A. DESIGN CRITERIA

1. Design Codes:
   a. International Building Code: IBC 2018
   b. Minimum Design Loads for Buildings and Other Structures: ASCE 7-16
2. Design Loads:
   a. Dead Loads
      Self Weight = 145 pcf
   b. Live Loads
      HL-93 = 16 kip
   c. Wind Load
      Basic Design Wind Speed, V = 109 mph (3 sec. Gust)
      ASD Wind Speed, V_{asd} = 85 mph
      Risk Category = II
      Wind Exposure = C
      Internal pressure Coefficient (GC_{pi}) = ±0.18
   d. Earthquake Load
      Risk Category = II
      Seismic Importance Factor (I) = 1.0
      Mapped Spectral Response Acceleration Parameters
      S_S = 0.099g S_1 = 0.068g
      Design Spectral Response Acceleration Parameters
      S_{DS} = 0.086 S_{D1} = 0.068
      Soil Site Class = C
      Seismic Design Category = B
      Seismic loads not required to be considered for this application
3. Soil Properties:
   a. Soil properties are based on the project geotechnical report entitled Geotechnical Engineering Report Discovery Park Lot 2, prepared by Olsson on Aug. 08, 2023 (herein known as "Geotechnical Report").
   b. Lateral Earth Pressure:

Cohesive Earth Pressure Coefficient (k), Active	= 0.42
Granular Earth Pressure Coefficient (k), Active	= 0.31
Cohesive Material, at Rest:	= 71 pcf
Cohesive Material, Active:	= 51 pcf
Granular Material, at Rest:	= 56 pcf
Granular Material Active:	= 37 pcf
In situ backfill Density	= 120 pcf

   c. Allowable Soil Bearing Pressure = 2500 psf

B. SPECIALTY STRUCTURAL ENGINEERING DESIGN SCOPE

1. The information contained on these drawings produced by McClure Engineering Company (McClure, MEC) and the associated Specialty Structural Engineering (SSE) design is limited to the following items:
   a. Reinforced cast-in-place concrete bends in the culvert – limited to items identified on the drawings.
   b. Reinforced cast-in-place concrete ends to the culvert – limited to items identified on the drawings.
2. The following items are specifically excluded from McClure's design scope as represented on these drawings:
   a. Documentation of general design criteria applicable to the whole structure, which is the responsibility of the designer(s) of record.
   b. Global stability of soil mass.
   c. Shoring design, formwork design, temporary bracing, and other means and methods items.
   d. Responsibility for review of submittals (aside from concrete & reinforcing) – this responsibility falls to the Contractor, Architect, and Engineer of Record.
   e. Precast portions of the culvert including interconnection detailing with C.I.P. portions
3. The following contract documents form the basis of design for McClure's scope of work:
   a. Civil Drawings provided by Olsson dated 09/08/2023
   b. Structural Drawings provided by Hart Creek Engineering dated 10/23/2023

C. GENERAL NOTES

1. All construction shall conform to the standards referenced in "Design Criteria".
2. The structural drawings are intended to be utilized in conjunction with other design consultant's drawings (Civil, Structural, etc.). It is the responsibility of the contractor to coordinate the requirements of the drawings into their shop drawings and construction.
3. See Specifications or Notes on drawings for materials of construction.
4. Contractor shall verify all dimensions and conditions at the job site before commencing work and shall report any discrepancies to the engineer.
5. Omissions or conflicts between various elements of the drawings, notes and details shall be brought to the attention of the engineer and resolved before proceeding with the work.
6. Do not use scaled dimensions; use written dimensions or where no dimension is provided, consult the engineer for clarification before proceeding with the work.
7. Details and keynotes shown shall be incorporated into the project at all appropriate locations whether specifically called out or not.
8. Refer to structural, and civil drawings for location and size of block outs, inserts, openings, curbs, bases & pads, and dimensions not shown on the structural drawings.
9. Refer to the structural/civil drawings for size and location of doors and window openings, dimensions not shown on structural drawings, exterior wall assemblies, and floor, wall and roof finishes.
10. Construction sequence and methods
    a. Construction Loads have not been considered and the Contractor must brace all elements of the structure during construction.
    b. The structural drawings are intended for the structure to act as a whole once construction is complete. It is the responsibility of the contractor to ensure safety and stability during construction as a result of means and sequence by providing shoring, bracing etc. as required.
       i. Temporary bracing shall remain until positive connection is made to shear walls (with floor diaphragm). This is a means and methods item.
    c. The contractor shall consider the effects of thermal movements due to hot or cold weather or extreme temperature variations.
    d. Any foundation wall restrained by a floor is not designed to be backfilled prior to the floor being in place unless temporary bracing is designed and provided.

D. SUBMITTAL REQUIREMENTS

1. Submittal Procedures:
   a. The Contractor shall provide all submittals in PDF format unless otherwise requested or indicated in the Project Specifications.
   b. All submittals must be reviewed by the Contractor prior to McClure's review. The Contractor is responsible for reviewing each submittal for basic coordination with these drawings and to verify that all the required components of the submittal are incorporated. The submittal must bear the electronic review stamp of the Contractor before McClure will proceed with the review.
   c. Incomplete submittals or submittals not meeting the requirements of this section will not be reviewed. McClure will notify the contractor that the submittal is incomplete or unacceptable and that resubmission is required.
      i. Shop Drawings shall be original drawings. Submissions incorporating any portion or reproduction of the contract documents will not be reviewed.
      ii. Resubmittals with comments from a previous review left unaddressed or without any response will not be reviewed.
   d. Allow two weeks for review of all submittals unless an agreement for expedited review is made in writing by McClure.
   e. McClure's submittal review scope of work includes a single submittal review and one review of the revised submittal if required (two reviews total of the same submittal). Time required for more than two reviews of a submittal is considered an additional service and will be billed hourly. McClure reserves the right to withhold review of a submittal surpassing this allowance until proper billing to the responsible party can be established.
   f. Submittals must be returned to the Contractor by McCure bearing a stamp marked "Reviewed No Exception Taken" or "Reviewed With Comments/Exceptions" prior to proceeding with the work. Submittals marked "Reject/Resubmit" must be revised according to the comments provided prior to commencing with the respective scope of work.
2. Submittal List:
   a. Submittals (product data, test records, shop drawings, and/or calculations) are required for the following:

Submittal Name	Items Required:				
	Product Data	Shop Drawings	Test Records	Engineering Drawings	Engineering Calculations
1. Concrete Mix Designs	X		X		
2. Concrete Break Reports			X		
3. Concrete Reinforcing Layout		X			

   b. "Product Data" may indicate mill certifications, material data sheets, Evaluation Service Reports (ESRs), etc. See requirements of each material section of the general notes for further information.

E. CONCRETE

1. Reinforced concrete shall have the following minimum 28 day compressive strengths:
   a. Cast in Place (C.I.P.) Culverts 6000 psi normal weight
2. All concrete exposed to weather shall have 6% (+- 1%) air entrainment.
3. Submit mix designs for all concrete mixes prior to placement. All submittals shall include the following:
   a. Batch quantities including admixture dosage rates.
   b. Strength test results for trial mixes.
   c. Aggregate source(s) and gradation(s).
   d. Product data for cement, fly ash and other cementitious materials.
   e. Product data for all admixtures.
4. Provide protection for reinforcing bars as follows:
   a. Concrete cast against and permanently exposed to earth 3"
   b. Concrete exposed to earth and weather (formed)
      i. #5 and smaller 1-1/2"
      ii. #6 and larger 2"
5. Interface of all slab and wall construction joints shall be roughened with 1/4" amplitude. Surface of construction joints shall be clean and free of laitance. Immediately before new concrete is placed, construction joints shall be wetted and standing water removed.
6. Construction joints in walls shall be keyed and placed at locations approved by the Civil and Structural Engineer.
7. Provide PVC waterstops in all below grade construction joints and at other locations as shown.
8. Sleeves and openings in slabs not shown on structural drawings or outside the parameters of typical sleeve details are not permitted, unless approved by the Structural Engineer.
9. Conduit and pipes embedded in slabs, walls, or grade beams shall be no larger in outside dimension than 1/3 the overall member thickness and shall be placed no closer than 3 diameters or widths on center.
10. All exposed concrete edges shall have a ¾" chamfer on corners.
11. Foundation walls shall be temporarily braced until positive attachment is made to lid framing (obtaining a minimum strength of 4,000psi) per details. This is a means and methods item.

Slab on Grade

1. Slab shall be constructed as shown on plans.
2. Refer to Civil drawings for culvert substrate.
3. Concrete slab to be cured according to ACI Standards. Concrete slab cure to be compatible with any sealer, grout, or adhesive that may be used on the floor later.

Subsurface Requirements

1. Foundation design is based on geotechnical report by Olsson, dated August 08, 2023.

F. REINFORCING FOR CONCRETE

1. General
   a. All reinforcing steel to be ASTM A615, Grade 60, deformed bars, unless noted otherwise.
      i. Any reinforcing to be welded shall be ASTM A706 and welded with E80 electrodes.
      ii. Alternatively, ASTM A615 reinforcing may be welded with E90 electrodes and proper preheat according to AWS D1.4.
      iii. E70 electrodes are not permitted for welding rebar.
   b. All reinforcing bars to be detailed and placed in accordance with the ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures" specifications.
   c. All reinforcing, including dowels, shall be securely tied and cast with the lower member. Placing reinforcing after concrete has been placed will not be permitted.
   d. Field bending of reinforcing partially embedded in concrete will not be allowed unless specifically noted on the drawings or approved by the Structural Engineer.
   e. All reinforcing bars shall be contact lap spliced or doweled as follows, unless noted otherwise:

Tension Development and Splice Lengths for f'_c = 5,000psi

Bar Size	*Development* Top Bar	*Development* Other Bar	*Class "B" Splice* Top Bar	*Class "B" Splice* Other Bar	*Standard 90 deg. Hook* Embed	Leg Length	Bend Dia.
#3	17	13	22	17	6	6	2-1/4
#4	22	17	29	22	6	8	3
#5	28	22	36	28	8	10	3-3/4
#6	33	26	43	33	9	12	4-1/2
#7	49	37	63	49	11	14	5-1/4
#8	55	43	72	55	12	16	6
#9	63	48	81	63	14	19	9-1/2
#10	70	54	91	70	15	22	10-3/4
#11	78	60	101	78	17	24	12
#14	94	72	---	---	29	31	18-1/4
#18	125	96	---	---	39	41	24

1. Straight development and Class "B" splice lengths shown in above tables are based on uncoated bars assuming center-to-center bar spacing ≥ 3"d_b without ties or stirrups or ≥ 2"d_b with ties or stirrups, and bar clear cover ≥ 1.0"d_b. Normal weight concrete as well as no transverse reinforcing are both assumed.
2. Standard 90 deg. hook embedment lengths are based on bar side cover ≥ 2.5" and bar end cover ≥ 2" without ties around hook.
1. For special seismic considerations, refer to ACI 318 Code Chapter 21.
3. All tension splices shall be Class "B" splices unless noted otherwise on plans.

   f. Provide (2) #8 x 6'-0" diagonals at all corners of openings and re-entrant corners, unless noted otherwise.
   g. Dowels between foundation and walls shall be installed and shall be the same grade, size, and spacing as the vertical wall reinforcing, unless noted otherwise.
   h. Provide corner bars to match longitudinal reinforcing in all footings. Provide (2) corner bars at tee intersections.
2. Slabs and Slabs-on-Grade
   a. All slabs on grade to be reinforced per details.
3. Walls
   a. Provide corner bars in the outside face and at wall intersections to match horizontal wall bars. Use (3) #5 vertical construction rods at corners.
   b. Minimum reinforcing shall be as follows for each wall thickness, unless noted otherwise:
      6" wall – #4@18 one layer 24" wall – #7@16 Ea. Face
      8" wall – #4@18 one layer 30" wall – #7@12 Ea. Face
      10" wall – #4@18 Ea. Face
      12" wall – #5@18 Ea. Face
   c. Provide #5 at 12" o.c. each way unless noted otherwise.

G. FOUNDATIONS

1. Foundation design is based on Geotechnical Report prepared by Olsson on Aug 08, 2023.
2. The Contractor shall provide dewatering of excavations from surface water and ground water. Do not place concrete if water is present at base of excavation.
3. See notes on sheets and details for additional information.

H. RETAINING STRUCTURES

1. Materials:
   a. Materials shall conform to the following, unless noted otherwise.
      i. The minimum 28-day concrete compressive strength shall be 6,000 psi (UNO) and shall comply with ACI 318.
      ii. Reinforcing steel shall comply with ASTM A615 and shall have yield strength of 60 ksi.
1. Fabricator:
   a. Structural members shall be detailed, fabricated, and erected in accordance with the latest edition of ACI 318.
2. Erection:
   a. Minimum reinforcement of retaining structures shall comply with ACI 318 Chapter 14.
   b. The footing of the retaining wall shall be at a minimum of 24" below the finished grade.
      i. Where soil under footing consists of soft clay, place 4" to 6" of crushed gravel.
3. Backfill and Drainage:
   a. Backfilling against concrete retaining structures shall not be permitted until the concrete has reached its 28-day strength unless walls are braced or lid is poured and has reached 5,000psi.
      i. Heavy equipment shall not be allowed within a distance equivalent to the height of the retaining wall.
      ii. Large impact forces to the wall should be avoided.
   b. Drainage:
      i. Refer to Civil drawings and Geotechnical Report for backfill material and drainage requirements.

McCLURE™
2001 W Broadway
Columbia, MO 65203
P 573-814-1568

MISSOURI CERTIFICATE OF AUTHORITY
NO. E-2006022253
EXPIRES: DECEMBER 31, 2024

STATE OF MISSOURI
CELESTE KAY SPICKERT
NUMBER PE-2006022213
PROFESSIONAL ENGINEER

02/20/2024

CELESTE SPICKERT
20060022
12/31/2024

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MISSOURI.

No.	Description	Date

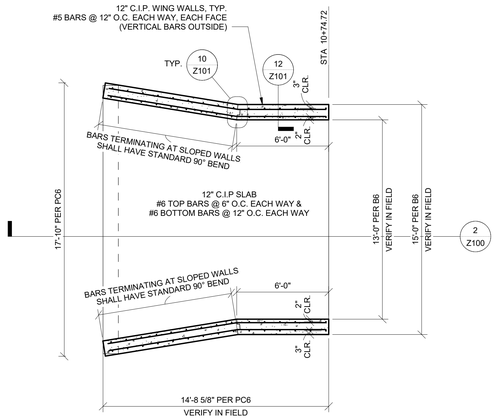
PROJECT NUMBER 2023000333
SET ISSUE DATE
ENGINEER IWC
DRAWN BY MHS
CHECKED BY CKS

ROSEMANN & ASSOCIATES
THE VILLAGE AT DISCOVERY PARK
CAST IN PLACE BOX CULVERTS
LEE'S SUMMIT, MO

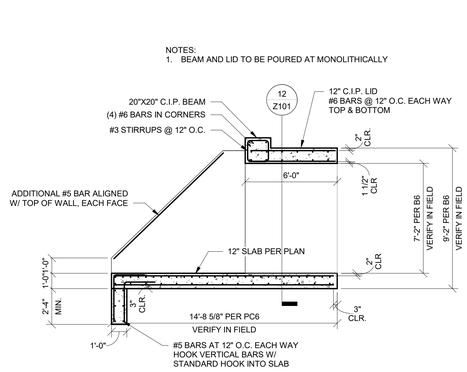
GENERAL NOTES

Autodesk Docs://2023000333 - Discovery Park Lee's Summit/CULVERTS.rvt

DRAWING NO.
Z001



1 Z100 PLAN OF END SECTION - SEE1/PC6 IN PRECAST DRAWINGS
1/4" = 1'-0"



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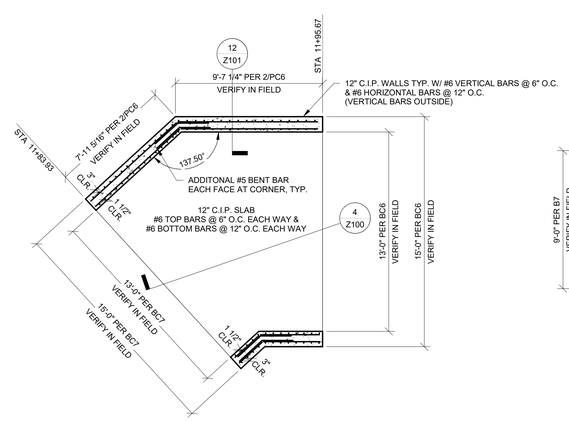
1/4" = 1'-0"



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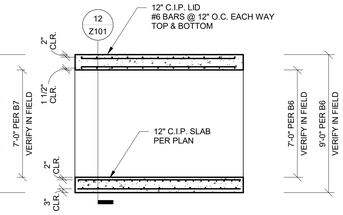

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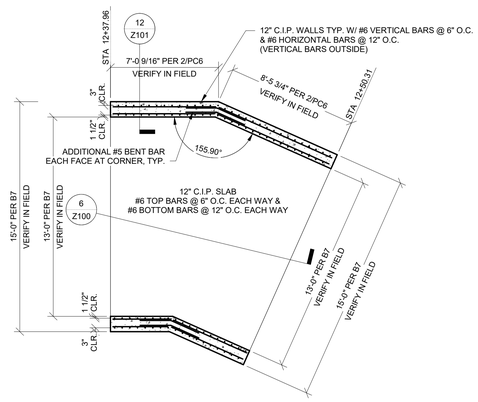
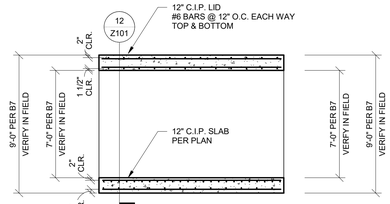
1/4" = 1'-0"



5 Z100 PLAN OF BEND SECTION 2 - SEE 2/PC6 IN PRECAST DRAWINGS
1/4" = 1'-0"



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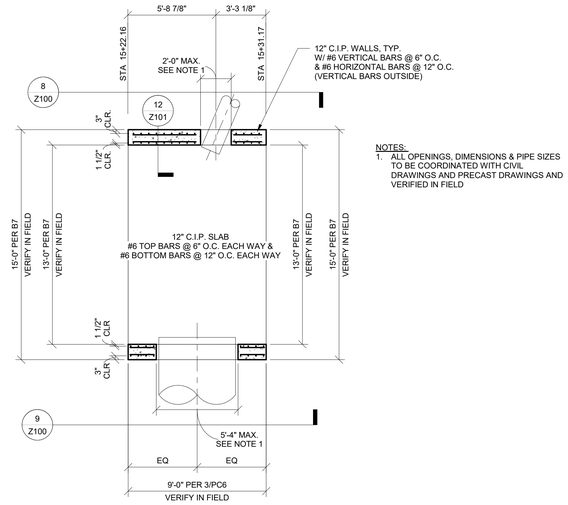
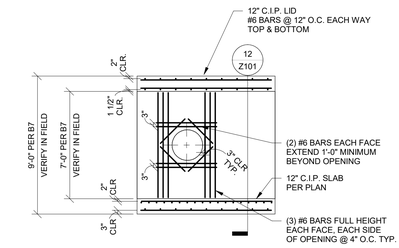
1/4" = 1'-0"



NOTES:
1. ALL OPENINGS, DIMENSIONS & PIPE SIZES TO BE COORDINATED WITH CIVIL DRAWINGS AND PRECAST DRAWINGS AND VERIFIED IN FIELD

7 Z100 PLAN OF STORM LINE D TIE IN - SEE3/PC6 IN PRECAST DRAWINGS
1/4" = 1'-0"



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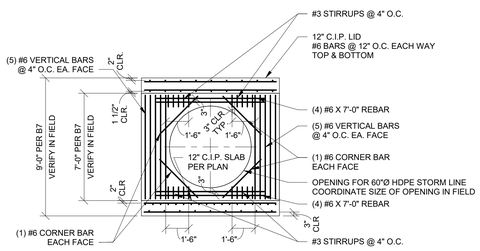
1/4" = 1'-0"



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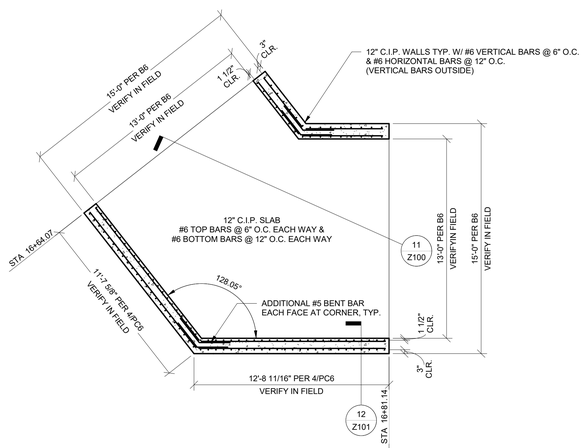

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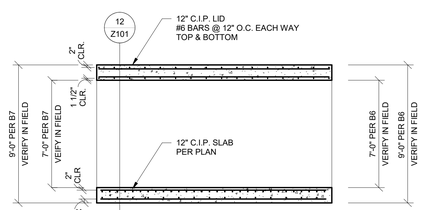

11 Z100 BEND SECTION 3 - SECTION
1/4" = 1'-0"

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NOTICE:
McClure Engineering Co. is not responsible or liable for any issues, claims, damages, or losses (collectively, "Losses") which arise from failure to follow these Plans, Specifications, and the engineering intent they convey, or for Losses which arise from failure to obtain and/or follow the engineers' or surveyors' guidance with respect to any alleged errors, omissions, inconsistencies, ambiguities, or conflicts contained within the Plans or Specifications.

MISSOURI CERTIFICATE OF AUTHORITY
NO. E-2006022253
EXPIRES: DECEMBER 31, 2024

STATE OF MISSOURI
CELESTE KAY SPICKERT
NUMBER PE-2006022213
PROFESSIONAL ENGINEER

02/20/2024

CELESTE SPICKERT
20060022
12/31/2024

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MISSOURI.

No.	Description	Date

PROJECT NUMBER
2023000333

SET ISSUE DATE

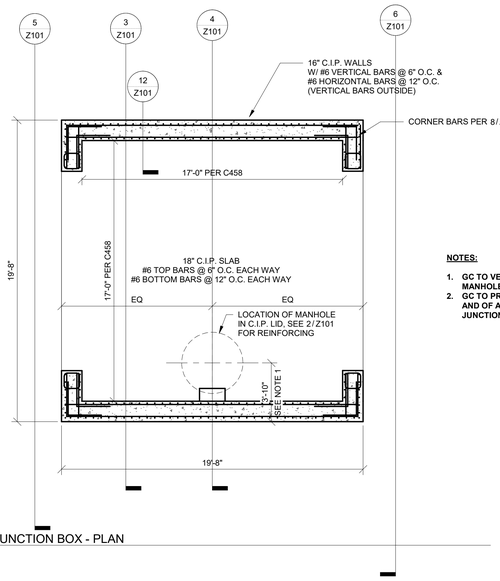
ENGINEER	DRAWN BY	CHECKED BY
IWC	MHS	CKS

ROSEMANN & ASSOCIATES
THE VILLAGE AT DISCOVERY PARK
CAST IN PLACE BOX CULVERTS
LEE'S SUMMIT, MO

PLANS AND SECTIONS

Autodesk Docs://2023000333 - Discovery Park Lee's Summit/CULVERTS.rvt

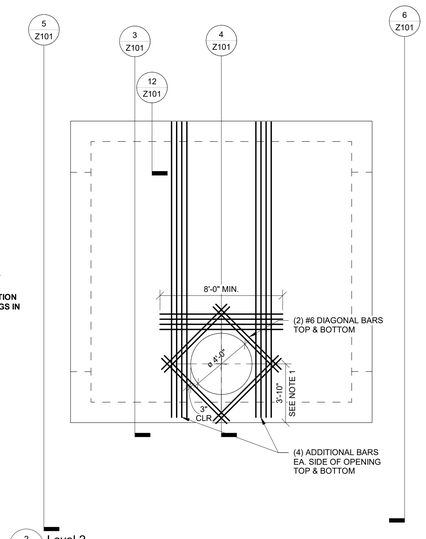
DRAWING NO.
Z100



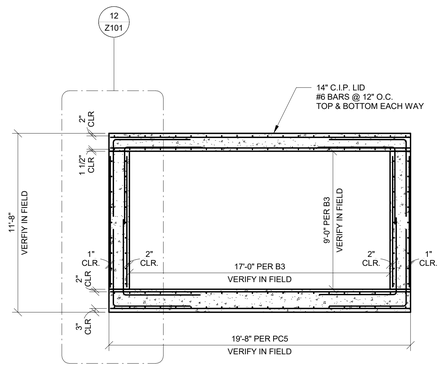
NOTES:

1. **GC TO VERIFY LOCATION OF MANHOLE IS ACCEPTABLE**
2. **GC TO PROVIDE SIZE LOCATION AND OF ALL OTHER OPENINGS IN JUNCTION BOX**

1 Z101 17'X17' JUNCTION BOX - PLAN
1/4" = 1'-0"



2 Z101 Level 2
1/4" = 1'-0"



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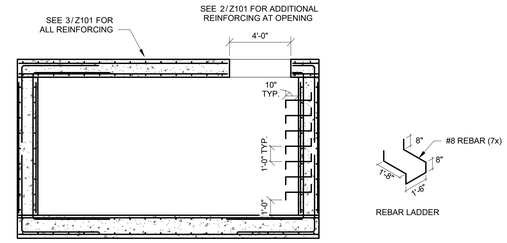
1/4" = 1'-0"



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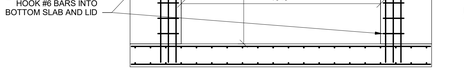
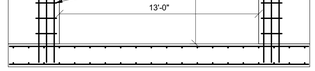


NOTES:
1. SEE 3/Z101 FOR REINFORCING IN BASE SLAB AND LID

5 Z101 17'X17' JUNCTION BOX ELEVATION 1
1/4" = 1'-0"



NOTES:
1. SEE 3/Z101 FOR REINFORCING IN BASE SLAB AND LID

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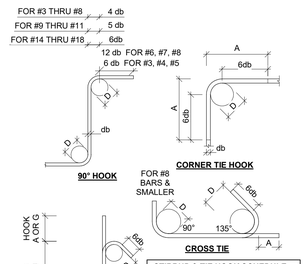
1/4" = 1'-0"

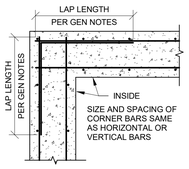


STIRRUP & TIE HOOK SCHEDULE

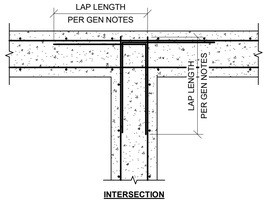
BAR SIZE	D (IN.)	90° HOOK A OR G (IN.)	135° HOOK A OR G (IN.)
#3	1 1/2	4	4
#5	2 1/2	6	5 1/2

D = INSIDE DIAMETER OF BEND

7 Z101 BAR BENDING DETAIL
3/4" = 1'-0"

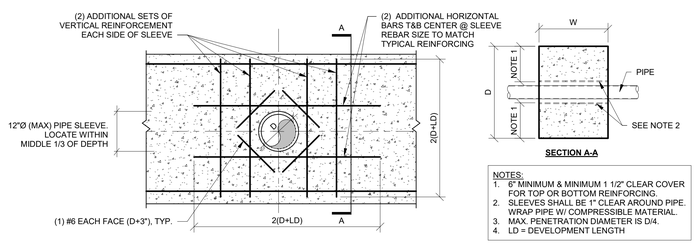


EXTERIOR CORNER



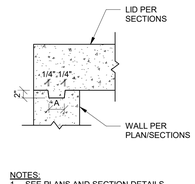
INTERSECTION

8 Z101 CORNER BAR DETAIL
3/4" = 1'-0"



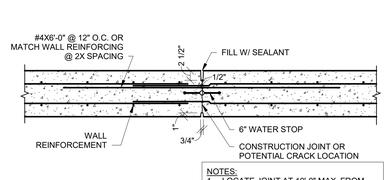
NOTES:
1. 6" MINIMUM & MINIMUM 1 1/2" CLEAR COVER FOR TOP OR BOTTOM REINFORCING.
2. SLEEVES SHALL BE 1" CLEAR AROUND PIPE. WRAP PIPE W/ COMPRESSIBLE MATERIAL.
3. MAX. PENETRATION DIAMETER IS D/4.
4. LD = DEVELOPMENT LENGTH

9 Z101 OPENING IN CONCRETE WALL
3/4" = 1'-0"



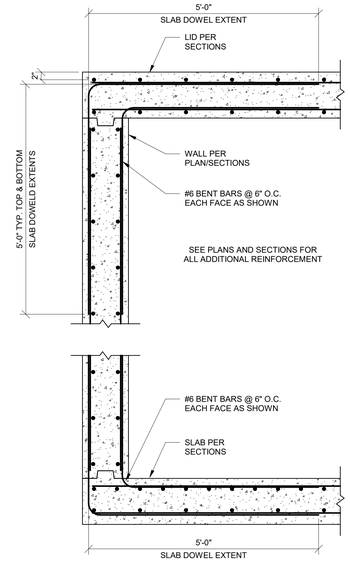
NOTES:
1. SEE PLANS AND SECTION DETAILS FOR ALL REINFORCING
2. "A" = 1/3 OF WALL THICKNESS

10 Z101 KEYED CONSTRUCTION JOINT
3/4" = 1'-0"



NOTES:
1. LOCATE JOINT AT 10'-0" MAX. FROM CORNER AND 20'-0" O.C. MAX.
2. COORDINATE W/ ARCH. MASONRY JOINT LOCATION WHERE APPLICABLE
3. COORDINATE W/ ANY ARCH. FORM LINERS OR TEXTURED CONCRETE.

11 Z101 TYPICAL WALL/SLAB CONTROL OR CONSTRUCTION JOINT
3/4" = 1'-0"



12 Z101 WALL TO SLAB AND LID DETAIL
3/4" = 1'-0"

McCLURE™
2001 W Broadway
Columbia, MO 65203
P 573-814-1568

MISSOURI CERTIFICATE OF AUTHORITY NO. E-2006022253
EXPIRES: DECEMBER 31, 2024

STATE OF MISSOURI
CELESTE KAY SPICKERT
NUMBER PE-2008022213
PROFESSIONAL ENGINEER

02/20/2024

CELESTE SPICKERT
20080022
12/31/2024

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MISSOURI.

No.	Description	Date

PROJECT NUMBER 2023000333
SET ISSUE DATE

ENGINEER	DRAWN BY	CHECKED BY
IWC	MHS	CKS

ROSEMANN & ASSOCIATES
THE VILLAGE AT DISCOVERY PARK
CAST IN PLACE BOX CULVERTS
LEE'S SUMMIT, MO

PLANS SECTIONS & DETAILS

Autodesk Docs://2023000333 - Discovery Park Lee's Summit/CULVERTS.rvt

DRAWING NO.
Z101