# Onondaga Cave State Park Water & Wastewater Improvements Leasburg, Missouri

CM Archer Group, P.C. dba:



**Corporate Authority:** 

CM Archer Group, P.C.: E: 2003023612-D, LS: 2004017577-D, A-2016017179

310 East 6th Street; Rolla, Missouri 65401 ■ Phone: 573-364-6362 Fax: 573-364-4782 ■ www.archer-elgin.com

OWNER & CONTINUING **AUTHORITY:** 

STATE OF MISSOURI

**GOVERNOR** 

MICHAEL L. PARSON,

MISSOURI STATE PARKS

MISSOURI DEPARTMENT OF NATURAL RESOURCES

**PROJECT** 

OFFICE OF ADMINISTRATION

DIVISION OF FACILITIES MANAGEMENT, MANAGEMENT:

DESIGN AND CONSTRUCTION

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C-105 PRESSURE REDUCING VALVE PLAN AND DETAILS

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LAND APPLICATION PLAN

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C-502 CIVIL DETAILS

C-503 CIVIL DETAILS

C-504 CIVIL DETAILS

**DESIGNER:** 

Archer-Elgin

PROJECT NUMBER:

X2306-02

SITE NUMBER:

5215

FACILITY NUMBER: 7815215010 Well House 1

7815215011 Water Storage Tamk

7815215044 Infrastructure

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S-102 ROOF FRAMING PLAN

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WELL HOUSE SECTION AND DETAILS

WELL HOUSE SECTION AND DETAILS

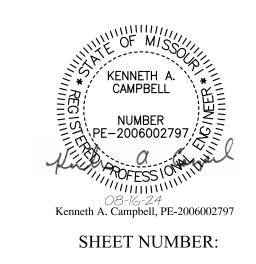
**GENERAL STRUCTURAL DETAILS** 

ME-101 WELL HOUSE MECHANICAL & ELECTRICAL PLANS

WELL HOUSE MECHANICAL & ELECTRICAL SCHEDULES

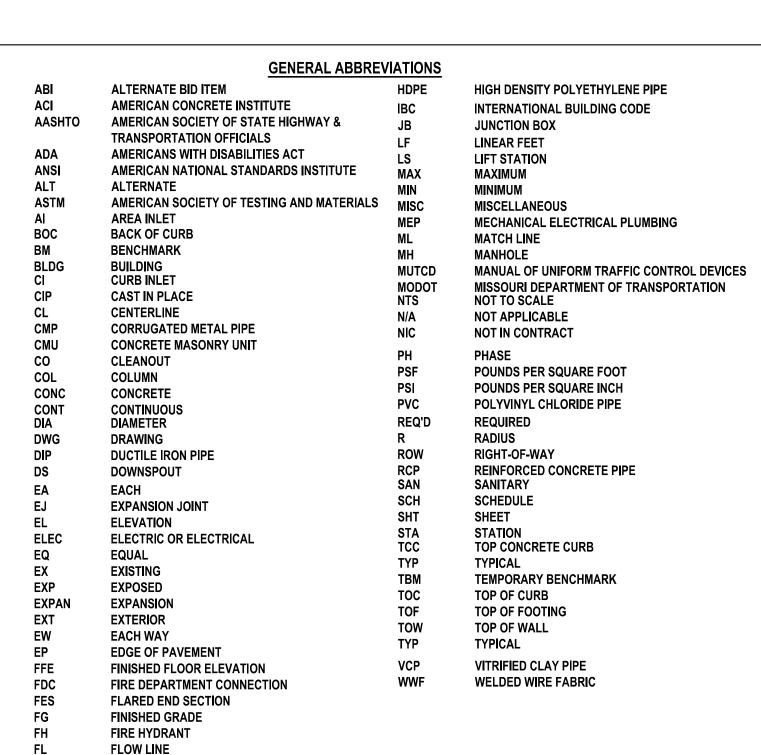
ME-502 ELECTRICAL & CONTROL LEGEND

ME-503 ELECTRICAL PROCESS ONE LINE



G-0011 OF 27 SHEETS

August 16, 2024



**FENCE** FEET FORCE MAIN **GRATED INLET** 

<u> </u>	POWER POLE & GUY WIRE		E
Ŷ-П <sup>*</sup>	LIGHT POLE		E)
	AREA LIGHT	ROW	E)
ĺ	FLOOD LIGHT	——————————————————————————————————————	E)
$\stackrel{\checkmark}{\bigcirc}$	TELEPHONE MANHOLE		E)
$\langle T \rangle$	TELEPHONE PEDESTAL		E)
\F/	CABLE MARKER		E)
Ň	CABLE TV PEDESTAL	———— UGE ————	E)
É	ELECTRIC METER		E)
Ě	ELECTRIC BOX		E)
(E)	ELECTRICAL MANHOLE	—— ss ——— ss ——	
	TRAFFIC CONTROL BOX	— FM — FM —	
$\overline{\mathbb{Z}}$	TRAFFIC STANDARD		E)
	WATER METER		E)
(ww)	WATER WELL		E)
WMH	WATER MANHOLE		E)
, oʻ	WATER SPRINKLER		
-(cv)	IRRIGATION CONTROL VALVE	X	
(sn)	STORM SEWER MANHOLE	<del></del>	E
	CLEANOUT	oo	E
	SIGN	0 0 0 0	E
(D)	GAS DRIP	_/ / / / / / / / / / /	E
₩>	GAS METER	——— (A)W ————	ΑĒ
⟨v⟩ ̈	GAS VALVE	/- <i></i>	ΑE
MBX	MAILBOX		PF
0	BOLLARD	<b>—•—</b> (500) <b>—•—•</b>	PF
P	PARKING METER	========	PF
	EX CONCRETE PAVING	• • • • • • • • • • • • • • • • • • • •	PF
	EX ASPHALT PAVING	SS —	PF
	EX GRANULAR PAVING	FM	PF
	PROPOSED CONCRETE PAVING	WL —	PF

PROPOSED ASPHALT PAVING

PROPOSED GRANULAR PAVING

STANDARD LEGEND

		- EX 1' CONTOUR	WL	EX. WATER MAIN
		EX 5' CONTOUR		
		EX RIGHT-OF-WAY	SAN SAN	— EX. SANITARY
		EX PROPERTY LINE (APPROXIMATE)	——E———E———E—	- FX LIGE
		EX EASEMENT LINE		
		EX BUILDING SETBACK LINE		<ul><li>EX. NATURAL GAS</li></ul>
		EX OVERHEAD ELECTRIC	—— DB ——— DB —	- FX DUCTBANK
		EX UNDERGROUND ELECTRIC		
		EX UNDERGROUND TELEPHONE	COMM COMM	<ul> <li>EX. COMMUNICATION</li> </ul>
		EX UNDERGROUND CABLE	spsp	— EX.STORM
SS -	ss	EX SANITARY SEWER	П	
FM -	——— FM —	EX FORCE MAIN		EX. FIRE HYDRANT
		EX WATER LINE	$oldsymbol{\Theta}$	EX. WATER VALVE
		EX CHILLED WATER LINE		
		─ EX STEAM LINE	( <u>©</u> )	EX. SANITARY MANH
	- GAS	EX NATURAL GAS		
		EX STORM PIPE		
		EX BARBED WIRE FENCE		
_	<del></del> 0			
	· · · · · · · · · · · · · · · · · · ·	<ul><li>─ EX WOOD FENCE</li><li>─ EX GUARD RAIL</li></ul>		
////	////////	EX GUARD RAIL  EX BUILDING LINE		
		ABANDONED WATER LINE		
		- ABANDONED UNDERGROUND UTILITY		
		PROPOSED 1' CONTOUR		
	(500) — - —			
		PROPOSED STORM PIPE		
	<del> </del>	· · PROPOSED GRADING LIMITS		
	SS			
	FM	PROPOSED FORCE MAIN		
	WL	PROPOSED WATER LINE		
	DD\/			

NEW PRESSURE RELEASE VALVE

**NEW CHLORINE INJECTION PORT** 

**NEW THRUST BLOCK** 

**NEW FIRE HYDRANT** 

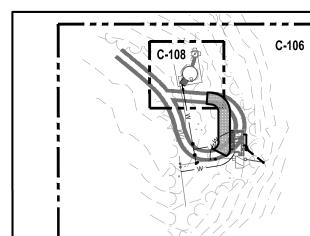
**NEW WATER VALVE** 

**NEW YARD HYDRANT** 

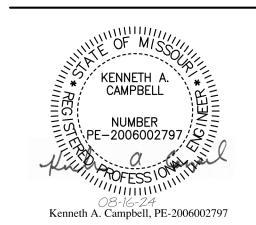
#### **UTILITY NOTES:**

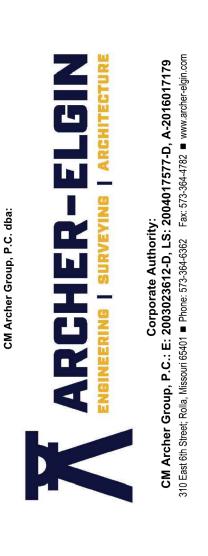
**EX. SANITARY MANHOLE** 

- 1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE CONSIDERED APPROXIMATE. CONTRACTOR SHALL MAKE ALL REASONABLE EFFORTS TO LOCATE EXISTING UTILITIES IMPACTED BY CONSTRUCTION PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY ENGINEER IS TO BE NOTIFIED IMMEDIATELY IF ANY DISCREPANCIES REGARDING THE LOCATION AND DISPOSITION OF THIS EXISTING UTILITIES DISCOVERED AT ANY TIME THROUGHOUT THE PROJECT. CONTRACTOR SHALL MAKE ANY ADJUSTMENTS TO THE PROPOSED ALIGNMENT WITHIN 10 FT OF ORIGINAL DESIGN. CHANGES TO CONTRACT DOCUMENTS MUST BE FORMALLY APPROVED BY THE OWNER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
- 2. ALL TRENCHES UNDER PAVED AREAS SHALL BE BACKFILLED WITH FULL DEPTH GRANULAR MATERIAL. GRANULAR MATERIAL SHALL BE PLACED AND COMPACTED TO A LEVEL EQUAL TO THE TRENCH DEPTH AT THE TIME OF THE UTILITY INSTALLATION.
- 3. COORDINATION IN WRITING IS REQUIRED FOR ALL CONNECTIONS TO, ABANDONMENT OF, AND / OR ADJUSTMENT TO EXISTING UTILITY WITH THE APPROPRIATE UTILITY OWNER. WRITTEN NOTICE AND WRITTEN APPROVAL WITH A MINIMUM OF 72 HOURS PRIOR TO THE COMMENCEMENT OF WORK IS REQUIRED.
- 4. ALL WATERLINES SHALL HAVE A MINIMUM OF 42" INCHES OF COVER BELOW FINISH GRADE, UNLESS OTHERWISE INDICATED ON
- 5. PROVIDE ALL WATERLINE TEES, VALVES, BENDS, TAPPING SLEEVES, YARD HYDRANTS, ETC. NECESSARY TO CONSTRUCT THE WATERLINES AS SHOWN ON THESE PLANS.
- 6. WHEN WATER AND SEWER LINES RUN PARALLEL THERE IS TO BE A 10 FEET HORIZONTAL SEPARATION MEASURED EDGE TO EDGE. WHEN WATER AND SEWER LINES CROSS THERE IS TO BE AN 18 INCH SEPARATION VERTICALLY MEASURED EDGE TO EDGE. THIS SHALL BE THE CASE WHERE THE WATERLINE IS ABOVE OR BELOW THE SEWER. AT CROSSING THE FULL LENGTH OF WATER PIPE SHALL BE LOCATED SO BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE BUT IN NO CASE LESS THAN 10 FEET. IF EITHER SEPARATION IS NOT PRACTICAL CONTACT ENGINEER TO DETERMINE IF A DEVIATION IS ACCEPTABLE.
- 7. SEQUENCE CONSTRUCTION ACTIVITIES TO MAINTAIN TO THE MAXIMUM EXTENTS POSSIBLE, POTABLE WATER SERVICES FOR ALL FACILITIES. PROPOSED WATERLINE SHALL NOT BE PLACED INTO SERVICE UNTIL: CONSTRUCTION IS COMPLETE; ACCEPTANCE TESTING HAS BEEN PERFORMED; THE WATERLINE HAS BEEN DISINFECTED; WRITTEN AUTHORIZATION HAS BEEN PROVIDED BY ENGINEER AND OWNER.
- 8. ALL FITTINGS ARE TO BE FULLY RESTRAINED.
- 9. SEQUENCE CONSTRUCTION IN ROADWAYS TO MAINTAIN VEHICULAR ACCESS TO ALL FACILITIES AT ALL TIMES.



STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR** 





OFFICE OF ADMINISTRATION **DIVISION OF FACILITIES** MANAGEMENT, **DESIGN AND CONSTRUCTION** 

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

LEASBURG, MISSOURI

PROJECT # X2306-02 SITE# 5215 FACILITY # 7815215010 7815215011 7815215044

REVISION: ISSUED TO MDNR
DATE: 06-17-24
REVISION: ISSUED FOR BIDDING
DATE: 08-16-24 **REVISION:** 

ISSUE DATE: 08-16-24

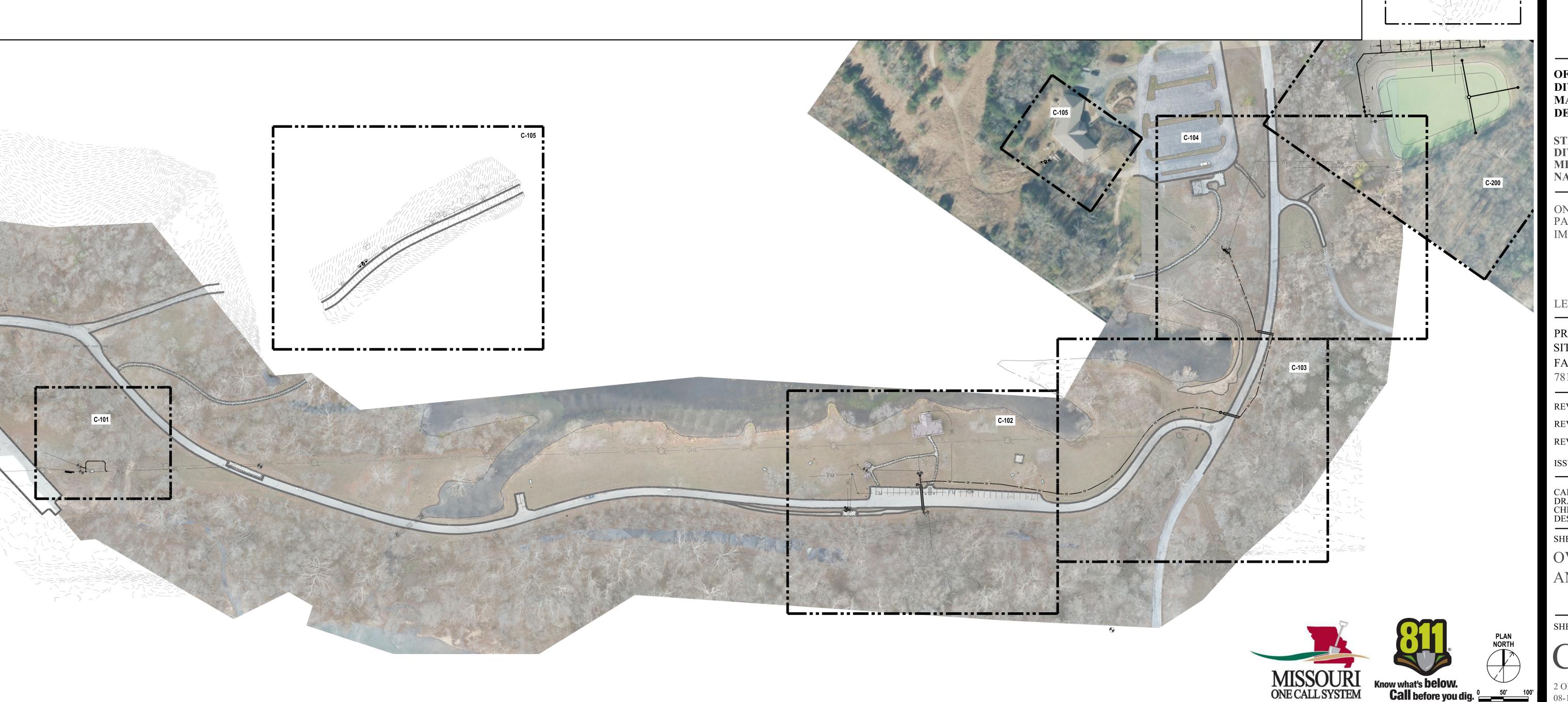
CAD DWG FILE:C-100.DWC
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

OVERALL SITE PLAN AND KEY SHEET

SHEET NUMBER:

2 OF 27 SHEETS





## **GENERAL NOTES:**

- 1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE CONSIDERED APPROXIMATE. CONTRACTOR SHALL MAKE ALL REASONABLE EFFORTS TO LOCATE EXISTING UTILITIES IMPACTED BY CONSTRUCTION PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY ENGINEER IS TO BE NOTIFIED IMMEDIATELY IF ANY DISCREPANCIES REGARDING THE LOCATION AND DISPOSITION OF THIS EXISTING UTILITIES DISCOVERED AT ANY TIME THROUGHOUT THE PROJECT. CONTRACTOR SHALL MAKE ANY ADJUSTMENTS TO THE PROPOSED ALIGNMENT WITHIN 10 FT OF ORIGINAL DESIGN. CHANGES TO CONTRACT DOCUMENTS MUST BE FORMALLY APPROVED BY THE OWNER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
  - 2. ALL FITTINGS SHALL BE FULLY RESTRAINED, UNLESS OTHERWISE NOTED.

#### KEYNOTES: (#)

1. REMOVE EXISTING VAULT LID, PROCESS PIPING AND VALVES, BACKFILL WITH ENGINEERED GRANULAR MATERIAL COMPACTED TO 95% OF THE STANDARD PROCTOR DENSITY.

#### STATE OF MISSOURI MICHAEL L. PARSON,

**GOVERNOR** 

Kenneth A. Campbell, PE-2006002797



OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, **DESIGN AND CONSTRUCTION** 

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

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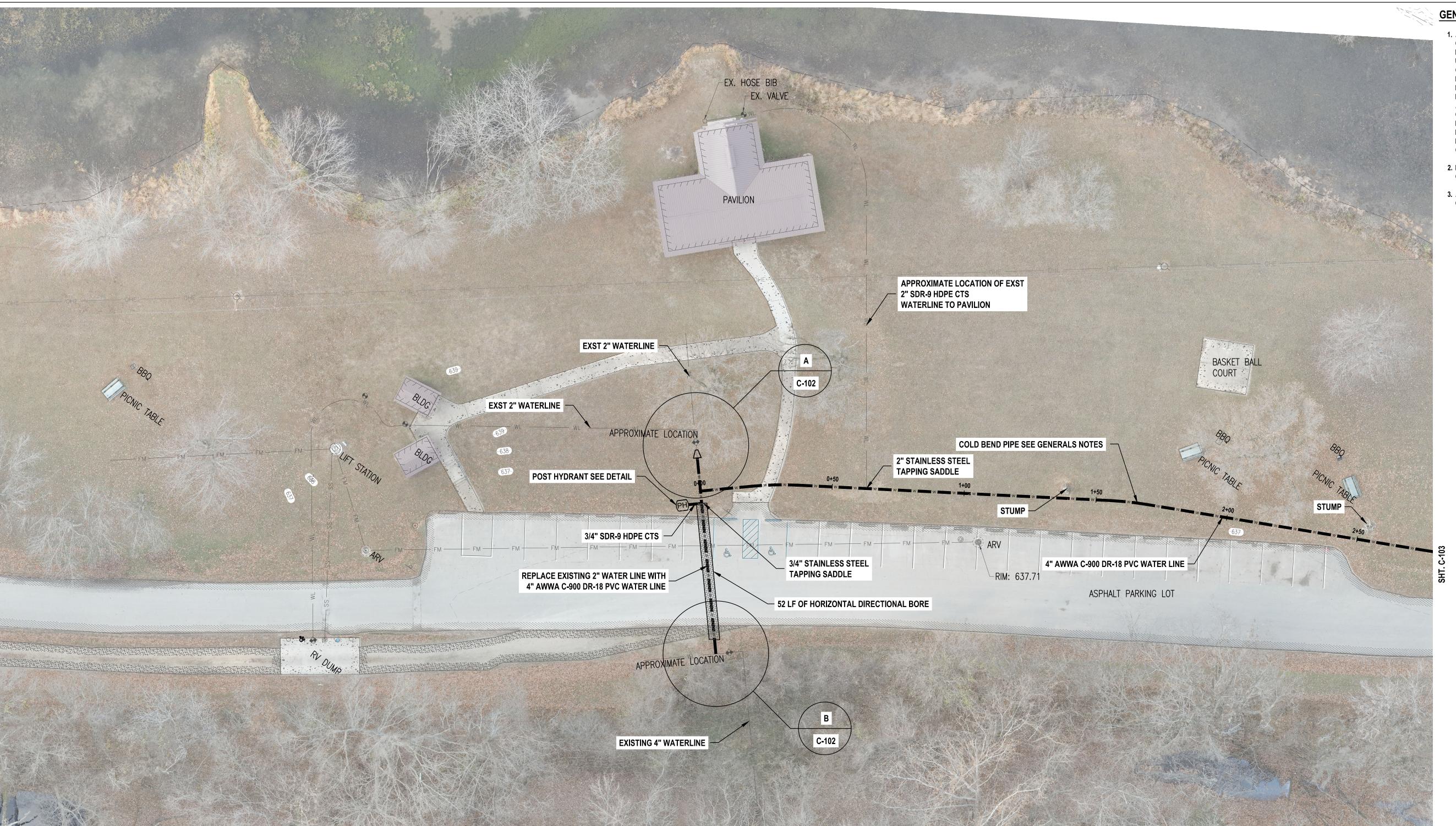
DESIGNED BY: EMH

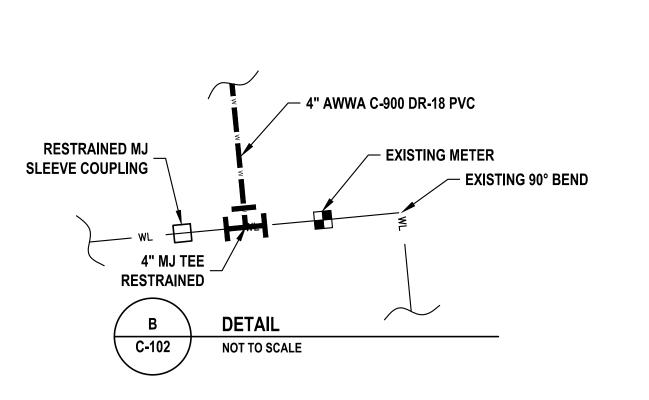
CAD DWG FILE:C-101.DWG
DRAWN BY: JSM
CHECKED BY: KAC

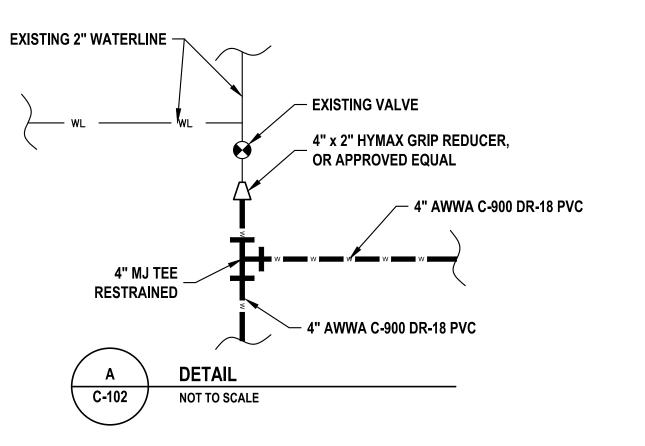
SHEET TITLE:

WATERLINE PLAN

SHEET NUMBER:









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- 2. MINIMUM A COLD BEND RADIUS FOR 4IN DR-18 AWWA C900 PVC IS 100 FT.
- 3. ALL FITTINGS SHALL BE FULLY RESTRAINED, UNLESS OTHERWISE NOTED.

#### STATE OF MISSOURI MICHAEL L. PARSON,

GOVERNOR

OF MISSOURIES

KENNETH A. CAMPBELL

NUMBER
PE-2006002797

08-16-24 Kenneth A. Campbell, PE-2006002797

ARCHERNO I SURVEYING | ARCHITECTURE

Corporate Authority:

CM Archer Group, P.C.: E: 2003023612-D, LS: 2004017577-D, A-2016017179

310 East 6th Street; Rolla, Missouri 65401 

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ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

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FACILITY # 7815215010 7815215011 7815215044

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REVISION: DATE:

ISSUE DATE: 08-16-24

CAD DWG FILE:C-102.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

WATERLINE PLAN

SHEET NUMBER:

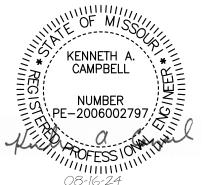
C-102



#### **GENERAL NOTES:**

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#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**



Kenneth A. Campbell, PE-2006002797



OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

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CAD DWG FILE:C-103.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

WATERLINE PLAN

SHEET NUMBER:

# APPROXIMATE LOCATION 2" PVC APPROXIMATE LOCATION 6" PVC FORCEMAIN SHELTER C-104 4" WATER VALVE CHLORINE INJECTION PORT 4" AWWA C-900 DR-18 PVC WATER LINE COLD BEND PIPE SEE GENERAL NOTES 32 LF OF HORIZONTAL DIRECTIONAL BORE 45° MJ BEND, RESTRAINED 22.5° MJ BEND, RESTRAINED 🥌 SHT. C-103

#### **GENERAL NOTES:**

- 4" MJ TEE FULLY RESTRAINED

— EXISTING 4" PVC WATERLINE

NOT TO SCALE

— EXISTING METER

\_ EXISTING VALVE NORMALLY CLOSED

- 45° MJ BEND, RESTRAINED

RESTRAINED MJ
SLEEVE COUPLING

45° MJ BEND, \_ RESTRAINED

**4" WATER VALVE** 

CHLORINE INJECTION PORT —

- 1. ALL EXISTING UTILITY LOCATIONS SHOWN ARE CONSIDERED APPROXIMATE. CONTRACTOR SHALL MAKE ALL REASONABLE EFFORTS TO LOCATE EXISTING UTILITIES IMPACTED BY CONSTRUCTION PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY ENGINEER IS TO BE NOTIFIED IMMEDIATELY IF ANY DISCREPANCIES REGARDING THE LOCATION AND DISPOSITION OF THIS EXISTING UTILITIES DISCOVERED AT ANY TIME THROUGHOUT THE PROJECT. CONTRACTOR SHALL MAKE ANY ADJUSTMENTS TO THE PROPOSED ALIGNMENT WITHIN 10 FT OF ORIGINAL DESIGN. CHANGES TO CONTRACT DOCUMENTS MUST BE FORMALLY APPROVED BY THE OWNER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
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#### STATE OF MISSOURI MICHAEL L. PARSON,

GOVERNOR

OF MISSON

KENNETH A.

CAMPBELL

NUMBER

PE-2006002797

OFESSION

NUMBER

PE-1006002797

PE-1006002797

PE-1006002797

PE-1006002797

PE-1006002797

PE-100600279

PE-100600279

PE-100600279

PE-100600279

PE-100600279

PE-100600279

PE-100600279

PE-1006

08-16-24 Kenneth A. Campbell, PE-2006002797



OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES
MANAGEMENT,
DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

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CAD DWG FILE:C-104.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

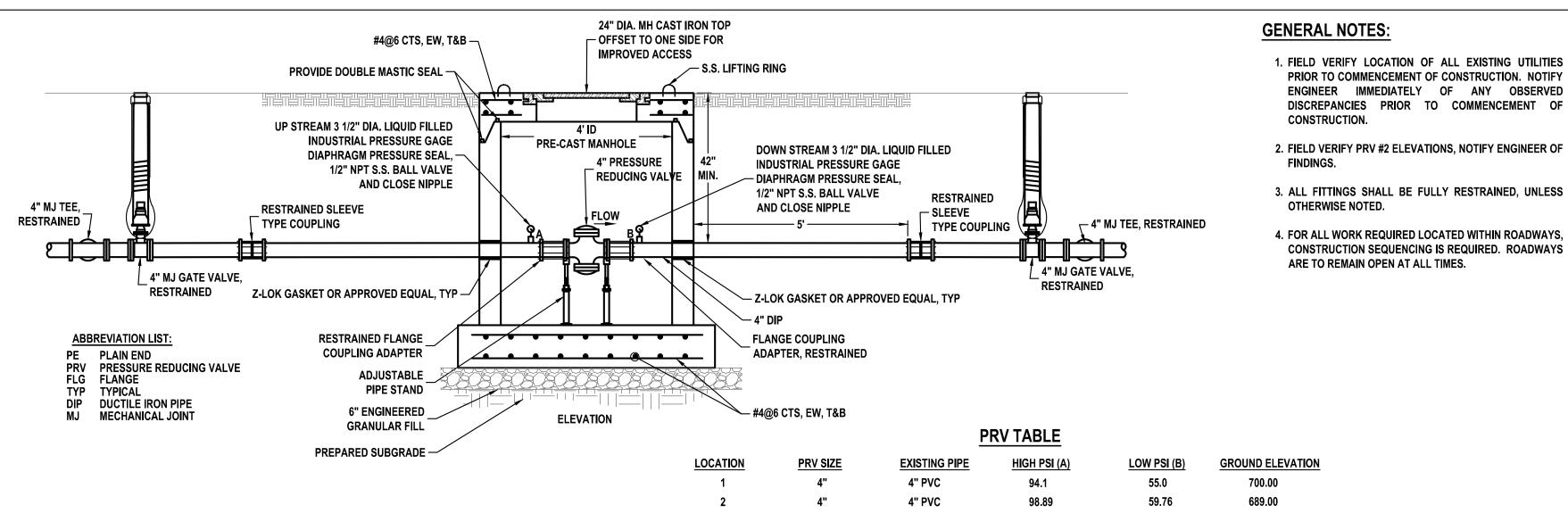
WATERLINE PLAN

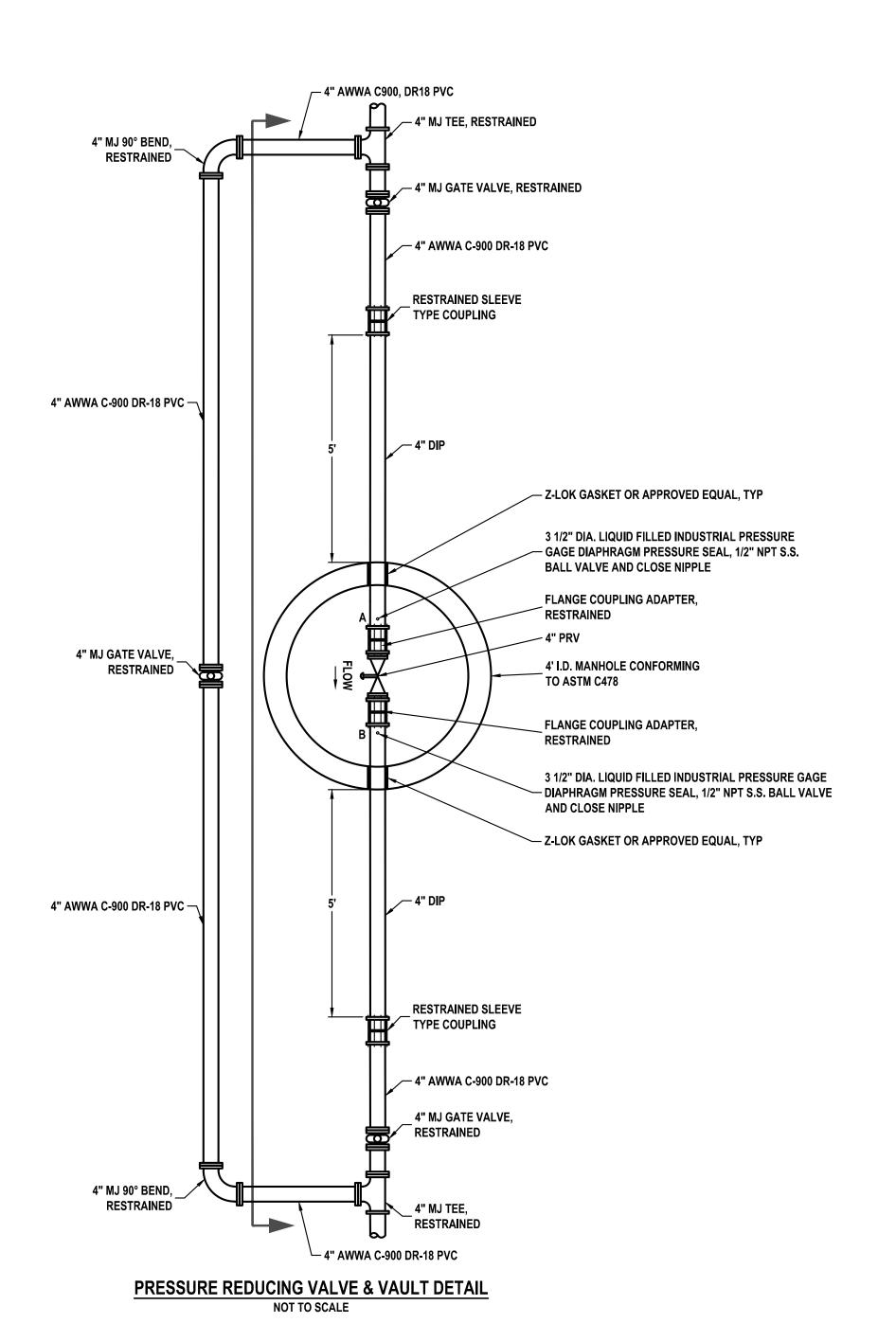
SHEET NUMBER:

C-104
6 OF 27 SHEETS

08-16-24

10' 20'



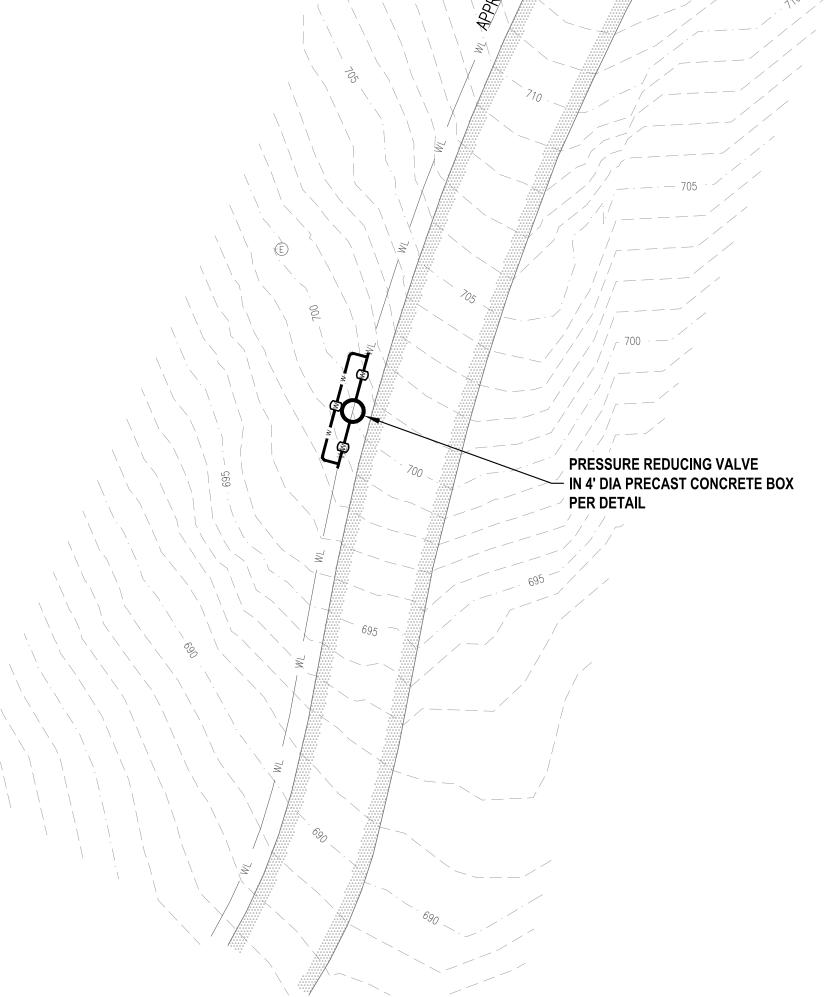


1. FIELD VERIFY LOCATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION. NOTIFY ENGINEER IMMEDIATELY OF ANY OBSERVED

2. FIELD VERIFY PRV #2 ELEVATIONS, NOTIFY ENGINEER OF

3. ALL FITTINGS SHALL BE FULLY RESTRAINED, UNLESS

CONSTRUCTION SEQUENCING IS REQUIRED. ROADWAYS

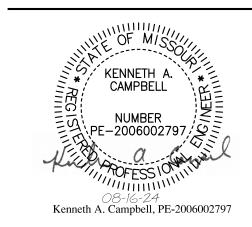


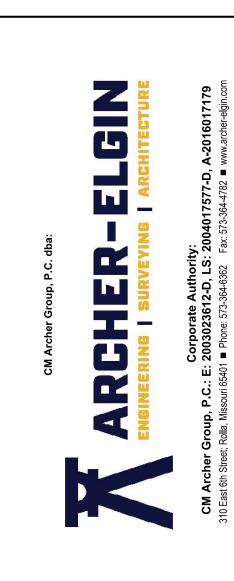
PRESSURE REDUCING VALVE LOCATION 1 SCALE: 1" = 20'



PRESSURE REDUCING VALVE LOCATION 2 SCALE: 1" = 20'

STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR** 





OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

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CAD DWG FILE:C-106.DWG DRAWN BY: CHECKED BY: KA DESIGNED BY: EMH

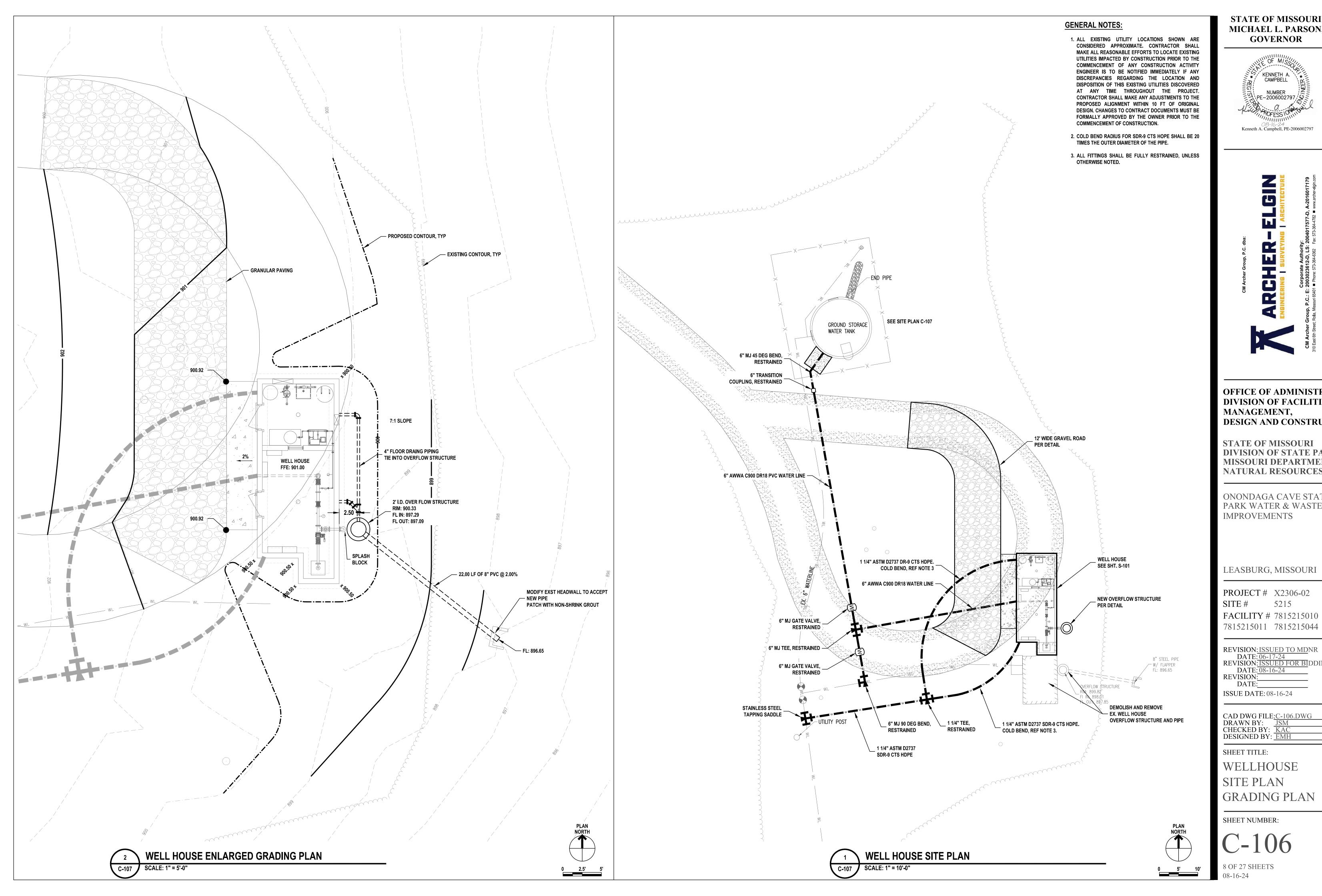
SHEET TITLE:

PRESSURE REDUCING VALVE PLAN AND DETAILS

SHEET NUMBER:

7 OF 27 SHEETS

08-16-24



#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**



Kenneth A. Campbell, PE-2006002797

OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

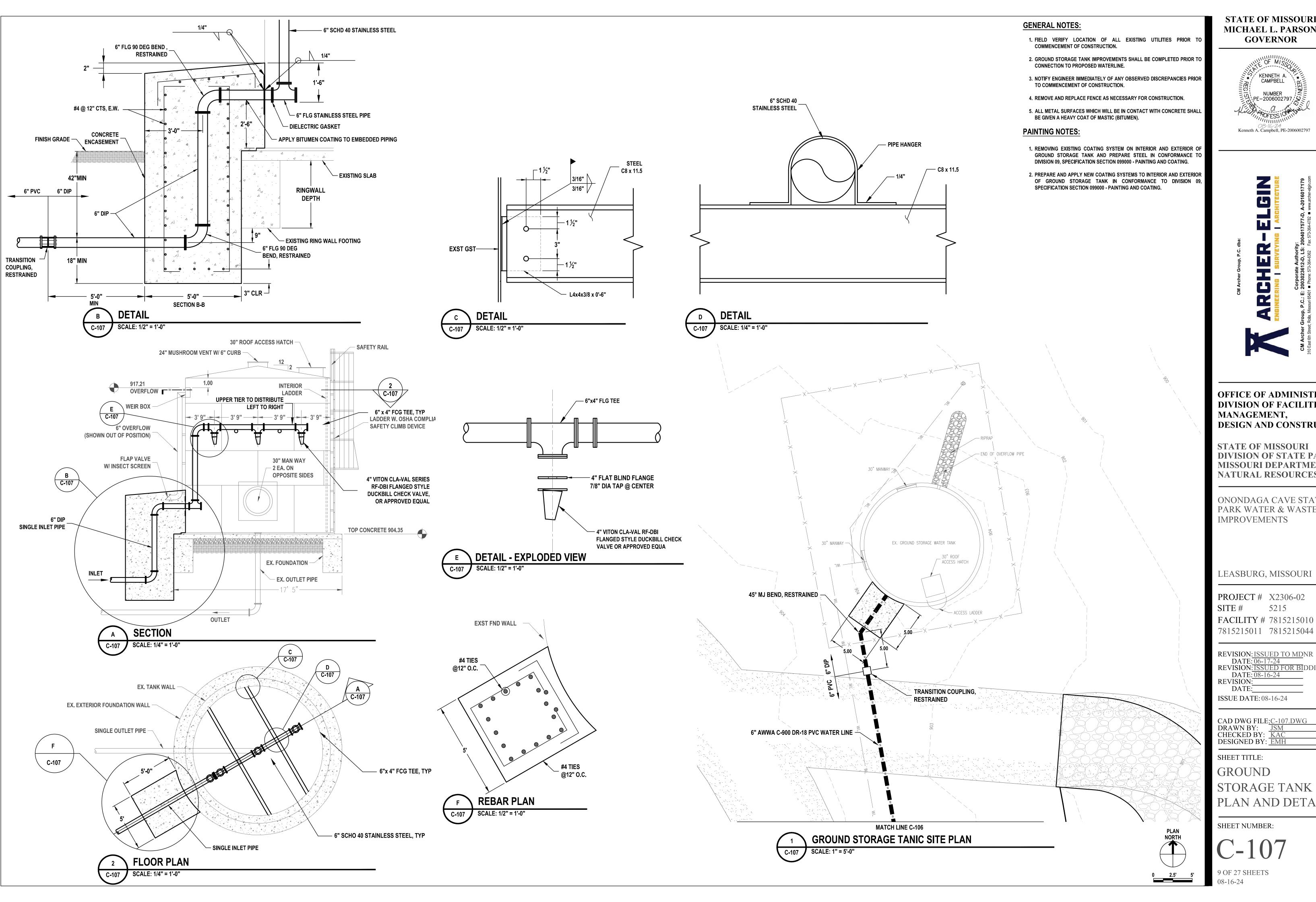
LEASBURG, MISSOURI

5215 FACILITY # 7815215010

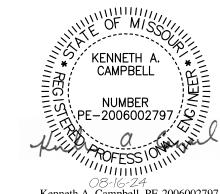
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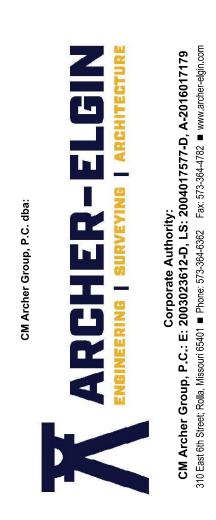
CAD DWG FILE:C-106.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SITE PLAN GRADING PLAN



STATE OF MISSOURI MICHAEL L. PARSON,





OFFICE OF ADMINISTRATION DIVISION OF FACILITIES DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER

LEASBURG, MISSOURI

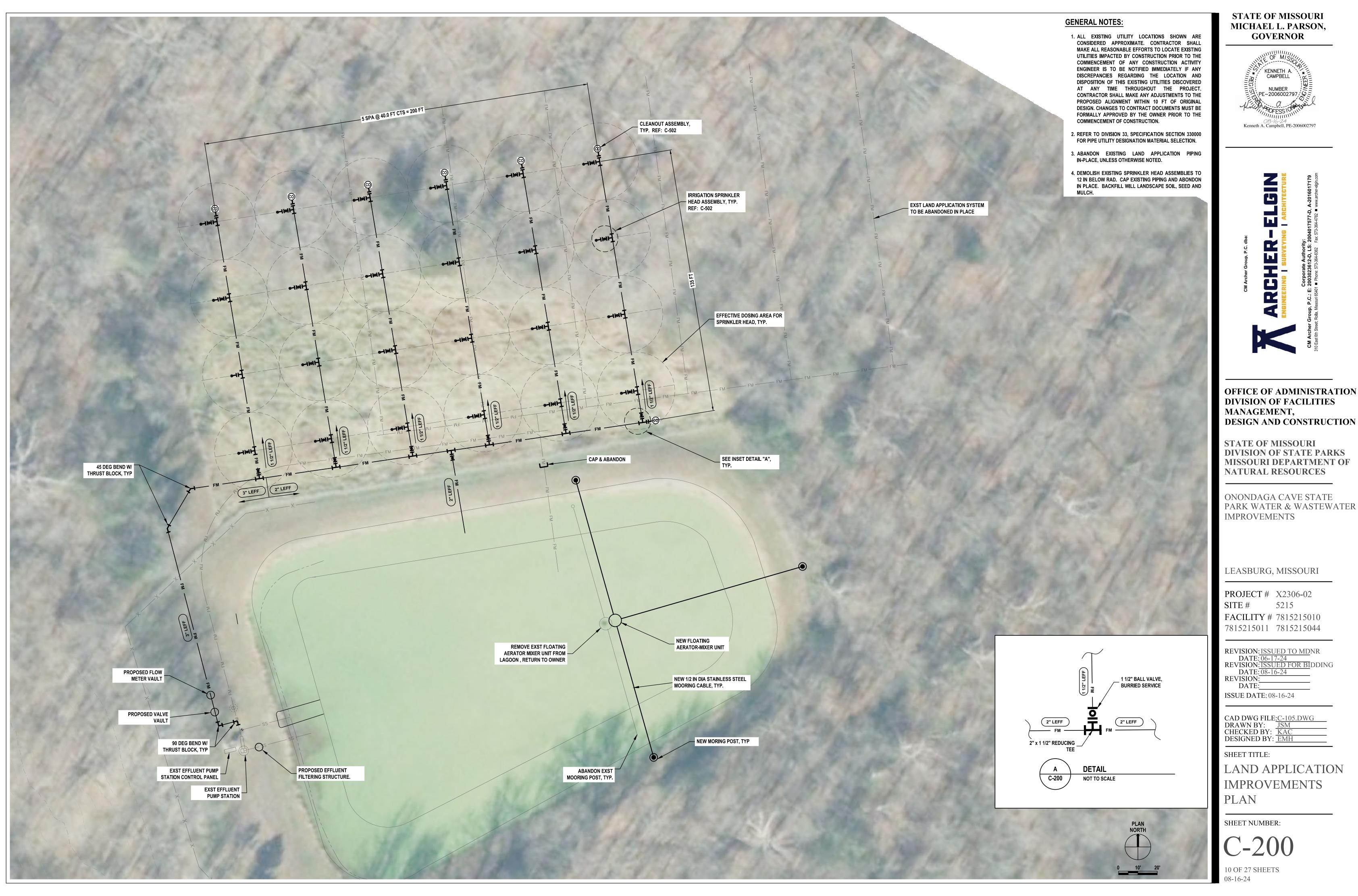
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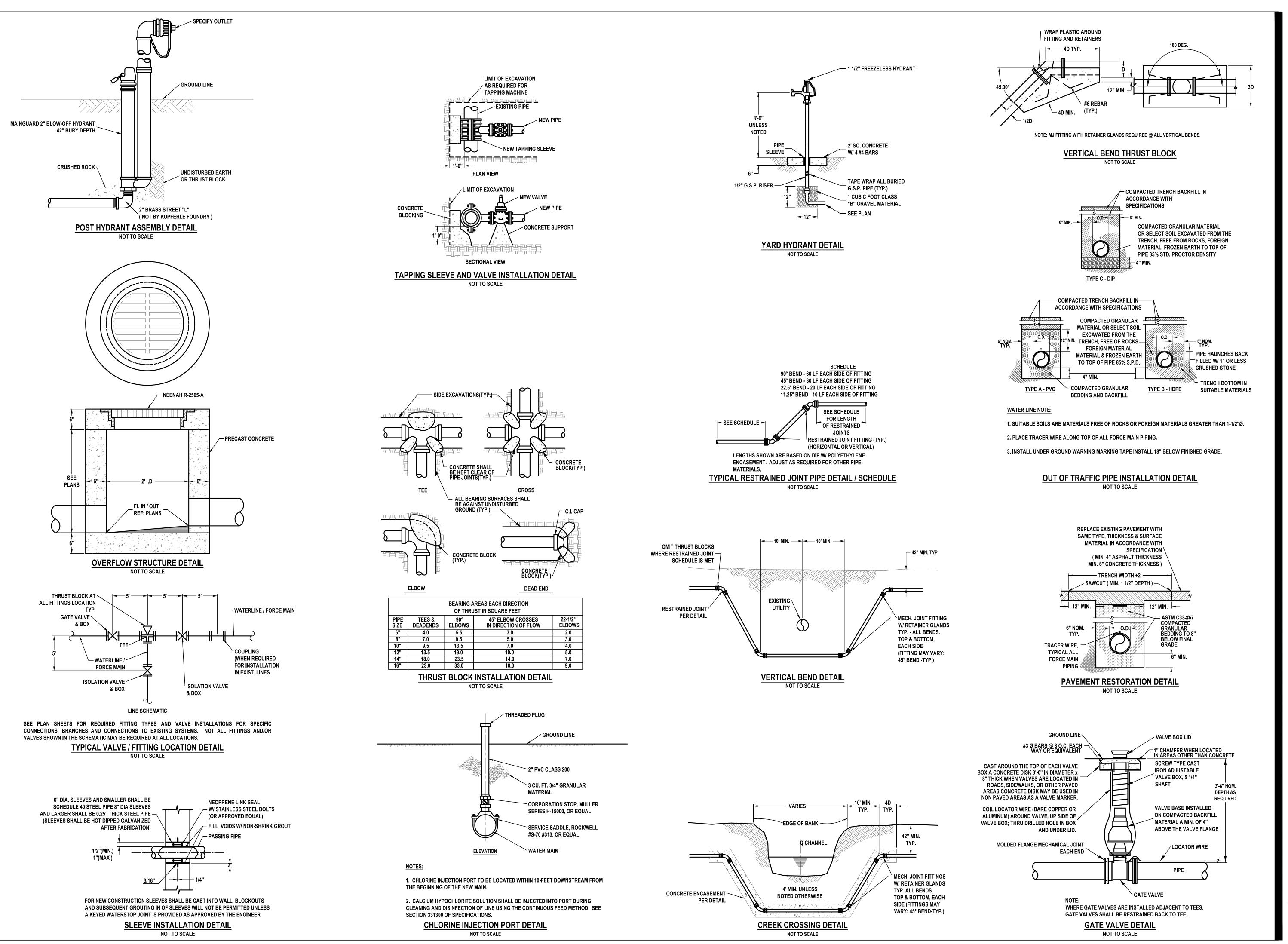
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CAD DWG FILE: C-107. DWG

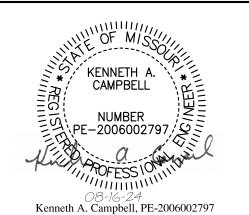
STORAGE TANK PLAN AND DETAILS



OFFICE OF ADMINISTRATION



STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR



ARCHITER PELGIN

ENGINEERING | SURVEYING | ARCHITECTURE

Corporate Authority:

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OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE
PARK WATER & WASTEWATER
IMPROVEMENTS

LEASBURG, MISSOURI

PROJECT # X2306-02 SITE # 5215

FACILITY # 7815215010 7815215011 7815215044

REVISION: ISSUED TO MDNR
DATE: 06-17-24
REVISION: ISSUED FOR BIDDING
DATE: 08-16-24
REVISION:

DATE: ISSUE DATE: 08-16-24

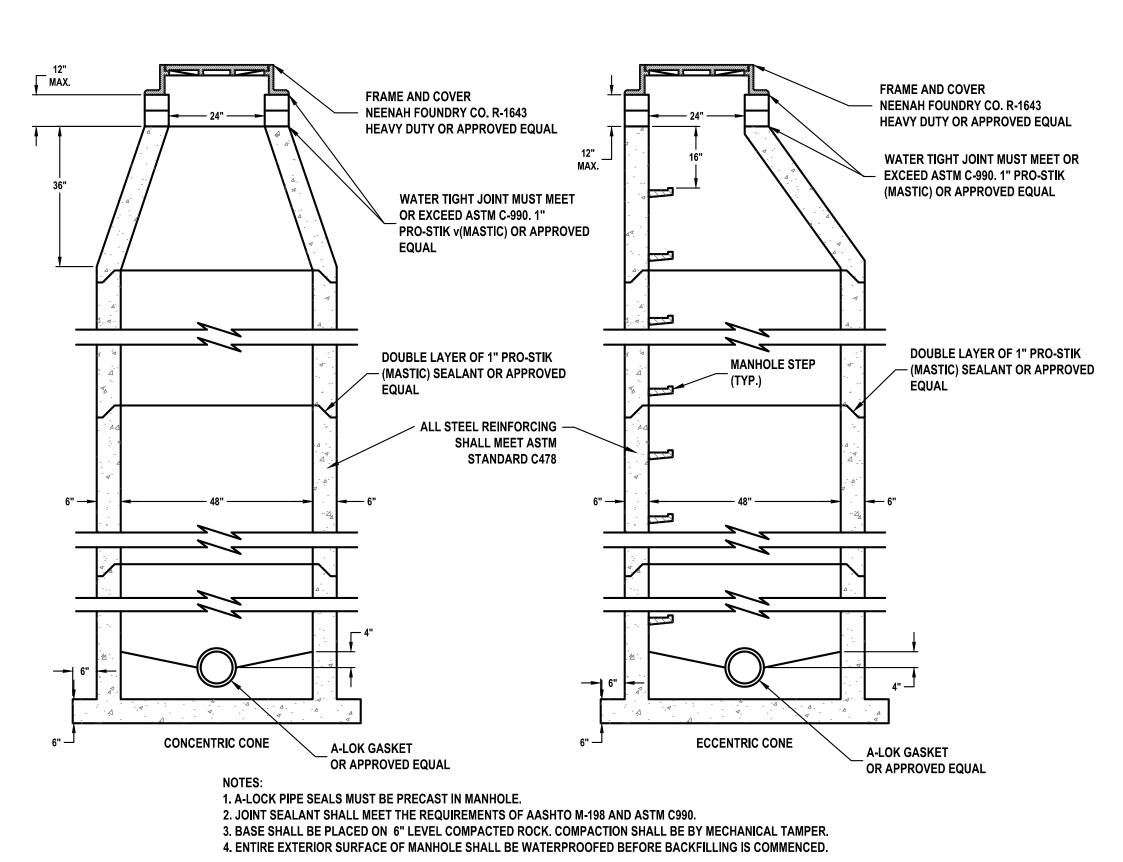
CAD DWG FILE:C-501.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

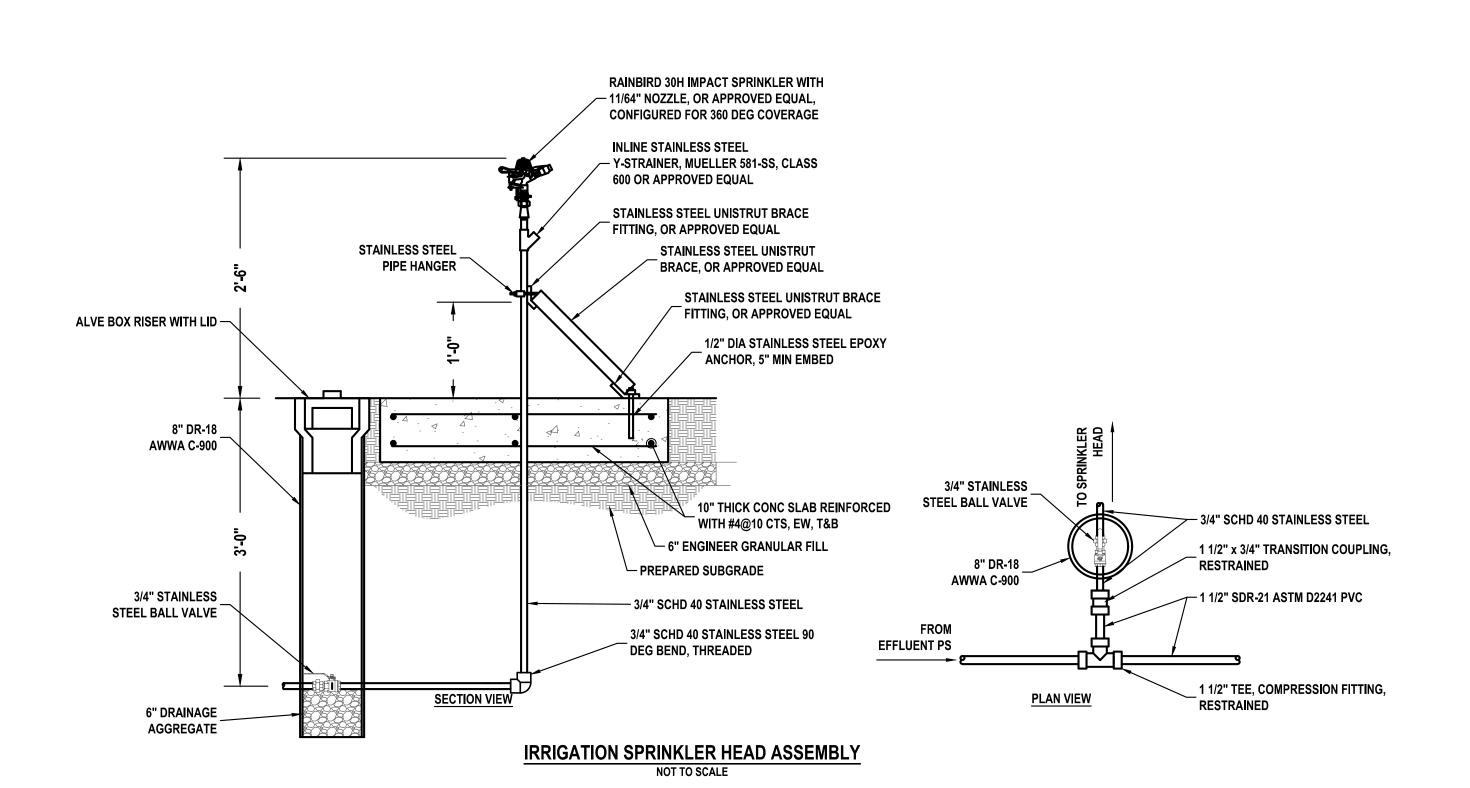
CIVIL DETAILS

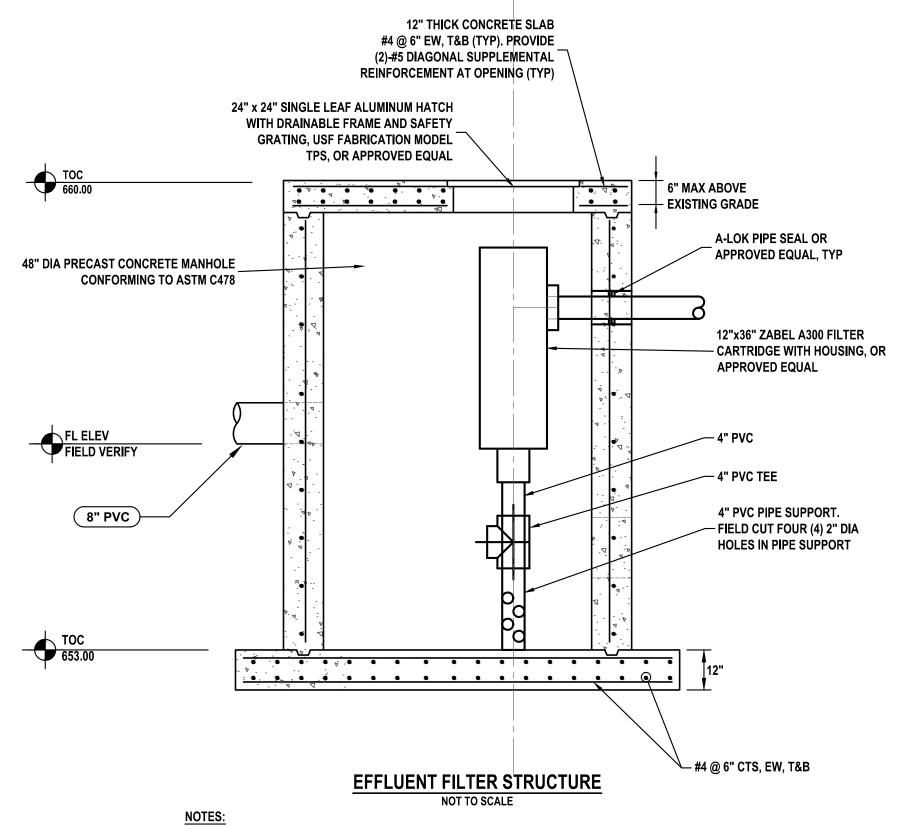
SHEET NUMBER:

C-501



# PRECAST CONCRETE MANHOLE DETAIL NOT TO SCALE

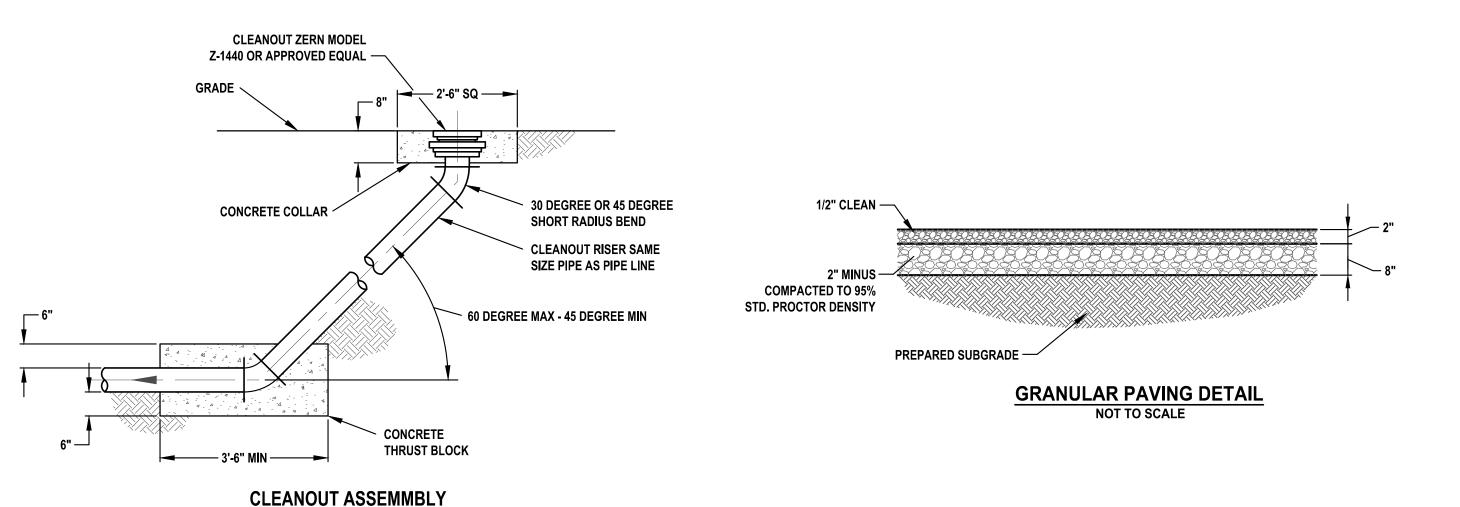




1. APPLY WATERPROOFING TO FLOW METER MANHOLE PER SPECIFICATION SECTION 071400.

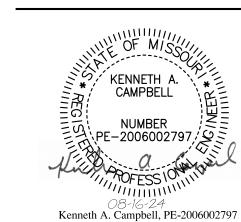
2. PRECAST CONCRETE MANHOLE SHALL CONFORM TO MINIMUM REQUIREMENTS OF ASTM C478. SEE MANHOLE

SCHEDULE FOR DIAMETER AND ELEVATIONS.



NOT TO SCALE

#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**



L D J ARCHER

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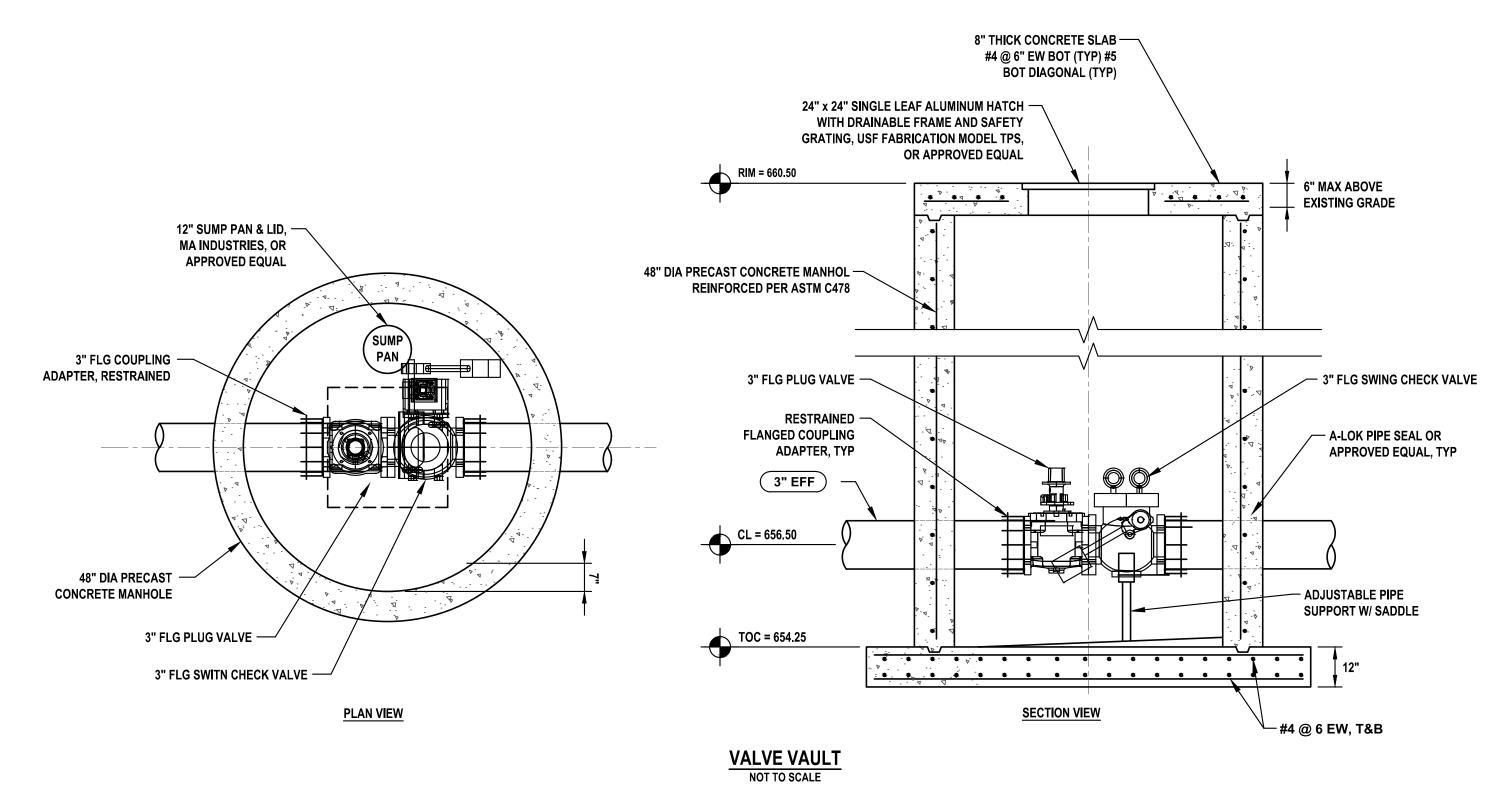
DATE: ISSUE DATE: 08-16-24

CAD DWG FILE:C-501.DWG DRAWN BY: CHECKED BY: KA DESIGNED BY: EMH

SHEET TITLE:

CIVIL DETAILS

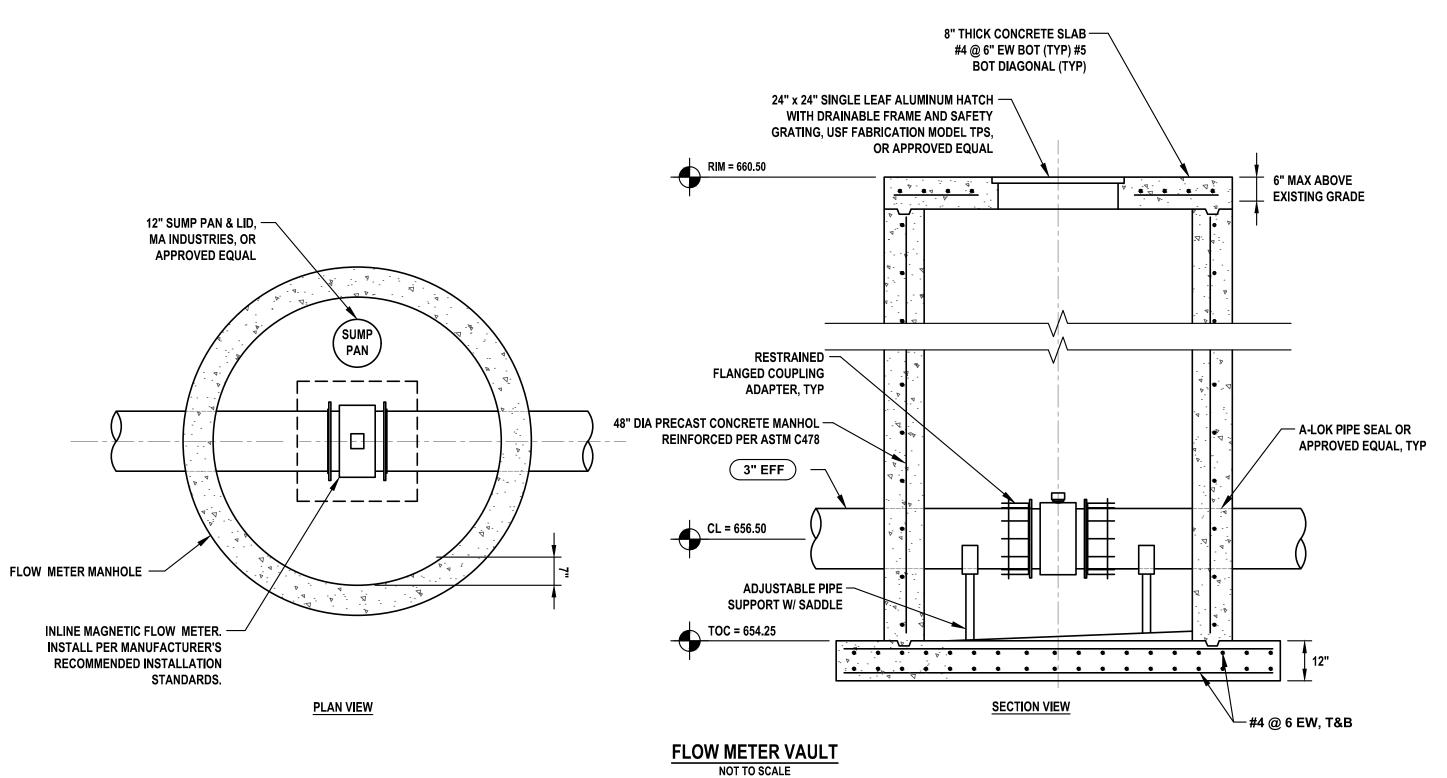
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1. APPLY WATERPROOFING TO EXTERIOR OF MANHOLE PER SPECIFICATION SECTION 071400.

2. PRECAST CONCRETE MANHOLE SHALL CONFORM TO MINIMUM REQUIREMENTS OF ASTM C478. SEE MANHOLE SCHEDULE FOR DIAMETER AND ELEVATIONS.

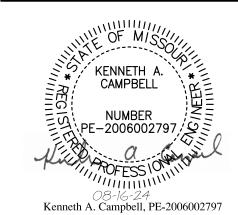
3. PROVIDE APPROPRIATE TRANSITION COUPLING(S) TO CONNECT PROPOSED PIPING TO EXISTING PIPING.

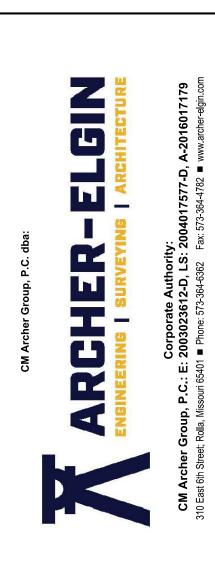


#### NOTES:

- 1. APPLY WATERPROOFING TO FLOW METER MANHOLE PER SPECIFICATION SECTION 071400.
- 2. PRECAST CONCRETE MANHOLE SHALL CONFORM TO MINIMUM REQUIREMENTS OF ASTM C478. SEE MANHOLE SCHEDULE FOR DIAMETER AND ELEVATIONS.
- 3. PROVIDE APPROPRIATE TRANSITION COUPLING(S) TO CONNECT PROPOSED PIPING TO EXISTING PIPING.

#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**





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SHEET TITLE:

REVISION:

CIVIL DETAILS

SHEET NUMBER:

PROJECT NAME: ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

COUNTY:

UTM 15N: X=655128 Y=4214930 (OUTFALL NO. 1) DESCRIPTION:

UTM 15N: X=655670 Y=4214176 (OUTFALL NO. 2)

DEVELOPER NAME STATE OF MISSOURI, MISSOURI STATE PARKS P.O. BOX 176

JEFFERSON CITY, MISSOURI 65102

PROJECT DESCRIPTION: PROJECT INVOLVES THE CLEARING, GRADING AND CONSTRUCTION ASSOCIATED WITH THE IMPLEMENTATION OF IMPROVEMENTS TO THE EXISTING WELL, GROUND STORAGE TANK, WWTF AND WATER DISTRIBUTION SYSTEM. CONSTRUCTION ACTIVITIES WILL INCLUDE: CLEARING AND GRADING OF SITE; INSTALLATION OF UTILITIES, INCLUDING ELECTRIC, SANITARY, STORM & WATER; CONCRETE PLACEMENT; PAVING; EQUIPMENT INSTALLATION; ETC. THE APPROPRIATE BEST MANAGEMENT PRACTICES WILL BE IMPLEMENTED TO PRESERVE EXISTING VEGETATION, LIMIT FLOODING OF SITE, PROVIDE FOR SOIL STABILIZATION AND LIMIT SEDIMENT LADEN STORM WATER LEAVING THE SITE.

PREDEVELOPMENT RUNOFF COEFFICIENT:

C = 0.40 (AVERAGE)

POST DEVELOPMENT RUNOFF COEFFICIENT: C = 0.40 (AVERAGE)1,357.7 ACRES TOTAL AREA OF SITE:

DISTURBED AREA:

RECEIVING STREAM OUTFALL NO. 1: UNNAMED TRIBUTARY TO MERAMEC RIVER OUTFALL NO. 2: UNNAMED TRIBUTARY TO MERAMEC RIVER

SWPPP COORDINATOR:

2155 N. WESTWOOD BLVD MODNR REGIONAL OFFICE: POPLAR BLUFF, MO 63901

MODNR PHONE:

#### SEQUENCE OF MAJOR ACTIVITIES

POST A COPY OF THE PUBLIC NOTICE AT THE MAIN ENTRANCE TO THE SITE(S).

DESIGNATE A SWPPP COORDINATOR WHO WILL BE RESPONSIBLE FOR OVERSIGHT OF

- ALL EROSION AND SEDIMENT CONTROL BMPS.
- BEGIN AND MAINTAIN A LOG BOOK DETAILING REGULAR INSPECTIONS AND MAINTENANCE OF BMPS.
- NOTIFY ALL CONTRACTORS PERFORMING WORK AT THE SITE ABOUT THE PRESENCE OF THE SWPPP AND ALL CONDITIONS AND REQUIREMENTS CONTAINED HEREIN.
- STABILIZE ANY BARE AREAS WITH SEED AND MULCH. INSTALL SILT FENCING OUTSIDE OF AREAS TO BE FILLED AND AROUND BORROW
- CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE. MAINTAIN VEGETATIVE BUFFER AROUND ALL DRAINAGE CHANNELS.
- 9. PERFORM ALL CLEARING, GRUBBING, EXCAVATION AND GRADING FOR
- CONSTRUCTION. 10. INSTALL SILT FENCING AT TOE OF FILL SLOPES.
- 11. EXCAVATE FOR PRIMARY UTILITIES (I.E. STORM SEWER, SANITARY SEWER, ETC.)
- 12. STABILIZE ANY DENUDED AREAS AND STOCKPILES WITHIN 14 DAYS OF LAST CONSTRUCTION ACTIVITY IN THAT AREA.
- COMPLETE GRADING AND INSTALL PERMANENT SEEDING AND LANDSCAPING. 14. REMOVE SILT FENCING ONCE PERMANENT VEGETATION IS ESTABLISHED.

- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONNEL AND PROPERTY DURING THE DURATION OF THE PROJECT. THIS REQUIREMENT WILL NOT BE LIMITED TO NORMAL WORK HOURS.
- THE LOCATIONS OF ALL UTILITIES INDICATED IN THE DRAWINGS HAVE BEEN DETERMINED BASED ON AVAILABLE INFORMATION. THEIR LOCATIONS SHOULD BE CONSIDERED APPROXIMATE. FURTHERMORE, ADDITIONAL UTILITIES MIGHT BE PRESENT THAT ARE NOT CURRENTLY SHOWN. THE CONTRACTOR SHALL CONTACT ALL NECESSARY UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF ALL BURIED UTILITY LINES, PRIOR TO ANY SITE EXCAVATIONS. ALSO, STATE LAW (RSMO CHAPTER 319) REQUIRES A BURIED CABLE LOCATOR SERVICE TO BE CONTACTED PRIOR TO **EXCAVATION. CALL 1-800-DIG-RITE.**
- THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE AND SUBSEQUENT REPAIR TO ANY UNDERGROUND UTILITIES ON THE SITE OR IMMEDIATE AREA, DURING THE COURSE OF CONSTRUCTION.
- CONTRACTOR SHALL RELOCATE/REPLACE EXISTING ITEMS AS NECESSARY TO CONSTRUCT THE PROPOSED IMPROVEMENTS, INCLUDING, BUT NOT LIMITED TO. PROPERTY PINS, MAILBOXES, SHRUBS, FENCES, LANDSCAPING, UTILITIES, ETC. ANY PROPERTY PINS/MONUMENTS THAT ARE DISTURBED OR DESTROYED DURING CONSTRUCTION SHALL BE REPLACED UNDER THE DIRECT SUPERVISION OF A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF MISSOURI.
- THE CONTRACTOR SHALL RESTORE OFF-SITE AREAS DAMAGED BY CONSTRUCTION TO A CONDITION EQUAL TO OR BETTER THAN THE CONDITION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

#### **EROSION CONTROL NOTES**

- THE CONTRACTOR SHALL DEVELOP AND SUBMIT A SWPPP TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. THE SWPPP SHALL CONFORM TO THE REQUIREMENTS OF DIVISION 2, SPECIFICATION SECTION 02370 AND AS STATE HEREIN.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MANAGING STORM WATER RUNOFF AND EROSION DURING THE COURSE OF CONSTRUCTION. THE EROSION CONTROL BEST MANAGEMENT PRACTICES (BMPS) SHOWN ON THE PLANS SHALL BE CONSIDERED THE MINIMAL ACCEPTABLE BMPS FOR THE PROJECT. THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL BMPS AS DEEMED NECESSARY TO ADEQUATELY RETAIN SEDIMENT ON-SITE. ANY MODIFICATIONS TO THE PLANS SHALL BE DOCUMENTED USING THE APPROPRIATE FORMS, WHICH SHALL BE KEPT IN THE LOG BOOK. THE LOG BOOK SHALL BE KEPT ON THE JOB SITE AND SHALL BE AVAILABLE IMMEDIATELY FOR REVIEW BY GOVERNING **AUTHORITIES, AT THEIR REQUEST.**
- ALL BMPS SHALL BE INSPECTED ONCE A WEEK AND IMMEDIATELY AFTER EACH SIGNIFICANT RAIN EVENT (0.5-INCHES IN 24-HOURS). ALL APPROPRIATE MEASURES MUST BE TAKEN TO REPAIR BMPS IF DAMAGE IS OBSERVED DURING THE INVESTIGATIONS.
- THE APPROPRIATE INSPECTION AND MAINTENANCE FORMS MUST BE FILLED OUT DURING EACH INSPECTION. THE INSPECTION AND MAINTENANCE FORMS MUST BE SAVED IN THE LOG BOOK FOR THE PROJECT. THE LOG BOOK SHALL BE KEPT ON THE JOB SITE AND SHALL BE AVAILABLE IMMEDIATELY FOR REVIEW BY GOVERNING AUTHORITIES, AT THEIR REQUEST. THE INSPECTION AND MAINTENANCE FORMS MAY BE FOUND IN SPECIFICATION SECTION 02370, LOCATED IN THE PROJECT MANUAL
- THE CONTRACTOR SHALL ESTABLISH A MINIMUM OF ONE TEMPORARY CONSTRUCTION ENTRANCE PER DEVELOPMENT SITE TO PROVIDE SITE ACCESS. ALL VEHICULAR ACCESS TO THE SITE(S) SHALL OCCUR VIA THE TEMPORARY CONSTRUCTION ENTRANCE.

#### **EROSION CONTROL NOTES (CONT)**

- 5. NO AREA SHALL BE LEFT DENUDED FOR LONGER THAN 14 CONSECUTIVE DAYS. AREAS LEFT DENUDED FOR LONGER THAN 14 CONSECUTIVE DAYS WITHOUT HEAVY CONSTRUCTION TRAFFIC OR WORK SHALL BE TEMPORARILY SEEDED AND MULCHED SO AS TO LIMIT EROSION.
- 6. ALL TEMPORARY DIVERSION BERMS, DIVERSION DITCHES AND SOIL STOCKPILE AREAS SHALL BE SEEDED AND MULCHED IMMEDIATELY AFTER GRADING.
- WHERE POSSIBLE, THE CONTRACTOR SHALL MAINTAIN AND PROTECT EXISTING TREES AND VEGETATION.
- 8. AFTER THE SITE HAS BEEN SEEDED AND PERMANENT VEGETATION HAS BEEN ESTABLISHED, THE CONTRACTOR SHALL REMOVE EACH BMP AS INDICATED ON EACH BMP DETAIL SHEET. EXCESS DEBRIS AND SEDIMENT SHALL BE REMOVED FROM EACH BMPS AND WASTED ON THE SITE IN SUCH A MANNER AS TO ELIMINATE ANY MOVEMENT OF THE MATERIAL OFF OF THE SITE.

#### EROSION CONTROL MAINTENANCE

- SILT FENCING SHALL BE INSPECTED DAILY DURING PERIODS OF RAINFALL, IMMEDIATELY AFTER EACH SIGNIFICANT RAINFALL EVENT, AND WEEKLY DURING PERIODS OF NO RAINFALL. REPAIRS TO SILT FENCES SHALL BE DONE IMMEDIATELY. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN THE SEDIMENT REACHES ONE-HALF THE HEIGHT OF THE SILT FENCE. LIMIT TO 1/4 ACRE PER 100-FT OF FENCE.
- EARTHEN BERMS SHALL BE REGULARLY INSPECTED, AND INSPECTED AFTER EACH RAINFALL EVENT. REPAIRS TO EARTHEN BERMS SHALL BE MADE IMMEDIATELY. IF THE EARTHEN BERM SHOWS SIGNS OF EROSION, AND IT IS DETERMINED THAT MATERIAL MUST BE ADDED TO FIX THE BERM, THE MATERIAL SHALL BE PROPERLY PLACED, COMPACTED AND RESEEDED. THE BERM SHALL BE RESEEDED AND STABILIZED, AS NEEDED, TO MAINTAIN ITS SOUNDNESS WHETHER OR NOT THERE HAS BEEN ANY RAINFALL.
- THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE INSPECTED REGULARLY, AFTER EVERY RAINFALL EVENT, AND DURING HIGH VOLUMES OF TRAFFIC. REPAIRS TO THE CONSTRUCTION ENTRANCE SHALL BE MADE IMMEDIATELY. ALL SEDIMENTS, AND ALL OTHER MATERIALS, TRACKED OFF SITE SHALL BE REMOVED IMMEDIATELY.
- DRAINAGE SWALES SHALL BE INSPECTED REGULARLY AND AFTER EVERY RAINFALL EVENT. REPAIRS TO DRAINAGE SWALES SHALL BE MADE IMMEDIATELY. IF THE FLOW CHANNEL AND/OR OUTLETS SHOW SIGNS OF DEFICIENCY, THE DAMAGED AREA(S) SHALL BE RESTABILIZED AND RESEEDED, AS NEEDED, TO PREVENT FURTHER DAMAGE.

#### MATERIALS MANGEMENT PRACTICES

- ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS. IF POSSIBLE, MATERIALS SHALL BE STORED UNDER A ROOF OR OTHER ENCLOSURE.
- PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE MANUFACTURER'S LABEL. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER. WHENEVER POSSIBLE, ALL OF THE PRODUCT SHALL BE USED UP BEFORE DISPOSING OF THE CONTAINER. THE MANUFACTURER'S RECOMMENDATIONS FOR THE PROPER USE AND DISPOSAL OF THEIR PRODUCTS SHALL BE FOLLOWED. THE CONSTRUCTION MANGER SHALL INSPECT THE ON-SITE MATERIALS DAILY TO ENSURE THE PROPER USE AND DISPOSAL.
- HAZARDOUS PRODUCTS SHALL BE KEPT IN ORIGINAL CONTAINERS UNLESS THEY ARE NOT REUSEABLE. ORIGINAL LABELS AND MATERIAL SAFETY DATA SHALL BE RETAINED. ALL FEDERAL, STATE AND CITY REGULATIONS SHALL BE FOLLOWED WHEN DISPOSING OF ANY HAZARDOUS WASTE.

- 1. ALL ON-SITE VEHICLES SHALL BE MONITORED FOR LEAKS AND SHALL RECEIVE REGULAR PREVENTATIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE.
- CONCRETE TRUCKS SHALL ONLY WASH-OUT OR DISCHARGE SURPLUS CONCRETE, OR DRUM-WASH WATER, AT DEDICATED CONCRETE TRUCK WASH-OUT AREAS. NO EXCESS CONCRETE OR DRUM WASH WATER SHALL BE RELEASED FROM THE SITE.
- PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED.
- ALL ASPHALTIC SUBSTANCES USED ON-SITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURERS RECOMMENDATIONS.
- 5. FERTILIZERS SHALL BE APPLIED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, FERTILIZER SHALL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORM WATER. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER SHALL BE TRANSFERRED TO A SEALABLE PLASTIC CONTAINER TO AVOID SPILLS.
- ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY. THE MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE RELAYED TO SITE PERSONNEL AND THEY SHALL BE MADE AWARE OF THE LOCATION OF THE CLEANUP SUPPLIES. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP SHALL BE STORED ON-SITE. IN CASE OF A SPILL. THE SPILL AREA SHALL BE KEPT WELL VENTILATED AND CLEANUP PERSONNEL SHALL WEAR THE APPROPRIATE CLOTHING TO PREVENT INJURY FROM CONTACT WITH THE HAZARDOUS SUBSTANCE. SPILLS OF TOXIC AND HAZARDOUS MATERIAL, REGARDLESS OF THE SIZE OF THE SPILL, SHALL BE REPORTED TO THE APPROPRIATE STATE AND LOCAL GOVERNMENT AGENCIES IMMEDIATELY AFTER DISCOVERY.

#### SIGNIFICANT MATERIAL INVENTORY

#### THE FOLLOWING IS A LIST OF MATERIALS THAT MIGHT BE FOUND ON THE JOBSITE DURING CONSTRUCTION.

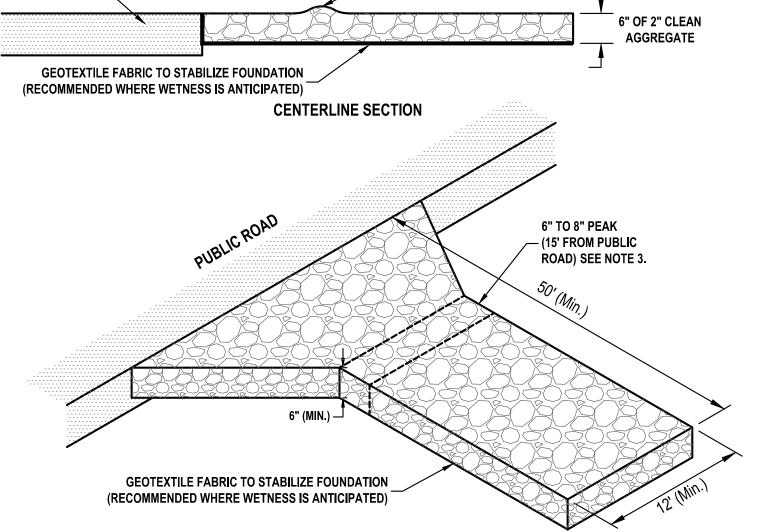
TRADE NAME/MATERIAL	CHEMICAL/PHYSICAL DESCRIPTION	STORM WATER POLLUTANTS
Erosion	Solid Particles	Soil, sediment
Fertilizer	Liquid or solid grains	Nitrogen, phosphorus
Pesticides (insecticides, fungicides, herbicides, rodenticides)	Various colored to colorless liquid, powder, pellets, or grains	Chlorinated hydrocarbons, organophosphates, carbonates, arsenic
Asphalt	Black solid	Oil, petroleum distillates
Concrete	White solid	Limestone, sand
Plaster	White granules or powder	Calcium Sulphate, calcium carbonate, sulfuric acid
Glue, adhesives	White or yellow liquid	Polymers, epoxies
Paints	Various colored liquid	Metal oxides, Stoddard solvent, talc, calcium carbonate, arsenic
Curing compounds	Creamy white liquid	Naphtha
Wood preservatives	Clear amber or dark brown liquid	Stoddard solvent, petroleum distillates, arsenic, copper, chromium.
Hydraulic oil/fluids	Brown oily petroleum hydrocarbon	Mineral oil
GasolineDiesel	Colorless, pale brown or pink petroleum	Benzene, ethyl benzene, toluene, xylene, MTBE
Fuel	hydrocarbon	Petroleum distillate, oil & grease, naphthalene, xylenes
Antifreeze/coolant	Clear, blue-green to yellow liquid Clear green/yellow liquid	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)

- THE PERMITTEE SHALL RETAIN A COPY OF THE GENERAL PERMIT, THE SWPPP, THE INSPECTION LOG, RESULTS OF ANY REQUIRED MONITORING AND ANALYSIS ON HAND AT ALL TIMES. THE AFOREMENTIONED INFORMATION SHOULD BE AVAILABLE FOR REVIEW BY LOCAL AGENCY OR **GOVERNMENT REPRESENTATIVE, DURING NORMAL BUSINESS HOURS.**
- 2. THE PERMITTEE SHALL PROVIDE A COPY OF THE SWPPP AND GENERAL PERMIT TO THOSE INDIVIDUALS WHO ARE RESPONSIBLE FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF ANY BMP. A COPY OF THE SWPPP MUST BE PRESENT AT THE JOB SITE AT ALL TIMES.

- STRIP TOPSOIL ONLY FROM THOSE AREAS THAT WILL BE DISTURBED BY EXCAVATION, FILLING, ROAD BUILDING, OR COMPACTION BY EQUIPMENT. A 4-6 INCH STRIPPING DEPTH IS COMMON, BUT DEPTH VARIES DEPENDING ON THE SITE. DETERMINE DEPTH OF STRIPPING BY TAKING SOIL CORES AT SEVERAL LOCATIONS WITHIN EACH AREA TO BE STRIPPED. TOPSOIL DEPTH GENERALLY VARIES ALONG A GRADIENT FROM HILLTOP TO TOE OF THE SLOPE. PUT SEDIMENT BASINS, DIVERSIONS, AND OTHER CONTROLS INTO PLACE BEFORE STRIPPING.
- SELECT STOCKPILE LOCATION TO AVOID SLOPES AND NATURAL DRAINAGEWAYS, AVOIDING TRAFFIC ROUTES. ON LARGE SITES. RE-SPREADING IS EASIER AND MORE ECONOMICAL WHERE TOPSOIL IS STOCKPILED IN SMALL PILES LOCATED NEAR AREAS WHERE THEY WILL BE USED.
- 3. INSPECT AND MAINTAIN ALL BMPS LOCATED DOWN HILL OF AREA BEING GRADED, AS INDICATED. ADDITIONAL BMPS SHOULD BE CONSTRUCTED IF IT IS OBSERVED THAT THE PROPOSED BMPS ARE NOT EFFECTIVELY LIMITING SEDIMENT TRANSPORT FROM THE SITE. TYPICAL BMPS THAT MIGHT BE UTILIZED INCLUDE, BUT ARE NOT LIMITED TO:
- SEDIMENT BARRIERS USE SILT FENCES, STRAW BALE SEDIMENT TRAPS OR OTHER BARRIERS 3.1. WHERE NECESSARY TO RETAIN SEDIMENT
- TEMPORARY SEEDING PROTECT TOPSOIL STOCKPILES BY TEMPORARILY SEEDING AS SOON AS POSSIBLE, NO MORE THAN 14 CALENDAR DAYS AFTER THE FORMATION OF THE STOCKPILE
- PERMANENT VEGETATION IF STOCKPILES WILL NOT BE USED WITHIN 12 MONTHS, THEY MUST BE STABILIZED WITH PERMANENT VEGETATION TO CONTROL EROSION AND WEED GROWTH

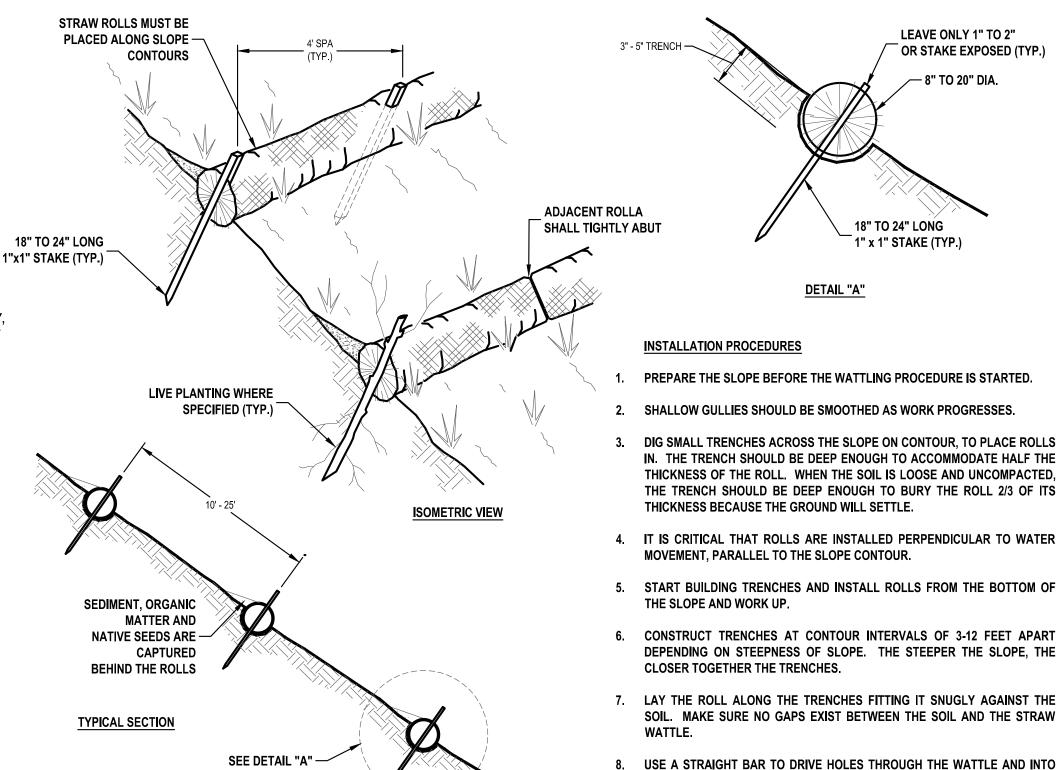
#### ADDITIONAL SITE MANAGEMENT BMPS

- 1. THE FOLLOWING IS A LIST OF ADDITIONAL SITE MANAGEMENT BMPS THAT WILL BE INCORPORATED TO PREVENT CONTAMINATION OF STORM WATER RUNOFF.
- 1.1. PROVIDE TRASH CONTAINERS ONSITE AND PERFORM REGULAR SITE CLEAN UP FOR PROPER DISPOSAL OF SOLID WASTE. SOLID WASTE SHALL INCLUDE, BUT NOT BE LIMITED TO, SCRAP BUILDING MATERIALS, PRODUCT/MATERIAL PACKAGING, FOOD AND DRINK CONTAINERS.
- 1.2. PROVIDE CONTAINERS FOR THE DISPOSAL OF WASTE PAINTS, SOLVENTS, CLEANING COMPOUNDS, ETC.
- 1.3. STORE CONSTRUCTION MATERIALS AWAY FROM DRAINAGE COURSES AND LOW AREAS.
- 1.4. INSTALL CONTAINMENT BERMS AND DRIP PANS AT PETROLEUM PRODUCT AND LIQUID STORAGE TANKS
- CONCRETE TRUCKS SHALL NOT DISCHARGE SURPLUS CONCRETE OR WASH WATER ON THE GROUND OR INTO DITCHES ON SITE. DEDICATED CONCRETE TRUCK WASH-OUT AREAS WILL BE DESIGNED TO ENSURE CONCRETE PARTICLES WILL NOT BE RELEASED FROM THE CONSTRUCTION SITE.
- OTHER EROSION CONTROL MEASURES MAY BE IMPLEMENTED WITH THE WRITTEN CONSENT OF THE ENGINEER
- 3. ALL EROSION CONTROL MEASURES MUST MEET LOCAL REQUIREMENTS AND THE "PROTECTING WATER QUALITY, A FIELD GUIDE TO EROSION. SEDIMENT AND STORM WATER BEST MANAGEMENT PRACTICES FOR DEVELOPMENT SITES IN MISSOURI AND KANSAS" (BMP). THE BMP IS AVAILABLE FROM THE MISSOURI DEPARTMENT OF NATURAL RESOURCES AND CAN BE DOWNLOADED FROM THE DNR WEBSITE AT HTTP:/WWW.DNR.MO.GOV/ENV/WPP/WPCP-GUIDE.HTM.



- 1. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS. IF POSSIBLE, LOCATE WHERE PERMANENT ROADS WILL EVENTUALLY BE CONSTRUCTED.
- 2. REMOVE ALL VEGETATION AND OTHER UNSUITABLE MATERIAL FROM THE FOUNDATION AREA, GRADE AND CROWN FOR POSITIVE DRAINAGE.
- 3. IF ACCESS ROAD IS SLOPED TOWARD STREET, CONTRACTOR SHALL CREATE 6" TO 8" PEAK 15 FOOT FROM PUBLIC ROADWAY. CONTRACTOR SHALL GRADE PEAK TO DIVERT WATER AWAY FROM PUBLIC ROAD AND INTO NEAREST DRAINAGE SYSTEM.

#### TEMPORARY CONSTRUCTION ENTRANCE DETAIL



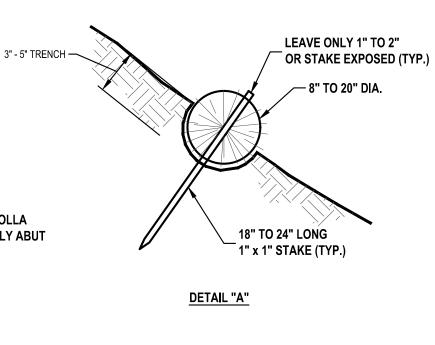
### NOTE:

- 1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3"-5" DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.
- 2. SPACING SHALL DEPEND ON SOIL TYPE AND SLOPE GRADE.

EX. PAVEMENT

NOTES:

3. WATTLES AT THE TOE OF SLOPES GREATER THAN 5:1 (H:V) MAY REQUIRE THE USE OF 20-INCH DIAMETER UNITS OR INSTALLATION ACHIEVING THE SAME PROTECTION (E.G., STACKED SMALLER DIAMETER STRAW WATTLES, ETC).



- PREPARE THE SLOPE BEFORE THE WATTLING PROCEDURE IS STARTED.
- 2. SHALLOW GULLIES SHOULD BE SMOOTHED AS WORK PROGRESSES.
- 3. DIG SMALL TRENCHES ACROSS THE SLOPE ON CONTOUR, TO PLACE ROLLS IN. THE TRENCH SHOULD BE DEEP ENOUGH TO ACCOMMODATE HALF THE THICKNESS OF THE ROLL. WHEN THE SOIL IS LOOSE AND UNCOMPACTED THE TRENCH SHOULD BE DEEP ENOUGH TO BURY THE ROLL 2/3 OF ITS THICKNESS BECAUSE THE GROUND WILL SETTLE.
- 4. IT IS CRITICAL THAT ROLLS ARE INSTALLED PERPENDICULAR TO WATER MOVEMENT, PARALLEL TO THE SLOPE CONTOUR.
- 5. START BUILDING TRENCHES AND INSTALL ROLLS FROM THE BOTTOM OF
- 6. CONSTRUCT TRENCHES AT CONTOUR INTERVALS OF 3-12 FEET APART DEPENDING ON STEEPNESS OF SLOPE. THE STEEPER THE SLOPE, THE CLOSER TOGETHER THE TRENCHES.
- SOIL. MAKE SURE NO GAPS EXIST BETWEEN THE SOIL AND THE STRAW
- THE SOIL FOR THE WILLOW OR WOODEN STAKES. 9. DRIVE THE STAKE THROUGH PREPARED HOLE INTO SOIL. LEAVE ONLY 1
- 10. INSTALL STAKES AT LEAST EVERY 4 FEET APART THROUGH THE WATTLE ADDITIONAL STAKES MAY BE DRIVEN ON THE DOWNSLOPE SIDE OF THE TRENCHES ON HIGHLY EROSIVE OR VERY STEEP SLOPES.

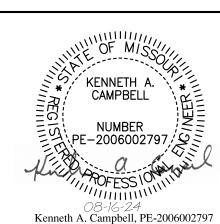
OR 2 INCHES OF STAKE EXPOSED ABOVE ROLL.

- INSPECTION & MAINTENANCE PROCEDURES 1. INSPECT SEDIMENTATION BASINS WEEKLY AND AFTER EACH SIGNIFICANT STORM EVENT (0.5-INCHES IN 24-HOURS).
- 2. ALL DAMAGES CAUSED BY SOIL EROSION OR CONSTRUCTION EQUIPMENT SHALL BE REPAIRED BEFORE THE END OF EACH WORKING DAY.
- 3. REMOVE SEDIMENT WHEN THE SEDIMENT STORAGE ZONE IS HALF FULL. THIS SEDIMENT SHALL BE PLACED IN SUCH A MANNER THAT IT WILL NOT ERODE FROM THE SITE. THE SEDIMENT SHALL NOT BE DEPOSITED DOWNSTREAM FROM THE EMBANKMENT OR IN OR ADJACENT TO A STREAM OR FLOODPLAIN.
- 4. WHEN TEMPORARY STRUCTURES HAVE SERVED THEIR INTENDED PURPOSE AND THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED. THE EMBANKMENT AND RESULTING SEDIMENT DEPOSIT SHALL BE LEVELED OR OTHERWISE DISPOSED OF IN ACCORDANCE WITH THE APPROVED EROSION AND SEDIMENT CONTROL PLAN,

STRAW WATTLE DETAIL

NOT TO SCALE

STATE OF MISSOURI MICHAEL L. PARSON **GOVERNOR** 





**OFFICE OF ADMINISTRATION DIVISION OF FACILITIES** MANAGEMENT, **DESIGN AND CONSTRUCTION** 

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

LEASBURG, MISSOURI

PROJECT # X2306-02 5215

FACILITY # 7815215010 7815215011 7815215044

**REVISION: ISSUED TO MDNR** DATE: 06-17-24 REVISION: ISSUED FOR BIDDING DATE: 08-16-24

ISSUE DATE: 08-16-24 CAD DWG FILE:C-501.DWG

SHEET TITLE:

DRAWN BY:

CHECKED BY:

**REVISION:** 

DATE:

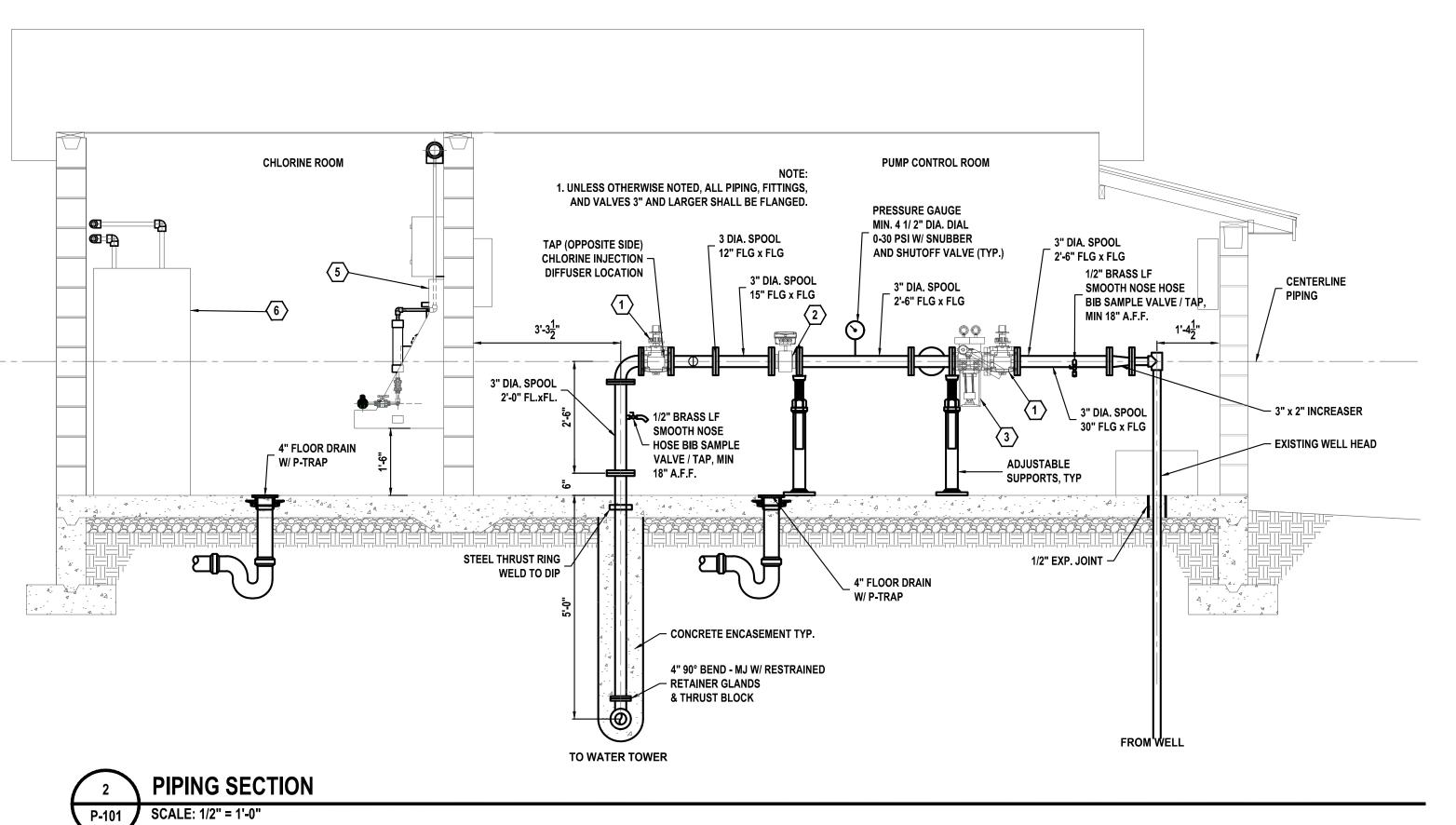
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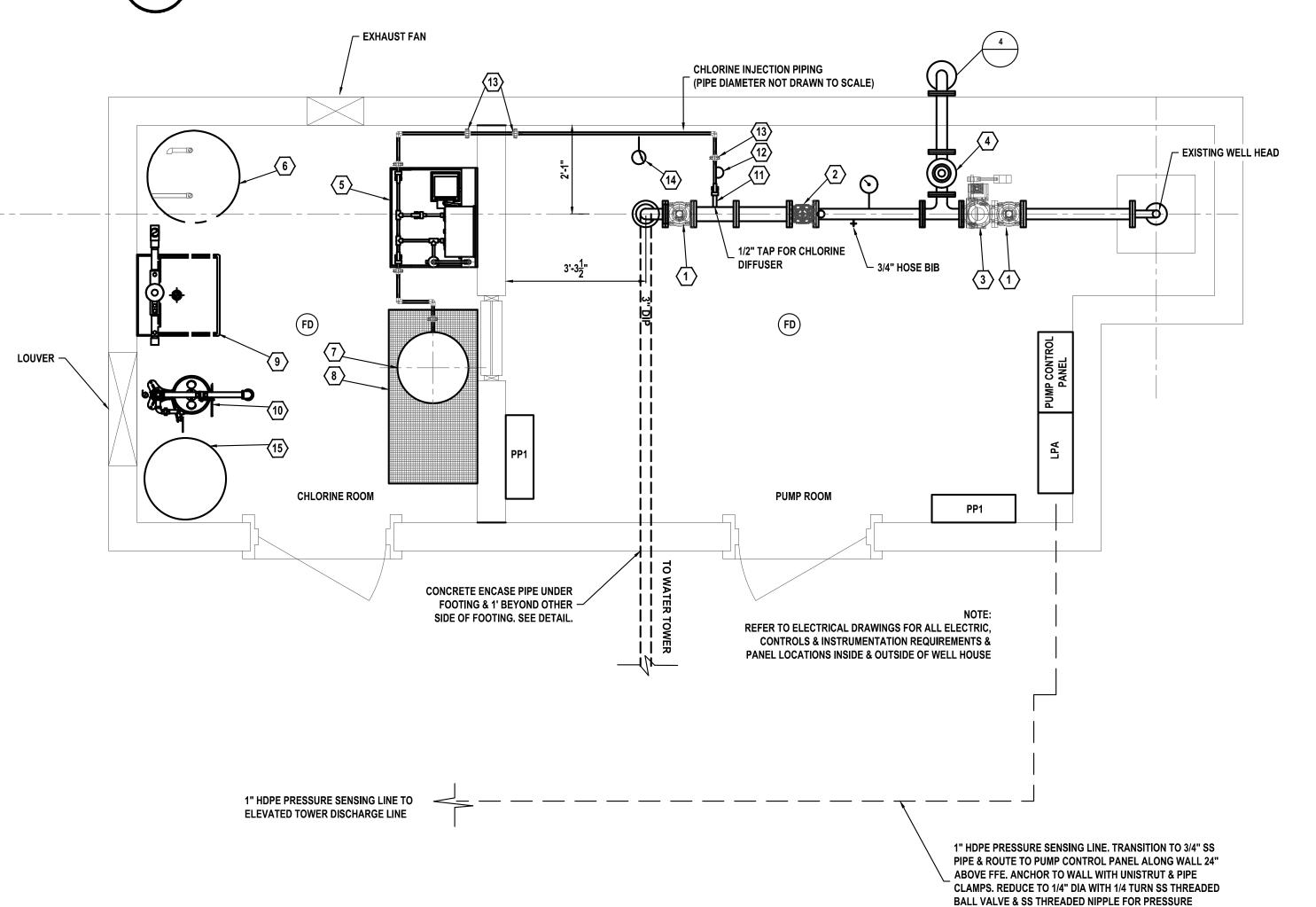
DESIGNED BY: EMH

SHEET NUMBER:

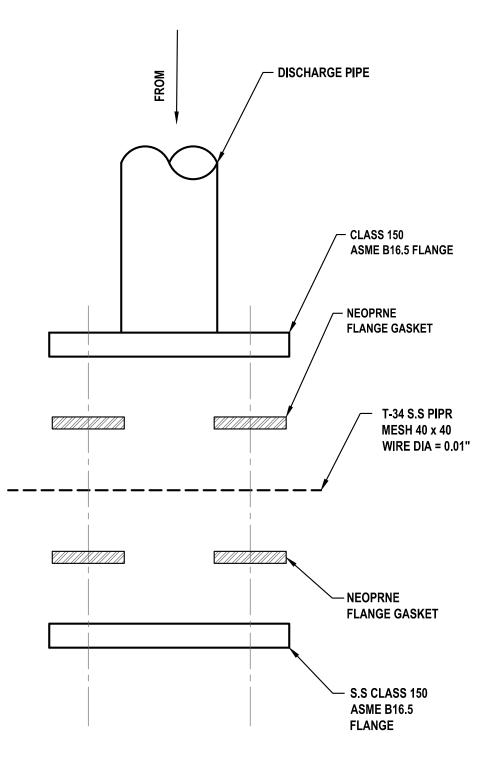
14 OF 27 SHEETS

08-16-24

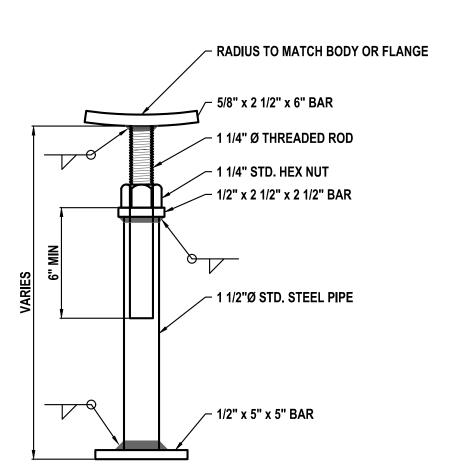








**DISCHARGE PIPE INSECT SCREEN** 



**ADJUSTABLE PIPE STAND DETAIL** P-101 SCALE: N.T.S.

PLAN NORTH

SENSOR TRANSMITTER.

#### **GENERAL NOTES:**

1.) ALL CHEMICALS AND EQUIPMENT FOR USE IN THE PROPOSED DISINFECTION SHALL BE NSF61 CERTIFIED FOR USE IN POTABLE WATER SUPPLY SYSTEMS.

2.) CHEMICAL DIFFUSER SHALL CONSIST OF A LMI CORP STOP & NOZZLE ASSEMBLY CONTAINING A 1" MUELLER POLYPROPYLENE NOZZLE & BRONZE CORP STOP OR APPROVED EQUAL.

3.) THE CHEMICAL SOLUTION TANK SHALL CONSIST OF LMI 35 GALLON FRP TANK, COMPLETE W/ AGITATOR AND LIQUID LEVEL PROBE OR APPROVED EQUAL. THE CHEMICAL SOLUTION TANK FOR THE DISINFECTION PROCESS SHALL BE PROVIDED WITH A 4" PVC VENT TO THE EXTERIOR OF THE BUILDING. TURN VENT DOWN AND INSTALL INSECT SCREEN ON OPEN END OF VENT PIPE

4.) THE CHEMICAL SOLUTION TANK SHALL BE CLEARLY LABELED TO INDICATE THE CHEMICAL CONTAINED WITHIN THE STORAGE TANK AND THE TANK'S FUNCTION (I.E., SOLUTION).

5.) THE PROPELLER FLOW METER SHALL BE McCROMETER PROPELLER MW500, SENSUS MODEL 101-102 (PROP 300:1 ROFI), OR APPROVED EQUAL.

6.) SEE SPECIFICATION SECTION 43 25 16 FOR DETAILS RELATING TO CHEMICAL METERING PUMP SKID ASSEMBLY.

7.) PROCESS PIPING AND SPECIALTIES SHALL BE IN CONFORMANCE WITH DIVISION 33 SPECIFICATIONS. SODIUM HYPOCHLORATE SOLUTION LINES, FITTINGS AND VALVES SHALL CONSIST OF SCHD. 80 PVC. ALL SOLUTION LINE BALL VALVES SHALL BE VENTED.

8.) ALL DISINFECTION ROOM PIPING SHALL BE CLEARLY IDENTIFIED AS **INDICATED IN SECTION 330597.** 

9.) PRESSURE GAUGE ASSEMBLIES SHALL BE OMEGA PGH-30PSI $\frac{1}{2}$ -100-SS- $\frac{1}{4}$ CG STAINLESS STEEL, LIQUID FILLABLE INDUSTRIAL PRESSURE GAUGE OR APPROVED EQUAL. PRESSURE GAUGE ASSEMBLY SHALL INCLUDE A DIAPHRAGM PRESSURE SEAL AND VENTED BALL VALVE.

10.) AT NO TIME DURING CONSTRUCTION OF IMPROVEMENTS SHALL THE OWNER BE LEFT WITHOUT A POTABLE WATER SUPPLY. SEQUENCE CONSTRUCTION ACTIVITIES TO AFFORD CONTINUOUS WATER SERVICE DURING CONSTRUCTION.

12.) ALL PIPING JOINTS, FITTINGS & VALVES SHALL BE RESTRAINED.

13.) ALL NUTS, BOLTS & OTHER FASTENERS SHALL BE STAINLESS STEEL.

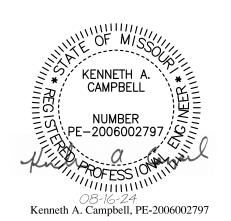
15.) CONTRACTOR SHALL BE RESPONSIBLE FOR PIPING LAYOUT AND DIMENSIONS. SEE STRUCTURAL DRAWINGS FOR BUILDING DIMENSIONS.

16.) ALL HARDWARE SHALL BE STAINLESS STEEL, UNLESS OTHERWISE NOTED.

#### KEYNOTES: (#)

- 1. 3" FLG PLUG VALVE WITH HANDWHEEL
- 2. 3" PROPELLER FLOW METER
- 3. 3" FLG AIR CUSHIONED SWING CHECK VALVE
- 4. 3" PRESSURE RELIEF VALVE
- 5. CHEMICAL METERING SKID
- 6. HOT WATER HEATER
- 7. CHEMICAL STORAGE TANK
- 8. SPILL CONTAINMENT SKID
- 9. UTILITIY SINK
- 10. EMERGENCY SHOWER & EYE WASH STATION
- 11. CHLORINE INJECTOR
- 12. Y-STRAINER
- 13. UNION
- 14. PRESSURE GAUGE ASSEMBLY WITH BALL VALVE AND DIAPHRAGM SEAL.
- 15. WATER PRESSURE BOOSTER

#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**



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OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

PROJECT # X2306-02 5215 SITE#

FACILITY # 7815215010 7815215011 7815215044

REVISION: <u>ISSUED TO MD</u>NR DATE: 06-17-24 REVISION: <u>ISSUED FOR BI</u>DDING

DATE: 08-16-24 **REVISION:** 

DATE: ISSUE DATE: 08-16-24

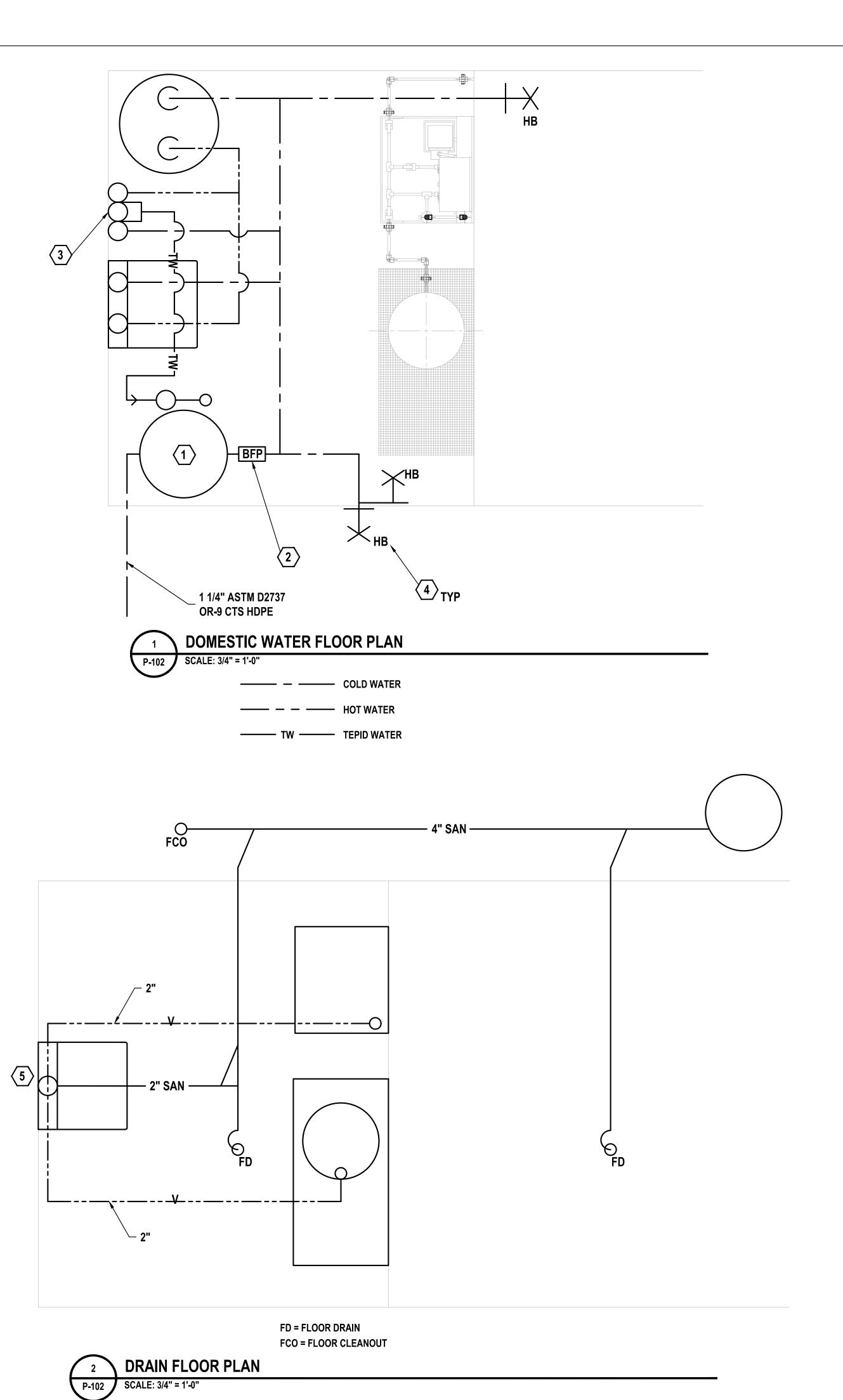
CAD DWG FILE:P-101.DWG DRAWN BY: CHECKED BY: KA

SHEET TITLE:

WELL HOUSE PIPING PLAN

DESIGNED BY: EMH

SHEET NUMBER:



#### **GENERAL NOTES:**

#### 1.) ALL COMPONENT OF WATER SUPPLY SYSTEM SHALL BE NSF61 CERTIFIED.

2.) COMBINATION EYE WASH AND EMERGENCY SHOWER SHALL BE FLOOR MOUNTED SINGLE UNIT. SHOWER PORTION SHALL HAVE A 10 IN DIA STAINLESS STEEL SHOWER HEAD RATED AT 20 GPM WITH 1 IN IPS CHROME PLATED BRASS STAY-OPEN BALL VALVE AND 29 IN STAINLESS STEEL PULL ROD. THE EYE WASH PORTION SHALL HAVE FOUR SPRAY STAINLESS STEEL BOWL 1/2 IN STAY OPEN BALL VALVE AND LEVEL ACTUATOR. PROVIDE ANSI COMPLIANT IDENTIFICATION SIGN. GUARDIAN MODEL G199 OR APPROVED EQUAL.

3.) THERMOSTATIC MIXING VALVE TO SERVE EMERGENCY SHOWER AND EMERGENCY EYEWASH SHALL BE EXPOSED AND WALL MOUNTED. GUARDIAN G3800LF OR APPROVED EQUAL. OPERATING PARAMETERS:

- A. FLOW CONTROL RANGE 3 TO 44 GPM
- B. MAIN FLOW AT 30 PSI: 20 GPMC. MAIN FLOW AT MAX PRESSURE DROP 10PSIG: 25 GPM
- D. OUTPUT TEMPERATURE RANGE: 60 TO 90 DEG F.
- E. HW SUPPLY TEMPERATURE: 90 DEG
  F. SUPPLY PRESSURE RANGE: 40 TO 80 PSIG
- G. MIXING VALVE BYPASS: COLD WATER BYPASS IF VALVE SHOULD FAIL.

4.) POTABLE HOT WATER HEATER SHALL BE PROVIDED TO THERMOSTATIC MIXING VALVE FROM AN ELECTRIC STORAGE TYPE WATER HEATER. THE WATER HEATER SHALL HAVE AN ELECTRIC HEATING ELEMENT OF 3 KW, AND A 119 GPM STORAGE TANK.

5.) WATER PRESSURE BOOSTER ASSEMBLY SHALL CONSIST OF 1/2 HP, 1-PHASE, 12 OVAC HEAVY DUTY PUMP WHICH DISCHARGES TO PRE PRESSURIZED, HEAVY DUTY DIAPHRAGM STYLE STORAGE TANK. PRESSURIZED, TANK SHALL HAVE A MINIMUM CAPACITY OF 34 GALLONS. SYSTEM SHALL BE CAPABLE OF INCREASING SUPPLY PRESSURE BY 45 PSI WITH MAIN DISCHARGE VOLUMETRIC FLOW RATE OF 20GPM. AMTROL PRESSURIZER RP-25HP OR APPROVED EQUAL.

#### 6.) PLUMBING:

- A. POTABLE WATER SERVICE SHALL BE PROTECTED BY REDUCED PRESSURE FLOW PREVENTER APPROVED BY LOCAL PUBLIC UTILITY BUREAU AND STATE DEPARTMENT OF NATURAL RESOURCES UNIT SHALL HAVE TWO CHECK VALVES TEST COCKS PRESSURE DIFFERENTIAL RELIEF VALVE ISOLATION VALVES ASSEMBLED AS A UNIT, HORIZONTALLY MOUNTED.
- B. ALL POTABLE WATER PIPING AND WATER SERVICE INSIDE BUILDING SHALL BY COPPER, TYPE L, WITH SOLDIER JOINTS, AND WROUGHT COPPER OR CAST BRASS FITTINGS.
- C. UTILITY SINK: FLOOR MOUNTED UTILITY SINK:

  MOLDED STONE SINGLE COMPARTMENT SINK APPROXIMATELY

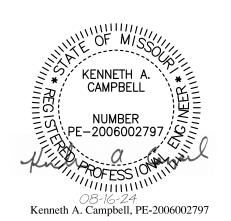
  20 IN x 17 IN x 13 IN. PROVIDE FOUR WHITE BAKED ENAMEL LEGS. SINGLE 2 IN

  DRAIN WITH GRID COVER. FIAT MODEL FL-1 OR APPROVED EQUAL.
- D. HOSE BID: ANTI SIPHON, VACUUM BREAKER PROJECTED WALL FAUCET WITH 3/4 IN HOSE THREAD, METAL WHEEL HANDLE, 3/4 IN INLET ROUGH BRASS FINISH. WOODFORD MODEL 24 OR APPROVED EQUAL.

## KEYNOTES: (#)

- 1. WATER PRESSURE BOOSTER
- 2. BACKFLOW PREVENTER MOUNTED ABOVE UTILITY SINK
- 3. THERMOSTATIC MIXING VALVE
- 4. 3/4" HOSE BIB, MOUNT 36" ABOUT FINISHED FLOOR
- 5. 4" VENT UP TO VENT THROUGH ROOF

#### STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR



OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

PROJECT # X2306-02 SITE # 5215

FACILITY # 7815215010 7815215011 7815215044

REVISION: ISSUED TO MDNR
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ISSUE DATE: 08-16-24

CAD DWG FILE:P-101.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

WELL HOUSE PIPING PLAN

SHEET NUMBER:

P-102

#### **GENERAL REQUIREMENTS:**

- A. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY IN AND AROUND THE SITE AND FOR THE STRENGTH AND STABILITY OF ALL PARTIALLY COMPLETED STRUCTURES. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE TEMPORARY BRACING AND SHORING AS REQUIRED FOR THE STABILITY OF THE STRUCTURE AND STRUCTURAL COMPONENTS DURING ALL PHASES OF CONSTRUCTION AND FABRICATION. THE CONTRACTOR SHALL, AT HIS DISCRETION, EMPLOY A DULLY LICENSED AND REGISTERED PROFESSIONAL ENGINEER TO DESIGN ALL TEMPORARY BRACING, SHORING, AND OTHER WORKS NECESSARY TO COMPLETE THE WORK DESCRIBED IN THESE DOCUMENTS.
- B. CONSTRUCTION AND OTHER LOADS ARE TO BE KEPT WITHIN THE LIMITS OF THE DESIGN LOADS.

#### **GENERAL NOTES:**

- A. MECHANICAL UNITS SUPPORTED BY ROOF STRUCTURE ARE SUBJECT TO THE APPROVAL OF THE STRUCTURAL ENGINEER.
- B. DURING ERECTION OF THE BUILDING, THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY BRACING TO WITHSTAND ALL LOADS TO WHICH THE STRUCTURE MAY BE SUBJECTED, INCLUDING LATERAL LOADS, STOCKPILES OF MATERIAL AND EQUIPMENT. SUCH BRACING SHALL BE LEFT IN PLACE AS LONG AS REQUIRED FOR SAFETY AND UNTIL ALL FRAMING INCLUDING ROOF

#### FOUNDATION DESIGN:

- A. FOUNDATION DESIGN HAS BEEN BASED ON AN ASSUMED SOIL BEARING CAPACITY OF 1,500 P.S.F.
- B. FOOTINGS SHALL BE PLACED ON THE NATURAL UNDISTURBED SOIL, OR COMPACTED STRUCTURAL FILL, BELOW FROST DEPTH.
- C. REPORT ANY FINDINGS TO ENGINEER FOR RE-EVALUATION OF FOUNDATION DESIGN IF ASSUMED ALLOWABLE BEARING PRESSURE IS NOT PRESENT IN FOUNDATION LOCATIONS.

#### FOUNDATION AND EARTHWORK:

- D. MINIMUM DEPTH TO BOTTOM OF FOOTINGS SHALL BE 3'-0" BELOW LOWEST ADJACENT FINISHED GRADE FOR EXTERIOR FOOTINGS AND 1'-0" BELOW FINISHED FLOOR FOR INTERIOR FOOTINGS, UNLESS OTHERWISE NOTED.
- QUALITY ASSURANCE: AN ACCEPTABLE TESTING LABORATORY SHALL BE SELECTED AND PAID FOR BY THE CONTRACTOR TO PERFORM ALL REQUIRED LABORATORY AND FIELD SOIL TESTING NECESSARY TO DEMONSTRATE COMPLIANCE WITH THE COMPACTION REQUIREMENTS.
- 1-INCH MINUS (TYPE 1) AGGREGATE: AGGREGATE SHALL BE LIMESTONE OR DOLOMITE. THE AGGREGATE SHALL NOT CONTAIN MORE THAN 15-PERCENT DELETERIOUS ROCK AND SHALE. SAND MAY BE ADDED ONLY FOR THE PURPOSE OF REDUCING THE PLASTICITY INDEX OF THE FRACTION PASSING THE NO. 40 SIEVE IN THE FINISHED PRODUCT. ANY SAND, SILT AND CLAY AND ANY DELETERIOUS ROCK AND SHALE SHALL BE UNIFORMLY DISTRIBUTED THROUGHOUT THE MATERIAL. THE FRACTION PASSING THE NO. 40 SIEVE SHALL HAVE A MAXIMUM PLASTICITY INDEX OF SIX. THE AGGREGATE SHALL HAVE THE FOLLOWING GRADATION:

SIEVE	PERCENT BY WEIGH
PASSING 1-INCH	100
PASSING 1/2-INCH	60 TO 90
PASSING NO. 4	35 TO 60
PASSING NO. 30	10 TO 35

- G. BACKFILL MATERIALS: SHALL INCLUDE SUITABLE APPROVED MATERIALS FROM THE EXCAVATION AND/OR BORROW AREA(S). SHALL BE FRIABLE SANDY OR SILTY CLAY CONTAINING FINE MATERIAL SUFFICIENT TO PROVIDE A DENSE MASS FREE OF VOIDS AND CAPABLE OF SATISFACTORY COMPACTION. SHALL BE FREE OF ROOTS AND OTHER ORGANIC MATTER, REFUSE, CINDER, ICE, SNOW, FROZEN EARTH OR OTHER UNSUITABLE MATTER. DO NOT USE MATERIAL CONTAINING GRAVEL, STONES, OR SHALE PARTICLES GREATER IN DIMENSION THAN ONE-HALF THE DEPTH OF THE LAYER TO BE COMPACTED.
- EXCAVATION: EXCAVATE AREA ADEQUATE TO PERMIT ERECTION AND REMOVAL OF FORMS. TRIM EXCAVATION TO NEAT LINES WHERE CONCRETE IS TO BE PLACED AGAINST THE EARTH. EXCAVATE BY HAND ANY AREAS WHERE SPACE AND ACCESS WILL NOT PERMIT THE USE OF MACHINES. NOTIFY THE ENGINEER IMMEDIATELY WHEN EXCAVATION HAS REACHED THE DEPTH INDICATED. DO NOT PROCEED FURTHER UNTIL EXCAVATION IS APPROVED. RESTORE THE BOTTOM OF THE EXCAVATION TO PROPER ELEVATIONS IN AREAS OVEREXCAVATED WITH CONCRETE.
- COMPACTION FOR EMBANKMENT, BACKFILLING, AND SUBGRADE: PERFORM WETTING OR DRYING OF COMPACTED MATERIAL AS REQUIRED TO OBTAIN THE SPECIFIED DENSITY. MOISTURE CONTENT AT THE TIME OF PLACEMENT SHALL NOT BE LESS THAN THE OPTIMUM NOR MORE THAN 4-PERCENT ABOVE THE OPTIMUM AS DETERMINED BY ASTM D698. DO NOT PLACE SNOW, ICE OR FROZEN EARTH IN COMPACTED SOIL AND DO NOT PLACE COMPACTED SOIL ON A FROZEN SURFACE. REMOVE WASTE MATERIALS FROM SOILS TO BE COMPACTED. AN ACCEPTABLE TESTING LABORATORY SHALL BE SELECTED AND PAID FOR BY THE CONTRACTOR TO PERFORM ALL LABORATORY AND FIELD TESTING NECESSARY TO DEMONSTRATE COMPLIANCE WITH COMPACTION REQUIREMENTS. PERFORM TESTING IN ACCORDANCE WITH ASTM D698 WHERE "STANDARD PROCTOR" HAS BEEN INDICATED. THE SOIL DENSITY TESTING FREQUENCY SHALL BE AS FOLLOWS:
- I.A. FOR COMPACTED SUBGRADE. DENSITY TESTS REPRESENTATIVE OF EACH 500-SQURE YARDS OF SUBGRADE OR PER **EXCAVATION SHALL BE TAKEN.**
- FOR STRUCTURAL BACKFILL, DENSITY TESTS REPRESENTATIVE OF EACH 100-CUBC YARDS OF FILL OR PER EXCAVATION SHALL BE TAKEN
- BACKFILLING: PLACE BACKFILL TO THE ELEVATIONS INDICATED. IN AREAS REQUIRING 95-PERCENT COMPACTION, PLACE BACKFILL IN LIFTS NOT TO EXCEED EIGHT (8) INCHES (UNCOMPACTED DEPTH). PLACE TWELVE (12) INCH MAXIMUM LIFTS IN OTHER AREAS. OBTAIN COMPACTION SPECIFIED BY NORMAL METHODS AND EQUIPMENT. BACKFILL FAILING TO MEET

SPECIFIED DENSITIES SHALL BE REMOVED OR SCARIFIED AND RECOMPACTED TO MEET SPECIFIED DENSITIES.

- J.A. STRUCTURES: COMPACT BACKFILL TO 95-PERCENT OF THE MAXIMUM DENSITY (ASTM D698) UNDER ALL STRUCTURES AND IN EXCAVATIONS ADJACENT TO STRUCTURES. BACKFILL ONLY AFTER CONCRETE HAS OBTAINED 70-PERCENT OF ITS INTENDED DESIGN STRENGTH. BACKFILL ADJACENT STRUCTURES ONLY AFTER A SUFFICIENT PORTION OF THE STRUCTURE HAS BEEN COMPLETED TO RESIST THE IMPOSED SOIL LOADS. REMOVE ALL FORMS AND DEBRIS FROM THE EXCAVATION PRIOR TO BACKFILL. BACKFILL WITHIN 1-FT OF THE STRUCTURE SHALL BE FREE OF GRAVEL, ROCK OR SHALE PARTICLES LARGER THAN 4-INCHES IN DIAMETER. BRING LIFTS UP SIMULTANEOUSLY ON ALL SIDES OF STRUCTURES, EXERCISE CAUTION IN THE USE OF HEAVY EQUIPMENT IN AREAS ADJACENT TO STRUCTURE TO AVOID HIGH LATERAL STRESSES ON THE STRUCTURE. USE ONLY LIGHT EQUIPMENT TO PLACE BACKFILL WITHIN TWENTY (20) FEET OF THE STRUCTURE. WHERE STRUCTURAL EXCAVATION HAS BEEN THROUGH ROCK, BACKFILL WITH COMPACTED GRANULAR FILL TO TOP OF ROCK FORMATION, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- K. SUBGRADE PREPARATION: EXCAVATE OR PLACE EMBANKMENT AS REQUIRED TO CONSTRUCT SUBGRADES TO ELEVATIONS INDICATED. REMOVE ALL UNSUITABLE MATERIAL AND REPLACE WITH APPROVED EMBANKMENT MATERIAL. PERFORM ALL WETTING, DRYING, SHAPING AND COMPACTION REQUIRED TO PREPARE A SUITABLE SUBGRADE. ROUGHEN SUBGRADE BY DISCING OR SCARIFYING AND WET OR DRY THE TOP EIGHT (8) INCHES AS REQUIRED. COMPACT THE TOP EIGHT (8) INCHES OF SUBGRADE TO 95-PERCENT OF ITS STANDARD PROCTOR DENSITY. PROOFROLL SUBGRADE AFTER MOISTURE CONDITIONING AND COMPACTION TO IDENTIFY SOFT OR DISTURBED AREAS. USE FULLY LOADED TANDEM AXLE DUMP TRUCK OR EQUIPMENT PROVIDING AN EQUIVALENT LOADING FOR PROOF ROLLING. UNDERCUT AND REPLACE SOFT AREAS IDENTIFIED BY PROOFROLLING WITH STRUCTURAL BACKFILL IF SO DIRECTED BY THE ENGINEER.

#### WOOD CONSTRUCTION:

- MATERIALS (FOLLOWING INDICATE MINIMUM GRADES U.N.O.): 1.1. 2x4 RAFTERS: SOUTHERN PINE NO.2
- 2x6 CEILING JOISTS: SOUTHERN PINE NO.1 OR SPF SELECT STRUCTURAL GRADE.
- ROOF DECK: 19/32" OSB SHEATHING WITH MINIMUM 32/16 SPAN RATING, WITH METAL CLIPS, JOINTS TO BE STAGGERED OR BLOCKED AND NAILED WITH 10d NAILS AT 6" O.C. AT ALL PANEL EDGES. FASTEN PANEL TO INTERMEDIATE FRAMING WITH
- 2x6 CEILING JOISTS: SOUTHERN PINE NO.1 OR SPF SELECT STRUCTURAL GRADE.

#### 2. FRAMING NOTES:

2.1. BEAMS & POSTS MADE-UP OF MULTIPLE PIECE MEMBERS SHALL BE NAILED TOGETHER 18" ON CENTER EACH SIDE. STAGGERED SPACING, USING 10d NAILS FOR 2 PIECE MEMBERS AND 20d NAILS FOR 3 AND 4 PIECE MEMBERS.

#### REINFORCED CONCRETE:

- A. CONCRETE SHALL BE PROPORTIONED TYPE I/II OR TYPE 1L CEMENT.
- B. STRUCTURAL CONCRETE FOR USE IN FOOTING SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3,500-PSI. ALL OTHER STRUCTURAL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
- C. SLUMP: 2" 4". NO WATER SHALL BE ADDED ON SITE WHICH WILL INCREASE SLUMP ABOVE 4".
- D. AIR CONTENT: NORMAL WEIGHT CONCRETE EXPOSED TO FREEZING AND THAWING OR DEICING CHEMICALS SHALL HAVE A MINIMUM ENTRAINED AIR CONTENT BETWEEN 5 AND 7-PERCENT. ALL OTHER NORMAL WEIGHT CONCRETE SHALL HAVE A AIR **CONTENT LESS THAN 3%.**
- E. ADMIXTURES CONTAINING CHLORIDE SALTS SHALL NOT BE USED.
- REINFORCEMENT PLACEMENT: PLACE IN ACCORDANCE WITH THE CONTRACT DRAWINGS, CHAPTERS 7 AND 12 OF ACI 318 AND THE MANUAL OF STANDARD PRACTICE OF THE CONCRETE REINFORCING STEEL INSTITUTE. CLEAN REINFORCEMENT OF LOOSE RUST AND MILL SCALE, EARTH, ICE AND OTHER MATERIALS WHICH REDUCE OR DESTROY BOND WITH CONCRETE ACCURATELY POSITION, SUPPORT AND SECURE REINFORCEMENT AGAINST DISPLACEMENT BY FORMWORK, CONSTRUCTION, OR CONCRETE PLACEMENT OPERATIONS. TIE SECURELY WITH 16-GAGE OR LARGER ANNEALED IRON WIRE. LOCATE AND SUPPORT REINFORCING BY METAL CHAIRS, RUNNERS, BOLSTERS, SPACERS, AND HANGERS, AS REQUIRED.
- G. CONCRETE COVERAGE FOR REINFORCING STEEL (ACI 318):

CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH:	3"
CONCRETE EXPOSED TO EARTH OR WEATHER:	2"
CONCRETE NOT EXPOSED TO WEATHER OR IN CONTRACT WITH GROUND:	
SLABS, WALLS, JOISTS (#11 BAR AND SMALLER)	1-1/2"
BEAMS, COLUMNS	1-1/2"

- H. JOINTS:
- CONSTRUCTION JOINTS: LOCATE AND INSTALL JOINTS WHICH ARE NOT INDICATED OR SPECIFIED IN CONFORMANCE WITH ACI 318. OBTAIN ENGINEER'S APPROVAL OF JOINTS LOCATED BY CONTRACTOR PRIOR TO PREPARATION OF REINFORCING STEEL DRAWINGS. PLACE CONSTRUCTION JOINTS PERPENDICULAR TO MAIN REINFORCEMENT. CONTINUE REINFORCEMENT ACROSS CONSTRUCTION JOINTS.CLEAN AND BREAK LAITANCE OR OTHER FOREIGN MATERIAL FROM BONDING SURFACES. TIGHTEN FORMS REMAINING IN PLACE (WHERE APPLICABLE) TO PREVENT SEEPAGE BETWEEN FORMS AND HARDENED CONCRETE.
- H.B. <u>ISOLATION JOINTS IN SLABS-ON-GRADE</u>: CONSTRUCT ISOLATION JOINTS IN SLABS ON-GRADE AT POINTS OF CONTRACT BETWEEN SLABS ON GROUND AND VERTICAL SURFACES, SUCH AS COLUMN PEDESTALS, FOUNDATION WALLS, EQUIPMENT FOUNDATIONS AND ELSEWHERE AS INDICATED.
- H.C. CONTRACTION (CONTROL) JOINTS: MAINTAIN TRUE ALIGNMENT WITH STRAIGHTEDGE AND LOCATE AS INDICATED. JOINTS SHALL BE GROOVED EXCEPT WHERE SAWED JOINTS ARE INDICATED. INSTALL GROOVED JOINTS DURING FINISHING PROCESS. WIDTH OF GROOVE SHALL NOT EXCEED 1/4" AND DEPTH SHALL BE AT LEAST 1". SAWED JOINTS SHALL BE INSTALLED AS SOON AS THE CONCRETE SURFACE IS FIRM ENOUGH TO RESIST TEARING OR DAMAGE BY THE POWER BLADE AND BEFORE RANDOM SHRINKAGE CRACKS CAN OCCUR. MAKE JOINTS APPROXIMATELY 1/8" WIDE WITH DEPTH AS INDICATED. SEAL JOINT WITH THE SAME TYPE SEALANT SPECIFIED FOR EXPANSION JOINT
- INSTALLATION OF EMBEDDED ITEMS: SET AND BUILD INTO WORK ANCHORAGE DEVICES AND OTHER EMBEDDED ITEMS REQUIRED FOR OTHER WORK THAT IS ATTACHED TO, OR SUPPORTED BY, CAST-IN-PLACE CONCRETE. PROVIDE FOR ACCURATE INSTALLATION OF EMBEDDED ITEMS. SECURELY FIX FLOOR DRAINS, PRESSURE RELIEF VALVES, ETC IN PLACE TO PREVENT FLOTATION WHILE PLACING CONCRETE. UNIFORMLY AND ACCURATELY SLOPE FLOOR SLAB TOWARD THE DRAINS. PROTECT PIPE SLEEVES FROM MOISTURE DURING COLD WEATHER. PROTECT ANCHOR BOLT THREADS FROM CONCRETE
- COLD WEATHER PLACEMENT OF CONCRETE: WHEN THE TEMPERATURE IS 40°F OR IS LIKELY TO FALL BELOW 40°F DURING A 24-HOUR PERIOD AFTER CONCRETE PLACEMENT, FOLLOW THE RECOMMENDATIONS OF ACI 306 TO PREVENT LOSS OF CONCRETE STRENGTH OR QUALITY. MINIMUM TEMPERATURE FOR CONCRETE AS MIXED SHALL BE INDICATED ON LINES 2, 3 AND 4 OF TABLE 1.4.1 OF ACI 306. MAXIMUM TEMPERATURE FOR CONCRETE AS MIXED SHALL BE 10°F GREATER THAN THE CORRESPONDING MINIMUM TEMPERATURE. PLACE AND MAINTAIN CONCRETE SO THAT ITS TEMPERATURE IS NEVER LESS THAN THE TEMPERATURE INDICATED ON LINE 1 OF TABLE 1.4.1 OF ACI 306. MAINTAIN THE REQUIRED TEMPERATURE FOR THE TIME DURATION INDICATED ON TABLE 1.4.2 OF ACI 306, MONITOR TEMPERATURES OF CONCRETE AT CORNERS OR EDGES OF FORMWORK AS APPLICABLE. DO NOT EXPOSE CONCRETE TO CARBON MONOXIDE OR CARBON DIOXIDE FUMES FROM HEATERS OR ENGINES. OIL OR COKE BURNING SALAMANDERS WILL NOT BE PERMITTED. PERSONNEL SHALL BE PRESENT AT ALL TIMES TO MAINTAIN SAFE, CONTINUOUS OPERATION OF HEATING SYSTEM, CONTROL TEMPERATURE AND HUMIDITY OF PROTECTED CONCRETE SO THAT EXCESSIVE DRYING OF CONCRETE SURFACES DOES NOT OCCUR. CALCIUM CHLORIDE WILL NOT BE PERMITTED AS A CONCRETE ACCELERATOR OR TO THAW FROZEN SUBGRADE PRIOR TO CONCRETE PLACEMENT.
- K. HOT-WEATHER PLACING OF CONCRETE: WHEN THE TEMPERATURE IS  $90^\circ$ F OR ABOVE, OR IS LIKELY TO RISE ABOVE  $90^\circ$ F WITHIN A 24-HOUR PERIOD AFTER THE CONCRETE PLACEMENT OR WHEN THERE IS ANY COMBINATION OF HIGH AIR TEMPERATURE. LOW RELATIVE HUMIDITY AND WIND VELOCITY WHICH WOULD IMPAIR CONCRETE STRENGTH OR QUALITY. FOLLOW THE RECOMMENDATIONS OF ACI 305. CONCRETE SHALL HAVE A MAXIMUM TEMPERATURE OF 85°F DURING PLACEMENT. DAMPEN SUBGRADE AND FORMS WITH COOL WATER IMMEDIATELY PRIOR TO PLACEMENT OF CONCRETE. COVER REINFORCING STEEL WITH WATER-SOAKED BURLAP IF IT BECOMES TOO HOT, SO THAT STEEL TEMPERATURE WILL NOT EXCEED THE AMBIENT AIR TEMPERATURE. PROTECT FRESHLY PLACED CONCRETE IMMEDIATELY AFTER PLACEMENT SO THAT THE RATE OF EVAPORATION AS DETERMINED BY ACI 305 DOES NOT EXCEED 0.2 POUND PER SQUARE FOOT PER HOUR. PROTECT CONCRETE WITH SUITABLE INSULATION. IF RAPIDLY DECREASING NIGHTTIME TEMPERATURES OCCUR. WHICH WOULD CAUSE THERMAL SHOCK TO CONCRETE PLACED DURING WARM DAYTIME TEMPERATURES. PROTECT THE CONCRETE WITH TEMPORARY WET COVERING DURING ANY APPRECIABLE DELAY BETWEEN PLACEMENT AND FINISHING.
- L. ALL EXPOSED EDGES AND CORNERS SHALL BE CHAMFERED 3/4".
- M. CONCRETE CURING AND PROTECTION: PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING AND EXCESSIVE COLD OR HOT TEMPERATURES. START INITIAL CURING AS SOON AS FREE WATER HAS DISAPPEARED FROM CONCRETE SURFACE AFTER PLACING AND FINISHING. WEATHER PERMITTING. KEEP CONTINUOUSLY MOIST FOR NOT LESS THAN 7 DAYS. BEGIN FINAL CURING PROCEDURES IMMEDIATELY FOLLOWING INITIAL CURING AND BEFORE CONCRETE HAS DRIED. CONTINUE FINAL CURING FOR AT LEAST 7 DAYS IN ACCORDANCE WITH ACI 301 PROCEDURES. AVOID DRYING AT END OF FINAL CURING PERIOD.

CURING METHODS: CURE ALL CONCRETE BY ONE OF THE FOLLOWING METHODS UNLESS SPECIFIED OTHERWISE:

- M.A. LEAVE IN FORMS FOR A MINIMUM OF 7 DAYS. KEEP FORMWORK WET TO PREVENT DRYING OF CONCRETE SURFACES.
- M.B. USE SATURATED BATS, SOAKER HOSES, OR SPRINKLER FOR A MINIMUM OF 7 DAYS. KEEP CONCRETE CONTINUOUSLY WET.
- M.C. USING 1 COAT OF A LIQUID MEMBRANE-FORMING COMPOUND CONFORMING TO ASTM C309, TYPE 1. APPLY IMMEDIATELY AFTER REMOVAL OF FORMS (WHICH HAVE BEEN CONTINUOUSLY WET); OR IN CASE OF A SLAB, AFTER THE CONCRETE HAS BEEN FINISHED AND IS HARDENED SUFFICIENTLY TO WALK ON.
- M.D. USING POLYETHYLENE SHEETS APPLIED IN FULL CONTRACT WITH SURFACES.
- N. PLACEMENT: PER ACI STANDARD 614.
- O. TESTS:

SLUMP:	SLUMP SHALL BE TESTED 1 PER 25 YDS OR EACH PLACEMENT CONCRETE TO BE MIXED PER ASTM C94
COMPRESSIVE STRENGTH:	FOUR (4) CYLINDERS FOR EACH POUR, FOR EACH 150 CU. YDS. OR EACH 5000 SQ. FEET OF SURFACE AREA, WHICHEVER IS LESS. CYLINDERS SHALL BE BROKEN AS FOLLOWS: 1 AT 7 DAYS, 2 AT 28 DAYS AND 1 AT 56-DAYS (AS NECESSARY)
AIR ENTRAINMENT:	SHALL BE TESTED 1 PER 25 YDS OR EACH PLACEMENT

#### **REINFORCING STEEL:**

- REINFORCING BARS: ASTM A 615, GRADE 60, DEFORMED EXCEPT AS OTHERWISE SPECIFIED. COLUMN TIES AND STIRRUPS OF ANY SIZE SHALL CONFORM TO ASTM A 615, GRADE 60, UNLESS OTHERWISE INDICATED.
- B. <u>FABRICATION OF REINFORCING BARS:</u> FABRICATE WITH COLD BENDS CONFORMING TO THE RECOMMENDED DIMENSIONS SHOWN IN ACI 318. FIELD FABRICATION WILL BE ALLOWED ONLY IF THE CONTRACTOR HAS EQUIPMENT TO PROPERLY FABRICATE STEEL. ATTACH METAL OR PLASTIC TAGS WITH IDENTIFYING MARK CORRESPONDING TO MARK NUMBER ON
- SUPPORTS FOR REINFORCEMENT: PROVIDE SUPPORTS FOR REINFORCEMENT INCLUDING BOLSTERS, CHAIRS, SPACERS AND OTHER DEVICES FOR SPACING, SUPPORTING AND FASTENING REINFORCING BARS AND WELDED WIRE FABRIC IN PLACE. USE WIRE BAR-TYPE SUPPORTS COMPLYING WITH CRSI SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED. METAL ACCESSORIES SHALL BE PLASTIC COATED (CRSI, CLASS 1) OR STAINLESS STEEL PROTECTED (CRSI, CLASS 2) WHERE LEGS WILL BE EXPOSED IN FINISHED CONCRETE SURFACES. DO NOT USE ROCKS, BROKEN BRICKS, WOOD BLOCKS, CONCRETE FRAGMENTS, OR REINFORCING BARS DRIVEN INTO THE GROUND FOR SUPPORT OF STEEL REINFORCEMENT.

FOR SLABS ON-GRADE, USE SUPPORTS WITH SAND PLATES OR HORIZONTAL RUNNERS WHERE BASE MATERIAL WILL NOT SUPPORT CHAIR LEGS. PRECAST CONCRETE BLOCK BAR SUPPORTS MAY BE USED. BLOCKS SHALL BE MADE WITH A MINIMUM OF 9 SACKS OF CEMENT PER CUBIC YARD AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI IN 7 DAYS. EACH BLOCK SHALL HAVE A MINIMUM OF 9 SQUARE INCHES OF BEARING AREA. SPACE AS REQUIRED BY THE PARTICULAR CONDITION OF WEIGHT, BEARING SURFACE AND RIGIDITY OF THE STEEL REINFORCEMENT.

- D. AT SPLICES IN CONCRETE, LAP BARS A MINIMUM OF 48 DIAMETERS UNLESS OTHERWISE NOTED. DO NOT WELD OR USE MECHANICAL SPLICING DEVICES UNLESS SPECIFICALLY APPROVED BY ENGINEER.
- E. UNLESS SPECIFICALLY LOCATED ON PLAN OR DETAILS, COORDINATE COLD JOINT LOCATIONS WITH ENGINEER.
- F. AT CORNERS, MAKE HORIZONTAL BARS CONTINUOUS OR PROVIDE CORNER BARS.
- AROUND OPENINGS AND STEPS IN CONCRETE, PROVIDE (2)-#5'S EXTENDING 2'-0" BEYOND EDGE OF OPENING OR STEP, EXTEND REINFORCING STEEL A MINIMUM OF 24" THROUGH COLD JOINTS.

#### REINFORCEMENT DEVELOPMENT LENGTH FOR CONCRETE

BAR	LENGTH OF LAF FOR REINFORC		LENGTH OF EMBEDMENT FOR END ANCHORAGE OF REINFORCING IN INCHES			
SIZE	* TOP BARS	OTHERS	* TOP BARS	OTHERS		
3	18	14	14	12		
4	24	18	18	14		
5	30	23	23	18		
6	40	31	31	23		
7	54	42	42	32		
8	71	54	54	42		
9	90	69	69	53		

\* TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12" OF CONCRETE CAST IN THE MEMBER BELOW THE BAR. HORIZONTAL BARS IN WALLS SHALL BE PROVIDED WITH LAPS AS REQUIRED FOR TOP BARS. EXCEPT AS OTHERWISE INDICATED ON THE PLANS, EMBEDMENT LENGTHS FOR END

ANCHORAGES AND LAPPED SPLICES SHALL NOT BE LESS THAN SHOWN ABOVE. NO SPLICES SHALL BE MADE EXCEPT WHERE SHOWN ON THE DESIGN DRAWINGS OR AS

# SPECIFIED OR AUTHORIZED BY THE ENGINEER.

#### REINFORCED MASONRY:

- A. EXTERIOR MASONRY UNITS SHALL COMPLY W/ ASTM C90 REQUIREMENTS
- B. LIGHTWEIGHT MASONRY UNITS WILL NOT BE USED FOR EXTERIOR WALL CONSTRUCTION. C. MORTAR SHALL BE TYPE S.
- D. GROUT USED FOR VERTICAL REINFORCING AND HORIZONTAL BOND BEAMS SHALL CONFORM TO ASTM C476 REQUIREMENTS. E. DO NOT INSTALL MASONRY MATERIALS IF TEMPERATURE IS BELOW 40° UNLESS ALL MATERIALS ARE HEATED AND AN AIR
- TEMPERATURE OF AT LEAST 40° IS MAINTAINED ON BOTH SIDES OF THE WALL FOR AT LEAST 72 HOURS. UNITS SHALL BE INSTALLED IN RUNNING BOND WITH 3/8" JOINTS.
- G. BOND AND INTERLOCK EACH COURSE AT CORNERS. BOND INTERSECTING WALLS W/ CONTINUOUS REINFORCEMENT.
- H. DO NOT USE UNITS W/ LESS THAN 4" HORIZ. FACE DIMENSION AT CORNERS OR JAMBS.
- LAY UNITS W/ FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS.
- GROUT CELLS FULL AT VERTICAL REINFORCEMENT LOCATIONS. K. CLEAN UNITS AT END OF EACH DAYS WORK.
- MASONRY DESIGN IS BASED UPON A MINIMUM COMPRESSIVE STRENGTH OF F'M = 2.000 PSI.
- ESTABLISHED IN ACCORDANCE WITH THE UNIT STRENGTH METHOD.
- N. MASONRY UNITS SHALL HAVE A NET AREA COMPRESSIVE STRENGTH OF 2,800 PSI.
- O. GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI AT 28 DAYS.
- P. MASONRY UNITS & MORTAR SHALL CONTAIN INTEGRAL WATER REPELLANT.
- Q. EXTERIOR FACE OF CMU WALLS SHALL RECEIVE A POST-CLEANING FIELD APPLIED WATER REPELLANT.

#### **DESIGN PARAMETERS**

BUIL	DING CODE A. OCCUPANCY CATEGORY	2018 IBC II (NORMAL)
1.	LIVE LOADS ROOF	20 PSF
2.	SNOW LOADS	
	A. GROUND SNOW LOAD, Pg	20 PSF
	B. SNOW EXPOSURE FACTOR, Ce	1.0
	C. SNOW THERMAL FACTOR, Ct	1.1
	D. IMPORTANCE FACTOR, I	1.0
	E. MINIMUM ROOF SNOW LOAD	20 PSF
3.	WIND LOADS	
	A. WIND SPEED (ULTIMATE)	106 MPH
	B. EXPOSURE CATEGORY	С
EAR	THQUAKE LOADS (ASCE 7-16)	
	A. SPECTRAL RESPONSE ACCELERATION (SHORT PERIOD), Ss	0.334
	B. SPECTRAL RESPONSE ACCELERATION (1-SEC. PERIOD), S1	0.149
	C. IMPORTANCE FACTOR, I	1.0
	D. SEISMIC DESIGN CATEGORY	D
	E. SOIL SITE CLASS (ASSUMED)	D
		CMU BLDG
	F. BASIC STRUCTURAL SYSTEM	BEARING WALLS
	G. BASIC SEISMIC FORCE RESISTING SYSTEM	A7 - S.R.M.S.W.
	H. RESPONSE MODIFICATION COEFFICIENT, R	5
	I. DEFLECTION AMPLIFICATION FACTOR, Cd	3.5
	J. OVERSTRENGTH FACTOR, OMEGA	2.5
		-

#### SUBMITTALS - MORTAR & GROUT

- PRODUCT DATA: INCLUDE PRODUCT DATA SHEETS FOR EACH NAMED PRODUCT.
- TEST REPORTS: SUBMIT INDEPENDENT LABORATORY TESTS REPORTS OR INITIAL MORTAR AND GROUT TESTS, INCLUDING DESIGN MIX PROPORTIONS, FOR EACH MORTAR AND GROUT.

#### 3. CERTIFICATION: SUBMIT MANUFACTURER'S CERTIFICATION THAT MATERIAL MEET SPECIFICATIONS REQUIREMENTS.

CERTIFICATION: PRIOR TO DELIVERY, SUBMIT CERTIFICATES ATTESTING COMPLIANCE WITH APPLICABLE SPECIFICATIONS FOR GRADES, TYPES, CLASSES AND STRENGTHS OF CONCRETE MASONRY UNITS.

1. PORTLAND CEMENT: ASTM C150, TYPE I, II OR III. PROVIDE NATURAL COLOR OR WHITE CEMENT AS REQUIRED TO PRODUCE REQUIRED

#### MORTAR COLOR. MASONRY CEMENT: NOT ALLOWED.

- MORTAR CEMENT: ALLOWED AND MUST MEET ALL REQUIREMENTS OR THIS SECTION. HYDRATED LIME: ASTM C207, TYPE S.
- SAND: ASTM C144, STANDARD MASONRY TYPE; CLEAN, DRY PROTECTED AGAINST DAMPNESS, FREEZING AND FOREIGN MATTER. AGGREGATE FOR GROUT: ASTM C404, MAXIMUM SIZE 3/8 INCH.
- WATER: CLEAN AND POTABLE, FREE OF ORGANIC MATTER.
- OTHERWISE ON THE CONTRACT DOCUMENTS.

HOLLOW LOAD BEARING UNITS: ASTM C90 WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OVER NET AREA OR 1900 PSI, UNLESS NOTED

- A. NOMINAL FACE DIMENSIONS: 8"x16" AND 12"x16"
- B. SPECIAL SHAPES: FURNISH REQUIRED SIZES, SHAPES, LINTELS, PILASTERS, BOND BEAMS, AND MISCELLANEOUS SHAPES SHOWN ON DRAWINGS OR REQUIRED TO COMPLETE BOND.
- C. SPECIAL FEATURES: FURNISH REQUIRED FACE FINISHES SHOWN ON DRAWINGS.
- 9. JOINT REINFORCEMENT AND ANCHORS:
- A. JOINT REINFORCEMENT: PROVIDE HORIZONTAL REINFORCEMENT IN MORTAR JOINTS AS SHOWN ON STRUCTURAL DRAWINGS. B. ANCHORS: INSTALL ANCHORS AND TIES AS SHOWN ON DRAWINGS.
- 10. STEEL REINFORCEMENT: PLACE STEEL REINFORCEMENT, GROUTED SPACES AND BOND BEAMS AS WORK PROGRESSES, AS FOLLOWS: A.A. ACCURATELY POSITION AND SECURE AGAINST DISPLACEMENT FROM LOCATIONS SHOWN. HORIZONTAL REINFORCEMENT MAY BE PLACED AS WORK PROGRESSES, ALL VERTICAL REINFORCING SHALL BE IN PLACE PRIOR TO GROUTING AND SHALL BE HELD IN PLACE BY MEANS OF BAR POSITIONERS AS SHOWN ON DRAWINGS. BAR POSITIONERS SHALL MEET THE FOLLOWING: 1. BAR POSITIONERS FOR VERTICAL WALL BARS: MINIMUM 9 GAGE, GALVANIZED WIRE.
- AA WIRE PRODUCTS CO., DALLAS, TX (214) 637-1511.
- 3. DUR-O-WALL, INC., ARLINGTON HEIGHTS, IL (708) 577-6400. 4. MASONRY REINFORCING CORPORATION OF AMERICA; CHARLOTTE, NC (704) 525-3761
- B. PROVIDE CLEAR DISTANCE BETWEEN VERTICAL BARS NOT LESS THAN 1 1/2 TIMES BAR DIAMETER, NOR LESS THAN 1 1/2 INCHES. 11. PROVIDE NOT LESS THAN 1/4 INCH THICKNESS OR GROUT BETWEEN MASONRY UNITS AND REINFORCEMENTS.
- 12. PROVIDE MINIMUM WIDTH OF COLLAR JOINTS CONTAINING BOTH HORIZONTAL AND VERTICAL REINFORCEMENT OF 1/2 INCH LARGER THAN SUM OF DIAMETERS OR HORIZONTAL AND VERTICAL REINFORCEMENT.
- 13. MAKE SPLICES IN BARS AS SHOWN ON DRAWINGS. LAPPED SPLICES FOR REINFORCEMENT SHALL NOT BE LESS THAN 48 BAR DIAMETERS. PROVIDE LAP SPLICES OF GREATER LENGTHS WHEN INDICATED ON THE DRAWINGS, WELDED OR MECHANICAL SPLICES SHALL DEVELOP THE STRENGTH OR THE REINFORCEMENT.

1. MASONRY DESIGN IS BASED UPON A COMPRESSIVE STRENGTH OF F'm = 2,000 PSI. ESTABLISHED IN ACCORDANCE WITH THE UNIT STRENGTH METHOD (AC1530-95, TABLE 2). 2. MORTAR MIX:

- A. PROPORTION AND MIX MORTAR IN ACCORDANCE WITH ASTM C270, TYPE S.
- 1. MINIMUM COMPRESSIVE STRENGTH OF 1800 PSI IN 28 DAYS. 2. MAXIMUM AIR CONTENT 12%.
- B. POINTING MORTAR: ASTM C270, TYPE S, WITH A MAXIMUM OF 2% AMMONIUM STEARATE OR CALCIUM STEARATE PER CEMENT WEIGHT. C. MORTAR COLOR FOR EXPOSED TO VIEW MASONRY AS REQUIRED TO PRODUCE MORTAR AS ESTABLISHED BY SAMPLE WALL OR OWNER.
- A. PROPORTION AND MIX MORTAR IN ACCORDANCE WITH ASTM C476.
- B. MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI IN 28 DAYS. C. USE FINE OR COURSE GROUT AS APPROPRIATE FOR GROUT POUR HEIGHT AND WIDTH OF GROUT SPACE. CONFORM TO ACI 530.1, TABLE 5 FOR
- GROUT SPACE REQUIREMENTS. 4. MIXING PROCEDURES - MORTAR AND GROUT:
- A. MEASURE MATERIALS BY VOLUME, USE APPROVED CONTAINER OF EQUIVALENT WEIGHT.
- B. THOROUGHLY MIX INGREDIENTS IN ACCORDANCE WITH SPECIFIED STANDARD IN QUANTITIES NEEDED FOR IMMEDIATE USE. C. FOR FACING WORK ADD MORTAR COLOR AS SELECTED. AND WHITE CEMENT TO PRODUCE MORTAR AS ESTABLISHED BY SAMPLE.
- D. IF MORTAR BEGINS TO STIFFEN FROM EVAPORATION OR ABSORPTION OF A PART OF MIXING WATER, RETEMPER BY ADDING WATER AND
- E. GROUT SHALL HAVE A SLUMP OF 8 TO 10 INCHES, AT TIME OF PLACEMENT. F. USE MORTAR AND GROUT WITHIN 2 1/2 HOURS OF INITIAL MIXING.
- G. DO NOT USE MORTAR OR GROUT AFTER IT HAS BEGUN TO SET. H. DO NOT USE ANTIFREEZE COMPOUNDS.

## FIELD QUALITY CONTROL

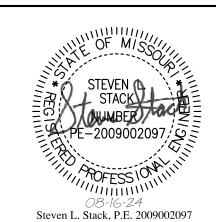
1. MASONRY MORTAR TESTING: A. CONDUCT STRENGTH TESTS IN ACCORDANCE WITH THE FOLLOWING

- 1. SPREAD MORTAR ON THE MASONRY UNITS 1/2 INCH TO 5/8 THICK AND ALLOW TO STAND FOR ONE MINUTE.
- 2. REMOVE MORTAR AND PLACE IN A 2 INCH BY 4 INCH CYLINDER IN TWO LAYERS, COMPRESSING THE MORTAR INTO THE CYLINDERS USING A FLAT END STICK OR FINGERS, LIGHTLY TAP MOLD ON OPPOSITE SIDES, LEVEL OFF AND IMMEDIATELY COVER MOLDS AND KEEP THEM DAMP
- UNTIL TAKEN TO THE LABORATORY. 11. AFTER 48 HOURS SET, HAVE THE LABORATORY REMOVE MOLDS AND PLACE THEM IN THE FOG ROOM UNTIL TESTED IN DAMP CONDITIONS. B, EXECUTE ONE MORTAR TEST SPECIMEN FOR EACH 5,000 SQUARE FEET OF MASONRY WALL CONSTRUCTED AND A MINIMUM OF ONE MORTAR TEST SPECIMEN FOR EACH DAY THAT MASONRY CONSTRUCTION IS PERFORMED. TEST SPECIMENS AT 28 DAYS.
- C. STRENGTH OF MORTAR WILL BE CONSIDERED SATISFACTORY IF EACH MORTAR TEST EQUALS OR EXCEEDS 1500 PSI (THIS CORRESPONDS WITH TYPE S, 1800 PSI MORTAR MIX AS SPECIFIED)
- D. IN ADDITION TO REQUIRED INFORMATION PREVIOUSLY IN THIS SECTION, RECORD THE FOLLOWING INFORMATION ON MORTAR
- COMPRESSION REPORTS: 1. MIX DESIGN OR MIX DESIGNATION
- 2. TEXT SAMPLE NUMBER
- 3. SPECIFIC WALL AREAS COVERED BY TEST.
- 4. DESCRIPTION OF UNITS USED TO FORM SAMPLE. 5. TESTED COMPRESSIVE STRENGTH, 2. MASONRY GROUT TESTING:
- 2 MASONRY GROUT TESTING A. CONDUCT STRENGTH TESTS IN ACCORDANCE WITH ASTM C1019.
- 1. TAKE TWO STRENGTH SAMPLES FOR EACH 5.000 SQUARE FEET OF MASONRY WALL
- SURFACE FOR EACH TYPE OF GROUT PLACED EACH DAY. 2. CREATE TEST SAMPLES BY FORMING WITH WOOD SURFACE ON BOTTOM AND CONCRETE BLOCK ON SIDES. THE SAMPLES SHALL BE 3 INCHES SQUARE AND 8 INCHES HIGH.
- 3. INITIAL CURE DURING FIRST 48 HOURS. PROTECT SAMPLES FROM LOSS OF MOISTURE BY COVERING WITH WET CLOTH AND KEEPING MOIST. PROTECT FROM FREEZING AND VARIATIONS IN TEMPERATURE. RECORD MAXIMUM AND MINIMUM TEMPERATURES BY USING A MAX/MIN THERMOMETER.
- 4. REMOVE MASONRY UNITS THAT FORM SAMPLES AFTER 48 HOURS AND TRANSPORT GROUT SAMPLES TO LABORATORY. KEEP SAMPLES PROTECTED FROM VIBRATION, FREEZING AND MOISTURE LOSS DURING TRANSPORTATION. 5. TESTS SAMPLES WITH TEST METHOD ASTM C39 AT 28 DAYS. COMPRESSIVE STRENGTH SHALL BE ADEQUATE IF IT EQUALS F'm AS DEFINED ON
- DRAWINGS BUT NOT LESS THAN 2,000 PSI. B. CONDUCT SLUMP TEST AT TIME COMPRESSIVE TEST SAMPLES ARE TAKEN IN ACCORDANCE WITH ASTM C143. C. IN ADDITION TO REQUIRED INFORMATION NOTED PREVIOUSLY IN THIS SECTION, RECORD THE FOLLOWING INFORMATION ON GROUT
- **COMPRESSION REPORTS:** 1. MIX DESIGN OR MIX DESIGNATION.

7, TESTED COMPRESSIVE STRENGTH,

- 2. TEST SAMPLES NUMBER.
- 3. SPECIFIC WALL AREAS COVERED BY TEST. 4. DESCRIPTION OF SAMPLES DIMENSIONS, AMOUNT OUT OF PLUMB IN PERCENT.
- 5, DESCRIPTION OF UNITS USED TO FORM SAMPLES. 6. CURING HISTORY WITH MAX/MIN TEMPERATURE, AGE WHEN TRANSPORTED TO LAB, AND AGE WHEN TESTED.
- 8. DESCRIPTION OF FAILURE. D. CONCRETE UNIT MASONRY TESTING:
- 1. CONDUCT STRENGTH TESTS IN ACCORDANCE WITH ASTM AC140. 2. SELECT 3 UNITS FROM EACH LOT OF 10,000 UNITS OR LESS, 6 UNITS FOR EACH LOT OF 10,000 TO 100,000 UNITS. FOR LOTS GREATER THAN 100,000 SELECT 3 UNITS FOR EVERY 50,000 UNITS.
- 3. STRENGTH OF CONCRETE MASONRY UNITS WILL BE CONSIDERED SATISFACTORY IF CALCULATED TEST COMPRESSIVE
- STRENGTH CONFORMS TO REQUIREMENTS OF ASTM C90 FOR HOLLOW UNITS AND SOLID UNITS. E. MASONRY WALL INSPECTIONS: 1. INSPECT WALL FOR COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS. REPORT ON THE FOLLOWING.
- A. PLACEMENT OF CONCRETE MASONRY UNITS JOINT SPACE, LEVEL PLUMB. B, HORIZONTAL REINFORCING, SPACING AND LAP.
- C. VERTICAL BARS D. LIFT HEIGHTS, PLACEMENT AND VIBRATION OF GROUT.
- 2. INSPECT OPENINGS FOR COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS. REPORT ON THE FOLLOWING:
- A. TYPES OF CONCRETE MASONRY UNITS USED. B. VERTICAL REINFORCING SIZES AND PLACEMENT AT DOOR JAMBS.
- C. PLACEMENT AND VIBRATION OF GROUT IN LINTELS AND JAMBS.

## STATE OF MISSOURI MICHAEL L. PARSON **GOVERNOR**





**OFFICE OF ADMINISTRATION DIVISION OF FACILITIES** MANAGEMENT, **DESIGN AND CONSTRUCTION** 

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

LEASBURG, MISSOURI

PROJECT # X2306-02

7815215011 7815215044 **REVISION: ISSUED TO MDNR** 

FACILITY # 7815215010

DATE: 06-17-24 REVISION: ISSUED FOR BIDDING DATE: 08-16-24 **REVISION:** 

> ISSUE DATE: 08-16-24 CAD DWG FILE:S-001.DWG

DESIGNED BY: EMH

DRAWN BY:

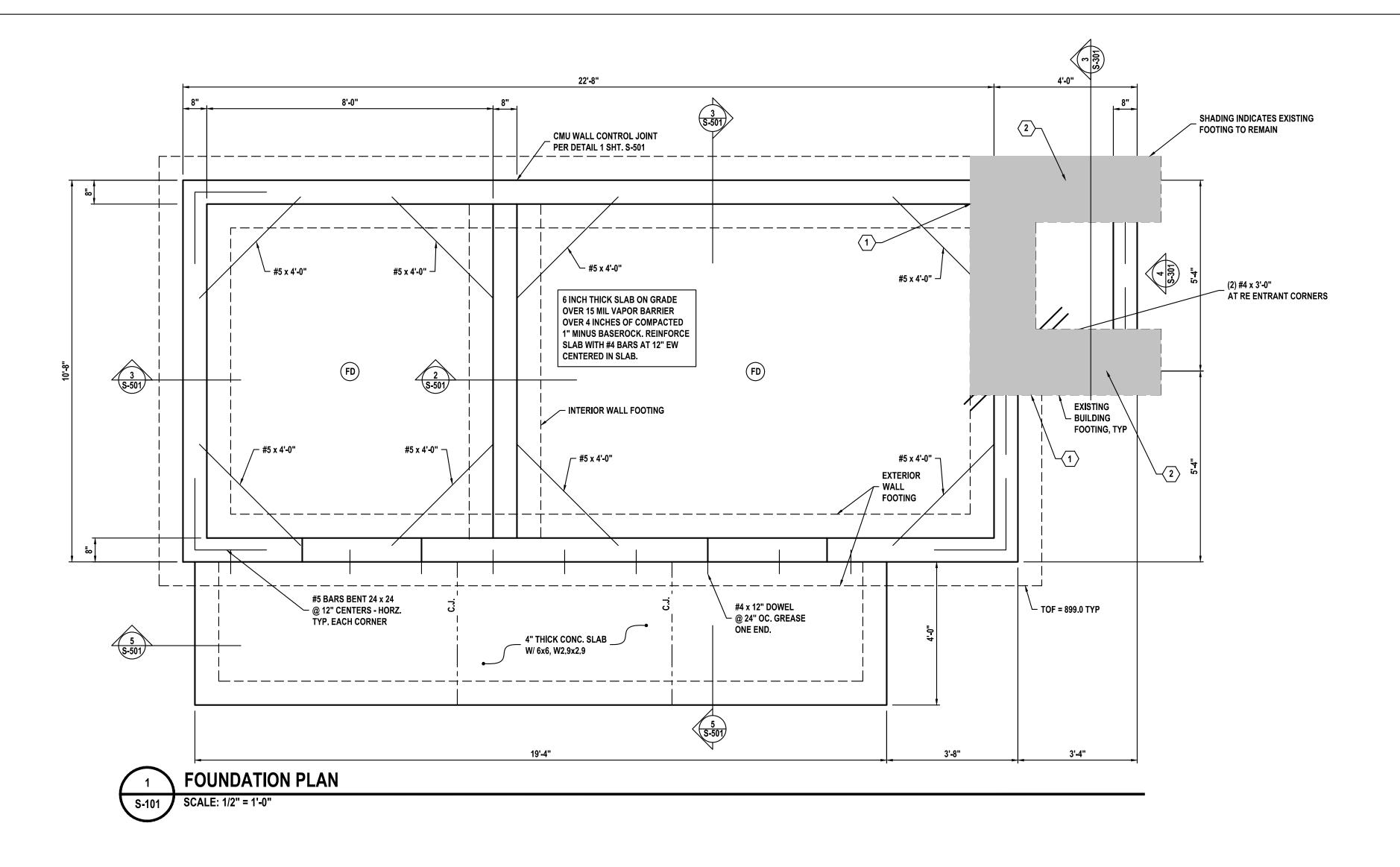
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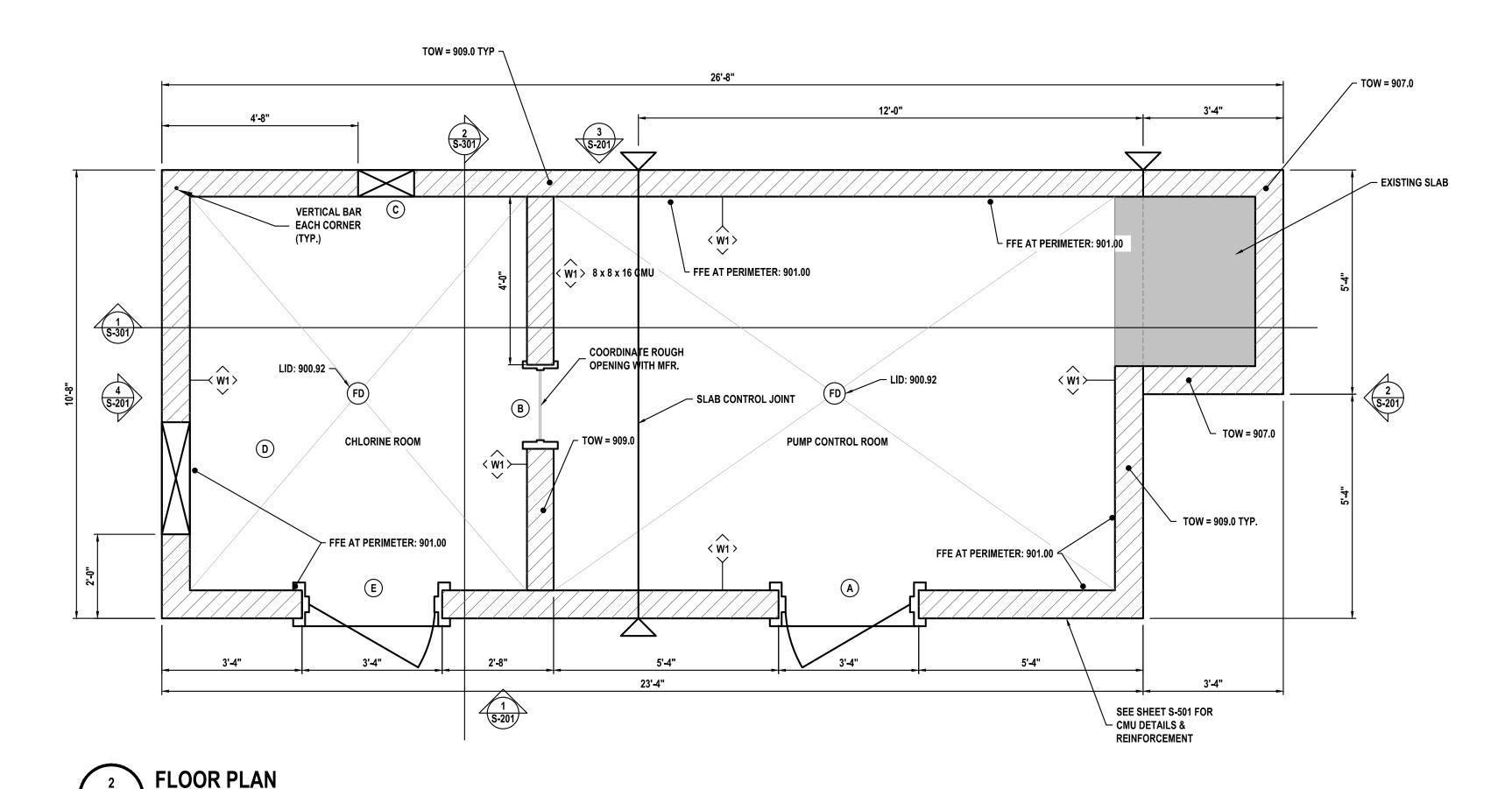
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SHEET TITLE:

SHEET NUMBER:

NOTES





- CMU WALL CONTROL JOINT

**EQUIPMENT NOTES:** 

- (A) INSULATED, HOLLOW METAL DOOR (MIN. 16 GA.); AND WELDED, MITERED FRAME (MIN. 16 GA.), 3'-0" X 6'-8", W/COMPLETE WEATHERSTRIPPING AND ALUMINUM THRESHOLD, 1-REQ'D. INSTALL KEYED LOCKSET FOR EACH DOOR, (KEYED ALIKE). INSTALL PANIC BAR ASSEMBLY FOR CHLORINE ROOM DOOR. SEE SPECIFICATIONS
- (B) 2'-0" SQUARE FIXED PANE WINDOW; LOCATE TOP OF PANE 6'-8" A.F.F. GLASS SHALL BE
- SHATTER RESISTANT OR WIRE REINFORCED W/ AIRTIGHT SEAL ALL AROUND OPENING. (C) WALL MOUNTED EXHAUST FAN #1. SEE MECHANICAL PLAN FOR REQUIREMENTS.
- (D) COMBINATION LOUVER/DAMPER AIR INTAKE ASSEMBLY #1. SEE MECHANICAL PLAN FOR REQUIREMENTS.
- (E) INSULATED, HOLLOW METAL DOOR (MIN. 18 GA.) W/MIN. 14 GA. REINFORCED AT HINGE AND LOCK POSITIONS; AND WELDED, MITERED FRAME (MIN. 14 GA.), 6'-0" X 6'-8", AMWELD OR EQUAL, W/COMPLETE WEATHER STRIPPING AND ALUMINUM THRESHOLD, 1-REQ'D. INSTALL KEYED LOCKSET FOR EACH DOOR, (KEYED ALIKE). INSTALL PANIC BAR ASSEMBLY FOR CHLORINE ROOM DOOR.

MATERIALS NOTES:

EXTERIOR MASONRY UNITS SHALL COMPLY WITH ASTM C90 REQUIREMENTS

LIGHTWEIGHT MASONRY UNITS WILL NOT BE USED FOR EXTERIOR WALL CONSTRUCTION.

FILL EMPTY CELLS WITH PERLITE LOOSE FILL INSULATION.

SPECIFICATIONS. MORTAR SHALL BE TYPE N; CONCRETE GROUT USED FOR VERTICAL REINFORCING AND HORIZONTAL BOND BEAMS SHALL CONFORM TO ASTM C476 REQUIREMENTS.

DO NOT INSTALL MASONRY MATERIALS IF TEMPERATURE IS BELOW 40° UNLESS ALL MATERIALS ARE HEATED AND AN AIR TEMPERATURE OF AT LEAST 40° IS MAINTAINED ON BOTH SIDES OF THE WALL FOR AT LEAST 72 HOURS.

UNITS SHALL BE INSTALLED IN RUNNING BOND WITH 3/8" JOINTS. BOND AND INTERLOCK EACH COURSE AT CORNERS; BOND INTERSECTING WALLS W/CONTINUOUS REINFORCEMENT.

DO NOT USE UNITS W/LESS THAN 4" HORIZ. FACE DIMENSION AT CORNERS OR JAMBS.

LAY UNITS W/FULL MORTAR COVERAGE ON HORIZONTAL AND VERTICAL FACE SHELLS. SLUSH BLOCK CELLS FULL AT VERTICAL REINFORCEMENT LOCATIONS. CLEAN UNITS AT END

OF EACH DAYS WORK.

LUMBER SHALL COMPLY WITH PS20 REQUIREMENTS AND SHALL BE S4S. MAXIMUM MOISTURE CONTENT SHALL BE 19%; STANDARD GRADE LIGHT FRAMING LUMBER SHALL BE NO. 4 OR BETTER. NO. 3 COMMON OR STANDARD (OR BETTER) SHALL BE USED FOR RAFTERS, JOISTS AND VERTICAL FRAMING MEMBERS.

DRILL & EPOXY INTO EXISTING FOOTINGS & FOUNDATION WALL. EMBED ALL HORIZONTAL REBAR 6" MINIMUM.

DRILL & EPOXY VERTICAL CMU REINFORCEMENT INTO EXISTING CONCRETE WITH 6" EMBEDMENT.

< W1 >- CMU WALL TYPE SEE 1/S-501

ARCHER

STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR** 

Steven L. Stack, P.E. 2009002097

OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

PROJECT # X2306-02 5215

FACILITY # 7815215010

7815215011 7815215044 REVISION: ISSUED TO MDNR

DATE: 06-17-24 REVISION: ISSUED FOR BIDDING DATE: 08-16-24

REVISION: DATE: ISSUE DATE: 08-16-24

CAD DWG FILE:S-101.DWG

DRAWN BY: CHECKED BY: KAG DESIGNED BY: EMH

SHEET TITLE:

WELL HOUSE STRUCTURAL PLANS

SHEET NUMBER:

<u>LEG</u>

 $\langle H 
angle$  - CMU LINTEL - SEE SCHEDULE ON SHEET S-501



Steven L. Stack, P.E. 2009002097

STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR

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CAD DWG FILE:S-101.DWG

DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

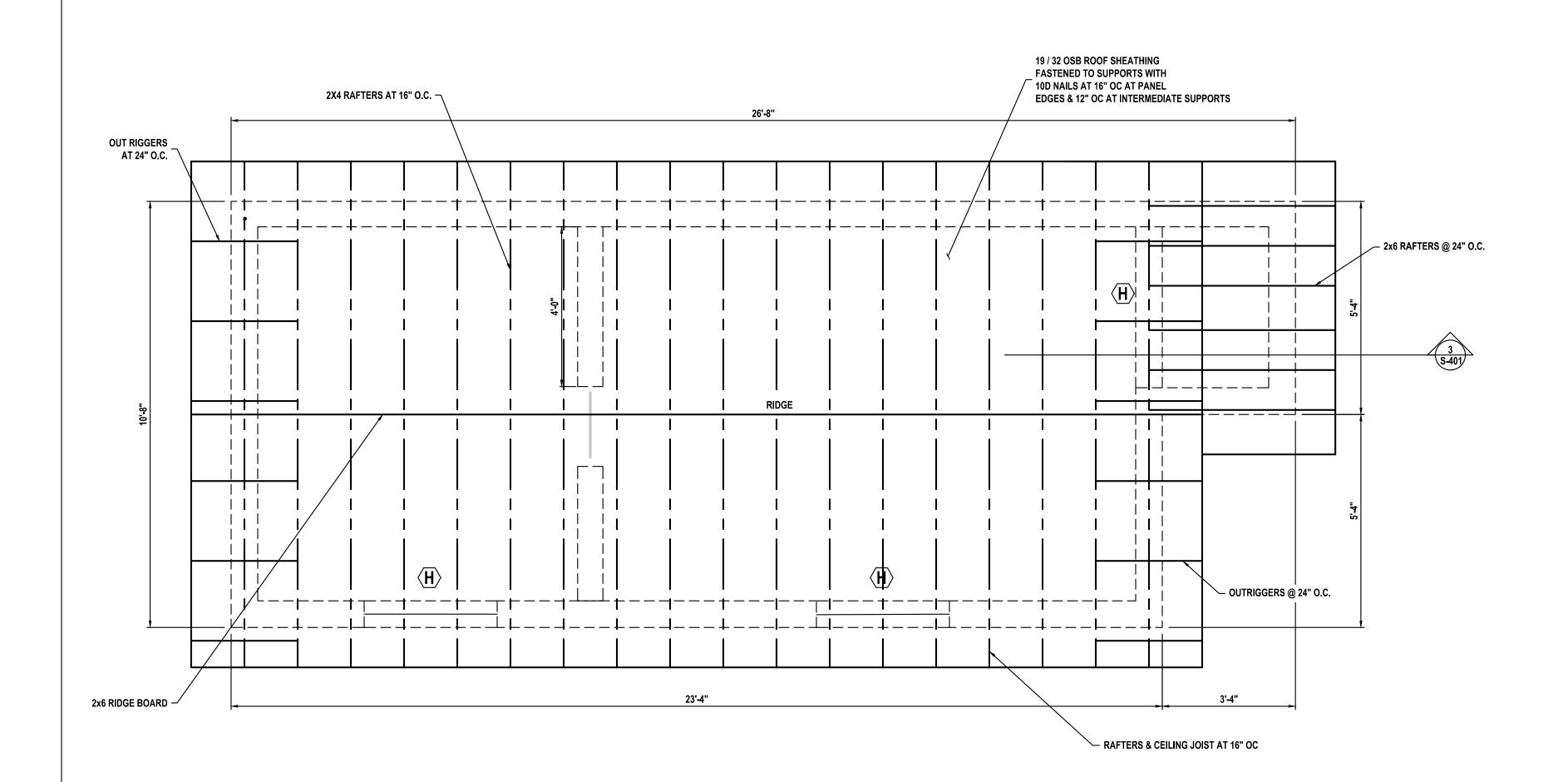
SHEET TITLE:

ROOF FRAMING PLAN STRUCTURAL PLANS

SHEET NUMBER:

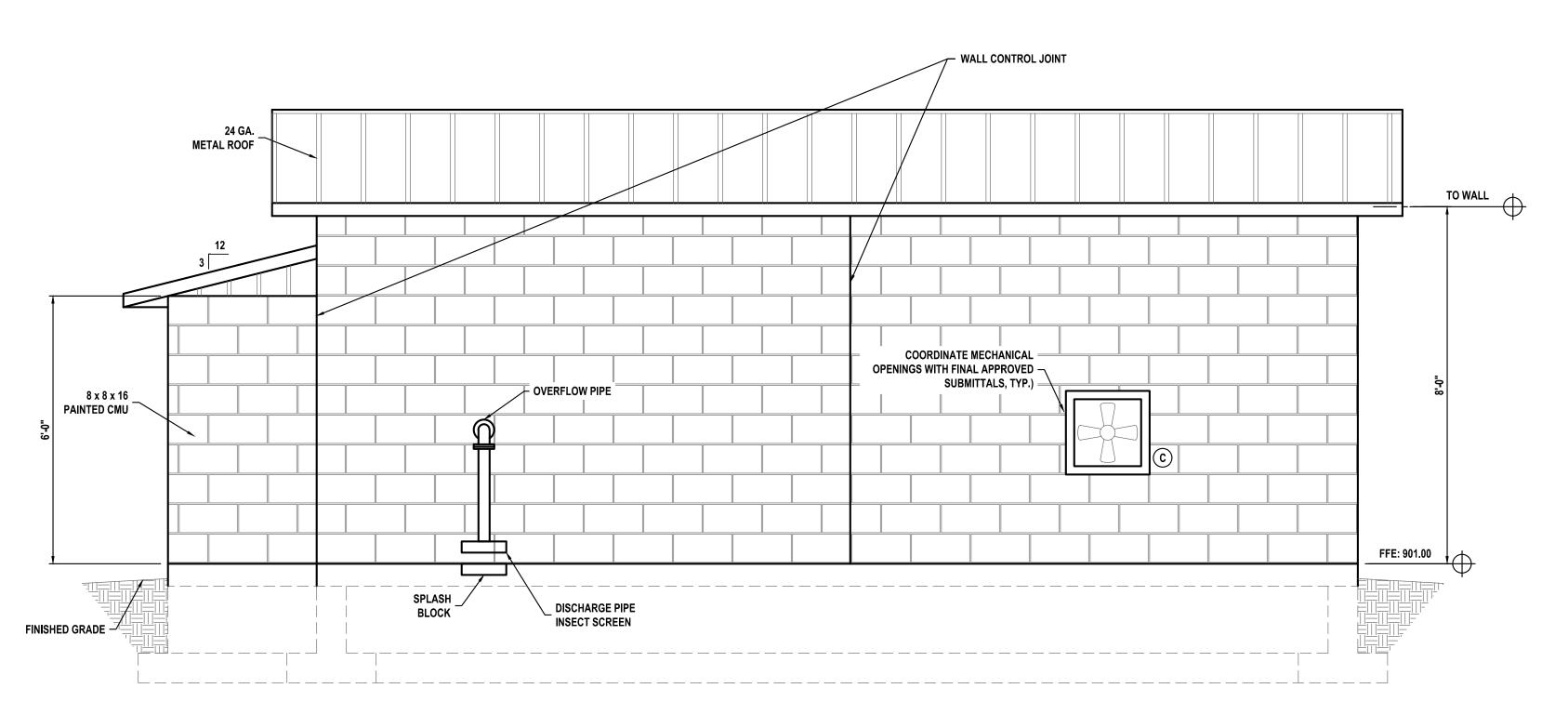
S-10

19 OF 27 SHEETS 08-16-24



**ROOF FRAMING PLAN** 

S-101 | SCALE: 1/2" = 1'-0"



TO WALL FASCIA METAL DRIP EDGE -AIR INTAKE REF: MEP PLANS. COORD.

— LOCATION & SIZE 8x8x16 PAINTED CMU -W/FINAL APPROVED SUBMITTALS DISCHARGE PIPE INSECT SCREEN SPLASH \_ BLOCK 2% SLOPE OVERFLOW -STRUCTURE OVERFLOW STRUCTURE REF: CIVIL PLANS **EXTERIOR ELEVATION - SIDE** 

24 GA METAL

(SAME AS ROOF) W/ BACKFING -COORDINATE COLOR W/ OWNER

24 GA METAL (SAME AS ROOF) W/ BACKFING —

TYP.

METAL DRIP EDGE -

8x8x16 PAINTED CMU -

12" x 12" ALUMINUM LOUVER
W/ INSECT SCREEN
TYP. EACH GABLE

12" x 12" ALUMINUM LOUVER

OVERFLOW STRUCTURE REF: CIVIL PLANS

\_ 1 x 6 FASCIA

\_ DISCHARGE PIPE INSECT SCREEN

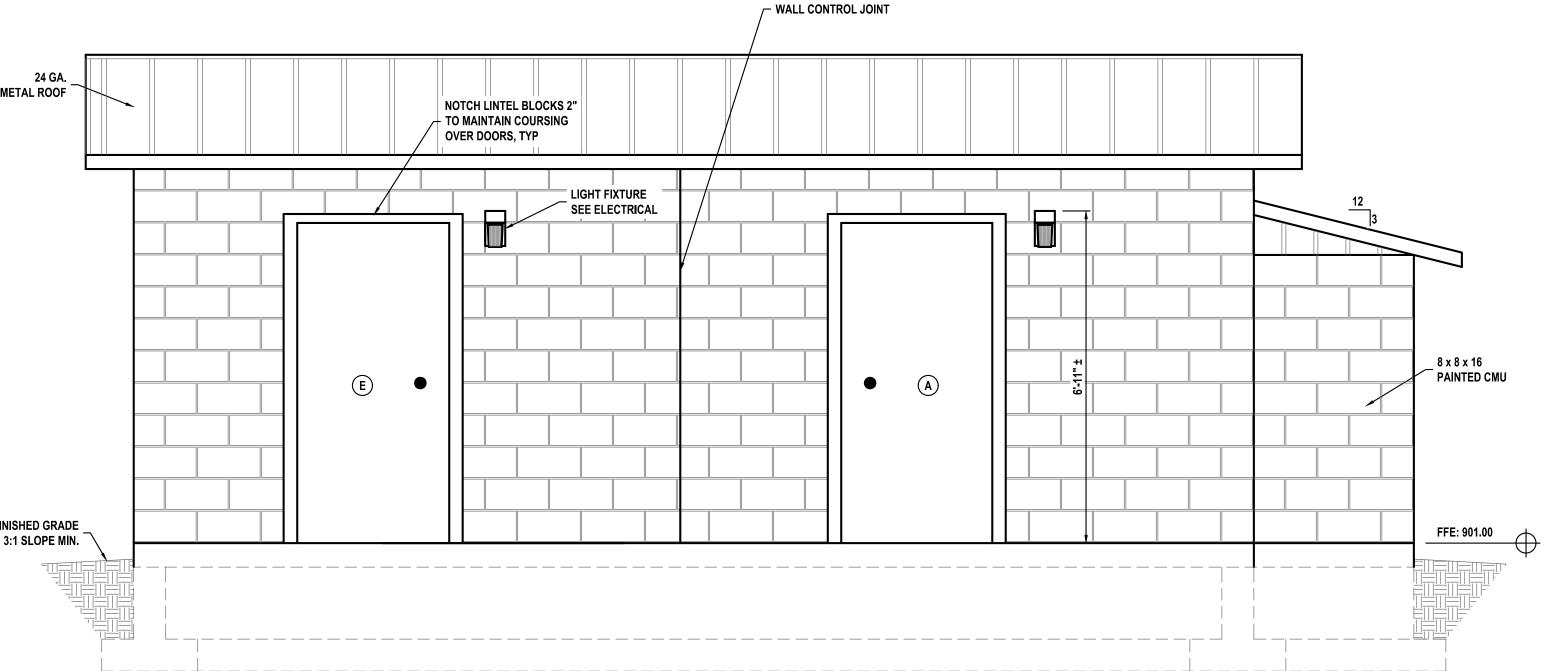
BLOCK

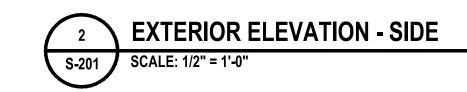
← OVERFLOW STRUCTURE

- W/ INSECT SCREEN

**EXTERIOR ELEVATION - REAR** 

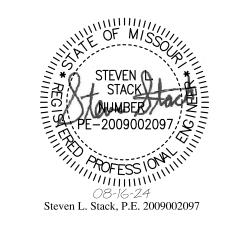
**EXTERIOR ELEVATION - FRONT** 

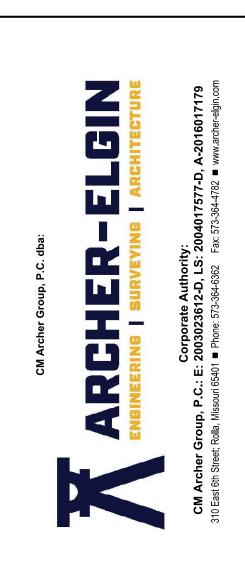




S-201 | SCALE: 1/2" = 1'-0"

STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR** 





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STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

LEASBURG, MISSOURI

PROJECT # X2306-02 5215 FACILITY # 7815215010

7815215011 7815215044

REVISION: ISSUED TO MDNR
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REVISION: ISSUED FOR BIDDING DATE: 08-16-24 REVISION:

ISSUE DATE: 08-16-24

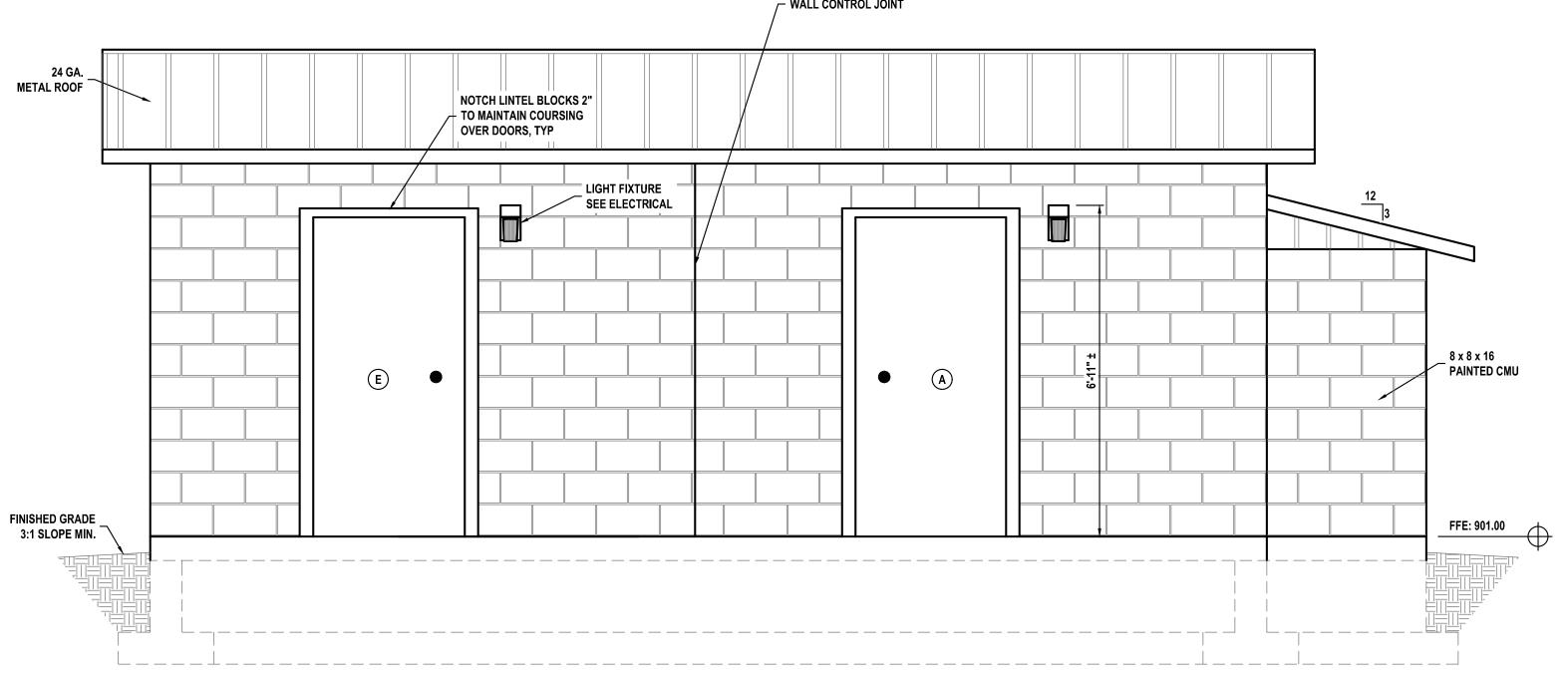
CAD DWG FILE:S-201.DWG DRAWN BY: CHECKED BY: KAC DESIGNED BY: EMH

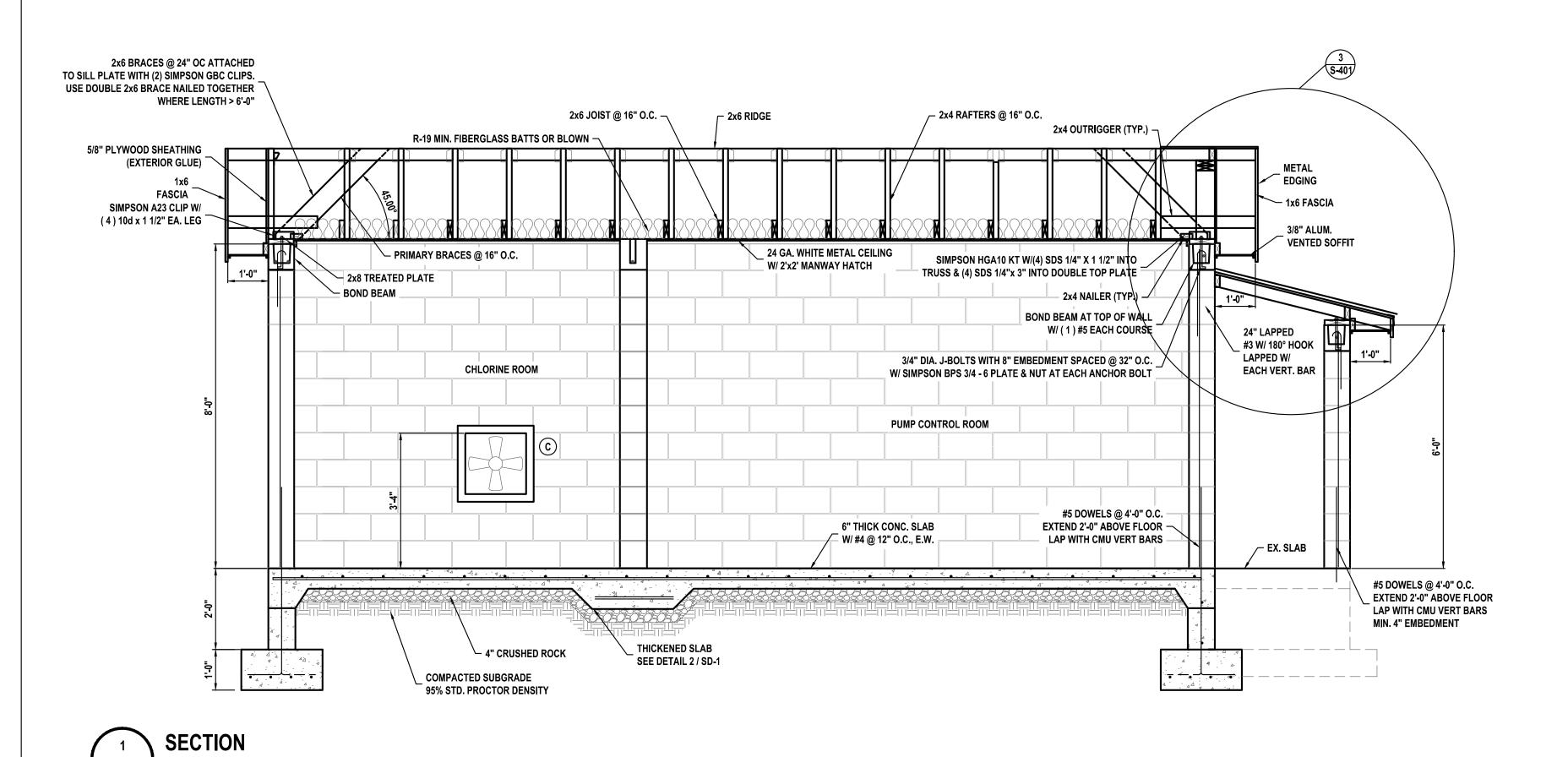
SHEET TITLE:

WELL HOUSE **EXTERIOR ELEVATIONS** 

SHEET NUMBER:

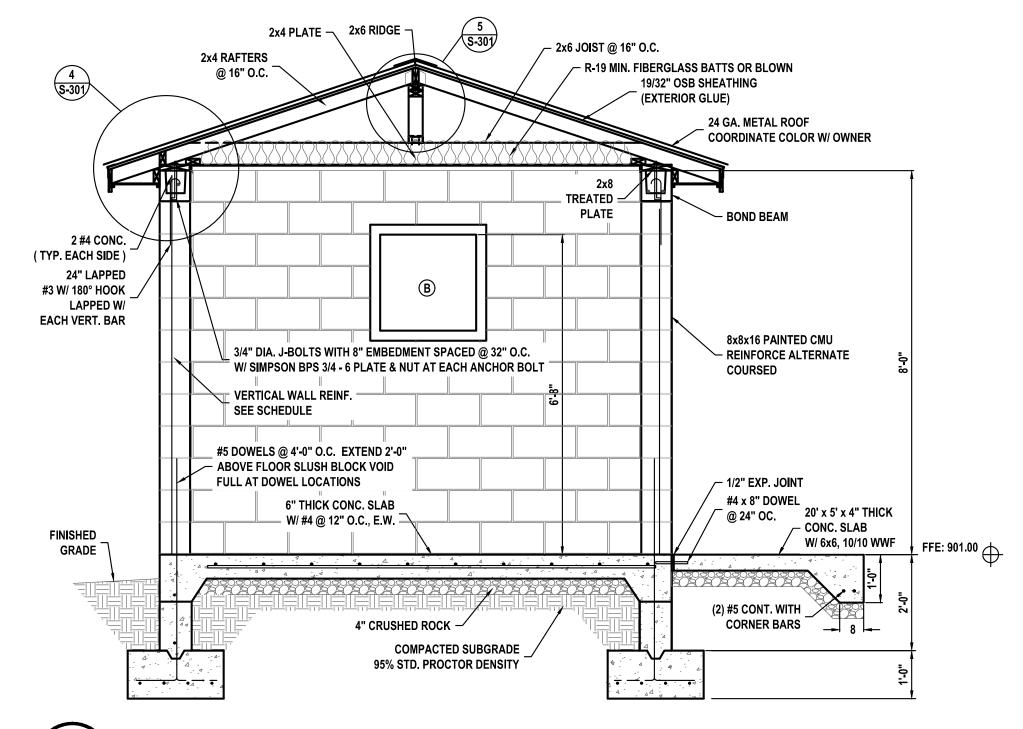
08-16-24





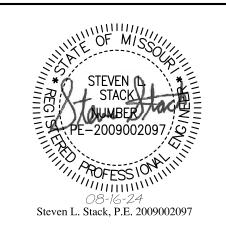
SCALE: 1/2" = 1'-0"

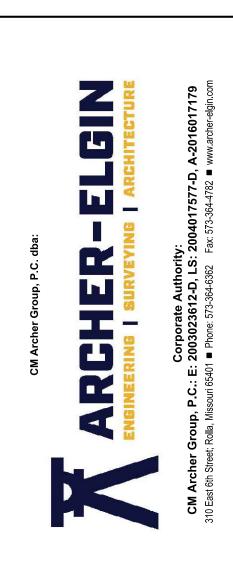
**├** BOND BEAM W/ # 5 AT TOP OF WALL. #5 VERT. \_— 24" LAP TYPICAL EXISTING SLAB DRILL & EPOXY #4 DOWELS INTO EXISTING TO REMAIN - #5 VERT. AT EA CORNER CONCRETE WALL W/ 6" EMBEDMENT. LAP WITH EACH VERT. WALL BAR **FULLY GROUT ALL** CELLS IN THIS WALL HOOK WITH 12" LEG — COMPACTED SAND FILL 24" BOND BEAM EXISTING SLAB — WITH #5 TOP & BOTTOM **EXISTING FOUNDATION** TO REMAIN **DRILL & EPOXY INTO** ─ EXISTING SLAB WITH **3" EMBEDMENT END WALL REINFORCEMENT** SECTION SCALE: 1/2" = 1'-0" S-101 SCALE: 1/2" = 1'-0"



2 SECTION
S-301 SCALE: 1/2" = 1'-0"

STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR





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LEASBURG, MISSOURI

PROJECT # X2306-02 SITE # 5215

FACILITY # 7815215010 7815215011 7815215044

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REVISION:
DATE:
ISSUE DATE: 08-16-24

CAD DWG FILE:S-301.DWG
DRAWN BY: JSM
CHECKED BY: KAC

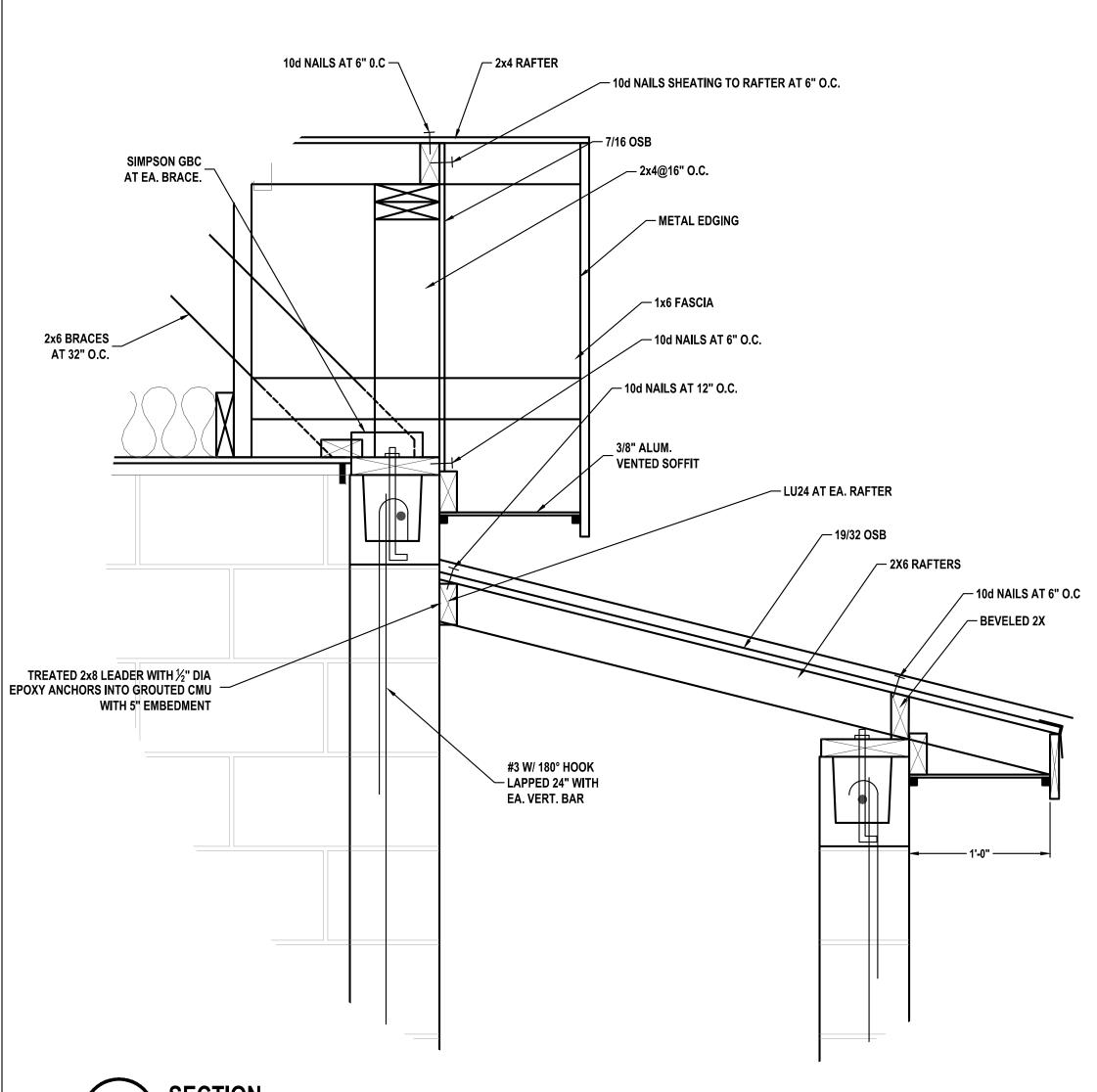
SHEET TITLE:

WELL HOUSE SECTION AND DETAILS

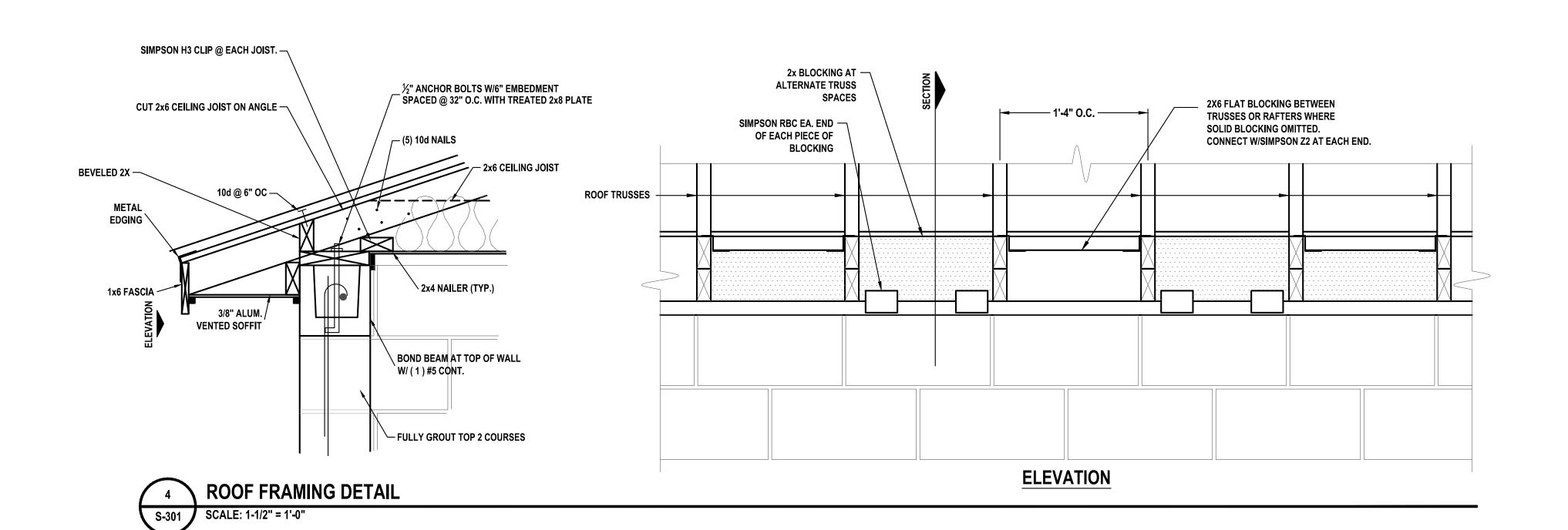
DESIGNED BY: EMH

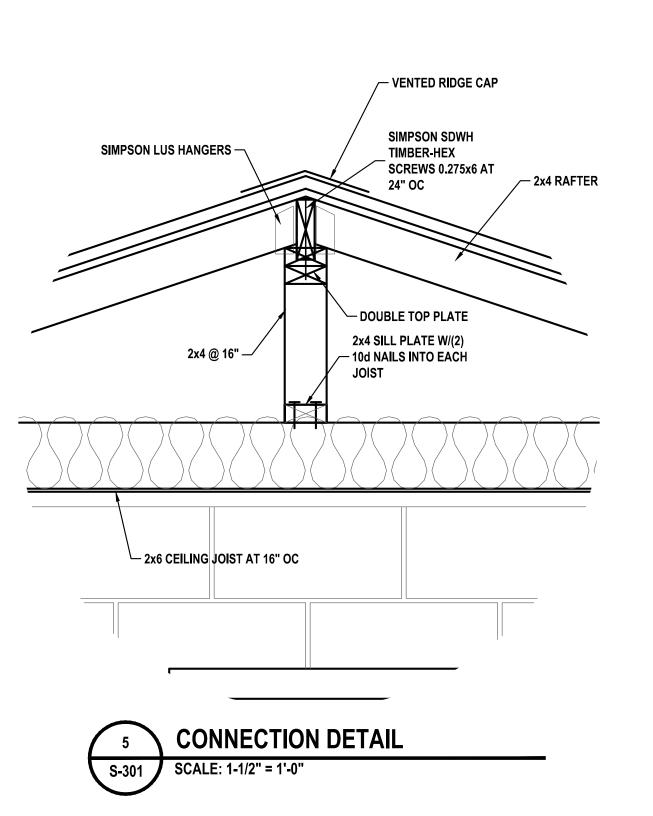
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S-30

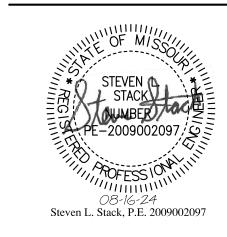


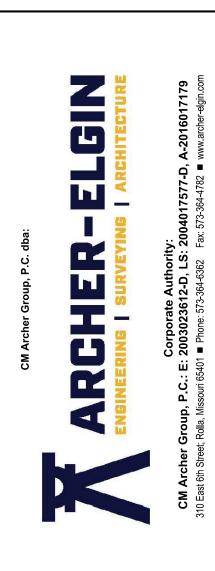
3 SECTION S-301 SCALE: 1-1/2" = 1'-0"





STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR





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ONONDAGA CAVE STATE
PARK WATER & WASTEWATER
IMPROVEMENTS

LEASBURG, MISSOURI

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DATE: ISSUE DATE: 08-16-24

CAD DWG FILE:S-301.DWG
DRAWN BY: JSM
CHECKED BY: KAC
DESIGNED BY: EMH

SHEET TITLE:

WELL HOUSE SECTION AND DETAILS

SHEET NUMBER:

S-40]

#### **GROUTING PROCEDURES**

1. GROUT ALL REINFORCED CELLS AND THOSE CELLS NOTED ON THE PLANS.

2. DO NOT PLACE GROUT UNTIL THE INSTALLED MASONRY HAS ATTAINED SUFFICIENT STRENGTH TO RESIST DISPLACEMENT OF MASONRY UNITS AND BREAKING OF MORTAR BOND (NORMALLY THE FOLLOWING MORNING). LIMIT GROUT POURS TO AREA WHICH CAN BE COMPLETED WITH NO MORE THAN ONE HOUR INTERUPTION OF POURING OPERATION.

3. LAP SPLICE THE REINFORCING.

4. POUR GROUT USING A CONTAINER WITH SPOUT, BY CHUTE OR BY PUMPING. MECHANICALLY VIBRATE DURING PLACEMENT. RECONSOLIDATE GROUT LIFTS EXCEEDING 12" IN HEIGHT BY MECHANICAL VIBRATION AFTER INITIAL SETTLEMENT AND WATER LOSS HAS OCCURED (ABOUT 30 MINUTES LATER). ADD GROUT AS NECESSARY TO TERMINATE LIFT 1 1/2" BELOW TOP OF GROUTED COURSE.

5. REPEAT SEQUENCE AS NECESSARY TO COMPLETE ANY GIVEN WALL PANEL.

NOTES:

GROUT ALL CELLS WITHIN 12" IN EACH DIRECTION OF EMBEDDED

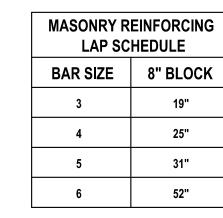
AT WALL INTERSECTIONS AND CORNERS PROVIDE TYPICAL VERTICAL WALL REINFORCEMENT IN THE COMMON (CORNER) CELL, MATCH IT WITH #5 DOWEL INTO THE FOOTING. PROVIDE CORNER BARS TO MATCH AND LAP WITH BOND BEAM REINFORCING.

REFER TO MASONRY SCHEDULE FOR JAMB & LINTEL SIZES.

AT LINTEL, ALL HEAD JOINTS SHALL BE FULLY MORTARED.

LOCATE REBAR IN CENTER OF WALL FOR SINGLE REINFORCED CELLS.

ALL CMU SHALL BE NORMAL WEIGHT.



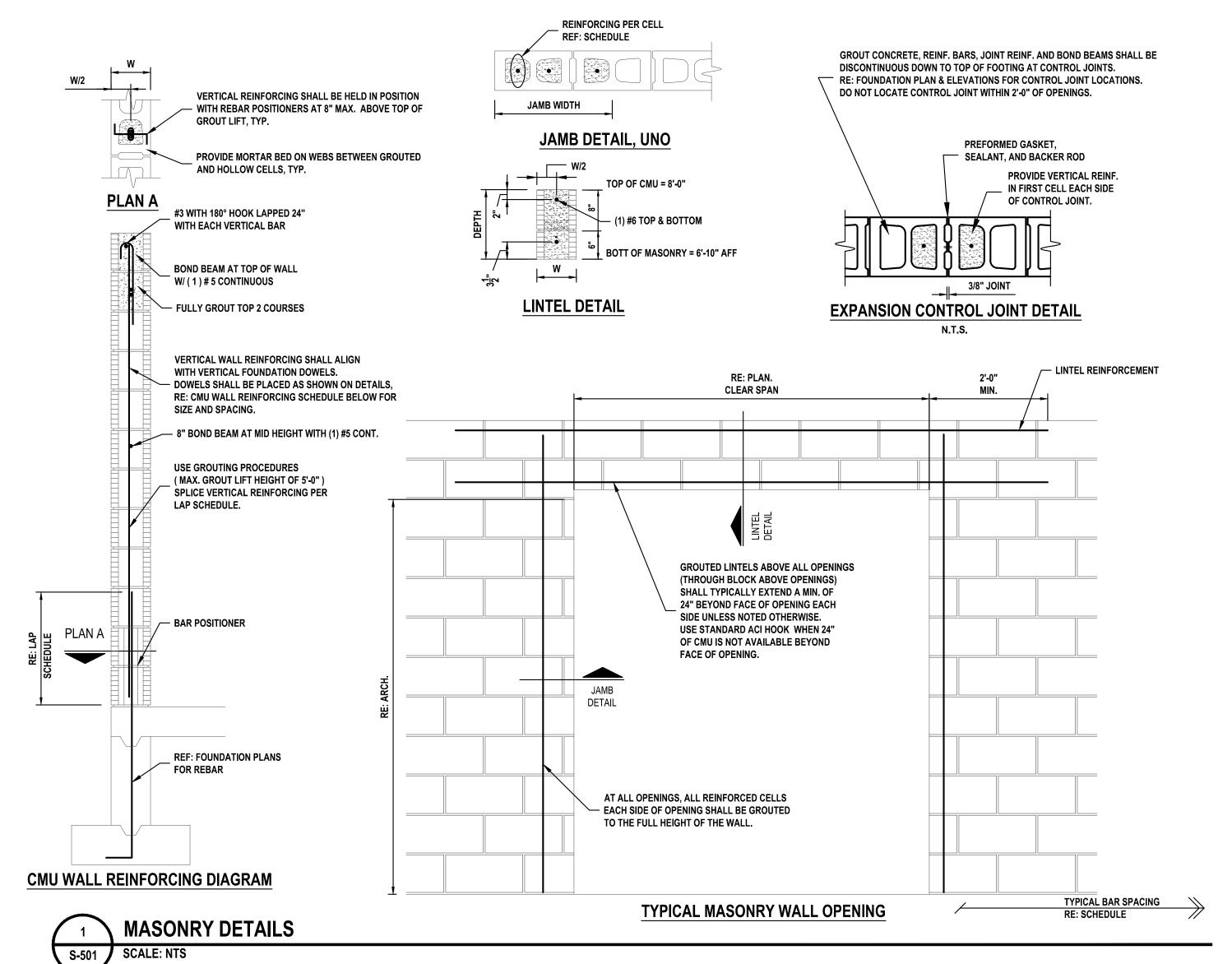
		LINTEL		JAMB			
WALL	CLEAD CDAN			RCING	WIDTH	REINFORCING	
SIZE	CLEAR SPAN	DEPTH	ТОР	воттом	חוטוא	PER CELL	
8"	0" TO 3-4"	14"	-	(1)#6	8"	(1) # 5	
8"	3'-5" TO 6'-8"	14"	(1)#6	(1)#6	8"	(1) # 5	

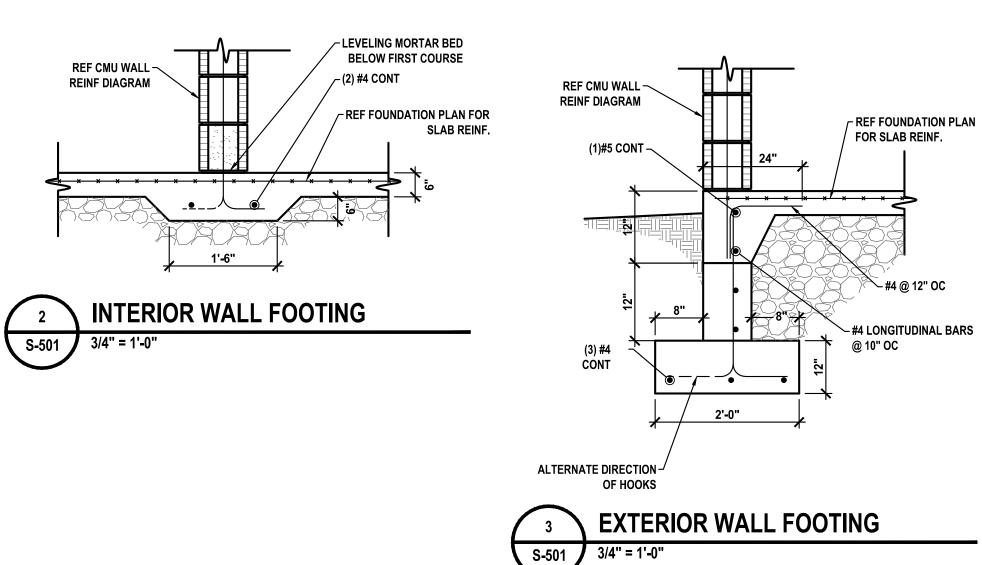
1. AT LINTEL, ALL HEAD JOINTS SHALL BE FULLY MORTARED.

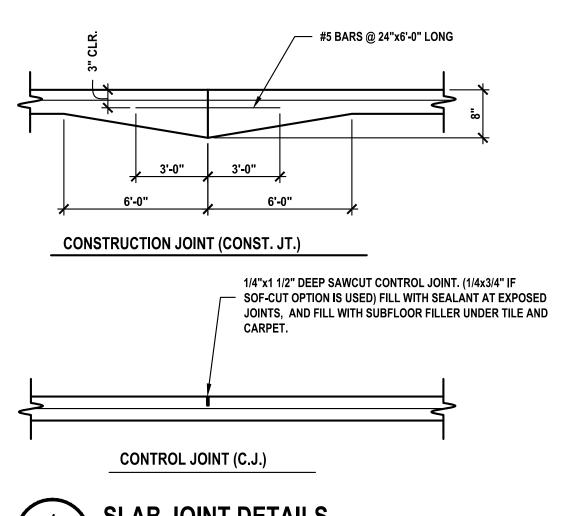
CMU WALL REINF. SCHEDULE										
MARK	WALL SIZE	DOWELS	VERT. BARS	REMARKS						
₩1>	8"	(1) #5 @ 32" O.C.	(1) #5 @ 32" O.C.	HORIZ. #5 @ MID HEIGHT						

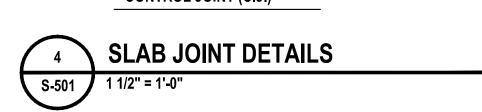
REFER TO CMU WALL REINFORCING DIAGRAM FOR HORIZONTAL REINFORCEMENT

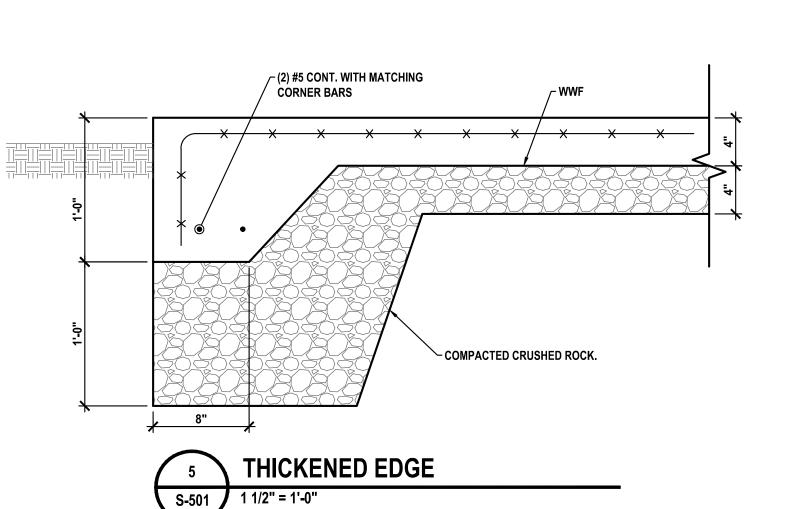


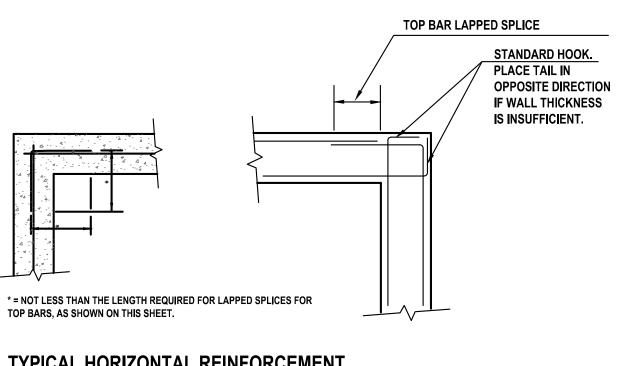


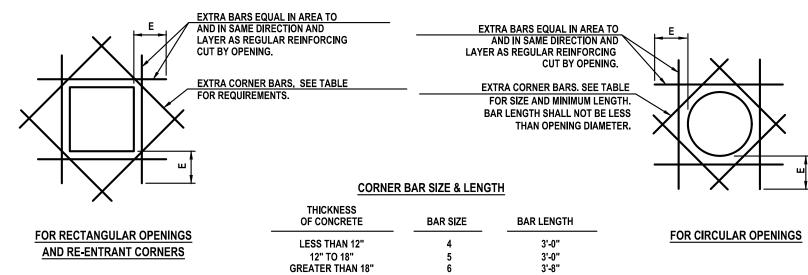












E = THE REQUIRED END ANCHORAGE LENGTH

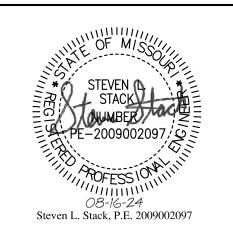
TYPICAL EXTRA REINFORCEMENT AT OPENINGS

FOR TOP BARS AS SHOWN ON THIS SHEET.

TYPICAL HORIZONTAL REINFORCEMENT

REINFORCEMENT AT OPENINGS AND CORNERS S-501 SCALE: NTS

STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR** 





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LEASBURG, MISSOURI

PROJECT # X2306-02 5215 FACILITY # 7815215010

7815215011 7815215044

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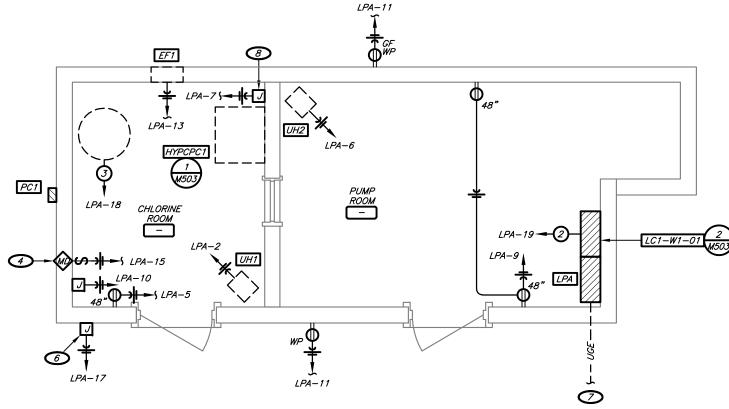
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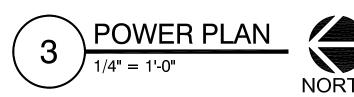
SHEET TITLE:

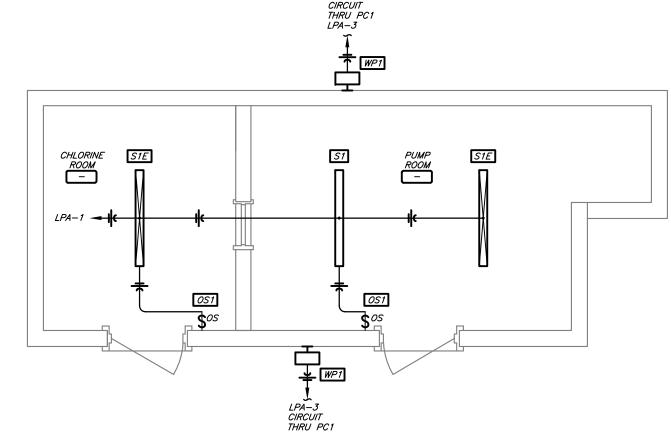
DESIGNED BY: EMH

**GENERAL** STRUCTURAL **DETAILS** 

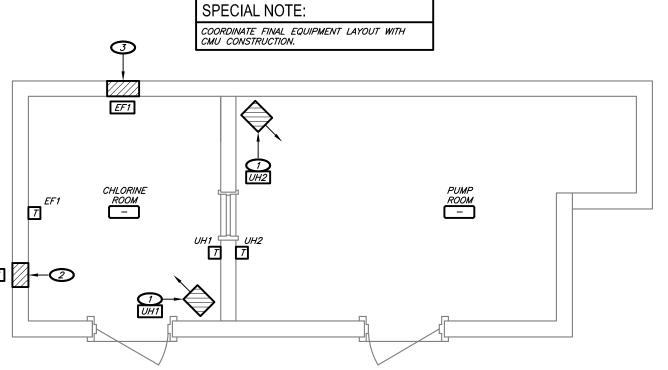
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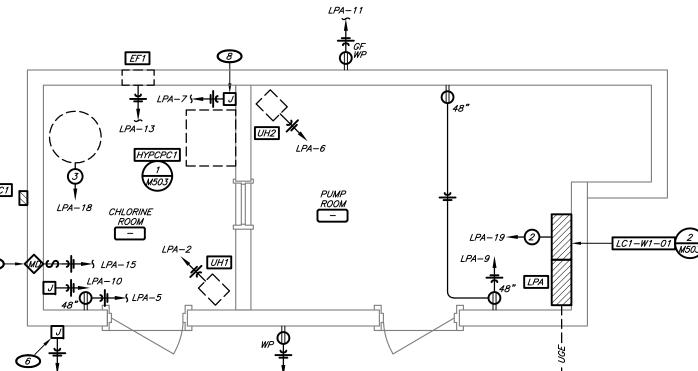




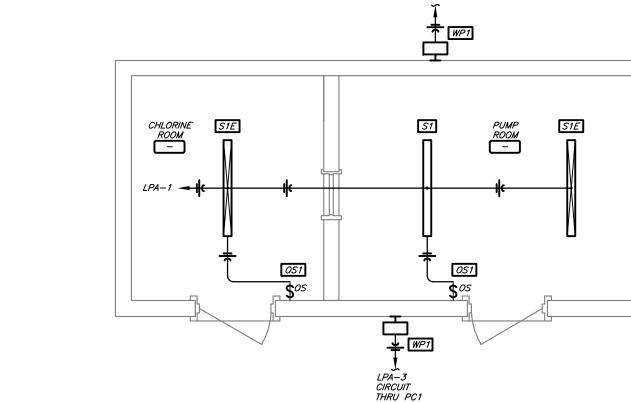












PROVIDE NEW 240V-SINGLE PHASE 200-AMP PANELBOARD. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS.

EXISTING LOAD CENTER/PANELBOARD -SHALL BE REMOVED

EXISTING POLE MOUNTED / TRANSFORMER SHALL REMAIN

EXISTING SERVICE CONDUCTORS — AND CONDUIT SHALL REMAIN

EXISTING PEDESTAL — MOUNTED ELECTRICAL METER SHALL REMAIN.

**EXISITNG** 

#4 GROUNDING ELECTRODE

- REMOVE EXISTING SERVICE FEEDERS SERVING PANEL LPA FROM EXISTING ELECTRICAL METER.

ELECTRICAL RISER DIAGRAM

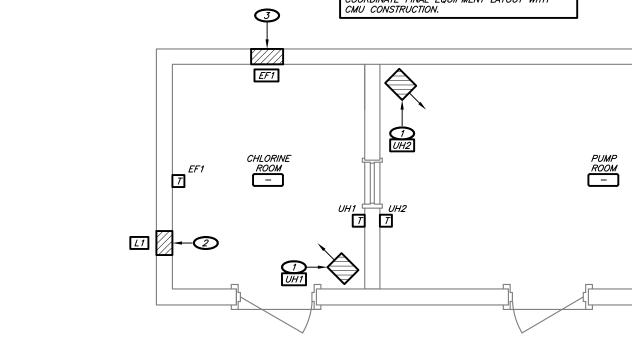
**ELECTRICAL RISER DIAGRAM** 

EXISTING POLE MOUNTED / TRANSFORMER SHALL REMAIN

EXISTING SERVICE CONDUCTORS — AND CONDUIT SHALL REMAIN

EXISTING PEDESTAL — MOUNTED ELECTRICAL METER SHALL REMAIN.









- INSTALL UNIT HEATERS USING MANUFACTURER PROVIDED HARDWARE.
- 2 INSTALL LOUVER SO THAT BOTTOM FLANGE IS NOT LOWER THAN 48" AFF. 3 INSTALL EXHAUST FAN SO THAT BOTTOM FLANGE IS NO LOWER THAN 48" AFF.
- PROVIDE POWER FOR MOTORIZED DAMPER IN LOUVER. INTERLOCK MOTORIZED DAMPER WITH EXHAUST FAN IN SAME ROOM. DAMPER SHALL OPEN UPON OPERATION OF EXHAUST FAN. FIELD VERIFY EXACT LOCATION AND REQUIREMENTS.
- 5 POWER CONNECTION FOR SYSTEM PRESSURIZER PUMP. COORDINATE EXACT LOCATION AND CONNECTION REQUIREMENTS WITH EQUIPMENT PROVIDER.
- 6 PROVIDE POWER TO OWNER SUPPLIED EMERGENCY LIGHT. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH OWNER.
- SEE ELECTRICAL RISER DIAGRAM FOR CONTINUATION.

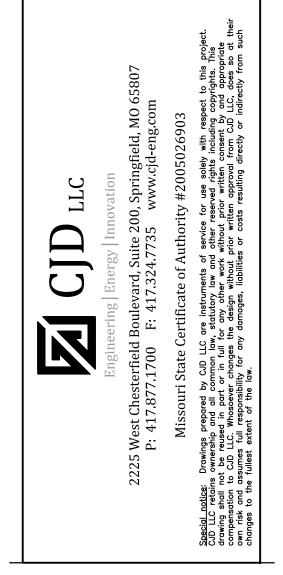
# 8 PROVIDE JUNCTION BOX WITH DISCONNECT BREAKER AND CONTROL WIRING TERMINAL BLOCKS (FOR FUTURE SCADA SYSTEM) FOR CHEMICAL METERING SKID.

- CONDUIT AND CONDUCTOR SCHEDULE:
- (3) #3/0 AND (1) #6 GROUND IN 2" CONDUIT (3) #6 AND (1) #8 GROUND IN 1" CONDUIT
- (3) #8 AND (1) #10 GROUND IN 0.75" CONDUIT



STATE OF MISSOURI

MICHAEL L. PARSON, **GOVERNOR** 



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LEASBURG, MISSOURI

PROJECT # X2306-02

5215

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CAD DWG FILE:MEP-101.DWG DRAWN BY: CJ CHECKED BY: CF DESIGNED BY: CJD

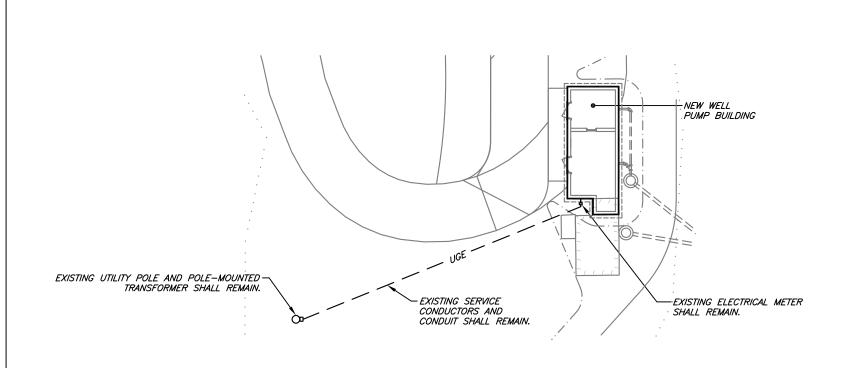
SHEET TITLE:

WELL HOUSE

PLANS

SHEET NUMBER:

24 OF 27 SHEETS 08/16/2024







PHOTOCELL SCHEDULE  LOAD SWITCH									
MARK	EQUIPMENT SERVED	WATTS	VOLTAGE	MANUFACTURER	MODEL#	AMP	POLE	ENCLOSURE	ACCESSORIES
PC1	EXTERIOR LIGHTS	168	120	INTERMATIC	K4222	15	1	NEMA 3R	1,2
ACCESSORIES:  1. SWIVEL MOUNTING									

	UNIT HEATER SCHEDULE										
MARK	MANUFACTURER	MODEL#	CFM (MIN)	ESP ("WC)	HTG CAPACITY  LOW (MBH) HIGH (MBH)		VOLTAGE/ PHASE	FLA	МОСР	WEIGHT (LBS)	NOTES & ACCESSORIES
UH1	REZNOR	EUH-TSL	125	NA	NA	10.2	240/1	12.8	15	49	1 THRU 6
UH2	REZNOR	EUH-TSL	125	NA	NA	10.2	240/1	12.8	15	49	1 THRU 6

CCESSORIES: FULL FAN SAFETY GUARD. 24 VOLT CONTROL TRANSFORMER.

2. LIGHT LEVEL SLIDE ADJUSTMENT

REMOTE SINGLE STAGE HEATING ONLY THERMOSTAT. ADJUSTABLE HORIZONTAL AND VERTICAL LOUVERS.

HANGER KIT.

PROVIDE FACTORY INSTALLED DISCONNECT SWITCH FROM MANUFACTURER.

			LO	UVE	R SC	HEDUL	E			
MARK	MANUFACTURER	MODEL#	SERVICE	CFM	DELTA P (STATIC)	WIDTH X HEIGHT (IN)	DEPTH (IN)	FREE AREA MIN (SQ.FT.)	VELOCITY (FPM)	NOTES
L1	POTTORFF	SFD-445	INTAKE	100	0.11"	12" x 12"	4"	0.3	700	1,2,3,4,5

. BIRD SCREEN

DRAINABLE BLADE 3. FLANGE FRAME

I. FACTORY PAINTED BAKED ENAMEL FINISH. COLOR AS SELECTED BY ARCHITECT.

PROVIDE 120-VOLT, TWO-POSITION MOTORIZED DAMPER. INTERLOCK WITH EF1 TO OPEN WHEN EXHAUST FAN IS IN OPERATION.

	FAN SCHEDULE										
MARK	MANUFACTURER	MODEL#	AREA SERVED	SERVICE	CFM	DELTA P (STATIC)	MOTOR HP/WATTS	VOLTAGE/ PHASE	NOTES AND ACCESSORIES		
EF1	COOK	ACWD - 70W17DEC	CHLORINE ROOM	EXHAUST	100	0.15"	50 W	120/1	1,2,3,4		

L-L - LINE TO LINE

PROVIDE FACTORY MOUNTED DISCONNECTING MEANS. PROVIDE GRAVITY BACKDRAFT DAMPER.

PROVIDE FAN SPEED CONTROLLER INSTALLED NEAR FAN MOTOR. PROVIDE WITH THERMOSTAT SET TO 75 DEG (ADJUSTABLE).

4. ADVANCED MONITORING: PRIMARY MONITORING PLUS EVENT COUNTER DISPLAY, AUDIBLE ALARM W/LED

5. STANDALONE ENCLOSURE - TVSS SHALL NOT BE INTEGRAL TO SWITCHGEAR

WHERE SWITCHING IS SHOWN, WIRE OCCUPANCY SENSOR CONTROL IN SERIES WITH LOCAL LIGHT SWITCHING.

PROVIDE CONTROL UNIT(S)/POWER PACK(S) AS REQUIRED. FINISH/COLOR SHALL MATCH ALL OTHER DEVICES

		SUR	GE PROTECTIO	N DEVICE S	CHEDULE	•		
MARK	MANUFACTURER	MODEL	SURGE RATING	VOLTAGE	MODES OF PROTECTION	MCOV	NEMA ENCLOSURE	NOTES AND OPTIONS
SPD1	CURRENT TECHNOLOGY	#TG 150	150kA PER MODE	120/240V 1PH, 3W	L-N,L-G,N-G,L-L	550V	NEMA 1	1,2,4
1. INTE 2. STA	SSORIES/NOTES: EGRAL DISCONNECT ITUS L.E.D.s INDARD MONITORING					L-N - LI L-G LIN	<u>VIATIONS:</u> NE TO NEUTRAL IE TO GROUND EUTRAL TO GRO	

					AF	PPROVED	MANUFACTURER	S: SIEMENS, SQUAR	RE D	
	OCO	CUPAN	ICY SEI	NSOR S	CHE	DUL	.E			
AAADK	LOAD					SI	ENSOR			
MARK	EQUIPMENT SERVED	VOLTAGE	MANUF	MODEL#	VOLTAGE	TYPE	TIME DELAY	MOUNTING	INTERLOCK	ACC
OS1	CHLORINE/PUMP ROOM LIGHTS	120	HUBBELL	AD2000	120	US/IR	15 MIN.	WALL BOX	-	
<ol> <li>WHERE SWITCHIN</li> <li>WALL SWITCH SHA</li> </ol>	S: L ADD-A-RELAY, SUCH THAT PARALLEL SENSORS SH/ NG IS SHOWN, WIRE OCCUPANCY SENSOR CONTROL ALL BE CAPABLE OF MANUAL ON-OFF CONTROL SENSORS ARE SHOWIN IN A SINGLE ROOM/SPACE AI	IN SERIES WITH LO	CAL LIGHT SWITCHIN	G.				ABBREVIATIONS PIR - PASSIVE INFI US - ULTRASONIC IR/US -DUAL TECH	- RARED	
	PLIES TO ALL SENSORS): YPE MAY BE SHOWN IN MULTIPLE LOCATIONS ON ELE	CTRICAL PLANS						APPROVED MAN	IUFACTURERS:	

	BOARD SCHEDU													LPA
/OLTAGE:	120/240	POLES.				24		MOUNTIN	G:		SUR	FACE	LOCATION: PL	UMP ROO
PHASE / WIRE:	1/3	KAIC A	MPS (R	MS):		10		ENCLOSU	IRE:		NEI	VIA 3R	MANUFACTURER:	SQUARE
AMPS:	200	MCB / N	•	,		MLO		FED FROI	Λ:		N	IETER	MODEL:	Q
ENCLOSURE A	CCESSORIES: CH					_		PANELBO	ARD ACC	ESSORIES.	:		CL, GB, TPB	
CIRC. NO.	EQUIPMENT SERVED		C/B AMPS	C/B POLES	C/B ACC.	LOAD (VA)	PHASE L	OADS (VA) B	LOAD (VA)	C/B ACC.	C/B POLES	C/B AMPS	EQUIPMENT SERVED	CIRC NO.
1	NTERIOR LIGHTING		20	1	-	100	1636		1536	HACR	2	20	UNIT HEATER UH1	2
3 E	EXTERIOR LIGHTING		20	1	-	175		1711	1536	-	-	-	-	4
5 C	CHLORINE ROOM RECEPTACLES		20	1	GFCI	360	1896		1536	HACR	2	20	UNIT HEATER UH2	6
7 C	CHEMICAL METERING SKID		20	1	-	1200		2736	1536	-	-	-	-	8
9 F	PUMP ROOM RECEPTACLES		20	1	GFCI	360	960		600	-	1	20	SYSTEM 'PRESSURIZER	10
11 E	EXTERIOR RECEPACTLES		20	1	GFCI	360		360		-	1	20	SPARE	12
13 E	EXHAUST FAN EF1		20	1	HACR	75	75			-	1	20	SPARE	14
15 A	NOTORIZED DAMPER		20	1	-	180		180		-	1	20	SPARE	16
17 E	EXTERIOR EMERGENCY LIGHT		20	1	-	180	3230		3050	-	2	40	WATER HEATER	18
19 F	PUMP CONTROL PANEL (LC1-W1-O1)		60	2	-	3360		6410	3050	-	_	-	-	20
21 "					-	3360	3360			-	1	20	SPARE	22
23 S	SPARE		20	1	_					_	1	20	SPARE	24
23 S  CIRCUIT BRI AFCI EO GFCI HACR HLF HLN	SPARE  EAKER ACCESSORIES: ARC-FAULT INTERRUPTING ELECTRICAL OPERATOR GROUND-FAULT INTERRUPTING HACR RATING HANDLE LOCK-OFF HANDLE LOCK-ON SWITCH RATING	ENCLOSU CH CW DWD EGT EGB EGSL EGSR	IRE ACCE - CONCE - COLUM - HINGE - EXTEM - EXTEM - EXTEM	EALED HIN MN WIDTH D DOOR V DED GUT DED GUT DED GUT	: NGE PANEL WITHIN HINGED	DOOR O SIDE	3360	PANELBOARI CL FTL GB GBI NBK PS SB	- COMPRES - FEED-THI - EQUIPME - GROUND - NEUTRAL	- RIES SSION LUGS RU LUGS NT GROUND BA BAR INSULATO BONDING KIT	R KIT	20	SPARE  SPARE  SFB - SUB-FEED CIRCUIT BREAKER  SFL - SUB-FEED LUGS  SPB - SILVER PLATED COPPER BUS BARS  TPB - TIN PLATED ALUMINUM BUS BARS  TRN - 200% RATED NEUTRAL BUS BAR  TVSS - TRANSIENT VOLTAGE SURGE SUPPRESS	SIC

FOUIPMENT SUBMITTAL PRIOR TO APPROVAL WITH OCCUPANCY SENSOR SPECIFICATION INFORMATION CONTRACTOR SHALL SUBMIT PLAN (PROVIDED BY

IUFACTURER'S REPRESENTATIVE) WITH OCCUPANCY SENSOR LOCATIONS, OCCUPANCY SENSOR TYPE, MOUNTING HEIGHT AND SENSOR COVERAGE

		LIGH	ITING	FIXTURE	SCHE	DULE					
MARK	MANUFACTURER	MODEL#	FINISH	MOUNTING		LAMPS		FIXTURE	VOLTAGE	APPROVED	NOTES
WAKK	WANOFACTORER	WODEL#	FINISH	WOONTING	TYPE	CODE	QTY.		VOLTAGE	MANUFACTURERS	NOTES
S1	WILLIAMS	96-4-L40/835-DRV-UNV	WHITE	SURFACE	LED	WITH FIXTURE	-	30	120	SUBMIT FOR APPROVAL	3
S1E	WILLIAMS	96-4-L40/835-EM/10W-DRV-UNV	WHITE	SURFACE	LED	WITH FIXTURE	-	30	120	SUBMIT FOR APPROVAL	1,3
WP1	WILLIAMS	WPCS-L90-840-BZ-EM/6W-DIM-UNV	BRONZE	WALL	LED	WITH FIXTURE	-	84	120	SUBMIT FOR APPROVAL	3,4,5

PROVIDE INTERNAL BATTERY FOR 90 MINUTES OF EMERGENCY OPERATION.

REFER TO PLANS FOR MOUNTING TYPE, FACE ORIENTATION AND CHEVERON DIRECTION. COORDINATE WITH ARCHITECT FOR EXACT MOUNTING HEIGHT AND LOCATION.

PER LIGHTING CUTSHEET, BUG RATING IS LISTED AS B1-U0-G1

FIXTURE SHALL BE LISTED FOR OUTDOOR USE AND SHALL BE LISTED FOR DAMP OR WET LOCATION AS REQUIRED PER LIGHTING CUTSHEET, BUG RATING IS LISTED AS B2-U0-G2

EQUIVALENT MANUFACTURES: COOPER LIGHTING AND LITHONIA

#### **ELECTRICAL SYMBOLS: GENERAL MECHANICAL NOTES: ⊗ EXIT LIGHT; WALL / CEILING MOUNTED** EMERGENCY LIGHT EXIT/EMERGENCY LIGHT FLUORESCENT OR LED LIGHT FIXTURE

▼ ▼ ▼ TRACK LIGHT CEILING FAN

UNSWITCHED "NIGHT LIGHT" FIXTURE

RECESSED CAN LIGHT FIXTURE

*LP1* 

WALL-MOUNT LIGHT FIXTURE 20AMP, SINGLE POLE, 120/277V SWITCH 20AMP, THREE-WAY, 120/277V SWITCH 20AMP. FOUR-WAY. 120/277V SWITCH

20AMP, DOUBLE POLE, 120/277V SWITCH DIMMER SWITCH 120V ELECTRONIC TIMER SWITCH WALL BOX OCCUPANCY SENSOR SWITCH

OCCUPANCY SENSOR FOR LIGHTING CONTROL; WALL/CEILING MOUNTED POWER PACK FOR LIGHTING CONTROL; CEILING MOUNTED SIMPLEX RECEPTACLE; 2P, 3W, 20A, 125V 14-30 SIMPLEX RECEPTACLE; NEMA CONFIGURATION AS INDICATED

FLUORESCENT OR LED LIGHT FIXTURE WITH DUAL LEVEL SWITCHING

FLUORESCENT OR LED LIGHT FIXTURE WITH EMERGENCY BALLAST

DUPLEX RECEPTACLE; 2P, 3W, 20A, 125V DUPLEX RECEPTACLE; MOUNTED @ 42" ABOVE FINISHED FLOOR DUPLEX RECEPTACLE: INSTALLED FLUSH WITH CEILING DUPLEX RECEPTACLE; MOUNTED 6" ABOVE COUNTERTOP BACKSPLASH

DUPLEX RECEPTACLE W/ GROUND FAULT INTERRUPTER DUPLEX RECEPTACLE; SWITCHED DUPLEX RECEPTACLE; TAMPER RESISTANT DUPLEX RECEPTACLE; WEATHERPROOF

DOUBLE DUPLEX RECEPTACLE WITH COMMON FACEPLATE RECEPTACLE MOUNTED IN FLUSH FLOOR BOX. REFER TO SPECIFICATIONS RECEPTACLE MOUNTED IN FS TYPE BOX ON RIGID CONDUIT JUNCTION BOX; WALL / CEILING MOUNTED

ELECTRICAL EQUIPMENT. SEE SCHEDULE FOR TAGGED EQUIPMENT DS1 DISCONNECT SWITCH

---- CONDUIT CONCEALED IN FLOOR SLAB - - CONDUIT ROUTED EXPOSED AT STRUCTURE #12 CONDUCTORS, TICK MARKS INDICATE QUANTITY P1-1 HOME RUN WITH PANEL AND CIRCUIT DESIGNATION

LIGHTING & POWER PANELBOARD

CONDUIT CONCEALED IN CEILING OR WALL

P1-2 PARTIAL HOME RUN WITH PANEL AND CIRCUIT DESIGNATION GROUND WIRE #18 CONDUCTORS AND QUANTITY DOORBELL SYSTEM; PUSH-BUTTON OR CHIME

FIRE ALARM CONTROL PANEL FIRE ALARM REMOTE ANNUNCIATOR PANEL FIRE ALARM MANUAL PULL STATION SINGLE STATION SMOKE ALARM **(F)**SD SMOKE DETECTOR

(F) HD HEAT DETECTOR

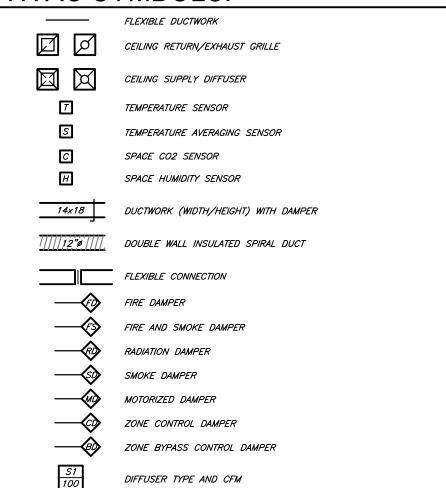
OCO/SA COMBINATION SMOKE/CARBON MONOXIDE ALARM FIRE ALARM VISUAL ANNUNCIATING DEVICE FIRE ALARM AUDIO/VISUAL ANNUNCIATING DEVICE FIRE ALARM LOW-FREQUENCY AUDIO/VISUAL ANNUNCIATING DEVICE

FIRE SPRINKLER SYSTEM FLOW SWITCH FIRE SPRINKLER SYSTEM TAMPER SWITCH \* TELEPHONE OUTLET X: NUMBER OF DATA PORTS \* TELECOMMUNICATIONS OUTLET

X: NUMBER OF DATA PORTS \* CABLE TELEVISION OR MATV OUTLET

\* CONTRACTOR SHALL COORDINATE WITH OWNER'S SERVICE PROVIDER TO PROVIDE ROUGH-IN FOR THESE OUTLETS.

# **HVAC SYMBOLS:**



RECTANGULAR TO ROUND TAKE-OFF

RESPONSIBILITY OF THE CONTRACTOR AT NO COST TO OWNER OR A/E.

THE CONTRACTOR SHALL INCLUDE ALL PERMIT AND INSPECTION FEES IN BID.

EXTRAS WILL BE PAID DUE TO UNANTICIPATED EXISTING CONDITIONS.

RESULT SHALL BE EQUIVALENT TO THAT INDICATED ON DRAWINGS.

AND WITH MILLWORK AND WITH OTHER TRADES PRIOR TO ROUGH-IN.

NOT CONSTITUTE PRIOR APPROVAL OF PROPOSED SUBSTITUTIONS.

CONDUIT, WIRING, ETC. ARE INCLUDED IN THE BID PRICE.

SELECTED BY THE ARCHITECT/INTERIOR DESIGNER.

SPECIFIED EQUIPMENT.

PENETRATIONS WEATHERTIGHT

EQUIVALENT LIGHTING CONTROLS: WATTSTOPPER, LEVITON, TORK.

ALL EXPOSED WIRING SHALL BE INSTALLED IN EMT CONDUIT.

INSTALLED AT 48" AFF TO CENTER UNLESS NOTED OTHERWISE.

AND EQUIPMENT FURNISHED UNDER THIS CONTRACT.

IT SHALL BE COORDINATED CAREFULLY BETWEEN ALL TRADES.

SATISFACTORILY AS DESIGNED AND INTENDED.

THE INTENT OF THE WORK INDICATED ON THESE CONSTRUCTION DOCUMENTS IS TO PROVIDE A FULLY FUNCTIONING SYSTEM IN COMPLETE WORKING ORDER. IT SHALL BE THE RESPONSIBILITY

DOCUMENTS TO PROVIDE BUILDING CODE COMPLIANT SYSTEMS AND EQUIPMENT THAT OPERATE

ALL ELECTRICAL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS IN ACCORDANCE

WITH THE 2018 INTERNATIONAL BUILDING CODES, THE 2017 NATIONAL ELECTRICAL CODE, AND ALL LOCAL CODES AS ADOPTED BY THE AUTHORITIES HAVING JURISDICTION.

THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID. NO

PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED, REFER TO CIVIL, STRUCTURAL AND ARCHITECTURAL DRAWINGS AND EXISTING CONDITIONS FOR DIMENSIONS. FIELD VERIFY ALL

EQUIPMENT AND CONDUIT/CONDUCTOR LAYOUTS ARE DIAGRAMMATIC. FIELD COORDINATE EXACT LOCATIONS AND ROUTINGS WITH STRUCTURE, PIPING, DUCTWORK, LIGHT FIXTURES, ETC. FINAL

COOPERATE CLOSELY WITH ALL OTHER TRADES TO EXPEDITE CONSTRUCTION AND AVOID INTERFERENCES AND CONFLICTS. BEFORE ANY PIPING, DUCTWORK, CONDUIT, ETC. IS INSTALLED,

MAINTAIN ALL CLEARANCES REQUIRED BY ELECTRICAL EQUIPMENT. COORDINATE WITH PLUMBING, HVAC, AND SPRINKLER CONTRACTORS TO MAINTAIN ALL CLEARANCES REQUIRED FOR EQUIPMENT. DO NOT ROUTE PIPING, DUCTWORK, ETC. ABOVE ELECTRICAL PANELS.

COORDINATE INFORMATION OUTLET, RECEPTACLE, AND OTHER DEVICE LOCATIONS WITH OWNER

INFORMATION OUTLET (DATA AND TELEPHONE) DEVICES, WALL PLATES, AND ASSOCIATED WIRING SHALL BE SUPPLIED AND INSTALLED BY OTHERS UNDER A SEPARATE CONTRACT WITH THE

THE CONTRACTOR SHALL PROVIDE ELECTRONIC SHOP DRAWINGS/SUBMITTALS OF ALL FIXTURES

IF CONTRACTOR WISHES TO INCORPORATE PRODUCTS OTHER THAN THOSE NAMED IN

PECLIFICATIONS IN HIS BID OR PRODUCTS BY MANUFACTURERS OTHER THAN THOSE LISTED AS

APPROVED MANUFACTURERS, THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR REVIEW

AND APPROVAL OF PROPOSED SUBSTITUTIONS TO CJD ENGINEERING LLC NOT LESS THAN FIVE

WORKING DAYS PRIOR TO BID DATE. APPROVAL OR ACCEPTANCE OF PROPOSED SUBSTITUTION

OF MANUFACTURERS OR ITEMS IS FOR THE PURPOSES OF BIDDING ONLY AND DOES NOT

RELIEVE THE PROPOSED SUBSTITUTION FROM SUBMITTAL/SHOP DRAWING REVIEW AND DOES

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COSTS OF LARGER WIRING, CONDUIT,

ENCLOSURES, CONTROL AND OVERCURRENT PROTECTIVE DEVICES, ETC. RESULTING FROM SUBSTITUTION OF EQUIPMENT OTHER THAN THAT WHICH WAS THE BASIS OF DESIGN AT NO

BY HIM FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE AGAINST ALL DEFECTS.

IN COLOR SELECTED BY THE ARCHITECT/INTERIOR DESIGNER, OR APPROVED EQUAL.

DUPLEX RECEPTACLES SHALL BE EQUIVALENT TO HUBBELL 5300 SERIES (OR APPROVED EQUAL), 20A, 125V, NEMA CONFIGURATION 5-20R, IN COLOR SELECTED BY OWNER.

ELECTRICAL DEVICE WALL PLATES SHALL BE HIGH IMPACT NYLON PLASTIC IN COLOR AS

THE CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, ACCESSORIES, AND MATERIAL FURNISHED

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING COSTS TO CUT, PATCH AND REPAIR

EXISTING WALL, FLOOR AND CEILING CONSTRUCTION AS REQUIRED TO INSTALL NEW FIXTURES,

LIGHT SWITCHES SHALL BE EQUIVALENT TO HUBBELL 1220 SERIES, 20-AMP, 120/277-VOLT,

ALL RECEPTACLES THROUGHOUT UNITS SHALL BE TAMPER-RESISTANT TYPE, TO COMPLY WITH

FEEDER AND BRANCH CIRCUIT WIRING SHALL BE COPPER, 600V WITH THHN/THWN INSULATION.

OVER 75 FEET LONG SHALL BE #10 AWG; OVER 100 FEET LONG, #8 AWG UNLESS INDICATED

EQUIVALENT WIRING DEVICES BY BRYANT, COOPER, HUBBELL, LEVITON, OR AS APPROVED BY

EQUIVALENT PANELBOARDS, LIGHTING CONTACTORS AND DISCONNECT SWITCHES BY CUTLER HAMMER, GENERAL ELECTRIC, SIEMENS, SQUARE D, OR AS APPROVED BY OWNER.

PROVIDE ALL ACCESSORIES, COMPONENTS, ETC. REQUIRED FOR COMPLETE INSTALLATION OF

PROVIDE UNISTRUTS AND ACCESSORIES AS REQUIRED FOR SUPPORT OF PIPING, EQUIPMENT,

COORDINATE LIGHTING AND CEILING DEVICE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING

ALL WIRING SHALL BE INSTALLED IN EMT CONDUIT AND SHALL BE CONCEALED UNLESS OTHERWISE NOTED. PVC CONDUIT WILL BE ALLOWED BELOW SLAB. ALL TRANSITIONS FROM PVC

TO STEEL CONDUIT SHALL BE MADE BELOW GRADE. MINIMUM CONDUIT SIZE FOR LIGHTING AND

AND POWER BRANCH CIRCUITS BELOW GRADE SHALL BE 3/4". CONTRACTOR SHALL HAVE THE

OPTION TO USE METALLIC CLAD (M/C) CABLE FOR CONCEALED BRANCH CIRCUIT WIRING.

MINIMUM CONDUIT SIZE FOR INFORMATION OUTLETS SHALL BE 3/4". CONDUIT STUBS SHALL EXTEND TO AN ACCESSIBLE CEILING AND BE TERMINATED WITH INSULATING BUSHINGS.

ALL RECEPTACLES, TELECOMMUNICATIONS OUTLETS, AND TELEVISION OUTLETS SHALL BE

INSTALLED AT 18" AFF TO CENTER UNLESS NOTED OTHERWISE. ALL SWITCHES SHALL BE

PROVIDE SLEEVES AT CONDUIT PENETRATIONS OF EXTERIOR OR FOUNDATION WALLS. SEAL

SEAL ALL PENETRATIONS THROUGH FIRE—RATED ASSEMBLIES AS NECESSARY TO RESTORE

PROVIDE TYPED CIRCUIT DIRECTORIES FOR ALL PANELBOARDS. DIRECTORY INFORMATION SHALL

ALL LIGHTING AND POWER CIRCUITS SHALL HAVE A GROUNDING CONDUCTOR.

POWER BRANCH CIRCUITS ABOVE GRADE SHALL BE 1/2". MINIMUM CONDUIT SIZE FOR LIGHTING

BRANCH CIRCUIT WIRING SHALL BE #12 AWG MINIMUM. HOMERUNS FOR BRANCH CIRCUITS

IF CONTRACTOR WISHES TO INCORPORATE PRODUCTS OTHER THAN THOSE NAMED IN

DRAWINGS REPRESENT FINAL RESULT. REMOVE, RELOCATE, MODIFY EXISTING EQUIPMENT, DUCTWORK, PIPING, ETC. AS REQUIRED. FIELD VERIFY EXISTING CONDITIONS AND EXACT

OF THE CONTRACTOR AND THE CONTRACTORS SUPPLIERS TO INCLUDE ALL ACCESSORIES, COMPONENTS, PARTS, ETC. THAT MAY NOT BE INDICATED ON THESE CONSTRUCTION

GENERAL ELECTRICAL NOTES APPLY TO ALL ELECTRICAL SHEETS. GENERAL MECHANICAL NOTES APPLY TO ALL MECHANICAL SHEETS. CJD ENGINEERING LLC, BEING THE AUTHOR OF THESE CONSTRUCTION DOCUMENTS RESERVES CJD ENGINEERING LLC, BEING THE AUTHOR OF THESE CONSTRUCTION DOCUMENTS RESERVES THE RIGHT OF FINAL INTERPRETATION AS TO THEIR INTENT AND MEANING. ANY ADDITIONAL WORK OR THE RIGHT OF FINAL INTERPRETATION AS TO THEIR INTENT AND MEANING. ANY ADDITIONAL WORK OR COSTS RESULTING FROM THE CONTRACTOR'S OWN INTERPRETATION AS TO THE COSTS RESULTING FROM THE CONTRACTOR'S OWN INTERPRETATION AS TO THE INTENT OR INTENT OR MEANING WITHOUT CONSULTATION WITH CJD ENGINEERING LLC SHALL BE THE MEANING WITHOUT CONSULTATION WITH CJD ENGINEERING LLC SHALL BE THE RESPONSIBILITY OF

THE INTENT OF THE WORK INDICATED ON THESE CONSTRUCTION DOCUMENTS IS TO PROVIDE A FULLY FUNCTIONING SYSTEM IN COMPLETE WORKING ORDER. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THE CONTRACTOR'S SUPPLIERS TO INCLUDE ALL ACCESSORIES, COMPONENTS, PARTS, ETC. THAT MAY NOT BE INDICATED ON THESE CONSTRUCTION DOCUMENTS TO PROVIDE BUILDING CODE COMPLIANT SYSTEMS AND EQUIPMENT THAT OPERATE SATISFACTORILY

THE CONTRACTOR AT NO COST TO OWNER OR A/E.

DRAWINGS ARE NOT SET UP SPECIFICALLY ACCORDING TO TRADE AND EACH CONTRACTOR AND SUB-CONTRACTOR OR TRADE IS REQUIRED TO REVIEW THE CONSTRUCTION DOCUMENTS AS A WHOLE AND PROVIDE ANY MISC. ITEMS, MATERIALS, WORK, ETC. REQUIRED TO COMPLETE THE WORK AS SHOWN ON ALL DOCUMENTS. THIS REQUIREMENT APPLIES TO ALL TRADES. STRUCTURAL MECHANICAL, ELECTRICAL, AND PLUMBING REQUIREMENTS AND RELATED WORK ARE INDICATED THROUGHOUT THE DOCUMENTS AND SHOULD BE REVIEWED WITH EACH FOR OVERALL SCOPE OF

ALL MECHANICAL WORK SHALL BE PERFORMED BY LICENSED PLUMBING AND MECHANICAL CONTRACTORS AND SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF THE 2018 INTERNATIONAL BUILDING, PLUMBING, FUEL GAS AND MECHANICAL CODES, AND ALL APPLICABLE LOCAL CODES AS

ADOPTED BY LOCAL AUTHORITIES. THE CONTRACTOR SHALL INCLUDE ALL PERMIT AND INSPECTION FEES IN BID. THE PLANS ARE DIAGRAMMATIC AND SHALL NOT BE SCALED. REFER TO CIVIL, STRUCTURAL, AND

PIPING AND DUCTWORK LAYOUTS ARE DIAGRAMMATIC. FIELD COORDINATE EXACT LOCATIONS AND ROUTINGS WITH STRUCTURE, LIGHT FIXTURES, CONDUITS, ETC. FINAL RESULT SHALL BE EQUIVALENT TO THAT INDICATED ON DRAWINGS.

ARCHITECTURAL DRAWINGS AND EXISTING CONDITIONS FOR DIMENSIONS. FIELD VERIFY ALL

INTERFERENCES AND CONFLICTS. BEFORE ANY PIPING, DUCTWORK, CONDUIT, ETC. IS INSTALLED, IT SHALL BE COORDINATED CAREFULLY BETWEEN ALL TRADES. MAINTAIN ALL CLEARANCES REQUIRED BY PLUMBING AND HVAC EQUIPMENT. COORDINATE WITH ELECTRICAL CONTRACTOR TO MAINTAIN ALL CLEARANCES REQUIRED FOR EQUIPMENT. DO NOT ROUTE PIPING, DUCTWORK, ETC. ABOVE ELECTRICAL PANELS.

COOPERATE CLOSELY WITH ALL OTHER TRADES TO EXPEDITE CONSTRUCTION AND AVOID

DRAWINGS REPRESENT FINAL RESULT. REMOVE, RELOCATE, MODIFY EXISTING EQUIPMENT, DUCTWORK, PIPING, ETC. AS REQUIRED. FIELD VERIFY EXISTING CONDITIONS AND EXACT REQUIREMENTS. NO EXTRAS WILL BE PAID DUE TO UNANTICIPATED EXISTING CONDITIONS.

IF CONTRACTOR WISHES TO INCORPORATE PRODUCTS OTHER THAN THOSE NAMED IN IF CONTRACTOR WISHES TO INCORPORATE PRODUCTS OTHER THAN THOSE NAMED IN

SPECIFICATIONS IN HIS BID OR PRODUCTS BY MANUFACTURERS OTHER THAN THOSE LISTED AS

APPROVED MANUFACTURERS, THE CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR REVIEW

AND APPROVAL OF PROPOSED SUBSTITUTIONS TO CJD ENGINEERING LLC NOT LESS THAN FIVE

WORKING DAYS PRIOR TO BID DATE. APPROVAL OR ACCEPTANCE OF PROPOSED SUBSTITUTION OF

MANUFACTURERS OR ITEMS IS FOR THE PURPOSES OF BIDDING ONLY AND DOES NOT RELIEVE THF PROPOSED SUBSTITUTION FROM THE SUBMITTAL/SHOP DRAWING REVIEW AND DOES NOT CONSTITUTE PRIOR APPROVAL OF PROPOSED SUBSTITUTIONS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COSTS OF LARGER WIRING, CONDUIT ENCLOSURES, CONTROL AND OVERCURRENT PROTECTIVE DEVICES, ETC. RESULTING FROM SUBSTITUTION OF EQUIPMENT OTHER THAN THAT WHICH WAS THE BASIS OF DESIGN AT NO COST TO OWNER OR A/E.

THE CONTRACTOR SHALL PROVIDE ELECTRONIC SHOP DRAWINGS/SUBMITTALS OF ALL FIXTURES AND EQUIPMENT FURNISHED UNDER THIS CONTRACT. THE CONTRACTOR SHALL PERFORM A PRELIMINARY FUNCTIONAL TEST AND BALANCE FOR ALL EQUIPMENT INSTALLED UNDER THIS CONTRACT. THE CONTRACTOR SHALL THEN OBTAIN THE SERVICES OF AN INDEPENDENT FIRM CERTIFIED WITH ASSOCIATED AIR BALANCING COUNCIL OR

NATIONAL ENVIRONMENTAL BALANCING BUREAU TO PERFORM THE HVAC SYSTEM TESTING AND

16. THE CONTRACTOR SHALL GUARANTEE ALL EQUIPMENT, ACCESSORIES, AND MATERIAL FURNISHED BY HIM FOR A PERIOD OF ONE YEAR FROM FINAL ACCEPTANCE AGAINST ALL DEFECTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING COSTS TO CUT, PATCH AND REPAIR EXISTING WALL, FLOOR AND CEILING CONSTRUCTION AS REQUIRED TO INSTALL NEW PLUMBING FIXTURES, DUCTWORK, EQUIPMENT, PIPING, ETC. ARE INCLUDED IN THE BID PRICE.

BALANCING IN ACCORDANCE WITH AABC OR NEBB NATIONAL STANDARDS

ALL SHUTOFF VALVES ON DOMESTIC WATER SHALL BE BRONZE FULL-PORT BALL VALVE TYPE. 2. P-TRAPS SHALL INCLUDE INTEGRAL CLEANOUT.

EQUIVALENT EXHAUST FANS BY ACME, COOK, GREENHECK, PENN, OR OTHERS WITH PRIOR

EQUIVALENT LOUVER BY RUSKIN, ARCHITECTURAL LOUVERS, OR OTHERS WITH PRIOR APPROVAL. EQUIVALENT UNIT HEATERS BY MARLEY, MODINE, OR OTHERS WITH PRIOR APPROVAL.

PROVIDE ALL ACCESSORIES, COMPONENTS, ETC. REQUIRED FOR COMPLETE INSTALLATION OF

PROVIDE UNISTRUTS AND ACCESSORIES AS REQUIRED FOR SUPPORT OF PIPING, EQUIPMENT, ETC. CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS TO EQUIPMENT. PROVIDE ADAPTERS, FITTINGS, ETC. FOR ALL EQUIPMENT AS REQUIRED. COORDINATE SPECIFIC REQUIREMENTS WITH EQUIPMENT SUPPLIERS. REFER TO SPECIAL EQUIPMENT DRAWINGS FOR ADDITIONAL INFORMATION.

**EXECUTION** ALL THERMOSTATS, SENSORS, DAMPER CONTROLS, ASSOCIATED ACCESSORIES, AND FINAL WIRING SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR.

INSTALL ALL ROOF EQUIPMENT. PIPE. CONDUIT AND DUCTWORK SUPPORTS, CURBS AND PENETRATIONS IN ACCORDANCE WITH THE REQUIREMENTS OF THE ROOFING SYSTEM MANUFACTURER.

PROVIDE SLEEVES AT PIPE PENETRATIONS OF EXTERIOR OR FOUNDATION WALLS. SEAL

ALL EXPOSED PIPING, DUCTWORK AND EQUIPMENT SHALL BE PRIMED AND PAINTED. REFER TO ARCHITECTURAL DRAWINGS FOR REQUIREMENTS AND COORDINATE WITH GENERAL CONTRACTOR.

STATE OF MISSOURI GENERAL ELECTRICAL NOTES: MICHAEL L. PARSON





**GOVERNOR** 



**OFFICE OF ADMINISTRATION** DIVISION OF FACILITIES MANAGEMENT. **DESIGN AND CONSTRUCTION** 

STATE OF MISSOURI **DIVISION OF STATE PARKS** MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

PROJECT # X2306-02

FOR RATED ASSEMBLIES. FIRESTOPPING MATERIALS AND REQUIREMENTS. CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS TO SPECIAL EQUIPMENT. PROVIDE ADAPTERS, FITTINGS, ETC. FOR ALL EQUIPMENT AS REQUIRED. COORDINATE SPECIFIC REQUIREMENTS WITH EQUIPMENT SUPPLIERS. REFER TO SPECIAL EQUIPMENT DRAWINGS FOR

PE-RESISTANCE RATING OF ASSEMBLY. REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS

ELECTRICAL CONTRACTOR SHALL PROVIDE ROUGH-IN FOR THERMOSTATS AND SENSORS. PROVIDE SINGLE—GANG BOX WITH 0.75" CONDUIT TO ABOVE ACCESSIBLE CEILING OR TO ASSOCIATED EQUIPMENT. THERMOSTATS, SENSORS, AND WIRING SHALL BE PROVIDED BY MECHANICAL CONTRACTOR. REFER TO HVAC PLANS FOR THERMOSTAT AND CONTROL LOCATIONS.

REMOVE EXISTING LIGHT FIXTURES, SWITCHES, RECEPTACLES, TELEPHONE JACKS, DATA JACKS, FIRE ALARM DEVICES, ETC. IN REMOVED WALL AND CEILINGS. OTHER LIGHT FIXTURES, SWITCHES, RECEPTACLES, TELEPHONE, DATA, FIRE ALARM DEVICES, ETC. SHALL REMAIN UNLESS INDICATEL REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL NOTES AND EXTENTS OF DEMOLITION.

SALVAGE AND PROTECT DEMOLISHED LIGHT FIXTURES FOR RE-USE. THE OWNER SHALL HAVE FIRST RIGHT OF REFUSAL ON ALL MATERIALS BEING REMOVED. ITEMS WHICH ARE TO REMAIN THE PROPERTY OF THE OWNER SHALL BE MOVED BY THE CONTRACTOR TO AN AREA IN THE BUILDING AS DIRECTED BY THE OWNER. ALL OTHER ITEMS SHALL BE REMOVED FROM THE PREMISES AND LEGALLY DISPOSED OF BY THE CONTRACTOR.

REMOVE CONDUIT, SUPPORTS, AND CONDUCTORS, ETC. ASSOCIATED WITH DEMOLISHED ITEMS EXCEPT WHERE NEW DEVICES ARE INSTALLED IN PLACE OF EXISTIF REMOVE EXISTING UNUSED CONDUIT, BOXES, SUPPORTS, CONDUCTORS, ETC. ABANDONED WITHII THE AREA OF CONSTRUCTION.

MODIFY EXISTING CONDUIT AND WIRING AS REQUIRED TO MAINTAIN CONTINUITY OF EXISTING

LEASBURG, MISSOURI

5215

FACILITY # 7815215010 7815215011 7815215044

REVISION: ISSUED TO MDNR DATE: 06-17-24 REVISION: ISSUED FOR BIDDING DATE: 08-16-24 REVISION:

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SHEET TITLE:

WELL HOUSE SCHEDULES / DETAILS

SHEET NUMBER:

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OR 100AF 80AT 3P	LOW — VOLTAGE CIRCUIT BREAKER (CB). RATINGS AND NO. OF POLES AS SHOWN. WHEN SPECIFIC TYPE IS REQUIRED, X INDICATES	KVA	NON-MOTOR LOAD WITH DESIGN KVA, KW, OR AMP	7	NORMALLY OPEN LEVEL SWITCH, CLOSE ON RISING LEVEL	$\bigcirc$ $\stackrel{X}{\bullet}$ $\vdash$ $\stackrel{X}{\bullet}$ $\stackrel{X}{\bullet}$	DOUBLE-FACED CEILING OR WALL-MOUNTED EXIT LIGHT; DIRECTIONAL ARROWS (IF	СР	CONTROL PANEL
○ 3P	TYPE.	1 1		9	NORMALLY CLOSED LEVEL SWITCH,	' <del>-</del> '	REQUIRED) AS INDICATED ON PLANS SINGLE-FACED CEILING OR WALL-MOUNTED EXIT	EUH OR UH	ELECTRIC UNIT HEATER
	TYPES:  MCCB — MOLDED CASE ICCB — INSULATED CASE	СРТ	CONTROL POWER TRANSFORMER (CPT)	0	OPEN ON RISING LEVEL  NORMALLY OPEN PRESSURE SWITCH.	$\bigotimes_{Y}^{X} \vdash \bigotimes_{Y}^{X}$	LIGHT; DIRECTIONAL ARROWS (IF REQUIRED) AS INDICATED ON PLANS	FE FIT	FLOW SENSOR/TUBE FLOW TRANSMITTER/METER
	LVP - LOW - VOLTAGE POWER MCP - MOTOR CIRCUIT PROTECTOR			0.70	CLOSE ON INCREASING PRESSURE  NORMALLY CLOSED PRESSURE SWITCH,	• X Y	AREA OR ROADWAY LIGHT — POLE—MOUNTED	LS	LEVEL FLOAT SWITCH OR LIMIT SWITCH
<u></u>	(RATING PER CONNECTED LOAD)  SEPARATELY MOUNTED CIRCUIT BREAKER; SEE ELECTRICAL ONE — LINE DIAGRAM OR	<b>→</b>	VOLTAGE TRANSFORMER (VT OR PT)	$\triangle$	OPEN ON INCREASING PRESSURE		<u>LIGHTING FIXTURE SUBSCRIPTS:</u> X — INDICATES FIXTURE TYPE PER LIGHTING	LE	LIQUID LEVEL SENSOR AND/OR TRANSDUCER
	SCHEDULE FOR DESCRIPTION	{	CURRENT TRANSFORMER (CT)	$\sim$	NORMALLY OPEN LIMIT SWITCH, CLOSE ON REACHING LIMIT		FIXTURE SCHEDULE Y — INDICATES CIRCUIT NUMBER FROM PANELBOARD	LIT	LEVEL TRANSMITTER
P	GROUND FAULT PROTECTION	WH	UTILITY WATT-HOUR METER PER UTILITY	0_70	NORMALLY CLOSED LIMIT SWITCH, OPEN ON REACHING LIMIT		z — INDICATES CONTROLLING SWITCH (IF REQUIRED)	N/O N/C	NORMALLY OPEN NORMALLY CLOSED
2	MEDIUM - VOLTAGE CIRCUIT BREAKER		REQUIREMENTS	□□ <u> </u>	FIELD WIRING EXTERNAL TO CONTROL PANEL	S Y	TOGGLE SWITCH	Р	LIFT STATION PUMP
⊩	FUSE, SIZE, AND NUMBER OF FUSES AS NOTED	DMP	DIGITAL METERING PACKAGE	\( x \)	INTERLOCK; X INDICATES TYPE <u>TYPES:</u>		<u>SUBSCRIPTS:</u> X — INDICATES TYPE NONE — SINGLE POLE	SPD	SURGE PROTECTION DEVICE  TO BE REMOVED
<b>&gt;</b>	FUSED CUTOUT, CURRENT RATING, FUSE SIZE, AND NUMBER OF POLES AS NOTED	RTM	RUN TIME METER		E — ELECTRICAL M —		3 - THREE-WAY 4 - FOUR-WAY	ТВМ	TO BE MODIFIED
	FUSIBLE SWITCH, CURRENT RATING, FUSE SIZE,			OFF HAND   AUTO	MECHANICAL K — KEY		HP — TOGGLE SWITCH, HORSEPOWER RATED K — KEY SWITCH	ТВС	TO BE CONFIRMED
	AND QUANTITY AS NOTED		GROUND	X00			LV - LOW VOLTAGE M - MOMENTARY	TVSS	TRANSIENT VOLTAGE
	NON-FUSED SWITCH, CURRENT RATING, AND NUMBER OF POLES AS NOTED	<del>-</del> 		ooox	UNLESS OTHERWISE NOTED, 2-POSITION SIMILAR		TE — MANUAL MOTOR STARTER WITH THERMAL ELEMENT	RVSS	SURGE SUPPRESSION REDUCED VOLTAGE, SOLID
	DISCONNECT OR DRAWOUT CONNECTION	<u> </u>	LIGHTNING ARRESTER		NORMALLY OPEN PUSHBUTTON, MOMENTARY CONTACT UNLESS OTHERWISE NOTED		P — PILOT LIGHT L — LIGHTED HANDLE Y — INDICATES CONTROLLING SWITCH (IF REQUIRED)	FVNR	STATE MOTOR STARTER FULL VOLTAGE NON-REVERSING
vFD ŏ	MAGNETIC MOTOR STARTER OR VFD WHERE X = WIRING DIAGRAM #	SPD	LOW VOLTAGE SURGE PROTECTIVE DEVICE	0   0	NORMALLY CLOSED PUSHBUTTON, MOMENTARY CONTACT UNLESS OTHERWISE NOTED	OC	TYPES:  PIR - PASSIVE INFRARED (CEILING MOUNTED)	HOA	MOTOR STARTER HAND-OFF-AUTO SELECTOR SWIT
	X = WIRING DIAGRAM # A = MAGNETIC NEMA STARTER SIZE B = STARTER TYPE		ELECTRICAL CONNECTION	X	INDICATING LIGHT, X INDICATES LENS COLOR	. 🕿	US - ULTRASONIC (CEILING MOUNTED)	LOR	LOCAL-OFF-REMOTE SELECTOR S
				-0(x)-	PUSH TO TEST INDICATING LIGHT, X INDICATES	₩	SPECIAL-PURPOSE RECEPTACLE AS DEFINED ON PLANS		
<del>]</del>	INDICATES UNDERGROUND CIRCUIT, SEE DUCTBANK SCHEDULE	→ OR → OR —	NO ELECTRICAL CONNECTION	<del>-</del> 0 XX	LENS COLORS:		PLUG-IN RECEPTACLE STRIP, QUANTITY AND SPACING OF RECEPTACLES AS NOTED OR SPECIFIED		
хJ	DISCONNECT OR SAFETY SWITCH, 3P NON-FUSED UNLESS NOTED OTHERWISE	SV OR O	SOLENOID VALVE		R — RED Y — YELLOW G — GREEN W — WHITE B — BLUE A — AMBER	<b>I</b>	TELECOMMUNICATIONS OUTLET OR JUNCTION BOX	SITE UTILITY SYMBOLS	•
_	XX-INDICATES CURRENT RATING  DISCONNECT OR SAFETY SWITCH,	X	CONTROL/RELAY COIL; X INDICATES TYPE,	Т	TRANSFORMER	₩ <mark> </mark>	QUAD-DUPLEX RECEPTACLE, TWO NEMA 5-20R UNDER COMMON COVER PLATE	UGPE	UNDERGROUND PRIMARY CONDU
<b>X</b> }⊦	3P FUSED UNLESS NOTED OTHERWISE XX-INDICATES CURRENT RATING	Y	Y INDICATES LOOP NO. WHEN USED	SS	SELECTOR SWITCH	$ opin_{Y}^{X} $	DUPLEX RECEPTACLE, NEMA 5-20R		AND CONDUCTORS
	YY-FUSE RATING		<u>TYPES:</u> CR — CONTROL RELAY DP — DEFINITE PURPOSE RELAY	РВ	PUSHBUTTON	$\mapsto^{X}_{Y}$	SIMPLEX RECEPTACLE, NEMA 5-20R	UGSE	UNDERGROUND SECONDARY CO AND CONDUCTORS
	SEPARATELY MOUNTED COMBINATION MOTOR STARTER OR CONTROLLER; SEE ELECTRICAL		LC - LIGHTING CONTACTOR  M - MOTOR STARTER	IC	INSTRUMENTATION/CONTROL DEVICE	Y	SUBSCRIPTS:	——— OHPE ———	OVERHEAD PRIMARY ELECTRICA
	ONE - LINE DIAGRAM OR SCHEDULE FOR DESCRIPTION		PC — PHOTO CELL TC — TIME CLOCK		TERMINATION BLOCK (TB)		X - INDICATES TYPE	OTH E	CONDUCTORS
<i>_</i>	THERMAL OVERLOAD ELEMENT		TR — TIMING RELAY		XX = TB DESIGNATION YY = TB NUMBER		GFCI — GROUND FAULT CIRCUIT INTERRUPTER Y — INDICATES CIRCUIT NUMBER FROM PANELBOARD	——— OHSE ———	OVERHEAD SECONDARY ELECTR
L		$\dashv\vdash$	NORMALLY OPEN CONTACT (N.O.)		CONTROL PANEL INTEGRAL OR PROVIDED WITH		WP — WEATHERPROOF WHILE IN USE CONDUIT TURNING UP		CONDUCTORS
	THERMAL OVERLOAD RELAY CONTACT	<del>-\</del>	NORMALLY CLOSED CONTACT (N.C.)		ASSOCIATED EQUIPMENT  CONTROL PANEL WITH DISCONNECT SWITCH INTEGRAL OR		CONDUIT TURNING DOWN	UGC	UNDERGROUND COMMUNIACATIO CONDUIT AND CABLING
OB US		$\sim$	NORMALLY OPEN TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS ENERGIZED		PROVIDED WITH ASSOCIATED EQUIPMENT		HOME RUN TO PANEL, 2 #12, 1 #12G IN	——онс ——	OVERHEAD COMMUNICATIONS CA
OR HP	MOTOR WITH DESIGN HORSEPOWER (WHEN INDICATED)	0,0	NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON OPENING AFTER COIL IS	J	JUNCTION OR PULL BOX PANELBOARD (250V TO 600V)		3/4"C UNLESS OTHERWISE NOTED		
		ο ο	ENERGIZED NORMALLY OPEN TIME DELAY RELAY CONTACT		PANELBOARD (LESS THAN 250V)		CIRCUIT RUN BETWEEN DEVICES EXPOSED IN NON-ARCHITECTURALLY FINISHED AREAS;		
			WITH TIME DELAY ON OPENING AFTER COIL IS DE-ENERGIZED		ELECTRICAL EQUIPMENT ENCLOSURE: SWITCHBOARD, MOTOR CONTROL CENTER, CONTROL PANEL, OR OTHER		CONCEALED IN ARCHITECTURALLY FINISHED AREAS. CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE		
	MOTOR STARTER INTERGRAL WITH MOTOR OR	0_0	NORMALLY CLOSED TIME DELAY RELAY CONTACT WITH TIME DELAY ON CLOSING AFTER COIL IS	PO	EQUIPMENT AS INDICATED		CIRCUIT.		
<i></i>	PROVIDED WITH MOTOR/DRIVEN EQUIPMENT	•	DE-ENERGIZED	PC	PHOTOCELL		CONDUIT RUN BETWEEN DEVICES CONCEALED IN NON-ARCHITECTURALLY FINISHED AREAS OR		
	GENERATOR	2/0	NORMALLY OPEN TEMPERATURE SWITCH; CLOSE ON RISING TEMPERATURE	(z) $(x)$	CEILING/PENDANT-MOUNTED LUMINAIRE — HID, LED, COMPACT FLUORESCENT, OR INCANDESCENT		UNDER FLOOR SLAB. CONDUIT AND CONDUCTOR SIZES SHALL BE THE SAME AS THE HOMERUN FOR THE CIRCUIT.		D ELECTRICAL SYMBOLOGY SHEET.
<u>/</u> 0]	TRANSFER SWITCH, CURRENT RATING, AND NUMBER OF POLES AS NOTED	0-50	NORMALLY CLOSED TEMPERATURE SWITCH; OPEN ON RISING TEMPERATURE	Hz X	WALL-MOUNTED LUMINAIRE - HID, LED, COMPACT FLUORESCENT, OR INCANDESCENT		CIRCUIT HASH MARKS (WHEN INDICATED); LONG, SHORT, SINGLE DOT, AND DOUBLE DOT	ALL SYMBOLS MAY BE	USED ON THIS PROJECT.  DING OF WORK IS USED TO INDIC
/ ATS	ATS - AUTOMATIC MTS		NORMALLY OPEN FLOW SWITCH; CLOSE ON INCREASING FLOW	$\begin{bmatrix} z & \bigcirc & X \\ z & \bigcirc & Y \end{bmatrix}$	CEILING/PENDANT-MOUNTED FLUORESCENT OR	111'11	REPRESENT PHASE, NEUTRAL, EQUIPMENT GROUND, AND ISOLATED EQUIPMENT GROUND, RESPECTIVELY. #12 IN 3/4" CONDUIT UNLESS	EXISTING COMPONENTS	OR TO DE-EMPHASIZE PROPOSE HLIGHT SELECTED TRADE WORK. I
	- MANUAL	00	NORMALLY CLOSED FLOW SWITCH;	Z O Y	LED FIXTURE WALL-MOUNTED FLUORESCENT OR LED FIXTURE	<del></del>	OTHERWISE INDICATED.  CIRCUIT CONTINUATION	3. SEE P&ID LEGEND	SHEET FOR PROJECT—SPECIFIC
$\sim$	TRANSFORMER		OPEN ON INCREASING FLOW	z X Y	CEILING/PENDANT-MOUNTED FLUORESCENT		CONDUIT STUBBED OUT AND CAPPED	EQUIPMENT SYMBOLS, SYSTEM ABBREVIATIONS	EQUIPMENT ABBREVIATIONS, AND
	△ 3-PHASE, 3-WIRE DELTA CONNECTION	PLC	PLC DIGITAL OUTPUT	·	FIXTURE NORMAL/EMERGENCY WALL-MOUNTED FLUORESCENT FIXTURE	(SXX)—	UNDERGROUND DUCT BANK WITH SEGMENT TAG		
	Y_ 3-PHASE, 4-WIRE GROUNDED WYE CONNECTION	$\checkmark$		Z Y Y	NORMAL/EMERGENCY	E	<ul> <li>CABLE AND CONDUIT SIZE AS SPECIFIED IN DUCK BANK SCHEDULE ON THE SHEETS</li> </ul>		
	SWITCHBOARD OR PANELBOARD; NAME,	PLC	PLC DIGITAL INPUT	X	EMERGENCY LIGHT FIXTURE, 2 ATTACHED HEADS AS SHOWN		XX - INDICATES SEGMENT ID#		
100	VOLTAGE, PHASE, NUMBER OF WIRES WHEN INDICATED		. 23 3.3.77.2 1111 31	ΥX	EMERGENCY LIGHT, REMOTE MOUNTED HEAD		GROUND CABLE		
/120V 4W						•	GROUND ROD		

## STATE OF MISSOURI MICHAEL L. PARSON, GOVERNOR





OFFICE OF ADMINISTRATION DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER IMPROVEMENTS

LEASBURG, MISSOURI

PROJECT # X2306-02 SITE # 5215 FACILITY # 7815215010

7815215011 7815215010 7815215011 7815215044

REVISION: ISSUED TO MDNR
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DRAWN BY: CJH

CHECKED BY: CF

DESIGNED BY: CJD

SHEET TITLE:

ELECTRICAL &

CONTROL LEGEND

SHEET NUMBER:

IE-502

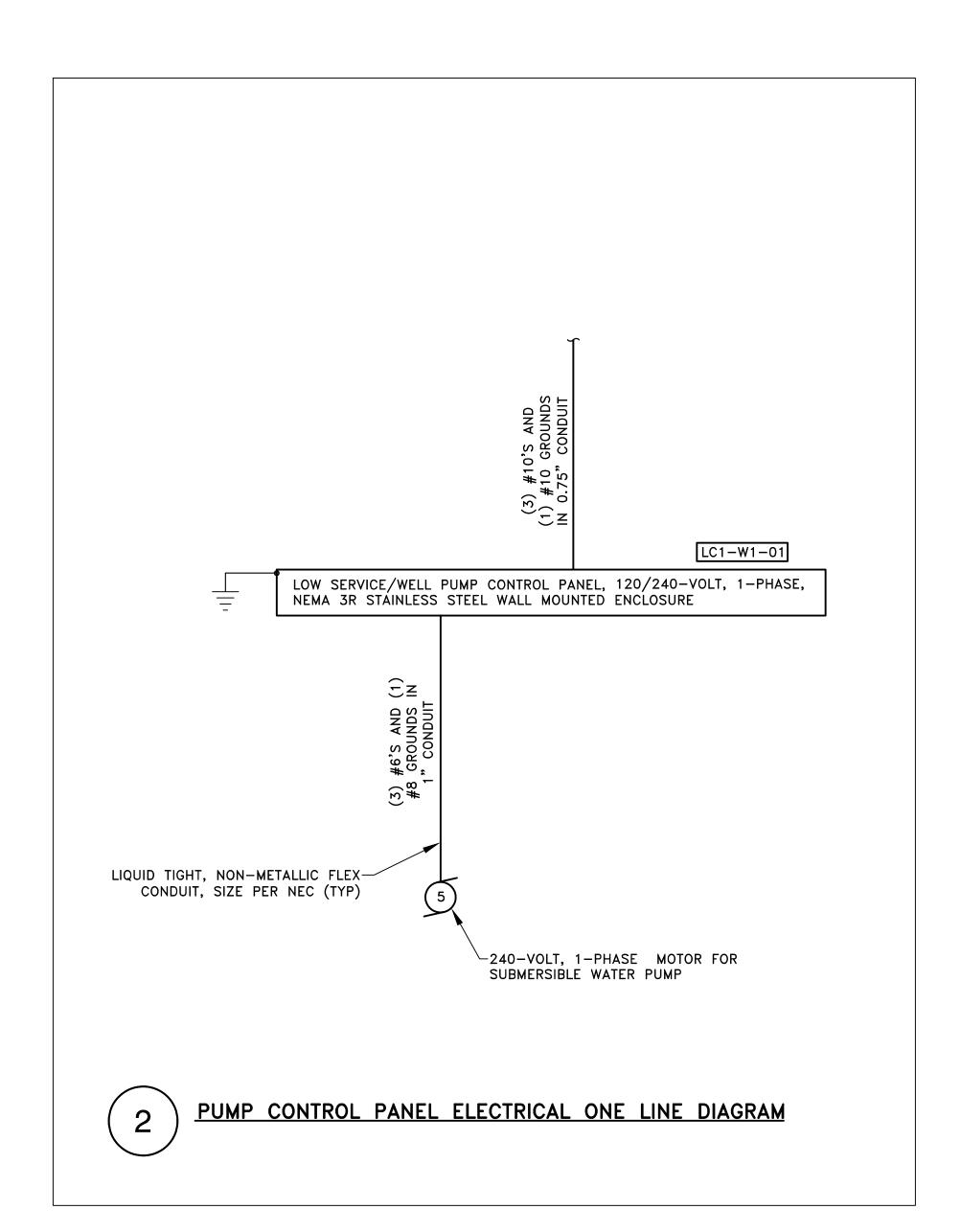
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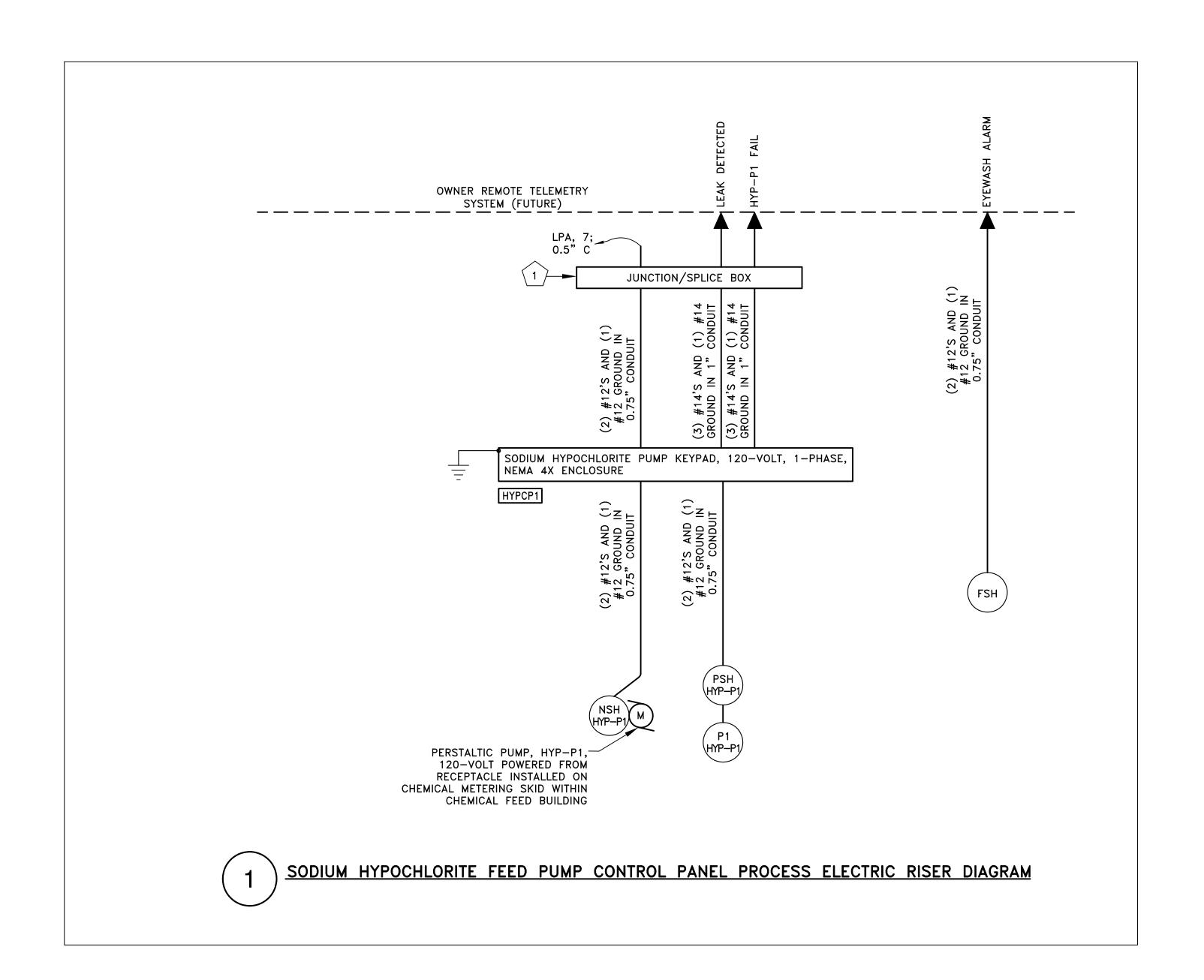
# GENERAL ELECTRICAL NOTES:

- POTTED CONDUIT SEALS ARE REQUIRED FOR ALL ELECTRICAL INTERCONNECTIONS WITH PROCESS EQUIPMENT.
- 2. STAINLESS STEEL KELLUM-TYPE STRAIN RELIEF GRIPS OR APPROVED EQUAL ARE REQUIRED FOR ALL CABLES INSTALLED IN WETWELLS.
- 3. PVC COATED RIGID METAL CONDUIT REQUIRED FOR ALL INSTRUMENTATION CONDUIT.
- RIGID METAL CONDUIT REQUIRED FOR ALL ABOVE GRADE CONDUIT INSTALLATIONS. ALL BELOW GRADE PVC CONDUIT SHALL BE TRANSITIONED TO RIGID METAL CONDUIT BELOW GRADE (OR CONCRETE FLOOR) AT SWEEP/BEND PRIOR TO PASSING ABOVE GRADE/THROUGH CONCRETE AT CONCRETE.

# **KEYNOTES:**

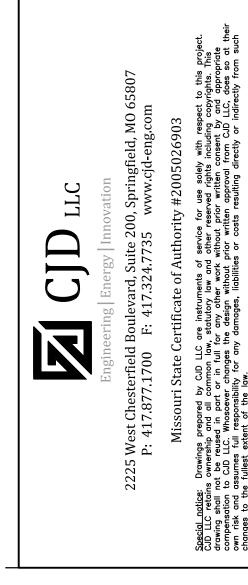
(1) NEMA 3R JUNCTION/TERMINATION AND PULLBOX WITH: HINGED DOOR COVER, RATED TERMINAL BLOCKS (DIN-RAIL MOUNTED), GROUNDING TERMINAL BLOCK; GROUNDED BACK PANEL AND PERMAGUM MATERIAL AT CONDUIT PENETRATIONS. ENCLOSURE MOUNTED ON STAINLESS STEEL OR ZINC PLATED GALVANIZED.





#### STATE OF MISSOURI MICHAEL L. PARSON, **GOVERNOR**





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STATE OF MISSOURI DIVISION OF STATE PARKS MISSOURI DEPARTMENT OF NATURAL RESOURCES

ONONDAGA CAVE STATE PARK WATER & WASTEWATER **IMPROVEMENTS** 

LEASBURG, MISSOURI

PROJECT # X2306-02 5215

FACILITY # 7815215010 7815215011 7815215044

REVISION: <u>ISSUED TO MD</u>NR DATE: <u>06-17-24</u> REVISION: <u>ISSUED FOR BI</u>DDING DATE: 08-16-24 REVISION:

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DATE:

CAD DWG FILE:MEP-301.DWG DRAWN BY: CJH CHECKED BY: CF DESIGNED BY: CJD

SHEET TITLE:

ELECTRICAL PROCESS ONE LINES

SHEET NUMBER:

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