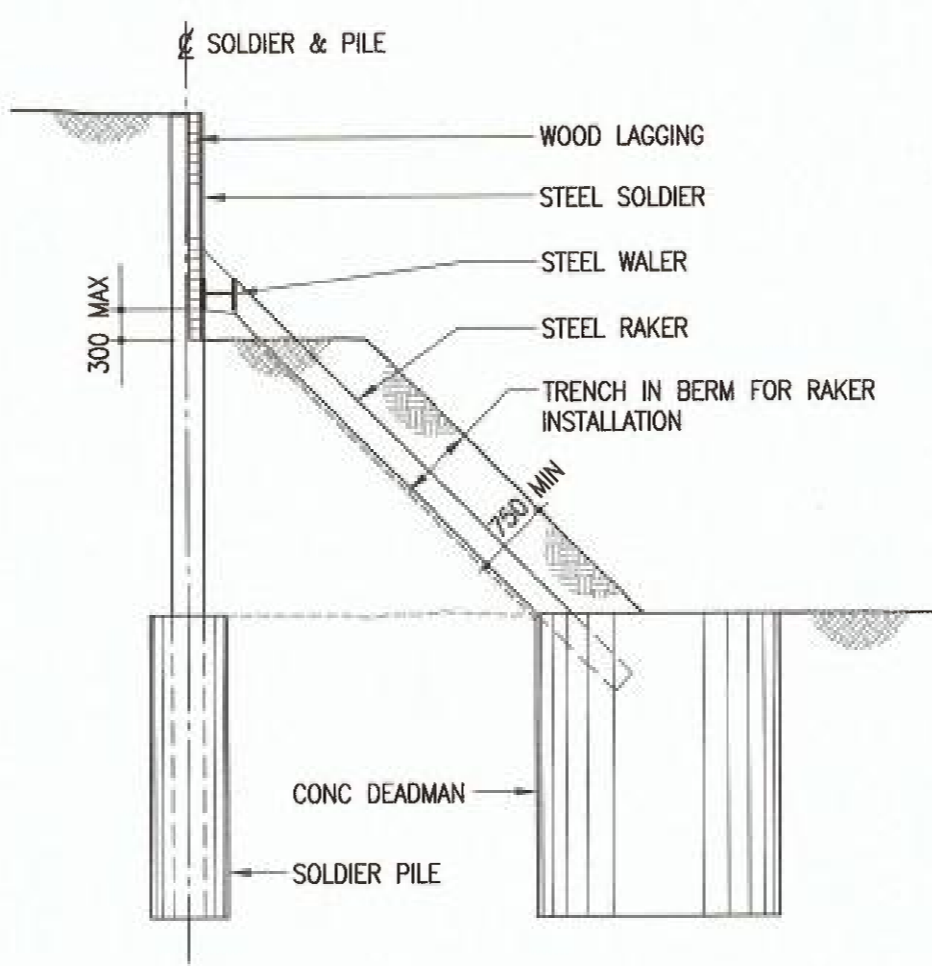


DESIGN PARAMETERS
ka = 0.60 (ACTIVE PRESSURE COEFFICIENT)
kp = 2.50 (PASSIVE PRESSURE COEFFICIENT)
delta = 19.7 kN/m³ (SOIL UNIT WEIGHT)
q = 12.0 kPa (SURCHARGE)
sigma_v = 80 kPa (BEARING CAPACITY)
h = DEPTH OF EXCAVATION
d1 = DEPTH OF SOLDIER PILE BELOW UNDISTURBED SOIL
d2 = DEPTH OF DEADMAN BELOW UNDISTURBED SOIL

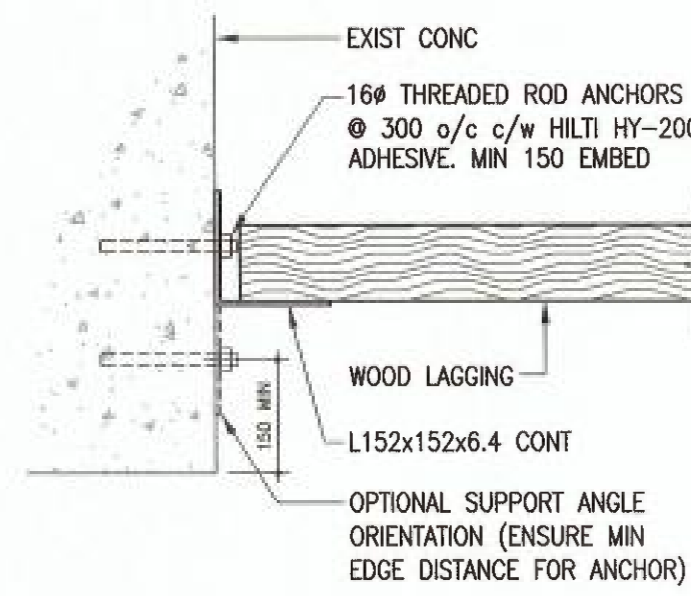
TYPICAL BRACED EXCAVATION AT EXIST BUILDING DESIGN LOADS



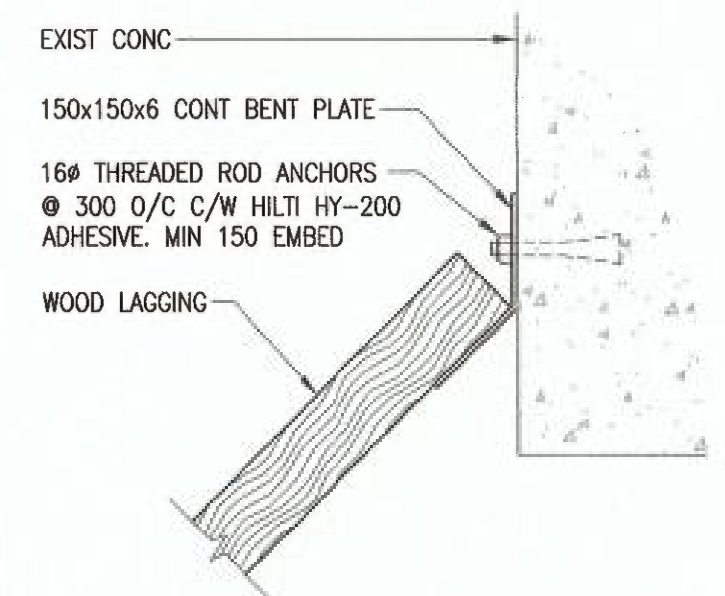
DESIGN PARAMETERS
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kp = 2.50 (PASSIVE PRESSURE COEFFICIENT)
delta = 19.7 kN/m³ (SOIL UNIT WEIGHT)
q = 12.0 kPa (SURCHARGE)
sigma_v = 80 kPa (BEARING CAPACITY)
h = DEPTH OF EXCAVATION
d1 = DEPTH OF SOLDIER PILE BELOW UNDISTURBED SOIL
d2 = DEPTH OF DEADMAN BELOW UNDISTURBED SOIL
dx = 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

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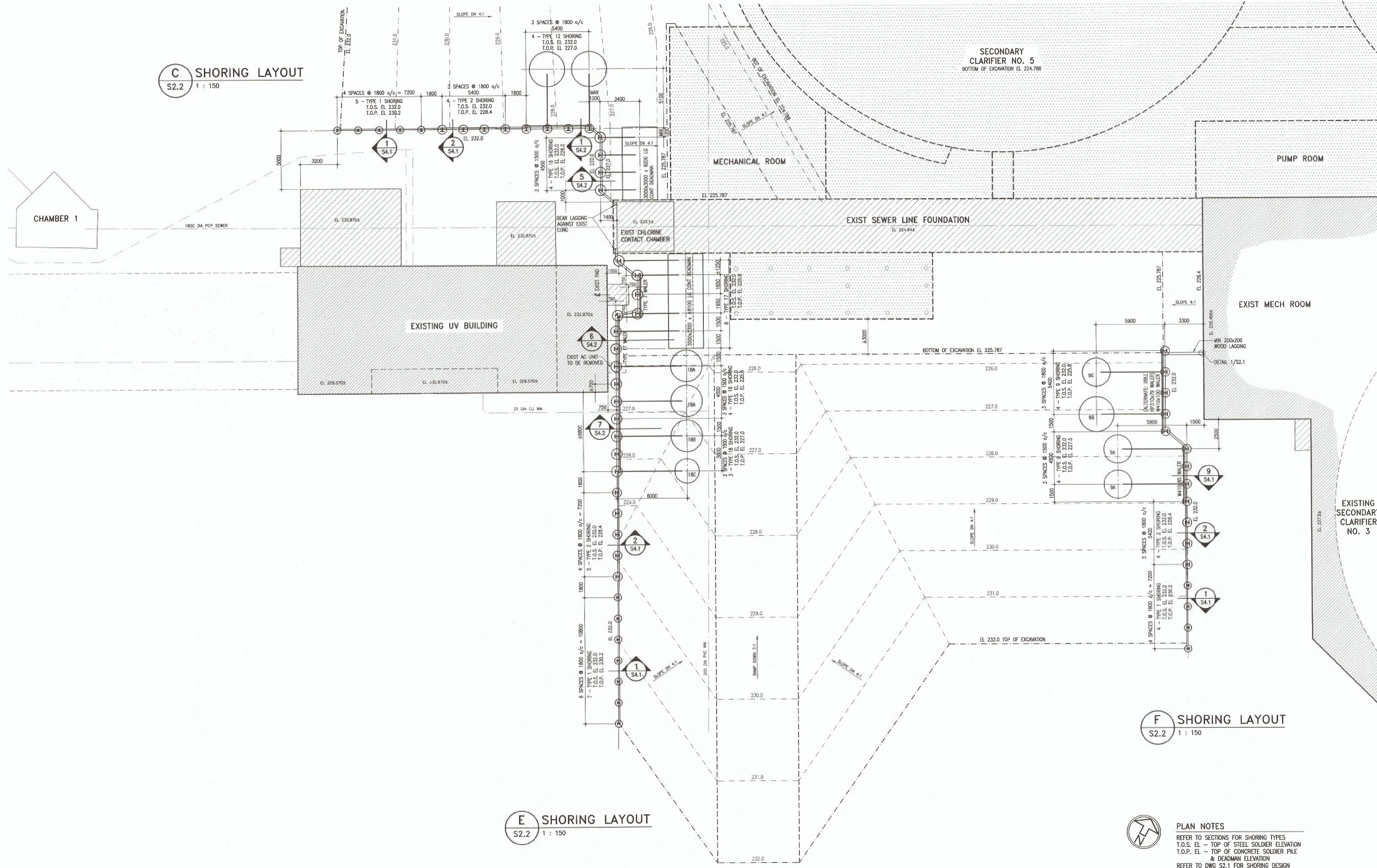
No.	Date	Issue/Revision	By
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
3	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF
2	01 DEC 2014	ISSUED FOR CONSTRUCTION	BF
1	19 NOV 2014	ISSUED FOR REVIEW	BF

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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**
Sheet No.: **S2.1**
Design: JAL Drawn: KJL Checked: BF Scale: AS NOTED Date: 18 NOV 2014 File: 2014-1223

C SHORING LAYOUT
S2.2 1 : 150



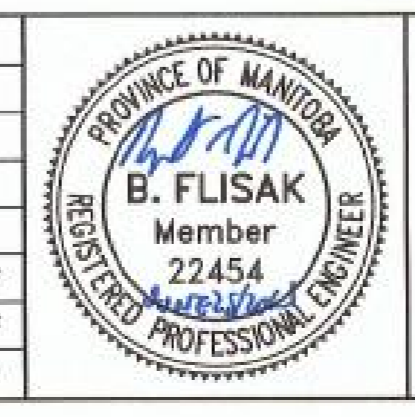
E SHORING LAYOUT
S2.2 1 : 150

F SHORING LAYOUT
S2.2 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.

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1	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF



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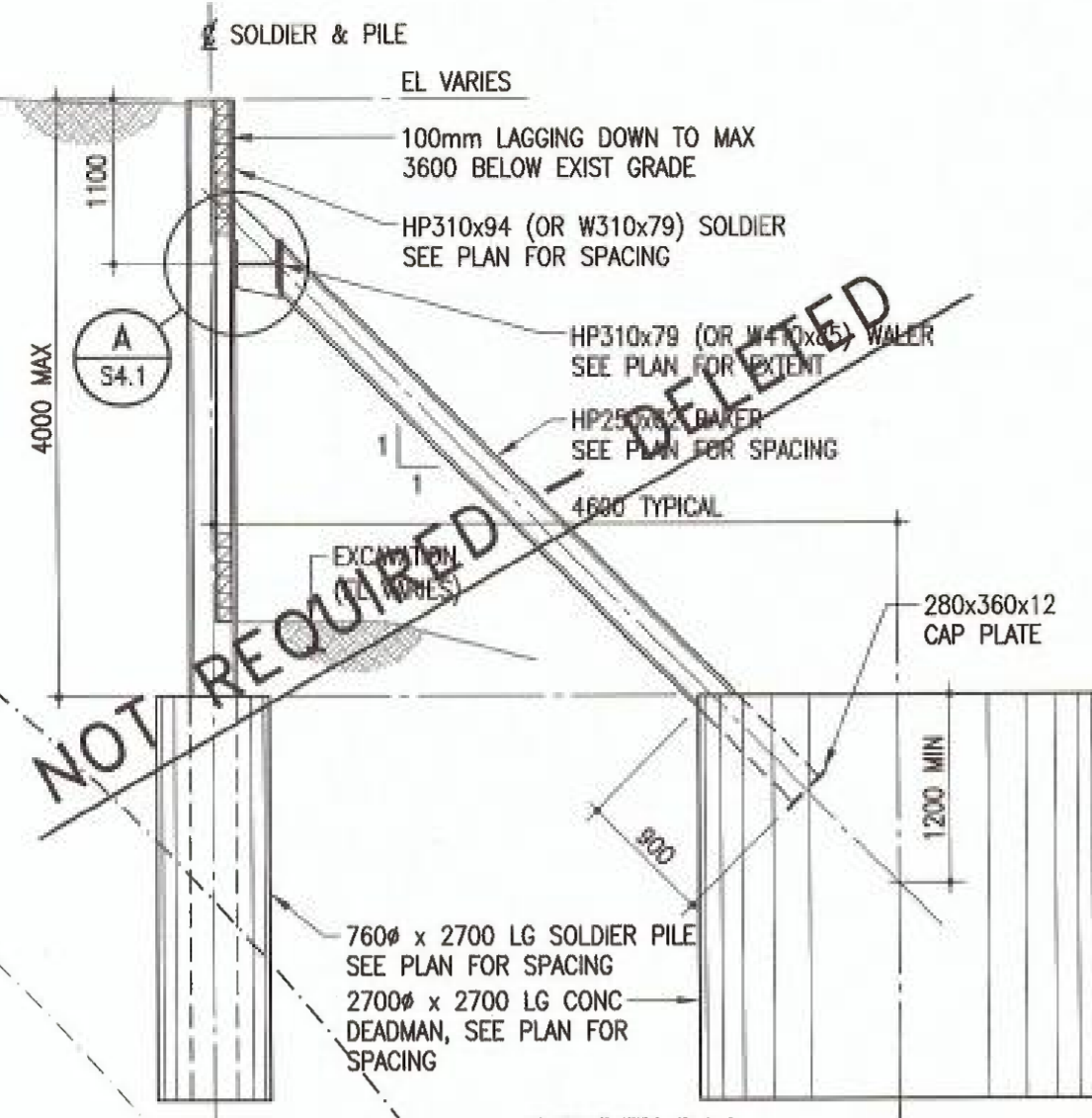
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Project						THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION					
Sheet Title						UV EXPANSION & SECONDARY CLARIFIER NO. 5 SHORING LAYOUTS					
Design						JAL					
Drawn						KJL					
Checked						BF					
Scale						AS NOTED					
Date						19 DEC 2014					
File						2014-1223					
Sheet No.						S2.2					

PLAN NOTES

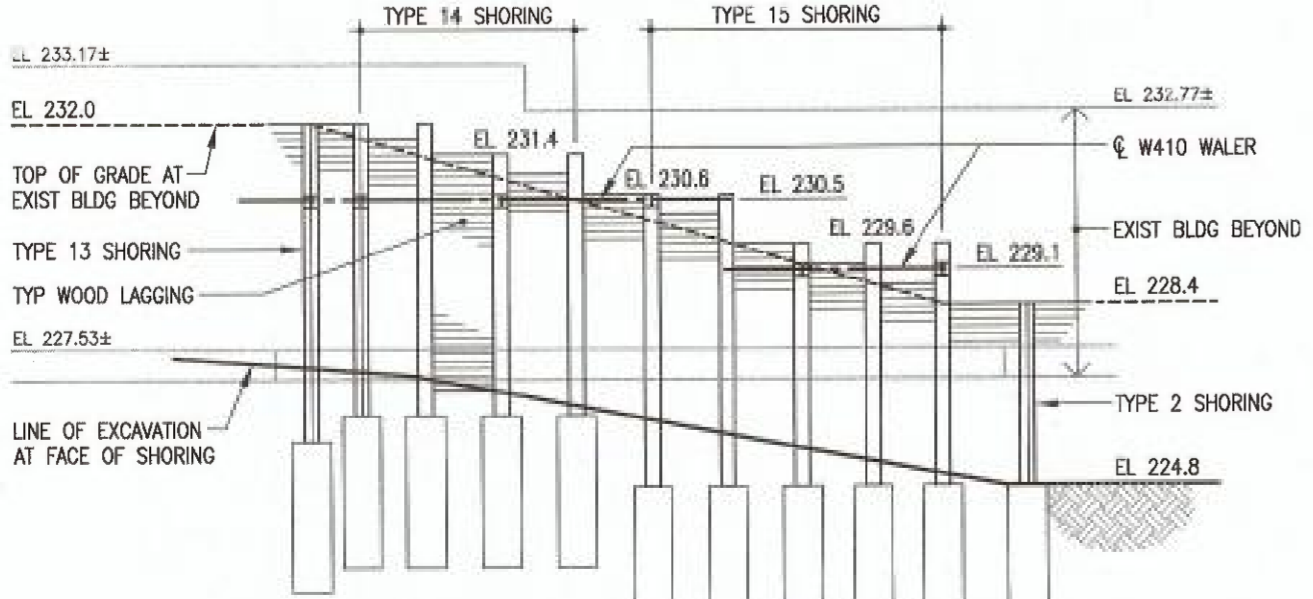
REFER TO SECTIONS FOR SHORING TYPES
 T.O.S. EL. - TOP OF STEEL SOLDIER ELEVATION
 T.O.P. EL. - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION
 REFER TO DWG S2.1 FOR SHORING DESIGN LOADS & TYPICAL SLOPING BERM EXCAVATION DETAIL.



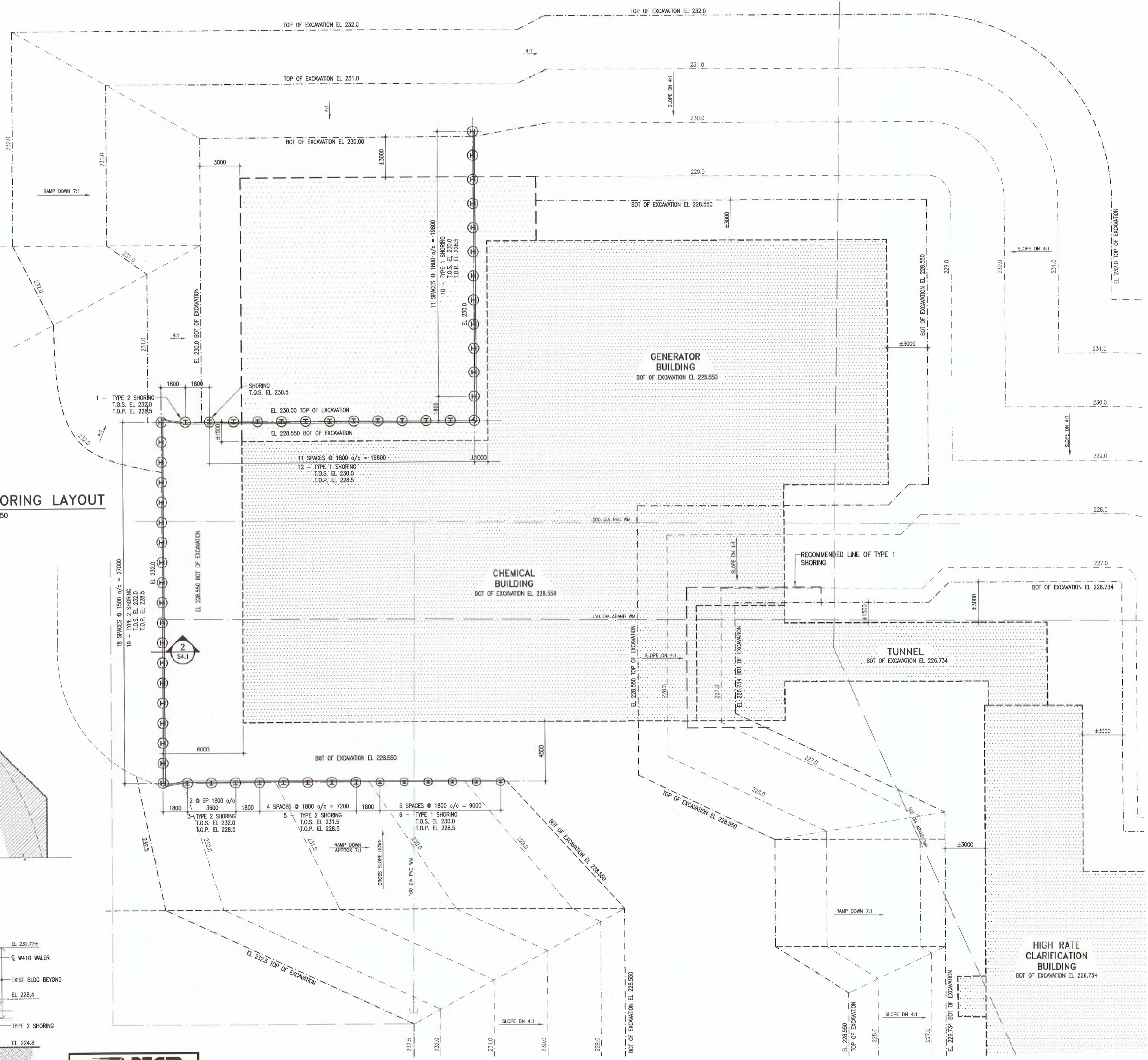
SECTION TYPE 10 SHORING
 1 : 50

H SHORING LAYOUT
 S2.3 1 : 150

G SHORING LAYOUT
 S2.3 1 : 150



2 SHORING ELEVATION
 S2.3 1 : 150



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 No. 235 Date: June 25, 2015

No.	Date	Issue/Revision	By
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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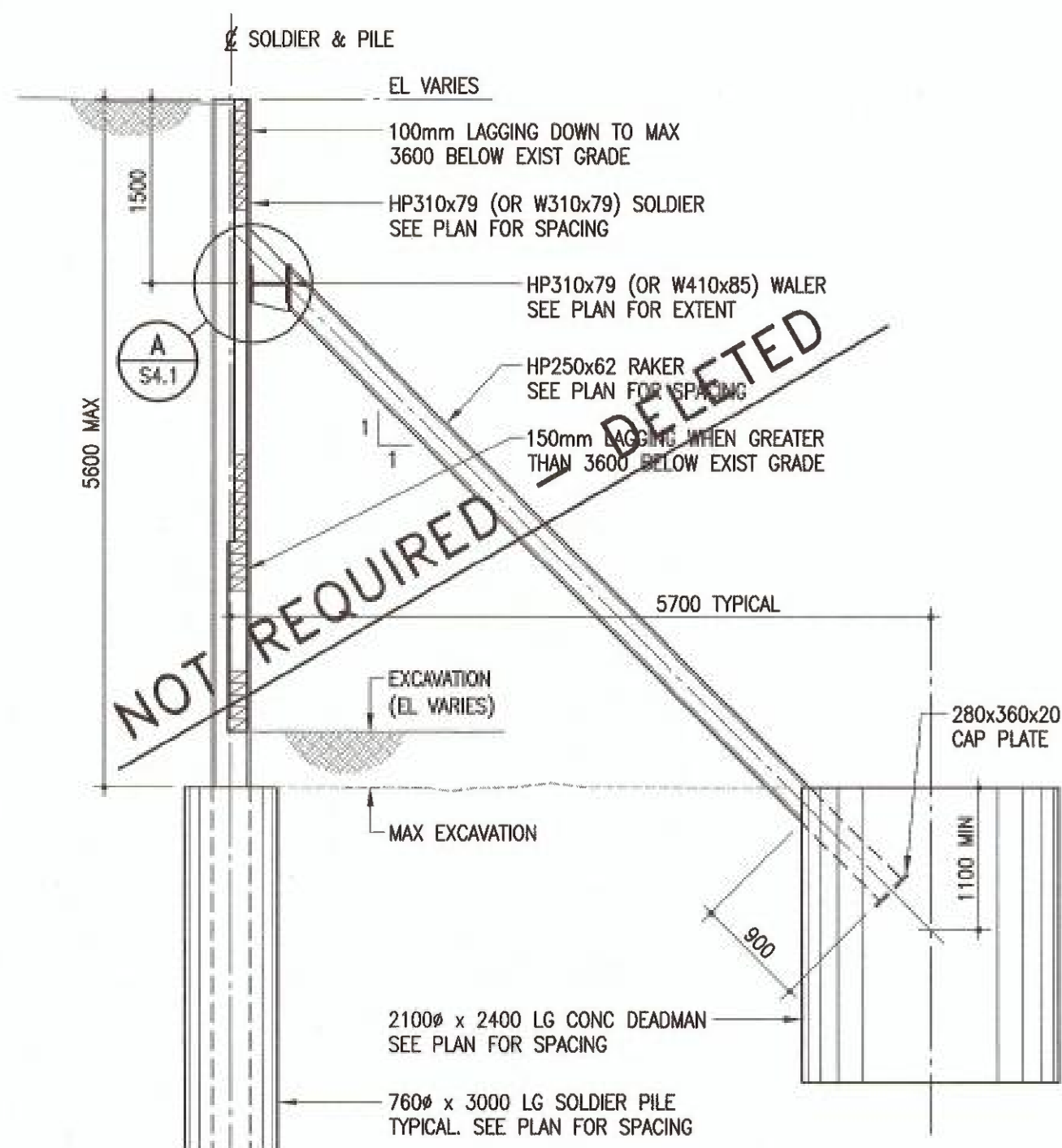
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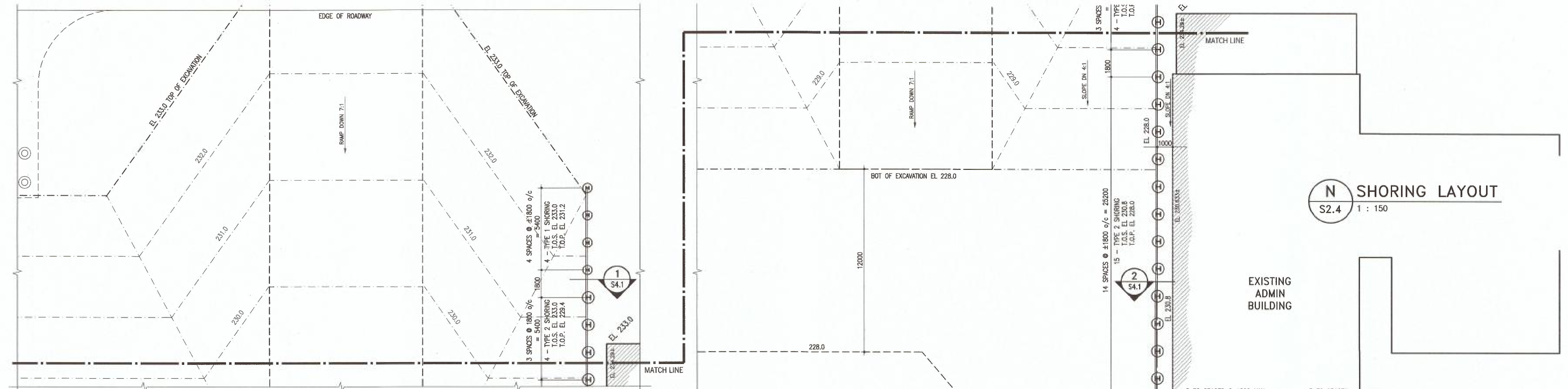
THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT
SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION
SHORING AND EXCAVATION

Design	Drawn	Checked	Scale	Date	File
JAL	KJL	BF	AS NOTED	26 NOV 2014	2014-1223

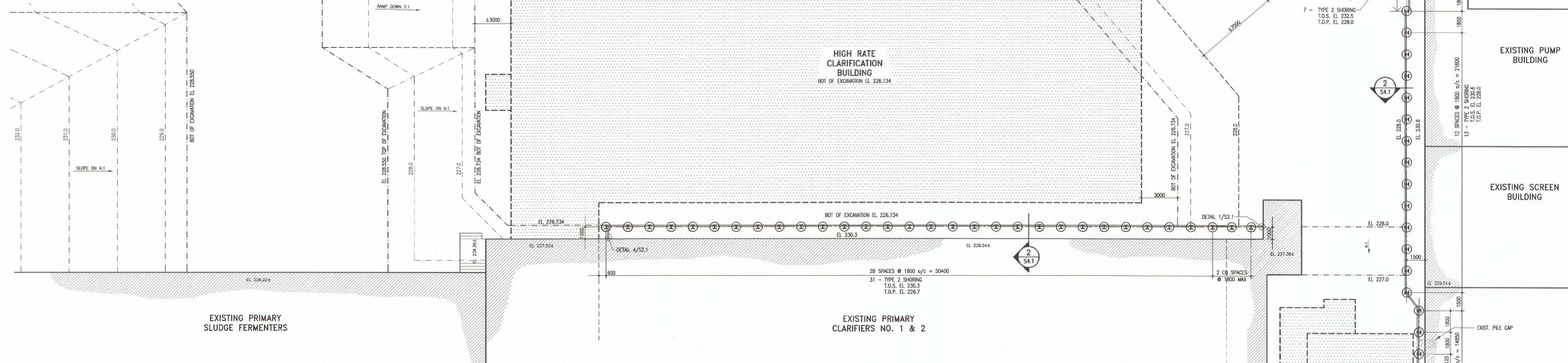
Sheet No. **S2.3**



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

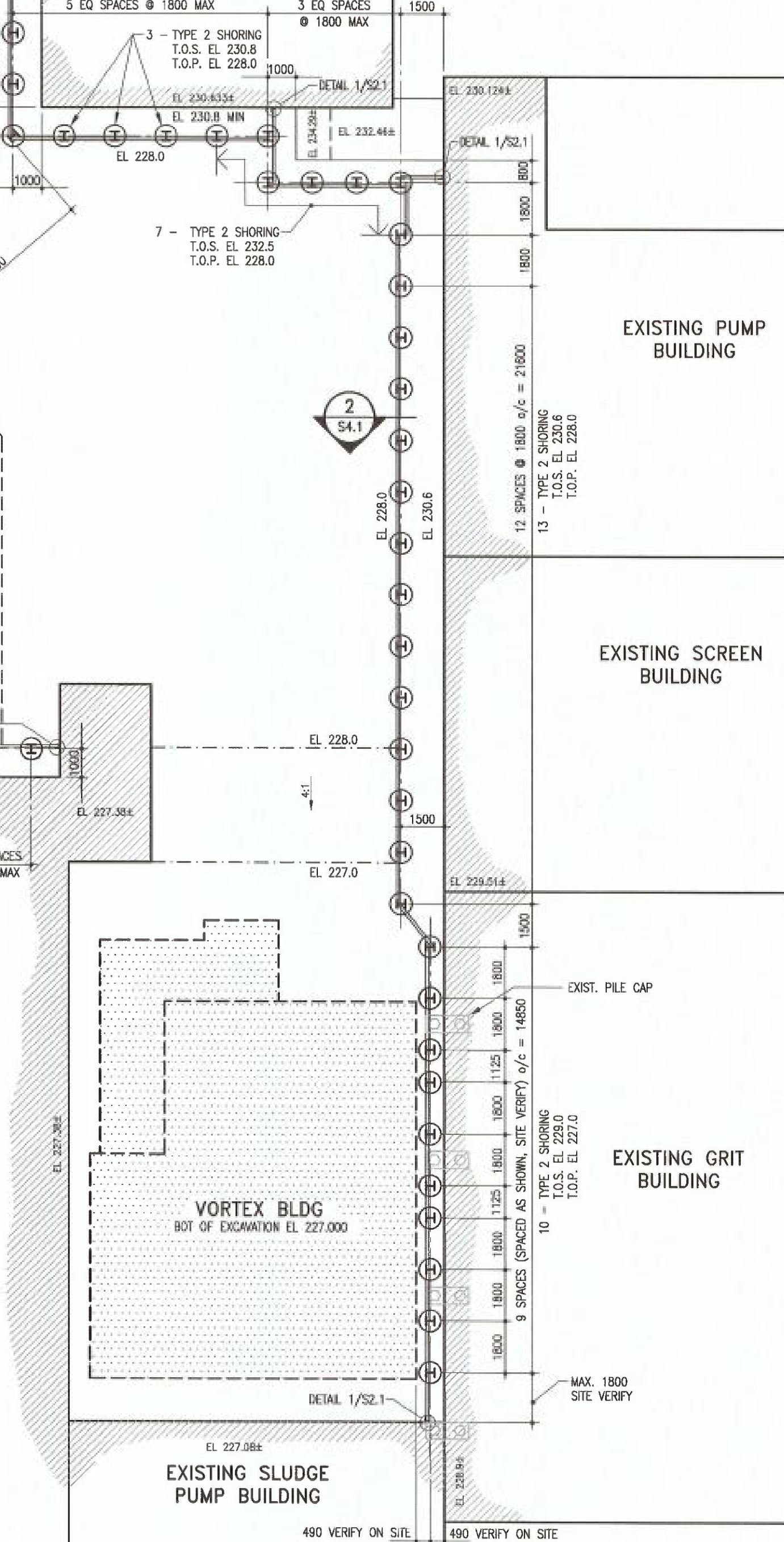


N SHORING LAYOUT
S2.4
1 : 150



M SHORING LAYOUT
S2.4
1 : 150

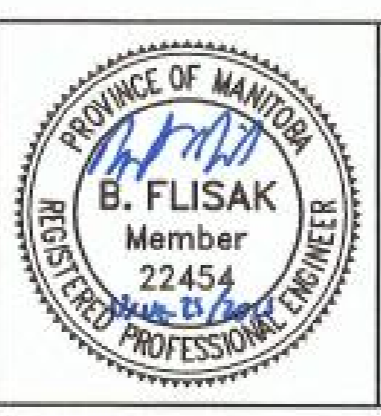
PLAN NOTES
REFER TO SECTIONS FOR SHORING TYPES
T.O.S. EL - TOP OF STEEL SOLDIER ELEVATION
T.O.P. EL - TOP OF CONCRETE SOLDIER PILE & DEADMAN ELEVATION
REFER TO DWG S2.1 FOR SHORING DESIGN LOADS & TYPICAL SLOPING BERM EXCAVATION DETAIL.



S SHORING LAYOUT
S2.4
1 : 150



No.	Date	Issue/Revision	By
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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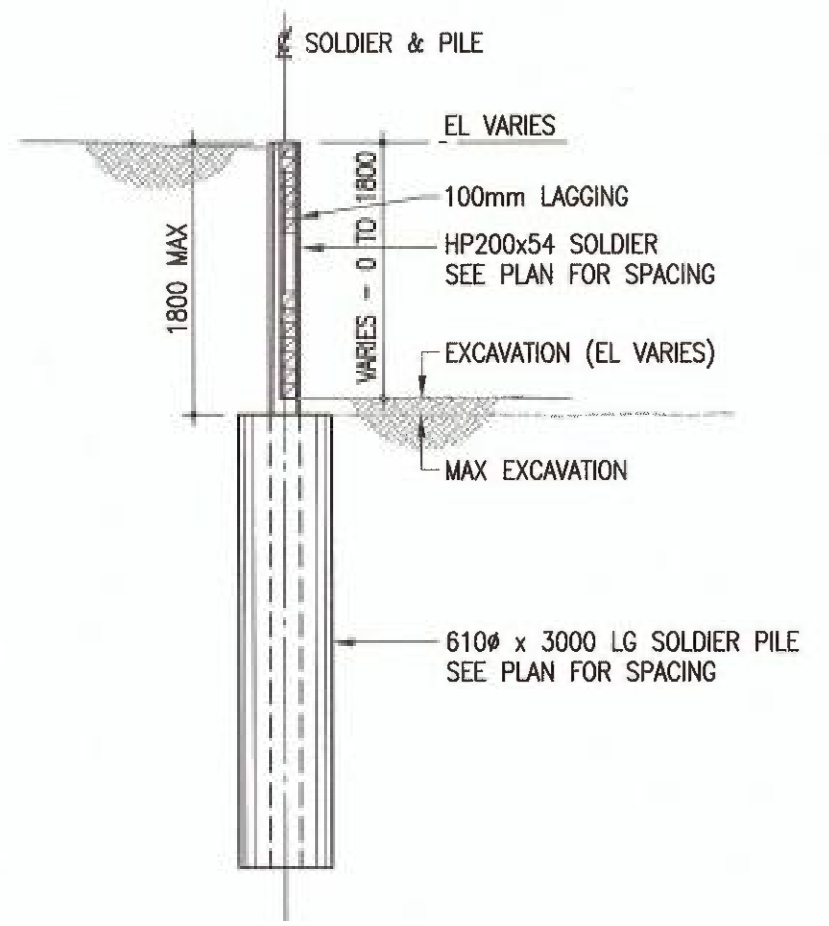
The General Contractor shall check & verify all dimensions and report any errors or omissions to the designers.

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

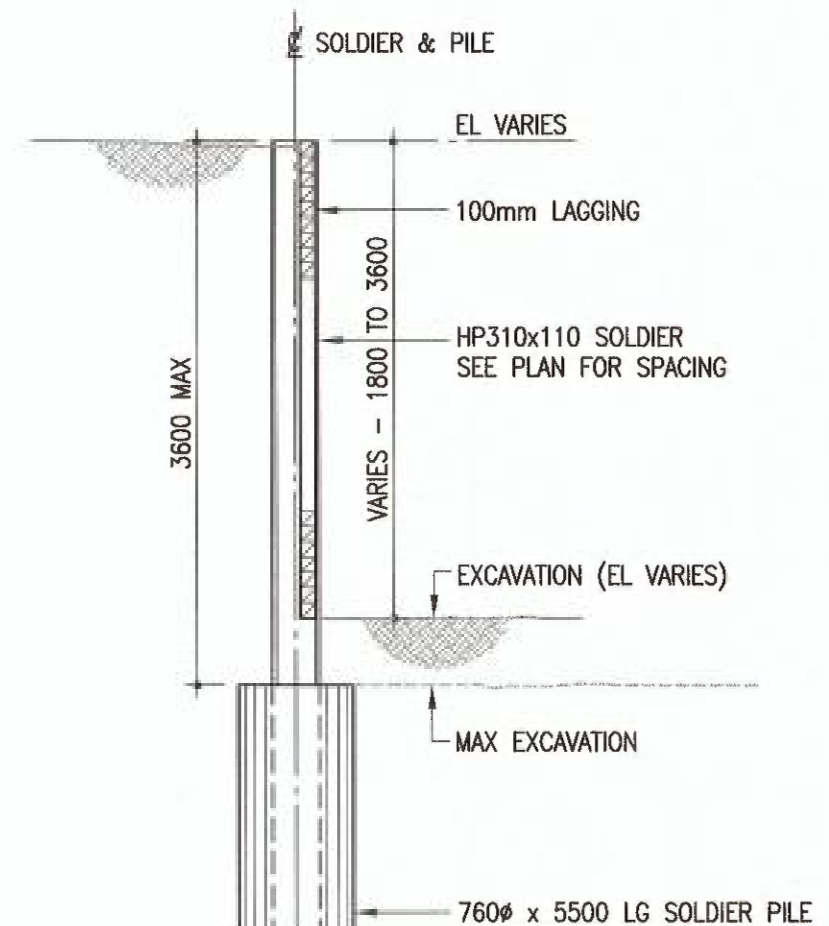
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Sheet No.: **S2.4**

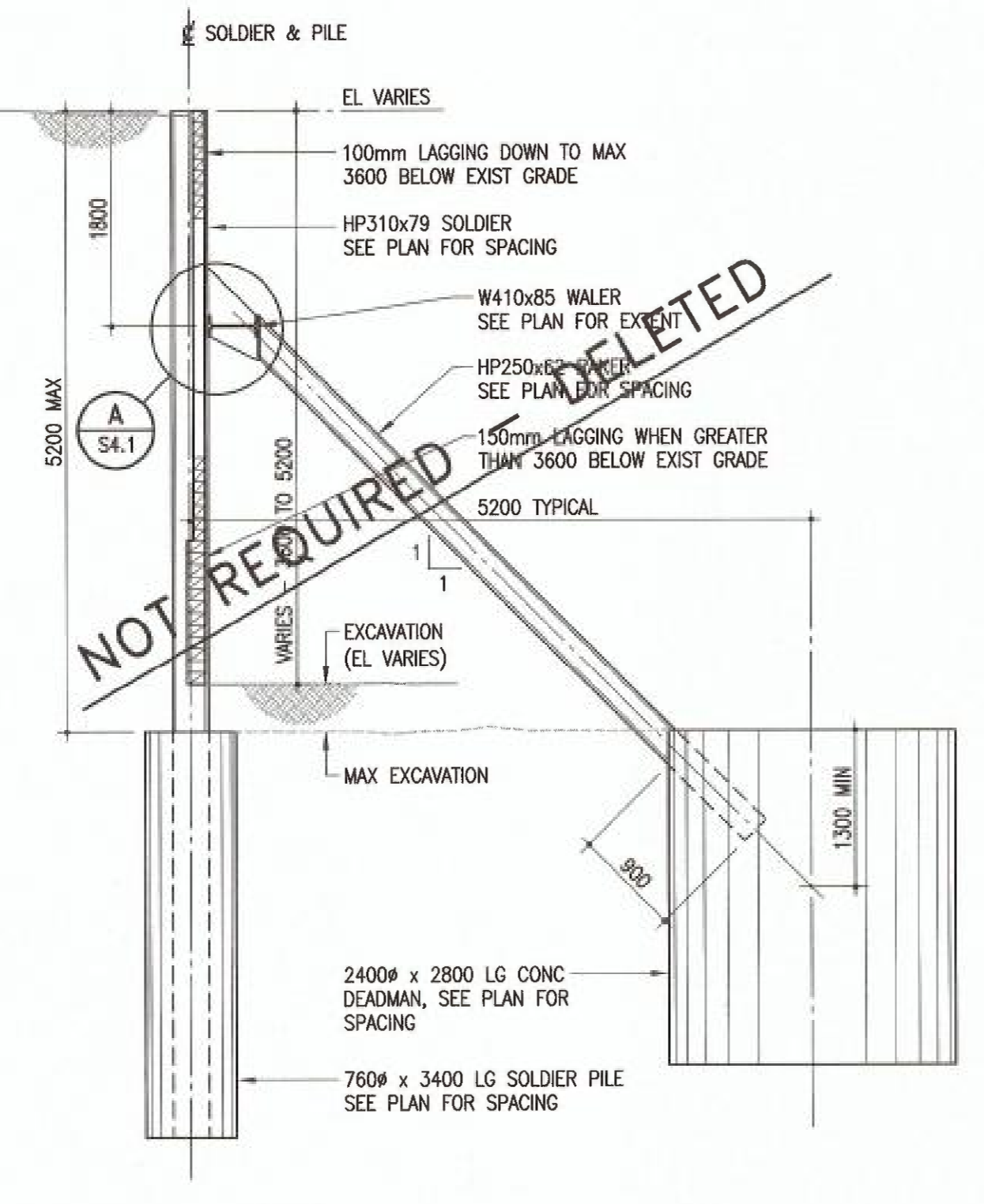
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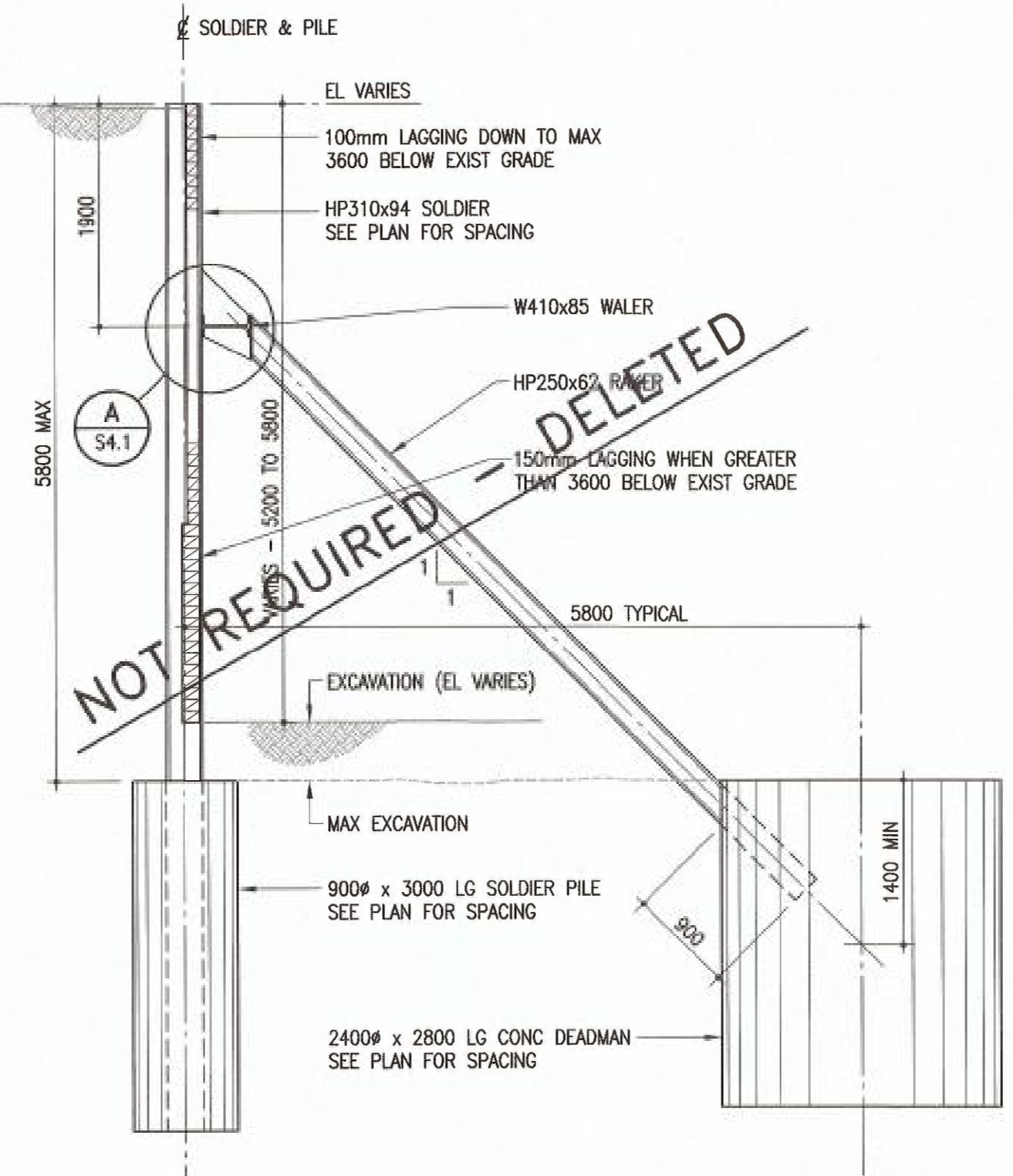
1 SECTION - TYPE 1 SHORING
S4.1 1 : 50



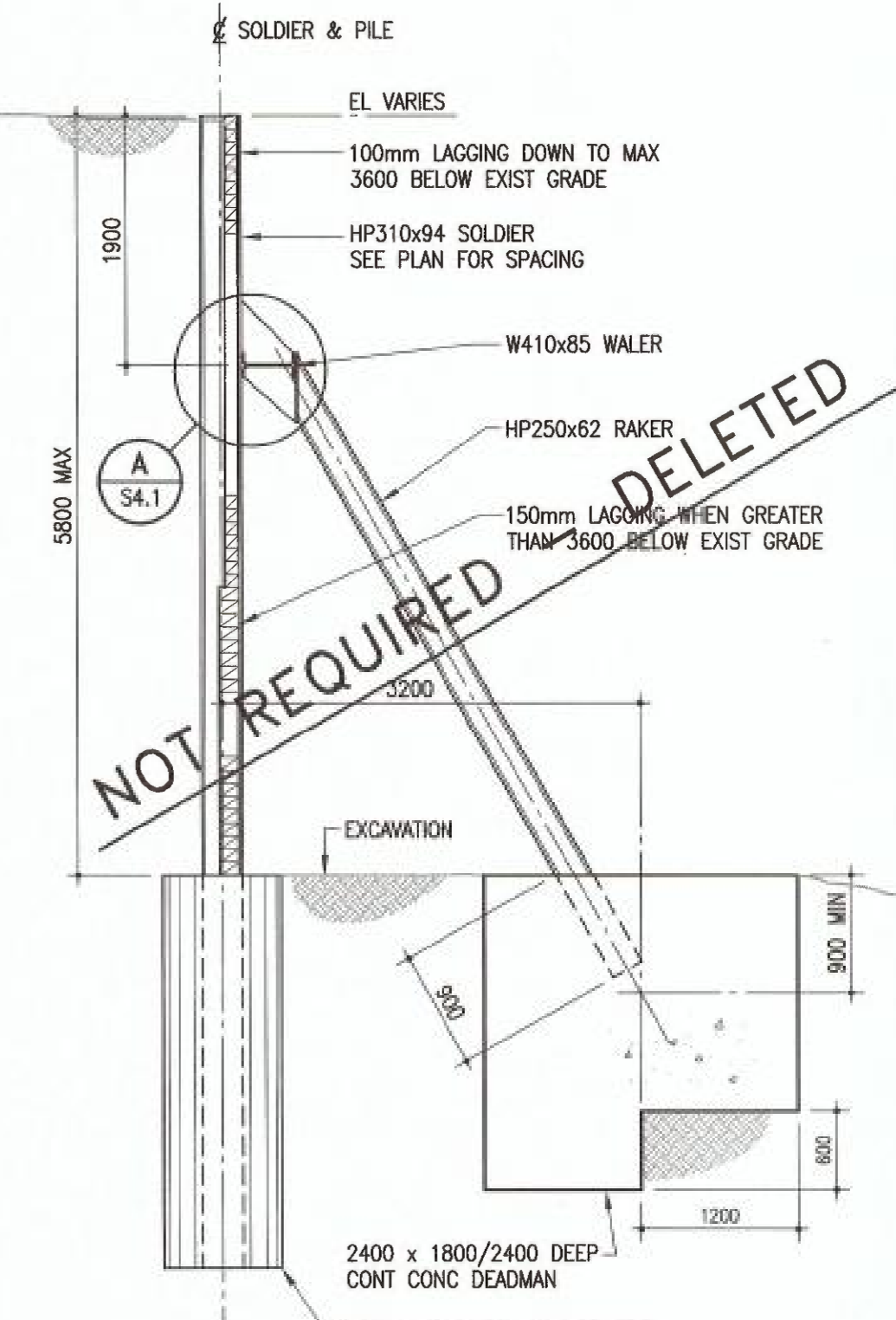
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S4.1 1 : 50



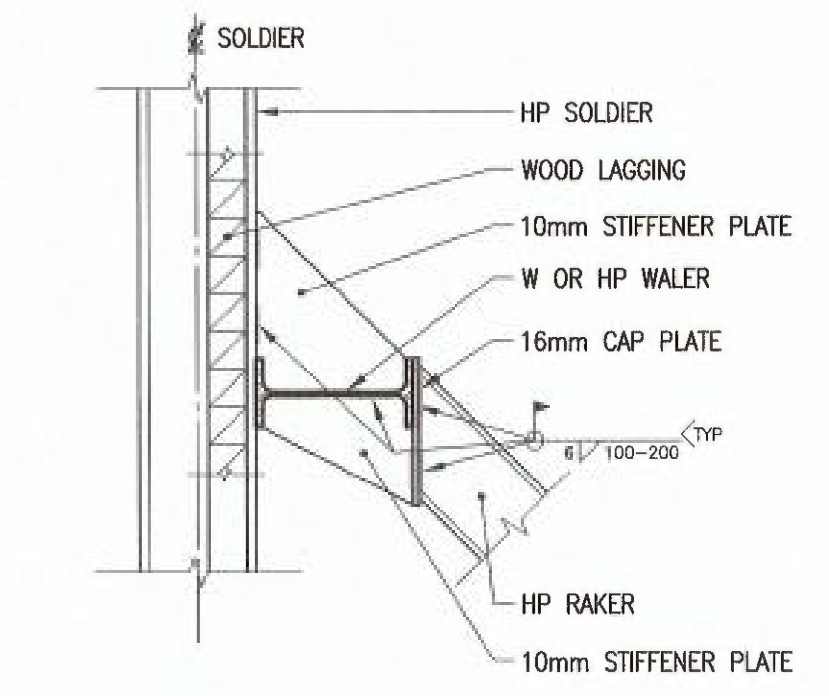
3 SECTION - TYPE 3 SHORING
S4.1 1 : 50



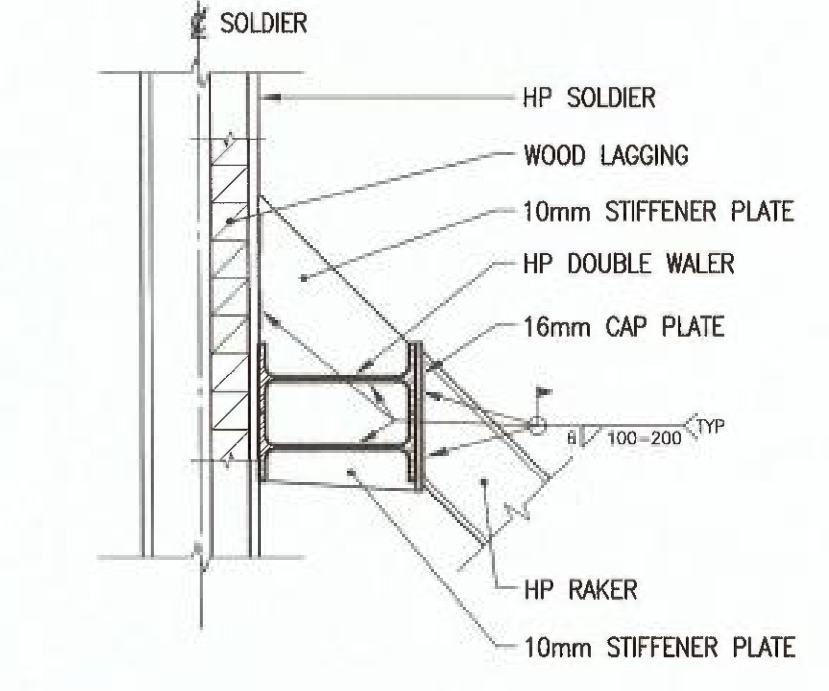
4 SECTION - TYPE 4 SHORING
S4.1 1 : 50



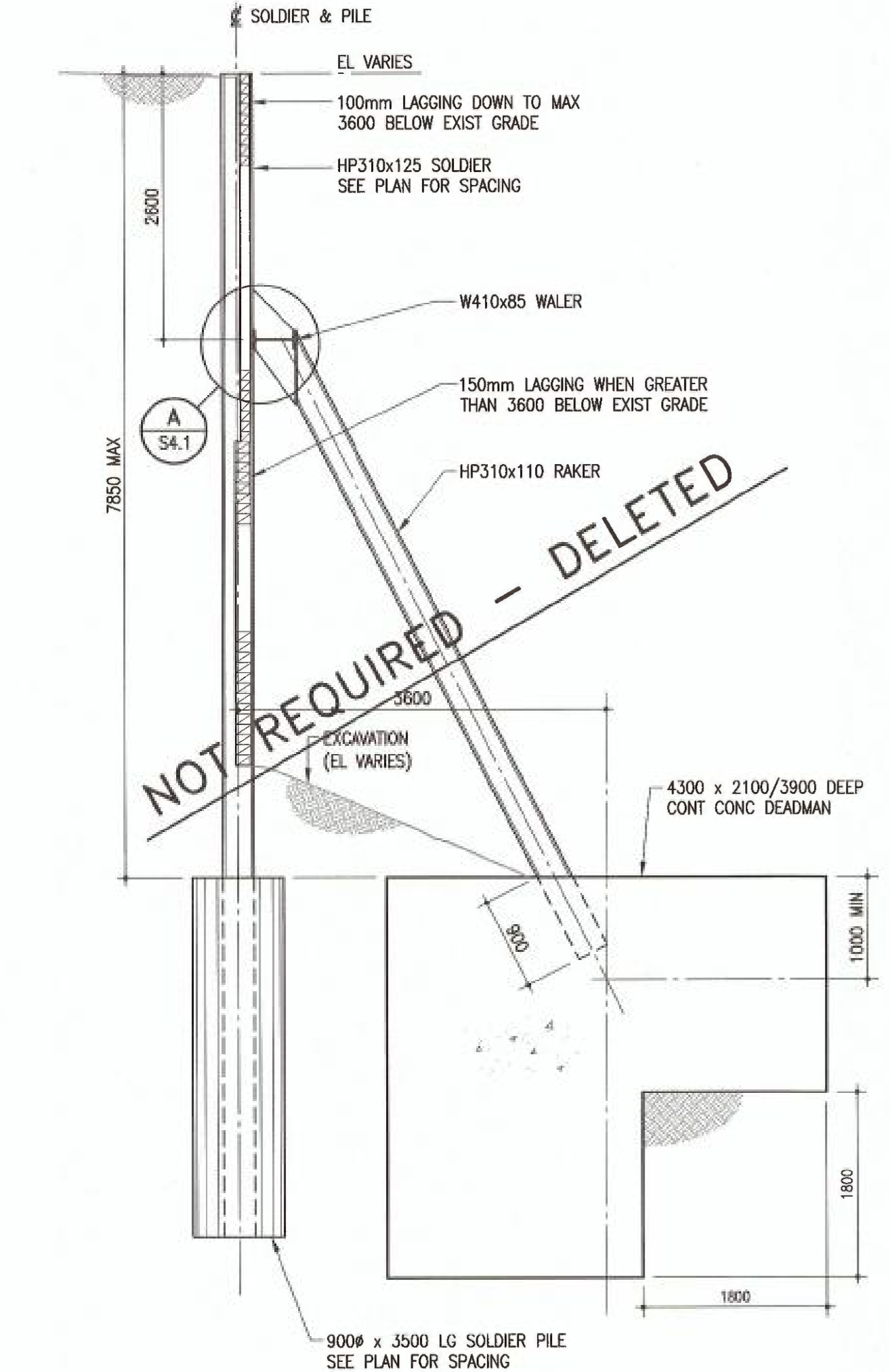
5 SECTION - TYPE 5 SHORING
S4.1 1 : 50



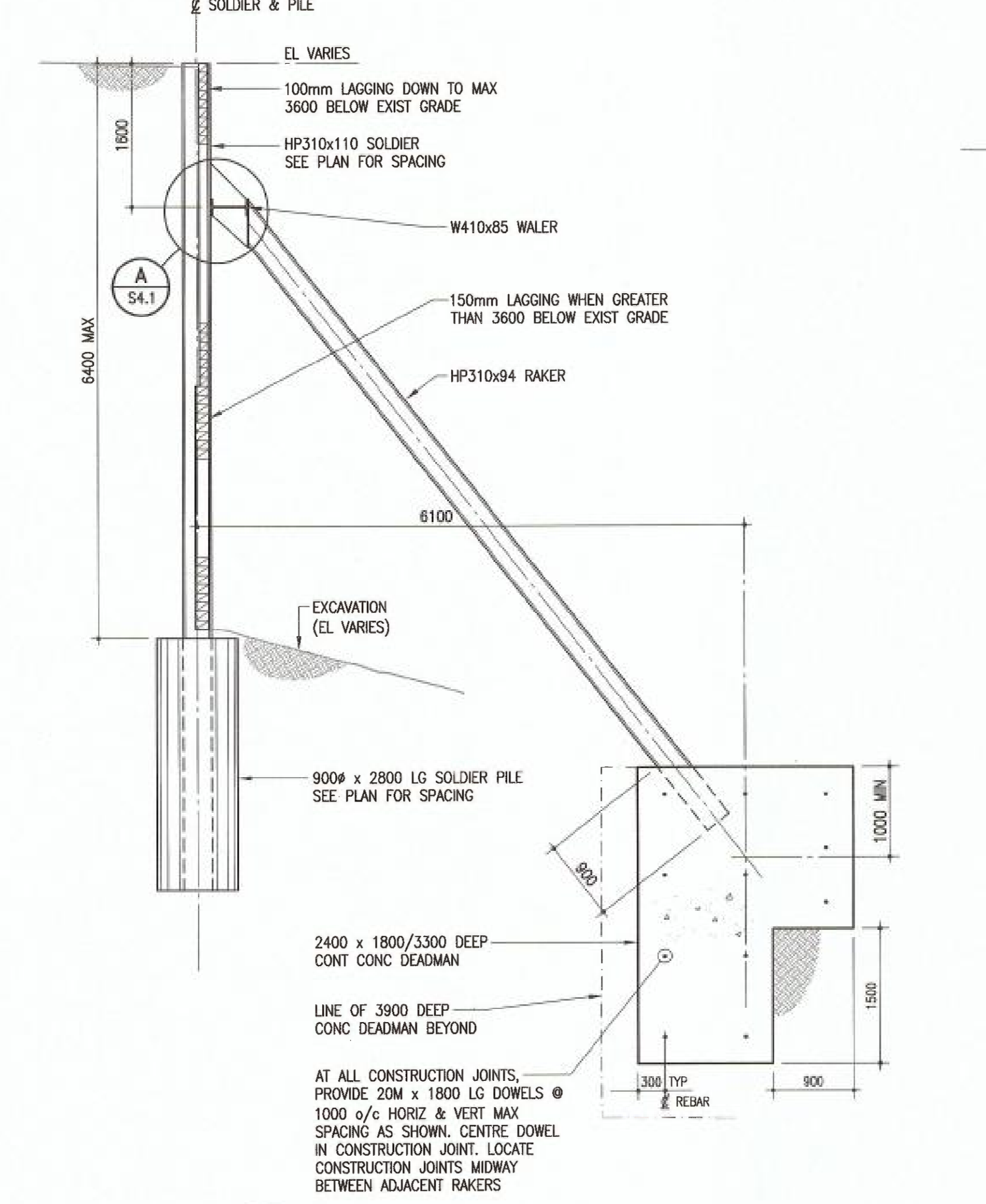
A DETAIL - SINGLE WALER
S4.1 1 : 20



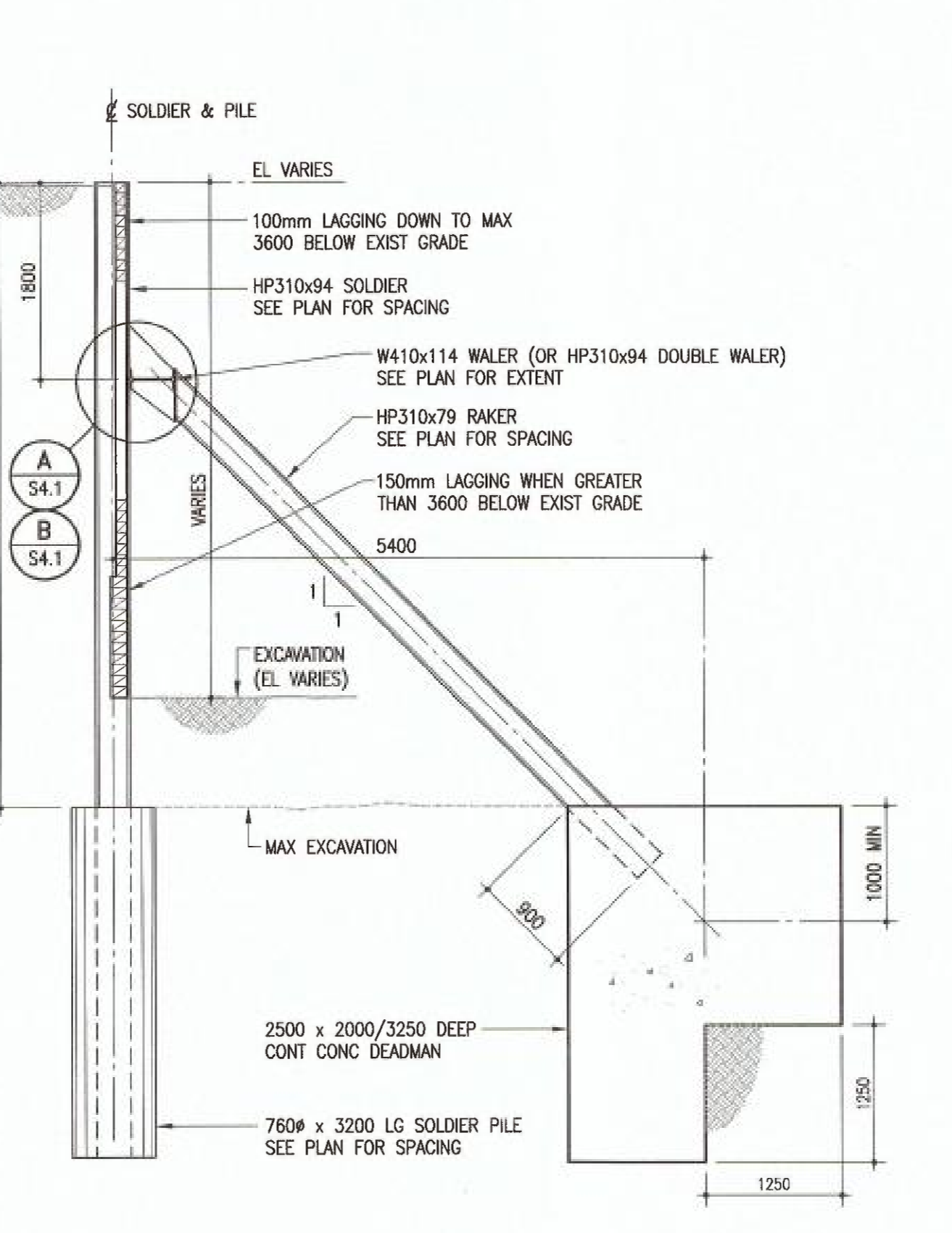
B DETAIL - DOUBLE WALER
S4.1 1 : 20



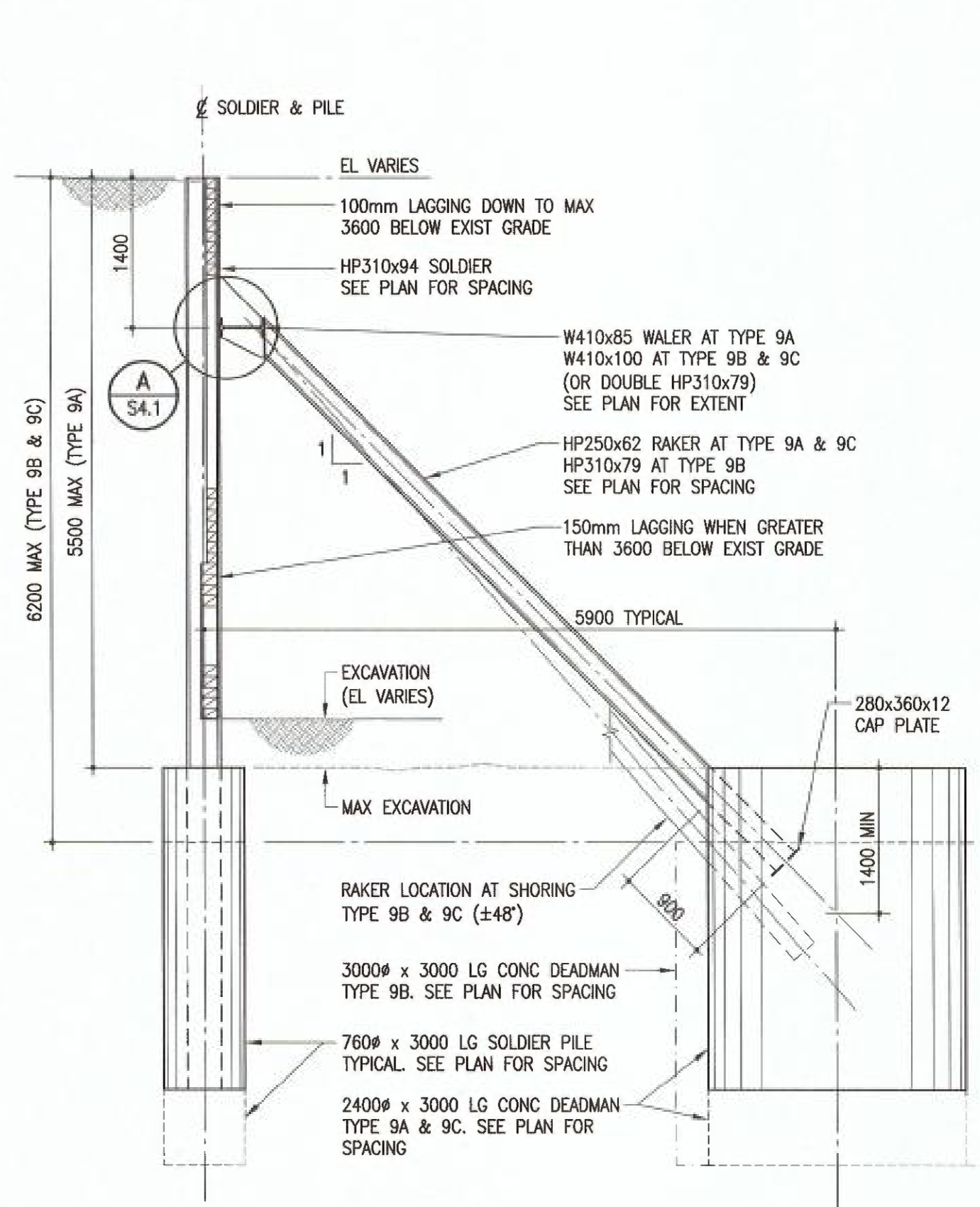
6 SECTION - TYPE 6 SHORING
S4.1 1 : 50



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



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

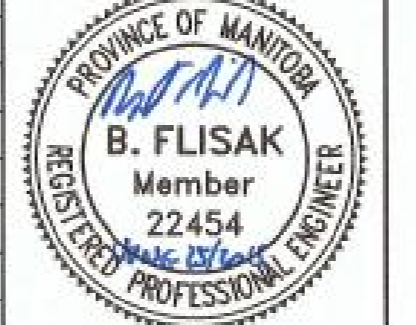


9 SECTION - TYPE 9 SHORING
S4.1 1 : 50

REFER TO SECTION 1/S2.3 FOR TYPE 10 SHORING
REFER TO SECTION 1/S2.4 FOR TYPE 11 SHORING



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4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
3	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF
2	01 DEC 2014	ISSUED FOR CONSTRUCTION	BF
1	19 NOV 2014	ISSUED FOR REVIEW	BF



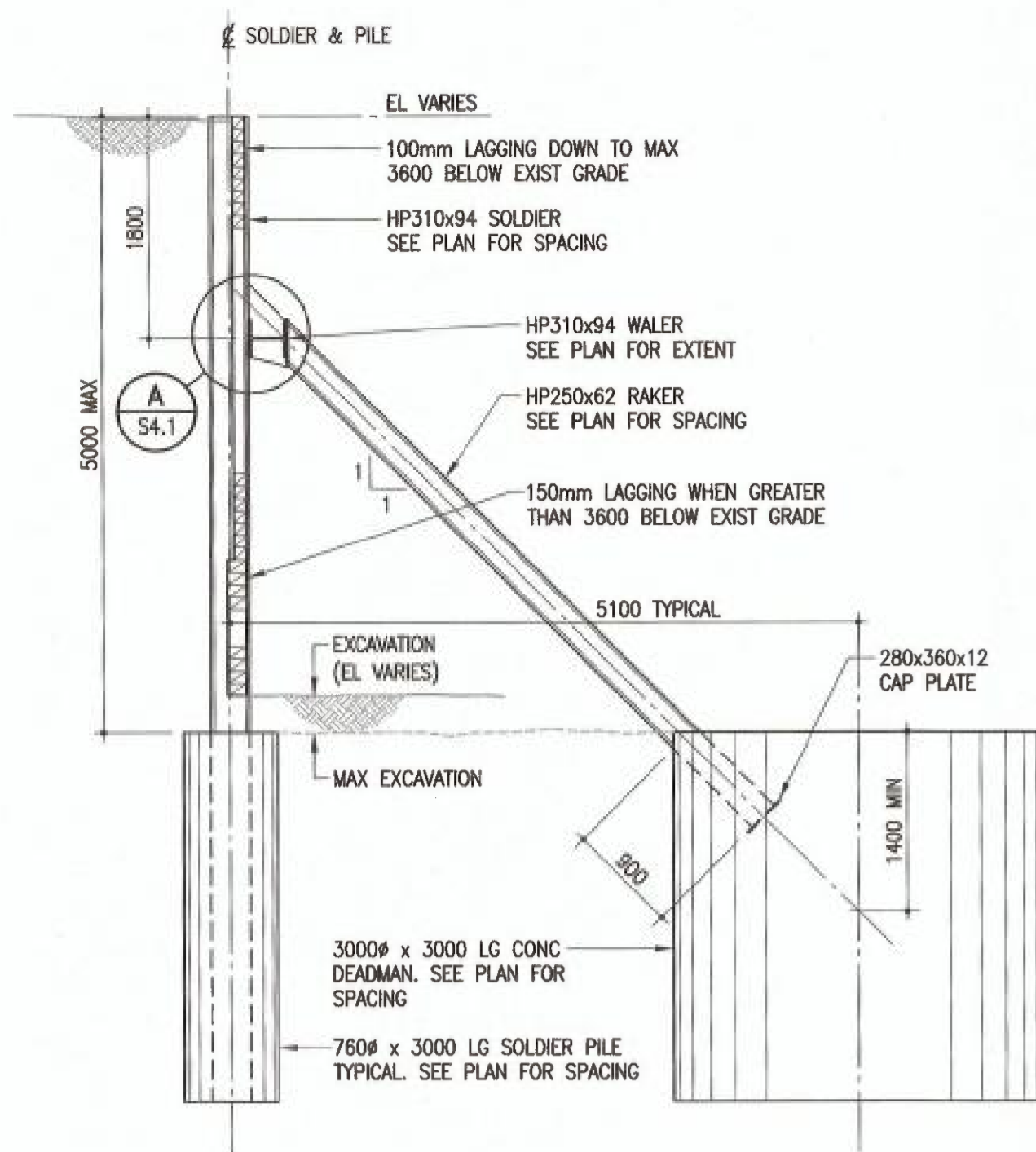
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Project: THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT SOUTH END WATER POLLUTION CONTROL CENTRE EXPANSION SHORING AND EXCAVATION

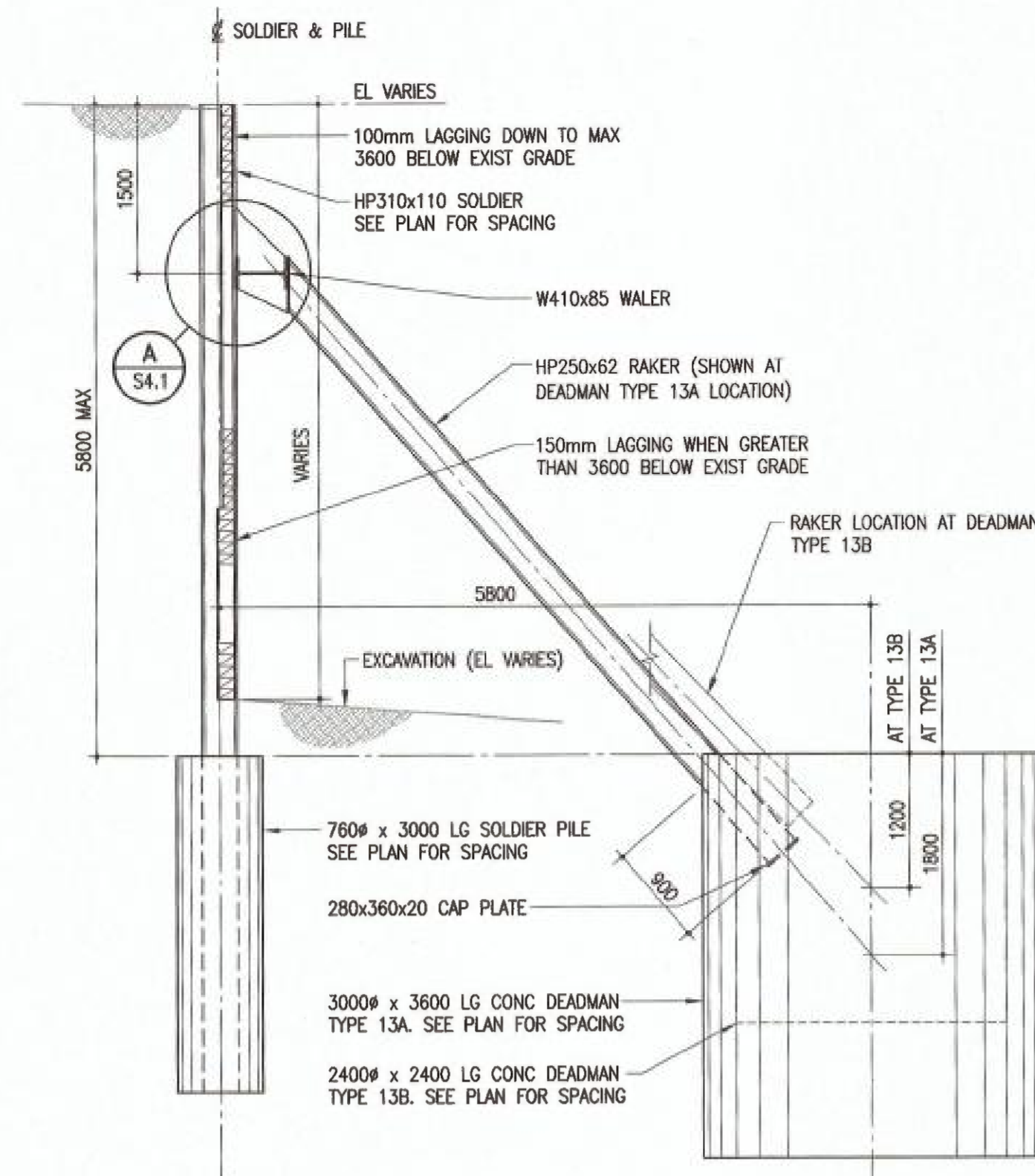
Sheet Title: SHORING SECTIONS

Sheet No.: S4.1

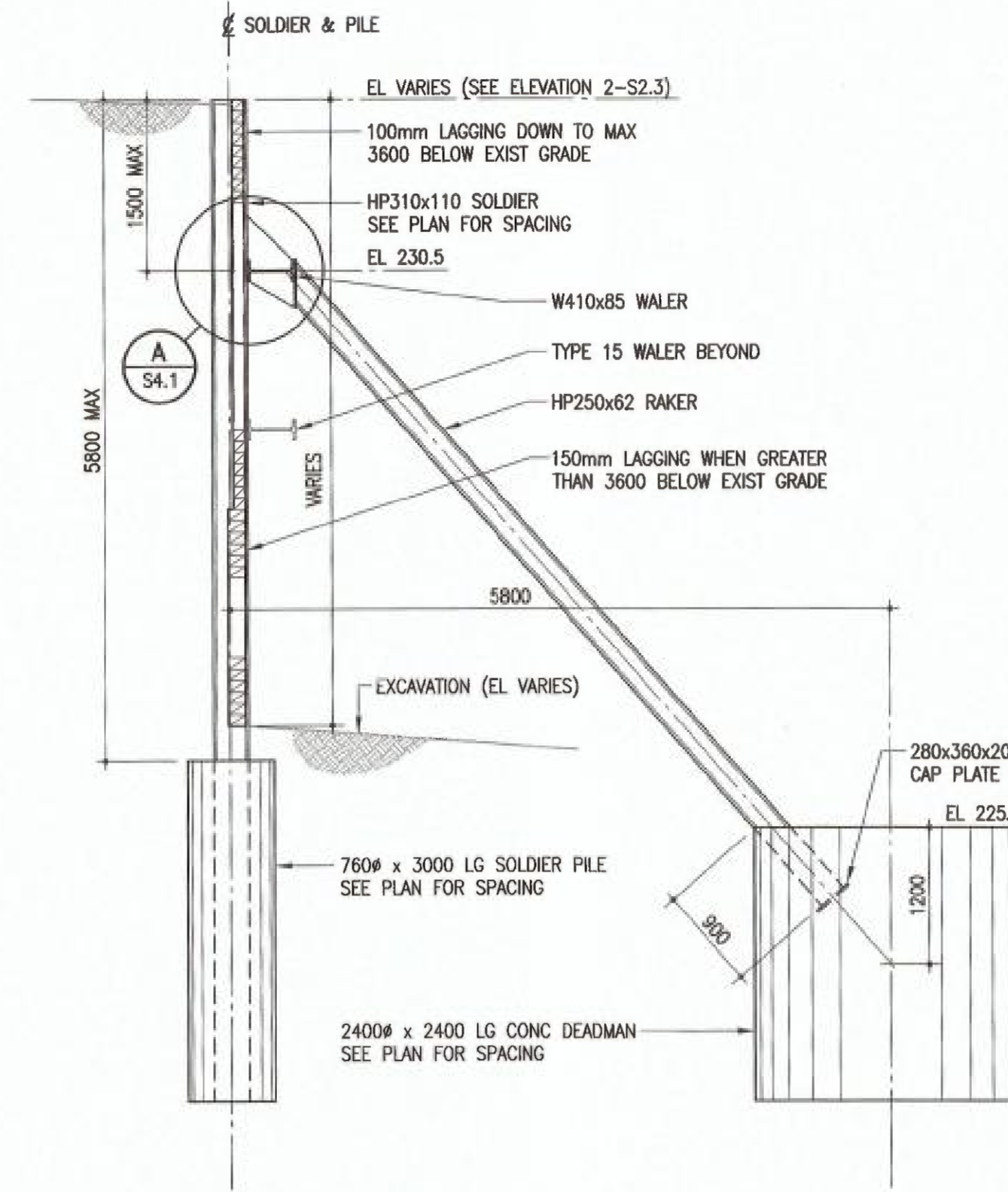
Design	Drawn	Checked	Scale	Date	File
JAL	KJL	BF	AS NOTED	18 NOV 2014	2014-1223



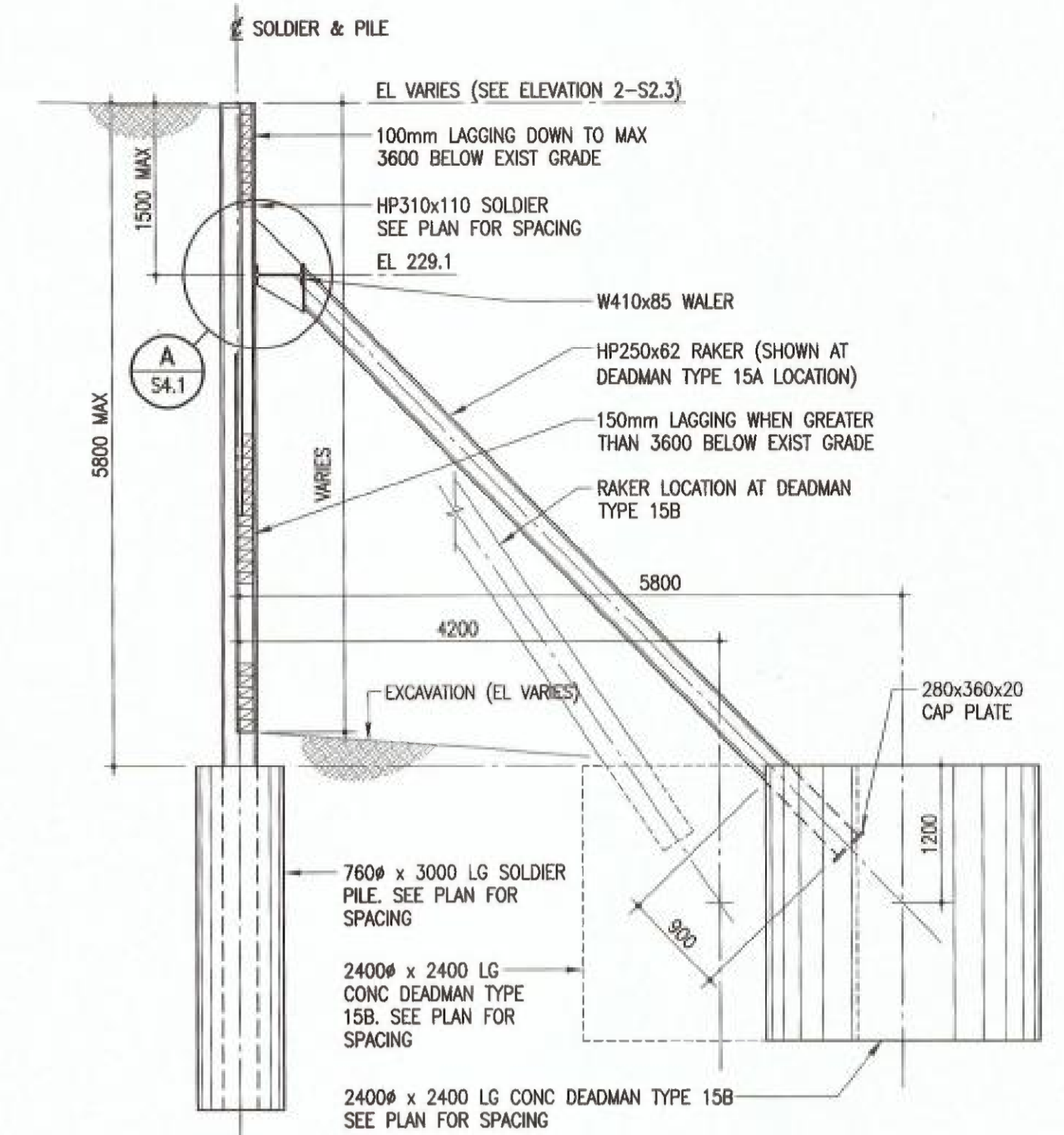
1 SECTION - TYPE 12 SHORING
S4.2 1 : 50



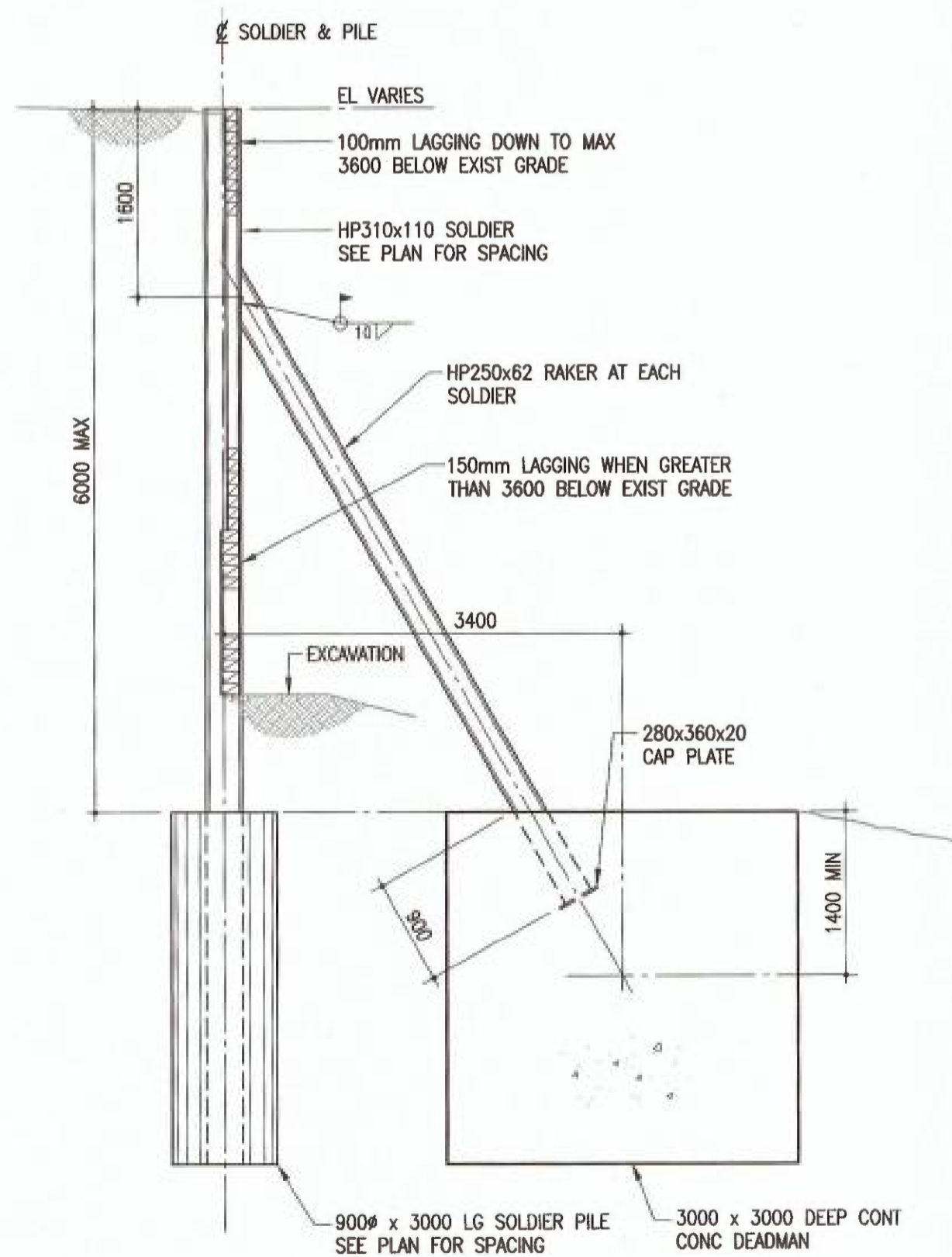
2 SECTION - TYPE 13 SHORING
S4.2 1 : 50



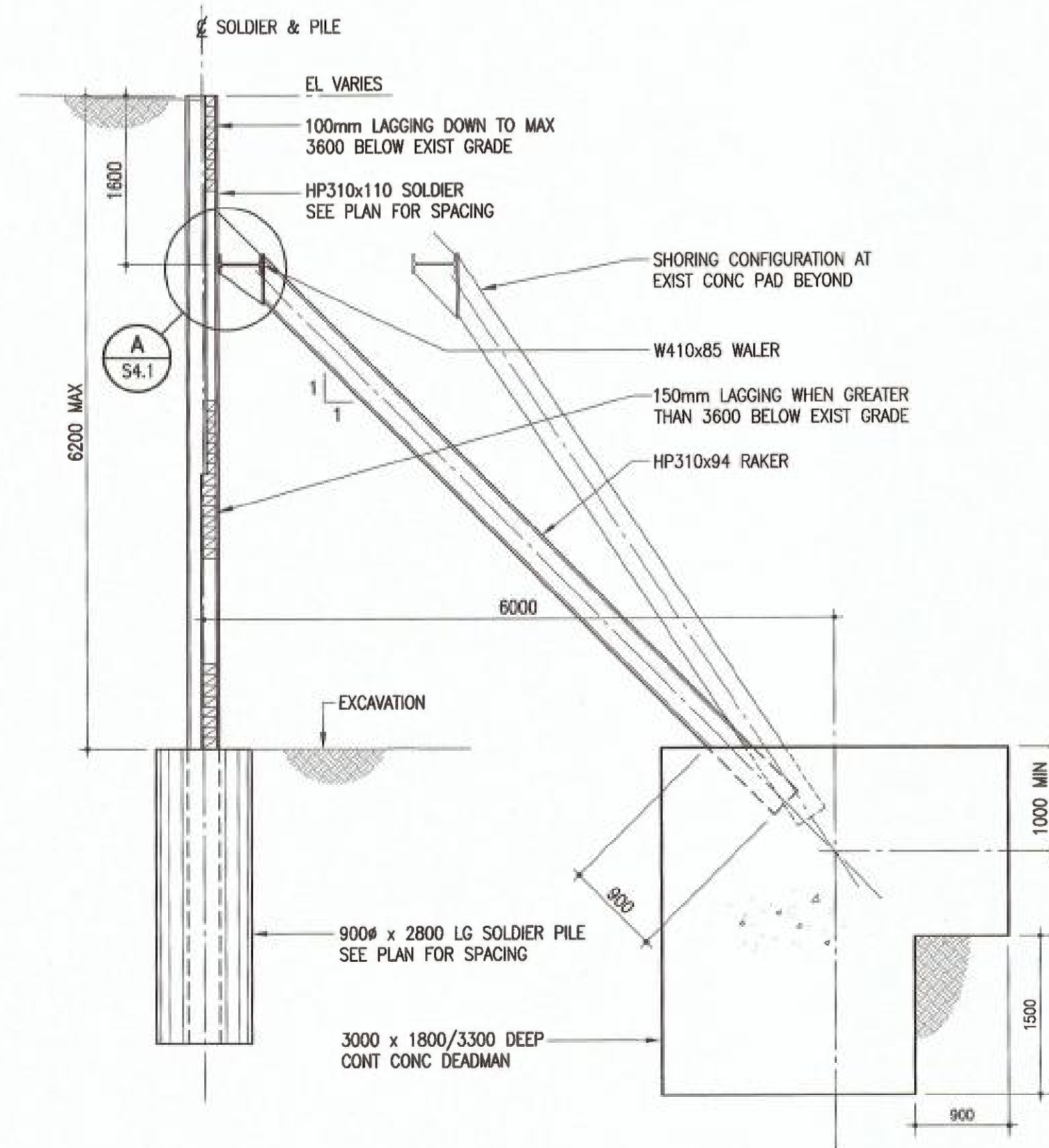
3 SECTION - TYPE 14 SHORING
S4.2 1 : 50



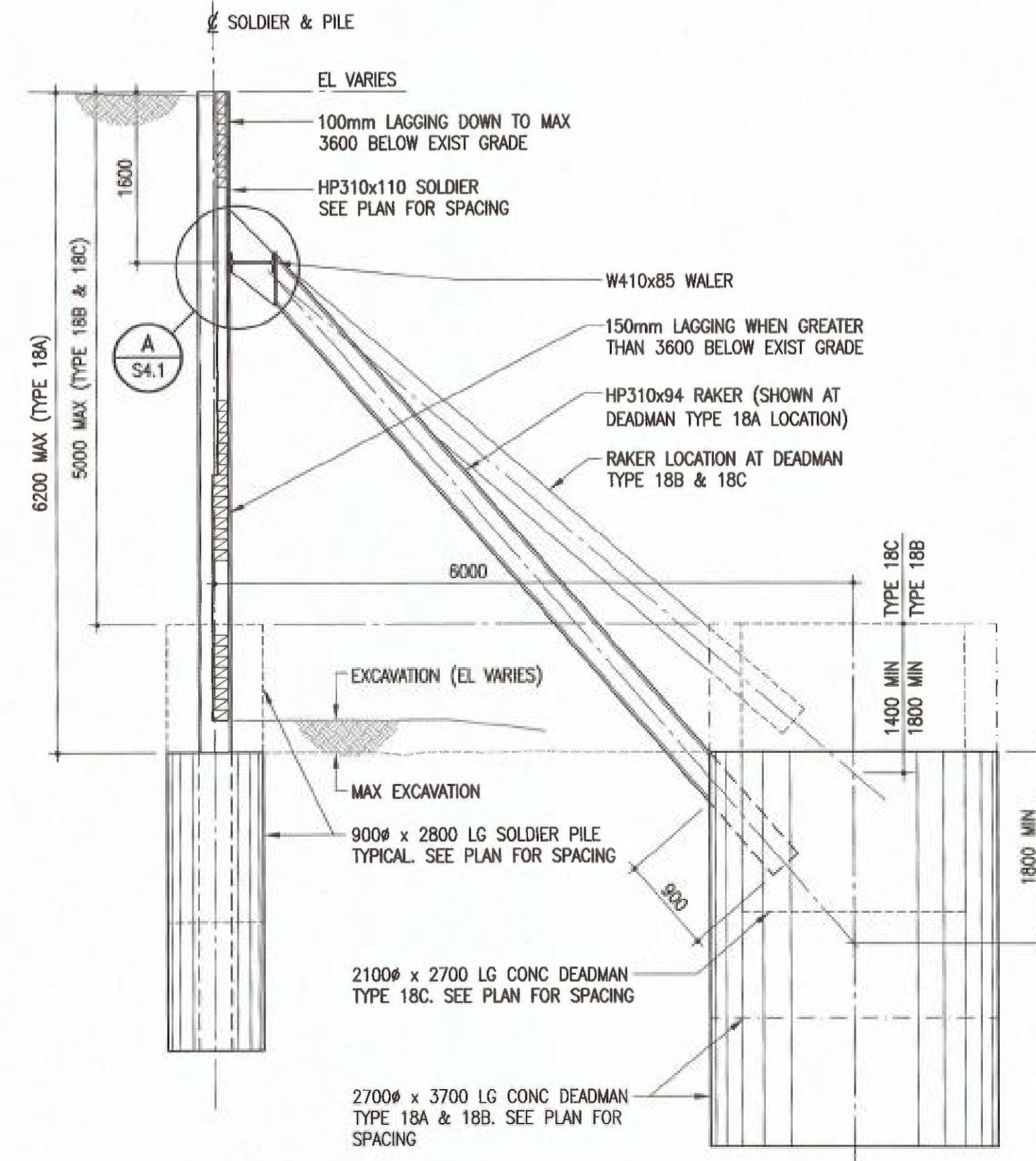
4 SECTION - TYPE 15 SHORING
S4.2 1 : 50



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



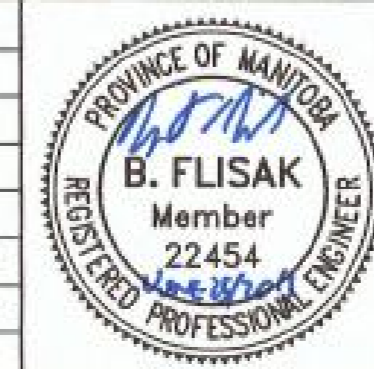
6 SECTION - TYPE 17 SHORING
S4.2 1 : 50



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



No.	Date	Issue/Revision	By
4	25 JUN 2015	RE-ISSUED FOR CONSTRUCTION	BF
1	28 JAN 2014	ISSUED FOR EXCAVATION PERMIT	BF



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Crosier Kilgour & Partners Ltd.
CONSULTING STRUCTURAL ENGINEERS

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					Sheet No.
SHORING SECTIONS					S4.2
Design	Drawn	Checked	Scale	Date	File
JAL	KJL	BF	AS NOTED	19 DEC 2014	2014-1223