

THESE PLANS, DRAWINGS AND DESIGNS ARE THE EXCLUSIVE PROPERTY OF ENGINEERING SYSTEM SOLUTIONS, AND SHALL NOT BE REPRODUCED IN ANY FORM WITHOUT WRITTEN CONSENT. ALL RIGHTS ARE RESERVED. COPYRIGHT 2015 ENGINEERING SYSTEM SOLUTIONS.

GENERAL REQUIREMENTS

DRAWINGS

THESE DRAWINGS HAVE BEEN PREPARED USING STANDARDS OF PROFESSIONAL CARE AND COMPLETENESS NORMALLY EXERCISED UNDER SIMILAR CIRCUMSTANCES BY REPUTABLE STRUCTURAL ENGINEERS IN THIS OR SIMILAR LOCALITIES. THEY NECESSARILY ASSUME THAT THE WORK DEPICTED WILL BE PERFORMED BY AN EXPERIENCED CONTRACTOR AND/OR WORKERS WHO HAVE A WORKING KNOWLEDGE OF THE APPLICABLE CODE STANDARDS AND REQUIREMENTS AND OF INDUSTRY ACCEPTED STANDARD GOOD PRACTICE. AS NOT EVERY CONDITION OR ELEMENT IS (OR CAN BE) EXPLICITLY SHOWN ON THESE DRAWINGS, IT IS UNDERSTOOD THAT THE CONTRACTOR WILL USE INDUSTRY ACCEPTED STANDARD GOOD PRACTICE FOR ALL MISCELLANEOUS WORK NOT EXPLICITLY SHOWN.

MISCELLANEOUS ITEMS

CALCULATION AND DESIGN OF MISCELLANEOUS NON-STRUCTURAL ITEMS, SUCH AS STAIRS, RAILINGS, NON-STRUCTURAL WALLS AND PREFABRICATED STRUCTURAL ITEMS, SUCH AS FLOOR AND ROOF TRUSSES, ARE NOT INCLUDED AND ARE TO BE PROVIDED BY OTHERS UNLESS SPECIFICALLY NOTED ON THESE DRAWINGS.

CONSTRUCTION MEANS AND METHODS

THESE DRAWINGS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DESIGN AND PROVIDE ADEQUATE SHORING, BRACING, FORM-WORK, ETC., AS REQUIRED FOR THE PROTECTION OF LIFE AND PROPERTY (INCLUDING UTILITIES) DURING CONSTRUCTION. CONSTRUCTION MATERIALS SHALL BE PLACED ON THE STRUCTURE SUCH THAT THE DESIGN LOADS ARE NOT EXCEEDED.

DIMENSIONS, INSERTS AND OPENINGS

THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL DIMENSIONS, CONDITIONS, AND ELEVATIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO START OF CONSTRUCTION. THE CONTRACTOR SHALL INFORM THE ARCHITECT IN WRITING OF ANY DISCREPANCIES OR OMISSIONS NOTED ON THE DRAWINGS. ANY SUCH DISCREPANCY, OMISSION, OR VARIATION NOT REPORTED BEFORE START OF CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. WHERE DISCREPANCIES OCCUR IN THESE DRAWINGS, NOTES AND DETAILS ON DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS.

CONTRACTOR SHALL ESTABLISH AND VERIFY ALL OPENINGS AND INSERTS FOR ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL WITH APPROPRIATE TRADES, DRAWINGS AND SUBCONTRACTORS PRIOR TO CONSTRUCTION.

STANDARDS

WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE EDITION REFERENCED IN THE GOVERNING BUILDING CODE.

TYPICAL DETAILS AND NOTES

TYPICAL DETAILS AND NOTES SHALL APPLY, THOUGH NOT NECESSARILY INDICATED AT A SPECIFIC LOCATION ON PLANS. WHERE NO DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR WORK ON THE PROJECT. DETAILS MAY SHOW ONLY ONE SIDE OF CONNECTION OR MAY OMIT INFORMATION FOR CLARITY.

SHOP DRAWINGS

SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL ITEMS. SHOP DRAWINGS ARE REVIEWED ONLY FOR GENERAL COMPLIANCE WITH THE STRUCTURAL DRAWINGS. REVIEW DOES NOT INDICATE THAT THE SHOP DRAWINGS ARE CORRECT OR COMPLETE. RESPONSIBILITY FOR CORRECTNESS SHALL REST WITH THE CONTRACTOR. ANY CHANGES, SUBSTITUTIONS, OR DEVIATIONS FROM CONTRACT DRAWINGS SHALL BE CLOUDED. ANY OF THE AFOREMENTIONED SHALL NOT BE CONSIDERED APPROVED AFTER ENGINEER'S REVIEW UNLESS SPECIFICALLY NOTED ACCORDINGLY. THE SHOP DRAWINGS DO NOT SUPERSEDE OR REPLACE THE ORIGINAL CONTRACT DRAWINGS. ANY ENGINEERING PROVIDED BY OTHERS AND SUBMITTED FOR REVIEW SHALL BEAR THE SEAL OF AN APPROPRIATELY REGISTERED ENGINEER. ENGINEERING SYSTEM SOLUTIONS SHALL NOT BE RESPONSIBLE FOR THE ADEQUACY OF ENGINEERING DESIGNS PERFORMED BY OTHERS. FIVE WORKING DAYS SHALL BE ALLOWED FOR THE ENGINEER'S REVIEW. CONTRACTOR SHALL PROVIDE A COPY OF EACH SUBMITTAL FOR ENGINEERING SYSTEM SOLUTIONS RECORDS.

SHOP DRAWINGS SHALL REFERENCE DATE AND DELTA (IF ANY) OF CONTRACT DRAWINGS.

MOLD

MOLD CONCERNS AND PREVENTION IS OUT OF ENGINEERING SYSTEM SOLUTIONS SCOPE OF SERVICES. ENGINEERING SYSTEM SOLUTIONS SHALL BE HELD HARMLESS, TO THE EXTENT OF THE LAW, FOR ALL MOLD PREVENTION AND MOLD RELATED CONCERNS.

FOUNDATION

GEOTECHNICAL REPORT

FIRM-SOUTHWEST GEOTECHNICAL; REPORT NO.:175337; DATE: OCTOBER 26, 2017

ENGINEERING SYSTEM SOLUTIONS ASSUMES NO LIABILITY FOR GROUNDWATER OR OTHER MEANS OF FLOODING.

FOOTING EMBEDMENT

ALL FOOTINGS SHALL EXTEND BELOW GRADE THE MINIMUM EMBEDMENT DEPTH AS NOTED ON THE FOUNDATION PLAN.

GRADE IS DEFINED AS FOLLOWS

THE LOWEST OF THE FOLLOWING (BEFORE LANDSCAPING):

- BUILDING PAD SUBGRADE
- LOWEST SURROUNDING SOIL GRADE WITHIN 5'-0" OF BUILDING

SLAB ON GRADE

SUPPORT PER THE GEOTECHNICAL RECOMMENDATIONS.

FOLLOW ACI 302.1 RECOMMENDATIONS FOR PLACING CONCRETE, CURING, AND QUALITY CONTROL.

BACKFILL

BACKFILL SHALL NOT BE PLACED AGAINST EXTERIOR WALLS UNTIL THE INTERIOR FLOOR SYSTEM CAN ADEQUATELY BRACE THE WALL.

BACKFILL AND RECOMPACT ALL TRENCHES PER THE GEOTECHNICAL REPORT. (MIN 90% DRY DENSITY)

DRAINAGE

PROVIDE ADEQUATE DRAINAGE AWAY FROM THE STRUCTURE.

BASIS FOR DESIGN

GOVERNING BUILDING CODE

2012 IBC (W/ SOUTHERN NEVADA AMENDMENTS) 2008 AASHTO STANDARD SPECIFICATIONS

DEAD LOAD

STRUCTURE SELF-WEIGHT CONCRETE 150 PCF

VARYING COVER WITH A SOIL BACKFILL DENSITY 135 PCF

SOILS

SOIL BEARING PRESSURE (D+L) 2000 PSF

SOIL BEARING PRESSURE (W OR +E) 2667 PSF

BEARING INCREASE PER FT MAX 350/3500 PSF

MINIMUM FOOTING EMBEDMENT DEPTH 12 INCHES

ACTIVE EARTH PRESSURE - LEVEL BACKFILL 35 PCF

ACTIVE EARTH PRESSURE - 3:1 BACKFILL 50 PCF

ACTIVE EARTH PRESSURE - 2:1 BACKFILL 60 PCF

AT REST EARTH PRESSURE - LEVEL BACKFILL 60 PCF

PASSIVE EARTH PRESSURE 233 PCF

COEFFICIENT OF FRICTION FOR LATERAL SLOING 0.45

RESISTANCE

SEISMIC

SITE CLASS D

SEISMIC DESIGN CATEGORY D

SDS (SHORT PERIOD) 0.440g

LATERAL FORCE WITH LEVEL BACKFILL 8.6H/2

WIND

BASIC WIND SPEED 115 MPH

EXPOSURE C

CONCRETE

MATERIAL

MINIMUM 28 DAY COMPRESSIVE STRENGTH FOR ARCH CULVERT, WALLS, FOOTING, AND CONCRETE APRON IS 4500 PSI.

CEMENT SHALL BE TYPE V.

MAXIMUM W/C RATIO SHALL BE 0.45.

CONCRETE SLUMP SHALL BE 4-6 INCHES.

ALL CONCRETE SHALL BE NORMAL WEIGHT OF 145 POUND PER CUBIC FOOT UNLESS NOTED OTHERWISE. USING HARD ROCK AGGREGATES CONFORMING TO ASTM C33. MAXIMUM AGGREGATE SIZE FOR STRUCTURAL ELEMENTS SHALL NOT EXCEED 3/4".

BATCHING, MIXING, AND TRANSPORTING

BATCHING, MIXING, AND TRANSPORTING CONCRETE SHALL BE PER ACI 301.

CONCRETE MIXES SHALL BE DESIGNED BY A CERTIFIED LABORATORY AND APPROVED BY THE ENGINEER OF RECORD.

PORTLAND CEMENT SHALL CONFORM TO ACI 301.

WATER SHALL NOT BE ADDED AT THE JOB SITE SUCH THAT THE APPROVED MIX DESIGN W/C RATIO IS EXCEEDED.

FORM WORK

FORM WORK SHALL BE PER ACI 301.

PLACING

PLACING OF CONCRETE SHALL BE PER ACI 301.

PLACING OF CONCRETE BY MEANS OF PUMPING SHALL BE PER ACI 301.

WHERE THERE IS A RISK OF PREMATURE DRYING, SUCH AS IN HOT OR WINDY WEATHER, CURING MEASURES SHALL BE IMPLEMENTED PER THE RECOMMENDATIONS OF ACI 301.

CONSOLIDATION

CONSOLIDATION OF CONCRETE SHALL BE PER ACI 301.

EMBEDDED ITEMS

EMBEDDED ITEMS SHALL BE PLACED PER ACI 301.

CONDUITS AND PIPES SHALL NOT BE EMBEDDED IN STRUCTURAL CONCRETE WITHOUT WRITTEN APPROVAL FROM THE ENGINEER OF RECORD.

EMBEDDED CONDUITS, PIPES, AND SLEEVES SHALL NOT BE LARGER IN DIAMETER THAN 1/3 THE OVERALL THICKNESS OF THE SLAB, BEAM, OR WALL IN WHICH THEY ARE EMBEDDED AND SHALL NOT BE SPACED CLOSER THAN 3 DIAMETERS OR ELEMENT WIDTHS ON CENTER.

NO ALUMINUM EMBEDS SHALL BE IN DIRECT CONTACT WITH CONCRETE.

COLD WEATHER CONCRETING

WHEN THE AIR TEMPERATURE IS BELOW 40°F, COLD WEATHER CONCRETE PROCEDURES SHALL BE USED PER ACI 301.

A CONSTRUCTION PLAN SHALL BE SUBMITTED TO THE ENGINEER DETAILING THE PROTECTION PROCEDURES PRIOR TO PLACEMENT OF CONCRETE.

HOT WEATHER CONCRETING

PRIOR TO CONCRETE PLACEMENT, TOP 3 INCHES OF SUB-BASE SHALL BE WETTED SUFFICIENTLY TO SATURATE SUB-BASE WITHOUT ANY STANDING WATER.

CONCRETE PLACEMENT TEMPERATURE MAY NOT EXCEED 90° FAHRENHEIT WHEN MEASURED IN ACCORDANCE WITH ASTM C1064.

STEEL FORMS AND REINFORCEMENT SHALL BE COOLED PRIOR TO CONCRETE PLACEMENT WHEN STEEL TEMPERATURES EXCEED 120° FAHRENHEIT.

MIX WATER, AGGREGATES, CONVEYING AND PLACING EQUIPMENT OR ANY COMBINATION OF THE ABOVE SHALL BE COOLED IF NECESSARY TO MAINTAIN PROPER CONCRETE PLACING TEMPERATURE.

SLAB ON GRADE

CONTRACTOR SHALL FOLLOW ACI 301 AGGREGATE SPECIFICATION INCLUDING #8 AND #4 AGGREGATES TO PROVIDE A WELL-GRADED AGGREGATE MIX. MAXIMUM AGGREGATE SIZE SHALL NOT EXCEED 1 1/2".

CONTRACTOR SHALL PROVIDE CONTROL JOINTS. SEE TYPICAL CONTROL JOINT IN CONCRETE SLAB ON GRADE DETAIL.

SHOTCRETE

MATERIAL

MINIMUM 28 DAY COMPRESSIVE STRENGTH FOR ARCH IS 4500 PSI.

CEMENT SHALL BE TYPE V.

MAXIMUM W/C RATIO SHALL BE 0.45.

SHOTCRETE SLUMP SHALL BE 4-6 INCHES.

ALL SHOTCRETE SHALL BE NORMAL WEIGHT OF 145 POUND PER CUBIC FOOT UNLESS NOTED OTHERWISE. USING HARD ROCK AGGREGATES CONFORMING TO ASTM C33. MAXIMUM AGGREGATE SIZE FOR STRUCTURAL ELEMENTS SHALL NOT EXCEED 3/4".

GENERAL

SHOTCRETE PROPORTIONS SHALL BE SELECTED THAT ALLOW SUITABLE PLACEMENT PROCEDURES USING THE DELIVERY EQUIPMENT SELECTED AND SHALL RESULT IN FINISHED IN-PLACE HARDENED SHOTCRETE MEETING THE STRENGTH REQUIREMENTS STATED IN THE CONCRETE MATERIAL SECTION. COARSE AGGREGATE, IF USED, SHALL NOT EXCEED 3/8 INCH. ANY REBOUND OR ACCUMULATED LOOSE AGGREGATE SHALL BE REMOVED FROM THE SURFACES TO BE COVERED PRIOR TO PLACING THE INITIAL OR ANY SUCCEEDING LAYERS OF SHOTCRETE. REBOUND SHALL NOT BE REUSED AS AGGREGATE.

SHOTCRETE PLACEMENT SHALL BE PLACED ACCORDING TO ACI 506R-90. PRE-CONSTRUCTION TESTING OF SHOTCRETE IS NOT REQUIRED PROVIDED THE CONTRACTOR DEMONSTRATES TO THE BUILDING OFFICIAL, BY MEANS APPROVED BY THE BUILDING OFFICIAL, ACCEPTED SHOTCRETE WORK USING SIMILAR EQUIPMENT UNDER SIMILAR CONDITIONS WITH THE SAME PERSONNEL.

FINISHING

ACCORDING TO THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY, ONLY SURFACES EXPOSED TO VIEW AFTER BACKFILL IS PLACED REQUIRE FINISHING (EITHER ORDINARY OR FINE). HOWEVER, IT IS REQUIRED THAT THE EXTERIOR SHOTCRETE SURFACE IS MADE SMOOTH WITH A STEEL TROWEL, OR FRESNO TO FACILITATE THE APPLICATION OF WATERPROOFING. THIS FINISH SHALL HAVE NO REQUIREMENTS FOR FLATNESS. HOWEVER, THE SURFACE SHALL BE FREE FROM STONE POCKETS, DEPRESSIONS OR PROJECTIONS IN EXCESS OF 1/4 INCH BEYOND THE SURFACE. INVERT EXPOSED SURFACE SHALL BE INDUSTRY-STANDARD BROOM FINISH.

ADMIXTURES

ONLY ADMIXTURES PERMITTED BY THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY SHALL BE ALLOWED.

CURING

CURING ON THE OUTSIDE SURFACE AND INSIDE SURFACE AFTER FORM REMOVAL SHALL BE BY MEANS OF LIQUID MEMBRANE-FORMING COMPOUND MEETING THE REQUIREMENTS OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY. A BULKHEAD SHALL BE PLACED AT THE END OF THE CULVERT TO STOP WIND MOVEMENT THROUGH THE CULVERT IMMEDIATELY AFTER FORM REMOVAL.

FORMS SHALL NOT BE STRIPPED FOR A MINIMUM OF 36 HOURS AFTER SHOTCRETE HAS BEEN PLACED.

MISCELLANEOUS

COMPLETED SHOTCRETE WORK SHALL BE CHECKED VISUALLY DURING CONSTRUCTION AND PRIOR TO FINAL APPROVAL OF SHOTCRETE FOR REINFORCING BAR EMBEDMENT, VOIDS, ROCK POCKETS, SAND STREAKS, AND SIMILAR DEFICIENCIES. THE SPECIAL INSPECTOR SHALL EXAMINE.

SURFACES OF STEEL FORMS SHALL BE COATED W/ AN ICC APPROVED FORM RELEASE.

SHOTCRETE NOZZLEMAN SHALL BE CERTIFIED PER ACI 506.3R-91. CERTIFIED NOZZLEMAN SHALL BE ABLE TO SHOW COMPLETION OF COMPETENT WORK ON ARCH CULVERT OF SIMILAR SIZE AND SCOPE. COMPARABLE WORK SHALL HAVE BEEN COMPLETED WITHIN THE LAST 12 MONTHS.

SHOTCRETE CONTRACTOR SHALL BE ABLE TO SHOW COMPLETION OF COMPETENT WORK ON ARCH CULVERT OF SIMILAR SIZE AND SCOPE. COMPARABLE WORK SHALL HAVE BEEN COMPLETED WITHIN THE LAST 12 MONTHS.

SHOTCRETE MAY BE USED IN LIEU OF POURED IN PLACE CONCRETE ON ALL ARCHES, WALLS, MANHOLE BASES (ATTACHED DIRECTLY TO ARCH).

SLABS SHALL BE POURED IN PLACE.

AT CONTRACTOR'S OPTION, CUT OFF WALLS MAY UTILIZE A 3/8 INCH MINUS AGGREGATE IN MIX DESIGN.

CONCRETE ARCH DAMP-PROOFING

THE EXTERIOR SURFACE OF ALL BURIED STRUCTURES SHALL BE DAMP-PROOFED WITH THE TUFF-N-DRI XTS SYSTEM OR EQUIVALENT. INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

REINFORCING STEEL

REINFORCING BARS SHALL BE DEFORMED, EXCEPT AS NOTED IN ACI 301.

USE OF EPOXY-COATED BARS IS NOT PERMITTED.

GRADE

ALL WELDED BARS SHALL BE GRADE 60, REFER TO ASTM STANDARD A706.

#4 BARS OR LARGER SHALL BE GRADE 60, REFER TO ASTM STANDARD A615.

#3 BARS OR SMALLER SHALL BE GRADE 40, REFER TO ASTM STANDARD A615.

WELDED WIRE FABRIC SHALL BE GRADE 60, REFER TO ASTM STANDARD A185.

CLEAR COVER

UNLESS NOTED OTHERWISE TACK WELDING OF REINFORCING BARS NOT ALLOWED.

FOR CLEAR COVER REQUIREMENTS REFER TO TYPICAL DETAIL "MINIMUM COVER FOR REINFORCING STEEL".

REINFORCEMENT SUPPORTS

REINFORCEMENT SUPPORT SHALL BE PROVIDED TO MAINTAIN CLEAR DIMENSIONS SHOWN ON PLANS AND SHALL CONFORM TO ONE OF THE FOLLOWING SUPPORT TYPES: WIRE, COATED WIRE, PRECAST CONCRETE, PLASTIC.

REINFORCEMENT SUPPORT SHALL COMPLY WITH ACI 301.

LAP SPLICING

UNLESS NOTED OTHERWISE TACK WELDING OF REINFORCING BARS NOT ALLOWED.

FOR LAP LENGTH REQUIREMENTS REFER TO TYPICAL DETAIL "LAP LENGTH SCHEDULE".

MECHANICAL SPLICE COUPLERS

MECHANICAL SPLICE COUPLERS SHALL HAVE CURRENT ICC-ES APPROVAL AND SHALL BE CAPABLE OF DEVELOPING 125% OF THE STRENGTH OF THE BAR.

WELDING

WELDING OF REINFORCING BARS, METAL INSERTS, AND CONNECTIONS SHALL CONFORM TO AWS D1.4. BENDING SHALL BE MADE ONLY AT LOCATIONS SHOWN ON PLANS OR DETAILS. ALL REINFORCING SHALL BE BENT COLD. BARS SHALL NOT BE UNBENT AND REBENT. #5 BAR AND SMALLER MAY BE COLD FIELD BENT. #6 BAR AND LARGER SHALL NOT BE FIELD BENT WITHOUT PRIOR APPROVAL FROM ENGINEER.

BENDING

BENDING SHALL BE MADE ONLY AT LOCATIONS SHOWN ON PLANS OR DETAILS. ALL REINFORCING SHALL BE BENT COLD. BARS SHALL NOT BE UNBENT AND REBENT. #5 BAR AND SMALLER MAY BE COLD FIELD BENT. #6 BAR AND LARGER SHALL NOT BE FIELD BENT WITHOUT PRIOR APPROVAL FROM ENGINEER.

PLACE AND DETAIL

ALL BARS SHALL BE DETAILED AND PLACED PER CRSI SPECIFICATIONS AND HANDBOOK. DOWEL ALL VERTICAL REINFORCING TO FOUNDATION. SECURELY TIE ALL BARS IN LOCATION BEFORE PLACING CONCRETE.

INSTALLATION

INSTALL THE ANCHORS LISTED IN THIS SECTION IN ACCORDANCE WITH THE CURRENT ICC-ES OR IAPMO-UES REPORT AND MANUFACTURER'S RECOMMENDATIONS.

ADHESIVE ANCHORS

ADHESIVE-ANCHORED THREADED RODS AND REBAR SHALL BE INSTALLED USING ONE OF THE FOLLOWING ADHESIVE ANCHOR SYSTEMS:

FOR CONCRETE: HILTI HIT-RE 500-V3 (ICC ESR-3814), OR SIMPSON STRONG-TIE SET-XP (ICC ESR-2508), OR SIMPSON STRONG-TIE AT-XP (IAPMO ER-263), OR HILTI HIT-HY 200 (ICC ESR-3187) UNO ON DETAILS.

FOR GROUTED MASONRY: HILTI HIT-HY 70 (ICC ESR-2682), OR SIMPSON STRONG-TIE SET-XP (IAPMO ER-265), OR SIMPSON STRONG-TIE AT-XP (IAPMO ER-281)

ADHESIVE ANCHORS SHALL BE INSTALLED BY QUALIFIED PERSONNEL TRAINED TO INSTALL ANCHORS IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND THE MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS. INSTALLATION OF ADHESIVE ANCHORS HORIZONTALLY OR UPWARDLY INCLINED TO SUPPORT SUSTAINED TENSION LOADS SHALL BE PERFORMED BY PERSONNEL CERTIFIED BY ACI/CRSI ADHESIVE ANCHOR INSTALLER CERTIFICATION PROGRAM OR EQUIVALENT. INSTALLER'S CERTIFICATION SHALL BE COMPLETED PRIOR TO ANCHOR INSTALLATION.

MINIMUM AGE OF CONCRETE SHALL BE 21 DAYS PRIOR TO INSTALLATION AND LOADING OF ADHESIVE ANCHORAGE

ALTERNATE

ALTERNATE ANCHOR SYSTEMS WITH CURRENT ICC-ES OR IAPMO-UES REPORT MAY BE USED WITH PRIOR WRITTEN APPROVAL BY ENGINEER.

SPECIAL INSPECTIONS

A SPECIAL INSPECTOR SHALL BE PROVIDED TO OBSERVE WORK FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS. THE INSPECTOR SHALL SUBMIT A SIGNED STATEMENT TO THE OWNER, CONTRACTOR, AND ENGINEER INDICATING THE SPECIAL INSPECTION WORK WAS IN COMPLIANCE WITH THE PLANS AND SPECIFICATIONS. INSPECTIONS SHALL BE PERFORMED BY AN ICC CERTIFIED INSPECTOR APPROVED BY CLARK COUNTY, EMPLOYED BY OWNER/DEVELOPER.

SPECIAL INSPECTIONS SHALL BE PROVIDED FOR THE FOLLOWING WORK:

- BACKFILL (PERIODIC)
- REINFORCEMENT (PERIODIC)
- SHOTCRETE PLACEMENT AND STRENGTH (CONTINUOUS)
- CONCRETE PLACEMENT AND STRENGTH (CONTINUOUS)
- ADHESIVE ANCHORING (PERIODIC)

SPECIAL INSPECTION OF THE FILL AROUND THE STRUCTURE SHALL BE PROVIDED AT A FREQUENCY AS NECESSARY TO ENSURE THAT PROPER FILL AND COMPACTION IS ACHIEVED. COMPACTION TESTS FOR EACH LIFT SHALL BE TAKEN FOR EVERY 2500 SQUARE FEET PLACED AS A MINIMUM. COMPACTION TESTS FOR EACH LIFT SHALL BE TAKEN PER CCADSD 203.05.02. THE SPECIAL INSPECTOR SHALL SUBMIT A COMPLIANCE REPORT TO THE OWNER, CONTRACTOR, AND ENGINEERING SYSTEM SOLUTIONS DOCUMENTING FILL TYPE AND PROCUDURES OF PLACEMENT.

DEFERRED SUBMITTALS

PREFABRICATED OR SPECIALTY ITEMS AND THEIR COMPONENTS, WHICH ARE INDICATED BY THE STRUCTURAL DRAWINGS TO BE DESIGNED BY OTHERS, MAY BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AS A DEFERRED SUBMITTAL PROVIDED THAT SUCH SUBMITTAL IS AUTHORIZED BY THE AUTHORITY HAVING JURISDICTION. DEFERRED SUBMITTALS REQUIRED TO BE SUBMITTED TO THE STRUCTURAL ENGINEER OF RECORD SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING:

- CONCRETE MIX DESIGN
- REBAR PLACEMENT SHOP DRAWINGS

PREPARATION

ALL DEFERRED SUBMITTALS SHALL INCLUDE CALCULATIONS AND DRAWINGS PREPARED IN ACCORDANCE WITH ALL APPLICABLE DESIGN CODES AND STAMPED BY AN APPROPRIATELY LICENSED PROFESSIONAL ENGINEER. SUBMITTALS SHALL SHOW LOCATION AND MAGNITUDE OF LOADS, SIZE AND CONFIGURATIONS OF MEMBERS, AND COMPATIBILITY WITH THE PRIMARY STRUCTURAL SYSTEM.

REVIEW

DEFERRED SUBMITTAL ITEMS SHALL BE REVIEWED IN ACCORDANCE WITH STANDARD SHOP DRAWING REVIEW PROCEDURES AS DESCRIBED IN THE GENERAL REQUIREMENTS SECTION OF THE GENERAL STRUCTURAL NOTES.

STANDARD ABBREVIATIONS

CL CENTERLINE

(E) EXISTING

AB ANCHOR BOLT

ADDL ADDITIONAL

ALT ALTERNATE

ARCH ARCHITECTURAL

ASD ALLOWABLE STRESS DESIGN

BLDG BUILDING

BLKG BLOCKING

BN BOUNDARY NAILING OR FASTENERS

BO BOTTOM OF

BOT BOTTOM

CLR CLEAR

CMU CONCRETE MASONRY UNIT

COL COLUMN

CONC CONCRETE

CONT CONTINUOUS

DBA DEFORMED BAR ANCHOR

DBL DOUBLE

DIA OR Ø DIAMETER

DIAG DIAGONAL

DIM DIMENSION

DWG DRAWING

EA EACH

ELEV ELEVATION

EN EDGE NAILING

EQ EQUAL

EQUIP EQUIPMENT

EW EACH WAY

FDN FOUNDATION

FF FINISH FLOOR

FLR FLOOR

FN FIELD NAILING

FT FOOT

FTG FOOTING

GA GAUGE

GALV GALVANIZED

GSN GENERAL STRUCTURAL NOTES

GT GIRDER TRUSS

HI HIGH

HORIZ HORIZONTAL

HSS HOLLOW STRUCTURAL SHAPE

HT HEIGHT

K KIP (1,000 LBS)

KLF KIPS PER LINEAR FOOT

KSF KIPS PER SQUARE FOOT

KSI KIPS PER SQUARE INCH

LLH LONG LEG HORIZONTAL

LLV LONG LEG VERTICAL

LO LOW

LONG LONGITUDINAL

LRFD LOAD AND RESISTANCE FACTOR DESIGN

LT LIGHT

MAX MAXIMUM

MECH MECHANICAL

MFD MANUFACTURED

MFR MANUFACTURER

MIN MINIMUM

MISC MISCELLANEOUS

NTS NOT TO SCALE

O.C. ON CENTER

OPP OPPOSITE HAND

PL PLATE

PLF POUNDS PER LINEAR FOOT

PREFAB PREFABRICATION

PRELIM PRELIMINARY

PSF POUNDS PER SQUARE FOOT

PSI POUNDS PER SQUARE INCH

PT PRESSURE TREATED

REINF REINFORCING

RECD REQUIRED

RME ROOF MOUNTED EQUIPMENT

SCHED SCHEDULE

SIM SIMILAR

SM5 SHEET METAL SCREW

SPEC SPECIFICATION

STD STANDARD

T&B TOP AND BOTTOM

T&G TONGUE AND GROOVE

T.O. TOP OF

TRANS TRANSVERSE

TYP TYPICAL

UNO UNLESS NOTED OTHERWISE

VERT VERTICAL

VIF VERIFY IN FIELD

W/ WITH

W/O WITHOUT

WT WEIGHT

WWF WELDED WIRE FABRIC

SHEET INDEX

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S3.12	HEADWALL ELEVATIONS	
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S4.11	HEADWALL SECTIONS	

DISCLAIMER

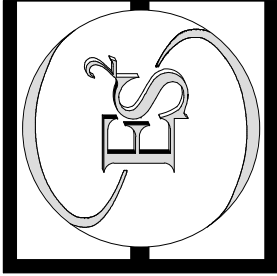
EXISTING CONDITIONS SHOWN IN THESE CONSTRUCTION DOCUMENTS ARE BASED ON DRAWINGS AND/OR INFORMATION PROVIDED TO ES2 BY THE OWNER OR THE OWNER'S DULY AUTHORIZED REPRESENTATIVE. ES2 HAS NOT FIELD VERIFIED THE EXISTING CONDITIONS INFORMATION AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS OF THIS INFORMATION. THE GENERAL CONTRACTOR SHALL NOTIFY ES2 AND THE OWNER IMMEDIATELY IF EXISTING CONDITIONS ARE NOT AS SHOWN ON THE CONSTRUCTION DOCUMENTS.

ENGINEERING SYSTEM SOLUTIONS

STRUCTURAL • MEP • BUILDING COMMISSIONING

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BUILDING RELATIONSHIPS EXCEEDING EXPECTATIONS



SKYE CANYON II PHASE 3A

HYDRO-ARCH

HENDERSON, NV

GENERAL STRUCTURAL NOTES

PROJECT:

ISSUE:

SUBMIT FOR PERMIT 07/26/2018

REVISIONS:

DESCRIPTION DATE

DRAWN:

PF

CHECKED:

GM

PROJECT NUMBER:

18.2620

SHEET NUMBER:

S0.00



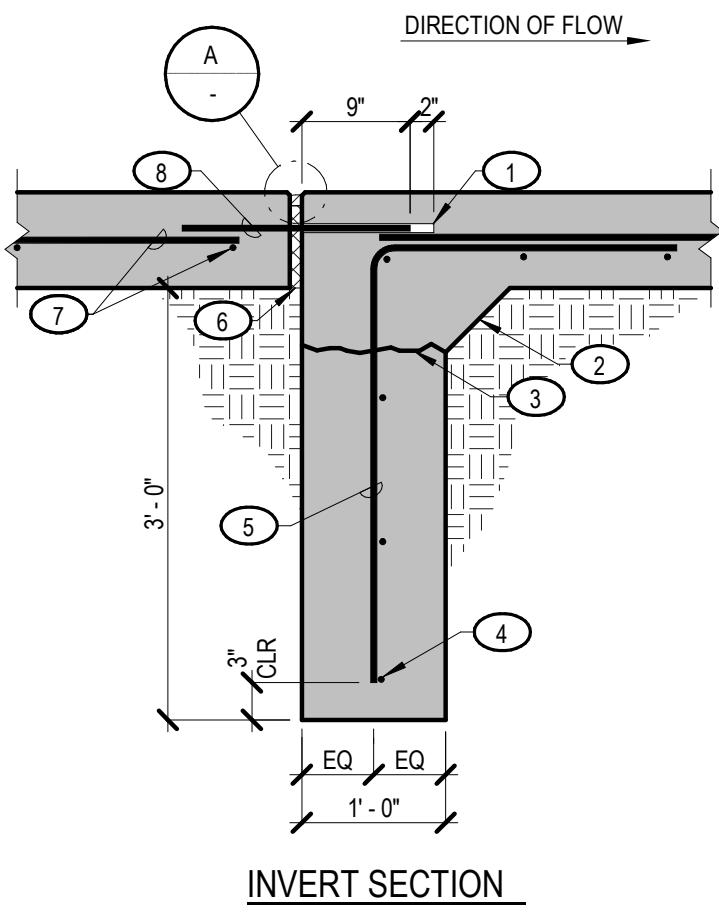
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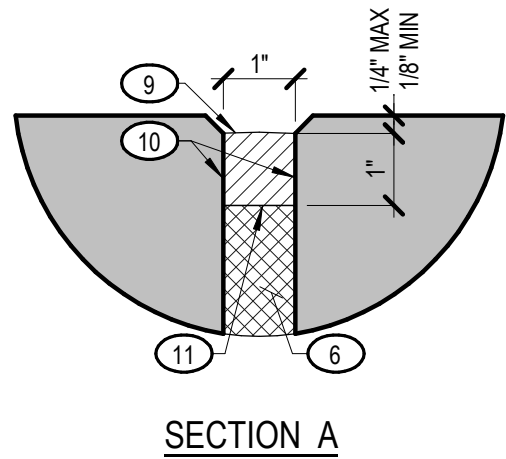
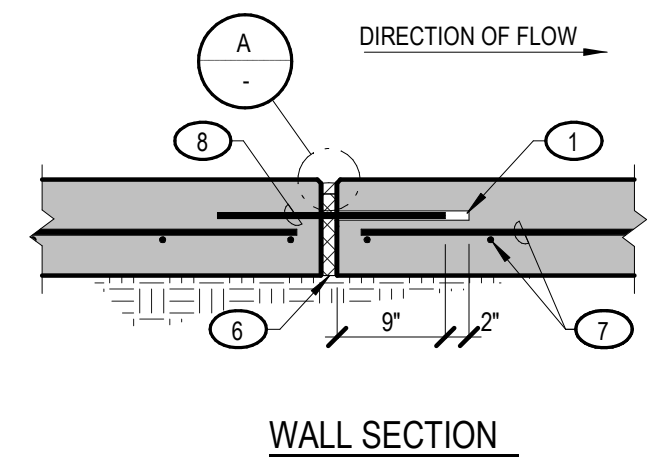
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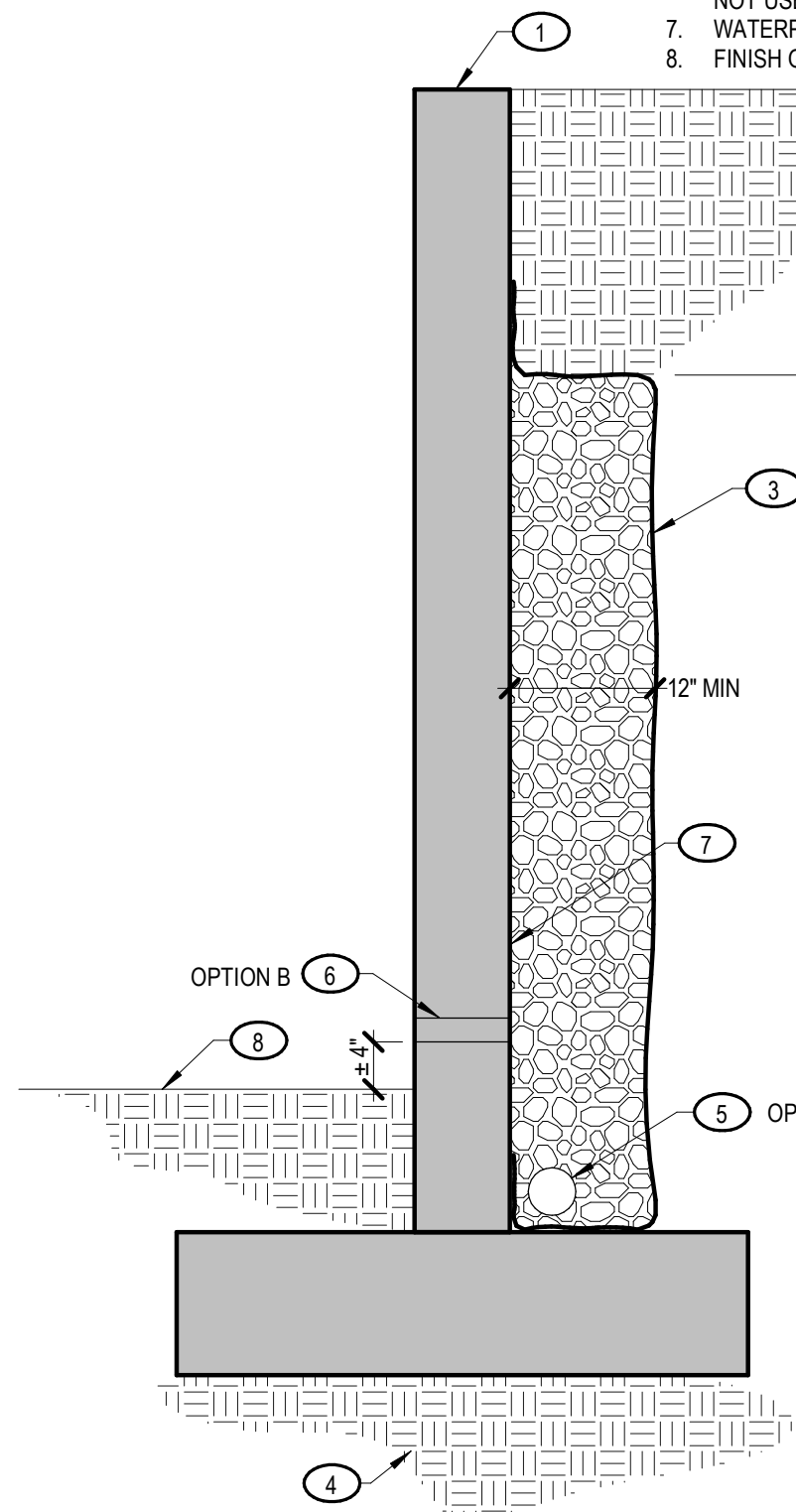
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- KEYNOTES:**
- 5/8"Ø ID PLASTIC SLEEVE MFD BY SPEED DOWEL OR APPROVED EQ
 - CHAMFER
 - CONSTRUCTION JOINT AT CONTRACTOR'S OPTION
 - #4 HORIZ AT 12" O.C. CONT
 - #4 BENT DOWEL TO LAP AND MATCH SLAB REINF
 - PREFORMED SPONGE RUBBER
 - REINF PER DETAILS
 - 5/8"ØX19" SMOOTH EPOXY COATED DOWELS AT 12" O.C. ALIGN ALL DOWELS TO BE SQUARE W/ JOINT FACE. HORIZ AND VERT DOWEL ALIGNMENT TO BE CHECKED BEFORE CONC IS PLACED
 - 1" DEEP PHYTYTE 380 COMPRESSION SEAL MFD BY E-POXY ENGINEERED MATERIALS LLC OR APPROVED EQ. THE WIDTH OF THE SEAL SHALL BE 25% GREATER THAN THE WIDTH OF THE JOINT AT THE TIME OF INSTALLATION. MEASURE WIDTH OF JOINT AFTER INITIAL SHRINKAGE AND THERMAL MOVEMENT HAS OCCURED. ORDER SEALER MATERIAL WIDTH PLUS 25% AND INSTALL INTO JOINT AS SOON AS POSSIBLE AFTER DELIVERY TO JOB SITE. BRUSH BLAST ALL SURFACES IN DIRECT CONTACT W/ JOINT SEAL. BLOW DEBRIS FROM THE JOINT SURFACES W/ OIL FREE COMPRESSED AIR. ALL JOINTS IN THE COMPRESSION SEAL SHALL BE HEAT WELDED
 - EVA-POX BONDER #1 OR APPROVED EQ APPLIED TO BOTH SURFACES OF THE COMPRESSION SEAL AND BOTH CONC SURFACES. BONDER SHALL FILL THE GROOVES ON THE COMPRESSION SEAL
 - BOND BREAKER TAPE



11 TYPICAL EXPANSION JOINT IN CHANNEL INVERT AND WALL
S1.10 TCV132

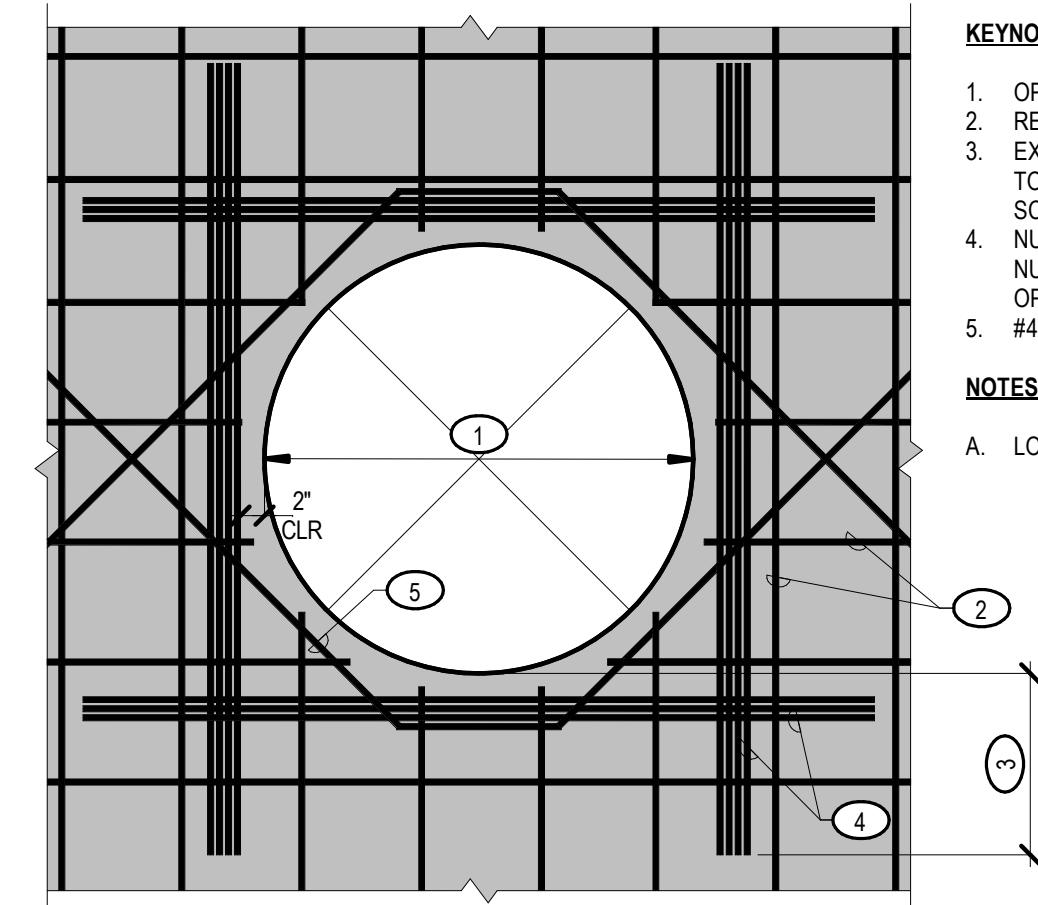


- NOTES:**
- CONTRACTOR SHALL CONSULT GEOTECH REPORT PRIOR TO SELECTING OPTION A OR OPTION B FOR WALL DRAIN SYSTEM
 - BACKFILL DETAIL IS A MIN. ADDL REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT SHALL BE FOLLOWED WHEN A REPORT IS PROVIDED
 - MFD ALTERNATIVES TO A FREE-DRAINING ROCK SYSTEM SHALL BE REVIEWED AND PRE-APPROVED BY GEOTECHNICAL ENGINEER

- KEYNOTES:**
- RETAINING WALL PER PLAN
 - TERMINATE FREE-DRAINING BACKFILL W/ LAYER OF COMPACTED, IMPERVIOUS FILL
 - FREE-DRAINING UNIFORMLY-GRADED BACKFILL SHALL BE 3/4" TO 1 1/2" CLEAN CRUSHED ROCK WRAPPED IN FILTER FABRIC
 - COMPACTED SUBGRADE PER GSN
 - OPTION A: 4" Ø PERFORATED PIPE DRAIN SYSTEM. CONTRACTOR SHALL ENSURE THAT PIPE DAYLIGHTS OR TERMINATES AT SUMP PIT
 - OPTION B: PROVIDE 2"Ø WEEP HOLE AT 8'-0" O.C. W/ FILTER FABRIC WHERE PERFORATED PIPE IS NOT USED
 - WATERPROOF BACK OF WALL
 - FINISH GRADE

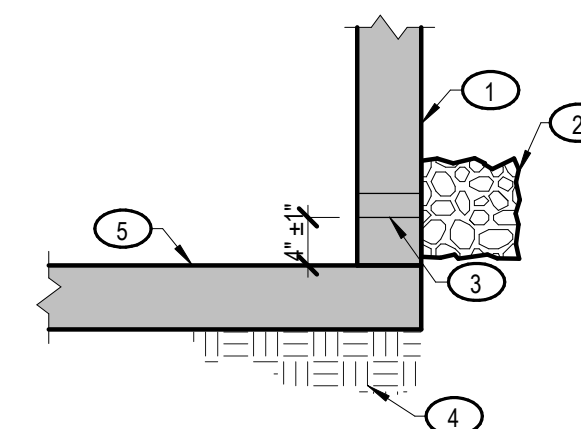
9 TYPICAL RETAINING WALL BACKFILL AND DRAINAGE
S1.10 TDC405

5 TYPICAL CONCRETE FOOTING REINFORCING AT INTERSECTIONS
S1.10 TDC106



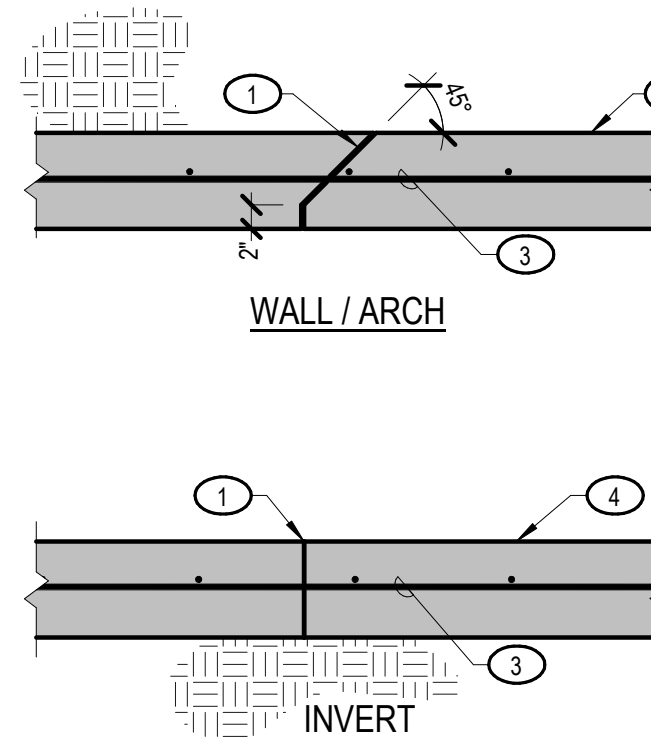
- KEYNOTES:**
- OPENING DIA 4'-0" MAX UNO
 - REINF PER PLAN
 - EXTEND BARS PAST EDGE OF OPENING EQ TO LAP LENGTH OF BAR UNO, SEE LAP SCHED
 - NUMBER OF ADDED BARS EQ TO THE NUMBER OF BARS INTERRUPTED BY OPENING
 - #4 DIAG BARS AROUND OPENING AS SHOWN
- NOTES:**
- LOCATION AS SHOWN PER CIVIL

6 TYPICAL REINFORCING AT OPENING
S1.10 TCV109



- KEYNOTES:**
- CONC WALL PER PLAN
 - (2) CUBIC FT OF FREE DRAIN MATERIAL WRAPPED IN FILTER FABRIC AT EA WEEP HOLE
 - 2"Ø WEEP HOLE EA SIDE OF STRUCTURE, LOCATE PER PLAN
 - SUBGRADE PREPARATION PER TYP DETAIL
 - STRUCTURE INVERT AS OCCURS

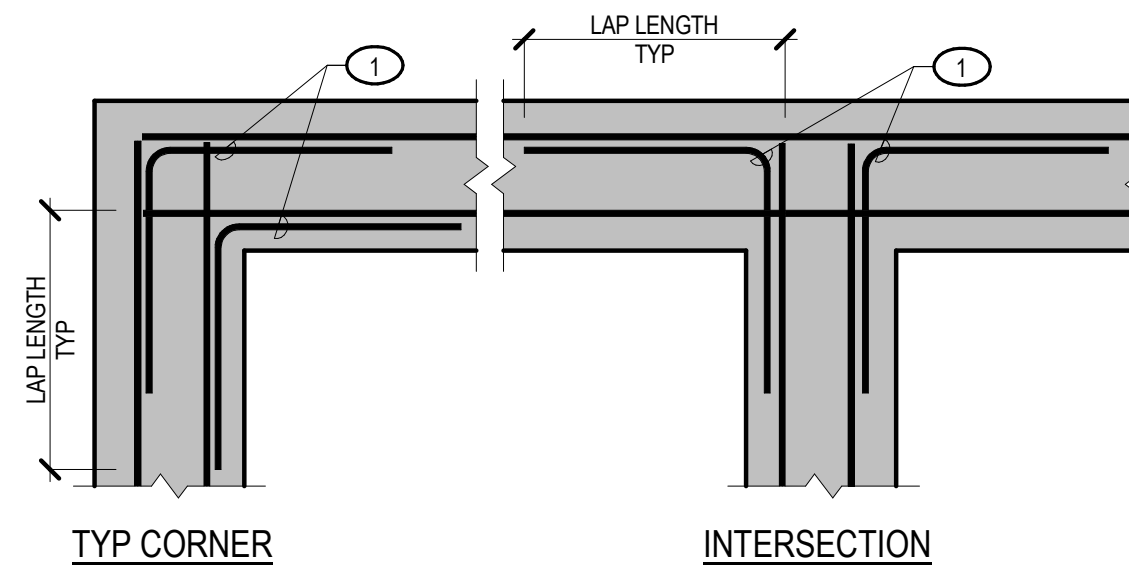
7 TYPICAL WEEP HOLE DRAIN REQUIREMENTS
S1.10 TCV101



- KEYNOTES:**
- CONSTRUCTION JOINT
 - CONC WALL OR ARCH PER PLAN
 - REINF TO EXTEND THROUGH JOINT PER PLAN
 - INVERT PER CIVIL

8 TYPICAL CONSTRUCTION JOINT IN ARCH WALL OR INVERT
S1.10 TCV102

- KEYNOTES:**
- PROVIDE CORNER DOWEL TO MATCH FTG LONG REINF (LAP PER GSN)

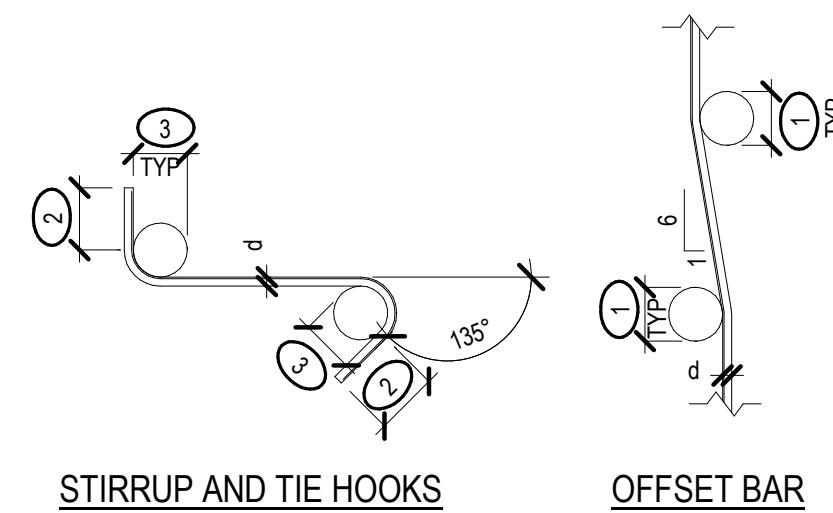


REBAR LAP LENGTH SCHEDULE NORMAL-WEIGHT CONCRETE (145 PCF)							
BAR	MIN CLR COVER	MIN BAR SPACING	F _c >= 2500 PSI		F _c >= 4000 PSI		OTHER
			TOP *	OTHER	TOP *	OTHER	
#3	1.5	4.5	20	16	16	14	
#4	1.5	4.0	26	20	20	16	
#5	1.5	3.8	32	24	26	20	
#6	2.0	3.0	46	36	38	28	
#7	2.0	3.5	68	52	54	42	
#8	2.0	3.0	102	78	82	62	
#9	2.0	3.4	116	88	92	70	
#10	2.0	3.8	130	100	102	80	
#11	2.0	4.2	144	110	114	88	

1 CONCRETE REBAR LAP SCHEDULE
S1.10 TDC101

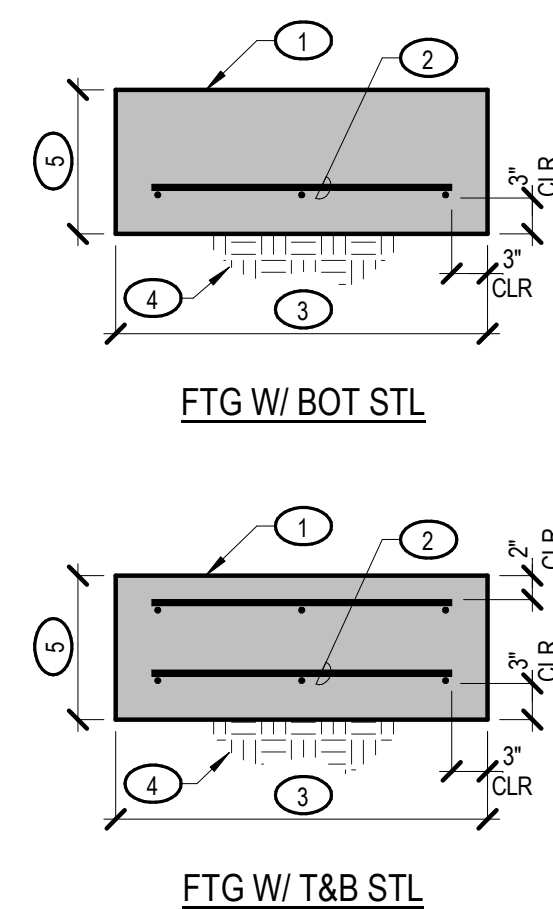
MINIMUM REINFORCING COVER		
STRUCTURAL ELEMENT	COVER	TOLERANCE
FOOTING AND SLAB ON GRADE	3"	3/8"
WALLS (#5 OR SMALLER)	1 1/2"	3/8"
WALLS (#6 OR LARGER)	2"	1/2"
BEAMS AND COLUMNS	1 1/2"	3/8"
ELEVATED SLABS	3/4"	3/8"

2 MINIMUM COVER FOR REINFORCING STEEL
S1.10 TDC102



- KEYNOTES:**
- MIN FINISHED BEND DIA: 6d FOR #3 THRU #8; 8d FOR #9, #10 AND #11; 10d FOR #14 AND #18
 - EXTENSION FOR STIRRUPS AND TIES ONLY: 90°: 6d FOR #5 AND SMALLER, 12d FOR #6 THRU #8 (3" MIN); 135°: 6d (3" MIN); 180°: 4d (2 1/2" MIN)
 - MIN FINISHED BEND DIA FOR STIRRUPS AND TIES ONLY: 4d FOR #5 AND SMALLER; 6d FOR #6 THRU #8
- NOTES:**
- d = BAR DIA
 - ALL REINF SHALL BE BENT COLD UNO ON PLANS OR DETAILS
 - REINF SHALL NOT BE UN-BENT OR RE-BENT UNO

3 STANDARD REBAR BENDING DETAILS
S1.10 TDC103



- KEYNOTES:**
- CONSTRUCTION ABOVE FOOTING PER PLAN AND FTG DETAILS
 - FTG REINF
 - FTG WIDTH AND/OR LENGTH PER FTG SCHED
 - COMPACTED SUBGRADE PER GSN
 - FTG THICKNESS PER FTG SCHED

4 TYPICAL FOOTING
S1.10 TDC104

10 SECTION AT DROP INLET
S1.10 D103

MODIFIED TYPE CM-2 WALL TABLE				
D (MAX)	"W"	"A" BARS	"B" BARS	"C" BARS - SOIL FACE
10' - 0" AND LESS	SEE CCUSD DWG NO. 412.1			
12' - 0"	10"	#5 VERTS AT 7" O.C.	#4 HORIZ AT 10" O.C.	NONE
14' - 0"	10"	#5 VERTS AT 4" O.C.	#4 HORIZ AT 10" O.C.	NONE
16' - 0"	12"	#5 VERTS AT 4" O.C.	#4 HORIZ AT 16" O.C.	#4 VERTS AT 16" O.C. #4 HORIZ AT 16" O.C.
18' - 6"	14"	#6 VERTS AT 5" O.C.	#5 HORIZ AT 18" O.C.	#5 VERTS AT 18" O.C. #5 HORIZ AT 18" O.C.

- NOTES:**
- END WALL CONSTRUCTION SHALL MATCH WALL CONSTRUCTION SHOWN
 - ALL EXPOSED STEEL SHALL BE HOT-DIPPED GALV. ANY GALVANIZING DAMAGED DURING CONSTRUCTION SHALL BE PAINTED W/ (2) COATS OF ALUMINUM PAINT (GALVANOX OR APPROVED EQ)
 - * DIMS SHOWN ARE BASED UPON THE CIVIL DWGS. CONTRACTOR TO VERIFY PRIOR TO CONSTRUCTION
 - ACTUAL DEPTH OF DROP INLET TO BE VERIFIED W/ CIVIL PLANS PRIOR TO CONSTRUCTION

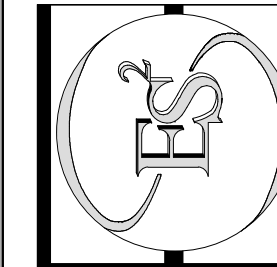
- DESIGN CRITERIA:**
- DESIGN FOR 2012 IBC AND 2008 AASHTO STD SPECIFICATIONS
 - SOIL DENSITY = 136 PCF
 - AT REST SOIL PRESSURE = 65 PCF



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SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

TYPICAL DETAILS

PROJECT:

ISSUE:
SUBMIT FOR PERMIT 07/26/2018

REVISIONS:
DESCRIPTION DATE

DRAWN: PF CHECKED: GM

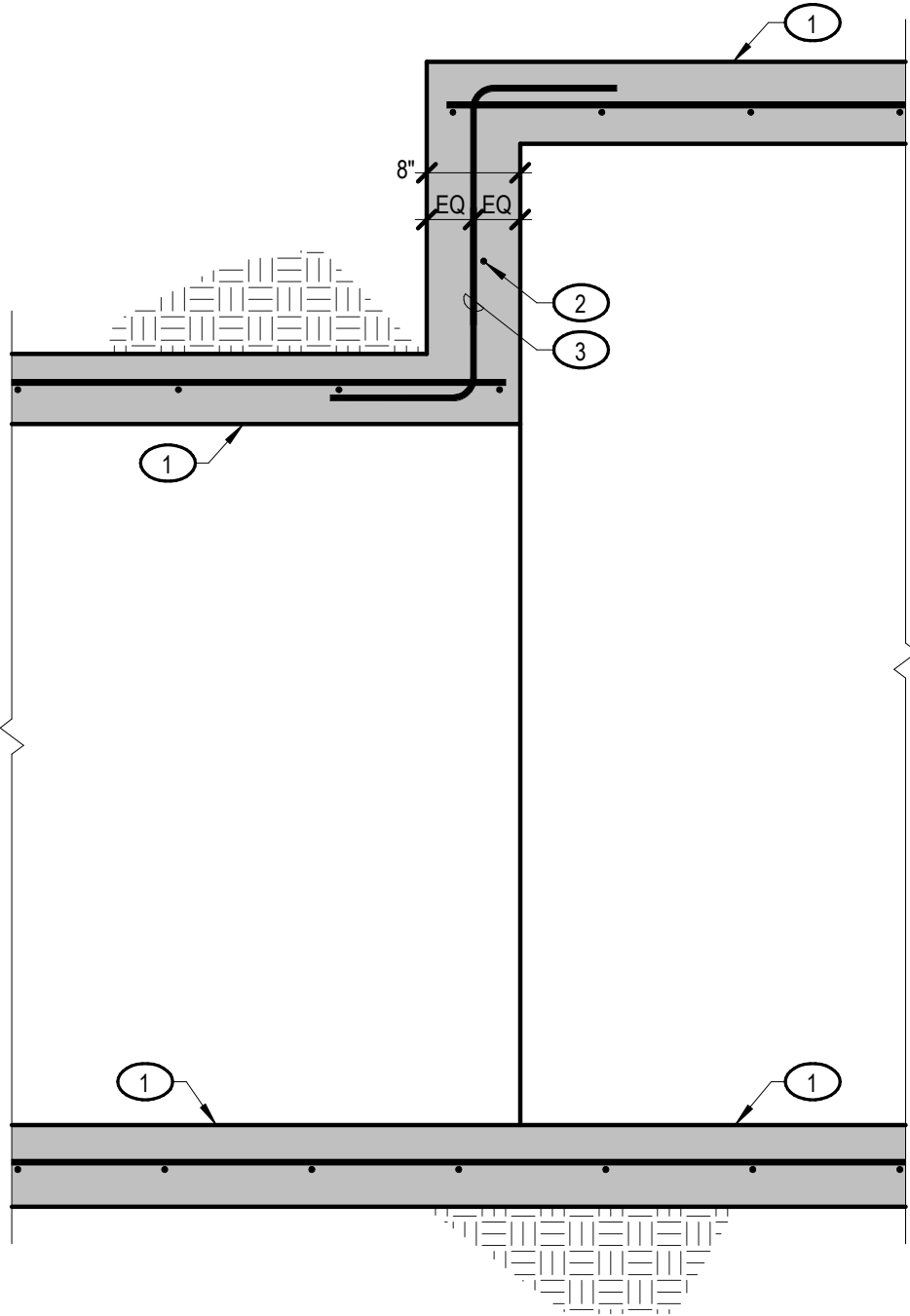
PROJECT NUMBER: 18.2620
SHEET NUMBER:

S1.10

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KEYNOTES:

1. ARCH PER PLAN AND DETAILS
2. #4 HORIZ AT 12" O.C.
3. #4 VERT DOWEL W/ 12" HOOK T&B AT 12" O.C.



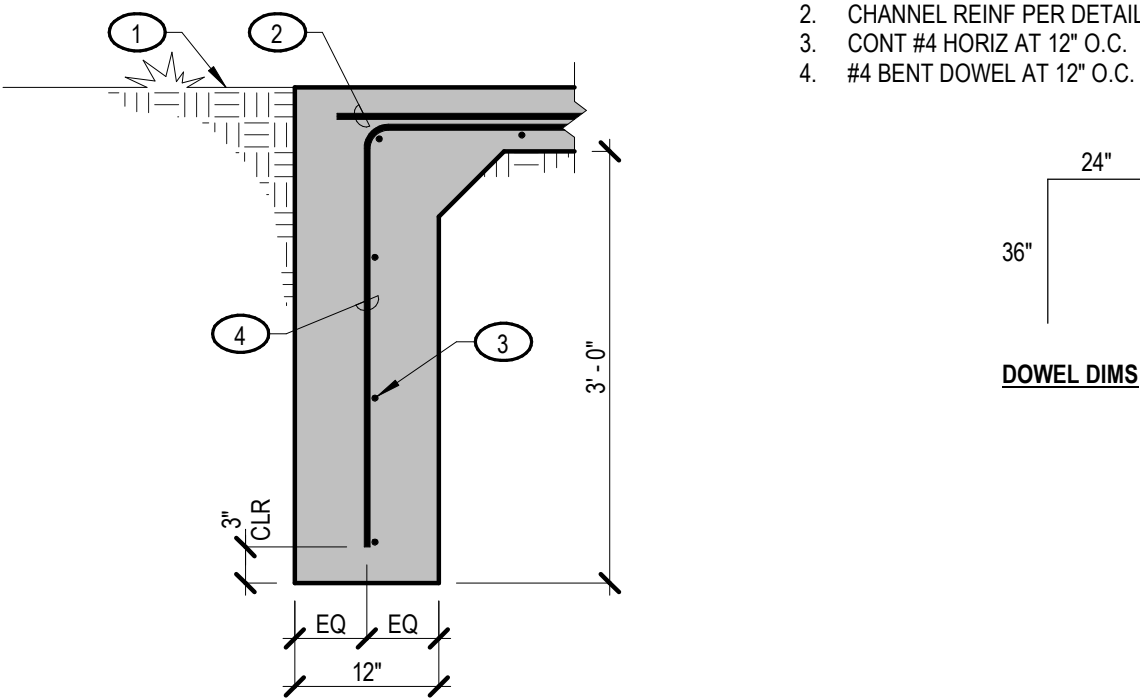
ARCH TO ARCH TRANSITION

S1.11

RCA231

KEYNOTES:

1. LOWEST ADJACENT FINAL COMPACTED SUBGRADE
2. CHANNEL REINF PER DETAIL
3. CONT #4 HORIZ AT 12" O.C.
4. #4 BENT DOWEL AT 12" O.C.



SECTION

S1.11

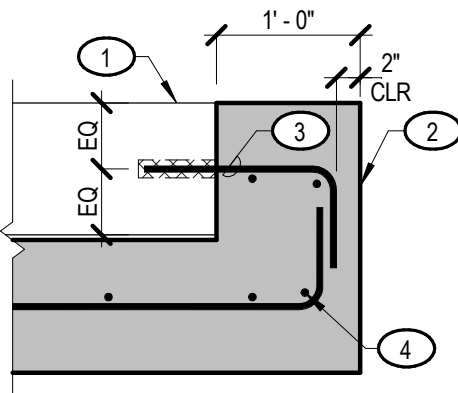
OOD4R

KEYNOTES:

1. SIDEWALL OF PRECAST RCB PER PLAN
2. CONC ENCLOSURE CAP, FULL HT OF RCB'S
3. #4 DOWELS AT 18" O.C. W/ STD HOOK, DRILL AND EPOXY INTO PRECAST RCB 6" MIN EMBED
4. (4) #5 VERT BARS W/ STD HOOK T&B

NOTES:

- A. EPOXY INSTALLATION PER MFR RECOMMENDATIONS AND SPECS. SPECIAL INSPECTION REQ'D



TYPICAL PRECAST WALL END CAP - PLAN VIEW

S1.11

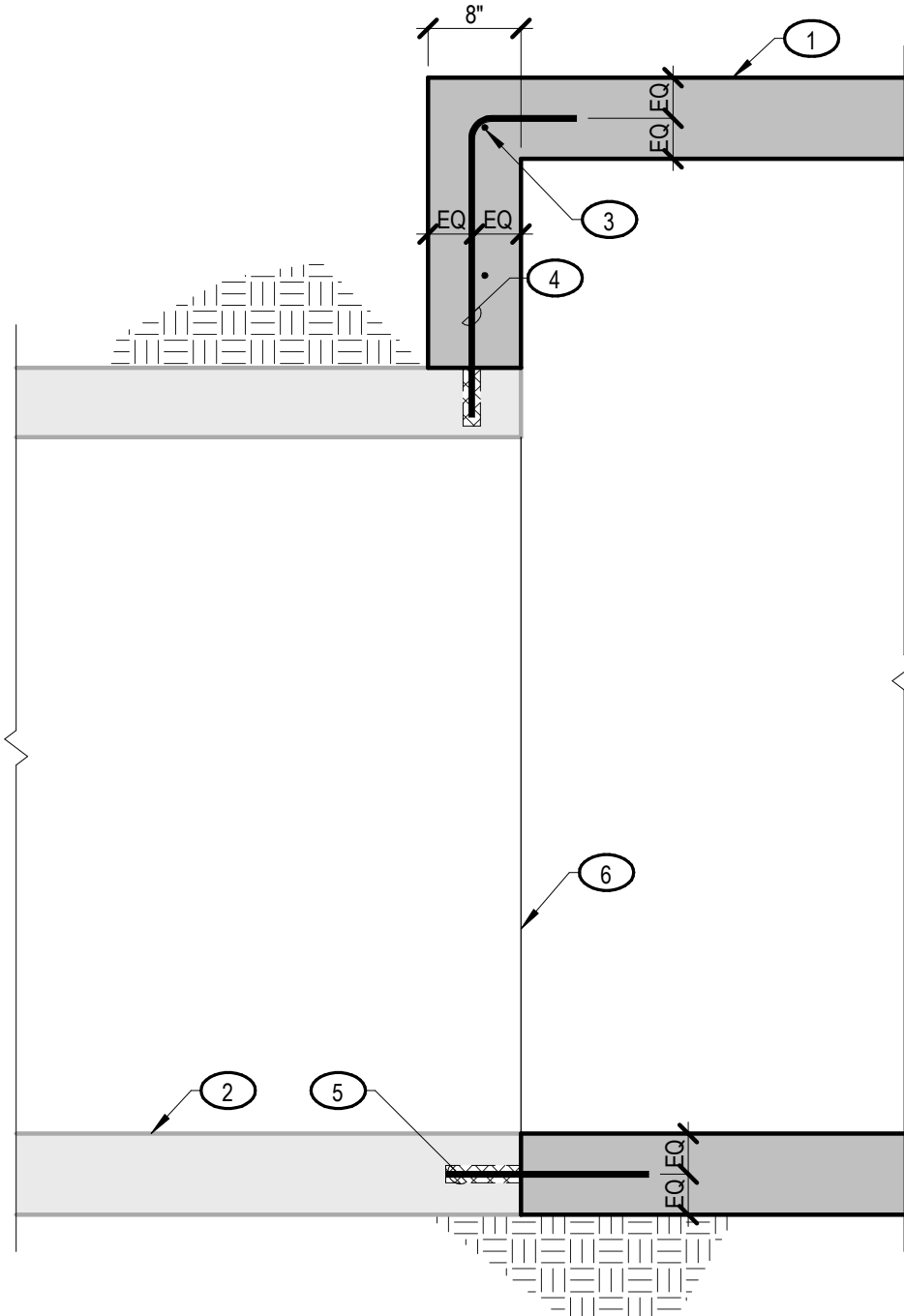
TOV111

NOTES:

- A. EPOXY CONSTRUCTION PER MFR RECOMMENDATIONS AND SPECIFICATIONS. SPECIAL INSPECTION REQ'D.
- B. REINF AT ARCH NOT SHOWN FOR CLARITY. SEE APPROPRIATE DETAILS

KEYNOTES:

1. ARCH PER PLAN AND DETAILS
2. (E) RCB
3. #4 HORIZ AT 12" O.C.
4. #4 VERT DOWEL W/ STD HOOK AT 12" O.C. DRILL AND EPOXY INTO (E) RCB. 4" MIN EMBED
5. #4x30" DOWEL AT 12" O.C. DRILL AND EPOXY INTO END OF (E) RCB AROUND ENTIRE PERIMETER. 4" MIN EMBED
6. END OF ARCH PER PLAN



NEW ARCH CONNECTION TO EXISTING RCB

S1.11

RCA222

EQUIPMENT OVER ARCH CULVERT:

BEFORE MIN DESIGN COVER IN PLACE:
NO EQUIPMENT SHALL BE PERMITTED TO PASS OVER THE ARCH CULVERT UNTIL BACKFILL MATERIAL ALONG BOTH SIDES OF THE ARCH CULVERT HAS BEEN PROPERLY PLACED UP TO 80% OF THE OVERALL ARCH HEIGHT.

EQUIPMENT WEIGHING LESS THAN OR EQUAL TO AN EMPTY 3 CU. YARD RUBBER TIRE LOADER (928 CATERPILLAR OR EQUIVALENT (13,000 LB AXLES SPACED 9'-6" MIN APART)) MAY PASS OVER THE ARCH PRIOR TO THE MINIMUM DESIGN SOIL COVER OVER THE ARCH BEING PLACED.

AFTER MIN DESIGN COVER IN PLACE:
AFTER THE MINIMUM DESIGN SOIL COVER OVER THE ARCH CULVERT HAS BEEN PROPERLY PLACED, EQUIPMENT MAY BE ALLOWED TO PASS OVER THE ARCH, PROVIDED THE EQUIPMENT DOES NOT EXCEED AASHTO HS-20 VEHICLE LOADING.

VEHICLES AND EQUIPMENT EXCEEDING THE AASHTO HS-20 LOADING (32,000 LB AXLES SPACED 14' MIN APART) SHALL NOT BE ALLOWED TO PASS OVER THE ARCH CULVERT WITHOUT PRIOR WRITTEN CONSENT FROM THE ENGINEER.

TYPICAL EQUIPMENT OVER ARCH CULVERT

S1.11

TOV123

NOTES:

- A. PLACEMENT OF THE FILL AT THE STEM WALLS AND OVER THE CULVERT MAY BEGIN WHEN THE CONC STRENGTH HAS REACHED 80% OF THE REQ'D COMPRESSIVE STRENGTH. FILL SHALL BE PLACED IN 8" MAX VERT LIFTS AND COMPACTED TO 95% OF DRY DENSITY PER ASTM D1557 (MODIFIED PROCTOR). LIFTS SHALL BE PLACED SYMMETRICALLY EA SIDE ALONG THE FULL LENGTH OF CULVERT W/ A MAX BACKFILL LIFT HT DIFFERENTIAL OF 1'-0". MAX DRY DENSITY SHALL BE DETERMINED PER TEST METHOD AASHTO T310 OR PER THE GEOTECHNICAL REPORT
- B. CONTRACTOR SHALL CONSULT GEOTECHNICAL REPORT PRIOR TO COMMENCING BACKFILL
- C. SHOTCRETE REBOUND MAY BE USED AS BACKFILL

STRUCTURAL FILL BACKFILL GRADATION REQUIREMENTS	
SIEVE SIZES	PERCENTAGE PASSING BY MASS
75 MM (3 IN.)	100
4.75 MM (NO. 4)	35-85
1200 µM (NO.16)	25-75
75 µM (NO. 200)	5-15
NATIVE SOILS SHALL BE FREE OF CLAYS AND SILTS AND MEET A MIN SOIL CLASS OF SM OR SP PER THE UNIFIED CLASSIFICATION SYSTEM.	

STRUCTURAL FILL SOIL REQUIREMENTS		
TEST	TEST METHOD	REQUIREMENTS
SIEVE ANALYSIS	AASHTO T27	SEE TABLE
LIQUID LIMIT	AASHTO T89	35 MAX
PLASTICITY INDEX	AASHTO T90	SEE TABLE
TOTAL AVAILABLE WATER SOLUBLE SULFATES	AWWA 4550E	LESS THAN 0.3% BY DRY SOIL WT

STRUCTURAL FILL PLASTIC LIMITS	
PERCENTAGE BY WEIGHT PASSING 200 SIEVE	PLASTICITY INDEX MAXIMUM
0.1 TO 3.0	15
3.1 TO 4.0	12
4.1 TO 5.0	9
5.1 TO 8.0	6
8.1 TO 11.0	4
11.1 TO 15.0	3

ZONE OF SUBGRADE PREPARATION	
DEPTH OF OVEREXCAVATION	PER GEOTECH REPORT
DEPTH OF SCARIFY AND RECOMPACTION	PER GEOTECH REPORT
DEPTH OF STRUCTURAL FILL	PER GEOTECH REPORT

KEYNOTES:

1. FINISHED GRADE
2. STRUCTURAL BACKFILL WITHIN THE ENVELOPE AS SHOWN SHALL CONSIST OF BACKFILL MEETING THE GRADATION REQUIREMENTS AND PLASTIC LIMIT AS SPECIFIED
- FOR FILL HT LESS THAN 2'-0", THE FINISH GRADE SHALL BE THE BOUNDARY LINE FOR THE BACKFILL ZONE
- GRANULAR BACKFILL SHALL CONSIST OF NATURAL SAND OR A MIXTURE OF SAND W/ GRAVEL, CRUSHED GRAVEL, OR CRUSHED STONE AND CONFORM TO GRADATION, SOIL, AND PLASTIC LIMIT REQUIREMENTS SPECIFIED IN THE TABLES
- DO NOT USE PEA GRAVEL AS GRANULAR BACKFILL. PEA GRAVEL IS TYPICALLY A BYPRODUCT OF AGGREGATE CRUSHING AND/OR SCREENING OPERATIONS. IT IS UNIFORMLY GRADED, NORMALLY HAVING A NOMINAL SIZE OF 9.5 MM (3/8 IN.)
3. STRUCTURAL BACKFILL WITHIN 2'-0" OF ARCH OR STEM WALLS SHALL CONSIST OF WELL GRADED 3" MINUS GRANULAR MATERIAL OF A MIN SOIL CLASSIFICATION OF SM OR SP PER THE UNIFIED CLASSIFICATION SYSTEM. ASTM D-2487 PROPERLY COMPACTED TO 95% DRY DENSITY
4. ZONE OF SUBGRADE PREPARATION PER TABLE:

OVEREXCAVATION:

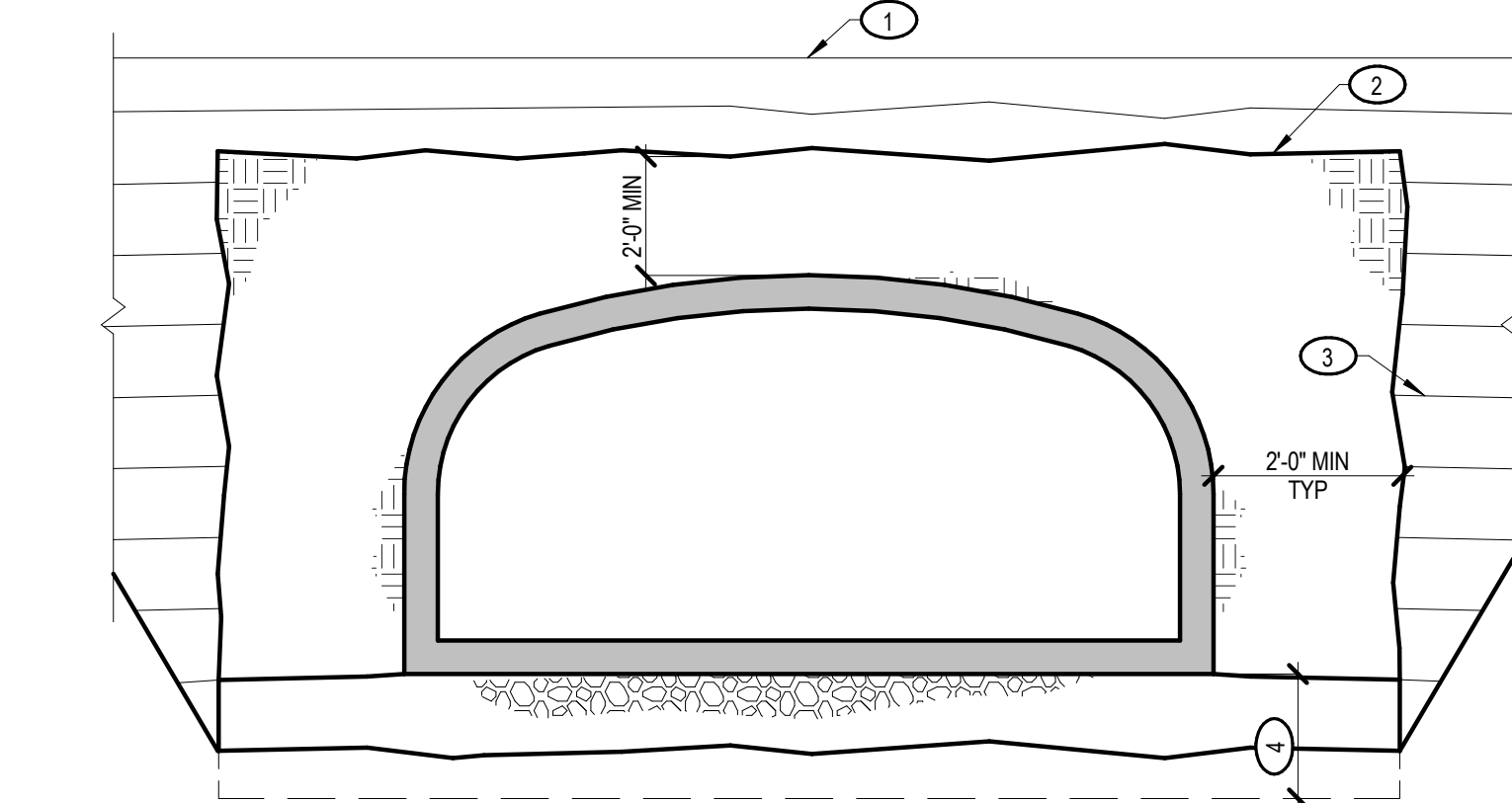
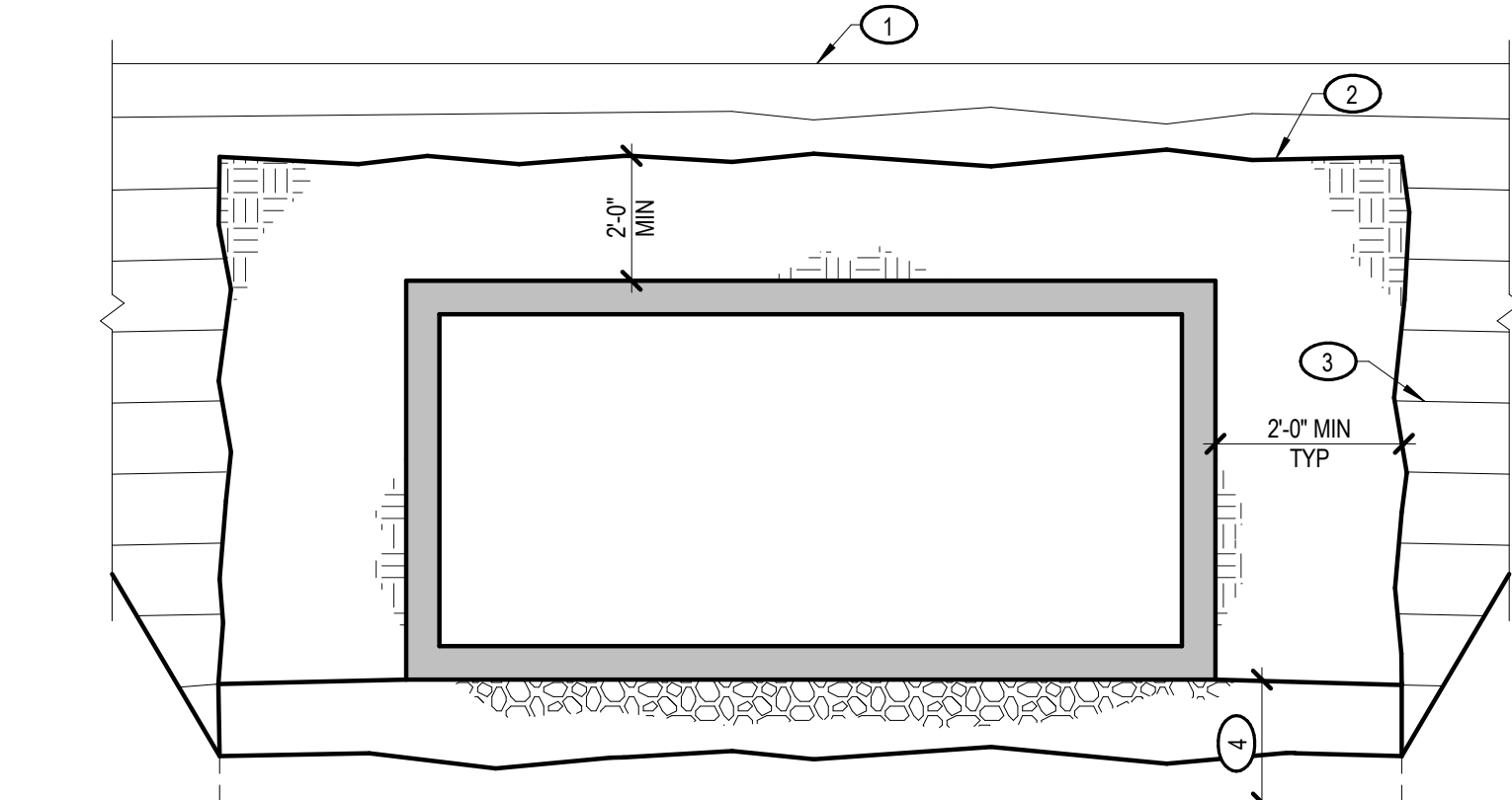
OVEREXCAVATION PER TABLE. OVEREXCAVATION SHOULD EXTEND A MIN OF 2'-0" BEYOND EDGE OF STRUCTURE.

SCARIFY AND RECOMPACTION:

THE EXPOSED SUBGRADE SHALL BE SCARIFIED PER TABLE. MOISTURE CONDITIONED AND COMPACTED TO 95% OF MAX DRY DENSITY.

STRUCTURAL FILL:

PLACE A LAYER OF STRUCTURAL FILL PER TABLE ATOP THE COMPACTED (E) SUBBASE AND COMPACT TO 95% MAX DRY DENSITY. COMPACTION SHALL BE PER ASTM D1557 (MODIFIED PROCTOR). PLACE IN 8" MAX LIFTS.



TYPICAL BACKFILL AND SUBGRADE PREPARATION REQUIREMENTS

S1.11

TOV121

KEYNOTES:

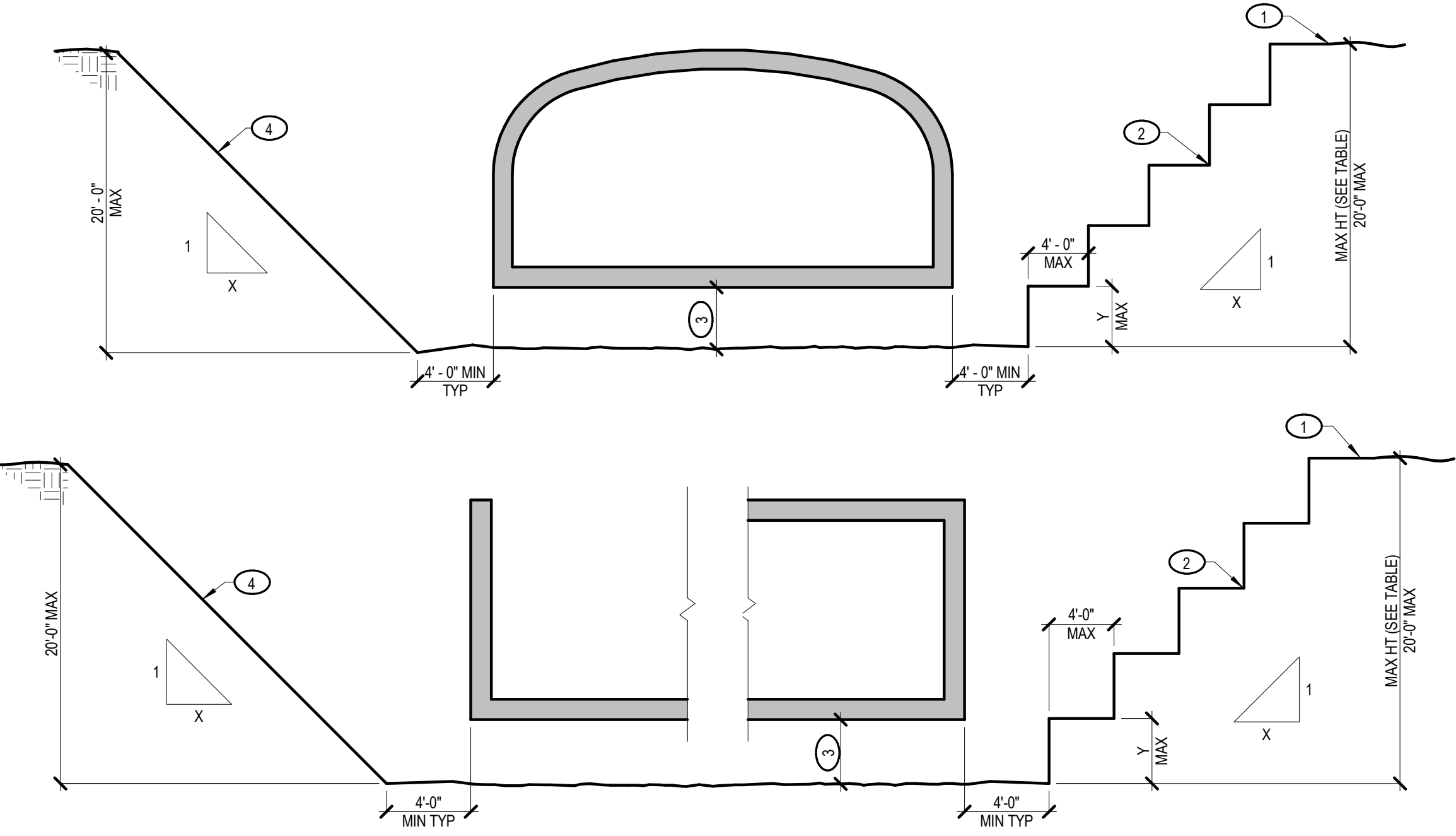
1. HIGHEST ADJACENT GRADE
2. MULTIPLE BENCH EXCAVATION (SEE TABLE)
3. OVER EXCAVATE AS REQ'D FOR SUBGRADE PREPARATION. REFER TO GEOTECHNICAL REPORT OR TYP DETAIL
4. OPTIONAL SIMPLE SLOPE EXCAVATION

NOTES:

- A. COORDINATE EXCAVATION SOIL W/ OSHA 29 CFR 1926 SUBPART P TO DETERMINE SOIL TYPE A, B, OR C
- B. CONTRACTOR SHALL CONSULT GEOTECHNICAL REPORT PRIOR TO EXCAVATION
- C. THE INFO PRESENTED IS A GUIDELINE TO EXCAVATION BASED ON OSHA 29 CFR 1926 SUBPART P. TO DETERMINE WHERE SHORING IS REQ'D AND FOR FURTHER INFO SEE OSHA 29 CFR 1926

SOIL TYPE	(X) HORIZ	(Y) MULT BENCH
A	3/4	5'-0"
B	1	4'-0"
C	1 1/2	N/A

RECOMMENDED EXCAVATION GUIDELINES PER OSHA 29 CFR 1926 SUBPART P



TYPICAL EXCAVATION REQUIREMENTS

S1.11

TOV122



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07/27/2018

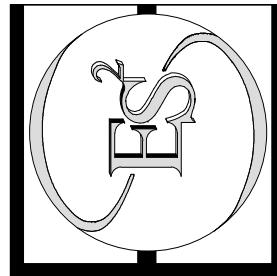
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SKYE CANYON II PHASE 3A

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HENDERSON, NV

TYPICAL DETAILS

PROJECT:

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REVISIONS:

DESCRIPTION DATE

DRAWN:

PF

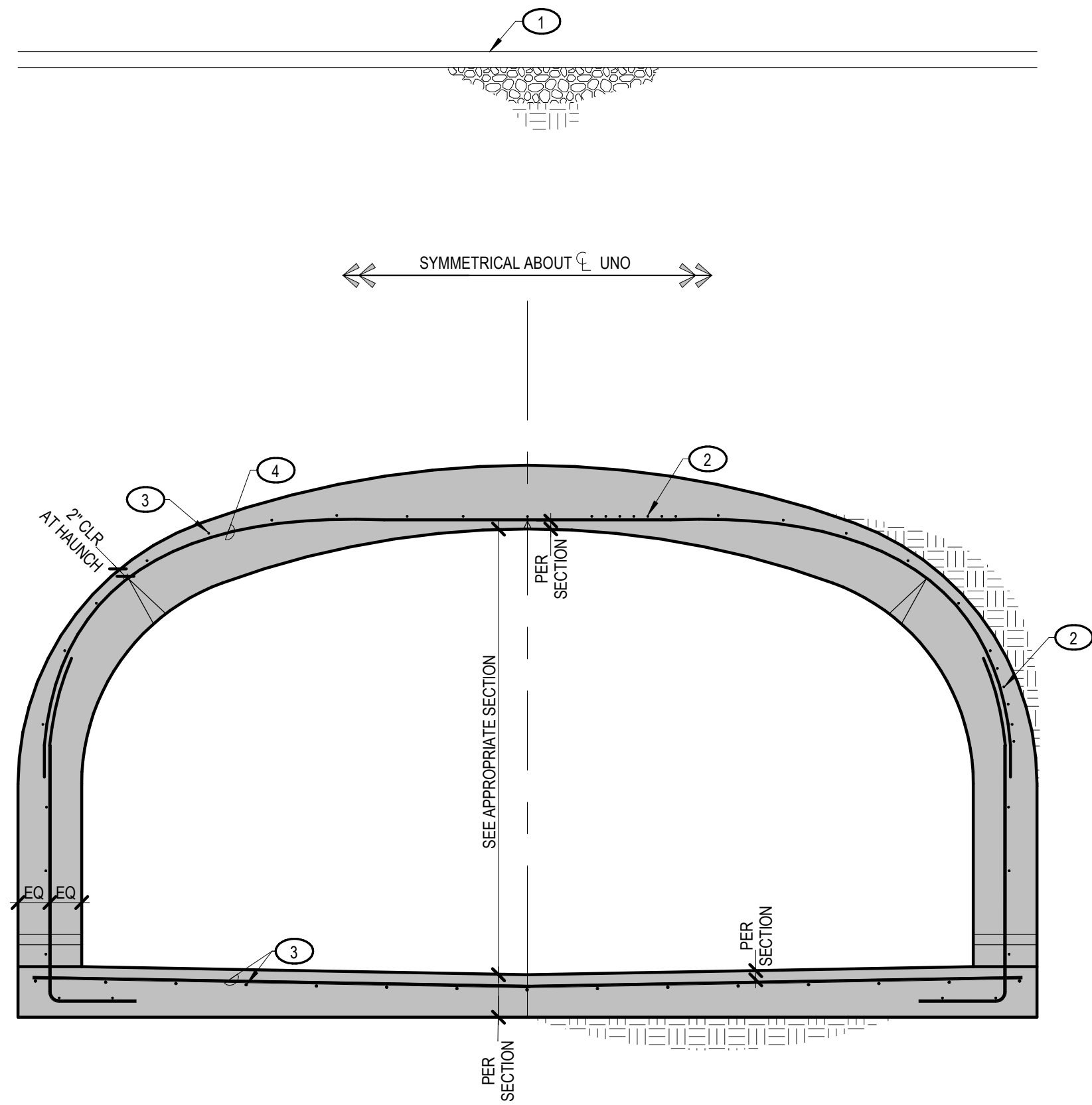
CHECKED:

GM

PROJECT NUMBER: 18.2620

SHEET NUMBER:

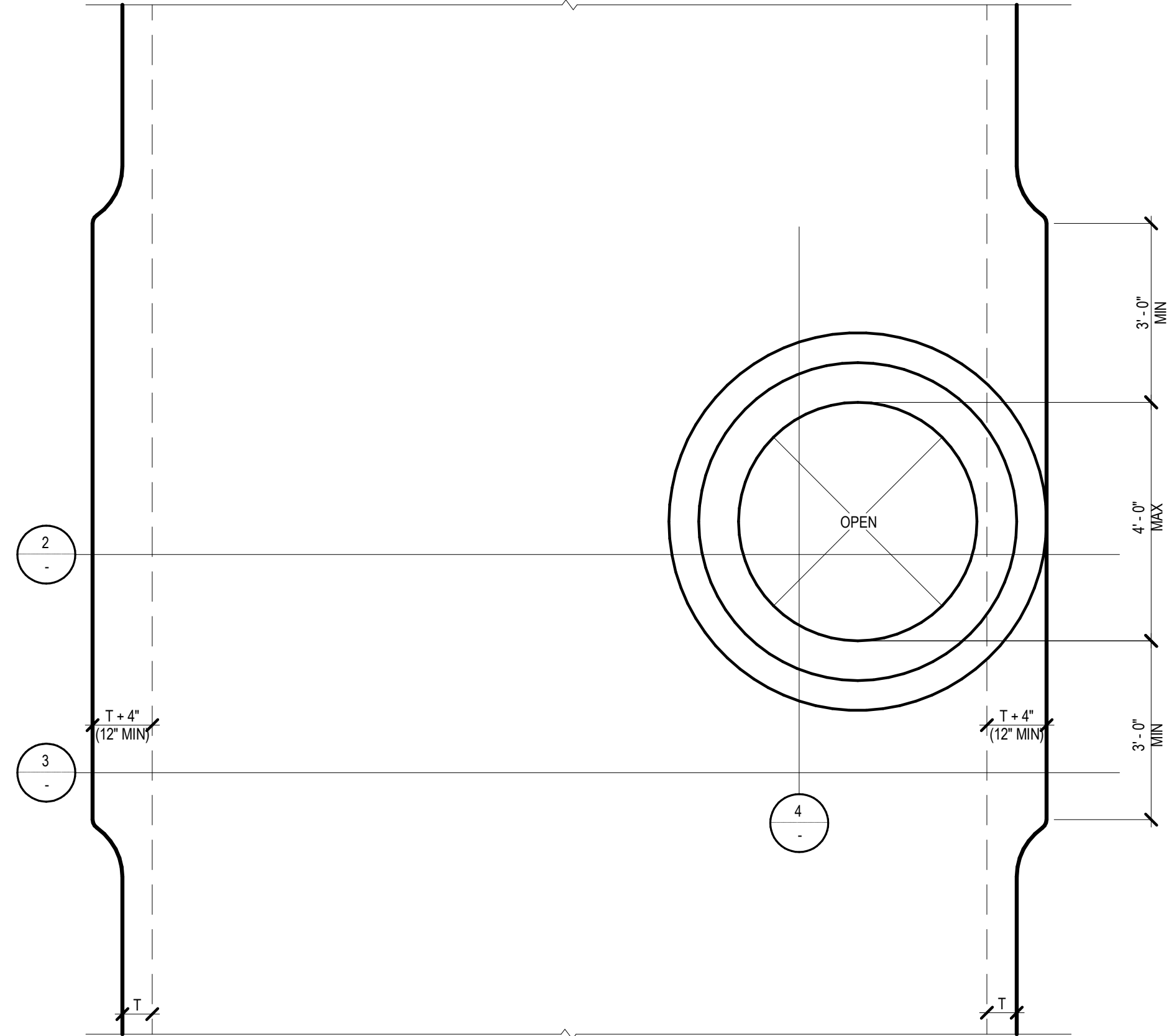
S1.11



KEYNOTES:

1. FINISHED GRADE PER CIVIL
2. ADDL LONG BARS ADJACENT TO MANHOLE OPENING PER DETAIL 2
3. REINF PER CULVERT SECTION
4. ADDL BARS EA SIDE OF MANHOLE OPENING EQ TO HALF THE NUMBER OF TRANS BARS INTERRUPTED. DISTRIBUTE ADDL BARS OVER 3'-0". COMBINE AND SPACE EQUALLY W/ TYP REINF *

*EXAMPLE- #4 @ 6" O.C. TRANS TYP AT 48"Ø MANHOLE OPENING. (8) TRANS BARS INTERRUPTED. (4) ADDL BARS REQ'D EA SIDE PLUS (6) TYP BARS. DISTRIBUTE (10) TOTAL BARS IN 3' WIDTH



NOTES:

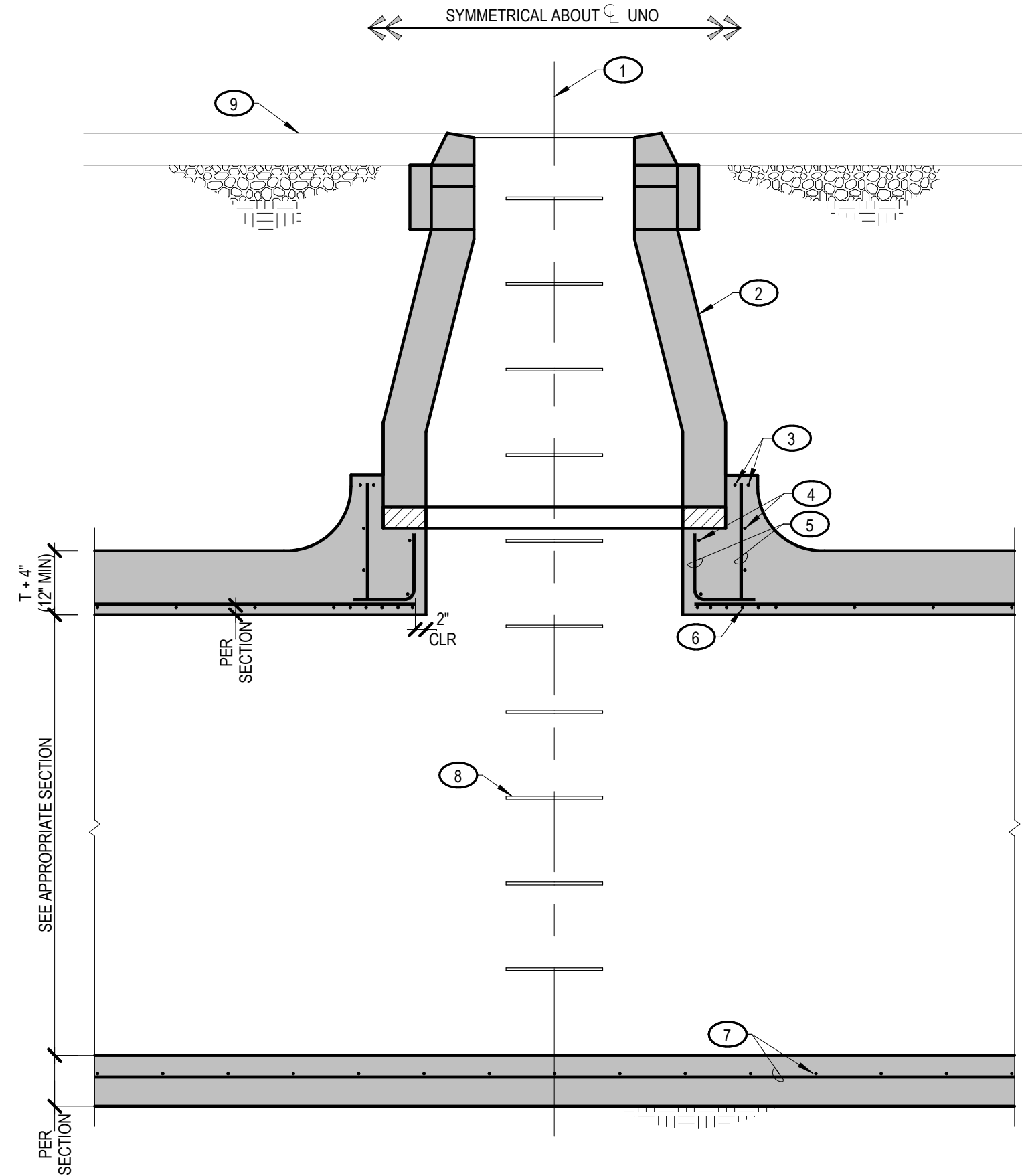
- A. T DESIGNATES TYP ARCH WALL THICKNESS PER APPROPRIATE SECTION
- B. EXACT STATION AND LOCATION OF MANHOLE PER CIVIL PLANS
- C. MANHOLE DIA PER CIVIL PLANS

3
S1.12
TYPICAL SECTION AT THICKENED ARCH AT MANHOLE

RCA313

1
S1.12
TYPICAL PLAN AT MANHOLE

RCA311

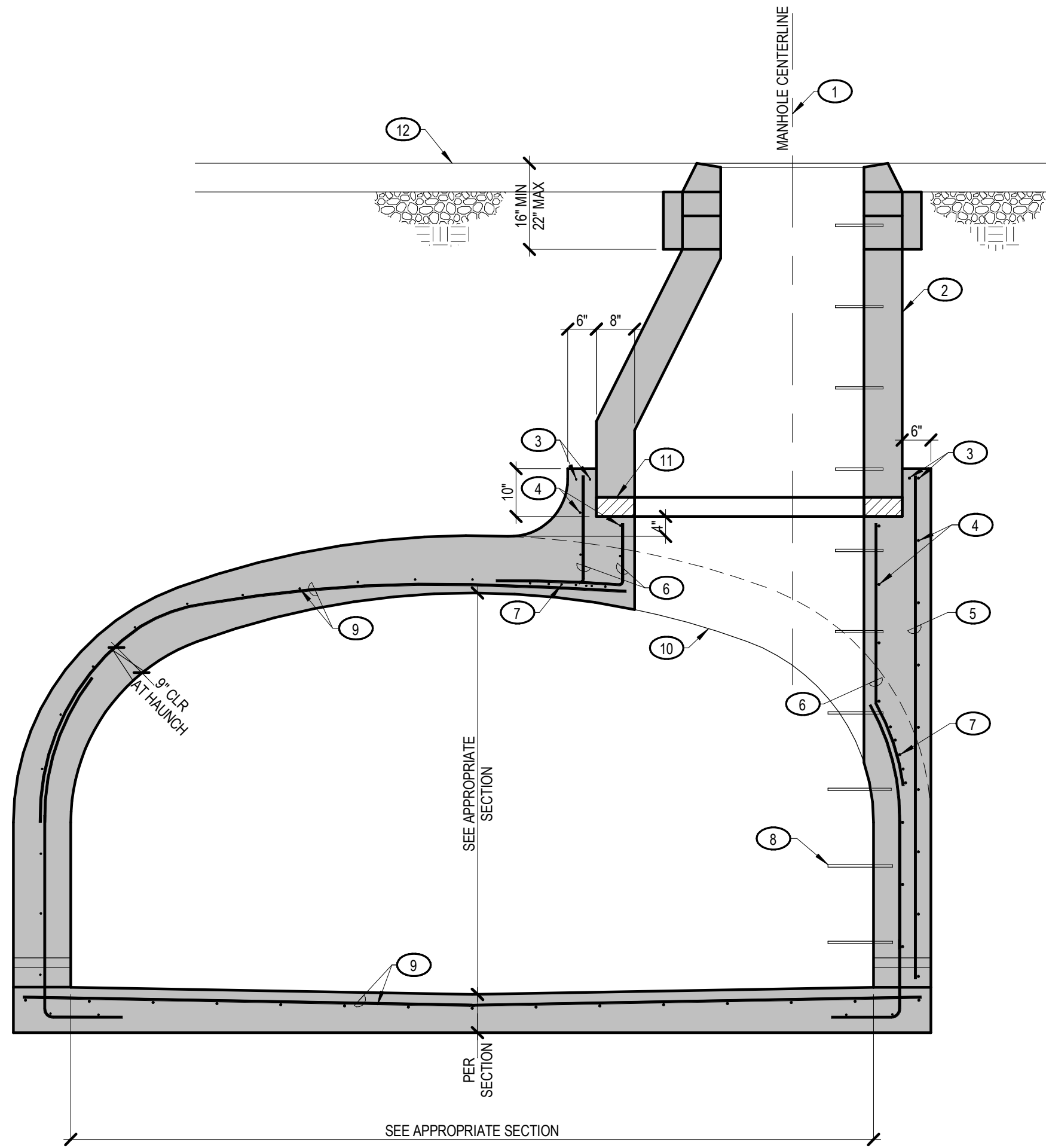


KEYNOTES:

1. MANHOLE STATIONING PER CIVIL DWGS
2. MANHOLE AND RISER PER DETAIL 2
- (2) #4 CONT AT T.O. WALL
4. #4 HORIZ AT 8" O.C.
- #4 AT 8" O.C. PROVIDE 18" LONG HOOK INTO ARCH
6. ADDL BARS EA SIDE OF MANHOLE PER DETAIL 3
7. REINF PER CULVERT SECTION
8. STEPS PER DETAIL 2
9. FINISHED GRADE PER CIVIL

NOTES:

- A. FOR ITEMS SHOWN BUT NOT NOTED, SEE DETAILS 1, 2, AND 3 THIS SHEET
- B. "T" INDICATES TYP ARCH WALL THICKNESS PER APPROPRIATE SECTION



KEYNOTES:

1. MANHOLE STATIONING PER CIVIL DWGS
- 48"Ø MAX TYPE I OR IA MANHOLE ASSEMBLY PER CLARK COUNTY UNIFORM STANDARD DRAWING NO. 403/403.1 OR 404/404.1. USE OF TYPE I OR IA SHALL BE DETERMINED BASED ON THE FINAL COVER REQ'D
- (2) #4 CONT AT T.O. WALL
- #4 HORIZ AT 8" O.C.
- #4 VERT AT 8" O.C.
- #4 AT 8" O.C. PROVIDE 18" LONG HOOK INTO ARCH
- (5) #5 x 10'-0" LONG AT 3" O.C. LONGITUDINAL EA SIDE OF OPENING
- MANHOLE STEPS PER CLARK COUNTY UNIFORM STANDARD DRAWING NO. 410
- REINF PER CULVERT SECTION
- ARCH BEYOND
- STYROFOAM FILL BETWEEN CULVERT AND MANHOLE ASSEMBLY
12. FINISHED GRADE PER CIVIL

NOTES:

- A. FOR ITEMS SHOWN BUT NOT KEYNOTED, REFER TO APPROPRIATE ARCH SECTION
- B. "T" INDICATES TYP ARCH WALL THICKNESS PER APPROPRIATE SECTION

4
S1.12
TYPICAL LONGITUDINAL SECTION AT MANHOLE

RCA314

2
S1.12
TYPICAL TRANSVERSE SECTION AT MANHOLE

RCA312



SEAL:

07/27/2018

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3632 N RANCHO DRIVE

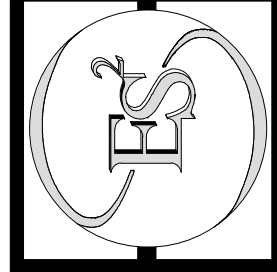
LAS VEGAS, NV 89130

PHONE: (702) 606-1007

1677 EUREKA ROAD, STE. #102

ROSEVILLE, CA 95661

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PROJECT:

SKYE CANYON II PHASE 3A

HYDRO-ARCH

HENDERSON, NV

SHEET TITLE:

TYPICAL DETAILS

ISSUE:

SUBMIT FOR PERMIT 07/26/2018

REVISIONS:

DESCRIPTION DATE

DRAWN:

PF

CHECKED:

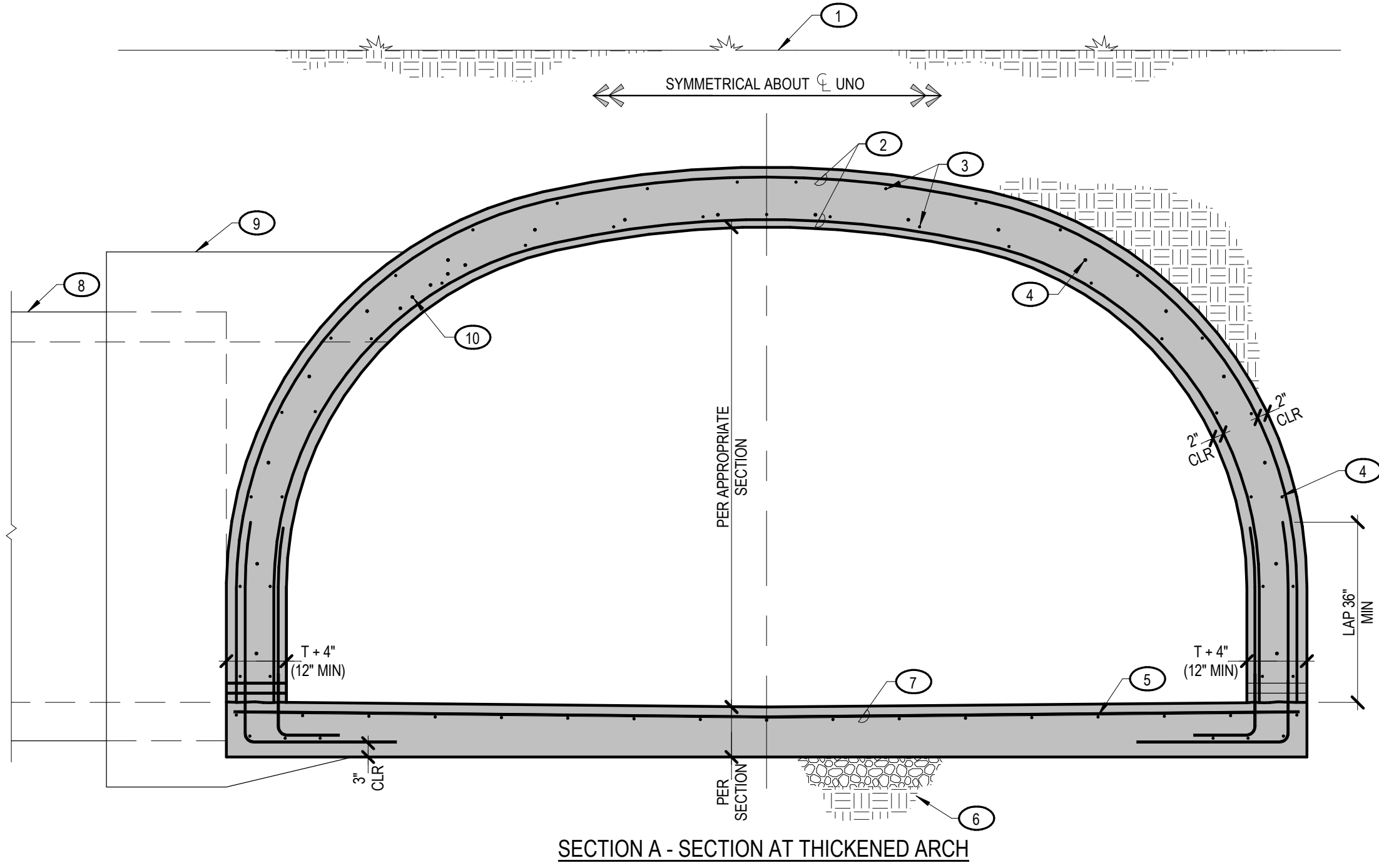
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PROJECT NUMBER: 18.2620

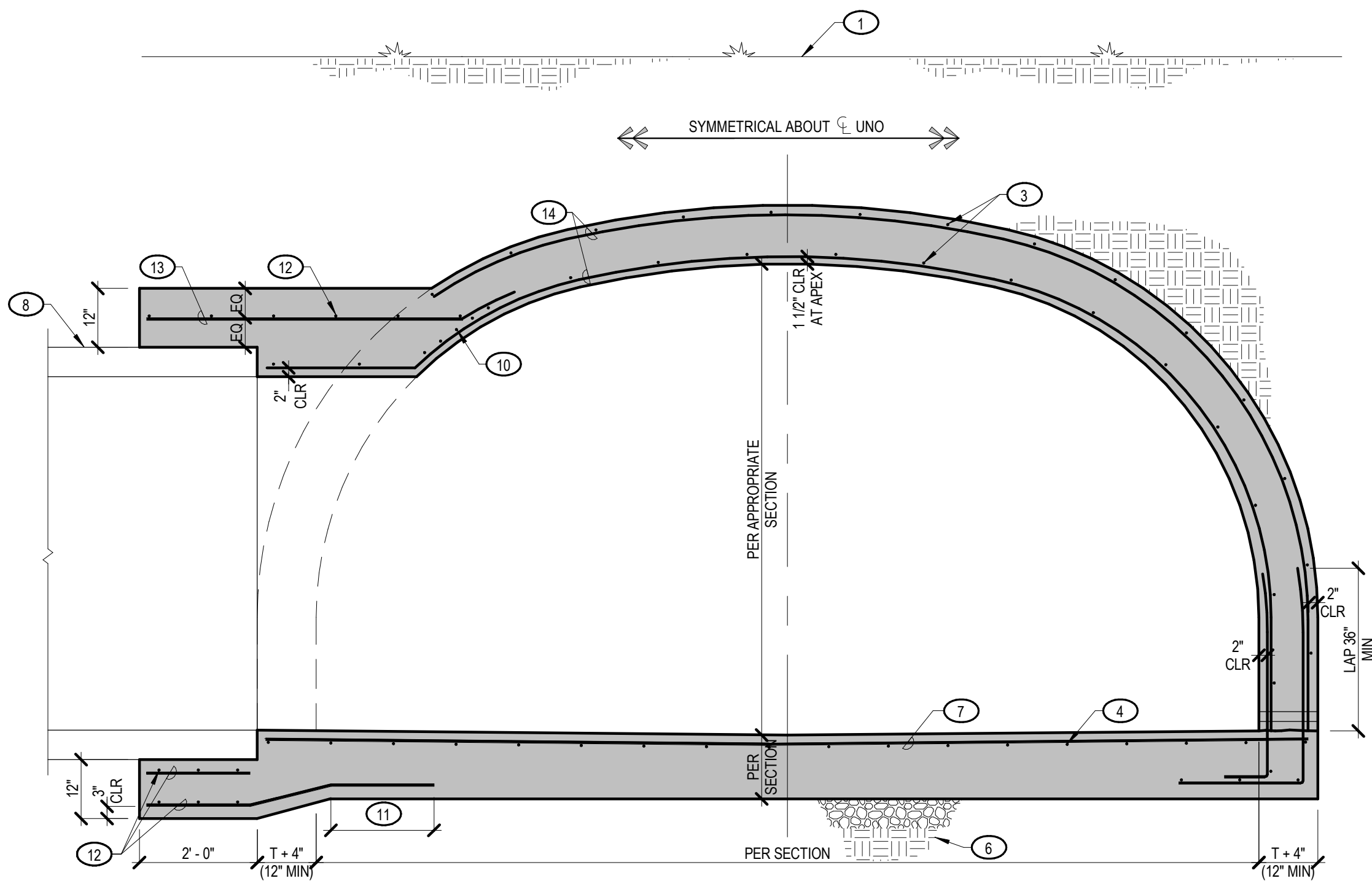
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S1.12

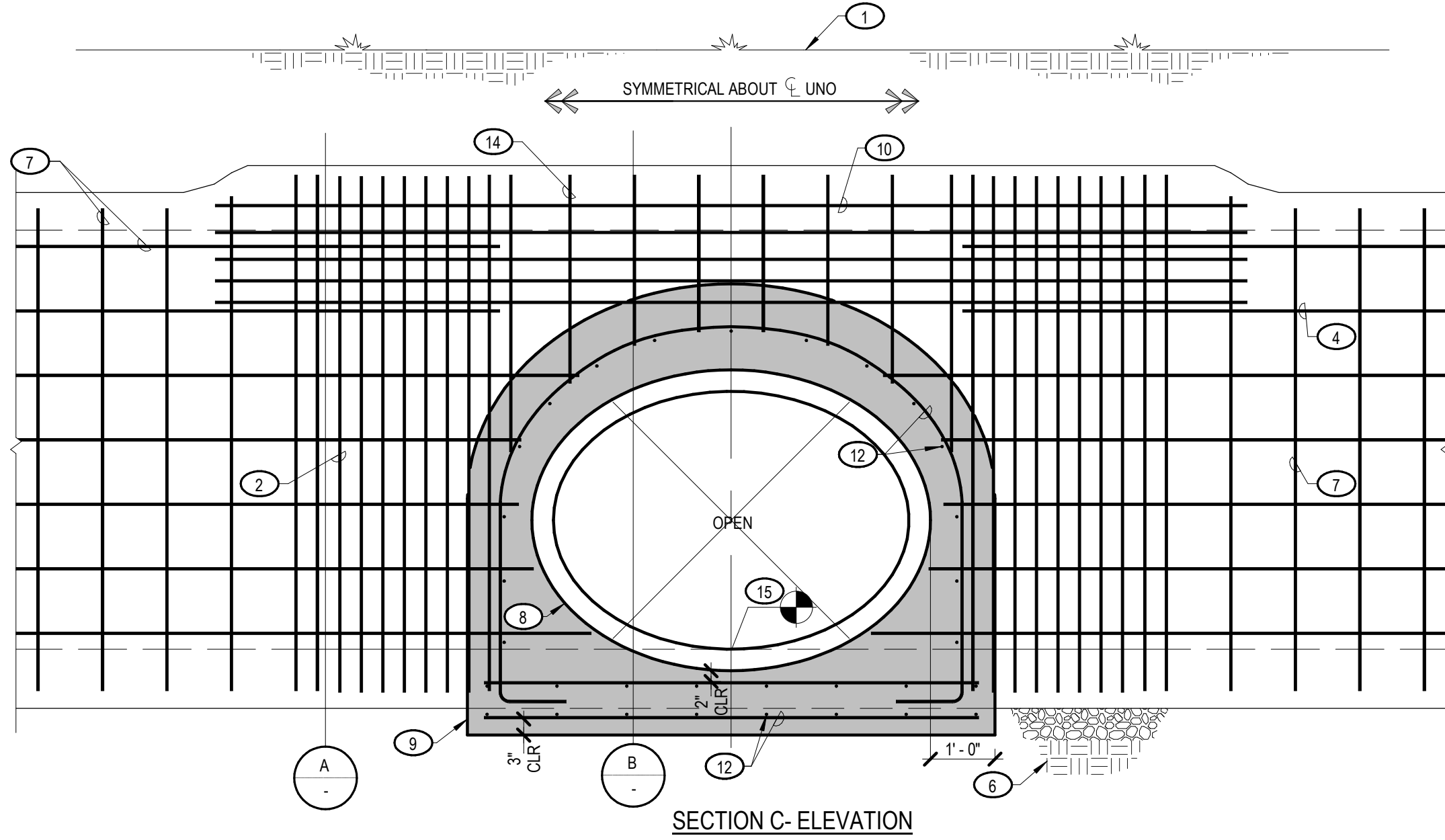
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SECTION A - SECTION AT THICKENED ARCH



SECTION B - SECTION AT RCP COLLAR



SECTION C - ELEVATION

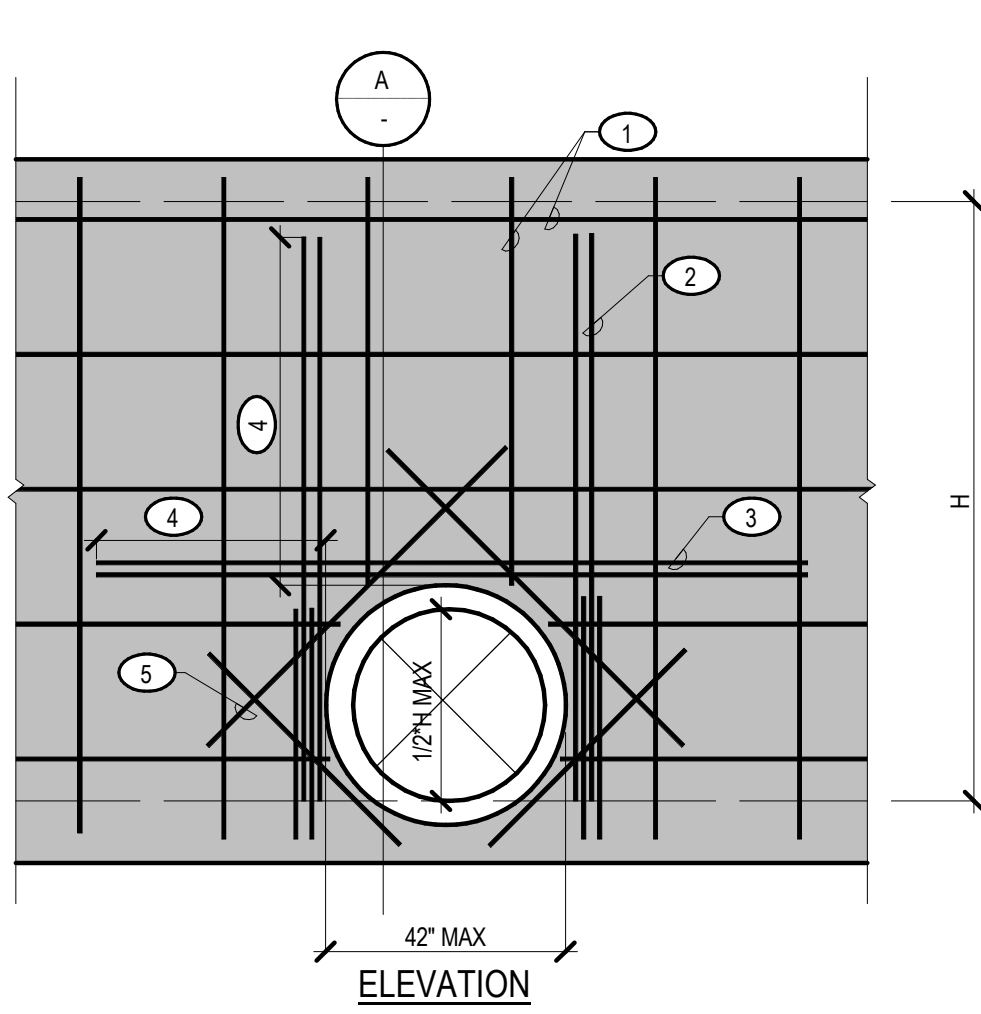
KEYNOTES:

1. FINAL GRADE PER CIVIL
2. (10) #5 AT 4" O.C. EA FACE TO REPLACE TYP TRANS REINF W/ HOOKED DOWEL TO MATCH AND LAP AT BASE. 36" LONG HOOK AT OUTSIDE DOWEL
3. #4 x 15'-0" LONG AT 18" O.C. EA FACE
4. TYP LONG REINF. EXTEND AND LAP INTO THICKENED SECTION PER APPROPRIATE SECTION
5. TYP LONG REINF PER APPROPRIATE SECTION
6. SUBGRADE PREPARATION PER TYP DETAIL
7. TYP TRANS REINF PER APPROPRIATE SECTION
8. RCP PER PLAN
9. COLLAR AT RCP
10. (5) #5 x 15'-0" LONG AT 4" O.C. ABOVE RCP OPENING
11. EXTEND BARS 18" INTO INVERT AS SHOWN
12. #4 AT 8" O.C.
13. #4 AT 8" O.C. PLACE RADIALLY AROUND COLLAR

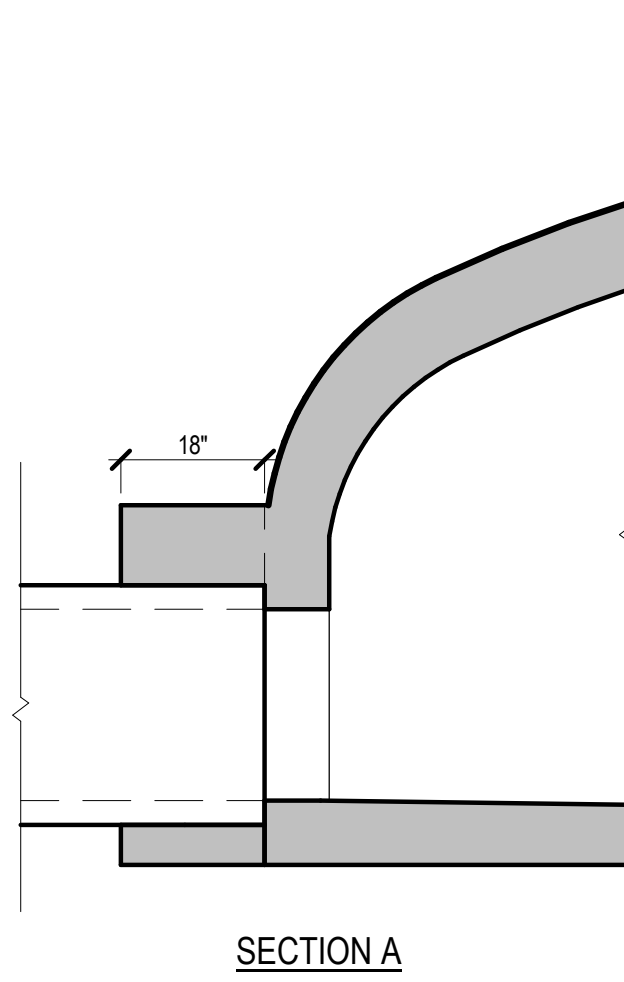
VARIES 18"

NOTES:

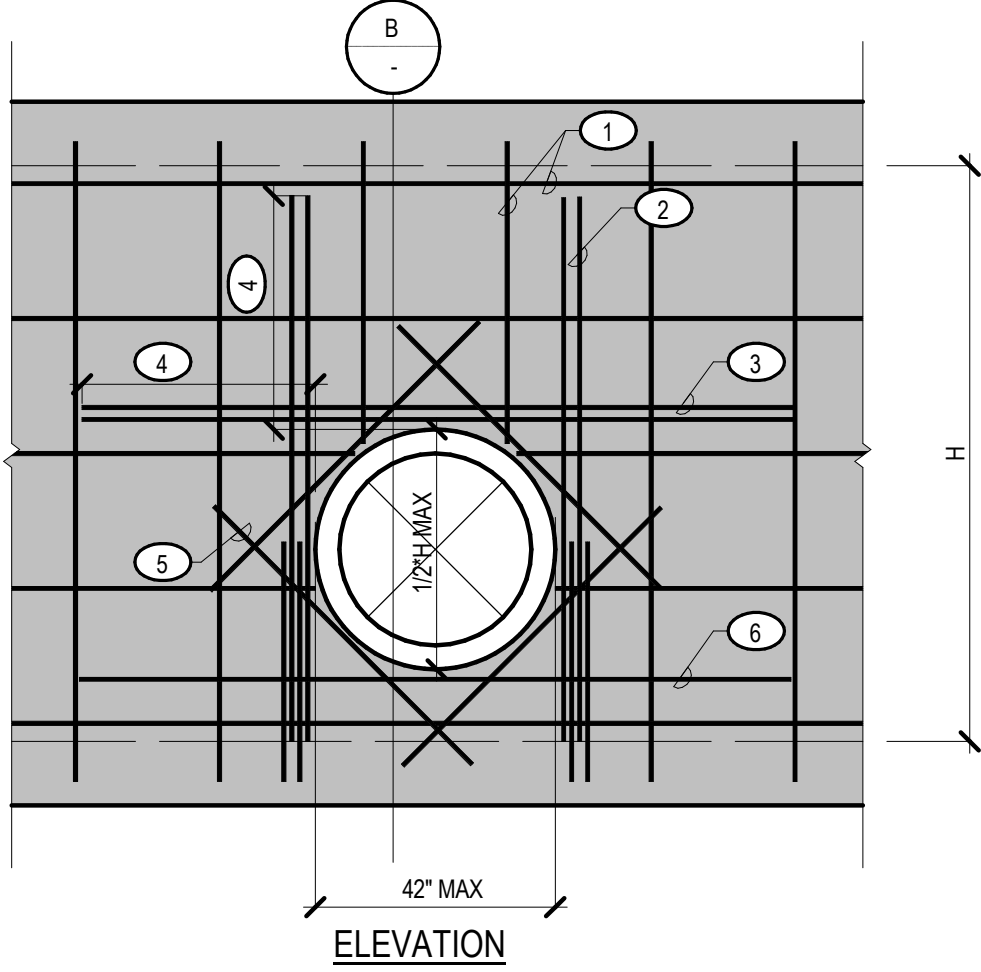
- A. "T" DESIGNATES TYP ARCH WALL THICKNESS PER APPROPRIATE SECTION



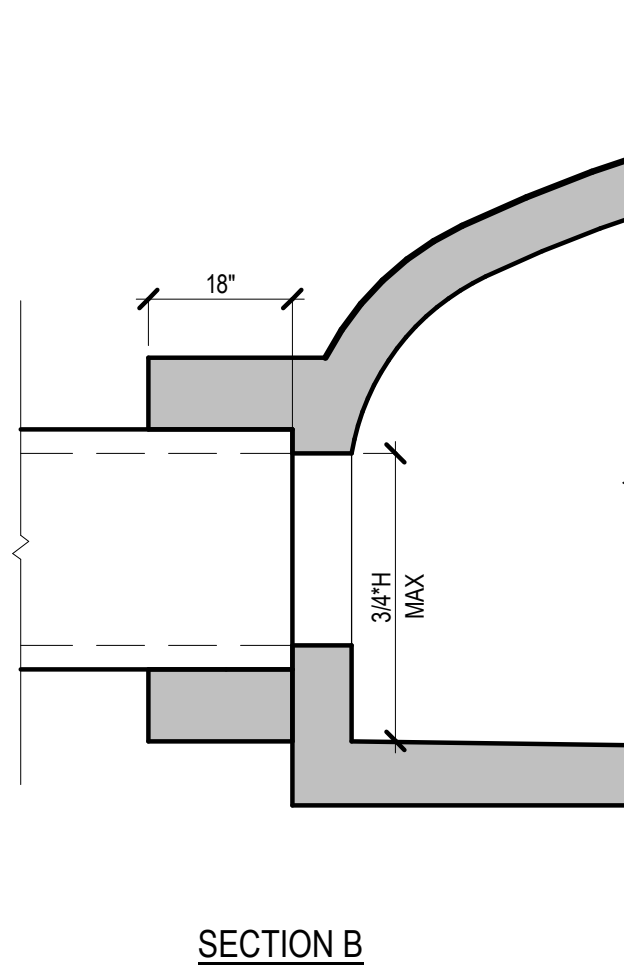
ELEVATION



SECTION A



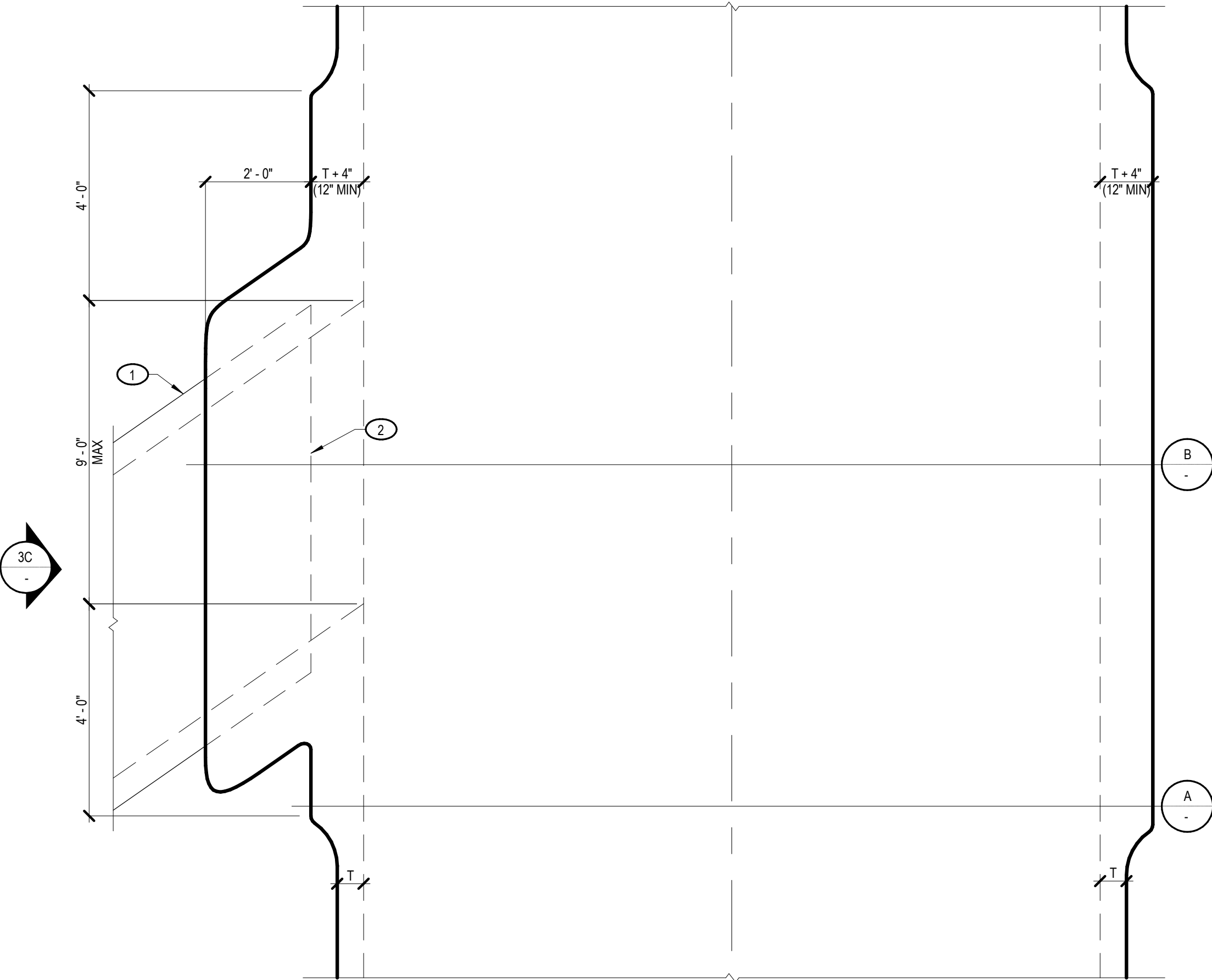
ELEVATION



SECTION B

TYPICAL SMALL LATERAL PENETRATIONS

1
S1.13
RCA322



KEYNOTES:

1. RCP PER PLAN
2. TERMINATE RCP AT OUTSIDE FACE OF ARCH. EXTEND SONOTUBE FORM TO FACE OF ARCH FORMWORK

NOTES:

- A. "T" DESIGNATES TYP ARCH WALL THICKNESS PER APPROPRIATE SECTION
- B. EXACT STATION AND LOCATION OF RCP LATERAL PER CIVIL PLANS
- C. RCP LATERAL SIZE PER CIVIL PLANS
- D. RCP LATERAL MAY BE SKEWED (SHOWN) OR PERPENDICULAR TO ARCH ALIGNMENT PER CIVIL PLANS
- E. DETAIL ACCOMODATES A 72" DIA PIPE AT APPROX 45 DEGREE SKEW

KEYNOTES:

1. TYP REINF PER ARCH SECTION
2. NUMBER OF VERT BARS ADDED EQUAL TO NUMBER OF BARS INTERRUPTED BY OPENING
3. NUMBER OF HORIZ BARS ADDED EQUAL TO THE NUMBER OF INTERRUPTED BARS
4. EXTEND BARS PAST EDGE OF OPENING EQUAL TO LAP LENGTH OF BAR PLUS 12" UNO
5. #4 DIAGONAL BARS AROUND OPENING AS SHOWN
6. ADD HORIZ BAR BELOW OPENING

NOTES:

- A. INVERT DOWELS MAY BE DRILLED AND EPOXIED INTO INVERT W/ MATCHING EMBEDMENT TO WET CAST DOWELS
- B. LATERAL MAY BE SKEWED. DO NOT EXCEED MAX OPENING WIDTH NOTED.

CONDITION A: LATERAL INVERT MATCHES ARCH INVERT

CONDITION B: LATERAL INVERT ABOVE ARCH INVERT

DETAILS AT LARGE RCP LATERAL CONNECTION

3
S1.13
RCA323

TYPICAL LARGE RCP CONNECTION

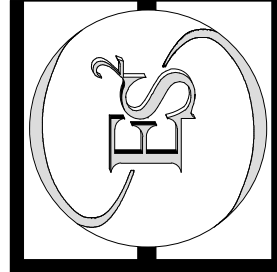
2
S1.13
RCA321



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SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

TYPICAL DETAILS

PROJECT:

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DESCRIPTION DATE

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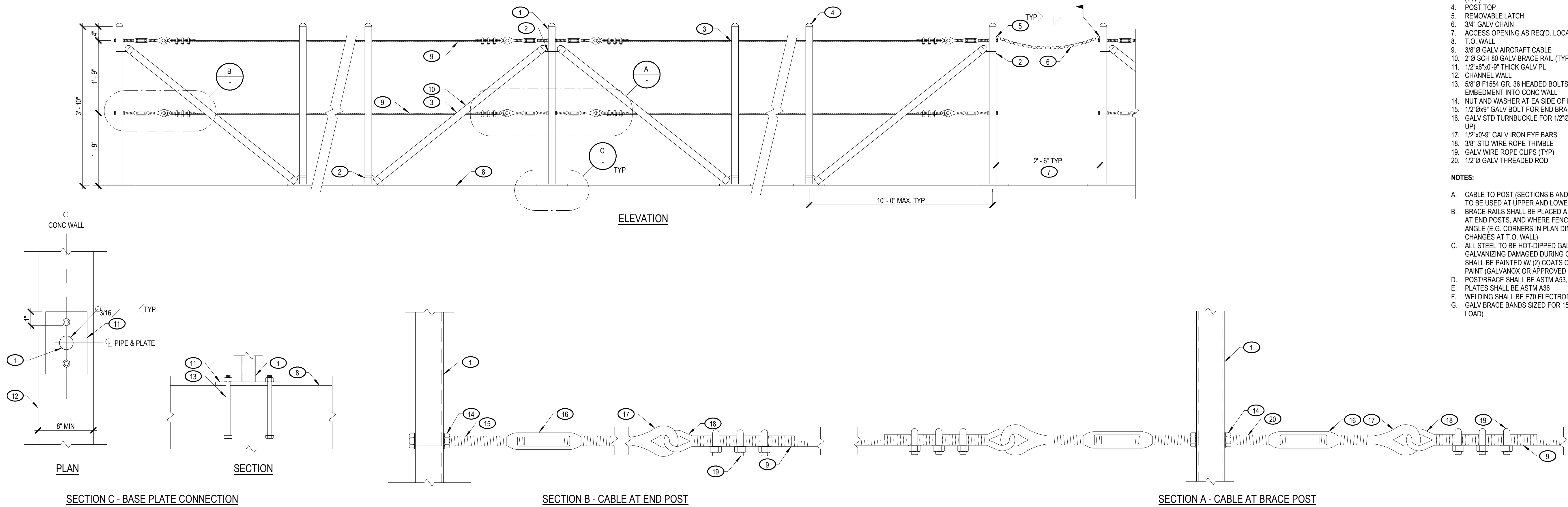
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SHEET NUMBER:

S1.13

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1
S1.14
TCV141

TYPICAL POST AND CABLE FENCE DETAIL



KEYNOTES:

- 2" SCH 80 GALV POST
- 2" GALV BRACE BAND
- 3/4" HOLE IN POST AND BRACE RAIL FOR CABLE (TYP)
- POST TOP
- REMOVABLE LATCH
- 3/4" GALV CHAIN
- ACCESS OPENING AS REQ'D. LOCATION PER CIVIL
- T.O. WALL
- 3/8" GALV AIRCRAFT CABLE
- 2" SCH 80 GALV BRACE RAIL (TYP)
- 1/2"x8"x0-9" THICK GALV PL
- CHANNEL WALL
- 5/8" F1554 GR. 36 HEADED BOLTS. 8" MIN EMBEDMENT INTO CONC WALL
- NUT AND WASHER AT EA SIDE OF POST
- 1/2"x8" GALV BOLT FOR END BRACE POST
- GALV STD TURNBUCKLE FOR 1/2" BOLTS (12" TAKE UP)
- 1/2"x0'-9" GALV IRON EYE BARS
- 3/8" STD WIRE ROPE THIMBLE
- GALV WIRE ROPE CLIPS (TYP)
- 1/2" GALV THREADED ROD

NOTES:

- A. CABLE TO POST (SECTIONS B AND C) CONNECTIONS TO BE USED AT UPPER AND LOWER CABLES
- B. BRACE RAILS SHALL BE PLACED A MAX OF 200' O.C. AT END POSTS, AND WHERE FENCE CHANGES AT AN ANGLE (E.G. CORNERS IN PLAN DIMS OR SLOPE CHANGES AT T.O. WALL)
- C. ALL STEEL TO BE HOT-DIPPED GALV. ANY GALVANIZING DAMAGED DURING CONSTRUCTION SHALL BE PAINTED W/ (2) COATS OF ALUMINUM PAINT (GALVANOX OR APPROVED EQ)
- D. POST/BRACE SHALL BE ASTM A53, GRADE B
- E. PLATES SHALL BE ASTM A36
- F. WELDING SHALL BE E70 ELECTRODE
- G. GALV BRACE BANDS SIZED FOR 1500 LBS (WORKING LOAD)



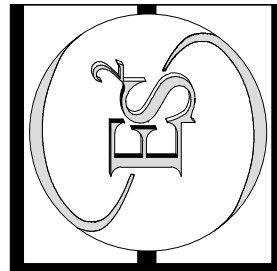
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SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

PROJECT:

ISSUE:

SUBMIT FOR PERMIT 07/26/2018

REVISIONS:

DESCRIPTION DATE

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PF

CHECKED:

GM

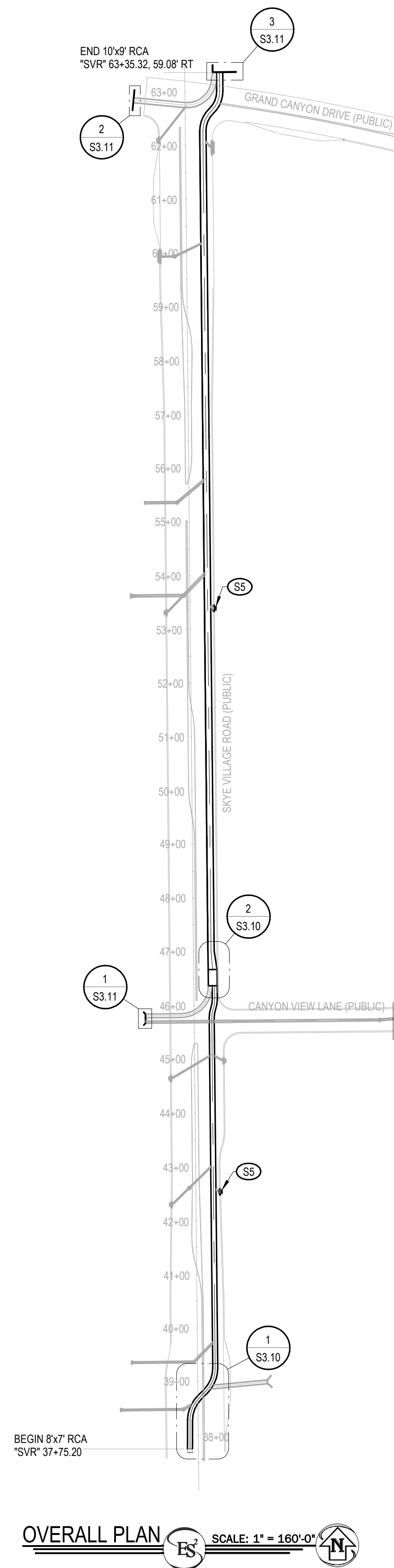
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SHEET NUMBER:

S1.14

TYPICAL DETAILS

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REINFORCED CONCRETE ARCH CULVERT CONSTRUCTION SCHEDULE				
BEGIN STATION	END STATION	CULVERT SIZE	DETAIL REFERENCE	WEEPHOLE SPACING PER TYP DETAIL
"SVR" 37+75.20, 15.81' LT	"SVR" 45+36.51, 34.08' RT	8x7' RCA	1/S4.10	24'-0"
"SVR" 45+36.51, 34.08' RT	"SVR" 46+66.51, 35.17' RT	16"x9' RCA CONFLUENCE STRUCTURE	3/S4.10	16'-0"
"SVR" 46+66.51, 35.17' RT	"SVR" 47+01.51, 32.75' RT	16"x9' RCA TRANSITION TO 10"x9' RCA	4/S4.10	16'-0"
"SVR" 47+01.51, 32.75' RT	"SVR" 63+35.32, 59.08' RT	10"x9' RCA	2/S4.10	24'-0"

MANHOLE- DETAIL 1/S1.12	
STATION	TOP OF MANHOLE
"SVR" 41+20.03, 30.75' RT	2851.62
"SVR" 45+20.03, 30.75' RT	2849.29
"SVR" 49+20.03, 29.75' RT	2846.96
"SVR" 53+20.03, 29.75' RT	2844.64
"SVR" 57+20.03, 29.75' RT	2842.31
"SVR" 61+20.03, 29.75' RT	2839.96

SMALL RCP LATERAL SCHEDULE- DETAIL 1/S1.13		
STATION	INVERT ELEVATION	RCP SIZE
"SVR" 38+58.00	2735.64	30"
"SVR" 39+72.28	2835.00	30"
"SVR" 42+57.39	2833.57	18"
"SVR" 42+99.93	2833.36	18"
"SVR" 45+06.25	2832.33	18"
"SVR" 45+06.25	2832.33	18"
"SVR" 53+41.82	2828.90	18"
"SVR" 60+16.60	2826.20	18"
"SVR" 62+06.13	2826.44	18"

LARGE RCP LATERAL SCHEDULE- DETAIL 2/S1.13		
STATION	INVERT ELEVATION	RCP SIZE
"SVR" 38+89.92	2735.43	72"
"SVR" 54+02.47	2828.66	42"
"SVR" 55+75.47	2827.97	36"

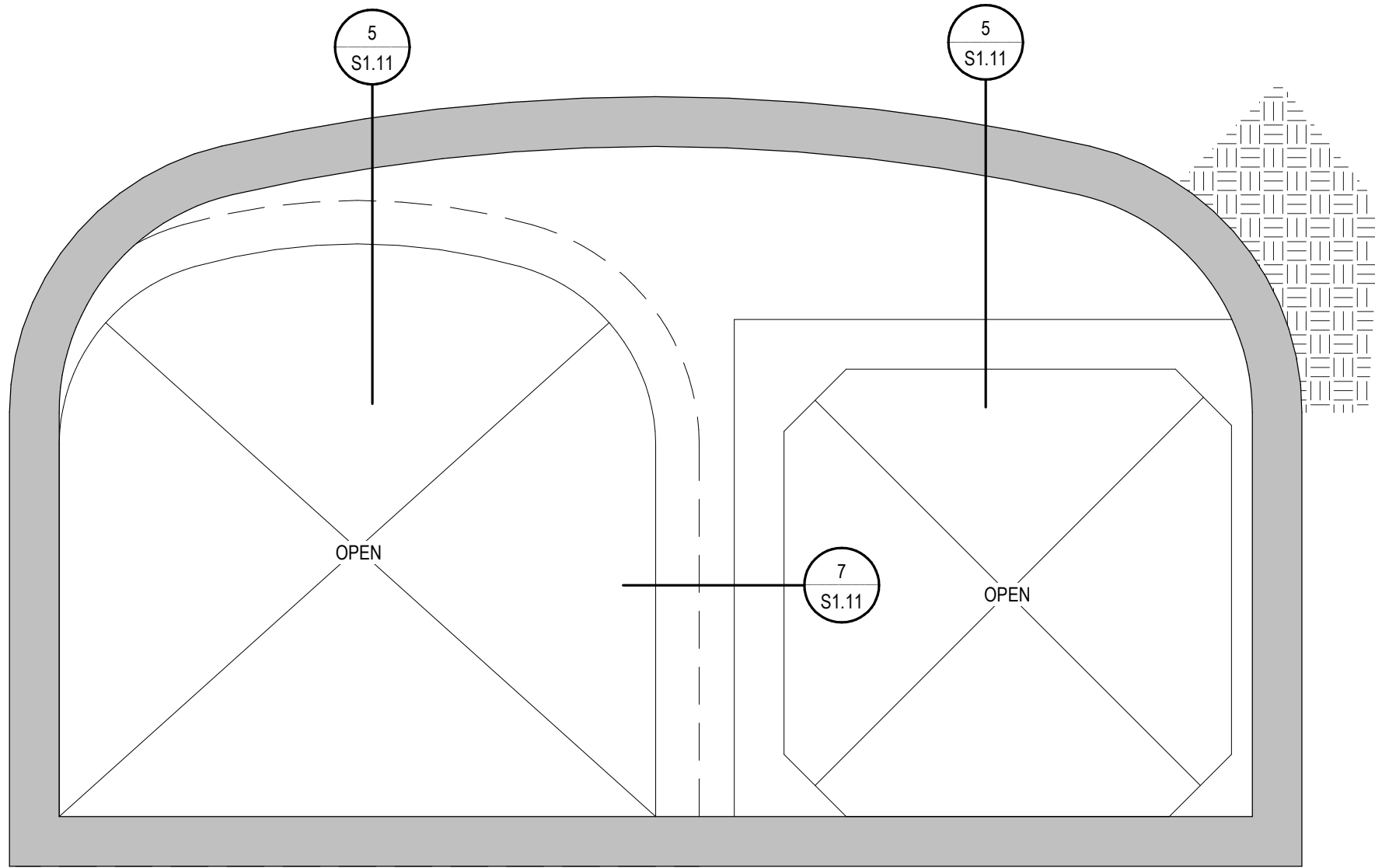
DROP INLET- DETAIL 10/S1.10		
DROP INLET ID	STATION	DROP INLET HEIGHT
2	"SVR" 42+57.39, 36.75' RT	13.95'
6	"SVR" 53+38.50, 45.50' RT	12.93'

KEYNOTES

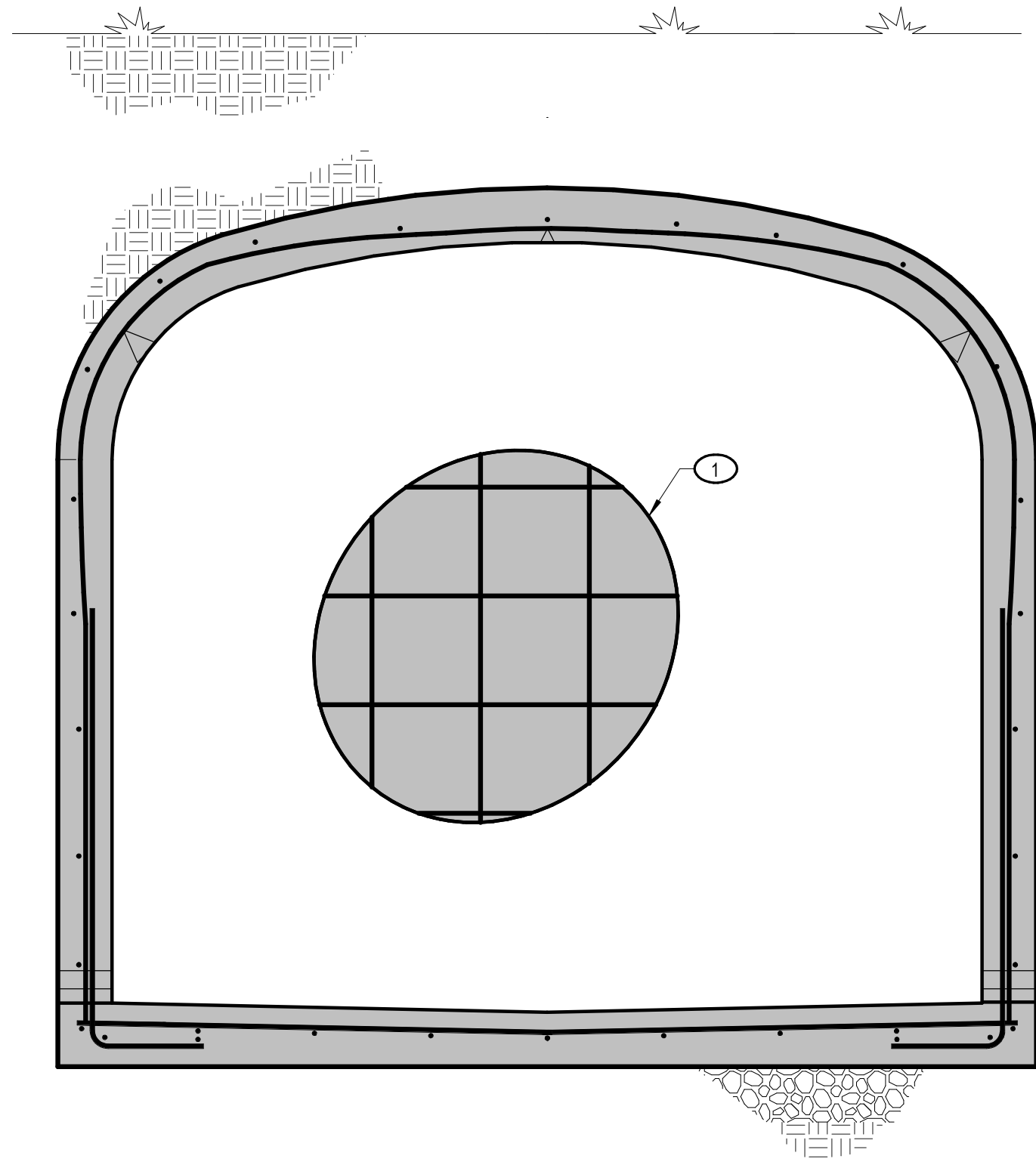
S5 DROP INLET PER DETAIL 10/S1.10

 PROFESSIONAL ENGINEER-STATE OF NEVADA GREG A. MEYER Exp. 12/31/19 CIVIL/STRUCTURAL No. 15063 07/27/2018		
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4045 NORTH OCEAN BLVD. STE. A HENDERSON, NV 89015 PHONE: (702) 552-9874		
SKYE CANYON II PHASE 3A HYDRO-ARCH HENDERSON, NV		
OVERALL PLAN		
PROJECT:		
SHEET TITLE:		
ISSUE:		
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CHECKED: GM		
PROJECT NUMBER:		18-2620
SHEET NUMBER:		S2.10

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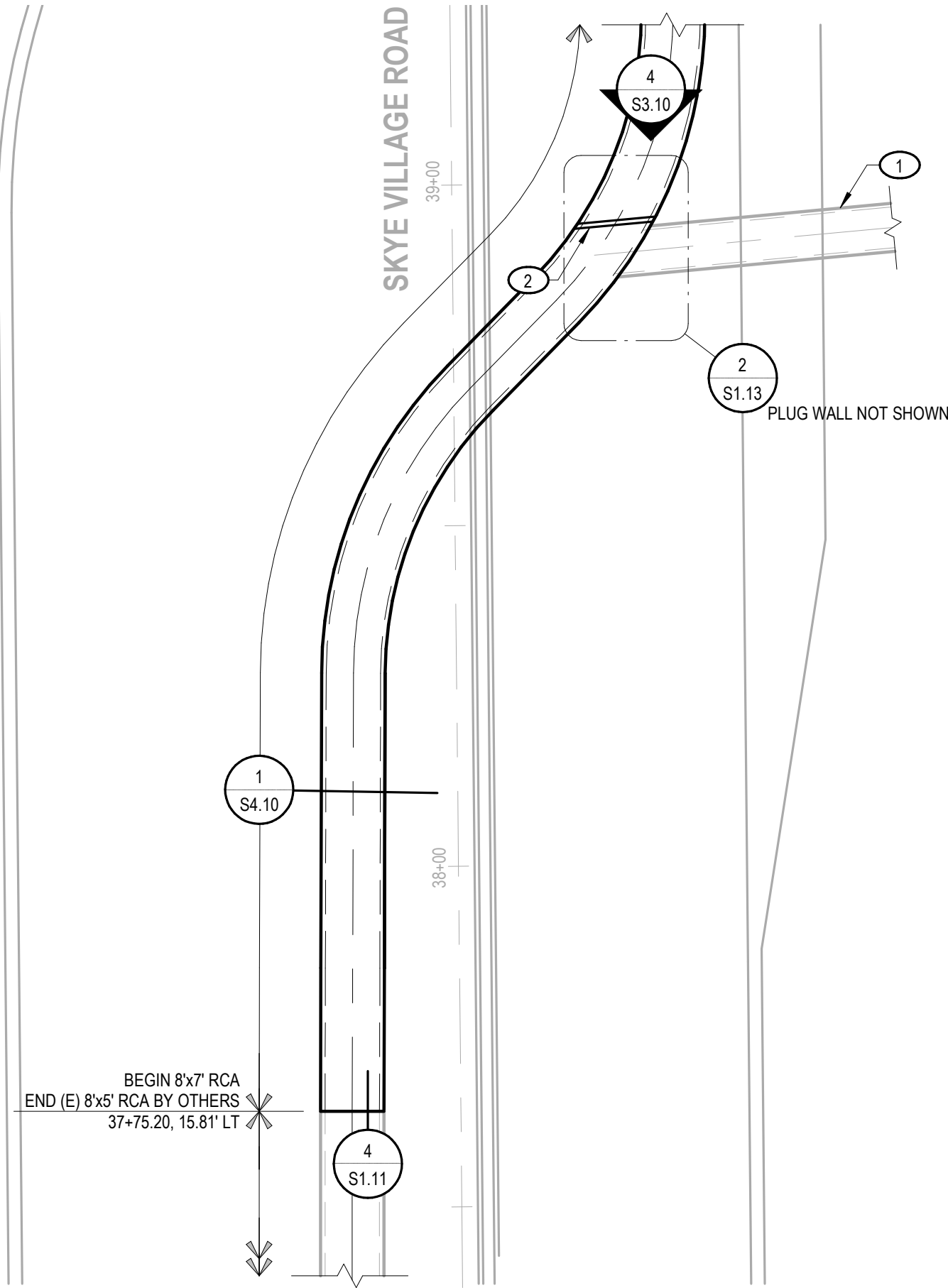


3
S3.10
END WALL AT 6x6 RCB & 8x7 RCA
RCB108

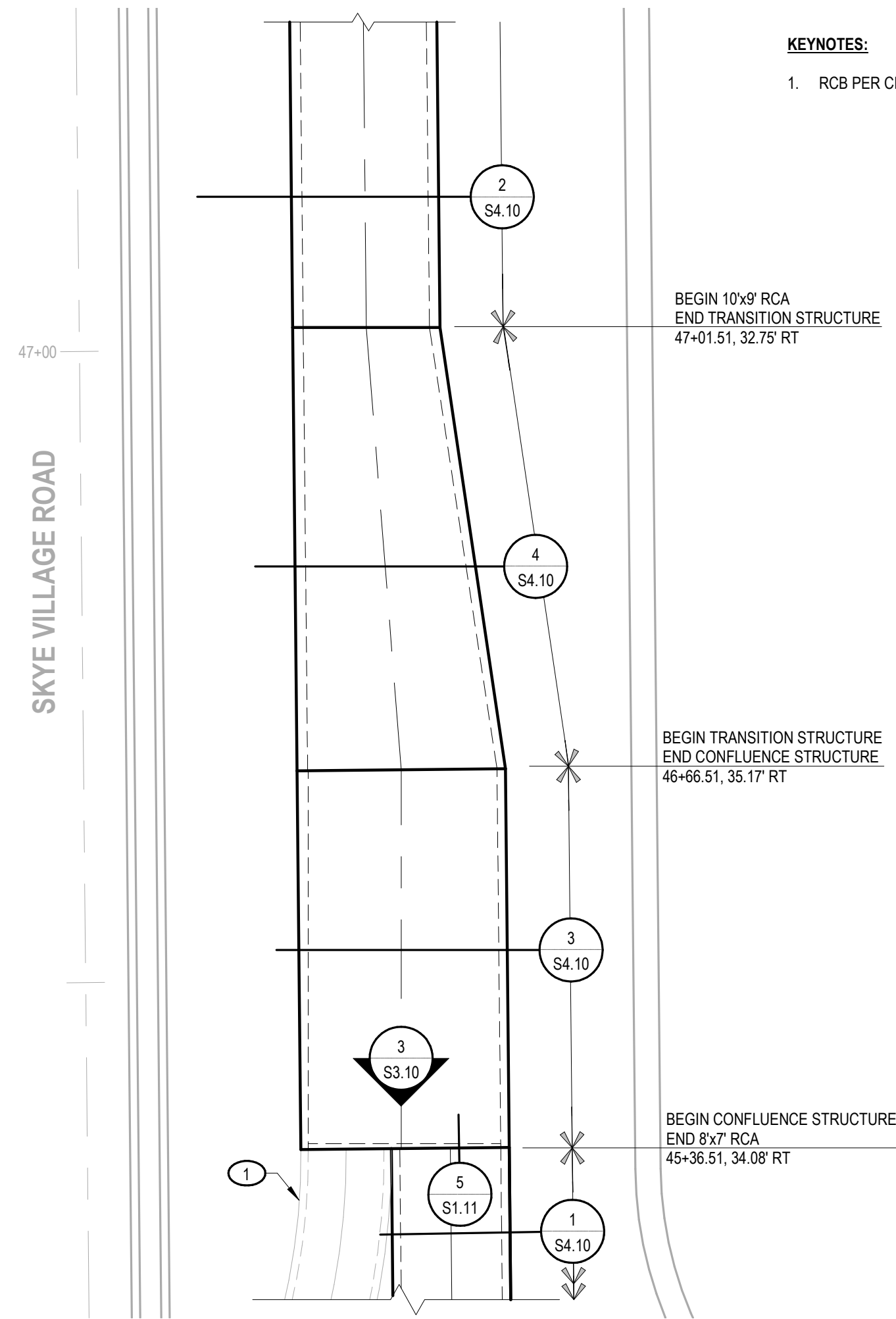


- KEYNOTES:
- 8" THICK CONCRETE WALL WITH #5 AT 8" O.C. E.W. CENTERED. DRILL AND EPOXY-ANCHOR REBAR AROUND PERIMETER INTO ARCH. 4" MIN EMBED.

4
S3.10
PLUG WALL AT 8x7 RCA



1
S3.10
ENLARGED PLAN AT UPSTREAM CONNECTION

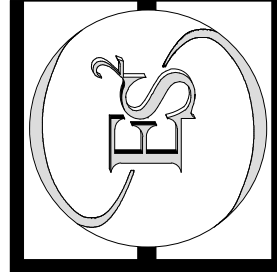


2
S3.10
ENLARGED PLAN AT CONFLUENCE

- KEYNOTES:
- 72" Ø PIPE PER CIVIL
 - CONSTRUCT PLUG WALL. LOCATE PER CIVIL



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PROJECT:
SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

SHEET TITLE:
CONNECTIONS AND TRANSITIONS

ISSUE:
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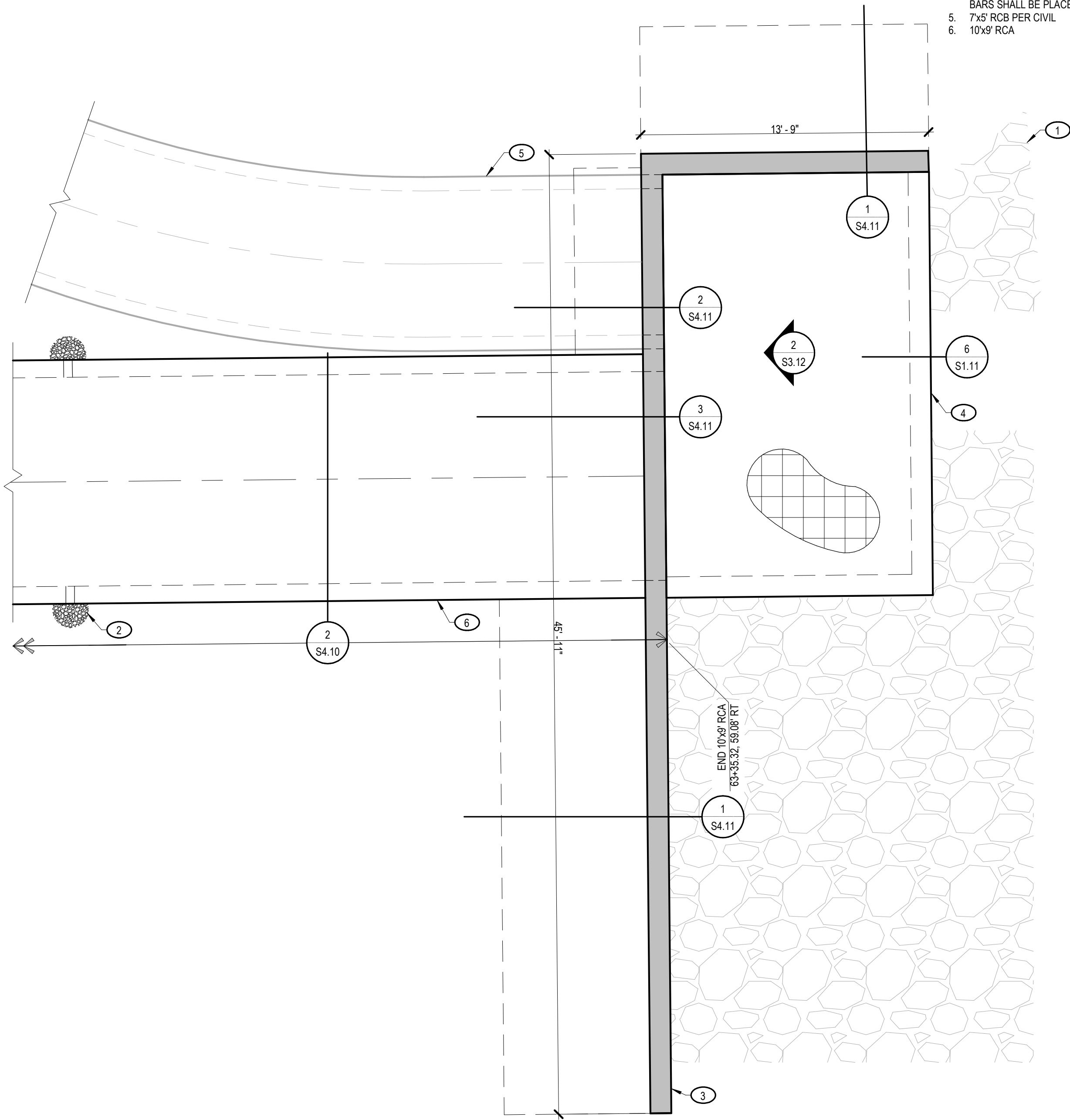
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PROJECT NUMBER: 18.2620
SHEET NUMBER:

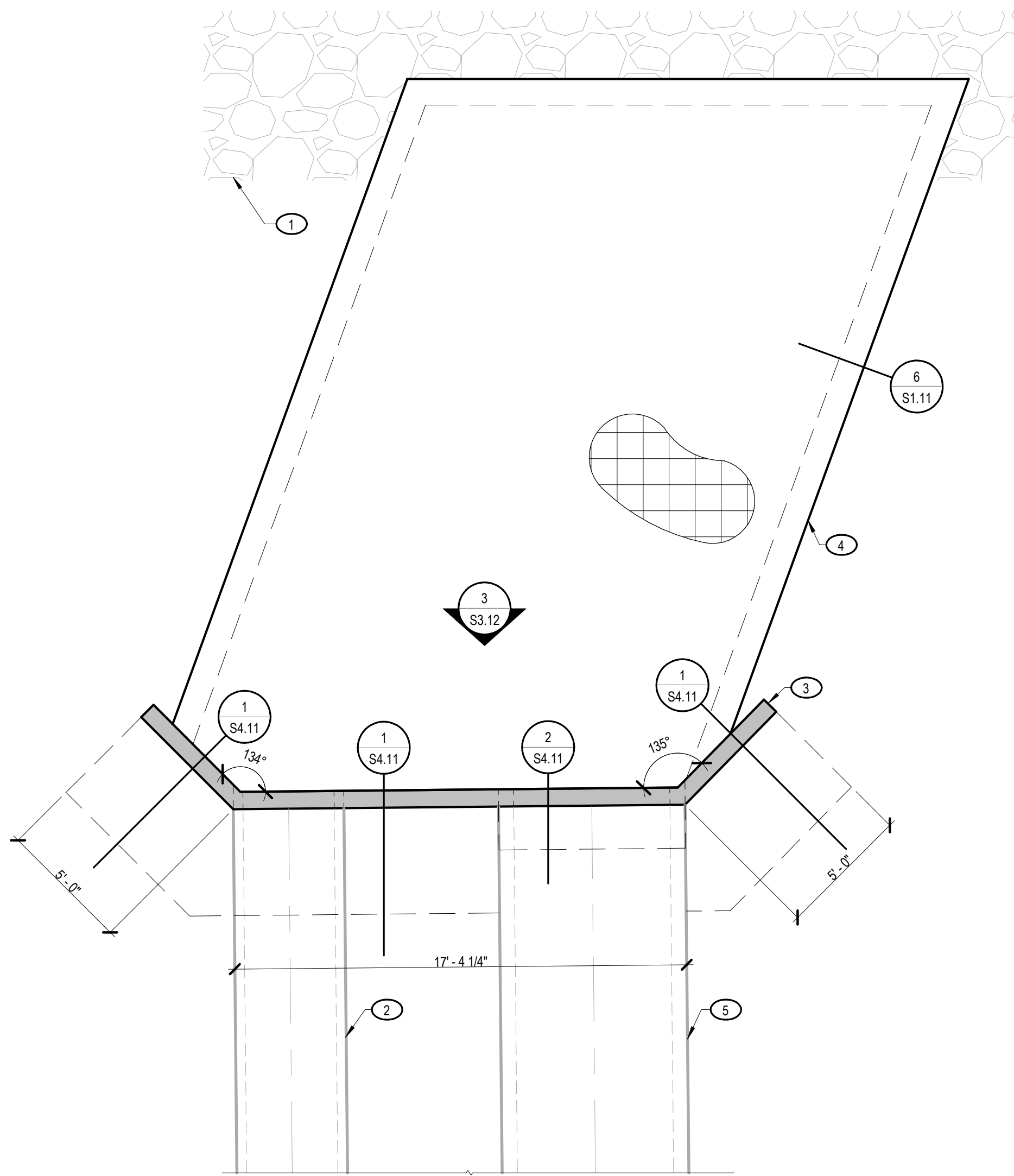
S3.10

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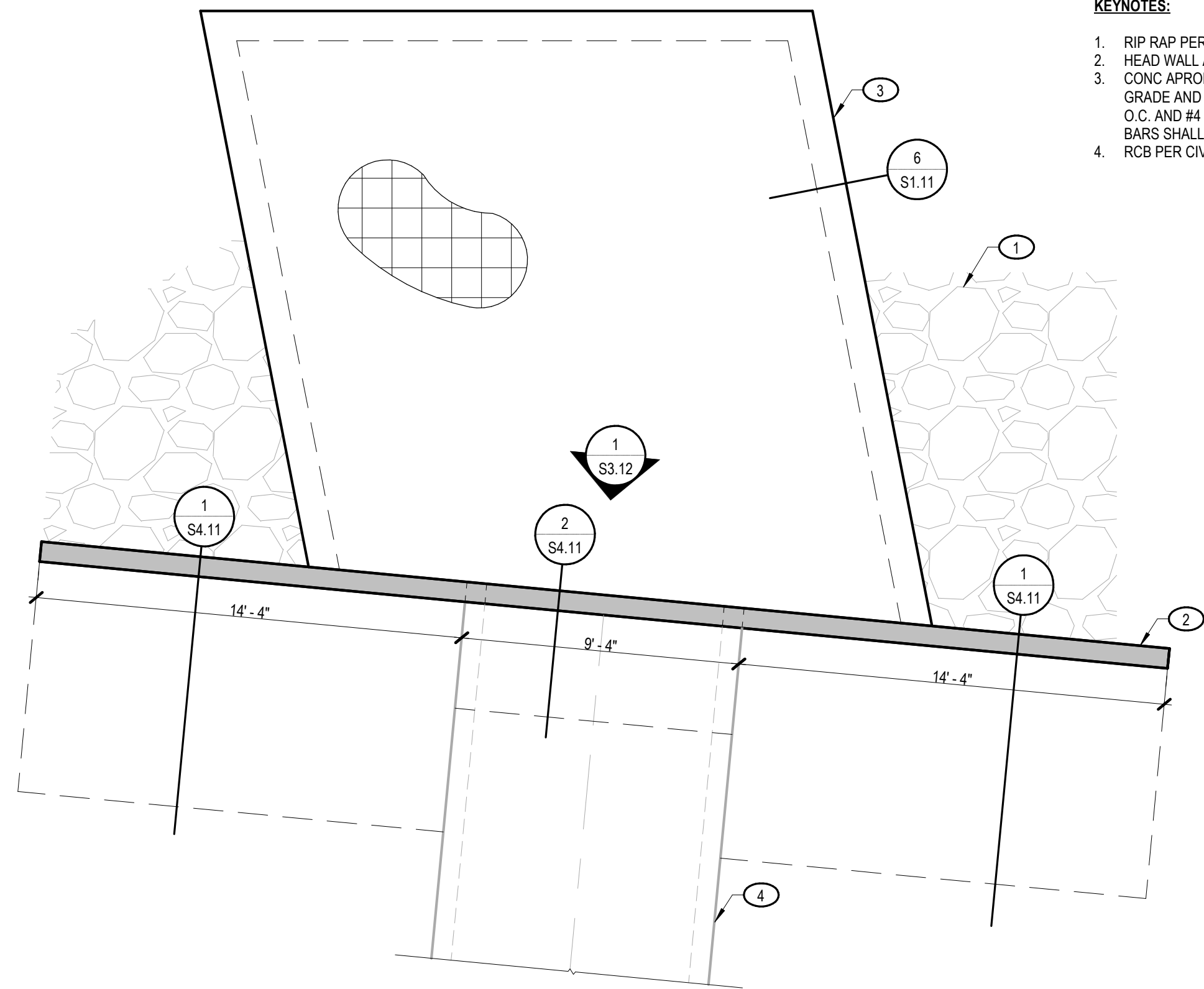
- KEYNOTES:
1. RIP RAP PER CIVIL
 2. WEEP HOLE ROCK POCKET, AND FILTER FABRIC PER TYP DETAIL ALONG ENTIRE LENGTH OF CULVERT EA SIDE. SPACING PER PLAN
 3. HEAD WALL AND WING WALLS
 4. CONC APRON TO BE 6" THICK SLAB ON GRADE AND REINF W/ #4 TRANS AT 12" O.C. AND #4 LONG AT 10" O.C. LONG BARS SHALL BE PLACED ON TOP.
 5. 7x5' RCB PER CIVIL
 6. 10x9' RCA

HEADWALL AT "SVR" 63+35.32, 59.08' RT



- KEYNOTES:
1. RIP RAP PER CIVIL
 2. 42" Ø PIPE PER CIVIL
 3. HEAD WALL AND WING WALLS
 4. CONC APRON TO BE 6" THICK SLAB ON GRADE AND REINF W/ #4 TRANS AT 12" O.C. AND #4 LONG AT 10" O.C. LONG BARS SHALL BE PLACED ON TOP.
 5. 6x6 RCB PER CIVIL

HEADWALL AT "SVR" 45+81.51, 90.19' LT

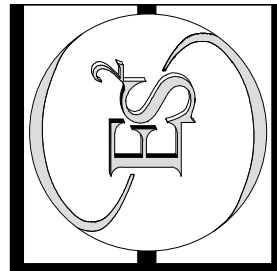


- KEYNOTES:
1. RIP RAP PER CIVIL
 2. HEAD WALL AND WING WALLS
 3. CONC APRON TO BE 6" THICK SLAB ON GRADE AND REINF W/ #4 TRANS AT 12" O.C. AND #4 LONG AT 10" O.C. LONG BARS SHALL BE PLACED ON TOP.
 4. RCB PER CIVIL

HEADWALL AT "SVR" 62+85.13, 96.62' LT



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SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

ENLARGED HEADWALLS

PROJECT:

SHEET TITLE:

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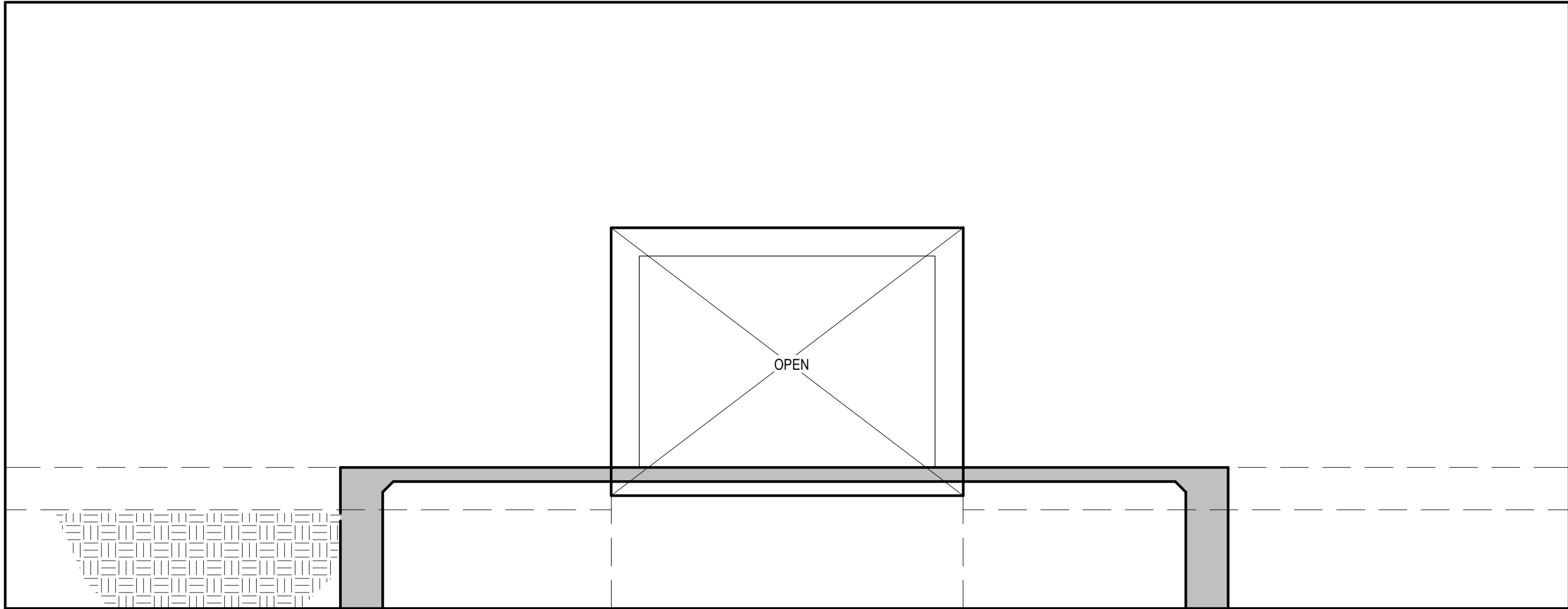
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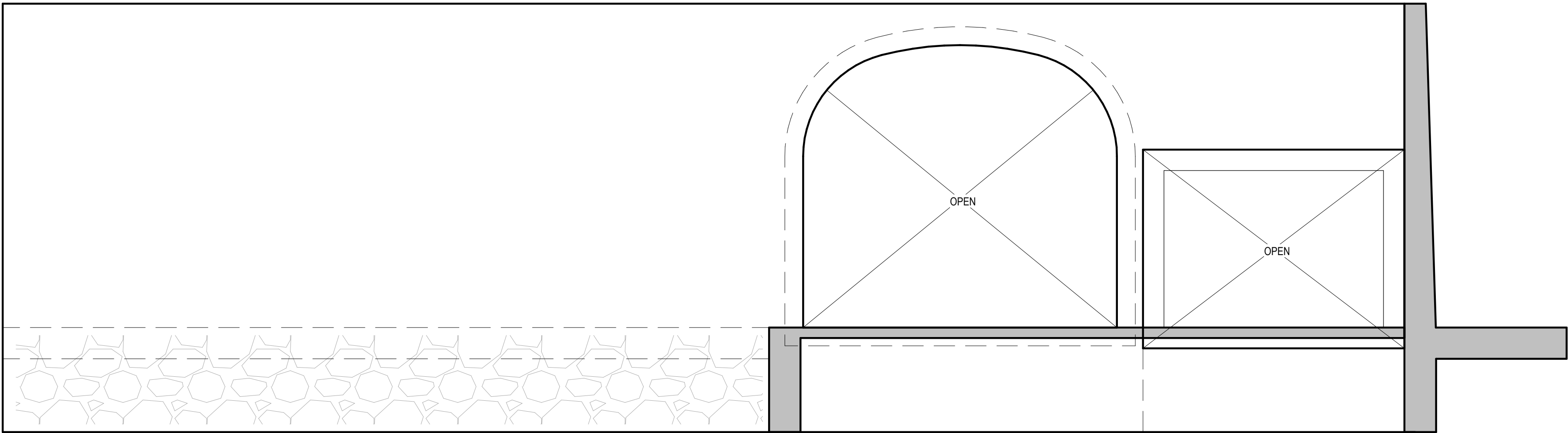
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SHEET NUMBER:

S3.11

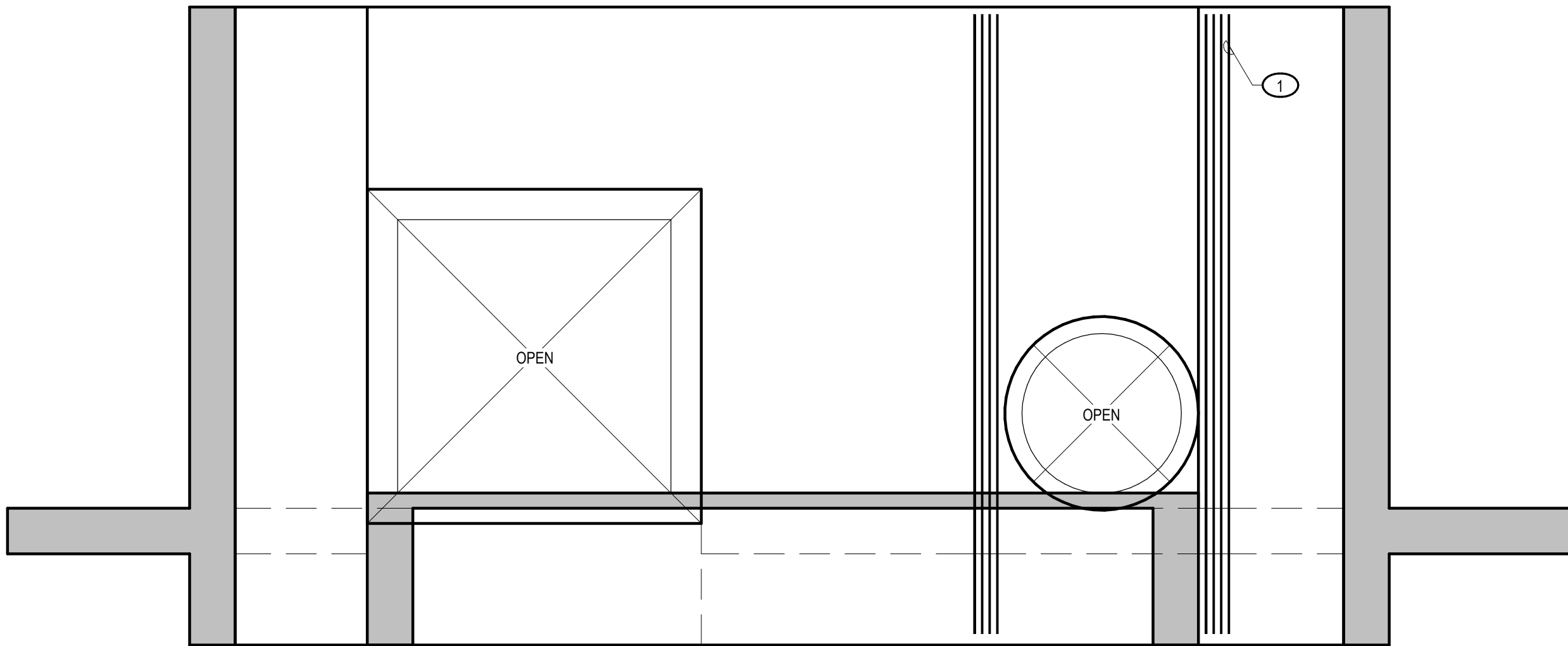
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1 HEADWALL AT "SVR" 62+85.13, 96.62' LT ELEVATION
S3.12 CUSTOM



2 HEADWALL AT "SVR" 63+35.32, 59.08' RT ELEVATION
S3.12



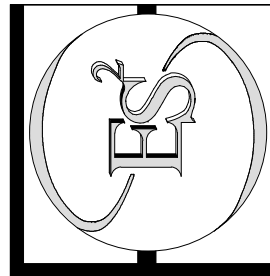
3 HEADWALL AT "SVR" 45+81.51, 90.19' LT ELEVATION
S3.12

KEYNOTES:

1. PROVIDE (4) VERT BARS EA SIDE OF RCP OPENING PER WALL DETAIL



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PROJECT: SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

SHEET TITLE: HEADWALL ELEVATIONS

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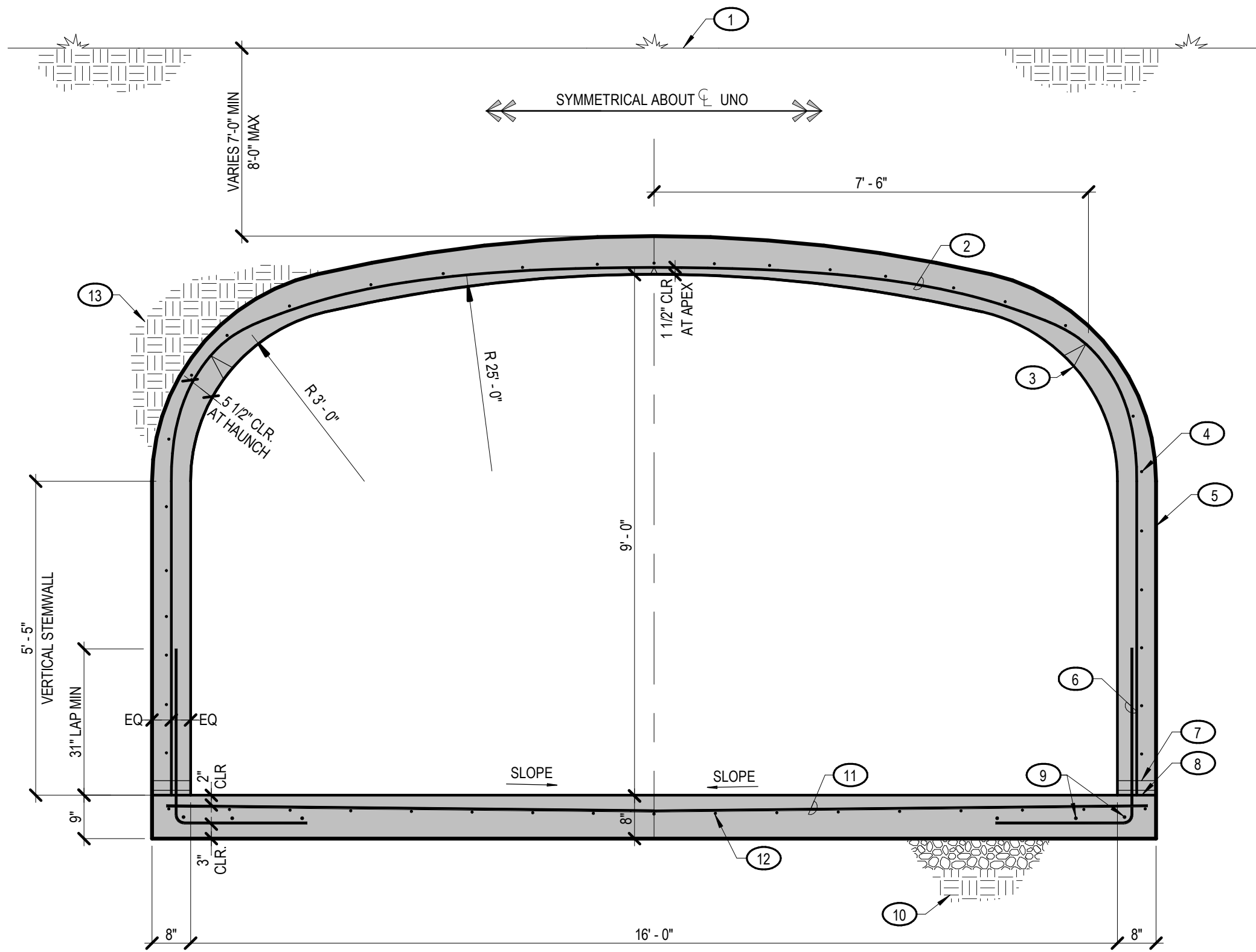
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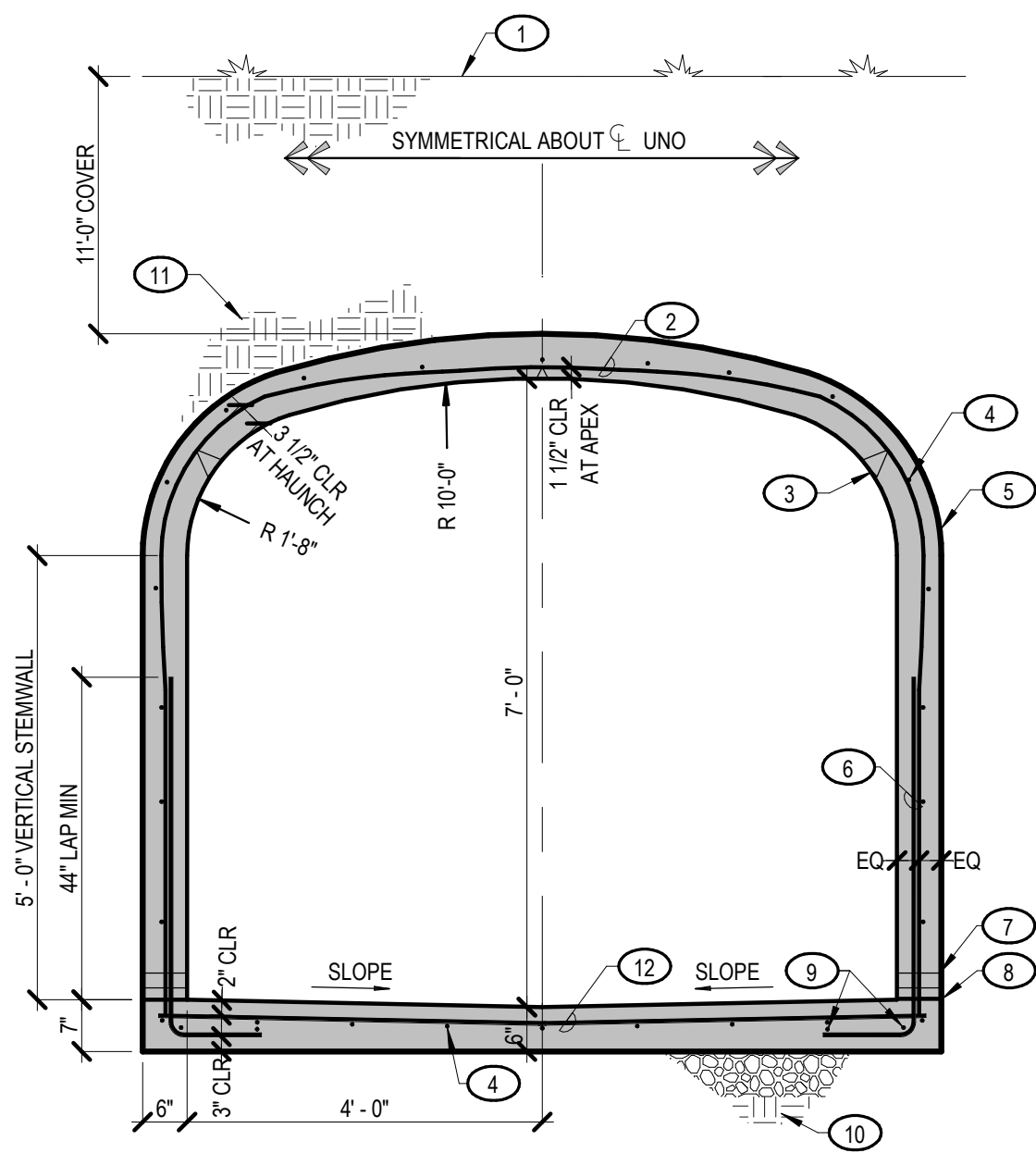
KEYNOTES:

1. FINAL GRADE
2. #4 TRANS AT 8" O.C.
3. REBAR CHAIR POINT
4. #4 LONG AT 10" O.C. LAP 18" MIN
5. WATER PROOF MEMBRANE COVER ARCH AND WALL ONLY
6. #4 DOWEL AT 8" O.C. W/ 36" HOOK AT BASE
7. WEEP HOLE PER PLAN
8. CONSTRUCTION JOINT ROUGHENED TO 1/4" AMPLITUDE
9. (3) #4 LONG. LAP PER TYP DETAIL
10. SUBGRADE PREPARATION PER TYP DETAIL
11. #4 TRANS AT 7" O.C.
12. #4 LONG AT 10" O.C. LAP 18" MIN
13. BACKFILL MATERIAL AND PROCEDURE PER TYP DETAIL

NOTES:

- A. ALTERNATE REINFORCING DETAILING MAY BE ACCEPTABLE PROVIDED SHOP DRAWINGS ARE SUBMITTED TO THE ENGINEER PRIOR TO CONSTRUCTION
- B. BAR LENGTHS IN TABLE ARE APPROXIMATE AND SHOULD BE USED FOR ESTIMATION PURPOSES ONLY

KEYNOTE	BAR LENGTH	SHAPE
2	31' - 5"	



KEYNOTES:

1. FINAL GRADE
2. #4 TRANS AT 9" O.C.
3. REBAR CHAIR POINT
4. #4 LONG AT 12" O.C. LAP 18" MIN
5. WATER PROOF MEMBRANE COVER ARCH AND WALL ONLY
6. #4 DOWEL AT 9" O.C. W/ 12" HOOK AT BASE
7. WEEP HOLE PER PLAN
8. CONSTRUCTION JOINT PER GSN
9. (2) #4 LONG. LAP PER TYP DETAIL
10. SUBGRADE PREPARATION PER TYP DETAIL
11. BACKFILL MATERIAL AND PROCEDURE PER TYP DETAIL
12. #4 TRANS AT 8" O.C.

NOTES:

- A. ALTERNATE REINFORCING DETAILING MAY BE ACCEPTABLE PROVIDED SHOP DRAWINGS ARE SUBMITTED TO THE ENGINEER PRIOR TO CONSTRUCTION
- B. BAR LENGTHS IN TABLE ARE APPROXIMATE AND SHOULD BE USED FOR ESTIMATION PURPOSES ONLY

KEYNOTE	BAR LENGTH	SHAPE
2	20' - 9"	

8'x7' ARCH CULVERT SECTION

S4.10 RCA113R

KEYNOTES:

1. FINAL GRADE
2. #4 TRANS AT 8" O.C.
3. REBAR CHAIR POINT
4. #4 LONG AT 10" O.C. LAP 18" MIN
5. WATER PROOF MEMBRANE COVER ARCH AND WALL ONLY
6. #4 DOWEL AT 8" O.C. W/ 12" HOOK AT BASE
7. WEEP HOLE PER PLAN
8. CONSTRUCTION JOINT ROUGHENED TO 1/4" AMPLITUDE
9. (2) #4 LONG. LAP PER TYP DETAIL
10. SUBGRADE PREPARATION PER TYP DETAIL
11. #4 TRANS AT 7" O.C.
12. #4 LONG AT 10" O.C. LAP 18" MIN
13. BACKFILL MATERIAL AND PROCEDURE PER TYP DETAIL
14. WARP CONCRETE ARCH GEOMETRY THROUGH TRANSITION
15. 10x9 RCA BEYOND

NOTES:

- A. ALTERNATE REINFORCING DETAILING MAY BE ACCEPTABLE PROVIDED SHOP DRAWINGS ARE SUBMITTED TO THE ENGINEER PRIOR TO CONSTRUCTION
- B. BAR LENGTHS IN TABLE ARE APPROXIMATE AND SHOULD BE USED FOR ESTIMATION PURPOSES ONLY

KEYNOTE	BAR LENGTH	SHAPE
2	31' - 5"	

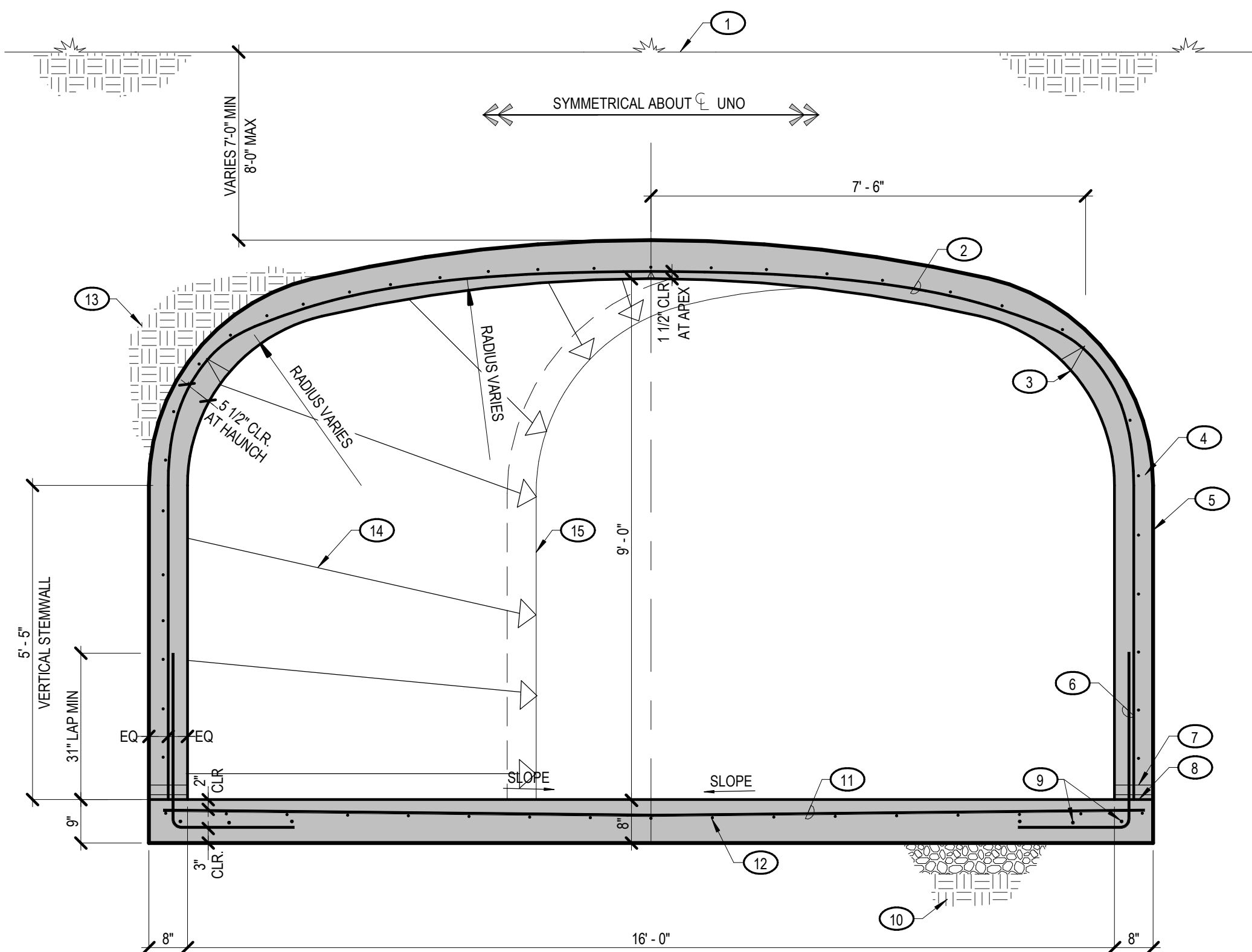
KEYNOTES:

1. FINAL GRADE
2. #4 TRANS AT 7 1/2" O.C.
3. REBAR CHAIR POINT
4. #4 LONG AT 12" O.C. LAP 18" MIN
5. WATER PROOF MEMBRANE COVER ARCH AND WALL ONLY
6. #4 DOWEL AT 7 1/2" O.C. W/ 12" HOOK AT BASE
7. WEEP HOLE PER PLAN
8. CONSTRUCTION JOINT ROUGHENED TO 1/4" AMPLITUDE
9. (2) #5 LONG. LAP PER TYP DETAIL
10. SUBGRADE PREPARATION PER TYP DETAIL
11. #4 TRANS AT 9" O.C.
12. BACKFILL MATERIAL AND PROCEDURE PER TYP DETAIL
13. #4 LONG AT 10" O.C. LAP 18" MIN.

NOTES:

- A. ALTERNATE REINFORCING DETAILING MAY BE ACCEPTABLE PROVIDED SHOP DRAWINGS ARE SUBMITTED TO THE ENGINEER PRIOR TO CONSTRUCTION
- B. BAR LENGTHS IN TABLE ARE APPROXIMATE AND SHOULD BE USED FOR ESTIMATION PURPOSES

KEYNOTE	BAR LENGTH	SHAPE
2	25' - 6"	



SECTION AT TRANSITION FROM 16'x9' RCA TO 10'x9' RCA

S4.10 RCA213

10'x9' ARCH CULVERT SECTION

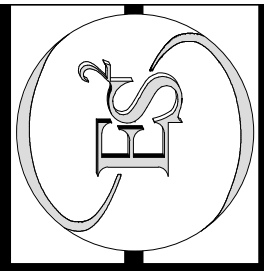
S4.10 RCA115R



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SKYE CANYON II PHASE 3A
HYDRO-ARCH
HENDERSON, NV

PROJECT:

ISSUE:
SUBMIT FOR PERMIT 07/26/2018

REVISIONS:

DESCRIPTION DATE

DRAWN:

PF

CHECKED:

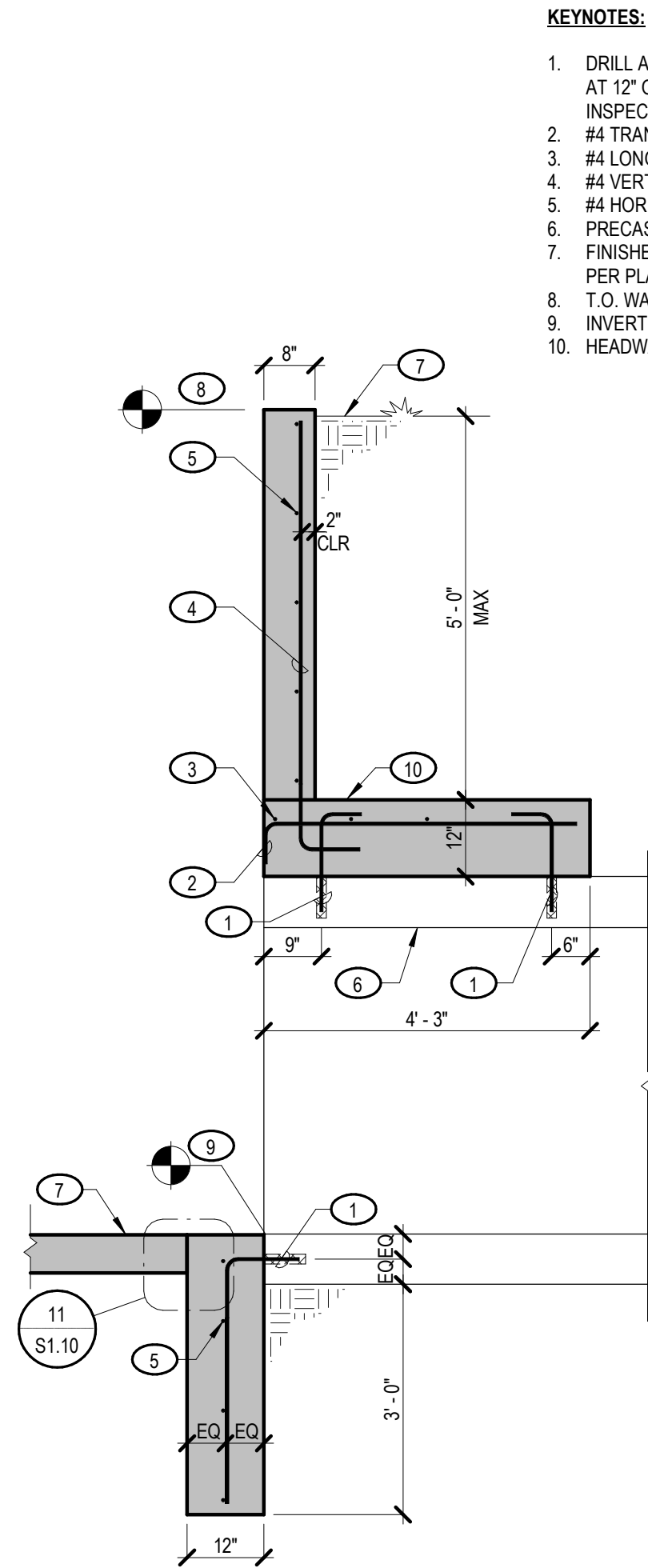
GM

PROJECT NUMBER: 18.2620
SHEET NUMBER:

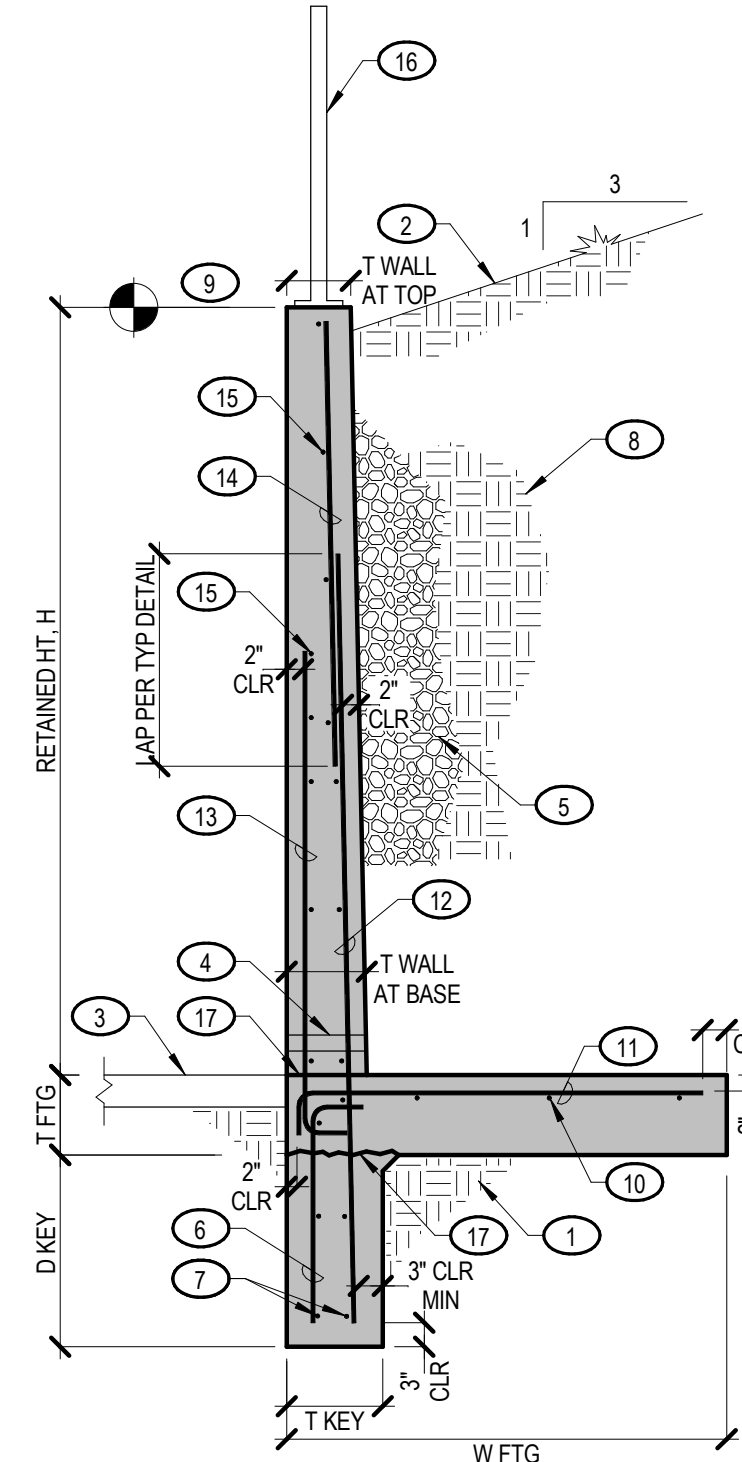
S4.10

SECTIONS

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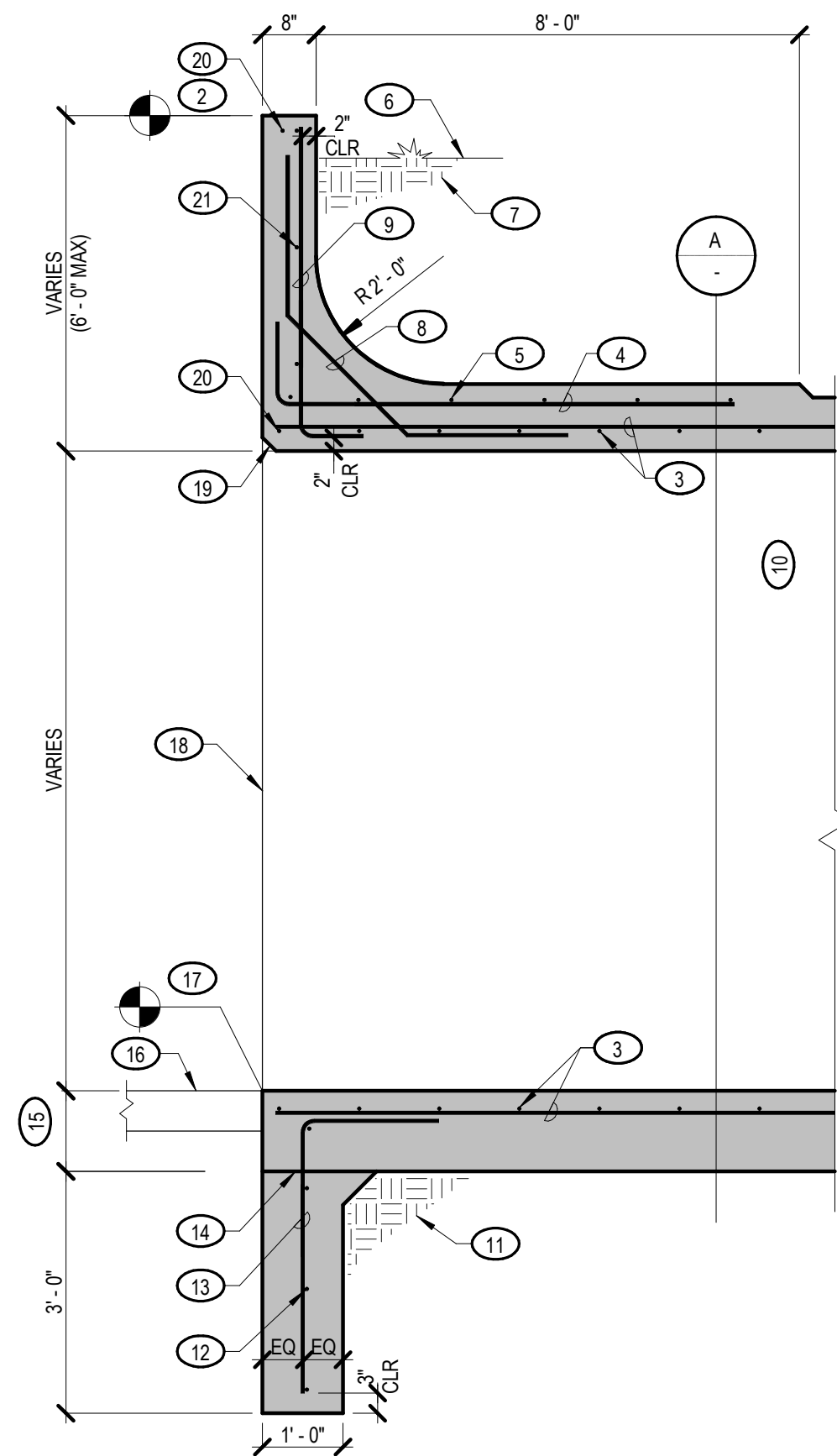
2
S4.11
R
HEADWALL AT PRECAST RCB



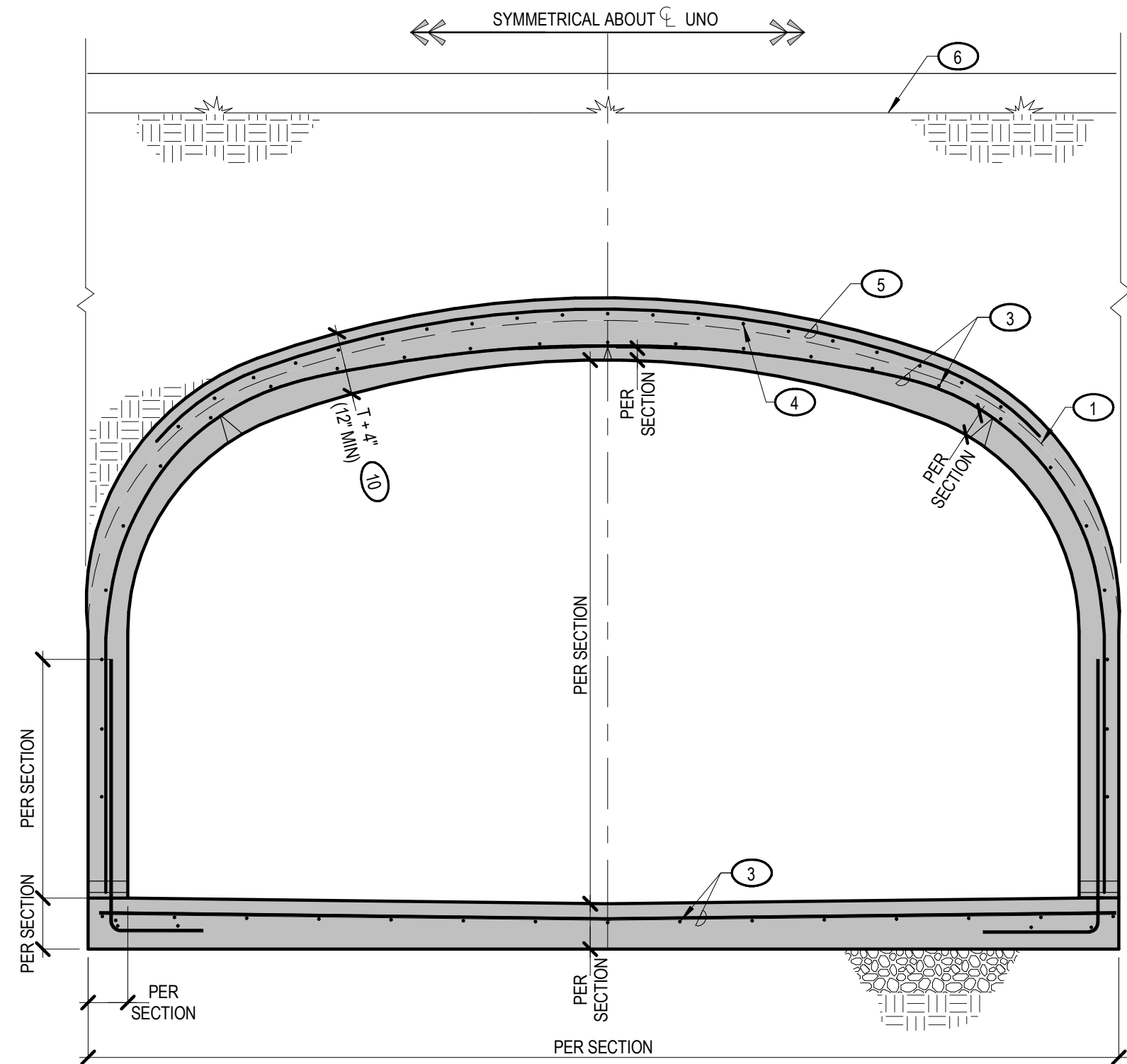
RETAINED HT H	D KEY	T KEY	W FTG	T FTG	T WALL AT TOP	T WALL AT BASE	A	B
UP TO 7'-0"	2'-0"	1'-0"	4'-9"	12"	8"	8"	-	-
UP TO 11'-0"	2'-0"	1'-0"	7'-9"	14"	8"	10"	-	-

RETAINED HT H	11 FTG TRANS	12 WALL DOWEL SOIL SIDE	13 WALL DOWEL OUTSIDE	14 WALL VERT SOIL SIDE	15 WALL HORIZ
UP TO 7'-0"	#4 AT 12	#4x65" AT 9	NOT REQUIRED	#4 AT 12	#4 AT 12
UP TO 11'-0"	#6 AT 11	#6x102" AT 6	NOT REQUIRED	#4 AT 12	#4 AT 10

1
S4.11
W502R
SECTION AT WINGWALL/RETAINING WALL



3
S4.11
RCA224
TYPICAL THICKENED SECTION AT HEADWALL



SECTION A

- KEYNOTES:**
1. PROFILE OF TYPICAL ARCH THICKNESS PER APPROPRIATE SECTION
 2. TOP OF HEADWALL ELEV PER CIVIL
 3. TYPICAL ARCH REINF PER APPROPRIATE SECTION
 4. #5x8'-6" W/ STD HOOK AT 12" O.C. PLACE RADIALLY AROUND ARCH
 5. #4 TRANS AT 12" O.C. AT THICKENED SECTION
 6. FINAL GRADE PER CIVIL
 7. BACKFILL MATERIAL AND PROCEDURE PER TYP DETAIL
 8. #4 AT 18" O.C. PLACE RADIALLY AROUND ARCH. BEND 24" ENDS AS REQ'D
 9. #5 VERT DOWEL AT 12" O.C. W/ STD HOOK INTO ARCH
 10. THICKENED CULVERT SECTION TO EXTEND BEYOND HEADWALL AS SHOWN
 11. SUBGRADE PREPARATION PER TYP DETAIL
 12. #4 HORIZ AT 12" O.C.
 13. #4 AT 12" O.C. W/ 24" HOOK INTO INVERT SLAB
 14. CONSTRUCTION JOINT ROUGHENED TO 1/4" AMPLITUDE
 15. INVERT THICKNESS PER ARCH SECTION
 16. FLAT WORK PER CIVIL
 17. INVERT ELEV PER CIVIL
 18. END OF ARCH/FACE OF WING WALL BEYOND 2" CHAMFER
 20. (2) #5 HORIZ BARS ABOVE OPENING AND AT T.O. WALL. EXTEND 4'-0" MIN PAST EDGE OF OPENING INTO WINGWALLS
 21. #4 HORIZ AT 10" O.C.

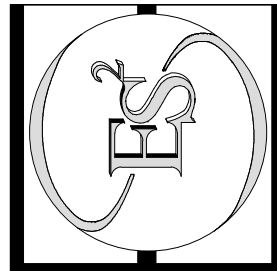
- NOTES:**
- A. CHAMFER ALL EXTERIOR CONC EDGES
 - B. AT ARCH MAX HT, HEADWALL WILL BE SHORTEST. ADJUST VERT BARS AS NEEDED
 - C. "PER SECTION" INDICATES TO REFER TO ADJACENT ARCH SECTION



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HENDERSON, NV

HEADWALL SECTIONS

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REVISIONS:

#	DESCRIPTION	DATE
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DRAWN:

PF

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GM

PROJECT NUMBER: 18.2620
SHEET NUMBER:

S4.11