

MAURICES / 425 PROJECT

425 W. SUPERIOR ST. DULUTH, MN

TEMPORARY EARTH RETENTION SYSTEMS

SHEET INDEX

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GENERAL NOTES:

- GENERAL
 - ENGINEER CONTACT INFORMATION: CHAD UNDERWOOD, P.E., ENGINEERING PARTNERS INTERNATIONAL LLC (612) 751-8648 OR (651) 209-0108.
 - THE SCOPE OF SERVICES COVERED BY THESE DRAWINGS INCLUDES THE DESIGN OF TEMPORARY SOIL NAIL WALLS ALONG THE EAST AND WEST SIDES OF THE 400/425 W. SUPERIOR STREET SITE, AND TEMPORARY SOIL NAILS / WALL ANCHORS ALONG THE NORTH WALLS OF THE FOLLOWING BUILDINGS: 400 W. SUPERIOR STREET, 425 W. SUPERIOR STREET, AND 408 W. FIRST STREET.
 - ENGINEERING PARTNERS INTERNATIONAL, LLC (ENGINEER) IS NOT RESPONSIBLE FOR ANY DAMAGE DUE TO INSTALLATION OF THE SOIL NAILS AND WALL ANCHORS.
- DESIGN CRITERIA
 - THE RETENTION WALLS ARE DESIGNED FOR ACTIVE EARTH PRESSURE CONDITIONS WITH RETAINED SOIL HEIGHTS AS SHOWN ON THE DRAWINGS.
 - THE EARTH RETENTION SYSTEM DESIGNS ARE BASED ON SUBSURFACE INFORMATION PROVIDED IN THE GEOTECHNICAL REPORTS PREPARED BY AMERICAN ENGINEERING TESTING, INC. AND DATED AUGUST 7, 2013 AND FEBRUARY 27, 2014.
 - THE RETENTION WALLS ARE DESIGNED AS TEMPORARY EARTH RETENTION SYSTEMS TO FACILITATE CONSTRUCTION OF THE NEW BUILDINGS ON THE SITE. THE NEW STRUCTURES ARE ASSUMED TO RESIST ALL LATERAL EARTH PRESSURES AND SURCHARGE PRESSURES AFTER THE NEW FOUNDATION WALLS ARE BACKFILLED.
 - THE TEMPORARY SOIL NAIL WALLS ARE DESIGNED USING A SAFETY FACTOR OF 1.3 FOR GLOBAL STABILITY.
- DESIGN CODES
 - NHCRP REPORT 701, PROPOSED SPECIFICATIONS FOR LRFD SOIL-NAILING DESIGN AND CONSTRUCTION (2011).
 - FHWA-IF-03-017, GEOTECHNICAL ENGINEERING CIRCULAR NO. 7, SOIL NAIL WALLS (2003).
- SURCHARGE LOAD
 - THE EAST AND WEST TEMPORARY RETENTION WALLS AT 400/425 W. SUPERIOR STREET ARE DESIGNED FOR A 250 PSF TRAFFIC SURCHARGE STARTING 5 FEET FROM THE BACK OF THE RETENTION WALL AND EXTENDING 40 FEET BEYOND THE WALL.
 - THE WALL ANCHORS FOR THE EXISTING NORTH WALL OF THE 400 AND 425 W. SUPERIOR STREET BUILDINGS ARE DESIGNED FOR A 250 PSF TRAFFIC SURCHARGE STARTING AT THE BACK OF THE EXISTING WALL AND EXTENDING 20 FEET BEYOND THE BACK OF THE WALL.
 - NO VEHICLE TRAFFIC OR MATERIAL STORAGE IS PERMITTED WITHIN 5 FEET OF THE BACKS OF THE EAST AND WEST RETENTION WALLS, OR WITHIN 5 FEET OF THE EXISTING NORTH WALL OF THE 408 W. FIRST STREET BUILDING.
 - NO SURCHARGE LOADING FROM CRANES OR OTHER HEAVY EQUIPMENT IS PERMITTED WITHIN 20 FEET OF THE BACKS OF THE RETENTION WALLS UNLESS SPECIFIED ON THE DRAWINGS OR OTHERWISE APPROVED BY THE ENGINEER.
 - ANY OTHER TRAFFIC SURCHARGE OR MATERIALS STORAGE WITHIN 20 FEET OF THE TOP OF THE WALL AND/OR GREATER THAN THE ASSUMED SURCHARGE LOADING MUST BE EVALUATED BY THE ENGINEER.
- FIELD CONDITIONS
 - VERIFY DEPTH AND LIMITS OF EXCAVATION PRIOR TO START OF WORK.
 - VERIFY UNDERGROUND UTILITY LOCATIONS AND ANY OTHER BURIED OBSTRUCTIONS BEFORE COMMENCING ANY WORK. NOTIFY ENGINEER OF CONFLICTS.
 - GROUNDWATER IS ASSUMED TO BE BELOW THE BOTTOM OF EXCAVATION, UNLESS NOTED OTHERWISE, AND IS NOT INCLUDED AS A LOAD ON THE RETENTION SYSTEMS.
- DRAINAGE
 - PROVIDE BERMS AND ANY OTHER DRAINAGE CONTROL AROUND THE SITE TO REDUCE THE AMOUNT OF SURFACE DRAINAGE FROM RUNNING ON THE SITE AND SATURATING THE SOIL BEHIND THE RETENTION WALLS.
- SAFETY
 - THE ENGINEER AND THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR CONSTRUCTION SAFETY.
 - THE ENGINEER DOES NOT CONTROL THE MEANS AND METHODS OF CONSTRUCTION.
 - CONTRACTOR IS RESPONSIBLE FOR PROVIDING FALL PROTECTION AT THE TOPS OF THE RETENTION WALLS.
- USE OF DOCUMENTS
 - USE OF THESE DOCUMENTS IS PROHIBITED FOR OTHER PROJECTS, ADDITIONS TO OR EXTENSIONS OF THIS PROJECT OR FOR THE COMPLETION OF THE PROJECT BY OTHERS EXCEPT WITH THE WRITTEN PERMISSION OF ENGINEERING PARTNERS INTERNATIONAL, LLC.

TEMPORARY EARTH RETENTION WALL NOTES:

- MATERIALS
 - TYPE 1 SOIL NAILS: CTS/TITAN 40/20 HOLLOW BAR INJECTION ANCHOR, OR EQUAL (MIN. $F_y = 80$ KSI, $A_s = 1.13$ SQ. IN.), WITH MIN. 110 MM DIA. SACRIFICIAL BIT.
 - TYPE 2 ROCK DOWELS: WILLIAMS #8 GR. 75 ALL-THREAD BAR, OR EQUAL, WITH WILLIAMS POLYESTER RESIN GROUT, OR EQUAL.
 - SOIL NAIL ACCESSORIES SHALL BE COMPATIBLE WITH THE SELECTED SOIL NAIL BAR MANUFACTURER'S PRODUCT.
 - SOIL NAIL GROUT: NEAT CEMENT, W/C RATIO = 0.40 TO 0.45, $f_c = 4,000$ PSI.
 - DRAINAGE BOARD: AMERIDRAIN 500, MIRADRAIN 6000, OR EQUAL.
 - STEEL REINFORCING BARS: CONFORM TO ASTM A615 GR 60.
 - SHOTCRETE: $f_c = 4,000$ PSI, W/C RATIO OF 0.45.
 - SOIL NAIL AND WALL ANCHOR BEARING PLATES: $F_y = 50$ KSI (SEE SOIL NAIL SCHEDULE).
 - STEEL H-PILE AND WIDE FLANGE SECTIONS SHALL BE ASTM A572 GR 50, $F_y = 50$ KSI.
 - TIMBER LAGGING SHALL BE QUALITY BOARDS, SOUTHERN PINE, MIXED HARD WOOD, OAK, OR DOUGLAS FIR, MIN. $f_b = 850$ PSI.
 - THREADED STUD SHALL BE 3/4" DIA. A36 THREADED ROD, A307 BOLT, OR OTHER WELDABLE LOW CARBON STEEL THREADED ROD (MIN. $F_y = 36$ KSI).
 - STEEL CHANNEL AND MISC. PLATES SHALL BE ASTM A36, $F_y = 36$ KSI.
 - STEEL BARS AND RODS SHALL BE ASTM A36, $F_y = 36$ KSI.
 - CLSM FILL (IF USED), MIN. 50 PSI UNCONFINED COMPRESSIVE STRENGTH.
- WELDING
 - USE E70XX ELECTRODES. ALL WELDS SHALL CONFORM TO AWS D1.1 AND SIZED AS SHOWN ON THE DRAWINGS.
- SOIL NAIL AND WALL ANCHOR DESIGN CAPACITIES: REFER TO SOIL NAIL SCHEDULE.
- SOIL NAIL WALL / WALL ANCHOR INSTALLATION
 - THE METHOD OF INSTALLATION OF THE SOIL NAILS AND WALL ANCHORS SHALL BE AT THE DISCRETION OF THE CONTRACTOR INSTALLER.
 - THE SOIL NAILS AND WALL ANCHORS SHALL BE INSTALLED AT THE LOCATIONS AND TO THE ELEVATIONS SHOWN ON THE DRAWINGS.
 - DO NOT EXCAVATE MORE THAN 2 FEET BELOW THE CENTERLINE OF SOIL NAIL ELEVATION UNTIL THE SOIL NAIL IS INSTALLED AND THE SOIL NAIL GROUT AND SHOTCRETE HAVE ACHIEVED MIN. 72 HOUR CURE TIME BETWEEN SOIL NAIL INSTALLATION / SHOTCRETE PLACEMENT AND EXCAVATION FOR THE NEXT LIFT.
 - NOTE THAT A FLASH COAT OF SHOTCRETE OR OTHER TEMPORARY STABILIZATION MEASURES MAY BE APPLIED TO THE EXPOSED EXCAVATION FACE PRIOR TO DRILLING THE SOIL NAILS TO MAINTAIN STABILITY OF THE EXCAVATION FACE DURING SOIL NAIL INSTALLATION.
 - INSTALL STRIP DRAINS AS SHOWN ON THE DRAWINGS, CENTERED BETWEEN VERTICAL ROWS OF SOIL NAILS. VERTICAL STRIP DRAINS SHALL EXTEND TO WITHIN 1 FOOT OF THE TOP OF THE WALL. SPLICE STRIP DRAINS USING MIN. 12 INCH OVERLAP. PROTECT STRIP DRAIN FROM DAMAGE OR FROM SOIL / SHOTCRETE CONTAMINATION DURING INSTALLATION.
 - PLACE SHOTCRETE IN MAX. 5 FT VERTICAL PANELS OR LIFTS (UNLESS NOTED OTHERWISE ON THE DRAWINGS) AS THE EXCAVATION ADVANCES VERTICALLY.
 - INSTALL STEEL BEARING PLATES FOR SOIL NAILS ON OUTSIDE FACE OF SHOTCRETE WHILE SHOTCRETE IS STILL SOFT.
 - MAINTAIN AIR TEMPERATURE ABOVE 40 DEGREES FAHRENHEIT DURING CURING OF SHOTCRETE.
 - INSTALLATION TOLERANCES:
 - CENTER-TO-CENTER SOIL NAIL SPACING: $+ / - 6$ INCHES.
 - SOIL NAIL LENGTH: NO LESS THAN SHOWN ON THE DRAWINGS.
 - SOIL NAIL INCLINATION (HORIZONTAL OR VERTICAL): $+ / - 5$ DEGREES.
 - SHOTCRETE THICKNESS: NO LESS THAN SHOWN ON THE DRAWINGS.
- TESTING
 - PERFORM PROOF TESTS ON SELECTED SOIL NAILS PER FHWA STANDARDS (1.5 X DESIGN LOAD). PROVIDE MIN. 3 FT LONG UNBONDED LENGTH FOR VERIFICATION TEST SOIL NAILS. TEST NAIL LOCATIONS TO BE SELECTED BY THE ENGINEER.
 - PROVIDE COPIES OF TEST RECORDS TO THE ENGINEER.
- MONITORING
 - MONITOR FOR ANY HORIZONTAL DEFLECTION OR VERTICAL MOVEMENT OF THE RETENTION WALLS WEEKLY DURING CONSTRUCTION UNTIL BACKFILLING IS COMPLETED. NOTIFY ENGINEER IF HORIZONTAL OR VERTICAL MOVEMENT OF THE RETENTION WALL EXCEEDS 3/4 INCH.
 - MONITOR EXISTING FOUNDATIONS AND SLABS FOR SIGNS OF MOVEMENT OR DISTRESS. STOP WORK AND CONTACT ENGINEER IF HORIZONTAL OR VERTICAL MOVEMENT OF EXISTING FOOTINGS OR WALLS EXCEEDS 1/8", OR IF DISTRESS OF FOOTINGS, WALLS, OR SLABS IS OBSERVED.
- REMOVAL
 - SOIL NAILS, WALL ANCHORS, AND SHOTCRETE ARE TO BE ABANDONED IN PLACE.

FILE: 14172-101 DATE: 05/19/14 PROJECT # 14.172

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Chad A. Underwood
 CHAD A. UNDERWOOD
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 TEMPORARY EARTH RETENTION SYSTEMS

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SHEET NO.	101

SOIL NAIL SCHEDULE							
SOIL NAIL NUMBER	SOIL NAIL TYPE (1)	NO. OF SOIL NAILS	SOIL NAIL DESIGN LOAD (K)	SOIL NAIL LENGTH (FT) (2)	VERTICAL ANGLE (DEGREES)	DRILL BIT DIA. (MM)	SOIL NAIL BEARING PLATE
Wall A							
A1 THRU A6	1	6	17	9	15	110	8"x8"x1"
A7 THRU A13	1	7	33	14	15	110	8"x8"x1"
A14 THRU A20	1	7	50	19	15	110	8"x8"x1"
A21 THRU A25	1	5	17	9	10	110	8"x8"x1"
A26 THRU A32	1	7	33	14	10	110	8"x8"x1"
A33 THRU A39	1	7	50	19	10	110	8"x8"x1"
A40 THRU A46	1	7	33	14	10	110	8"x8"x1"
A47 THRU A60	1	14	50	19	10	110	8"x8"x1"
A61 THRU A63	1	3	50	19	15	110	8"x8"x1"
A64 THRU A69	1	6	50	19	10	110	8"x8"x1"
TOTAL (WALL A SOIL NAILS) =		69					
Wall B							
B1 THRU B9	1	9	33	14	15	110	8"x8"x1"
B10 THRU B21	1	12	17	9	15	110	8"x8"x1"
B22 THRU B26	1	5	50	24	25	110	8"x8"x1"
B27 THRU B35	1	9	33	14	10	110	8"x8"x1"
B36 THRU B43	1	8	17	9	10	110	8"x8"x1"
B44 THRU B48	1	5	50	19	15	110	8"x8"x1"
B49 THRU B57	1	9	33	14	10	110	8"x8"x1"
B58 THRU B62	1	5	50	19	10	110	8"x8"x1"
B63	1	1	33	14	10	110	8"x8"x1"
TOTAL (WALL B SOIL NAILS) =		63					
Wall C (3)							
C1 THRU C18	1	18	50	24	35	110	12"x12"x1"
C19 THRU C34	1	16	50	24	35	110	12"x12"x1"
C35 THRU C42	1	8	50	24	35	110	12"x12"x1"
C43 THRU C60	1	18	50	19	25	110	12"x12"x1"
C61 THRU C76	1	16	50	19	25	110	12"x12"x1"
C77 THRU C84	1	8	50	19	25	110	12"x12"x1"
C85 THRU C102	1	18	50	19	15	110	12"x12"x1"
C103 THRU C118	1	16	50	19	15	110	12"x12"x1"
C119 THRU C126	1	8	50	19	15	110	12"x12"x1"
TOTAL (WALL C SOIL NAILS) =		84					
Wall D							
D1 THRU D12	1	12	33	14	15	110	12"x12"x1"
D13 THRU D24	2		(ROCK DOWEL - REFER TO DRAWINGS)				
TOTAL (WALL D SOIL NAILS) =		12					

FOOTNOTES:

- (1) SOIL NAILS BASED ON CTS/TITAN PRODUCTS, OR HOLLOW INJECTION BAR ANCHOR OF EQUAL OR GREATER YIELD STRENGTH. TYPE 1 SOIL NAIL = 40/20 BAR.
- (2) SOIL NAIL LENGTH BEHIND SHOTCRETE FACING; ADD TAIL LENGTH IN FRONT OF SHOTCRETE TO OBTAIN TOTAL REQUIRED NAIL LENGTH.
- (3) ADDITIONAL CONTINGENCY SOIL NAIL / WALL ANCHORS COULD BE REQUIRED. REFER TO DRAWINGS.

SOIL NAIL PROOF TEST SCHEDULE					
LOAD STEP	LOAD INCREMENT	HOLD TIME (MIN.)	LOAD (KIPS)	JACK PRESSURE (PSI)	MOVEMENT (IN.)
1	ALIGNMENT LOAD	UNTIL STABLE			
2	0.25 X DESIGN LOAD	UNTIL STABLE			
3	0.50 X DESIGN LOAD	UNTIL STABLE			
4	0.75 X DESIGN LOAD	UNTIL STABLE			
5	1.00 X DESIGN LOAD	UNTIL STABLE			
6	1.25 X DESIGN LOAD	UNTIL STABLE			
7	1.50 X DESIGN LOAD CREEP TEST	10			

SOIL NAIL ACCEPTANCE CRITERIA

1. TOTAL MOVEMENT EXCEEDS 80% OF THE THEORETICAL ELASTIC ELONGATION OF THE UNBONDED LENGTH.
2. TOTAL CREEP MOVEMENT IS LESS THAN 0.04 INCHES DURING THE 10 MINUTE HOLD PERIOD AND THE CREEP RATE IS LINEAR OR DECREASING THROUGHOUT THE HOLD PERIOD.
3. A PULLOUT FAILURE DOES NOT OCCUR AT THE MAXIMUM TEST LOAD.

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CHAD A. UNDERWOOD

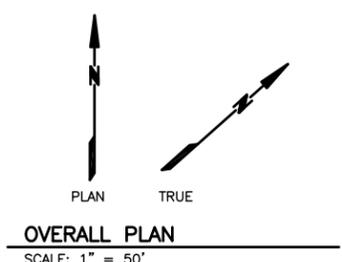
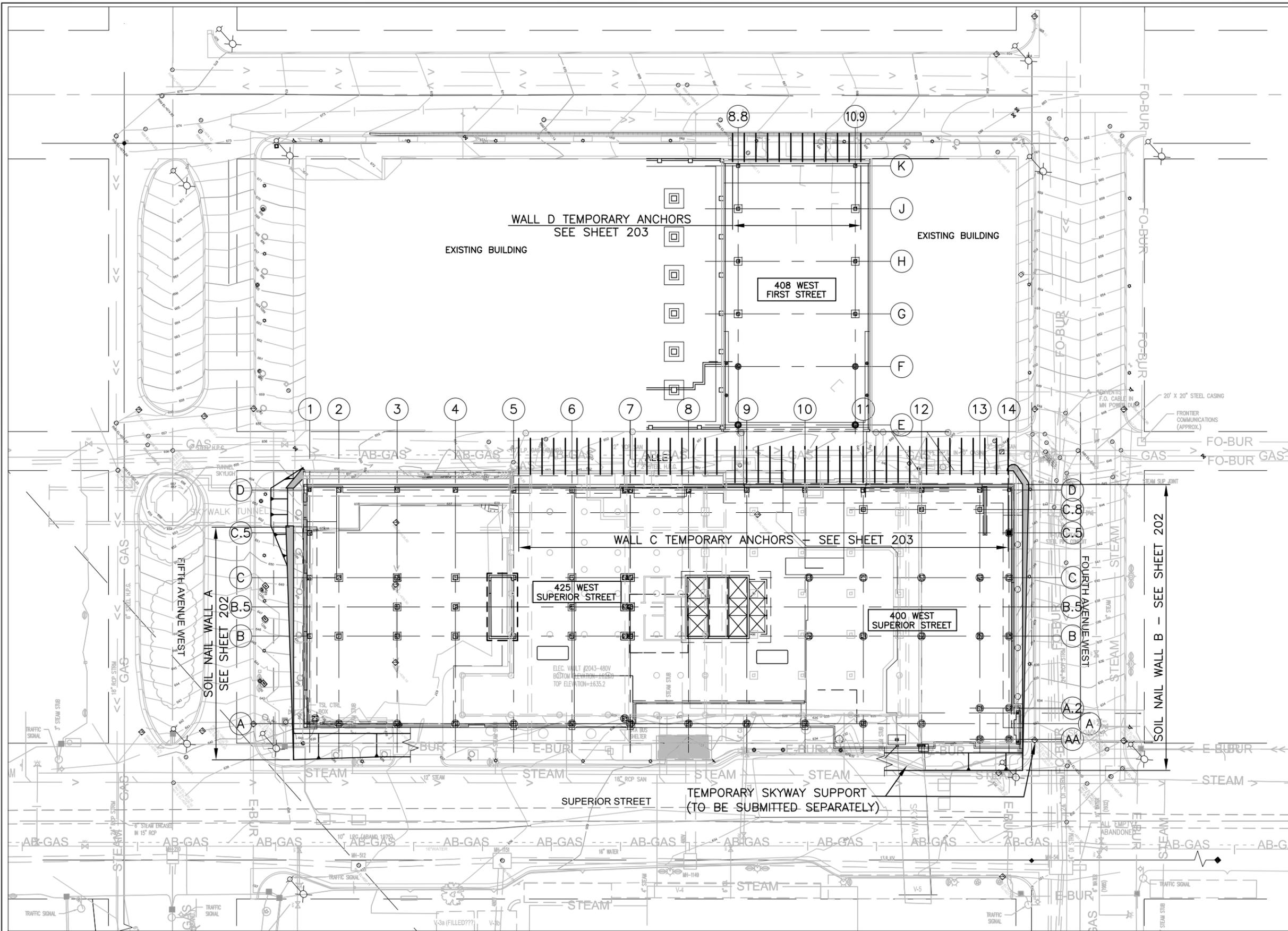
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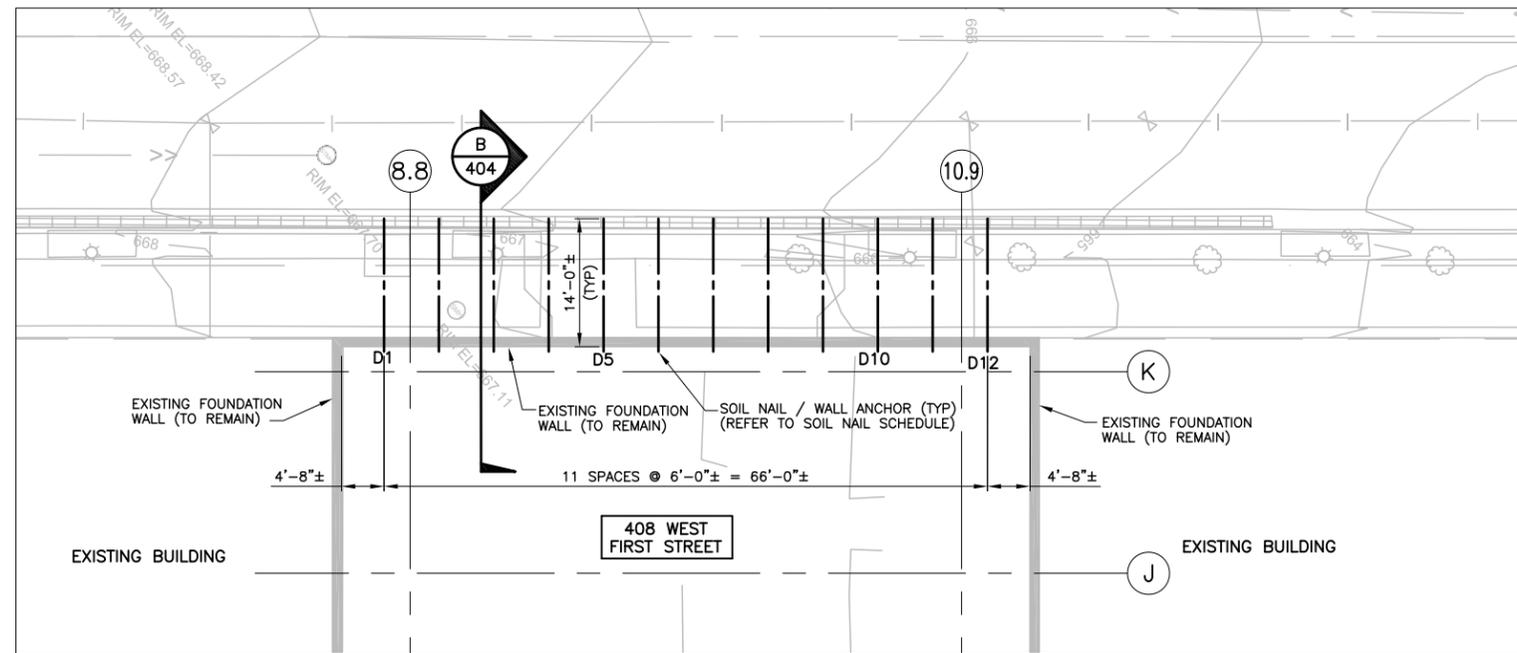
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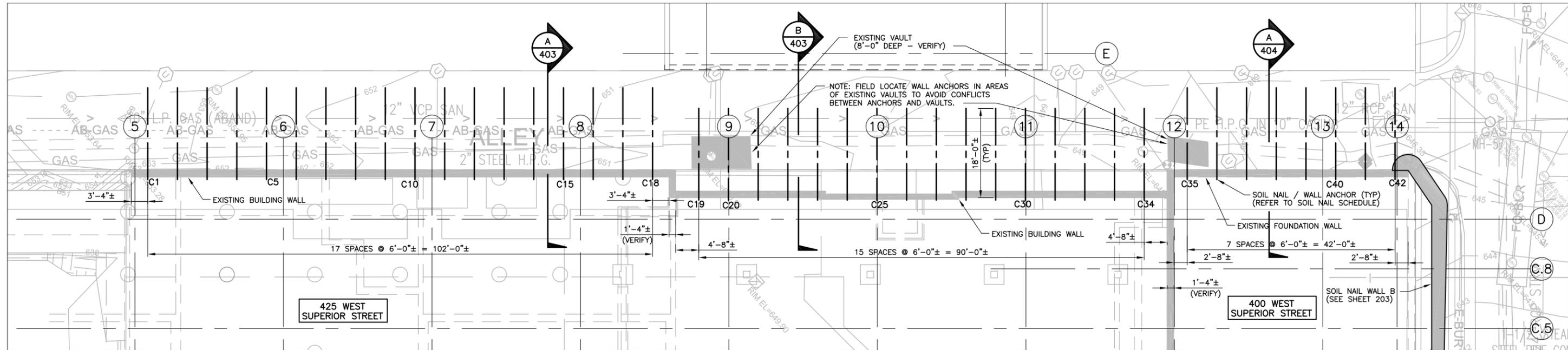
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PLAN - WALL D TEMPORARY ANCHORS

SCALE: 1" = 20'



PLAN - WALL C TEMPORARY ANCHORS

SCALE: 1" = 20'



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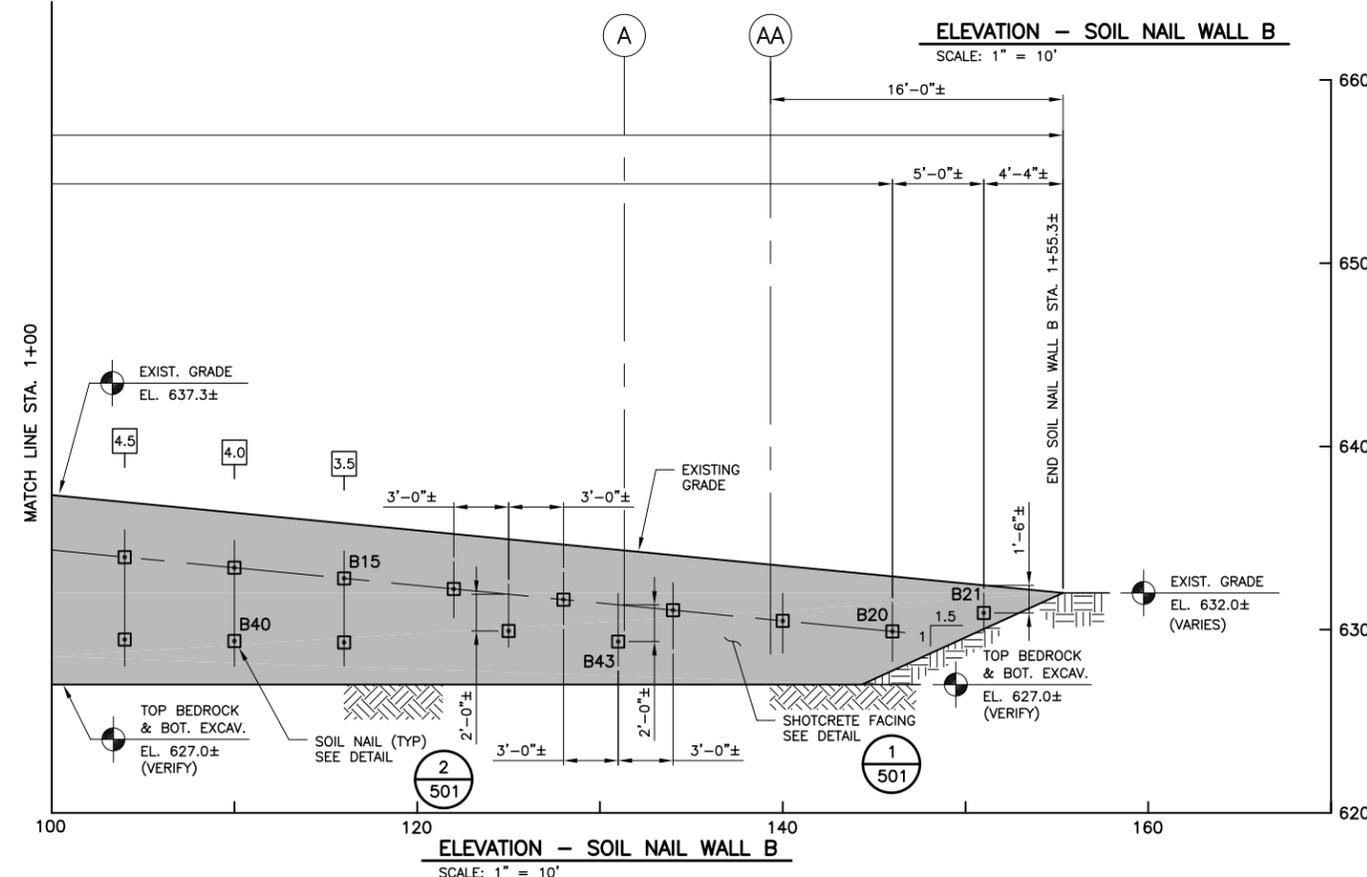
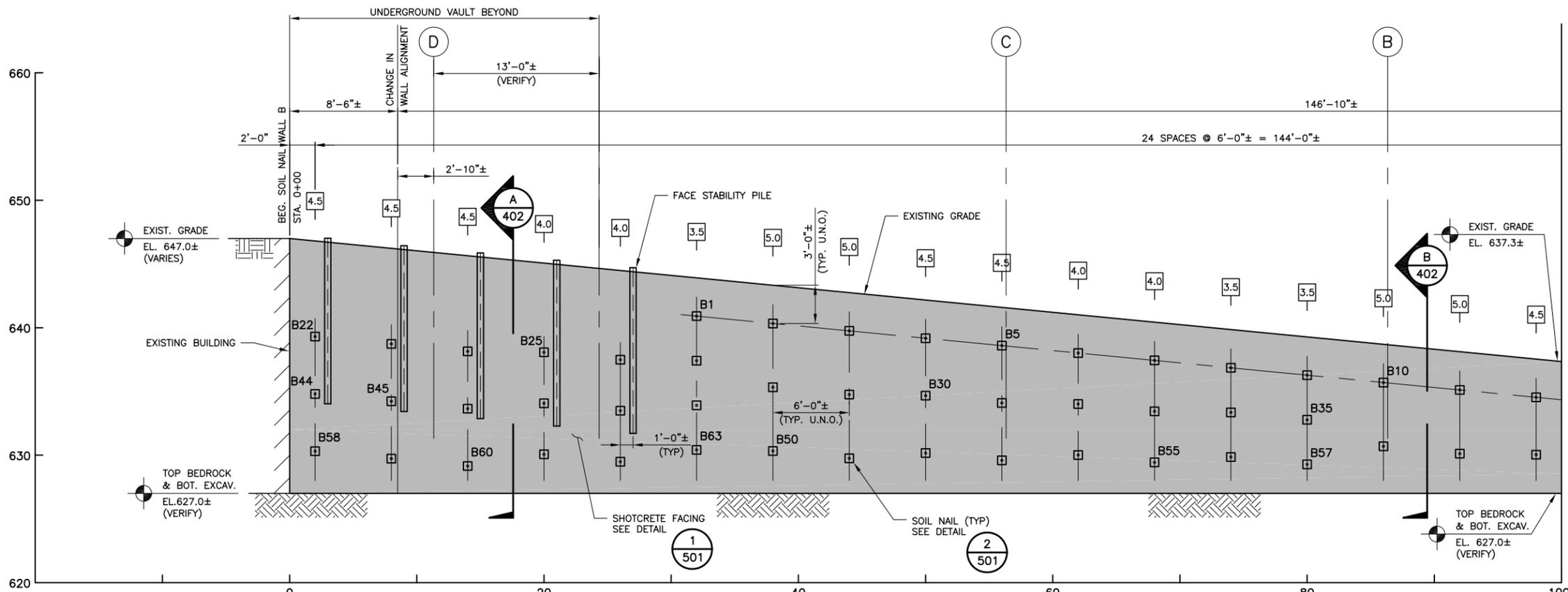
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- NOTES:
- 5.0 = VERTICAL SOIL NAIL SPACING IN FEET
 - 1. UPPER ROW OF SOIL NAILS SHALL BE INSTALLED 3'-0"± BELOW EXISTING GRADE OR 2'-0"± BELOW TOE OF SLOPE AT THE TOP OF THE WALL, WHICHEVER IS GREATER, UNLESS OTHERWISE NOTED.
 - 2. VERTICAL SOIL NAIL SPACING SHALL NOT EXCEED 5'-0" WITHOUT ENGINEER'S APPROVAL.
 - 3. HORIZONTAL SOIL NAIL SPACING SHALL NOT EXCEED 6'-0" WITHOUT ENGINEER'S APPROVAL.
 - 4. SOIL NAIL INSTALLATION ANGLE SHALL NOT EXCEED 20 DEGREES FROM HORIZONTAL WITHOUT ENGINEER'S APPROVAL, UNLESS OTHERWISE NOTED.

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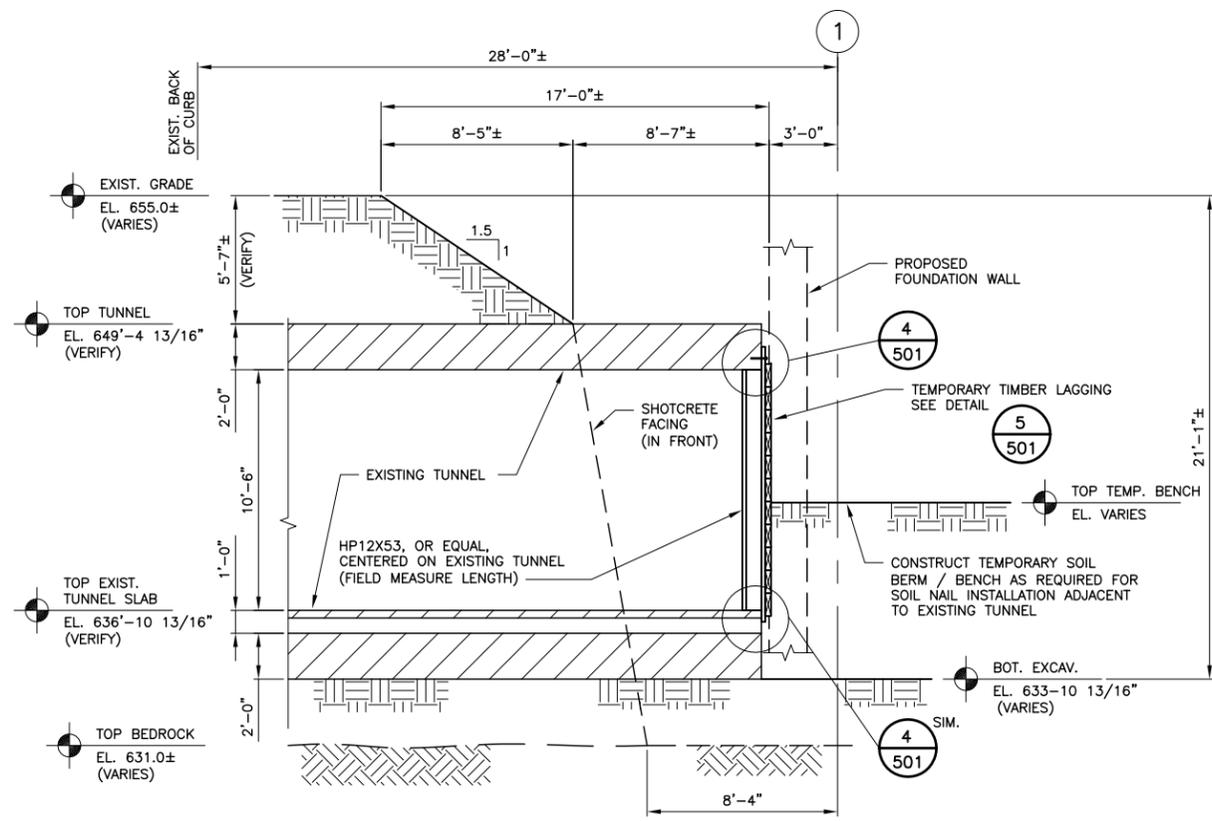
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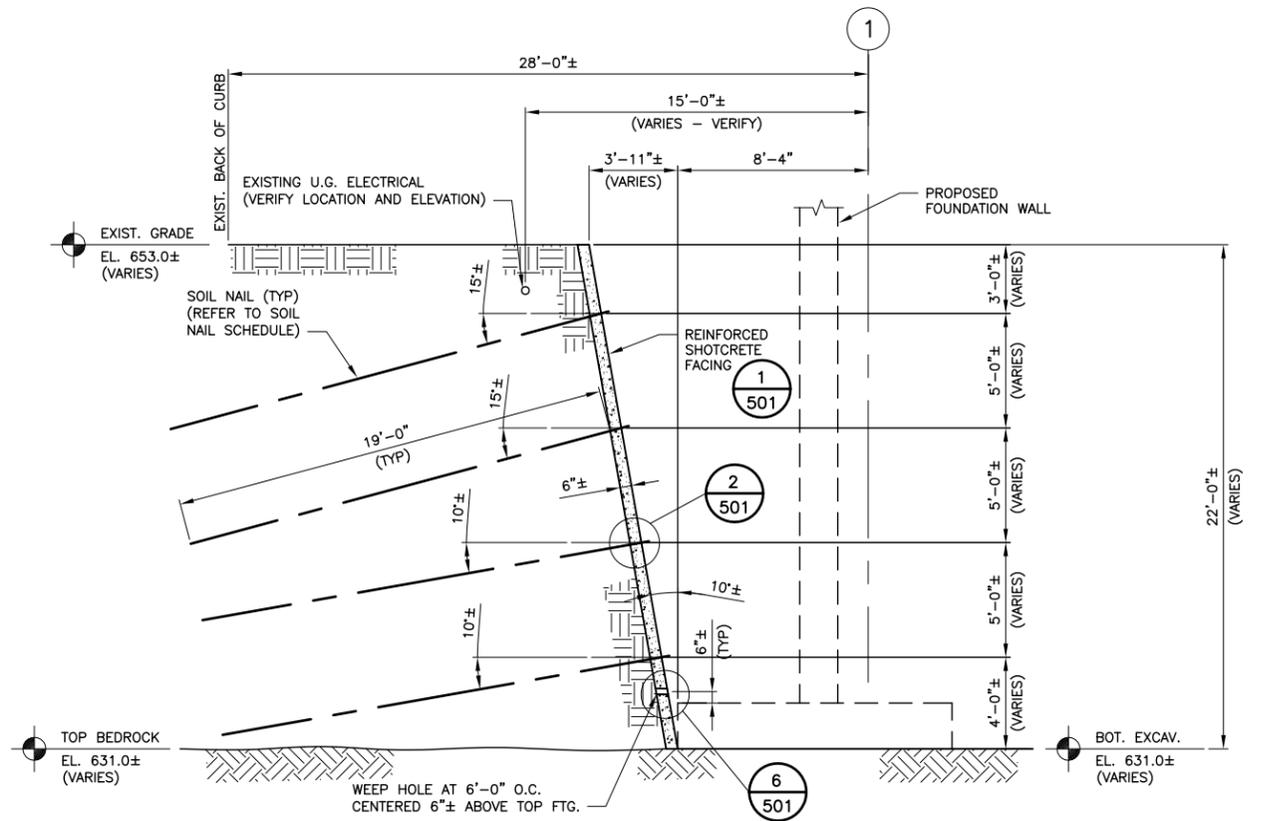
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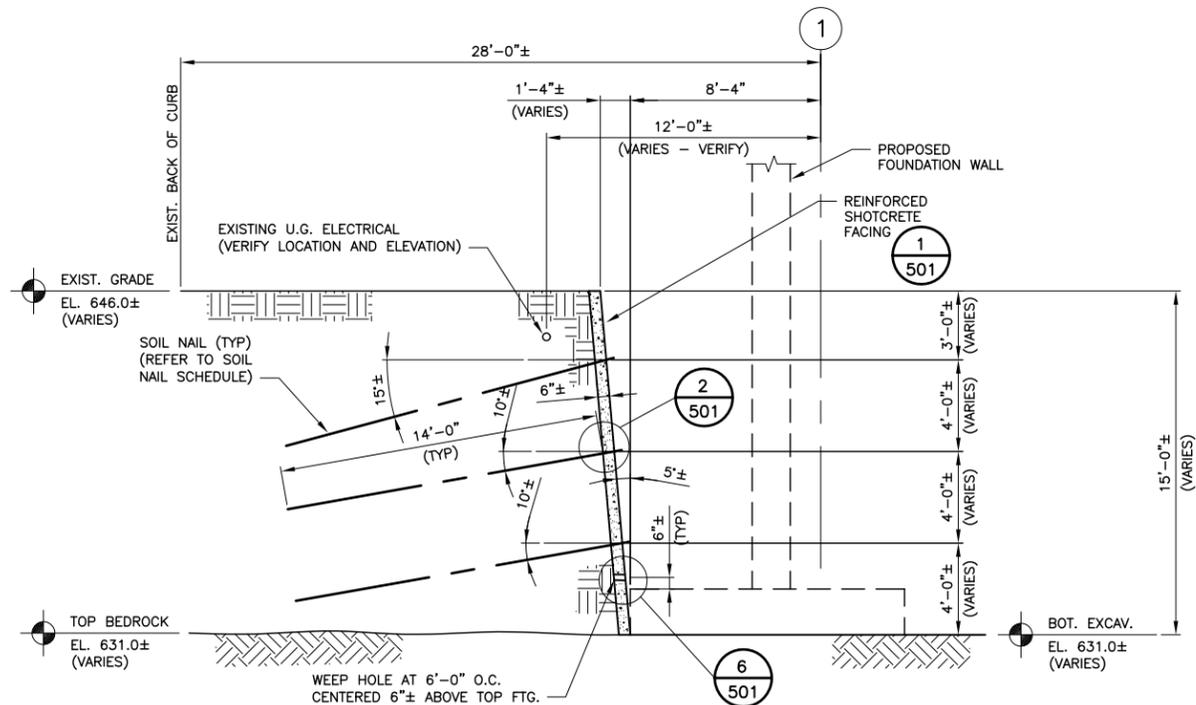
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SHEET NO.	302



SECTION - WALL A
SCALE: 1/8" = 1'-0"
A
401



SECTION - WALL A
SCALE: 1/8" = 1'-0"
B
401



SECTION - WALL A
SCALE: 1/8" = 1'-0"
C
401

FILE: 14172-401 DATE: 05/19/14 PROJECT # 14.172

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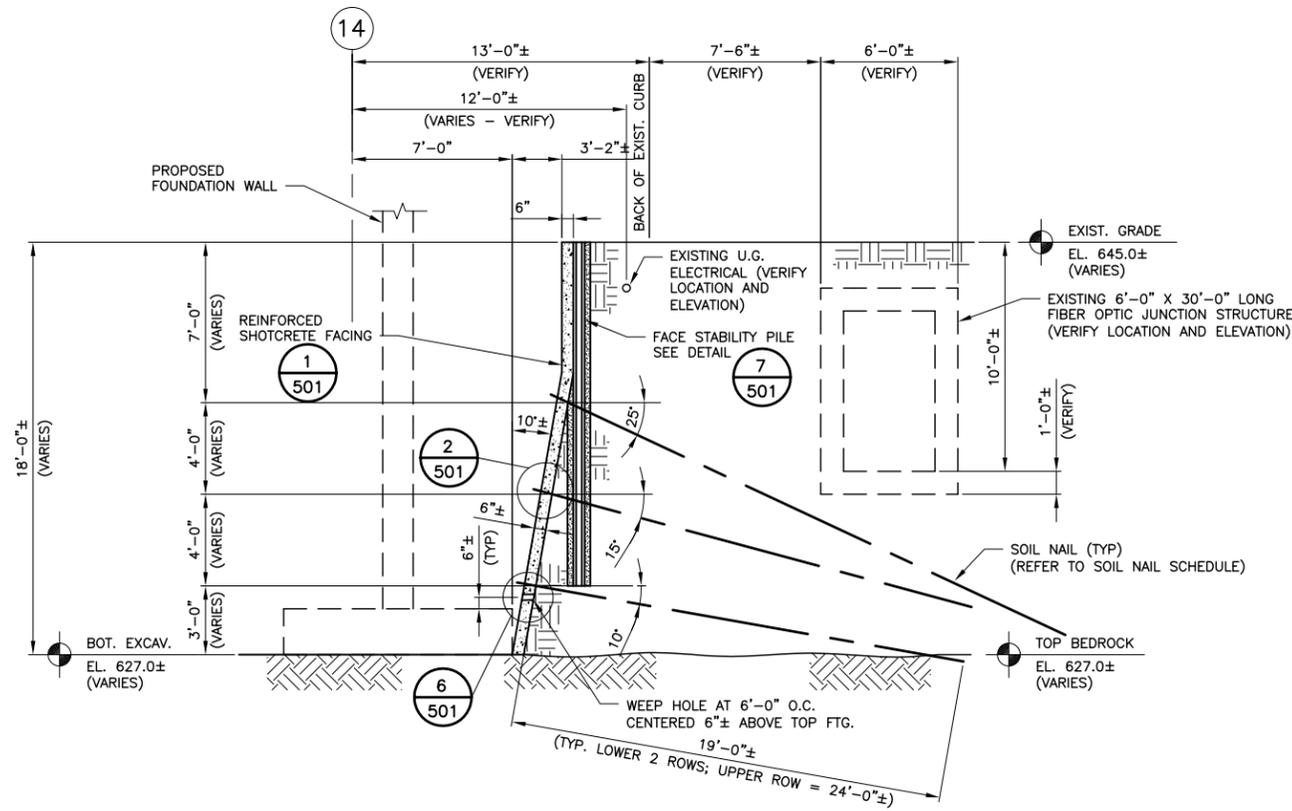
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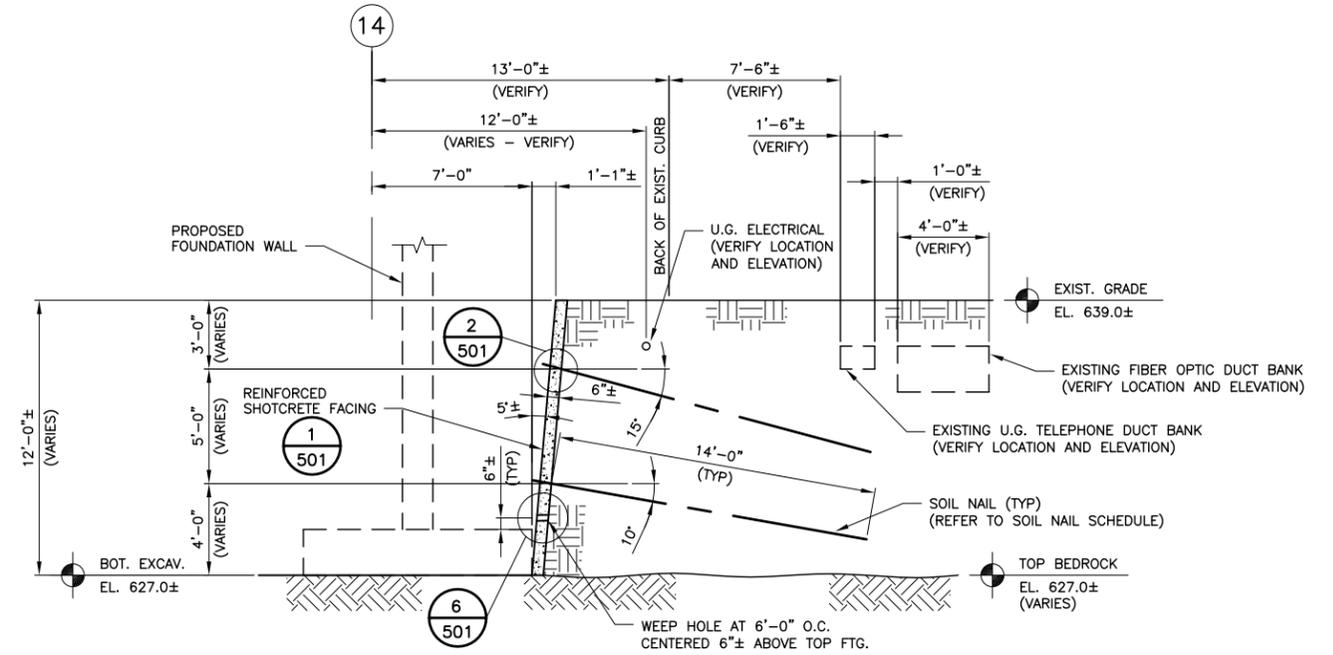
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SECTION - WALL B
SCALE: 1/8" = 1'-0"



SECTION - WALL B
SCALE: 1/8" = 1'-0"

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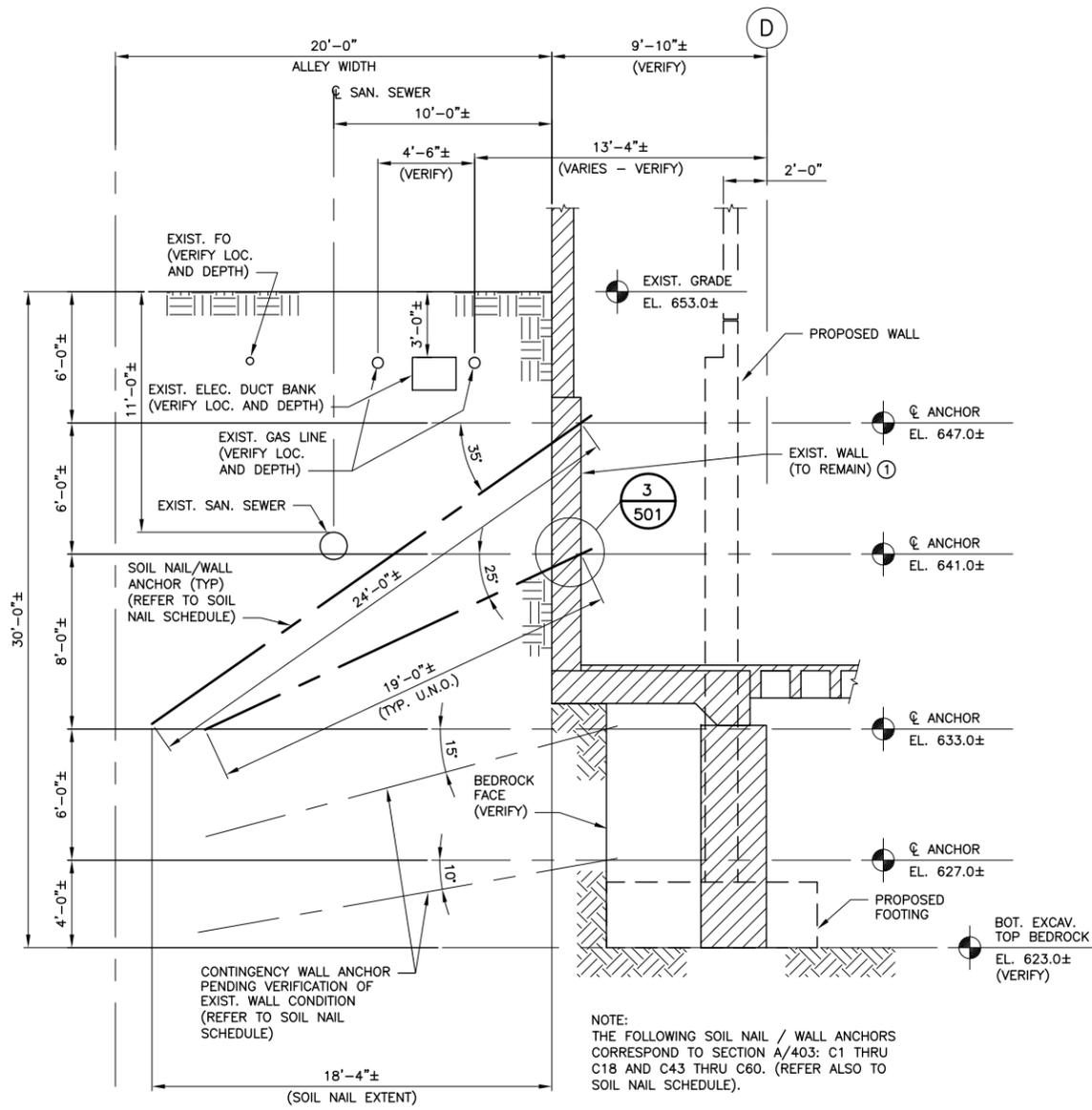
Chad A. Underwood
CHAD A. UNDERWOOD
DATE: 05/05/14 REG. NO. 43026

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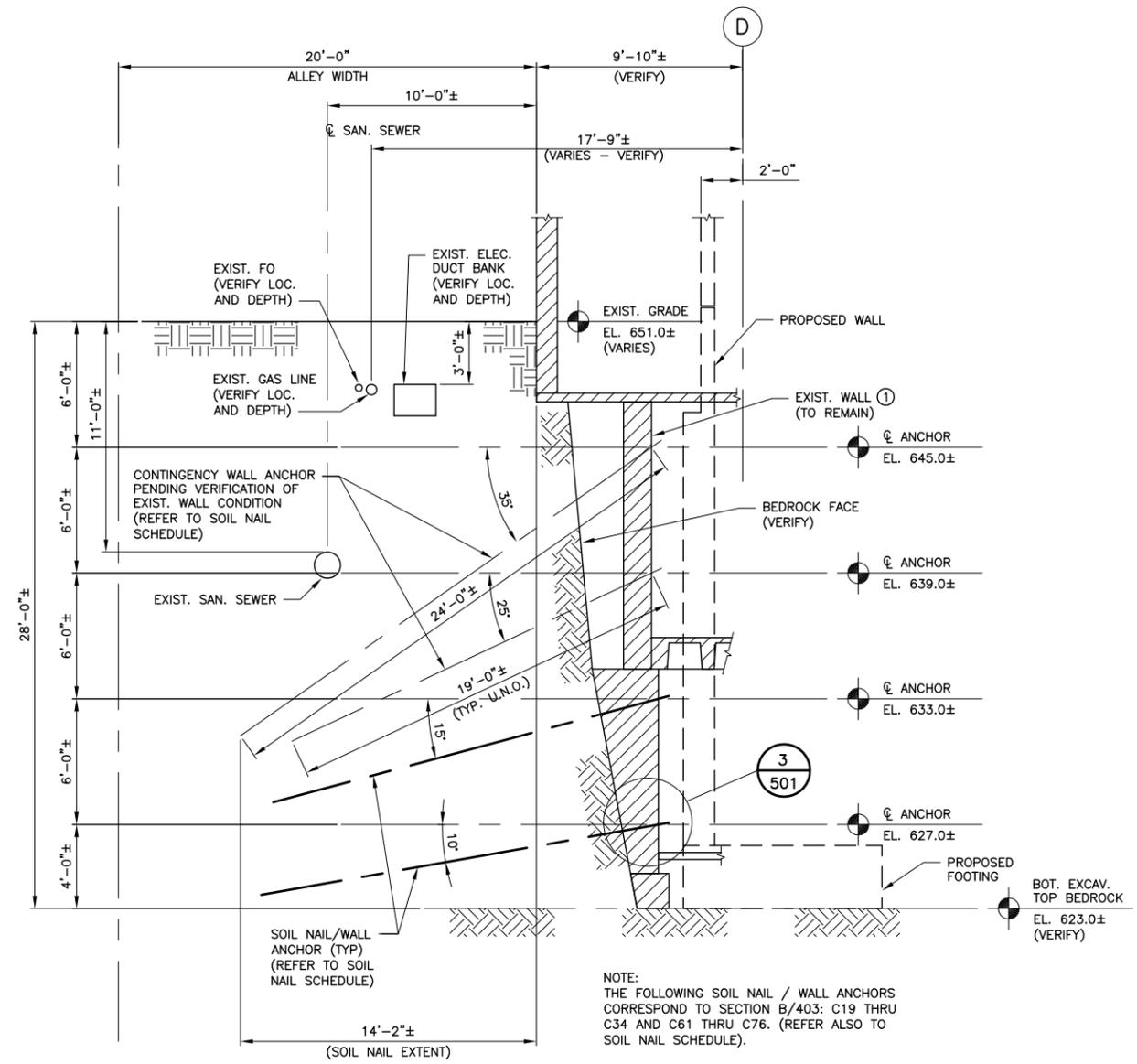
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DRAWN	MSR
CHECKED	CAU
PEER REVIEWED	GTG
PROJECT MANAGER	CAU
DATE	05/05/14

VEIT COMPANIES
MAURICES / 425 PROJECT
425 W. SUPERIOR ST. - DULUTH, MN
TEMPORARY EARTH RETENTION SYSTEMS

REVISION	△
PROJECT	14.172
SHEET NO.	402



SECTION - WALL C **A**
SCALE: 1/8" = 1'-0"
403



SECTION - WALL C **B**
SCALE: 1/8" = 1'-0"
403

KEYNOTES:

- ① VERIFY CONDITION OF EXISTING WALL PRIOR TO INSTALLATION OF WALL ANCHORS. ADJUSTMENTS TO ANCHOR LOCATIONS / ELEVATIONS MAY BE REQUIRED DEPENDING ON THE ACTUAL CONDITION OF THE WALL.

NOTES:

1. VERIFY LOCATIONS AND DEPTHS OF ALL UNDERGROUND UTILITIES AND CONTACT ENGINEER WITH FIELD VERIFIED INFORMATION BEFORE INSTALLING SOIL NAILS.
2. ACTUAL WALL ANCHOR ELEVATIONS, INSTALLATION ANGLES, AND LENGTHS TO BE DETERMINED BY ENGINEER FOLLOWING OBSERVATION OF EXISTING WALL CONDITIONS.

FILE: 14172-403 DATE: 05/19/14 PROJECT # 14.172

REV	DESCRIPTION OF REVISION	BY	DATE
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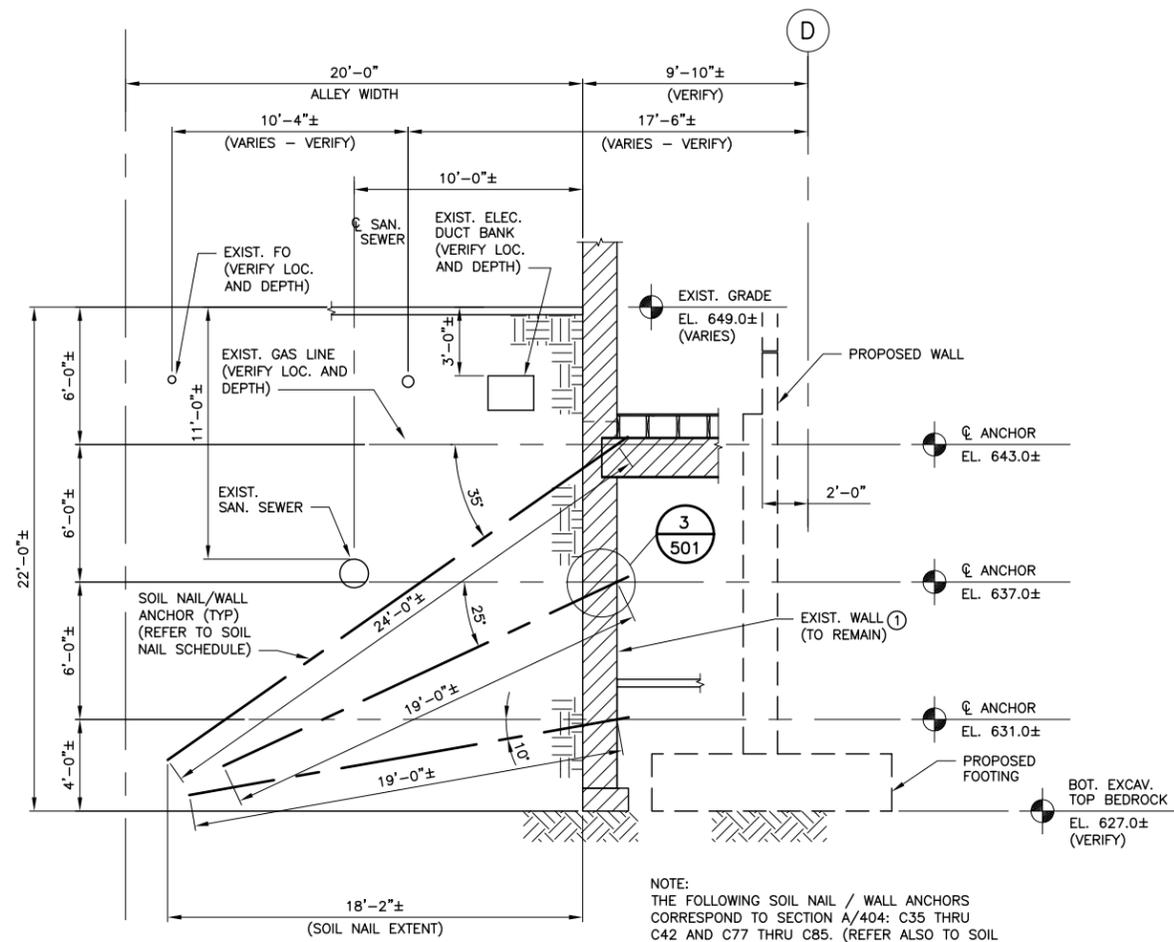
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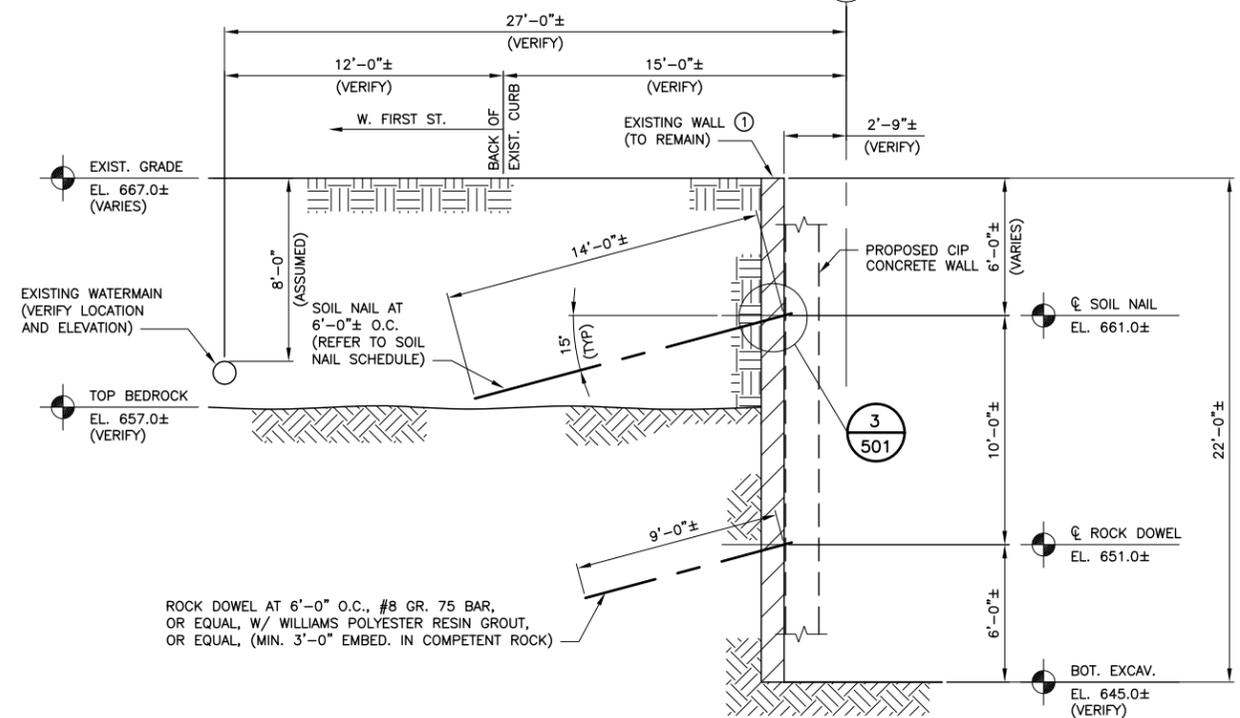
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TEMPORARY EARTH RETENTION SYSTEMS

REVISION	△
PROJECT	14.172
SHEET NO.	403



SECTION - WALL C A
404
SCALE: 1/8" = 1'-0"

NOTE:
THE FOLLOWING SOIL NAIL / WALL ANCHORS
CORRESPOND TO SECTION A/404: C35 THRU
C42 AND C77 THRU C85. (REFER ALSO TO SOIL
NAIL SCHEDULE).



SECTION - WALL D B
404
SCALE: 1/8" = 1'-0"

KEYNOTES:

- ① VERIFY CONDITION OF EXISTING WALL PRIOR TO INSTALLATION OF WALL ANCHORS. ADJUSTMENTS TO ANCHOR LOCATIONS / ELEVATIONS MAY BE REQUIRED DEPENDING ON THE ACTUAL CONDITION OF THE WALL.

NOTES:

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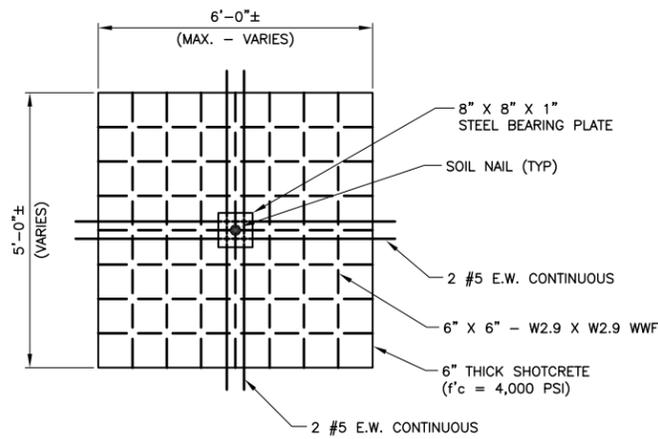
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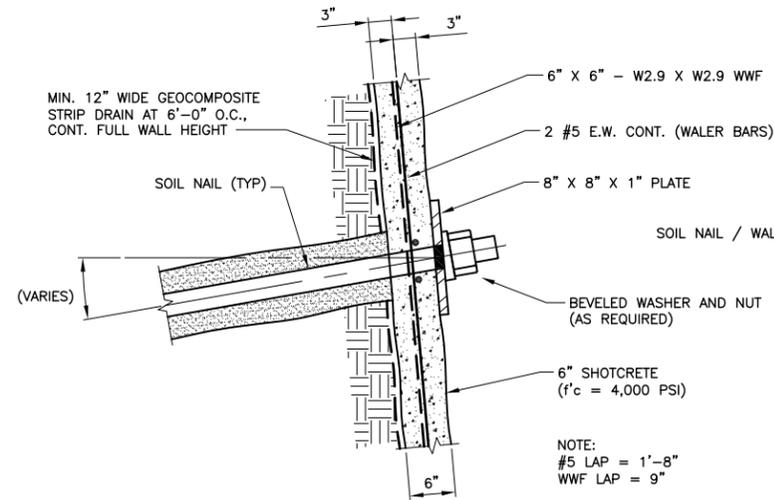
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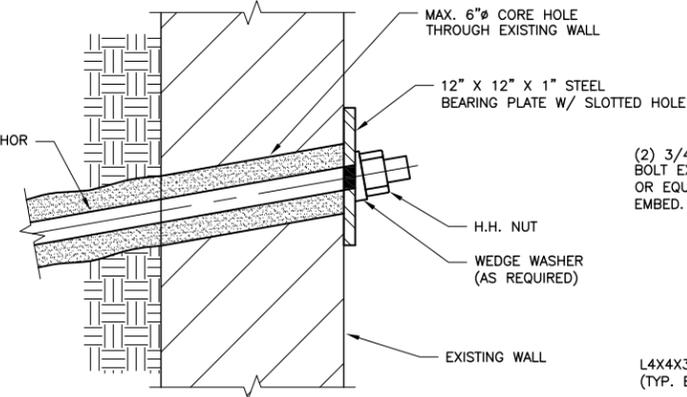
REVISION	△
PROJECT	14.172
SHEET NO.	404



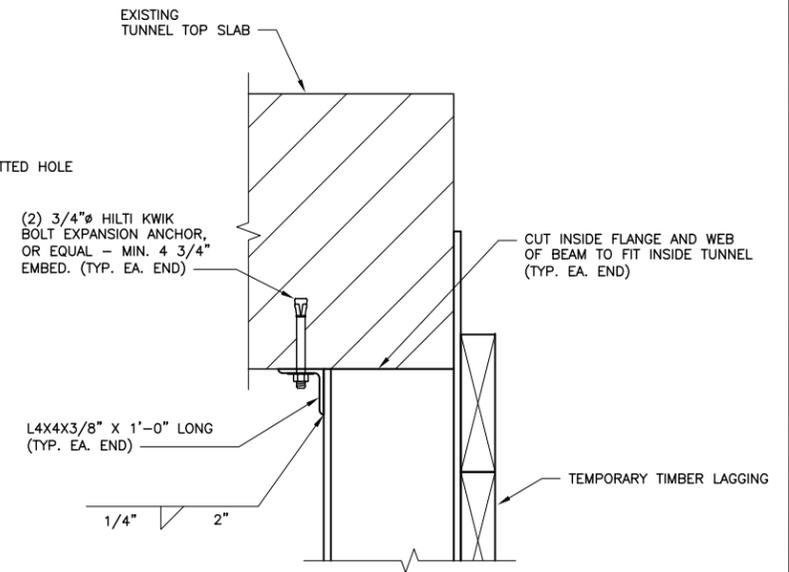
TYPICAL SHOTCRETE PANEL 1
N.T.S. 501



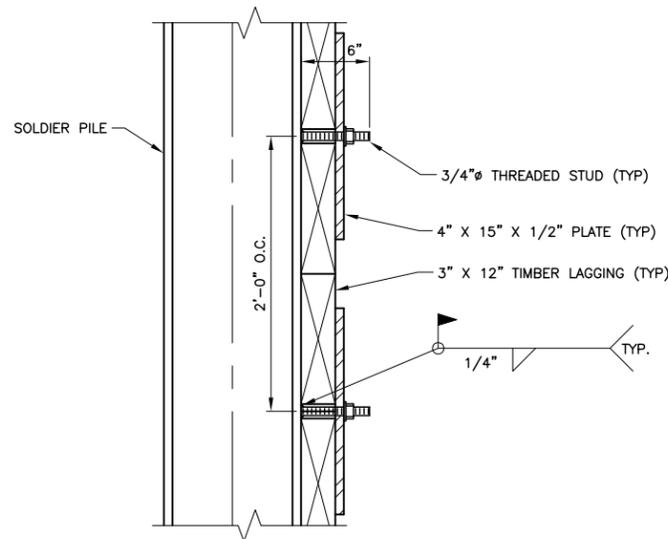
SOIL NAIL HEAD DETAIL 2
N.T.S. 501



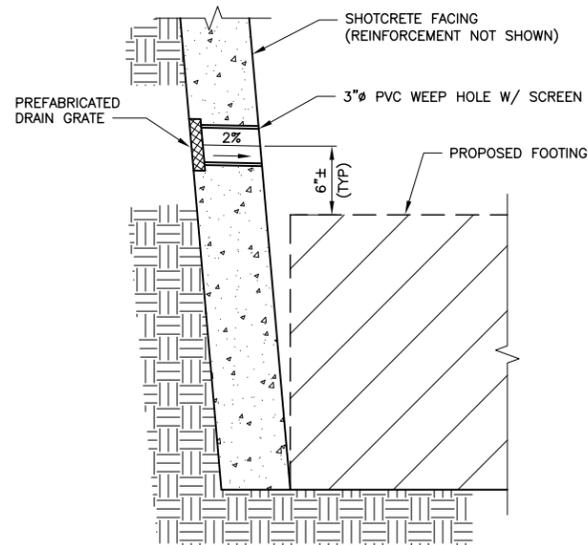
WALL ANCHOR HEAD DETAIL 3
N.T.S. 501



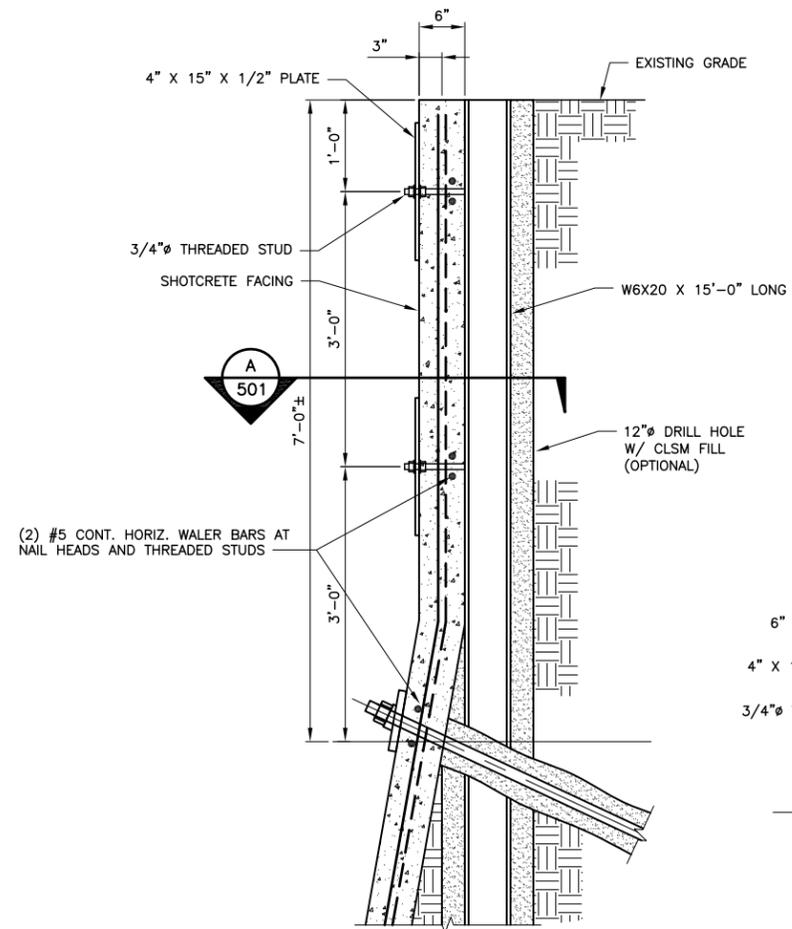
DETAIL 4
N.T.S. 501



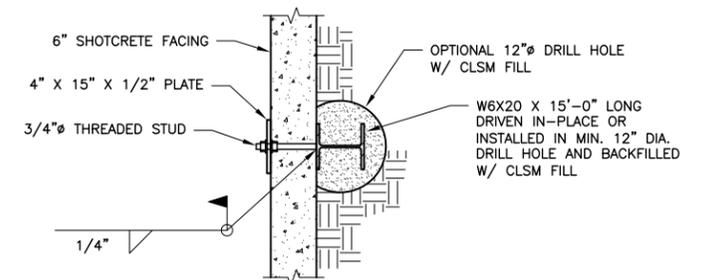
LAGGING DETAIL 5
N.T.S. 501



WEEP HOLE DETAIL 6
N.T.S. 501



FACE STABILITY PILE DETAIL 7
N.T.S. 501



SECTION A
N.T.S. 501

FILE: 14172-501 DATE: 05/19/14 PROJECT # 14.172

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SHEET NO.	501