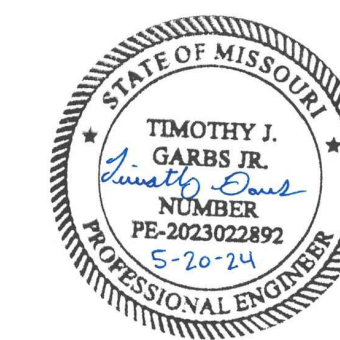


WASTEWATER SPRAY IRRIGATION SYSTEM ST. FRANCOIS STATE PARK BONNE TERRE, MISSOURI

ST. FRANCOIS STATE PARK
ST. FRANCIOS COUNTY, MO

ASSET NUMBER: 7815216018

SITE NUMBER: 5216



Timothy J. Garbs No. PE-2023022892
Professional Engineer
State of Missouri
Cochran

OWNER: STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR
DEPARTMENT OF
NATURAL RESOURCES
MISSOURI STATE PARKS

PROJECT
MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

PROJECT NUMBER: X2310-02

CIVIL ENGINEER
COCHRAN ENGINEERING
TIMOTHY GARBS, P.E.
530A E. INDEPENDENCE DR.
UNION, MO 63084
PHONE: (636)-584-0540

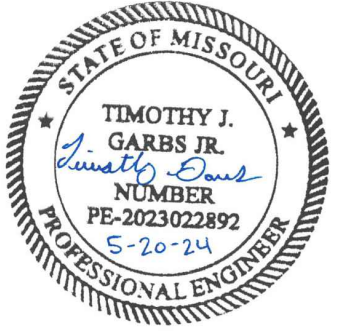
SHEET INDEX

G-001 - COVER SHEET
C-101 - GENERAL NOTES
C-102 - TOPOGRAPHIC SURVEY/ DEMOLITION PLAN
C-103 - LAGOON SLUDGE SURVEY
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C-108 - EROSION & SEDIMENT CONTROL PLAN 1
C-109 - EROSION & SEDIMENT CONTROL DETAIL SHEET
C-110 - LAGOON PLAN & PROFILE
C-111 - FORCEMAIN #1 PLAN AND PROFILE
C-112 - FORCEMAIN #1 PLAN AND PROFILE
C-113 - DETAIL SHEET
C-114 - DETAIL SHEET
C-115 - DETAIL SHEET
C-116 - DETAIL SHEET
C-117 - CONTROL PANEL PLAN

SHEET NUMBER:

G-001

1 OF 18 SHEETS
05/20/24



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5304 E. Independence Dr.
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Missouri State Certificate of Authority Numbers:
Survey : 000380
Engineering : 001655
Architecture: 2002014240

OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES
MANAGEMENT,
DESIGN AND CONSTRUCTION

DEPARTMENT OF
NATURAL RESOURCES
MISSOURI STATE PARKS

WASTEWATER SPRAY
IRRIGATION SYSTEM

8920 US HWY 67 NORTH
BONNE TERRE, MISSOURI 63628

PROJECT # X2310-02
SITE # 5216
ASSET # 7815216018

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____

ISSUE DATE: 05/20/24

CAD DWG FILE: X2310-GN-101
DRAWN BY: MDB
CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
GENERAL
NOTES

SHEET NUMBER:

C-101

2 OF 18 SHEETS
05/20/24

CONSTRUCTION MATERIAL NOTES

- Sanitary force main pipe shall be SDR 21, Class 200 PVC. All sanitary sewer force mains shall have a minimum 36 inches of cover below finish grade, unless otherwise indicated on the plans.
- Water lines less than 2" and smaller shall be SDR 9 PE tubing. All water lines constructed shall have a minimum of 42 inches of cover below finish grade, unless otherwise indicated on the plans.
- Discharge piping through the lift station shall be ductile iron pipe, Class 50 conforming to ANSI/AWWA C151/A21.51. All pipe and fittings material shall follow standards and specifications.
- Wet well, valve vault, and manholes exteriors shall be sealed with commercial grade water proofing sealer.
- Lagoon cells shall be lined with 60 mil minimum, reinforced geosynthetic liner system manufactured by Industrial and Environmental Concepts, Inc (IEC) or approved equal exceeding Missouri Department of Natural Resources minimum thickness of 30mm and all other requirements per 10 CSR 20-8.180(S)(A). Liner system shall include Slopestep Stairway System by IEC or approved equal system for safe ingress and egress from lagoon cells.

EROSION CONTROL NOTES

- Land disturbing activities shall not commence until approval to do so has been received by governing agencies and until all erosion control measures have been taken.
- Contractor shall assure positive drainage from buildings for all natural & paved areas.
- No land clearing or grading shall begin until all erosion control measures have been installed.
- Site grading shall not proceed until erosion control measures have been taken.
- Should construction stop for longer than 14 days, the site shall be seeded as specified by temporary seeding mix.
- Maintain erosion control measures after each rain and at least once a week.
- This plan shall not be considered all inclusive as the contractor shall take all necessary precautions to prevent soil sediment from leaving the site.
- Contractor shall comply with all state ordinances that apply.
- Additional erosion and sediment control measures will be installed if deemed necessary by on site inspection.
- If installation of storm drainage system should be interrupted by weather or nightfall, the pipe ends shall be covered with filter fabric.
- Contractor shall be responsible to take whatever means necessary to establish permanent soil stabilization.
- The contractor is responsible for keeping stormwater run-off and siltation under control during construction.
- Contractor shall maintain the site in a well-drained manner in order to assume the shortest possible drying time after each rainfall. This will mean that pumping of standing water in low areas on the site will most likely be required during construction.
- It shall be the contractor's responsibility to keep mud and silt on site off of streets.

Rock Preparation and Compaction:

Prior to fill placement, vegetation should be stripped and sloped areas should be benched. The fill materials placed at the site will consist primarily of a rock/soil mixture and blasted rock generated from the site. The shot rock fill materials should be well graded with particle sizes ranging from sand and silt to boulders less than 18 inches in diameter. Boulders larger than 18 inches in diameter should be separated and broke using a track hoe with a breaker or by other means or the boulders should be placed in non-critical fill areas, as approved by a soil technician. We recommend that boulders larger than 18 inches not be placed in areas where they will be encountered when excavating to install utilities or construct basements, or within 2 or 3 feet of the street subgrade level. Where the larger boulders are placed, care should be taken to ensure that voids are not present around them. It may be necessary to place gravel to in fill or "choke off" voids around the larger boulders.

Ripped rock and shot rock should be placed in horizontal lifts not exceeding 18 inches in loose thickness and compacted by a minimum of five passes of a vibratory roller weighing at least 10 tons. Proper compaction may not be achieved without vibratory roller. Due to the varying gradation of fill materials, density tests will generally be considered inappropriate to determine the quality of the fill. Therefore, performance criteria will be used to evaluate the fill. This involves observing the placement of each lift of fill and the effects of the compaction equipment prior to placing additional fill.

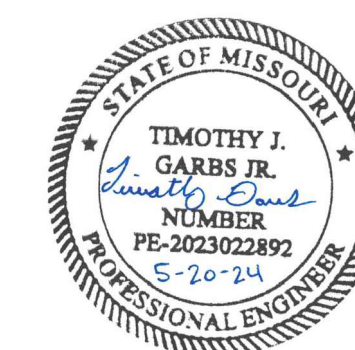
Soil Preparation and Compaction:

Remove all stumps, bushes, trees, weeds, roots and other surface obstructions from the site. Contractor to strip all topsoil from the entire area to be graded. After the removal of all foreign organic matter, and after stripping of topsoil, the entire surface to be filled, or areas that are cut to subgrade shall be scarified to a minimum depth of 12 inches and the compacted by proof rolling with suitable compaction equipment weighing not less than 400 psi based on the contact area of one row of feet, or pneumatic-tired roller of equivalent compaction characteristics.

The maximum thickness of fill shall be in lifts not to exceed 8 inches. The proof rolling and the fill compaction operations under the building and paved areas shall produce at least 95% of the Standard Proctor Maximum Dry Density Test (ASTM D-698). Any soft areas encountered during proof rolling shall be undercut and replaced with a properly compacted fill. The compaction of the fill shall be tested during placement by a qualified soil technician to determine if the proper densification is taking place. All fill used on the site should consist of low plasticity soils as approved by the soils engineer. After proof rolling, no water should be allowed to pond on the surface. The earthwork for all building foundations and slabs shall be in accordance with architectural building plans and specifications. Compaction equipment shall be operating of the site at all times during filling operations.

GENERAL PLAN NOTES

- The sitework on this project shall meet or exceed the Missouri Department of Natural Resources standards and specifications in addition to all FMDC plans and specifications.
- Bearings referenced to grid north of the Missouri Coordinate System OF 1983, East Zone per GPS Observations utilizing THE MDDOT VRS RTK Network and Monuments for Station "LEAD".
- Project Benchmark is GRS LEAD. ELEV. = 827.82 (NAVD 88).
- Flood Zones: Portions of this property lie within "ZONE X"(UNSHADED), areas determined to be outside the 0.2% annual chance floodplain and "ZONE A" determined to be inside the 1% chance flood area (100 PER YEAR) per Flood Insurance Rate Map for St. Francois County, Missouri & Incorporated Areas, per Panel 135 OF 450, Community Panel Number 29187C01350, effective date June 16, 2011
- The contractor is encouraged to visit the site prior to submitting their bid for this project.
- This property is in accordance with generally accepted construction practices, the Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours, Contractor will be responsible for providing and maintaining all barricades, warning signs, flashing lights and traffic control devices during construction. Contractor to comply with all OSHA regulation requirements and safety meeting requirement.
- All survey monuments disturbed during construction shall be replaced by a licensed land surveyor licensed in the state in which this project is located at the Contractor's expense.
- Underground structures, facilities and utilities have been plotted from available surveys and records. Therefore, their locations must be considered approximate only. There may be others, the existence of which is presently not known.
- No investigation has been performed by Cochran regarding hazardous waste or utilities affecting the tract shown hereon. Cochran performed a soils test to look at soil absorption rates.
- Contractor to contact One Call at 811 for telephone, electric, gas, water and cable companies to have underground utilities located on this site and adjacent to this site prior to doing any excavating.
- The Contractor is specifically cautioned that the location and/or elevation of existing utilities as shown on these plans is based on records of the various utility companies and, where possible, measurements taken in the field. The information is not to be relied on as being exact or complete. The Contractor must call the appropriate utility company to request exact field location of utilities. It shall be the responsibility of the Contractor to relocate all existing utilities, which conflict with the new improvements shown on plans.
- All trenching, pipe laying, and backfilling shall be in accordance with Federal OSHA Regulations.
- Contractor shall coordinate adjustments to existing utilities with appropriate utility company as work progresses.
- Contractor shall coordinate the scheduling and location of the demolition and installation of all utilities, including stakeout, conduit required, trenching required, etc. Contractor shall contact each utility provider with at least 30 days advance notice of any work to be done.
- If any existing structures to remain are damaged during construction it shall be the Contractor's responsibility to repair and/or replace the existing structure as necessary to return it to existing conditions or better.
- All trenches under paved areas shall be backfilled with granular material and compacted to meet compaction requirements for the road/parking lot.
- Contractor shall provide a minimum of 18" of clearance between sanitary sewer and waterlines and a minimum of 18" of clearance between storm sewers and waterlines. This may mean that lowering of waterlines may be necessary. State Park/FMDC must approve any lowering of waterlines prior to work.
- Precast structures may be used if approved by designer.
- Sanitary sewer plan information depicts pipe lengths and grades calculated from the center of all structures.
- All unsurfaced areas are to receive 4 inches of topsoil. Contractor to seed, mulch, fertilize, and maintain all areas outside of paved areas that were disturbed during construction until an acceptable stand of grass is established. The Contractor shall be responsible to take whatever means necessary to establish permanent soil stabilization.
- Existing grade contours shown at 1 foot intervals. New grade contours shown at 1 foot intervals.
- All cut or fill slopes shall be 3:1 or flatter unless otherwise noted.
TS = Top of structure
TG = Top of grade
- Contractor shall saw cut all curb and gutter sections, concrete medians and along pavement where new construction ties into existing areas. Contractor shall adjust and/or cut existing pavement as necessary to assure a smooth fit and continuous grade. Contractor shall maintain traffic flow and provide traffic control throughout construction.
- Contractor shall be responsible to remove any basements, wells, utility lines, foundations, cisterns, cellars, etc. on site which exist and are within the projects construction area.
- All demolition, disposal, etc. fees are to be paid by the Contractor.
- Storm sewer and sanitary sewer shall be constructed from the lowest point to the highest point. (Downstream to Upstream)



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530A E. Independence Dr.
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Missouri State Certificate
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Engineering : 001655
Architecture : 2002014240

OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES
MANAGEMENT,
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DEPARTMENT OF
NATURAL RESOURCES
MISSOURI STATE PARKS

WASTEWATER SPRAY
IRRIGATION SYSTEM

8920 US HWY 67 NORTH
BONNE TERRE, MISSOURI 63628

PROJECT # X2310-02
SITE # 5216
ASSET # 7815216018

REVISION: _____
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ISSUE DATE: 05/20/24

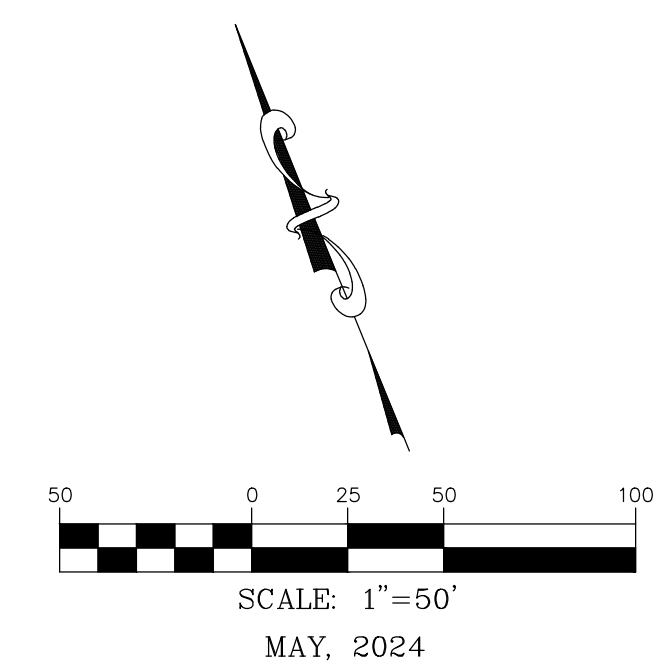
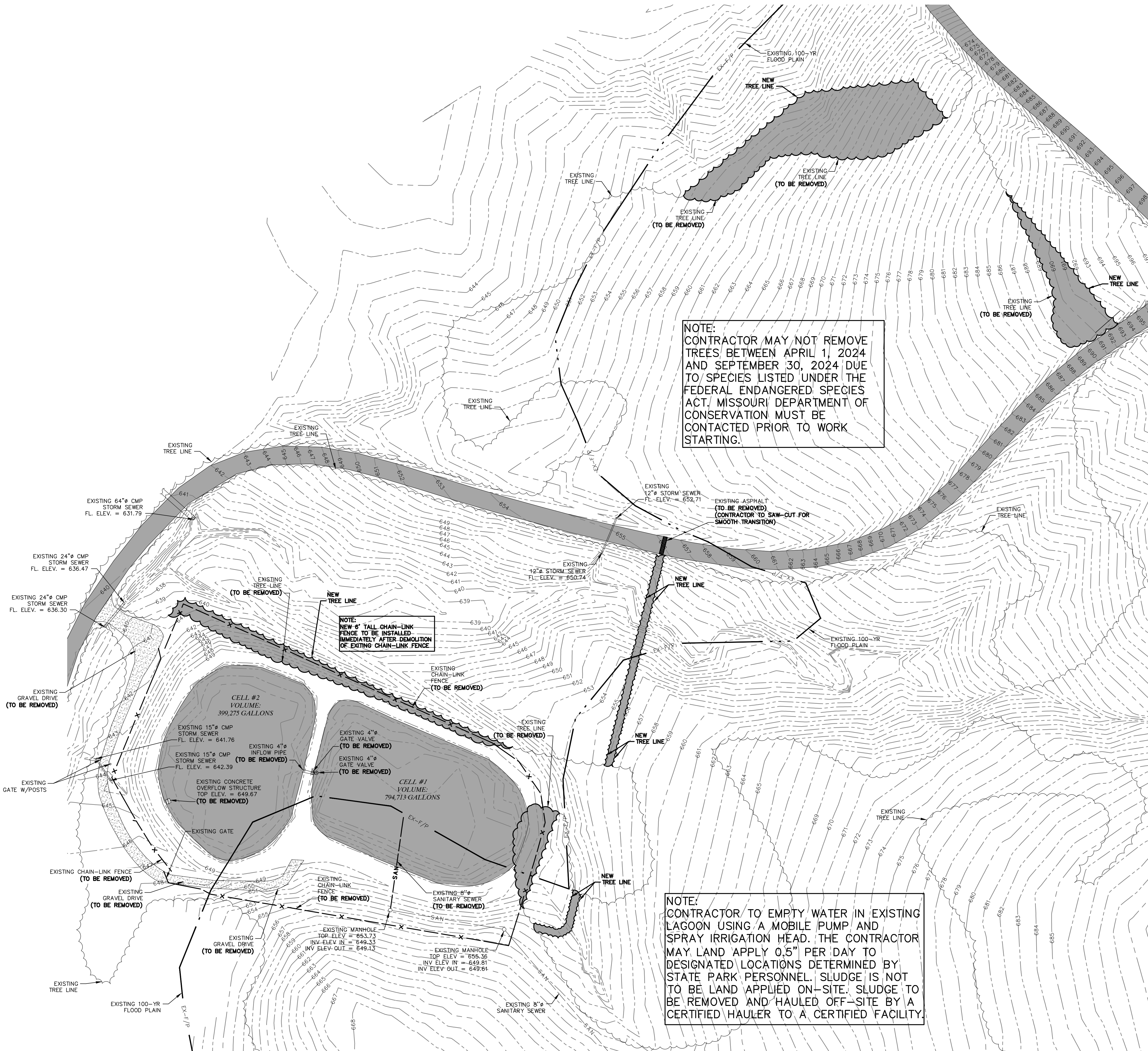
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DRAWN BY: MDB
CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
DEMOLITION PLAN/
TOPOGRAPHIC SURVEY

SHEET NUMBER:

C-102

3 OF 18 SHEETS
05/20/24



LEGEND

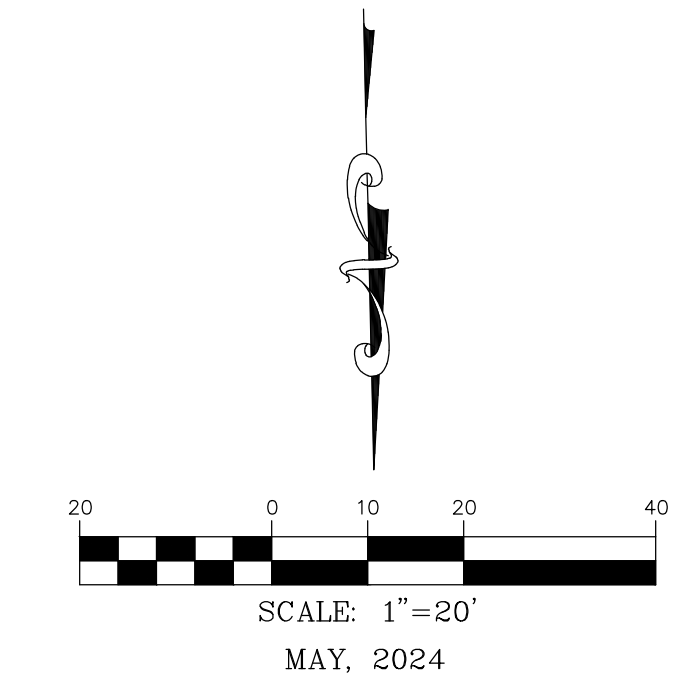
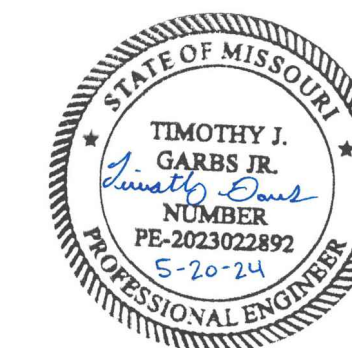
INDEX CONTOUR	---	500-
INTERMEDIATE CONTOUR	---	
SANITARY SEWER	---	SAN
SANITARY MANHOLE	○	
STORM SEWER	---	SS
TREE	○	
ASPHALT PAVEMENT	▬	
TREE LINE	~	

- NOTES:
1. BEARINGS REFERENCED TO GRID NORTH OF THE MISSOURI COORDINATE SYSTEM OF 1983. EAST ZONE AND ELEVATIONS REFERENCED TO NAVD 1988 PER GPS OBSERVATIONS UTILIZING THE MODOT VRS RTK NETWORK AND GRS MONUMENT "LEAD"
 2. UNDERGROUND STRUCTURES, FACILITIES AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE SURVEYS AND RECORDS. THEREFORE, THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY NOT KNOWN.
 3. PORTIONS OF THIS PROPERTY LIE WITHIN "ZONE X"(UNSHADED), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN AND "ZONE A" DETERMINED TO BE INSIDE THE 1% CHANCE FLOOD AREA (100 PER YEAR) PER FLOOD INSURANCE RATE MAP FOR ST. FRANCOIS COUNTY, MISSOURI & INCORPORATED AREAS, PER PANEL 135 OF 450, COMMUNITY PANEL NUMBER 29187C01350, EFFECTIVE DATE JUNE 16, 2011
 4. PROJECT BENCHMARK IS GRS LEAD ELEV. = 827.82
 5. SITE BENCHMARK: IS A P.K. NAIL LOCATED AT THE SOUTHEAST OF THE EXISTING ACCESSIBLE PARKING SPACE ELEV. = 640.43 (NAVD 88)
 6. FIELDWORK WAS PERFORMED BY J.L.W. MAY 2, 2023

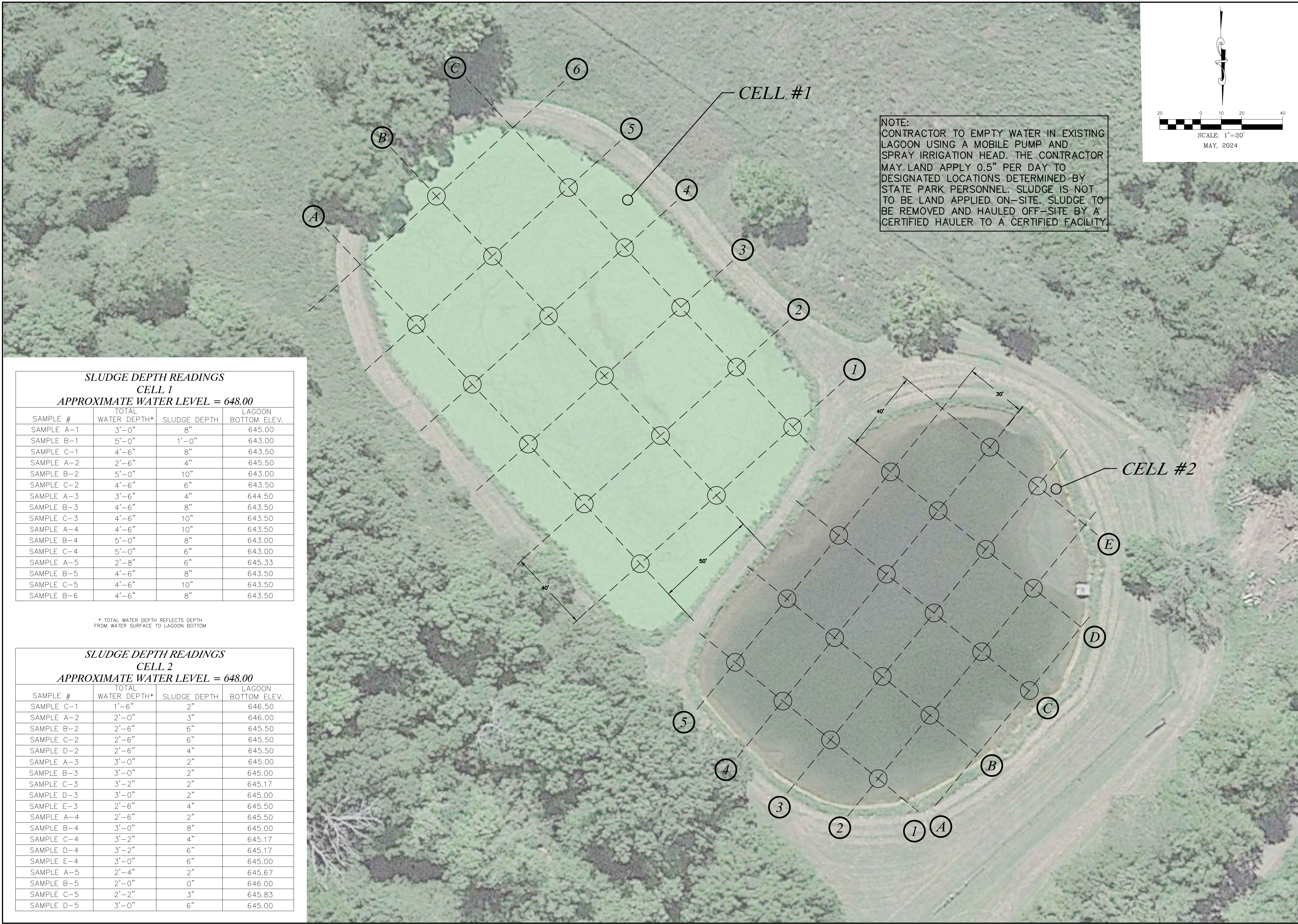
NOTE:
CONTRACTOR MAY NOT REMOVE TREES BETWEEN APRIL 1, 2024 AND SEPTEMBER 30, 2024 DUE TO SPECIES LISTED UNDER THE FEDERAL ENDANGERED SPECIES ACT. MISSOURI DEPARTMENT OF CONSERVATION MUST BE CONTACTED PRIOR TO WORK STARTING.

NOTE:
NEW 6' TALL CHAIN-LINK FENCE TO BE INSTALLED IMMEDIATELY AFTER DEMOLITION OF EXISTING CHAIN-LINK FENCE.

NOTE:
CONTRACTOR TO EMPTY WATER IN EXISTING LAAGOON USING A MOBILE PUMP AND SPRAY IRRIGATION HEAD. THE CONTRACTOR MAY LAND APPLY 0.5" PER DAY TO DESIGNATED LOCATIONS DETERMINED BY STATE PARK PERSONNEL. SLUDGE IS NOT TO BE LAND APPLIED ON-SITE. SLUDGE TO BE REMOVED AND HAULED OFF-SITE BY A CERTIFIED HAULER TO A CERTIFIED FACILITY.



NOTE:
CONTRACTOR TO EMPTY WATER IN EXISTING LAGOON USING A MOBILE PUMP AND SPRAY IRRIGATION HEAD. THE CONTRACTOR MAY LAND APPLY 0.5" PER DAY TO DESIGNATED LOCATIONS DETERMINED BY STATE PARK PERSONNEL. SLUDGE IS NOT TO BE LAND APPLIED ON-SITE. SLUDGE TO BE REMOVED AND HAULED OFF-SITE BY A CERTIFIED HAULER TO A CERTIFIED FACILITY.



**SLUDGE DEPTH READINGS
CELL 1
APPROXIMATE WATER LEVEL = 648.00**

SAMPLE #	TOTAL WATER DEPTH*	SLUDGE DEPTH	LAGOON BOTTOM ELEV.
SAMPLE A-1	3'-0"	8"	645.00
SAMPLE B-1	5'-0"	1'-0"	643.00
SAMPLE C-1	4'-6"	8"	643.50
SAMPLE A-2	2'-6"	4"	645.50
SAMPLE B-2	5'-0"	10"	643.00
SAMPLE C-2	4'-6"	6"	643.50
SAMPLE A-3	3'-6"	4"	644.50
SAMPLE B-3	4'-6"	8"	643.50
SAMPLE C-3	4'-6"	10"	643.50
SAMPLE A-4	4'-6"	10"	643.50
SAMPLE B-4	5'-0"	8"	643.00
SAMPLE C-4	5'-0"	6"	643.00
SAMPLE A-5	2'-8"	6"	645.33
SAMPLE B-5	4'-6"	8"	643.50
SAMPLE C-5	4'-6"	10"	643.50
SAMPLE B-6	4'-6"	8"	643.50

* TOTAL WATER DEPTH REFLECTS DEPTH FROM WATER SURFACE TO LAGOON BOTTOM

**SLUDGE DEPTH READINGS
CELL 2
APPROXIMATE WATER LEVEL = 648.00**

SAMPLE #	TOTAL WATER DEPTH*	SLUDGE DEPTH	LAGOON BOTTOM ELEV.
SAMPLE C-1	1'-6"	2"	646.50
SAMPLE A-2	2'-0"	3"	646.00
SAMPLE B-2	2'-6"	6"	645.50
SAMPLE C-2	2'-6"	6"	645.50
SAMPLE D-2	2'-6"	4"	645.50
SAMPLE A-3	3'-0"	2"	645.00
SAMPLE B-3	3'-0"	2"	645.00
SAMPLE C-3	3'-2"	2"	645.17
SAMPLE D-3	3'-0"	2"	645.00
SAMPLE E-3	2'-6"	4"	645.50
SAMPLE A-4	2'-6"	2"	645.50
SAMPLE B-4	3'-0"	8"	645.00
SAMPLE C-4	3'-2"	4"	645.17
SAMPLE D-4	3'-2"	6"	645.17
SAMPLE E-4	3'-0"	6"	645.00
SAMPLE A-5	2'-4"	2"	645.67
SAMPLE B-5	2'-0"	0"	646.00
SAMPLE C-5	2'-2"	3"	645.83
SAMPLE D-5	3'-0"	6"	645.00

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- Civil Engineering
- Land Surveying
- Architecture
- Site Development
- General Consulting
- Master Planning



Missouri State Certificate of Authority Numbers:
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Architecture : 2002014240

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ASSET # 7815216018

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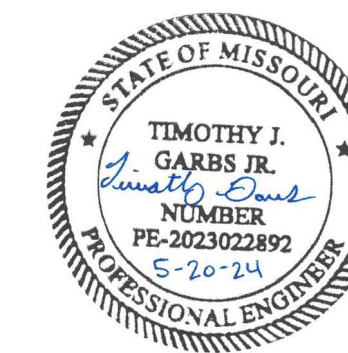
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DRAWN BY: MDB
CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
LAGOON SLUDGE SURVEY

SHEET NUMBER:

C-103

4 OF 18 SHEETS
05/20/24



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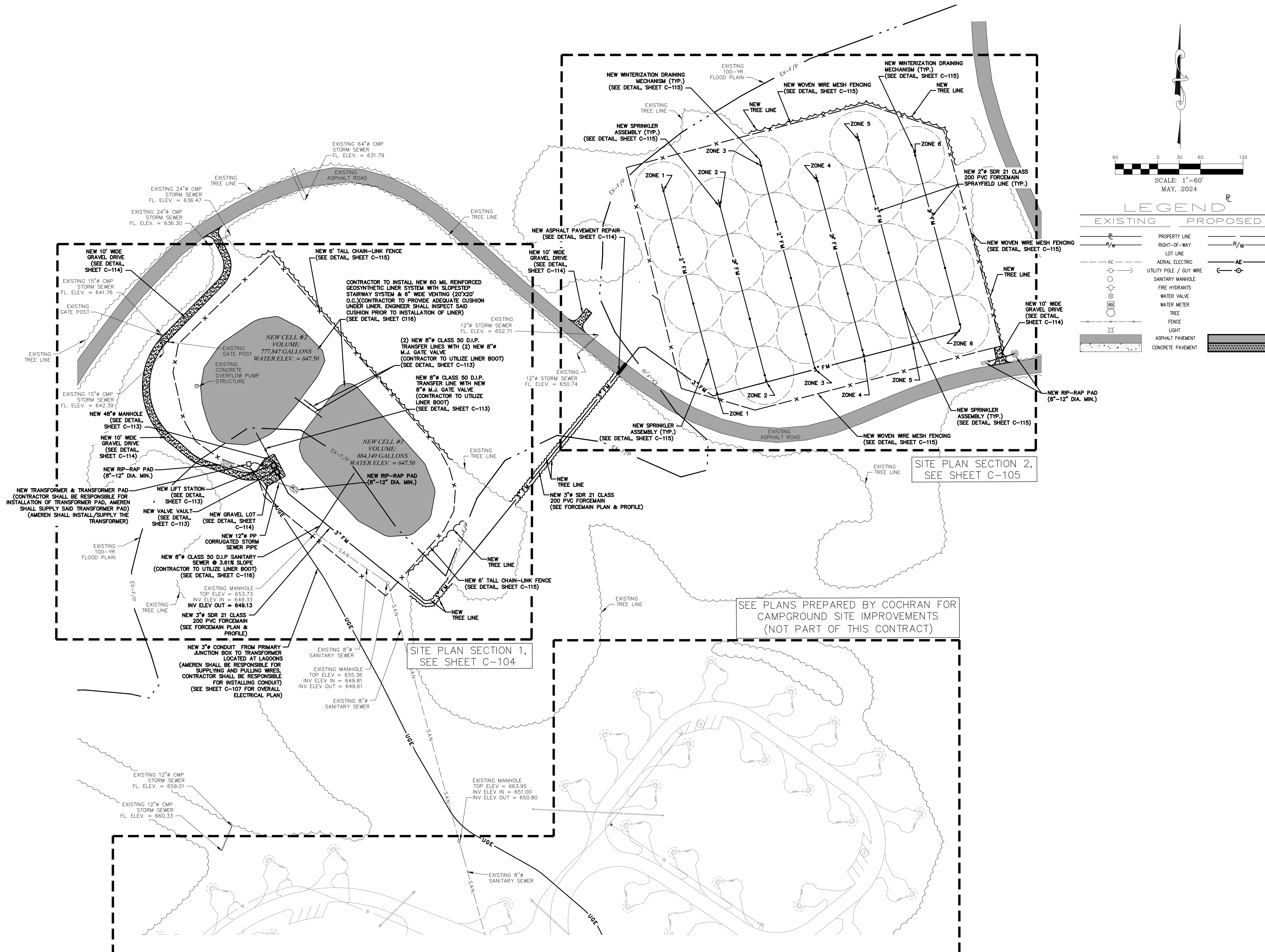
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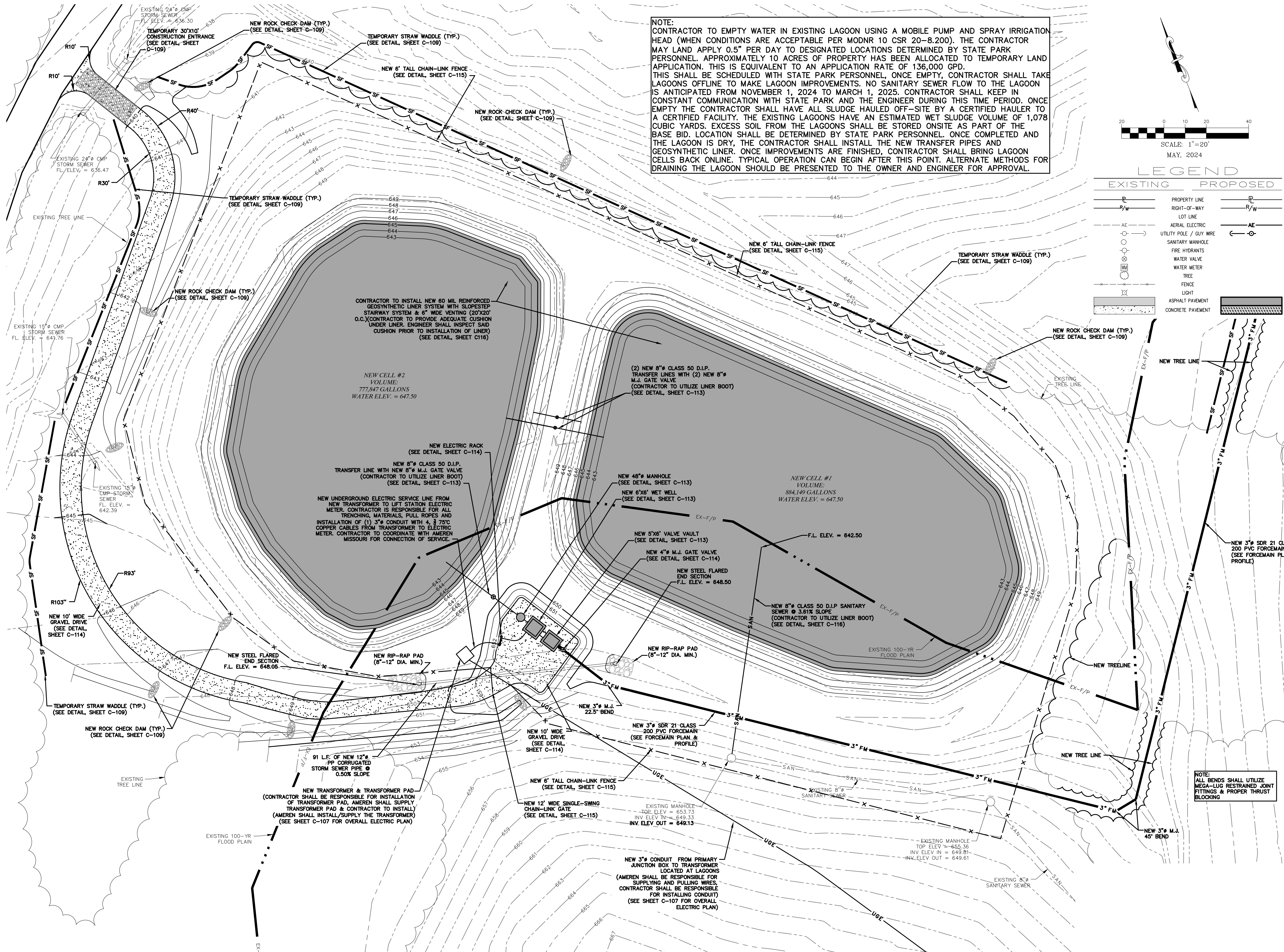
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SITE PLAN**

SHEET NUMBER:

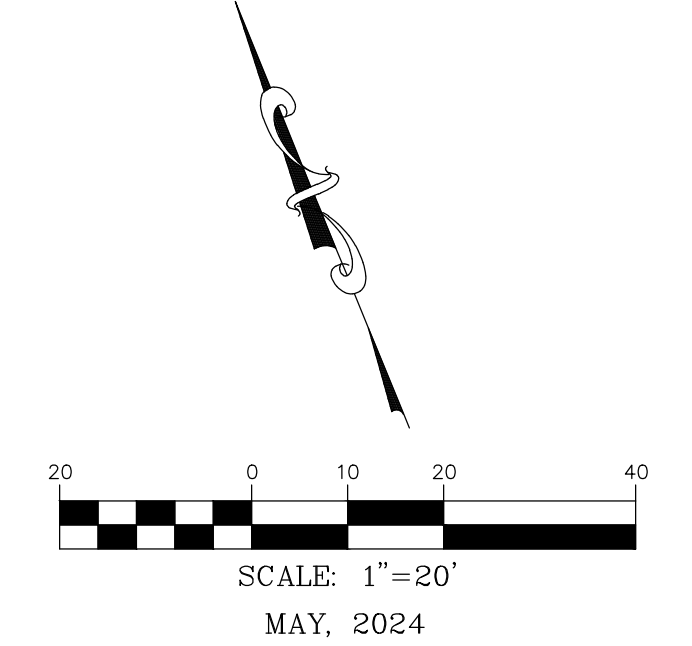
C-104

5 OF 18 SHEETS
05/20/24





NOTE:
 CONTRACTOR TO EMPTY WATER IN EXISTING LAGOON USING A MOBILE PUMP AND SPRAY IRRIGATION HEAD (WHEN CONDITIONS ARE ACCEPTABLE PER MODNR 10 CSR 20-8.200). THE CONTRACTOR MAY LAND APPLY 0.5" PER DAY TO DESIGNATED LOCATIONS DETERMINED BY STATE PARK PERSONNEL. APPROXIMATELY 10 ACRES OF PROPERTY HAS BEEN ALLOCATED TO TEMPORARY LAND APPLICATION. THIS IS EQUIVALENT TO AN APPLICATION RATE OF 136,000 GPD. THIS SHALL BE SCHEDULED WITH STATE PARK PERSONNEL, ONCE EMPTY, CONTRACTOR SHALL TAKE LAGOONS OFFLINE TO MAKE LAGOON IMPROVEMENTS. NO SANITARY SEWER FLOW TO THE LAGOON IS ANTICIPATED FROM NOVEMBER 1, 2024 TO MARCH 1, 2025. CONTRACTOR SHALL KEEP IN CONSTANT COMMUNICATION WITH STATE PARK AND THE ENGINEER DURING THIS TIME PERIOD. ONCE EMPTY THE CONTRACTOR SHALL HAVE ALL SLUDGE HAULED OFF-SITE BY A CERTIFIED HAULER TO A CERTIFIED FACILITY. THE EXISTING LAGOONS HAVE AN ESTIMATED WET SLUDGE VOLUME OF 1,078 CUBIC YARDS. EXCESS SOIL FROM THE LAGOONS SHALL BE STORED ONSITE AS PART OF THE BASE BID. LOCATION SHALL BE DETERMINED BY STATE PARK PERSONNEL. ONCE COMPLETED AND THE LAGOON IS DRY, THE CONTRACTOR SHALL INSTALL THE NEW TRANSFER PIPES AND GEOSYNTHETIC LINER. ONCE IMPROVEMENTS ARE FINISHED, CONTRACTOR SHALL BRING LAGOON CELLS BACK ONLINE. TYPICAL OPERATION CAN BEGIN AFTER THIS POINT. ALTERNATE METHODS FOR DRAINING THE LAGOON SHOULD BE PRESENTED TO THE OWNER AND ENGINEER FOR APPROVAL.



LEGEND

EXISTING	PROPOSED		
PL	PROPERTY LINE	PL	PROPERTY LINE
R/W	RIGHT-OF-WAY	R/W	RIGHT-OF-WAY
	LOT LINE		LOT LINE
AE	AERIAL ELECTRIC	AE	AERIAL ELECTRIC
	UTILITY POLE / GUY WIRE		UTILITY POLE / GUY WIRE
	SANITARY MANHOLE		SANITARY MANHOLE
	FIRE HYDRANTS		FIRE HYDRANTS
	WATER VALVE		WATER VALVE
	WATER METER		WATER METER
	TREE		TREE
	FENCE		FENCE
	LIGHT		LIGHT
	ASPHALT PAVEMENT		ASPHALT PAVEMENT
	CONCRETE PAVEMENT		CONCRETE PAVEMENT

STATE OF MISSOURI
 MICHAEL L. PARSON,
 GOVERNOR



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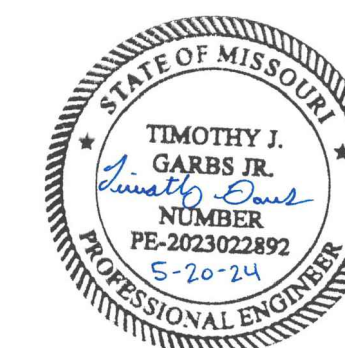
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 DATE: _____
 ISSUE DATE: 05/20/24

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 CHECKED BY: TJG
 DESIGNED BY: TJG

SHEET TITLE:
 SITE PLAN SECTION 1

SHEET NUMBER:
C-105
 6 OF 18 SHEETS
 05/20/24

NOTE:
 ALL BENDS SHALL UTILIZE
 MEGA-LUG RESTRAINED JOINT
 FITTINGS & PROPER THRUST
 BLOCKING



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DIVISION OF FACILITIES
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DESIGN AND CONSTRUCTION

DEPARTMENT OF
NATURAL RESOURCES
MISSOURI STATE PARKS

WASTEWATER SPRAY
IRRIGATION SYSTEM

8920 US HWY 67 NORTH
BONNE TERRE, MISSOURI

PROJECT # X2310-02
SITE # 5216
ASSET # 7815216018

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: 05/20/24

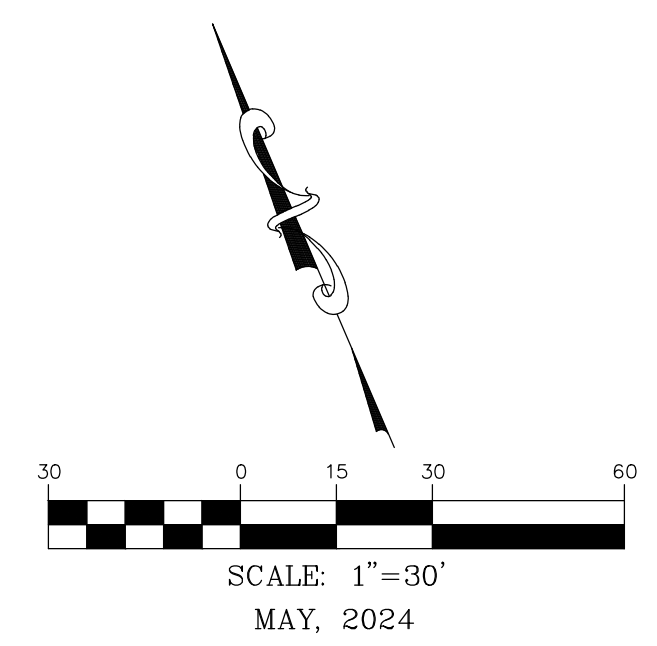
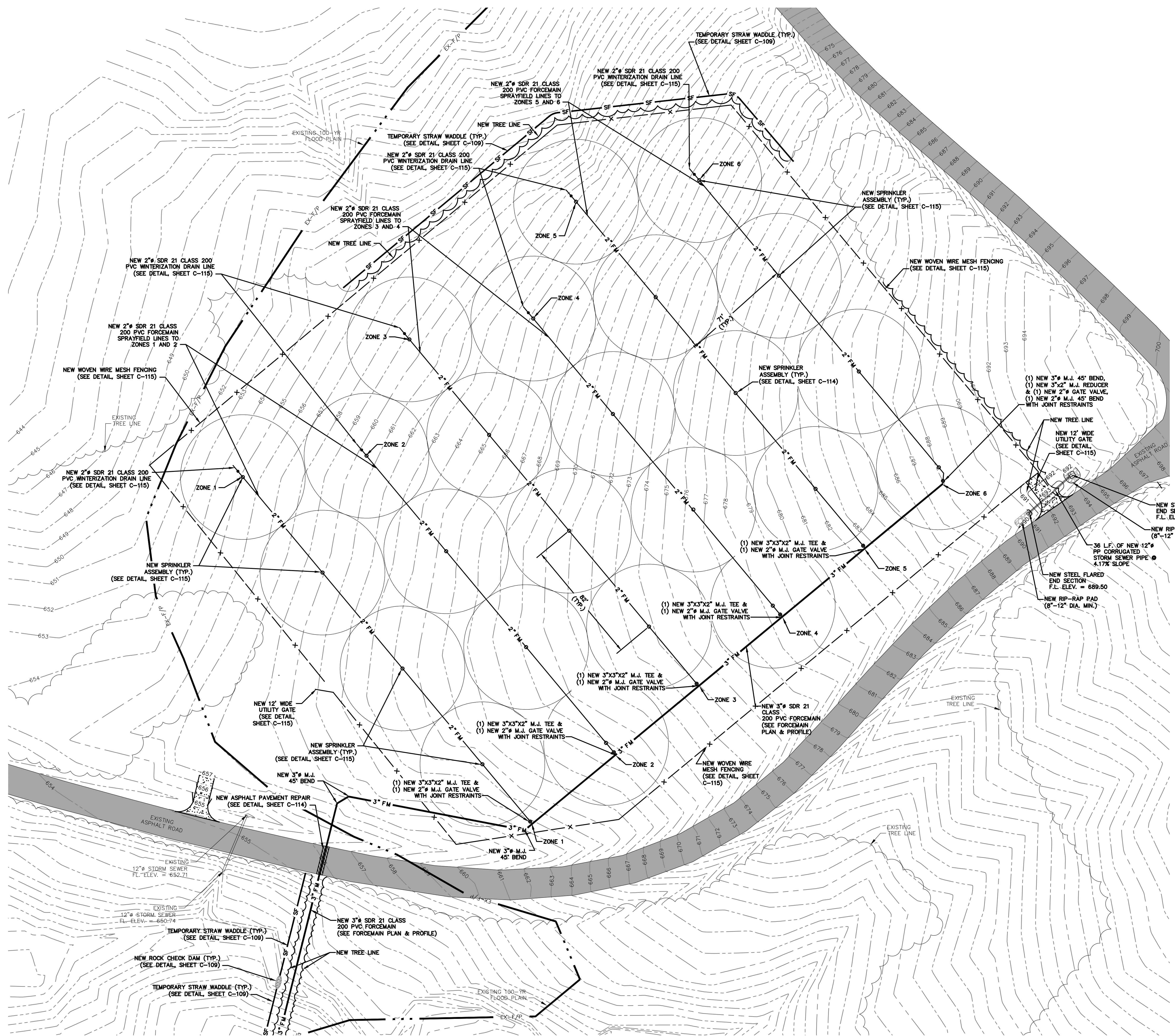
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SHEET NUMBER:

C-106

7 OF 18 SHEETS
05/20/24

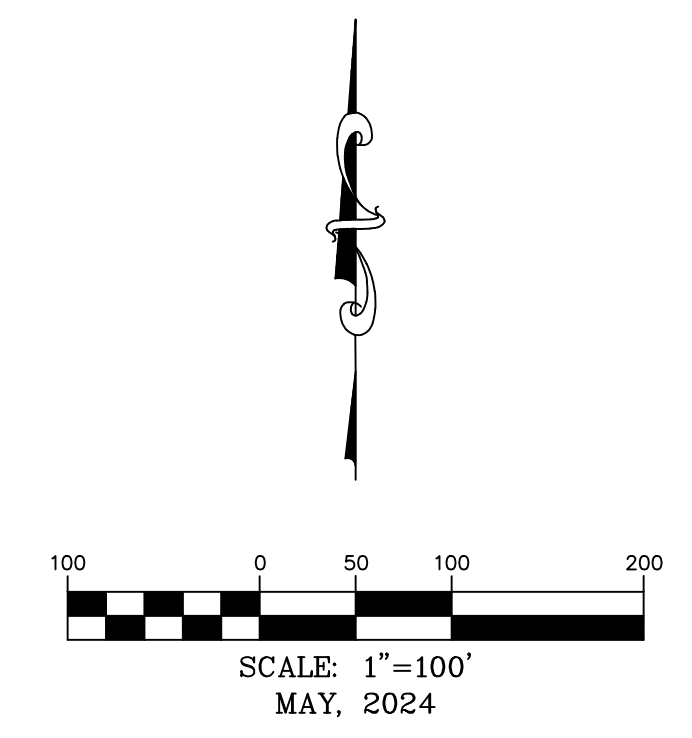


LEGEND	
EXISTING	PROPOSED

NOTE:
ALL BENDS SHALL UTILIZE
MEGA-LUC RESTRAINED JOINT
FITTINGS & PROPER
CONCRETE THRUST BLOCKING

NOTE:
PROPOSED SPRAY IRRIGATION
FIELD SHALL BE CLEARED
AND GRUBBED BEFORE
INSTALLATION OF UTILITIES.

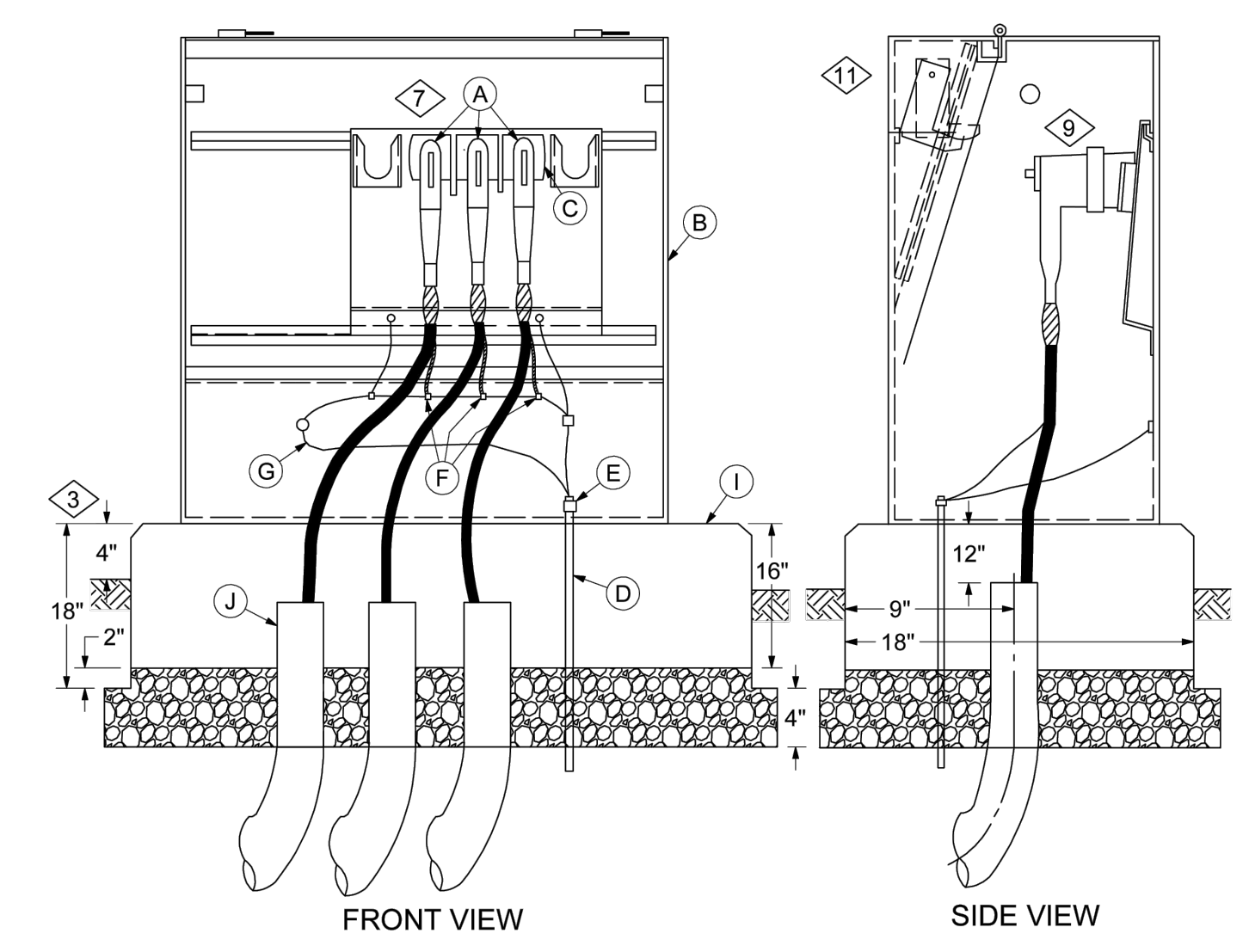
OVERALL ELECTRIC PLAN



- (P) PRIMARY JUNCTION BOX (CONTRACTOR WILL INSTALL GROUND SLEEVE. SEE DETAIL, THIS SHEET)
- (T) NEW TRANSFORMER PAD (AMEREN WILL PROVIDE PAD CONTRACTOR WILL INSTALL PAD)

Ameren UG PRIMARY EQUIPMENT
Primary Pedestal Single Phase
2-3-4 Way 200A Loadbreak

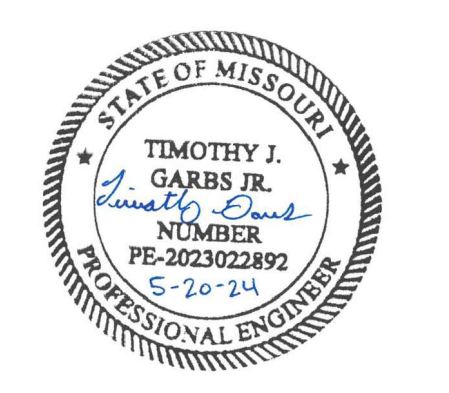
51 11 06 **
5kV, 15kV
1 of 2



- CONSTRUCTION NOTE(S):
- An initial depth of 18" shall be excavated and all loose soil shall be removed or tamped. The length and width of the hole should be sized to allow a minimum of 6" of clearance on all sides.
 - To install the 36" radius bends, an increase in the initial excavation depth will be required. After the bends have been installed, crushed stone screening shall be placed and tamped to the level shown.
 - The final depth should be adjusted to provide 4" of exposed ground sleeve pad at final grade.
 - Stabilize the ground sleeve pad over the conduits before backfilling so that there will be no shifting. Provide 12" of space between the load bearing surface of the ground sleeve pad and the end of each conduits.
 - To further stabilize the ground sleeve pad and the bends, place additional screening inside the ground sleeve pad and hand tamp in place.
 - Backfill with loose material, DO NOT backfill next to the ground sleeve pad with chunks of material or rocks. Pack loose backfill by foot tamping and do not tamp excessively close to the ground sleeve pad sides.

REV	DATE	ENG	DESCRIPTION
16	01/01/23	JMW	Converted to new format
15	08/14/17	JMW	

STATE OF MISSOURI
MICHAEL L. PARSON,
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Missouri Certificate of Authority Numbers:
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WASTEWATER SPRAY
IRRIGATION SYSTEM

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BONNE TERRE, MISSOURI 63628
ST. FRANCOIS COUNTY, MISSOURI

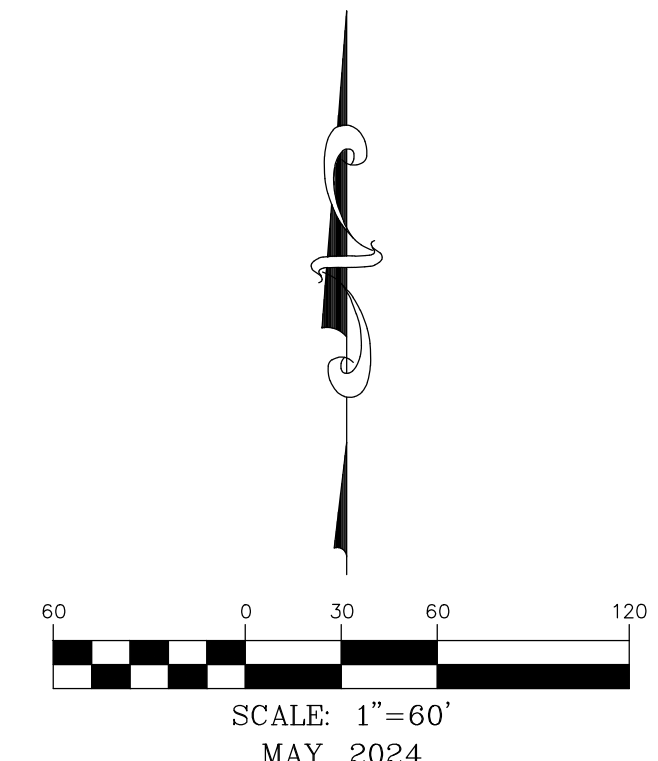
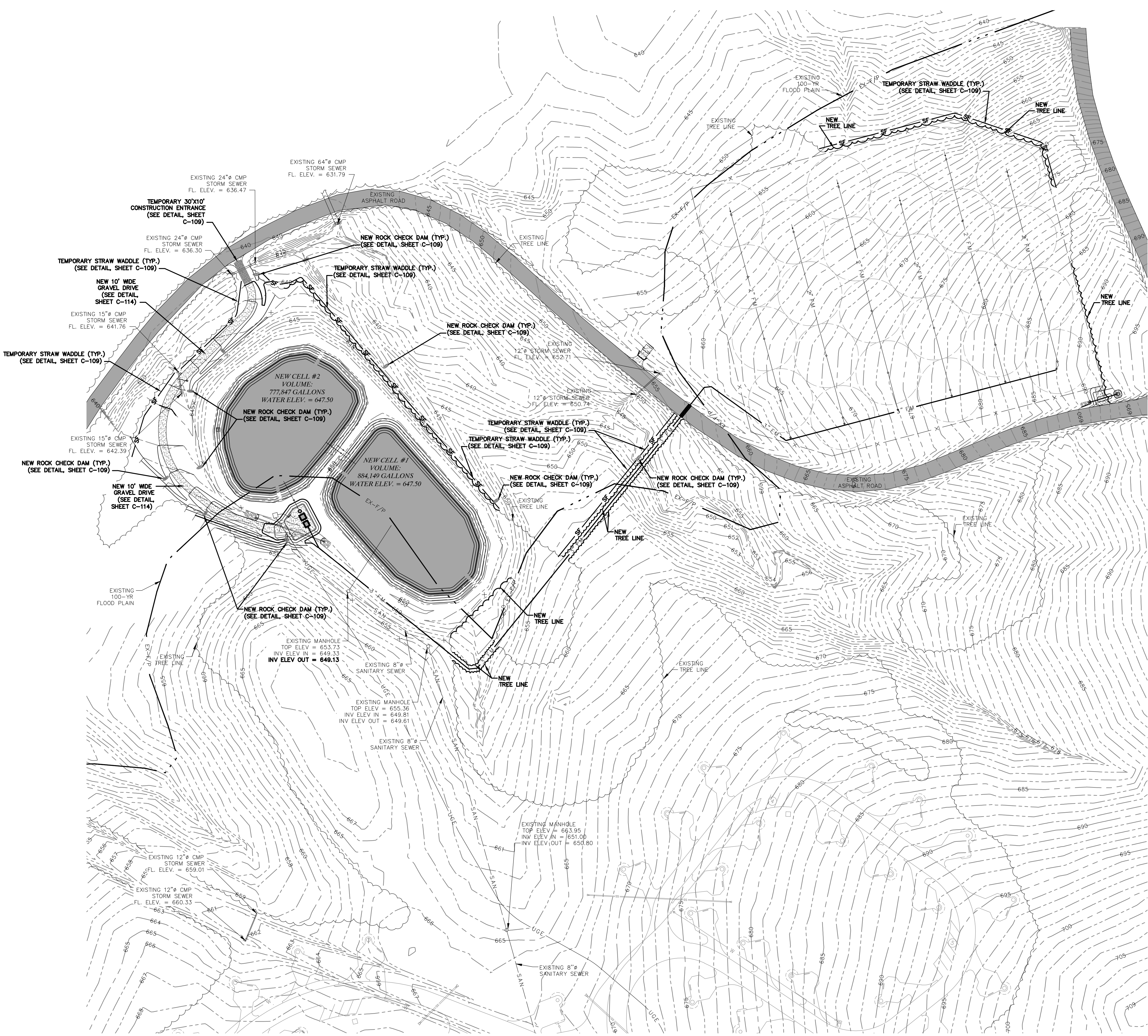
PROJECT # X2310-02
SITE # 5216
ASSET # 7815216018

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: 05/20/24

CAD DWG FILE: X2310-UPO-107
DRAWN BY: MDB
CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
**OVERALL
ELECTRIC PLAN**

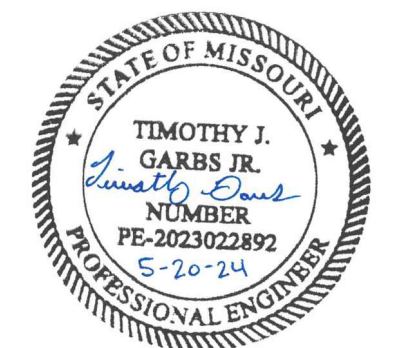
SHEET NUMBER:
C-107
8 OF 18 SHEETS
05/20/24



LEGEND

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MISSOURI STATE PARKS

WASTEWATER SPRAY
IRRIGATION SYSTEM

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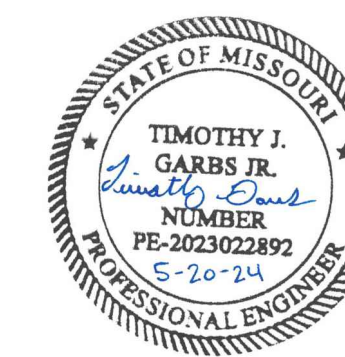
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SITE # 5216
ASSET # 7815216018

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: 05/20/24

CAD DWG FILE: X2310-ES-108
DRAWN BY: MDB
CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
EROSION & SEDIMENT
CONTROL PLAN 1

SHEET NUMBER:
C-108
9 OF 18 SHEETS
05/20/24



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WASTEWATER SPRAY
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SITE # 5216
ASSET # 7815216018

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____

ISSUE DATE: 05/20/24

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CHECKED BY: TJG
DESIGNED BY: TJG

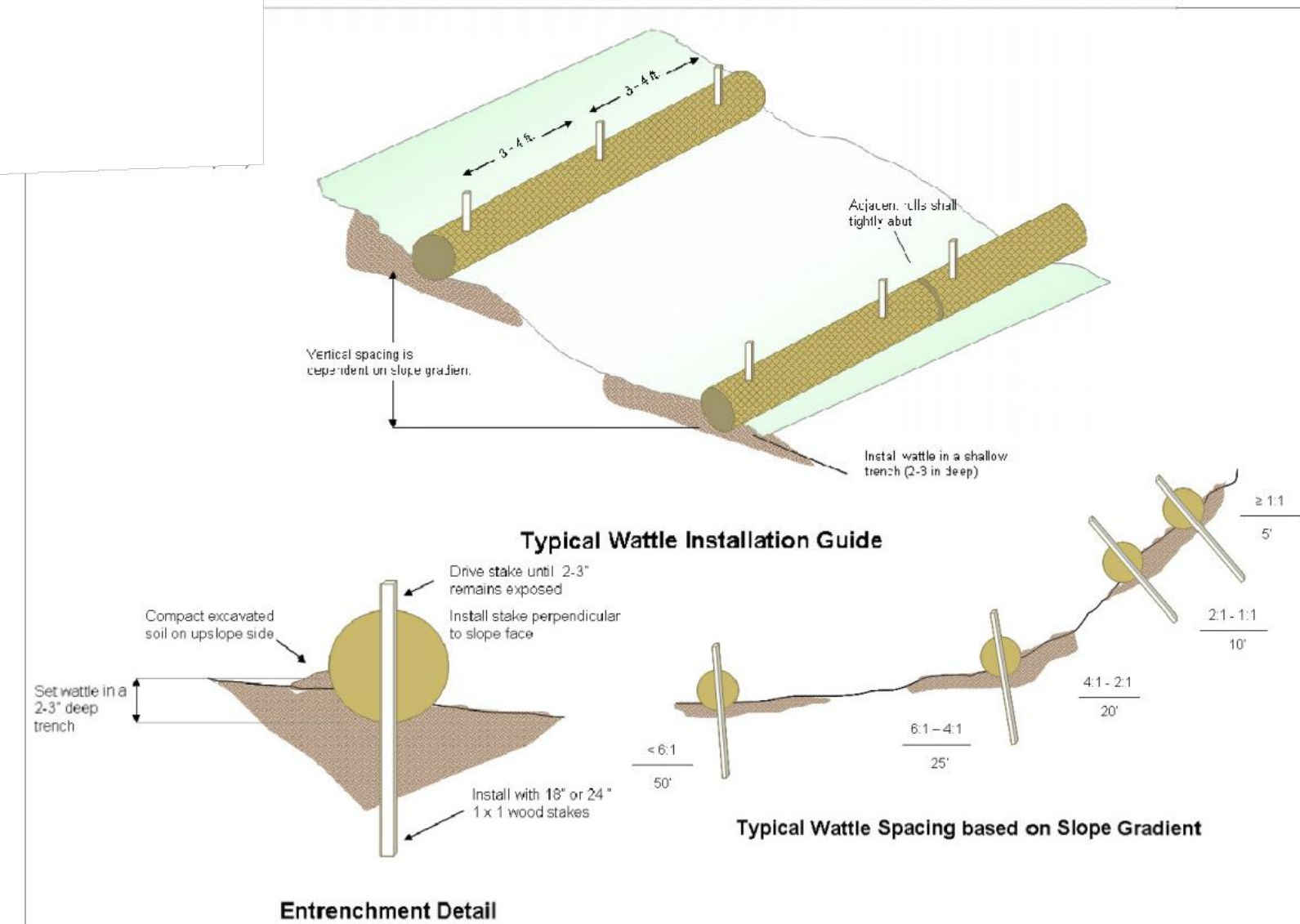
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EROSION & SEDIMENT CONTROL
DETAIL SHEET

SHEET NUMBER:

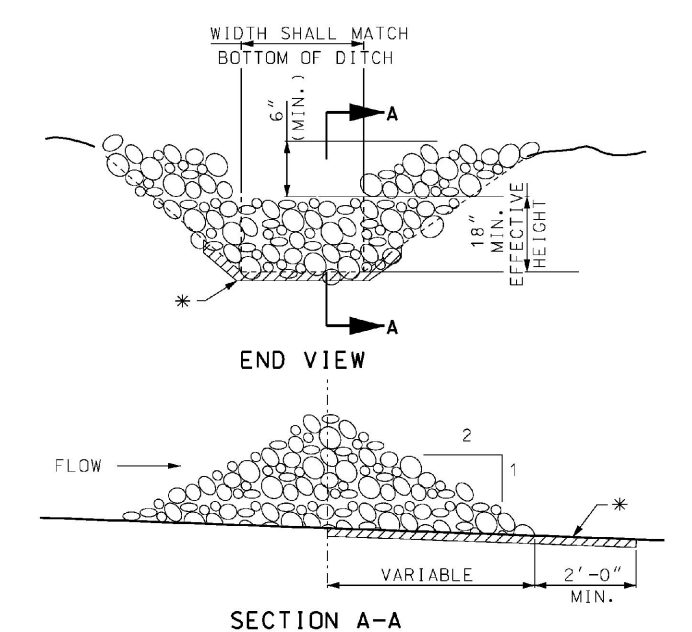
C-109

10 OF 18 SHEETS
05/20/24

Straw Wattle Installation Guide



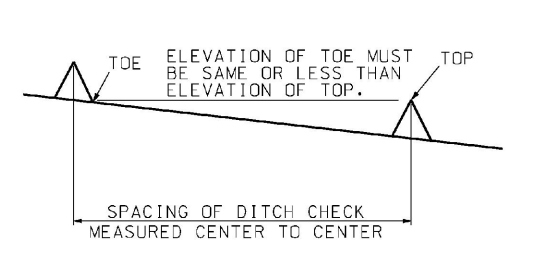
ROCK DITCH CHECK



NOTE:
ROCK DITCH CHECK IN THE CLEAR ZONE SHALL BE REMOVED OR LEVELED (IF ALLOWABLE) AFTER THE VEGETATION HAS SUFFICIENTLY MATURED TO PROTECT THE DITCH OR SWALE.

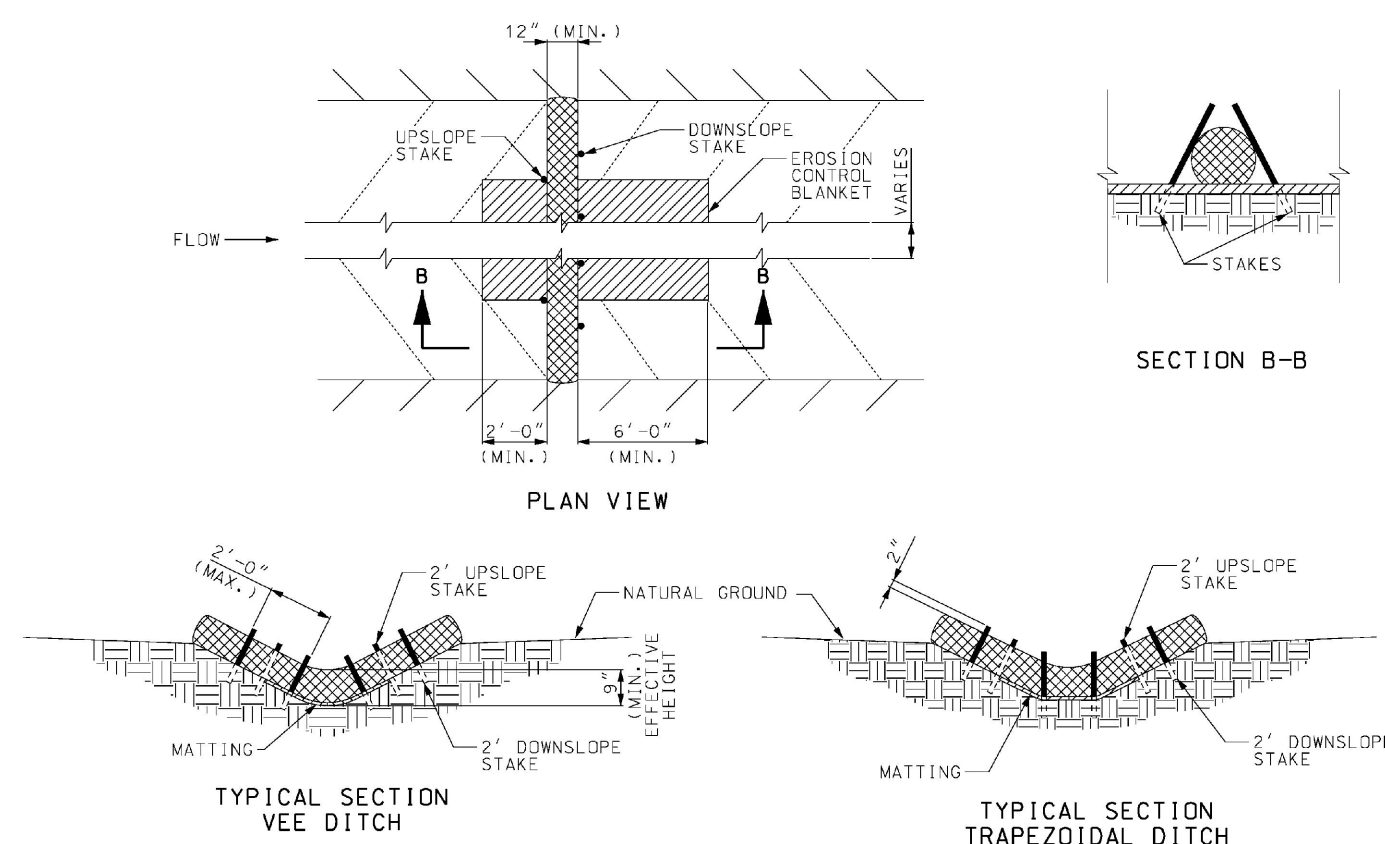
EXAMPLE
DITCH CHECK SPACING
FOR STANDARD HEIGHTS

DITCH SLOPE %	SPACING FOR 9" EFF. HEIGHT	SPACING FOR 18" EFF. HEIGHT
0.5	150	300
1.0	75	150
1.5	50	100
2.0	37	75
2.5	30	60
3.0	25	50
3.5	21	43
4.0	18	38
4.5	16	33
5.0	15	30
5.5	13	27
6.0	12	25
6.5	11	23
7.0	10	21
7.5	10	20
8.0	9	19
8.5	9	18
9.0	8	17
9.5	8	16
10.0	7	15



MINIMUM DITCH CHECK SPACING

ALTERNATE DITCH CHECK



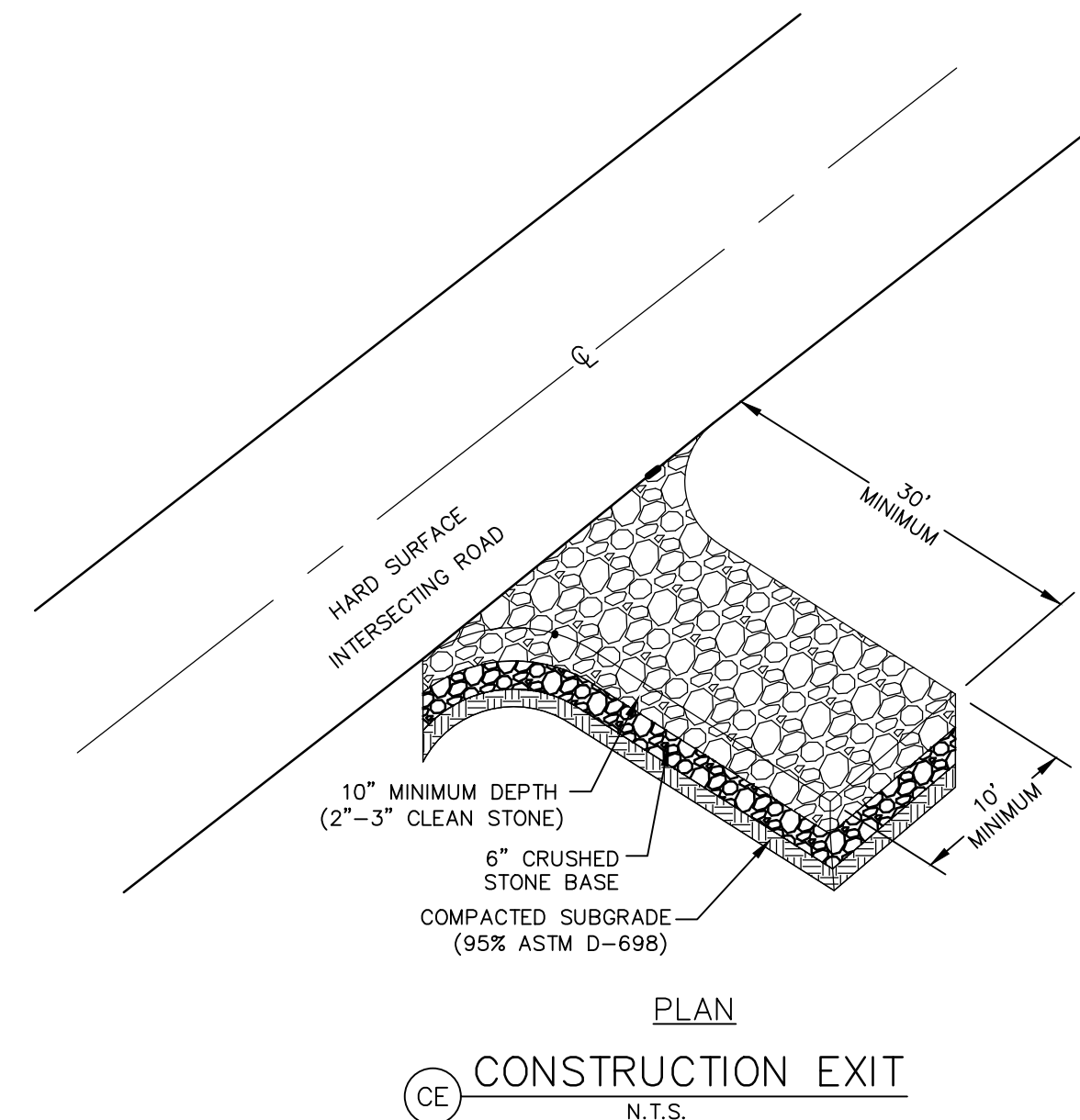
NOTES:
USE MINIMUM 1/2 IN. DIAMETER LOG/SOCK.
USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.
INSTALL LOG/SOCK TO A HEIGHT IN DITCH SO FLOW WILL NOT WASH AROUND LOG/SOCK AND SCOUR DITCH SLOPES OR AS DIRECTED BY ENGINEER.
INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE LOG/SOCK TO BOTTOM OF DITCH.
EROSION CONTROL BLANKET SHALL BE ANCHORED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

GENERAL NOTES:
OTHER PROPRIETARY DITCH CHECKS MAY BE SUBSTITUTED IN ACCORDANCE WITH SEC 806 OR AS DIRECTED BY THE ENGINEER.
INSTALLATION OF PROPRIETARY DITCH CHECKS SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.

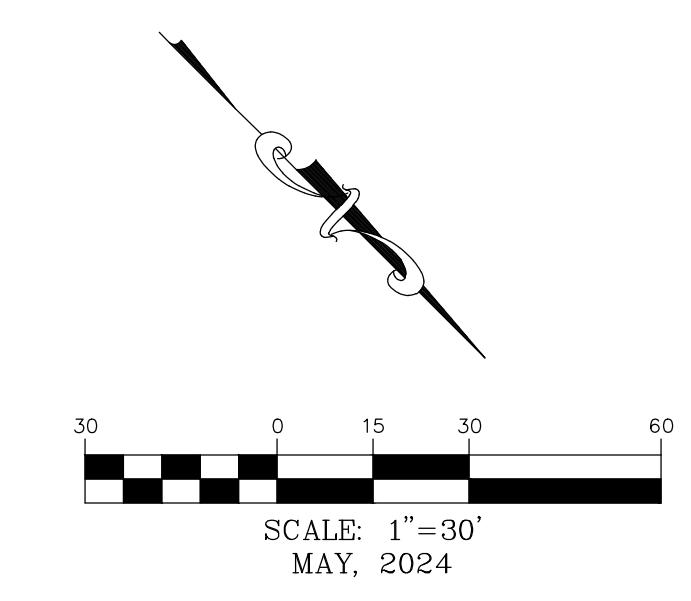
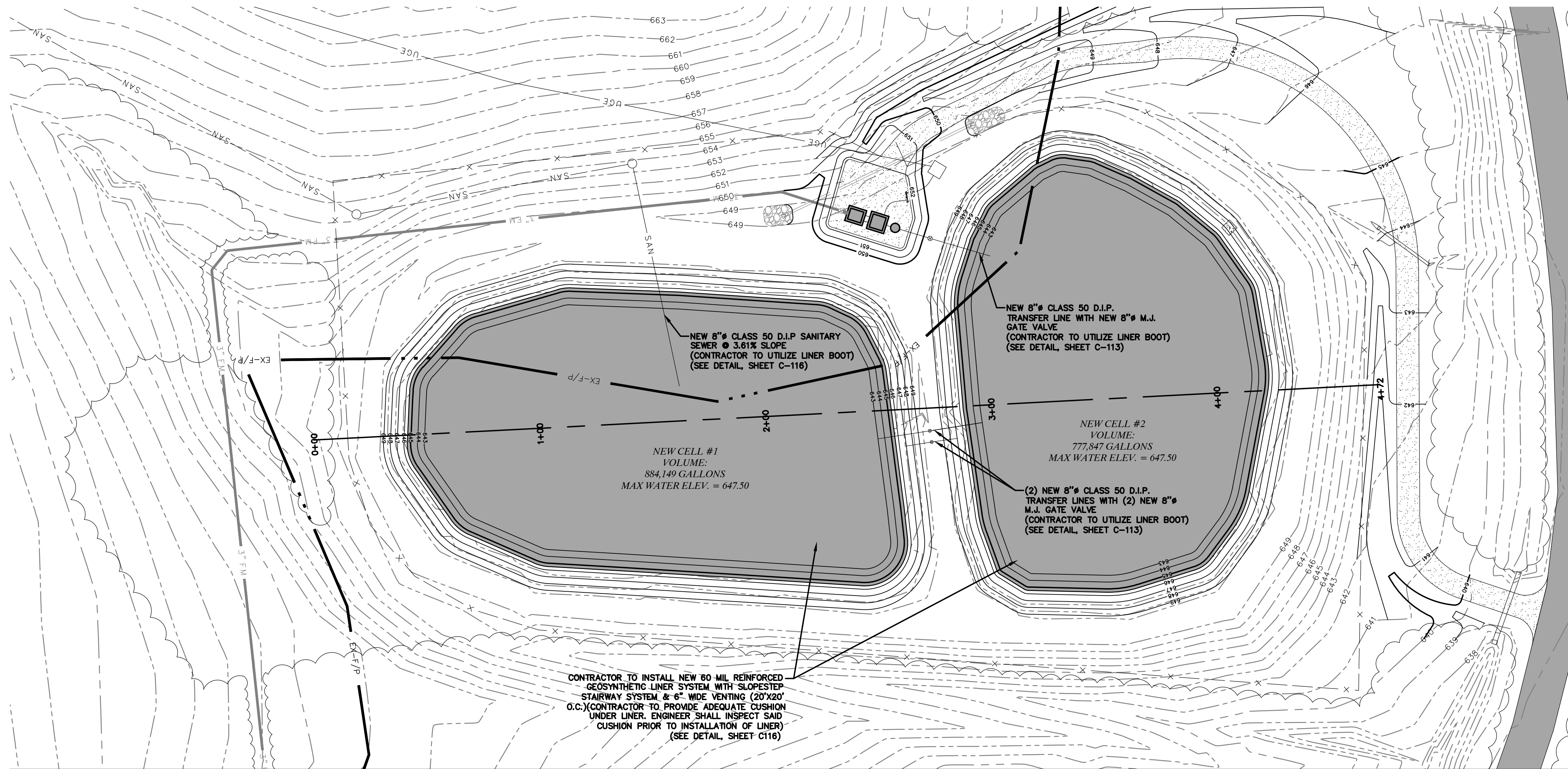
PERFORMANCE STANDARDS:

- ALL SITE ACCESS MUST BE CONFINED TO THE CONSTRUCTION EXIT(S). BARRICADE TO PREVENT USE OF ANY LOCATIONS OTHER THAN THE CONSTRUCTION EXIT(S) WHERE VEHICLES OR EQUIPMENT MAY ACCESS THE SITE.
- CONTRACTOR TO LOCATE TEMPORARY STRAW WATTLE ALONG THE SIDES OF THE CONSTRUCTION EXIT TO PREVENT CONSTRUCTION TRAFFIC FROM SHORT CIRCUITING/BYPASSING THE EXIT.
- IF THE ACTION OF VEHICLES TRAVELING OVER THE GRAVEL CONSTRUCTION EXIT(S) IS NOT SUFFICIENT TO PREVENT TRACKING OF DIRT, DUST OR MUD, THEN TIRES MUST BE WASHED BEFORE THE VEHICLES ENTER A PUBLIC ROAD. ALL WASH WATER MUST BE ROUTED TO A SEDIMENT TRAP OR OTHER TREATMENT AREA AND SHALL NOT BE DIRECTLY DISCHARGED OFF-SITE.
- LOCATIONS WHERE VEHICLES ENTER AND EXIT THE SITE MUST BE INSPECTED FOR EVIDENCE OF SEDIMENT TRACKING BEYOND THE PERMITTED PROJECT AREA. ALL MATERIALS SPILLED, DROPPED, WASHED OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
- ANY SEDIMENT DEPOSITED ON THE ROADWAY SHALL BE SWEEPED AS NECESSARY (AND WITHIN THE SAME DAY AS DISCOVERY) AND DISPOSED OF IN AN APPROPRIATE MANNER. SEDIMENT SHALL NOT BE WASHED INTO STORM SEWER SYSTEMS.
- EXIT(S) SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD BEYOND THE EXIT(S). THIS MAY REQUIRE PERIODIC TOP DRESSING OF THE CONSTRUCTION EXIT(S) AS CONDITIONS DEMAND.
- CONTRACTOR SHALL BE PERMITTED TO TURN THE STONE WHEN THE SURFACE BECOMES SMOOTH AND SURFACE VOIDS ARE FILLED TO MAINTAIN EFFECTIVENESS OF CONSTRUCTION EXIT UNTIL SUCH TIME THAT VOIDS BELOW THE SURFACE BECOME FILLED AND THE CONSTRUCTION EXIT IS NO LONGER EFFECTIVE. AT SUCH A TIME THE CONTRACTOR SHALL REMOVE THE INEFFECTIVE STONE AND REPLACE PER DETAIL.
- IF EXIT BMP IS STILL INEFFECTIVE, GC MUST CONTACT THE ENGINEER AND SUBMIT AN RFI AS NECESSARY.

NOTE TO GC: THE GOAL OF A CONSTRUCTION EXIT AND ASSOCIATED WHEEL WASH AREAS IS TO ELIMINATE TRACK OUT. SIMPLY MANAGING TRACK OUT THROUGH DESIGNATED OR CONTINUAL STREET SWEEPING IS NOT AN ACCEPTABLE PRACTICE. WHILE STREET SWEEPING IS AN ACCEPTABLE PRACTICE FOR REMOVING DUST AND MINIMAL AMOUNTS OF FINE SEDIMENT, OBSERVABLE TRACK OUT FROM THE PROJECT SHOULD TRIGGER THE USE OF ADDITIONAL MEASURES (WHEEL WASH). CONSIDERATION OF ALTERNATE EXITS, OR DISCONTINUING VEHICLE TRAFFIC UNTIL CONDITIONS ON-SITE HAVE IMPROVED, TRACK OUT IS A SEDIMENT RELEASE. ALL SEDIMENT RELEASES MUST BE REPORTED TO THE SWCT VIA THE ONLINE CRITICAL INCIDENT REPORT.



EXISTING ASPHALT/CONCRETE PAVEMENT MAY BE UTILIZED IN LIEU OF THE CONSTRUCTION ENTRANCE SHOWN ABOVE IF SITE CONDITIONS ALLOW.

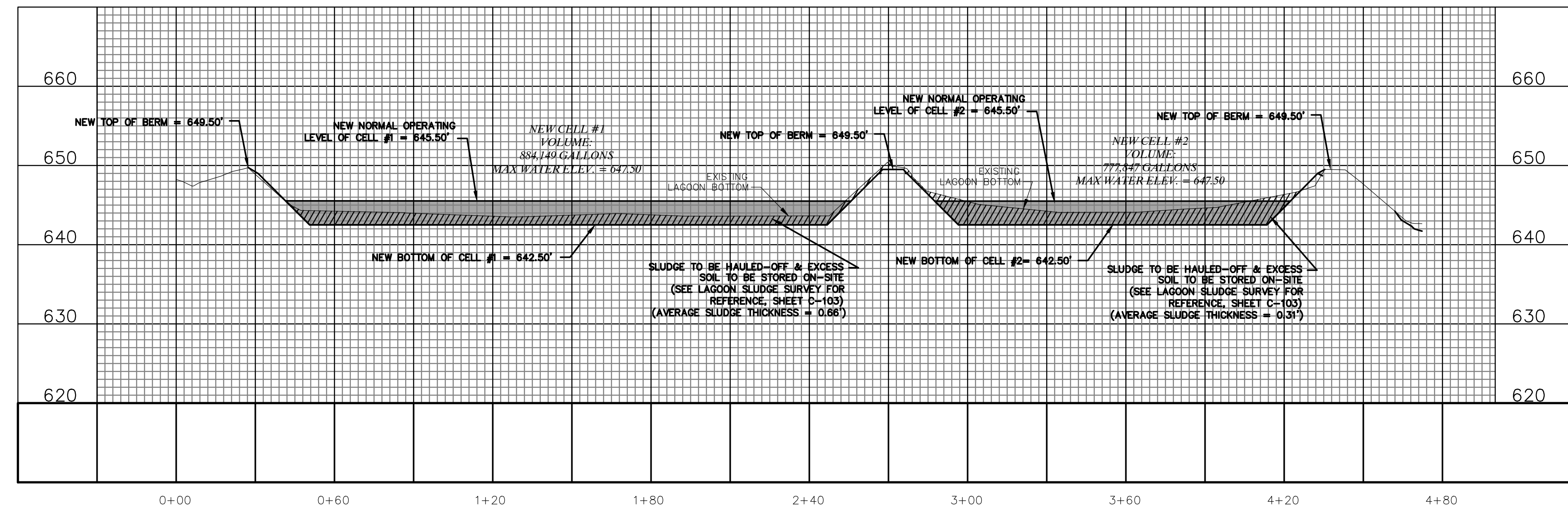


LEGEND

EXISTING	PROPOSED

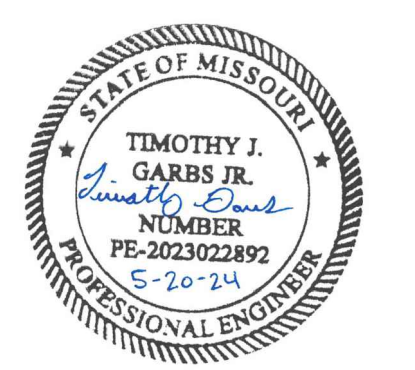
CONTRACTOR TO INSTALL NEW 80 MIL REINFORCED GEOSYNTHETIC LINER SYSTEM WITH SLOPESTEP STAIRWAY SYSTEM & 6" WIDE VENTING (20'X20' O.C.) (CONTRACTOR TO PROVIDE ADEQUATE CUSHION UNDER LINER. ENGINEER SHALL INSPECT SAID CUSHION PRIOR TO INSTALLATION OF LINER) (SEE DETAIL, SHEET C-116)

LAGOON PLAN & PROFILE: STA. 0+00 - STA. 4+72



NOTE:
 CONTRACTOR TO EMPTY WATER IN EXISTING LAGOON USING A MOBILE PUMP AND SPRAY IRRIGATION HEAD (WHEN CONDITIONS ARE ACCEPTABLE PER MODNR 10 CSR 20-8.200). THE CONTRACTOR MAY LAND APPLY 0.5" PER DAY TO DESIGNATED LOCATIONS DETERMINED BY STATE PARK PERSONNEL. APPROXIMATELY 10 ACRES OF PROPERTY HAS BEEN ALLOCATED TO TEMPORARY LAND APPLICATION. THIS IS EQUIVALENT TO AN APPLICATION RATE OF 136,000 GPD.
 THIS SHALL BE SCHEDULED WITH STATE PARK PERSONNEL. ONCE EMPTY, CONTRACTOR SHALL TAKE LAGOONS OFFLINE TO MAKE LAGOON IMPROVEMENTS. NO SANITARY SEWER FLOW TO THE LAGOON IS ANTICIPATED FROM NOVEMBER 1, 2024 TO MARCH 1, 2025. CONTRACTOR SHALL KEEP IN CONSTANT COMMUNICATION WITH STATE PARK AND THE ENGINEER DURING THIS TIME PERIOD. ONCE EMPTY THE CONTRACTOR SHALL HAVE ALL SLUDGE HAULED OFF-SITE BY A CERTIFIED HAULER TO A CERTIFIED FACILITY. THE EXISTING LAGOONS HAVE AN ESTIMATED WET SLUDGE VOLUME OF 1,078 CUBIC YARDS. EXCESS SOIL FROM THE LAGOONS SHALL BE STORED ON-SITE AS PART OF THE BASE BID. LOCATION SHALL BE DETERMINED BY STATE PARK PERSONNEL. ONCE COMPLETED AND THE LAGOON IS DRY, THE CONTRACTOR SHALL INSTALL THE NEW TRANSFER PIPES AND GEOSYNTHETIC LINER. ONCE IMPROVEMENTS ARE FINISHED, CONTRACTOR SHALL BRING LAGOON CELLS BACK ONLINE. TYPICAL OPERATION CAN BEGIN AFTER THIS POINT. ALTERNATE METHODS FOR DRAINING THE LAGOON SHOULD BE PRESENTED TO THE OWNER AND ENGINEER FOR APPROVAL.

NOTE:
 CONTRACTOR TO INSTALL A 7" WIDE FIBER GLASS DEPTH GAUGE WITH A RANGE OF 7'. CONTRACTOR TO INSTALL A DEPTH GAUGE IN BOTH LAGOON CELLS. (SEE DETAIL, SHEET C-116)



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 MISSOURI STATE PARKS

WASTEWATER SPRAY
 IRRIGATION SYSTEM

8920 US HWY 67 NORTH
 BONNE TERRE, MISSOURI 63628

PROJECT # X2310-02
 SITE # 5216
 ASSET # 7815216018

REVISION: _____
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ISSUE DATE: 05/20/24

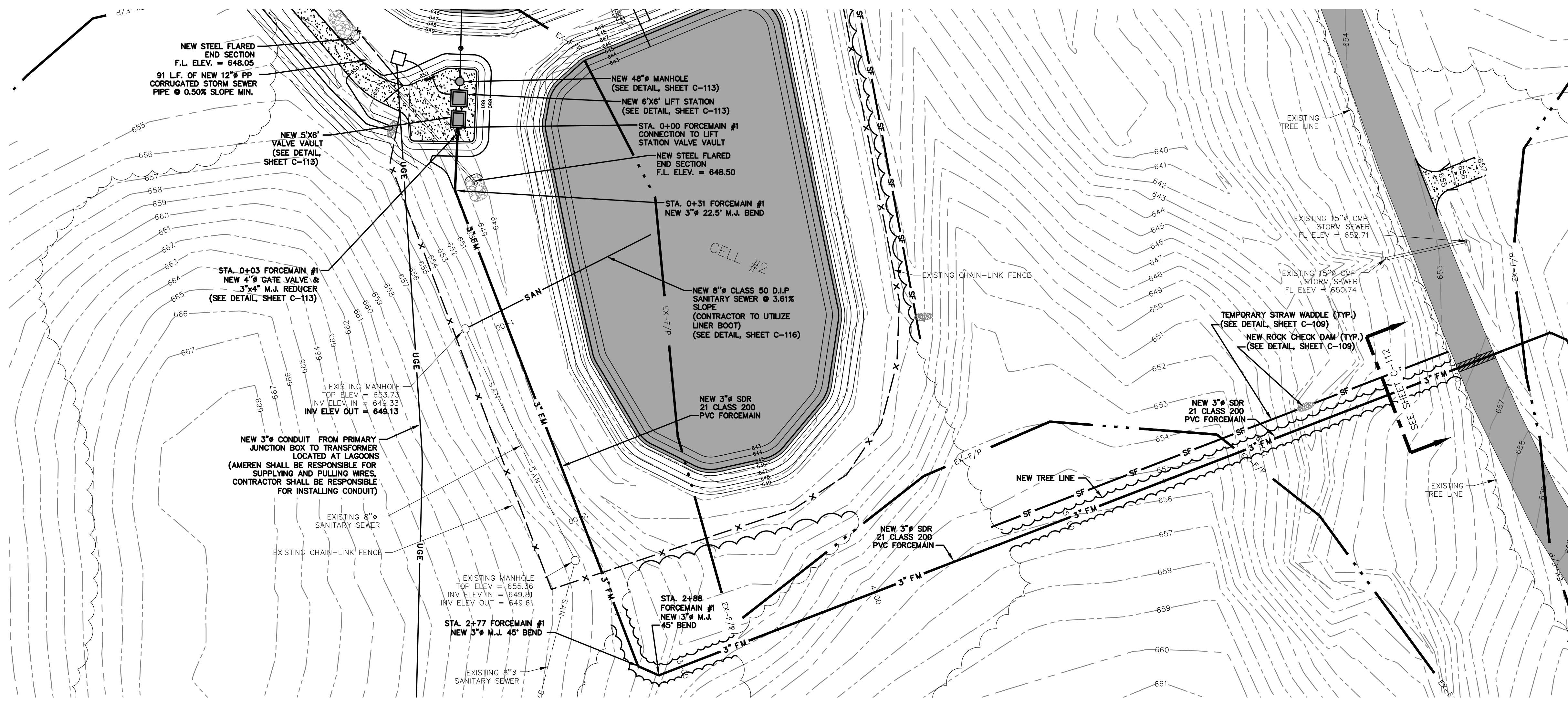
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SHEET TITLE:
**LAGOON PLAN
 AND PROFILE**

SHEET NUMBER:

C-110

11 OF 18 SHEETS
 05/20/24



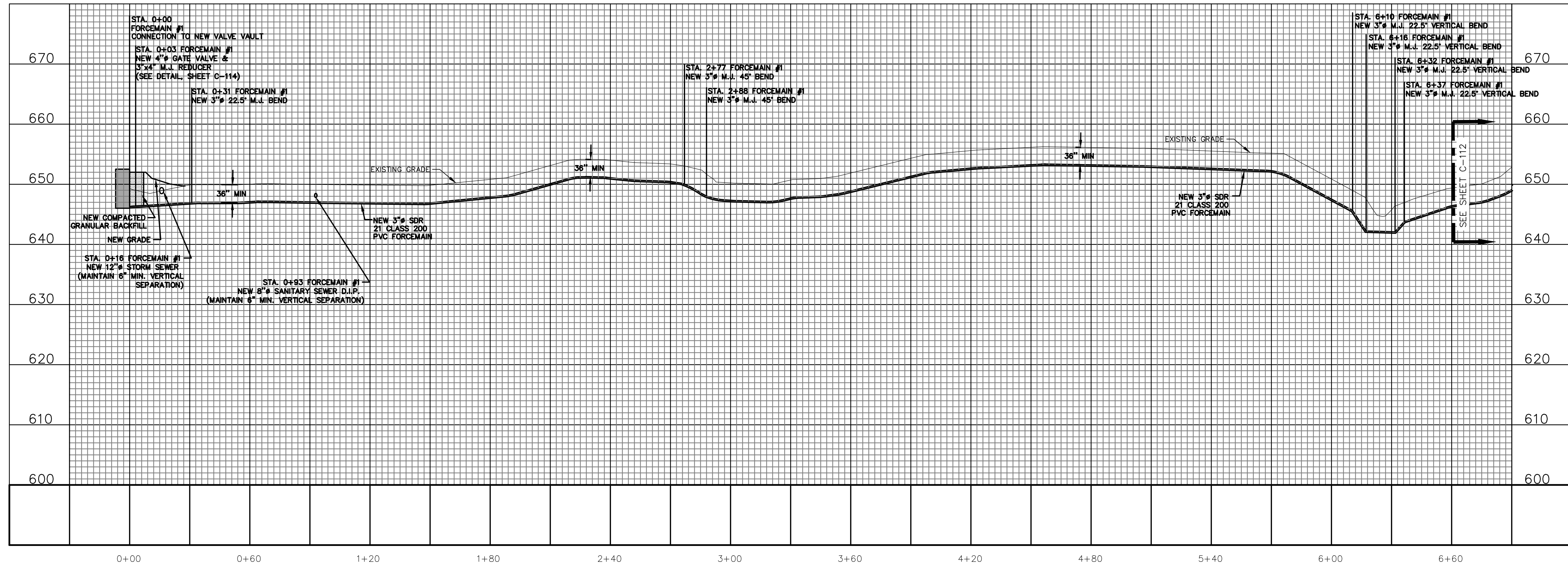
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MAY, 2024

LEGEND

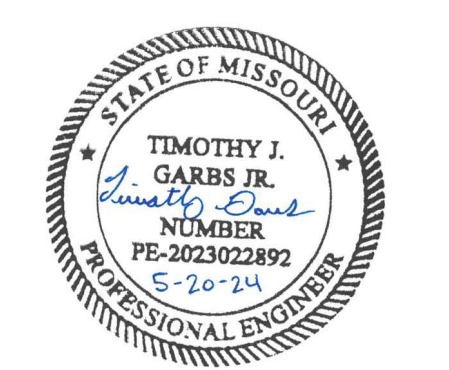
EXISTING	PROPOSED

NOTE:
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FORCEMAIN #1: STA. 0+00 - STA. 6+60



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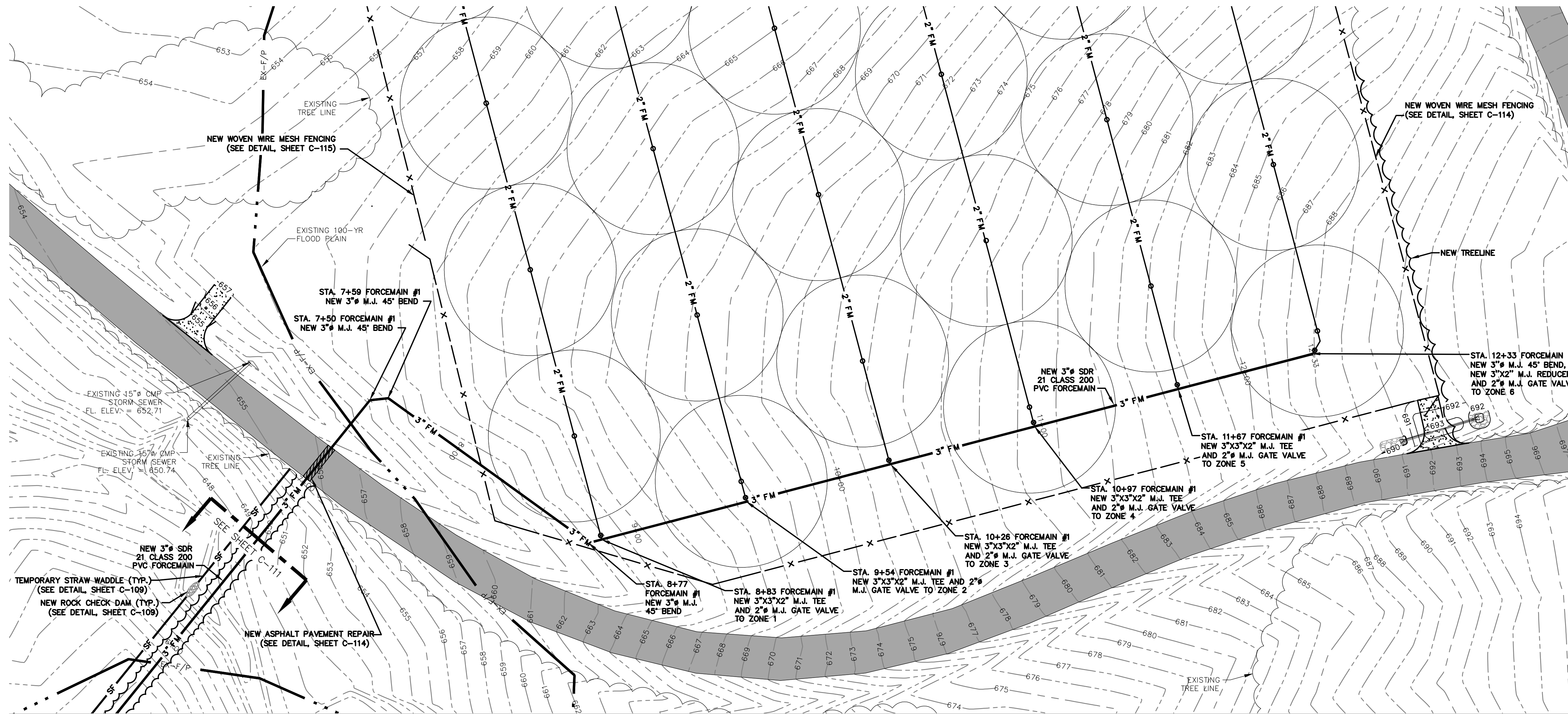
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DATE: _____
ISSUE DATE: 05/20/24

CAD DWG FILE: X2310-EL-202
DRAWN BY: MDB
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SHEET TITLE:
**FORCEMAIN PLAN
AND PROFILES**

SHEET NUMBER:
C-111
12 OF 18 SHEETS
05/20/24



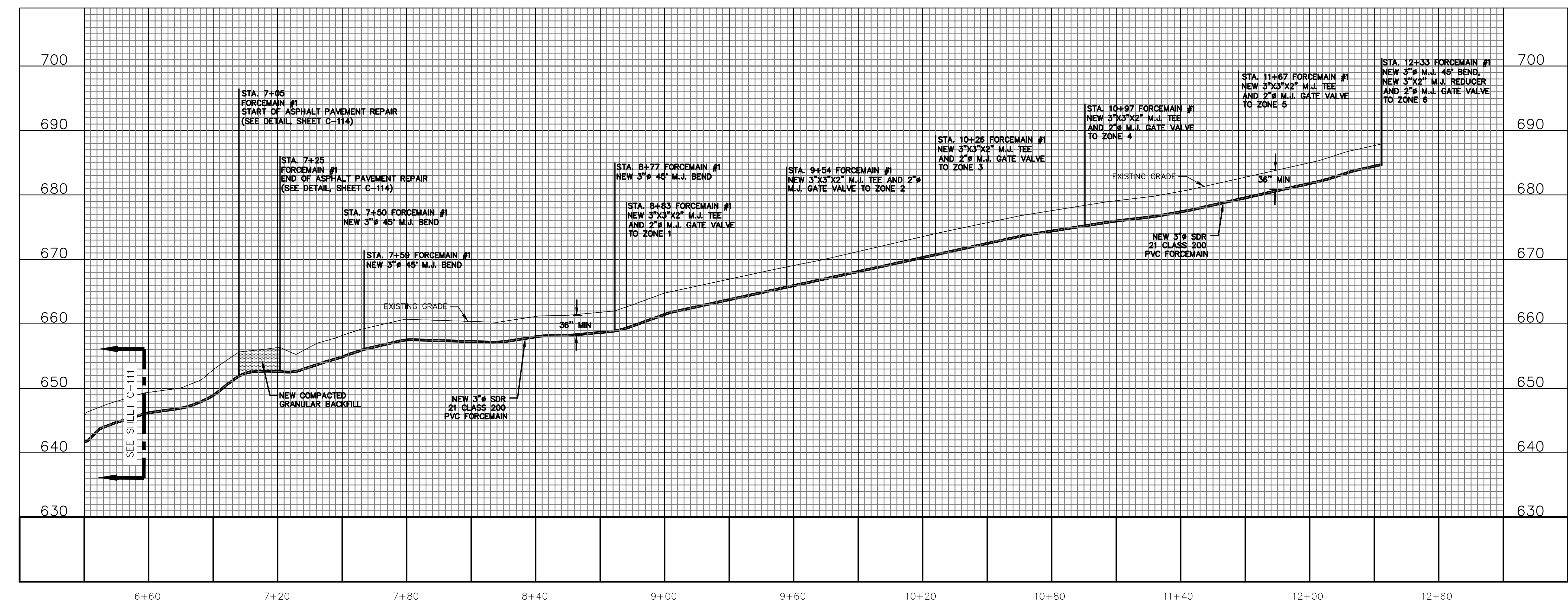
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MAY, 2024

LEGEND

EXISTING	PROPOSED

FORCEMAIN #1 : STA. 6+60 - STA. 12+33

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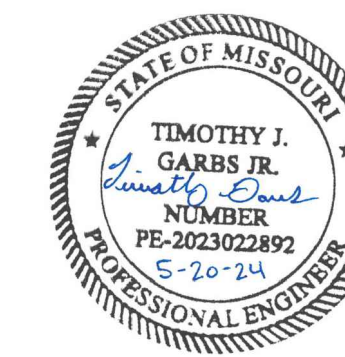
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ASSET # 7815216018

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REVISION: _____
DATE: _____
ISSUE DATE: 05/20/24

CAD DWG FILE: X2310-EL-203
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CHECKED BY: TJG
DESIGNED BY: TJG

SHEET TITLE:
**FORCEMAIN PLAN
AND PROFILES**

SHEET NUMBER:
C-112
13 OF 18 SHEETS
05/20/24



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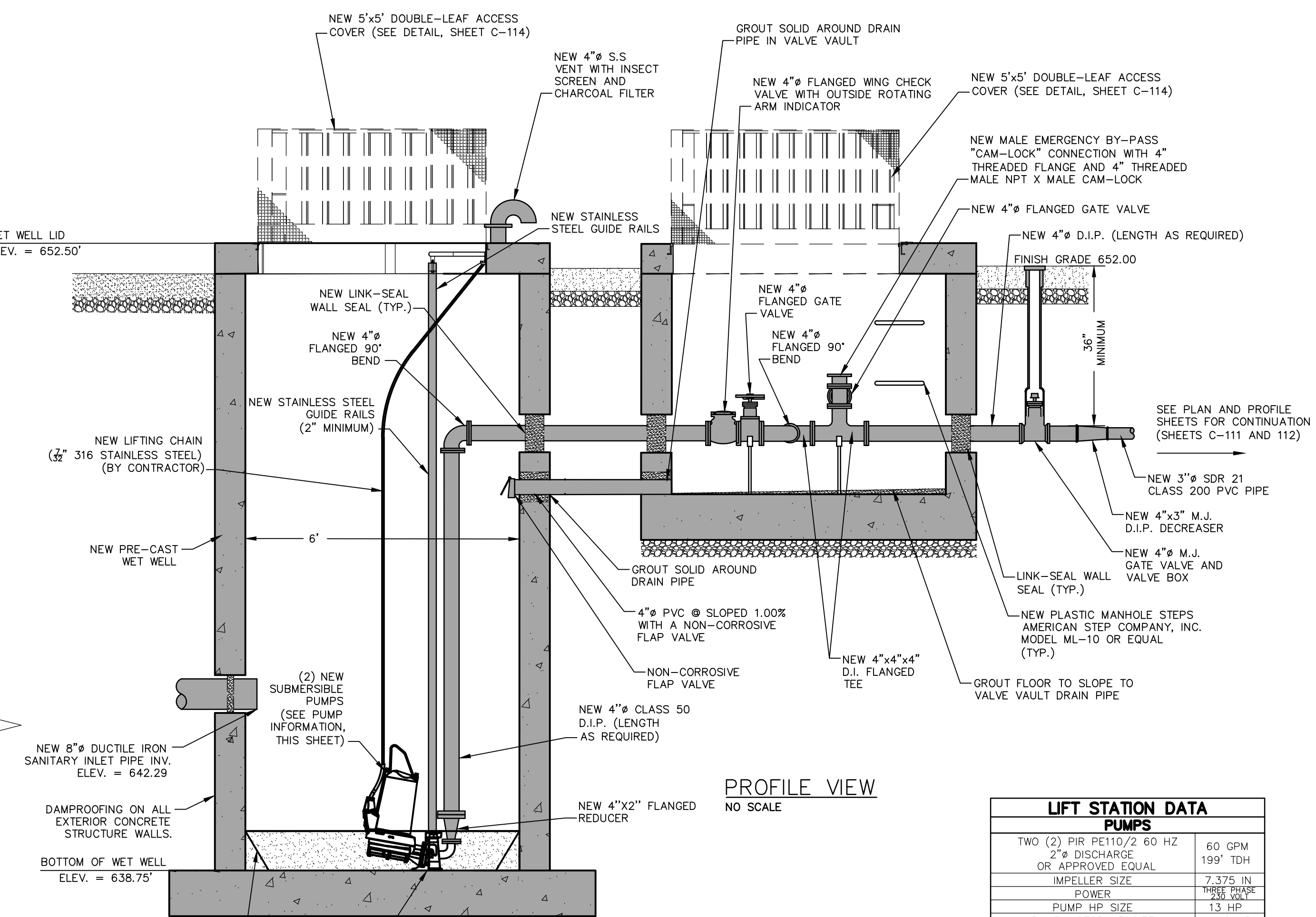
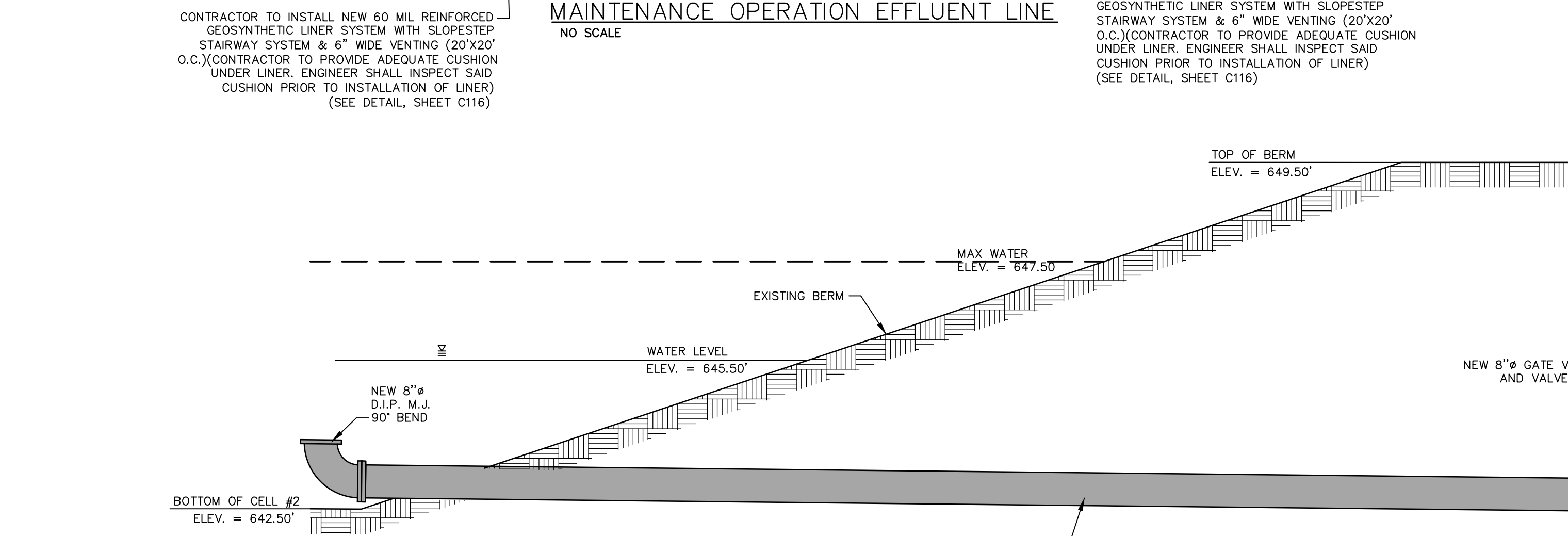
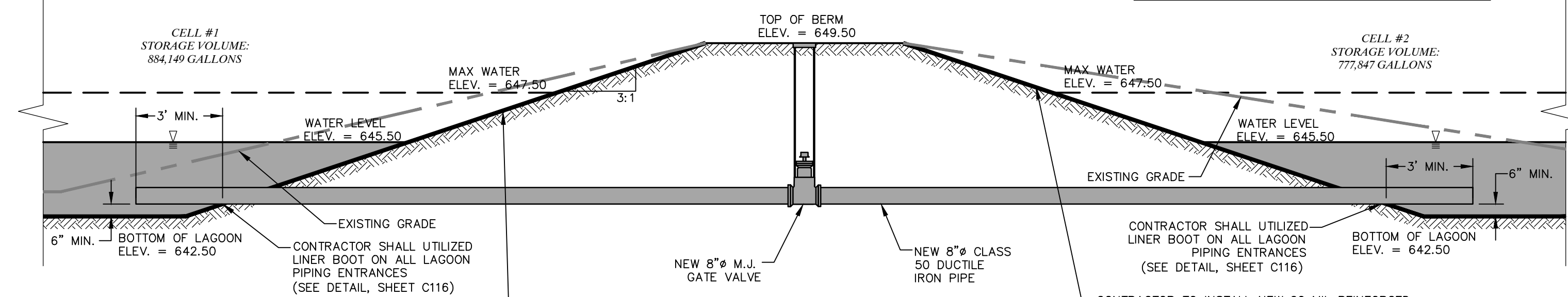
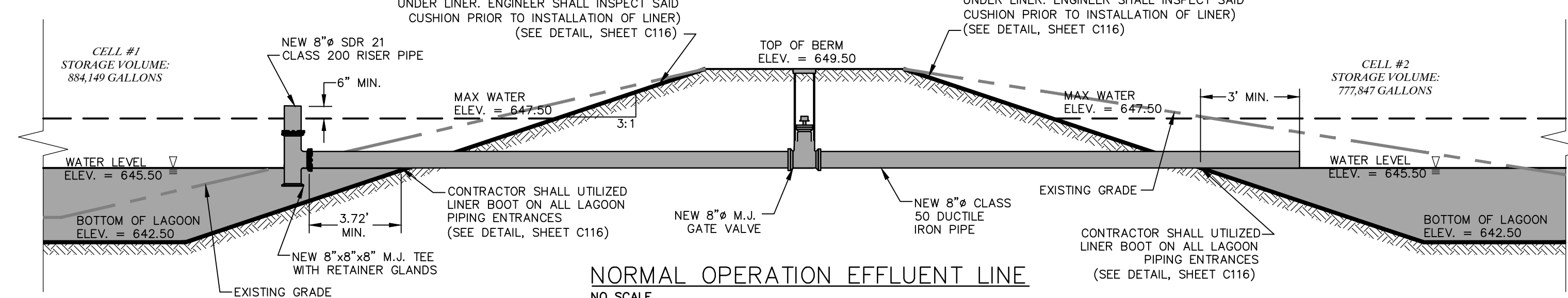
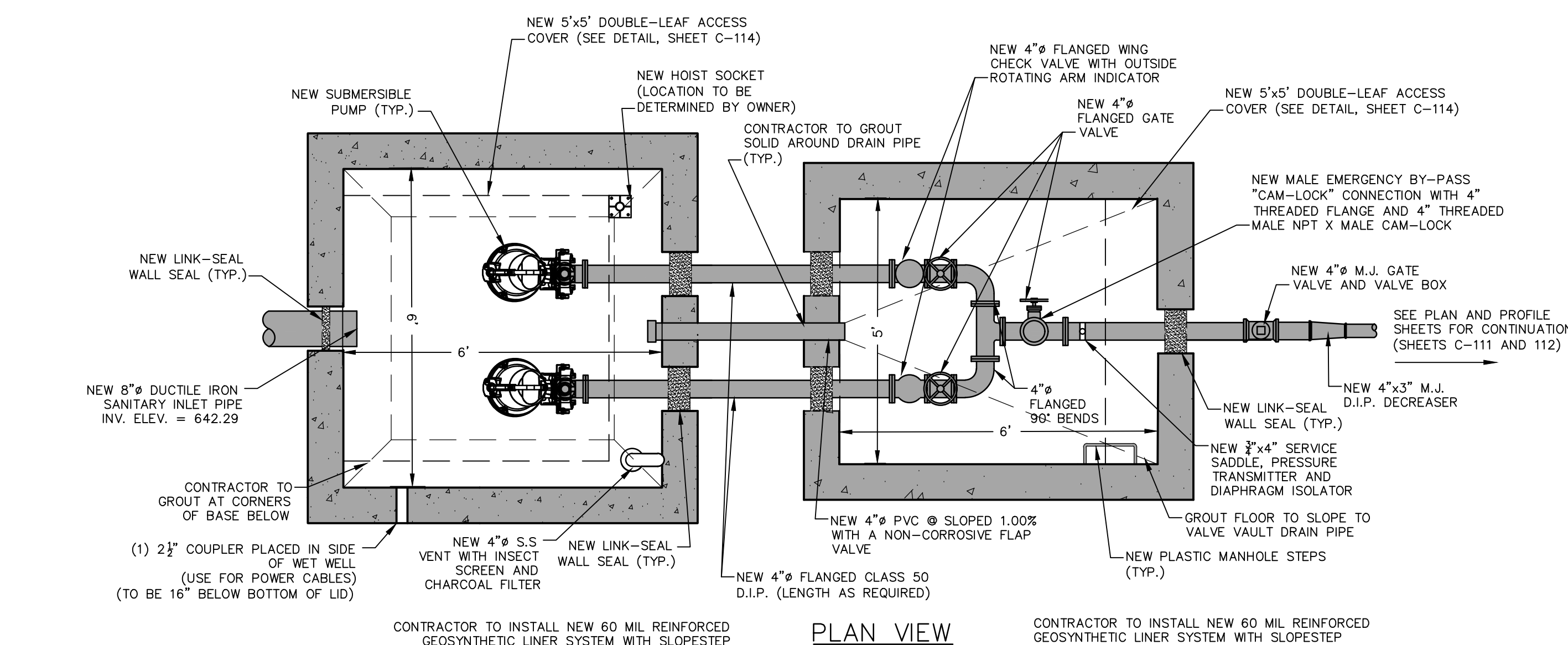
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CHECKED BY: TJG
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PUMP STATION WET WELL
AND PIPING DETAILS

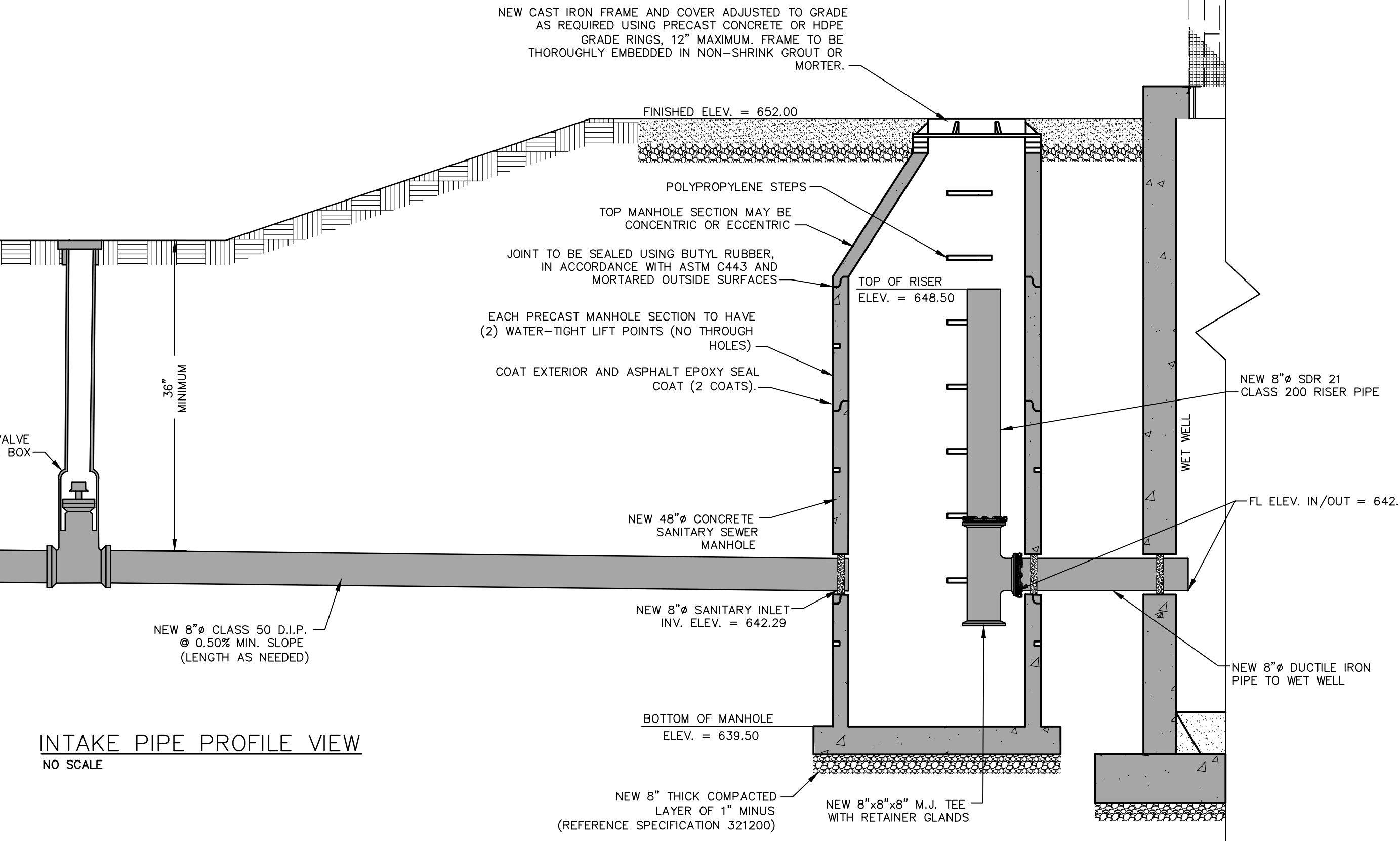
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C-113

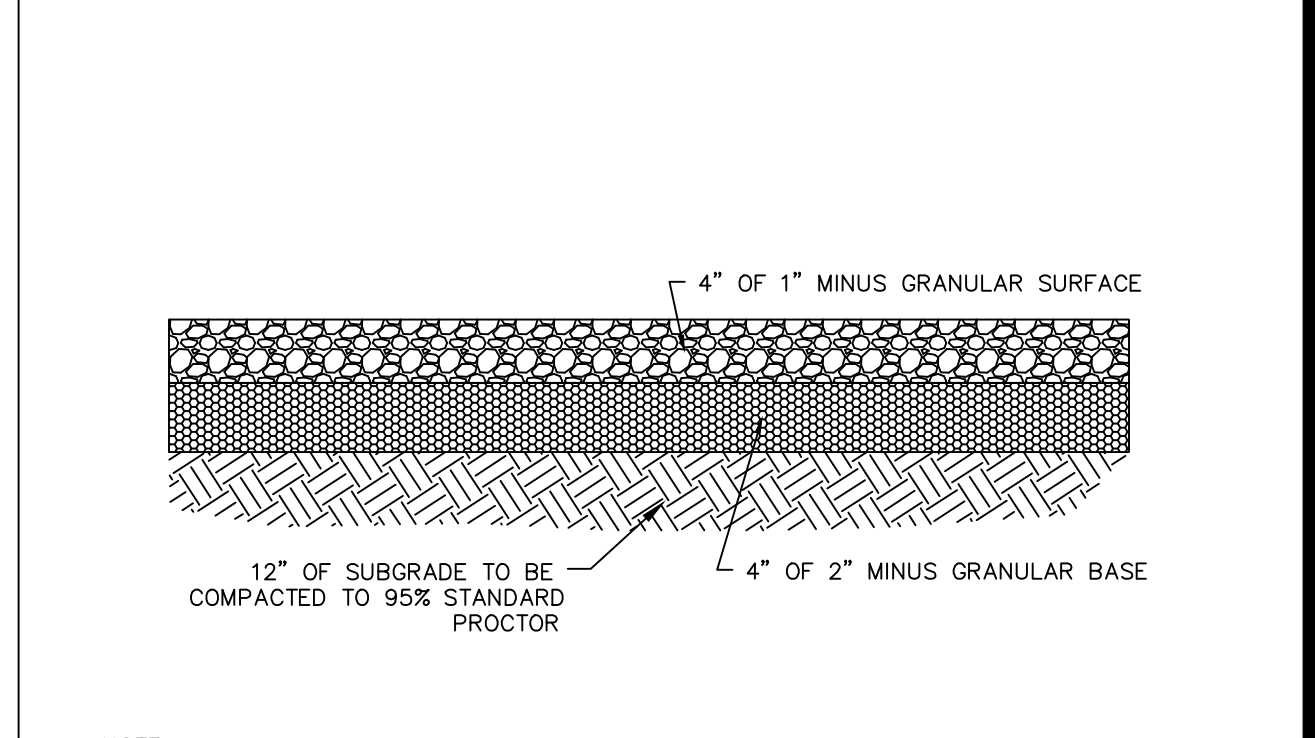
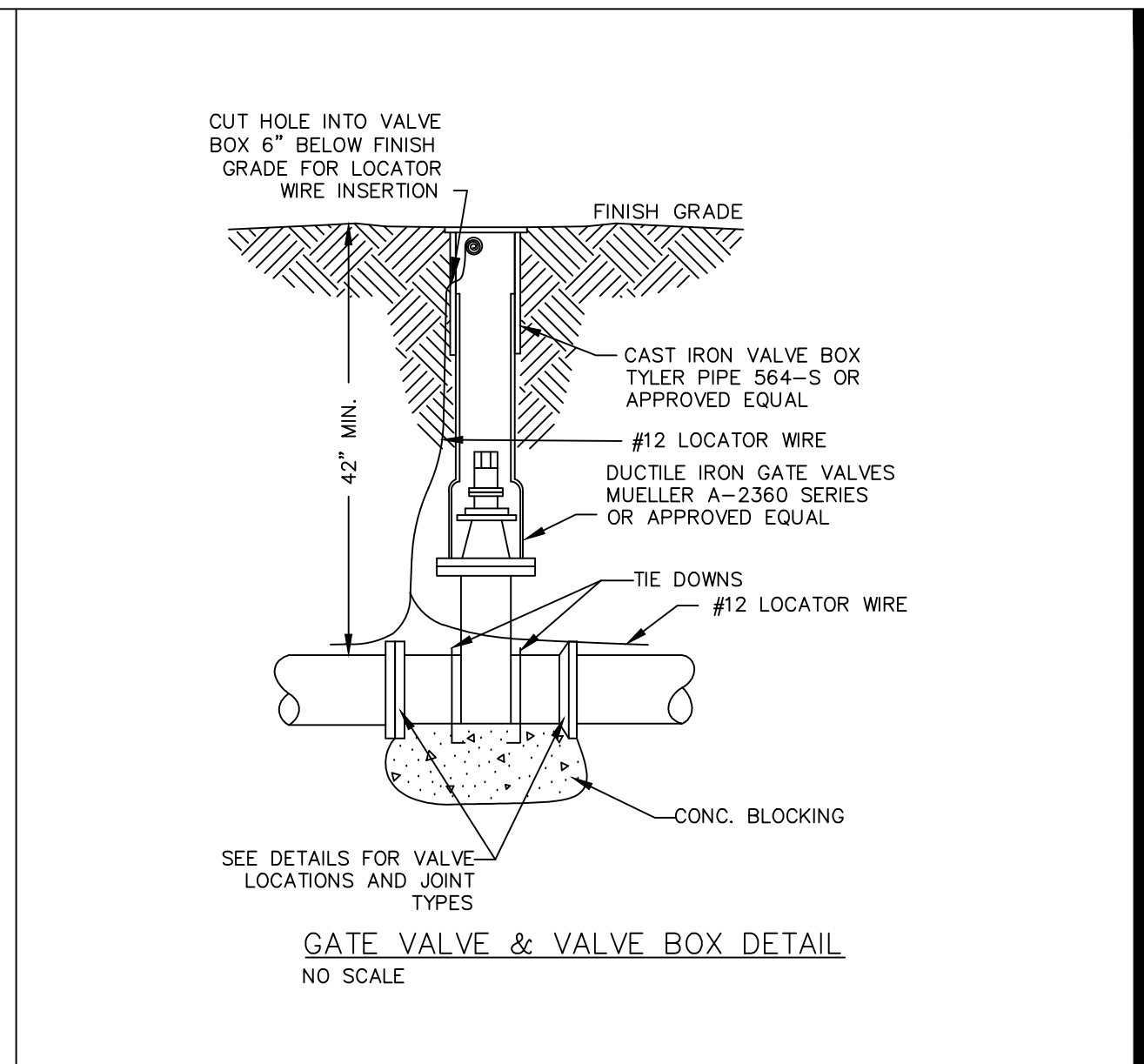
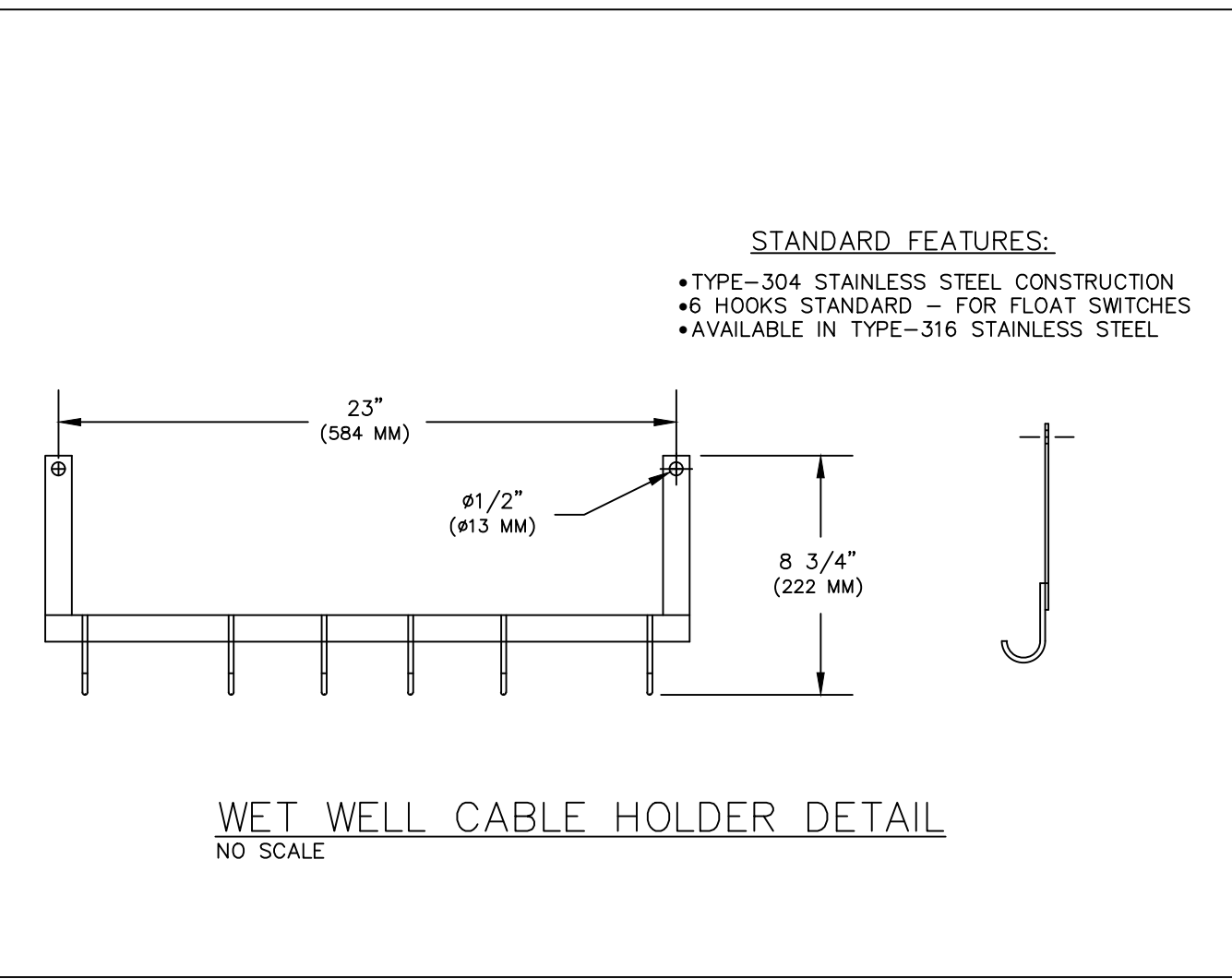
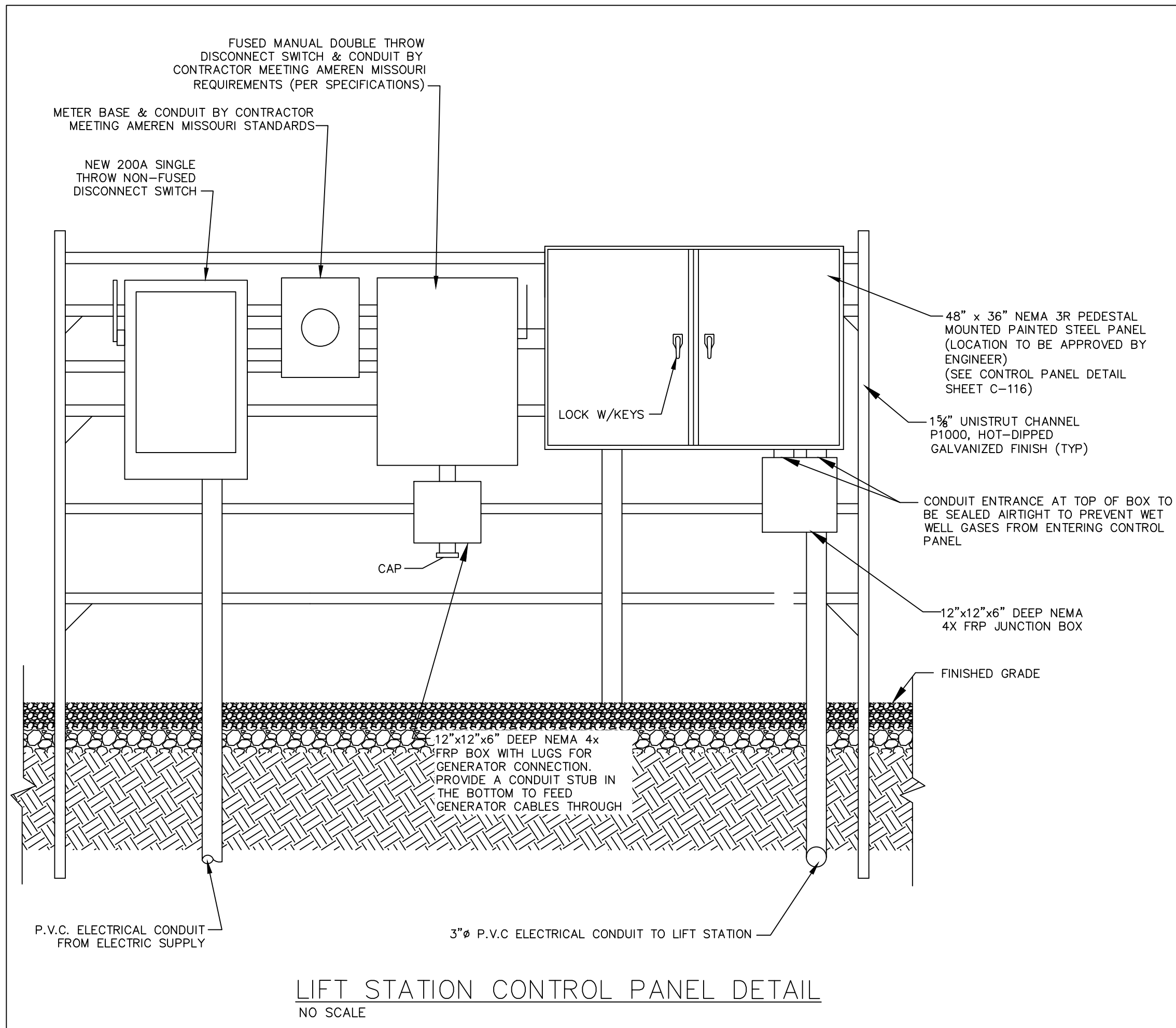
14 OF 18 SHEETS
05/20/24



LIFT STATION DATA	
PUMPS	
TWO (2) PIR PRT11/2 60 HZ	60 GPM
2" DISCHARGE OR APPROVED EQUAL	199' TDH
IMPELLER SIZE	7.375" IN
POWER	13 HP
PUMP HP SIZE	14.8 HP
PUMP MOTOR HP SIZE	GRINDER
PUMP TYPE	HERTZ
MOTOR SPEED (RPM)	3530
CONTROL SYSTEM	MANUAL/TMR
PUMP WEIGHT (LBS.)	391.00
RAIL SYSTEM	S.S. GUIDE RAILS
VAULT PIPING	4" DIA.

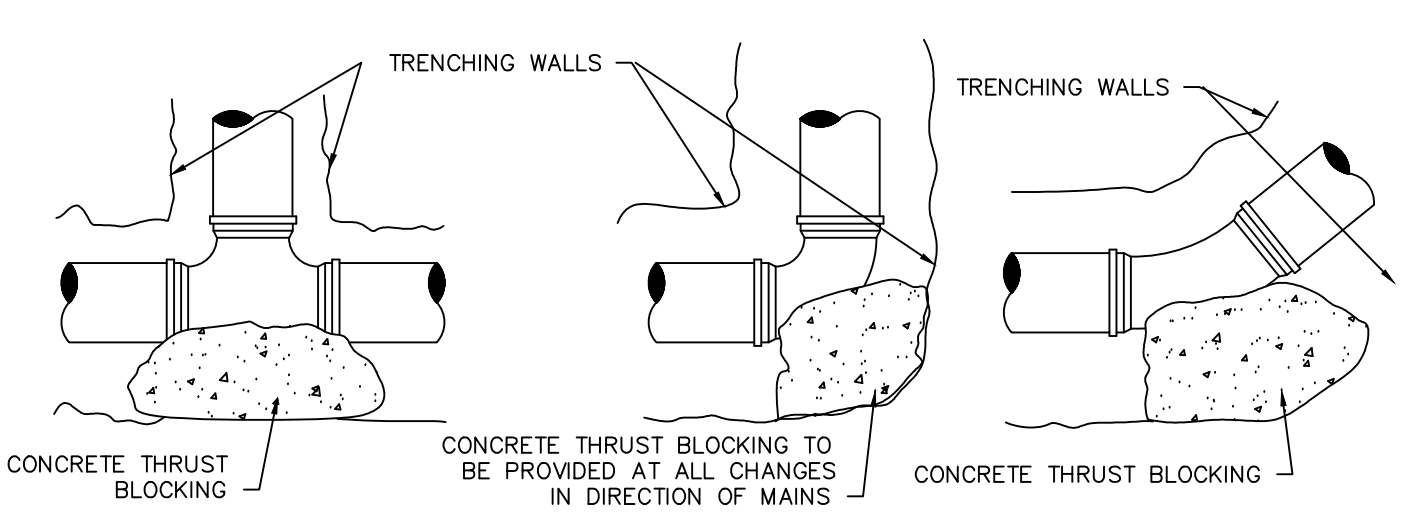
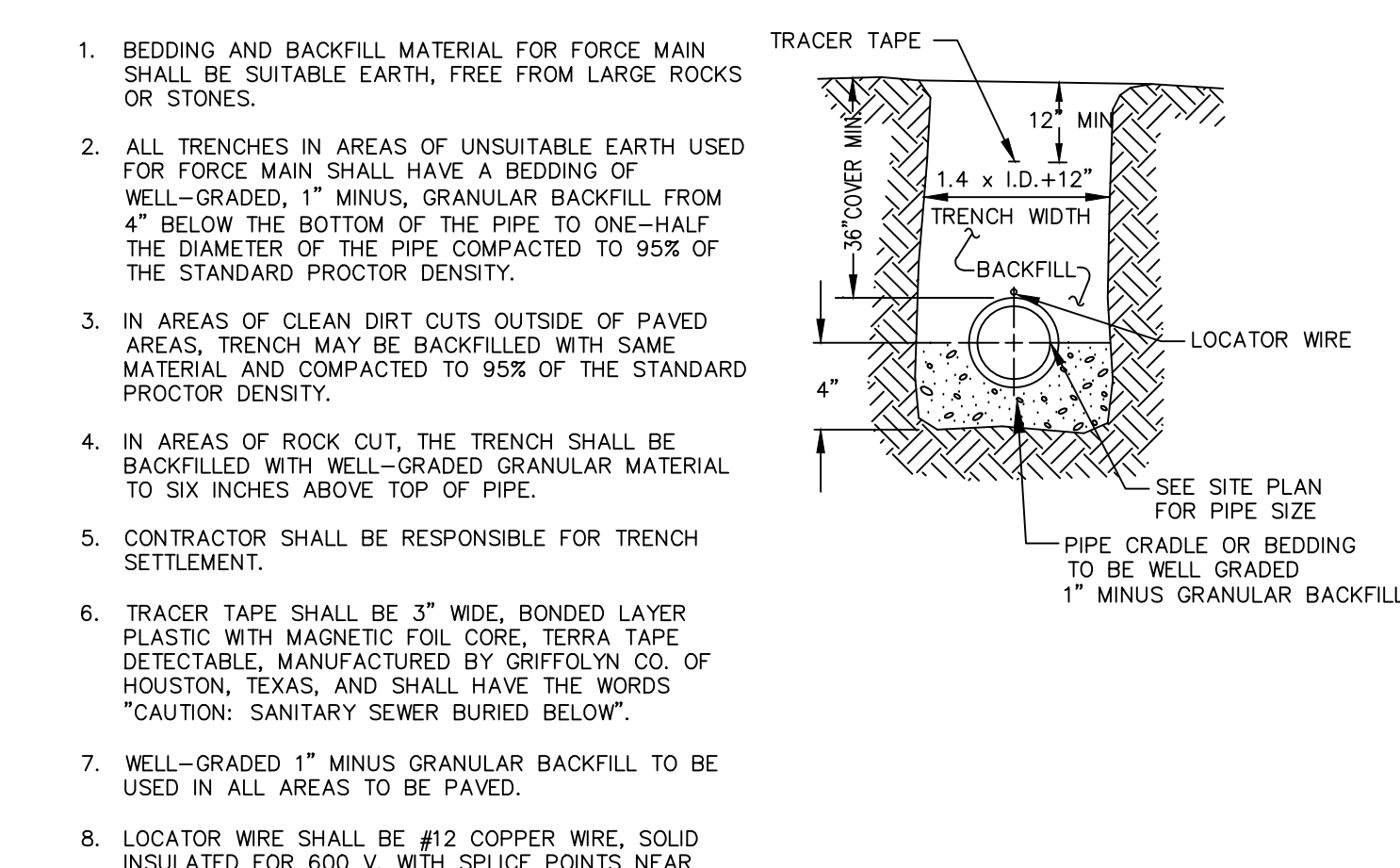
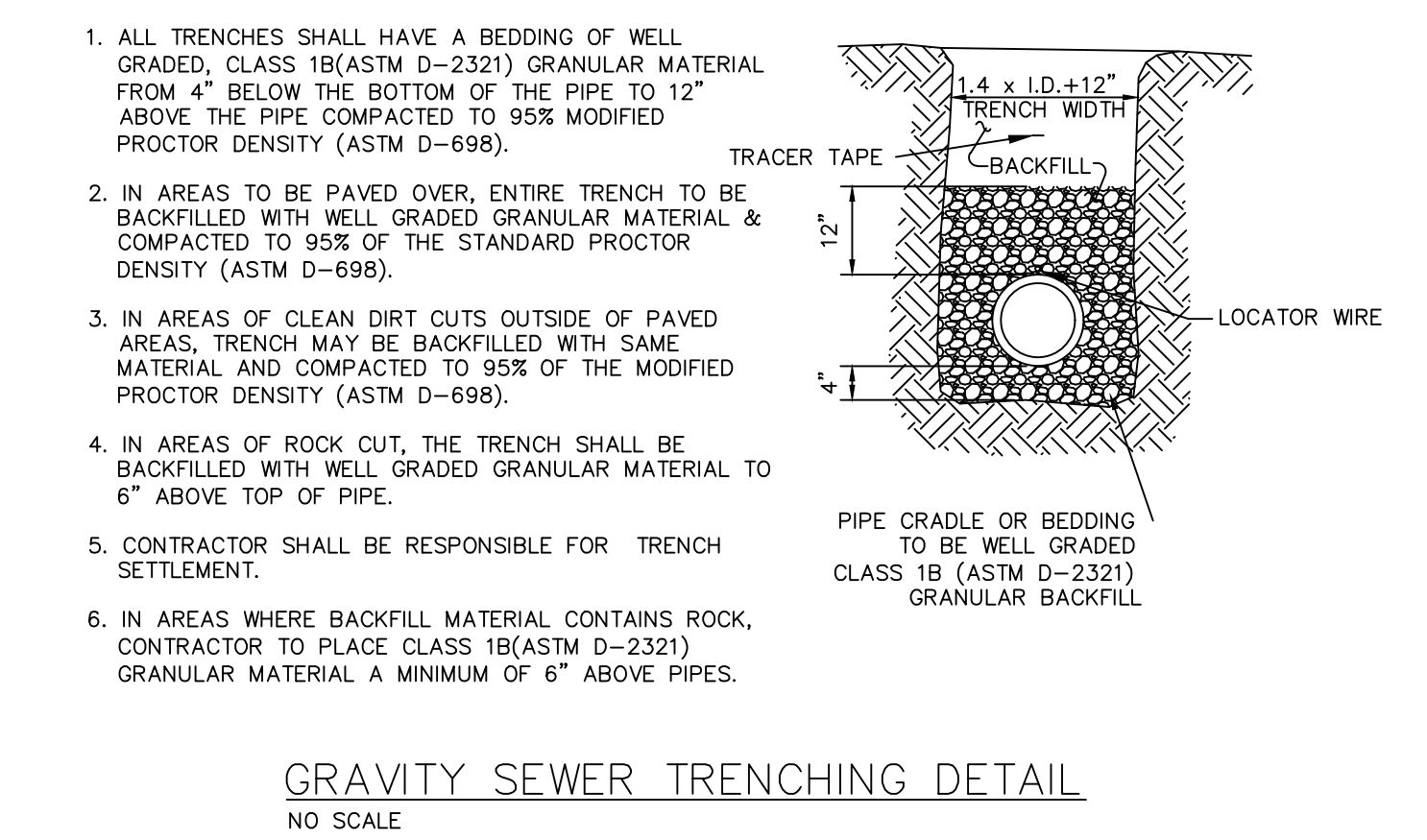
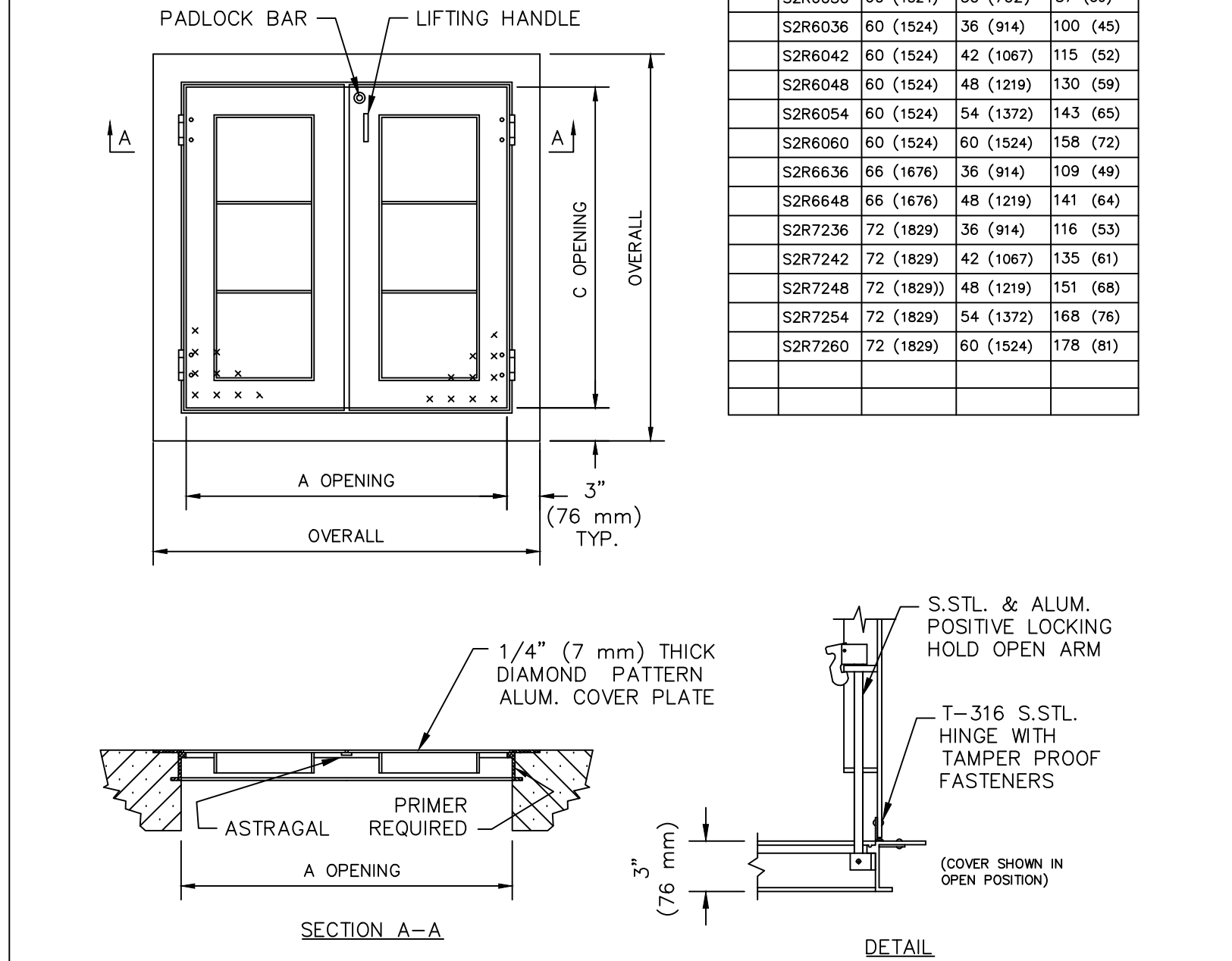


INTAKE PIPE PROFILE VIEW
NO SCALE



STANDARD SIZES

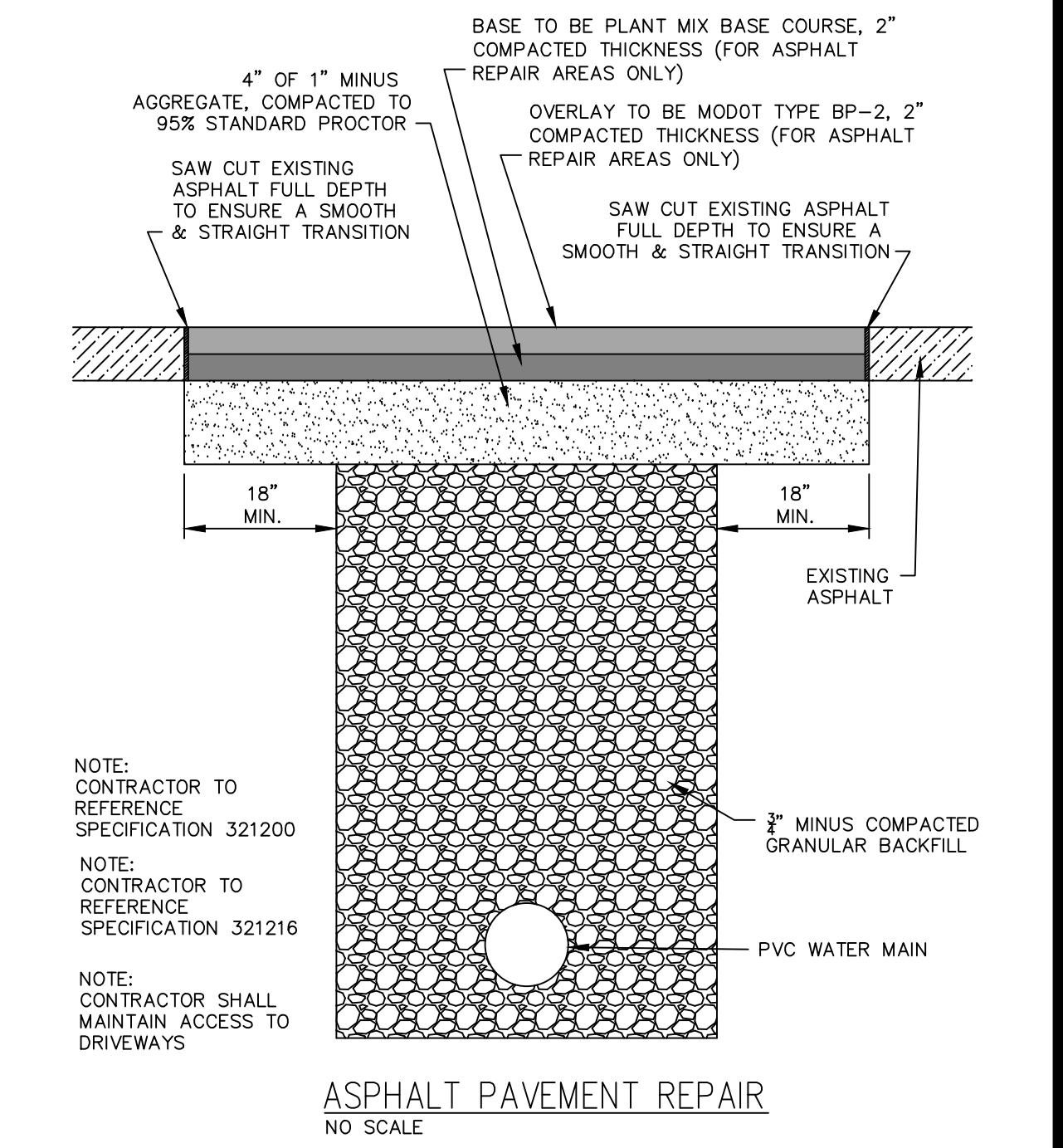
QTY.	MODEL NO.	A DIM. INCHES (mm)	C DIM. INCHES (mm)	UNIT WT. LBS. (kg.)
	S2R4242	42 (1067)	42 (1067)	93 (42)
	S2R4842	48 (1219)	42 (1067)	99 (45)
	S2R4848	48 (1219)	48 (1219)	110 (50)
	S2R5442	54 (1372)	42 (1067)	108 (49)
	S2R5448	54 (1372)	48 (1219)	119 (54)
	S2R5454	54 (1372)	54 (1372)	127 (58)
	S2R6030	60 (1524)	30 (762)	87 (39)
	S2R6036	60 (1524)	36 (914)	100 (45)
	S2R6042	60 (1524)	42 (1067)	115 (52)
	S2R6048	60 (1524)	48 (1219)	130 (59)
	S2R6054	60 (1524)	54 (1372)	143 (65)
	S2R6060	60 (1524)	60 (1524)	158 (72)
	S2R6636	66 (1676)	36 (914)	109 (49)
	S2R6648	66 (1676)	48 (1219)	141 (64)
	S2R7236	72 (1829)	36 (914)	116 (53)
	S2R7242	72 (1829)	42 (1067)	135 (61)
	S2R7248	72 (1829)	48 (1219)	151 (68)
	S2R7254	72 (1829)	54 (1372)	168 (76)
	S2R7260	72 (1829)	60 (1524)	178 (81)



SQ. FT. OF THRUST BLOCK AREA REQ'D

PIPE SIZE	DEAD END TEE OR IN-LINE VLV.	90° ELBOW	45° ELBOW	22-1/2° ELBOW
2"	MIN.	MIN.	MIN.	MIN.
4"	MIN.	MIN.	MIN.	MIN.
6"	MIN.	MIN.	MIN.	MIN.
8"	2'3" x 2'3"	2'8" x 2'8"	MIN.	MIN.
10"	2'10" x 2'10"	3'6" x 3'6"	2'6" x 2'6"	MIN.

MIN. THRUST BLOCK BEARING TO BE 2 SQ. FT.



STATE OF MISSOURI
MICHAEL L. PARSON,
GOVERNOR



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Architecture : 2002014240

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DEPARTMENT OF
NATURAL RESOURCES
MISSOURI STATE PARKS

WASTEWATER SPRAY
IRRIGATION SYSTEM

8920 US HWY 67 NORTH
BONNE TERRE, MISSOURI 63628

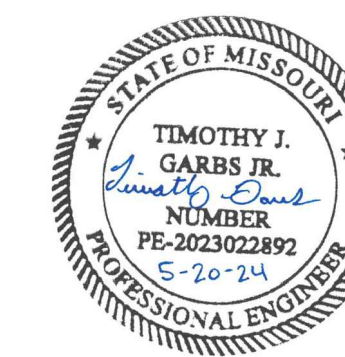
PROJECT # X2310-02
SITE # 5216
ASSET # 7815216018

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REVISION: _____
DATE: _____
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DATE: _____
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CAD DWG FILE: X2310-DT-502
DRAWN BY: MDB
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SHEET TITLE:
DETAIL SHEET

SHEET NUMBER:
C-114
15 OF 18 SHEETS
05/20/24



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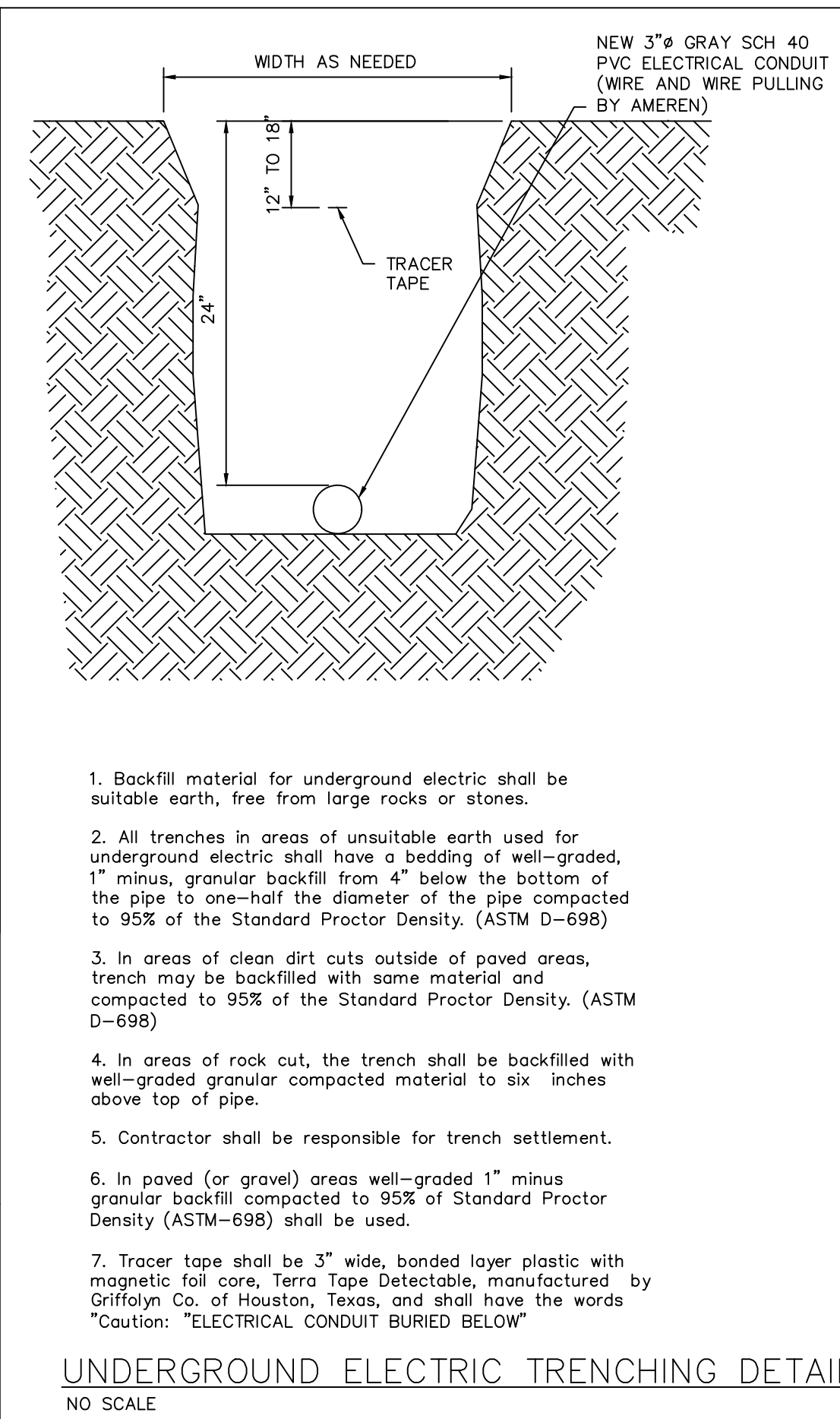
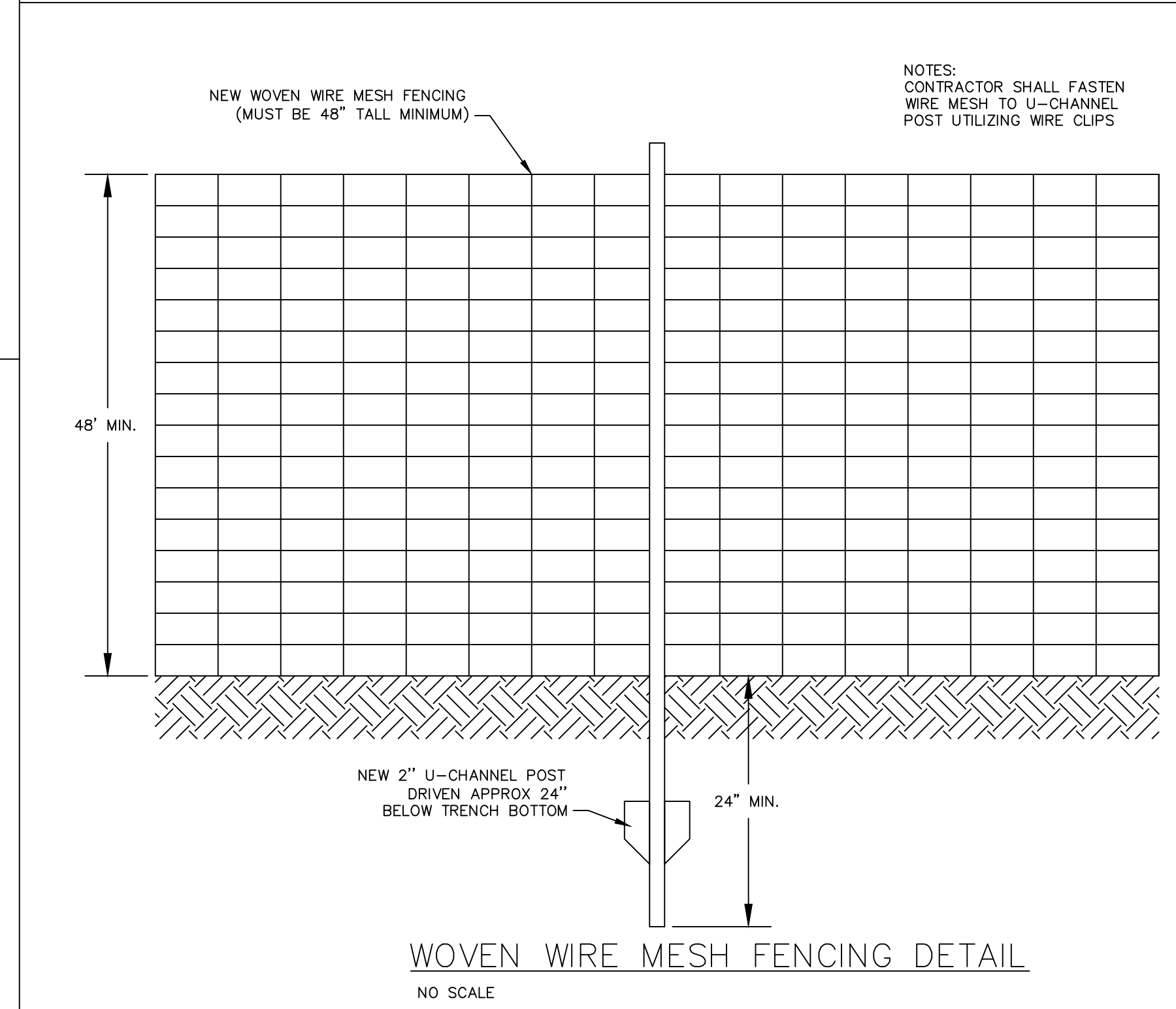
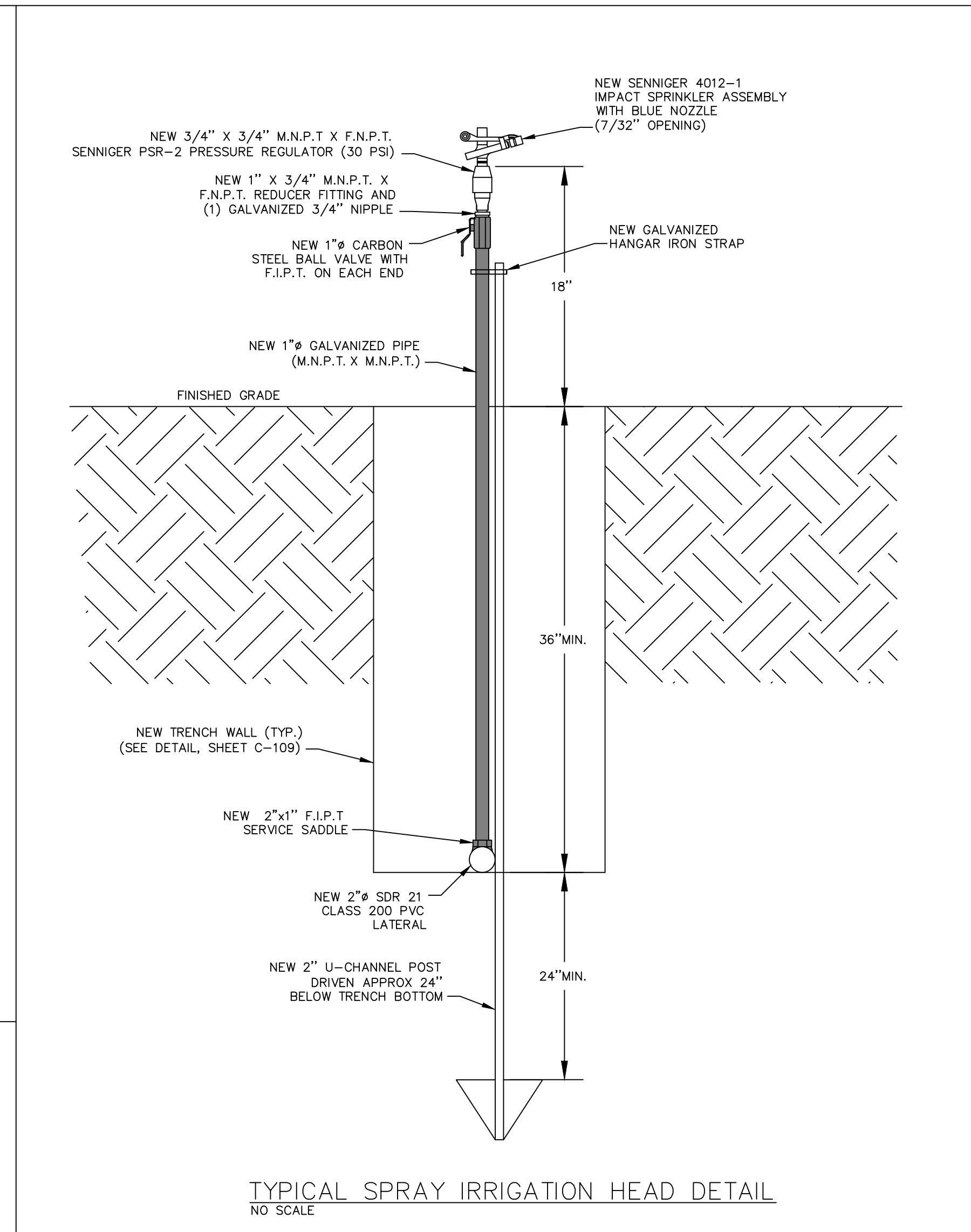
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DRAWN BY: MDB
CHECKED BY: TJG
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DETAIL SHEET

SHEET NUMBER:

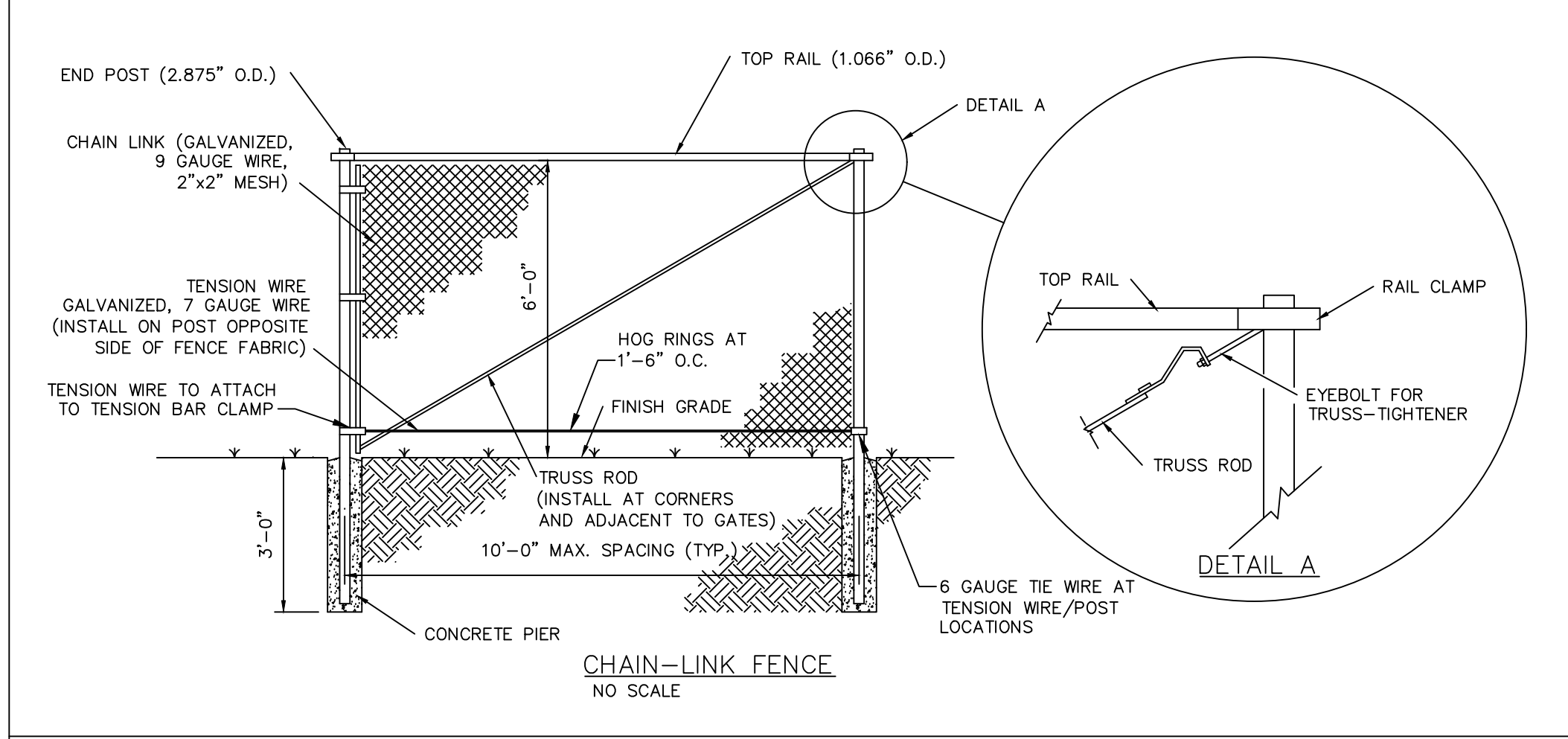
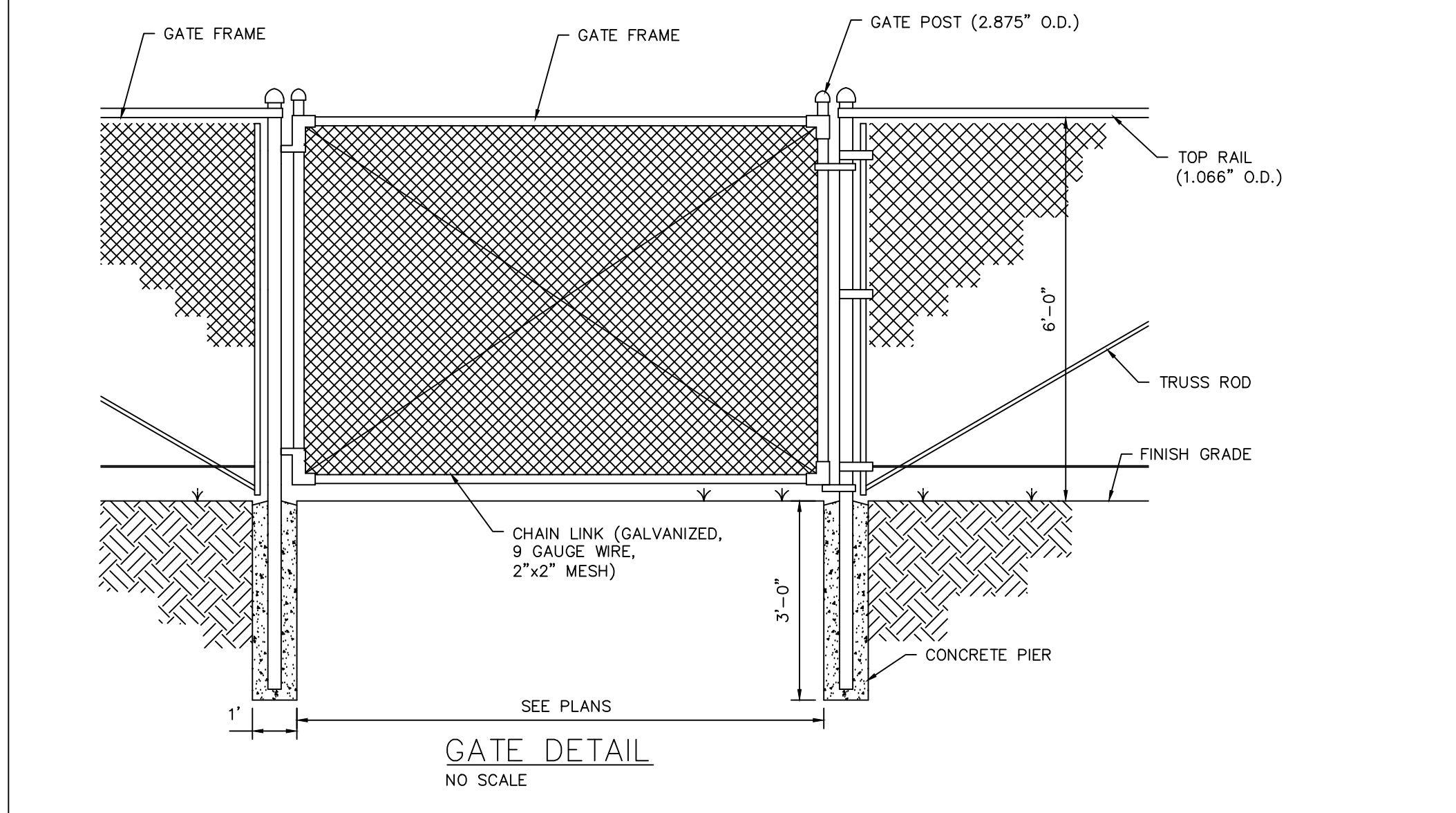
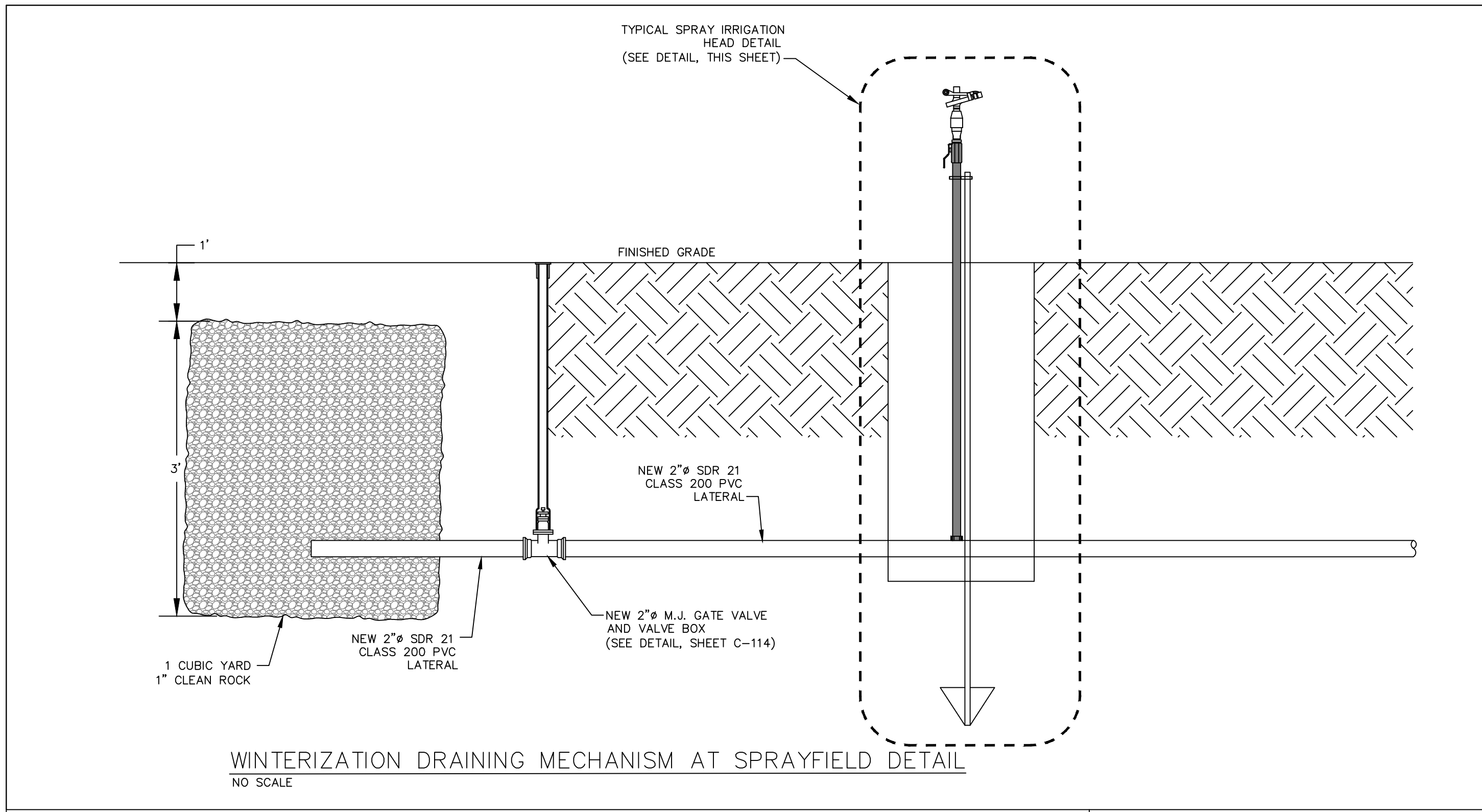
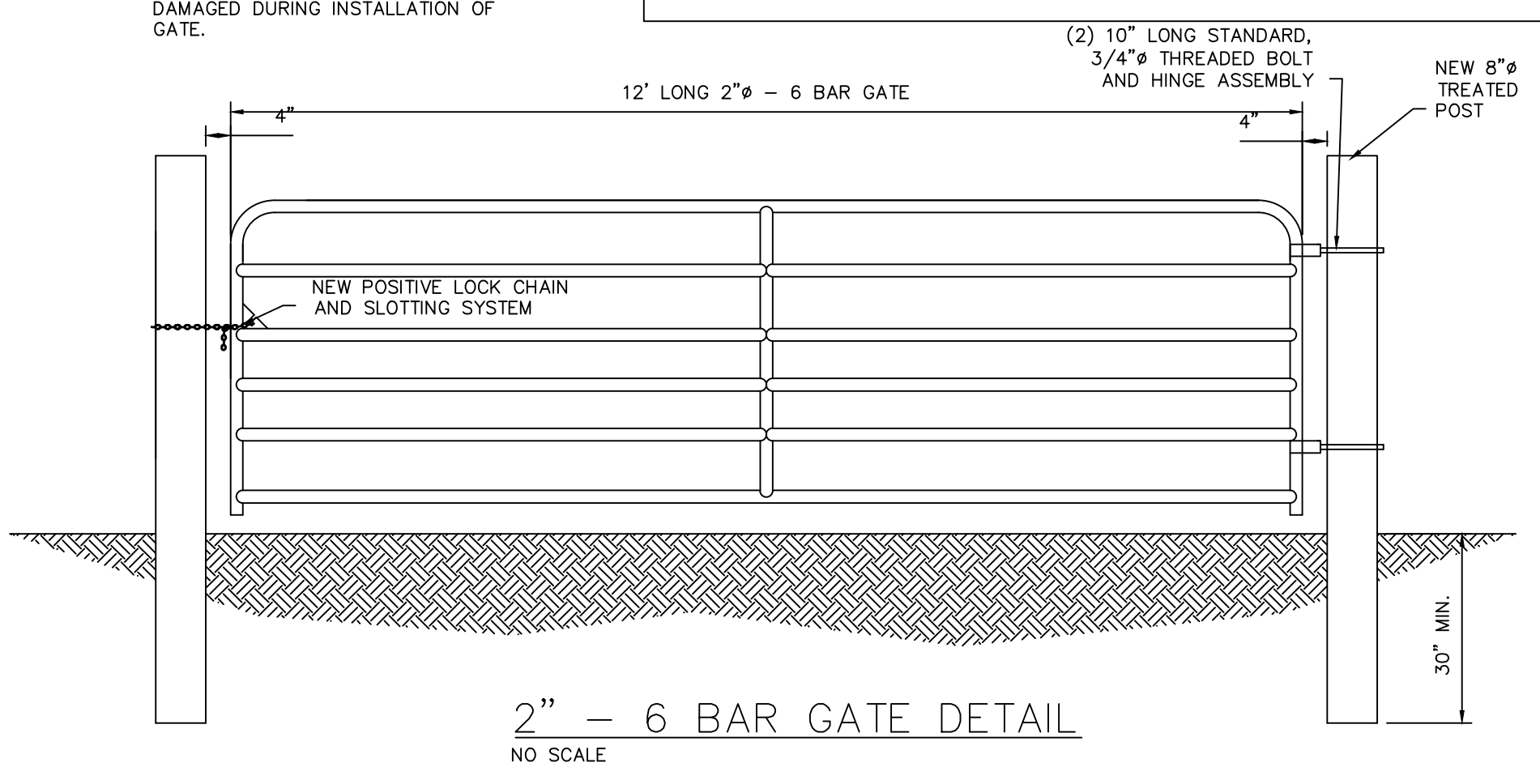
C-115

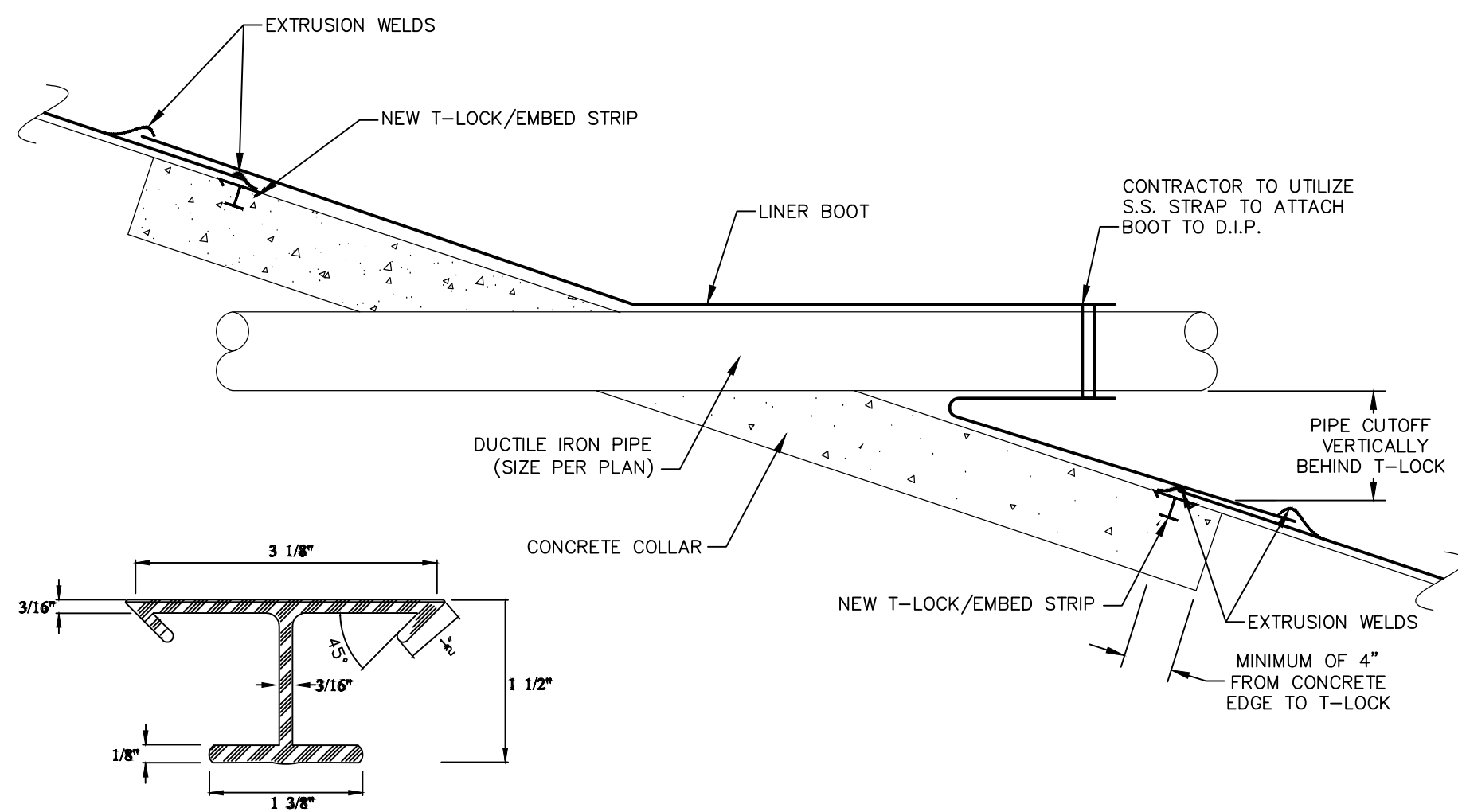
16 OF 18 SHEETS
05/20/24



1. Backfill material for underground electric shall be suitable earth, free from large rocks or stones.
2. All trenches in areas of unsuitable earth used for underground electric shall have a bedding of well-graded, 1" minus, granular backfill from 4" below the bottom of the pipe to one-half the diameter of the pipe compacted to 95% of the Standard Proctor Density. (ASTM D-698)
3. In areas of clean dirt cuts outside of paved areas, trench may be backfilled with same material and compacted to 95% of the Standard Proctor Density. (ASTM D-698)
4. In areas of rock cut, the trench shall be backfilled with well-graded granular compacted material to six inches above top of pipe.
5. Contractor shall be responsible for trench settlement.
6. In paved (or gravel) areas well-graded 1" minus granular backfill compacted to 95% of Standard Proctor Density (ASTM-698) shall be used.
7. Tracer tape shall be 3" wide, bonded layer plastic with magnetic foil core, Terra Tape Detectable, manufactured by Griffolyn Co. of Houston, Texas, and shall have the words "Caution: ELECTRICAL CONDUIT BURIED BELOW"

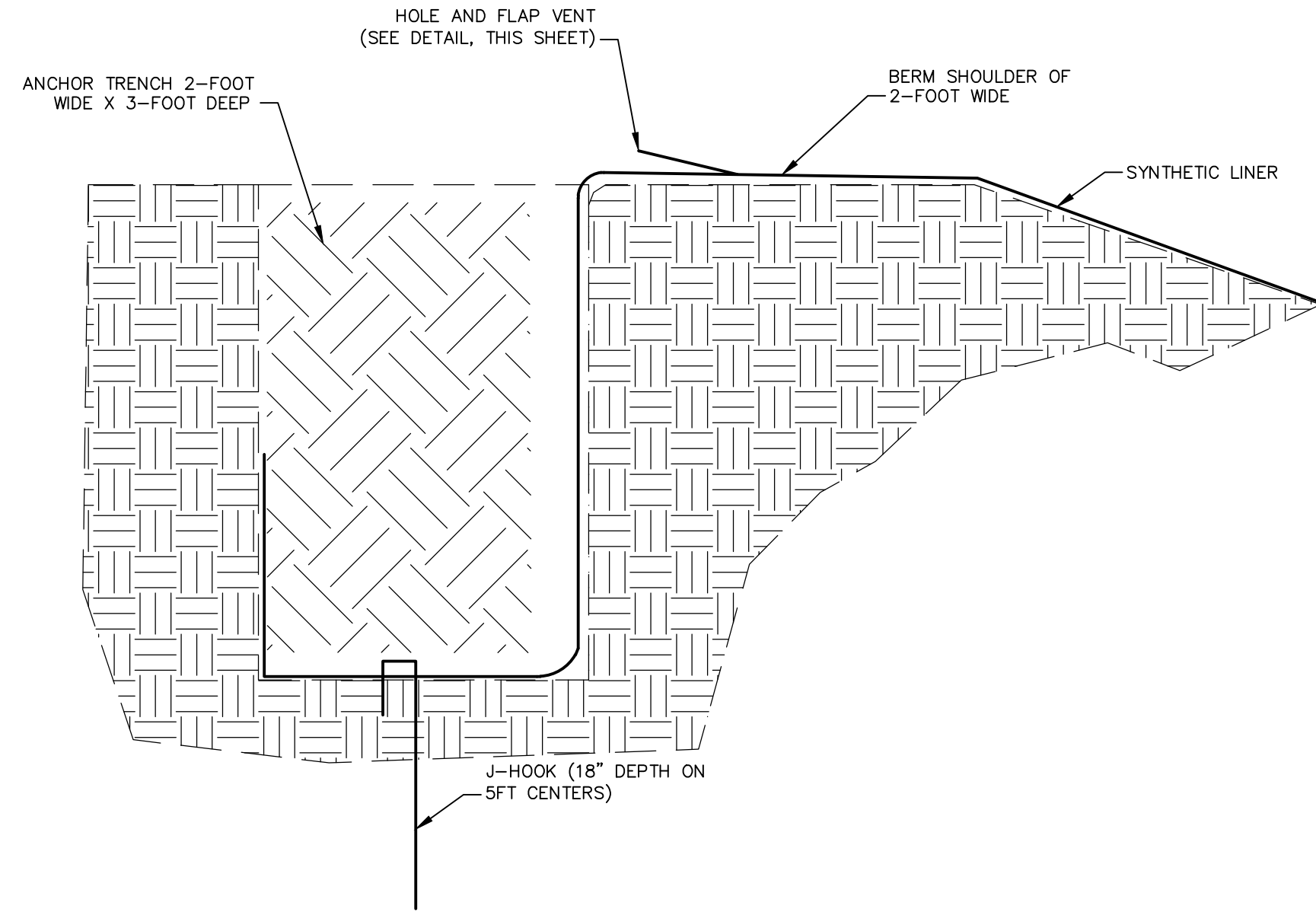
UNDERGROUND ELECTRIC TRENCHING DETAIL
NO SCALE



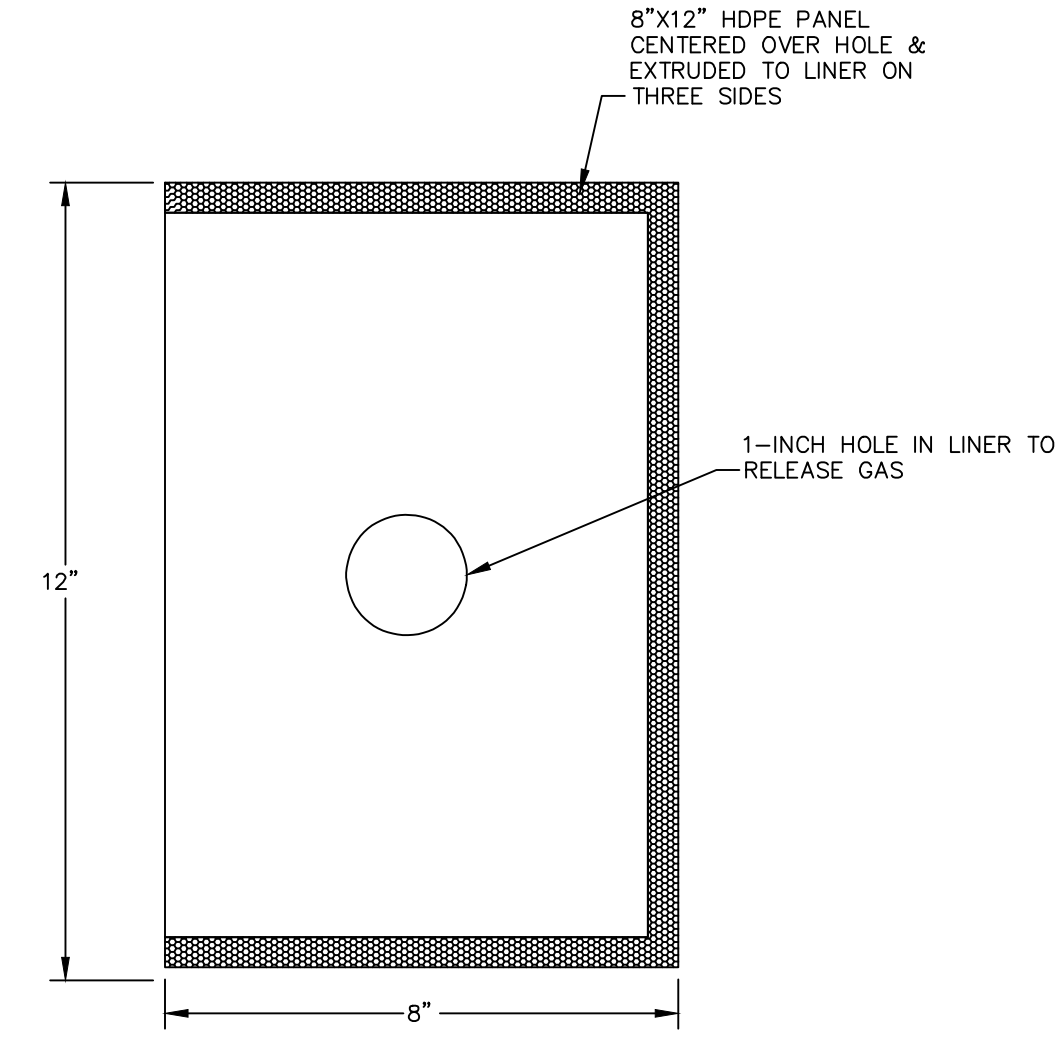


T-Lock / Embedment Strip Profile

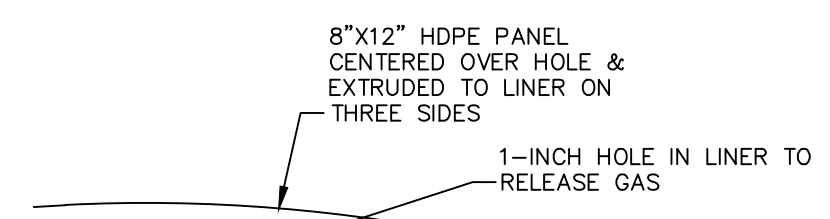
LINER BOOT/ PIPE PENETRATION DETAIL
NO SCALE



LINER PERIMETER CROSS SECTION
NO SCALE

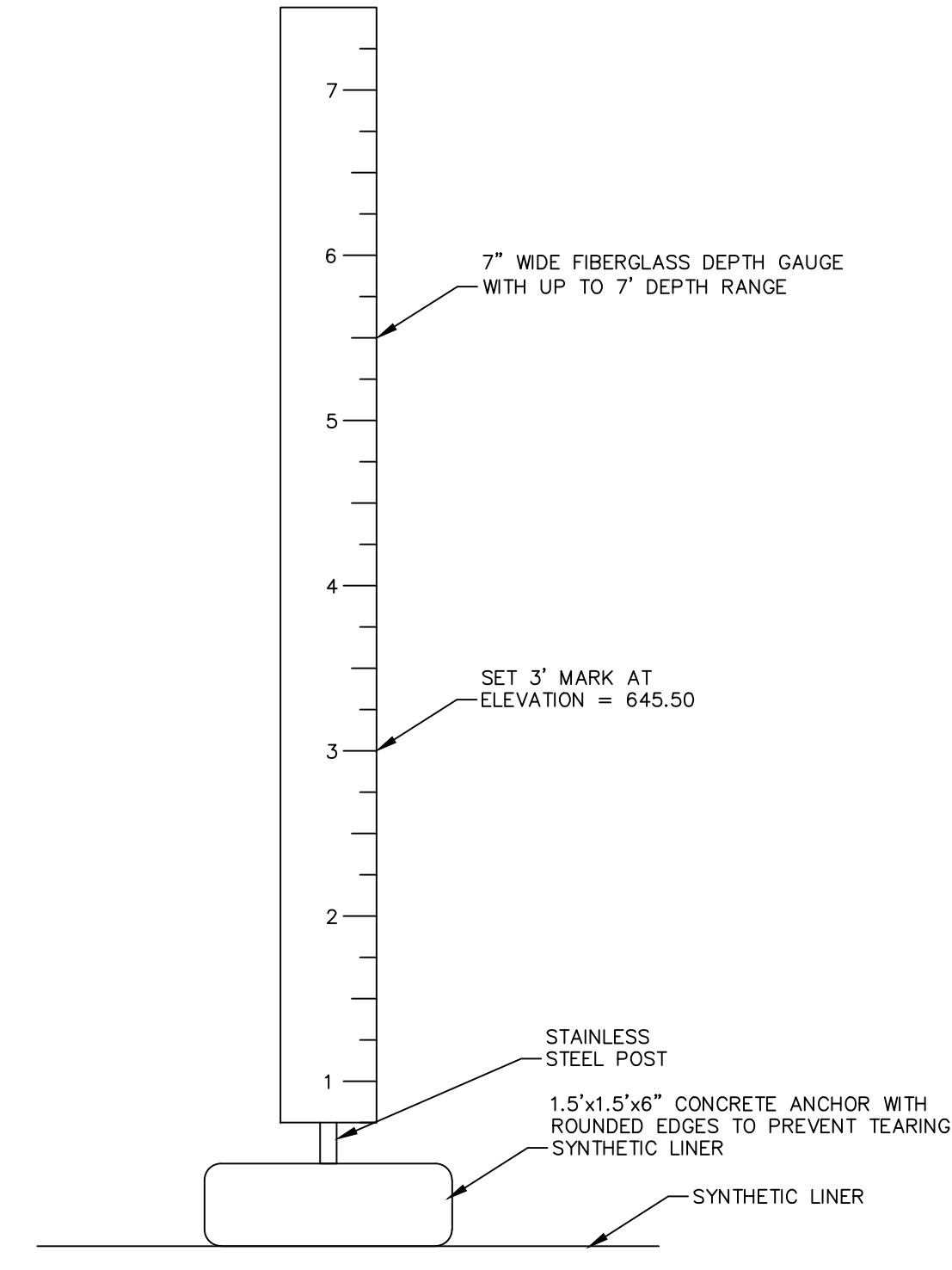


PLAN VIEW

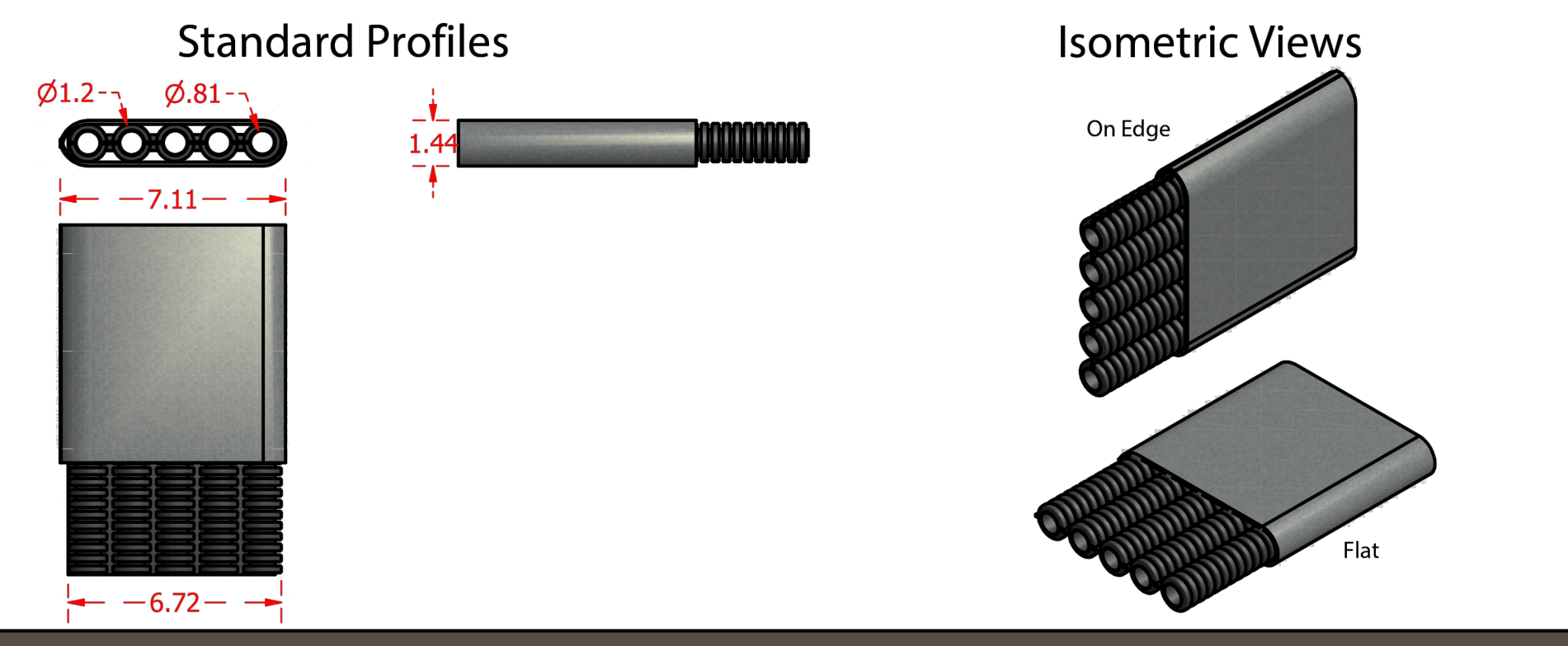


SECTION VIEW

LINER POCKET VENT DETAIL



GAUGE DETAIL



Multi-Flow Product Data Sheet - #06300 6" Multi-Flow Drain Pipe

Geo-Textile Filter		
Property	Test Method	Value
Weight (oz/sq2)	ASTM D-3776	4
Tensile Strength	ASTM D-4632	100
Elongation, %	ASTM D-4632	50
Puncture, lb	ASTM D-4833	50
Mullen Burst, psi	ASTM D-3786	200
Trapezoidal Tear, lb	ASTM D-4533	42
Coefficient of Perm, cm/s	ASTM D-4491	0.1
Flow Rate, gpm/ft2	ASTM D-4491	100
Permittivity, 1/sec	ASTM D-4491	1.8
A.O.S. Max US Std Sieve	ASTM D-4751	70
UV Stability, 500 hrs, %	ASTM D-4355	70
Seam Strength, lb/ft	ASTM D-4595	100
Fungus	ASTM G-21	No Growth

All values given represent minimum average roll values
*Horizontal installation, gradient = 0.1, pressure = 10 psi for 100 hours



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ASSET # 7815216018

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CAD DWG FILE: X2310-DT-504
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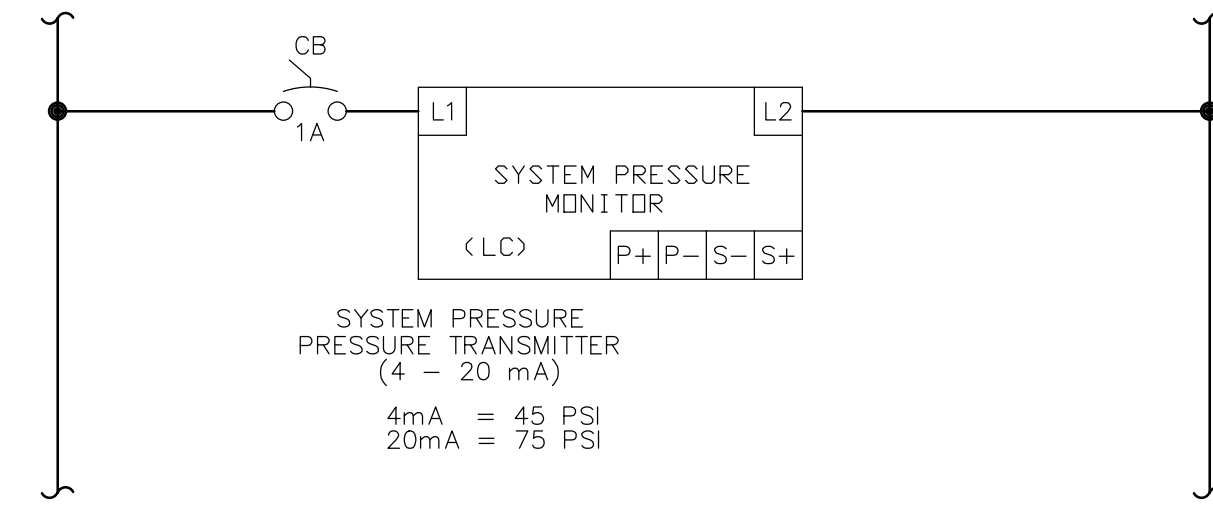
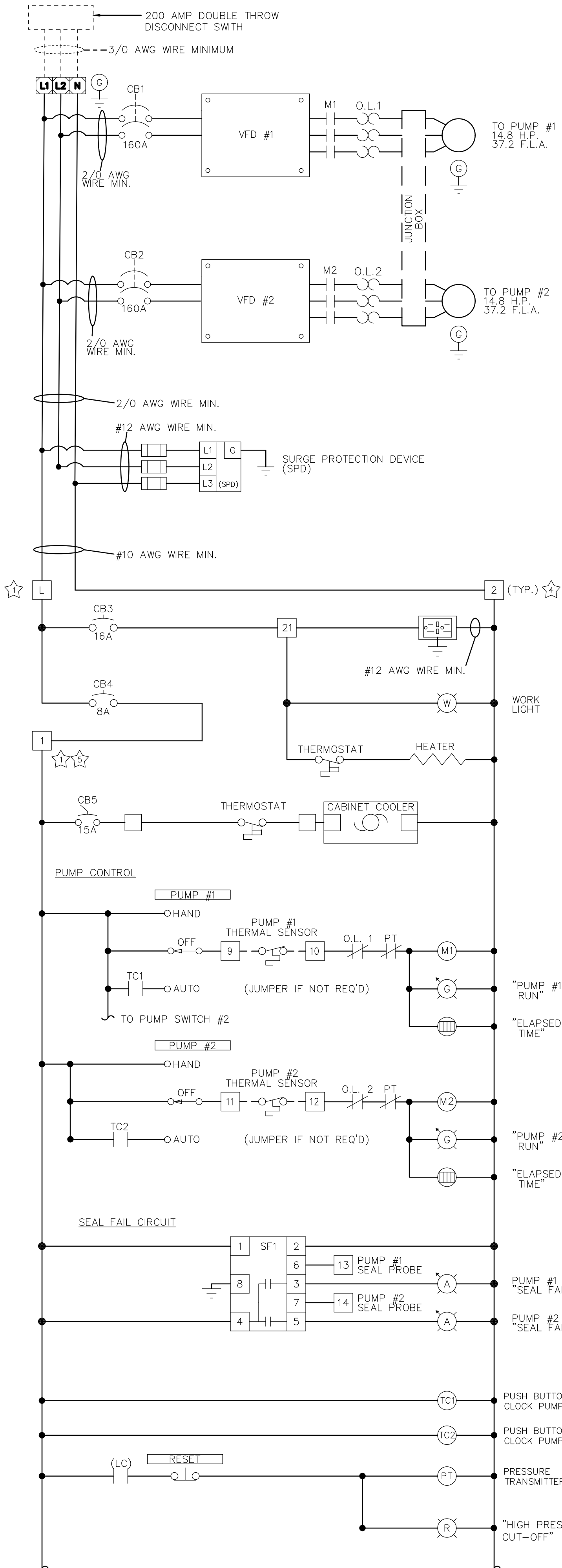
SHEET TITLE:
DETAIL SHEET

SHEET NUMBER:

C-116

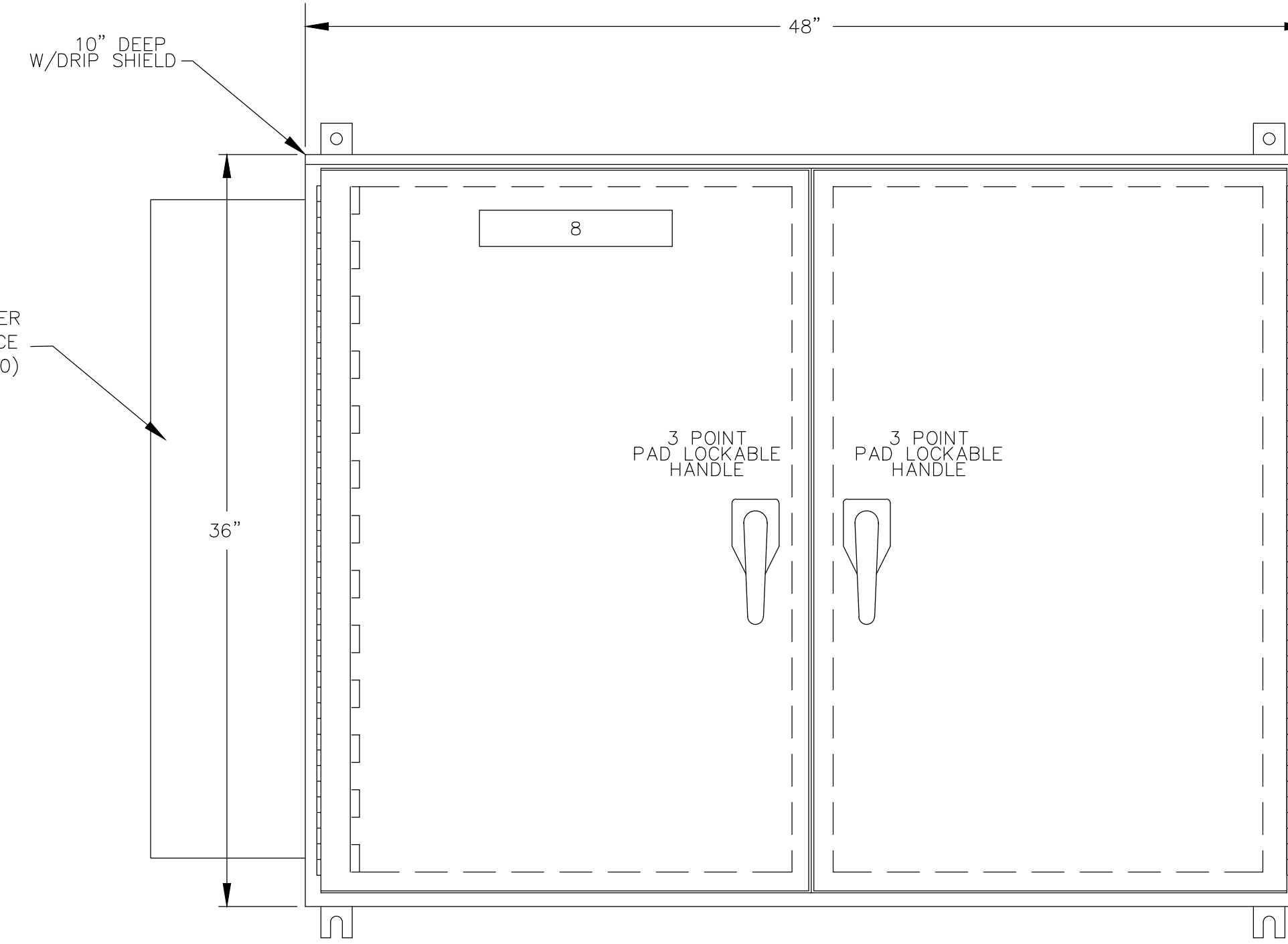
17 OF 18 SHEETS
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230 VAC, SINGLE PHASE, 60 HZ

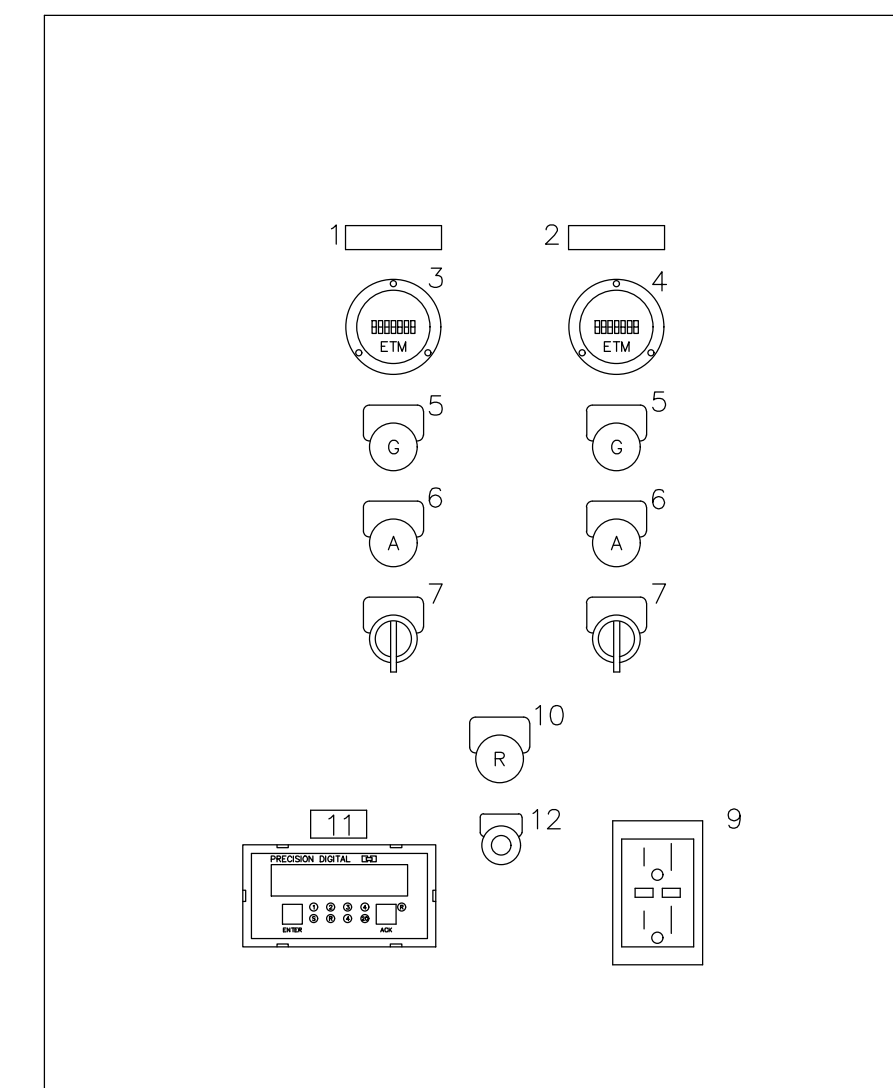


NOTE:
PANEL PROVIDER SHALL HAVE ALL EQUIPMENT AND ELECTRICAL COMPONENTS FACTORY TESTED PRIOR TO SHIPPING TO SITE AND INSTALLATION ON RACK SYSTEMS.

- GENERAL NOTES:**
- CONTROL PANEL AND ENCLOSURES SHALL FOLLOW ALL NFPA 70 AND NFPA 820 RULES AND REGULATIONS AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THEIR SUBCONTRACTORS TO MEET OR EXCEED.
 - ALL ENCLOSURES SHALL INCLUDE INTRINSICALLY SAFE DEVICES FOR OPERATION AND MONITORING OF THE FACILITIES.
 - CONTRACTOR AND THEIR SUBCONTRACTORS SHALL BE RESPONSIBLE FOR MEETING OR EXCEEDING NEC 801 RULES AND REGULATIONS FOR INSTALLATION OF ELECTRICAL MATERIALS.
 - ALL ENCLOSURES SHALL FOLLOW AND MEET ELECTRICAL SPECIFICATIONS.



NEMA ENCLOSURE W/WHITE SUBPANEL & INNER DOOR



INNER DOOR LAYOUT

NAMEPLATE LEGEND

- PUMP #1
- PUMP #2
- hour meter PUMP #1
- hour meter PUMP #2
- RUN
- SEAL FAIL
- HAND-OFF-AUTO
- PUMP CONTROL PANEL
- ELECTRICAL OUTLET
- HIGH PRESSURE CUT-OFF
- SYSTEM PRESSURE
- RESET BUTTON

SYMBOL LEGEND

- POWER BLOCK
- TERMINAL BLOCK
- FUSE
- RELAY OR COIL
- REMOTE WIRING



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SHEET TITLE:
CONTROL PANEL PLAN

SHEET NUMBER:

C-117

18 OF 18 SHEETS
05/20/24