June 5, 2026

City of Bryan Development Services
300 S. Texas Ave.
Bryan, TX 77803

Subject: **Site Plan Upload**
Site Plan Development Project Application
Messer LLC Air Separation Unit Facility
1096 Boatcallie Rd., Bryan, TX 77808

Messer LLC (Messer) is submitting this overview cover letter and attachments for the Site Plan Upload in support of a Site Plan Development Project Application for development of a new Messer Air Separation Unit (ASU) Facility located at 1096 Boatcallie Rd, Bryan, TX 77808.

Note that Messer LLC is the property owner, but the City of Bryan Development Services Online Permitting Portal shows the property owner incorrectly as GRT INTERESTS LLC (and this field cannot be edited). GRT INTERESTS LLC was the prior property owner and may have had prior applications but this Site Plan Development Project Application by Messer LLC is for the development of the ASU Facility under Messer's ownership.

Attachment A provides a Site Plan Drawings Reference Table to cross reference the drawings provided with the site plan requirements. Please also note the following:

- Detailed drawings and related information regarding the proposed administration building, truck maintenance building, and workshop building can be submitted later, once available;
- The truck maintenance building will have an oil/water interceptor located exterior to the building that will serve as a wastewater pre-treatment device but the related drawings/information can be submitted later once available;
- Drawings/information regarding proposed signage can be submitted later, once available;
- Details relating to compliance with Chapter 102 (Solid Waste) of the City of Bryan, Texas, Code of Ordinances can be submitted later, once available; and,
- Landscaping plans (in compliance with Section 62-429 of the City of Bryan, Texas, Code of Ordinances) can be submitted later, once available.

Attachment B includes the Site Improvement Package drawings. In this Package, drawing 566901-C-D-001-001 (Civil Cover Sheet) provides an index of other drawings/sheets/plans/specifications included in this Site Plan Upload package. **Attachment C** includes redline conceptual mark-ups on two of the Site Improvement Package drawings for coordination purposes only as revisions to those two drawings are planned (for a subgrade underdrain update) and those updated drawings to reflect the redline updates will

be submitted once available. Reference drawings are provided in **Attachment D**. Stormwater Pollution Prevention Plans are provided in **Attachment E**. Relevant City of Bryan specifications are provided in **Attachment F**. Relevant Middough specifications are provided in **Attachment G**. Relevant Messer specifications are provided in **Attachment H**. Additionally, a Stormwater Management Report is provided in **Attachment I**.

We look forward to the initiation of the Site Plan Development Project Application Review. Please contact me at 346-213-9313 or Alex.Gomez@messer-us.com if you have questions or require additional information.

Sincerely,

Alejandro J Gomez Aponte

Alejandro (Alex) J. Gomez Aponte
Principal Project Manager
Messer LLC

Attachments:
Attachment A – Site Plan Drawings Reference Table
Attachment B – Site Improvement Package
Attachment C – Site Improvement Package Drawings for Coordination
Attachment D – Stormwater Pollution Prevention Plans
Attachment E – Reference Drawings
Attachment F – City of Bryan Specifications
Attachment G – Middough Specifications
Attachment H – Messer Specifications
Attachment I – Stormwater Management Report

Attachment A

Site Plan Drawings Reference Table

MEU2510 - Messer Bryan, TX ASU
Site Plan Drawings Reference Table
5/14/2026

Item	Permit Requirement	Included on Drawing (Y/N)	Comments	Associated Drawing(s) # - Included in Permit Package
1	Site plan shall not exceed 24-in by 36-in nor less than 8.5-in by 11-in and drafted at an appropriate engineering scale.	Y	Ordinance satisfied.	All Civil Drawings.
2	Property lines of subject site and all adjoining parcels, platted or unplatted. Parcels shall be identified with the legal description and owner's name.	Y	Ordinance satisfied.	Property lines included on Middough produced drawings, legal description included in Kerr produced Survey - TOPOGRAPHIC EXHIBIT SHEET 1 OF 2, TOPOGRAPHIC EXHIBIT SHEET 2 OF 2, ALTA/NSPS Land Title Survey Plat
3	Boundaries of the property with dimensions, and with building setback lines on all sides.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, grading plans 566901-C-D-005…utility plans 566901-C-D-006…and Survey drawings.
4	Existing and proposed streets, alleys, lots, reservations, public and private easements and areas dedicated to public use. Easements labeled as to type and volume and page. Show all driveways, rights-of-way, and street intersections that are adjacent to or directly across from the subject site.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, grading plans 566901-C-D-005…utility plans 566901-C-D-006…and Survey drawings.
5	Location and design of all vehicular access to and from site onto public rights-of-way, indicating location and size of all driveways (including those on adjacent property and opposite side of the street), curb return radii, curb cuts and location and size of sidewalks and ambulatory ramps when and where required. For any development abutting frontage roads, all entrance and exit ramps shall be shown on the vicinity map.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, and Vehicle Turn Plans 566901-ZD-D-900-006 through 566901-ZD-D-900-009
6	Location of existing and proposed buildings-number of stories, gross square footage of building; solid line indicating slab location and dashed lines indicating line of roof overhangs; AC unit pads and covered entries; retaining walls, fences, culverts, bridges, roadways, etc. The structures to be removed or abandoned shall be shown with dotted lines.	Y	The administration building, truck maintenance building and workshop building drawings are by others and will be permitted as a separate package.	See applicable site plans 566901-C-D-004 series
7	Location of existing and proposed storm drainage structures, storm sewers, grates, inlets, detention ponds, etc., with pipe sizes, grades and direction of flow and associated drainage easements, if any.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, grading plans 566901-C-D-005…utility plans 566901-C-D-006…and Civil Notes and Details 566901-C-D-008…
8	Limits of existing flood hazard areas within and adjacent to the property, accurately showing the limits of building encroachments and earth fill within this area, with 100-year water surface elevations and proposed finished floor elevations denoted. For any encroachment of buildings or fill in the flood hazard area, the developer must have previously met the requirements set forth in chapter 46.	N	Ordinance satisfied.	Zone X - See survey drawings. Plant is not within the flood plain.
9	Location of existing and proposed utilities (water, sanitary sewer, cable television, gas, electric and telephone) with service sizes, tap and meter locations, service types, grades and direction of flow. Related easements that will accommodate more than one utility shall be shown and described.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, and utility plans and profiles 566901-C-D-006...
10	Location of power poles, guy wires, pad mount transformers, and other major electrical equipment.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004…, utility plans and profiles 566901-C-D-006…and applicable electrical drawings.
11	Location of existing and proposed fire hydrants and the vehicle lay-of-hose distance.	Y	Ordinance satisfied.	See applicable utility plans and profiles 566901-C-D-006… and vehicle turn plan 566901-ZD-D-900-006
12	Location of existing and proposed contour lines with spot elevations for proposed top-of-curb and parking lot slabs. The city engineer will determine the extent to which this information will be shown in accordance with chapter 46.	Y	Ordinance satisfied.	See applicable grading plans 566901-ZD-D-005…
13	Location and screening or description to indicate control and handling of solid waste. Indicate location and size of dumpster pad when dumpster is to be used.	N	Messer will separately discuss their plans for waste management with the City.	Not addressed with this submittal. If required for dumpster location on site plans, update drawing showing accessible location meeting ordinances will be provided.
14	The planned use or uses of the site.	N	Not applicable to/ stated on engineering drawings. This should be explained by permit applicant responsible party or Messer .	N/A
15	Location and design of any off-street parking areas, including handicapped parking and loading areas, showing size and location in compliance with city standards and Texas Accessibility Standards. Customer parking areas must be clearly defined and separate from areas to be used for display.	Y	Ordinance satisfied.	See applicable site plans 566901-C-D-004… & grading plans 566901-C-D-005…
16	Name of development, legal description of property, north arrow, scale, acreage name and address of owner, engineer, draftsperson, architect and land planner.	Y	Ordinance satisfied.	See Civil Cover Sheet 566901-C-D-001-001
17	Both vicinity map and site plan shall be oriented with parallel north arrows. North arrow shall be oriented generally upward.	Y	Ordinance satisfied.	See applicable plans sheets.
18	Zoning designation as determined by the official zoning map.	Y	Ordinance satisfied.	Planned Development-Industrial (PD-I) per survey drawings.
19	Landscaping plan as required by article VII.	N	Requirements for the landscape plan will be resolved throughout the permit review process.	N/A
20	Address of property as assigned by planning and development services.	Y	Ordinance satisfied.	See Civil Cover Sheet 566901-C-D-001-001.
21	Area designated for placement of debris during construction and wash out area for concrete trucks.	Y	Ordinance satisfied.	See applicable SWPPP drawings 566901-C-D-009… and Construction Access Plan 566901-ZD-D-900-003.
22	Location and pavement type for temporary access for vehicles during construction.	Y	Ordinance satisfied.	See applicable Site Plans 566901-C-D-004… and Construction Access Plan 566901-ZD-D-900-003.
23	Location of all wastewater pre-treatment devices and sampling well, as applicable.	Y	The truck maintenance building will have an oil/water interceptor located exterior to the building. This building including the interceptor will be permitted as a separate package.	See applicable utility plan 566901-C-D-006-201 for identification of oil/water interceptor. The lift station will serve as the sampling point for the City. See the wastewater underground utility plan 566901-C-D-006-201 for lift station location.
24	All existing and proposed signage, including height, square footage, setbacks, and landscaping.	Y	Any intended monument signage or exterior building signage will be addressed under a separate Signage package by the Owner and is not part of the subject Site Plan package.	See applicable site plans 566901-C-D-004… for site roadway and directional signage.
25	Additional information or engineering data, in such form and content as necessary, to determine that the site plan meets the standards of the City.	Y	Acknowledged.	As appropriate.
26	Fire Striping, access control gates across fire lane, barricades,	Y	Ordinance satisfied.	See applicable Site Plans 566901-C-D-004…, Site Fencing Plan 566901-C-D-004-004, Civil Notes & Details 566901-C-D-008-002 and electrical drawings.

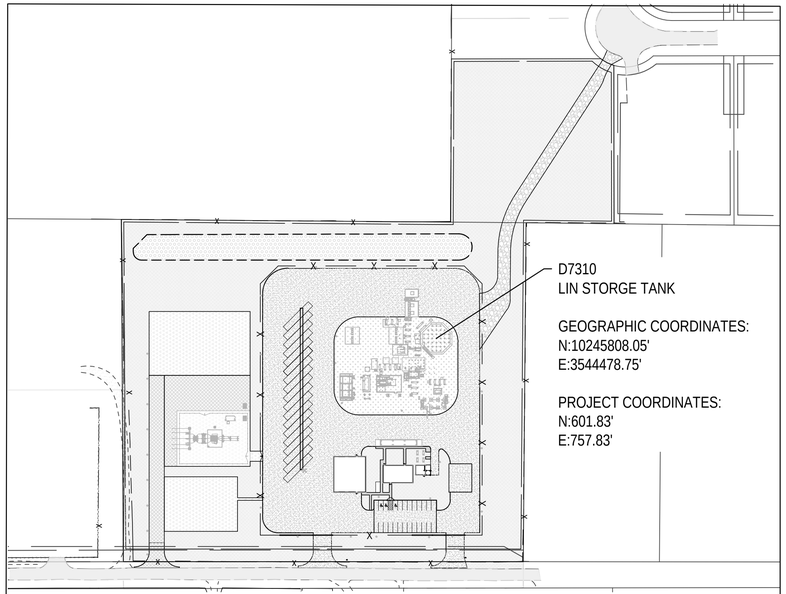
Attachment B

Site Improvement Package

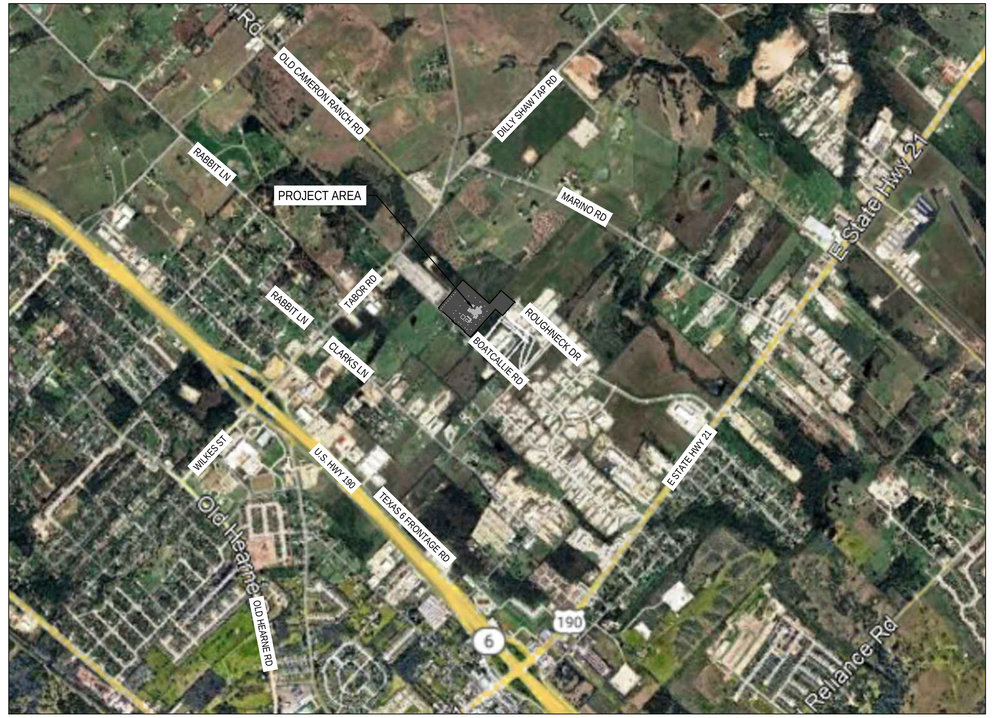
SITE IMPROVEMENT PACKAGE

MESSER
AIR SEPARATION UNIT
BRYAN ASU

1096 BOATCALLIE ROAD
BRYAN, TEXAS 77808



PROJECT SITE MAP
SCALE: N.T.S.



SOURCE:
GOOGLE EARTH

LOCATION MAP
(N.T.S.)
LATITUDE: 30.714429°
LONGITUDE: -96.362163°

N

SHEET INDEX	
SITE IMPROVEMENT PACKAGE	
DRAWING TITLE	DRAWING NUMBER
CIVIL COVER SHEET - SITE IMPROVEMENT PACKAGE	566901-C-D-001-001
EXISTING CONDITIONS PLAN	566901-C-D-002-001
SITE PREPARATION PLAN	566901-C-D-003-001
SITE PLAN - GEOGRAPHICAL SOUTH AREA	566901-C-D-004-001
SITE PLAN - GEOGRAPHICAL NORTH AREA	566901-C-D-004-002
SITE PLAN - TABLES	566901-C-D-004-003
SITE PLAN - SITE FENCING PLAN	566901-C-D-004-004
GRADING PLAN - OVERALL SITE	566901-C-D-005-001
GRADING PLAN - GEOGRAPHICAL SOUTH AREA	566901-C-D-005-101
GRADING PLAN - GEOGRAPHICAL NORTH AREA	566901-C-D-005-102
UNDERGROUND UTILITY PLAN - OVERALL SITE	566901-C-D-006-001
UNDERGROUND UTILITY PLAN - STORM SEWER - GEOGRAPHICAL SOUTH AREA	566901-C-D-006-101
UNDERGROUND UTILITY PLAN - STORM SEWER - GEOGRAPHICAL NORTH AREA	566901-C-D-006-102
STORM SEWER PROFILES	566901-C-D-006-103
STORM SEWER PROFILES	566901-C-D-006-104
UNDERGROUND UTILITY PLAN - WASTEWATER	566901-C-D-006-201
UNDERGROUND UTILITY PLAN - WASTEWATER	566901-C-D-006-202
WASTEWATER PROFILES	566901-C-D-006-203
UNDERGROUND UTILITY PLAN - WATER - GEOGRAPHICAL SOUTH AREA	566901-C-D-006-301
UNDERGROUND UTILITY PLAN - WATER - GEOGRAPHICAL NORTH AREA	566901-C-D-006-302
WATER PROFILES	566901-C-D-006-303
WATER PROFILES	566901-C-D-006-304
CIVIL NOTES AND DETAILS	566901-C-D-008-001
CIVIL NOTES AND DETAILS	566901-C-D-008-002
CIVIL NOTES AND DETAILS	566901-C-D-008-003
CIVIL NOTES AND DETAILS	566901-C-D-008-004
CIVIL NOTES AND DETAILS	566901-C-D-008-005
CIVIL NOTES AND DETAILS	566901-C-D-008-006
CIVIL NOTES AND DETAILS	566901-C-D-008-007
CIVIL NOTES AND DETAILS	566901-C-D-008-008
CIVIL NOTES AND DETAILS	566901-C-D-008-009
CIVIL NOTES AND DETAILS	566901-C-D-008-010
CIVIL NOTES AND DETAILS	566901-C-D-008-011

SCOPE OF WORK:

THE SCOPE OF WORK FOR THE SITE IMPROVEMENT PACKAGE INCLUDES DRAWINGS, DETAILS, SPECIFICATIONS AND NOTES FOR LAND DISTURBING ACTIVITIES RELATED TO PROPOSED INFRASTRUCTURE INCLUDING:

A. MASS GRADING/FINAL GRADING
B. ROADWAYS AND PAVING
C. SITE FENCING
D. CIVIL UNDERGROUND UTILITIES (STORM SEWER, DOMESTIC SANITARY SEWER, PROCESS INDUSTRIAL WASTEWATER, DOMESTIC (POTABLE) WATER, PROCESS (NON-POTABLE) WATER, FIRE PROTECTION WATER).

STORMWATER POLLUTION PREVENTION PLANS INDEX	
DRAWING TITLE	DRAWING NUMBER
STORMWATER POLLUTION PREVENTION PLAN - COVER SHEET	566901-C-D-009-001
STORMWATER POLLUTION PREVENTION PLAN - SITE PLAN - PHASE A	566901-C-D-009-002
STORMWATER POLLUTION PREVENTION PLAN - SITE PLAN - PHASE B	566901-C-D-009-003
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-004
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-005
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-006
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-007
REFERENCE DRAWINGS	
DRAWING TITLE	DRAWING NUMBER
GEOGRAPHICAL/PROJECT COORDINATE TRANSFORMATION	566901-ZD-D-001-001
SITE VICINITY PLAN	566901-ZD-D-900-001
SITE PLOT PLAN	566901-ZD-D-900-002
CONSTRUCTION ACCESS PLAN	566901-ZD-D-900-003
PRELIMINARY GRADING PLAN	566901-ZD-D-900-004
PRELIMINARY UTILITY PLAN - UTILITY COORDINATION	566901-ZD-D-900-005
VEHICLE TURN PLAN - EMERGENCY VEHICLES	566901-ZD-D-900-006
VEHICLE TURN PLAN - CONSTRUCTION ACCESS	566901-ZD-D-900-007
VEHICLE TURN PLAN - OPERATIONS TRUCK ROUTING	566901-ZD-D-900-008
VEHICLE TURN PLAN - OPERATIONS TRUCK ROUTING	566901-ZD-D-900-009
TOPOGRAPHIC EXHIBIT BY KERR SURVEYING, DATED: 06/18/2025	25-0712-S (SHEET 1 OF 2)
TOPOGRAPHIC EXHIBIT BY KERR SURVEYING, DATED: 06/18/2025	25-0712-S (SHEET 2 OF 2)
ALTA/NSPS LAND TITLE SURVEY PLAT BY KERR SURVEYING, DATED: 01/13/2026	25-0712-ALTA

CITY OF BRYAN SPECIFICATIONS INDEX	
DOCUMENT TITLE	DOCUMENT NUMBER
CEMENT STABILIZED SAND BACKFILL	SECTION 31 23 23.53
MAIN LINE VALVES	SECTION 33 12 16
FIRE HYDRANTS	SECTION 33 12 19
SEEDING FOR EROSION CONTROL	SECTION 32 92 19
POLYVINYLCHLORIDE PIPE AND FITTINGS	SECTION 33 05 01
DUCTILE IRON PIPE	SECTION 33 05 02
MIDDOUGH SPECIFICATIONS INDEX	
DOCUMENT TITLE	DOCUMENT NUMBER
SUBDRAINAGE	566901-C-S-334600-001
FACILITY SANITARY SEWERS	566901-C-S-221313-001
CONCRETE PAVING	566901-C-S-321313-001
TURF AND GRASSES	566901-C-S-329200-001
SITE WATER DISTRIBUTION PIPING	566901-C-S-331415-001
STORMWATER CONVEYANCE	566901-C-S-334200-001
MESSER SPECIFICATIONS INDEX	
DOCUMENT TITLE	DOCUMENT NUMBER
PVC PIPING MATERIAL SPECIFICATION	00000-P-S-001/1P1
HDPE PIPING MATERIAL SPECIFICATION - 150# (1P4)	00000-P-S-001/1P4
SPECIFICATIONS FOR UNDERGROUND PIPING TRACER WIRE	00000-P-S-747
CLEANING STANDARD FOR PIPING, VESSELS AND COMPONENTS	00000-P-S-084-00-1
PIPING SYSTEM PRESSURE AND LEAK TESTING SPECIFICATION	00000-P-S-104
PIPING SYSTEM HYDROSTATIC TESTING SPECIFICATION	00000-P-S-105

STATE OF TEXAS
JOSEPH MICHAEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

ENGINEER'S CONTACT:
MIDDOUGH
1901 EAST 13TH STREET, SUITE 400
CLEVELAND, OHIO 44114
(216) 367-6163
JOSEPH KHATER, PE
JOSEPH.KHATER@MIDDOUGH.COM

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL COVER SHEET
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-001-001
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

c:\acc\accdocs\middough inc\meu2510 - messer - bryan asu\project files\meu2510\middough\05_civil 3d\meu2510_civil-cover sheet.dwg

TBM #3

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10246316.53
E:3544987.60

PROJECT COORDINATES
US FOOT
N:-116.11
E:712.71

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10246419.55
E:3544695.36

PROJECT COORDINATES
US FOOT
N:0.00
E:1000.00

PROPERTY LINE S 48°42'14" E 295.59'

PROPERTY LINE N 41°40'26" E 322.89'

PROPERTY LINE S 41°19'16" W 313.56'

L=29.176, R=80.000

ROUGHNECK DR

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245757.91
E:3545445.18

PROJECT COORDINATES
US FOOT
N:0.00
E:0.00

PROPERTY LINE S 48°06'52" E 652.22'

PROPERTY LINE N 47°54'26" W 174.18'

D7310
LIN STORAGE TANK

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245808.05
E:3544478.75

PROJECT COORDINATES
US FOOT
N:601.83
E:757.83

N 41°05'04" E 677.34'

PROPERTY LINE S 41°53'39" W 670.90'

TBM #1

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245904.54
E:3543690.36

PROJECT COORDINATES
US FOOT
N:1051.11
E:1412.82

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245669.72
E:3544033.72

PROJECT COORDINATES
US FOOT
N:1000.00
E:1000.00

APPROXIMATE LOCATION OF 30' WIDE PIPELINE EASEMENT

PROPERTY LINE N 48°34'30" W 791.90'

23' WIDE CITY OF BRYAN ELECTRICAL TRANSMISSION EASEMENT

BOATCALLIE RD

TBM #2

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245336.50
E:3544326.92

PROJECT COORDINATES
US FOOT
N:1055.87
E:559.68

GEOGRAPHIC COORDINATES
NSRS 2011 TEXAS STATE PLANES
CENTRAL ZONE, US FOOT
N:10245008.09
E:3544783.55

PROJECT COORDINATES
US FOOT
N:1000.00
E:0.00

EXISTING CONDITIONS AND CAD MODELING:

THE TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT BY KERR SURVEYING DATED 6/18/2025, PRODUCED USING CONVENTIONAL GROUND SURVEY TECHNIQUES AND SUPPLEMENTED WITH ORTHO-RECTIFIED IMAGERY AND SURFACE INFORMATION OBTAINED BY AERIAL DRONE LIDAR METHODS WERE USED FOR THE PREPARATION OF THE EXISTING CONDITIONS CAD MODELING FOR THIS PROJECT.

GEOGRAPHICAL COORDINATES:

PER THE TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT, THE GEOGRAPHIC COORDINATE SYSTEM IS BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (4203), GRID NORTH AS ESTABLISHED FROM GPS OBSERVATION USING THE LEICA SMARTNET NAD83 (NA2011) EPOCH 2010 MULTI-YEAR CORS SOLUTION 2 (MYCS2).

VERTICAL ELEVATION DATUM:

THE VERTICAL ELEVATION DATUM USED IS NAVD 1988 (GEOIDI12B).

GEOGRAPHICAL AND PROJECT HORIZONTAL COORDINATES AND ELEVATION DATUM:

PROJECT COORDINATES AND ELEVATIONS HAVE BEEN ESTABLISHED IN ADDITION TO THE GEOGRAPHICAL COORDINATES AND ELEVATIONS. THE CIVIL SERIES DRAWINGS UTILIZE THE GEOGRAPHICAL COORDINATE SYSTEM. THE REMAINDER OF THE DISCIPLINE SPECIFIC DRAWINGS UTILIZE THE PROJECT COORDINATE SYSTEM. CIVIL DRAWINGS USE THE NAVD88 ELEVATION DATUM AND THE OTHER MIDDOUGH DISCIPLINE DRAWINGS USE THE PROJECT ELEVATION DATUM.

366.75' (NAVD 88) = 100.00' (PROJECT)
SUBTRACT 266.75 FEET FROM GEOGRAPHICAL ELEVATIONS TO OBTAIN PROJECT ELEVATIONS.
ADD 266.75 FEET TO PROJECT ELEVATIONS TO OBTAIN GEOGRAPHICAL ELEVATIONS.

THE PROJECT COORDINATE GRID SYSTEM, IDENTIFIED BY COORDINATES (0,0), (0,1000), (1000,0) & (1000,1000) ARE SET RELATIVE TO PROJECT CONDITIONS (PROPERTY LINES, ETC.) AND THE CENTER OF THE D7310 LIN STORAGE TANK. NO PHYSICAL CONTROL POINTS HAVE BEEN SET IN THE FIELD FOR THESE PROJECT COORDINATES SHOWN.

CONTROL POINTS:

AS SHOWN ON THIS DRAWING, THREE TEMPORARY CONTROL POINTS (TBM #1, TBM#2, AND TBM#3) HAVE BEEN SET BY KERR SURVEYING. PROJECT COORDINATES HAVE BEEN ASSIGNED TO THESE POINTS TO AID THE CONTRACTOR IN ESTABLISHING THE PROJECT COORDINATE GRID SYSTEM. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THE PROVIDED COORDINATES. BY SURVEYING METHODS, PRIOR TO CONSTRUCTION. IT SHALL ALSO BE THE CONTRACTORS RESPONSIBILITY TO ESTABLISH HIS OWN PERMANENT CONTROL POINTS/BENCHMARKS FOR CONSTRUCTION PURPOSES.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
W	WATER
G	NATURAL GAS
	STORM SEWER
OHL	AERIAL POWER/COMMUNICATION
S	SANITARY SEWER
WW	PROCESS WASTEWATER

SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	EXISTING ASPHALT PAVEMENT

STATE OF TEXAS
JOSEPH MICHAEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

GEOGRAPHICAL
PROJECT
N
138.53°E.P.

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

Texas 811 Know what's below. Call before you dig.

DRAWING SCALE: AS NOTED

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: EXISTING CONDITIONS PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-002-001
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

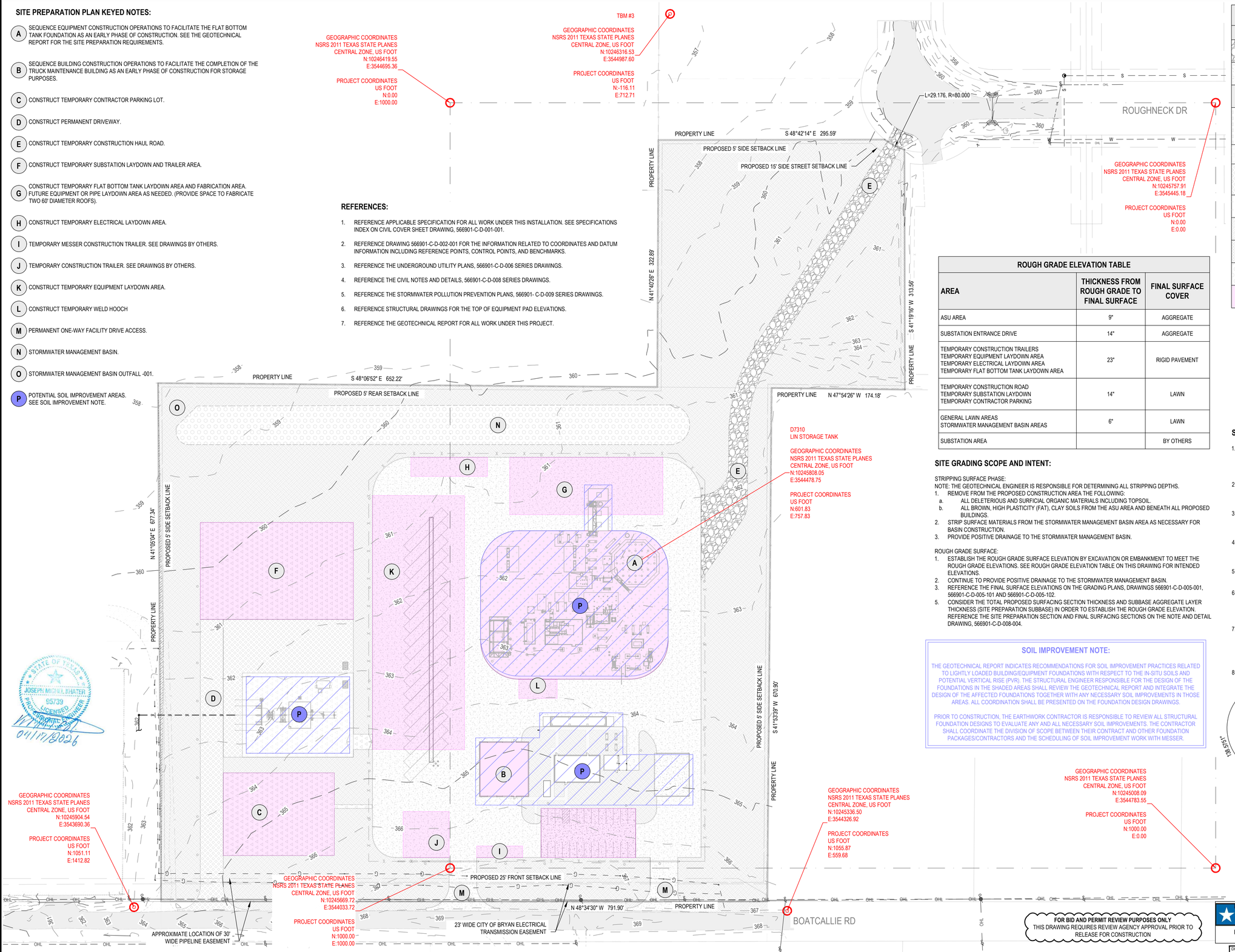
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SITE PREPARATION PLAN KEYED NOTES:

- **A** SEQUENCE EQUIPMENT CONSTRUCTION OPERATIONS TO FACILITATE THE FLAT BOTTOM TANK FOUNDATION AS AN EARLY PHASE OF CONSTRUCTION. SEE THE GEOTECHNICAL REPORT FOR THE SITE PREPARATION REQUIREMENTS.
- **B** SEQUENCE BUILDING CONSTRUCTION OPERATIONS TO FACILITATE THE COMPLETION OF THE TRUCK MAINTENANCE BUILDING AS AN EARLY PHASE OF CONSTRUCTION FOR STORAGE PURPOSES.
- **C** CONSTRUCT TEMPORARY CONTRACTOR PARKING LOT.
- **D** CONSTRUCT PERMANENT DRIVEWAY.
- **E** CONSTRUCT TEMPORARY CONSTRUCTION HAUL ROAD.
- **F** CONSTRUCT TEMPORARY SUBSTATION LAYDOWN AND TRAILER AREA.
- **G** CONSTRUCT TEMPORARY FLAT BOTTOM TANK LAYDOWN AREA AND FABRICATION AREA. FUTURE EQUIPMENT OR PIPE LAYDOWN AREA AS NEEDED. (PROVIDE SPACE TO FABRICATE TWO 60' DIAMETER ROOFS).
- **H** CONSTRUCT TEMPORARY ELECTRICAL LAYDOWN AREA.
- **I** TEMPORARY MESSER CONSTRUCTION TRAILER. SEE DRAWINGS BY OTHERS.
- **J** TEMPORARY CONSTRUCTION TRAILER. SEE DRAWINGS BY OTHERS.
- **K** CONSTRUCT TEMPORARY EQUIPMENT LAYDOWN AREA.
- **L** CONSTRUCT TEMPORARY WELD HOOCH
- **M** PERMANENT ONE-WAY FACILITY DRIVE ACCESS.
- **N** STORMWATER MANAGEMENT BASIN.
- **O** STORMWATER MANAGEMENT BASIN OUTFALL -001.
- **P** POTENTIAL SOIL IMPROVEMENT AREAS. SEE SOIL IMPROVEMENT NOTE.

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.



ROUGH GRADE ELEVATION TABLE

AREA	THICKNESS FROM ROUGH GRADE TO FINAL SURFACE	FINAL SURFACE COVER
ASU AREA	9"	AGGREGATE
SUBSTATION ENTRANCE DRIVE	14"	AGGREGATE
TEMPORARY CONSTRUCTION TRAILERS TEMPORARY EQUIPMENT LAYDOWN AREA TEMPORARY ELECTRICAL LAYDOWN AREA TEMPORARY FLAT BOTTOM TANK LAYDOWN AREA	23"	RIGID PAVEMENT
TEMPORARY CONSTRUCTION ROAD TEMPORARY SUBSTATION LAYDOWN TEMPORARY CONTRACTOR PARKING	14"	LAWN
GENERAL LAWN AREAS STORMWATER MANAGEMENT BASIN AREAS	6"	LAWN
SUBSTATION AREA		BY OTHERS

SITE GRADING SCOPE AND INTENT:

STRIPPING SURFACE PHASE:
NOTE: THE GEOTECHNICAL ENGINEER IS RESPONSIBLE FOR DETERMINING ALL STRIPPING DEPTHS.
1. REMOVE FROM THE PROPOSED CONSTRUCTION AREA THE FOLLOWING:
   a. ALL DELETERIOUS AND SURFICIAL ORGANIC MATERIALS INCLUDING TOPSOIL.
   b. ALL BROWN, HIGH PLASTICITY (FAT), CLAY SOILS FROM THE ASU AREA AND BENEATH ALL PROPOSED BUILDINGS.
2. STRIP SURFACE MATERIALS FROM THE STORMWATER MANAGEMENT BASIN AREA AS NECESSARY FOR BASIN CONSTRUCTION.
3. PROVIDE POSITIVE DRAINAGE TO THE STORMWATER MANAGEMENT BASIN.

ROUGH GRADE SURFACE:
1. ESTABLISH THE ROUGH GRADE SURFACE ELEVATION BY EXCAVATION OR EMBANKMENT TO MEET THE ROUGH GRADE ELEVATIONS. SEE ROUGH GRADE ELEVATION TABLE ON THIS DRAWING FOR INTENDED ELEVATIONS.
2. CONTINUE TO PROVIDE POSITIVE DRAINAGE TO THE STORMWATER MANAGEMENT BASIN.
3. REFERENCE THE FINAL SURFACE ELEVATIONS ON THE GRADING PLANS, DRAWINGS 566901-C-D-005-001, 566901-C-D-005-101 AND 566901-C-D-005-102.
5. CONSIDER THE TOTAL PROPOSED SURFACING SECTION THICKNESS AND SUBBASE AGGREGATE LAYER THICKNESS (SITE PREPARATION SUBBASE) IN ORDER TO ESTABLISH THE ROUGH GRADE ELEVATION. REFERENCE THE SITE PREPARATION SECTION AND FINAL SURFACING SECTIONS ON THE NOTE AND DETAIL DRAWING, 566901-C-D-008-004.

SOIL IMPROVEMENT NOTE:

THE GEOTECHNICAL REPORT INDICATES RECOMMENDATIONS FOR SOIL IMPROVEMENT PRACTICES RELATED TO LIGHTLY LOADED BUILDING/EQUIPMENT FOUNDATIONS WITH RESPECT TO THE IN-SITU SOILS AND POTENTIAL VERTICAL RISE (PVR). THE STRUCTURAL ENGINEER RESPONSIBLE FOR THE DESIGN OF THE FOUNDATIONS IN THE SHADED AREAS SHALL REVIEW THE GEOTECHNICAL REPORT AND INTEGRATE THE DESIGN OF THE AFFECTED FOUNDATIONS TOGETHER WITH ANY NECESSARY SOIL IMPROVEMENTS IN THOSE AREAS. ALL COORDINATION SHALL BE PRESENTED ON THE FOUNDATION DESIGN DRAWINGS.

PRIOR TO CONSTRUCTION, THE EARTHWORK CONTRACTOR IS RESPONSIBLE TO REVIEW ALL STRUCTURAL FOUNDATION DESIGNS TO EVALUATE ANY AND ALL NECESSARY SOIL IMPROVEMENTS. THE CONTRACTOR SHALL COORDINATE THE DIVISION OF SCOPE BETWEEN THEIR CONTRACT AND OTHER FOUNDATION PACKAGES/CONTRACTORS AND THE SCHEDULING OF SOIL IMPROVEMENT WORK WITH MESSER.

SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN
	PROPOSED LAYDOWN AREA

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
W	WATER
G	NATURAL GAS
	STORM SEWER
OHL	AERIAL POWER/COMMUNICATION
S	SANITARY SEWER
WW	PROCESS WASTEWATER

SITE PREPARATION PLAN NOTES:

1. THIS DRAWING DEPICTS THE WORK REQUIRED DURING THE CIVIL SITE PREPARATION PACKAGE PHASE RELATED TO THE GENERAL SITE AREAS DURING CONSTRUCTION OPERATIONS (IDENTIFIED BY THE KEYED NOTES). SEE ALSO THE RELATED DRAWINGS INCLUDED AS PART OF THE COMPLETE CIVIL SITE IMPROVEMENT PACKAGE FOR THE REMAINDER SCOPE OF THE CIVIL WORK.
2. GRADING AND GENERAL EARTHWORK AS PART OF THE SITE PREPARATION PACKAGE IS COVERED UNDER THIS DRAWING, THE STORMWATER POLLUTION PREVENTION PLAN (PHASE A), THE CIVIL SITE DETAILS AND SPECIFICATIONS, THE PROJECT SPECIFICATIONS, AND THE PROJECT GEOTECHNICAL REPORT.
3. SOIL IMPROVEMENTS AS MAY BE NECESSARY FOR STRUCTURAL FOUNDATIONS AT EQUIPMENT AND AT ANCILLARY BUILDINGS ON THE PROJECT ARE NOT DEPICTED. REFERENCE THE STRUCTURAL DRAWINGS, THE BUILDING VENDOR DRAWINGS AND THE GEOTECHNICAL REPORT.
4. THE CIVIL SITE PREPARATION PACKAGE AND THE CIVIL SITE IMPROVEMENT PACKAGE DO NOT CONVEY THE ENTIRE WORK SCOPE FOR THE FACILITY. THE CONTRACTOR SHALL COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
5. THE BACKGROUND SITE DESIGN SHOWN HEREON IS FOR REFERENCE PURPOSES ONLY. SEE RELATED PROJECT DRAWINGS FOR ALL SUCH WORK.
6. ALL EARTHWORK, INCLUDING SITE PREPARATION (EX. SOIL REMOVALS/PROOF-ROLLING), APPROVED FILL MATERIALS, SUBGRADE PREPARATION, DRAINAGE AND OTHER SOIL IMPROVEMENT RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER OF RECORD SHALL BE FOLLOWED IN THEIR ENTIRETY AS PART OF THIS CONTRACT.
7. THESE CONSTRUCTION DRAWINGS HAVE BEEN PREPARED WITH THE UNDERSTANDING THAT THE GEOTECHNICAL ENGINEER OF RECORD IS RESPONSIBLE FOR ON-SITE INSPECTION, THE REVIEW AND APPROVAL FOR ALL GEOTECHNICAL PROJECT CONSTRUCTION WORK RELATED TO THE SUBGRADE INCLUDING EXCAVATIONS, SITE DRAINAGE, UTILITY TRENCH BACKFILL MATERIALS, EARTHWORK FILL MATERIALS, AND SPECIALIZED SOIL IMPROVEMENTS.
8. MATERIALS SUBMITTALS AND QUALITY CONTROL DOCUMENTATION FOR RELATED WORK SHALL BE PRESENTED TO THE GEOTECHNICAL ENGINEER OF RECORD FOR REVIEW AND APPROVAL.

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: SITE PREPARATION PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

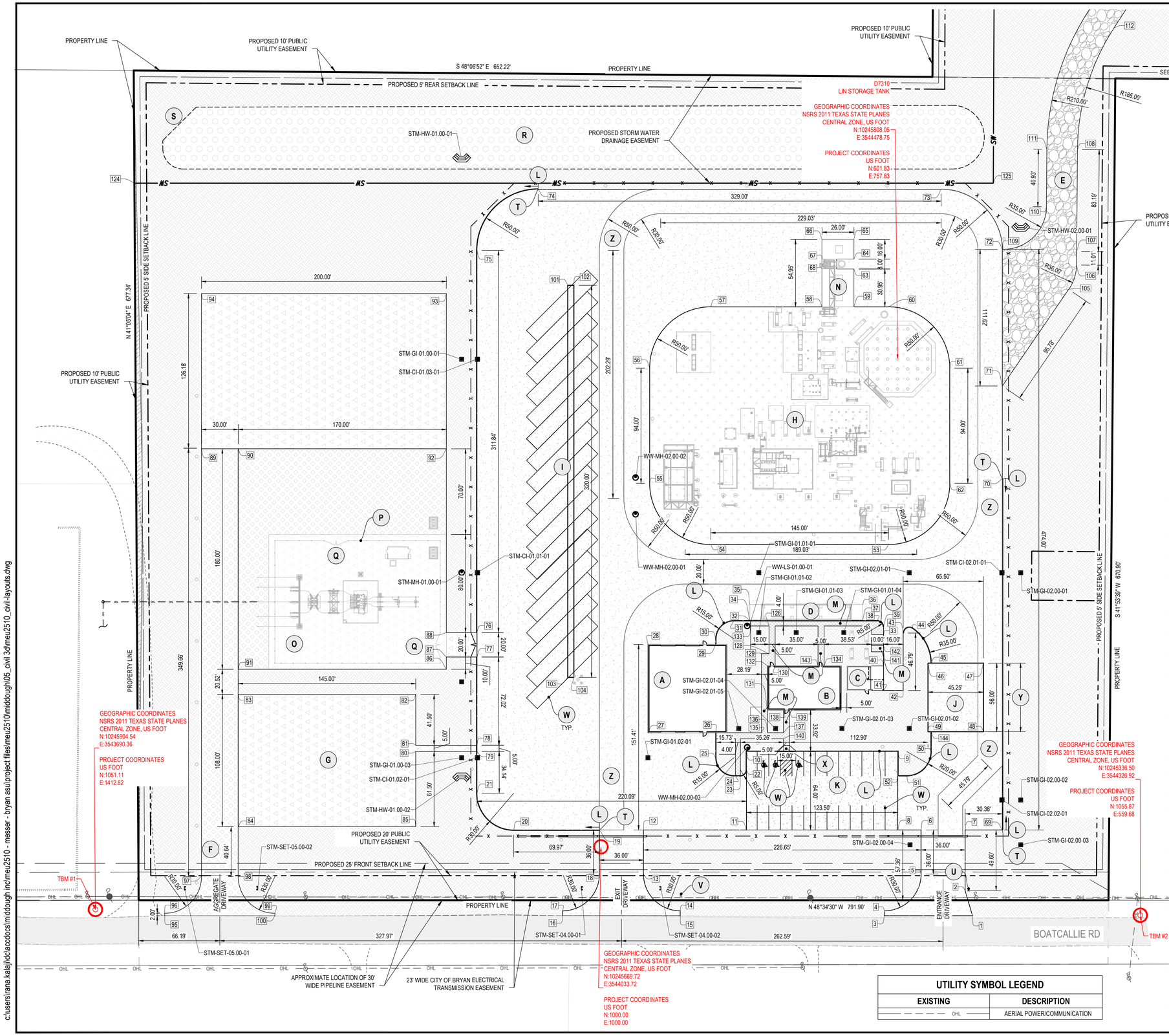
DRAWING NO.: 566901-C-D-003-001
REV.: 00C
DRAWING SCALE: AS NOTED

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MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

SITE PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.

REFERENCES:

1. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
2. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
3. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
4. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
5. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
6. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

SITE PLAN KEYED NOTES:

- (A) TRUCK MAINTENANCE BUILDING, REFERENCE BUILDING DRAWINGS.
- (B) ADMINISTRATION BUILDING, REFERENCE BUILDING DRAWINGS.
- (C) WORKSHOP BUILDING, REFERENCE BUILDING DRAWINGS.
- (D) TRUCK WEIGH SCALE, REFERENCE STRUCTURAL DRAWINGS.
- (E) CONSTRUCT TEMPORARY CONSTRUCTION HAUL ROAD.
- (F) CONSTRUCT AGGREGATE DRIVE.
- (G) CONSTRUCT TEMPORARY CONTRACTOR PARKING.
- (H) AIR SEPARATION UNIT (ASU).
- (I) SEMI TRUCK PARKING AND TRAILER PAD, REFERENCE DRAWING 566901-S-D-124-01 FOR TRAILER PAD DETAIL.
- (J) DIESEL FUEL SYSTEM INCLUDING EQUIPMENT, CONCRETE PAD, CANOPY AND SECONDARY CONTAINMENT SYSTEM (DRAWINGS AND CONSTRUCTION BY OTHERS).
- (K) CONSTRUCT AUTO PARKING AREA.
- (L) CONSTRUCT MONOLITHIC CONCRETE CURB.
- (M) CONSTRUCT CONCRETE SIDEWALK.
- (N) CONSTRUCT TRUCK LOADING AREA PAD, REFERENCE STRUCTURAL DRAWINGS.
- (O) MESSER SUBSTATION BY OTHERS.
- (P) PROPOSED SUBSTATION FENCE BY OTHERS.
- (Q) PROPOSED SWING GATE BY OTHERS.
- (R) PROPOSED STORMWATER MANAGEMENT BASIN.
- (S) PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001.
- (T) TRANSITION CURB FROM 6" REVEAL TO 0" REVEAL OVER 36" LENGTH.
- (U) INSTALL SIGN - "TRUCK AND PASSENGER VEHICLE ENTER ONLY".
- (V) INSTALL SIGN - "EXIT ONLY - DO NOT ENTER".
- (W) APPLY PAVEMENT MARKINGS.
- (X) CONSTRUCT ACCESSIBLE RAMP.
- (Y) THE CURB ALONG THE FIRE APPARATUS ACCESS LANE SHALL BE PAINTED RED WITH FOUR INCH (4") WHITE LETTERING STATING "FIRE LANE – NO PARKING – TOW AWAY ZONE" EACH PHRASE SHOULD BE SPACED NO MORE THAN 15FT APART.
- (Z) FIRE APPARATUS ACCESS ROUTE FOR REVIEW PURPOSES ONLY (NO PHYSICAL MARKINGS).

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED PROFESSIONAL ENGINEER
04/17/2026

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

GEOGRAPHIC NORTH
PROJECT NORTH
158.51°

0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

Texas 811
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NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

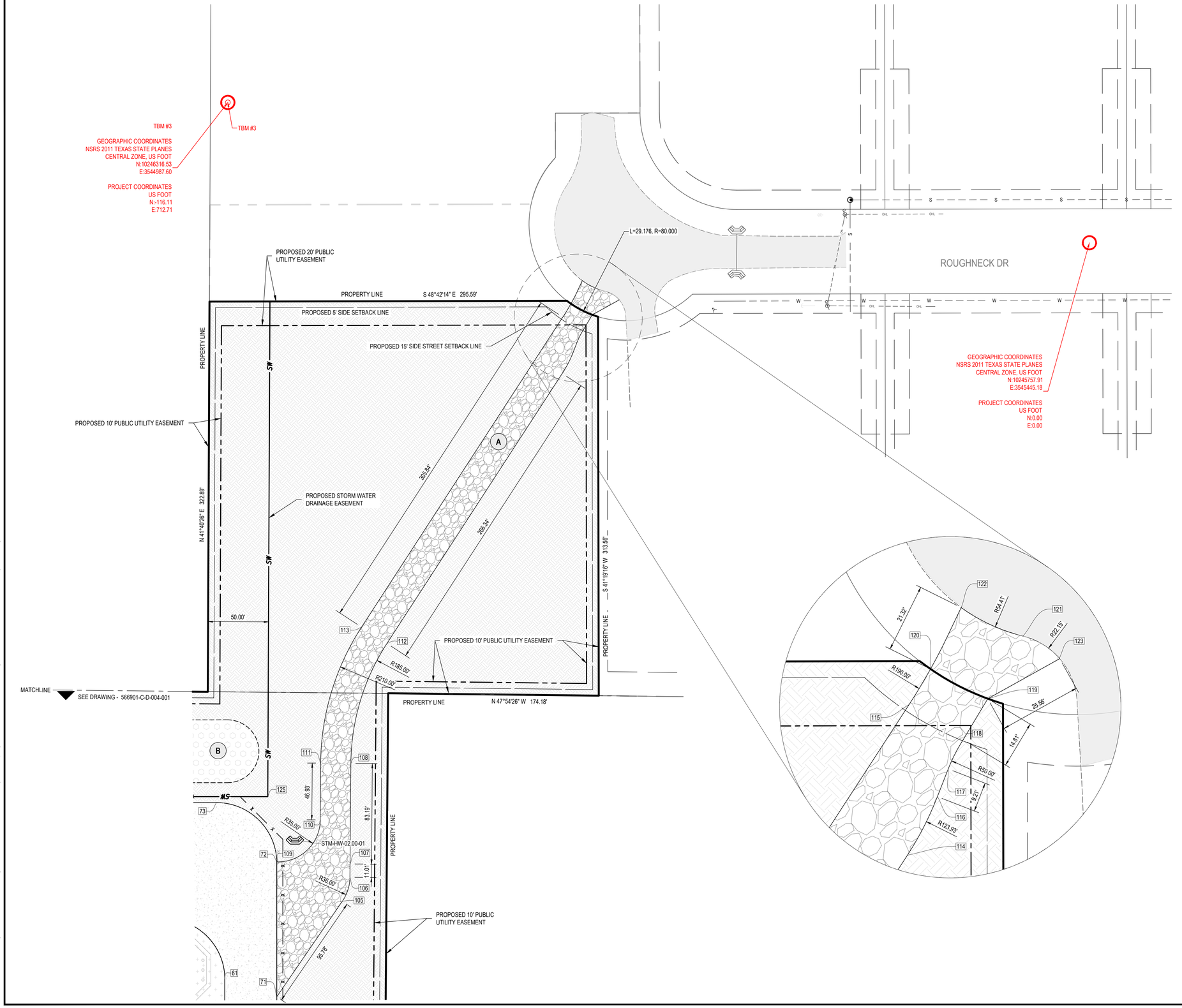
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: SITE PLAN GEOGRAPHICAL SOUTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-004-001
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

SITE PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.

REFERENCES:

1. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
2. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
3. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
4. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
5. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
6. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

SITE PLAN KEYED NOTES:

(A) CONSTRUCT TEMPORARY CONSTRUCTION HAUL ROAD.

(B) PROPOSED STORMWATER MANAGEMENT BASIN.

STATE OF TEXAS
JOSEPH MICHEL BAKER
95739
LICENSED PROFESSIONAL ENGINEER
04/17/2026

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GEOGRAPHICAL NORTH
PROJECT NORTH
139.51°

0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

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00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: SITE PLAN GEOGRAPHICAL NORTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-004-002
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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SITE PLAN POINT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
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2	10245446.08	3544232.98	1035.86	702.62
3	10245474.46	3544169.99	1056.26	768.62
4	10245477.45	3544172.64	1052.26	768.62
5	10245480.10	3544214.98	1022.26	738.62
6	10245507.09	3544238.80	986.26	738.62
7	10245483.27	3544265.80	986.26	702.62
8	10245519.68	3544224.54	986.26	757.65
9	10245567.67	3544266.88	922.26	757.65
10	10245649.39	3544174.27	922.26	881.16
11	10245601.40	3544131.93	986.26	881.16
12	10245657.05	3544068.85	986.26	965.27
13	10245630.06	3544045.03	1022.26	965.27
14	10245587.72	3544047.68	1052.26	935.27
15	10245584.72	3544045.03	1056.26	935.27
16	10245648.23	3543973.05	1056.26	1031.27
17	10245651.23	3543975.70	1052.26	1031.27
18	10245653.88	3544018.04	1022.26	1001.27
19	10245680.87	3544041.86	986.26	1001.27
20	10245727.17	3543989.40	986.26	1071.24
21	10245769.51	3543986.75	956.26	1101.24
22	10245638.14	3544164.35	937.26	881.16
23	10245637.70	3544157.29	942.26	886.16
24	10245640.35	3544154.29	942.26	890.16
25	10245662.33	3544152.05	927.26	906.38
26	10245677.64	3544165.55	906.84	906.38
27	10245714.19	3544124.13	906.84	961.63
28	10245768.18	3544171.76	834.84	961.63
29	10245731.62	3544213.19	834.84	906.38
30	10245735.06	3544216.23	830.26	906.38
31	10245736.39	3544237.40	815.26	891.38
32	10245727.00	3544247.27	815.76	877.77
33	10245646.89	3544321.33	826.83	769.24
34	10245728.25	3544247.52	814.66	878.42
35	10245737.63	3544255.79	802.16	878.42
36	10245676.65	3544324.90	802.16	786.25
37	10245667.27	3544316.63	814.66	786.25
38	10245658.88	3544325.23	815.26	774.24
39	10245651.82	3544325.68	820.26	769.24
40	10245627.77	3544304.45	852.33	769.24
41	10245612.77	3544291.22	872.33	769.24
42	10245602.19	3544303.22	872.33	753.24
43	10245637.27	3544334.18	825.54	753.24
44	10245635.18	3544342.78	821.42	745.41
45	10245603.66	3544335.19	850.07	730.24
46	10245605.48	3544333.13	850.07	732.99
47	10245575.54	3544367.06	850.07	687.74
48	10245533.55	3544330.01	906.07	687.74
49	10245563.49	3544296.08	906.07	732.99
50	10245549.54	3544287.43	922.26	730.24
51	10245547.77	3544259.20	942.26	750.24
52	10245552.68	3544253.64	942.26	757.66
53	10245699.42	3544373.00	753.25	765.24
54	10245795.35	3544264.28	753.25	910.24
55	10245865.93	3544259.87	703.25	960.24
56	10245936.41	3544322.06	609.26	960.24
57	10245940.82	3544392.64	559.26	910.24
58	10245880.80	3544460.71	559.22	819.48
59	10245863.57	3544480.19	559.26	793.48
60	10245844.88	3544501.36	559.26	765.24
61	10245774.31	3544505.77	609.26	715.24
62	10245703.83	3544443.58	703.25	715.24
63	10245886.77	3544500.66	528.31	793.48
64	10245892.77	3544505.96	520.31	793.48
65	10245904.77	3544516.54	504.31	793.48
66	10245921.97	3544497.05	504.31	819.48
67	10245909.97	3544486.46	520.31	819.48
68	10245903.97	3544481.17	528.31	819.48
69	10245463.17	3544288.57	986.26	672.24

SITE PLAN POINT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
70	10245678.37	3544478.46	699.26	672.24
71	10245734.88	3544528.36	623.87	672.22
72	10245818.60	3544602.18	512.26	672.25
73	10245888.41	3544597.12	463.26	722.24
74	10246106.09	3544350.43	463.26	1051.24
75	10246101.68	3544279.86	513.26	1101.24
76	10245867.86	3544073.53	825.10	1101.24
77	10245852.86	3544060.30	845.10	1101.24
78	10245798.86	3544012.65	917.12	1101.24
79	10245795.11	3544009.34	922.12	1101.24
80	10245828.19	3543971.85	922.12	1151.24
81	10245831.94	3543975.15	917.12	1151.24
82	10245863.06	3544002.61	875.62	1151.24
83	10245959.00	3543893.89	875.62	1296.24
84	10245878.02	3543822.43	983.62	1296.24
85	10245782.08	3543931.16	983.62	1151.24
86	10245861.90	3544034.94	855.10	1126.24
87	10245869.40	3544041.55	845.10	1126.24
88	10245884.40	3544054.78	825.10	1126.24
89	10246129.20	3544004.07	675.10	1326.24
90	10246109.35	3544026.56	675.10	1296.24
91	10245974.38	3543907.47	855.10	1296.24
92	10245996.87	3544154.03	675.10	1126.24
93	10246091.86	3544237.85	548.41	1126.24
94	10246224.19	3544087.88	548.41	1326.24
95	10245863.24	3543729.37	1056.27	1356.24
96	10245864.75	3543730.70	1054.26	1356.24
97	10245867.39	3543773.05	1024.26	1326.24
98	10245847.54	3543795.54	1024.26	1296.24
99	10245805.20	3543798.19	1054.26	1266.24
100	10245803.69	3543796.87	1056.26	1266.23
101	10246031.32	3544316.66	541.67	1027.09
102	10246028.01	3544320.40	541.67	1022.09
103	10245791.37	3544104.93	861.67	1027.09
104	10245788.06	3544108.68	861.67	1022.09
105	10245758.27	3544621.23	544.89	618.06
106	10245768.99	3544639.11	525.03	611.75
107	10245777.14	3544646.51	514.01	611.59
108	10245839.08	3544702.05	430.82	610.92
109	10245818.28	3544602.53	512.26	671.79
110	10245820.83	3544652.11	477.55	636.30
111	10245855.77	3544683.44	430.62	635.92
112	10245893.75	3544790.05	331.60	581.12
113	10245917.83	3544783.33	317.99	602.09
114	10245965.35	3545046.59	108.18	436.13
115	10246000.05	3545077.91	61.44	435.60
116	10245972.82	3545065.59	90.01	426.82
117	10245977.05	3545073.78	81.42	423.48
118	10245980.78	3545083.29	72.33	418.82
119	10245985.26	3545097.40	59.63	411.20
120	10246003.92	3545090.18	50.42	428.96
121	10245992.63	3545118.44	40.19	400.30
122	10246011.95	3545109.94	31.33	419.46
123	10245980.03	3545122.38	47.03	389.01
124	10246327.99	3544106.51	458.26	1380.95
125	10245864.00	3544632.35	458.26	679.68
126	10245714.08	3544255.88	819.76	862.77
128	10245697.15	3544240.94	842.33	862.77
129	10245701.23	3544236.31	842.33	868.94
130	10245686.35	3544238.07	852.33	857.77
131	10245663.43	3544209.63	888.33	863.94
132	10245690.43	3544233.45	852.33	863.94
133	10245724.01	3544244.63	819.76	877.77
134	10245659.88	3544268.06	852.33	817.77
135	10245652.86	3544193.63	906.84	868.94
136	10245649.55	3544197.38	906.85	863.94
137	10245640.92	3544207.16	906.85	850.90
138	10245654.80	3544219.41	888.33	850.90
139	10245651.50	3544223.16	888.33	845.90

SITE PLAN POINT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
140	10245637.17	3544203.85	911.85	850.90
141	10245636.40	3544312.06	840.83	769.24
142	10245640.14	3544315.37	835.83	769.24
143	10245663.19	3544264.31	852.33	822.77
144	10245561.67	3544298.14	906.07	730.24

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: SITE PLAN TABLES

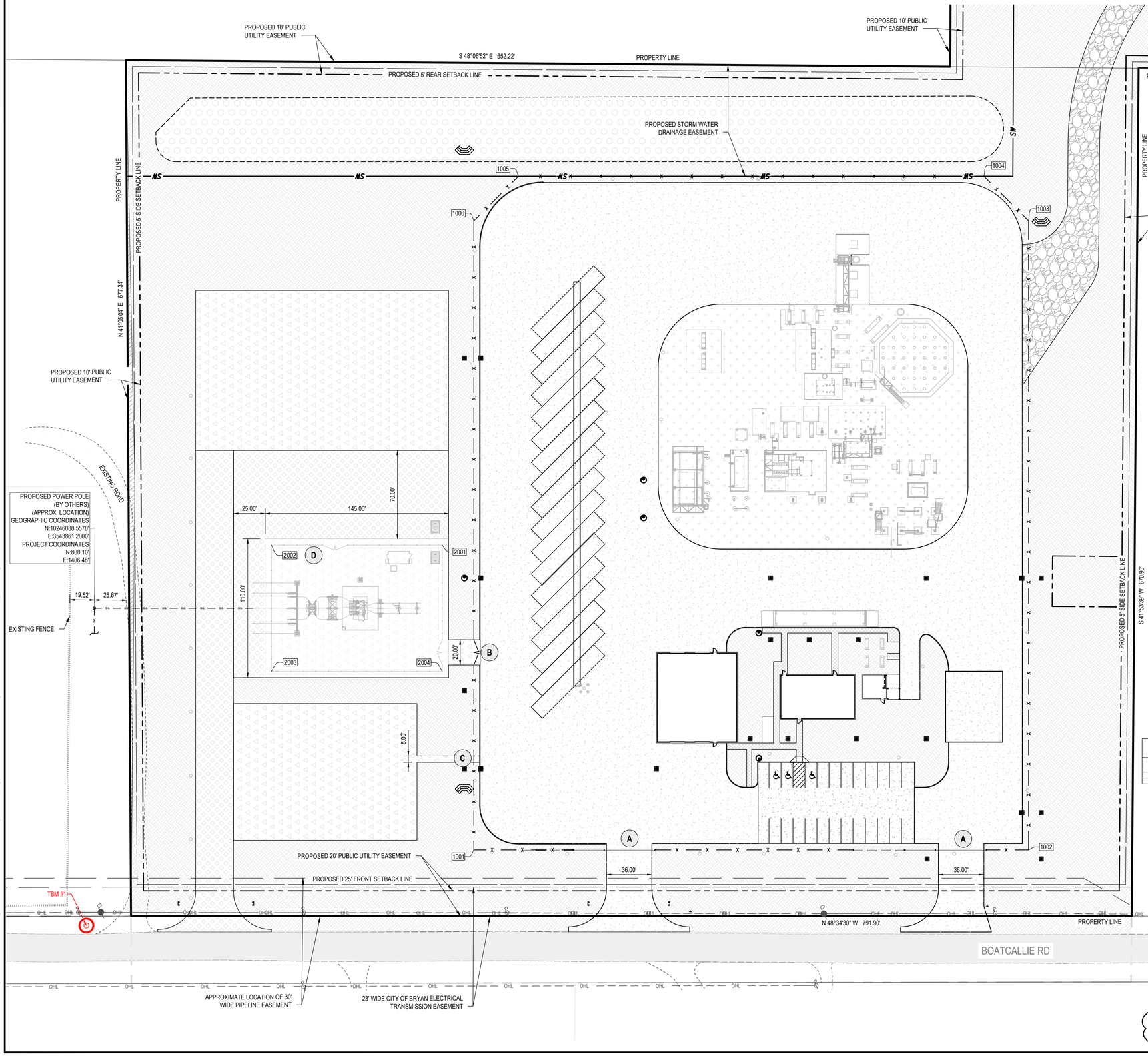
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-004-003
REV.: 00C

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

ELECTRICALLY OPERATED SECURITY GATES:

ALL ACCESS CONTROL SYSTEMS SHALL COMPLY WITH IFC 2021 SECTION 503 FIRE APPARATUS ACCESS ROADS, D103.5, 503.6 AND THE FOLLOWING CRITERIA:

A. THE INSTALLATION OF SECURITY GATES ACROSS A FIRE APPARATUS ACCESS ROAD SHALL BE APPROVED BY THE FIRE CODE OFFICIAL.

B. SECURITY GATES AND THE EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM F 2200.

C. METHODS OF LOCKING SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL OF THE FIRE CODE OFFICIAL.

D. SECURITY GATES SHALL BE EQUIPPED WITH A MEANS OF OPENING THE GATE BY FIRE DEPARTMENT PERSONNEL FOR EMERGENCY ACCESS. EMERGENCY OPENING DEVICES SHALL BE APPROVED BY THE FIRE CODE OFFICIAL.

E. ALL ELECTRICALLY OPERATED GATES ARE REQUIRED TO HAVE A KNOX GATE SWITCH.

F. SECURITY GATES SHALL BE EQUIPPED WITH AN APPROVED "FAIL-SAFE" SYSTEM TO ALLOW MANUAL OPERATION OF THE GATE IN THE EVENT OF POWER FAILURE OR EQUIPMENT MALFUNCTION.

G. G. CONSTRUCTION OF GATES SHALL BE OF MATERIALS THAT ALLOW MANUAL OPERATION BY ONE PERSON.

SITE FENCING PLAN KEYED NOTES:

A. PROPOSED AUTOMATIC MOTORIZED SLIDING GATE SYSTEM.

B. PROPOSED DOUBLE SWING GATE, REFER TO SHEET 566901-C-D-008-002 FOR GATE DETAIL.

C. PROPOSED MAN GATE.

D. PROPOSED SUBSTATION FENCE AND ACCESS GATES BY OTHERS.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

SITE FENCING NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. THIS DRAWING DEPICTS THE GENERAL SITE FENCING/GATE LAYOUT. THE FENCING CONTRACTOR SHALL COORDINATE ALL FENCE/GATE CONSTRUCTION IN CONSIDERATION WITH SITE ELEVATIONS AND LAYOUT.
3. THE CONTRACTOR SHALL COORDINATE FENCE GROUNDING AND POWER WITH THE ELECTRICAL DRAWINGS.

REFERENCES:

1. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
2. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
3. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
4. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
5. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
6. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.
7. REFERENCE THE ELECTRICAL DRAWINGS FOR FENCE GROUNDING AND POWER REQUIREMENTS.

FENCE POINT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
1001	10245746.58	3543959.84	991.26	1106.24
1002	10245456.12	3544289.02	991.26	667.24
1003	10245829.26	3544618.28	493.61	667.24
1004	10245879.17	3544615.16	458.26	702.60
1005	10246122.84	3544339.01	458.26	1070.89
1006	10246119.72	3544289.10	493.61	1106.24

SUBSTATION FENCE POINT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
2001	10245943.94	3544100.66	750.10	1131.24
2002	10246033.27	3543999.43	750.10	1266.24
2003	10245958.28	3543933.27	850.10	1266.24
2004	10245868.96	3544034.49	850.10	1131.24

STATE OF TEXAS
JOSEPH MICHAEL FRATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/11/2026

GEOGRAPHICAL NORTH
PROJECT NORTH
158°51'51"

0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

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DRAWING SCALE: AS NOTED

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: SITE PLAN SITE FENCING PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-004-004
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

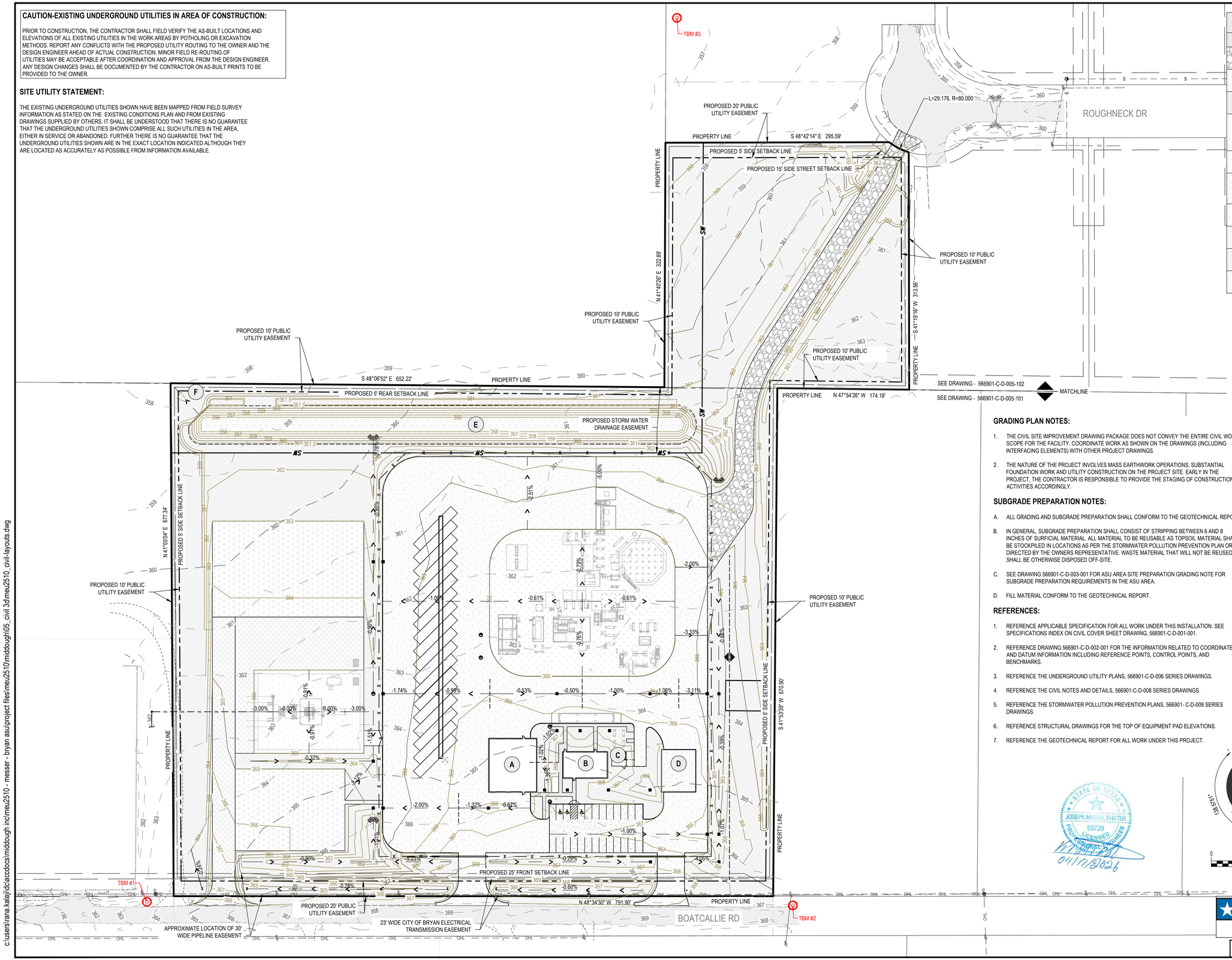
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CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.



SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

GRADING LEGEND

SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR
XXX.XX' E.G. / XXX.XX' P.G.	E.G.=EXISTING GRADE / P.G.=PROPOSED GRADE

PATTERN LEGEND

PATTERN	DESCRIPTION
	PROPOSED SLOPE DIRECTION
	SURFACE FLOW DIRECTION

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

GRADING PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. THE NATURE OF THE PROJECT INVOLVES MASS EARTHWORK OPERATIONS, SUBSTANTIAL FOUNDATION WORK AND UTILITY CONSTRUCTION ON THE PROJECT SITE. EARLY IN THE PROJECT, THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE STAGING OF CONSTRUCTION ACTIVITIES ACCORDINGLY.

SUBGRADE PREPARATION NOTES:

A. ALL GRADING AND SUBGRADE PREPARATION SHALL CONFORM TO THE GEOTECHNICAL REPORT.

B. IN GENERAL, SUBGRADE PREPARATION SHALL CONSIST OF STRIPPING BETWEEN 6 AND 8 INCHES OF SURFICIAL MATERIAL. ALL MATERIAL TO BE REUSABLE AS TOPSOIL MATERIAL SHALL BE STOCKPILED IN LOCATIONS AS PER THE STORMWATER POLLUTION PREVENTION PLAN OR AS DIRECTED BY THE OWNERS REPRESENTATIVE. WASTE MATERIAL THAT WILL NOT BE REUSED SHALL BE OTHERWISE DISPOSED OFF-SITE.

C. SEE DRAWING 566901-C-D-003-001 FOR ASU AREA SITE PREPARATION GRADING NOTE FOR SUBGRADE PREPARATION REQUIREMENTS IN THE ASU AREA.

D. FILL MATERIAL CONFORM TO THE GEOTECHNICAL REPORT.

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

GRADING PLAN KEYED NOTES:

A. TRUCK MAINTENANCE BUILDING

B. ADMINISTRATION BUILDING

C. WORK SHOP BUILDING

D. DIESEL FUEL SYSTEM INCLUDING EQUIPMENT, CONCRETE PAD, CANOPY AND SECONDARY CONTAINMENT SYSTEM (DRAWINGS AND CONSTRUCTION BY OTHERS).

E. PROPOSED STORMWATER MANAGEMENT BASIN.

F. PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001. SEE DETAIL DRAWING 566901-C-D-009-007.

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STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED PROFESSIONAL ENGINEER
04/17/2026

GEOGRAPHIC PROJECT NORTH
138.515°

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: GRADING PLAN OVERALL SITE

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-005-001
REV.: 00C
DRAWING SCALE: AS NOTED

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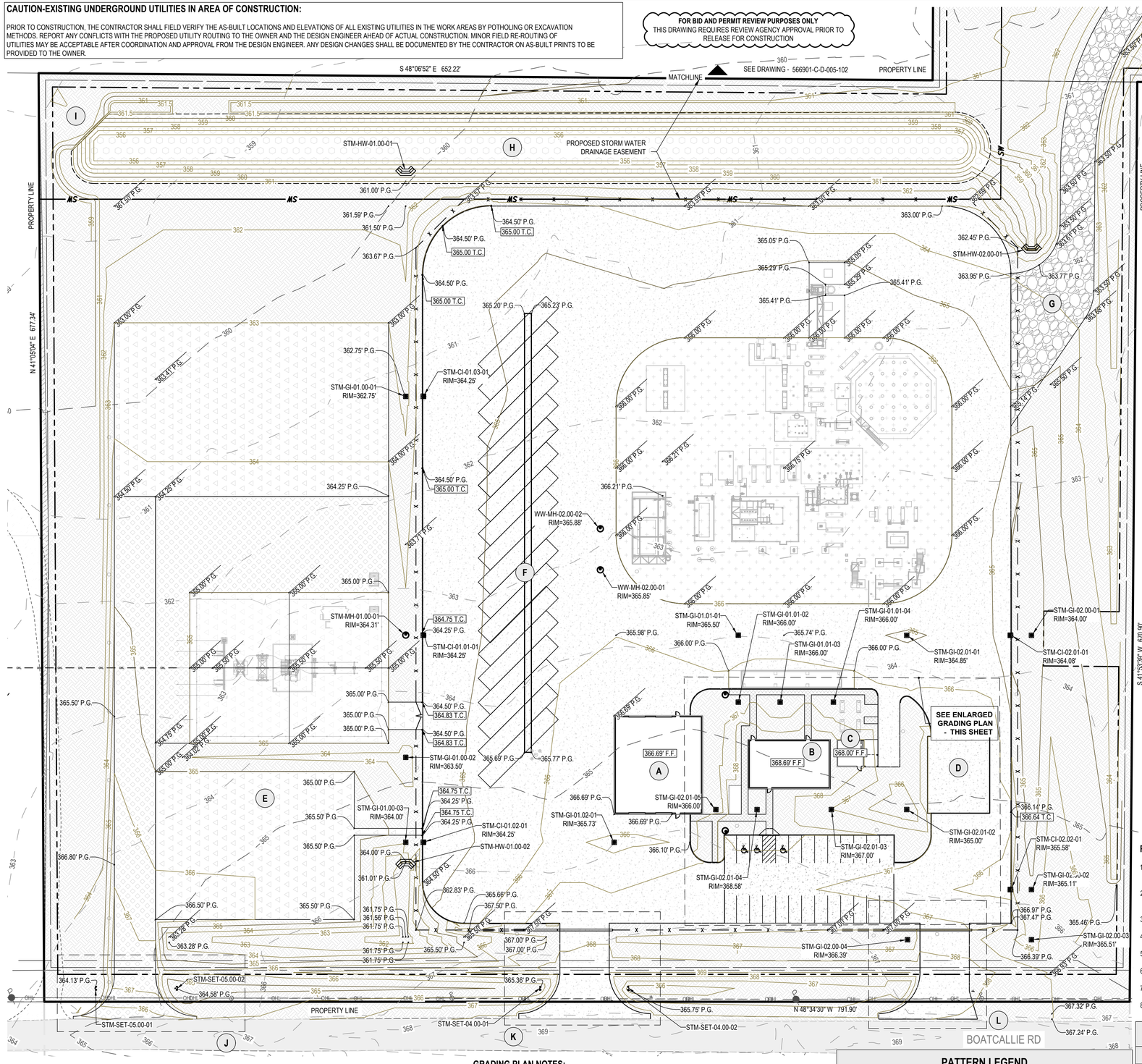
MIDDOUGH PROJ.#: MEU2510

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CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

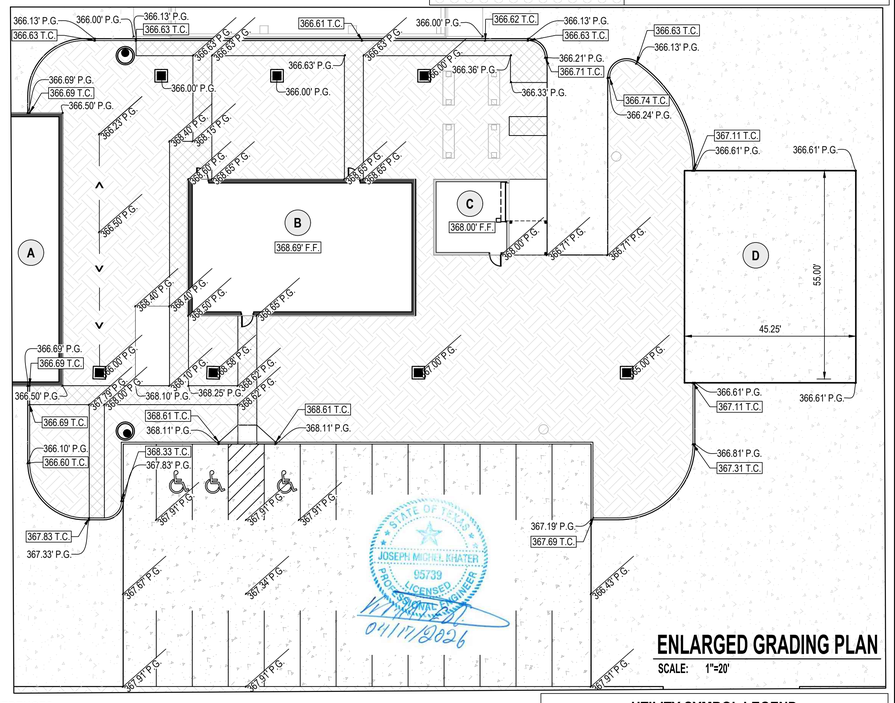


GRADING PLAN KEYED NOTES:

- (A) TRUCK MAINTENANCE BUILDING.
- (B) ADMINISTRATION BUILDING.
- (C) WORK SHOP BUILDING.
- (D) DIESEL FUEL SYSTEM INCLUDING EQUIPMENT, CONCRETE PAD, CANOPY AND SECONDARY CONTAINMENT SYSTEM (DRAWINGS AND CONSTRUCTION BY OTHERS).
- (E) TEMPORARY CONTRACTOR PARKING LOT.
- (F) SEMI TRUCK PARKING.
- (G) TEMPORARY CONSTRUCTION HAUL ROAD.
- (H) PROPOSED STORMWATER MANAGEMENT BASIN.
- (I) PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001. SEE DETAIL DRAWING 566901-C-D-009-007.
- (J) SEE CIVIL NOTES AND DETAILS DRAWING 566901-C-D-008-004 FOR AGGREGATE DRIVEWAY DETAIL.
- (K) SEE CIVIL NOTES AND DETAILS DRAWING 566901-C-D-008-004 FOR EXIT DRIVEWAY DETAIL.
- (L) SEE CIVIL NOTES AND DETAILS DRAWING 566901-C-D-008-004 FOR ENTRANCE DRIVEWAY DETAIL.

SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN



ENLARGED GRADING PLAN

SCALE: 1"=20'

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET, DRAWING 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.
8. REFERENCE DIESEL VENDOR DRAWINGS FOR FUEL SYSTEM COMPONENTS.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

GEOGRAPHICAL NORTH
GRID NORTH
138.57°

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: GRADING PLAN GEOGRAPHICAL SOUTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-005-101
REV.: 00C

DRAWING SCALE: AS NOTED

Texas 811 Know what's below. Call before you dig.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

GRADING PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. THE NATURE OF THE PROJECT INVOLVES MASS EARTHWORK OPERATIONS, SUBSTANTIAL FOUNDATION WORK AND UTILITY CONSTRUCTION ON THE PROJECT SITE. EARLY IN THE PROJECT, THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE STAGING OF CONSTRUCTION ACTIVITIES ACCORDINGLY.

PATTERN LEGEND

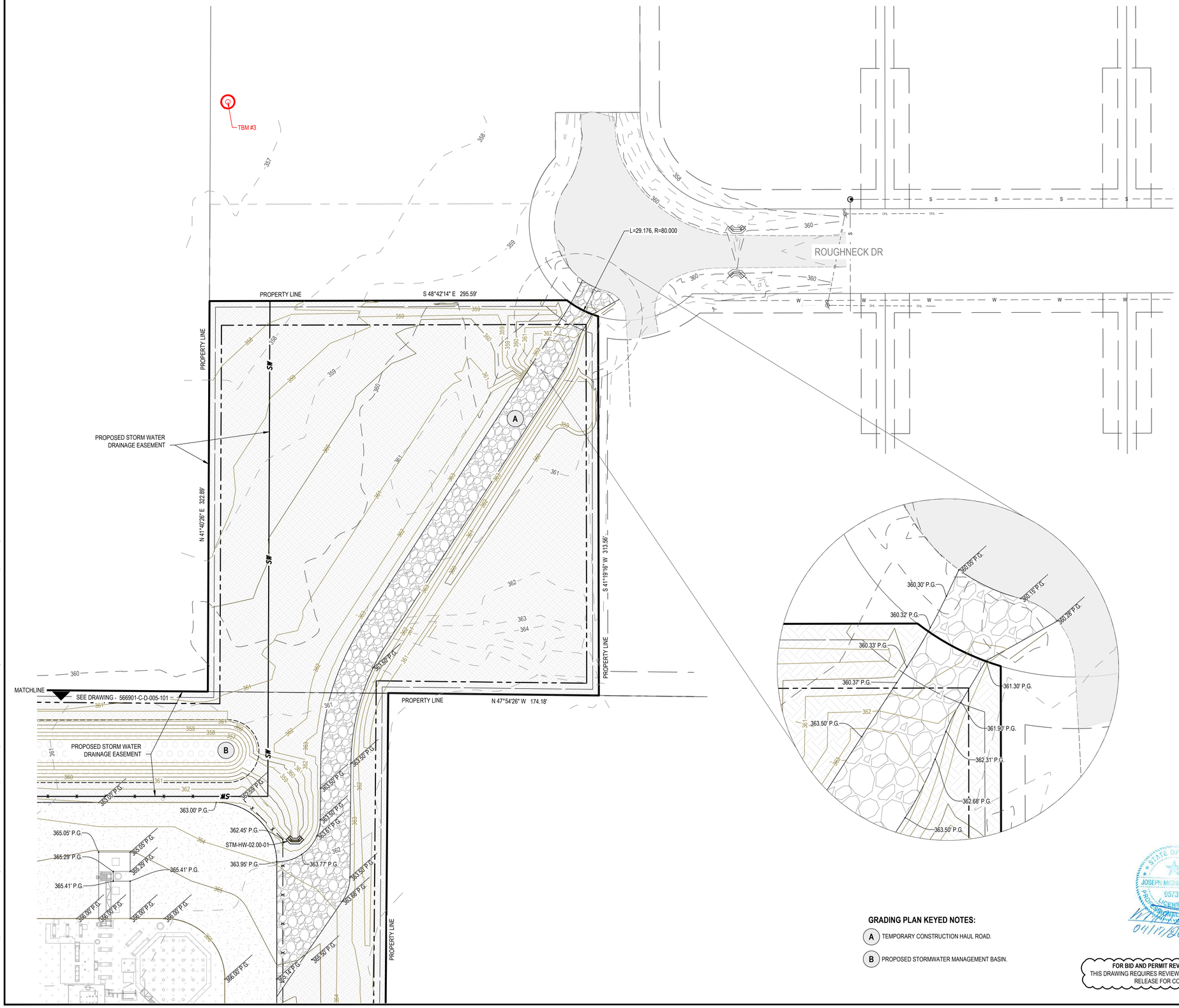
PATTERN	DESCRIPTION
	PROPOSED SLOPE DIRECTION
	SURFACE FLOW DIRECTION

GRADING LEGEND

SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR
XXX.XX' E.G. XXX.XX' P.G.	E.G.=EXISTING GRADE P.G.=PROPOSED GRADE

MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

GRADING LEGEND

SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR
XXX.XX' E.G. / XXX.XX' P.G.	E.G.=EXISTING GRADE P.G.=PROPOSED GRADE

PATTERN LEGEND

PATTERN	DESCRIPTION
	PROPOSED SLOPE DIRECTION
	SURFACE FLOW DIRECTION

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

GRADING PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. THE NATURE OF THE PROJECT INVOLVES MASS EARTHWORK OPERATIONS, SUBSTANTIAL FOUNDATION WORK AND UTILITY CONSTRUCTION ON THE PROJECT SITE. EARLY IN THE PROJECT, THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE STAGING OF CONSTRUCTION ACTIVITIES ACCORDINGLY.

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

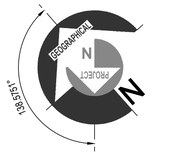
GRADING PLAN KEYED NOTES:

A TEMPORARY CONSTRUCTION HAUL ROAD.

B PROPOSED STORMWATER MANAGEMENT BASIN.



FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION



Texas 811 Know what's below. Call before you dig.

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00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: GRADING PLAN GEOGRAPHICAL NORTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-005-102
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

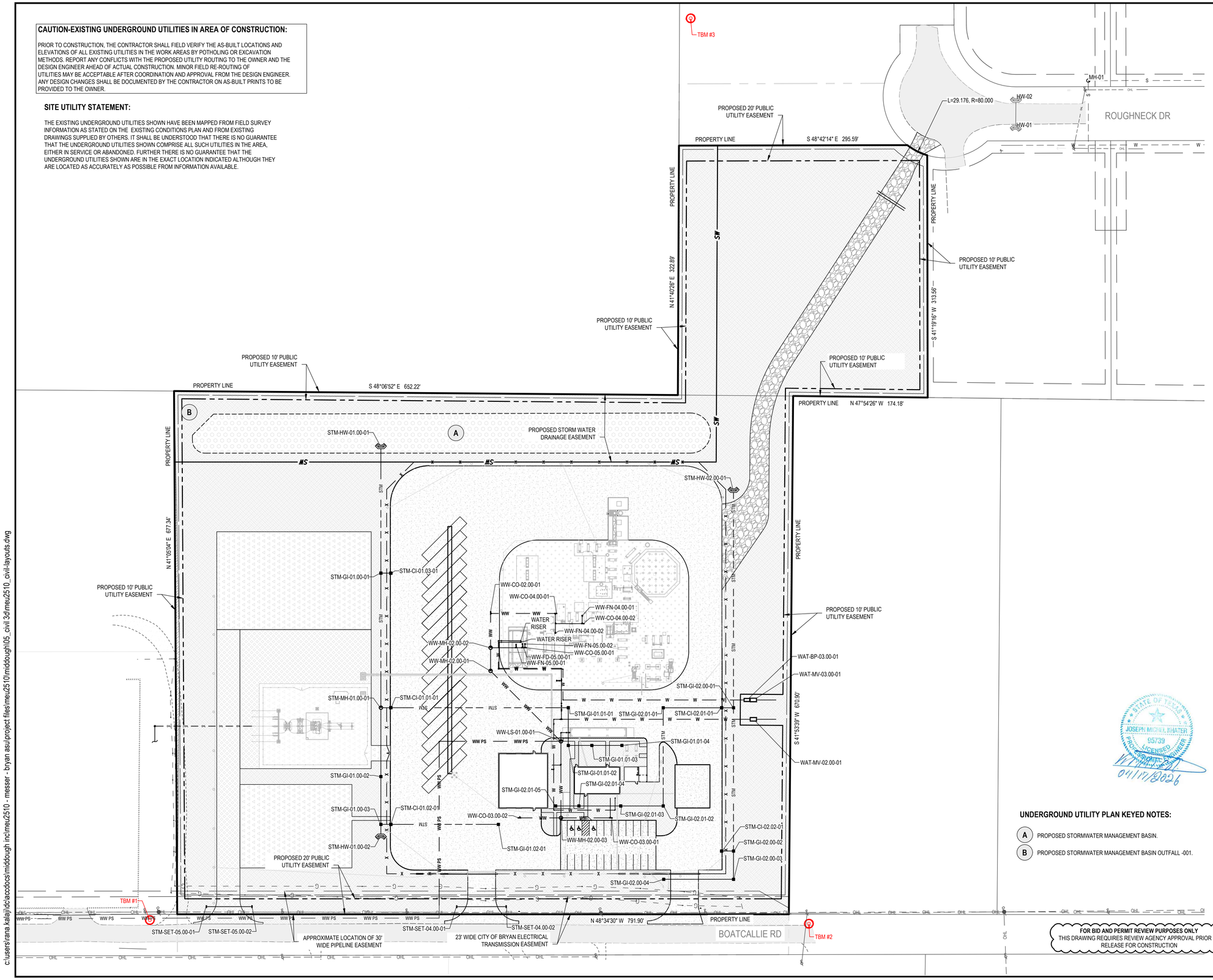
c:\users\rana.kalajidcaccdocs\middough inc\meu2510 - messer - bryan asu\project files\meu2510\middough\05_civil 3d\meu2510_civil-layouts.dwg

CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.



SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W W W
G	NATURAL GAS	NG NG NG
	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL OHL OHL
WW WW WW	WASTEWATER SEWER	WW WW WW
WW PS	WASTEWATER PRESSURE SEWER	WW PS WW PS

UNDERGROUND UTILITY PLAN NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED TESTING, INSPECTION AND/OR SUBMITTALS WITH THE AHJ (AUTHORITY HAVING JURISDICTION) FOR ALL PORTIONS OF THE UNDERGROUND UTILITY SYSTEM AS REQUIRED.
3. THE CONTRACTOR SHALL COORDINATE ALL REQUIRED TESTING IN CONFORMANCE WITH MESSER'S PRESSURE TEST PLAN FOR ALL PORTIONS OF THE PRIVATE (PRIVATELY OWNED AND MAINTAINED) UNDERGROUND UTILITY SYSTEM. REFERENCE THE FOLLOWING MESSER SPECIFICATIONS:
   a. 00000-P-S-104, PIPING SYSTEM PRESSURE AND LEAK TESTING SPECIFICATION
   b. 00000-P-S-105, PIPING SYSTEM HYDROSTATIC TESTING SPECIFICATION
   c. 00000-P-S-106, PIPING SYSTEM PNEUMATIC TESTING SPECIFICATION

REFERENCES:

1. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
2. REFERENCE THE SITE PLANS, 566901-C-D-004 SERIES DRAWINGS.
3. REFERENCE THE GRADING PLANS, 566901-C-D-005 SERIES DRAWINGS.
4. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
5. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
6. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
7. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
8. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

UNDERGROUND UTILITY PLAN KEYED NOTES:

A PROPOSED STORMWATER MANAGEMENT BASIN.

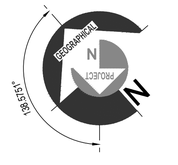
B PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001.

STATE OF TEXAS — JOSEPH MICHEL KHATER — 95739 — LICENSED PROFESSIONAL ENGINEER — 04/17/2026

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DRAWING SCALE: AS NOTED



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00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough — 1901 EAST 13TH STREET — FIRM NUMBER: F-4433

CLIENT: MESSER NA — CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: UNDERGROUND UTILITY PLAN OVERALL SITE

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

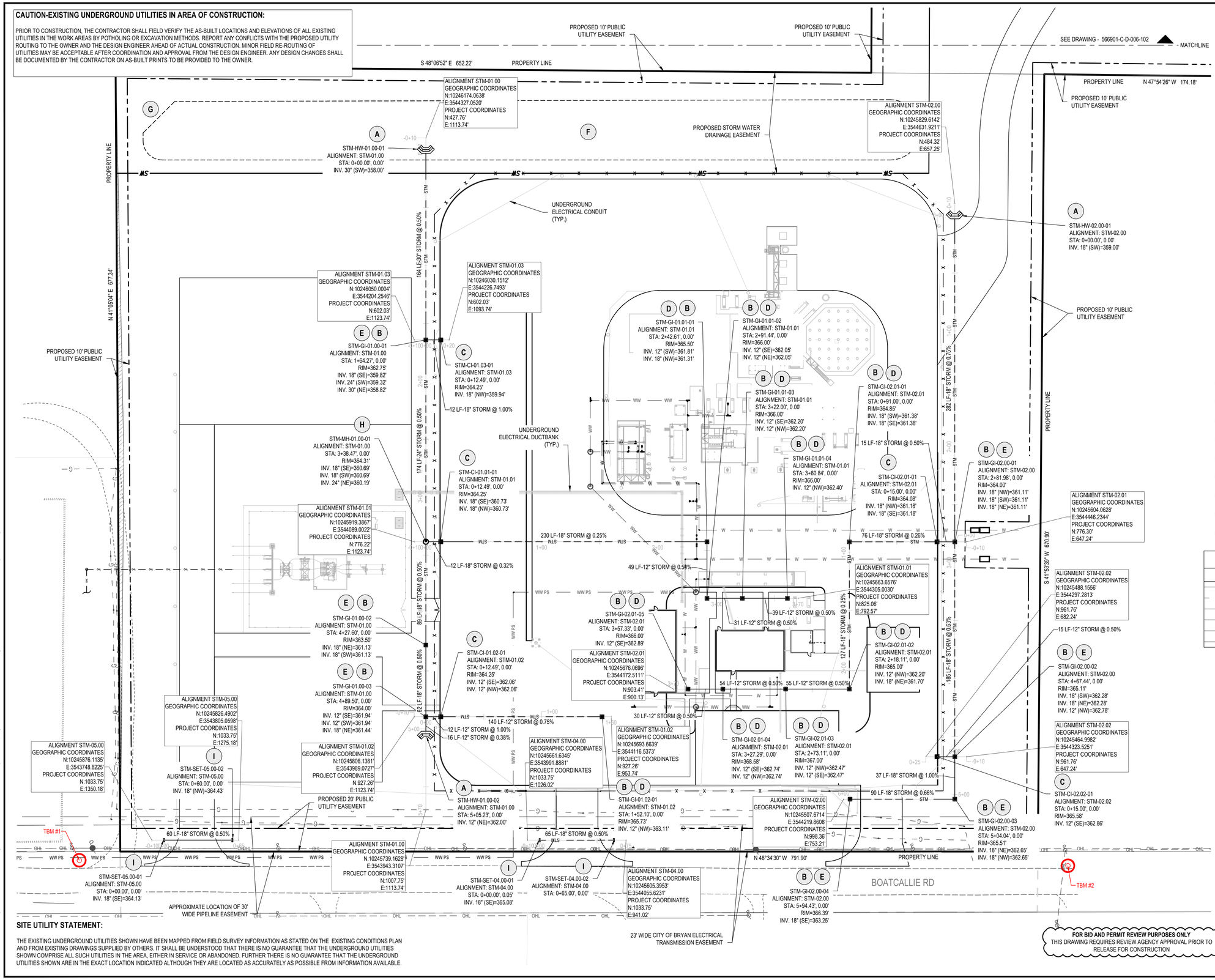
DRAWING NO.: 566901-C-D-006-001 — REV.: 00C

MIDDOUGH PROJ.#: MEU2510

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CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.



SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

UNDERGROUND STORM SEWER NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. WORK THIS DRAWING WITH STORM PROFILES DRAWINGS 566901-C-D-006-103 THROUGH 566901-C-D-006-104.
3. CORRUGATED-PE PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED FOR STORM SEWER PIPING IN THE PUBLIC UTILITY EASEMENTS AND ON PRIVATE PROPERTY WITHIN THE PROJECT SITE LIMITS.
4. PVC PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED ACCORDING TO THE APPLICABLE DETAILS ASSOCIATED WITH THE PRIVATE STORM SEWER SYSTEM.
5. STORM SEWER STRUCTURES SHALL CONFORM TO MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE AND CIVIL NOTES AND DETAILS.
6. THE CONTRACTOR SHALL ENSURE THAT ALL MANUFACTURERS REQUIREMENTS OF THE PIPING SYSTEM ARE MET, INCLUDING BUT NOT LIMITED TO; HANDLING, HAULING, TRENCH CONDITIONS AND INSTALLATION.
7. THE CONTRACTOR SHALL SEEK ACCEPTANCE OF THE WORK FROM THE OWNER OR THEIR DULY AUTHORIZED REPRESENTATIVE, OR THE AUTHORITY HAVING JURISDICTION AS APPROPRIATE.

REFERENCES:

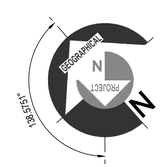
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2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE SITE PLANS, 566901-C-D-004 SERIES DRAWINGS.
4. REFERENCE THE GRADING PLANS, 566901-C-D-005 SERIES DRAWINGS.
5. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
6. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
7. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
8. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
9. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

UNDERGROUND UTILITY PLAN KEYED NOTES:

- (A) INSTALL CONCRETE HEADWALL & ENDWALL WITH WINGS.
- (B) INSTALL GRATE INLET.
- (C) INSTALL SINGLE RECESSED CURB INLET.
- (D) INSTALL HS20 FLAT GRATE, NEENAH R-4859-C OR EQUAL.
- (E) INSTALL BEEHIVE GRATE NEENAH R-4347 (SQUARE) OR EQUAL.
- (F) PROPOSED STORMWATER MANAGEMENT BASIN.
- (G) PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001.
- (H) INSTALL STORM MANHOLE.
- (I) INSTALL SAFETY END TREATMENT STRUCTURE.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W
G	NATURAL GAS	NG
STM	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL
WW	WASTEWATER SEWER	WW
WW PS	WASTEWATER PRESSURE SEWER	WW PS



0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

STATE OF TEXAS
JOSEPH MICHAEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN STORM SEWER GEOGRAPHICAL SOUTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-101
REV.: 00C
DRAWING SCALE: AS NOTED

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

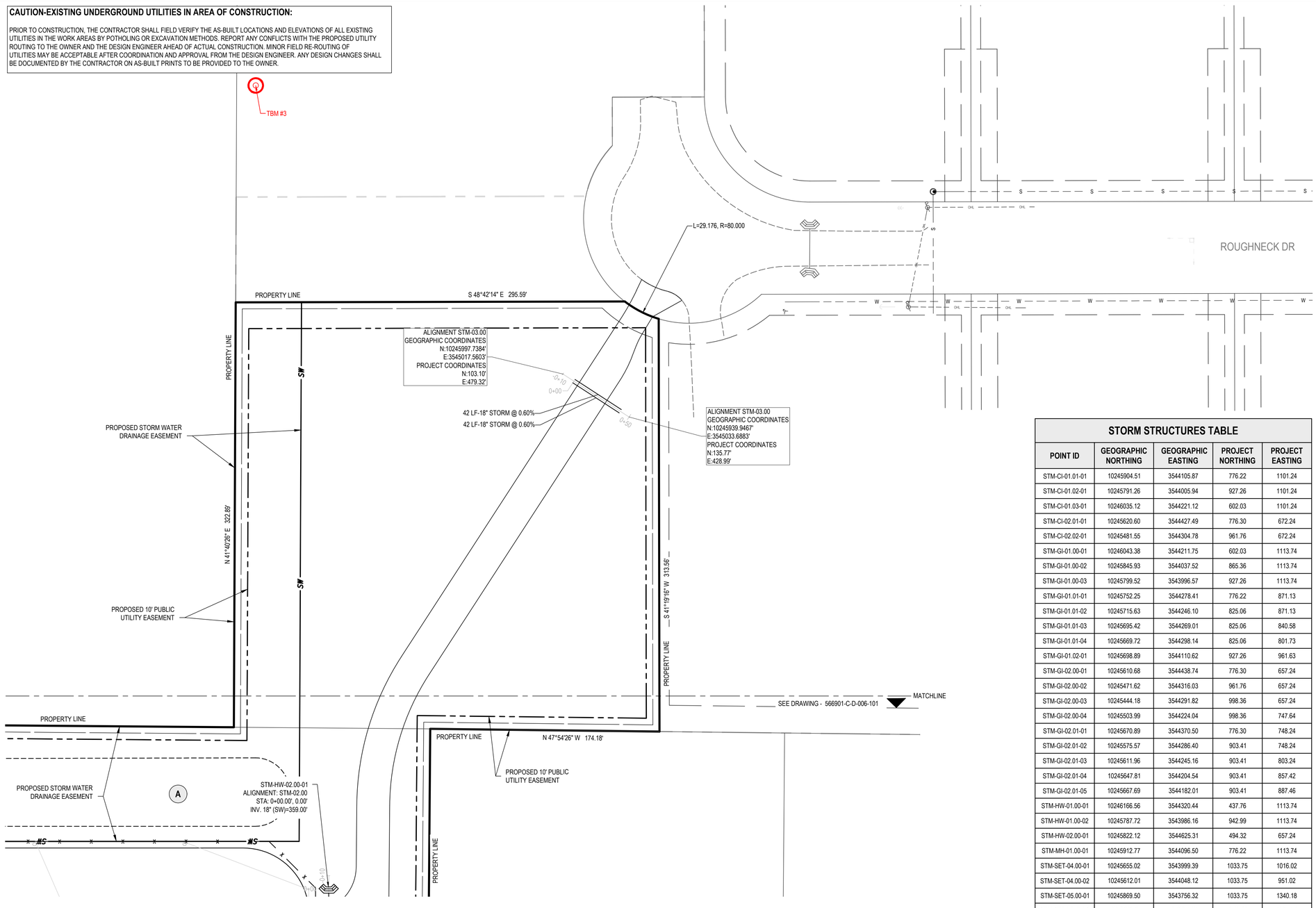
Texas 811 Know what's below. Call before you dig.

MIDDOUGH PROJ.#: MEU2510

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CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.



UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W
G	NATURAL GAS	NG
	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL
WW	WASTEWATER SEWER	WW
WW PS	WASTEWATER PRESSURE SEWER	WW PS

UNDERGROUND STORM SEWER NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. WORK THIS DRAWING WITH STORM PROFILES DRAWINGS 566901-C-D-006-103 THROUGH 566901-C-D-006-104.
3. CORRUGATED-PE PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED FOR THE PRIVATE STORM SEWER SYSTEM HEADERS.
4. PVC PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED ACCORDING TO THE APPLICABLE DETAILS ASSOCIATED WITH THE PRIVATE STORM SEWER SYSTEM.
5. STORM SEWER STRUCTURES SHALL CONFORM TO MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE AND SITE NOTES AND DETAILS.
6. THE CONTRACTOR SHALL ENSURE THAT ALL MANUFACTURERS REQUIREMENTS OF THE PIPING SYSTEM ARE MET, INCLUDING BUT NOT LIMITED TO; HANDLING, HAULING, TRENCH CONDITIONS AND INSTALLATION.
7. THE CONTRACTOR SHALL SEEK ACCEPTANCE OF THE WORK FROM THE OWNER OR THEIR DULY AUTHORIZED REPRESENTATIVE, OR THE AUTHORITY HAVING JURISDICTION AS APPROPRIATE.

REFERENCES:

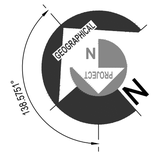
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2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE SITE PLANS, 566901-C-D-004 SERIES DRAWINGS.
4. REFERENCE THE GRADING PLANS, 566901-C-D-005 SERIES DRAWINGS.
5. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
6. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
7. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
8. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
9. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

UNDERGROUND UTILITY PLAN KEYED NOTES:

(A) PROPOSED STORMWATER MANAGEMENT BASIN.

STORM STRUCTURES TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
STM-CI-01.01-01	10245904.51	3544105.87	776.22	1101.24
STM-CI-01.02-01	10245791.26	3544005.94	927.26	1101.24
STM-CI-01.03-01	10246035.12	3544221.12	602.03	1101.24
STM-CI-02.01-01	10245620.60	3544427.49	776.30	672.24
STM-CI-02.02-01	10245481.55	3544304.78	961.76	672.24
STM-GI-01.00-01	10246043.38	3544211.75	602.03	1113.74
STM-GI-01.00-02	10245845.93	3544037.52	865.36	1113.74
STM-GI-01.00-03	10245799.52	3543996.57	927.26	1113.74
STM-GI-01.01-01	10245752.25	3544278.41	776.22	871.13
STM-GI-01.01-02	10245715.63	3544246.10	825.06	871.13
STM-GI-01.01-03	10245695.42	3544269.01	825.06	840.58
STM-GI-01.01-04	10245669.72	3544298.14	825.06	801.73
STM-GI-01.02-01	10245698.89	3544110.62	927.26	961.63
STM-GI-02.00-01	10245610.68	3544438.74	776.30	657.24
STM-GI-02.00-02	10245471.62	3544316.03	961.76	657.24
STM-GI-02.00-03	10245444.18	3544291.82	998.36	657.24
STM-GI-02.00-04	10245503.99	3544224.04	998.36	747.64
STM-GI-02.01-01	10245670.89	3544370.50	776.30	748.24
STM-GI-02.01-02	10245575.57	3544286.40	903.41	748.24
STM-GI-02.01-03	10245611.96	3544245.16	903.41	803.24
STM-GI-02.01-04	10245647.81	3544204.54	903.41	857.42
STM-GI-02.01-05	10245667.69	3544182.01	903.41	887.46
STM-HW-01.00-01	10246166.56	3544320.44	437.76	1113.74
STM-HW-01.00-02	10245787.72	3543986.16	942.99	1113.74
STM-HW-02.00-01	10245822.12	3544625.31	494.32	657.24
STM-MH-01.00-01	10245912.77	3544096.50	776.22	1113.74
STM-SET-04.00-01	10245655.02	3543999.39	1033.75	1016.02
STM-SET-04.00-02	10245612.01	3544048.12	1033.75	951.02
STM-SET-05.00-01	10245869.50	3543756.32	1033.75	1340.18
STM-SET-05.00-02	10245829.80	3543801.31	1033.75	1280.18



0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.



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00A	10/17/25	ISSUED FOR APPROVAL

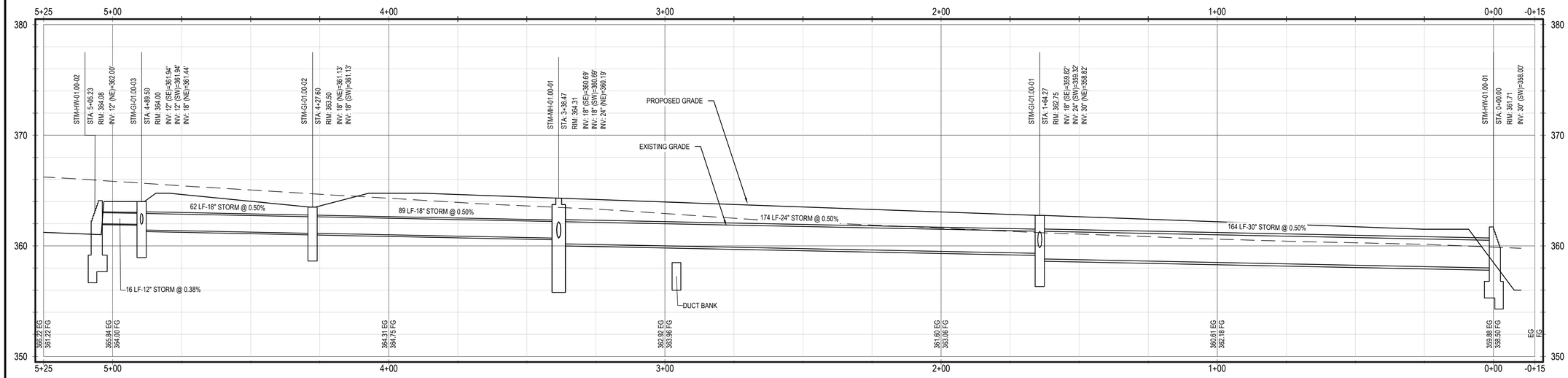
MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

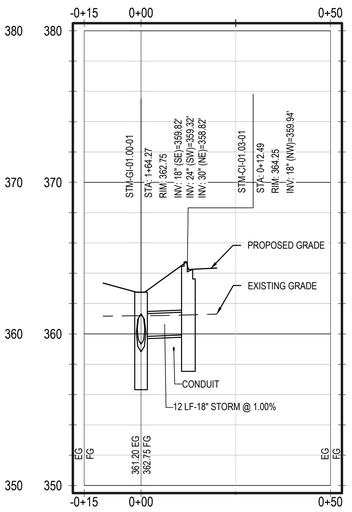
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN STORM SEWER GEOGRAPHICAL NORTH AREA
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-006-102
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

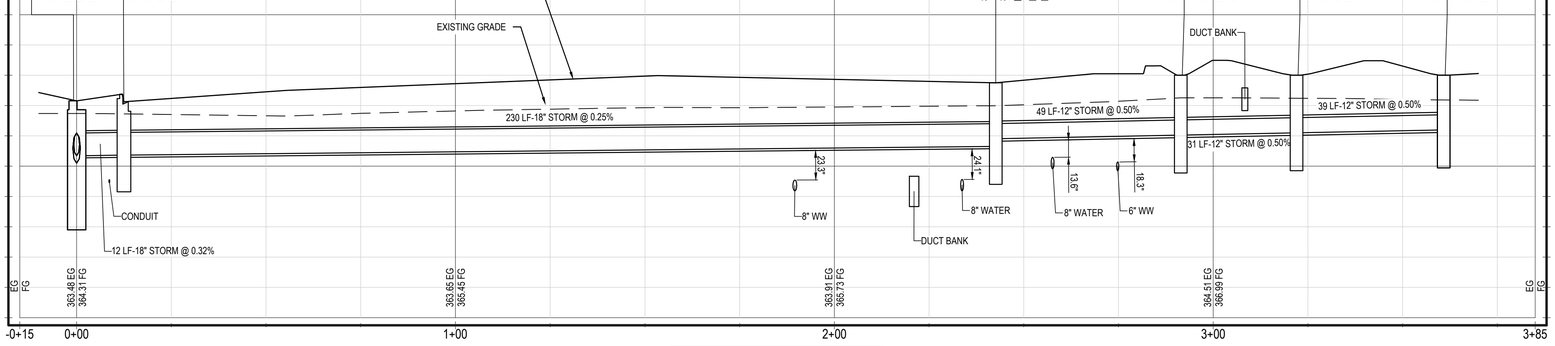
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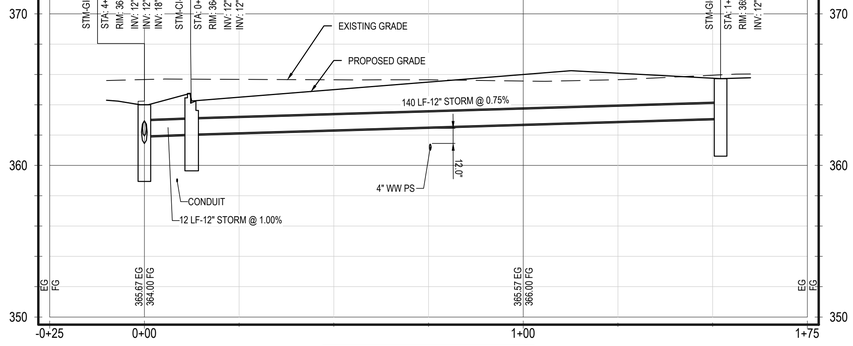
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PROFILE: STM-01.03
SCALE: 1"=20' H, 1"=5' V



PROFILE: STM-01.01
SCALE: 1"=20' H, 1"=5' V



PROFILE: STM-01.02
SCALE: 1"=20' H, 1"=5' V

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

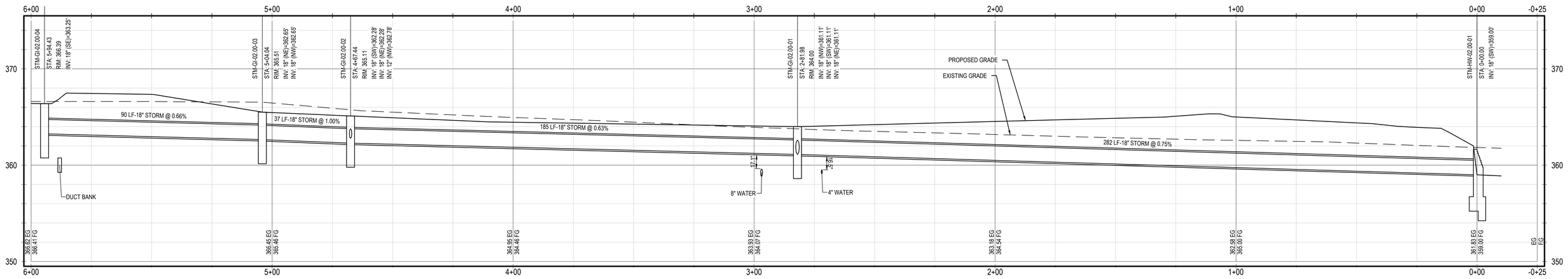
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: STORM SEWER PROFILES

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

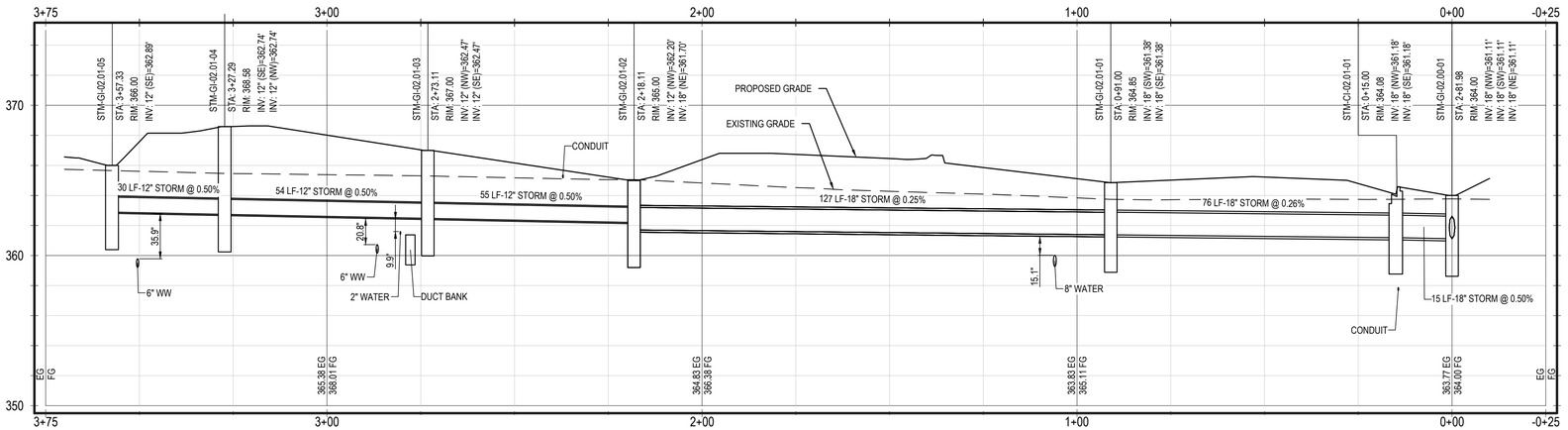
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REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

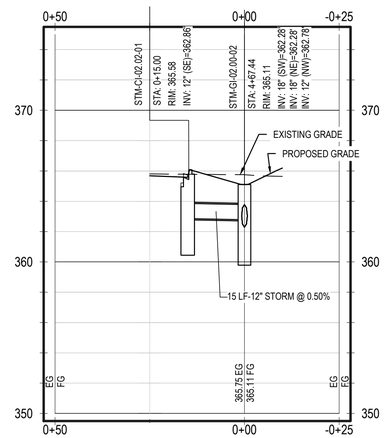
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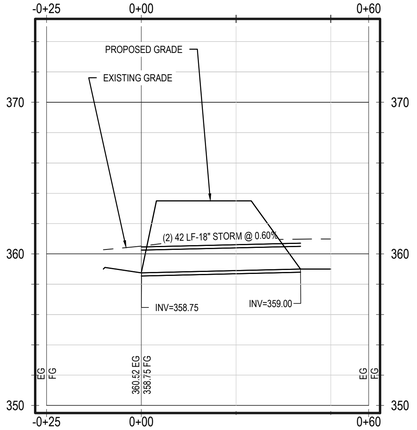
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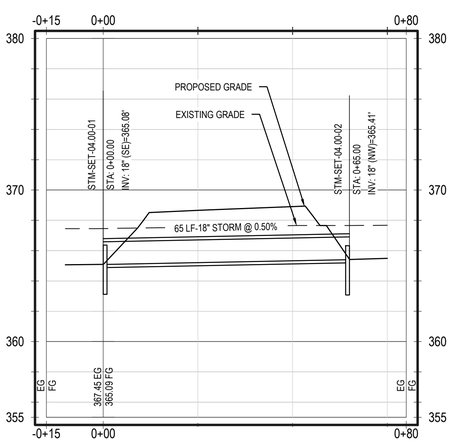
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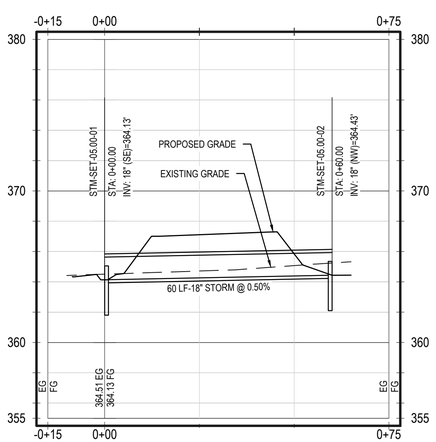
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PROFILE: STM-03.00
SCALE: 1"=20' H, 1"=5' V



PROFILE: STM-04.00
SCALE: 1"=20' H, 1"=5' V



PROFILE: STM-05.00
SCALE: 1"=20' H, 1"=5' V

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: STORM SEWER PROFILES

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-104
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

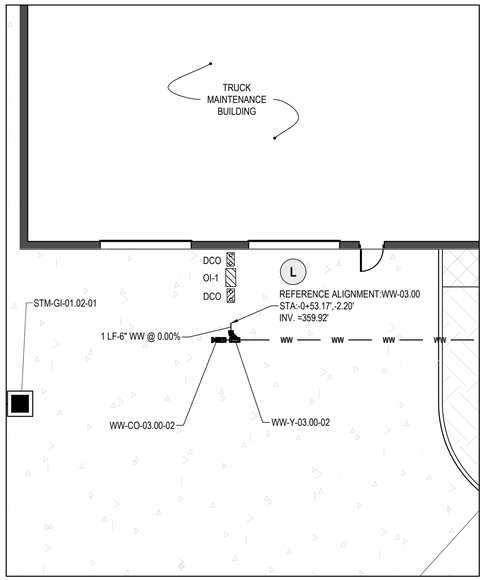
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CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.



TIE-POINT TO OIL/WATER INTERCEPTOR DETAIL

SCALE: 1"=10'

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W W W
G	NATURAL GAS	NG NG NG
STM	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL OHL OHL
WW WW WW	WASTEWATER SEWER	WW WW WW
WW PS WW PS	WASTEWATER PRESSURE SEWER	WW PS WW PS



ALIGNMENT WW-02.00
GEOGRAPHIC COORDINATES
N:10245919.1066'
E:3544291.4231'
PROJECT COORDINATES
N:642.50'
E:971.77'

ALIGNMENT WW-04.00
GEOGRAPHIC COORDINATES
N:10245916.9186'
E:3544276.1598'
PROJECT COORDINATES
N:654.24'
E:981.77'

ALIGNMENT WW-05.00
GEOGRAPHIC COORDINATES
N:10245883.6374'
E:3544246.7888'
PROJECT COORDINATES
N:698.63'
E:981.77'

UNDERGROUND ELECTRICAL DUCTBANK (TYP.)

WW-CO-02.00-01 E
WW-Y-02.00-02 C
81 LF-6" WW @ 1.01%
WW-FN-05.00-01 D
ALIGNMENT: WW-05.00
STA: 0+32.99', -3.91'
RIM=367.25'
INV. 6" (SW)=359.83'
WW-FD-05.00-01 J
ALIGNMENT: WW-05.00
STA: 0+41.33', -4.90'
RIM=367.08'
INV. 6" (SW)=359.92'
43 LF-6" WW @ 1.00%
2 LF-6" WW @ 1.01%
32 LF-6" WW @ 1.00%
4 LF-6" WW @ 1.00%
3 LF-6" WW @ 1.00%
WW-Y-05.00-01 C
WW-CO-05.00-01 E
WW-Y-05.00-03 C
2 LF-6" WW @ 1.00%
WW-Y-05.00-02 C
7 LF-6" WW @ 1.00%
WW-MH-02.00-02 G
ALIGNMENT: WW-02.00
STA: 1+58.88', 0.00'
RIM=365.88'
INV. 6" (NE)=361.28'
INV. 6" (SE)=359.50'
INV. 8" (SW)=359.37'
30 LF-8" WW @ 1.00%
WW-MH-02.00-01 F
ALIGNMENT: WW-02.00
STA: 1+28.89', 0.00'
RIM=365.85'
INV. 8" (S)=359.07'
INV. 8" (NE)=359.07'
129 LF-8" WW @ 1.00%

E WW-CO-04.00-01
C WW-Y-04.00-01
11 LF-6" WW @ 1.02%
WW-Y-04.00-02 C
8 LF-6" WW @ 1.00%
11 LF-6" WW @ 1.00%
WW-CO-04.00-02 E
WW-Y-04.00-03 C
D WW-FN-04.00-02
ALIGNMENT: WW-04.00
STA: 0+96.95', 12.06'
RIM=367.14'
INV. 6" (NE)=362.75'
D WW-FN-04.00-01
ALIGNMENT: WW-04.00
STA: 1+40.92', 0.00'
RIM=367.66'
INV. 6" (SW)=363.04'
ALIGNMENT WW-04.00
GEOGRAPHIC COORDINATES
N:10245832.7662'
E:3544373.4767'
PROJECT COORDINATES
N:652.95'
E:853.12'
ALIGNMENT WW-05.00
GEOGRAPHIC COORDINATES
N:10245840.6302'
E:3544295.5267'
PROJECT COORDINATES
N:698.63'
E:916.77'

Lift Station will serve as sampling point for city
HOLD
LIFT STATION AND WASTEWATER PRESSURE SEWER
(COORDINATE DESIGN WITH DEVELOPER AND LIFT STATION VENDOR)

I WW-B-01.00-01
157 LF- 4" WW PS
WW-B-02.01-01 I
7 LF-6" WW @ 0.00%
WW-B-02.01-02 I
4 LF-6" WW @ -99.92%
WW-B-02.01-03 I
2 LF-6" WW @ 0.00%
11 LF-6" WW @ 0.91%
ALIGNMENT WW-01.00
GEOGRAPHIC COORDINATES
N:10245718.9983'
E:3544250.3024'
PROJECT COORDINATES
N:819.76'
E:870.21'
30 LF-6" WW @ 1.05%
B WW-LS-01.00-01
ALIGNMENT: WW-01.00
STA: 3+69.57', 0.00'
RIM=366.62'
INV. 6" (SW)=358.41'
INV. 6" (NE)=357.46'
INV. 4" (NW)=363.25'
INV. 8" (N)=357.78'
10 LF-6" WW @ 1.07%
WW-Y-02.00-01 C
SEE TIE-POINT TO OIL/WATER INTERCEPTOR DETAIL - THIS SHEET
K
INV. =360.29'
68 LF-6" WW @ 1.00%
24 LF-6" WW @ 1.03%
ALIGNMENT WW-03.00
GEOGRAPHIC COORDINATES
N:10245691.2989'
E:3544131.9330'
PROJECT COORDINATES
N:918.84'
E:940.63'
1 LF-6" WW @ 0.00%
L
52 LF-6" WW @ 1.00%
63 LF-6" WW @ 1.02%
ALIGNMENT WW-03.00
GEOGRAPHIC COORDINATES
N:10245601.9778'
E:3544233.1591'
PROJECT COORDINATES
N:918.84'
E:805.63'
E WW-CO-03.00-02
WW-Y-03.00-02 C
F
WW-MH-02.00-03
ALIGNMENT: WW-02.00
STA: -0+99.09', 0.00'
RIM=368.39'
INV. 6" (NE)=359.40'
INV. 6" (SE)=359.40'
INV. 6" (NW)=359.40'
WW-CO-03.00-01 E
WW-Y-03.00-01 C
ALIGNMENT WW-02.00
GEOGRAPHIC COORDINATES
N:10245643.4178'
E:3544169.7019'
PROJECT COORDINATES
N:929.76'
E:880.63'
212 LF-4" WW PS
WW PS
WASTEWATER T.O.P.
GEOGRAPHIC COORDINATES
N:10245671.3027'
E:3543984.0595'
PROJECT COORDINATES
N:1031.68'
E:1038.28'
A
UNDERGROUND ELECTRICAL CONDUIT (TYP.)
PROPOSED 20' PUBLIC UTILITY EASEMENT
APPROXIMATE LOCATION OF 30' WIDE PIPELINE EASEMENT
23' WIDE CITY OF BRYAN ELECTRICAL TRANSMISSION EASEMENT
PROPERTY LINE
N 48°34'30" W 791.90'

WASTEWATER NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. WORK THIS DRAWING WITH WASTEWATER PROFILES DRAWING 566901-C-D-006-203.
3. PROPOSED WASTEWATER PIPING SHALL BE INSTALLED WITH 36" OF COVER, MINIMUM.
4. THE WASTEWATER PIPING SYSTEM SHALL CONFORM TO MIDDOUGH SPECIFICATION 566901-C-S-221313-001, FACILITY WASTEWATER SEWER SYSTEM.
5. WASTEWATER MANHOLES SHALL CONFORM TO MIDDOUGH SPECIFICATION 566901-C-S-221313-001, FACILITY WASTEWATER SEWER SYSTEM AND CIVIL NOTES AND DETAILS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROPER HORIZONTAL AND VERTICAL SEPARATION BETWEEN WASTEWATER LINES AND WATER LINES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION. WHERE SUCH LINES CROSS AND THE VERTICAL SEPARATION IS LESS THAN 18 INCHES, THE CONTRACTOR SHALL COMPLY WITH THE TEXAS PLUMBING CODE, SECTION 603-2, SEPARATION OF WATER SERVICE AND BUILDING SEWER.
7. ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER CONNECTIONS TO THE SANITARY SEWER ARE PROHIBITED.
8. THE SANITARY DRAINAGE SYSTEM SHALL COMPLY WITH THE CITY OF BRYAN PLUMBING CODE.
9. ALL PIPE PENETRATIONS THROUGH STRUCTURAL ELEMENTS (FOOTINGS, WALLS, FLOORS, ETC.) SHALL BE MADE WITH A PIPE SLEEVE. REFERENCE "UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL" ON DRAWING 566901-C-D-008-005.
10. THE SITE CONTRACTOR SHALL TERMINATE UNDERGROUND PIPING APPROXIMATELY 5 FEET OUTSIDE OF THE ADMINISTRATION BUILDING AND THE TRUCK MAINTENANCE BUILDING FOR CONTINUATION BY THE PIPING CONTRACTOR. PIPING ENDS SHALL BE CAPPED FOR LATER REMOVAL AND EXTENSION. COORDINATE WITH BUILDING DRAWINGS.
11. THE SITE CONTRACTOR SHALL ENSURE THAT RISERS FOR THE WASTEWATER SERVICES IN THE PLANT AREA TERMINATE AT THE LOCATION SPECIFIED TO MATCH THE FUTURE ABOVE-GROUND PIPING TO BE INSTALLED BY THE PIPING CONTRACTOR. PROVIDE SUFFICIENT SUPPORT WHILE BACKFILLING.

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

WASTEWATER KEYED NOTES:

- (A) WASTEWATER TAKE-OVER POINT (T.O.P.).
- (B) INSTALL LIFT STATION AND CONTROL PANEL. REFERENCE DRAWINGS 566901-C-D-008-009, 566901-C-D-008-010 AND 566901-C-D-008-011 FOR LIFT STATION DETAILS, INSTALLATION REQUIREMENTS AND SPECIFICATIONS. INSTALL CONCRETE BALLAST PER DETAILS TO PREVENT FLOATATION.
- (C) INSTALL WYE ASSEMBLY "Y". REFERENCE WYE ASSEMBLY DETAIL ON DRAWING 566901-C-D-008-005.
- (D) INSTALL FUNNEL DRAIN ASSEMBLY "FN". REFERENCE FUNNEL DRAIN ASSEMBLY DETAIL ON DRAWING 566901-C-D-008-005.
- (E) INSTALL CLEANOUT ASSEMBLY "CO". REFERENCE "CLEANOUT ASSEMBLY DETAIL" ON DRAWING 566901-C-D-008-005.
- (F) INSTALL SANITARY MANHOLE (SOLID COVER). REFERENCE SANITARY SEWER MANHOLE DETAIL ON DRAWING 566901-C-D-008-006.
- (G) INSTALL SANITARY MANHOLE (VENTED COVER) WITH SUMP AND TURNDOWN PIPE ON 6" SE INLET. REFERENCE SANITARY SEWER MANHOLE DETAIL AND PIPE TURNDOWN AT INLET MANHOLE DETAIL ON DRAWING 566901-C-D-008-005.
- (I) INSTALL BEND.
- (J) INSTALL NYLOPLAST DRAIN BASIN. REFERENCE "NYLOPLAST 12" DRAIN BASIN DETAIL" ON DRAWING 566901-C-D-008-008.
- (K) TIE POINT TO ADMINISTRATION BUILDING SERVICE LINE.
- (L) TIE-POINT TO OIL/WATER INTERCEPTOR (BY OTHERS).

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GEOGRAPHIC NORTH
PROJECT NORTH
136.515°

0 10 20 40
SCALE (IN FEET)
1 inch = 20 ft.

Texas 811 Know what's below. Call before you dig.

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MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN WASTEWATER
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-006-201
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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WASTEWATER CLEANOUT TABLE

ID	RIM ELEVATION	ALIGNMENT NAME	STATION & OFFSET
WW-CO-02.00-01	365.59'	WW-02.00	2+05.11, 0.00 R
WW-CO-03.00-01	368.15'	WW-03.00	0+65.74, 0.00 L
WW-CO-03.00-02	366.16'	WW-03.00	-0+55.01, 0.00 L
WW-CO-04.00-01	366.16'	WW-04.00	0+84.19, -1.62 L
WW-CO-04.00-02	366.35'	WW-04.00	1+31.27, 2.01 R
WW-CO-05.00-01	367.08'	WW-05.00	0+45.94, 0.00 L

WASTEWATER CLEANOUT TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
WW-CO-02.00-01	10245911.68	3544284.88	652.40	971.77
WW-CO-03.00-01	10245608.11	3544226.22	918.84	814.90
WW-CO-03.00-02	10245688.00	3544135.67	918.84	935.65
WW-CO-04.00-01	10245853.88	3544347.60	654.24	886.49
WW-CO-04.00-02	10245820.67	3544365.26	667.46	851.27
WW-CO-05.00-01	10245846.63	3544288.73	698.63	925.83

WASTEWATER FITTING TABLE

ID	FITTING DESCRIPTION	CENTERLINE ELEVATION	ALIGNMENT NAME	STATION
WW-B-01.00-01	4" 90° BEND	361.42	WW-01.00	2+11.93 ,0.00' L
WW-B-02.01-01	6" 90° BEND	357.81	WW-02.00	0+08.02 ,8.02' R
WW-B-02.01-02	6" 45° BEND	357.81	WW-02.00	0+02.84 ,13.20' R
WW-B-02.01-03	6" 45° BEND	361.00	WW-02.00	0+00.58 ,15.45' R
WW-Y-02.00-01	WYE ASSEMBLY	358.97	WW-02.00	-0+30.74 ,-1.21' L
WW-Y-02.00-02	WYE ASSEMBLY	361.96	WW-02.00	2+03.26 ,1.21' R
WW-Y-03.00-01	WYE ASSEMBLY	360.29	WW-03.00	0+63.90 ,-1.21' L
WW-Y-03.00-02	WYE ASSEMBLY	360.17	WW-03.00	-0+53.17 ,-1.21' L
WW-Y-04.00-01	WYE ASSEMBLY	362.78	WW-04.00	0+84.62 ,0.00' R
WW-Y-04.00-02	WYE ASSEMBLY	362.89	WW-04.00	0+97.38 ,0.00' R
WW-Y-04.00-03	WYE ASSEMBLY	363.21	WW-04.00	1+31.70 ,0.00'
WW-Y-05.00-01	WYE ASSEMBLY	360.07	WW-05.00	0+32.99 ,-1.21' L
WW-Y-05.00-02	WYE ASSEMBLY	360.14	WW-05.00	0+41.33 ,-1.21' L
WW-Y-05.00-03	WYE ASSEMBLY	360.16	WW-05.00	0+44.51 ,-1.21' L

WASTEWATER FITTING TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
WW-B-01.00-01	10245830.20	3544124.28	819.76	1038.27
WW-B-02.01-01	10245734.40	3544249.98	808.42	880.63
WW-B-02.01-02	10245729.56	3544255.48	808.42	873.31
WW-B-02.01-03	10245727.44	3544257.87	808.42	870.12
WW-Y-02.00-01	10245703.44	3544222.66	849.71	880.63
WW-Y-02.00-02	10245909.72	3544283.14	655.02	971.77
WW-Y-03.00-01	10245609.84	3544224.25	918.84	817.52
WW-Y-03.00-02	10245686.26	3544137.64	918.84	933.02
WW-Y-04.00-01	10245855.33	3544345.95	654.24	888.69
WW-Y-04.00-02	10245845.49	3544338.32	666.68	887.90
WW-Y-04.00-03	10245822.40	3544363.29	667.46	853.90
WW-Y-05.00-01	10245855.71	3544278.44	698.63	939.56
WW-Y-05.00-02	10245850.19	3544284.69	698.63	931.22
WW-Y-05.00-03	10245848.09	3544287.08	698.63	928.04

WASTEWATER STRUCTURE TABLE

STRUCTURE NAME	STRUCTURE TYPE	RIM ELEVATION	ALIGNMENT NAME	STATION & OFFSET
WW-FD-05.00-01	FLOOR DRAIN	367.08	WW-05.00	0+41.33, -4.90 L
WW-FN-04.00-01	FUNNEL DRAIN ASSEMBLY	367.66	WW-04.00	1+40.92, 0.00 R
WW-FN-04.00-02	FUNNEL DRAIN ASSEMBLY	367.14	WW-04.00	0+96.95, 12.06 R
WW-FN-05.00-01	FUNNEL DRAIN ASSEMBLY	367.25	WW-05.00	0+32.99, -3.91 L
WW-FN-05.00-02	FUNNEL DRAIN ASSEMBLY	368.08	WW-05.00	0+44.51, -4.90 L
WW-LS-01.00-01	LIFT STATION	366.62	WW-01.00	3+69.57, 0.00
WW-MH-02.00-01	WASTEWATER MANHOLE	365.85	WW-02.00	1+28.89, 0.00
WW-MH-02.00-02	WASTEWATER MANHOLE	365.88	WW-02.00	1+58.88, 0.00
WW-MH-02.00-03	WASTEWATER MANHOLE	368.39	WW-02.00	-0+99.09, 0.00

WASTEWATER STRUCTURE TABLE

POINT ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
WW-FD-05.00-01	10245853.35	3544288.52	693.73	930.44
WW-FN-04.00-01	10245829.70	3544370.77	657.04	853.12
WW-FN-04.00-02	10245835.88	3544329.84	679.49	887.90
WW-FN-05.00-01	10245858.12	3544281.62	694.72	938.78
WW-FN-05.00-02	10245851.25	3544290.91	693.73	927.26
WW-LS-01.00-01	10245725.90	3544242.48	819.76	880.63
WW-MH-02.00-01	10245854.53	3544234.45	728.62	971.77
WW-MH-02.00-02	10245877.02	3544254.29	698.63	971.77
WW-MH-02.00-03	10245651.60	3544176.92	918.84	880.63

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FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHAEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

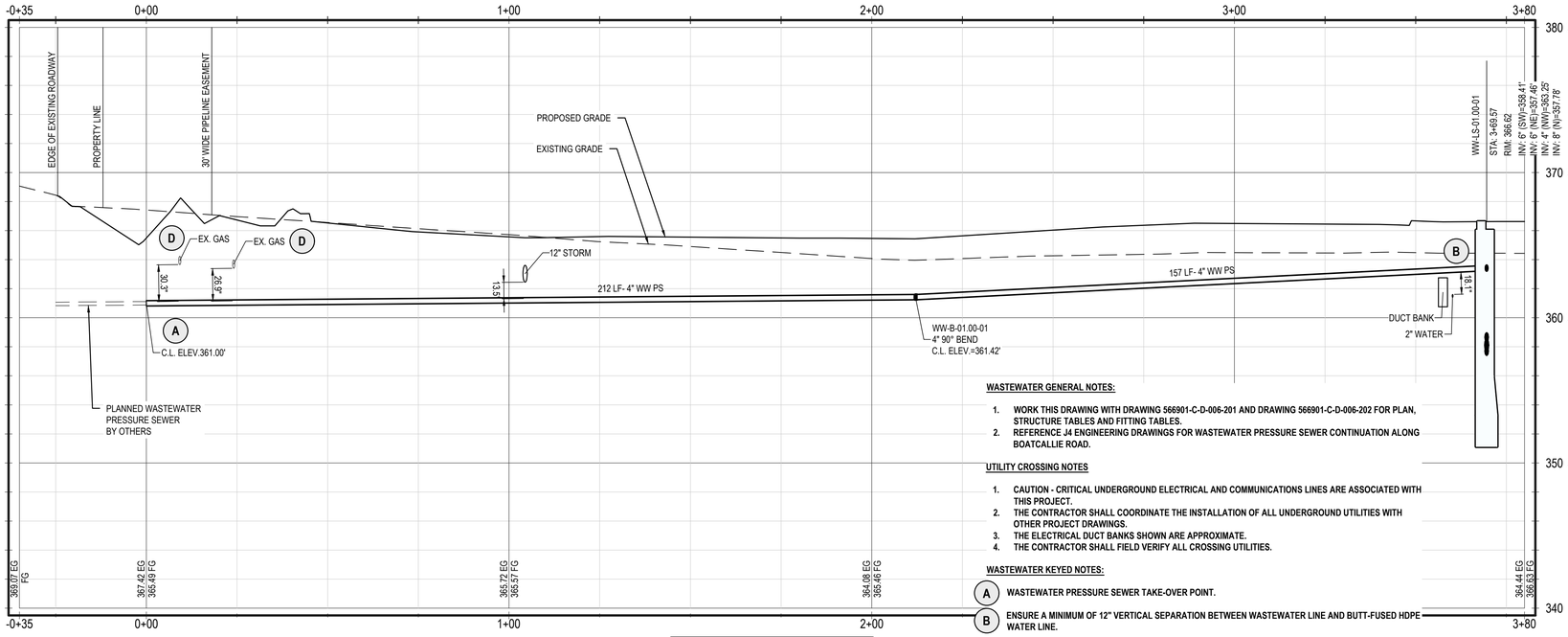
DESCRIPTION: UNDERGROUND UTILITY PLAN WASTEWATER

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-202
REV.: 00C

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510



PROFILE: WW-01.00
SCALE: 1"=20' H, 1"=5' V

HOLD
LIFT STATION AND FORCEMAIN
(COORDINATE DESIGN WITH DEVELOPER AND LIFT STATION VENDOR)

WASTEWATER GENERAL NOTES:

1. WORK THIS DRAWING WITH DRAWING 566901-C-D-006-201 AND DRAWING 566901-C-D-006-202 FOR PLAN, STRUCTURE TABLES AND FITTING TABLES.
2. REFERENCE J4 ENGINEERING DRAWINGS FOR WASTEWATER PRESSURE SEWER CONTINUATION ALONG BOATCALLIE ROAD.

UTILITY CROSSING NOTES

1. CAUTION - CRITICAL UNDERGROUND ELECTRICAL AND COMMUNICATIONS LINES ARE ASSOCIATED WITH THIS PROJECT.
2. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL UNDERGROUND UTILITIES WITH OTHER PROJECT DRAWINGS.
3. THE ELECTRICAL DUCT BANKS SHOWN ARE APPROXIMATE.
4. THE CONTRACTOR SHALL FIELD VERIFY ALL CROSSING UTILITIES.

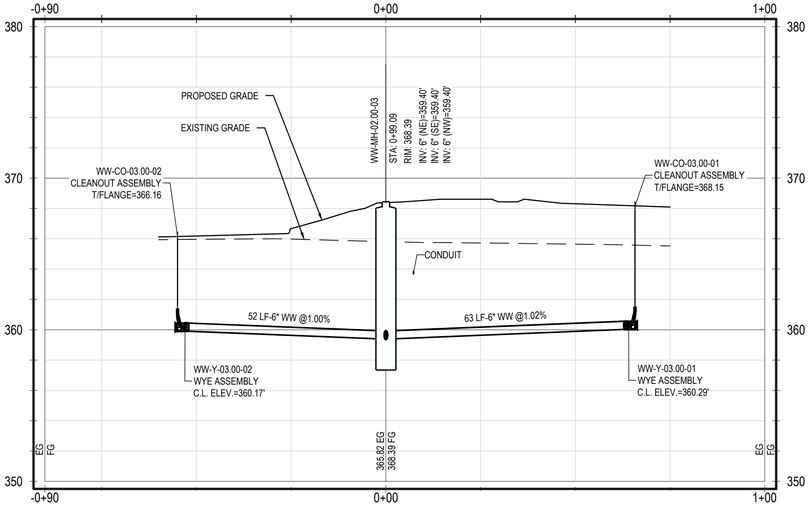
WASTEWATER KEYED NOTES:

(A) WASTEWATER PRESSURE SEWER TAKE-OVER POINT.

(B) ENSURE A MINIMUM OF 12" VERTICAL SEPARATION BETWEEN WASTEWATER LINE AND BUTT-FUSED HDPE WATER LINE.

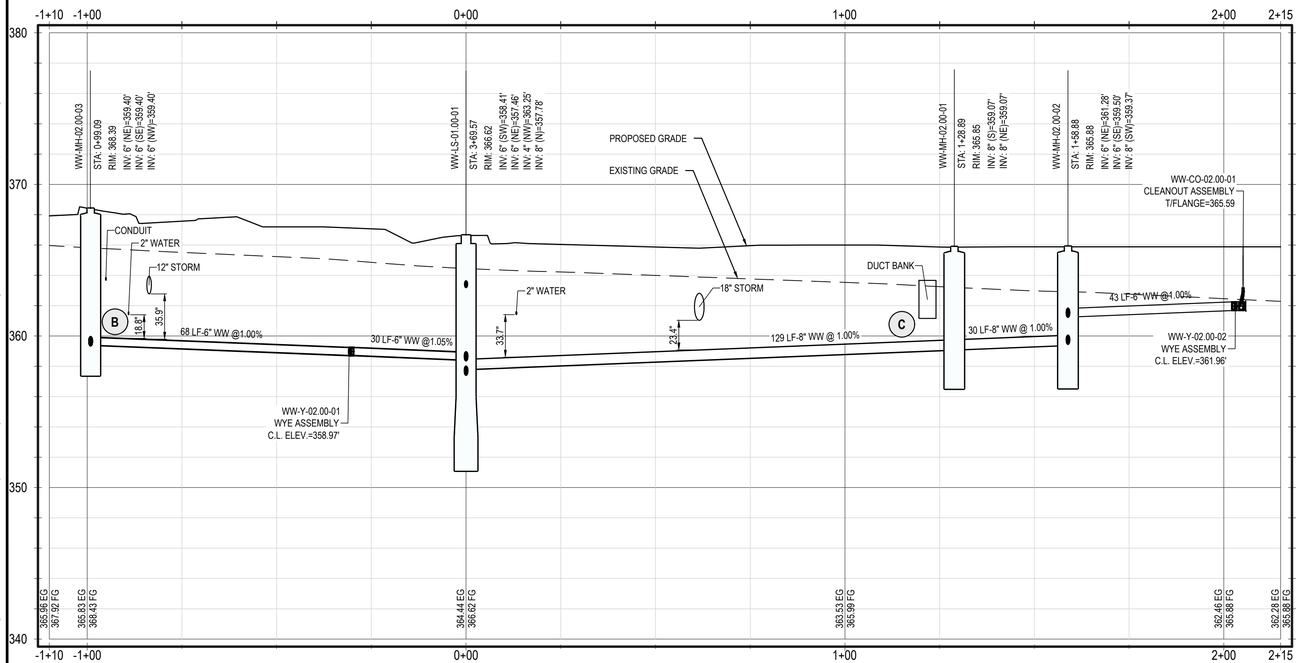
(C) ENSURE A MINIMUM OF 12" RADIAL SEPARATION BETWEEN WASTEWATER LINE AND CROSSING UTILITY. IF THESE CONDITIONS CANNOT BE MET, PROVIDE LOW STRENGTH MORTAR BACKFILL SURROUNDING THE WASTWATER LINE FOR A MINIMUM OF 4 FEET ON EACH SIDE OF THE CROSSING.

(D) FIELD VERIFY THE AS BUILT LOCATION AND DEPTH OF EXISTING UTILITY. PROVIDE SUITABLE CLEARANCE PER UTILITY OWNER.

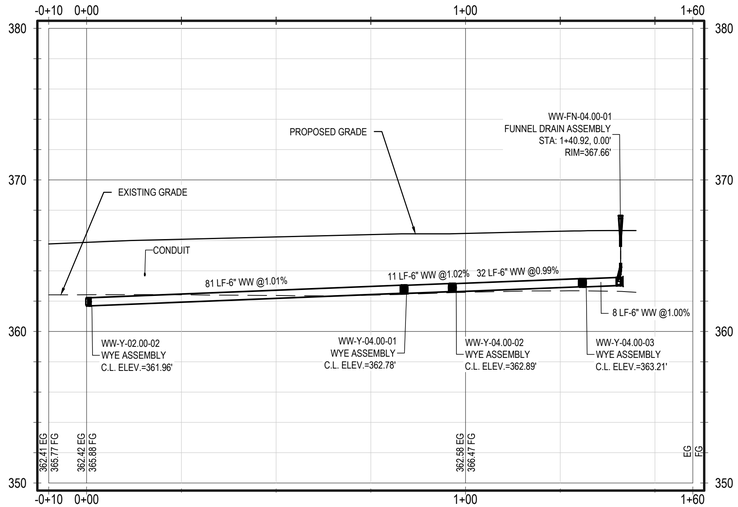


PROFILE: WW-03.00
SCALE: 1"=20' H, 1"=5' V

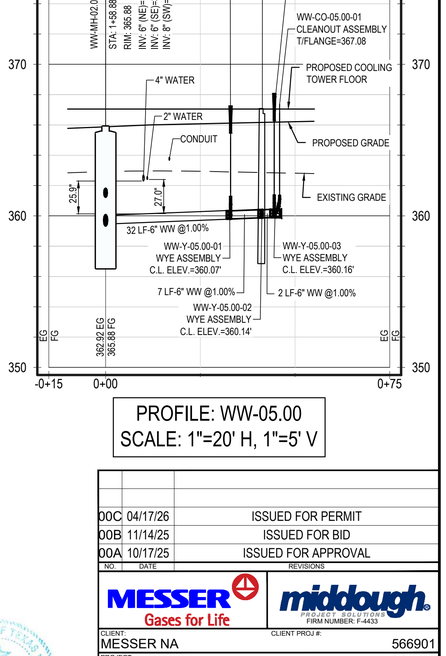
FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION



PROFILE: WW-02.00
SCALE: 1"=20' H, 1"=5' V



PROFILE: WW-04.00
SCALE: 1"=20' H, 1"=5' V



PROFILE: WW-05.00
SCALE: 1"=20' H, 1"=5' V

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: WASTEWATER PROFILES

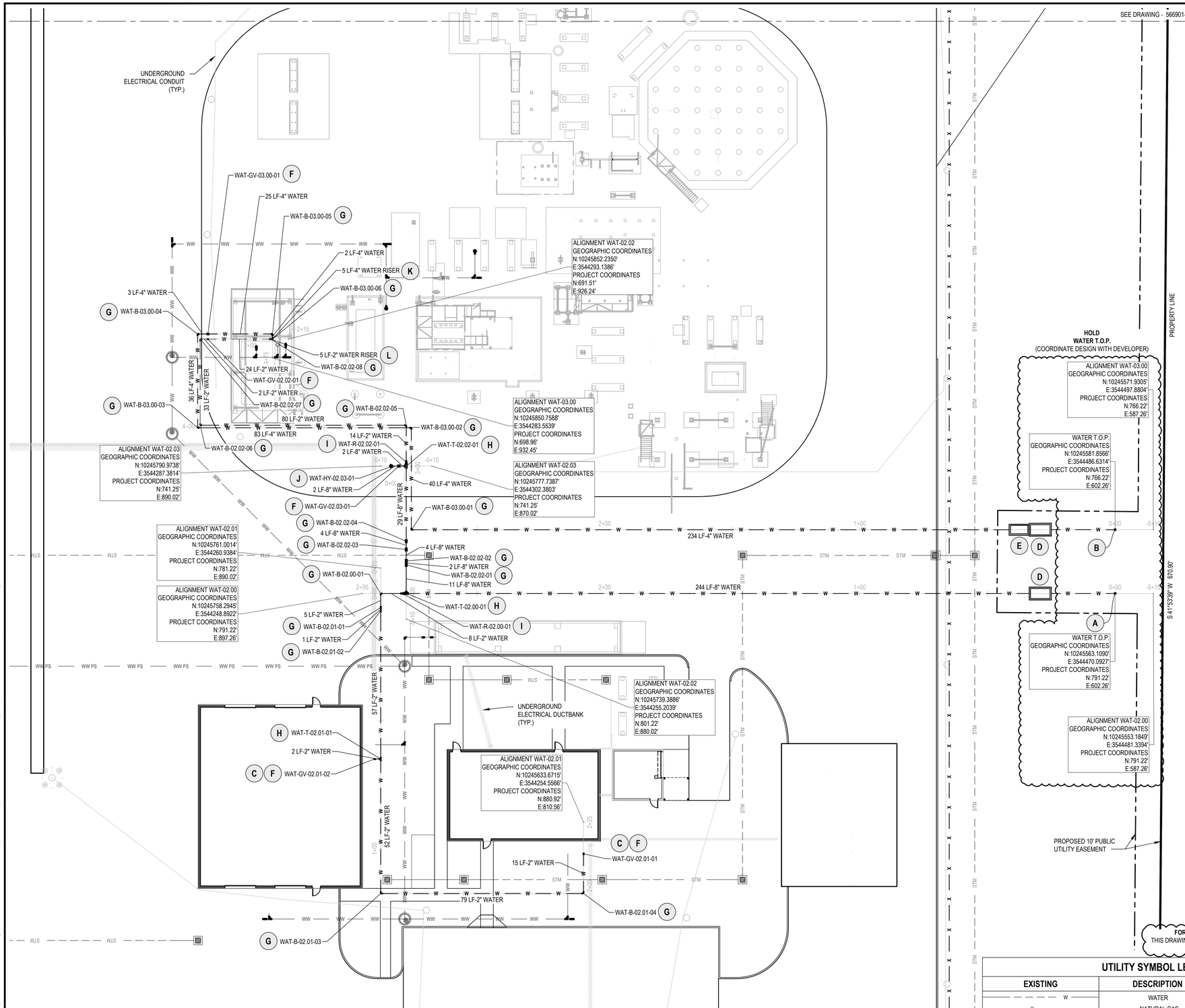
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-203
REV.: 00C
DRAWING SCALE: AS NOTED

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

MIDDOUGH PROJ.#: MEU2510

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UNDERGROUND WATER NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. WORK THIS DRAWING WITH WITH DRAWING 566901-C-D-006-302 AND WATER PROFILES DRAWINGS 566901-C-D-006-303 TO 566901-C-D-006-304.
3. PROPOSED WATER PIPING SHALL BE INSTALLED WITH 36" OF COVER, MINIMUM.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PROPER HORIZONTAL AND VERTICAL SEPARATION BETWEEN WASTEWATER LINES AND WATER LINES AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
5. ALL PIPE PENETRATIONS THROUGH STRUCTURAL ELEMENTS (FOOTINGS, WALLS, FLOORS, ETC.) SHALL BE MADE WITH A PIPE SLEEVE. REFERENCE "UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL" ON DRAWING 566901-C-D-008-005.
6. THE SITE CONTRACTOR SHALL TERMINATE UNDERGROUND PIPING APPROXIMATELY 5 FEET OUTSIDE OF THE ADMINISTRATION BUILDING AND TRUCK MAINTENANCE BUILDING FOR CONTINUATION BY THE PIPING CONTRACTOR. PIPING ENDS SHALL BE CAPPED FOR LATER REMOVAL AND EXTENSION. COORDINATE WITH BUILDING DRAWINGS.
7. THE SITE CONTRACTOR SHALL ENSURE THAT RISERS FOR THE WATER SERVICES IN THE PLANT AREA TERMINATE AT THE LOCATION SPECIFIED TO MATCH THE FUTURE ABOVE-GROUND PIPING TO BE INSTALLED BY THE PIPING CONTRACTOR. PROVIDE SUFFICIENT SUPPORT WHILE BACKFILLING. REFERENCE THE "WATER RISER DETAIL" ON DRAWING 566901-C-D-008-005.
8. WATER MAIN SHUT-OFFS AND TIE-IN'S SHALL BE COORDINATED BETWEEN THE CONTRACTOR, MESSER AND THE CITY.
9. SOME DI (DUCTILE IRON) MATERIALS WILL BE USED ON PORTIONS OF THE PRIVATE WATER PIPING SYSTEM THAT REQUIRE DI COMPONENTS (FIRE HYDRANTS, VALVES, ETC.). THE MATERIALS AND EXECUTION PORTIONS OF THE BI/SC UNIFIED SPECIFICATIONS SECTION 33 05 02, DUCTILE IRON PIPE SHALL APPLY TO THE DUCTILE IRON PORTIONS OF THE PRIVATE UNDERGROUND WATER SERVICE PIPING SYSTEM. IN GENERAL DI MATERIALS WILL BE USED BETWEEN THE WATER TAKE-OVER-POINTS (T.O.P.) THROUGH THE WATER METER VAULTS AND BACKFLOW PREVENTION ASSEMBLY VAULTS. DI MATERIALS WILL ALSO BE USED AT FIRE HYDRANT BRANCHES.
10. HDPE (HIGH DENSITY POLYETHYLENE) PIPING AND FITTINGS PER MESSER STANDARD SPECIFICATION 00000-P-S-001/1P4, HDPE PIPING MATERIAL SPECIFICATION - 150# (1P4) SHALL APPLY TO THE PRIVATE UNDERGROUND WATER SERVICE PIPING SYSTEM.
11. THRUST RESTRAINT FOR THE PUBLIC PORTIONS OF THE PIPING SYSTEM SHALL CONFORM TO B/CS UNIFIED SPECIFICATIONS SECTION 03 30 01, CONCRETE BLOCKING OR ANCHORAGE.
12. THRUST RESTRAINT FOR THE PORTIONS OF THE PRIVATE UNDERGROUND WATER PIPING SYSTEM SHALL CONFORM TO CIVIL NOTES AND DETAILS AND SPECIFICATIONS.
13. ALL UNDERGROUND WATER VALVE PRODUCTS AND EXECUTION SHALL CONFORM TO B/CS UNIFIED SPECIFICATIONS SECTION 33 12 16, MAIN LINE VALVES.

REFERENCES:

1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
4. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
5. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
6. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
7. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

WATER KEYED NOTES:

- A WATER TAKE-OVER POINT (T.O.P.) AT WATER VALVE TO BE INSTALLED BY DEVELOPER.
- B COOLING TOWER MAKE-UP WATER TAKE-OVER POINT (T.O.P.) AT WATER VALVE TO BE INSTALLED BY DEVELOPER.
- C WATER TIE-POINT AT BUILDING. BUILDING PLUMBING SHALL CONTAIN A CHECK VALVE TO PREVENT DOWNSTREAM CONTAMINATION.
- D INSTALL WATER METER VAULT. REFER TO DRAWING 566901-C-D-008-007 FOR DETAIL.
- E INSTALL BACKFLOW PREVENTER VAULT. REFER TO DRAWING 566901-C-D-008-007 FOR DETAIL. 1500 GPM AT 70 PSI REQUIREMENT AT DISCHARGE FROM BACKFLOW PREVENTER
- F INSTALL GATE VALVE ("GV"). REFERENCE "GATE VALVE & BOX DETAIL" ON DRAWING 566901-C-D-008-007.
- G INSTALL BEND ("B").
- H INSTALL TEE ("T").
- I INSTALL REDUCER ("R").
- J INSTALL FIRE HYDRANT. FIRE WATER DEMAND=1575 GALLONS PER MINUTE AT 20 PSI FOR 2-HR DURATION BASED ON BUILDING NEEDS. REFERENCE "FIRE HYDRANT ASSEMBLY DETAIL" ON DRAWING 566901-C-D-008-007.
- K WATER RISER SERVING COOLING TOWER WATER MAKE-UP. REFERENCE "WATER RISER DETAIL" ON DRAWING 566901-C-D-008-005.
- L WATER RISER TO ABOVE-GROUND BACKFLOW PREVENTOR SERVING UTILITY SINK, WATER HEATER AND SAFETY SHOWER & EYE WASH. REFERENCE "WATER RISER DETAIL" ON DRAWING 566901-C-D-008-005 AND ABOVE-GROUND PIPING DRAWINGS.

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W W W
G	NATURAL GAS	NG NG NG
	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL OHL OHL
WW WW WW	WASTEWATER SEWER	WW WW WW
WW PS WW PS	WASTEWATER PRESSURE SEWER	WW PS WW PS

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS · JOSEPH MICHEL KHATER · 95739 · LICENSED · PROFESSIONAL ENGINEER · 04/17/2026

GEOGRAPHICAL PROJECT N 136.59°

0 10 20 40
SCALE (IN FEET)
1 inch = 20 ft.

Texas 811 Know what's below. Call before you dig.

DRAWING SCALE: AS NOTED

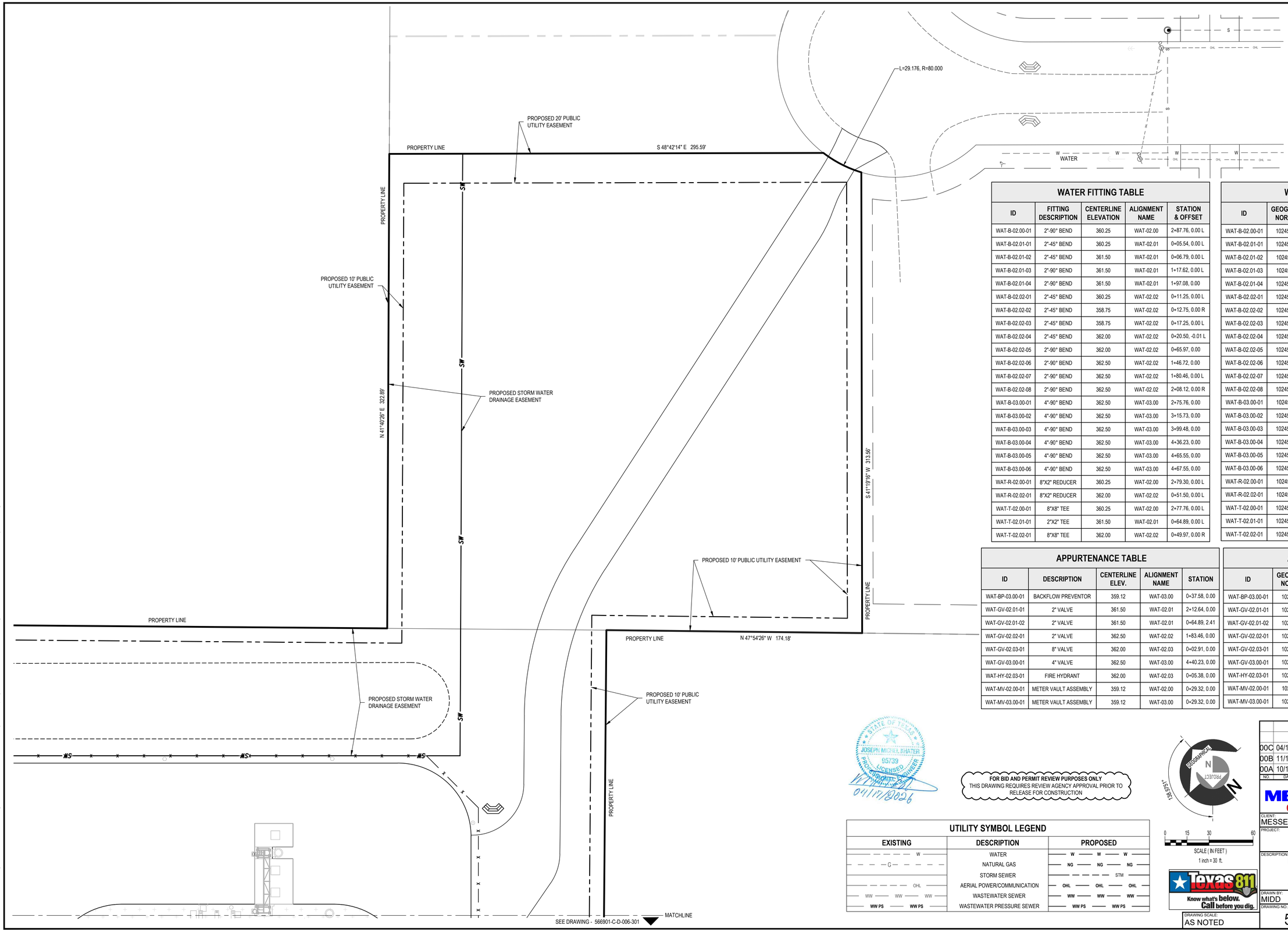
NO	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN WATER GEOGRAPHICAL SOUTH AREA
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-006-301
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

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WATER FITTING TABLE

ID	FITTING DESCRIPTION	CENTERLINE ELEVATION	ALIGNMENT NAME	STATION & OFFSET
WAT-B-02.00-01	2"-90° BEND	360.25	WAT-02.00	2+87.76, 0.00 L
WAT-B-02.01-01	2"-45° BEND	360.25	WAT-02.01	0+05.54, 0.00 L
WAT-B-02.01-02	2"-45° BEND	361.50	WAT-02.01	0+06.79, 0.00 L
WAT-B-02.01-03	2"-90° BEND	361.50	WAT-02.01	1+17.62, 0.00 L
WAT-B-02.01-04	2"-90° BEND	361.50	WAT-02.01	1+97.08, 0.00
WAT-B-02.02-01	2"-45° BEND	360.25	WAT-02.02	0+11.25, 0.00 L
WAT-B-02.02-02	2"-45° BEND	358.75	WAT-02.02	0+12.75, 0.00 R
WAT-B-02.02-03	2"-45° BEND	358.75	WAT-02.02	0+17.25, 0.00 L
WAT-B-02.02-04	2"-45° BEND	362.00	WAT-02.02	0+20.50, -0.01 L
WAT-B-02.02-05	2"-90° BEND	362.00	WAT-02.02	0+65.97, 0.00
WAT-B-02.02-06	2"-90° BEND	362.50	WAT-02.02	1+46.72, 0.00
WAT-B-02.02-07	2"-90° BEND	362.50	WAT-02.02	1+80.46, 0.00 L
WAT-B-02.02-08	2"-90° BEND	362.50	WAT-02.02	2+08.12, 0.00 R
WAT-B-03.00-01	4"-90° BEND	362.50	WAT-03.00	2+75.76, 0.00
WAT-B-03.00-02	4"-90° BEND	362.50	WAT-03.00	3+15.73, 0.00
WAT-B-03.00-03	4"-90° BEND	362.50	WAT-03.00	3+99.48, 0.00
WAT-B-03.00-04	4"-90° BEND	362.50	WAT-03.00	4+36.23, 0.00
WAT-B-03.00-05	4"-90° BEND	362.50	WAT-03.00	4+65.55, 0.00
WAT-B-03.00-06	4"-90° BEND	362.50	WAT-03.00	4+67.55, 0.00
WAT-R-02.00-01	8"X2" REDUCER	360.25	WAT-02.00	2+79.30, 0.00 L
WAT-R-02.02-01	8"X2" REDUCER	362.00	WAT-02.02	0+51.50, 0.00 L
WAT-T-02.00-01	8"X8" TEE	360.25	WAT-02.00	2+77.76, 0.00 L
WAT-T-02.01-01	2"X2" TEE	361.50	WAT-02.01	0+64.89, 0.00 L
WAT-T-02.02-01	8"X8" TEE	362.00	WAT-02.02	0+49.97, 0.00 R

WATER FITTING TABLE

ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
WAT-B-02.00-01	10245753.50	3544254.32	791.22	890.02
WAT-B-02.01-01	10245749.35	3544250.66	796.76	890.02
WAT-B-02.01-02	10245748.41	3544249.83	798.01	890.02
WAT-B-02.01-03	10245665.31	3544176.50	908.84	890.02
WAT-B-02.01-04	10245612.73	3544236.08	908.84	810.56
WAT-B-02.02-01	10245755.33	3544269.26	779.97	880.02
WAT-B-02.02-02	10245756.45	3544270.26	778.47	880.02
WAT-B-02.02-03	10245759.82	3544273.23	773.97	880.02
WAT-B-02.02-04	10245762.26	3544275.38	770.72	880.02
WAT-B-02.02-05	10245796.35	3544305.47	725.25	880.02
WAT-B-02.02-06	10245849.78	3544244.92	725.25	960.77
WAT-B-02.02-07	10245875.08	3544267.25	691.51	960.77
WAT-B-02.02-08	10245856.79	3544287.98	691.51	933.12
WAT-B-03.00-01	10245764.31	3544279.86	766.22	878.02
WAT-B-03.00-02	10245794.28	3544306.31	726.25	878.02
WAT-B-03.00-03	10245849.69	3544243.51	726.25	961.77
WAT-B-03.00-04	10245877.24	3544267.82	689.51	961.77
WAT-B-03.00-05	10245857.84	3544289.81	689.51	932.45
WAT-B-03.00-06	10245856.34	3544288.48	691.51	932.45
WAT-R-02.00-01	10245747.91	3544260.66	791.22	881.56
WAT-R-02.02-01	10245785.51	3544295.90	739.72	880.02
WAT-T-02.00-01	10245746.89	3544261.82	791.22	880.02
WAT-T-02.01-01	10245704.85	3544211.39	856.11	890.02
WAT-T-02.02-01	10245784.36	3544294.88	741.25	880.02

APPURTENANCE TABLE

ID	DESCRIPTION	CENTERLINE ELEV.	ALIGNMENT NAME	STATION
WAT-BP-03.00-01	BACKFLOW PREVENTOR	359.12	WAT-03.00	0+37.58, 0.00
WAT-GV-02.01-01	2" VALVE	361.50	WAT-02.01	2+12.64, 0.00
WAT-GV-02.01-02	2" VALVE	361.50	WAT-02.01	0+64.89, 2.41
WAT-GV-02.02-01	2" VALVE	362.50	WAT-02.02	1+83.46, 0.00
WAT-GV-02.03-01	8" VALVE	362.00	WAT-02.03	0+02.91, 0.00
WAT-GV-03.00-01	4" VALVE	362.50	WAT-03.00	4+40.23, 0.00
WAT-HY-02.03-01	FIRE HYDRANT	362.00	WAT-02.03	0+05.38, 0.00
WAT-MV-02.00-01	METER VAULT ASSEMBLY	359.12	WAT-02.00	0+29.32, 0.00
WAT-MV-03.00-01	METER VAULT ASSEMBLY	359.12	WAT-03.00	0+29.32, 0.00

APPURTENANCE TABLE

ID	GEOGRAPHIC NORTHING	GEOGRAPHIC EASTING	PROJECT NORTHING	PROJECT EASTING
WAT-BP-03.00-01	10245606.72	3544458.45	766.22	639.84
WAT-GV-02.01-01	10245624.40	3544246.38	893.28	810.56
WAT-GV-02.01-02	10245706.44	3544209.59	856.11	892.43
WAT-GV-02.02-01	10245873.10	3544269.50	691.51	957.77
WAT-GV-02.03-01	10245786.28	3544292.70	741.25	882.93
WAT-GV-03.00-01	10245874.60	3544270.82	689.51	957.77
WAT-HY-02.03-01	10245788.39	3544290.31	741.25	886.11
WAT-MV-02.00-01	10245582.51	3544448.11	791.22	631.58
WAT-MV-03.00-01	10245601.25	3544464.65	766.22	631.58

STATE OF TEXAS
JOSEPH MICHAEL BAKER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W W W
G	NATURAL GAS	NG NG NG
	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL OHL OHL
WW WW WW	WASTEWATER SEWER	WW WW WW
WW PS	WASTEWATER PRESSURE SEWER	WW PS WW PS

0 15 30 60
SCALE (IN FEET)
1 inch = 30 ft.

Texas 811
Know what's below. Call before you dig.

DRAWING SCALE: AS NOTED

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN WATER GEOGRAPHICAL NORTH AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

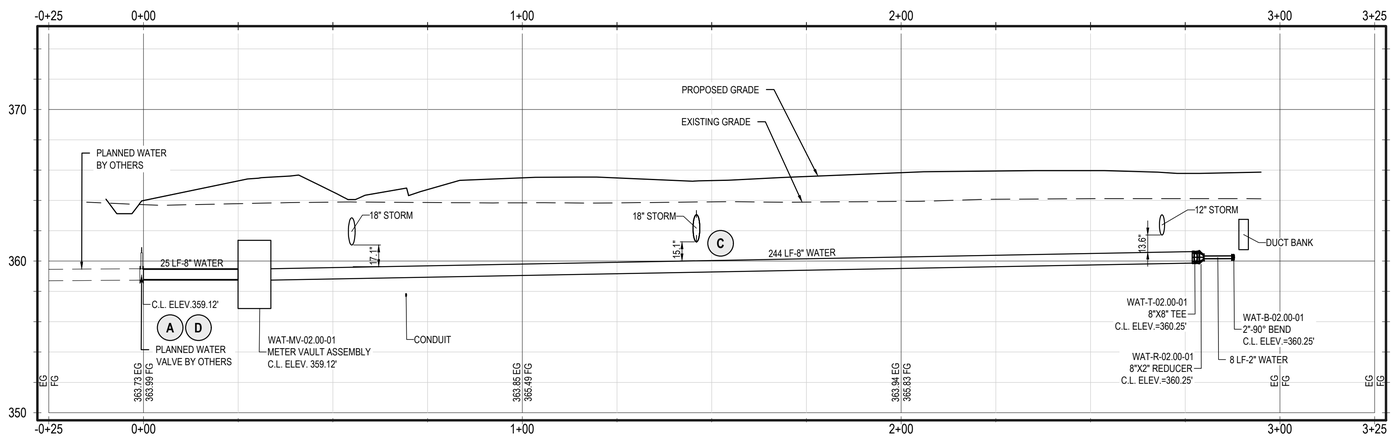
DRAWING NO.: 566901-C-D-006-302
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

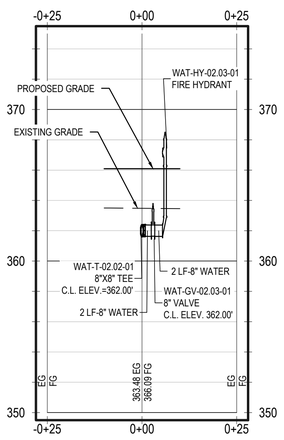
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TO BE COORDINATED WITH DEVELOPER

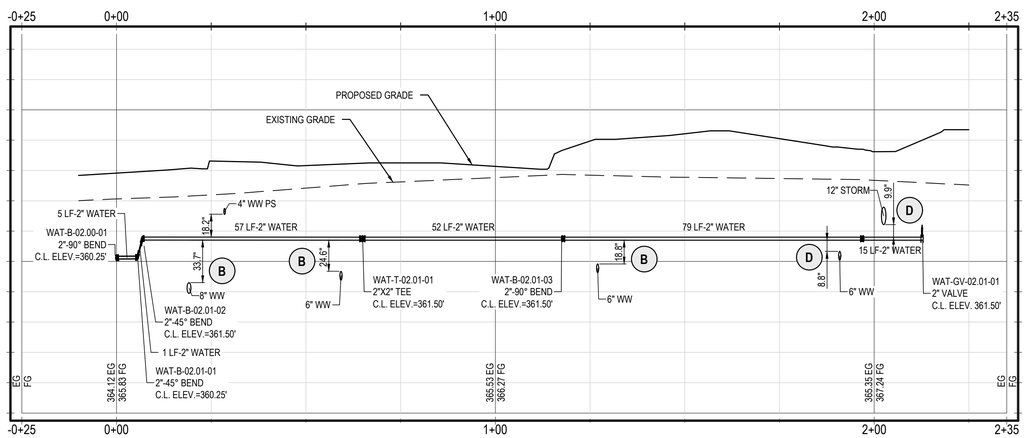
PROFILE: WAT-01.00
SCALE: 1"=20' H, 1"=5' V



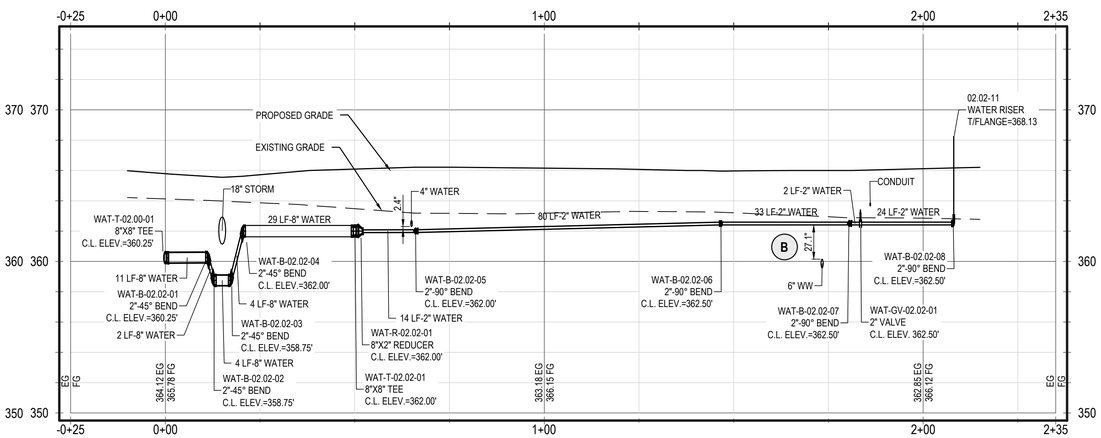
PROFILE: WAT-02.00
SCALE: 1"=20' H, 1"=5' V



PROFILE: WAT-02.03
SCALE: 1"=20' H, 1"=5' V



PROFILE: WAT-02.01
SCALE: 1"=20' H, 1"=5' V



PROFILE: WAT-02.02
SCALE: 1"=20' H, 1"=5' V

WATER GENERAL NOTES:

1. WORK THIS DRAWING WITH DRAWING 566901-C-D-006-301 AND DRAWING 566901-C-D-006-302 FOR PLAN, STRUCTURE TABLES AND FITTING TABLES.
2. REFERENCE J4 ENGINEERING DRAWINGS FOR WATER MAIN EXTENSION PLAN.

UTILITY CROSSING NOTES

1. CAUTION - CRITICAL UNDERGROUND ELECTRICAL AND COMMUNICATIONS LINES ARE ASSOCIATED WITH THIS PROJECT.
2. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL UNDERGROUND UTILITIES WITH OTHER PROJECT DRAWINGS.
3. THE ELECTRICAL DUCT BANKS SHOWN ARE APPROXIMATE.
4. THE CONTRACTOR SHALL FIELD VERIFY ALL CROSSING UTILITIES.

WATER KEYED NOTES:

(A) WATER TAKE-OVER POINT.

(B) ENSURE A MINIMUM OF 12" VERTICAL SEPARATION BETWEEN WASTEWATER LINE AND BUTT-FUSED HDPE WATER LINE.

(C) ENSURE A MINIMUM OF 12" RADIAL SEPARATION BETWEEN WASTEWATER LINE AND CROSSING UTILITY. IF THESE CONDITIONS CANNOT BE MET, PROVIDE LOW STRENGTH MORTAR BACKFILL SURROUNDING THE WASTWATER LINE FOR A MINIMUM OF 4 FEET ON EACH SIDE OF THE CROSSING.

(D) FIELD VERIFY THE AS BUILT LOCATION AND DEPTH OF EXISTING UTILITY. PROVIDE SUITABLE CLEARANCE PER UTILITY OWNER.

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

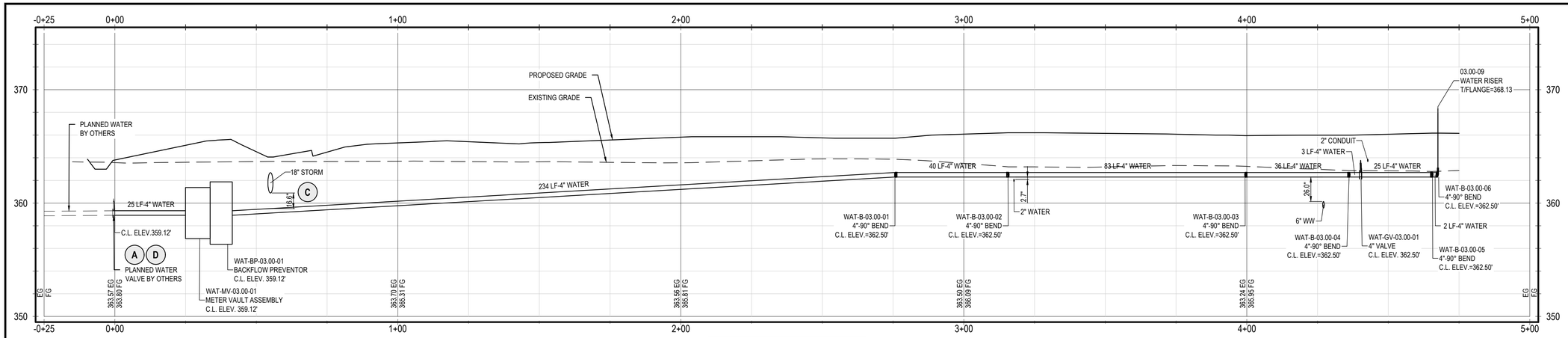
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: WATER PROFILES

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-303
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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PROFILE: WAT-03.00
SCALE: 1"=20' H, 1"=5' V

WATER GENERAL NOTES:

1. WORK THIS DRAWING WITH DRAWING 566901-C-D-006-301 AND DRAWING 566901-C-D-006-302 FOR PLAN, STRUCTURE TABLES AND FITTING TABLES.
2. REFERENCE J4 ENGINEERING DRAWINGS FOR WATER MAIN EXTENSION PLAN.

UTILITY CROSSING NOTES

1. CAUTION - CRITICAL UNDERGROUND ELECTRICAL AND COMMUNICATIONS LINES ARE ASSOCIATED WITH THIS PROJECT.
2. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL UNDERGROUND UTILITIES WITH OTHER PROJECT DRAWINGS.
3. THE ELECTRICAL DUCT BANKS SHOWN ARE APPROXIMATE.
4. THE CONTRACTOR SHALL FIELD VERIFY ALL CROSSING UTILITIES.

WATER KEYED NOTES:

(A) WATER TAKE-OVER POINT.

(B) ENSURE A MINIMUM OF 12" VERTICAL SEPARATION BETWEEN WASTEWATER LINE AND BUTT-FUSED HDPE WATER LINE.

(C) ENSURE A MINIMUM OF 12" RADIAL SEPARATION BETWEEN WASTEWATER LINE AND CROSSING UTILITY. IF THESE CONDITIONS CANNOT BE MET, PROVIDE LOW STRENGTH MORTAR BACKFILL SURROUNDING THE WASTWATER LINE FOR A MINIMUM OF 4 FEET ON EACH SIDE OF THE CROSSING.

(D) FIELD VERIFY THE AS BUILT LOCATION AND DEPTH OF EXISTING UTILITY. PROVIDE SUITABLE CLEARANCE PER UTILITY OWNER.

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

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MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: WATER PROFILES

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-304
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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GENERAL NOTES-CONSTRUCTION

1. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR RESPONSIBILITIES ASSOCIATED WITH PERMITS.
2. REFERENCE THE OWNERS CONTRACT DOCUMENTS FOR SCHEDULING AND FEE RESPONSIBILITIES ASSOCIATED WITH ALL TESTING AND INSPECTION THROUGHOUT CONSTRUCTION.
3. EXISTING ABOVE-GRADE AND BELOW-GRADE SITE IMPROVEMENTS HAVE BEEN SHOWN PER THE SURVEY AND RECORD DRAWINGS.
4. THE CONTRACTOR SHALL NOTIFY THE OWNER PRIOR TO ANY CONSTRUCTION.
5. THE CONTRACTOR SHALL ALERT THE UTILITIES PROTECTION SERVICES, 48 HOURS BEFORE ANY EXCAVATING IS INITIATED. THE CONTRACTOR MUST CONTACT UTILITY COMPANIES FOR EXACT LOCATIONS OF UTILITIES 2 WORKING DAYS BEFORE DIGGING.
6. THE CONTRACTOR IS RESPONSIBLE FOR EXAMINING THE SITE, EVALUATING THE SURFACE AND SUBSURFACE CONDITIONS AND DETERMINE ANY DIFFICULTIES THAT MAY BE ENCOUNTERED IN THE EXECUTION OF THE WORK, PRIOR TO BID.
7. ALL WORK AND MATERIALS SHALL CONFORM TO THE OWNERS CONSTRUCTION STANDARDS AND SPECIFICATIONS AS PART OF THIS CONTRACT AND ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND REGULATIONS, UNLESS NOTED OTHERWISE.
8. THE CONTRACTOR IS RESPONSIBLE TO FOLLOW ALL NECESSARY COUNTY, STATE, AND FEDERAL PERMITS (EXAMPLES MAY INCLUDE, BUT NOT BE LIMITED TO; ZONING, HIGHWAY USE, LAND DISTURBANCE, SURFACE WATER, HAULING, ROAD OPENING, CLEARING/GRUBBING, EARTHWORK, BUILDING CONSTRUCTION, STREET OPENINGS AND UTILITY CONNECTIONS).
9. THE CONTRACTOR SHALL KEEP ALL EXISTING STREETS CLEAN OF ALL SOIL, DIRT, MUD, AND DEBRIS. THE CONTRACTOR SHALL EXERCISE DILIGENT CARE TO PROTECT ALL TREES, SHRUBS, AND PLANTS NOT DESIGNATED FOR REMOVAL. THE CONTRACTOR SHALL REPLACE, TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE AND AT NO COST TO THE OWNER, ANY TREES, SHRUBS, PLANTS, AND OTHER OBJECTS REMOVED, DESTROYED, DISFIGURED, OR DAMAGED DUE TO THE CONTRACTOR'S NEGLIGENCE.
10. EXISTING CONDITIONS DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE, AS DIRECTED BY THE OWNER OF THE IMPROVEMENT.
11. THE CONTRACTOR SHALL IMPLEMENT THE PLANS INDICATING EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES FOR THE PROJECT.
12. ADDITIONAL SOIL AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED DURING CONSTRUCTION AS DETERMINED BY THE ENGINEER OR PERMITTING AUTHORITY.
13. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL RUBBISH, TRASH, DEBRIS, AND ORGANIC MATERIAL IN A LAWFUL MANNER.
14. THE COST OF ANY SHEETING, DE-WATERING OR FOUNDATIONS NECESSARY FOR CONSTRUCTION SHALL BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF RESPECTIVE ITEMS.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL MEANS, METHODS, AND MATERIALS OF CONSTRUCTION TO COMPLETE PROPOSED CONSTRUCTION.
16. THE DESIGN ENGINEER SHALL NOT BE RESPONSIBLE FOR THE FOLLOWING:
    - MEANS, METHODS, PROCEDURES, TECHNIQUES OR SEQUENCES OF CONSTRUCTION (NOT SPECIFIED HEREIN).
    - SAFETY ON THE JOB SITE.
    - THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
17. ANY APPARENT DISCREPANCIES OR QUESTIONS IN CONTRACT DOCUMENTS ARE TO BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE IMMEDIATELY.
18. TRAFFIC SHALL BE MAINTAINED ON ALL ADJOINING ROADWAYS AT ALL TIMES. TRAFFIC CONTROL SHALL BE MAINTAINED IN ACCORDANCE WITH THE STATE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. WARNING DEVICES (SIGNS, FLASHERS, BARRICADES, ETC.) SHALL BE PROVIDED AT THE CONTRACTOR'S EXPENSE AS NECESSARY DURING CONSTRUCTION TO MAINTAIN SAFE TRAFFIC AND PEDESTRIAN CIRCULATION.
19. ANY MODIFICATIONS TO THE WORK SHOWN ON THE PLANS MUST HAVE PRIOR WRITTEN APPROVAL FROM THE OWNER AND REVIEW AGENCIES.
20. CONSULT THE OWNER'S REPRESENTATIVE FOR ITEMS TO BE SUPPLIED BY THE OWNER. ITEMS NOT SUPPLIED BY THE OWNER SHALL BE SUPPLIED BY THE CONTRACTOR.

GENERAL NOTES-SITE PREPARATION

1. WITHIN THE SUBJECT PROPERTY, THE INTENT IS TO HAVE A CLEAN, CLEAR SITE, FREE OF ALL EXISTING ITEMS NOTED TO BE REMOVED IN ORDER TO PERMIT THE CONSTRUCTION OF THE NEW PROJECT.
2. THE CONTRACTOR IS RESPONSIBLE FOR THE DEMOLITION AND CLEARING OF ALL PERTINENT EXISTING ON-SITE FACILITIES IN THE WORK AREA UNLESS OTHERWISE NOTED AS PART OF THE CONTRACT FOR GENERAL CONSTRUCTION. ALL EXISTING STRUCTURES SHALL BE REMOVED IN THEIR ENTIRETY, INCLUDING BELOW GRADE FOUNDATIONS, FOOTERS AND BASEMENT AREAS. THE CONTRACTOR SHALL PERFORM CLEARING, GRUBBING, REMOVAL OF TREES AND STUMPS, REMOVAL AND DISPOSAL OF ALL VEGETATION AND DEBRIS WITHIN THE LIMITS OF THE WORK AREA. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL FROM THE SITE OF ALL DEMOLISHED MATERIALS AND THE FILLING OF ALL DEPRESSIONS AND GRADING OF THESE AREAS DISTURBED BY DEMOLITION ACTIVITIES.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING STRUCTURES, SURFACE IMPROVEMENTS AND UTILITIES FROM DAMAGE THROUGHOUT CONSTRUCTION. WHERE EXISTING ITEMS ARE SHOWN TO REMAIN, CARE SHOULD BE TAKEN TO ENSURE PROTECTION OF THAT ITEM FROM DAMAGE. ANY ITEM DISTURBED BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE TO A CONDITION EQUAL TO OR BETTER THAN EXISTING AND TO THE SATISFACTION OF THE OWNER OF THE ITEM.
4. PAVEMENT, CURBS, SIDEWALKS, UTILITIES, AND OTHER EXISTING IMPROVEMENTS WHICH ARE TO REMAIN AND ARE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SPECIFICATIONS OF THE OWNER OF THE IMPROVEMENT.
5. REMOVE SOILS AS NECESSARY TO COMPLETE PROPOSED CONSTRUCTION.

GENERAL NOTES-EARTHWORK

1. THE CONTRACTOR SHALL IMPLEMENT THE PLANS INDICATING EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES FOR THE PROJECT.
2. THE CONTRACTOR SHALL INSTALL ALL SEDIMENTATION CONTROLS TO MINIMIZE SOIL EROSION AND OFF-SITE SILTATION BEFORE ANY CLEARING, GRUBBING OR EARTHWORK HAS BEGUN.
3. ALL TOPSOIL, VEGETATION AND UNSUITABLE SOILS (AS DETERMINED BY THE GEOTECHNICAL ENGINEER OF RECORD) SHALL BE REMOVED FROM THE PLANNED CONSTRUCTION AREAS AND TEMPORARILY STOCKPILED. TOPSOIL TO BE REUSED SHALL BE STOCKPILED FOR LATER USE IN DESIGNATED AREAS AS SHOWN ON THE PLANS. SPOILS TO BE HAULED FROM THE PROJECT SITE SHALL BE DISPOSED AS DIRECTED BY THE OPERATOR/OWNER.
4. ALL TIMBER, LOGS, BRUSH, RUBBISH, AND VEGETATIVE MATTER WHICH WILL INTERFERE WITH THE GRADING OPERATION OR AFFECT THE PLANNED STABILITY OF FILL AREAS SHALL BE REMOVED FROM THE CONSTRUCTION AREAS.
5. AT ALL TIMES, SITE GRADING AND BACKFILL SHALL PROVIDE POSITIVE DRAINAGE TO STORM WATER CONVEYANCES OR SHEET FLOW OFF OF AREAS, THUS PREVENTING THE PONDING OF WATER ON SITE.
6. SUB-GRADE WORK AND FILL OPERATIONS SHOULD BE OBSERVED AND TESTED BY A THE GEOTECHNICAL ENGINEER OF RECORD AS COORDINATED BY THE CONTRACTOR.
7. PRIOR TO FILLING OPERATIONS, EXPOSED SUB-GRADES ARE TO BE PROOF-ROLLED AND MEET THE REQUIREMENTS AS STATED IN THE GEOTECHNICAL REPORT AND SPECIFICATIONS.
8. ANY UNSUITABLE SOILS ENCOUNTERED SHALL BE REMOVED AND REPLACED WITH COMPACTED MATERIAL PER SPECIFICATIONS AND APPROVED BY THE GEOTECHNICAL ENGINEER OF RECORD.
9. REFERENCE THE GEOTECHNICAL REPORT AND SPECIFICATIONS FOR ACCEPTABLE ENGINEERED FILL MATERIALS AND COMPACTION REQUIREMENTS.
10. PRIOR TO THE PLACEMENT OF ANY COMPACTED FILLS, PROCTOR CURVES SHALL BE ESTABLISHED FROM PROPOSED BORROW MATERIAL SAMPLES.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMPORTATION OF ANY BORROW MATERIAL NECESSARY TO COMPLETE THE JOB, UNLESS NOTED OTHERWISE IN THE CONTRACT.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE OFF-SITE DISPOSAL OF ANY AND ALL EXCESS OR UNSUITABLE MATERIAL NOT USED ON THE JOB SITE.
13. PROPOSED ELEVATIONS SHOWN SHALL NOT BE CHANGED WITHOUT APPROVAL OF THE ENGINEER.
14. UNLESS OTHERWISE INDICATED AT A SPECIFIC LOCATION, ALL FINISHED GRADES AT THE LIMITS OF NEW WORK ARE TO CONFORM TO AND MATCH EXISTING GRADES.
15. UNDER-DRAINS MAY BE REQUIRED TO BE ADDED, IF DETERMINED NECESSARY BY THE ENGINEER, THE GEOTECHNICAL ENGINEER OF RECORD, OR THE OWNERS CONSTRUCTION REPRESENTATIVE.

GENERAL NOTES-UTILITIES

1. ALL PIPING SYSTEMS AND APPURTENANCES SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AND REGULATIONS, UNLESS NOTED OTHERWISE.
2. EXISTING UTILITIES ON THE SITE HAVE BEEN SHOWN ON THE PLANS, SEE SITE UTILITY STATEMENT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITIES AS REQUIRED TO AVOID CONFLICTS WITH THE PROPOSED WORK.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES AND STRUCTURES DESIGNATED TO REMAIN UNTIL ALL CONSTRUCTION IS COMPLETE. ANY ITEM DISTURBED BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE. INFORM THE ENGINEER OF ANY DISCREPANCIES.
4. EXISTING UTILITY SERVICES ENCOUNTERED AND NOT BEING SAVED SHALL BE PROPERLY TERMINATED. ALL ON-SITE PIPING IN THE WORK AREA SHALL BE REMOVED AND BE PROPERLY BACKFILLED. THE DEMOLITION CONTRACTOR SHALL CONTACT THE UTILITY OWNER FOR TERMINATION REQUIREMENTS PRIOR TO DEMOLITION.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE, PROTECTION, AND CONTINUATION OF SERVICE FOR ALL UTILITIES INTENDED TO REMAIN AND SERVICING THE PROJECT AND ADJOINING AREAS.
6. EXISTING UTILITIES, ENCOUNTERED DURING CONSTRUCTION AND TO REMAIN, SHALL BE LOWERED AS NECESSARY TO MEET PIPE COVER REQUIREMENTS.
7. THE CONTRACTOR SHALL ALERT THE THE TEXAS 811 AT 800-344-8377, 2 BUSINESS DAYS BEFORE ANY EXCAVATING IS INITIATED. THE CONTRACTOR MUST ALSO CONTACT NON-RESPONSIVE UTILITY COMPANIES FOR EXACT LOCATIONS OF UTILITIES.
8. UNDERGROUND UTILITY CONSTRUCTION PRACTICES ARE TO CONFORM TO THE SAFETY REQUIREMENTS OF OSHA.
9. EXCAVATIONS SHALL BE SHORED OR SLOPED AS NECESSARY TO PROVIDE SAFE WORKING CONDITIONS DURING CONSTRUCTION. IN DEEP TRENCHES OR WHERE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED, A TRENCH BOX OR OTHER METHOD OF EMBANKMENT STABILIZATION WILL BE REQUIRED.
10. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL UTILITY STRUCTURES, VALVES, FITTINGS AND APPURTENANCES AS SHOWN ON THE DRAWINGS AND AS REQUIRED TO MAKE A COMPLETE OPERABLE SYSTEM FOR ALL PROPOSED UTILITIES.
11. ALL SEWER RUN DISTANCES GIVEN ARE FROM CENTERLINE TO CENTERLINE OF STRUCTURES. ALL PIPE INVERT ELEVATIONS GIVEN AT STRUCTURES ARE AT THE CENTERLINE OF STRUCTURE. SEWER GRADES ARE ESTABLISHED FROM CENTERLINE OF STRUCTURE AND SHALL BE CARRIED THROUGH STRUCTURE TO ASSURE POSITIVE FLOW.
12. PROPOSED MANHOLE RIMS AND CATCH BASIN GRATES SHALL BE SET TO ELEVATIONS SHOWN. SET ALL EXISTING MANHOLE FRAMES AND COVERS, CATCH BASIN GRATES, VALVE BOXES, ETC., TO BE RAISED OR LOWERED AS NECESSARY, TO PROPOSED FINISHED GRADE, FLUSH WITH THE ADJACENT GRADE.
13. THE JOINT SEAL BETWEEN REINFORCED CONCRETE MANHOLE JOINT SECTIONS SHALL BE LEAK RESISTANT, RUBBER GASKETS MEETING ASTM C443.
14. THE CONNECTORS BETWEEN MANHOLE STRUCTURES AND PIPES SHALL BE RESILIENT AND FLEXIBLE RUBBER MATERIALS MEETING ASTM C923.
15. THE CONTRACTOR SHALL PROVIDE ALL BENDS, FITTINGS, ADAPTERS, ETC. AS REQUIRED FOR PIPE CONNECTIONS FROM BUILDING STUB-OUTS, INCLUDING ROOF DRAINAGE AND FOOTING DRAINAGE SYSTEMS, TO THE PROPER DRAINAGE SYSTEM.
16. UTILITIES PROPOSED UNDER NEW PAVEMENT SHALL EITHER BE BORED OR INSTALLED PRIOR TO PAVEMENT INSTALLATION. OPEN CUTTING FOR UTILITIES WILL NOT BE PERMITTED ONCE PAVEMENT CONSTRUCTION IN UNDERWAY.
17. GENERALLY, ALL STORM SEWER AND WASTEWATER STRUCTURES GREATER THAN 4 FEET IN DEPTH REQUIRE STEPS. THE CONTRACTOR SHALL CONFIRM WITH THE AUTHORITY HAVING JURISDICTION.
18. THE CONTRACTOR SHALL SHOW ALL MODIFIED PIPING, CONDUIT RUNS, UTILITIES AND ANY MODIFICATIONS MADE TO THE ORIGINAL DRAWINGS ON AS-BUILT PRINTS AND TURN OVER TO THE OWNERS REPRESENTATIVE UPON COMPLETION OF THE JOB.
19. PROPER COORDINATION WITH THE RESPECTIVE UTILITY COMPANIES SHALL BE PERFORMED BY THE CONTRACTOR TO ENSURE THAT ALL UTILITY COMPANY AND LOCAL GOVERNING AGENCIES STANDARDS FOR MATERIALS AND CONSTRUCTION METHODS ARE MET.
20. THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO THE COMMENCEMENT OF WORK AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE. THE CONTRACTOR IS RESPONSIBLE FOR VISITING THE SITE AND BECOMING FAMILIAR WITH THE SITE CONDITIONS PRIOR TO BIDDING.
21. THE WORKING DRAWINGS ARE GENERALLY DIAGRAMMATIC. THEY DO NOT SHOW EVERY OFFSET, BEND OR ELBOW REQUIRED FOR INSTALLATION IN THE SPACE PROVIDED. THEY DO NOT SHOW EVERY DIMENSION, COMPONENT PIECE, OR FITTING REQUIRED TO COMPLETE THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A COMPLETE AND WORKING SYSTEM.
22. REFERENCE UTILITY SPECIFICATIONS FOR MINIMUM COVER, UNLESS SHOWN OTHERWISE.
23. ALL EXISTING UTILITIES AND TIE-IN POINTS SHALL BE CONSIDERED ACTIVE UTILITIES UNLESS OTHERWISE INDICATED.
24. ALL EXISTING FLEXIBLE AND RIGID PAVEMENT SYSTEMS ALONG A PROPOSED UTILITY ROUTE SHALL BE NEATLY SAW-CUT, REMOVED AND REPLACED AS REQUIRED.

GENERAL NOTES-PAVEMENT (ROADWAYS, SIDEWALK, OTHER AREAS NOT COVERED ON STRUCTURAL DRAWINGS)

1. REFERENCE THE SITE PLAN FOR ALL PROPOSED PAVEMENT.
2. THE PAVEMENT AND BASE COURSES SHALL BE CONSTRUCTED AS SHOWN ON THE TYPICAL PAVEMENT SECTIONS IN THIS PLAN SET AND IN ACCORDANCE WITH THE GEOTECHNICAL REPORT AND SPECIFICATIONS.
3. UNDERDRAINS SHALL BE INSTALLED WHERE INDICATED ON THE PLANS AND AS SPECIFIED ON THE DETAILS IN THE PLAN SET.
4. TO RESTRICT ACCESS TO NEW PAVEMENT PRIOR TO OPENING, THE PAVING CONTRACTOR SHALL PROVIDE ADEQUATE BARRICADES WITH FLASHERS.
5. ANY AREA IN WHICH PAVED SURFACES ARE PROPOSED, THE TOPSOIL OR ANY UNSUITABLE SOIL SHALL BE STRIPPED AND A SUITABLE BACKFILL MATERIAL IS TO BE PLACED AND COMPACTED TO MEET SPECIFICATIONS.
6. ALL TESTING AND INSPECTION FEES ARE THE RESPONSIBILITY OF THE CONTRACTOR.
7. NO TRAFFIC SHALL BE PERMITTED ON THE CONCRETE PAVEMENT FOR A PERIOD OF 7 DAYS UNLESS APPROVED BY THE GEOTECHNICAL ENGINEER.
8. PRIOR TO PAVING, THE SUB-GRADE SHALL BE PROOF-ROLLED BY THE CONTRACTOR AND WITNESSED BY THE GEOTECHNICAL ENGINEER OF RECORD. ANY YIELDING AREAS IN THE SUBGRADE SHALL BE REMOVED AND/OR REPLACED AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER.
9. UPON COMPLETION OF CONSTRUCTION, POWER WASH ALL PAVING TO OWNER'S SATISFACTION.



FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: CIVIL NOTES AND DETAILS

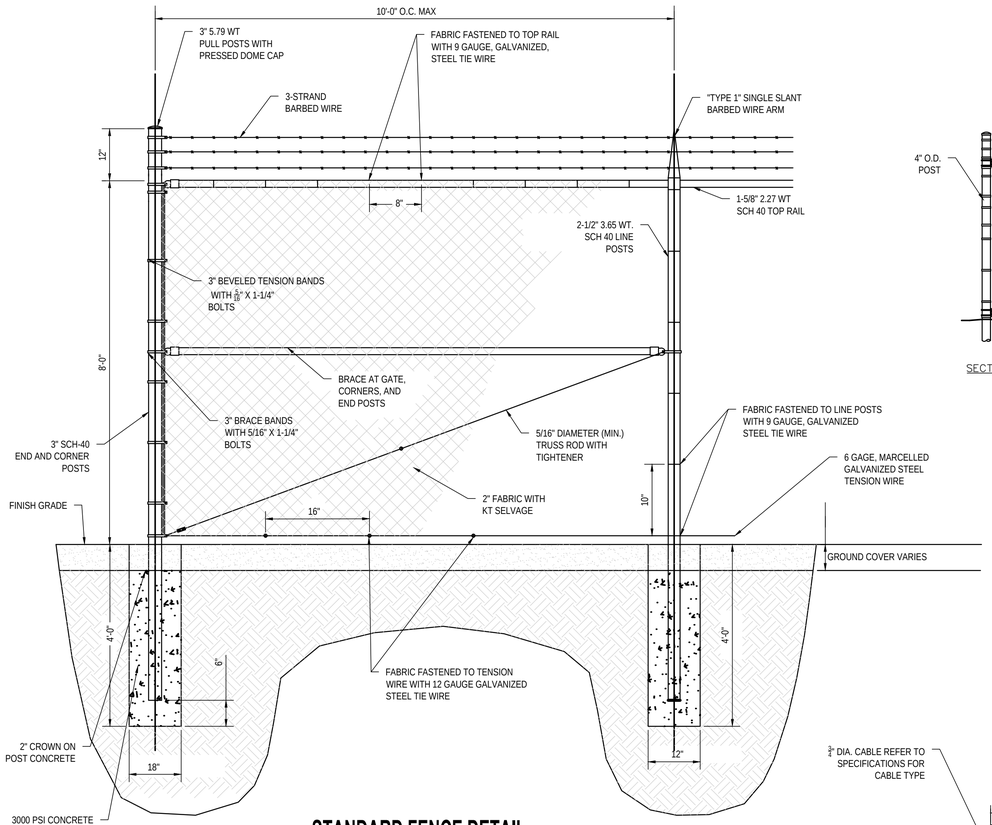
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-008-001
REV.: 00C

DRAWING SCALE: AS NOTED

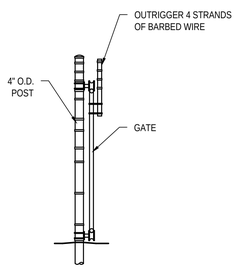
MIDDOUGH PROJ.#: MEU2510

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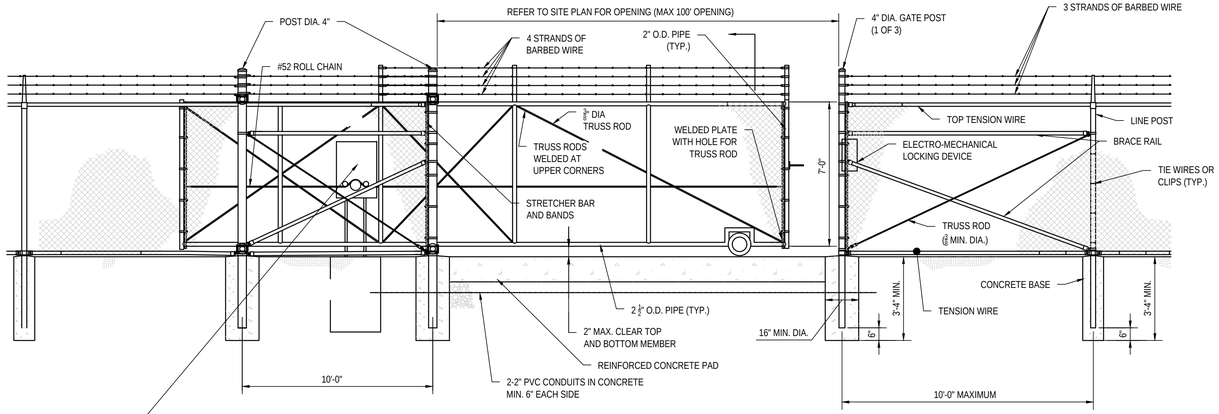


STANDARD FENCE DETAIL

SCALE: N.T.S.

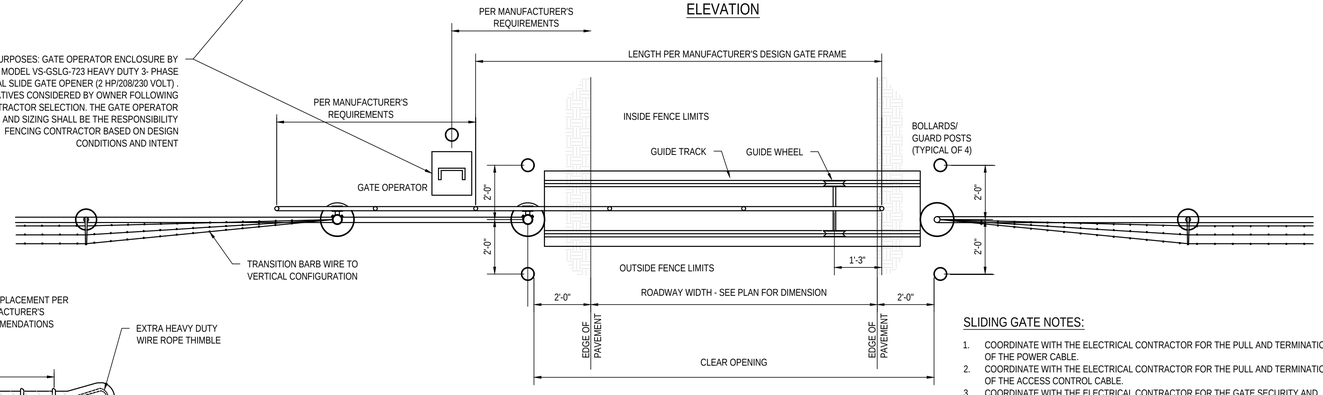


SECTION



ELEVATION

FOR BID PURPOSES: GATE OPERATOR ENCLOSURE BY LINEAR MODEL VS-GSLG-723 HEAVY DUTY 3- PHASE COMMERCIAL SLIDE GATE OPENER (2 HP/208/230 VOLT) . ALTERNATIVES CONSIDERED BY OWNER FOLLOWING CONTRACTOR SELECTION. THE GATE OPERATOR SELECTION AND SIZING SHALL BE THE RESPONSIBILITY OF THE FENCING CONTRACTOR BASED ON DESIGN CONDITIONS AND INTENT



PLAN

SLIDING GATE DETAIL

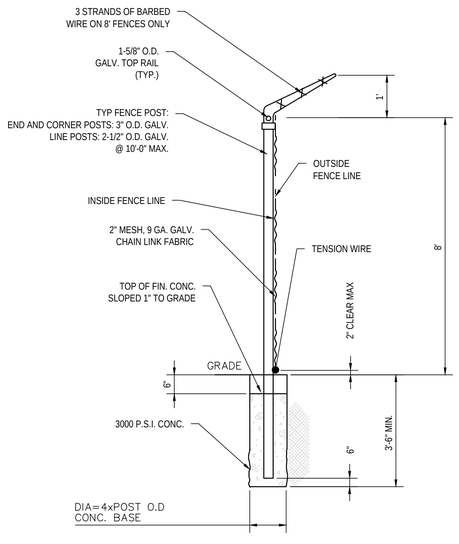
SCALE: N.T.S.

SLIDING GATE NOTES:

1. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR THE PULL AND TERMINATION OF THE POWER CABLE.
2. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR THE PULL AND TERMINATION OF THE ACCESS CONTROL CABLE.
3. COORDINATE WITH THE ELECTRICAL CONTRACTOR FOR THE GATE SECURITY AND ENTRY LOOP DETECTOR/SENSOR FEATURES.

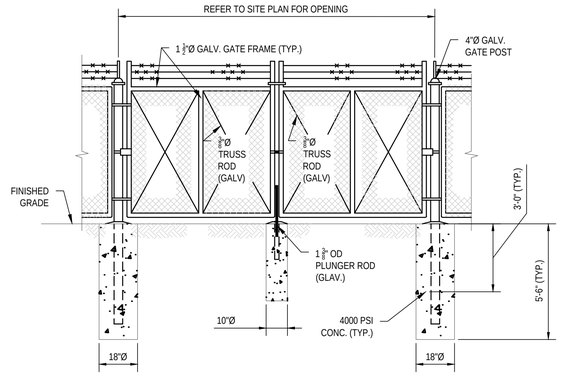
TYPICAL WIRE ROPE CLAMP DETAIL

SCALE: N.T.S.



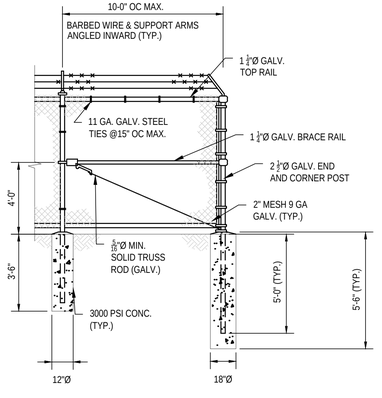
FENCE LINE POST DETAIL

SCALE: N.T.S.



DOUBLE SWING GATE DETAIL

N.T.S.



CORNER POST DETAIL

N.T.S.

FENCE AND GATE GENERAL NOTES:

1. THE FENCE AND GATE DETAILS SHOWN REPRESENT MINIMUM REQUIREMENTS AND DESIGN INTENT.
2. THE CONTRACTORS FENCE AND GATE PACKAGE SHALL MEET SUCH MINIMUM REQUIREMENTS.
3. THE FENCE AND GATE VENDOR SHALL THOUROUGHLY REVIEW THE SITE DESIGN PLANS (SITE PLANS, GRADING PLANS, UTILITY PLANS, ELECTRICAL/SECURITY PLANS) WHEN MAKING DESIGN SELECTIONS.
4. ANY DISCREPANCY BETWEEN THE SITE DESIGN PLANS AND THE FENCE/GATE DESIGN SHALL BE COORDINATED BY THE CONTRACTOR PRIOR TO ANY RELATED CONSTRUCTION (GRADING, DRIVEWAY WORK, ELECTRICAL POWER/SIGNALS, ETC.).

ELECTRICALLY OPERATED SECURITY GATE NOTES:

ALL ACCESS CONTROL SYSTEMS SHALL COMPLY WITH IFC 2021 SECTION 503 FIRE APPARATUS ACCESS ROADS, D103.5, 503.6 AND THE FOLLOWING CRITERIA:

5. THE INSTALLATION OF SECURITY GATES ACROSS A FIRE APPARATUS ACCESS ROAD SHALL BE APPROVED BY THE FIRE CODE OFFICIAL.
6. SECURITY GATES AND THE EMERGENCY OPERATION SHALL BE MAINTAINED OPERATIONAL AT ALL TIMES. ELECTRIC GATE OPERATORS, WHERE PROVIDED, SHALL BE LISTED IN ACCORDANCE WITH UL 325. GATES INTENDED FOR AUTOMATIC OPERATION SHALL BE DESIGNED, CONSTRUCTED AND INSTALLED TO COMPLY WITH THE REQUIREMENTS OF ASTM F 2200.
7. METHODS OF LOCKING SHALL BE SUBMITTED BY THE CONTRACTOR FOR APPROVAL OF THE FIRE CODE OFFICIAL.
8. SECURITY GATES SHALL BE EQUIPPED WITH A MEANS OF OPENING THE GATE BY FIRE DEPARTMENT PERSONNEL FOR EMERGENCY ACCESS. EMERGENCY OPENING DEVICES SHALL BE APPROVED BY THE FIRE CODE OFFICIAL.
9. ALL ELECTRICALLY OPERATED GATES ARE REQUIRED TO HAVE A KNOX GATE SWITCH.
10. SECURITY GATES SHALL BE EQUIPPED WITH AN APPROVED "FAIL-SAFE" SYSTEM TO ALLOW MANUAL OPERATION OF THE GATE IN THE EVENT OF POWER FAILURE OR EQUIPMENT MALFUNCTION.
11. CONSTRUCTION OF GATES SHALL BE OF MATERIALS THAT ALLOW MANUAL OPERATION BY ONE PERSON.



FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

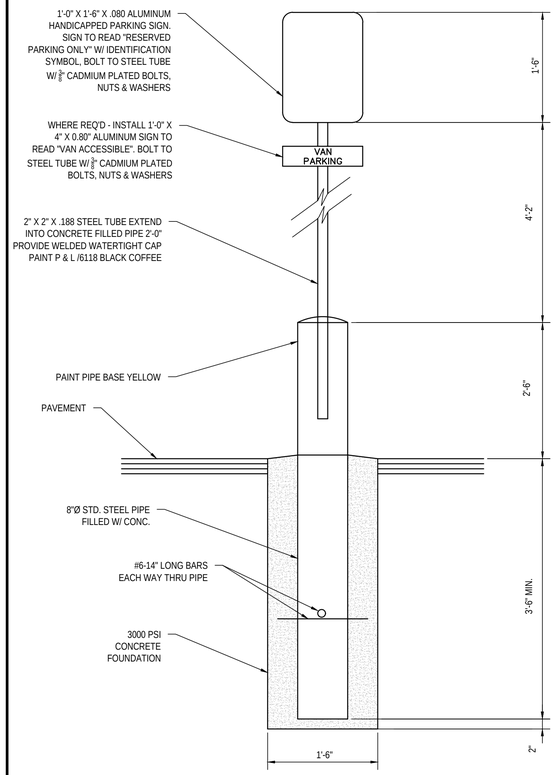
NO.	DATE	REVISIONS
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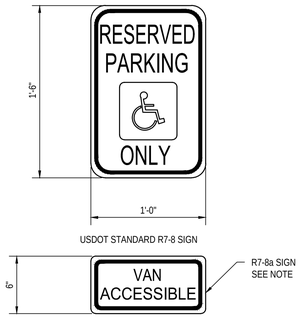
MESSER Gases for Life — middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-008-002
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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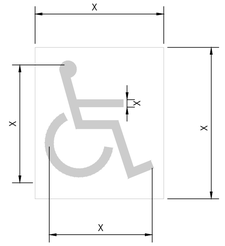




TYPICAL ACCESSIBILITY SIGNAGE DETAIL

SCALE: N.T.S.

NOTE:
(R7-8 SIGN): THIS IS A STANDARD SIGN AND MAY BE ORDERED FROM ANY TRAFFIC SIGN SUPPLIER BY NUMBER. THE SIGN MUST BE SUPPLEMENTED WITH A "VAN ACCESSIBLE" (R7-8a) SIGN AS APPLICABLE AND/OR AMOUNT OF THE FINE FOR ILLEGALLY PARKING IN THE RESERVED SPACE(S) A MUNICIPALITY MAY IMPOSE. CONFIRM WITH LOCAL REGULATIONS.

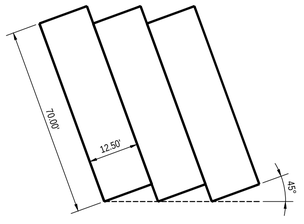


TYPICAL ACCESSIBLE SPACE MARKING DETAIL

SCALE: N.T.S.

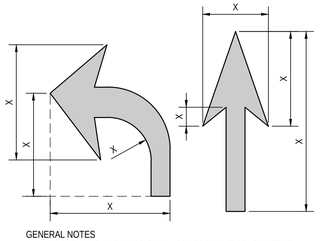
TYPICAL BARRIER FREE PARKING SIGN DETAIL

SCALE: N.T.S.



PAVEMENT MARKINGS (TRUCK STAGING)

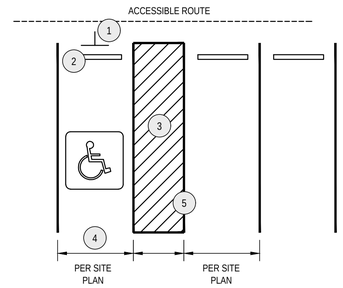
SCALE: N.T.S.



GENERAL NOTES
1. PAVEMENT MARKINGS SHALL CONFORM WITH THE LATEST EDITIONS OF THE STATE DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIALS SPECIFICATIONS AND STATE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, AS APPLICABLE.

PAVEMENT MARKINGS DETAIL

SCALE: N.T.S.

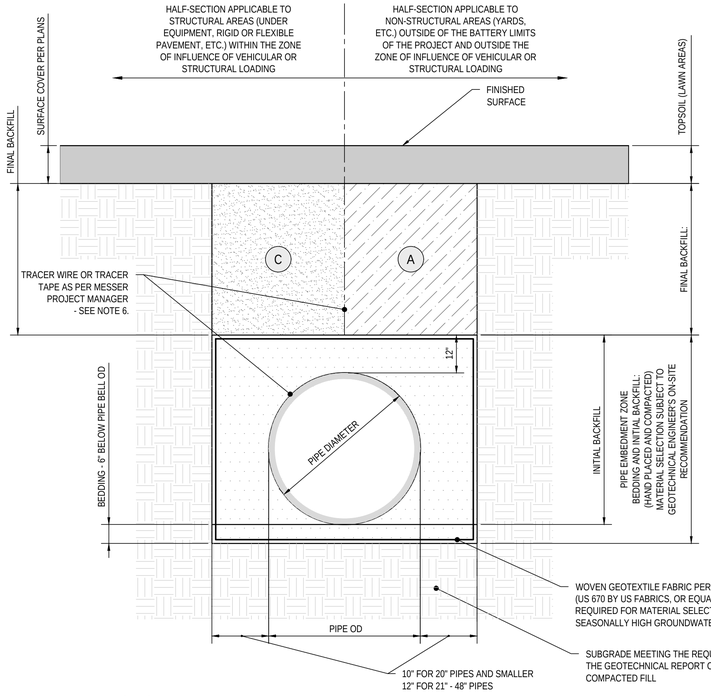


GENERAL NOTES
1. PAVEMENT MARKINGS SHALL CONFORM WITH THE LATEST EDITIONS OF THE STATE DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIALS SPECIFICATIONS AND STATE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS, AS APPLICABLE.

KEYED NOTES
1. PARKING SPACE IDENTIFICATION SIGN WITH THE INTERNATIONAL SYMBOL OF ACCESSIBILITY COMPLYING WITH 703.7.2.1 MOUNTED 60 INCHES MINIMUM ABOVE THE GROUND SURFACE MEASURED TO THE BOTTOM OF THE SIGN.
2. IF THE ACCESSIBLE ROUTE IS LOCATED IN FRONT OF THE PARKING SPACE, INSTALL WHEEL STOPS TO KEEP VEHICLES FROM REDUCING THE CLEAR WIDTH OF THE ACCESSIBLE ROUTE BELOW 36 INCHES.
3. TWO PARKING SPACES MAY SHARE AN ACCESS AISLE EXCEPT FOR ANGLED PARKING SPACES. ACCESS AISLE WIDTH IS AT LEAST 60 INCHES, MUST BE AT THE SAME LEVEL AND THE SAME LENGTH AS THE ADJACENT PARKING SPACE(S) IT SERVES. MAXIMUM SLOPE IN ALL DIRECTIONS IS 1:48, AND ACCESS AISLE MUST CONNECT TO AN ACCESSIBLE ROUTE TO THE BUILDING. RAMPS MUST NOT EXTEND INTO THE ACCESS AISLE.
4. PARKING SPACE SHALL BE 96 INCHES WIDE MINIMUM, MARKED TO DEFINE THE WIDTH, AND MAXIMUM SLOPE IN ALL DIRECTIONS IS 1:48.
5. BOUNDARY OF THE ACCESS AISLE MUST BE CLEARLY MARKED SO AS TO DISCOURAGE PARKING IN IT. (STATE OR LOCAL LAWS MAY ADDRESS THE COLOR AND MANNER THAT PARKING SPACES AND ACCESS AISLES ARE MARKED.)

PAVEMENT MARKINGS (ADMINISTRATION AREA)

SCALE: N.T.S.



UNDERGROUND UTILITY TRENCH DETAIL (UTILITIES INSTALLED OUTSIDE THE RIGHT OF WAY & PUBLIC UTILITY EASEMENTS)

SCALE: N.T.S.

PIPE EMBEDMENT ZONE		
MATERIAL SELECTION BASED ON PLACEMENT CONDITION		
CLAY SOILS IN CUT	NEAR FRACTURED ROCK	ENGINEERED FILL
B, C OR D	C OR D	C OR D

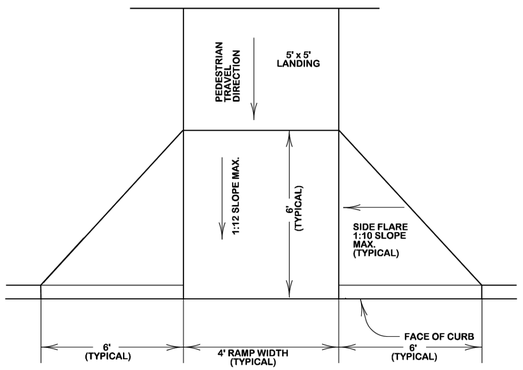
TABLE 1 - BEDDING AND BACKFILL SELECTIONS

MATERIAL	DESCRIPTION	PLACEMENT AND COMPACTION REQUIREMENTS
A	SELECT NATIVE MATERIAL - MATERIAL EXCAVATED FROM THE DITCH, (WHICH IS FREE OF ROCKS, LUMPS, CLODS, OR DEBRIS LARGER THAN TWO (4) INCHES IN THE LARGEST DIMENSION)	PER LOCAL AHJ REQUIREMENTS WHERE APPLICABLE OR PER THE FOLLOWING: PLACED IN LOOSE LIFTS NOT EXCEEDING 6 INCHES. EACH LIFT SHALL BE COMPACTED TO A MINIMUM OF 90% OF THE STANDARD PROCTOR (ASTM D698) MAXIMUM DRY DENSITY AT A MOISTURE CONTENT WITHIN OPTIMUM TO +4% OF OPTIMUM MOISTURE CONTENT.
B	GRANULAR MATERIAL - MATERIAL SHALL BE BANK RUN RIVER SAND WHICH IS FREE OF DETRIMENTAL QUANTITIES OF CLAY, DEBRIS, OR ORGANIC MATERIAL AND WHICH, WHEN TESTED BY STANDARD LABORATORY METHODS, MEET THE FOLLOWING REQUIREMENTS: MAXIMUM LIQUID LIMIT: 45 MAXIMUM PLASTICITY INDEX: 15 MAXIMUM PERCENT PASSING NO. 200 SIEVE: 15 MINIMUM PERCENT PASSING 3/4" SIEVE: 100 MINIMUM PERCENT PASSING NO. 4 SIEVE: 35 THE MATERIAL SHALL BE FREE FLOWING AND WHEN WET, SHALL NOT ADHERE TO OR FORM A BALL WHEN PRESSED IN HAND.	PLACED IN LOOSE LIFTS NOT EXCEEDING 6 INCHES. EACH LIFT SHALL BE COMPACTED TO AT LEAST 95% OF THE MODIFIED PROCTOR (ASTM D1557) MAXIMUM DRY DENSITY. SAND SHALL BE MOISTENED TO OPTIMUM MOISTURE CONTENT TO FACILITATE COMPACTION.
C	CEMENT STABILIZED SAND - PER B/CS UNIFIED SPECIFICATIONS SECTION 31 23 23.53 CEMENT STABILIZED SAND BACKFILL	PER B/CS UNIFIED SPECIFICATIONS SECTION 31 23 23.53 CEMENT STABILIZED SAND BACKFILL
D	FLOWABLE FILL - EXCAVATABLE TYPE, LEAN CEMENT CONCRETE FILL PER CITY OF MCGREGOR STANDARD SPECIFICATIONS SECTION 31 23 24 - 2: 75-100 LBS/CY CEMENT CONTENT. 150 PSI MAX. 28 DAY COMPRESSIVE STRENGTH. 80-110 PCF WET UNIT MASS.	PER CITY OF MCGREGOR STANDARD SPECIFICATIONS SECTION 31 23 24 - 2:



UNDERGROUND UTILITY TRENCH NOTES:

1. THIS DETAIL IS APPLICABLE FOR ALL PRIVATE UNDERGROUND UTILITIES .
2. ALL UTILITY WORK SHALL BE IN CONFORMANCE TO UTILITY SPECIFICATIONS AND THE GEOTECHNICAL REPORT.
3. THE GEOTECHNICAL ENGINEER SHALL BE CONSULTED FOR ANY INSPECTION WORK REQUIRED AS PART OF THE UTILITY WORK.
4. THE GEOTECHNICAL ENGINEER OF RECORD SHALL REVIEW AND APPROVE ALL FILL MATERIAL SUBMITTALS AND ANSWER CONSTRUCTION RFI'S RELATED TO GEOTECHNICAL ASPECTS THROUGHOUT THE PROJECT.
5. THE PLACEMENT AND COMPACTION OF BACKFILL MATERIAL MUST BE OBSERVED, MONITORED AND TESTED BY THE GEOTECHNICAL ENGINEER OF RECORD.
6. ANY DEVIATION OF ENCOUNTERED CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE GEOTECHNICAL ENGINEER OF RECORD.
7. WHERE THE UTILITY LINES PASS BENEATH PAVEMENT, THE FINAL BACKFILL ZONE WITHIN THE PAVEMENT BASE COURSE SHALL BE PREPARED AND COMPACTED SIMILARLY TO THE REMAINDER OF THE PAVEMENT BASE COURSE.
8. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS INSTALLATION, SPECIFICALLY:
   8.1. SITE AND SUBGRADE PREPARATION
   8.2. FILL MATERIAL REQUIREMENTS
   8.3. PLACEMENT AND COMPACTION
   8.4. QUALITY CONTROL AND FIELD TESTING
   8.5. UNDERGROUND UTILITY LINES BEDDING REQUIREMENTS
   8.6. ADDENDUM-1, OCTOBER 10, 2025
9. THE UNDERGROUND UTILITY LINES SHALL BE SUPPORTED AND CONSTRUCTED IN ACCORDANCE WITH THE CITY OF BRYAN/COLLEGE STATION UNIFIED DESIGN GUIDELINES MANUAL, TECHNICAL SPECIFICATIONS AND STANDARD CONSTRUCTION DETAILS FOR WASTEWATER COLLECTION SYSTEMS, WATER LINES, STORM DRAINAGE AND STREET PAVING.
10. TRENCH EXCAVATIONS SHALL CONFORM TO SPEC 31 50 00 "TRENCH SAFETY".
11. THE CONTRACTOR SHALL CONFIRM ALL BEDDING REQUIREMENTS WITH THE PIPE MANUFACTURER.
12. TRACER WIRE TO BE INSTALLED FOR ALL NON-METALLIC AND NON-CONDUCTIVE UNDERGROUND PIPING. REFERENCE 00000-P-S-747, MESSER SPECIFICATION FOR UNDERGROUND TRACER WIRE.
13. FOR SAND EMBEDMENT, PROVIDE A WATER STOP BLOCK EVERY 100 FEET ALONG THE TRENCH. THE BLOCK SHALL BE COMPOSED OF CEMENT STABILIZED SAND OR IMPERVIOUS NATIVE MATERIAL AND BE 6 FEET IN LENGTH. NO BEDDING SHALL BE PLACED IN THIS AREA.



CITY OF BRYAN "The Good Life, Texas Style."

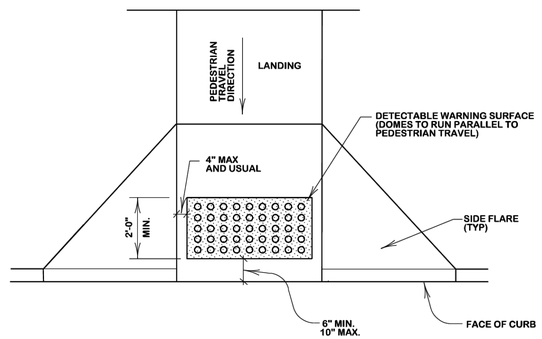
TYPICAL AMBULATORY RAMP W/ FLARED WINGS

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
AUG. 2012		SW2-02

CITY OF COLLEGE STATION

DETECTABLE WARNINGS GENERAL NOTES:

1. CURB RAMPS MUST CONTAIN A DETECTABLE WARNING SURFACE THAT CONSISTS OF RAISED TRUNCATED DOMES COMPLYING WITH SECTION 4.29 OF THE TEXAS ACCESSIBILITY STANDARDS (TAS). THE SURFACE MUST CONTRAST VISUALLY WITH ADJOINING SURFACES, INCLUDING SIDE FLARES. FURNISH DARK BROWN OR DARK RED DETECTABLE WARNING SURFACE ADJACENT TO UNCOLORED CONCRETE, UNLESS SPECIFIED ELSEWHERE IN THE PLANS.
2. DETECTABLE WARNING SURFACES MUST BE SLIP RESISTANT AND NOT ALLOW WATER TO ACCUMULATE.
3. ALIGN TRUNCATED DOMES IN THE DIRECTION OF PEDESTRIAN TRAVEL WHEN ENTERING THE STREET.
4. SHADED AREAS ON SHEETS 3 AND 4 INDICATE THE APPROXIMATE LOCATION FOR THE DETECABLE WARNING SURFACE FOR EACH CURB RAMP TYPE.
5. DETECTABLE WARNING SURFACES SHALL BE A MINIMUM OF 24" IN DEPTH IN THE DIRECTION OF PEDESTRIAN TRAVEL, AND EXTEND THE FULL WIDTH OF THE CURB RAMP OR LANDING WHERE THE PEDESTRIAN ACCESS ROUTE ENTERS THE STREET.
6. DETECTABLE WARNING SURFACES SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS A MINIMUM OF 6" AND A MAXIMUM OF 10" FROM THE EXTENSION OF THE FACE OF CURB. DETECTABLE WARNING SURFACES MAY BE CURVED ALONG THE CORNER RADIUS.
7. ACCEPTABLE PAVER MATERIAL SHALL BE CLAY, VITRIFIED POLYMER COMPOSITE, PRECAST POLYMER CONCRETE, AND CONCRETE.



CITY OF BRYAN "The Good Life, Texas Style."

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
AUG. 2012		SW2-01

CITY OF COLLEGE STATION

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THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

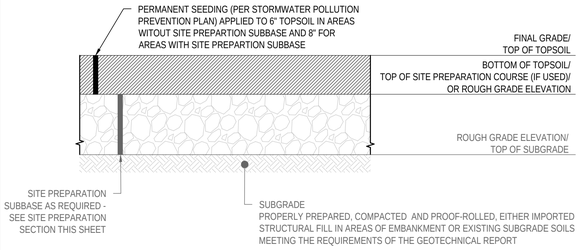
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-008-003
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

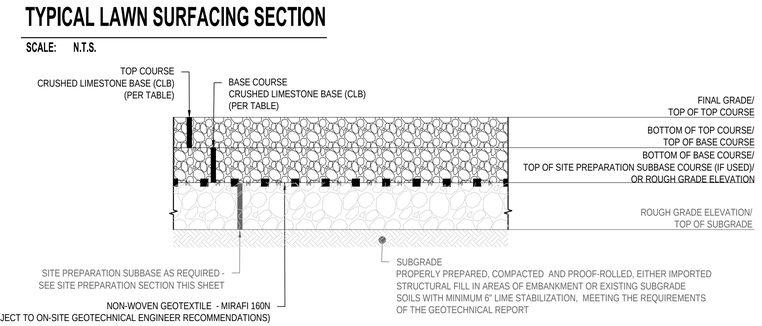
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TYPICAL LAWN SURFACING SECTION

SCALE: N.T.S.

STRUCTURAL FILL REQUIREMENTS (PER GEOTECHNICAL REPORT)		
FILL DESIGN ELEMENT	REQUIREMENTS	APPLICABLE TEST METHODS
MXIMUM CLAY LUMP SIZE	LESS THAN 3-INCHES OR LESS	-
LIQUID LIMIT	LESS THAN 35	ASTM 4318
PLASTICITY INDEX	8 to 20	ASTM 4318
MAXIMUM LOOSE LIFT THICKNESS	8-INCH	-
ORGANIC CONTENT	ESSENTIALLY FREE OF ORGANICS	-
PERCENT COMPACTION	95 PERCENT OF STANDARD PROCTOR MAXIMUM DRY DENSITY	ASTM D698
MOISTURE CONTENT AT THE TIME OF COMPACTION	0% TO +3% OF OPTIMUM MOISTURE CONTENT (OMC)	ASTM D2216



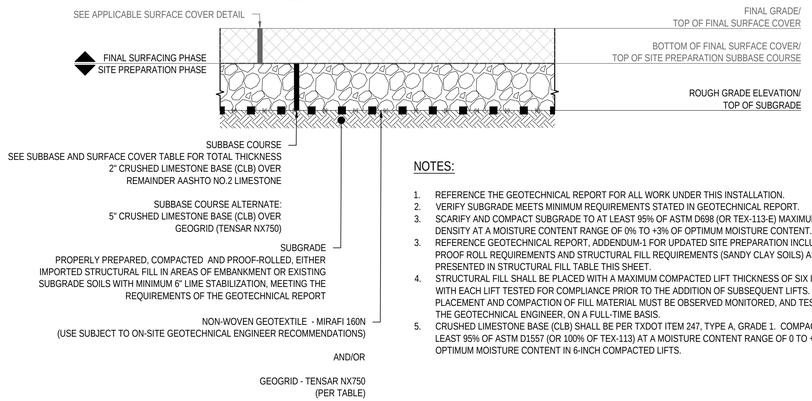
AGGREGATE SURFACE COVER TABLE		
AREA	TOP COURSE THICKNESS	BASE COURSE THICKNESS
PERMANENT ASU	6"	3"
SUBSTATION ENTRANCE DRIVE	4"	2"

AGGREGATE SURFACE COVER NOTES:

1. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS INSTALLATION.
2. VERIFY SUBGRADE MEETS MINIMUM REQUIREMENTS STATED IN GEOTECHNICAL REPORT.
3. REFERENCE GEOTECHNICAL REPORT, ADDENDUM-1 FOR UPDATED SITE PREPARATION INCLUDING PROOF ROLL REQUIREMENTS AND STRUCTURAL FILL REQUIREMENTS (SANDY CLAY SOILS) AS ALSO PRESENTED IN STRUCTURAL FILL TABLE THIS SHEET.
4. AGGREGATE BASE COURSE AND TOP COURSE LAYERS SHALL BE TESTED FOR COMPLIANCE PRIOR TO THE ADDITION OF SUBSEQUENT LIFTS. THE PLACEMENT AND COMPACTION OF ALL MATERIAL MUST BE OBSERVED MONITORED, AND TESTED BY THE GEOTECHNICAL ENGINEER, ON A FULL-TIME BASIS.
8. CRUSHED LIMESTONE BASE (CLB) SHALL BE PER TXDOT ITEM 247, TYPE A, GRADE 1. COMPACT TO AT LEAST 95% OF ASTM D1557 (OR 100% OF TEX-113) AT A MOISTURE CONTENT RANGE OF 0 TO +3% OF OPTIMUM MOISTURE CONTENT IN MAXIMUM 6-INCH COMPACTED LIFTS.

AGGREGATE SURFACE COVER SECTION

SCALE: N.T.S.



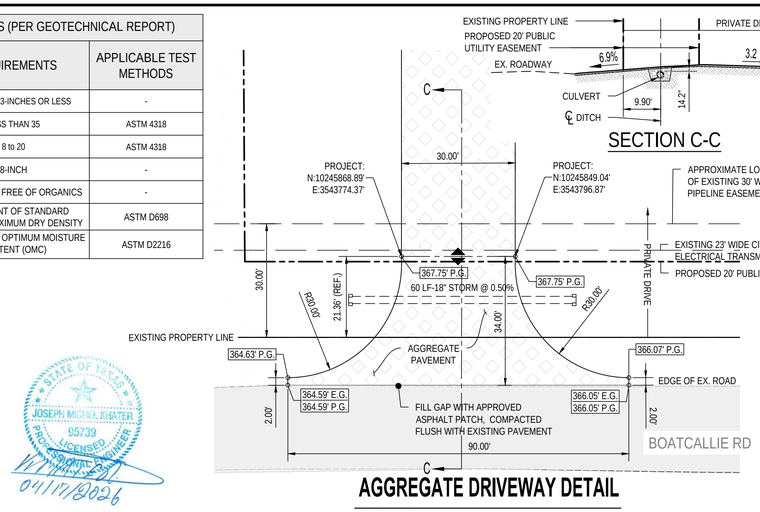
NOTES:

1. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS INSTALLATION.
2. VERIFY SUBGRADE MEETS MINIMUM REQUIREMENTS STATED IN GEOTECHNICAL REPORT.
3. SCARIFY AND COMPACT SUBGRADE TO AT LEAST 95% OF ASTM D698 (OR TEX-113-E) MAXIMUM DRY DENSITY AT A MOISTURE CONTENT RANGE OF 0% TO +3% OF OPTIMUM MOISTURE CONTENT.
3. REFERENCE GEOTECHNICAL REPORT, ADDENDUM-1 FOR UPDATED SITE PREPARATION INCLUDING PROOF ROLL REQUIREMENTS AND STRUCTURAL FILL REQUIREMENTS (SANDY CLAY SOILS) AS ALSO PRESENTED IN STRUCTURAL FILL TABLE THIS SHEET.
4. STRUCTURAL FILL SHALL BE PLACED WITH A MAXIMUM COMPACTED LIFT THICKNESS OF SIX INCHES, WITH EACH LIFT TESTED FOR COMPLIANCE PRIOR TO THE ADDITION OF SUBSEQUENT LIFTS. THE PLACEMENT AND COMPACTION OF FILL MATERIAL MUST BE OBSERVED MONITORED, AND TESTED BY THE GEOTECHNICAL ENGINEER, ON A FULL-TIME BASIS.
5. CRUSHED LIMESTONE BASE (CLB) SHALL BE PER TXDOT ITEM 247, TYPE A, GRADE 1. COMPACT TO AT LEAST 95% OF ASTM D1557 (OR 100% OF TEX-113) AT A MOISTURE CONTENT RANGE OF 0 TO +3% OF OPTIMUM MOISTURE CONTENT IN 6-INCH COMPACTED LIFTS.

SUBBASE AND SURFACE COVER TABLE				
AREA	SUBBASE COURSE THICKNESS	TEMPORARY SURFACE COVER	FINAL SURFACE COVER	SURFACE COVER THICKNESS
PERMANENT ASU	N/A	SEE SWPPP	AGGREGATE	SEE AGGREGATE SURFACE COVER SECTION
TEMPORARY CONSTRUCTION ACCESS ROAD (TO ROUGHNECK ROAD)	8"	SUBBASE AGGREGATE	LAWN	SEE LAWN SURFACING SECTION
SUBSTATION ENTRANCE DRIVE	8"	SUBBASE AGGREGATE	AGGREGATE	SEE AGGREGATE SURFACE COVER SECTION
TEMPORARY SUBSTATION LAYDOWN	8"	SUBBASE AGGREGATE	LAWN	SEE LAWN SURFACING SECTION
TEMPORARY CONSTRUCTION TRAILERS	8"	SUBBASE AGGREGATE	RIGID PAVEMENT	SEE RIGID PAVEMENT SECTION
TEMPORARY CONTRACTOR PARKING	8"	SUBBASE AGGREGATE	LAWN	SEE LAWN SURFACING SECTION
TEMPORARY EQUIPMENT LAYDOWN	8"	SUBBASE AGGREGATE	RIGID PAVEMENT	SEE RIGID PAVEMENT SECTION
TEMPORARY ELECTRICAL LAYDOWN	8"	SUBBASE AGGREGATE	RIGID PAVEMENT	SEE RIGID PAVEMENT SECTION
TEMPORARY FLAT BOTTOM TANK LAWDOWN	8"	SUBBASE AGGREGATE	RIGID PAVEMENT	SEE RIGID PAVEMENT SECTION
GENERAL LAWN AREAS	N/A	SEE SWPPP	LAWN	SEE LAWN SURFACING SECTION
STORMWATER MANAGEMENT BASIN AREAS	N/A	SEE SWPPP	LAWN	SEE LAWN SURFACING SECTION

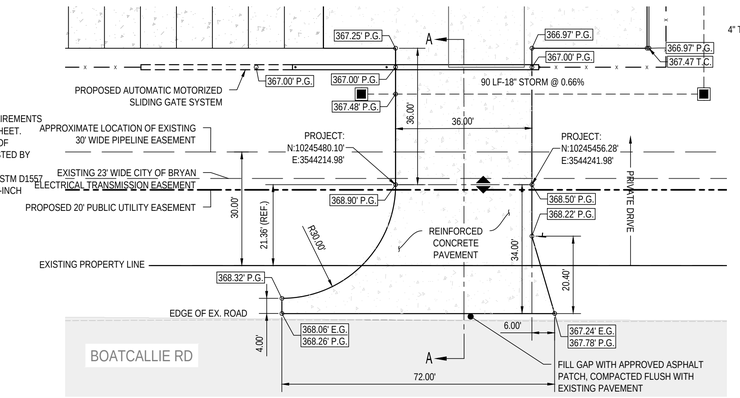
SITE PREPARATION SECTION

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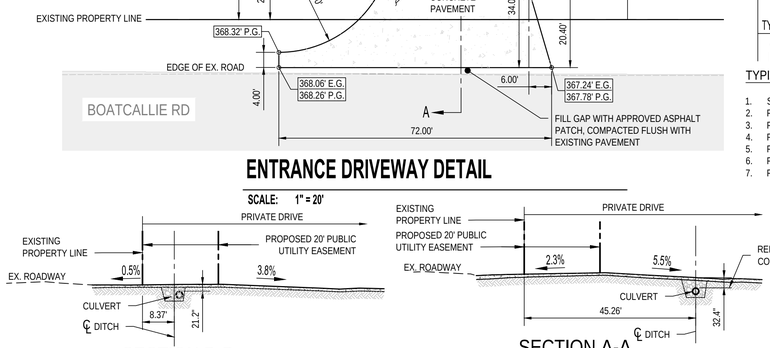
AGGREGATE DRIVEWAY DETAIL

SCALE: 1" = 20'



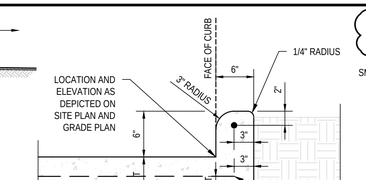
ENTRANCE DRIVEWAY DETAIL

SCALE: 1" = 20'



EXIT DRIVEWAY DETAIL

SCALE: 1" = 20'

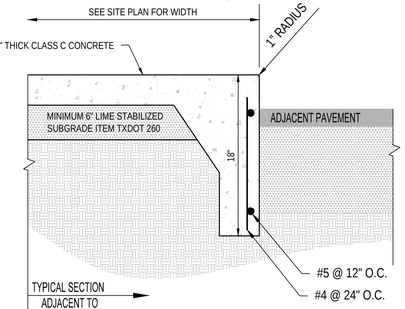


CONCRETE BARRIER CURB NOTES:

1. REMOVE FORMS AS EARLY AS POSSIBLE. BRUSH TOP AND FACE OF CURBS TO REMOVE ALL IMPERFECTIONS, TYPICAL OF ALL FORM WORK.
2. ALL RADII SHALL BE TRUE ARCS.
3. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4 INCH.
4. DIMENSION T SHOWN IS THE THICKNESS OF CONCRETE PAVEMENT.
5. VERTICAL BAR USED AS NEEDED TO SUPPORT CURB REINFORCING STEEL DURING CONCRETE PLACEMENT.
6. PROVIDE 3/8" X 1 1/4" CONTROL JOINTS 10' O.C.
7. PROVIDE 3/8" X 4" IMPREGNATED FIBERBOARD EXPANSION JOINT AT 30' O.C.
8. CURB TO MATCH EXISTING PROFILE AND DIMENSIONS OF ADJOINING CURBS.
9. JOINT SEALER AND PREFORMED JOINT MATERIAL ARE NOT REQUIRED FOR THE PORTION OF THE CURB THAT IS ADJACENT TO A FLEXIBLE PAVEMENT TYPE. BOTH MATERIALS ARE REQUIRED, AS DETAILED, FOR THE FULL HEIGHT OF RIGID CONCRETE AND CONCRETE BASES.

MONOLITHIC CONCRETE CURB

SCALE: N.T.S.

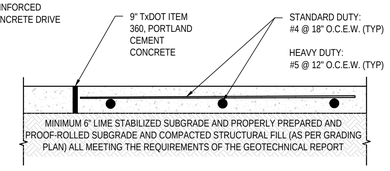


TYPICAL SIDEWALK NOTES:

1. SIDEWALKS VARY IN WIDTH. SEE PLAN FOR LOCATIONS AND DIMENSIONS.
2. PROVIDE 3/8" X 1-1/4" CONTROL JOINTS TO BE PLACED AT SPACING EQUAL TO SIDEWALK WIDTH.
3. PROVIDE 3/8" X 4" IMPREGNATED FIBERBOARD EXPANSION JOINT AT 30' O.C. AND ADJACENT TO STRUCTURES.
4. PROVIDE 3/8" X 1-1/4" CONTROL JOINT AT 10' O.C.
5. PROVIDE SMOOTH DOWELS AT ALL CONSTRUCTION JOINTS.
6. PROVIDE CONCRETE WITH AIR ENTRAINMENT OF 5%, 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI.
7. PROVIDE LIGHT BROOM FINISH ON ALL EXTERIOR CONCRETE.

TYPICAL SIDEWALK

SCALE: N.T.S.



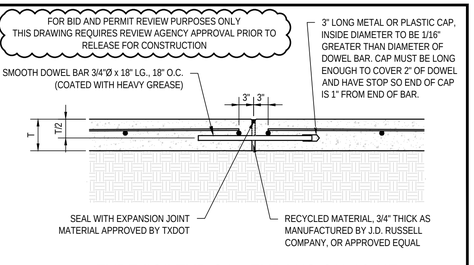
TYPICAL RIGID PAVEMENT NOTES:

1. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS INSTALLATION.
2. REFERENCE GEOTECHNICAL REPORT, ADDENDUM-1 FOR UPDATED SITE PREPARATION INCLUDING PROOF ROLL REQUIREMENTS AND STRUCTURAL FILL REQUIREMENTS (SANDY CLAY SOILS) AS ALSO PRESENTED IN TABLE 2.
3. FILL SHALL BE PLACED WITH A MAXIMUM COMPACTED LIFT THICKNESS OF SIX INCHES, WITH EACH LIFT TESTED FOR COMPLIANCE PRIOR TO THE ADDITION OF SUBSEQUENT LIFTS. THE PLACEMENT AND COMPACTION OF FILL MATERIAL MUST BE OBSERVED MONITORED, AND TESTED BY THE GEOTECHNICAL ENGINEER, ON A FULL-TIME BASIS.
4. VERIFY SUBGRADE MEETS MINIMUM REQUIREMENTS STATED IN GEOTECHNICAL REPORT.
5. SUBGRADE TO BE TREATED WITH LIME APPLICATION OF ABOUT 8% TO 10% OF THE DRY WEIGHT OF THE SOIL.
6. REFERENCE THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS BRIDGES, LASTEST EDITION, FOR CONSTRUCTION REQUIREMENTS INCLUDING, BUT NOT LIMITED TO:
   - 6.1. LEVELING COURSE
   - 6.2. CONCRETE COMPRESSIVE STRENGTH
   - 6.3. CONCRETE PLACING
   - 6.4. CONCRETE ADDITIVES
   - 6.5. REINFORCING
   - 6.6. PAVEMENT JOINTING
   - 6.7. PAVEMENT FINISHING
7. COMPACT SUBGRADE TO AT LEAST 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY PER ASTM D698 WITHIN ZERO TO THREE PERCENTAGE POINTS ABOVE THE OPTIMUM MOISTURE CONTENT.
8. PROVIDE WET MAT CURING FOR FAST TRACK CONCRETE PAVEMENT PER TXDOT, ITEM 360 CONCRETE PAVEMENT.
9. ALL CONCRETE TO HAVE A MINIMUM AVERAGE COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS. THE CONCRETE SHOULD ALSO BE DESIGNED WITH 5±1 PERCENT ENTRAINED AIR TO IMPROVE WORKABILITY AND DURABILITY. PAVEMENT MAY BE OPENED AFTER 72 HOURS AND SUCCESSFUL STRENGTH TESTING. COMPLETE TESTING AT 3 DAYS (AND 7 DAYS IF REQUIRED) FOR A COMPRESSIVE STRENGTH OF 3,200 PSI AND FLEXURAL STRENGTH OF 450 PSI.
10. THE PAVEMENT PERIMETER SHALL HAVE THICKENED EDGES (12" WIDE BY ADDITIONAL 6" THICK) WHERE INTEGRAL CURBING IS NOT PRESENT.

TYPICAL RIGID PAVEMENT SECTION

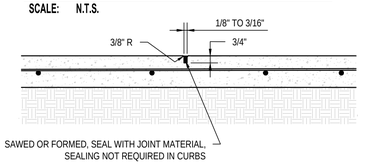
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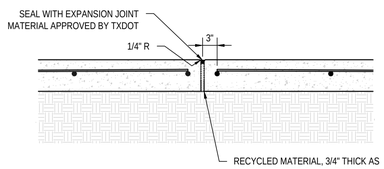
TYPE "G" TYPICAL EXPANSION JOINT

SCALE: N.T.S.



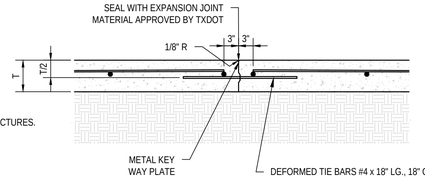
TYPE "B" CONTRACTION JOINT

SCALE: N.T.S.



TYPICAL UNDOWELED ISOLATION JOINT

SCALE: N.T.S.

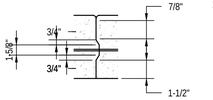


TYPE "D" LONGITUDINAL JOINT

SCALE: N.T.S.

PAVEMENT JOINT NOTES:

1. PROVIDE TYPE "G" EXPANSION JOINTS AT 60' MAX. INTERVAL AND AT EACH RADIUS POINT.
2. PROVIDE TYPE "B" CONTRACTION JOINTS AT 20' MAX. INTERVAL.
4. PROVIDE TYPE "D" LONGITUDINAL JOINT IN THE CENTERLINE OF THE DEFINED ROADWAYS AND IN INTERSECTIONS.
5. PROVIDE UNDOWELED ISOLATION JOINT WITH APPROVED EXPANSION JOINT FILLER AROUND ALL FOUNDATION PADS, EQUIPMENT PADS AND SIMILAR STRUCTURES WHERE CONCRETE PAVEMENT ABUTS. SEAL TOP OF JOINT TO PREVENT WATER INFILTRATION.



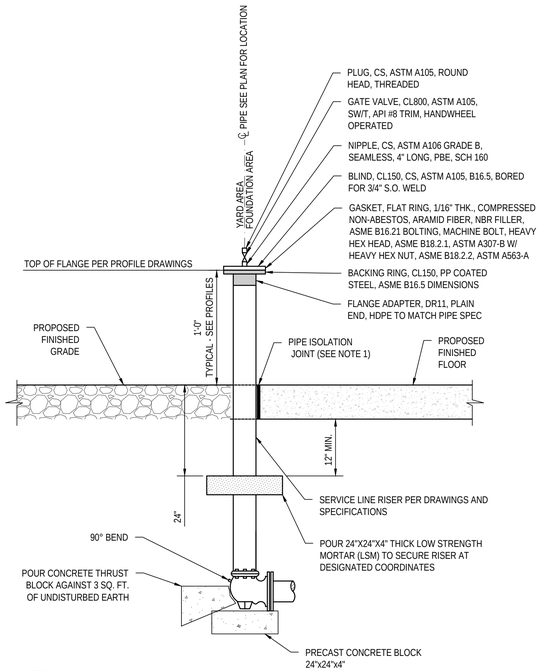
METAL KEY WAY PLATE

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
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00A	10/17/25	ISSUED FOR APPROVAL

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-008-004
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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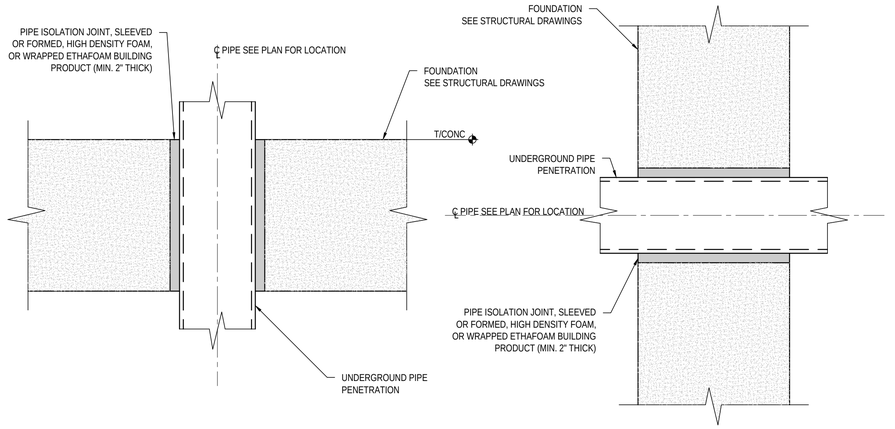


NOTES:

1. REFERENCE UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL .
2. COORDINATE UTILITY CONSTRUCTION IN CONFORMANCE TO THE GEOTECHNICAL ENGINEER REQUIREMENTS AND STRUCTURAL DRAWINGS FOR ALL UTILITY WORK INCLUDING EXCAVATION AND BACKFILL REQUIREMENTS IN FOUNDATION AREAS.
3. SEE THE APPROPRIATE UTILITY SPECIFICATION AND INSPECTION AUTHORITY FOR TESTING, FLUSHING AND CLEANING PROCEDURES.
4. SEE OWNER SPECIFICATIONS FOR INSULATING/HEAT TRACING OF UTILITY AT THE RISER LOCATION.

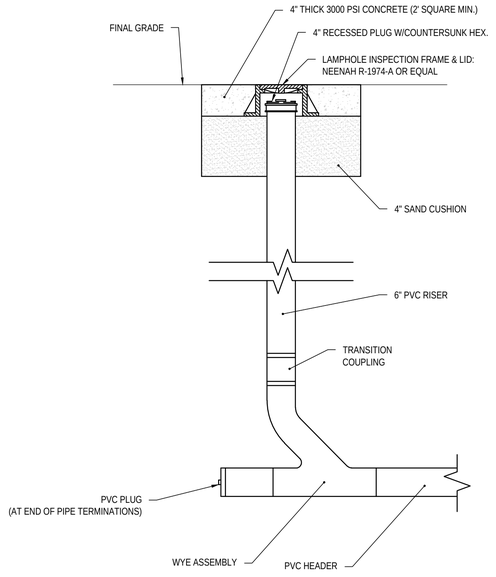
WATER RISER DETAIL

SCALE: N.T.S.



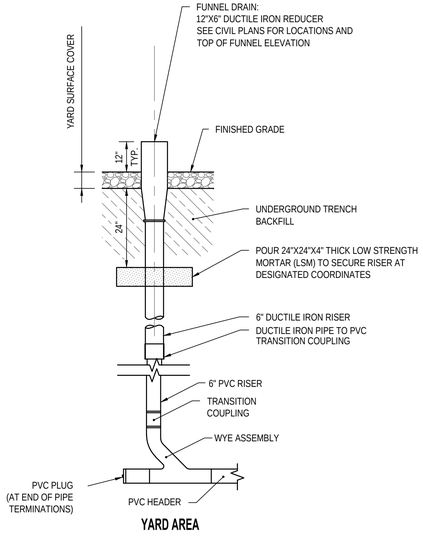
UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL

SCALE: N.T.S.



CLEANOUT ASSEMBLY DETAIL

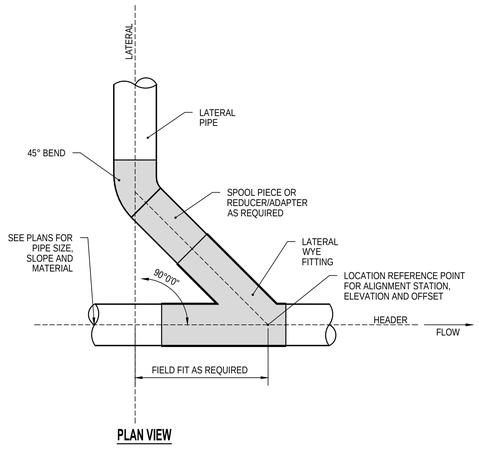
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YARD AREA

FUNNEL DRAIN ASSEMBLY DETAIL

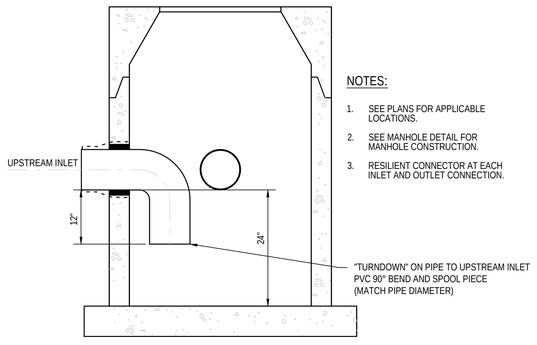
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PLAN VIEW

WYE ASSEMBLY DETAIL

SCALE: N.T.S.



NOTES:

1. SEE PLANS FOR APPLICABLE LOCATIONS.
2. SEE MANHOLE DETAIL FOR MANHOLE CONSTRUCTION.
3. RESILIENT CONNECTOR AT EACH INLET AND OUTLET CONNECTION.

PIPE TURNDOWN AT MANHOLE DETAIL

SCALE: N.T.S.

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED PROFESSIONAL ENGINEER
04/17/2026

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MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

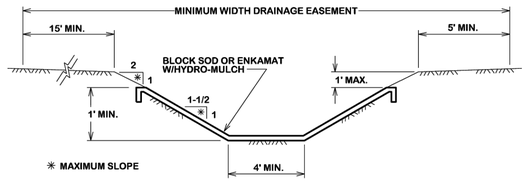
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DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

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REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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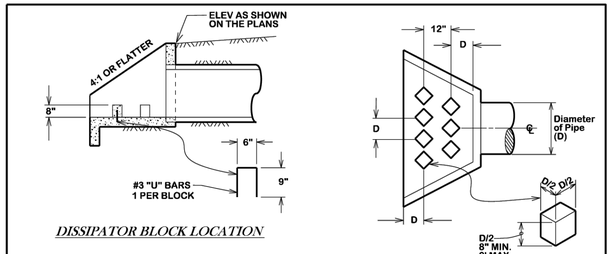


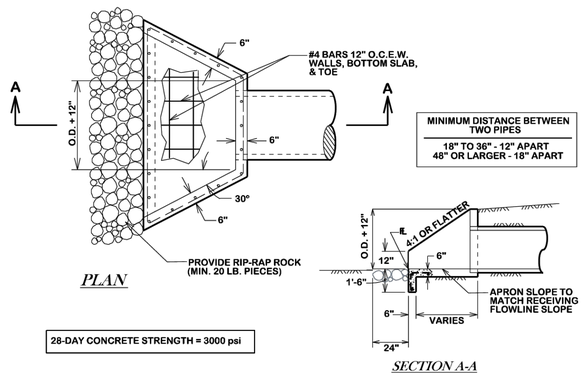
TYPICAL LINED CHANNEL SECTION

BLOCK SOD OR ENKAMAT W/ HYDRO-MULCH

CITY OF BRYAN	STANDARD CHANNEL SECTION		
	DATE: AUG. 2012	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.: D2-02

CITY OF COLLEGE STATION

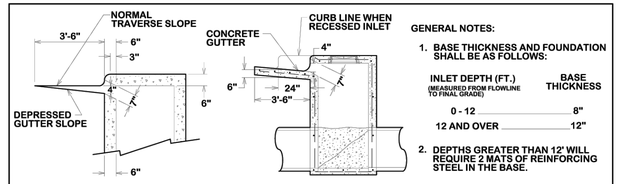




28-DAY CONCRETE STRENGTH = 3000 psi

CITY OF BRYAN	TYPICAL CONCRETE HEADWALL & ENDWALL WITH WINGS		
	DATE: AUG. 2012	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.: D3-00

CITY OF COLLEGE STATION

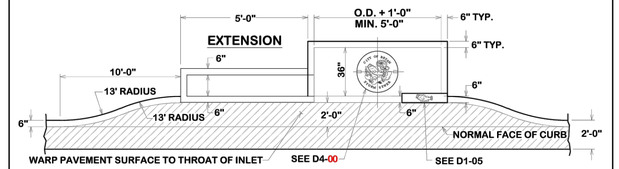


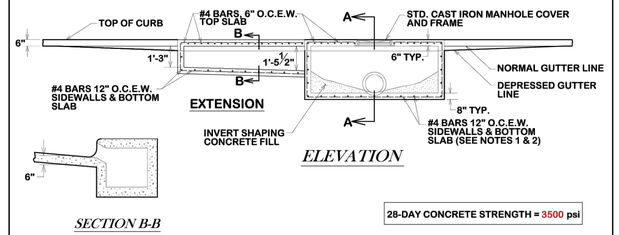
GENERAL NOTES:

1. BASE THICKNESS AND FOUNDATION SHALL BE AS FOLLOWS:

INLET DEPTH (FT.) (MEASURED FROM FLOWLINE TO FINAL GRADE)	BASE THICKNESS
0 - 12	8"
12 AND OVER	12"

2. DEPTHS GREATER THAN 12' WILL REQUIRE 2 MATS OF REINFORCING STEEL IN THE BASE.

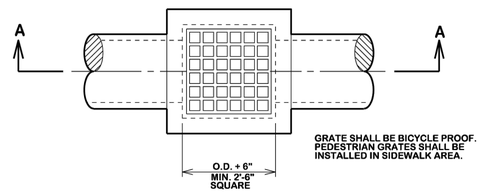




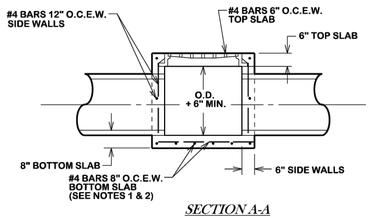
28-DAY CONCRETE STRENGTH = 3500 psi

CITY OF BRYAN	SINGLE RECESSED CURB INLET & CURB INLET W/EXTENSION		
	DATE: AUG 2024	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.: D1-00

CITY OF COLLEGE STATION



GRATE SHALL BE BICYCLE PROOF. PEDESTRIAN GRATES SHALL BE INSTALLED IN SIDEWALK AREA.



GENERAL NOTES:

1. BASE THICKNESS AND FOUNDATION SHALL BE AS FOLLOWS:

INLET DEPTH (FT.) (MEASURED FROM FLOWLINE TO FINAL GRADE)	BASE THICKNESS
0 - 12	8"
12 AND OVER	12"

2. DEPTHS GREATER THAN 12' WILL REQUIRE 2 MATS OF REINFORCING STEEL IN THE BASE.

28-DAY CONCRETE STRENGTH = 3000 psi

CITY OF BRYAN	SINGLE GRATE INLET		
	DATE: AUG. 2012	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.: D1-01

CITY OF COLLEGE STATION

NOTES:

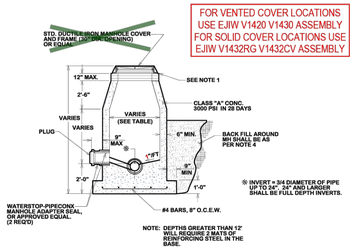
1. A MAX. OF 4 AND A MIN. OF 2 THROAT RINGS SHALL BE USED AT EACH MANHOLE IN NEW OR EXISTING RIGHT-OF-WAY.
2. USE NP-1 SEALANT OR APPROVED EQUAL BETWEEN RING/COVER, ADJUSTMENT AND CHIMNEY OR CONE/CONE SECTION.
3. MANHOLE BASE THICKNESS AND FOUNDATION FROM FLOWLINE TO RIM AS FOLLOWS:

MANHOLE DEPTH (FT.)	BASE THICKNESS
0 - 12	8"
12 AND OVER	12"

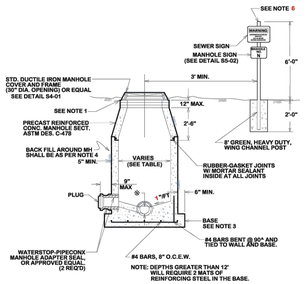
4. MANHOLE LOCATION AND COMPACTION AS FOLLOWS:

LOCATION	COMPACTION REQUIREMENT
PAVEMENT	98 % STANDARD PROCTOR - ASTM D 698
LANDSCAPE AREA	90 % STANDARD PROCTOR - ASTM D 698

5. IN FLOODPLAINS OR AREAS OF CONCENTRATED FLOW, MANHOLE COVERS SHALL BE SET BELOW THE BASE FLOOD ELEVATION ON A BOLT DOWN, WATER-TIGHT RING AND COVER SHALL BE USED, VENTED WHERE REQUIRED.
6. WARNING SIGN ONLY TO BE PLACED WHERE SEWER CROSSES OPEN FIELDS.



MANHOLE DIA.	MAIN SIZE
4 FT	<18in.
5 FT	≥18in. <30in.
6 FT	≥36in.

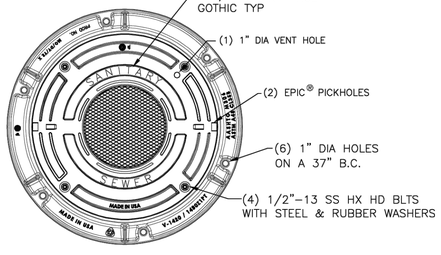


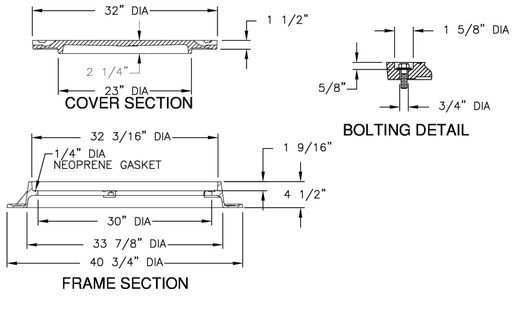
CITY OF BRYAN	STANDARD MANHOLE		
	DATE: APR 2024	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.: S1-00

CITY OF COLLEGE STATION

FOR VENTED COVER LOCATIONS USE EJIW V1420 V1430 ASSEMBLY
FOR SOLID COVER LOCATIONS USE EJIW V1432RG V1432CV ASSEMBLY

V1420 V1430 Assembly





Product Number
414300061B01

Design Features
-Materials
Frame
Gray Iron (CL35B)
Cover
Ductile Iron (70-50-05)

-Load Rating
Heavy Duty
-Open Area
n/a
-Coating
Undipped
-✓Designates Machined Surface

Certification
- ASTM A48
- ASTM A536
-
-Country of Origin:USA

Major Components
41420015
414300061

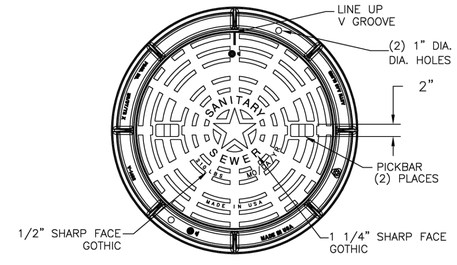
Drawing Revision
11/9/2018 Designer: MAH
3/30/2023 Revised By: DAE

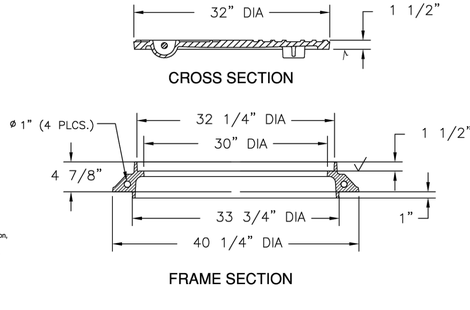
Disclaimer
Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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Contact
800 626 4653
ejco.com

V1432RG V1432CV Assembly





Product Number
41432003

Design Features
-Materials
Frame
Gray Iron (CL35B)
Cover
Gray Iron (CL35B)

-Design Load
Heavy Duty
-Open Area
n/a
-Coating
Undipped
-✓Designates Machined Surface

Certification
-
- ASTM A48
-
-Country of Origin:USA

Major Components
41432010
41432040

Drawing Revision
10/30/2002 Designer: DEW
4/17/2019 Revised By: MAH

Disclaimer
Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

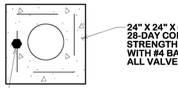
MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-008-006
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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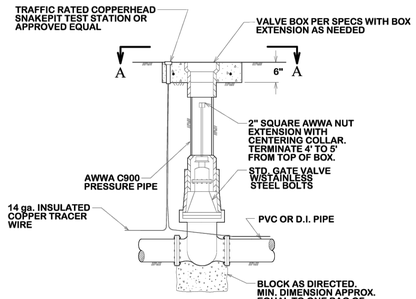
24" X 24" X 6" 28-DAY CONCRETE STRENGTH = 2000 psi WITH #4 BAR AROUND ALL VALVE BOX.

TRAFFIC RATED COPPERHEAD SNAKEPIT TEST STATION OR APPROVED EQUAL

VIEW A - A

NOTE:

1. VALVE EXTENSION TO BE USED ONLY WHEN TOP OF GATE VALVE IS DEEPER THAN 5 FEET FROM FINISHED GRADE.
2. ALL VALVE OPERATING NUT EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND PAINTED WITH TWO (2) COATS OF METAL PAINT.
3. EXTENSIONS SHALL BE A MINIMUM OF ONE (1) FOOT LONG.
4. VALVE BOX LIDS LOCATED ON VALVES TO ISOLATE FIRE SUPPRESSION LINES FROM PUBLIC WATER LINES SHALL BE EJ 6800, PRODUCT 06800044 LOCKABLE LID.



CITY OF BRYAN *The Good Life, Texas Style.*

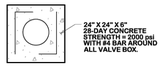
GATE VALVE & BOX

CITY OF COLLEGE STATION

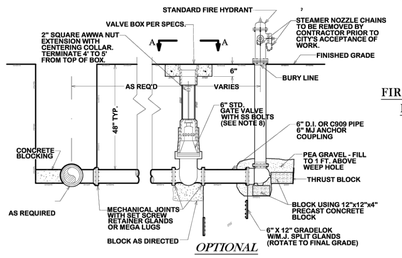
DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
APR 2024		W1-00

GENERAL NOTES:

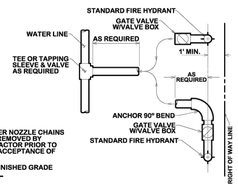
1. FINELY DIVIDED EARTH FREE OF ROCK, LUMPS AND CLODS EXCEEDING 6" SHALL BE PLACED BY HAND, AND COMPACTED AROUND THE CAST IRON PIPE TO A DEPTH OF 12" OVER THE TOP OF THE PIPE BEFORE BACKFILL IS BEGUN BY ANY MECHANICAL EQUIPMENT.
2. ALL CONCRETE BLOCKING SHALL BE - 28 DAY CONCRETE STRENGTH = 2000psi.
3. ALL THRUST BLOCKING SHALL PROVIDE A MINIMUM OF 2 SQUARE FEET OF BEARING AREA OF CONCRETE ON UNDISTURBED SOIL, OR AS DIRECTED BY THE ENGINEER.
4. WATER MAINS WILL NOT BE FULLY PRESSURIZED UNTIL CONCRETE HAS REACHED 7 DAY STRENGTH.
5. ALL PIPE WILL BE LAID SO AS THE ENTIRE BARRELL WILL HAVE FULL BEARING ON THE FINE GRADED TRENCH BOTTOM. BELL HOLES SHALL BE CUT FOR EACH BELL AND FIRE HYDRANT.
6. ALL FITTING SHALL BE MECHANICL JOINTS UNLESS OTHERWISE DIRECTED.
7. HYDRANTS SHALL BE LOCATED NO CLOSER THAN 3 FEET MEASURED FROM THE BACK OF CURB TO THE FACE OF THE STEAMER ON THE FIRE HYDRANT AND NO FURTHER THAN 15 FEET FROM BACK OF CURB
8. IF MAIN VALVE IS WITHIN 50 FEET OF FIRE HYDRANT THEN ASSEMBLY VALVE MAY BE OMITTED ON A DEAD END HYDRANT LEAD WITH NO ADDITIONAL CONNECTIONS.
9. HEIGHT OF FIRE HYDRANT MEASURED FROM THE STEAMER NOZZLE SHALL BE 18 TO 24 INCHES ABOVE NEAREST FINAL GRADE.
10. FIRE HYDRANTS SHALL COME EQUIPPED WITH STORZ QUARTER TURN PUMPER CONNECTIONS THAT ARE AN INTEGRAL PART OF THE FIRE HYDRANT, AND MUST BE FURNISHED BY THE MANUFACTURER. STORZ ADAPTERS WILL NOT BE ACCEPTED.



VIEW A - A



OPTIONAL



FIRE HYDRANT LOCATION
REALIGN AS NEEDED

CITY OF BRYAN *The Good Life, Texas Style.*

STANDARD FIRE HYDRANT ASSEMBLY

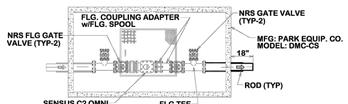
CITY OF COLLEGE STATION

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
APR 2024		W1-02

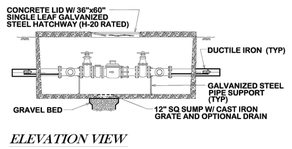
SPECIAL CONDITIONS

1. METER REGISTER SHALL BE NO DEEPER THAN 12 INCHES BELOW FINISHED GRADE.
2. FLOOR OF VAULT WILL BE A MINIMUM OF 6 INCHES FROM BOTTOM OF ANY PIPING APPARATUS OR METER WITHIN THE VAULT.
3. REINFORCED CONCRETE VAULT BASE (FLOOR) SHALL BE CONSTRUCTED USING A STANDARD FIVE SACK CONCRETE MIX AND REINFORCING COMPRISED OF #3 REBAR ON 12 INCH CENTERS WITH A MINIMUM BASE THICKNESS OF 6 INCHES.
4. SET SCREW RETAINER GLANDS SHALL BE INSTALLED AT EACH FITTING ON MECHANICAL JOINT PIPE.
5. VALVES SHALL MEET THE CITY SPECIFICATIONS FOR VALVES.
6. THERE SHALL BE NO PIPING UNDER THE FLOOR OF THE VAULT.

MODEL	SIZE	L1	W1	H1	WEIGHT LBS
DMC-CS3	3"	6'-8"	5'-0"	4'-6"	12,000
DMC-CS4	4"	8'-8"	5'-0"	4'-6"	12,000
DMC-CS6	6"	11'-0"	6'-0"	4'-9"	12,000



PLAN VIEW



ELEVATION VIEW

APPROVED 3" OR LARGER COMPOUND METERS, VAULTS & MATERIALS

APPROVED METERS - SENSUS SRH (U. S. GALLONS)

APPROVED VAULTS - PARK DMC-BR PRE-CAST CONCRETE VAULT W/ ADEQUATE ACCESS AND VAULT DIMENSIONS FOR METER SELECTED

APPROVED MATERIALS - DUCTILE IRON PIPE WITH MECHANICAL JOINT, SET SCREW RETAINER GLANDS WILL BE BASED ON ALL M.J. FITTINGS.

ANY DEVIATIONS FROM THE ABOVE SPECIAL CONDITIONS OR APPROVED METERS, VAULTS OR MATERIALS MUST BE SUBMITTED TO THE DIVISION MANAGER, WATER SERVICES, 72 HOURS PRIOR TO ANTICIPATED DEVIATION.

NOTE TO AHJ FOR REVIEW:
THE CLOSEST MATCH TO PARK DMC-BR APPEARS TO BE DMC-AL-SL ACCORDING TO CURRENT CATALOG

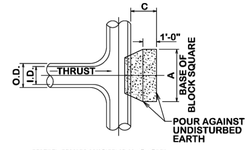
CITY OF BRYAN *The Good Life, Texas Style.*

CITY OF COLLEGE STATION METER VAULT ASSEMBLY

CITY OF COLLEGE STATION

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
FEB 2021		W5-00

NOTE:
USE POLYETHYLENE WRAP OR EQUAL BETWEEN CONCRETE & PLUG TO PREVENT CONCRETE FROM STICKING TO PLUG.



TEE THRUST BLOCK

TEE SCHEDULE				
ID (in)	THRUST (tons)	C (ft)	A (ft)	VOLUME (c.y.)
4,6,8	5.1	1.5	2.5	0.3
10,12	11.3	1.5	3.5	0.6

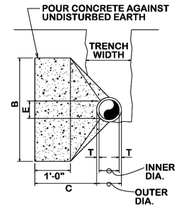
THRUST BLOCK NOTES:

1. ALL CALCULATIONS ARE BASED ON INTERNAL PRESSURE OF 200 psi FOR 24" AND SMALLER INNER DIAMETER PIPE.
2. ALL BEARING SURFACES OF THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED EARTH OR ROCK.
3. CONCRETE FOR BLOCKING SHALL BE 2000 psi.
4. DIMENSIONS MAY BE VARIED AS REQUIRED BY FIELD WHERE AND AS DIRECTED BY THE ENGINEER. THE VOLUME OF CONCRETE BLOCKING SHALL NOT BE LESS THAN SHOWN HERE.
5. WATER MAIN SHALL NOT BE PRESSURIZED UNTIL ALL CONCRETE BLOCKING HAS REACHED 1500 psi.

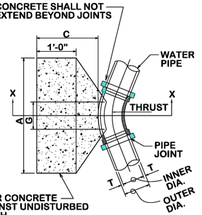
HORIZONTAL THRUST BLOCK SCHEDULE

BEND	SIZE	A (ft)	B (ft)	C (ft)	E (ft)	G (ft)	VOLUME (c.y.)
90°	6,8"	5.0	1.5	1.5	0.9	2.7	0.4
	10,12"	6.5	2.5	1.5	1.2	4.0	1.0
45°	6,8"	2.0	2.0	1.5	0.9	1.5	0.2
	10,12"	3.5	2.5	1.5	1.2	2.2	0.5
22.5°	6,8"	1.5	1.5	1.5	0.9	0.8	0.1
	10,12"	2.0	2.5	1.5	1.2	1.1	0.3
11.25°	6,8"	1.0	1.5	1.5	0.9	0.4	0.1
	10,12"	1.5	1.5	1.5	1.2	0.6	0.1

THRUST BLOCK DETAILS



SECTION X-X



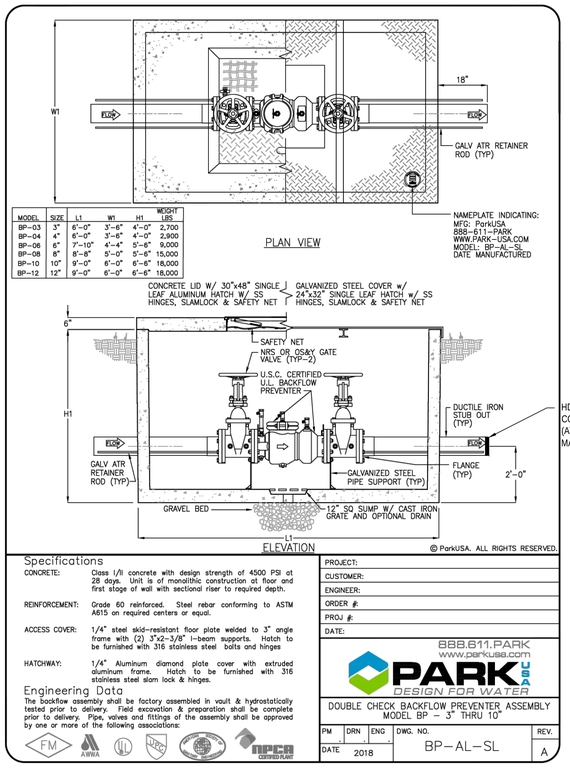
PLAN VIEW

CITY OF BRYAN *The Good Life, Texas Style.*

TYPICAL HORIZONTAL THRUST BLOCK

CITY OF COLLEGE STATION

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
AUG. 2012		W2-00



MODEL	SIZE	L1	W1	H1	WEIGHT LBS
BP-03	3"	6'-0"	3'-6"	4'-0"	2,700
BP-04	4"	6'-0"	3'-6"	4'-0"	2,900
BP-06	6"	7'-10"	4'-4"	5'-6"	9,000
BP-08	8"	8'-8"	5'-0"	5'-6"	15,000
BP-10	10"	9'-0"	6'-0"	6'-6"	18,000
BP-12	12"	9'-0"	6'-0"	6'-6"	18,000

Specifications

CONCRETE: Class I/II concrete with design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.

REINFORCEMENT: Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

ACCESS COVER: 1/4" steel skid-resistant floor plate welded to 3" angle frame with (2) 3"x2-3/8" I-beam supports. Hatch to be furnished with 316 stainless steel bolts and hinges

HATCHWAY: 1/4" Aluminum diamond plate cover with extruded aluminum frame. Hatch to be furnished with 316 stainless steel slam lock & hinges.

Engineering Data

The backflow assembly shall be factory assembled in vault & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by one or more of the following associations:

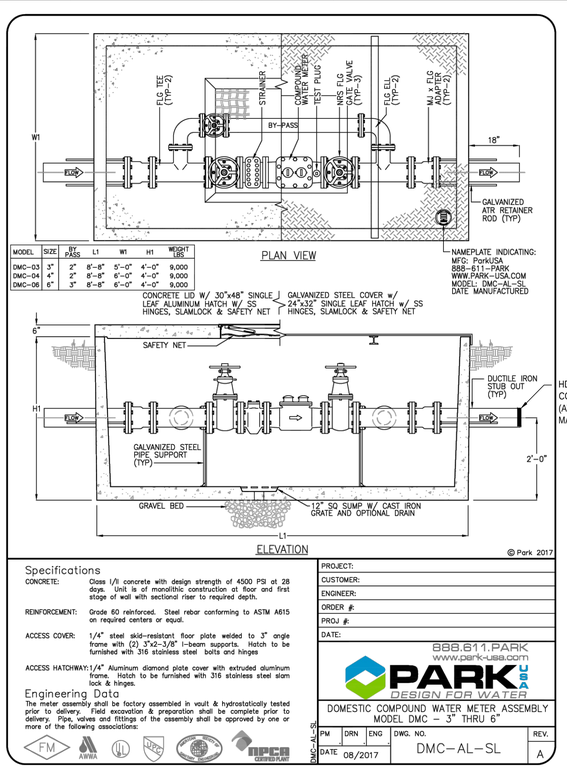
FM AWWA UL USC IAPMO

PROJECT:	
CUSTOMER:	
ENGINEER:	
ORDER #:	
PROJ #:	
DATE:	

888.611.PARK
www.parkusa.com
PARK USA DESIGN FOR WATER

DOUBLE CHECK BACKFLOW PREVENTER ASSEMBLY MODEL BP – 3" THRU 10"

PM	DRN	ENG	DWG. NO.	REV.
DATE 2018			BP-AL-SL	A



MODEL	SIZE	BY-PASS	L1	W1	H1	WEIGHT LBS
DMC-03	3"	2"	8'-8"	5'-0"	4'-0"	9,000
DMC-04	4"	2"	8'-8"	6'-0"	4'-0"	9,000
DMC-06	6"	3"	8'-8"	6'-0"	4'-0"	9,000

Specifications

CONCRETE: Class I/II concrete with design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.

REINFORCEMENT: Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

ACCESS COVER: 1/4" steel skid-resistant floor plate welded to 3" angle frame with (2) 3"x2-3/8" I-beam supports. Hatch to be furnished with 316 stainless steel bolts and hinges

ACCESS HATCHWAY: 1/4" Aluminum diamond plate cover with extruded aluminum frame. Hatch to be furnished with 316 stainless steel slam lock & hinges.

Engineering Data

The meter assembly shall be factory assembled in vault & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by one or more of the following associations:

FM AWWA UL USC IAPMO

PROJECT:	
CUSTOMER:	
ENGINEER:	
ORDER #:	
PROJ #:	
DATE:	

888.611.PARK
www.park-usa.com
PARK USA DESIGN FOR WATER

DOMESTIC COMPOUND WATER METER ASSEMBLY MODEL DMC – 3" THRU 6"

PM	DRN	ENG	DWG. NO.	REV.
DATE 08/2017			DMC-AL-SL	A

DMC-AL-SL

THE WATER METER ASSEMBLY DETAIL IS PROVIDED FOR VAULT DEPICTION AND GENERAL ARRANGEMENT PURPOSES ONLY. ALL COMPONENTS (VALVES, METERS, BY-PASS, ETC.) INSIDE THE VAULT SHALL CONFORM TO AHJ REQUIREMENTS. ALL INTERNAL VAULT DIMENSIONS SHALL CONFORM TO AHJ REQUIREMENTS. IF THE METER VAULT IS ORDERED AS AN ASSEMBLY WITH SUPPLIED COMPONENTS.

THE SELECTED METER SIZE FOR THE 8" WATER SERVICE SHALL BE ABLE TO PASS 1,500 GALLONS PER MINUTE, PEAK FLOW.
THE SELECTED METER SIZE FOR THE 4" WATER SERVICE SHALL BE ABLE TO PASS 200 GALLONS PER MINUTE, PEAK FLOW.
THE SELECTED VAULT SIZE SHALL MEET THE VAULT SIZE REQUIREMETNS BASED ON THE SELECTED METER SIZE AND INTERIOR COMPONENTS.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHIEL KHATER
95739
LICENSED PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA — CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: CIVIL NOTES AND DETAILS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

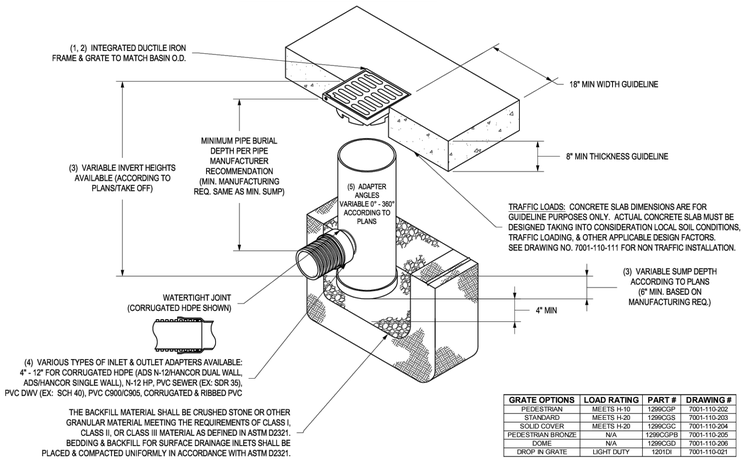
DRAWING NO.: 566901-C-D-008-007 — REV.: 00C

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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NYLOPLAST 12" DRAIN BASIN: 2812AG _ _ X



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-10	1299CGP	7001-110-202
STANDARD	MEETS H-20	1299CGS	7001-110-203
SOLID COVER	MEETS H-20	1299CGC	7001-110-204
PEDESTRIAN BRONZE	N/A	1299CGPB	7001-110-205
DOME	N/A	1299CGD	7001-110-206
DROP IN GRATE	LIGHT DUTY	1201DI	7001-110-021

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRONZE GRATE.
2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

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DRAWN BY EBC | DATE 03-29-06 | REVISED BY NMH | DATE 03-11-16 | DWG SIZE A | MATERIAL | PROJECT NO./NAME | SCALE 1:20 | SHEET 1 OF 1

ADS Nyloplast
3130 VERONA AVE
BUFORD, GA 30518
PHN (770) 932-2443
FAX (770) 932-2490
www.nyloplast-us.com

TITLE: 12 IN DRAIN BASIN QUICK SPEC INSTALLATION DETAIL

DWG NO. 7001-110-189 REV E

ENGINEERS NOTES:

A. THE BASIN SHALL BE ANCHORED PER VENDOR RECOMMENDATIONS.
B. DETAIL APPLICABLE TO:
WW-FD-05.00-01

NYLOPLAST DRAIN BASIN DETAIL

SCALE: N.T.S.



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NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

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DESCRIPTION: CIVIL NOTES AND DETAILS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-008-008 | REV.: 00C

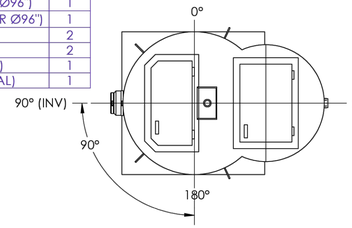
DRAWING SCALE: AS NOTED

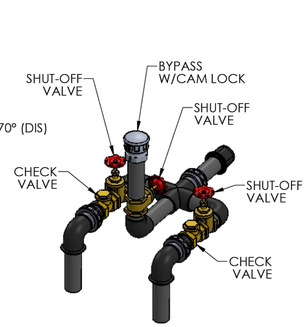
MIDDOUGH PROJ.#: MEU2510

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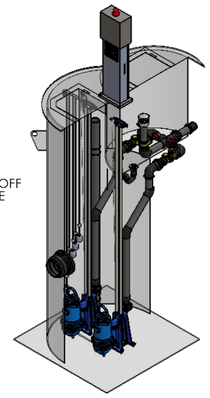
EXCEL FLUID GROUP PUMP STATION		
ITEM:	DESCRIPTION:	QTY:
A1	FIBERGLASS BASIN (Ø36", Ø48", Ø60", Ø72", OR Ø96")	1
A2	FIBERGLASS INT-BASIN (Ø36", Ø48", Ø60", Ø72", OR Ø96")	1
B	SUBMERSIBLE PUMP	2
C	BASE ELBOW	2
D	FLOAT BRACKET ASM (#FLOATS OPTIONAL)	1
E	TRANDUCER W/STILLING TUBE ASM (OPTIONAL)	1

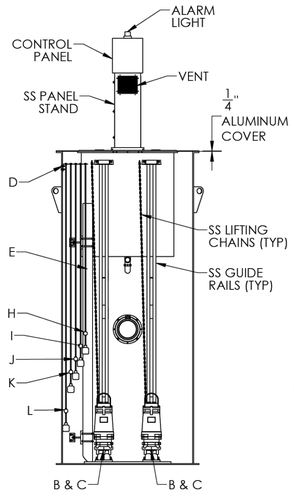
NOTE:
1) CONFIRM INVERT PIPE SIZE, MATERIAL, AND ORIENTATION

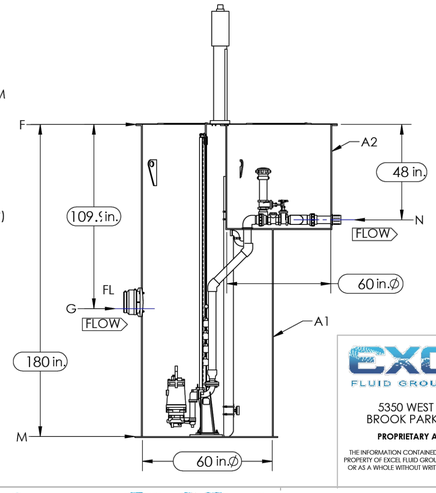




EXAMPLE PIPE AND VALVE HEADER ADDITIONAL OPTIONS AVAILABLE, SEE SHEET 2







EXCEL FLUID GROUP STATION ELEVATION TABLE		
ITEM:	DESCRIPTION:	ELEVATION
F	TOP OF STATION	366.62
G	INVERT (CONFIRM SIZE/TYPE)	357.46
H	HIGH WATER ALARM FLOAT	356.2
I	LAG PUMP ON FLOAT	355.74
J	LEAD PUMP ON FLOAT	355.24
K	PUMPS OFF FLOAT	354.12
L	FLOAT (OPTIONAL 5TH FLOAT)	
M	FLOOR OF BASIN	351.62
N	DISCHARGE	363.25

EXCEL FLUID GROUP

5350 WEST 137TH ST.
BROOK PARK, OH 44142

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TITLE: ASM, DUPLEX INT-FRP PUMP STATION

DRAWN BY: CBW
DATE: 04/10/26
SCALE: 1:35
DO NOT SCALE DRAWING

DWG. NO. 7200032

SIZE: B REV: 0 SHEET: 1 of 2

EXCEL FLUID GROUP INTEGRATED FIBERGLASS PUMP STATION SELECTIONS:		
	PUMP STATION LAYOUT	
INTEGRATED BASIN	IG	**IG**
	HATCH TYPE SELECTION	
ALUMINUM	AL	**AL**
H20 TRAFFIC RATED	TR	
	DISCHARGE PIPE & VALVE SIZE SELECTION	
2 IN	2	
3 IN	3	**4**
4 IN	4	
6 IN	6	
	PIPE MATERIAL SELECTION	
DUCTILE IRON	D	
HDPE	H	**P**
STAINLESS STEEL	S	
PVC	P	
	WET WELL SIZE SELECTION (DIA" X DEPTH") - SEE NOTE 1	
EXAMPLE: Ø48" X 96" DEEP WET WELL Ø48" X 60" VALVE VAULT = 4896/4860	(DIGITS/DIGITS)	**-ENTER-**
* [STRAIGHT: 36"MIN; 96"MAX INTEGRATED: 36"MIN; 72"MAX]		**-ENTER-**
	PUMP STATION STYLE SELECTION	
DUPLEX	D	**D**
	PIPE HEADER AND VALVE SELECTION - SEE NOTE 2	
BYPASS	01	
BYPASS, AIR RELEASE VALVE	02	
BYPASS, FLOW METER	05	
BYPASS, FLOW METER, AIR RELEASE VALVE	07	
BYPASS, DIAL GAUGE	09	**10**
BYPASS, AIR RELEASE VALVE, DIAL GAUGE	10	
BYPASS, FLOW METER, DIAL GAUGE	11	
BYPASS, FLOW METER, AIR RELEASE VALVE, DIAL GAUGE	12	
ANTI-SYPHON VALVE	13	
BYPASS, ANTI-SYPHON VALVE	14	
	ADDITIONAL ADD-ON SELECTIONS	
WET WELL AERATION BLOWER	I	**No**
ALUMINUM LADDER	K	**No**
STAINLESS STEEL LADDER	L	**No**
INLET BAFFLE	O	**No**
** INLET TRASH BASKET W/GUIDE RAILS	P	**No**
	SUBMERSIBLE PUMP BRAND SELECTION	
SUBMERSIBLE PUMP BRAND	(WRITE-IN)	**Barnes**

Additional Comments (Preferences, etc.):

Qty 3) Invert Sleeves Required....(2) 6" & (1) 8"
EFG Standard Duplex Panel w/ PLC Controller

NOTES:
1) BASIN DEPTH PROVIDED IN INCREMENTS OF 6"
2) PUMP STATION ADD-ON LETTERS ARE INCLUDED AT THE END OF YOUR MODEL NUMBER
3) * INTEGRATED BASIN CANNOT BE LARGER THAN THE STRAIGHT BASIN
4) ** INLET TRASH BASKET W/GUIDE RAILS CANNOT BE USED ON BASINS SMALLER THAN Ø72"

	SUBMERSIBLE PUMP TYPE SELECTION	
GRINDER PUMP	GR	
EXPLOSION PROOF GRINDER PUMP	XGR	
SEWAGE EJECTOR PUMP	EJ	
EXPLOSION SEWAGE EJECTOR PUMP	XEJ	
NON-CLOG PUMP	NC	
EXPLOSION PROOF NON-CLOG PUMP	XXNC	
AIR FILLED SOLIDS HANDLING PUMP	ASH	**XGR**
EXPLOSION PROOF AIR FILLED SOLID HANDLING PUMP	XASH	
AIR FILLED CHOPPER PUMP	ASC	
EXPLOSION PROOF AIR FILLED CHOPPER PUMP	XASC	
OIL FILLED SOLIDS HANDLING PUMP	OSH	
EXPLOSION PROOF OIL FILLED SOLIDS HANDLING PUMP	XOSH	
OIL FILLED CHOPPER PUMP	OSC	
	LEVEL CONTROL SELECTIONS	
4 FLOAT LEVEL CONTROL	4F	
5 FLOAT LEVEL CONTROL	5F	
SUBMERSIBLE TRANSDUCER LEVEL CONTROL	T	**T4F**
SUBMERSIBLE TRANSDUCER LEVEL CONTROL w/2 FLOAT BACKUP	T2F	
SUBMERSIBLE TRANSDUCER LEVEL CONTROL w/4 FLOAT BACKUP	T4F	
	INCOMING POWER SELECTION	
208 VOLT/SINGLE PHASE	208V1PH	
208 VOLT/THREE PHASE	208V3PH	
230 VOLT/SINGLE PHASE	230V1PH	**460V3PH**
230 VOLT/THREE PHASE	230V3PH	
460 VOLT/THREE PHASE	460V3PH	
	MOTOR STARTER OPTIONS SELCTION	
ACROSS THE LINE STARTERS	ATL	
VARIABLE FREQUENCY DRIVES	VFD	**ATL**
SOFT STARTERS	SS	
	FLOW & HEAD SELECTION (GPM @ TDH)	
EXAMPLE: 150 GPM @ 90 TDH = 150F90	(DIGITS)	**88F @ 36T**
	ADDITIONAL ADD-ON SELECTIONS	
DIESEL GENERATOR	S	**No**
NATURAL GAS GENERATOR	T	**No**
MANUAL TRANSFER SWITCH	U	**No**
AUTOMATIC TRANSFER SWITCH	V	**No**
POWER PEDESTAL	W	**No**
GENERATOR RECEPTACLE	X	**No**

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TITLE: ASM, DUPLEX INT-FRP PUMP STATION

DRAWN BY: CBW
DATE: 04/10/26
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DWG. NO. 7200032

SIZE: B REV: 0 SHEET: 2 of 2

EXCEL FLUID GROUP, LLC

Fiberglass Integrated Pump Station: EX-FGIV

Revision #002 / Oct. 2021

Factory Assembled Fiberglass Integrated Pump Station

Technical Specifications:

Wet Well & Valve Vault Basin
Fiberglass Basin, Chop-Hoop Filament Wound Construction, Manufactured to ASTM D3753 Specifications, Sizes Range from 36" (In.) – 120" (In.) Diameter and from 6' (Ft.) – 30' (Ft.) Deep. Wet Well Includes Fiberglass or Steel Anti-Floatation Flange and the Valve Vault is Integrally Wound Into The Wet Well Creating a Monolithic Structure. Capable to Withstand 150% of Anticipated Maximum Pressure Exerted by Saturated Soil (120 lbs./Cf).

Access Hatch Cover
Aluminum Cover with (2) Lockable Hinged Access Doors, Stainless Steel Hinges and Hardware, Rated for 300# PSF.

Guide Rail Assembly
- Two (2) Cast Iron Base Elbow Stationary Fittings, Bolted to Wet Well Floor with Stainless Steel Studs. Size Range From 1.25" (In.) – 6" (In.) Flanged Base Elbow Fittings.
- Two (2) Cast Iron Upper Guide Rail Brackets, Mounted on Wet Well Access Cover Frame.
- 1" or 2" 304 Stainless Steel Guide Rails.
- Two (2) Cast Iron Moveable Fittings, Mounted on Pump Discharges, Allow Pumps to be Removed Without Entering Wet Well.
- Two (2) 316 Stainless Steel Lifting Chain, Attached to Pump Lifting Handles.
- Includes Intermediate Guide Rail Brackets if Wet Well Depth is Greater Than 20' (Ft.) Deep.

Submersible Pumps
- **Submersible Grinder Pumps:** 1.25" – 3" Discharge, Range from 2 HP – 16 HP, 208-230/460 V, 1 Phase or 3 Phase.
- **Submersible Non-Clog Pumps:** 2" – 6" Discharge, Range from 1/2 HP – 30 HP, 208-230/460 V, 1 Phase or 3 Phase.
- **Submersible Chopper Pumps:** 2" – 6" Discharge, Range from 2 HP – 30 HP, 208-230/460 V, 3 Phase.

Discharge Piping
Socket or Flanged Pipe and Fittings, Ranging from 1.25" – 6.00" Diameter, Available in SCH 80 PVC, HDPE, Ductile Iron, or Stainless Steel.

Valve Options
- Ball Check Valves, Cast Iron Construction.
- Lever & Weight Swing Check Valves, Cast Iron Construction.
- Gate Valves, Bronze Construction.
- Plug Valves, Ductile Iron Construction.

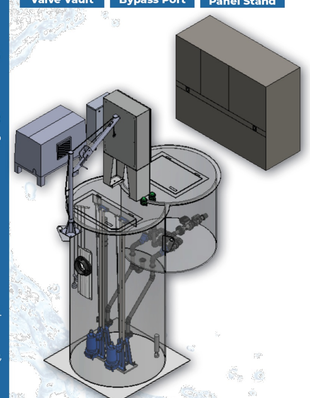
Electrical Controls
Duplex Control Panel, NEMA 4X Enclosure with Inner Door, HOA Switches, Run Lights, Alarm Lights, Seal Moisture Sensor and Motor Thermal Circuits, High Water Alarm Light and Audible Horn with Silence, Battery Operated Alarm Light, ETMs, Manual Transfer Switch and Generator Receptacle. 3 Phase or 1 Phase Options, 1 Phase Include Capacitor Packs.

Fiberglass Pump Station


Integrated Valve Vault


Discharge with Bypass Port


Stainless Steel Panel Stand



EXCEL FLUID GROUP, LLC

Fiberglass Integrated Pump Station: EX-FGIV

Revision #002 / Oct. 2021

Electrical Plugs/Receptacles
Electrical Pin and Sleeve Quick Disconnect Power Connections, Type 4X, Water and Gas Tight Design.

Emergency Bypass Connection
Aluminum Quick Disconnect Fitting with Aluminum Dust Cap includes Gate Valve and Pipe Fittings.

Level Controls
- Four (4) Float Switch Level Controls, Normally Open.
- Optional Pressure Transducer with Backup Float Switches.

Control Panel Stand
304 Stainless Steel Construction, Hinged Access Door with Lockable Hasps, Includes Stainless Steel Cable Hangers and Serves as Wet Well Vent and Junction Box.

Warranty
Two (2) Years from Date of Shipment, Covers Corrosion from Moisture, Soil, Septic Fluid and Gas, or Structural Failures Occurring In Normal Service, When Installed in Accordance With Manufacturer's Recommendations.

Options:

Crane
Steel Construction, 30 Ft of ¼" Stainless Steel Cable with Galvanized Safety Hook, Adjustable Boom, 120VAC Electric Winch with Remote Hand Held Pendulum and Manual Hand Crank, Rated for 800 Lbs.

Safety Grate
Aluminum "I" Bar Construction, Safety Orange Powder-Coated Finish, 316SS Hardware, Tamper Proof SS Hinge Bolts, 300# PSF Load Rated, With Lockable Capability.

Inlet Drop Bowl
Reliner Inside Drop System, Polyester Resin Drop Bowl with SCH80 PVC Drop Pipe, Includes Flexible External Sleeve.

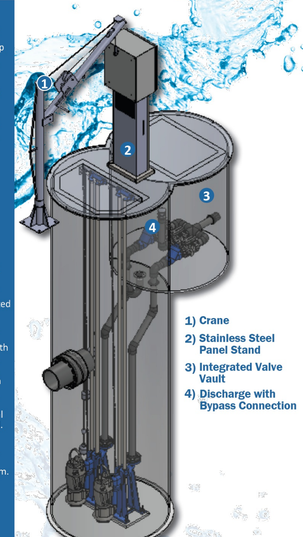
Trash Basket
Aluminum Construction, Perforated Screening Style, With Aluminum Guide Rail System and Stainless Steel Chain.

Manual Transfer Switch
Interlocked Main Double Circuit Breaker, Outdoor General Purpose, NEMA 4X, Stainless Steel Enclosure, UL98 Listed.

Generator Receptacle
Outdoor General Purpose, Load Rated

SCADA Compatibility
Ethernet Module for Control and Status to External System.

Flow Meter
Electromagnetic Flow Sensor, Carbon Steel Flanges, Ebonite Hard Rubber Liner, Hastelloy Electrode, Remote Transmitter with Display.



1) Crane
2) Stainless Steel Panel Stand
3) Integrated Valve Vault
4) Discharge with Bypass Connection



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THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: CIVIL NOTES AND DETAILS

DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025

DRAWING NO.: 566901-C-D-008-009
REV.: 00C

DRAWING SCALE: AS NOTED

FOR REFERENCE ONLY - FINAL LIFT STATION SYSTEM SELECTIONS TO BE PROVIDED BY EXCEL THROUGH MESSER

MIDDOUGH PROJ.#: MEU2510

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Material Specifications for Prefabricated Fiberglass Lift Stations

The manufacturer shall demonstrate the ability to fabricate the various lift station components, as shown in the plans and as specified herein, utilizing adequate number of skilled workmen, equipment, tools, facilities, and subcontractors.

Referenced Standards
2.2.3. ASTM D883 (Latest Revision): Definitions of Terms Relating to Plastics.
2.2.4. ASTM D3753 (Latest Revision): Standard Specification for Glass-Fiber-Reinforced Polyester Manholes.

Materials
Fiberglass Reinforced Polyester Wet Well (and Integral Valvebox): Unless otherwise indicated the plastic terminology used in this specification shall be in accordance with the definitions given in American Society for Testing and Materials (ASTM) designations D883 - Definitions of Terms Relating to Plastics.

Resins:
The resins used shall be a commercial grade polyester and shall be evaluated as a laminate by test or determined by previous service to be acceptable for the intended environment. The resins used may contain the minimum amount of fillers or additives required to improve handling properties. Up to 5% by weight of thixotropic agent, which will not interfere with visual inspection, may be added to the resin for viscosity control. Resins may contain pigments and dyes by agreement between manufacturer and engineer, recognizing that such additives may interfere with visual inspection of FRP laminate quality.

Reinforced Material:
The reinforcing material shall be a commercial grade of glass fiber (continuous strand, chopped strand, continuous mat and non-continuous mat) having a coupling agent, which will provide a suitable bond between the glass reinforcement material and resin.

Laminate Structure:
The FRP laminate shall consist of a resin rich inner surface: chop-spray interior liner; and, a chop hoop filament wound structural exterior layer.
Inner surface:
1) The resin rich inner surface shall be free of cracks and crazing with smooth finish and with an average of not over two (2) pits per square foot, providing the pits are less than 0.125 inches in diameter and 0.3125 inches in depth and are covered with sufficient resin to avoid exposure of any fiberglass reinforcement material. Some waviness shall be permissible as long as the surface is smooth. Between 0.01 to 0.02 inches of resin, rich surface shall be provided.
2) Chop-Spray Interior Liner: The interior liner shall be reinforced by 25 to 35% by weight of chopped strand glass fiber having fiber lengths from 0.5 to 2.0 inches. The chop-spray interior liner protects the chop-hoop filament-wound structural exterior liner from corrosion damage caused by "wicking" of the wet well liquid contents. A minimum of 0.100 inches of chop-spray interior liner shall be provided.
3) Chop-Hoop Filament-Wound Structural Exterior Layer:
   a. The structural reinforcement of the wet well shall be by the chop-hoop filament-wound manufacturing method only. The axial reinforcement shall be continuous-strand glass fiber. The longitudinal reinforcement shall be chopped-strand glass fiber. The glass fiber reinforcement content of the chop-hoop filament wound structural exterior layer shall be 50 to 80% by weight. The exterior surface of the wet well shall be relatively smooth with no exposed reinforcement fibers or sharp projections. Hand finish work is permissible to prevent reinforcement fiber exposure. The wall thickness of the chop-hoop filament-wound structural exterior layer shall vary with the wet well height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements.

Physical Properties:
Wet Well FRP Wall Laminate: The wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on the following assumptions and third party specifications:
1) Hydrostatic Pressure of 62.4 lbs. per square foot
2) Saturated soil weight of 120 lbs. per cubic foot
3) Soil Modulus of 700 pounds per square foot
4) Pipe stiffness values as specified in ASTM D3753.
The wet well FRP laminate must be constructed to withstand or exceed two times the assumed loading on any depth of the wet well.

Wet Well FRP Bottom Laminate:
The wet well FRP bottom laminate shall have less than 0.375 inches of center elastic deflection (deformation) when in service in totally submerged conditions.

FRP Laminate Surface Hardness:
The finished FRP laminate will have a Barcol Hardness of at least 90% of the resin manufacturer's specified hardness for the fully cured resin. The Barcol Hardness shall be the same for both interior and exterior surfaces.

Wet Well Top Flange:
1) The wet well top flange shall have an outside diameter at least 4.0 inches greater than the inside diameter of the well.
2) A six-hole pattern shall accommodate the mounting of a cover with at least 0.375 inches in diameter 300 series stainless steel fasteners. Non-corroding stainless steel threaded inserts shall be fully encapsulated with noncontinuous mat or chopped-strand glass fiber reinforcement. The inserts shall have an offset tab to prevent stripping or spinning out when removing and reinserting cover fasteners.

Steel Anti-Floatation Flange:
The steel anti-floatation flange shall be constructed from 0.1875 inches thick ASTM A36 structural steel plate, encapsulated in at least 0.125 inches of chopped-strand glass fiber reinforcement on all sides. The steel antifloatation flange shall be square with outside dimensions of at least 4.0 inches greater than the wet well inside diameter. The steel anti-floatation flange shall be attached to the wet well bottom with chopped-strand glass fiber reinforcement. Contractor shall place the wet well on a concrete pad and fill with grout covering the entire steel anti-floatation flange. The amount of grout shall be sufficient to prevent floatation of the wet well based on the jobsite conditions. The steel anti-floatation flange shall not require bolt holes to secure it to the concrete pad.

Solid Fiberglass Cover:
The solid fiberglass cover shall be constructed with continuous mat or chopped-strand glass fiber reinforcement with a minimum thickness of 0.325 inches. The cover shall be grass green in color. The cover shall be mounted to the wet well with six 300 series stainless steel fasteners of at least 0.375 inches in diameter.

Corporate Headquarters
Mailing/Remit-to Address
15950 Commerce Park Dr.
Brook Park, OH 44142

Excel Fluid Group, LLC
216.941.1500 phone
216.941.9916 fax
www.excelfluidgroup.com
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Operations Facility
Shipping & Receiving
15939 Industrial Parkway
Cleveland, OH 44135

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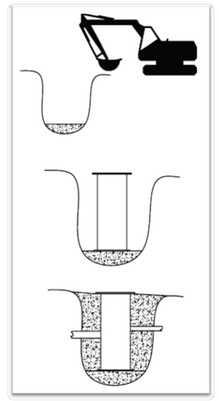
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Installation

INSTALLATION FOR EXCEL FIBERGLASS BASINS

1. *Inspect all parts for material supplied by Excel Fluid Group to assure no shipping damage. Remove shipping nuts from cover bolts if present.*
2. *Excavating hole large enough to accommodate basin, backfill and all piping.*
3. *Add 4" to 6" of backfill material or concrete to bottom of hole, insure it is level, compacted and smooth.*
4. *Install basin in hole making sure it is level. Anchor if necessary to concrete pad.*
5. *If buoyancy is a problem, ballast in the form of concrete may be poured, or concrete collars lowered on top of the anti-floatation collar.*
6. *Carefully backfill with naturally rounded gravel or stone, larger than 3/8" and smaller than 3/4" diameter, around periphery of the basin.*
7. *Connect all piping as their level is reached with backfill.*



Technology | Innovation | Solutions

EXCEL FLUID GROUP LLC

Email: carl.wootten@excelfluidgroup.com

Project Location: Bryan TX

Project Name: Q24381 MEU2510 ASU

Phone: 12162849504

Comments: Lift Station for Industrial WW and Process Condensate WW

Flow

Average Flow To Station	22.05 gal/min
Peak Factor	4
Pump Capacity	88.2 gal/min

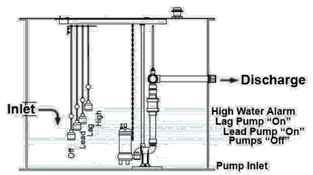
System Option: duplex

Wet Well Design

Well Diameter	60 in
Gallons Per Vertical Foot	146.88 gal/ft
Pump Starts	8
Pump Cycle Time	7.5 min
Design Working Volume	165.37 gal
Emergency Depth	0.75 ft
Emergency Volume	110.25 gal
Lowest Inlet Depth Below Grade	9.16 ft
Wet Well Depth Required	15 ft

Elevations (ft (Above Sea Level))

Top of Wet Well	366.62 ft
Inlet Invert	357.46 ft
Discharge	363.25 ft
High Water Float Alarm	356.2 ft
Lag Pump Float	355.74 ft
Lead Pump Float	355.24 ft
Pumps Off Float	354.12 ft
Wet Well Floor	351.62 ft



System

Force Main Key Info

Material	Schedule 80 PVC
C-Factor	130
Diameter	3.78 in
Retention Time	19.09 min
Total Friction Loss	22.85
Flow Velocity	2.51 ft/s
Static Elevation High (Above Sea)	364.25 ft
Static Elevation Low (Above Sea)	354.25 ft
Length	2880 ft

Force Main Fittings

Fitting	Equivalent Length	Quantity	Total Equivalent Length	C-Factor
Regular 90 Elbow	10.1	5	50.5	130

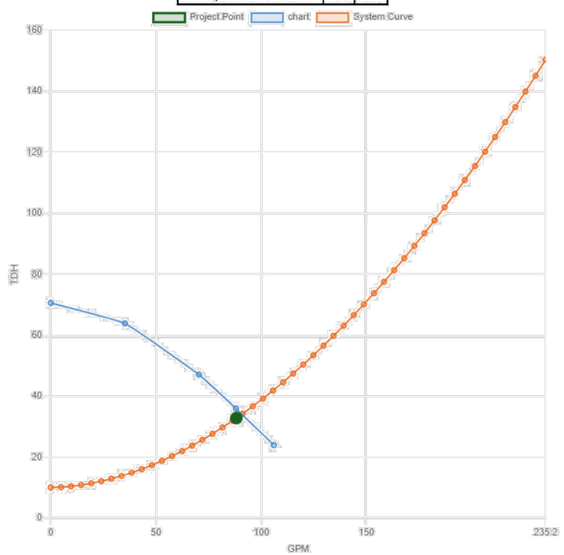
Standard Pipe Tree

Diameter	Fitting	Equivalent Length	Quantity	Total Equivalent Length	C-Factor
4	Regular 90 Elbow	10.1	2	20.2	130
4	45 Degree Elbow	5.4	2	10.8	130
4	Tee (Branch Flow)	20.1	1	20.1	130
4	Plug Valve	6.1	1	6.1	130
4	Check Valve	33.6	1	33.6	130
Total					90.8 ft

Project Design Point

Barnes XGV 3HP Grinder Pump

	GPM	TDH
Project Design Point	88.2	32.85
Shutoff Head	N/a	70.6
Minimum Pump Flow	35.2	63.9
Optional Point 1	70.4	47.1
Best Efficiency Point (BEP)	88	36
Optional Point 2	106	24



FOR REFERENCE ONLY - FINAL LIFT STATION SYSTEM SELECTIONS TO BE PROVIDED BY EXCEL THROUGH MESSER

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHAEL KRATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00A	04/17/26	ISSUED FOR PERMIT

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 04/17/2026
DRAWING NO.: 566901-C-D-008-010
REV.: 00A
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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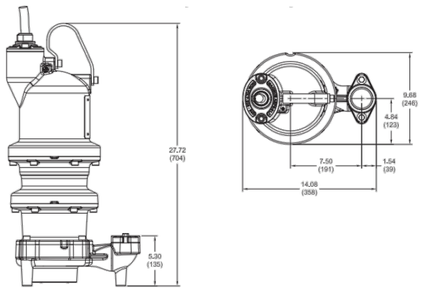
CRANE PUMPS & SYSTEMS

BARNES®

XGV – 3 HP



Drawing



All dimensions are in inches (mm)

1.) MOISTURE AND TEMPERATURE SENSORS MUST BE CONNECTED TO VALIDATE THE CSA LISTING.

2.) A SPECIAL MOISTURE SENSOR RELAY IS REQUIRED IN THE CONTROL PANEL FOR PROPER OPERATION OF THE MOISTURE SENSORS. CONTACT BARNES PUMPS FOR INFORMATION CONCERNING MOISTURE SENSING RELAYS FOR CUSTOMER SUPPLIED CONTROL PANELS.

3.) THESE PUMPS ARE CSA LISTED FOR PUMPING WATER AND WASTEWATER. DO NOT USE TO PUMP FLAMMABLE LIQUIDS. NOT SUITABLE FOR ENVIRONMENTS CONTAINING GASOLINE OR HEXANE.

4.) INSTALLATIONS SUCH AS DECORATIVE FOUNTAINS OR WATER FEATURES PROVIDED FOR VISUAL ENJOYMENT MUST BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE ANSI/NFPA 70 AND/OR THE AUTHORITY HAVING JURISDICTION. THIS PUMP IS NOT INTENDED FOR USE IN SWIMMING POOLS, RECREATIONAL WATER PARKS, OR INSTALLATIONS IN WHICH HUMAN CONTACT WITH PUMPED MEDIA IS A COMMON OCCURRENCE.

5.) A NON-SPARKING BREAKAWAY FITTING MUST BE USED TO VALIDATE THE EXPLOSION PROOF LISTING.

Specifications

DISCHARGE:	Vertical 2" NPT
LIQUID TEMPERATURE:	104°F (40°C) Continuous
VOLUTE:	Cast iron ASTM A-48, class 30
MOTOR HOUSING:	Cast iron ASTM A-48, class 30
SEAL PLATE:	Cast iron ASTM A-48, class 30
IMPELLER:	**Design:** 12 Vane vortex, with pump out vanes on back side. Dynamically balanced, ISO G6.3 **Material:** Cast iron ASTM A-48, class 30
SHREDDING RING:	Hardened 440C stainless steel, Rockwell® C-55
CUTTER:	Hardened 440C Stainless Steel, Rockwell® C-55
SHAFT:	416 Stainless steel
SQUARE RINGS:	Buna-N
HARDWARE:	300 Series stainless steel
PAINT:	Axalta™ Corlar® Epoxy, two coats
SEAL:	**Design:** Tandem mechanical, oil filled reservoir **Material:** • Rotating faces: Carbon • Stationary faces: Ceramic • Elastomer: Buna-N • Hardware: 300 Series stainless **Hardware:** 300 Series Stainless
CORD ENTRY:	Custom molded, quick connected for sealing and strain relief
POWER CORD:	CSA certified submersible power cable 2000V - ordered separately
UPPER BEARING:	**Design:** Single row, ball **Lubrication:** Oil **Load:** Radial
LOWER BEARING:	**Design:** Double row, ball **Lubrication:** Oil **Load:** Radial & thrust
MOTOR:	**Design:** • NEMA B • Three phase torque curve • Oil-filled squirrel cage induction • Inverter duty rated per NEMA MG1 **Insulation:** Class H varnish & magnet wire
SINGLE PHASE:	Requires overload protection to be included in control panel. Requires start components to be included in panel. Provided with pump
THREE PHASE:	Requires overload protection to be included in control panel
MOISTURE SENSORS:	Normally open (N/O), Requires relay in control panel
TEMPERATURE SENSOR:	Normally closed (N/C) To be wired in series with control circuit

Product Resources

Engineering Specification

I&O Manual

STEALTH Control Panel	Intermediate Rail Supports for Vertical Break Away Fitting
C-Channel Guide Rail System	Lifting Rope
Pump Monitor Relay	Lifting Chain
Vertical Break Away Fittings	Lifting Cable
C-Channel Moveable Fitting	Leg Kit

Station Drawings

Marketing Resources

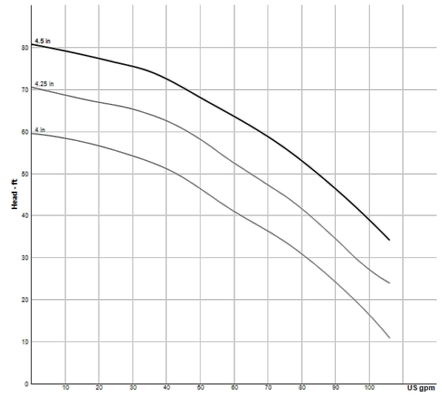
Sales Sheet

Brochure

Videos

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Curve



Pump HP	Impeller dia in. (mm)
7.5	6.25 (159)
5	5.25 (133)
3	4.50 (114)

Pump Data Sheet - Crane Barnes.60

Company: Excel Fluid Group
Name: Carl Wootten
Date: 04/10/2026

Q24381 MEU2510 ASU
Middough IWWPS

BARNES®

Pump:

Size:	XGV30*2 / XGVH30*2	Dimensions:	
Type:	Grinder XP - 3C	Suction:	---
Synch Speed:	3600 rpm	Discharge:	2 in
Dia:	4.25 in		
Curve:	---		

Fluid:

Name:	Water		
SG:	1	Vapor Pressure:	0.256 psi a
Density:	62.4 lb/ft³	Atm Pressure:	14.7 psi a
Viscosity:	1.1 cP		
Temperature:	60 °F	Margin Ratio:	1

Search Criteria:

Flow:	88 US gpm	Near Miss:	---
Head:	32 ft	Static Head:	10 ft

Pump Limits:

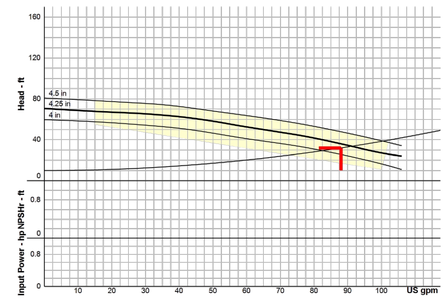
Temperature:	104 °F	Sphere Size:	---
Wkg Pressure:	---		

Motor:

Motor is integral to the pump except in 4A, 4B, and 5B catalog sections.

Pump Selection Warnings:
None

--- Duty Point ---	
Flow:	91.2 US gpm
Head:	33.6 ft
Eff:	---
Power:	--- hp
NPSHr:	---
Speed:	3450 rpm
--- Design Curve ---	
Shutoff Head:	70.6 ft
Shutoff dP:	30.6 psi
Min Flow:	--- US gpm
BEP:	--- %
NOL Power:	---
--- Max Curve ---	
Max Power:	---



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
106	3450	24	---	---	---
88	3450	36	---	---	---
70.4	3450	47.1	---	---	---
52.8	3450	56.6	---	---	---
35.2	3450	63.9	---	---	---

Selected from catalog: Barnes.60, Vers 4/23/20

Model Information

MODEL NUMBER - VOLTAGE	XGV3072 - 208	XGV3072 - 230	XGV30N2 - 208	XGV30N2 - 230	XGV30N2 - 460	XGV3062 - 575
EXPLOSION PROOF, CLASS 1, DIV 1, GROUPS C & D	T4	T4	T4	T4	T4	T4
PART NUMBER	141339	141339	141340	141340	141340	141342
HP	3	3	3	3	3	3
VOLTAGE	208	230	208	230	460	575
PHASE	1	1	3	3	3	3
HZ	60	60	60	60	60	60
RPM (NOMINAL)	3450	3450	3450	3450	3450	3450
NEMA START CODE	J	M	P	P	P	P
FULL LOAD AMPS	25.0	23.2	12.1	12.6	6.3	5.0
SERVICE FACTOR	1	1	1	1	1	1
LOCKED ROTOR AMPS	113.2	131.2	85.4	95.2	47.6	38.1
DRIVER FRAME	18	18	18	18	18	18
CORD PART NUMBER ▲	125496	125496	125496	125496	125497	125497
CORD SIZE	12/4 - 18/4	12/4 - 18/4	12/4 - 18/4	12/4 - 18/4	12/4 - 18/4	12/4 - 18/4
CORD O.D.	0.86 ± 0.02	0.86 ± 0.02	0.86 ± 0.02	0.86 ± 0.02	0.86 ± 0.02	0.86 ± 0.02

MOISTURE AND TEMPERATURE SENSOR LEADS ARE INTEGRAL TO POWER CORD. PUMP RATED FOR OPERATION AT ± 10% VOLTAGE AT MOTOR. ▲ CORD SUFFIX: XC - 30 FEET, XF - 50 FEET, XJ - 75 FEET, OR XL - 100 FEET. ▲ CORD SOLD SEPARATELY. SINGLE PHASE PUMPS REQUIRE START COMPONENTS TO BE INCLUDED IN PANEL. PROVIDED WITH PUMP.

FOR REFERENCE ONLY - FINAL LIFT STATION SYSTEM SELECTIONS TO BE PROVIDED BY EXCEL THROUGH MESSER

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00A	04/17/26	ISSUED FOR PERMIT

MESSER Gases for Life

middough PROJECT SOLUTIONS
FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: CIVIL NOTES AND DETAILS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		04/17/2026

DRAWING NO.: 566901-C-D-008-011
REV.: 00A

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

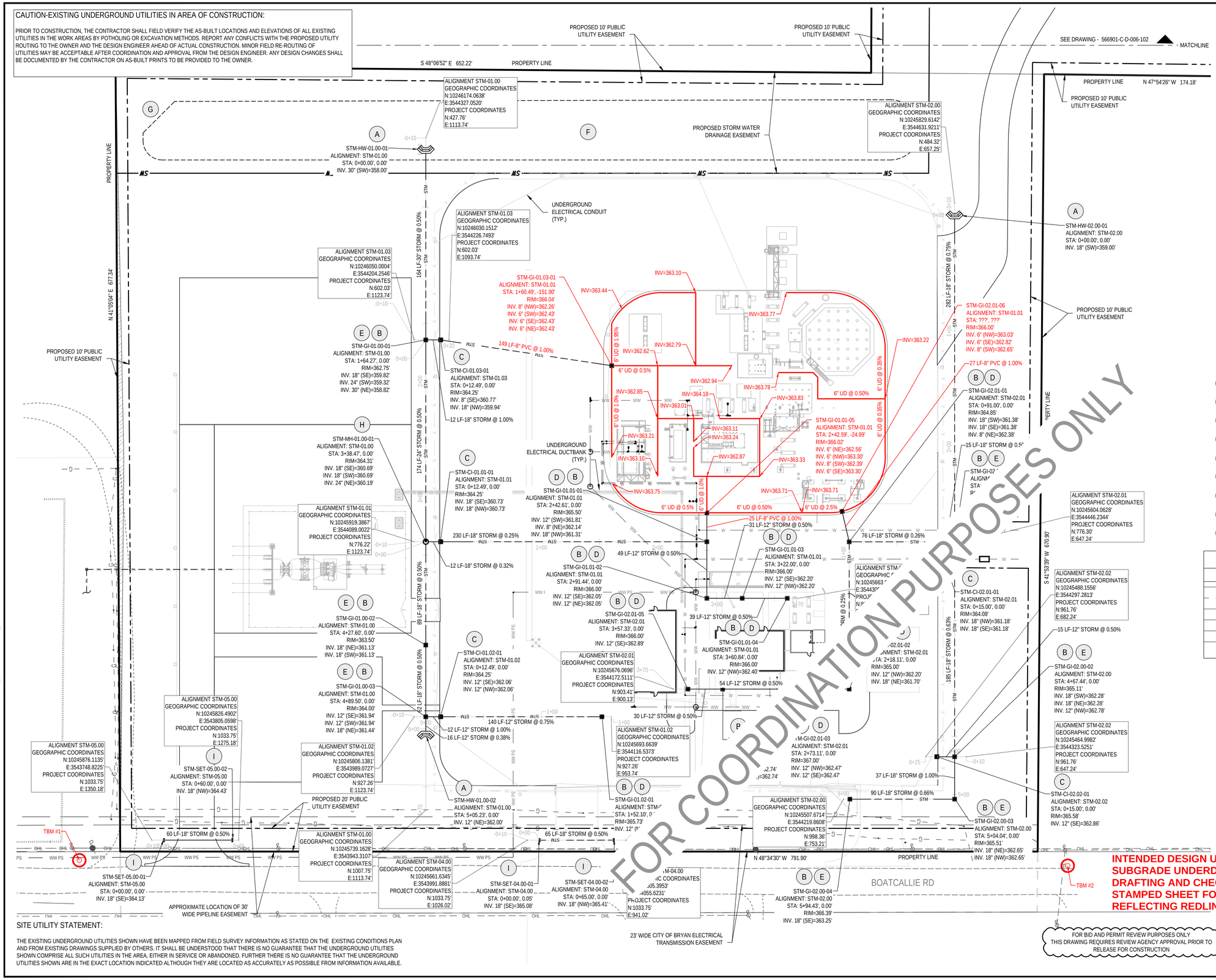
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Attachment C

Site Improvement Package Drawings for Coordination

CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO THE OWNER.



UNDERGROUND STORM SEWER NOTES:

1. THE CIVIL SITE IMPROVEMENT DRAWING PACKAGE DOES NOT CONVEY THE ENTIRE CIVIL WORK SCOPE FOR THE FACILITY. COORDINATE WORK AS SHOWN ON THE DRAWINGS (INCLUDING INTERFACING ELEMENTS) WITH OTHER PROJECT DRAWINGS.
2. WORK THIS DRAWING WITH STORM PROFILES DRAWINGS 566901-C-D-006-103 THROUGH 566901-C-D-006-104.
3. CORRUGATED-PE PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED FOR STORM SEWER PIPING IN THE PUBLIC UTILITY EASEMENTS AND ON PRIVATE PROPERTY WITHIN THE PROJECT SITE LIMITS.
4. PVC PIPE AND FITTINGS PER MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE SHALL BE USED ACCORDING TO THE APPLICABLE DETAILS ASSOCIATED WITH THE PRIVATE STORM SEWER SYSTEM.
5. STORM SEWER STRUCTURES SHALL CONFORM TO MIDDOUGH SPECIFICATION 566901-C-S-334200-001, STORMWATER CONVEYANCE AND CIVIL NOTES AND DETAILS.
6. THE CONTRACTOR SHALL ENSURE THAT ALL MANUFACTURERS REQUIREMENTS OF THE PIPING SYSTEM ARE MET, INCLUDING BUT NOT LIMITED TO; HANDLING, HAULING, TRENCH CONDITIONS AND INSTALLATION.
7. THE CONTRACTOR SHALL SEEK ACCEPTANCE OF THE WORK FROM THE OWNER OR THEIR DULY AUTHORIZED REPRESENTATIVE, OR THE AUTHORITY HAVING JURISDICTION AS APPROPRIATE.

REFERENCES:

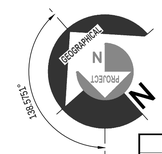
1. REFERENCE APPLICABLE SPECIFICATION FOR ALL WORK UNDER THIS INSTALLATION. SEE SPECIFICATIONS INDEX ON CIVIL COVER SHEET DRAWING, 566901-C-D-001-001.
2. REFERENCE DRAWING 566901-C-D-002-001 FOR THE INFORMATION RELATED TO COORDINATES AND DATUM INFORMATION INCLUDING REFERENCE POINTS, CONTROL POINTS, AND BENCHMARKS.
3. REFERENCE THE SITE PLANS, 566901-C-D-004 SERIES DRAWINGS.
4. REFERENCE THE GRADING PLANS, 566901-C-D-005 SERIES DRAWINGS.
5. REFERENCE THE UNDERGROUND UTILITY PLANS, 566901-C-D-006 SERIES DRAWINGS.
6. REFERENCE THE CIVIL NOTES AND DETAILS, 566901-C-D-008 SERIES DRAWINGS.
7. REFERENCE THE STORMWATER POLLUTION PREVENTION PLANS, 566901- C-D-009 SERIES DRAWINGS.
8. REFERENCE STRUCTURAL DRAWINGS FOR THE TOP OF EQUIPMENT PAD ELEVATIONS.
9. REFERENCE THE GEOTECHNICAL REPORT FOR ALL WORK UNDER THIS PROJECT.

UNDERGROUND UTILITY PLAN KEYED NOTES:

- (A) INSTALL CONCRETE HEADWALL & ENDWALL WITH WINGS.
- (B) INSTALL GRATE INLET.
- (C) INSTALL SINGLE RECESSED CURB INLET.
- (D) INSTALL HS20 FLAT GRATE, NEENAH R-4859-C OR EQUAL.
- (E) INSTALL BEEHIVE GRATE NEENAH R-4347 (SQUARE) OR EQUAL.
- (F) PROPOSED STORMWATER MANAGEMENT BASIN.
- (G) PROPOSED STORMWATER MANAGEMENT BASIN OUTFALL -001.
- (H) INSTALL STORM MANHOLE.
- (I) INSTALL SAFETY END TREATMENT STRUCTURE.

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION	PROPOSED
W	WATER	W W W
G	NATURAL GAS	NG NG NG
	STORM SEWER	STM
OHL	AERIAL POWER/COMMUNICATION	OHL OHL OHL
WW WW WW	WASTEWATER SEWER	WW WW WW
WW PS WW PS	WASTEWATER PRESSURE SEWER	WW PS WW PS
	UNDERDRAIN ENVELOPE	



0 20 40 80
SCALE (IN FEET)
1 inch = 40 ft.

FOR COORDINATION PURPOSES ONLY

INTENDED DESIGN UPDATE TO SUBGRADE UNDERDRAIN. FORMAL DRAFTING AND CHECKING IN PROGRESS. STAMPED SHEET FOR PERMIT REFLECTING REDLINES FORTHCOMING.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

SITE UTILITY STATEMENT:

THE EXISTING UNDERGROUND UTILITIES SHOWN HAVE BEEN MAPPED FROM FIELD SURVEY INFORMATION AS STATED ON THE EXISTING CONDITIONS PLAN AND FROM EXISTING DRAWINGS SUPPLIED BY OTHERS. IT SHALL BE UNDERSTOOD THAT THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE.

NO.	DATE	REVISIONS
		PROGRESS PRINT - FOR COORDINATION PURPOSES
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ.#: 566901
PROJECT: BRYAN ASU
DESCRIPTION: UNDERGROUND UTILITY PLAN STORM SEWER GEOGRAPHICAL SOUTH AREA

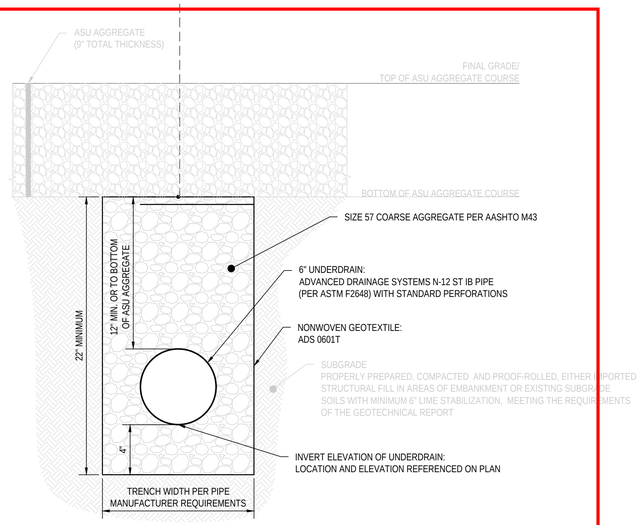
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-006-101
REV.: 00C
DRAWING SCALE: AS NOTED

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MIDDOUGH PROJ.#: MEU2510

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UNDERDRAIN ENVELOPE SECTION

SCALE: N.T.S.

INTENDED DESIGN UPDATE TO SUBGRADE UNDERDRAIN. FORMAL DRAFTING AND CHECKING IN PROGRESS. STAMPED SHEET FOR PERMIT REFLECTING REDLINES FORTHCOMING.

Drainage Filtration Separation

ADS 0601T NONWOVEN GEOTEXTILE SPECIFICATION

Scope

This specification describes ADS 0601T (6.0 oz) nonwoven geotextile.

Filter Fabric Requirements

ADS 0601T (6.0 oz) is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. ADS 0601T (6.0 oz) resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. ADS 0601T (6.0 oz) conforms to the physical property values listed below:

Filter Fabric Properties

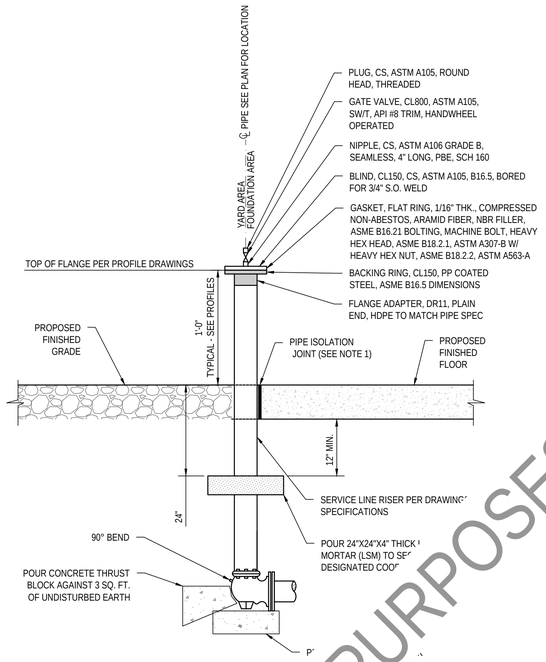
Property	Test Method	Unit	M.A.R.V. (Minimum Average Roll Value)
Grab Tensile	ASTM D4632	lbs (kN)	160 (0.711)
Grab Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (kN)	60 (0.267)
CBR Puncture Resistance	ASTM D6241	lbs (kN)	410 (1.82)
Permittivity*	ASTM D4491	sec^{-1}	1.5
Water Flow*	ASTM D4491	gpm/ft^2 ($l/min/m^2$)	110 (4480)
AOS*	ASTM D4751	US Sieve (mm)	70 (0.212)
Melting Point	ASTM D276	Fahrenheit (Celsius)	320 (160)
UV Resistance	ASTM D4355	%/hrs	70/500

Packaging

Roll Dimensions (W x L) - ft. (m)	3.0/5.0/6.25/7.5/9.0/12.5 x 360 -15 x 300 (0.9/1.5/1.9/2.3/2.7/3.8 x 110 - 4.5 x 91)
Roll Square Yards (Square Meters)	120/200/250/300/360/500 - 500 (100/167/209/251/301/418 - 418)
Estimated Roll Weight - lbs (kg)	44/65/97.5/102/141/195 - 195 (20/29/44/46/64/88 - 88)

* At the time of manufacturing. Handling may change these properties.

ADS "Terms and Conditions of Sale" can be found on the ADS website, adspipe.com.
The ADS logo is a registered trademark of Advanced Drainage Systems, Inc. #0601T 10/22 MH

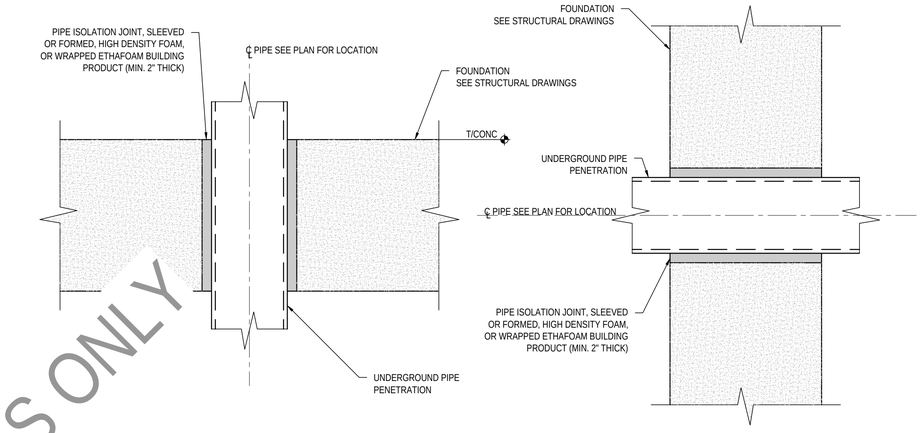


NOTES:

1. REFERENCE UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL.
2. COORDINATE UTILITY CONSTRUCTION IN CONFORMANCE WITH GEOTECHNICAL ENGINEER REQUIREMENTS AND STRUCTURAL DRAWINGS FOR ALL UTILITY WORK AND BACKFILL REQUIREMENTS IN FOUNDATION AREAS.
3. SEE THE APPROPRIATE UTILITY SPECIFICATION FOR THE AUTHORITY FOR TESTING, FLUSHING AND CLEANING PROCEDURES.
4. SEE OWNER SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS OF UTILITY AT THE RISER LOCATION.

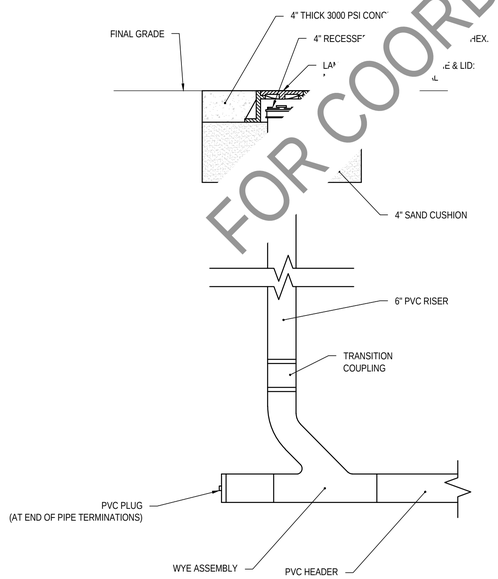
WATER RISER DETAIL

SCALE: N.T.S.



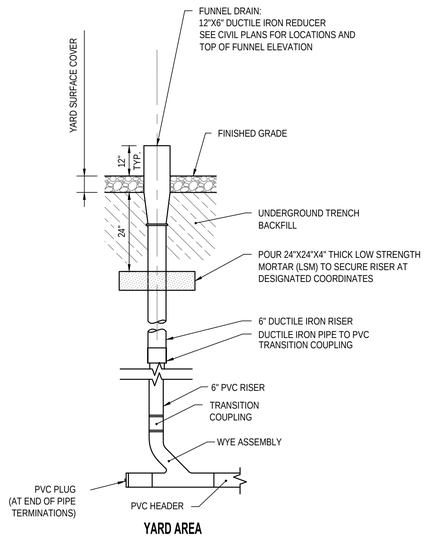
UNDERGROUND PIPE PENETRATION AT STRUCTURAL ELEMENT DETAIL

SCALE: N.T.S.



CLEANOUT ASSEMBLY DETAIL

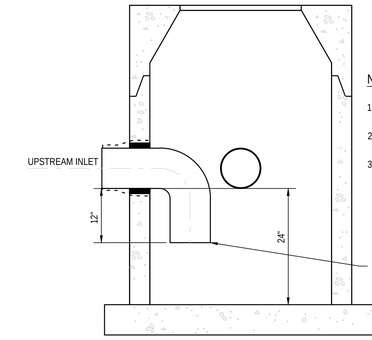
SCALE: N.T.S.



YARD AREA

FUNNEL DRAIN ASSEMBLY DETAIL

SCALE: N.T.S.

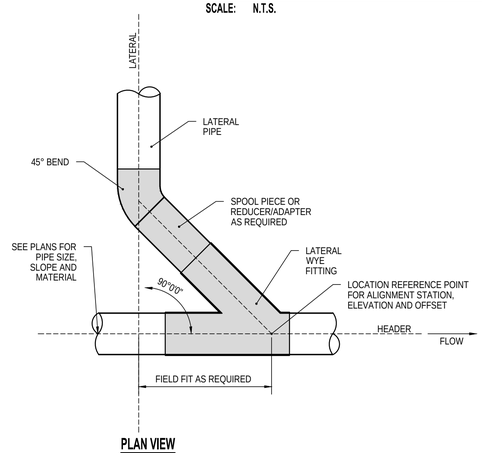


NOTES:

1. SEE PLANS FOR APPLICABLE LOCATIONS.
2. SEE MANHOLE DETAIL FOR MANHOLE CONSTRUCTION.
3. RESILIENT CONNECTOR AT EACH INLET AND OUTLET CONNECTION.

PIPE TURNDOWN AT MANHOLE DETAIL

SCALE: N.T.S.



PLAN VIEW

WYE ASSEMBLY DETAIL

SCALE: N.T.S.

FOR COORDINATION PURPOSES ONLY

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

PROGRESS PRINT - FOR COORDINATION PURPOSES

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: CIVIL NOTES AND DETAILS
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 10/17/2025
DRAWING NO.: 566901-C-D-008-005
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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Attachment D

Stormwater Pollution Prevention Plans

APPLICANT/COMPANY NAME:
MESSER LLC

APPLICANT/MAILING ADDRESS:
200 SOMERSET CORPORATE BLVD. SUITE 7000
BRIDGEWATER, NJ 08807

APPLICANT/CONTACT PERSON:
NAME: ALEJANDRO (ALEX) GOMEZ APONTE
PHONE NUMBER: +1 (346) 213-9313
EMAIL ADDRESS: ALEX.GOMEZ@MESSER-US.COM

RATIONALE STATEMENT:
THE PROJECT INVOLVES LAND DISTURBANCE THAT WILL EXPOSE SOILS CAUSING POTENTIAL SEDIMENT AND EROSION ON SITE AND TO NEARBY WATER BODIES. IN ORDER TO HELP MITIGATE THESE CONDITIONS, A STORM WATER POLLUTION PREVENTION PLAN (SWP3/SWPPP) HAS BEEN DEVELOPED BASED ON THE DESIGNERS SELECTION OF THE MOST APPLICABLE BEST MANAGEMENT PRACTICES (BMP'S). THE BMP'S SELECTED FOR THE PROJECT WERE CHOSEN BECAUSE THEY WERE DETERMINED TO EFFECTIVELY MANAGE EROSION & SEDIMENT CONTROL FOR THIS PROJECT BASED ON THE ANTICIPATED WORK AND SPECIFIC SITE CONDITIONS (INCLUDING SOIL CONDITIONS, TOPOGRAPHIC CONSTRAINTS, ACCESSIBILITY TO THE SITE AND OTHER RELATED CONDITIONS). AS THE PROJECT PROGRESSES, AND IF THERE IS A NEED TO REVISE THE SWP3, AN AMENDMENT WILL BE PROVIDED BY THE QUALIFIED SITE INSPECTOR.

NARRATIVE DESCRIPTIONS

EXISTING SITE CONDITIONS:
THE EXISTING SITE AREA CONSISTS OF IDLE LANDS COVERED BY BRUSH-WEEDS-GRASS MIXTURE IN FAIR/POOR CONDITION. THE WORK AREA SLOPES ARE MILD. SURFACE WATER SHEET DRAINS OFF THE PROJECT SITE.

DEVELOPED SITE CONDITIONS:
THE DEVELOPED SITE WILL CONSIST OF A GAS PRODUCING FACILITY WITH ASSOCIATED BUILDING, EQUIPMENT AND INFRASTRUCTURE. THESE ELEMENTS WILL ALL BE CONSTRUCTED ON CONCRETE FOUNDATIONS. SURFACES NOT COVERED BY BUILDINGS OR STRUCTURES WILL EITHER BE PAVED, AGGREGATE COVERED, LAWN OR STORMWATER MANAGEMENT BASIN FEATURES.

NATURE OF CONSTRUCTION ACTIVITY & ESTIMATED TIME TABLE:
* CIVIL/SITEWORK:.....07/01/2026 to 12/11/2026
* U/G UTILITY CONSTRUCTION:.....09/01/2026 to 12/11/2026
* PLANT/EQUIPMENT.....11/27/2026 to 06/24/2027
* FINAL STABILIZATION:.....07/01/2027 to 11/30/2027

SEDIMENT MANAGEMENT:
THE SITE WILL BE MASS GRADED TO ACHIEVE DESIGN ELEVATIONS. ALL SURFACE WATER RUNOFF FROM THE DISTURBED AREA WILL BE DIRECTED TO A SEDIMENT CAPTURE BEST MANAGEMENT PRACTICE (BMP) PRIOR TO DISCHARGE. EXCAVATIONS WILL BE MADE FOR UTILITIES AND STRUCTURAL FOUNDATIONS. SEDIMENT BAGS SHALL BE USED AS A BMP TO TREAT PUMPED WATER DISCHARGE CONTAINING SEDIMENT.

DUTY TO INFORM:
NPDES AND SURFACE WATER POLLUTION PREVENTION PLAN
CONTRACTORS AND SUBCONTRACTORS RESPONSIBLE FOR ANY EARTH DISTURBING ACTIVITY HAVE THE DUTY TO INFORM CONTRACTORS AND SUBCONTRACTORS

TEMPORARY EROSION AND SEDIMENT CONTROL IMPLEMENTATION SCHEDULE - NARRATIVE:

IN ORDER TO HELP MITIGATE EROSION AND SEDIMENT CONTROL ISSUES, THE CONTRACTOR SHALL IMPLEMENT THE EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES AS SHOWN ON THESE PLANS IN ACCORDANCE WITH THE TEMPORARY EROSION AND SEDIMENT CONTROL IMPLEMENTATION SCHEDULE. THE CONTRACTOR SHALL MODIFY THE ESTIMATED TIME FRAMES BASED ON FUTURE SCHEDULING.

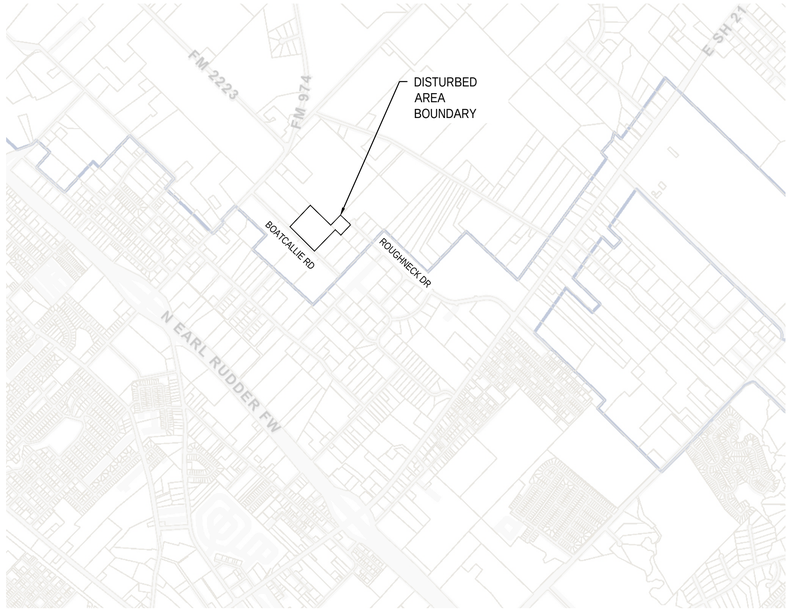
TEMPORARY EROSION AND SEDIMENT CONTROL IMPLEMENTATION SCHEDULE	
CONSTRUCTION ACTIVITY	ESTIMATED DATES
CONDUCT PRE-CONSTRUCTION MEETING.	07/01/2026
PROVIDE TEMPORARY SANITARY FACILITIES AND DUMPSTERS.	07/01/2026 TO 07/03/2026
INSTALL CONSTRUCTION ENTRANCE AND PERIMETER SEDIMENT CONTROL BMP'S. MOBILIZE ONLY THE EQUIPMENT NEEDED FOR THESE BMP'S.	07/02/2026 TO 07/10/2026
PERFORM GRADING ACTIVITIES AND UTILITY/FOUNDATION EXCAVATIONS. UTILIZE DUST CONTROL AND APPLY TEMPORARY SOIL STABILIZATION AS NEEDED.	07/06/2026 TO 06/24/2027
PERFORM PERMANENT STABILIZATION UPON FINAL GRADING IN UNPAVED AREAS.	07/01/2027 TO 11/30/2027
REMOVE TEMPORARY EROSION CONTROL MEASURES AFTER SITE ACHEIVES "FINAL STABILIZATION".	12/01/2027 TO 12/15/2027

STORMWATER POLLUTION PREVENTION PLANS FOR

MESSER
AIR SEPARATION UNIT
BRYAN ASU

1096 BOATCALLIE ROAD
BRYAN, TEXAS 77808

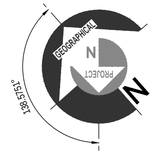
PROJECT DATA	
TOTAL SITE AREA (ACRES)	14.73
DISTURBED AREA (ACRES)	11.31
VOLUMETRIC RUNOFF COEFFICIENT (Rv) FOR PRE-CONSTRUCTION SITE	0.05
VOLUMETRIC RUNOFF COEFFICIENT (Rv) FOR POST-CONSTRUCTION SITE	0.44
IMPERVIOUS AREA FOR PRE-CONSTRUCTION SITE (ACRES)	0.00
IMPERVIOUS AREA FOR POST CONSTRUCTION SITE (ACRES)	6.37
APPROXIMATE LATITUDE OF CENTER OF PROJECT	30.714429°
APPROXIMATE LONGITUDE OF CENTER OF PROJECT	-96.362163°
IMMEDIATE RECEIVING WATER	TRIBUTARY TO CARTERS CREEK



LOCATION MAP
(N.T.S.)
LATITUDE: 30.714429°
LONGITUDE: -96.362163°

CONTACT INFORMATION				
	SWP3 CONTACT	EMERGENCY 24-HOUR CONTACT	FACILITY CONTACT	SITE SUPERVISOR
CONTACT	T.B.D.	T.B.D.	T.B.D.	T.B.D.
COMPANY	T.B.D.	T.B.D.	T.B.D.	T.B.D.
ADDRESS	T.B.D.	T.B.D.	T.B.D.	T.B.D.
PHONE NUMBER	T.B.D.	T.B.D.	T.B.D.	T.B.D.

SHEET INDEX	
STORMWATER POLLUTION PREVENTION PLANS	
DRAWING TITLE	DRAWING NUMBER
STORMWATER POLLUTION PREVENTION PLAN - COVER SHEET	566901-C-D-009-001
STORMWATER POLLUTION PREVENTION PLAN - SITE PLAN - PHASE A	566901-C-D-009-002
STORMWATER POLLUTION PREVENTION PLAN - SITE PLAN - PHASE B	566901-C-D-009-003
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-004
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-005
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-006
STORMWATER POLLUTION PREVENTION PLAN - DETAILS AND SPECIFICATIONS	566901-C-D-009-007



0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.



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00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN COVER SHEET

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-001
REV.: 00C
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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SOILS:

BoB	BOONVILLE FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES
ZaB	ZACK FINE SANDY LOAM , 1 TO 5 PERCENT SLOPES
ZuB	ZULCH FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES

BoB

ZuB

ZaB

ROUGHNECK DR

BOATCALLIE RD

SB-01

SCF1 SCF2 SCF3 SCF4 SCF5 SCF6 SCF7

ES1 ES2

LS1

CE1 CE2 CE3

CW1 CW2

VEHR

SS1

TS

EMERGENCY SPILLWAY ELEVATION: 360.25'
(35' LONG BY 5' WIDE, LEVEL CREST)

EMERGENCY SPILLWAY ELEVATION: 360.25'
(35' LONG BY 5' WIDE, LEVEL CREST)

LIMITS OF DISTURBANCE

STOCKPILE AREA
≈ 18,600 SQUARE FEET

TRANSITION GRADING AS NECESSARY DURING EARTHWORK OPERATIONS AS SITE IS RAISED

SB-01
DRAINAGE AREA

TEMPORARY DIVERSION AS NECESSARY DURING GRADING OPERATIONS

DIRECT SURFACE RUNOFF TOWARD SB-01

SB-01
DRAINAGE AREA
11.31 ACRES

ALL DISTURBED AREAS AS APPROPRIATE

OHL

SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	EXISTING ASPHALT PAVEMENT
	PROPOSED STORMWATER MANAGEMENT BASIN

SYMBOL LEGEND

ID	SYMBOL	DESCRIPTION
ES#		EMERGENCY SPILLWAY
LS#		LEVEL SPREADER
SRB		SOIL RETENTION BLANKET
WCD#		WATTLE CHECK DAM
VEHR		VEHICLE REFUELING
TS/PS		TEMPORARY SEEDING/ PERMANENT SEEDING
SS#		SOIL STOCKPILE
CE#		STABILIZED CONSTRUCTION ENTRANCE
SCF#		SILT FENCE
		SURFACE FLOW DIRECTION
		DISTURBED AREA BOUNDARY
CW#		CONCRETE WASHOUT

UTILITY SYMBOL LEGEND

EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

GRADING LEGEND

SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR
XXX.XX' E.G. XXX.XX' P.G.	E.G.=EXISTING GRADE P.G.=PROPOSED GRADE

STAGE STORAGE TABLE

SEDIMENT BASIN - SB-01

ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)	CONIC INC. VOL. (cu. ft.)	CONIC TOTAL VOL. (cu. ft.)
356.00	17,057.74	N/A	N/A	0.00	N/A	0.00
357.00	22,932.22	1.00	19994.98	19994.98	19922.67	19922.67
358.00	51,799.05	1.00	37365.64	57360.62	36398.91	56321.58
359.00	58,413.56	1.00	55106.30	112466.92	55073.19	111394.78
360.00	65,046.69	1.00	61730.12	174197.04	61700.40	173095.18
361.00	71,706.82	1.00	68376.76	242573.80	68349.71	241444.89
361.50	75,048.72	0.50	36688.89	279262.69	36685.72	278130.61

DESIGN CRITERIA TABLE

SEDIMENT BASIN: SB-01

CRITERIA	DRAINAGE AREA (ACRES)	REQUIRED VOLUME (CUBIC FEET)	PROVIDED ELEVATION (FEET)	PROVIDED VOLUME (CUBIC FEET)
SEDIMENT STORAGE ZONE VOLUME (SSV): 1,000 CF/AC	11.31	11,310	357.00	19,923
DEWATERING ZONE VOLUME BASED ON SURFACE COVER VARIABLES AND DESIGN CRITERIA	11.31	176,948	360.50	206,447

STATE OF TEXAS
JOSEPH MICHEL RHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NOTES:

INLET/OUTLET PROTECTION AT SURFACE WATER CONVEYANCES:
THE SWP3 INSPECTOR SHALL MONITOR CONDITIONS AT THE INLET AND OUTLET OF SURFACE WATER CONVEYANCES. WHERE EROSION HAS OCCURED OR SEDIMENT HAS ACCUMULATED, THIS EVIDENCE SHALL SERVE AS AN INDICATION THAT ADDITIONAL EROSION AND SEDIMENT CONTROLS MAY BE NECESSARY. ALL AREAS CONTRIBUTING FLOW TOWARD SURFACE WATER CONVEYANCES SHALL BE INSPECTED FOR POSSIBLE SEDIMENT TRANSPORT. BMP'S SHALL BE INSTALLED WHERE NECESSARY TO REDUCE SEDIMENT TRANSPORT DOWNSTREAM.

CONCRETE WASHOUT, VEHICLE REFUELING AND MATERIALS STAGING:
THESE OPERATIONS SHALL BE PERFORMED IN AREAS FIELD LOCATED BY THE CONTRACTOR IN APPROPRIATE AREAS AWAY FROM CONCENTRATED STORM WATER RUNOFF OR STORM WATER INLETS. THESE FACILITIES SHALL NOT IMPEDE USE OF ADJACENT PROPERTY OR BE SITED ON PRIVATE PROPERTY NOT OTHERWISE OWNED OR WITHOUT STANDING AGREEMENTS MADE BY THE CONTRACTOR. FUEL FOR VEHICLES SHALL BE STORED & MANAGED ACCORDING TO THE OPERATOR'S SPCC PLAN.

CONSTRUCTION ENTRANCE:
AS CONDITIONS WARRANT, PRIOR TO EARTH DISTURBANCE IN ANY GIVEN AREA, BMP'S (CONSTRUCTION ENTRANCE) SHOULD BE INSTALLED TO PROHIBIT SOILS FROM BEING DISTURBED AND EXPOSED TO PRECIPITATION AT POINTS OF INGRESS TO/EGRESS FROM THE CONSTRUCTION SITE. THIS BMP WILL ALSO REDUCE TRACKING OF SEDIMENT OFF THE PROJECT SITE. THIS BMP SHOULD BE IMPLEMENTED IN APPROPRIATE AREAS ACCORDING TO PROJECT PHASING AND WORK ZONES. THE LOCATIONS FOR THIS BMP AS SHOWN ON THIS PLAN ARE CONCEPTUAL AND THE NEED FOR THIS BMP SHALL BE DETERMINED BY THE SWP3 INSPECTOR AS WORK PROGRESSES. THE LOCATION SHALL BE AMENDED AS NECESSARY BY THE CONTRACTOR TO MEET THESE CONDITIONS.

HAZARDOUS WASTE:
ANY HAZARDOUS WASTE SHALL BE STORED & MANAGED ACCORDING TO THE OPERATOR'S SPCC PLAN. REFERENCE PERMIT NO. TXR150000.

GEOGRAPHIC PROJECT NORTH
N
139.95FT

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

Texas 811 Know what's below. Call before you dig.

DRAWING SCALE: AS NOTED

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN SITE PLAN - PHASE A

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-002
REV.: 00C

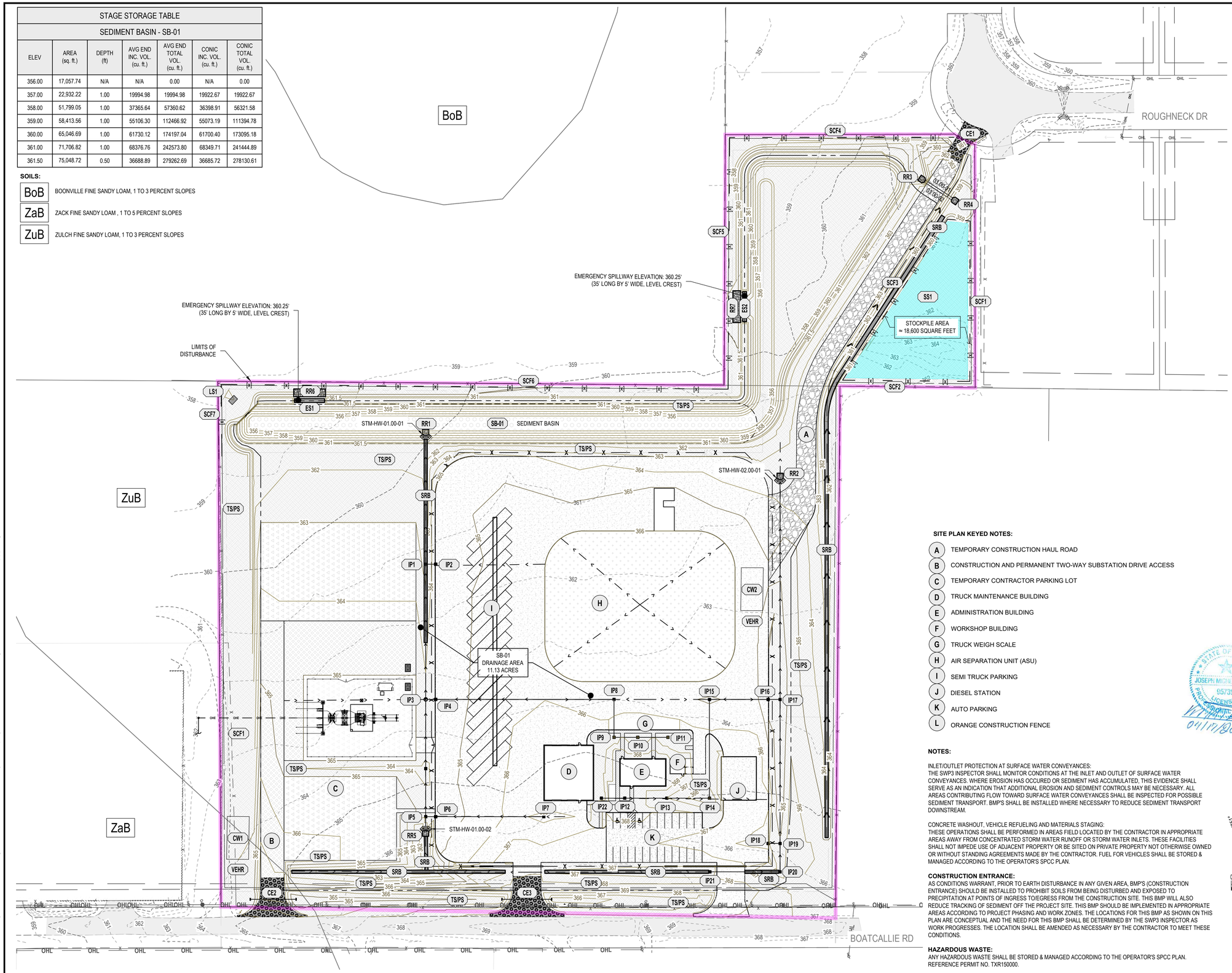
MIDDOUGH PROJ.#: MEU2510

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STAGE STORAGE TABLE						
SEDIMENT BASIN - SB-01						
ELEV	AREA (sq. ft.)	DEPTH (ft)	AVG END INC. VOL. (cu. ft.)	AVG END TOTAL VOL. (cu. ft.)	CONIC INC. VOL. (cu. ft.)	CONIC TOTAL VOL. (cu. ft.)
356.00	17,057.74	N/A	N/A	0.00	N/A	0.00
357.00	22,932.22	1.00	19994.98	19994.98	19922.67	19922.67
358.00	51,799.05	1.00	37365.64	57360.62	36398.91	56321.58
359.00	58,413.56	1.00	55106.30	112466.92	55073.19	111394.78
360.00	65,046.69	1.00	61730.12	174197.04	61700.40	173095.18
361.00	71,706.82	1.00	68376.76	242573.80	68349.71	241444.89
361.50	75,048.72	0.50	36688.89	279262.69	36685.72	278130.61

SOILS:

BoB	BOONVILLE FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES
ZaB	ZACK FINE SANDY LOAM , 1 TO 5 PERCENT SLOPES
ZuB	ZULCH FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES



SURFACE COVER LEGEND	
PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA), TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	AGGREGATE BY OTHERS (SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

SYMBOL LEGEND		
ID	SYMBOL	DESCRIPTION
ES#		EMERGENCY SPILLWAY
IP#		STORM DRAIN INLET PROTECTION
RR#		ROCK RIP RAP
LS#		LEVEL SPREADER
SRB		SOIL RETENTION BLANKET - CLASS 3 MATTING PER SECTION 626 OF THE ARKANSAS STATE HIGHWAY TRANSPORTATION DEPARTMENT - CURLEX ENFORCER
VEHR		VEHICLE REFUELING
TS/PS		TEMPORARY SEEDING/ PERMANENT SEEDING
SS#		SOIL STOCKPILE
CE#		STABILIZED CONSTRUCTION ENTRANCE
CW#		CONCRETE WASHOUT
SCF#		SILT FENCE
		SURFACE FLOW DIRECTION
		DISTURBED AREA BOUNDARY

SITE PLAN KEYED NOTES:

- A TEMPORARY CONSTRUCTION HAUL ROAD
- B CONSTRUCTION AND PERMANENT TWO-WAY SUBSTATION DRIVE ACCESS
- C TEMPORARY CONTRACTOR PARKING LOT
- D TRUCK MAINTENANCE BUILDING
- E ADMINISTRATION BUILDING
- F WORKSHOP BUILDING
- G TRUCK WEIGH SCALE
- H AIR SEPARATION UNIT (ASU)
- I SEMI TRUCK PARKING
- J DIESEL STATION
- K AUTO PARKING
- L ORANGE CONSTRUCTION FENCE

GRADING LEGEND	
SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR

UTILITY SYMBOL LEGEND	
EXISTING	DESCRIPTION
OHL	AERIAL POWER/COMMUNICATION

NOTES:

INLET/OUTLET PROTECTION AT SURFACE WATER CONVEYANCES:
THE SWP3 INSPECTOR SHALL MONITOR CONDITIONS AT THE INLET AND OUTLET OF SURFACE WATER CONVEYANCES. WHERE EROSION HAS OCCURED OR SEDIMENT HAS ACCUMULATED, THIS EVIDENCE SHALL SERVE AS AN INDICATION THAT ADDITIONAL EROSION AND SEDIMENT CONTROLS MAY BE NECESSARY. ALL AREAS CONTRIBUTING FLOW TOWARD SURFACE WATER CONVEYANCES SHALL BE INSPECTED FOR POSSIBLE SEDIMENT TRANSPORT. BMP'S SHALL BE INSTALLED WHERE NECESSARY TO REDUCE SEDIMENT TRANSPORT DOWNSTREAM.

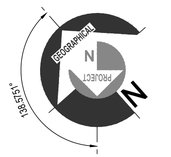
CONCRETE WASHOUT, VEHICLE REFUELING AND MATERIALS STAGING:
THESE OPERATIONS SHALL BE PERFORMED IN AREAS FIELD LOCATED BY THE CONTRACTOR IN APPROPRIATE AREAS AWAY FROM CONCENTRATED STORM WATER RUNOFF OR STORM WATER INLETS. THESE FACILITIES SHALL NOT IMPEDE USE BY ADJACENT PROPERTY OR BE SITED ON PRIVATE PROPERTY NOT OTHERWISE OWNED OR WITHOUT STANDING AGREEMENTS MADE BY THE CONTRACTOR. FUEL FOR VEHICLES SHALL BE STORED & MANAGED ACCORDING TO THE OPERATOR'S SPCC PLAN.

CONSTRUCTION ENTRANCE:
AS CONDITIONS WARRANT, PRIOR TO EARTH DISTURBANCE IN ANY GIVEN AREA, BMP'S (CONSTRUCTION ENTRANCE) SHOULD BE INSTALLED TO PROHIBIT SOILS FROM BEING DISTURBED AND EXPOSED TO PRECIPITATION AT POINTS OF INGRESS TO/EGRESS FROM THE CONSTRUCTION SITE. THIS BMP WILL ALSO REDUCE TRACKING OF SEDIMENT OFF THE PROJECT SITE. THIS BMP SHOULD BE IMPLEMENTED IN APPROPRIATE AREAS ACCORDING TO PROJECT PHASING AND WORK ZONES. THE LOCATIONS FOR THIS BMP AS SHOWN ON THIS PLAN ARE CONCEPTUAL AND THE NEED FOR THIS BMP SHALL BE DETERMINED BY THE SWP3 INSPECTOR AS WORK PROGRESSES. THE LOCATION SHALL BE AMENDED AS NECESSARY BY THE CONTRACTOR TO MEET THESE CONDITIONS.

HAZARDOUS WASTE:
ANY HAZARDOUS WASTE SHALL BE STORED & MANAGED ACCORDING TO THE OPERATOR'S SPCC PLAN. REFERENCE PERMIT NO. TXR150000.

STATE OF TEXAS
JOSEPH MICHAEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION



0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

Texas 811
Know what's below. Call before you dig.

DRAWING SCALE: AS NOTED

NO	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN SITE PLAN - PHASE B

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-003
REV.: 00C

MIDDOUGH PROJ.#: MEU2510

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GENERAL NOTES:

1. THE PROJECT IS TO BE PERMITTED UNDER THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY GENERAL PERMIT TO DISCHARGE UNDER THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES GENERAL PERMIT NO. TXR150000). THE PERMITTEE/OPERATOR SHALL REFERENCE AND FOLLOW THE PERMIT REQUIREMENTS.

   SPECIAL ATTENTION SHALL BE CALLED TO THE FOLLOWING PERMIT SECTION:

   PART II, SECTION E.3 AUTHORIZATION FOR LARGE CONSTRUCTION ACTIVITIES
   PART III, SECTION B. RESPONSIBILITIES OF OPERATORS
   PART III, SECTION D. SITE REVIEW AND UPDATES TO SWP3
   PART III, SECTION E. REVISION AND UPDATES TO SWP3'S
   PART III, SECTION F. CONTENTS OF SWP3
   PART IV, SECTION F.6 MAINTENNACE REQUIREMENTS
   PART IV, SECTION F.7 OBSERVATION AND EVALUATION OF DEWATERING CONTROLS PURSUANT TO PART IV.C OF THIS GENERAL PERMIT
   PART IV, SECTION F.8 INSPECTIONS OF ALL CONTROLS
   PART IV. EROSION AND SEDIMENT CONTROL REQUIREMENTSAPPLICABLE TO ALL SITES
   PART IV, SECTION A. EROSION AND SEDIMENT CONTROLS
   PART IV, SECTION B. SOIL STABILIZATION
   PART IV, SECTION C. DEWATERING
   PART IV, SECTION D. POLLUTION PREVENTION MEASURES
   PART IV, SECTION E. PROHIBITED DISCHARGES
   PART IV, SECTION F. SURFACE OUTLETS
   PART VI. CONCRETE TRUCK WASH OUT REQUIREMENTS
   PART VII. RETENTION OF RECORDS
   PART VIII. STANDARD PERMIT CONDITIONS

2. THE CONTRACTOR SHALL REVIEW AND STUDY THE DRAWINGS AND SPECIFICATIONS. IMPLEMENTATION OF THE EROSION CONTROL ACTIVITIES SHOULD CORRESPOND TO CONSTRUCTION ACTIVITIES.

3. IT IS THE CONTRACTOR'S RESPONSIBILITY AS PART OF THIS CONTRACT TO RETAIN KNOWLEDGABLE INSPECTION PERSONNEL AS DEFINED PER TPDES GENERAL PERMIT TXR150000, PART III, SECTION F. 7(a).

4. EROSION CONTROL MEASURES HAVE BEEN SHOWN FOR THE WORK AREAS AS IDENTIFIED ON THESE PLAN SHEETS. IF WORK IS CONDUCTED IN OTHER AREAS AS PART OF THIS PROJECT, ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED.

5. THE PROJECT ENGINEER OR EROSION CONTROL INSPECTOR SHOULD BE ABLE TO EXPLAIN THE SEDIMENT AND EROSION CONTROLS AND PLAN TO AN OUTSIDE INSPECTOR (I.E. TCEQ , ENVIRONMENTAL SERVICES, QAR INSPECTOR, COUNTY SCS).

6. THE OWNER AND CONTRACTOR SHALL COMPLY WITH SOIL SEDIMENT POLLUTION CONTROL ORDINANCES DURING CONSTRUCTION AND SHALL IMPLEMENT SEDIMENT CONTROL AS DIRECTED BY THE ENGINEER OR THE GOVERNING AGENCY.

7. ALL CONTRACTORS AND BUILDERS ARE REQUIRED TO INSTALL, REGULARLY INSPECT AND MAINTAIN TEMPORARY SEDIMENTATION CONTROLS TO MINIMIZE SOIL EROSION AND OFF-SITE SILTATION.

8. EROSION AND SEDIMENT CONTROL PRACTICES NOT ALREADY SPECIFIED MAY BE NECESSARY DUE TO UNFORESEEN ENVIRONMENTAL CONDITIONS AND/OR CHANGES IN THE DRAINAGE PATTERNS CAUSED BY EARTH-MOVING ACTIVITY. IF UNFORSEEN EROSION IS ENCOUNTERED DURING CONSTRUCTION, ADDITIONAL EROSION CONTROL MEASURES SHALL BE PROVIDED, AS DIRECTED BY THE ENGINEER, AT THE OWNER'S EXPENSE.

9. THE CONTRACTOR SHALL COMPLY WITH ANY FIELD ORDERS FOR SEDIMENT CONTROL AS ISSUED BY EITHER THE AUTHORITY HAVING JURISDICTION, THE OWNER/OPERATOR, THE COUNTY OR THE OWNER'S ENGINEER.

10. EROSION CONTROL MEASURES MUST BE PROVIDED AROUND ALL DIRT STOCKPILES AND OTHER TEMPORARILY DISTURBED AREAS.

11. THE OUTLET OF THE STORM COLLECTION SYSTEM WILL BE PROPERLY DESIGNED WITH VELOCITY DISSIPATING STRUCTURES/MEDIA. BY USING THESE PRACTICES, NO EROSIVE FLOW VELOCITIES ARE EXPECTED AT THE DISCHARGE LOCATION.

12. PERMANENT GROUND COVER SHALL BE ESTABLISHED AS S0ON AS POSSIBLE IN ACCORDANCE WITH THE PLAN.

13. MINIMIZE TRACKING OF SEDIMENTS BY VEHICLES BY UTILIZING THE CONSTRUCTION ENTRANCE AS THE ONLY ENTRANCE FOR VEHICLES. MAINTAIN THIS ENTRANCE WITH STONE AS NEEDED TO PREVENT DIRT AND MUD FROM TRACKING ONTO THE ROADWAY. REGULAR SWEEPING OF THE ROADWAY MAY BE NECESSARY TO ENSURE ROADWAY DOES NOT BUILD UP WITH SEDIMENT. STREETS DIRECTLY ADJACENT TO CONSTRUCTION ENTRANCES AND RECEIVING TRAFFIC FROM THE DEVELOPMENT AREA SHALL BE CLEANED DAILY TO REMOVE SEDIMENT TRACKED OFF-SITE. IF APPLICABLE, THE CATCH BASINS ON THESE STREETS NEAREST THE CONSTRUCTION ENTRANCES SHALL ALSO BE CLEANED WEEKLY.

14. NO SOLID OR LIQUID WASTE, INCLUDING BUILDING MATERIALS, SHALL BE DISCHARGED INTO STORM WATER RUNOFF. THE PERMITTEE MUST IMPLEMENT ALL NECESSARY BMP'S TO PREVENT DISCHARGE OF NON-SEDIMENT POLLUTANTS TO THE DRAINAGE SYSTEM OF THE SITE OR SURFACE WATERS OF THE STATE. UNDER NO CIRCUMSTANCE SHALL CONCRETE TRUCKS WASH OUT DIRECTLY INTO A DRAINAGE CHANNEL, STORM SEWER OR SURFACE WATERS OF THE STATE. NO EXPOSURE OF STORM WATER TO WASTE MATERIALS IS RECOMMENDED.

15. ANY DISTURBED AREA THAT IS NOT GOING TO BE WORKED FOR 14 DAYS OR MORE MUST BE SEEDED AND MULCHED BY NOVEMBER 1 OR MUST HAVE DORMANT SEEDING OR MULCH COVER APPLIED BETWEEN NOVEMBER 1 AND MARCH 1.

16. MAKE FIELD ADJUSTMENTS TO:
    - MEET FIELD CONDITIONS
    - ANTICIPATE FUTURE WORK
    - MAKE CORRECTION BASED ON THE WEEKLY INSPECTIONS

21. ALL FUELING VEHICLES SHALL BE EQUIPPED WITH SPILL KITS. ANY SPILLS OVER 5 GALLONS (OR THE MINIMUM REPORTING LEVEL) SHALL BE REPORTED TO THE APPROPRIATE AGENCY ACCORDING TO STATE AND LOCAL LAWS. FOR SPILLS OVER 25 GALLONS, CONTACT THE EPA (1-800-282-9378), THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE (LEPC) WITHIN 30 MINUTES.

22. SITE STABILIZATION, EITHER PERMANENT OR TEMPORARY, MUST FOLLOW THE REQUIREMENTS AS APPLICABLE PER THE PLANS AND SPECIFICATIONS.

23. CONTRACTOR TO IMPLEMENT GOOD HOUSEKEEPING PRACTICES THROUGHOUT CONSTRUCTION.

24. WHERE CONSTRUCTION ACTIVITIES ARE TO OCCUR ON SITES WITH CONTAMINATION FROM PREVIOUS ACTIVITIES, OPERATORS MUST BE AWARE THAT CONCENTRATIONS OF MATERIALS THAT MEET OTHER CRITERIA (IS NOT CONSIDERED A HAZARDOUS WASTE, MEETING VAP STANDARDS, ETC.) MAY STILL RESULT IN STORM WATER DISCHARGES IN EXCESS OF TEXAS WATER QUALITY STANDARDS. SUCH DISCHARGES ARE NOT AUTHORIZED BY THIS PERMIT. APPROPRIATE BMP'S INCLUDE, BUT ARE NOT LIMITED TO: THE USE OF BERMS TRENCHES, AND PITS TO COLLECT CONTAMINATED RUNOFF AND PREVENT DISCHARGES, PUMPING RUNOFF INTO A SANITARY SEWER (WITH PRIOR APPROVAL OF THE SANITARY SEWER OPERATOR) OR INTO A CONTAINER FOR TRANSPORT TO AN APPROPRIATE TREATMENT/ DISPOSAL FACILITY AND COVERING AREAS OF CONTAMINATION WITH TARPS OR OTHER METHODS THAT PREVENT STORM WATER FROM COMING IN CONTACT WITH THE MATERIAL. OPERATORS SHOULD CONSULT WITH THE TCEQ PRIOR TO SEEKING PERMIT COVERAGE.

25. ANY CONTAMINATED SOILS ENCOUNTERED SHALL BE STOCKPILED PER THE DIRECTION OF THE OWNER'S REPRESENTATIVE. "CLEAN" SOIL SHALL BE STOCKPILED SEPARATELY FROM CONTAMINATED SOIL AND SHALL NOT BE COMMINGLED. CONTAMINATED SOILS SHALL BE PLACED ON, AND COVERED WITH VISQUEEN. A BERM SHALL BE CONSTRUCTED AROUND ENTIRE STOCKPILE TO HOLD VISQUEEN DOWN AND PREVENT SURFACE WATER AND RAIN FROM ENTERING SOIL PILE. ALL SEALS OR OVERLAPS IN THE VISQUEEN COVERING SHALL BE SECURED. ALL CONTAMINATED SOILS MUST BE TREATED AND/OR DISPOSED IN TCEQ APPROVED SOLID WASTE MANAGMENT FACILITIES OR HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITIES (TSDF'S).

26. ADDITIONAL EROSION CONTROL MEASURES MAY BECOME NECESSARY DUE TO CONSTRUCTION SEQUENCING. THE CONTRACTOR SHALL CONSULT WITH THE ENGINEER TO DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY.

27. CONSTRUCTION ACTIVITIES SHALL BE IN COMPLIANCE WITH APPLICABLE STATE AND/OR LOCAL WASTE DISPOSAL, SANITARY SEWER OR SEPTIC SYSTEM REGULATIONS. WASTE DISPOSAL BY OPEN BURNING IS PROHIBITED. CONTRACTOR SHALL PROPERLY DISPOSE ANY CONTAMINATED SOILS, HAZARDOUS WASTE OR ASBESTOS CONTAINING MATERIAL ENCOUNTERED ON SITE ACCORDING TO CONTRACT DOCUMENTS.

28. CONTAINERS (E.G., DUMPSTERS, DRUMS) MUST BE MADE AVAILABLE FOR DISPOSAL OF DEBRIS, TRASH, HAZARDOUS OR PETROLEUM WASTE. ALL CONTAINERS MUST BE COVERED AND LEAK- PROOF. NO TOXIC OR HAZARDOUS WASTES SHALL BE DISPOSED INTO STORM DRAINS, SEPTIC TANKS, OR BY BURYING, BURNING, OR MIXING OF WASTES.

29. CONSTRUCTION AND DEMOLITION DEBRIS SHALL BE TRANSPORTED TO A LICENSED DISPOSAL FACILITY. THE MATERIAL SHALL BE COVERED WHILE BEING TRANSPORTED.

30. THERE SHALL BE NO TURBID DISCHARGES TO SURFACE WATERS OF THE STATE RESULTING FROM DE-WATERING ACTIVITIES. IF TRENCH OR GROUND WATER CONTAINS SEDIMENT, IT MUST PASS THROUGH A SEDIMENT SETTLING POND OR OTHER EQUALLY EFFECTIVE SEDIMENT CONTROL DEVICE, PRIOR TO BEING DISCHARGED FROM THE CONSTRUCTION SITE. ALTERNATIVELY, SEDIMENT MAY BE REMOVED BY SETTING IN PLACE OR BY DE-WATERING INTO A SUMP PIT, FILTER BAG OR COMPARABLE PRACTICE. GROUND WATER DE-WATERING WHICH DOES NOT CONTAIN SEDIMENT OR OTHER POLLUTANTS IS NOT REQUIRED TO BE TREATED PRIOR TO DISCHARGE. HOWEVER, CARE MUST BE TAKEN WHEN DISCHARGING GROUND WATER TO ENSURE THAT IT DOES NOT BECOME POLLUTANT LADEN BY TRAVERSING OVER DISTURBED SOILS OR OTHER POLLUTANT SOURCES.

31. REFERENCE PROJECT DESIGN PLANS FOR ADDITIONAL EROSION AND SEDIMENT CONTROLS THAT MAY BE REQUIRED, BUT ARE NOT IDENTIFIED ON THE STORMWATER POLLUTION PREVENTION PLAN DRAWINGS.

GOOD HOUSEKEEPING BMP'S:

MATERIAL HANDLING AND WASTE MANAGEMENT:

1. NON-HAZARDOUS WASTE MATERIALS:
   WASTE DISPOSAL CONTAINERS SHALL BE PROVIDED PRIOR TO MATERIALS BEING DELIVERED TO THE SITE. THE WASTE DISPOSAL CONTAINERS ARE FOR THE PROPER COLLECTION OF ALL WASTE MATERIAL INCLUDING CONSTRUCTION DEBRIS, SANITARY GARBAGE, PETROLEUM PRODUCTS AND ANY HAZARDOUS MATERIALS TO BE USED ON-SITE. CONTAINERS SHALL BE COVERED AND NOT LEAKING. THE DUMPSTERS SHALL BE INSPECTED WEEKLY AND IMMEDIATELY AFTER STORM EVENTS. ALL WASTE MATERIAL SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THAT MATERIAL. CONSTRUCTION DEMOLITION AND DEBRIS (CD&D) WASTE MUST BE DISPOSED OF IN ACCORDANCE WITH STATE LAW AT AN APPROVED TCEQ CD&D LANDFILL. CD&D WASTE IS DEFINED AS ALL MATERIALS ATTACHED TO A STRUCTURE, WHICH IS BEING DEMOLISHED.

2. HAZARDOUS WASTE MATERIALS:
   THE CONTRACTOR WILL ESTABLISH A HAZARDOUS MATERIALS STORAGE AREA CONTAINING PROPER SHIPPING CONTAINERS USED TO STORE THE MATERIALS PRIOR TO THESE MATERIALS BEING DELIVERED TO THE SITE. ALL HAZARDOUS WASTE MATERIALS SUCH AS OIL FILTERS, PETROLEUM PRODUCTS, PAINT, AND EQUIPMENT MAINTENANCE FLUIDS WILL BE STORED IN STRUCTURALLY SOUND AND SEALED SHIPPING CONTAINERS, WITHIN THE HAZARDOUS MATERIALS STORAGE AREA. HAZARDOUS WASTE MATERIALS WILL BE STORED IN APPROPRIATE AND CLEARLY MARKED CONTAINERS AND SEGREGATED FROM OTHER NON-WASTE MATERIALS. SECONDARY CONTAINMENT WILL BE PROVIDED FOR ALL WASTE MATERIALS IN THE HAZARDOUS MATERIALS STORAGE AREA AND WILL CONSIST OF COMMERCIALLY AVAILABLE SPILL PALLETS. THE AREA WILL BE INSPECTED WEEKLY AND AFTER STORM EVENTS. THE AREA WILL BE KEPT CLEAN, WELL ORGANIZED AND EQUIPPED WITH AMPLE CLEANUP SUPPLIES AS APPROPRIATE FOR THE MATERIALS BEING STORED. MATERIAL SAFETY DATA SHEETS, MATERIAL INVENTORY AND EMERGENCY CONTACT NUMBERS WILL BE MAINTAINED IN THE OFFICE TRAILER. ADDITIONALLY, ALL HAZARDOUS WASTE MATERIALS WILL BE DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE, AND MUNICIPAL REGULATIONS. HAZARDOUS WASTE MATERIALS WILL NOT BE DISPOSED OF INTO THE ON-SITE DUMPSTERS. ALL PERSONNEL WILL BE INSTRUCTED, DURING TAILGATE TRAINING SESSIONS, REGARDING PROPER PROCEDURES FOR HAZARDOUS WASTE DISPOSAL. NOTICES THAT STATE THESE PROCEDURES WILL BE POSTED IN THE OFFICE TRAILER AND THE INDIVIDUAL WHO MANAGES DAY-TO-DAY SITE OPERATIONS WILL BE RESPONSIBLE FOR SEEING THAT THESE PROCEDURES ARE FOLLOWED.

3. TEMPORARY SANITARY FACILITIES (PORTABLE TOILETS) WILL BE PROVIDED AT THE SITE UPON THE START OF CONSTRUCTION AND WILL REMAIN THROUGHOUT THE CONSTRUCTION PHASE. THE TOILETS WILL BE LOCATED BY THE CONTRACTOR, AWAY FROM ALL CONCENTRATED FLOW PATHS AND TRAFFIC FLOW AND WILL HAVE COLLECTION PANS UNDERNEATH AS SECONDARY CONTAINMENT. ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE FACILITIES AS NEEDED BY A LICENSED WASTE HAULER. THE PORTABLE TOILETS WILL BE INSPECTED WEEKLY FOR EVIDENCE OF LEAKING HOLDING TANKS. TOILETS WITH LEAKING HOLDING TANKS WILL BE REMOVED FROM THE SITE AND REPLACED WITH NEW PORTABLE TOILETS.

ADDITIONAL BMP'S:

REQUIREMENTS:

1. EDUCATE CONSTRUCTION PERSONNEL, INCLUDING SUBCONTRACTORS WHO MAY USE OR HANDLE HAZARDOUS OR TOXIC MATERIALS, MAKING THEM AWARE OF THE FOLLOWING GENERAL GUIDELINES:

2. WASTE DISPOSAL AND HANDLING OF HAZARDOUS AND OTHER CONSTRUCTION:

   DO:
   - PREVENT SPILLS
   - USE PRODUCTS UP
   - FOLLOW LABEL DIRECTIONS FOR DISPOSAL
   - REMOVE LIDS FROM EMPTY BOTTLES AND CANS WHEN DISPOSING IN TRASH
   - RECYCLE WASTES WHENEVER POSSIBLE

   DON'T:
   - DON'T POUR INTO WATERWAYS, STORM DRAINS OR ONTO THE GROUND
   - DON'T POUR DOWN THE SINK, FLOOR DRAIN OR SEPTIC TANKS
   - DON'T BURY CHEMICALS OR CONTAINERS
   - DON'T BURN CHEMICALS OR CONTAINERS
   - DON'T MIX CHEMICALS TOGETHER

3. NO CONSTRUCTION RELATED WASTE MATERIALS ARE TO BE BURIED ON-SITE. BY EXCEPTION, CLEAN FILL (BRICKS, HARDENED CONCRETE, SOIL) MAY BE UTILIZED IN A WAY THAT DOES NOT ENCROACH UPON NATURAL WETLANDS, STREAMS OR THEIR FLOODPLAINS, UNLESS PROHIBITED BY LOCAL ORDINANCE OR ZONING. FILLING OF STREAM SIDE AREAS MAY REQUIRE FEDERAL, STATE AND LOCAL PERMITS AND MAY NOT BE PERMITTED TO RESULT IN THE CONTAMINATION OF WATERS OF THE STATE.

4. HANDLING CONSTRUCTION CHEMICALS:
   MIXING, PUMPING, TRANSFERRING OR OTHER HANDLING OF CONSTRUCTION CHEMICALS SUCH AS FERTILIZER, LIME, ASPHALT, CONCRETE DRYING COMPOUNDS, AND ALL OTHER POTENTIALLY HAZARDOUS MATERIALS SHALL BE PERFORMED IN AN AREA AWAY FROM ANY WATERCOURSE, DITCH OR STORM DRAIN.

5. EQUIPMENT FUELING AND MAINTENANCE, OIL CHANGING, ETC., SHALL BE PERFORMED AWAY FROM WATERCOURSES, DITCHES OR STORM DRAINS, IN AN AREA DESIGNATED FOR THAT PURPOSE. THE DESIGNATED AREA SHALL BE EQUIPPED FOR RECYCLING OIL AND CATCHING SPILLS. SECONDARY CONTAINMENT SHALL BE PROVIDED FOR ALL FUEL OIL STORAGE TANKS. THESE AREAS MUST BE INSPECTED EVERY SEVEN DAYS AND WITHIN 24 HRS. OF A 0.5 INCH OR GREATER RAIN EVENT TO ENSURE THERE ARE NO EXPOSED MATERIALS WHICH WOULD CONTAMINATE STORM WATER. SITE OPERATORS MUST BE AWARE THAT SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) REQUIREMENTS MAY APPLY. A SPCC PLAN IS REQUIRED FOR SITES WITH ONE SINGLE ABOVEGROUND TANK OF 660 GALLONS OR MORE, ACCUMULATIVE ABOVEGROUND STORAGE OF 1330 GALLONS OR MORE, OR 42,000 GALLONS OF UNDERGROUND STORAGE. SOILS THAT HAVE BECOME CONTAMINATED MUST BE DISPOSED OF ACCORDANCE WITH ITEM 6 CONTAMINATED SOILS. ALL FUEL/LIQUID TANKS AND DRUMS SHALL BE STORED IN A MARKED STORAGE AREA. A DIKE SHALL BE CONSTRUCTED AROUND THIS STORAGE AREA WITH A MINIMUM CAPACITY EQUAL TO 110% OF THE VOLUME OF ALL CONTAINERS IN THE STORAGE AREA.

6. CONCRETE WASH WATER/WASH OUTS:
   CONCRETE WASH WATER SHALL NOT BE ALLOWED TO FLOW TO STREAMS, DITCHES, STORM DRAINS, OR ANY OTHER WATER CONVEYANCE. A SUMP OR PIT WITH NO POTENTIAL FOR DISCHARGE SHALL BE CONSTRUCTED AS SPECIFIED TO CONTAIN CONCRETE WASH WATER. FIELD TILE OR OTHER SUBSURFACE DRAINAGE STRUCTURES WITHIN 10 FT. OF THE SUMP SHALL BE CUT AND PLUGGED. FOR SMALL PROJECTS, TRUCK CHUTES MAY BE RINSED ON THE LOT AWAY FROM ANY WATER CONVEYANCES. CONCRETE WASH-OUT AREAS ARE SHOWN ON THE PLAN. REFERENCE PLANS FOR CONSTRUCTION DETAILS.

7. CONTAMINATED SOILS:
   IF SUBSTANCES SUCH AS OIL, DIESEL FUEL, HYDRAULIC FLUID, ANTIFREEZE, ETC. ARE SPILLED, LEAKED, OR RELEASED ONTO THE SOIL, THE SOIL SHOULD BE DUG UP AND DISPOSED OF AT LICENSED SANITARY LANDFILL OR OTHER APPROVED PETROLEUM CONTAMINATED SOIL REMEDIATION FACILITY (NOT A CONSTRUCTION/DEMOLITION DEBRIS LANDFILL). PLEASE BE AWARE THAT STORM WATER RUN OFF ASSOCIATED WITH CONTAMINATED SOILS ARE NOT AUTHORIZED UNDER TEXAS EPA'S GENERAL STORM WATER PERMIT ASSOCIATED WITH CONSTRUCTION ACTIVITIES. IN THE EVENT THERE ARE LARGE EXTENSIVE AREAS OF CONTAMINATED SOILS ADDITIONAL MEASURES ABOVE AND BEYOND THE CONDITIONS OF TEXAS EPA'S GENERAL CONSTRUCTION STORM WATER PERMIT WILL BE REQUIRED. DEPENDING ON THE EXTENT OF CONTAMINATION, ADDITIONAL TREATMENT AND/OR COLLECTION AND DISPOSAL MAY BE REQUIRED. ALL STORM WATER DISCHARGES ASSOCIATED WITH THE CONTAMINATED SOILS MUST BE AUTHORIZED UNDER AN ALTERNATE NPDES (NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM) PERMIT.

8. SPILL REPORTING REQUIREMENTS:
   REFERENCE THE SITE'S SPILL CONTAINMENT, CONTROL AND COUNTERMEASURES PLAN (SPCC). GENERALLY, SMALL SPILLS ON PAVEMENT SHALL BE ABSORBED WITH SAWDUST, KITTY LITTER OR OTHER ABSORBANT MATERIAL AND DISPOSED OF WITH THE TRASH AT A LICENSED SANITARY LANDFILL. HAZARDOUS OR INDUSTRIAL WASTES SUCH AS MOST SOLVENTS, GASOLINE, OIL-BASED PAINTS, AND CEMENT CURING COMPOUNDS REQUIRE SPECIAL HANDLING. SPILLS EXCEEDING REPORTABLE QUANTITIES SHALL BE REPORTED TO TCEQ AT (1-800-832-8224). THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE WITHIN 30 MIN. OF THE DISCOVERY OF THE RELEASE. ALL SPILLS, WHICH RESULT IN CONTACT WITH WATERS OF THE STATE, MUST BE REPORTED TO TCEQ.

9. OPEN BURNING:
   OPEN BURNING IN GENERAL IS PROHIBITED IN TEXAS, HOWEVER, PER TCEQ RG-049, OUTDOOR BURNING IN TEXAS, CERTAIN EXCEPTIONS MAY BE ALLOWED AND A PERMIT GRANTED.

10. DUST CONTROL/SUPPRESSANTS:
    DUST CONTROL IS REQUIRED TO PREVENT NUISANCE CONDITIONS. DUST CONTROLS MUST BE USED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND NOT BE APPLIED IN A MANNER WHICH WOULD RESULT IN A DISCHARGE TO WATERS OF THE STATE. ISOLATION DISTANCES FROM BRIDGES, CATCH BASINS, AND OTHER DRAINAGEWAYS MUST BE OBSERVED. APPLICATION (EXCLUDING WATER) MAY NOT OCCUR WHEN PRECIPITATION IS IMMINENT AS NOTED IN THE SHORT TERM FORECAST. USED OIL MAY NOT BE APPLIED FOR DUST CONTROL.

11. OTHER AIR PERMITTING REQUIREMENTS:
    ALL CONTRACTORS AND SUB CONTRACTORS MUST BE MADE AWARE THAT CERTAIN ACTIVITIES ASSOCIATED WITH CONSTRUCTION WILL REQUIRE AIR PERMITS. ACTIVITIES INCLUDING BUT NOT LIMITED TO MOBILE CONCRETE BATCH PLANTS, MOBILE ASPHALT PLANTS, CONCRETE CRUSHERS, LARGE GENERATORS, ETC., WILL REQUIRE SPECIFIC TCEQ AIR PERMITS FOR INSTALLATION AND OPERATION. THESE ACTIVITIES MUST SEEK AUTHORIZATION FROM THE CORRESPONDING DISTRICT OF TCEQ. NOTIFICATION FOR RESTORATION AND DEMOLITION MUST BE SUBMITTED TO TCEQ FOR ALL COMMERCIAL SITES TO DETERMINE IF ASBESTOS CORRECTIVE ACTIONS ARE REQUIRED.

12. LANDFILL PROCESS WASTE WATER/LEACHATE MANAGEMENT:
    ALL PROCESS WASTEWATERS MUST BE COLLECTED AND PROPERLY DISPOSED AT AN APPROVED DISPOSAL FACILITY. IN THE EVENT THERE ARE LEACHATE OUTBREAKS ASSOCIATED WITH ONSITE DISPOSAL, MEASURES MUST BE TAKEN TO ISOLATE THIS DISCHARGE FOR COLLECTION AND PROPER DISPOSAL. INVESTIGATIVE MEASURES AND CORRECTIVE ACTIONS MUST BE IMPLEMENTED TO IDENTIFY AND ELIMINATE THE SOURCE OF ALL LEACHATE OUTBREAKS.

TEMPORARY (ALL AREAS) AND PERMANENT (LAWN AREAS) SURFACE COVER REQUIREMENTS:

ALL SEEDING AND MULCHING SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE SECTIONS OF THE TXDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES.
SEEDING IS INTENDED TO REDUCE EROSION BY STABILIZING EXPOSED SOILS. A WELL-ESTABLISHED VEGETATIVE COVER IS ONE OF THE MOST EFFECTIVE METHODS OF REDUCING EROSION.

DESIGN CRITERIA

SEEDING SHALL CONSIST OF PREPARING GROUND, PROVIDING FOR SOWING OF SEEDS, MULCHING WITH STRAW, HAY OR CELLULOSE FIBER AND OTHER MANAGEMENT PRACTICES ALONG AND ACROSS SUCH AREAS AS ARE DESIGNATED ON THE PLANS AND IN ACCORDANCE WITH B/CS UNIFIED SPECIFICATIONS, SECTION 32 92 19, SEEDING FOR EROSION CONTROL.

TEMPORARY VEGETATION

THE FOLLOWING TABLE LISTS RECOMMENDED PLANT SPECIES FOR BRYAN TEXAS REGION DEPENDING ON THE SEASON FOR PLANTING.

RECOMMENDED GRASS MIXTURE		
PLANTING DATE	**TYPE**	**RATE OF APPLICATION PLANTING TYPE (LBS/ACRE)**
JAN. 1 -TO APR. 1	UNHULLED BERMUDA GRASS	20
APR. 1 TO OCT. 31	HULLED BERMUDA GRASS	12
OCT. 1 TO JAN. 1	UNHULLED BERMUDA GRASS RYE GRASS	MIX BERMUDA & RYE IN THE FOLLOWING PROPORTIONS: 12 50

AREAS RECEIVING TEMPORARY SEEDING AND VEGETATION SHALL BE LANDSCAPED, RE-SEEDED OR SODDED WITH PERENNIAL SPECIES TO ESTABLISH FINAL VEGETATION AT THE END OF CONSTRUCTION.

VEGETATION FOR FINAL STABILIZATION

FINAL STABILIZATION AND MAINTENANCE OF THE PROPOSED SEEDED AREAS SHALL CONFORM TO THE REQUIREMENTS OUTLINED IN THE TURF AND GRASSES SPECIFICATION, 566901-C-S-329200-001.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life
middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN DETAILS AND SPECIFICATIONS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-004
REV.: 00C
DRAWING SCALE: AS NOTED

Texas 811 Know what's below. Call before you dig.

MIDDOUGH PROJ.#: MEU2510

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SWPPP INSPECTIONS:

1. REFERENCE TPDES GENERAL PERMIT NO. TXR150000 PART III, SECTION F, 8. INSPECTIONS OF ALL CONTROLS FOR INSPECTION REQUIREMENTS AND FREQUENCIES.

MAINTENANCE & INSPECTION SCHEDULE

(REFERENCE SITE PLAN FOR BMP'S SPECIFIED ON THE PROJECT):

1. ALL PRACTICES SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH 0.5 INCH RAINFALL EVENT.

2. SILT FENCE:
   - A. INSURE THAT THE BOTTOM OF THE SILT FENCE IS EMBEDDED IN THE GROUND.
   - B. THE TOP OF THE SILT FENCE SHALL BE DRAWN TIGHT BETWEEN POSTS.
   - C. SILT SHALL BE REMOVED ONCE 40% OF THE CAPACITY IS LOST OR THE FENCE SHALL BE REPLACED.
   - D. JOINTS BETWEEN SECTIONS SHALL BE TIGHTLY JOINED WITHOUT GAPS.

3. DITCH CHECK:
   - A. MAINTAIN PARABOLIC SHAPE.
   - B. RUNOFF SHALL PASS OVER THE CENTER OF THE CHECK DAM.
   - C. ENSURE THAT EROSION IS NOT OCCURRING DOWNSTREAM OF THE CHECK DAM.

4. CONSTRUCTION ENTRANCE:
   - A. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE WASHING AND REWORKING OF EXISTING STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY STRUCTURES USED TO TRAP SEDIMENT.
   - B. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED FROM VEHICLES ONTO ROADWAYS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY. THE USE OF WATER TRUCKS TO REMOVE MATERIALS DROPPED, WASHED, OR TRACKED ONTO ROADWAYS WILL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES.
   - C. ENSURE THAT THE CONSTRUCTION ENTRANCE IS APPROPRIATELY SIZED TO MINIMIZE TRACKING ONTO THE ROADWAY.
   - D. RESTRICT VEHICULAR ACCESS TO STABILIZED AREAS TO MINIMIZE OFF-SITE TRACKING.

5. VEGETATIVE STABILIZATION:
   - A. ENSURE A 70% STAND ESTABLISHMENT RATE.
   - B. REPAIR AREAS NOT MEETING SPECIFICATIONS.

6. ROLLED EROSION CONTROL PRODUCTS:
   - A. ENSURE MANUFACTURES INSTALLATION RECOMMENDATIONS ARE FOLLOWED.
   - B. ENSURE GOOD CONTACT BETWEEN SOIL AND THE BLANKET.
   - C. IF EROSION OCCURS UNDER THE BLANKET, REPAIR ERODED AREA AND REINSTALL.
   - D. ENSURE MANUFACTURES STAPLING GUIDELINES ARE FOLLOWED.
   - E. ENSURE EROSION STOPS ARE NOT USED.
   - F. IN CHANNELS, ENSURE THAT THE WIDTH OF THE BLANKET USED IS SUFFICIENT.
   - G. INSTALL BLANKET/MATTING UP SIDE SLOPES OF DITCH LINE AS WELL AS THE BOTTOM.
   - H. IF RUNOFF ERODES AROUND THE BLANKET, WIDEN AS NEEDED.

7. INLET PROTECTION:
   - A. INSURE THE BOTTOM OF THE FABRIC IS EMBEDDED IN THE GROUND AND THE FRAME OF THE INLET PROTECTOR HAS NOT COLLAPSED.
   - B. CLEAN OUT SEDIMENT ONCE 40% OF CAPACITY IS LOST.
   - C. INSURE THAT THE INLET IS NOT CAUSING STORM WATER TO BYPASS THE INLET.
   - D. MAINTAIN BYPASS PREVENTION DIKE.

8. SEDIMENT TRAP/BASIN:
   - A. DEWATERING OPERATIONS MUST BE OBSERVED AND EVALUATED ONCE PER DAY WHILE DEWATERING DISCHARGE IS OCCURRING (PART III.F.7 AND PART IV.C).
   - B. THE CAPACITY AND FUNCTION OF THE SEDIMENT TRAP/BASIN SHALL BE MAINTAINED BY INSPECTING ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT, AND BY PERFORMING THE NECESSARY ACTIVITIES SHOWN BELOW.
   - C. ESTABLISH VEGETATIVE COVER AND FERTILIZE AS NECESSARY TO MAINTAIN A VIGOROUS COVER AROUND THE SEDIMENT TRAP.
   - D. MOW GRASS TO MAINTAIN A HEIGHT OF 4 TO 6 INCHES. REMOVE GRASS CLIPPINGS.
   - E. BASED ON INSPECTION, PLANT AN ALTERNATIVE GRASS SPECIES IF THE ORIGINAL GRASS COVER HAS NOT BEEN SUCCESSFULLY ESTABLISHED.
   - F. INSPECT THE POOL AREA, EMBANKMENT AND SPILLWAY AREA FOR BURROWING RODENTS, SLOPE FAILURE, SEEPAGE, EXCESS SETTLEMENT, AND DISPLACED STONE. THE AREA SHOULD BE INSPECTED FOR STRUCTURAL SOUNDNESS AND REPAIRED AS NEEDED.
   - G. REGULARLY INSPECT WATER DISCHARGED FROM TRAP FOR EXCESS SUSPENDED SEDIMENTS. IDENTIFY AND PERFORM NECESSARY REPAIRS TO IMPROVE WATER QUALITY. EXCESSIVE SUSPENDED SEDIMENTS MAY REQUIRE DESIGN MODIFICATIONS OR TREATMENT WITH FLOCCULANTS.
   - H. REMOVE WOODY VEGETATED GROWTH ON THE EMBANKMENT AND SPILLWAY AREAS.
   - I. REMOVE TRASH AND DEBRIS THAT ACCUMULATE IN THE POND AND HAVE POTENTIAL TO BLOCK SPILLWAYS.
   - J. DEWATERING OUTLETS SHALL BE REGULARLY CHECKED TO ENSURE THAT PERFORMANCE IS MAINTAINED. FILTER STONE CHOKED WITH SEDIMENT SHALL BE REMOVED AND REPLACED TO RESTORE ITS FLOW CAPACITY.
   - K. REMOVE SEDIMENT AND RESTORE THE TRAP/BSAIN TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 40% OF THE SEDIMENT STORAGE DEPTH, OR THE DESIGN CLEANOUT ELEVATION. THIS ELEVATION SHALL BE SIGNIFIED BY THE TOP OF A STAKE NEAR THE CENTER OF THE TRAP. REMOVING SEDIMENT BY HAND MAY BE NECESSARY ADJACENT TO THE OUTLET SECTION OF THE EMBANKMENT TO PREVENT EQUIPMENT DAMAGE. PLACE THE REMOVED SEDIMENT AND STABILIZE WITH VEGETATION IN A DESIGNATED AREA WHERE IT WILL NOT EASILY ERODE AGAIN. RESTORE TRAP TO ITS ORIGINAL DIMENSIONS AND REPLACE STONE AS NEEDED ON THE OUTLET. BASIN SIDE SLOPES AND EMBANKMENTS SHALL BE PROTECTED FROM EROSION BY VEGETATION OF A DENSITY NOT LESS THAN 70%.
   - L. RISER PIPES: DEBRIS AND SEDIMENT SHOULD BE CLEANED FROM THE STRUCTURE AS NEEDED TO RESTORE DESIGN FLOW RATES. ALL JOINTS SHOULD BE INSPECTED TO INSURE WATER TIGHTNESS.
   - M. STONE SPILLWAYS: MAINTAIN FLOW OVER THE CENTER OF THE SPILLWAY, REPAIR DAMAGE CAUSED BY EROSION. DOWNSTREAM CHANNELS SHOULD BE INSPECTED FOR EROSION CONTROL DAMAGE. IF DAMAGE IS OCCURRING, AN ADDITIONAL STONE APRON WILL BE NEEDED. DEBRIS AND SEDIMENT SHOULD BE REMOVED AS NEEDED.
   - N. AFTER THE ENTIRE CONSTRUCTION PROJECT IS COMPLETED, TEMPORARY SEDIMENT TRAPS SHOULD BE DEWATERED AND REGRADED SO AS TO CONFORM TO THE CONTOURS OF THE AREA. ALL TEMPORARY STRUCTURES SHOULD BE REMOVED AND THE AREA SEEDED, MULCHED AND STABILIZED AS NECESSARY.

9. CONSTRUCTED CONCRETE WASH-OUT FACILITIES:
   - A. ENSURE MANUFACTURE'S INSTRUCTIONS ARE FOLLOWED.
   - B. MAINTAIN ADJACENT AREAS CLEAN AND TIDY AND PROTECTED FROM DISTURBANCE.
   - C. CHECK ALL CONCRETE WASHOUT FACILITIES DAILY TO DETERMINE IF THEY HAVE BEEN FILLED TO THE MANUFACTURERS SUGGESTED CAPACITY, WHICH IS WHEN THE FACILITIES NEED TO BE REMOVED/REPLACED. ENSURE THAT THE BMP IS INTACT AND SIDEWALLS HAVE NOT BEEN DAMAGED BY CONSTRUCTION ACTIVITIES. PRE-FABRICATED WASHOUT CONTAINERS SHOULD BE INSPECTED DAILY TO ENSURE THE CONTAINER IS NOT LEAKING OR NEARING CAPACITY. INSPECTORS SHOULD ALSO NOTE WHETHER THE FACILITIES ARE BEING USED REGULARLY; IF DRIVERS HAVE WASHED OUT THEIR CHUTES OR HOPPERS IN OTHER LOCATIONS, YOU MAY NEED TO PROVIDE MORE EDUCATION, INSTALL ADDITIONAL SIGNAGE, OR PLACE ADDITIONAL WASHOUTS IN MORE CONVENIENT LOCATIONS.
   - D. CONCRETE WASHOUTS ARE DESIGNED TO PROMOTE EVAPORATION WHERE FEASIBLE. HOWEVER, IF STORED LIQUIDS HAVE NOT EVAPORATED AND THE WASHOUT IS NEARING CAPACITY, VACUUM AND DISPOSE OF THE LIQUID IN AN APPROVED MANNER - CHECK WITH THE LOCAL SANITARY SEWER AUTHORITY TO DETERMINE IF THERE ARE SPECIAL DISPOSAL REQUIREMENTS FOR CONCRETE WASH WATER. REMOVE LIQUIDS OR COVER THE STRUCTURES BEFORE PREDICTED RAINSTORMS TO PREVENT OVERFLOWS.
   - E. AN IMPORTANT FACTOR THAT DICTATES THE SUCCESS OF CONCRETE WASHOUT FACILITIES IS WHETHER OR NOT CONCRETE TRUCK DRIVERS USE CONCRETE WASHOUTS. MAKE PERSONNEL AWARE OF THE PRESENCE OF THESE FACILITIES. EDUCATE CONCRETE SUBCONTRACTORS, POST SIGNAGE INDICATING THE LOCATION AND DESIGNATED USE OF THESE AREAS, AND PROVIDE CAREFUL OVERSIGHT TO INSPECT FOR EVIDENCE OF IMPROPER DUMPING OF CONCRETE WASTE AND WASH WATER. INCLUDE REQUIREMENTS IN CONTRACTS WITH CONCRETE DELIVERY COMPANIES THAT DRIVERS MUST USE DESIGNATED CONCRETE WASHOUT FACILITIES.

10. MANUFACTURED CONCRETE WASH-OUT FACILITIES:
    - A. ENSURE MANUFACTURER'S INSTRUCTIONS ARE FOLLOWED.
    - B. DO NOT PLACE CONCRETE WASHOUT FACILITIES WITHIN 50 FEET OF STORM DRAINS, OPEN DITCHES, OR WATERBODIES. PLACE CONCRETE WASHOUT FACILITIES IN A LOCATION THAT ALLOWS CONVENIENT ACCESS FOR CONCRETE TRUCKS, PREFERABLY NEAR THE AREA WHERE THE CONCRETE IS BEING POURED. APPROPRIATE GRAVEL OR ROCK SHOULD COVER PATHS TO CONCRETE WASHOUT FACILITIES IF THE FACILITIES ARE LOCATED ON UNDEVELOPED PROPERTY. THESE AREAS SHOULD BE FAR ENOUGH AWAY FROM OTHER CONSTRUCTION TRAFFIC TO REDUCE THE LIKELIHOOD OF ACCIDENTAL DAMAGE AND SPILLS. THE NUMBER OF FACILITIES TO BE INSTALLED DEPENDS ON THE EXPECTED DEMAND FOR STORAGE CAPACITY. ON LARGE SITES WITH EXTENSIVE CONCRETE WORK, WASHOUTS SHOULD BE PLACED IN MULTIPLE LOCATIONS FOR EASE OF USE BY CONCRETE TRUCK DRIVERS.

11. MULCHING:
    - A. MULCHING IS PERFORMED AFTER GRADING AND SOIL SURFACE PREPARATION IS COMPLETED. THE EFFECTIVENESS OF THE MULCHING MATERIAL DEPENDS ON GOOD CONTACT BETWEEN THE SOIL AND MULCHING MATERIAL. PROVIDE A SMOOTH MULCHING APPLICATION SURFACE BY TRACKING, ROLLING, RAKING, ETC. TO ENSURE OPTIMAL MULCH TO SOIL CONTACT.
    - B. APPLY MULCHING MATERIAL A MINIMUM OF THREE (3) FEET OVER THE SHOULDER AND BEYOND THE BASE OF THE SLOPE OR INTO EXISTING VEGETATION WHERE POSSIBLE TO PREVENT RILL FORMATION AND TRANSPORT OF THE MATERIAL. THE MULCHING MATERIAL SHALL BE PLACED EVENLY AND UNIFORMLY TO PROVIDE 100% COVERAGE.
    - C. MULCH MATERIAL MUST BE FREE OF REFUSE, PHYSICAL CONTAMINANTS, AND MATERIAL TOXIC TO PLANT GROWTH; IT IS NOT ACCEPTABLE FOR THE MULCH MATERIAL TO CONTAIN GROUND CONSTRUCTION DEBRIS, BIOSOLIDS, OR MANURE.
    - D. THE MULCHED AREA SHALL BE INSPECTED REGULARLY AND AFTER EACH LARGE RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY, WITH ADDITIONAL MULCHING MATERIAL PLACED ON TOP OF THE MULCH TO REACH THE RECOMMENDED THICKNESS.
    - E. WHEN THE MULCH IS DECOMPOSED, CLOGGED WITH SEDIMENT, ERODED OR INEFFECTIVE, IT MUST BE REPLACED OR REPAIRED.

BMP DECOMMISSIONING

(REFERENCE SITE PLAN FOR BMP'S SPECIFIED ON THE PROJECT):

6. SEDIMENT TRAPS/BASINS:
   - A. PUMP REMAINING WATER THROUGH GRAVITY BAG FILTER PLACED ADJACENT TO AND DOWNSTREAM OF THE SEDIMENT TRAP.
   - B. RE-GRADE TO FINAL ELEVATIONS AND SEED DISTURBED AREAS.

2. SILT FENCE:
   - A. REMOVE SILT AND STABILIZE ON-SITE OR TRANSFER TO AN APPROVED OFF-SITE FACILITY.
   - B. REMOVE AND TRANSPORT SILT FENCE MATERIALS TO AN APPROVED OFF-SITE FACILITY.
   - C. RE-GRADE AND SEED DISTURBED AREAS.

3. DITCH CHECK:
   - A. REMOVE SILT AND STABILIZE ON-SITE OR TRANSFER TO AN APPROVED OFF-SITE FACILITY.
   - B. REMOVE AND TRANSPORT CHECK DAM MATERIALS TO AN APPROVED OFF-SITE FACILITY.

4. CONSTRUCTION ENTRANCE:
   - A. REMOVE SILT AND STABILIZE ON-SITE OR TRANSFER TO AN APPROVED OFF-SITE FACILITY.
   - B. STONE SHALL BE REMOVED. CLEAN STONE MAY BE INCORPORATED IN SUBBASE FOR PAVED AREAS (AS SPECIFICATIONS ALLOW). STONE NOT RE-USED SHALL BE TRANSPORTED TO AN OFF-SITE FACILITY FOR DISPOSAL.
   - C. RE-GRADE AND SEED DISTURBED AREAS.

5. PROCESS WATER/LEACHATE MANAGEMENT:
   - A. ALL PROCESS WASTEWATERS (EQUIPMENT WASHING, LEACHATE ASSOCIATED WITH ON-SITE WASTE DISPOSAL, AND CONCRETE WASH-OUTS) WILL BE COLLECTED AND DISPOSED OF PROPERLY TO A PUBLICLY-OWNED TREATMENT WORKS.
   - B. THE NPDES CONSTRUCTION STORM WATER GENERAL PERMIT ONLY AUTHORIZES THE DISCHARGE OF STORM WATER AND CERTAIN UNCONTAMINATED NON-STORM WATERS.
   - C. THE DISCHARGE OF NON-STORM WATERS TO WATERS OF THE STATE MAY BE IN VIOLATION OF LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS.

6. CONSTRUCTED CONCRETE WASHOUT FACILITIES:
   - A. TRANSFER WASTE WATER, SOLIDS AND CONTAINMENT MATERIALS TO AN APPROVED OFF-SITE DISPOSAL FACILITY.
   - B. RE-GRADE AND SEED DISTURBED AREAS.

7. MANUFACTURED CONCRETE WASHOUT FACILITIES:
   - A. TRANSFER STORAGE BAGS TO AN APPROVED OFF-SITE FACILITY FOR DISPOSAL.
   - B. RE-GRADE AND SEED DISTURBED AREAS.

8. PORTABLE SEDIMENT CAPTURE DEVICE (SC):
   - A. THE DE-WATERED BAG SHALL BE CUT OPEN ON SITE IN AN APPROPRIATE LOCATION.
   - B. ALL FABRIC SHALL BE REMOVED AND PROPERLY DISPOSED.
   - C. THE CONTENTS SHALL BE MIXED WITH TOPSOIL THEN SEEDED.

FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
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00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN DETAILS AND SPECIFICATIONS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

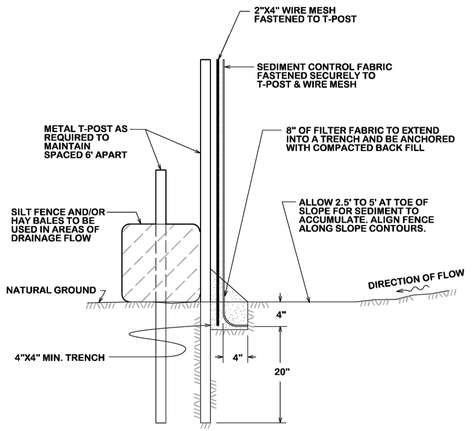
DRAWING NO.: 566901-C-D-009-005
REV.: 00C

DRAWING SCALE: AS NOTED

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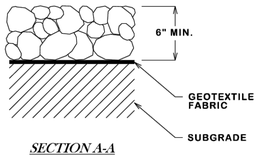


City of Bryan — The Good Life, Texas Style.

SILT FENCE ASSEMBLY

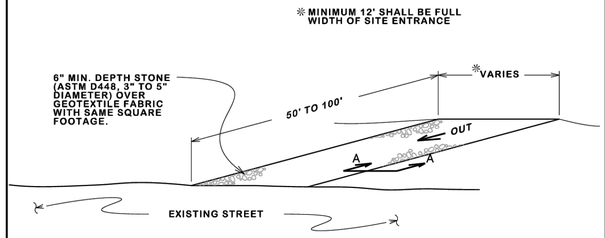
DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
AUG. 2012		SWPP1-03

City of College Station



SECTION A-A

NOTE:
DRESS WITH ADDITIONAL STONE AS NEEDED. STONE IS TO BE MAINTAINED SO AS TO PREVENT CONSTRUCTION TRAFFIC FROM TRACKING MUD ONTO ADJACENT PUBLIC STREETS.



City of Bryan — The Good Life, Texas Style.

CONSTRUCTION EXIT SLIT CONTROL

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
AUG. 2012		SWPP1-02

City of College Station

NOTE:
POST A SIGN READING "CONCRETE WASH OUT PIT" NEXT TO THE PIT.

VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASH OUT ONLY IN TRUCKS IN THE PIT AND NO WHERE ELSE.

NO WASHING OUT OF CONCRETE TRUCKS OR WASHING OF SWEEPINGS FROM EXPOSED AGGREGATE CONCRETE INTO STORM DRAINS, OPEN DITCHES, STREETS, OR STREAMS IS ALLOWED.

EXCESS CONCRETE IS NOT ALLOWED TO BE DUMPED ON-SITE, EXCEPT IN DESIGNATED TEMPORARY CONCRETE WASHOUT PIT AREAS.

ON-SITE TEMPORARY CONCRETE WASHOUT AREAS WILL BE LOCATED AT LEAST 50 FEET FROM STORM DRAINS, OPEN DITCHES, OR WATER BODIES AS DETERMINED IN THE FIELD.

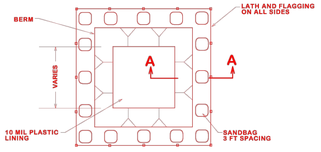
TEMPORARY CONCRETE WASHOUT FACILITIES WILL BE CONSTRUCTED AND MAINTAINED IN SUFFICIENT QUANTITY AND SIZE TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS.

WASHOUT FACILITIES WILL BE CLEANED OUT OR REPLACED ONCE THE WASHOUT IS 75% FULL.

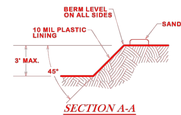
PLASTIC LINING MATERIAL WILL BE MINIMUM OF 10 MIL IN THICKNESS AND SHALL BE REINFORCED FREE OF HOLES, TEARS, OR OTHER DEFECTS.

WHEN WASHOUT FACILITIES ARE NO LONGER REQUIRED FOR WORK, THE HARDENED CONCRETE, RESIDUAL THIN CONCRETE AND DISPOSED OF OFFSITE. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES WILL BE REMOVED FROM THE SITE AND DISPOSED OF. BELOW GRADE PITS SHALL BE BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.

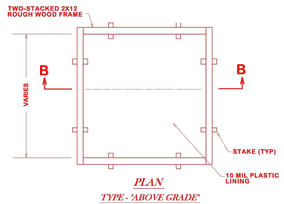
CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCK EQUIPMENT.



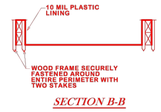
PLAN
TYPE - 'BELOW GRADE'



SECTION A-A



PLAN
TYPE - 'ABOVE GRADE'



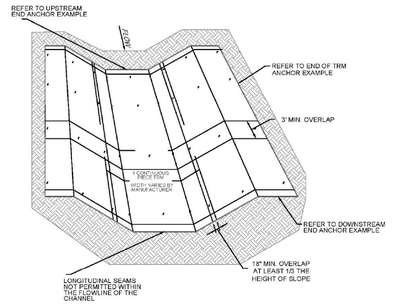
SECTION B-B

City of Bryan — The Good Life, Texas Style.

CONCRETE WASHOUT

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
DECEMBER 2020		SWPP1-04

City of College Station



TRM ISOMETRIC PLAN VIEW FOR SMALL CHANNELS/DITCHES
N.T.S.

NOTE: LONGITUDINAL INSTALLATION OF TURF REINFORCEMENT MAT PERMITTED ONLY FOR CHANNEL WIDTHS OF TO 9'. CONTRACTOR SHALL VERIFY MAT MEETS OVERLAP AND SLOPE REQUIREMENTS STATED ABOVE.



EROSION CONTROL BLANKET

SCALE: N.T.S.

NOTE:
TEMPORARY DEVICES AROUND STORMS DRAINS ARE USED TO DETAIN AND/OR FILTER SEDIMENT-LADEN RUNOFF. THE PROTECTION ALLOWS SEDIMENT TO SETTLE PRIOR TO DISCHARGE INTO A STORM DRAIN INLET OR CATCH BASIN.

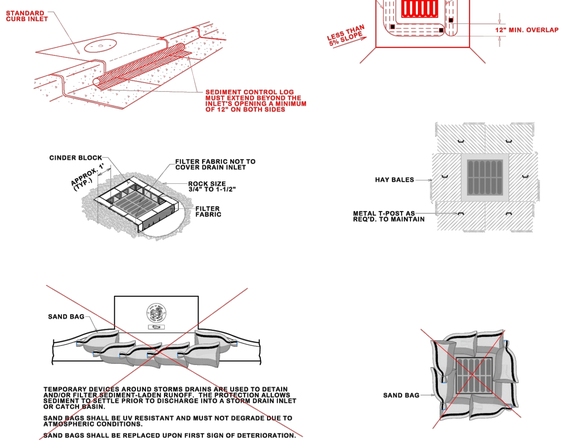
SEDIMENT CONTROL LOGS ARE TO BE USED ON EXISTING CURB INLETS WHICH ARE LOCATED ADJACENT TO OCCUPIED TRAVEL LANES WITHIN THE DISTURBED LIMITS OF A PROJECT AS SHOWN ON THE PLANS.

SEDIMENT CONTROL LOGS ARE TO BE INSTALLED AND MAINTAINED PER THE MANUFACTURER'S INSTRUCTIONS AND PROPERLY WEIGHTED IN ORDER TO REMAIN SECURELY IN PLACE. INSTALLATION MUST MEET THE CONSTRUCTION INSPECTOR'S APPROVAL.

SEDIMENT CONTROL LOGS ARE TO BE CONSTRUCTED OF WOOD FIBERS, SYNTHETIC FIBERS OR OTHER SUITABLE MATERIAL SUFFICIENT TO RETAIN ITS SHAPE AND ENCASED IN A UV STABILIZED FILTERING MEDIA OF SUFFICIENT STRENGTH TO RETAIN SEDIMENT.

SEDIMENT CONTROL LOGS ARE TO BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

SAND BAGS SHALL NOT BE USED.



TEMPORARY DEVICES AROUND STORMS DRAINS ARE USED TO DETAIN AND/OR FILTER SEDIMENT-LADEN RUNOFF. THE PROTECTION ALLOWS SEDIMENT TO SETTLE PRIOR TO DISCHARGE INTO A STORM DRAIN INLET OR CATCH BASIN.

SAND BAGS SHALL BE UV RESISTANT AND MUST NOT DEGRADE DUE TO ATMOSPHERIC CONDITIONS.

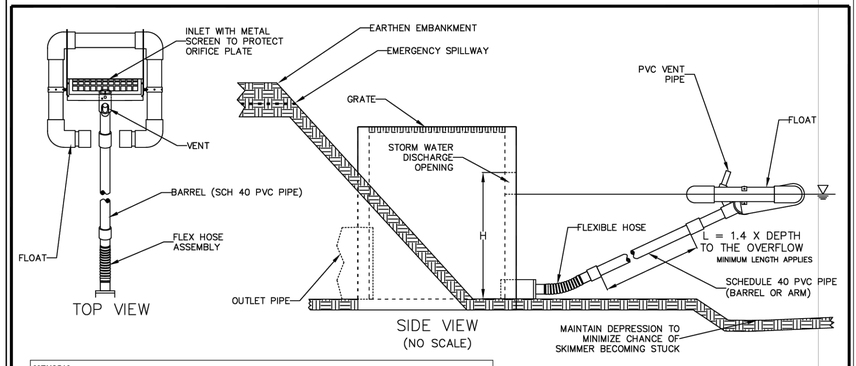
SAND BAGS SHALL BE REPLACED UPON FIRST SIGN OF DETERIORATION.

City of Bryan — The Good Life, Texas Style.

STORM DRAIN INLET PROTECTION

DATE	B/CS UNIFIED STANDARD DETAIL	DETAIL NO.
DECEMBER 2020		SWPP1-00

City of College Station



MEU2510				
Name	**Skimmer Size**	**Sliding Orifice %**	**Required Basin Volume**	**Days to Drain**
SWM-001	8 in.	50%	155,534	3

NOTE:
THIS IS A VENDOR DRAWING THAT MAY NOT DEPICT THE SITE CONFIGURATION. REFERENCE DRAWING 566901-C-D-009-007 FOR DETAILS.

GENERAL NOTES:
1. FAIRCLOTH SKIMMER® FLOW RATES WERE USED AS THE BASIS OF DESIGN WHEN DETERMINING DRAINAGE CALCULATIONS. UTILIZING A PRODUCT FROM AN ALTERNATIVE MANUFACTURER WILL CREATE A SIGNIFICANT DEVIATION TO THE DESIGN AND MUST BE APPROVED AND RECALCULATED BY THE DESIGN ENGINEER.
2. PROPER ORIFICE OPENING MUST BE SELECTED TO ENSURE POND DRAINS IN CORRECT AMOUNT OF TIME. MODIFICATIONS MAY BE REQUIRED IF FIELD CONDITIONS WARRANT A CHANGE.
3. BARREL PIPE SHOULD BE 1.4 X DEPTH OF THE BASIN TO ENSURE PROPER FUNCTION.

DRAWN BY T. R. EVANS 08/24

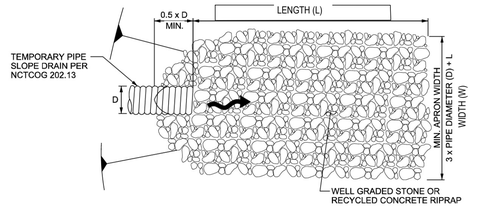
FAIRCLOTH SKIMMER® DISCHARGE SYSTEM WITH OUTLET STRUCTURE

FAIRCLOTH SKIMMER
WWW.FAIRCLOTHSKIMMER.COM
TELEPHONE: (919) 732-1244
FAX: (919) 732-1266
EMAIL: SALES@FAIRCLOTHSKIMMER.COM

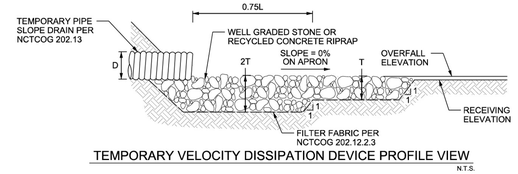
FOR BID AND PERMIT REVIEW PURPOSES ONLY
THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

ISWM™ TECHNICAL MANUAL — CONSTRUCTION CONTROLS

- SPECIFIC DESIGN INFORMATION ON THE EROSION CONTROL PLANS IS REQUIRED FOR EACH INSTALLATION



TEMPORARY VELOCITY DISSIPATION DEVICE PLAN VIEW
N.T.S.



TEMPORARY VELOCITY DISSIPATION DEVICE PROFILE VIEW
N.T.S.

NOTE: DIMENSIONS OF THE RIPRAP APRON SHALL BE DESIGNED BASED ON FLOW CONDITIONS. TEMPORARY CONTROL DESIGN STORM (2-YEARS, 24-HOUR). PROVIDE CALCULATIONS THAT DOCUMENT THE FOLLOWING PARAMETERS USED TO DESIGN THE APRON.

- PIPE DIAMETER (OR EQUIVALENT FOR FLUME, SWALE, ETC.), D, FEET
- DISCHARGE VELOCITY FROM DRAINAGE STRUCTURE, V_{pipe}, FT/S
- DETERMINE GRADATION FOR d_{50} WELL GRADED STONE OR RECYCLED CONCRETE RIPRAP
- MEDIAN STONE DIAMETER d_{50} AND MAXIMUM STONE DIAMETER (d_{100}), FEET

STRUCTURE ID	RIPRAP ID	PIPE SIZE, IN	RIPRAP DIMENSIONS, FT		
			LENGTH (L)	WIDTH (W)	THICKNESS (2T)
STM-HW-01.00-01	RR1	30	10	18	2
STM-HW-01.00-02	RR5	12	10	15	2
STM-HW-02.00-01	RR2	18	10	13	2
CULVERT 03.00-01 & 03.00-02	RR3	18 (2)	20	28	2
	RR4	18 (2)	20	28	2
EMERGENCY SPILLWAY	RR6, RR7	-	10	41	2

FIGURE 2.13 SCHEMATICS OF VELOCITY DISSIPATION DEVICE

VELOCITY DISSIPATION DEVICE REVISED

RIPRAP DETAIL

SCALE: N.T.S.

TXDOT STANDARD SPECIFICATIONS
ITEM 432
RIPRAP

2.3. STONE RIPRAP.
USE DURABLE NATURAL STONE WITH A BULK SPECIFIC GRAVITY OF AT LEAST 2.50 AS DETERMINED IN ACCORDANCE WITH TEX-403-A, UNLESS OTHERWISE SHOWN ON THE PLANS. PROVIDE STONE THAT, WHEN TESTED IN ACCORDANCE WITH TEX-411-A, HAS WEIGHT LOSS OF NO MORE THAN 18% AFTER FIVE CYCLES OF MAGNESIUM SULFATE SOLUTION.

PERFORM A SIZE VERIFICATION TEST ON THE FIRST 5,000 SQ. YD. OF FINISHED RIPRAP STONE FOR ALL TYPES OF STONE RIPRAP AT A LOCATION DETERMINED BY THE ENGINEER. TEST THE RIPRAP STONE IN ACCORDANCE WITH ASTM D5519, TEST METHOD D, UNLESS OTHERWISE DIRECTED. ADDITIONAL TESTS MAY BE REQUIRED. DO NOT PLACE ADDITIONAL RIPRAP UNTIL THE INITIAL 5,000 SQ. YD. OF RIPRAP HAS BEEN APPROVED.

PROVIDE GROUT OR MORTAR IN ACCORDANCE WITH ITEM 421 WHEN SPECIFIED. PROVIDE GROUT WITH A CONSISTENCY THAT WILL FLOW INTO AND FILL ALL VOIDS.

PROVIDE FILTER FABRIC IN ACCORDANCE WITH DMS-6200. PROVIDE TYPE 2 FILTER FABRIC FOR PROTECTION STONE RIPRAP, UNLESS OTHERWISE SHOWN ON THE PLANS. PROVIDE TYPE 2 FILTER FABRIC FOR TYPE R, F, OR COMMON STONE RIPRAP.

2.3.1. TYPE R. USE STONES BETWEEN 50 AND 250 LB., WITH AT LEAST 50% OF THE STONES HEAVIER THAN 100 LB.

2.3.2. TYPE F. USE STONES BETWEEN 50 AND 250 LB., WITH AT LEAST 40% OF THE STONES HEAVIER THAN 100 LB. USE STONES WITH AT LEAST ONE BROAD FLAT SURFACE.

2.3.3. COMMON. USE STONES BETWEEN 50 AND 250 LB. USE STONES THAT ARE AT LEAST 3 IN. IN THEIR LEAST DIMENSION. USE STONES THAT ARE AT LEAST TWICE AS WIDE AS THEY ARE THICK. WHEN SHOWN ON THE PLANS OR APPROVED, MATERIAL MAY CONSIST OF BROKEN CONCRETE REMOVED UNDER THE CONTRACT OR FROM OTHER APPROVED SOURCES. CUT EXPOSED REINFORCEMENT FLUSH WITH ALL SURFACES BEFORE PLACEMENT OF EACH PIECE OF BROKEN CONCRETE.

2.3.4. PROTECTION. USE BOULDERS OR QUARRIED ROCK THAT MEETS THE GRADATION REQUIREMENTS SHOWN IN TABLE 1. BOTH THE WIDTH AND THE THICKNESS OF EACH PIECE OF RIPRAP MUST BE AT LEAST 1/3 OF THE LENGTH. WHEN SHOWN ON THE PLANS OR AS APPROVED, MATERIAL MAY CONSIST OF BROKEN CONCRETE REMOVED UNDER THE CONTRACT OR FROM OTHER APPROVED SOURCES. CUT EXPOSED REINFORCEMENT FLUSH WITH ALL SURFACES BEFORE PLACEMENT OF EACH PIECE OF BROKEN CONCRETE. DETERMINE GRADATION OF THE FINISHED, IN-PLACE, RIPRAP STONE UNDER THE DIRECT SUPERVISION OF THE ENGINEER IN ACCORDANCE WITH ASTM D5519, TEST METHOD D, UNLESS OTHERWISE DIRECTED.

PROTECTION RIPRAP STONE SIZE

NOMINAL SIZE	Dmax (in)	D90 (in)	D50 (in)	D8 (in)
12in	13.76	10.14-13.29	7.31-9.92	3.39

PROVIDE BEDDING STONE THAT, IN PLACE, MEETS THE GRADATION REQUIREMENTS SHOWN IN TABLE 3 OR AS OTHERWISE SHOWN ON THE PLANS. IF THE NOMINAL SIZE OF THE PROTECTION RIPRAP IS LESS THAN OR EQUAL TO 30 IN., VERIFY THE GRADATION OF THE BEDDING MATERIAL IN ACCORDANCE WITH TEX-401-A UNLESS OTHERWISE DIRECTED. IF THE NOMINAL SIZE OF THE PROTECTION RIPRAP IS EQUAL TO 36 IN., VERIFY THE GRADATION OF THE BEDDING MATERIAL IN ACCORDANCE WITH ASTM D5519, TEST METHOD D, UNLESS OTHERWISE DIRECTED.

PROTECTION RIPRAP BEDDING MATERIAL GRADATION REQUIREMENTS

SIEVE SIZE, (SQ. MESH)	% BY WEIGHT PASSING
3"	100
1-1/2"	50-80
3/4"	20-60
#4	0-15
#10	0-5

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life — middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA — CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN DETAILS AND SPECIFICATIONS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-006 — REV: 00C

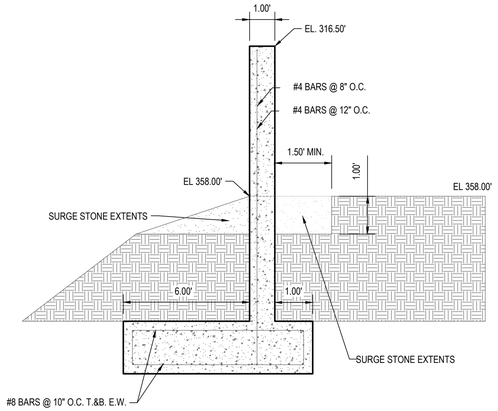
DRAWING SCALE: AS NOTED

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MIDDOUGH PROJ.#: MEU2510

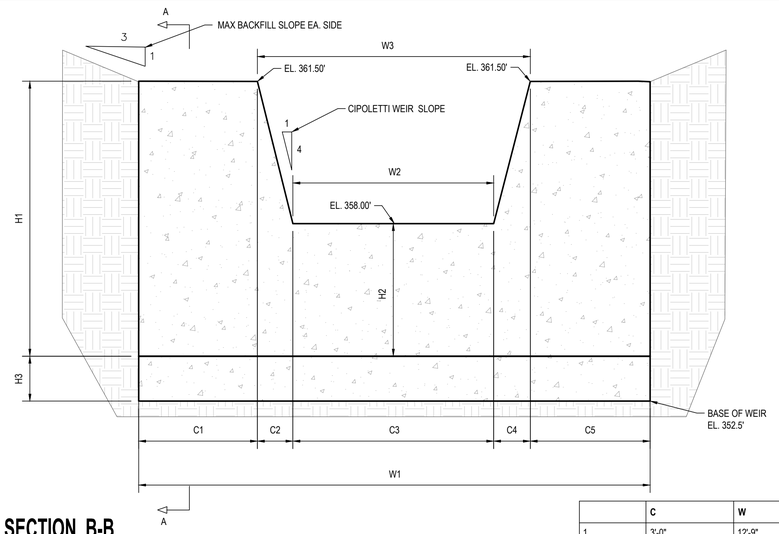
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PERMANENT OUTLET STRUCTURE WEIR WALL DETAIL



SECTION A-A

SCALE: N.T.S.

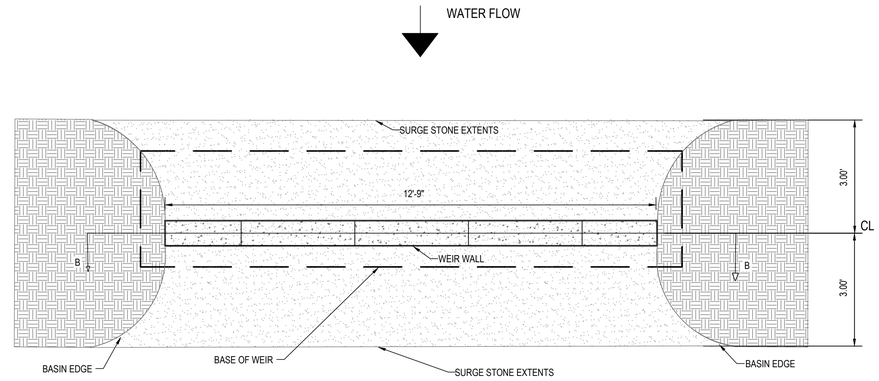


SECTION B-B

SCALE: N.T.S.

KEY NOTES:
1. SEE DRAWING 566901-C-D-008-001 FOR GENERAL NOTES AND SPECIFICATIONS.

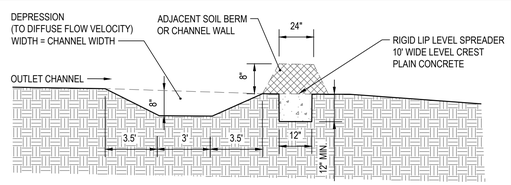
	C	W	H
1	3'-0"	12'-9"	6'-6"
2	0'-10.5"	5'-0"	3'-0"
3	5'-0"	6'-9"	2'-0"
4	0'-10.5"		
5	3'-0"		



PLAN VIEW

SCALE: N.T.S.

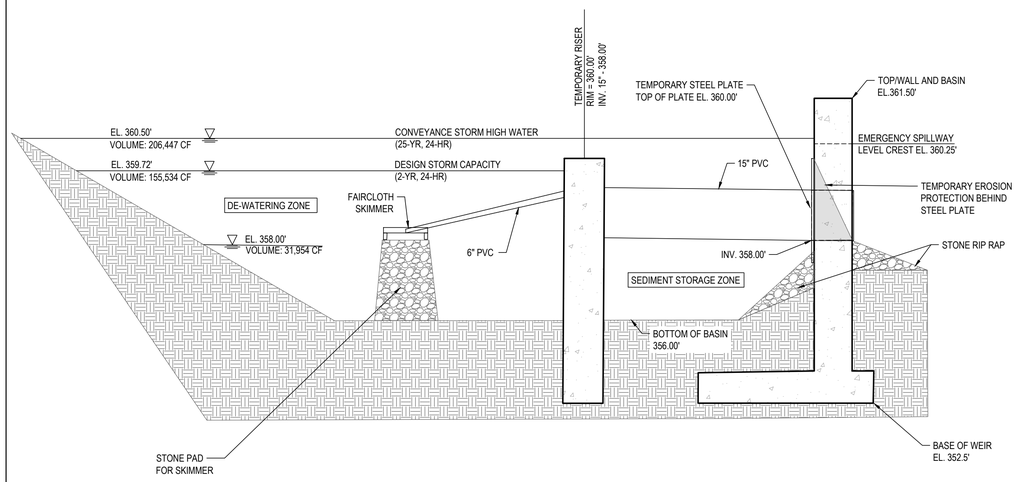
NOTES:
1. ROCK IN LEVEL SPREADER SHALL BE COMPACTED WITH AT THE LAST TWO PASSES OF HEAVY MACHINERY TO PREVENT FURTHER SETTLING. SPREADER GRAVEL OR SOIL OVER TOP IF THE PLACED RIPRAP SURFACE TO FILL THE VOIDS AND INTERLOCK THE RIPRAP TOGETHER.
2. FERTILIZING, SEDDING AND MULCHIN SHALL CONFORM TO THE RECOMMENDATIONS IN THE APPLICABLE VEGETATIVE SPECIFICATIONS.



LEVEL SPREADER DETAIL

SCALE: N.T.S

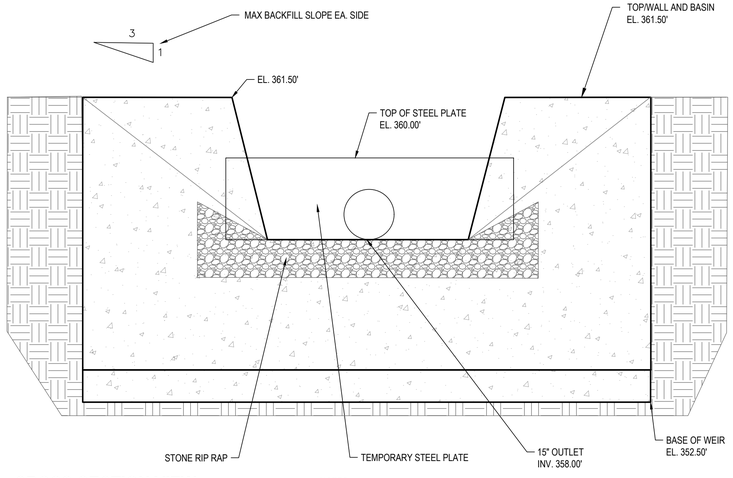
TEMPORARY OUTLET STRUCTURE WEIR WALL DETAIL



TEMPORARY SEDIMENT BASIN WEIR WALL DETAIL

SCALE: N.T.S.

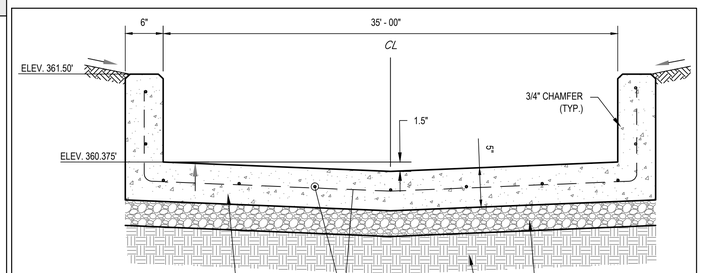
NOTES:
1. THE LOCATION OF THE TEMPORARY RISER SHALL BE DETERMINED BY THE CONTRACTOR BASED ON FIELD CONDITIONS.
2. THE SKIMMER SYSTEM SHALL BE CONNECTED TO THE RISER SYSTEM.



CROSS-SECTION VIEW

SCALE: N.T.S.

NOTES:
1. SECURE TEMPORARY STEEL PLATE TO CONCRETE STRUCTURE USING POST-INSTALLED STAINLESS STEEL ANCHORING SYSTEM (BOLTS AND NUTS) AND SILICONE SEALANT AT THE INTERFACE.
2. REFER TO DRAWING 567201-ZD-D-008-008 FOR GENERAL NOTES AND SPECIFICATIONS.
3. REFER TO PERMANENT OUTLET STRUCTURE WEIR WALL DETAIL, THIS SHEET FOR CONCRETE STRUCTURE DIMENSIONS.
4. SECURE 15" PIPE TO STEEL PLATE USING FLEXIBLE COUPLINGS ON EACH SIDE OF STEEL PLATE. APPLY SILICONE SEALANT AROUND THE CIRCUMFERENCE OF THE PIPE.



NOTE: SAWED CONTROL JOINTS SHALL NOT EXCEED 10' C-C.

EMERGENCY SPILLWAY OUTLET DETAIL

SCALE: N.T.S

STATE OF TEXAS
JOSEPH MICHEL KHATER
95739
LICENSED
PROFESSIONAL ENGINEER
04/17/2026

NO.	DATE	REVISIONS
00C	04/17/26	ISSUED FOR PERMIT
00B	11/14/25	ISSUED FOR BID
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS FIRM NUMBER: F-4433

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER POLLUTION PREVENTION PLAN DETAILS AND SPECIFICATIONS

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/2025

DRAWING NO.: 566901-C-D-009-007
REV.: 00C

DRAWING SCALE: AS NOTED

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THIS DRAWING REQUIRES REVIEW AGENCY APPROVAL PRIOR TO RELEASE FOR CONSTRUCTION

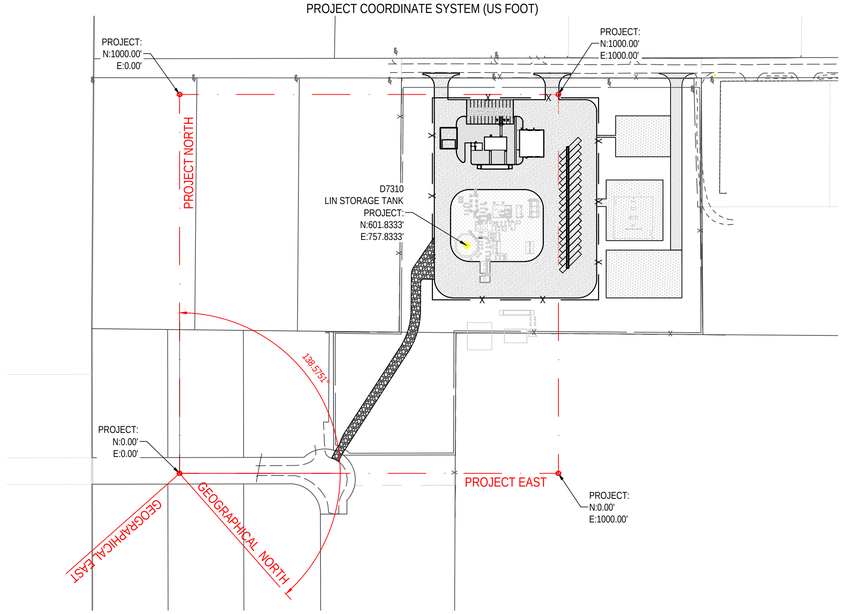
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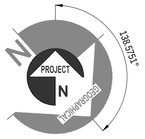
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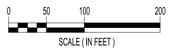
Attachment E

Reference Drawings

PROJECT COORDINATE SYSTEM (US FOOT)







EXISTING CONDITIONS AND CAD MODELING:

THE TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT BY KERR SURVEYING DATED 6/18/2025, PRODUCED USING CONVENTIONAL GROUND SURVEY TECHNIQUES AND SUPPLEMENTED WITH ORTHO-RECTIFIED IMAGERY AND SURFACE INFORMATION OBTAINED BY AERIAL DRONE LIDAR METHODS WERE USED FOR THE PREPARATION OF THE EXISTING CONDITIONS CAD MODELING FOR THIS PROJECT.

GEOGRAPHICAL COORDINATES:

PER THE TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT, THE GEOGRAPHIC COORDINATE SYSTEM IS BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (4203), GRID NORTH AS ESTABLISHED FROM GPS OBSERVATION USING THE LEICA SMARTNET NAD83 (NA2011) EPOCH 2010 MULTI-YEAR CORS SOLUTION 2 (MYCS2).

VERTICAL ELEVATION DATUM:

THE VERTICAL ELEVATION DATUM USED IS NAVD 1988 (GEOIDID12B).

GEOGRAPHICAL AND PROJECT HORIZONTAL COORDINATES AND ELEVATION DATUM:

PROJECT COORDINATES AND ELEVATIONS HAVE BEEN ESTABLISHED IN ADDITION TO THE GEOGRAPHICAL COORDINATES AND ELEVATIONS. THE CIVIL SERIES DRAWINGS UTILIZE THE GEOGRAPHICAL COORDINATE SYSTEM. THE REMAINDER OF THE DISCIPLINE SPECIFIC DRAWINGS UTILIZE THE PROJECT COORDINATE SYSTEM. CIVIL DRAWINGS USE THE NAVD88 ELEVATION DATUM AND THE OTHER MIDDOUGH DISCIPLINE DRAWINGS USE THE PROJECT ELEVATION DATUM.

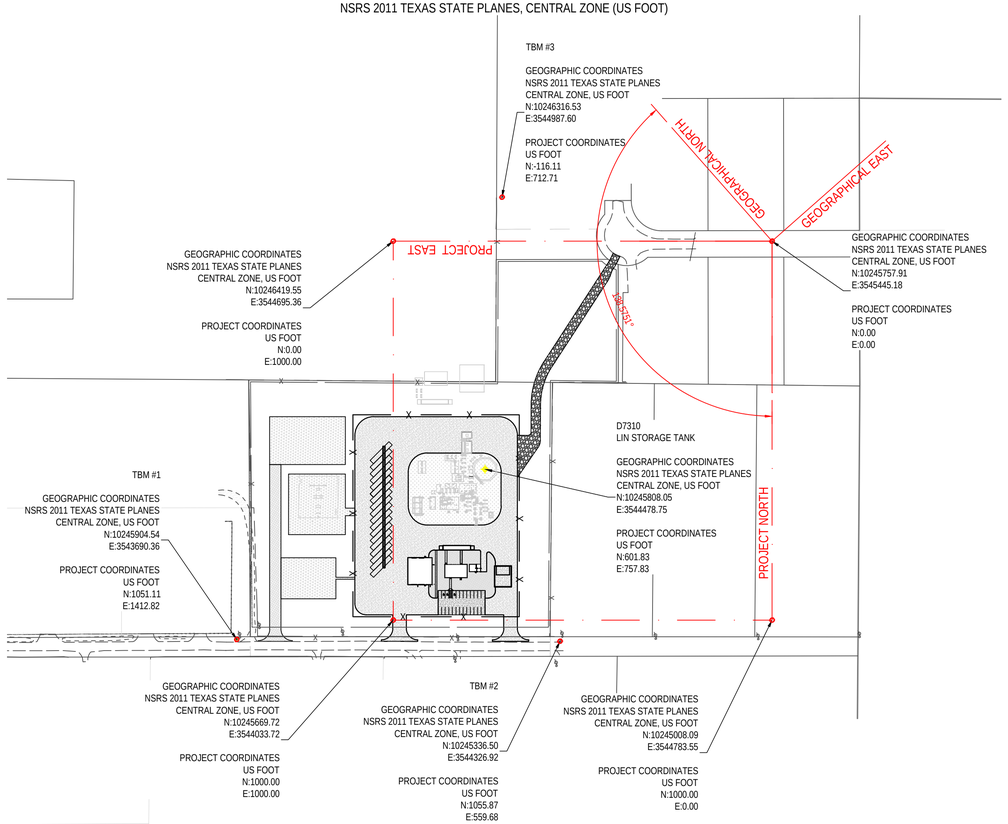
366.75' (NAVD 88) = 100.00' (PROJECT)
SUBTRACT 266.75 FEET FROM GEOGRAPHICAL ELEVATIONS TO OBTAIN PROJECT ELEVATIONS.
ADD 266.75 FEET TO PROJECT ELEVATIONS TO OBTAIN GEOGRAPHICAL ELEVATIONS.

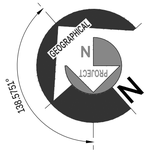
THE PROJECT COORDINATE GRID SYSTEM, IDENTIFIED BY COORDINATES (0,0), (0,1000), (1000,0) & (1000,1000) ARE SET RELATIVE TO PROJECT CONDITIONS (PROPERTY LINES, ETC.) AND THE CENTER OF THE D7310 LIN STORAGE TANK. NO PHYSICAL CONTROL POINTS HAVE BEEN SET IN THE FIELD FOR THESE PROJECT COORDINATES SHOWN.

CONTROL POINTS:

AS SHOWN ON THIS DRAWING, THREE TEMPORARY CONTROL POINTS (TBM #1, TBM#2, AND TBM#3) HAVE BEEN SET BY KERR SURVEYING. PROJECT COORDINATES HAVE BEEN ASSIGNED TO THESE POINTS TO AID THE CONTRACTOR IN ESTABLISHING THE PROJECT COORDINATE GRID SYSTEM. THE CONTRACTOR IS RESPONSIBLE TO VERIFY THE PROVIDED COORDINATES, BY SURVEYING METHODS, PRIOR TO CONSTRUCTION. IT SHALL ALSO BE THE CONTRACTORS RESPONSIBILITY TO ESTABLISH HIS OWN PERMANENT CONTROL POINTS/BENCHMARKS FOR CONSTRUCTION PURPOSES.

NSRS 2011 TEXAS STATE PLANES, CENTRAL ZONE (US FOOT)







00C REPLACED "PLANT" TEXT WITH "PROJECT"

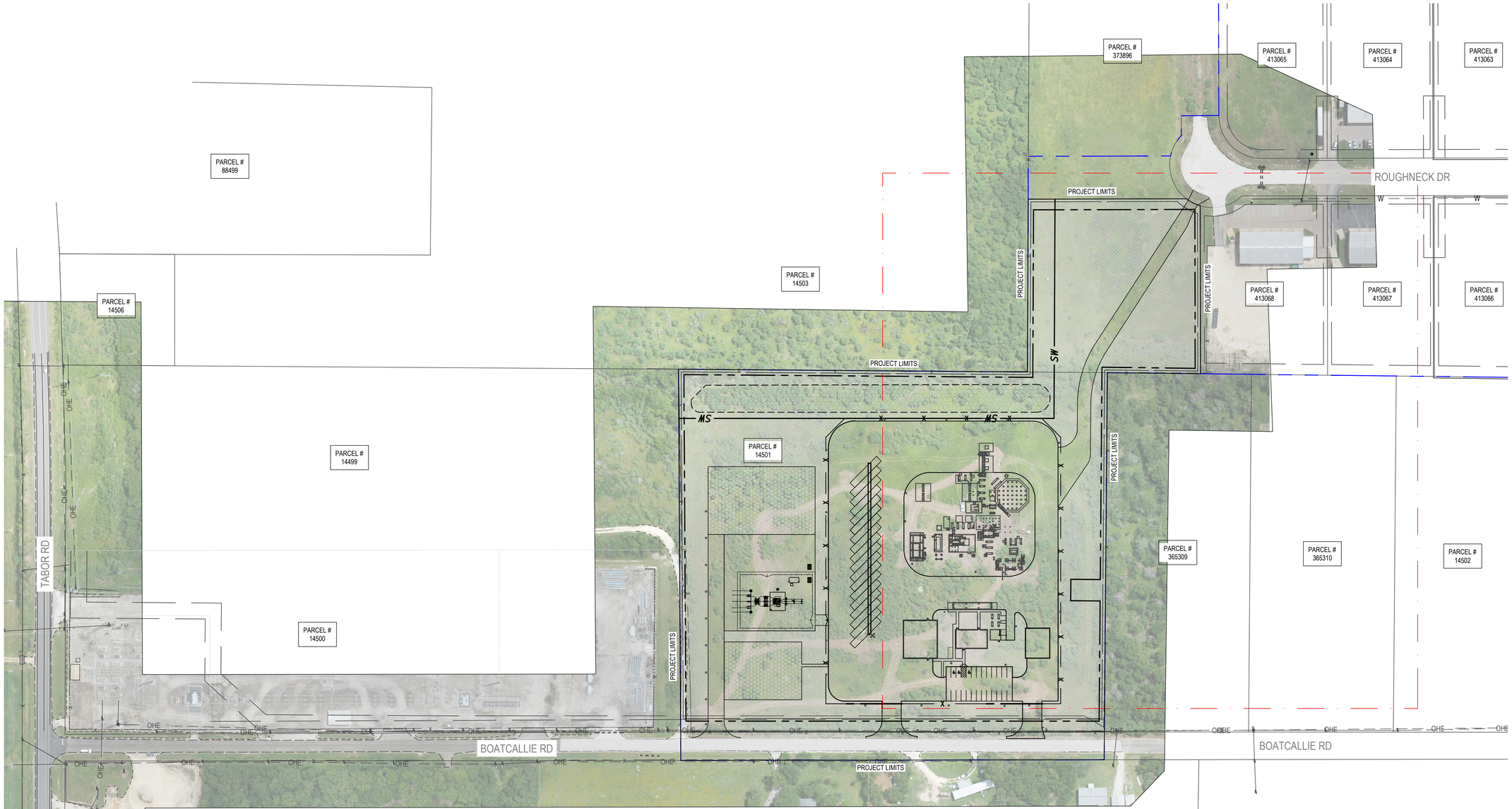
NO.	DATE	REVISIONS
00C	08/12/25	FOR DESIGN
00B	08/04/25	FOR DESIGN
00A	07/29/25	DRAFT- FOR COORDINATION

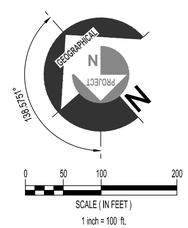
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: GEOGRAPHICAL/PROJECT COORDINATE TRANSFORMATION

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		07/29/25

DRAWING NO.: 566901-ZD-D-001-001
REV.: 00C
DRAWING SCALE: AS NOTED
MIDDOUGH PROJ.#: MEU2510

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Texas 811
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NO.	DATE	REVISIONS
00D	04/17/26	FOR REVIEW AND COORDINATION
00C	11/14/25	FOR REVIEW AND COORDINATION
00B	10/01/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: SITE VICINITY PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

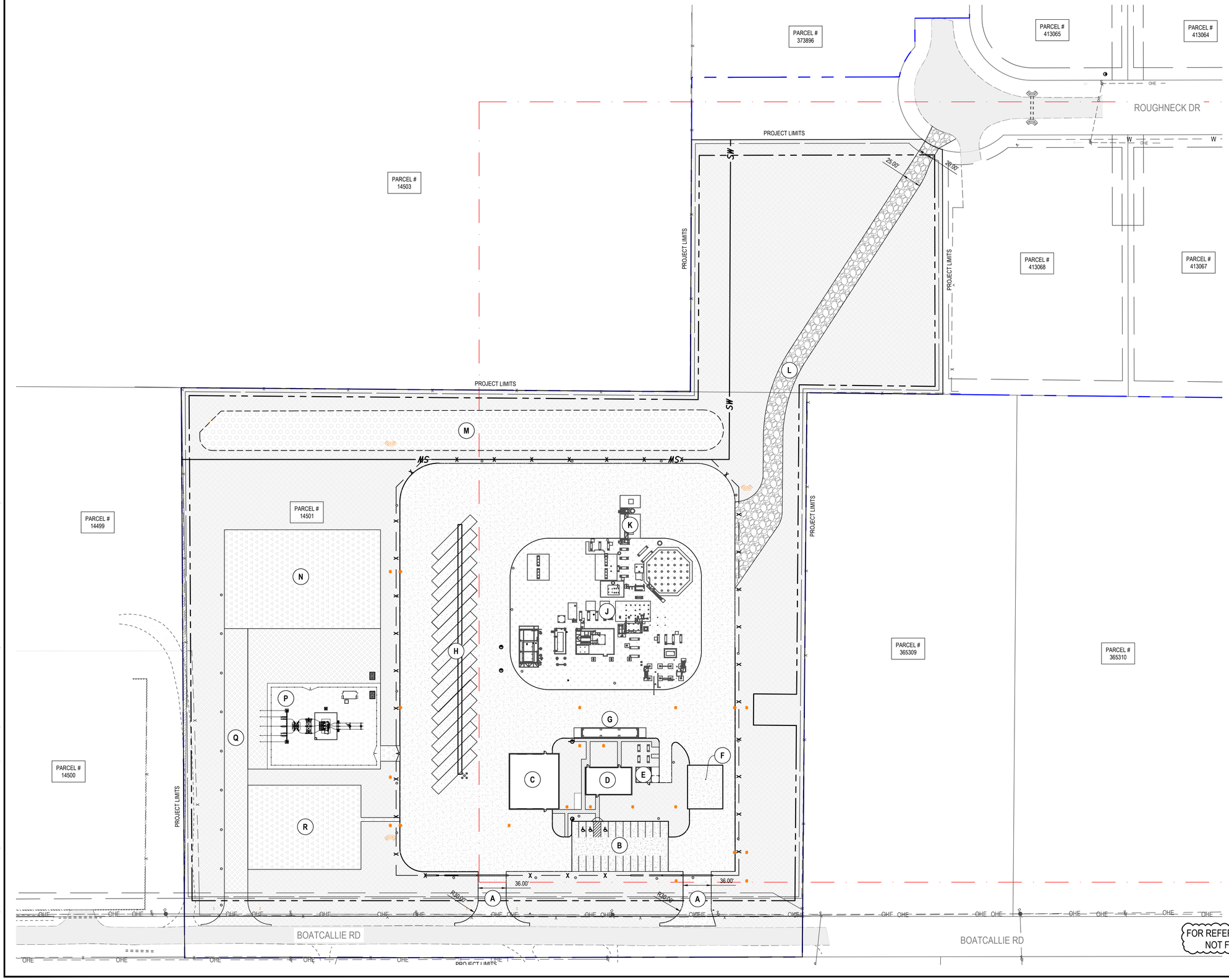
DRAWING NO.: 566901-ZD-D-900-001
REV.: 00D

FOR REFERENCE PURPOSES ONLY
NOT FOR CONSTRUCTION

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

KEYED NOTES:

- (A) PERMANENT ONE-WAY FACILITY DRIVE ACCESS
- (B) FACILITY PARKING LOT
- (C) TRUCK MAINTENANCE BUILDING; SEQUENCE BUILDING CONSTRUCTION OPERATIONS TO FACILITATE COMPLETION OF THE TRUCK MAINTENANCE BUILDING AS AN EARLY PHASE OF CONSTRUCTION FOR STORAGE PURPOSES
- (D) ADMINISTRATION BUILDING
- (E) WORKSHOP
- (F) DIESEL FUELING STATION
- (G) TRUCK WEIGH SCALE
- (H) TRUCK PARKING TO BE COMPLETED AS A LATE STAGE OF CONSTRUCTION TO ALLOW ADDITIONAL TEMPORARY LAYDOWN AREA AS REQUIRED.
- (J) AIR SEPARATION UNIT (ASU); SEQUENCE EQUIPMENT CONSTRUCTION OPERATIONS TO FACILITATE FLAT BOTTOM TANK FOUNDATION AS AN EARLY PHASE OF CONSTRUCTION.
- (K) PRODUCT LOADING / UNLOADING
- (L) TEMPORARY CONSTRUCTION ACCESS DRIVE
- (M) STORMWATER MANAGEMENT BASIN
- (N) TEMPORARY SUBSTATION LAYDOWN
- (P) PERMANENT SUBSTATION
- (Q) PERMANENT DRIVEWAY
- (R) TEMPORARY CONTRACTOR PARKING AREA

Texas 811 — Know what's below. Call before you dig.

GEOGRAPHIC PROJECT NORTH — 139.51°

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

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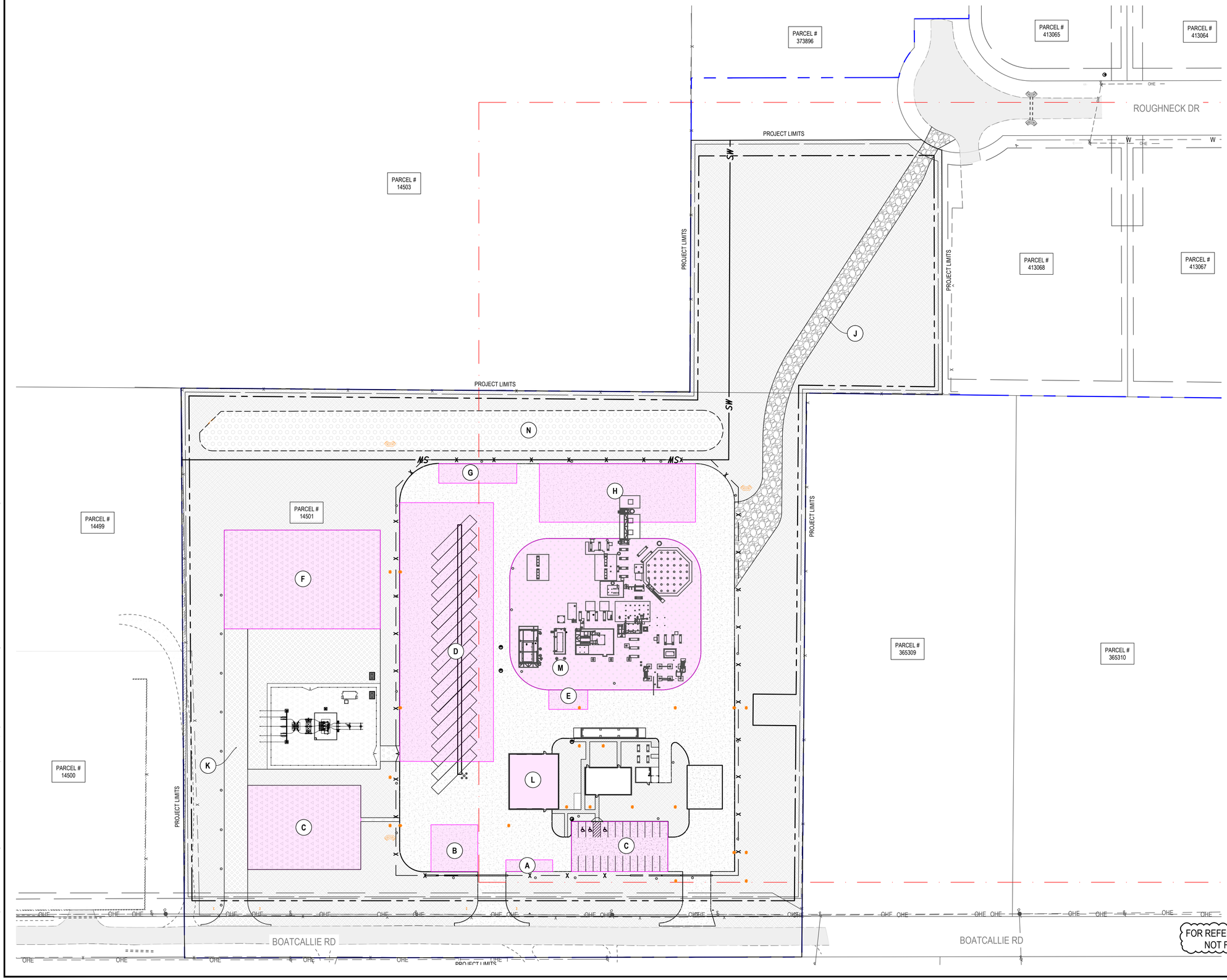
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00C	11/14/25	FOR REVIEW AND COORDINATION
00B	10/01/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

MESSER Gases for Life — middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: SITE PLOT PLAN
DRAWN BY: MIDD
CHECKED BY: KPS
APPROVED BY:
SHEET ISSUE DATE: 08/22/2025
DRAWING NO.: 566901-ZD-D-900-002
REV.: 00D
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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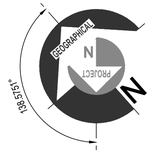


SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA [BY OTHERS], TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
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	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

KEYED NOTES:

- (A) TEMPORARY MESSER CONSTRUCTION TRAILER
- (B) TEMPORARY CONSTRUCTION TRAILERS
- (C) TEMPORARY CONTRACTOR PARKING
- (D) TEMPORARY EQUIPMENT LAYDOWN
- (E) TEMPORARY WELD HOOCH
- (F) TEMPORARY SUBSTATION LAYDOWN
- (G) TEMPORARY ELECTRICAL LAYDOWN
- (H) TEMPORARY FLAT BOTTOM TANK LAYDOWN AND FABRICATION (PROVIDE SPACE TO FABRICATE TWO 60' DIAMETER ROOFS)
- (J) TEMPORARY CONSTRUCTION ACCESS DRIVE
- (K) PERMANENT DRIVEWAY
- (L) TRUCK MAINTENANCE BUILDING; SEQUENCE BUILDING CONSTRUCTION OPERATIONS TO FACILITATE COMPLETION OF THE TRUCK MAINTENANCE BUILDING AS AN EARLY PHASE OF CONSTRUCTION FOR STORAGE PURPOSES
- (M) AIR SEPARATION UNIT (ASU); SEQUENCE EQUIPMENT CONSTRUCTION OPERATIONS TO FACILITATE FLAT BOTTOM TANK FOUNDATION AS AN EARLY PHASE OF CONSTRUCTION.
- (N) STORMWATER MANAGEMENT BASIN



0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

FOR REFERENCE PURPOSES ONLY
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DRAWING SCALE: AS NOTED

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00D	04/17/26	FOR REVIEW AND COORDINATION
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00B	10/01/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

MESSER Gases for Life
middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

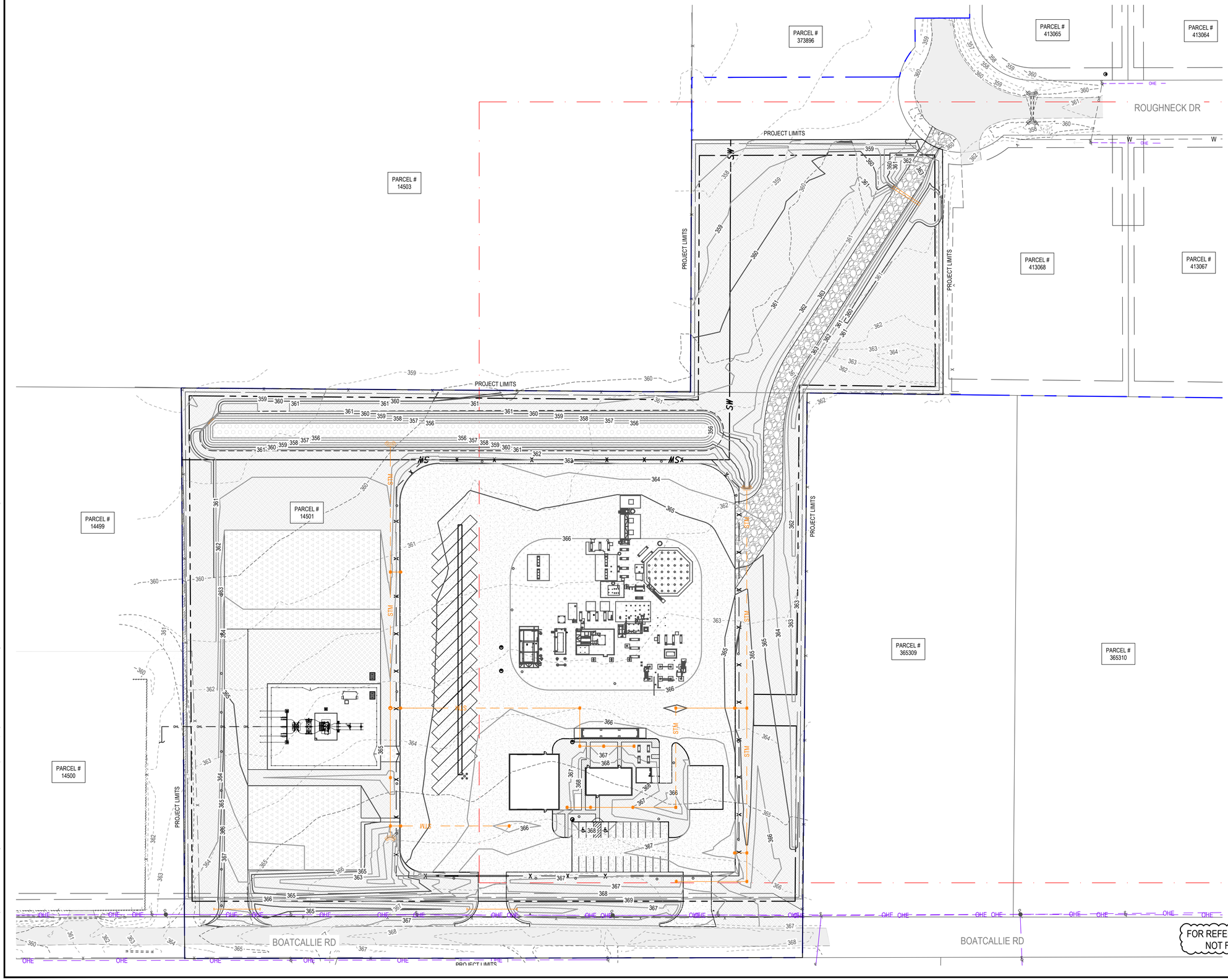
DESCRIPTION: CONSTRUCTION ACCESS PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

DRAWING NO.: 566901-ZD-D-900-003
REV.: 00D

MIDDOUGH PROJ.#: MEU2510

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SURFACE COVER LEGEND

PATTERN	DESCRIPTION
	PROPOSED TEMPORARY AGGREGATE DRIVEWAY (CONSTRUCTION ACCESS) TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION.
	PROPOSED CONCRETE PAVEMENT
	EXISTING ASPHALT PAVEMENT
	PROPOSED AGGREGATE (TEMPORARY SUBSTATION LAYDOWN AREA, PERMANENT SUBSTATION AREA (BY OTHERS), TEMPORARY CONTRACTOR PARKING AREA). TEMPORARY AGGREGATE TO BE CONVERTED TO SEEDED AREA FOLLOWING CONSTRUCTION
	PROPOSED PERMANENT AGGREGATE ACCESS DRIVEWAY (SERVING THE TEMPORARY SUBSTATION LAYDOWN AREA, TEMPORARY CONTRACTOR PARKING AREA AND PERMANENT SUBSTATION AREA)
	PROPOSED PERMANENT AGGREGATE (ASU AREA)
	PROPOSED SEEDED AREA
	PROPOSED CONCRETE SIDEWALK
	PROPOSED STORMWATER MANAGEMENT BASIN

UTILITY SYMBOL LEGEND

PROPOSED SYMBOL	
STM	PROPOSED STORM SEWER
OHE	EXISTING OVERHEAD ELECTRIC

GRADING LEGEND

SYMBOL / ID	DESCRIPTION
752	EXISTING SURFACE CONTOUR
752	PROPOSED SURFACE CONTOUR
XXX.XX' E.G. / XXX.XX' P.G.	E.G.=EXISTING GRADE P.G.=PROPOSED GRADE

CAUTION-EXISTING UNDERGROUND UTILITIES IN AREA OF CONSTRUCTION:

PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL FIELD VERIFY THE AS-BUILT LOCATIONS AND ELEVATIONS OF ALL EXISTING UTILITIES IN THE WORK AREAS BY POTHOLING OR EXCAVATION METHODS. REPORT ANY CONFLICTS WITH THE PROPOSED UTILITY ROUTING TO THE OWNER, LINDE AND THE DESIGN ENGINEER AHEAD OF ACTUAL CONSTRUCTION. MINOR FIELD RE-ROUTING OF UTILITIES MAY BE ACCEPTABLE AFTER COORDINATION AND APPROVAL FROM THE DESIGN ENGINEER. ANY DESIGN CHANGES SHALL BE DOCUMENTED BY THE CONTRACTOR ON AS-BUILT PRINTS TO BE PROVIDED TO LINDE.

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00B	10/01/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

GEOGRAPHICAL NORTH — PROJECT NORTH — 138.51°

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

FOR REFERENCE PURPOSES ONLY
NOT FOR CONSTRUCTION

MESSER Gases for Life — middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: PRELIMINARY GRADING PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

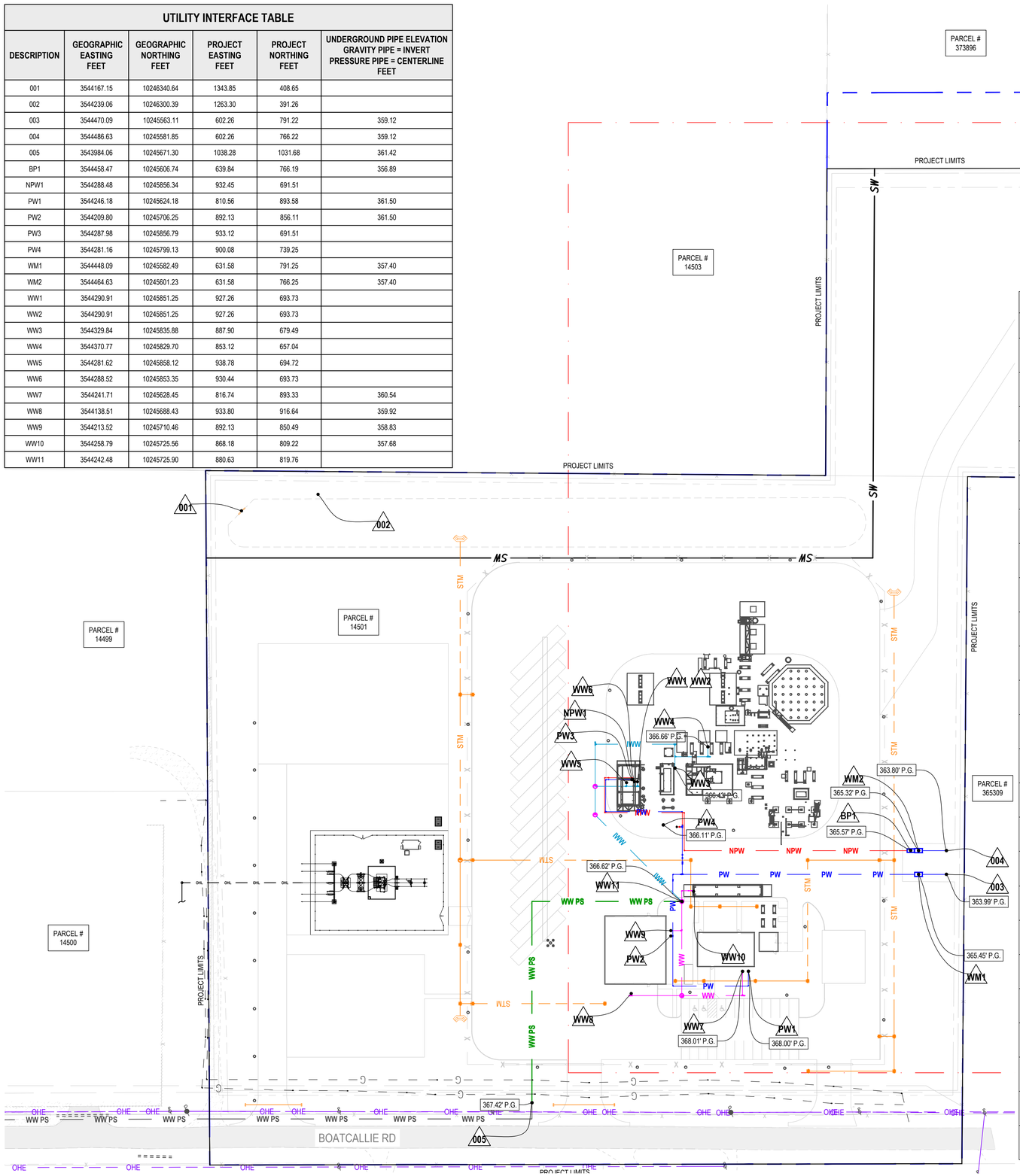
DRAWING NO.: 566901-ZD-D-900-004
REV: 00D
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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UTILITY INTERFACE TABLE

DESCRIPTION	GEOGRAPHIC EASTING FEET	GEOGRAPHIC NORTHING FEET	PROJECT EASTING FEET	PROJECT NORTHING FEET	UNDERGROUND PIPE ELEVATION GRAVITY PIPE = INVERT PRESSURE PIPE = CENTERLINE FEET
001	3544167.15	10246340.64	1343.85	408.65	
002	3544239.06	10246300.39	1263.30	391.26	
003	3544470.09	10245563.11	602.26	791.22	359.12
004	3544486.63	10245581.85	602.26	766.22	359.12
005	3543984.06	10245671.30	1038.28	1031.68	361.42
BP1	3544458.47	10245606.74	639.84	766.19	356.89
NPW1	3544288.48	10245856.34	932.45	691.51	
PW1	3544246.18	10245624.18	810.56	893.58	361.50
PW2	3544209.80	10245706.25	892.13	856.11	361.50
PW3	3544287.98	10245856.79	933.12	691.51	
PW4	3544281.16	10245799.13	900.08	739.25	
WM1	3544448.09	10245582.49	631.58	791.25	357.40
WM2	3544464.63	10245601.23	631.58	766.25	357.40
WW1	3544290.91	10245851.25	927.26	693.73	
WW2	3544290.91	10245851.25	927.26	693.73	
WW3	3544329.84	10245835.88	887.90	679.49	
WW4	3544370.77	10245829.70	853.12	657.04	
WW5	3544281.62	10245858.12	938.78	694.72	
WW6	3544288.52	10245853.35	930.44	693.73	
WW7	3544241.71	10245628.45	816.74	893.33	360.54
WW8	3544138.51	10245688.43	933.80	916.64	359.92
WW9	3544213.52	10245710.46	892.13	850.49	358.83
WW10	3544258.79	10245725.56	868.18	809.22	357.68
WW11	3544242.48	10245725.90	880.63	819.76	



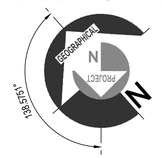
UTILITY COORDINATION TABLE

ITEM	UTILITY	DESCRIPTION
001	STORM WATER (STM)	STORM OUTFALL #001 SERVING SWM BASIN
002	STORM WATER (STM)	STORM OUTFALL #0021 SERVING SWM BASIN
003	POTABLE WATER (PW)	POTABLE WATER UNDERGROUND PIPE INTERFACE AT PUBLIC WATER SYSTEM
004	NON-POTABLE WATER (NPW)	NON-POTABLE WATER UNDERGROUND PIPE INTERFACE AT PUBLIC WATER SYSTEM
005	WASTEWATER (WW)	COMBINED INDUSTRIAL AND DOMESTIC WASTEWATER UNDERGROUND PIPE INTERFACE AT FORCE MAIN IN RIGHT-OF-WAY
WM1	POTABLE WATER (PW)	WATER METER SERVING POTABLE WATER USERS
WM2	NON-POTABLE WATER (NPW)	WATER METER SERVING NON-POTABLE WATER USERS
BP1	NON-POTABLE WATER (NPW)	BACKFLOW PREVENTOR SERVING NON-POTABLE WATER USERS
WW1	WASTEWATER (WW)	WASTEWATER STRUCTURE INSIDE COOLING TOWER BUILDING SERVING COOLING TOWER (E8421) BLOWDOWN
WW2	WASTEWATER (WW)	WASTEWATER STRUCTURE INSIDE COOLING TOWER BUILDING SERVING COOLING TOWER SIDE STREAM FILTER (S8446) BLOWDOWN
WW3	WASTEWATER (WW)	WASTEWATER STRUCTURE SERVING MAIN AIR COMPRESSOR (C1161) CONDENSATE
WW4	WASTEWATER (WW)	WASTEWATER STRUCTURE SERVING WATER SEPARATOR (D2431) DRAINAGE AND MOLSIEVE ADSORBER (A2626 A/B) DRAINAGE
WW5	WASTEWATER (WW)	WASTEWATER STRUCTURE INSIDE COOLING TOWER BUILDING SERVING SINK DRAIN AND COOLING WATER PUMP SKID (P8466 A/B) DRAINAGE
WW6	WASTEWATER (WW)	WASTEWATER STRUCTURE INSIDE COOLING TOWER BUILDING SERVING FLOOR DRAIN
WW7	WASTEWATER (WW)	WASTEWATER UNDERGROUND PIPE INTERFACE SERVING ADMINISTRATION BUILDING USERS
WW8	WASTEWATER (WW)	WASTEWATER UNDERGROUND PIPE INTERFACE AT TRUCK MAINTENANCE BUILDING FOR THE PIPE DISCHARGE FOLLOWING THE OIL/WATER INTERCEPTOR SERVING THE TRENCH DRAIN SYSTEM
WW9	WASTEWATER (WW)	WASTEWATER UNDERGROUND PIPE INTERFACE SERVING TRUCK MAINTENANCE BUILDING USERS
WW10	WASTEWATER (WW)	WASTEWATER UNDERGROUND PIPE INTERFACE SERVING SLAB DRAINAGE UNDER TRUCK SCALE
WW11	WASTEWATER (WW)	WASTEWATER LIFT STATION SERVING COMBINED INDUSTRIAL AND DOMESTIC WASTEWATER USERS
PW1	POTABLE WATER (PW)	POTABLE WATER UNDERGROUND PIPE INTERFACE SERVING ADMINISTRATION BUILDING USERS
PW2	POTABLE WATER (PW)	POTABLE WATER UNDERGROUND PIPE INTERFACE SERVING TRUCK MAINTENANCE BUILDING USERS
PW3	POTABLE WATER (PW)	POTABLE WATER RISER AT COOLING WATER TOWER BUILDING SERVING UTILITY SINK AND SAFETY SHOWER & EYE WASH USE
PW4	POTABLE WATER (PW)	POTABLE WATER TO FIRE HYDRANT WAT-HY-03.01-01
NPW1	NON-POTABLE WATER (NPW)	NON-POTABLE WATER TO COOLING TOWER E8421 SERVING MAKE-UP WATER USE

UTILITY SYMBOL LEGEND

PROPOSED SYMBOL	DESCRIPTION
WW / WW	PROPOSED WASTEWATER LATERAL
WW PS / WW PS	PROPOSED WASTEWATER PRESSURE SEWER
STM	PROPOSED STORM SEWER
NPW / NPW	PROPOSED NON-POTABLE WATER LINE
PW / PW	PROPOSED POTABLE WATER
IWW / IWW	PROPOSED INDUSTRIAL WASTEWATER
G	EXISTING NATURAL GAS
OHE	EXISTING OVERHEAD ELECTRIC

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00F	01/22/26	FOR REVIEW AND COORDINATION
00E	11/14/25	FOR REVIEW AND COORDINATION
00D	10/17/25	FOR REVIEW AND COORDINATION
00C	10/01/25	FOR REVIEW AND COORDINATION
00B	09/22/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

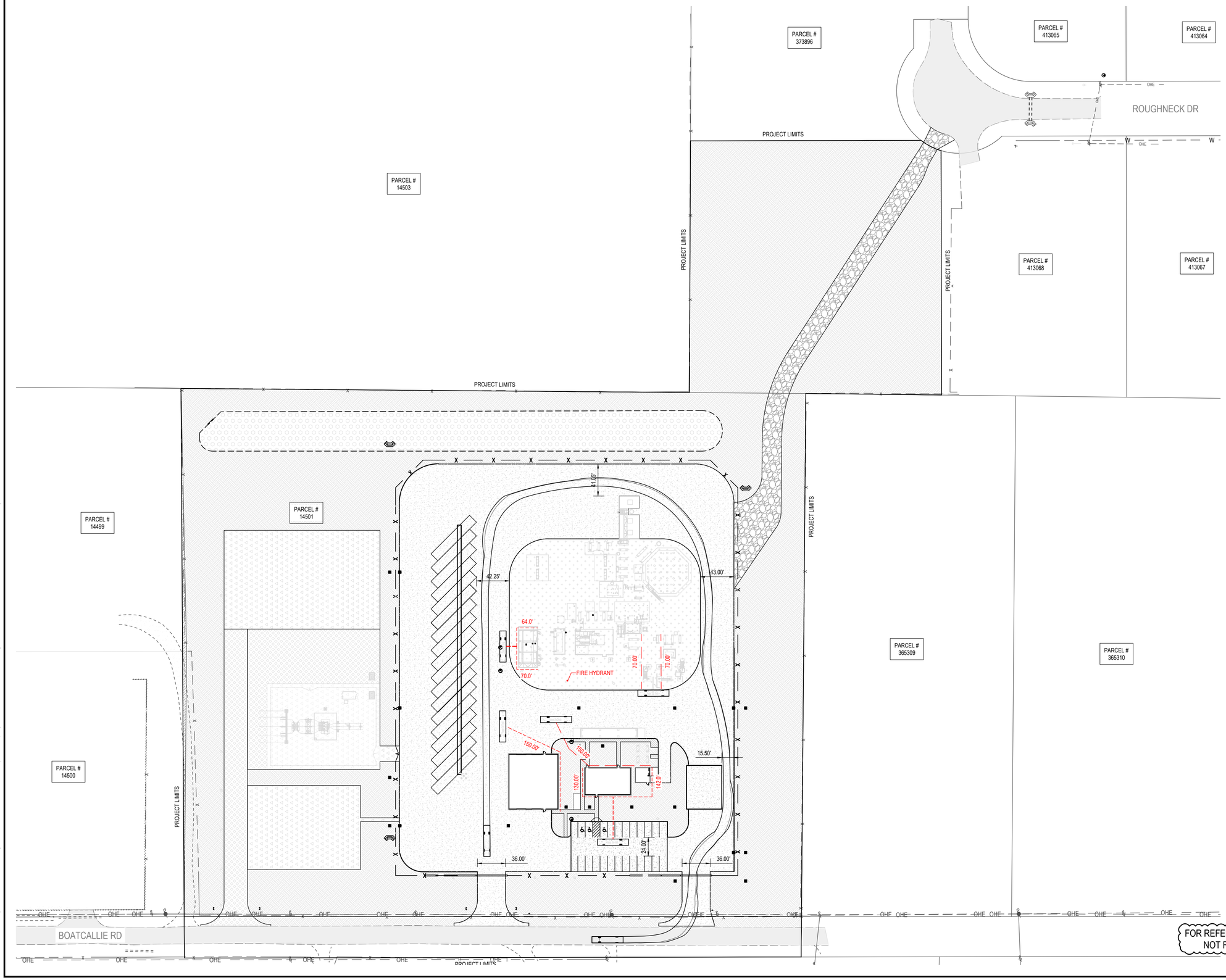
MESSER Gases for Life
middough PROJECT SOLUTIONS

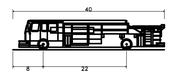
CLIENT: MESSER NA
CLIENT PROJ #: 566901
PROJECT: BRYAN ASU
DESCRIPTION: PRELIMINARY UTILITY PLAN UTILITY COORDINATION

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

DRAWING NO.: 566901-ZD-D-900-005
REV.: 00G
DRAWING SCALE: AS NOTED
MIDDOUGH PROJ.#: MEU2510

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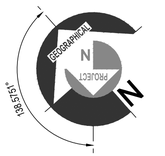




Pumper Fire Truck	
Overall Length	40.000ft
Overall Width	8.167ft
Overall Body Height	7.745ft
Min Body Ground Clearance	0.656ft
Track Width	8.167ft
Lock-to-lock time	5.00s
Max Wheel Angle	45.00°

SYMBOL LEGEND

PROPOSED SYMBOL	DESCRIPTION
XX.X'	FIRE TRUCK VEHICLE LAY-OF-HOSE DISTANCE



0 30 60 120

SCALE (IN FEET)
1 inch = 60 ft.

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NO	DATE	REVISIONS
00E	04/17/26	FOR REVIEW AND COORDINATION
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MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

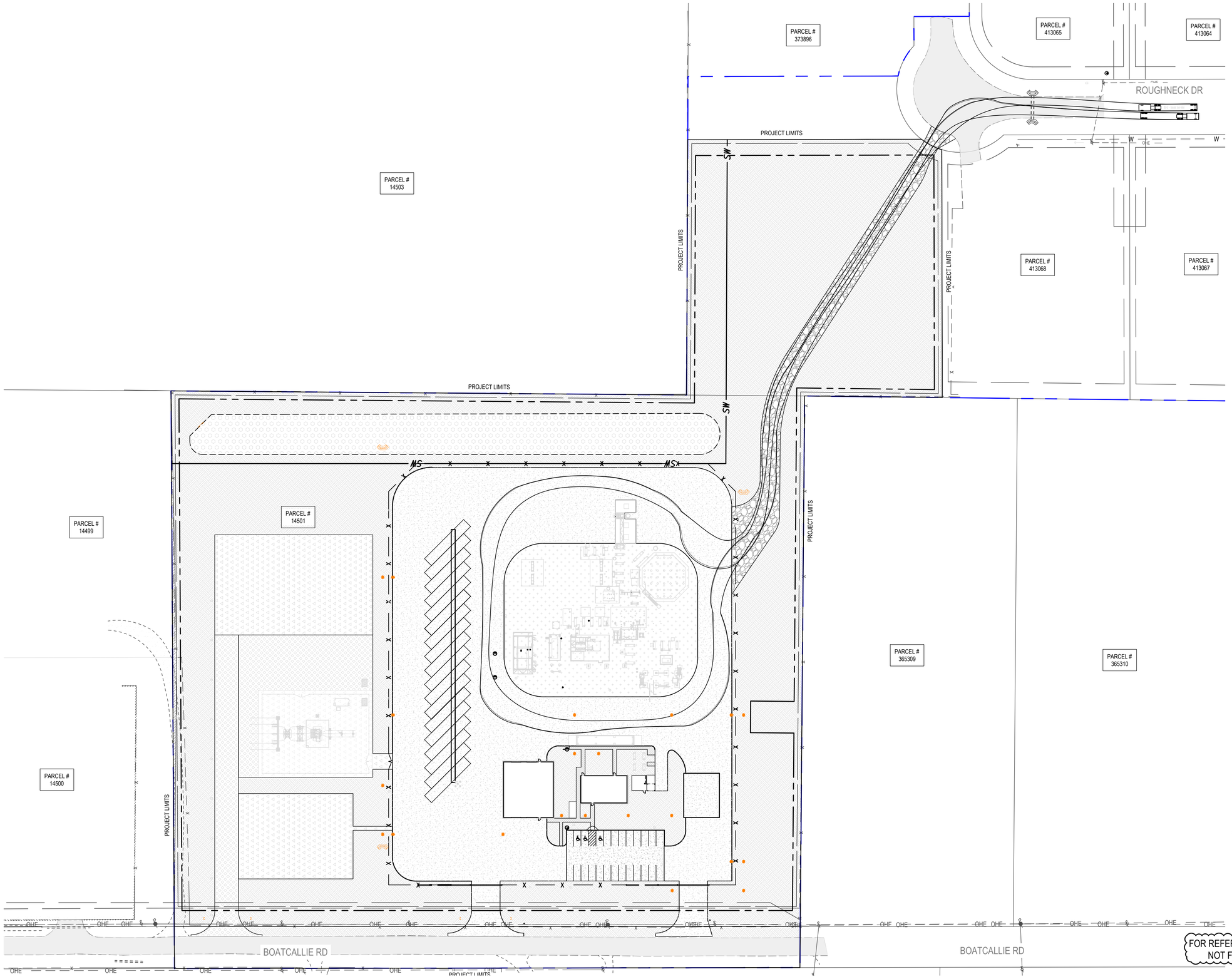
DESCRIPTION: VEHICLE TURN PLAN EMERGENCY VEHICLES

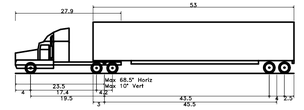
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

DRAWING NO.: 566901-ZD-D-900-006
REV.: 00E

MIDDOUGH PROJ.#: MEU2510

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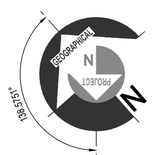




WB-67 - Interstate Semi-Trailer

Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

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0 30 60 120

SCALE (IN FEET)
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00A	08/22/25	FOR REVIEW AND COORDINATION

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

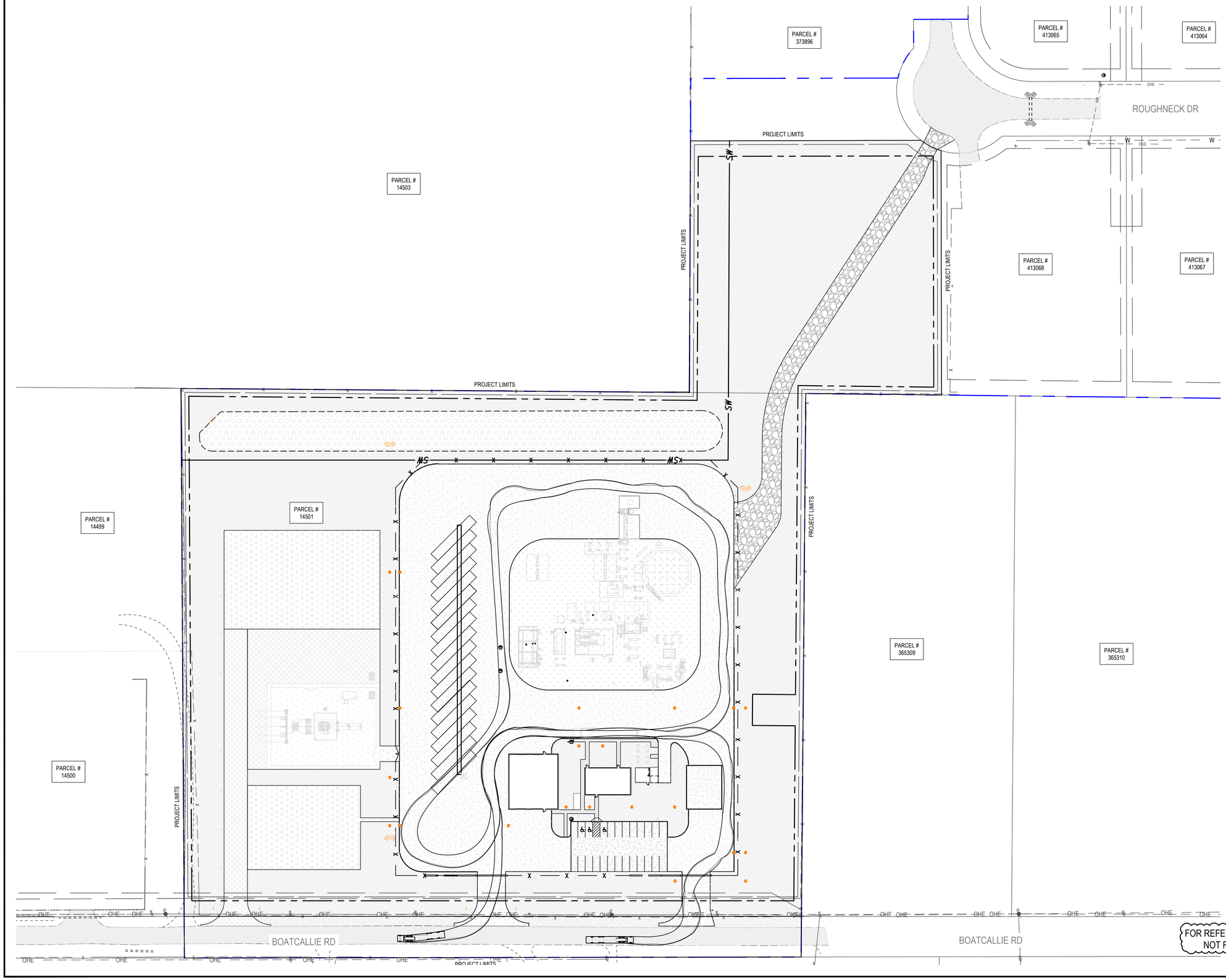
DESCRIPTION: VEHICLE TURN PLAN CONSTRUCTION ACCESS

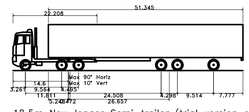
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MIDD	KPS		08/22/2025

DRAWING NO.: 566901-ZD-D-900-007
REV.: 00D

MIDDOUGH PROJ.#: MEU2510

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18.5m New longer Semi-trailer (trial version only) Volvo/Muldoon

Overall Length	60.697ft
Overall Width	8.366ft
Overall Body Height	12.117ft
Min Body Ground Clearance	1.087ft
Max Track Width	8.366ft
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	24.442ft

Texas 811 Know what's below. Call before you dig.

NO.	DATE	REVISIONS
00D	04/17/26	FOR REVIEW AND COORDINATION
00C	11/14/25	FOR REVIEW AND COORDINATION
00B	10/01/25	FOR REVIEW AND COORDINATION
00A	08/22/25	FOR REVIEW AND COORDINATION

GEOGRAPHIC N / PROJECT N, 136.525°

0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

FOR REFERENCE PURPOSES ONLY
NOT FOR CONSTRUCTION

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ.#: 566901

PROJECT: BRYAN ASU

DESCRIPTION: VEHICLE TURN PLAN OPERATIONS TRUCK ROUTING

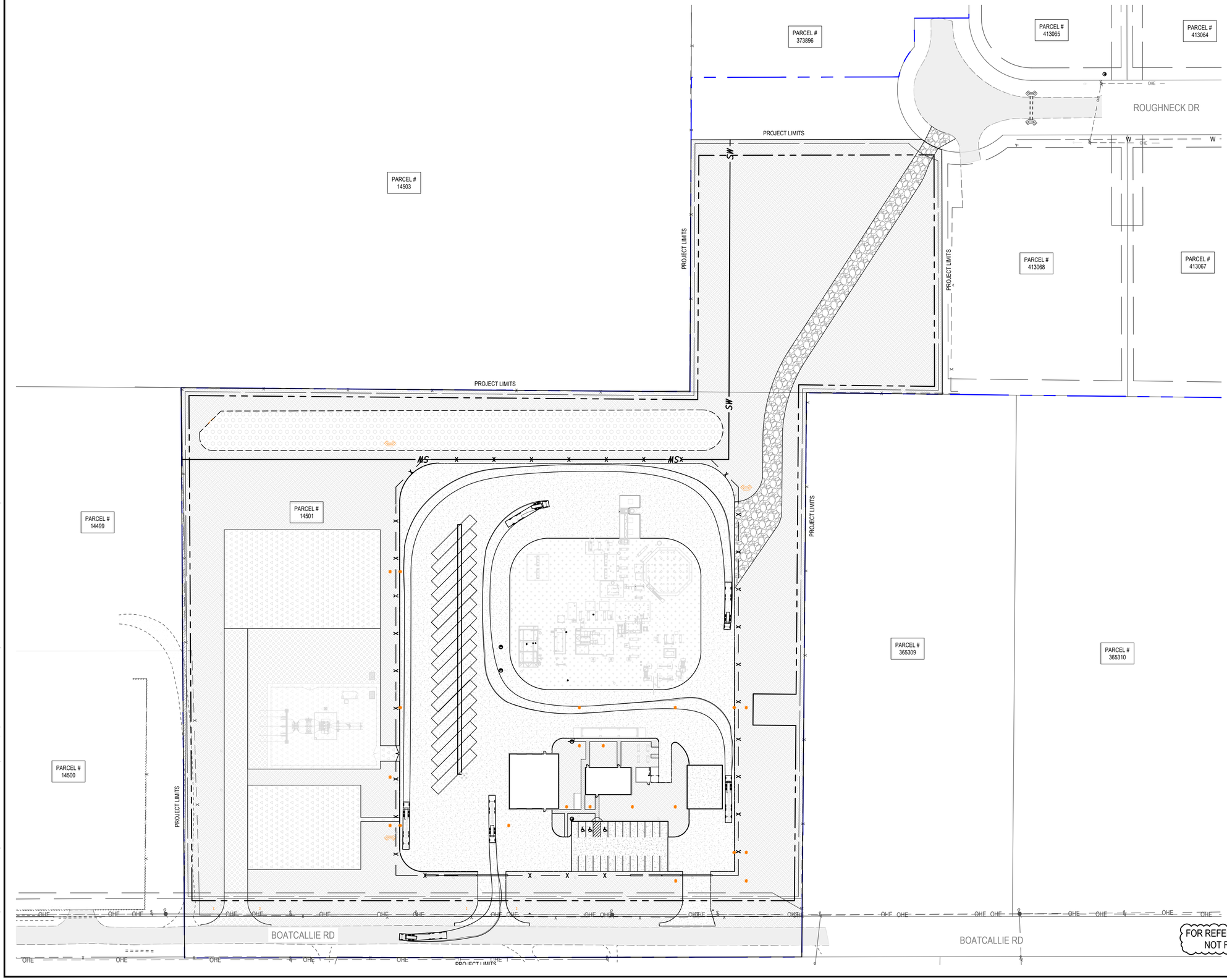
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MIDD	KPS		08/22/2025

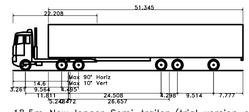
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REV.: 00D

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

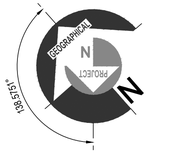
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18.5m New longer Semi-trailer (trial version only) Volvo/Muldoon

Overall Length	60.697ft
Overall Width	8.366ft
Overall Body Height	12.117ft
Min Body Ground Clearance	1.087ft
Max Track Width	8.366ft
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	24.442ft



0 30 60 120

SCALE (IN FEET)
1 inch = 60 ft.

FOR REFERENCE PURPOSES ONLY
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Texas 811
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NO.	DATE	REVISIONS
00D	04/17/26	FOR REVIEW AND COORDINATION
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middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ.#: 566901

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DESCRIPTION: VEHICLE TURN PLAN OPERATIONS TRUCK ROUTING

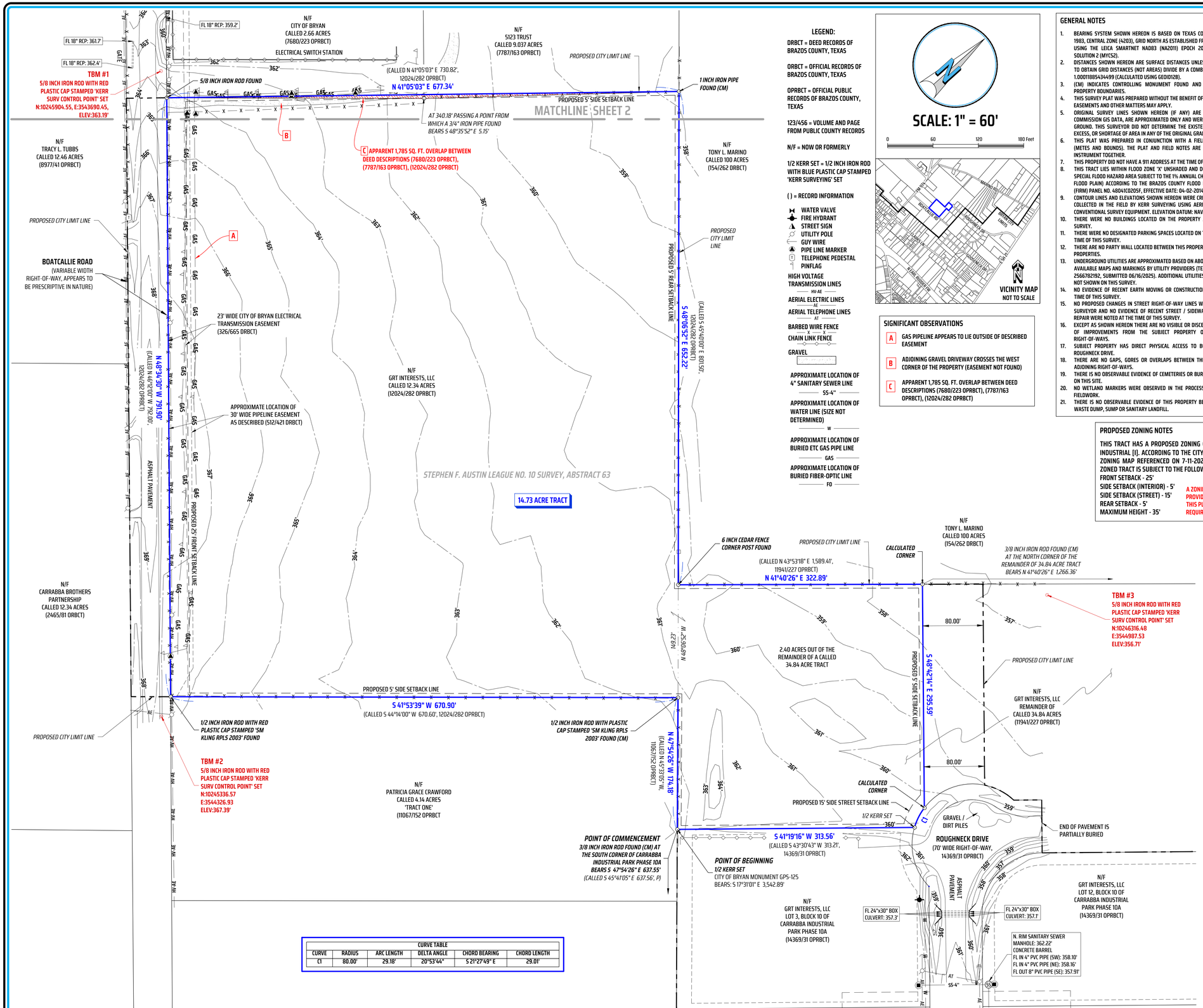
DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		08/22/2025

DRAWING NO.: 566901-ZD-D-900-009
REV.: 00D

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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CURVE TABLE					
CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	80.00'	29.18'	20°53'44"	S 21°27'49" E	29.01'

LEGEND:

DRBCT = DEED RECORDS OF BRAZOS COUNTY, TEXAS

ORBCT = OFFICIAL RECORDS OF BRAZOS COUNTY, TEXAS

OPRBCT = OFFICIAL PUBLIC RECORDS OF BRAZOS COUNTY, TEXAS

123/456 = VOLUME AND PAGE FROM PUBLIC COUNTY RECORDS

N/F = NOW OR FORMERLY

1/2 KERR SET = 1/2 INCH IRON ROD WITH BLUE PLASTIC CAP STAMPED 'KERR SURVEYING' SET

( ) = RECORD INFORMATION

- WATER VALVE
- FIRE HYDRANT
- STREET SIGN
- UTILITY POLE
- GUY WIRE
- PIPE LINE MARKER
- TELEPHONE PEDESTAL
- PINFLAG

HIGH VOLTAGE TRANSMISSION LINES — HV-AE —

AERIAL ELECTRIC LINES — AE —

AERIAL TELEPHONE LINES — AT —

BARBED WIRE FENCE — x — x —

CHAIN LINK FENCE — x — x —

GRAVEL

APPROXIMATE LOCATION OF 4" SANITARY SEWER LINE — SS-4" —

APPROXIMATE LOCATION OF WATER LINE (SIZE NOT DETERMINED) — W —

APPROXIMATE LOCATION OF BURIED ETC GAS PIPE LINE — GAS —

APPROXIMATE LOCATION OF BURIED FIBER-OPTIC LINE — FO —

SIGNIFICANT OBSERVATIONS

- A — GAS PIPELINE APPEARS TO LIE OUTSIDE OF DESCRIBED EASEMENT
- B — ADJOINING GRAVEL DRIVEWAY CROSSES THE WEST CORNER OF THE PROPERTY (EASEMENT NOT FOUND)
- C — APPARENT 1,785 SQ. FT. OVERLAP BETWEEN DEED DESCRIPTIONS (7680/223 OPRBCT), (7787/163 OPRBCT), (12024/282 OPRBCT)

GENERAL NOTES

1. BEARING SYSTEM SHOWN HEREON IS BASED ON TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (4203), GRID NORTH AS ESTABLISHED FROM GPS OBSERVATION USING THE LEICA SMARTNET NAD83 (NA2011) EPOCH 2010 MULTI-YEAR CORS SOLUTION 2 (MYCS2).
2. DISTANCES SHOWN HEREON ARE SURFACE DISTANCES UNLESS OTHERWISE NOTED. TO OBTAIN GRID DISTANCES (NOT AREAS) DIVIDE BY A COMBINED SCALE FACTOR OF 1.00011885434499 (CALCULATED USING GEOID12B).
3. (CM) INDICATES CONTROLLING MONUMENT FOUND AND USED TO ESTABLISH PROPERTY BOUNDARIES.
4. THIS SURVEY PLAT WAS PREPARED WITHOUT THE BENEFIT OF A TITLE COMMITMENT. EASEMENTS AND OTHER MATTERS MAY APPLY.
5. ORIGINAL SURVEY LINES SHOWN HEREON (IF ANY) ARE BASED ON RAILROAD COMMISSION GIS DATA, ARE APPROXIMATED ONLY AND WERE NOT LOCATED ON THE GROUND. THIS SURVEYOR DID NOT DETERMINE THE EXISTENCE OF ANY VACANCY, EXCESS, OR SHORTAGE OF AREA IN ANY OF THE ORIGINAL GRANTS SHOWN HEREON.
6. THIS PLAT WAS PREPARED IN CONJUNCTION WITH A FIELD NOTES DESCRIPTION (METES AND BOUNDS). THE PLAT AND FIELD NOTES ARE INTENDED TO BE ONE INSTRUMENT TOGETHER.
7. THIS PROPERTY DID NOT HAVE A 911 ADDRESS AT THE TIME OF THIS SURVEY PLAT.
8. THIS TRACT LIES WITHIN FLOOD ZONE 'X' UNSHADED AND DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA SUBJECT TO THE 1% ANNUAL CHANCE FLOOD (100 YEAR FLOOD PLAIN) ACCORDING TO THE BRAZOS COUNTY FLOOD INSURANCE RATE MAP (FIRM) PANEL NO. 48041C0205F, EFFECTIVE DATE: 04-02-2014.
9. CONTOUR LINES AND ELEVATIONS SHOWN HEREON WERE CREATED BASED ON DATA COLLECTED IN THE FIELD BY KERR SURVEYING USING AERIAL DRONE LIDAR AND CONVENTIONAL SURVEY EQUIPMENT. ELEVATION DATUM: NAVD 1988 (GEOID12B).
10. THERE WERE NO BUILDINGS LOCATED ON THE PROPERTY AT THE TIME OF THIS SURVEY.
11. THERE WERE NO DESIGNATED PARKING SPACES LOCATED ON THIS PROPERTY AT THE TIME OF THIS SURVEY.
12. THERE ARE NO PARTY WALL LOCATED BETWEEN THIS PROPERTY AND THE ADJOINING PROPERTIES.
13. UNDERGROUND UTILITIES ARE APPROXIMATED BASED ON ABOVE GROUND FEATURES, AVAILABLE MAPS AND MARKINGS BY UTILITY PROVIDERS (TEXAS 811 LOCATE TICKET 2566782192, SUBMITTED 06/16/2025). ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS SURVEY.
14. NO EVIDENCE OF RECENT EARTH MOVING OR CONSTRUCTION WAS NOTED AT THE TIME OF THIS SURVEY.
15. NO PROPOSED CHANGES IN STREET RIGHT-OF-WAY LINES WERE PROVIDED TO THE SURVEYOR AND NO EVIDENCE OF RECENT STREET / SIDEWALK CONSTRUCTION OR REPAIR WERE NOTED AT THE TIME OF THIS SURVEY.
16. EXCEPT AS SHOWN HEREON THERE ARE NO VISIBLE OR DISCERNABLE PROTRUSIONS OF IMPROVEMENTS FROM THE SUBJECT PROPERTY ONTO THE ADJOINING RIGHT-OF-WAYS.
17. SUBJECT PROPERTY HAS DIRECT PHYSICAL ACCESS TO BOATCALLIE ROAD AND ROUGHNECK DRIVE.
18. THERE ARE NO GAPS, GORES OR OVERLAPS BETWEEN THE PROPERTY AND THE ADJOINING RIGHT-OF-WAYS.
19. THERE IS NO OBSERVABLE EVIDENCE OF CEMETERIES OR BURIAL GROUNDS LOCATED ON THIS SITE.
20. NO WETLAND MARKERS WERE OBSERVED IN THE PROCESS OF CONDUCTING THE FIELDWORK.
21. THERE IS NO OBSERVABLE EVIDENCE OF THIS PROPERTY BEING USED AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.

PROPOSED ZONING NOTES

THIS TRACT HAS A PROPOSED ZONING CLASSIFICATION OF INDUSTRIAL [I]. ACCORDING TO THE CITY OF BRYAN ONLINE ZONING MAP REFERENCED ON 7-11-2025, AN INDUSTRIAL ZONED TRACT IS SUBJECT TO THE FOLLOWING MATTERS:

FRONT SETBACK - 25'
SIDE SETBACK (INTERIOR) - 5'
SIDE SETBACK (STREET) - 15'
REAR SETBACK - 5'
MAXIMUM HEIGHT - 35'

A ZONING REPORT WAS NOT PROVIDED AT THE TIME OF THIS PLAT. ADDITIONAL REQUIREMENTS MAY APPLY.

LEGAL DESCRIPTION

A FIELD NOTES DESCRIPTION OF 14.73 ACRES LYING IN THE STEPHEN F. AUSTIN LEAGUE NO. 10 SURVEY, ABSTRACT 63, IN BRAZOS COUNTY, TEXAS, 2.40 ACRES BEING OUT OF THE REMAINDER OF A CALLED 34.84 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GRT INTERESTS, LLC RECORDED IN VOLUME 11941, PAGE 227 OF THE OFFICAL PUBLIC RECORDS OF BRAZOS COUNTY, TEXAS (OPRBCT), AND BEING ALL OF A CALLED 12.34 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GRT INTERESTS, LLC RECORDED IN VOLUME 12024, PAGE 282 (OPRBCT), MEASURED TO BE 12.73 ACRES; SAID 14.73 ACRES BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS:

COMMENCING AT A 3/8 INCH IRON ROD FOUND ON THE NORTHWEST LINE OF THE REMAINDER OF A CALLED 51.00 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GOOSENECK TRAILER MANUFACTURING COMPANY, INC. RECORDED IN VOLUME 229, PAGE 680 OF THE DEED RECORDS OF BRAZOS COUNTY, TEXAS (DRBCT), AT THE SOUTH CORNER OF LOT 1, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAME BEING THE EAST CORNER OF A CALLED 4.14 ACRE TRACT OF LAND DESCRIBED IN A DEED TO REBECCA JOAN CRAWFORD RUSSELL RECORDED IN VOLUME 11067, PAGE 152 (OPRBCT), FROM WHICH A 1/2 INCH IRON ROD WITH A PLASTIC CAP STAMPED 'CARLOMAGNO' FOUND IN THE NORTHEAST RIGHT-OF-WAY LINE OF BOATCALLIE ROAD (A VARIABLE WIDTH RIGHT-OF-WAY, APPEARS TO BE PRESCRIPTIVE IN NATURE), AT THE SOUTH CORNER OF SAID RUSSEL TRACT BEARS S 41° 49' 51" W A DISTANCE OF 662.25 FEET;

THENCE, WITH THE SOUTHWEST LINE OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, N 47° 54' 26" W, A DISTANCE OF 637.55 FEET TO A 1/2 INCH IRON ROD SET (ALL RODS SET WITH BLUE PLASTIC CAP STAMPED 'KERR SURVEYING') ON THE NORTHEAST LINE OF A CALLED 4.14 ACRE TRACT OF LAND DESCRIBED IN A DEED AS "TRACT ONE" TO PATRICIA GRACE CRAWFORD RECORDED IN VOLUME 11067, PAGE 152 (OPRBCT), AT THE WEST CORNER OF LOT 3, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAME BEING THE MOST SOUTHERLY CORNER OF SAID REMAINDER TRACT, FOR THE SOUTHEAST CORNER AND **POINT OF BEGINNING** HEREOF, FROM WHICH THE CITY OF BRYAN MONUMENT GPS-125 BEARS S 17° 31' 01" E, A DISTANCE OF 3,542.89 FEET;

THENCE, WITH THE SOUTHWEST LINE OF SAID REMAINDER TRACT, **N 47° 54' 26" W,** A DISTANCE OF **174.18 FEET** TO 1/2 INCH IRON ROD WITH A PLASTIC CAP STAMPED 'SM KLING RPLS 2003' FOUND IN THE SOUTHWEST LINE OF SAID REMAINDER TRACT, AT THE NORTH CORNER OF SAID CRAWFORD TRACT, SAME BEING THE EAST CORNER OF SAID GRT 12.34 ACRE TRACT, FOR AN INTERIOR ELL CORNER HEREOF;

THENCE, WITH THE COMMON LINE OF SAID GRT 12.34 ACRE TRACT AND SAID CRAWFORD TRACT, **S 41° 53' 39" W,** A DISTANCE OF **670.90 FEET** TO A 1/2 INCH IRON ROD WITH PLASTIC CAP STAMPED 'SM KLING RPLS 2003' FOUND FOR THE SOUTH COMMON CORNER OF SAID GRT 12.34 ACRE TRACT AND SAID CRAWFORD TRACT, LYING ON THE NORTHEAST RIGHT-OF-WAY LINE OF SAID BOATCALLIE ROAD;

THENCE, WITH THE SOUTHWEST LINE OF SAID GRT 12.34 ACRE TRACT, ALONG THE NORTHEAST RIGHT-OF-WAY LINE OF SAID BOATCALLIE ROAD, **N 48° 34' 30" W,** A DISTANCE OF **791.90 FEET** TO A 5/8 INCH IRON ROD FOUND AT THE WEST CORNER OF SAID GRT 12.34 ACRE TRACT, SAME BEING THE SOUTH CORNER OF A CALLED 2.66 ACRE TRACT OF LAND DESCRIBED IN A DEED TO THE CITY OF BRYAN RECORDED IN VOLUME 7680, PAGE 223 (OPRBCT), FOR THE MOST WESTERLY CORNER HEREOF;

THENCE, WITH THE NORTHWEST LINE OF SAID GRT 12.34 ACRE TRACT, **N 41° 05' 03" E,** AT A DISTANCE OF 340.18 FEET PASSING A POINT FROM WHICH A 3/4 INCH IRON PIPE FOUND FOR THE EAST CORNER OF SAID CITY TRACT, SAME BEING THE SOUTH CORNER OF A CALLED 9.037 ACRE TRACT OF LAND DESCRIBED IN A DEED TO 5123 TRUST RECORDED IN VOLUME 7787, PAGE 163 (OPRBCT), BEARS S 48° 35' 52" E A DISTANCE OF 5.15 FEET, SAID 5123 TRACT AND SAID CITY TRACT BOTH HAVING AN APPARENT OVERLAP IN DEED DESCRIPTIONS WITH SAID GRT 12.34 ACRE TRACT, AND CONTINUING FOR A TOTAL DISTANCE OF **677.34 FEET** TO A 1 INCH IRON PIPE FOUND ON THE SOUTHWEST LINE OF A CALLED 100 ACRE TRACT OF LAND DESCRIBED IN A DEED TO TONY L. MARINO RECORDED IN VOLUME 154, PAGE 262 (DRBCT), FOR THE NORTH CORNER OF SAID GRT 12.34 ACRE TRACT AND THE EAST CORNER OF SAID 5123 TRACT, FOR THE NORTHWEST CORNER HEREOF;

THENCE, WITH THE COMMON LINES OF SAID GRT TRACTS AND SAID MARINO TRACT, FOR THE FOLLOWING TWO (2) BEARINGS AND DISTANCES:

1) **S 48° 06' 52" E,** A DISTANCE OF **652.22 FEET** TO A 6 INCH CEDAR FENCE POST FOUND AT THE SOUTH CORNER OF SAID MARINO TRACT, SAME BEING THE WEST CORNER OF SAID REMAINDER TRACT;
2) **N 41° 40' 26" E,** A DISTANCE OF **322.89 FEET** TO A CALCULATED CORNER LYING ON THE COMMON LINE OF SAID MARINO TRACT AND SAID REMAINDER TRACT, FOR A NORTHERLY CORNER HEREOF, FROM WHICH A 3/8 INCH IRON ROD FOUND AT THE COMMON NORTH CORNER OF SAID MARINO AND SAID REMAINDER TRACT BEARS N 41° 40' 26" E A DISTANCE OF 1,266.36 FEET;

THENCE, DEPARTING SAID COMMON LINE AND SEVERING SAID REMAINDER TRACT, **S 48° 42' 14" E,** A DISTANCE OF **295.59 FEET** TO A CALCULATED CORNER LYING ON THE WEST SIDE OF THE CUL-DE-SAC OF ROUGHNECK DRIVE (70' WIDE RIGHT-OF-WAY PER PLAT) OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAID CALCULATED CORNER MARKING THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE, AROUND SAID CUL-DE-SAC, WITH THE NORTHERLY LINES OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, FOR THE FOLLOWING TWO (2) COURSES AND DISTANCES:

1) WITH SAID CURVE TO THE RIGHT, HAVING A RADIUS OF **80.00 FEET,** AN ARC LENGTH OF **29.18 FEET,** A DELTA ANGLE OF **21° 27' 49",** AND A CHORD WHICH BEARS **S 21° 27' 49" E,** A DISTANCE OF **29.01 FEET** TO A 1/2 INCH IRON ROD SET FOR THE NORTH CORNER OF LOT 3, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A;
2) **S 41° 19' 16" W,** A DISTANCE OF **313.56 FEET** TO THE **POINT OF BEGINNING** HEREOF AND CONTAINING **14.73 ACRES,** MORE OR LESS.

PRELIMINARY, THIS DOCUMENT SHALL NOT BE RECORDED FOR ANY PURPOSE AND SHALL NOT BE USED OR VIEWED OR RELIED UPON AS A FINAL SURVEY DOCUMENT.

SHEET 1 OF 2

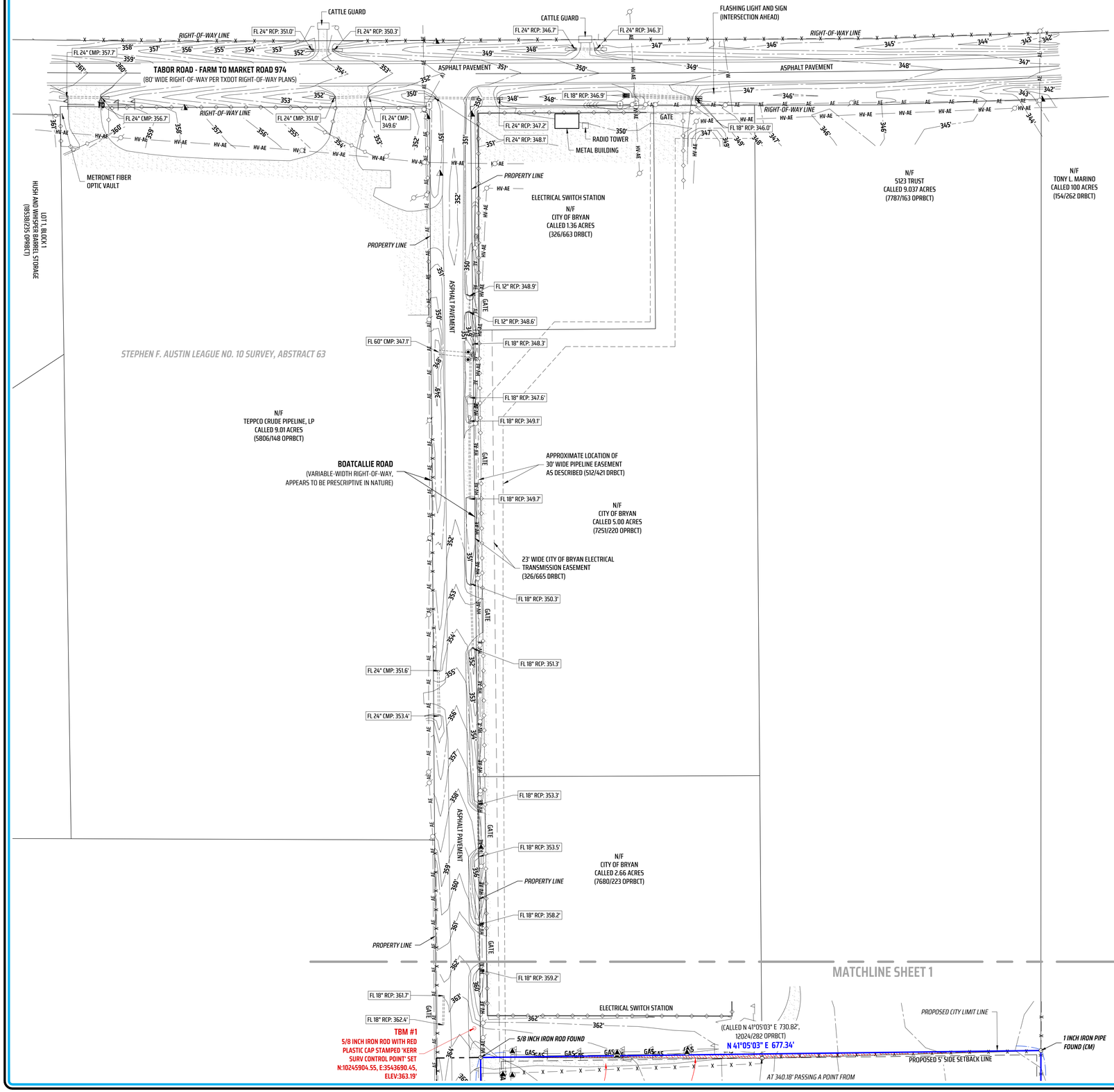
TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT
OF A
14.73 ACRE TRACT
2.40 ACRES BEING OUT OF THE REMAINDER OF A CALLED 34.84 ACRES DESCRIBED IN VOLUME 11941, PAGE 227 OPRBCT, AND BEING ALL OF A CALLED 12.34 ACRES DESCRIBED IN VOLUME 12024, PAGE 282 OPRBCT
STEPHEN F. AUSTIN NO. 10 LEAGUE SURVEY, ABSTRACT 63
BRAZOS COUNTY, TEXAS

KERR SURVEYING

"When one person stands to gain over another, the facts must be uncovered"

SCALE: 1 INCH = 60 FEET
SURVEY DATE: 06-18-2025
JOB NUMBER: 25-0712 | CAD NAME: 25-0712-S
POINT FILE: CONALA-GRID / 25-0305 (cont); 25-0712-ALL (job)
DRAWN BY: WJB CHECKED BY: NPK

PREPARED BY: KERR SURVEYING, LLC
TBPELS FIRM#10018500
1718 BRIARCREST DRIVE, BRYAN, TEXAS 77802
PHONE: (979) 268-3195
SURVEYS@KERRSURVEYING.NET | KERRLANDSURVEYING.COM



LEGEND:

DRBCT = DEED RECORDS OF BRAZOS COUNTY, TEXAS

ORBCT = OFFICIAL RECORDS OF BRAZOS COUNTY, TEXAS

OPRBCT = OFFICIAL PUBLIC RECORDS OF BRAZOS COUNTY, TEXAS

123/456 = VOLUME AND PAGE FROM PUBLIC COUNTY RECORDS

N/F = NOW OR FORMERLY

1/2 KERR SET = 1/2 INCH IRON ROD WITH BLUE PLASTIC CAP STAMPED 'KERR SURVEYING' SET

( ) = RECORD INFORMATION

WATER VALVE
FIRE HYDRANT
STREET SIGN
UTILITY POLE
GUY WIRE
PIPE LINE MARKER
TELEPHONE PEDESTAL
PINFLAG
HIGH VOLTAGE TRANSMISSION LINES — HV-AE —
AERIAL ELECTRIC LINES — AE —
AERIAL TELEPHONE LINES — AT —
BARBED WIRE FENCE — x — x —
CHAIN LINK FENCE
GRAVEL

APPROXIMATE LOCATION OF 4" SANITARY SEWER LINE — SS-4" —
APPROXIMATE LOCATION OF WATER LINE (SIZE NOT DETERMINED) — W —
APPROXIMATE LOCATION OF BURIED ETC GAS PIPE LINE — GAS —
APPROXIMATE LOCATION OF BURIED FIBER-OPTIC LINE — FO —

SCALE: 1" = 60'

0 60 120 180 Feet

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SHEET 2 OF 2

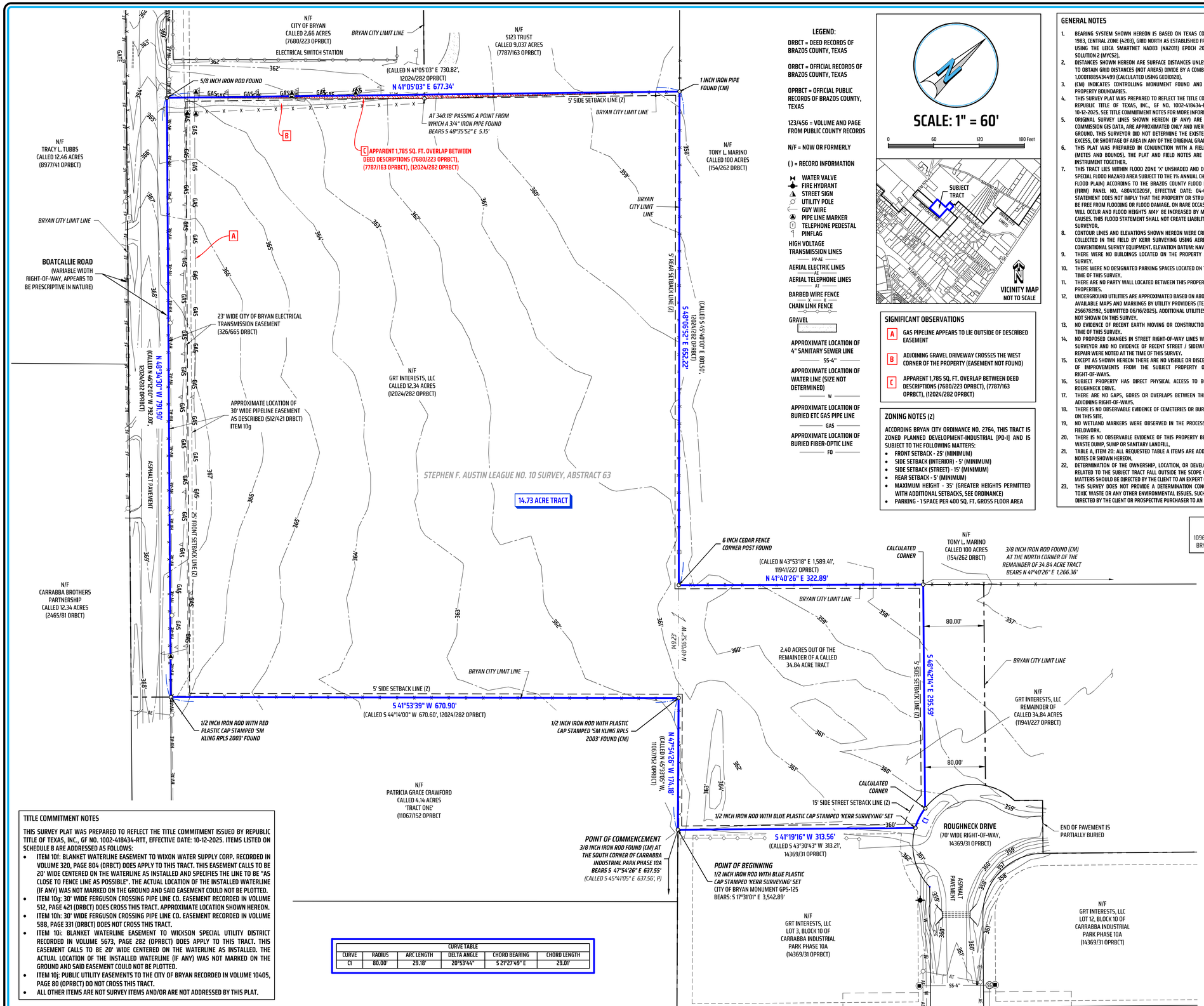
SEE SHEET 1 FOR NOTES, CERTIFICATION AND OTHER MATTERS

TSPS STANDARD LAND AND TOPOGRAPHIC SURVEY PLAT
OF A
14.73 ACRE TRACT
2.40 ACRES BEING OUT OF THE REMAINDER OF A CALLED 34.84 ACRES DESCRIBED IN VOLUME 11941, PAGE 227 OPRBCT, AND BEING ALL OF A CALLED 12.34 ACRES DESCRIBED IN VOLUME 12024, PAGE 282 OPRBCT
STEPHEN F. AUSTIN NO. 10 LEAGUE SURVEY, ABSTRACT 63
BRAZOS COUNTY, TEXAS

KERR SURVEYING

"When one person stands to gain over another, the facts must be uncovered"

SCALE: 1 INCH = 60 FEET
SURVEY DATE: 06-18-2025
JOB NUMBER: 25-0712 | CAD NAME: 25-0712-S
POINT FILE: COHALA-GRID / 25-0305 (cont); 25-0712-ALL (job)
DRAWN BY: WJB CHECKED BY: NPK
PREPARED BY: KERR SURVEYING, LLC
TBPELS FIRM#10018500
1718 BRIARCREST DRIVE, BRYAN, TEXAS 77802
PHONE: (979) 268-3195
SURVEYS@KERRSURVEYING.NET | KERRLANDSURVEYING.COM



CURVE TABLE					
CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD BEARING	CHORD LENGTH
C1	80.00'	29.18'	20°53'44"	S 21°27'49" E	29.01'

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- STREET SIGN
- UTILITY POLE
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- PINFLAG

HIGH VOLTAGE TRANSMISSION LINES — HV-AE —

AERIAL ELECTRIC LINES — AE —

AERIAL TELEPHONE LINES — AT —

BARBED WIRE FENCE — X — X —

CHAIN LINK FENCE

GRAVEL

APPROXIMATE LOCATION OF 4" SANITARY SEWER LINE — SS-4" —

APPROXIMATE LOCATION OF WATER LINE (SIZE NOT DETERMINED) — W —

APPROXIMATE LOCATION OF BURIED ETC GAS PIPE LINE — GAS —

APPROXIMATE LOCATION OF BURIED FIBER-OPTIC LINE — FO —

SCALE: 1" = 60'

0 60 120 180 Feet

VICINITY MAP
NOT TO SCALE

SIGNIFICANT OBSERVATIONS

- A — GAS PIPELINE APPEARS TO LIE OUTSIDE OF DESCRIBED EASEMENT
- B — ADJOINING GRAVEL DRIVEWAY CROSSES THE WEST CORNER OF THE PROPERTY (EASEMENT NOT FOUND)
- C — APPARENT 1,785 SQ. FT. OVERLAP BETWEEN DEED DESCRIPTIONS (7680/223 OPRBCT), (7787/163 OPRBCT), (12024/282 OPRBCT)

ZONING NOTES (Z)

ACCORDING BRYAN CITY ORDINANCE NO. 2764, THIS TRACT IS ZONED PLANNED DEVELOPMENT-INDUSTRIAL [PD-I] AND IS SUBJECT TO THE FOLLOWING MATTERS:

- FRONT SETBACK - 25' (MINIMUM)
- SIDE SETBACK (INTERIOR) - 5' (MINIMUM)
- SIDE SETBACK (STREET) - 15' (MINIMUM)
- REAR SETBACK - 5' (MINIMUM)
- MAXIMUM HEIGHT - 35' (GREATER HEIGHTS PERMITTED WITH ADDITIONAL SETBACKS, SEE ORDINANCE)
- PARKING - 1 SPACE PER 400 SQ. FT. GROSS FLOOR AREA

GENERAL NOTES

1. BEARING SYSTEM SHOWN HEREON IS BASED ON TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (4203), GRID NORTH AS ESTABLISHED FROM GPS OBSERVATION USING THE LEICA SMARTNET NAD83 (NA2011) EPOCH 2010 MULTI-YEAR CORS SOLUTION 2 (MYCS2).
2. DISTANCES SHOWN HEREON ARE SURFACE DISTANCES UNLESS OTHERWISE NOTED. TO OBTAIN GRID DISTANCES (NOT AREAS) DIVIDE BY A COMBINED SCALE FACTOR OF 1.00011885434499 (CALCULATED USING GEOID12B).
3. (CM) INDICATES CONTROLLING MONUMENT FOUND AND USED TO ESTABLISH PROPERTY BOUNDARIES.
4. THIS SURVEY PLAT WAS PREPARED TO REFLECT THE TITLE COMMITMENT ISSUED BY REPUBLIC TITLE OF TEXAS, INC., GF NO. 1002-418434-RTT, EFFECTIVE DATE: 10-12-2025, SEE TITLE COMMITMENT NOTES FOR MORE INFORMATION.
5. ORIGINAL SURVEY LINES SHOWN HEREON (IF ANY) ARE BASED ON RAILROAD COMMISSION GIS DATA, ARE APPROXIMATED ONLY AND WERE NOT LOCATED ON THE GROUND. THIS SURVEYOR DID NOT DETERMINE THE EXISTENCE OF ANY VACANCY, EXCESS, OR SHORTAGE OF AREA IN ANY OF THE ORIGINAL GRANTS SHOWN HEREON.
6. THIS PLAT WAS PREPARED IN CONJUNCTION WITH A FIELD NOTES DESCRIPTION (METES AND BOUNDS). THE PLAT AND FIELD NOTES ARE INTENDED TO BE ONE INSTRUMENT TOGETHER.
7. THIS TRACT LIES WITHIN FLOOD ZONE 'X' UNSHADED AND DOES NOT LIE WITHIN A SPECIAL FLOOD HAZARD AREA SUBJECT TO THE 1% ANNUAL CHANCE FLOOD (100 YEAR FLOOD PLAIN) ACCORDING TO THE BRAZOS COUNTY FLOOD INSURANCE RATE MAP (FIRM) PANEL NO. 48041C0205F, EFFECTIVE DATE: 04-02-2014. THIS FLOOD STATEMENT DOES NOT IMPLY THAT THE PROPERTY OR STRUCTURES THEREON WILL BE FREE FROM FLOODING OR FLOOD DAMAGE. ON RARE OCCASIONS FLOODS CAN AND WILL OCCUR AND FLOOD HEIGHTS MAY BE INCREASED BY MAN-MADE OR NATURAL CAUSES. THIS FLOOD STATEMENT SHALL NOT CREATE LIABILITY ON THE PART OF THE SURVEYOR.
8. CONTOUR LINES AND ELEVATIONS SHOWN HEREON WERE CREATED BASED ON DATA COLLECTED IN THE FIELD BY KERR SURVEYING USING AERIAL DRONE LIDAR AND CONVENTIONAL SURVEY EQUIPMENT. ELEVATION DATUM: NAVD 1988 (GEOID12B).
9. THERE WERE NO BUILDINGS LOCATED ON THE PROPERTY AT THE TIME OF THIS SURVEY.
10. THERE WERE NO DESIGNATED PARKING SPACES LOCATED ON THIS PROPERTY AT THE TIME OF THIS SURVEY.
11. THERE ARE NO PARTY WALL LOCATED BETWEEN THIS PROPERTY AND THE ADJOINING PROPERTIES.
12. UNDERGROUND UTILITIES ARE APPROXIMATED BASED ON ABOVE GROUND FEATURES, AVAILABLE MAPS AND MARKINGS BY UTILITY PROVIDERS (TEXAS 811 LOCATE TICKET 2566782192, SUBMITTED 06/16/2025). ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS SURVEY.
13. NO EVIDENCE OF RECENT EARTH MOVING OR CONSTRUCTION WAS NOTED AT THE TIME OF THIS SURVEY.
14. NO PROPOSED CHANGES IN STREET RIGHT-OF-WAY LINES WERE PROVIDED TO THE SURVEYOR AND NO EVIDENCE OF RECENT STREET / SIDEWALK CONSTRUCTION OR REPAIR WERE NOTED AT THE TIME OF THIS SURVEY.
15. EXCEPT AS SHOWN HEREON THERE ARE NO VISIBLE OR DISCERNABLE PROTRUSIONS OF IMPROVEMENTS FROM THE SUBJECT PROPERTY ONTO THE ADJOINING RIGHT-OF-WAYS.
16. SUBJECT PROPERTY HAS DIRECT PHYSICAL ACCESS TO BOATCALLIE ROAD AND ROUGHNECK DRIVE.
17. THERE ARE NO GAPS, GORES OR OVERLAPS BETWEEN THE PROPERTY AND THE ADJOINING RIGHT-OF-WAYS.
18. THERE IS NO OBSERVABLE EVIDENCE OF CEMETERIES OR BURIAL GROUNDS LOCATED ON THIS SITE.
19. NO WETLAND MARKERS WERE OBSERVED IN THE PROCESS OF CONDUCTING THE FIELDWORK.
20. THERE IS NO OBSERVABLE EVIDENCE OF THIS PROPERTY BEING USED AS A SOLID WASTE DUMP, SUMP OR SANITARY LANDFILL.
21. TABLE A, ITEM 20: ALL REQUESTED TABLE A ITEMS ARE ADDRESSED IN THE ABOVE NOTES OR SHOWN HEREON.
22. DETERMINATION OF THE OWNERSHIP, LOCATION, OR DEVELOPMENT OF MINERALS RELATED TO THE SUBJECT TRACT FALL OUTSIDE THE SCOPE OF THIS SURVEY. SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT TO AN EXPERT CONSULTANT.
23. THIS SURVEY DOES NOT PROVIDE A DETERMINATION CONCERNING FAULT LINES, TOXIC WASTE OR ANY OTHER ENVIRONMENTAL ISSUES, SUCH MATTERS SHOULD BE DIRECTED BY THE CLIENT OR PROSPECTIVE PURCHASER TO AN EXPERT CONSULTANT.

ADDRESS

1096 BOATCALLIE ROAD
BRYAN, TEXAS 77808

LEGAL DESCRIPTION

A FIELD NOTES DESCRIPTION OF 14.73 ACRES LYING IN THE STEPHEN F. AUSTIN LEAGUE NO. 10 SURVEY, ABSTRACT 63, IN BRAZOS COUNTY, TEXAS, 2.40 ACRES BEING OUT OF THE REMAINDER OF A CALLED 34.84 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GRT INTERESTS, LLC RECORDED IN VOLUME 11941, PAGE 227 OF THE OFFICIAL PUBLIC RECORDS OF BRAZOS COUNTY, TEXAS (OPRBCT), AND BEING ALL OF A CALLED 12.34 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GRT INTERESTS, LLC RECORDED IN VOLUME 12024, PAGE 282 (OPRBCT), MEASURED TO BE 12.73 ACRES; SAID 14.73 ACRES BEING MORE PARTICULARLY DESCRIBED BY METES AND BOUNDS AS FOLLOWS:

COMMENCING AT A 3/8 INCH IRON ROD FOUND ON THE NORTHWEST LINE OF THE REMAINDER OF A CALLED 51.00 ACRE TRACT OF LAND DESCRIBED IN A DEED TO GOOSENECK TRAILER MANUFACTURING COMPANY, INC. RECORDED IN VOLUME 229, PAGE 680 OF THE DEED RECORDS OF BRAZOS COUNTY, TEXAS (DRBCT), AT THE SOUTH CORNER OF LOT 1, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAME BEING THE EAST CORNER OF A CALLED 4.14 ACRE TRACT OF LAND DESCRIBED IN A DEED TO REBECCA JOAN CRAWFORD RUSSELL RECORDED IN VOLUME 11067, PAGE 152 (OPRBCT), FROM WHICH A 1/2 INCH IRON ROD WITH A PLASTIC CAP STAMPED 'CARLOMAGNO' FOUND IN THE NORTHEAST RIGHT-OF-WAY LINE OF BOATCALLIE ROAD (A VARIABLE WIDTH RIGHT-OF-WAY, APPEARS TO BE PRESCRIPTIVE IN NATURE), AT THE SOUTH CORNER OF SAID RUSSELL TRACT BEARS S 41° 49' 51" W A DISTANCE OF 662.25 FEET;

THENCE, WITH THE SOUTHWEST LINE OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, N 47° 54' 26" W, A DISTANCE OF 637.55 FEET TO A 1/2 INCH IRON ROD SET (ALL RODS SET WITH BLUE PLASTIC CAP STAMPED 'KERR SURVEYING') ON THE NORTHEAST LINE OF A CALLED 4.14 ACRE TRACT OF LAND DESCRIBED IN A DEED AS "TRACT ONE" TO PATRICIA GRACE CRAWFORD RECORDED IN VOLUME 11067, PAGE 152 (OPRBCT), AT THE WEST CORNER OF LOT 3, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAME BEING THE MOST SOUTHERLY CORNER OF SAID REMAINDER TRACT, FOR THE SOUTHEAST CORNER AND **POINT OF BEGINNING** HEREOF, FROM WHICH THE CITY OF BRYAN MONUMENT GPS-125 BEARS S 17° 31' 01" E, A DISTANCE OF 3,542.89 FEET;

THENCE, WITH THE SOUTHWEST LINE OF SAID REMAINDER TRACT, **N 47° 54' 26" W,** A DISTANCE OF **174.18 FEET** TO 1/2 INCH IRON ROD WITH A PLASTIC CAP STAMPED 'SM KLING RPLS 2003' FOUND IN THE SOUTHWEST LINE OF SAID REMAINDER TRACT, AT THE NORTH CORNER OF SAID CRAWFORD TRACT, SAME BEING THE EAST CORNER OF SAID GRT 12.34 ACRE TRACT, FOR AN INTERIOR ELL CORNER HEREOF;

THENCE, WITH THE COMMON LINE OF SAID GRT 12.34 ACRE TRACT AND SAID CRAWFORD TRACT, **S 41° 53' 39" W,** A DISTANCE OF **670.90 FEET** TO A 1/2 INCH IRON ROD WITH PLASTIC CAP STAMPED 'SM KLING RPLS 2003' FOUND FOR THE SOUTH COMMON CORNER OF SAID GRT 12.34 ACRE TRACT AND SAID CRAWFORD TRACT, LYING ON THE NORTHEAST RIGHT-OF-WAY LINE OF SAID BOATCALLIE ROAD;

THENCE, WITH THE SOUTHWEST LINE OF SAID GRT 12.34 ACRE TRACT, ALONG THE NORTHEAST RIGHT-OF-WAY LINE OF SAID BOATCALLIE ROAD, **N 48° 34' 30" W,** A DISTANCE OF **791.90 FEET** TO A 5/8 INCH IRON ROD FOUND AT THE WEST CORNER OF SAID GRT 12.34 ACRE TRACT, SAME BEING THE SOUTH CORNER OF A CALLED 2.66 ACRE TRACT OF LAND DESCRIBED IN A DEED TO THE CITY OF BRYAN RECORDED IN VOLUME 7680, PAGE 223 (OPRBCT), FOR THE MOST WESTERLY CORNER HEREOF;

THENCE, WITH THE NORTHWEST LINE OF SAID GRT 12.34 ACRE TRACT, **N 41° 05' 03" E,** AT A DISTANCE OF 340.18 FEET PASSING A POINT FROM WHICH A 3/4 INCH IRON PIPE FOUND FOR THE EAST CORNER OF SAID CITY TRACT, SAME BEING THE SOUTH CORNER OF A CALLED 9.037 ACRE TRACT OF LAND DESCRIBED IN A DEED TO 5123 TRUST RECORDED IN VOLUME 7787, PAGE 163 (OPRBCT), BEARS S 48° 35' 52" E A DISTANCE OF 5.15 FEET, SAID 5123 TRACT AND SAID CITY TRACT BOTH HAVING AN APPARENT OVERLAP IN DEED DESCRIPTIONS WITH SAID GRT 12.34 ACRE TRACT, AND CONTINUING FOR A TOTAL DISTANCE OF **677.34 FEET** TO A 1 INCH IRON PIPE FOUND ON THE SOUTHWEST LINE OF A CALLED 100 ACRE TRACT OF LAND DESCRIBED IN A DEED TO TONY L. MARINO RECORDED IN VOLUME 154, PAGE 262 (DRBCT), FOR THE NORTH CORNER OF SAID GRT 12.34 ACRE TRACT AND THE EAST CORNER OF SAID 5123 TRACT, FOR THE NORTHWEST CORNER HEREOF;

THENCE, WITH THE COMMON LINES OF SAID GRT TRACTS AND SAID MARINO TRACT, FOR THE FOLLOWING TWO (2) BEARINGS AND DISTANCES:

1) **S 48° 06' 52" E,** A DISTANCE OF **652.22 FEET** TO A 6 INCH CEDAR FENCE POST FOUND AT THE SOUTH CORNER OF SAID MARINO TRACT, SAME BEING THE WEST CORNER OF SAID REMAINDER TRACT;
2) **N 41° 40' 26" E,** A DISTANCE OF **322.89 FEET** TO A CALCULATED CORNER LYING ON THE COMMON LINE OF SAID MARINO TRACT AND SAID REMAINDER TRACT, FOR A NORTHERLY CORNER HEREOF, FROM WHICH A 3/8 INCH IRON ROD FOUND AT THE COMMON NORTH CORNER OF SAID MARINO AND SAID REMAINDER TRACT BEARS N 41° 40' 26" E A DISTANCE OF 1,266.36 FEET;

THENCE, DEPARTING SAID COMMON LINE AND SEVERING SAID REMAINDER TRACT, **S 48° 42' 14" E,** A DISTANCE OF **295.59 FEET** TO A CALCULATED CORNER LYING ON THE WEST SIDE OF THE CUL-DE-SAC OF ROUGHNECK DRIVE (70' WIDE RIGHT-OF-WAY PER PLAT) OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, SAID CALCULATED CORNER MARKING THE BEGINNING OF A NON-TANGENT CURVE TO THE LEFT;

THENCE, AROUND SAID CUL-DE-SAC, WITH THE NORTHERLY LINES OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A, FOR THE FOLLOWING TWO (2) COURSES AND DISTANCES:

1) WITH SAID CURVE TO THE RIGHT, HAVING A RADIUS OF **80.00 FEET**, AN ARC LENGTH OF **29.18 FEET**, A DELTA ANGLE OF **21° 27' 49"**, AND A CHORD WHICH BEARS **S 21° 27' 49" E**, A DISTANCE OF **29.01 FEET** TO A 1/2 INCH IRON ROD SET FOR THE NORTH CORNER OF LOT 3, BLOCK 10 OF SAID CARRABBA INDUSTRIAL PARK PHASE 10A;
2) **S 41° 19' 16" W,** A DISTANCE OF **313.56 FEET** TO THE **POINT OF BEGINNING** HEREOF AND CONTAINING **14.73 ACRES,** MORE OR LESS.

SURVEYOR'S CERTIFICATE

TO: MESSER LLC; GRT INTERESTS, LLC; REPUBLIC TITLE OF TEXAS, INC.; AND FIRST AMERICAN TITLE INSURANCE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 5, 6(A), 6(B), 7(A), 7(B)(1)(2), 7(C), 8, 9, 10, 11, 13, 15, 16, 17, 18, AND 20 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON JULY 18, 2025.

DATE: 1/13/2026

NATHAN PAUL KERR, R.P.L.S. #6834

STATE OF TEXAS — NATHAN PAUL KERR — 6834 — REGISTERED PROFESSIONAL LAND SURVEYOR

TITLE COMMITMENT NOTES

THIS SURVEY PLAT WAS PREPARED TO REFLECT THE TITLE COMMITMENT ISSUED BY REPUBLIC TITLE OF TEXAS, INC., GF NO. 1002-418434-RTT, EFFECTIVE DATE: 10-12-2025. ITEMS LISTED ON SCHEDULE B ARE ADDRESSED AS FOLLOWS:

- **ITEM 10f: BLANKET WATERLINE EASEMENT TO WIXON WATER SUPPLY CORP. RECORDED IN VOLUME 320, PAGE 804 (DRBCT) DOES APPLY TO THIS TRACT. THIS EASEMENT CALLS TO BE 20' WIDE CENTERED ON THE WATERLINE AS INSTALLED AND SPECIFIES THE LINE TO BE "AS CLOSE TO FENCE LINE AS POSSIBLE". THE ACTUAL LOCATION OF THE INSTALLED WATERLINE (IF ANY) WAS NOT MARKED ON THE GROUND AND SAID EASEMENT COULD NOT BE PLOTTED.**
- **ITEM 10g: 30' WIDE FERGUSON CROSSING PIPE LINE CO. EASEMENT RECORDED IN VOLUME 512, PAGE 421 (DRBCT) DOES CROSS THIS TRACT. APPROXIMATE LOCATION SHOWN HEREON.**
- **ITEM 10h: 30' WIDE FERGUSON CROSSING PIPE LINE CO. EASEMENT RECORDED IN VOLUME 588, PAGE 331 (DRBCT) DOES NOT CROSS THIS TRACT.**
- **ITEM 10i: BLANKET WATERLINE EASEMENT TO WICKSON SPECIAL UTILITY DISTRICT RECORDED IN VOLUME 5673, PAGE 282 (OPRBCT) DOES APPLY TO THIS TRACT. THIS EASEMENT CALLS TO BE 20' WIDE CENTERED ON THE WATERLINE AS INSTALLED. THE ACTUAL LOCATION OF THE INSTALLED WATERLINE (IF ANY) WAS NOT MARKED ON THE GROUND AND SAID EASEMENT COULD NOT BE PLOTTED.**
- **ITEM 10j: PUBLIC UTILITY EASEMENTS TO THE CITY OF BRYAN RECORDED IN VOLUME 10405, PAGE 80 (OPRBCT) DO NOT CROSS THIS TRACT.**
- **ALL OTHER ITEMS ARE NOT SURVEY ITEMS AND/OR ARE NOT ADDRESSED BY THIS PLAT.**

ALTA/NSPS LAND TITLE SURVEY PLAT
OF A
14.73 ACRE TRACT
2.40 ACRES BEING OUT OF THE REMAINDER OF A CALLED 34.84 ACRES DESCRIBED IN VOLUME 11941, PAGE 227 OPRBCT, AND BEING ALL OF A CALLED 12.34 ACRES DESCRIBED IN VOLUME 12024, PAGE 282 OPRBCT
STEPHEN F. AUSTIN NO. 10 LEAGUE SURVEY, ABSTRACT 63
BRYAN, BRAZOS COUNTY, TEXAS

KERR SURVEYING

"When one person stands to gain over another, the facts must be uncovered"

SCALE: 1 INCH = 60 FEET
FIELD SURVEY DATE: 06-18-2025, PLAT DATE: 01-13-2026
JOB NUMBER: 25-0712 | CAD NAME: 25-0712-ALTA
POINT FILE: COHALA-GRID / 25-0305 (corr); 25-0712-ALL (job)
DRAWN BY: WJB CHECKED BY: NPK
PREPARED BY: KERR SURVEYING, LLC
TBPELS FIRM#10018500
1718 BRIARCREST DRIVE, BRYAN, TEXAS 77802
PHONE: (979) 268-3195
SURVEYS@KERRSURVEYING.NET | KERRLANDSURVEYING.COM

Attachment F

City of Bryan Specifications

SECTION 31 23 23.53

CEMENT STABILIZED SAND BACKFILL

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2012 specification.)

PART 1 – GENERAL

1.1 DESCRIPTION

A. At the discretion of the Engineer, Cement Stabilized Sand meeting the following specification may be allowed as trench backfill.

1.2 MEASUREMENT AND PAYMENT

A. Cement-stabilized sand shall be considered a part of the backfill requirement for the unit installed and shall be considered subsidiary to the length of the unit bid. If the cement stabilized sand is indicated to be a separate construction item for bulk backfill then the cement stabilized sand shall be measured per cubic yard as indicated on the plans.

1.3 SUBMITTALS

A. Mix Design

PART 2 – PRODUCTS

2.1 MATERIALS

A. CEMENT - Type I/II Portland Cement conforming to ASTM C150.

B. SAND - Clean durable sand meeting grading requirements for fine aggregates of ASTM C33, and the following requirements:

1. Classified as SW, SP, or SM by the United Soil Classification System of ASTM D2487.
2. Deleterious materials:
    a.) Clay lumps, ASTM C142; less than 0.5 percent.
    b.) Lightweight pieces, ASTM C123; less than 5.0 percent.
    c.) Organic impurities, ASTM C40; color no darker than standard color.
    d.) Plasticity index of 4 or less when tested in accordance with ASTM D4318.
3. Water: Potable water, free of oils, acids, alkalis, organic matter, or other deleterious substances, meeting requirements of ASTM C94.

C. Submittals of above items shall be provided.

2.2 TESTING REQUIREMENTS

A. Mixing plant inspections may be performed periodically. Material samples shall be collected and tested for change in material characteristics.

B. Random samples of delivered product will be taken in the field at point of delivery for each day of placement in the work area. Specimens will be prepared in accordance with ASTM D1632 and tested for compressive strength in accordance with ASTM D1633 within three (3) hours of collection of sample.

C. The cement content may be tested at the discretion of the City.

D. Calibration of Pugmill to be provided to city monthly.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. DESIGN REQUIREMENTS

Design sand-cement mixture to produce a minimum unconfined compressive strength of 50 pounds per square inch in 48 hours and 100 pounds per square inch in 7 days when compacted to 95% in accordance to ASTM D558 and when cured in accordance with ASTM D1632, and tested in accordance with ASTM D1633. Mix for general use shall contain a minimum of 1-½ sacks of cement per cubic yard. Mix for use as sanitary sewer embedment within 9 feet of waterlines shall contain 2 sacks of cement per cubic yard. Compact mix with moisture content between 0% to 2% above optimum.

The maximum compressive strength in 7 days shall be 400 psi. Backfill that exceeds the maximum compressive strength shall be removed by the contractor.

B. MIXING

1. Thoroughly mix sand, cement, and water in proportions specified by the Design Requirements using a pugmill-type mixer. The plant shall be equipped with automatic weight controls to ensure correct mix proportions.

2. Stamp batch ticket at plant with time of loading directly after mixing and time delivered to site. Material not placed and compacted within 3 hours after mixing shall be rejected. Provide copy of ticket to inspector.

3. Compaction shall begin within one (1) hour after mixing.

C. PLACEMENT

1. Place sand-cement mixture in 8-inch-thick lifts and compact to 95% of ASTM D558 unless other specified by the engineer. The moisture content during compaction shall be between 0% to 2% above optimum. Perform and complete compaction of sand-cement mixture within 3 hours after addition of water at plant.

2. Do not place or compact sand-cement mixture in standing or free water.

3. Failed test can be overturned by in place testing to substantiate strength. Testing shall be by ASTM C-42 wet core method at contractor's expense.

END OF SECTION

SECTION 33 12 16

MAIN LINE VALVES

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2012 specification.)

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes the manufacture, construction, and installation of waterline valves for ordinary waterworks service.

1.2 MEASUREMENT AND PAYMENT

A. GATE VALVES

Gate valves will be measured by the each.

Payment will be made at the unit price bid per each for furnishing and installing gate valves, which bid price will include all costs for the complete gate valve installation, including extension stems, valve boxes, concrete blocking, testing, and disinfection.

B. APPURTENANCES

Operator extensions, valve boxes, brass plug valves, manholes, and concrete blocking will not be measured items.

1.3 SUBMITTALS

A. Submit manufacturer's data on materials furnished, indicating compliance with the specifications regarding dimensions, thickness, weights, and materials.

B. Submit manufacturer's "Certificate of Compliance", stating that the materials furnished comply with this specification.

1.4 INSPECTION, STORAGE, AND HANDLING

A. All valves should be unloaded carefully. The valve should be carefully lowered from the truck to the ground, not dropped. In the case of larger valves, fork trucks or slings around the body of the valve or under the skids should be used for unloading. Only hoists and slings with adequate load capacity to handle the weight of the valve or valves should be used. Do not hook hoists into or fasten chains around bypasses, yokes, gearing, motors, cylinders, or handwheels.

B. Valves should be inspected at the time of receipt for damage in shipment. The initial inspection should verify compliance with specifications, direction of opening, size and shape of operating nut, number or turns, and type of end connections. A visual inspection of gate rings and body rings should be performed to detect any damage in shipment or scoring of the seating surfaces. Inspection personnel should look for bent stems, broken handwheels, cracked parts, missing parts and accessories, and any other evidence of mishandling during shipment. The valve should be cycled through one complete opening-and-closing cycle. All valves sixteen (16") inches and larger should be operated through one full operating cycle in the position in which they are to be installed.

C. Valves should be stored in the fully closed position to prevent entry of foreign material that could cause damage to the seating surfaces. Whenever practical, valves should be stored indoors. If outside storage is required, means should be provided to protect the operating mechanisms, such as gears, motor operators, and cylinders, from the weather and foreign materials. If valves may be subject to freezing temperatures, remove water from the valve interior and close the gates tightly before storage. Valves in outside storage in cold climates should be stored with the discs in a vertical position; if the discs are in a horizontal flat position, rain water can accumulate on top of the top disc, seep into the valve body cavity, freeze, and crack the casting. Any valves damaged by weather will not be installed.

PART 2 – PRODUCTS

2.1 MATERIALS

A. APPLICABLE STANDARDS

1. AWWA – C110, C111
2. ASTM – A48, C33, C150 and C478

B. GATE VALVES

All gate valves up to and including thirty (30") inch shall conform to the current AWWA C515 standard. All valves shall be ductile iron body, resilient seat nonrising stem, internal wedging type and new. All gate valves shall have a square nut operated valve turning clockwise to close. Brass nut is not allowed. Valves shall have a working pressure rating of 250 psi.

1. Resilient-Seated Gate Valves per AWWA C515

a.) *General*

All valves up to and including thirty (30") inch shall have a bronze stem, resilient-seated disc, drip tight shutoff. City of Bryan will accept "Resilient Seated" (Powder Coated) valves manufactured by American Flow Control Series 2500 or M&H 7000 Series. City of College Station will accept "Resilient Seated" (Powder Coated) valves manufactured by American Flow Control Series 2500 or Clow Model No 2638.

b.) *Gates, Rings and Disc*

All gates shall be cast-iron with internally reinforced, molded rubber disc seat rings. All gate valves shall be manufactured with a modified wedge disc with steel reinforced, natural rubber disc seat ring. Disc shall slide on a vertical, machined guide surface and shall seat on a sloped, machined seating surface. Valves shall be tested for leakage per AWWA C515, Section 6.1.6.

c.) Gate valves twelve (12") inches or smaller will be installed seated on a minimum of one (1) 12"x12"x 4" solid concrete blocks. Valves larger than 12" will be seated by a poured-in-place concrete saddle. The size of this saddle is as shown on the plans.

2. Stuffing Boxes

   All valves up to and including sixteen (16") inches shall be equipped with double O-rings, provided arrangement is made for replacement under pressure of the upper O-ring when the valve is fully open. All geared valves will be equipped with conventional packing in the main stuffing box. Valves shall be installed in a vertical position. Stuffing box and bonnet bolts and nuts shall be 304 stainless steel.

3. Operating Nuts

   All valves shall be square nut operated. All valves shall open by turning to the left (counter clockwise). Operator nuts shall be two (2") inch square.

4. Miscellaneous Requirements

   a.) All exposed bolts, nuts, etc., for valves to be buried, shall be stainless steel. Cadmium plated bolts, nuts, etc., will not be accepted.

   b.) A valve nut extension will be installed to maintain 4' bury to operating nut when the operating nut is located 5' or more below finished grade after valve installation.

D. VALVE ENDS

1. Valves shall have mechanical joint ends. Mechanical joint ends shall conform to AWWA C111. Flanged ends shall conform to ASA B16.1, Class 125 lb. (unless otherwise noted).
2. Bolts and nuts for mechanical joints will be of high-strength low-alloy corrosion resistant steel and conform to AWWA C111. All mechanical joint glands will be ductile iron.
3. Bolts and nuts for flanged ends buried in the ground shall be Type 304 stainless steel.

E. OPERATOR EXTENSION SHAFTS

Operator extension shafts are required on all valves when the operating nut is over five (5') feet below finished grade. Extension shaft is to bring the operating nut to within four (4') to five (5') feet of the top of the valve box. Extension shaft shall have a centering collar placed directly below operating nut and shall be bolted to valve operating nut with stainless steel set screw.

F. VALVE BOXES

A valve box shall be furnished and installed over each underground valve. The boxes shall be cast iron of the two-piece screw type, with a shaft diameter of not less than five and one-fourth inches (5-1/4") and shall have the word "WATER" stamped on the lid. Provide extension stem for all buried valves terminating in a standard 2-inch square AWWA nut within four (4') to five (5') feet of valve box cover. All parts of the valve box, base and cover shall be coated with hot bituminous varnish. The box shall be furnished complete with cast iron cover and yoke to fit over the valve body. Concrete valve box collars (24"x24"x6") shall be installed with each gate valve. Valve boxes are to be installed plumb and adjusted to their proper grade by the Contractor.

G. BRASS PLUG VALVES

One-half (1/2") inch through two (2") inch plug valves, when shown on the plans or required, shall be of all brass construction, and warranted for a water working pressure of 200 pounds per square inch. Brass plug valves smaller than two (2") inches shall be Mueller Oriseal, or pre-approved equal. Two (2") inch brass plug valves shall be Ford B11-777W or Mueller H-10284, or pre-approved equal.

H. CONCRETE

Cement shall conform to ASTM C150, Type 1. Aggregates shall conform to ASTM C33. Twenty-eight (28) day compressive strength shall equal or exceed 3,000 psi.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Any and all instruction manuals supplied by the manufacturers should be reviewed in detail before installation of the valve. At the job site, prior to installation, the valve should be visually inspected and any foreign material in the interior portion of the valve should be removed. A detailed inspection of the valve should be performed prior to installation.

1. All bolts should be protected to prevent corrosion, either with a suitable paint or by polyethylene wrapping.
2. During installation, there exists the possibility of foreign materials inadvertently entering the valve. Valves should be installed in the closed position. The valve shall be seated on a minimum of one (1) 12"x12"x 4" solid concrete blocks. Valves larger than 12" will be seated by a poured-in-place concrete saddle in the trench to prevent settling and excessive strain on the connection to the pipe. Size of this saddle shall be shown on the plans.
3. A valve box or vault should be provided for each valve used in a buried service application. The valve box should be installed so as not to transmit shock or stress to the valve. The valve box should be centered over the operating nut of the valve, with the box cover flush with the surface of the finished area, or such other level as directed by the City. Valve boxes should be of such a design that a traffic load on the top of the box is not transmitted to the valve.
4. Valves buried in unusually deep trenches shall have extension stems for operating the valve.

B. Valves installed above ground or in plant piping systems should be supported in such a way as to minimize bending of the valve end connections as a result of pipe loading.

C. After installation and before pressurization of the valve, all pressure-containing bolting (bonnet, seal plate, bypass, and end connections) should be inspected for adequate tightness to prevent leakage. In addition, an inspection should be made for adequate tightness to prevent leakage. In addition, an inspection should be made for adequate tightness of all tapped and plug openings to the valve interior. Proper inspection at this time will minimize the possibility of leaks after pressurization of the piping system.

D. In order to prevent time lost searching for leaks, it is recommended that valve excavations not be backfilled until after pressure tests have been made.

1. If valves are used to isolate test section, the test pressures should not exceed twice the rated working pressure of the valve. After the test, steps should be taken to relieve any trapped pressure in the body of the valve. The valve should not be operated in either the opening or closing direction at differential pressures above the rated working pressures.

E. Upon completion of the installation, valve location, size, make, type, date of installation, and other information deemed pertinent should be entered on permanent records and given to the Engineer.

F. Valves should not be installed in applications or for service other than those recommended by the manufacturer.

1. Valves should not be installed in lines where service pressure will exceed the rated working pressure of the valve.

2. Mainline valves shall not be used for throttling service, unless the design is specifically recommended for that purpose or approved in advance by the manufacturer and Engineer.

3. Valves should not be used in applications for water distribution that is exposed to subfreezing temperatures unless sufficient flow is maintained through the gate valve to prevent freezing, or some other type of protection is provided to prevent freezing.

4. Valves should not be installed at the dead end of a pipeline without proper and adequate restraint to support the valve and prevent it from blowing off the end of the line. No concrete shall be used on the valve for blocking.

5. To prevent damage to the valve, gate valves, up to and including sixteen inches (16") in diameter shall not be operated with input torques greater than 300 ft-lbs.

END OF SECTION

SECTION 33 12 19

FIRE HYDRANTS

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2020 specification.)

PART 1 - GENERAL

1.1 DESCRIPTION

This section describes the manufacture, construction, and installation of fire hydrants.

1.2 MEASUREMENT AND PAYMENT

A. FIRE HYDRANTS

Fire hydrants will be measured by the each as shown on the plans.

Payment will be made at the unit price bid per each for furnishing and installing fire hydrants, which bid price will include all costs for the fire hydrant installation, (excluding TEE), hydrant piping and fittings, hydrant gate valve, extension stems, valve boxes, concrete blocking, testing, disinfection, and all other work not otherwise provided for in the Proposal. The main line fitting is not included in the cost of the fire hydrant.

B. APPURTENANCES

Operation extensions, valve boxes, gate valves, mainline fittings, hydrant piping and fittings, anchor couplings, and concrete blocking will not be measured items and shall be considered subsidiary.

1.3 SUBMITTALS

A. Submit manufacturer's data on fire hydrants to be furnished indicating compliance with the specifications especially regarding dimensions, materials of construction, and nozzle threads.

B. Submit manufacturer's "Certificate of Compliance" stating that the materials furnished comply with the specifications.

C. Upon request, flow data, indicating friction loss in PSI at the flow of 1,000 GPM from the pumper nozzle, such friction loss must not exceed 3 PSI. ISO 9001 certification.

PART 2 – PRODUCTS

2.1 APPLICABLE STANDARDS

A. AWWA –C110, C111, C502, and C600

B. ASTM – C33 and C105

2.2 GENERAL

All fire hydrants furnished shall conform to the requirements and test of AWWA C502- 94 Standard for Dry Barrel Fire Hydrant or latest version thereof, as they pertain to the design, component materials, construction and manufacture, except as modified or supplemented hereinafter. Fire hydrants shall have a published warranty against defects in material or workmanship for a period of ten (10) years from date of manufacture. Fire hydrants shall come equipped with Storz quarter turn pumper connections that are an integral part of the fire hydrant and must be furnished by the manufacturer. Storz adapters will not be accepted. The nozzles and the caps for the nozzles shall meet the applicable requirements of NFPA 1963. Acceptable fire hydrants for the City of Bryan shall be American Flow Control 5-1/4" B-84-B-5 and M&H Fire Hydrant Style 129. Acceptable fire hydrants for the City of College Station shall be American Flow Control 5-1/4" B-84-B-5 and Clow Medallion.

1. Pressure rating -- working pressure shall be 250 psig tested to 500 psig hydrostatic pressure.
2. Flow -- friction loss shall not exceed 3.0 psig at a flow of 1000gpm through the pumper nozzle connection when tested as prescribed in AWWA C-502 latest revision. This test must be conducted by an independent laboratory in their facility and attested to by a Professional Engineer. Documentation must accompany all requests for hydrant approval.
3. Drain valve -- must drain the barrel when the hydrant is closed, and seal shut when hydrant is opened.
4. Seat ring and Drain ring (show bushing) – must be bronze (ASTM B-62), shall work in conjunction to form an all bronze drain way, and shall have no less than two (2) openings. If they are in a cast iron shoe, they must be bronze lined and the bronze seat ring must thread into bronze drain ring (or shoe bushing) providing bronze to bronze connection. Seat rings must be "O" rings. The 6" shoe connection must be specified (flanged, A/C, M.J, etc.) having ample blocking for sturdy setting. A minimum of eight (8) bolts and nuts is required to fasten the shoe to the lower barrel.
5. Main valve – compression type closing with the pressure and must be not less than 5-1/4" in diameter. Composition of the main valve must be molded rubber or neoprene, having a durometer hardness of 95 (+) (-) 5 and must be not less than 1" thick.
6. Outlet – "Three-way" having two (2) 2-1/2" hose nozzles and one (1) 4-1/2" I.D. pumper nozzle; all National Standard Hose Coupling Thread. All nozzles shall be bronze and thread counter clockwise into the nozzle section with "O" ring pressure seals and held in place with an acceptable locking device
7. Hydrant barrel casting – inside diameter of the hydrant barrel shall not be less than six and one-eighth inches (6-1/8").
8. Operating nut – Non-rising, pentagonal in shape, measuring 1-1/2" from point to flat at base of nut; bronze.
9. Hold-down nut – Shall incorporate an integral resilient weather seal and open counter clockwise.

2.2 GENERAL (CONT'D)

10. Lubrication chamber - Must be provided with sealed top and bottom "O" rings, filled with lubricant which shall be either oil or grease, designed with thrust collar and threaded operating parts that are automatically lubricated each time the hydrant is cycled. There must not be less than two (2) "O" rings separating the lubrications reservoir from the waterway and that portion of the stem contracting these "O" rings shall be sleeved with bronze. An anti-friction device must be in place above the trust collar to further minimize operating torque.
11. Hydrant bonnet – must be attached to the upper barrel by not less than four (4) bolts and nuts, with an inserted flat rubber gasket as a pressure sea. Bonnet must be white in color and reflective.
12. Direction to open – counter clockwise.
13. Operating stem – must be two-piece, not less than 1-1/4" diameter or 1" x 1" square (excluding threaded or machined areas) and must be connected by a breakable stem coupling near the ground line flange. Screws, pins, bolts or fasteners used in conjunction with the stem coupling must be stainless steel.
14. Exterior paint – red machinery enamel with white reflective bonnet.

B. ADDITIONAL REQUIREMENTS

1. Breakable Type Construction

   Hydrants shall be traffic-model type having upper and lower barrels joined approximately two inches (2") above the ground line by a separated and breakable "swivel" flange providing 360 degree rotation of the upper barrel for proper nozzle facing. This flange must employ not less than eight (8) bolts.

2. Provisions for Extension

   All hydrants shall be capable of being extended to accommodate future grade changes without excavation. Compression type hydrants that close with the flow shall have breakable type stem coupling installed at the ground line flange. Extension of this type hydrant shall be made by adding at the ground line flange, a new coupling and stem section equal to the length of the extension. Stem extensions made by adding a new section of stem to the threaded section of the stem at the top of the hydrant will not be accepted. Only one extension is allowed.

3. Bury Length

   Furnish hydrants for a four (4') foot bury unless the water line grades shown on the plans indicate a deeper bury is required.

4. Operating Stems

   Operating stems whose threads are located in the barrel or waterway shall be of manganese bronze, Everdur, or other high quality non-corrodible metal, and all working parts in the waterway shall be bronze to bronze.

Operating Stems (cont'd)

Operating stems whose threads are not located in the barrel or waterway may be made of high-grade bronze, genuine wrought iron, or steel, and stem nuts shall be bronze. Iron or steel stems shall have a bronze, stainless steel, or other non-corrodible metal, sleeve where passing through "O"-rings. Operating threads must be sealed against contact with the water at all times regardless of open or closed position of the main valve.

The operating mechanism, safety stem coupling and main valve assembly shall be capable of withstanding 200 ft-lbs of torque against the fully open or closed positions, with no damage to the components. Downward stem travel shall be limited in the bottom of the hydrant by a one-piece lower valve plate that bottoms out in the hydrant shoe. Travel stops located in the bonnet or upper valve plate is unacceptable. The interior and the exterior of the hydrant shoe shall be fully coated with not less than 8 mils of fusion bonded epoxy.

5. Main Valve Seats

   Main valve seats on compression type hydrants closing with the flow shall be of such design that incorrect positioning is impossible and that the threads will be adequately guided into position. Arrangements shall also be made to hold the main valve gasket in place during assembly. The main seat shall be made of bronze and threaded into a heavy bronze bushing in the hydrant base.

6. Seat and Drain Ring

   The bronze seat shall thread directly into a bronze drain ring. This will assure easy removal of the main valve seat through the top of the hydrant shoe and all pressure seals must be "O"-rings.

7. Hydrant Heads

   The hydrant shall be constructed so that the nozzles may be faced in any desired direction.

8. Mating Surfaces

   All mating surfaces, such as bonnet-to-nozzle section, nozzle section-to-lower barrel, lower barrel-to-shoe, must utilize rubber gaskets for sealing and must be held in place by zinc-plated bolts and nuts. Other methods, such as snap rings, etc., will not be accepted.

9. Manufacturer Experience Record

   No hydrant will be considered which has not been regularly manufactured and in successful continuous use for at least 10 years.

C. ACCESSORIES REQUIRED

1. Full face ground line flange gaskets.
2. Nozzle cap gaskets
3. Drain valve and outlet
4. Cap nuts to seal the bottom end of stem threads against contact with water
5. Harnessing lugs (Required only when shown on the plans.)

2.2 TESTING REQUIREMENTS

See SECTION 33 13 10 – HYDROSTATIC TESTING and
SECTION 33 13 00 – DISINFECTION OF WATERLINES.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. Fire hydrant leads 18’ or shorter will be restrained the entire length. Fire hydrant leads shall require a separate valve for the fire hydrant assembly. If main line valve is within 50’ of fire hydrant, then assembly valve may be omitted on a dead end hydrant lead with no additional connections.

B. Place fire hydrants at all locations shown on the plans, or as directed by the Engineer.

C. Set each fire hydrant upon a concrete slab not less than four inches (4”) thick and not less than one (1) square foot of surface area.

D. Place eight (8) cubic feet of crushed rock, clean gravel or other suitable material to provide reservoir capacity so that the hydrant will completely drain when closed.

E. Set the hydrant perpendicular with large steamer nozzle facing nearest curb, and at a depth such that the center of the steamer nozzle is not less than eighteen inches (18”), nor more than twenty-four inches (24”) above nearest grade. Assure that the hydrant is sat at the bury line.

F. Contractor shall remove the chains from the steamer nozzles prior to final project inspection.

G. Polyethylene encasement of 8 mils thick shall be installed on all piping and appurtenances in contact with soil and shall conform to AWWA C105. Joint tape shall be self-sticking PVC or polyethylene, 8 mils thick.

END OF SECTION

SECTION 32 92 19

SEEDING FOR EROSION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Seeding shall consist of preparing ground, providing for sowing of seeds, mulching with straw, hay or cellulose fiber and other management practices along and across such areas as are designated on the plans and in accordance with these specifications. Note that a bid item for "SEEDING" does not constitute the requirement for fertilizer, mulch, and/or mesh unless the additional requirements are stated on the plans or special conditions.

1.2 MEASUREMENT AND PAYMENT

A. FERTILIZING: Measure by the acre or as indicated in the proposal. Payment for work under this item will be made at the contract price bid for "Fertilizing for Erosion Control", which price is full compensation for all fertilizer, equipment, materials and labor necessary for fertilizing.

B. SEEDING: Measure by the acre or as indicated in the proposal. Payment for work under this item will be made at the contract price bid for "Seeding for Erosion Control", which price is full compensation for all seeding, watering, equipment, materials and labor necessary for seeding.

C. STRAW MULCH SEEDING: Measure by the square yard or as indicated in the proposal. Payment for work under this item to be made at the contract price for "Straw Mulch Seeding", which price to be full compensation for all fertilizer, seed, straw mulch, equipment, watering, materials and labor necessary for fertilizing and seeding.

D. FIBER MAT SEEDING: Measure by the square yard or as indicated in the proposal. Payment for work under this item to be made at the contract price for "Fiber Mat Seeding", which price to be full compensation for all fertilizer, seed, fiber mat, watering, equipment, materials and labor necessary for fertilizing and seeding.

E. PAPER MESH SEEDING: Measure by the square yard or as indicated in the proposal. Payment for work under this item is to be made at the contract price for "Paper Mesh Seeding", which price to be full compensation for all fertilizer, seed, paper mesh, watering, equipment, materials and labor necessary for fertilizing and seeding.

1.3 SUBMITTALS

A. Source of seeds

B. Seed Mix

C. Fertilizer

D. Manufacturer's data on Mulch Material

E. Manufacturer's data on Fiber Mat

F. Manufacturer's data on Paper Mesh

PART 2 – PRODUCTS

2.1 MATERIALS

A. GRASS SEED: All seed must meet the requirements of the U.S. Department of Agriculture as set forth in the Rules and Regulations of the Federal Seed Act and the Texas Seed Law, including the labeling requirements for showing pure live seed, (PLS=purity x germination), name and type of seed. Seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project. Each variety of seed shall be furnished and delivered in separate bags or containers. A sample of each variety of seed shall be furnished and delivered when directed by the Engineer. Seed which has been become wet, moldy or otherwise damaged in transit or storage will not be accepted. The amount of seed planted per acre, the type and the planting date shall be as indicated in the table below.

TABLE I

Type	Rate of Application Planting Type in Pounds per Acre Date	Planting Date
Unhulled Bermuda Grass	20	Jan. 1 to Apr. 1
Hulled Bermuda Grass	12	Apr. 1 to Oct. 1
Mix Bermuda & Rye in the following Proportions:		
Unhulled Bermuda Grass	12	
Rye Grass	50	Oct. 1 to Jan. 1

B. FERTILIZER: Use pellet or granular fertilizer with analysis of 16 percent nitrogen, 20 percent phosphoric acid and zero percent potash (or 10-10-5), unless otherwise required. The container labels shall show the analysis. Powdered or caked fertilizers shall not be permitted. Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at an average rate of 400 pounds per acre.

C. STRAW MULCH: Straw mulch shall be oat, wheat, or rice straw. Hay mulch shall be prairie grass, bermuda grass, oat, wheat or rice stems or other hay as pre-approved by the Engineer. Do not use straw containing Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be molded or rotted. 164.5 Fiber Mat. Fiber mat to consist of machine produced mat of wood fibers, with consistent thickness throughout blanket. Use blanket with top side of netted twisted Kraft paper having high wet strength, or biodegradable extruded plastic mesh. Use blanket with a weight from 0.7 pounds per square yard to 1.0 pound per square yard.

D. PAPER MESH: Use paper mesh consisting of Knitted construction of yarn with uniform openings interwoven with strips of biodegradable paper, furnished in rolls for suitable protection for outdoor storage. Use paper mesh of weight from 0.2 pounds per square yard to approximately 0.5 pounds per square yard.

PART 3 – EXECUTION

3.1 CONSTRUCTION METHODS

A. GENERAL: Fertilizing & Seeding. After areas to receive fertilizing and seeding has been completed to the lines, grades and sections shown on the plans, apply fertilizer at the uniform average rate of 400 pounds per acre. Thoroughly mix upper 3 inches of top soil with fertilizer until a uniform mixture of fertilizer and top soil is obtained. Sprinkle areas to be seeded with water, using fine spray to avoid washing or erosion of soil. Broadcast seed with sowing equipment at the rate specified above, using care to obtain uniform distribution. After broadcasting, lightly rake seeds into soil to a depth not to exceed 1/2 inch. Complete seeding by rolling with roller developing 15 to 25 pounds per inch of tread. Keep seeded areas moist for a period of 10 days immediately following placement. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. Reseed any areas damaged by erosion.

B. STRAW MULCH SOIL RETENTION BLANKET:

1. Fertilizing & Seeding: After ditch or slope has been completed to lines, grades and cross-sections shown on the plans, apply fertilizer and seed in accordance with the above. When seed and fertilizer are to be distributed as water slurry, mixture is to be applied within 30 minutes after all components are placed in the equipment.
2. Mulch Application: Immediately upon completion of planting of seed and fertilizing, spray straw mulch uniformly over the area at the rate of 1 1/2 to 2 tons of hay or 2 1/2 tons of straw per acre. Mulching machine shall inject asphaltic material into straw uniformly as it leaves the equipment at the rate of 0.05 to 0.10 gallons of asphalt per square yard of mulched area. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. Reseed any areas damaged by erosion for any reason. The mulching operation shall immediately follow seeding and fertilizing as a continuous operation.

C. FIBER MAT OR PAPER MESH SOIL RETENTION BLANKET**:**

1. Fertilizing and seeding shall be in accordance with the above.
2. Fiber Mat or Paper Mesh Installation: Place fiber mat or paper mesh within 24 hours after seeding operations have been completed. Prior to placing, clear the area to be covered of all rocks or clods over 1 1/2 inches in diameter and all sticks or other foreign material which will prevent close contact of the blanket with the soil. Area shall be smooth and free of ruts or other depressions. If as a result of a rain, prepared seed bed becomes crusted or eroded, or if eroded places, ruts or depressions exist for any reason, rework soil until smooth and reseed such areas. After area has been properly prepared, lay fiber mat or paper mesh flat, smooth and loosely without stretching or crimping material. Apply materials with lengths running parallel to the flow of water. When more than one width is required, butt or overlap edges as required by the manufacturer. Hold the material in place by means of a wire staple driven into the soil at an angle to the surface. Staple material along each edge and in a grid pattern with minimum 3 foot centers each way. In ditches and on slopes, provided additional stapling as recommended by the manufacturer.

D. CONTRACTOR MAINTENANCE & GUARANTEE PERIOD: Maintenance of seeded areas shall be 60 days after successful completion of punch list items and shall consist of water and weeding, repair of all erosion and any reseeding as necessary to establish a uniform stand of the specified grasses. Contractor shall guarantee growth and coverage of seeding under this contract to the effect that a minimum of 95% of the area planted will be covered with the specified grass after 60 days with no bare spots greater than 10 square feet. The Contractor shall be responsible for one (1) mowing every 2 weeks between the months of April to October. The Contractor shall also be responsible for one (1) mowing every three (3) weeks between the months of November to March. In addition, the Contractor shall water the entire sodded and hydro-mulched areas to a saturated depth of one (1) inch at least once a week between the months of April to September and at least once a month between the months of October to March. Contractor shall make a second application of seeding to bare areas not meeting specified coverage as determined by the Engineer. Such replanting is to be performed within 90 days of initial application and immediately upon notification by the Engineer to replant.

END OF SECTION

SECTION 33 05 01

POLYVINYLCHLORIDE PIPE AND FITTINGS

(Sentences and/or paragraphs that are double underlined indicate revisions that were made from the 2020 specification.)

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work specified under this section includes the manufacture, construction and installation of Polyvinylchloride (PVC) pipe and fittings for Water Lines and for Gravity and Pressure Sanitary Sewers.

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds (Latest Edition)
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe (Latest Edition)
ASTM F 1483	Standard Specification for Oriented Poly (Vinyl Chloride), (PVCO) Pressure Pipe (Latest Edition)
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM D1598	Standard Test Method for Time-to-Failure of Plastic Pipe under Constant Internal Pressure
ASTM D1599	Standard Test Method for Resistance to Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D2122	Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings
ASTM D2152	Standard Test Method for Adequacy of Fusion of Extruded Poly (Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
ASTM D2241	Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2564	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM F679	Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ASTM D2672	Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4-Inch through 12- Inch for Water Distribution (Latest Edition)
AWWA C909	Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe. 4-Inch Through 12-Inch for Water Distribution (Latest Edition)
AWWA C104	ANSI Standard for Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water
AWWA C105	ANSI Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C111	ANSI Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C116	Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
AWWA C153	Ductile Iron Compact Fittings, 3 in. through 24 in. and 54 in. through 64 in. for Water Service
AWWA C905	Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. - 48 in.

1.3 MEASUREMENT AND PAYMENT

A. Payment shall be made at the price bid per unit length per the specification SECTION 33 11 13.1 - WATER MAIN CONSTRUCTION or SECTION 33 31 13 - SANITARY SEWAGE SYSTEM.

1.4 SUBMITTALS

A. Submit manufacturer's data on pipe furnished, indicating compliance with the specifications regarding dimensions, thickness, weights, and materials.
B. Submit manufacturer's "Certificate of Compliance," stating that the materials furnished comply with this specification.

1.5 STORAGE AND HANDLING

A. UNLOADING - COLD WEATHER HANDLING

As the temperature approaches and drops below freezing extra care should be used in handling during cold weather. Pipe at the bottom of a stack may become out-of-round due to the weight of material above it. Allow the pipe to recover to full initial roundness before installation. Pipe may be unloaded by hand, either by passing over the side or off the truck end. Sliding one length on another is permissible in unloading pipe, but lengths in the bottom layer shall be lifted off of the rough surface of the truck body to avoid abrasion. Compact shipping units (palletized bundles in a wood frame) may be unloaded by conventional fork lifts.

B. STOCKPILES

Store pipe on a flat surface so as to support the barrel evenly with bell ends overhanging. Store random lengths separately where they will be readily available. Individual lengths of pipe should be stacked in piles no higher than 5 feet. Pipe shall be protected during long exposures (over 3 months) to sunlight. Do not use clear plastic sheets. Provide space for air circulation under sheet.

C. STORING RUBBER RINGS

Store all rubber rings at a central point and distribute them as needed. Keep them clean, away from oil, grease, excessive heat and electric motors which produce ozone. If rubber rings are not to be used immediately, store them in their cartons, as shipped, in a cool dark place out of the direct rays of the sun.

PART 2 – PRODUCTS

2.1 MATERIALS

A. WATER LINES

1. Pipe

a. Blue colored Polyvinyl chloride (PVC) pressure pipe, six inch (6") through twelve inch (12") , shall conform to the current AWWA – C900 DR 14, be UL listed, be approved by the Texas State Board of Insurance and the National Sanitation Foundation. The outside diameter shall be identical to ductile-iron pipe (CIOD Standard, Table 2, AWWA – C900). All pipe shall be new and have the AWWA designation, pressure class, DR pressure rating and size of pipe stamped on the outside of each joint (follow requirements of C900 2.5.2 Markings). All piping shall be new. Partial pieces from other projects shall not be approved for installation. Metal detector tape shall be installed above all PVC pipe at an elevation of 2 feet below natural ground.

Blue colored C909 pressure class 305 PVC pipe (meeting current AWWA C909 standards), six inch (6") through twelve inch (12"), and having the identical outside diameter as ductile-iron pipe, is approved for use in the City of Bryan only.

b. Blue colored DR 14 (meeting current AWWA C-905 standards) for pipe sizes greater than 12 inches.

c. PVC Pressure Pipe shall be designed and tested in accordance with ASTM D1598, D1599, and D2152.

d. Fittings for PVC water pipe shall be ductile-iron, and shall conform to AWWA C153, unless otherwise specified.

Fitting joints shall be mechanical joints. Bolts and nuts for mechanical joints, or flanged ends will be of a high strength corrosion resistant low-alloy steel and shall conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts for below ground installation shall be 316 stainless steel. All fittings shall be epoxy coated and lined unless stainless steel is used.

Where joints are to be restrained, use Certa-Lok/Diamond Lok restrained pipe (or approved equal) or mega-lug type fittings for pipe six (6") inches in size and larger. Mega-lug type mechanical restraints with less than 6 contact points will not be allowed for six (6") inch pipe sizes and larger.

Polyethylene wrap or encasement of metal fittings shall conform to AWWA C105. Joint tape shall be self-sticking PVC or 8-mil-thick polyethylene.

e. Joints: PVC water pipe shall be furnished with an elastomeric gasket at each joint and an integral thickened bell as part of each joint. Pipe and fittings must be assembled with a non-toxic lubricant. Provisions must be made at each joint for expansion and contraction. Refer to ASTM F477, D3139 and D3212.

B. GRAVITY SANITARY SEWER

1. Pipe

Flexible pipe and fittings shall be unplasticized polyvinyl chloride gravity sewer pipe shall be green in color, made from clean, virgin, NSF approved Class 12454-B PVC conforming to ASTM D1784. All pipe shall be new and have the ASTM designation, SDR, pressure rating and size stamped on the outside of each joint. All markings shall follow requirements of ASTM D3034.

Green colored polyvinyl chloride (PVC) gravity pipe and fittings in sizes six inch (6") through twelve inch (12") shall conform to ASTM D3034 and be UL listed and approved by the National Sanitation Foundation. Pipe and fittings shall be SDR-26. Eighteen inch (18") pipe and fittings shall be SDR-26 and conform to ASTM F-679, be UL listed and approved by the National Sanitation Foundation.

C. SEWER FORCE MAIN AND PRESSURE PIPE

1. Pipe

a. Polyvinyl chloride (PVC) pressure pipe, four (4) inch through eight (8) inch, shall be green in color and shall conform to the current ASTM D2241, AWWA – C900, or AWWA C909 standard, be UL listed, be approved by the Texas State Board of Insurance and the National Sanitation Foundation. PVC pipe pressure class shall be equal to or greater than twice the maximum calculated pressure of the force main.

b. Polyvinyl chloride (PVC) pressure pipe shall be SDR-21 Class 200 and conform to the ASTM D2241 standard, be UL listed and approved by the National Sanitation Foundation, and shall be green in color. The outside diameter shall be identical to steel pipe.

c. PVC Pressure Pipe shall be designed and tested in accordance with ASTM D1598, D1599, and D2152.

d. Fittings for PVC pressure pipe shall be ductile-iron, and shall conform to AWWA C153, unless otherwise specified. Fitting joints shall be mechanical joints. Bolts and nuts for mechanical joints, or flanged ends will be of a high strength corrosion resistant low-alloy steel and shall conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts for below ground installation shall be 316 stainless steel. All fittings shall be epoxy coated and lined unless stainless steel is used. Polyethylene wrap or encasement of metal fittings shall conform to AWWA C105.

e. Joint tape shall be self-sticking PVC or 10-mil-thick polyethylene.

Where joints are to be restrained, use mega-lug type fittings

f. Joints: PVC water pipe shall be furnished with an elastomeric gasket at each joint and an integral thickened bell as part of each joint. Pipe and fittings must be assembled with a non-toxic lubricant. Provisions must be made at each joint for expansion and contraction. Refer to ASTM F477, D3139 and D3212.

2.2 TESTING REQUIREMENTS

See: SECTION 33 01 30 - TESTING OF GRAVITY SEWER SYSTEMS
SECTION 33 13 10 - HYDROSTATIC TESTING (Used for Waterlines & Sanitary Sewer Force Mains)
SECTION 33 13 00 - DISINFECTION OF WATERLINES

PART 3 – EXECUTION

3.1 TRENCHING

A. See Standard Details.

3.2 JOINT ASSEMBLY

A. Push-on joints shall be assembled as follows:

1. Thoroughly clean the groove and bell and insert the gasket, making sure that it faces the proper direction and that it is correctly seated.

2. Dirt or foreign material shall be cleaned from the spigot end to a point one inch (1") beyond the reference mark. A joint lubricant shall be used and applicable recommendations of the manufacturer shall be followed.

3. Be sure that the spigot end is beveled, as square or sharp edges may damage or dislodge the gasket and cause a leak. Push the spigot end into the bell of the pipe while keeping the joint straight. Brace the bell while the beveled end is pushed under the ring, so that previously completed joints in the line will not be closed up. Make deflection after the joint is assembled.

4. Push the spigot end in until the reference mark on the spigot end is flush with the end of the bell. If excessive resistance to insertion of the beveled end is encountered or the reference mark does not reach the flush position, disassemble the joint, and check the position of the ring. If it is twisted or pushed out of its seat, clean the ring, bell and beveled end and repeat assembly. Be sure both lengths are in proper alignment.

5. If the ring was not out of position, measure the distance between the reference mark and beveled end, and check it against correct values from the manufacturer. Relocate the reference mark if it is out of position.

6. Small pipe can be pushed into the bell end with a long bar. Large pipe requires additional power, such as a jack, lever puller, or backhoe. A timber header should be used between the pipe and jack or backhoe bucket to avoid damage to the pipe.
7. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means pre-approved by the Engineer. The plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation should the trench fill with water.

B. Mechanical joints shall be assembled as follows:

1. Wipe clean the bell and spigot end. The spigot end, bell, and gasket should be washed with a soap solution to improve gasket seating.
2. Place the gland on the spigot end with the lip extension toward the spigot end, followed by the gasket with the narrow edge of the gasket toward the spigot end of the pipe.
3. Insert the pipe into the bell and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly. Make deflection after joint assembly but before tightening the bolts.
4. Push the gland toward the bell and center it around the pipe with the gland lip against the gasket.
5. Align bolt holes and insert bolts, with bolt heads behind the bell flange, and tighten opposite nuts to keep the gland square with the bell.
6. Tighten the nuts in accordance with manufacturer's recommendations.

C. When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed that shown in Table 1. Pipes greater than twelve-inches (12") in diameter shall not be deflected.

TABLE 1
Maximum Deflection Full Length Pipe
Push-on Type Joint

Pipe Diameter in.	Deflection Angle (Deg.)	Min. Radius of Curve (ft.)*
6	2.5	220
8	1.9	400
12	1.3	600

*** All curvature results from the bending of pipe lengths. There is no deflection at the joint.**

D. Cutting and Beveling

1. A square cut is essential to insure proper assembly. Use either a tubing cutter or a miter box and carpenter's fine-toothed hand saw or hacksaw. (Do not use standard pipe cutters. The cutting wheel will crush or damage the pipe.)
2. Use a factory-finished beveled end as a guide to determine the angle and length of taper. The end may be beveled using a Pilot beveling tool which will cut the correct taper automatically or a thin steel, "cheese-grater" type of hand tool, Stanley "Sureform" No. 399.
3. With a pencil or crayon, locate the reference mark at the proper distance from the bevel end as indicated by the manufacturer.

3.3 POLYETHYLENE TUBE PROTECTION

A. All cast iron and ductile iron fittings shall be provided with 8 mil polyethylene tube protection. Completely cover all fittings and connections with polyethylene film held securely in place with joint tape or strapping according to the provisions of AWWA C105.

3.4 EMBEDMENT

A. Install embedment as shown on the Plans and in accordance with SECTION 31 23 33 - EXCAVATING, TRENCHING, AND BACKFILLING.

3.5 TAPPING WATER LINES

A. Where a tap occurs within a deflected section of pipe, utilize a fitting (ie: 8” x 1” tapped tee) in lieu of tapping the pipe.

B. The tapping sleeve specified will be the Smith-Blair 665MJ Stainless Steel Tapping Sleeve for pipe sizes 6"-24".

3.6 GRAVITY SANITARY SEWER DEFLECTION TEST

A. The sewer line shall be tested for deflection in accordance with SECTION 33 01 30 - TESTING FOR SANITARY SEWAGE GRAVITY SYSTEM.

END OF SECTION

SECTION 33 05 02

DUCTILE IRON PIPE

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work specified under this section includes furnishing all labor, tools, equipment, materials, and supplies for the installation of Ductile Iron Pipe for Water Lines or Sanitary Sewers.

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A746	Standard Specifications for Ductile Iron Gravity Sewer Pipe (Latest Revision)

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104	Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water (Latest Edition)
AWWA C105	Polyethylene Encasement for Ductile Iron Pipe Systems (Latest Edition)
AWWA C111	Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings (Latest Edition)
AWWA C115	Flanged Ductile Iron Pipe with Threaded Flanges (Latest Edition)
AWWA C116	Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
AWWA C151	Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids (Latest Edition)
AWWA C150	Thickness Design of Ductile Iron Pipe (Latest Edition)
AWWA C153	Ductile Iron Compact Fittings, 3 in. through 24 in. and 54 in. through 64 in. for Water Service
AWWA C600	Ductile Iron Water Mains (Latest Edition)

1.3 MEASUREMENT

A. Payment shall be made at the price bid per unit length per the specification SECTION 33 11 13.1 - WATER MAIN CONSTRUCTION or SECTION 33 31 13 - SANITARY SEWAGE SYSTEM.

1.4 SUBMITTALS

A. Submit manufacturer's data on pipe furnished, indicating compliance with the specifications regarding dimensions, thickness, weights, and materials.

B. Submit manufacturer's "Certificate of Compliance," stating that the materials furnished comply with this specification.

1.5 STORAGE AND HANDLING

A. Pipe to be shipped in accordance with the pipe manufacturer's recommendations and stored in a manner that the pipe is not damaged. The Contractor will replace damaged piping at no additional cost to the City.

B. Pipe shall not be stacked higher than manufacturer's recommendations. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Pipe in tiers shall be alternated: bell, plain end; bell, plain end. At least two (2) rows of 4" x 4" timbers shall be placed between tiers and chocks affixed to each end in order to prevent movement.

C. Gaskets for mechanical joints to be stored shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

D. Mechanical joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

PART 2 – PRODUCTS

2.1 MATERIALS

A. WATER LINES

1. Pipe

Ductile iron pressure pipe shall conform to the current AWWA C151 (ANSI A21.51) standard. All pipe shall be new, and shall have the AWWA or ASTM designation, pressure class and size of pipe stamped on the outside of each joint. Ductile iron pipe shall be approved by the Underwriter's Laboratory and shall be accepted by the State Fire Insurance Board for use in water distribution systems without penalty. Ductile iron pipe less than six (6") inches in diameter will not be allowed. Ductile iron thickness shall conform in all respects to the current AWWA C150 standard based on a minimum of 200 psi working pressure. A special design shall be provided for large diameters or deep embedment.

Flanged pipe shall conform to AWWA C115 and be based upon a minimum of 200 psi working pressure.

Foreign made pipe shall not be accepted.

2. Joints and Gaskets

All ductile iron pressure pipe shall be furnished with one of the following types of joints, and as described in the Proposal, or shown on the Plans.

Type Joint	Standard
Mechanical Joint	AWWA C111
Flanged Ends	AWWA C115
Bell & Spigot/Push-On	AWWA C111

Flange gaskets shall be full faced and conform to Appendix A of AWWA C115.

3. Fittings

Fittings for ductile iron pipe shall be of cast iron, or ductile iron, and shall conform to AWWA C153, unless otherwise specified in the proposal, special specification, or on the plans.

Fitting joints shall be mechanical, flanged, or special internally locked joint with body thickness and radii of curvature conforming to AWWA C153.

All screwed flanges shall be ductile iron.

4. Bolts and Nuts

Bolts and nuts for mechanical joints shall be of a high strength corrosion resistant low alloy steel and conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts for below ground installation shall be 316 stainless steel.

5. Polyethylene Encasement

Polyethylene encasement of 8 mils thickness shall conform to AWWA C105. Joint tape shall be self sticking PVC or polyethylene, 8 mils thick.

6. Restraint

See SECTION 03 30 01 - CONCRETE BLOCKING OR ANCHORAGE.

7. Coatings

Pipe exterior to be bituminous coated and in accordance with the requirements of AWWA C151 Section 4.3. Coating and Lining or epoxy coated in accordance with AWWA C116.

8. Lining

Unless otherwise noted, all pipe shall be cement-mortar lined inside with seal coat all in accordance with AWWA C104 or epoxy coated in accordance with AWWA C116.

B. GRAVITY SANITARY SEWER LINES

1. Pipe

a. Ductile iron gravity and pressure pipe shall conform to the current ASTM, A746, and AWWA C111 and C151 (ANSI A21.51) standard. All pipe shall be new, and shall have the AWWA or ASTM designation, pressure class and size of pipe stamped on the outside of each joint. Ductile iron pipe less than eight (8") inches in diameter will not be allowed for sewer mains.

b. Ductile iron thickness shall conform in all respects to the current AWWA C150/C151 standard, based on a minimum of 200 psi working pressure.

c. Pipe to be shipped in accordance with the pipe manufacturer's recommendations and stored in a manner that the pipe is not damaged. The Contractor will replace damaged piping at no additional cost to the City.

d. Flanged pipe shall conform to AWWA C115, and be based upon a minimum of 200 psi working pressure.

2. Joints and Gaskets

All ductile iron pressure pipe shall be furnished with one of the following types of joints, and as described in the Proposal or shown on the Plans. Flange gaskets shall be full faced, and conform to Appendix A of AWWA C115.

Type Joint	Standard
Mechanical Joint	AWWA C111
Flanged Ends	AWWA C115
Bell & Spigot/Push-On	AWWA C111

a. All screwed flanges shall be ductile iron.

b. Gaskets for mechanical joints to be stored shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

3. Fittings

a. Fittings for ductile iron pipe shall be of ductile iron, and shall conform to AWWA C153.

b. Fitting joints shall be mechanical, flanged, or special internally locked joint with body thickness and radii of curvature conforming to AWWA C153.

4. Bolts and Nuts

Bolts and nuts for mechanical joints shall be high-strength corrosion resistant low alloy steel, and conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts shall be 316 stainless steel.

Mechanical joint bolts shall be handled and stored in such a manner that will ensure proper use with respect to types and sizes.

5. Polyethylene Encasement

Polyethylene encasement shall conform to AWWA C105. Joint tape shall be self-sticking PVC or polyethylene, 8 mils thick.

6. Coatings/ Linings

All pipe and fittings shall be bituminous or epoxy coated outside and inside, all in accordance with AWWA C104 or AWWA C116. Interior lining for ductile iron sewer pipe shall conform to manufacturer's recommendations. Minimum lining thickness shall be 40 mils, regardless of material recommended.

Other acceptable lining materials are "Protecto 401" Ceramic Epoxy by Vulcan Group or pre-approved equal.

C. FORCE MAIN

Force mains shall comply with of all requirements of SECTION 33 11 13.1 – WATERLINE MAIN CONSTRUCTION.

2.2 TESTING REQUIREMENTS

See: SECTION 33 11 13.1 - WATER MAIN CONSTRUCTION or SECTION 33 31 13 - SANITARY SEWAGE SYSTEM for testing requirements.

PART 3 – EXECUTION

3.1 TRENCHING

A. See Standard Details.

3.2 PIPE INSTALLATION

A. All pipe fittings, services, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the Engineer, who may prescribe corrective repairs or reject the material. All rejected material must be removed from the project immediately at the sole expense of the Contractor.

B. All lumps, blisters, and excess coating shall be removed from the socket and plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit or any foreign material before the pipe is laid.

C. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe.

D. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with pre-approved backfill material.

E. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug, or other means pre-approved by the Engineer. The plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation should the trench fill with water.

3.3 MECHANICAL JOINT ASSEMBLY

A. Wipe clean the socket and plain end. The plain end, socket and gasket should be washed with a soap solution to improve gasket seating.

B. Place the gland on the plain end, with the lip extension toward the plain end, followed by the gasket, with the narrow edge of the gasket toward the plain end of the pipe.

C. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly. Make deflection after joint assembly, but before tightening the bolts.

D. Push the gland toward the bell, and center it around the pipe with the gland lip against the gasket.

E. Align bolt holes and insert bolts, with bolt heads behind the bell flange, and tighten opposite nuts to keep the gland square with the socket.

F. Tighten the nuts in accordance with the manufacturer's recommendations.

G. When it is necessary to deflect pipe from a straight line in either the vertical or horizontal plane, or where long radius curves are permitted, the amount of deflection shall not exceed manufacturer's recommendations.

3.4 PIPE CUTTING

A. Cutting pipe for the insertion of valves, fittings, or closure pieces shall be done in a neat, workmanlike manner, without creating damage to the pipe or lining. Seal-coat bare surfaces and cut ends per manufacturer's recommendations.

B. Cut ends and rough edges shall be ground smooth.

3.5 POLYETHYLENE TUBE PROTECTION

A. GENERAL

1. All cast iron & ductile iron pipe and fittings shall be provided with polyethylene tube protection according to the provisions of AWWA C105. Completely cover all fittings and connections with polyethylene film held securely in place with joint tape or strapping. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material.

2. Where polyethylene-wrapped pipe joints an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least two (2') feet. Secure the end with circumferential turns of tape.

3.6 EMBEDMENT

A. Install embedment as shown on the Plans and in accordance with SECTION 31 23 33, Excavating, Trenching, and Backfilling.

3.7 REACTION ANCHORAGE AND BLOCKING

A. The contractor shall install concrete blocking and retaining glands to all unlugged bell and spigot or all-bell tees, Y-branches, bends deflecting eleven and one-fourth degrees (11 ¼°) or more, and plugs which are subject to internal pressure in excess of 10 psi. to preclude separation of joints. See SECTION 03 30 01 - CONCRETE BLOCKING OR ANCHORAGE for additional details.

3.8 MINIMUM COVER

A. See SECTION 33 11 13.1 - WATER MAIN CONSTRUCTION or SECTION 33 31 13 - SANITARY SEWAGE SYSTEM for cover requirements.

END OF SECTION

Attachment G

Middough Specifications

Messer

Liquified Air Separation Unit

SUBDRAINAGE

566901-C-S-334600-001

Bryan, Texas ASU

Boatcallie Rd
Project Number 566901



Middough Project No. MEU2510

Rev	Date	By	Checked	Approved	Description
00A	10/17/25	KPS	KGC	-	ISSUED FOR APPROVAL
00B	11/14/25	KPS	KGC	-	ISSUED FOR BID
00C	04/17/26	KPS	KGC	-	ISSUED FOR PERMIT

1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes:

- Perforated-wall pipe and fittings.
- Geotextile filter fabrics.

1.2 ACTION SUBMITTALS

1.2.1 Product Data: For geotextile filter fabrics.

2 PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

2.1.1 Perforated PE Pipe and Fittings: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

2.2 SOIL MATERIALS

2.2.1 Soil materials are specified in the drawings an Geotechnical Report, completed by Intertek PSI on September 19, 2025.

2.3 WATERPROOFING FELTS

2.3.1 Material: Comply with ASTM D226, Type I, asphalt or ASTM D227, coal-tar-saturated organic felt.

2.4 GEOTEXTILE FILTER FABRICS

2.4.1 Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested in accordance with ASTM D4491.

2.4.2 Structure Type: Nonwoven, needle-punched continuous filament.

- Survivability: AASHTO M 288 Class 2.
- Styles: Flat and sock.

3 EXECUTION

3.1 EARTHWORK

3.1.1 Excavating, trenching, and backfilling are specified in drawings and Geotechnical Report, completed by Intertek PSI on September 19,2025.

3.2 FOUNDATION DRAINAGE INSTALLATION

3.2.1 Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.

3.2.2 Lay flat-style geotextile filter fabric in trench and overlap trench sides.

3.2.3 Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

3.2.4 Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

3.2.5 Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.

3.2.6 Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

3.2.7 After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

3.2.8 Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

3.2.9 Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

3.2.10 Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.3 PIPING INSTALLATION

3.3.1 Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

- Foundation Subdrainage: Install piping level and with a minimum cover of

36 inches unless otherwise indicated.

- Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.

- Lay perforated pipe with perforations down.

- Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

3.3.2 Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

3.3.3 Install thermoplastic piping in accordance with ASTM D2321.

3.4 PIPE JOINT CONSTRUCTION

3.4.1 Join perforated PE pipe and fittings with couplings in accordance with ASTM D3212 with loose banded, coupled, or push-on joints.

3.4.2 Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.5 CONNECTIONS

3.5.1 Comply with requirements for piping specified in Section "Stormwater Conveyance." Drawings indicate general arrangement of piping, fittings, and specialties.

3.5.2 Connect low elevations of subdrainage system to solid-wall-piping storm drainage system.

3.6 FIELD QUALITY CONTROL

3.6.1 Tests and Inspections:

- After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.

- Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.6.2 Drain piping will be considered defective if it does not pass tests and

inspections.

3.6.3 Prepare test and inspection reports.

3.7 CLEANING

3.7.1 Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

Messer

Liquified Air Separation Unit

FACILITY WASTEWATER SEWERS

566901-C-S-221313-001

MESSER
Gases for Life



Bryan, Texas ASU

Boatcallie Rd
Project Number 566901

middough®
PROJECT SOLUTIONS

Middough Project No. MEU2510

Rev	Date	By	Checked	Approved	Description
00A	10/17/25	KPS	KGC	-	ISSUED FOR APPROVAL
00B	11/14/25	KPS	KGC	-	ISSUED FOR BID
00C	04/17/26	KPS	KGC	-	ISSUED FOR PERMIT

1 SUMMARY

1.1 Section Includes:

1.1.1 Wastewater piping

1.1.2 Non-pressure type transition couplings.

1.1.3 Manholes.

1.1.4 Concrete.

2 PRODUCTS

2.1 PVC PIPE AND FITTINGS

2.1.1 Gravity Sewer Piping

- Pipe: ASTM D3034, SDR 26, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
- Fittings: ASTM D3034, PVC with bell ends.
- Gaskets: ASTM F477, elastomeric seals.

2.1.2 Force Main Sewer Piping

- Pipe: ASTM D2241, AWWA C900 or C909, SDR 21, PVC Class 200. Outside diameter shall be identical to steel pipe.
- Fittings: Ductile Iron, AWWA C153.
- Gaskets: ASTM F477, elastomeric seals.

2.2 NON-PRESSURE TYPE TRANSITION COUPLINGS

2.2.1 Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling; for joining underground non-pressure piping. Include ends of same sizes as piping to be joined and include corrosion-resistant-metal tension band and tightening mechanism on each end.

2.2.2 Sleeve Materials:

- For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.

- For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

2.2.3 Unshielded, Flexible Couplings:

- Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.2.4 Ring-Type, Flexible Couplings:

- Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.2.5 Non-pressure Type, Rigid Couplings:

- Description: ASTM C1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 MANHOLES

2.3.1 Standard Precast Concrete Manholes:

- Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- Diameter: 48 inches minimum unless otherwise indicated.
- Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
- Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
- Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
- Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
- Joint Sealant: ASTM C990, bitumen or butyl rubber.

- Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.

- Steps: Individual FRP steps, FRP ladder, or ASTM A615/A615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D4101; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

- Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.

- Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

2.3.2 Manhole Frames and Covers:

- Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."

- Material: ASTM A48/A48M, Class 35 gray iron unless otherwise indicated.

2.4 CONCRETE

2.4.1 General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:

- Cement: ASTM C150/C150M, Type II.

- Fine Aggregate: ASTM C33/C33M, sand.

- Coarse Aggregate: ASTM C33/C33M, crushed gravel.

- Water: Potable.

2.4.2 Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

- Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.

- Reinforcing Bars: ASTM A615/A615M, Grade 60 deformed steel.

2.4.3 Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

- Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - Invert Slope: 1 percent through manhole.
- Benches: Concrete, sloped to drain into channel.
    - Slope: 8 percent.

3 EXECUTION

3.1 EARTHWORK

3.1.1 Excavating, trenching, and backfilling are specified in drawings and Geotechnical Report, completed by Intertek PSI on September 19,2025.

3.2 PIPING INSTALLATION

3.2.1 General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground wastewater sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

3.2.2 Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

3.2.3 Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

3.2.4 Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

3.2.5 Install gravity-flow, nonpressure, drainage piping according to the following:

- Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.

- Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.

- Install piping with 36-inch minimum cover.

- Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."

- Install PVC Type PSM sewer piping according to ASTM D2321 and ASTM F1668.

3.2.6 Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A674 or AWWA C105/A21.5:

- Hub-and-spigot, cast-iron soil pipe.

- Expansion joints and deflection fittings.

3.2.7 Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

3.3.1 Join gravity-flow, nonpressure, drainage piping according to the following:

- Join PVC Type PSM sewer piping according to ASTM D2321 and ASTM D3034 for elastomeric-seal joints or ASTM D3034 for elastomeric-gasket joints.

- Join dissimilar pipe materials with nonpressure-type, flexible couplings.

3.3.2 Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

3.3.3 Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

- Unshielded flexible couplings for pipes of same or slightly different OD.
- Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
- Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 MANHOLE INSTALLATION

3.4.1 General: Install manholes complete with appurtenances and accessories indicated.

3.4.2 Install precast concrete manhole sections with sealants according to ASTM C891.

3.4.3 Form continuous concrete channels and benches between inlets and outlet.

3.4.4 Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CONCRETE PLACEMENT

3.5.1 Place cast-in-place concrete according to ACI 318.

3.6 CLEANOUT INSTALLATION

3.6.1 Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

3.6.2 Set cleanout frames and covers in earth in cast-in-place-concrete block, 24 by 24 by 4 inches deep. Set with tops 1 inch above surrounding grade.

3.6.3 Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.7 CONNECTIONS

3.7.1 Connect nonpressure, gravity-flow drainage piping to building's wastewater building drains.

3.7.2 Make connections to existing piping and underground manholes.

- Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

- Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

- Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of, and be flush with, inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

    - Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

    - Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

- Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

3.8.1 Comply with requirements in Section "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

- Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

3.9.1 Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

- Submit separate report for each system inspection.

- Defects requiring correction include the following:
    - Alignment: Less than full diameter of inside of pipe is visible between structures.
    - Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - Infiltration: Water leakage into piping.
    - Exfiltration: Water leakage from or around piping.
- Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- Reinspect and repeat procedure until results are satisfactory.

3.9.2 Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

- Do not enclose, cover, or put into service before inspection and approval.
- Test completed piping systems according to requirements of authorities having jurisdiction.
- Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
- Submit separate report for each test.

3.9.3 Leaks and loss in test pressure constitute defects that must be repaired.

3.9.4 Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

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Middough Project No. MEU2510

Rev	Date	By	Checked	Approved	Description
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00B	11/14/25	KPS	KGC	-	ISSUED FOR BID
00C	04/17/26	KPS	KGC	-	ISSUED FOR PERMIT

1 GENERAL

1.1 SUMMARY

1.1.1 Section includes concrete paving including the following:

- Driveways.
- Roadways.
- Parking lots.
- Curbs and gutters.
- Walks.

1.2 ACTION SUBMITTALS

1.2.1 Product Data: For each type of product.

1.2.2 Samples: For each type of product, ingredient, or admixture requiring color selection.

1.2.3 Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

1.3.1 Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

- Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.4 PRECONSTRUCTION TESTING

1.4.1 Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing on concrete paving mixtures.

2 PRODUCTS

2.1 CONCRETE, GENERAL

2.1.1 ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 STEEL REINFORCEMENT

2.2.1 Reinforcing Bars: ASTM A615, Grade 60; deformed.

2.2.2 Joint Dowel Bars: ASTM A615, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

2.2.3 Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.3 CONCRETE MATERIALS

2.3.1 Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

- Portland Cement: ASTM C150, portland cement Type I.
- Fly Ash: ASTM C618, Class C or Class F.
- Slag Cement: ASTM C989, Grade 100 or 120.

2.3.2 Normal-Weight Aggregates: TXDOT Section 421, Portland Cement Concrete.

2.3.3 Air-Entraining Admixture: ASTM C260.

2.3.4 Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3.5 Water: Potable and complying with ASTM C94.

2.4 CURING MATERIALS

2.4.1 Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

2.4.2 Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

2.4.3 Water: Potable.

2.4.4 Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

2.4.5 Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

2.4.6 White, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B, dissipating.

2.5 RELATED MATERIALS

2.5.1 Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber, ASTM D1752, cork or self-expanding cork or ASTM D8139, semirigid, closed-cell polypropylene foam in preformed strips.

2.6 CONCRETE MIXTURES

2.6.1 Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

2.6.2 Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent

2.6.3 Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

- Air Content: 5 percent plus or minus 1 percent.

2.6.4 Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

2.6.5 Concrete Mixtures: Normal-weight concrete.

- Compressive Strength (28 Days): 3500 psi.
- Maximum W/C Ratio at Point of Placement: 0.45.
- Slump Limit: 5 inches, plus or minus 1 inch.

2.7 CONCRETE MIXING

2.7.1 Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94. Furnish batch certificates for each batch discharged and used in the Work.

3 EXECUTION

3.1 EXAMINATION

3.1.1 Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

3.2 PREPARATION

3.2.1 Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

3.3.1 Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

3.3.2 Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

3.4.1 Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.5 JOINTS

3.5.1 General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

3.5.2 Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

3.5.3 Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

3.5.4 Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, to match jointing of existing adjacent concrete paving:

3.5.5 Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

3.6.1 Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

3.6.2 Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

3.6.3 Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

3.6.4 Screed paving surface with a straightedge and strike off.

3.6.5 Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

3.7.1 General: Do not add water to concrete surfaces during finishing operations.

3.7.2 Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

- Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

3.8 CONCRETE PROTECTION AND CURING

3.8.1 General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

3.8.2 Comply with ACI 306.1 for cold-weather protection.

3.8.3 Begin curing after finishing concrete but not before free water has disappeared

from concrete surface.

3.8.4 Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, or a combination of these.

3.9 PAVING TOLERANCES

3.9.1 Comply with tolerances in ACI 117 and as follows:

- Elevation: 3/4 inch.
- Thickness: Plus 3/8 inch, minus 1/4 inch.
- Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
- Joint Spacing: 3 inches.
- Contraction Joint Depth: Plus 1/4 inch, no minus.
- Joint Width: Plus 1/8 inch, no minus.

3.10 REPAIR AND PROTECTION

3.10.1 Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

3.10.2 Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

3.10.3 Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

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TURF AND GRASSES

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1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes:

- Seeding.

1.2 DEFINITIONS

1.2.1 Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

1.2.2 Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

1.3 PREINSTALLATION MEETINGS

1.3.1 Preinstallation Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

1.4.1 Certification of grass seed.

1.4.2 Product certificates.

1.5 QUALITY ASSURANCE

1.5.1 Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

- Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

- Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of

manufacturer, and indication of compliance with state and Federal laws, as applicable.

2 PRODUCTS

2.1 SEED

2.1.1 Grass Seed: Meet the requirements of US Department of Agriculture and Texas Seed Law.

2.1.2 Seed Species:

- Quality, State Certified: Unhulled Bermuda Grass during January 1 to April 1, Hulled Bermuda Grass during April 1 to October 1, and a mix of Unhulled Bermuda Grass and Rye Grass from October 1 to January 1.

2.2 FERTILIZERS

2.2.1 Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potash in the following composition:

- Composition: 16 percent nitrogen, 20 percent phosphorous, and 00 percent potash, by weight.

2.3 MULCHES

2.3.1 Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, oats, or rice.

3 EXECUTION

3.1 TURF AREA PREPARATION

3.1.1 General: Prepare planting area for soil placement and mix planting soil.

3.1.2 Reduce elevation of planting soil to allow for soil thickness of sod.

3.1.3 Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.1.4 Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

3.2.1 Sow seed with spreader or seeding machine. Do not broadcast or drop seed

when wind velocity exceeds 5 mph.

- Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
- Do not use wet seed or seed that is moldy or otherwise damaged.
- Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

3.2.2 Sow seed at a total rate of 20 pounds per acres from January 1 to April 1, 12 pounds per acre from April 1 to October 1, and 12 pounds of Unhulled Bermuda Grass and 50 pounds of Rye Grass per acre from October 1 to January 1.

3.2.3 Apply fertilizer at a uniform average rate of 400 pounds per acre.

3.2.4 Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

3.2.5 Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2½ tons/acre to form a continuous blanket over seeded areas.

- Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.2.6 Protect seeded areas from hot, dry weather or drying winds by applying peat mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.3 TURF MAINTENANCE

3.3.1 General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

3.3.2 Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.4 SATISFACTORY TURF

3.4.1 Turf installations shall meet the following criteria as determined by Engineer:

- Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

3.4.2 Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

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SITE WATER DISTRIBUTION PIPING

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1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes:

- Water-distribution piping and related components.

1.2 CLOSEOUT SUBMITTALS

1.2.1 Operation and maintenance data.

1.3 PROJECT CONDITIONS

1.3.1 Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service in accordance with requirements indicated:

- Notify Owner no fewer than two days in advance of proposed interruption of service.
- Do not proceed with interruption of water-distribution service without Owner's written permission.

1.4 COORDINATION

1.4.1 Coordinate connection to water main with utility company.

1.4.2 Content includes water-distribution piping and related components outside the building for domestic water service, fire-suppression water service, combined domestic water service and fire-suppression water service. Terminate water-service piping with appropriate fitting for extension as shown in drawings.

2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.1.1 Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

2.1.2 Comply with standards of authorities having jurisdiction for domestic water-service piping, including materials, installation, testing, and disinfection.

2.1.3 Comply with standards of authorities having jurisdiction for fire-suppression

water-service piping, including materials, hose threads, installation, and testing.

2.1.4 Piping materials to bear label, stamp, or other markings of specified testing agency.

2.1.5 Comply with ASTM F645 for selection, design, and installation of thermoplastic water piping.

2.1.6 Comply with FM Approvals' "Approval Guide" and/or UL's "Fire Protection Equipment Directory" for fire-suppression water-service products.

2.1.7 Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

2.1.8 All piping and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61/NSF 372 or are certified in compliance with NSF 61/NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

2.2.1 Comply with requirements in "Piping Applications" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and service sizes.

2.2.2 Potable-water piping and components comply with NSF 14, NSF 61, and NSF 372.

2.3 DUCTILE-IRON PIPE AND FITTINGS (reference B/CS Unified Specifications Section 33 05 02, Ductile Iron Pipe)

2.4 PE PIPE AND FITTINGS (reference Messer Standard Specification 00000-P-S-001/1P4, HDPE Piping Material Specification – 150# (1P4))

2.5 PIPING JOINING MATERIALS

2.5.1 Gaskets for Ferrous Piping and Copper-Alloy Tubing: ASME B16.21, asbestos free.

2.5.2 Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.6 PIPING SPECIALTIES (to be evaluated during the RFI process as applicable)

2.6.1 Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.7 GATE VALVES (reference B/CS Unified Specifications Section 33 12 16, Main Line Valves)

2.8 GATE VALVE ACCESSORIES AND SPECIALTIES (coordinate with B/CS Unified Specifications Section 33 12 16, Main Line Valves)

2.8.1 Tapping-Sleeve Assemblies: Sleeve and valve compatible with drilling machine.

- Standard: MSS SP-60.
- Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
- Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

2.8.2 Indicator Posts: UL 789, FM Global approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.9 CORPORATION VALVES, CURB VALVES, AND METER VALVES (coordinate with B/CS Unified Specifications Section 33 12 16, Main Line Valves)

2.9.1 Corporation Valves: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

- Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
- Corporation Valve: Bronze body, ground-key plug or ball, with AWWA C800, threaded inlet and outlet matching service piping material.

2.9.2 Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

- Service Boxes for Curb Valves: ASTM A48, Class 25 cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in

diameter.

- Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.9.3 Meter Valves: Comply with AWWA C800 for high-pressure, service-line valves. Include angle or straight-through-pattern bronze body, ground-key plug or ball, wide tee head, with inlet and outlet matching service piping material.

2.10 CONCRETE VAULTS

2.10.1 Concrete Vault - Precast, Reinforced Concrete: Designed for A-16 load designation in accordance with ASTM C857 and made in accordance with ASTM C858.

- Ladder: ASTM A36/A36M, steel or PE-encased steel steps.
- Manhole:
  - ASTM A48/A48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
- Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

2.11 FIRE HYDRANTS (coordinate with B/CS Unified Specifications Section 33 12 19, Fire Hydrants)

3 EXECUTION

3.1 EARTHWORK

3.1.1 Excavating, trenching, and backfilling are specified in drawings and Geotechnical Report, completed by Intertek PSI on September 19,2025.

3.2 PIPING APPLICATIONS

3.2.1 Transition couplings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.

3.2.2 Do not use flanges or unions for underground piping.

3.2.3 Flanges, unions, and grooved-end-pipe couplings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

3.3 VALVE APPLICATIONS (coordinate with B/CS Unified Specifications Section 33 12 16, Main Line Valves)

3.3.1 General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FM Global, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.

3.3.2 Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

- Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
- Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FM Global, cast-iron, nonrising-stem gate valves with indicator post.
- Use the following for valves in vaults and aboveground:
    - Gate Valves, NPS 2 and Smaller: Bronze, nonrising stem.
    - Gate Valves, NPS 3 and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.
    - Check Valves: AWWA C508, swing type.

3.4 INSTALLATION OF PIPING (also coordinate with B/CS Unified Specifications Section 33 05 02, Ductile Iron Pipe)

3.4.1 Water-Main Connection:

- Tap water main in accordance with requirements of water utility company and of size and in location indicated.

3.4.2 Make connections larger than NPS 2 with tapping machine according to the following:

- Install tapping sleeve and tapping valve in accordance with MSS SP-60.
- Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
- Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.

- Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

3.4.3 Make connections NPS 2 and smaller with drilling machine according to the following:

- Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
- Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
- Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
- Install corporation valves into service-saddle assemblies.
- Install manifold for multiple taps in water main.
- Install curb valve in water-service piping with head pointing up and with service box.

3.4.4 Comply with NFPA 24 for fire-service-main piping materials and installation.

3.4.5 Install ductile-iron, water-service piping in accordance with AWWA C600 and AWWA M41. Ductile iron piping shall be used from proposed water main extension through the meter and backflow preventer.

3.4.6 Install PE pipe in accordance with ASTM D2774 and ASTM F645. HDPE piping shall be used for piping on-site beyond the meter and backflow preventer.

3.4.7 Bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

- Under Driveways: With at least 36 inches of cover over top.
- Under Railroad Tracks: With at least 48 inches of cover over top.
- In Loose Gravelly Soil and Rock: With at least 12 inches of additional cover.

3.4.8 Extend water-service and fire-suppression water-service piping and connect to water-supply source and building water-piping and fire-suppression piping

systems at outside face of building wall in locations and pipe sizes indicated.

3.4.9 Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 JOINT CONSTRUCTION (also coordinate with B/CS Unified Specifications Section 33 05 02, Ductile Iron Pipe)

3.5.1 Make pipe joints according to the following:

- Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
- Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
- Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts in accordance with coupling manufacturer's written instructions.
- PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners in accordance with fitting manufacturer's written instructions.

3.6 INSTALLATION OF ANCHORAGE (also coordinate with project notes, details and B/CS Unified Specifications Section 03 30 01, Concrete Blocking Or Anchorage)

3.6.1 Anchorage: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

- Concrete thrust blocks.
- Locking mechanical joints.
- Set-screw mechanical retainer glands.
- Bolted flanged joints.
- Heat-fused joints.
- Pipe clamps and tie rods.

3.6.2 Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

- Gasketed-Joint, Ductile-Iron, Water-Service Piping: In accordance with AWWA C600.

- Fire-Service-Main Piping: In accordance with NFPA 24.

3.6.3 Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 INSTALLATION OF VALVES (also coordinate with B/CS Unified Specifications Section 33 12 16, Main Line Valves)

3.7.1 AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

3.7.2 AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.

3.7.3 UL-Listed or FM Global-Approved Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.

3.7.4 UL-Listed or FM Global-Approved Valves Other Than Gate Valves: Comply with NFPA 24.

3.7.5 MSS Valves: Install as component of connected piping system.

3.7.6 Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.7.7 Comply with requirements for concrete piers in Section 033000 "Cast-in-Place Concrete" for support of valves and piping not direct buried.

3.8 INSTALLATION OF CONCRETE VAULTS

3.8.1 Install precast concrete vaults in accordance with ASTM C891.

3.9 INSTALLATION OF FIRE HYDRANTS (also coordinate with B/CS Unified Specifications Section 33 12 19, Fire Hydrants)

3.9.1 Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

3.9.2 AWWA Fire Hydrants: Comply with AWWA M17.

3.9.3 UL/FM Global Fire Hydrants: Comply with NFPA 24.

3.10 IDENTIFICATION

3.10.1 Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in by Messer Specification 00000-P-S-747.

3.11 CLEANING

3.11.1 Clean and disinfect water-distribution piping as follows:

- Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
- Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
- Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for three hours.
    - After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

3.11.2 Prepare reports of purging and disinfecting activities.

Messer

Liquified Air Separation Unit

STORMWATER CONVEYANCE

566901-C-S-334200-001

MESSER
Gases for Life



Bryan, Texas ASU

Boatcallie Rd
Project Number 566901

middough®
PROJECT SOLUTIONS

Middough Project No. MEU2510

Rev	Date	By	Checked	Approved	Description
00A	10/17/25	KPS	KGC	-	ISSUED FOR APPROVAL
00B	11/14/25	KPS	KGC	-	ISSUED FOR BID
00C	04/17/26	KPS	KGC	-	ISSUED FOR PERMIT

1 GENERAL

1.1 SUMMARY

1.1.1 Section Includes:

- PE pipe and fittings.
- PVC pipe and fittings.
- Non-pressure transition couplings.
- Manholes.
- Catch basins.
- Stormwater inlets.
- Pipe outlets.

1.2 QUALITY ASSURANCE

1.2.1 Piping materials shall bear label, stamp, or other markings of specified testing agency.

2 PRODUCTS

2.1 CORRUGATED-PE PIPE AND FITTINGS

2.1.1 Corrugated-PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252, Type S, with smooth waterway for coupling joints.

2.1.2 Corrugated-PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294, Type S, with smooth waterway for coupling joints.

2.1.3 Corrugated-PE Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings.

2.2 PVC PIPE AND FITTINGS

2.2.1 PVC Corrugated Sewer Piping:

- Pipe: ASTM F949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.

- Fittings: ASTM F949, PVC molded or fabricated, socket type.
- Gaskets: ASTM F477, elastomeric seals.

2.2.2 Adhesive Primer: ASTM F656.

2.3 NON-PRESSURE TRANSITION COUPLINGS

2.3.1 Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground non-pressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3.2 Sleeve Materials:

- For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
- For Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

2.3.3 Unshielded, Flexible Couplings:

- Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3.4 Shielded, Flexible Couplings:

- Description: ASTM C1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3.5 Ring-Type, Flexible Couplings:

- Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 MANHOLES

2.4.1 Standard Precast Concrete Manholes:

- Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- Diameter: 48 inches minimum unless otherwise indicated.

- Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.

- Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.

- Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.

- Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.

- Joint Sealant: ASTM C990, bitumen or butyl rubber.

- Resilient Pipe Connectors: ASTM C923, cast or fitted into manhole walls, for each pipe connection.

- Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.

- Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.

- Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

2.5 CONCRETE

2.5.1 General: Cast-in-place concrete in accordance with ACI 318, ACI 350, and the following:

- Cement: ASTM C150/C150M, Type II.

- Fine Aggregate: ASTM C33/C33M, sand.

- Coarse Aggregate: ASTM C33/C33M, crushed gravel.

- Water: Potable.

2.5.2 Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

- Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.
- Reinforcing Bars: ASTM A615/A615M, Grade 60 (420 MPa) deformed steel.

2.5.3 Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

- Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
  - Invert Slope: 1 percent through manhole.
- Benches: Concrete, sloped to drain into channel.
  - Slope: 4 percent.

2.5.4 Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

- Reinforcing Fabric: ASTM A1064/A1064M, steel, welded wire fabric, plain.
- Reinforcing Bars: ASTM A615/A615M, Grade 60 (420 MPa) deformed steel.

2.6 CATCH BASINS

2.6.1 Standard Precast Concrete Catch Basins:

- Description: ASTM C478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
- Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
- Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

- Joint Sealant: ASTM C990, bitumen or butyl rubber.

- Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.

- Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch- diameter frame and grate.

- Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches.

- Pipe Connectors: ASTM C923, resilient, of size required, for each pipe connecting to base section.

2.6.2 Frames and Grates: ASTM A536, Grade 60-40-18, ductile iron designed for A-16 (AASHTO HS20-44), structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange, and 26-inch- diameter flat grate with small square or short-slotted drainage openings.

- Grate Free Area: Approximately 50 percent unless otherwise indicated.

2.7 STORMWATER INLETS

2.7.1 Curb Inlets: Made with vertical curb opening, of materials and dimensions in accordance with utility standards.

2.7.2 Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions in accordance with utility standards. Include heavy-duty frames and grates.

2.7.3 Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions in accordance with utility standards. Include heavy-duty frames and grates.

2.7.4 Frames and Grates: Heavy duty, in accordance with utility standards.

3 EXECUTION

3.1 EARTHWORK

3.1.1 Excavating, trenching, and backfilling are specified in drawings and Geotechnical Report, completed by Intertek PSI on September 19,2025.

3.2 PIPING INSTALLATION

3.2.1 General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

3.2.2 Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

3.2.3 Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

3.2.4 Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

3.2.5 Install gravity-flow, non-pressure drainage piping in accordance with the following:

- Install piping pitched down in direction of flow.
- Install piping with 36-inch minimum cover.
- Install PE corrugated sewer piping in accordance with ASTM D2321.
- Install PVC sewer piping in accordance with ASTM D2321 and ASTM F1668.

3.3 PIPE JOINT CONSTRUCTION

3.3.1 Join gravity-flow, non-pressure drainage piping in accordance with the following:

- Join corrugated-PE piping in accordance with ASTM D3212 for push-on joints.
- Join PVC corrugated sewer piping in accordance with ASTM D2321 for elastomeric-seal joints.
- Join dissimilar pipe materials with non-pressure-type flexible couplings.

3.4 MANHOLE INSTALLATION

3.4.1 General: Install manholes, complete with appurtenances and accessories indicated.

3.4.2 Install precast concrete manhole sections with sealants in accordance with ASTM C891.

3.4.3 Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.

3.4.4 Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.5 CATCH BASIN INSTALLATION

3.5.1 Construct catch basins to sizes and shapes indicated.

3.5.2 Set frames and grates to elevations indicated.

3.6 STORMWATER INLET AND OUTLET INSTALLATION

3.6.1 Construct riprap of broken stone, as indicated.

3.6.2 Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

3.6.3 Construct energy dissipaters at outlets, as indicated.

3.7 CONCRETE PLACEMENT

3.7.1 Place cast-in-place concrete in accordance with ACI 318.

3.8 CONNECTIONS

3.8.1 Connect non-pressure, gravity-flow drainage piping in building's storm building drains specified in drawings.

3.8.2 Make connections to existing piping and underground manholes.

- Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with

inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

- Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

- Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8.3 Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

- Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping unless otherwise indicated.

  - Unshielded flexible couplings for same or minor difference OD pipes.

  - Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.

  - Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.9 IDENTIFICATION

3.9.1 Materials and their installation for detectable warning tape are specified in Messer Specification 00000-P-S-747. Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

- Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.10 FIELD QUALITY CONTROL

3.10.1 Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

- Submit separate reports for each system inspection.
- Defects requiring correction include the following:
    - Alignment: Less than full diameter of inside of pipe is visible between structures.
    - Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - Infiltration: Water leakage into piping.
    - Exfiltration: Water leakage from or around piping.
- Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- Reinspect and repeat procedure until results are satisfactory.

Attachment H

Messer Specifications

1. DOCUMENT INFORMATION

1.1 Revision History

Rev.	Date	Remarks	By	Chk'd	Approved		
1	June-2019	Document Rebranded	FK	FK	RS		
00	04-Apr-00	First Issue	AMc	RWS	RWS		

2. CLASSIFICATION

Service: Potable and Process water, above ground in areas where temperature will not go below 45°F or above 140°F

Material: Polyvinyl Chloride (PVC) or Chlorinated Polyvinyl Chloride (CPVC)

Rating: See Pressure Temperature Range

NOMINAL PIPE SIZE: ½" - 10" inclusive

Pressure Temp. Range: 5.17 barg (75 psig) @ 311°K (100°F)
1.72 barg (25 psig) @ 333°K (140°F)
Minimum Temp. 280°K (45°F)
Details see Note 1

Piping Code: ASME B 31.3

Corrosion Allowance: None

3. SCHEDULE OF MATERIALS

{}Item	Type	Rating	Material	Notes
Pipe ½" - 10"	Thermoplastic	Sch. 40	Polyvinyl Chloride (PVC) ASTM D-1784/D-1785, Class 12454-B Chlorinated Polyvinyl Chloride (CPVC), ASTM D-1784/F-441, Class 23447-B	
Fittings All Sizes	Socket End or Flanged	Wall to Match Pipe	Polyvinyl Chloride (PVC) ASTM D-1784/D-2466 Class 12454-B Chlorinated Polyvinyl Chloride (CPVC), ASTM D-1784/F-438, Class 23447-B	2,3,4
Flanges All Sizes	Flat Face	Matches ANSI B16.5 Flg. 150# Drilling	Polyvinyl Chloride (PVC) ASTM D-1784/D-2466 Class 12454-B Chlorinated Polyvinyl Chloride (CPVC), ASTM D-1784/F-438, Class 23447-B	5,6
Gaskets All Sizes	1/8" Full Face		Neoprene Hypalon	7
Bolting All Sizes All Sizes	Machine Bolts Washers		Sq. head bolts with semi-heavy hexagon nuts, ASTM A307, GRB, Galvanized Type B Plain washer, ANSI B27.2 regular series, galvanized or zinc plated.	

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Notes:

1) Pressure-Temperate Rating, barg (psig).

DESIGN TEMP. °K (°F)	PVC		CPVC	
	6" & Under	8", 10"	6" & Under	8", 10"
280-311(45-100)	7.76 (113)	5.17 (75)	7.76 (113)	5.17 (75)
316 (110)	6.98 (101)	4.66 (68)	7.24 (105)	4.83 (70)
322 (120)	5.69 (83)	3.79 (55)	6.72 (98)	4.48 (65)
328 (130)	3.88 (56)	2.59 (38)	6.21 (90)	4.14 (60)
333 (140)	2.59 (38)	1.72 (25)	5.69 (83)	3.79 (55)

2) Branch connections in this class shall be made only with the use of Tees.

3) See Supplier installation instructions.

4) Standard elbow shall have a centerline radius of one and one half times the nominal diameter, and shall be molded one piece construction.

5) Recommended Bolt Torques:

{PRIVATE} Flange Size	Bolt Diameter	Recommended Torque for Well Lubricated Bolt
1/2" to 1-1/2"	1/2"	10-15 Ft. Lbs.
2" to 4"	5/8"	20-30 Ft. Lbs.
6" to 8"	3/4"	33-50 Ft. Lbs.
10"	7/8"	53-75 Ft. Lbs.

6) When mating to metallic flanges or valves, the metallic flanges shall be flat faced.

7) Gaskets shall have a Shore A hardness of 40 to 50.

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HDPE PIPING MATERIAL SPECIFICATION - 150# (1P4)

Standard Specification 00000-P-S-001/1P4

1. Document Information

1.1 Revision History

Rev.	Date	Remark	By	Chk'd	Approved		
M01	15 May 2025	Complete Document Revision	CK	JW	MB	CK	

2. Basic Design Data

Parameter	Value
Service Description	Potable Water, Cooling Water ; Below Ground in Clean Soil
Messer Spec. Designation	1P4
Messer Spec Description	HDPE (High Density Polyethylene) Pipe Class 150#
Design Temperature Range	-20F to 140F*
Code of Record	ASME B31.3
Fluid Service Category	Normal Fluid Service or Category D Fluid Service
Corrosion/Erosion Allowance	0 inch

*See pressure-temperature ratings section for material/size and temperature limits

1) If the system is to be for potable water service, the system shall also be certified to meet NSF Standard 61.

3. Pressure-Temperature Ratings

Temperature	-20F	73F	80F	90F	100F	110F	120F	130F	140F
Pressure Rating	150 psig	150 psig	150 psig	150 psig	150 psig	150 psig	126 psig	120 psig	100 psig

1) See Section 9 for further explanation on pressure rating of pipe. If pipe is installed in soil ≥ 2% hydrocarbon content, the pressure ratings shall be adjusted to lower values as noted.
2) Pressure ratings above are decreased from the nominal pipe/flange ratings based on standard installation of Cast/Ductile Iron Class 125# valves on the line, which are rated for 150 psig up to 150F per ASME B16.1 Table I-1. This 150 psig limit also corresponds to the upper pressure limit of ASME B31.3 Category D fluid systems.

4. References

1) The following Messer specifications shall be applied to this standard. When the piping is underground, electrical tracer wire shall be installed per **00000-P-S-747**.

Messer Specification	Document Description
00000-P-S-084	Cleaning Standard For Piping, Vessels
00000-P-S-104	Piping System Pressure Testing
00000-P-S-747	Specification for Underground Piping Tracer Wire

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5. Schedule of Materials (See Note 6)

Component	Nom. Size	Dim. Standard	Sch./Class	Material Spec.	Type	Notes
Pipe	1/2” to 3”	ASTM D3035 (IPS)	SDR-11	D3350 PE445574C Gr.PE4710	Plain End	1,2,3
	4” to 48”	ASTM F714 (IPS)	SDR-11	D3350 PE445574C Gr.PE4710	Plain End	1,2,3
Fittings	1/2” to 3”	ASTM D3261	SDR-11/ 200#	D3350 PE445574C Gr.PE4710	Butt Fusion	1,2,4
	4” to 48”	ASTM D3261	SDR-11/ 200#	D3350 PE445574C Gr.PE4710	Butt Fusion	1,2,4
Flanges	1/2” to 48”	ASME B16.42	150# LJFF	A536	Back-Up Ring & LapJoint	1,5
	1/2” to 48”	ASTM D3261	SDR-11/ 200#	D3350 PE445574C Gr.PE4710	Flange Adapter	1,2,4,5
Gaskets	1/2” to 48”	ASME B16.21	150# FF	PTFE, Microcellular Outer Layer	Ring, 1/8" Thick	1,9
Bolts	All	ASME B18.2.1		A307 Gr.B	Fully Threaded Stud	1,6
Nuts	All	ASME B18.2.2		A563 Gr.A	Heavy Hex	1,6

Schedule of Materials Notes:

1) Installation, examination, and inspection requirements per PIP PNSC0036. Butt fusion joints and flanged joints shall be exclusively used unless mechanical joints are approved on a case-by-case basis by the Messer piping engineer.
2) All HDPE components shall be sourced from a single manufacturer. HDPE Components shall be sourced from the following approved vendors:
    a. Performance Pipe (Chevron-Phillips), Plano TX
    b. PolyPipe Inc, Gainesville TX
    c. ISCO Industries, Louisville KY
3) All pipe shall be FM approved with the diamond logo, and marked as PR200
4) All fittings shall be FM approved and rated for SDR-11 / 200# service. All fittings 6” and less shall be molded fittings unless fabricated fittings are approved by Messer piping engineer beforehand.
5) Ductile iron flanges / back-up rings shall be epoxy coated. Mechanical joining to other fittings shall be accomplished with flange adapters and metal back-up flange.
6) Bolts/Studs, Nuts and Washers shall be hot-dipped galvanized (HDG).
7) Branch Connections Shall Follow the Table in Section 7 For Integrally Reinforced Branches or Table 8 For Fabricated Branch Connections.
8) All Piping Components and Valves for This Class Must Be Cleaned to **Class “C”** in Accordance With **00000-P-S-084** as Specified in Purchase Agreement, System Specification or Line List.
9) Gaskets may not be required for some HDPE piping flanged joints. Ductile iron fittings may require filler plates to provide full face ID support of HDPE flange adapter stub end.

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6. Pipe Schedule

Pipe Schedule - Nominal Dimensions					
Nominal Size	**Outside Diameter**	**Schedule**	**Wall Thickness**	**Material**	**Notes**
1/2”	0.840 in	SDR-11	0.076 in	D3350 PE445574C Gr.PE4710	
3/4”	1.050 in	SDR-11	0.095 in	D3350 PE445574C Gr.PE4710	
1”	1.315 in	SDR-11	0.120 in	D3350 PE445574C Gr.PE4710	
1.5”	1.900 in	SDR-11	0.173 in	D3350 PE445574C Gr.PE4710	
2”	2.375 in	SDR-11	0.216 in	D3350 PE445574C Gr.PE4710	
2.5”	2.875 in	SDR-11	0.261 in	D3350 PE445574C Gr.PE4710	
3”	3.500 in	SDR-11	0.318 in	D3350 PE445574C Gr.PE4710	
4”	4.500 in	SDR-11	0.409 in	D3350 PE445574C Gr.PE4710	
6”	6.625 in	SDR-11	0.602 in	D3350 PE445574C Gr.PE4710	
8”	8.625 in	SDR-11	0.784 in	D3350 PE445574C Gr.PE4710	
10”	10.750 in	SDR-11	0.977 in	D3350 PE445574C Gr.PE4710	
12”	12.750 in	SDR-11	1.159 in	D3350 PE445574C Gr.PE4710	
14”	14.000 in	SDR-11	1.273 in	D3350 PE445574C Gr.PE4710	
16”	16.000 in	SDR-11	1.455 in	D3350 PE445574C Gr.PE4710	
18”	18.000 in	SDR-11	1.636 in	D3350 PE445574C Gr.PE4710	
20”	20.000 in	SDR-11	1.818 in	D3350 PE445574C Gr.PE4710	
22”	22.000 in	SDR-11	2.000 in	D3350 PE445574C Gr.PE4710	
24”	24.000 in	SDR-11	2.182 in	D3350 PE445574C Gr.PE4710	
26”	26.000 in	SDR-11	2.364 in	D3350 PE445574C Gr.PE4710	
28”	28.000 in	SDR-11	2.545 in	D3350 PE445574C Gr.PE4710	
30”	30.000 in	SDR-11	2.727 in	D3350 PE445574C Gr.PE4710	
32”	32.000 in	SDR-11	2.909 in	D3350 PE445574C Gr.PE4710	
34”	34.000 in	SDR-11	3.091 in	D3350 PE445574C Gr.PE4710	
36”	36.000 in	SDR-11	3.273 in	D3350 PE445574C Gr.PE4710	
42”	42.000 in	SDR-11	3.818 in	D3350 PE445574C Gr.PE4710	
48”	48.000 in	SDR-11	4.364 in	D3350 PE445574C Gr.PE4710	

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7. Branch Connection Table (Integrally Reinforced Branches)

		BRANCH SIZE																
		1/2”	3/4”	1”	1.5”	2”	2.5”	3”	4”	6”	8”	10”	12”	14”	16”	18”	20”	22”	24”
Header Size	1/2”	ST																
	3/4”	RT	ST															
	1”	C	RT	ST														
	1.5”	C	C	RT	ST													
	2”	C	C	C	RT	ST												
	2.5”	C	C	C	C	RT	ST											
	3”	C	C	C	C	C	RT	ST										
	4”	C	C	C	C	C	C	RT	ST									
	6”	C	C	C	C	C	C	C	RT	ST								
	8”	C	C	C	C	C	C	C	C	RT	ST							
	10”	S	S	S	S	S	S	S	S	S	S	ST						
	12”	S	S	S	S	S	S	S	S	S	S	S	ST					
	14”	S	S	S	S	S	S	S	S	S	S	S	S	ST				
	16”	S	S	S	S	S	S	S	S	S	S	S	S	S	ST			
	18”	S	S	S	S	S	S	S	S	S	S	S	S	S	S	ST		
	20”	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	ST	
	22”	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	ST
	24”	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	ST

ST	Straight Tee Fitting per Section 7
RT	Reducing Tee Fitting per Section 7
C	Straight Tee Fitting and Concentric Reducer(s) or Reducing Tee per Section 7
S	Reducing Tee Fitting or Branch Saddle Reducing Tee per Section 7

1) For sizes larger than 24”, please consult Messer piping engineer.

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8. Branch Connection Table (Fabricated Branches)

1) Fabricated branches are not permitted per this specification.

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9. Supplemental Explanatory Notes

1) ASTM D3350 made several changes and updates in 2006-2007, one of which was the re-designation of the HDPE resin grade PE3408 to become separate specs PE3608 and PE4710. The HDPE material itself did not change, but the ASTM D3350 cell classification that described the material did change, requiring the split to PE3608 and PE4710. Previous versions and revisions of this pipe specification referenced the old PE3408 designation.
2) The pressure rating of non-metallic piping is not directly calculated from ASME B31.3 as metallic piping would be. The pressure rating of non-metallic PE3608 can be calculated from ASTM F714 and PPI TR-4 and determined via the equation and tables below.

$$P = \frac{2 * HDS * F_T * A_F}{SDR - 1}$$

$P = Pressure\ Rating\ at\ Temperature, psig$
$HDS = Hydrostatic\ Design\ Stress\ at\ 73F\ is\ 1{,}000\ psi\ for\ PE4710$
$F_T = Temperature\ Rating\ Factor, see\ table\ below$
$A_F = Environmental\ Factor, see\ table\ below$
$SDR = Standard\ Dimensional\ Ratio$

Temperature	-20F	73F	80F	90F	100F	110F	120F	130F	140F
F_T	1.00	1.00	1.00	0.90	0.78	0.75	0.63	0.60	0.50

Temperature	A_F
Water Service, Clean Soil	1.00
Hydrocarbon Service or ≥ 2% Hydrocarbon Laden Soil	0.50

Temperature	-20F	73F	80F	90F	100F	110F	120F	130F	140F
Pipe Pressure Rating	200 psig	200 psig	200 psig	180 psig	156 psig	150 psig	126 psig	120 psig	100 psig

3) The material designation ASTM D3350 Grade PE4710 Class 445574C
   a. PE4710
      i. PE = Polyethylene
      ii. 4 = Density 0.947-0.955 g/cm^3
      iii. 7 = PENT slow crack growth rate test of 500 hours
      iv. 10 = Hydrostatic design stress of 10*100 = 1,000 psi
   b. Class 445574C
      i. 4 = Density 0.947-0.955 g/cm^3
      ii. 4 = Melt Index < 0.15 g/10 min
      iii. 5 = Flexural Modulus 110,000 – 160,000 psi
      iv. 5 = Yield Tensile Strength 3,500 to 4,000 psi
      v. 7 = PENT slow crack growth rate test of 500 hours
      vi. 4 = Hydrostatic Design Basis (HDB) 1,600 psig
      vii. C = Black color w/ 2% minimum carbon black adder
         1. For piping to be installed above ground, UV class E shall be selected instead.

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SPECIFICATION FOR UNDERGROUND PIPING TRACER WIRE

Standard Specification 00000-P-S-747

1. Document Information

1.1 Revision History

Rev.	Date	Remark	By	Chk'd	Approved		
M01	12 May 2025	New Issue	CK	MB	JW	CK	

1.2 Scope

1. The purpose of this document is to provide requirements for tracer wire to be installed with the use of underground piping.
2. Tracer wire is an electrically conductive wire intended for direct burial with co-located underground piping for the purpose of detection and/or tracing of the pipe from above ground.
3. Tracer wire shall be installed for all non-metallic and non-conductive underground piping, or when specified in the engineering design.

2. Requirements

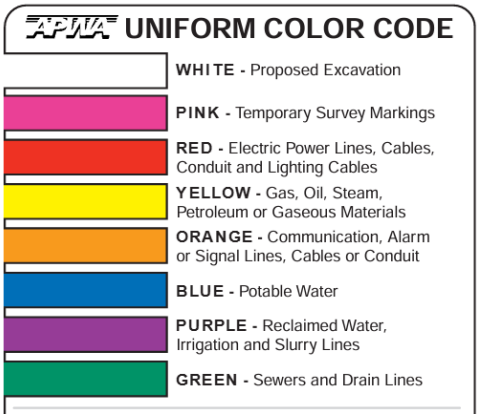
2.1 Basic

1. The tracer wire shall meet the basic construction requirements of the table below.
   a. Option A using Copper Clad Steel is preferred due to higher strength. Option B (solid copper) may be used with approval from Messer before implementation, if cost and availability advantages can be realized.

	Parameter	Value
Option A	Wire Material	CCS (Copper Clad Steel)
	Wire Gauge	12 AWG or 10 AWG
	Insulation Material	HDPE (HDHMWPE)
	Insulation Thick.	0.030" or 0.045"
	Insulation Color	See Chart
Option B	Wire Material	Solid Copper, ASTM B3, ASTM B258
	Wire Gauge	12 AWG or 10 AWG
	Insulation Material	HDPE (HDHMWPE)
	Insulation Thick.	0.030" or 0.045"
	Insulation Color	See Chart

2. The tracer wire insulation shall be color-coded based on the service of the underground pipe that it is tracing (e.g. potable water line is blue, sewer line is green) from the APWA uniform color code below
3. The tracer wire shall be suitable for direct underground burial.
4. At all points underground the wire shall be insulated. Wires may be spliced, but shall only be connected with 3M Direct Bury Splice Kits or equivalent and shall be watertight to provide electrical continuity.

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2.2 Installation and Testing

1. The tracer wire shall be consistently placed in the same orientation to all installed pipe. The tracer wire shall be securely taped to either the 3:00 or 9:00 position on the pipe at a spacing of no greater than 10 feet per instance of tape.
2. Wire may be spliced at tees and crosses, but not at other changes of direction (e.g. elbows).
3. At points where the non-metallic underground piping connects to underground metallic piping (e.g. carbon steel, ductile iron, etc), the wire may be terminated to the iron pipe with cad/thermite weld and then sealed with 2” thick mastic suitable for underground service.
4. At all points where the underground piping comes up above ground, no less than 6 additional feet of tracer wire shall be supplied, coiled and secured. The end of the tracer wire shall be spliced to the wire of a six pound zinc anode.
5. An electrical continuity test shall be performed on all tracer wire. If the tracer wire is found to be not continuous, the tracer wire shall be repaired by the Contractor at no cost to Messer.

2.3 Optional Detectable Underground Warning Tape

1. If specified in the engineering design or selected as an option by the project manager, 4.5 mil thick metallic foil detectable tap shall be installed no less than 12” directly above the underground line. The tape shall have text on it regarding the presence of an underground pipe.
   a. If the tape depth is 24” or less, 3” wide tape is permitted.
   b. If the tape is greater than 24”, 6” wide tape is required.

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1. DOCUMENT INFORMATION

1.1 Revision History

Rev.	Date	Remarks	By	Chk'd	Approved		
1	09-Jun-19	Document Rebranded	FK	FK	RS		
01	13-Mar-00	Generally revised throughout - to suit the first release of 00000-P-S-080	RWS	PJL	RWS	ICP	
00	17-Aug-99	First Electronic Issue (was SP 40.31.51)	EWS	PJL	EWS	RS	

1.2 Referenced/Related Company Standards

Guides

00000-P-G-084 Guidelines for Selection of Cleaning Class (was DM 35.45.12)

Specifications

00000-P-S-080 Cleaning for Oxygen Service

2. GENERAL

2.1 This specification defines the various cleaning categories (levels) and associated methods (cleaning classes) used to clean vessels, piping systems, pipe fittings, valves, instruments, machine components, etc. In the case of "cleaning for oxygen service", this specification should be used in conjunction with 00000-P-S-080.

Various categories of cleaning, their application and their implementation are specified herein.

2.2 The following order of documents specify / state cleaning requirements to be applied, with the higher listed documents taking project specific precedence:-

- Purchase Order
- Job Specifications
- Data Sheets
- Drawings
- This Specification

2.3 The terms Messer, Messer Americas, purchaser - all refer to Messer Americas.

The terms contractor, bidder, vendor, fabricator and supplier all refer to the companies and their sub-suppliers who have been requested to submit quotations for work or who have been awarded a purchase order(s) to do work for Messer.

2.4 Any deviation from the documents referenced in section 2.2 requires the prior written approval of Messer.

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3. CATEGORIES OF CLEANING

3.1 Class "A"

This requires thorough cleaning and degreasing to remove all contaminants and loose particles. A UV Light ("black light") inspection is always a necessary part of Class "A" cleaning. Items and piping systems designated as requiring Class "A" must be cleaned in accordance with Messer Engineering standard 00000-P-S-080.

3.2 Class "B"

This level of cleaning is not as stringent as Class "A" but significantly more stringent than Class "C". Items and piping systems designated as requiring Class "B" must be cleaned in accordance with Messer Engineering standard 00000-P-S-080, with the exception that the post cleaning UV light inspection ***is not*** required.

3.3 Class "C"

This level of cleaning is commercial.

3.4 Class "D"

This requires pickling in addition to a Class "C" level of cleanliness.

3.5 Class "U"

This requires cleaning to a Class "A" level of cleanliness and in addition requires that ultrasonic techniques be utilized to ensure cleaning of convolutions and crevices. Items and piping systems designated as requiring Class "U" must be cleaned in accordance with Messer Engineering standard 00000-P-S-080.

4. APPLICATIONS

The level of cleanliness required will usually be called out in the specifications, line list, valve list or other purchase documents. However, as a minimum the following must be observed:

4.1 Oxygen Service

All items in oxygen service shall receive either a Class "A" or Class "U" cleaning.

4.2 Food Grade Service

All items in food grade service shall receive as a minimum Class "B" cleaning.

4.3 Lube Oil Service

All carbon steel piping in lube oil service shall receive as a minimum a Class "D" cleaning.

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4.4 Cryogenic Service

All items in cryogenic service shall receive as a minimum a Class “B” cleaning.

4.5 Other Services

Items in all other services shall receive as a minimum a Class “C” cleaning.

5. CLEANING REQUIREMENTS

5.1 General

Items must be cleaned to the level called for and pass all inspections required for each class of cleaning. Suggested methods of cleaning are outlined below. In general, alternate methods which achieve the same or more stringent results may be utilized if they have been approved in writing by Messer, prior to the commencement of work. The decision of the Messer representative in these matters shall be final. However, certain aspects of the cleaning procedures are mandatory. These are specifically called for below or elsewhere in the purchase documents.

5.2 Criteria

The level of cleanliness (5.4) called for in each class is an absolute requirement. The methods suggested by Messer, should in most cases, result in the contractor achieving this level of cleanliness. Merely complying with the suggested method, however, does not discharge the contractor from their obligation. The contractor must take, at their own expense, whatever steps are necessary to achieve the specified level of cleaning and pass the required inspections.

5.2.1 All items and systems shall be thoroughly dried as part of the cleaning process and show no sign of moisture when examined. This is a mandatory requirement for all classes of cleaning.

5.3 Inspection

This section describes approved inspection methods which shall be used to determine that the required level of cleanliness has been achieved. If any of the methods used reveal contamination beyond the maximum acceptable level then it is mandatory that the item be re-cleaned. If persistent rejection of items occurs then the cleaning procedure should be re- evaluated.

5.3.1 Direct Visual Inspection

Inspect the item by using a bright white light and look into or at it. This is suitable to detect loose rust, scale, excessive grease, filings, etc.

5.3.2 Black Light Inspection

Inspect the item by using an ultraviolet light (3200 -3800 AU wave length) and look into or at it. This must take place in a background of subdued light or darkness. Most common oils and greases will fluoresce under this examination. This is suitable to detect most oils and greases. Any fluorescence shall be taken to indicate the presence of oils or grease.

Note - If specifically called for 5.3.1 and 5.3.2 shall be performed by first wiping the surface involved with a clean white lint-free cloth. The cloth is then examined for traces of oil and/or grease. As much of the surface as possible should be wiped.

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5.3.3 Solvent Color Comparison

Compare a pint jar of clean solvent with one of used solvent by holding them up to a bright white light. No discoloration or excessive particles should be visible in the jar of used solvent as compared with the clean one.

5.4 Levels of Cleanliness

5.4.1 Class “A”

For the full description of this Class, see 00000-P-S-080 (Section 7). However, Class “A” cleaning is summarized as follows. All parts of the item and system which can come in contact with the process fluid show no visible dirt, scale, rust, weld splatter, chips, oil, paint, varnish, grease, crayon marking, etc., when examined under white light (5.3.1) and black light (5.3.2) both directly and by wiping with a cloth. Inspection by solvent color comparison (5.3.3) may be required in addition to verify the cleanliness of inaccessible surfaces. A tightly adhering uniform light layer of oxide film is acceptable.

5.4.2 Class “B”

For the full description of this Class, see 00000-P-S-080 (Section 7). However, Class “B” cleaning is summarized as follows. All parts of the item which can come in contact with the process fluid show no visible dirt, scale, rust, weld splatter, chips, paint, varnish, oil, grease, crayon markings, etc. when examined under white light (5.3.1) both directly and by wiping with a cloth. A tightly adhering uniform light layer of oxide film is acceptable.

5.4.3 Class “C”

Class “C” cleaning requires that all parts of the item which can come in contact with the process fluid show no visible dirt, loose scale or rust particles, weld splatter, chips, or excessive oil or grease which might contaminate downstream equipment when examined under white light (5.3.1) by direct viewing.

5.4.4 Class “D”

Class “D” cleaning requires that all parts of the item which can come in contact with the process fluid show no visible dirt, scale, rust particles, weld splatter, chips, etc, when examined under white light (5.3.1).

5.4.5 Class “U”

The requirements for Class “U” cleaning are the same as for Class “A” and in addition the requirement that ultrasonic techniques are utilized to ensure acceptable cleaning levels of convolutions and crevices are achieved.

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5.5 Methods of Cleaning

This section describes approved methods of cleaning items. Items and piping systems designated as requiring Class “A”, “B” or “U” must be cleaned in accordance with Messer Engineering standard 00000-P-S-080. Other methods or variations of these methods may be used only if approved in writing by Messer, prior to the commencement of work. When using a commercially available cleaning agent or process, the cleaning agent manufacturer's recommended procedures shall be followed. Special attention shall be paid to the strength of solutions, application temperature, need for agitation, immersion or circulation time, rinsing, drying, blowing out, etc. This is to ensure that the item or system in its final state is clean, dry, and free of any residue, vapor, liquid, solid, or particles which may have been present initially, introduced by the process or dislodged during cleaning.

Some of the chemicals and power tools used for cleaning are dangerous if not handled properly. The contractor shall make sure that safe practices are utilized and that manufacturer’s recommendations for safe handling as well as OSHA, HSE and all applicable country, regional, federal, state and local regulations and legislation requirements are followed without deviation.

The contractor is responsible for the safe and environmentally acceptable disposal of all agents used, along with compliance to all country, regional, federal, state and local regulations and legislation requirements which pertain.

5.5.1 Mechanical Cleaning

This method consists of loosening and conveying contaminants out of the system or item by the application of physical means, e.g. brushing, scraping, blowing, steam cleaning, etc. When a detergent is used in conjunction with steam or water jet cleaning, then all residue must be flushed out and dried.

5.5.2 Sand Blasting

This method consists of scouring the system or item with a pneumatically conveyed stream of abrasive particles. The term sand blasting is a generic term and covers a variety of different abrasive particles, e.g., shot and grit etc. It is mandatory that all the particles be removed from the system after blasting by blowing, vacuuming, or other means. Partial disassembly and/or the inclusion of special clean-outs may be required to a system.

5.5.3 Chemical Cleaning

This method consists of bringing the item or system into contact with either :-

a) chemically active solutions (usually heated) to remove rust and scale. Processes which fall in this category are - acid pickling, alkaline cleaning, bright dipping, de- rusting etc., or

b) commercially available cleaning agents. The use of some agents (e.g. acids) requires prior removal of oil and grease.

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The contractor shall only use solutions, which they know will not damage the items or systems to be cleaned. The manufacturers' requirements for flushing with water shall be strictly adhered to. If a solution is one which leaves a residue, its application, must be followed by final cleaning. If a solution is one which does not result in a passivated condition, then passivation should be considered. In the case of carbon steel or iron, the cleared item must be left in a passivated or rust inhibited state. In the final condition the item or system must be free of stripping agent and/or residue and dry.

5.5.4 Solvent Degreasing

This method consists of bringing the item or system in contact with a solvent cleaning agent (usually unheated) to remove oil and grease. A commonly used acceptable solvent due to a combination of affinity for oil and grease and ease of handling is inhibited 1-1-1 trichloroethane, which meets federal specification O-T-620a. ***Highly flammable solvents such as acetone are not acceptable.***

Prior to solvent degreasing the item or system must be dry. The solvent may be circulated or the items may be immersed in or swabbed with solvent. At the completion of the cleaning procedure, the solvent must be completely driven out by dry oil-free air or nitrogen.

**** CAUTIONARY NOTES ON USES OF CHLORINATED FLUOROCARBONS***

1. The use of Freon or any chlorinated fluorocarbon is presently under scrutiny for adverse environmental impact. Where prohibited by regulations and/or legislation they shall not be used whatsoever. Where other cleaning agents of equal effect and economy are/or available, such agents shall be given precedence.

2. Chlorinated Florocarbons usually do not have a strong odor. To ensure that all traces of these agent have been driven from a system a halogen leak detector must be used.

Organic Solvents including 1-1-1 trichloroethylene ***are flammable in oxygen mixtures and a serious accident could occur if they are not completely driven out***. Any trace of solvent odor in a system is an indication that solvent is present and that the purging process is not yet complete. ***Conversely a solvent should never be introduced into a system which has been in oxygen service until the system has been thoroughly purged with dry oil-free air or nitrogen.***

Solvent, which is circulated or reused, should be tested to confirm that hydrocarbon build up has not occurred.

5.5.5 Vapor Degreasing

This method consists of causing vaporized solvent to condense on the cool surfaces of the items or systems to be cleaned. The item or system must be positioned so as to drain completely. Parts, which do not drain completely, must be cleaned by another method. After cleaning, the solvent must be completely driven out by the same techniques used in 5.5.4.

5.5.6 Ultrasonic Cleaning

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This method consists of immersing the item in a solvent bath and agitating the bath by means of ultrasonic vibration. Often this is done in conjunction with spraying or vapor degreasing techniques. After cleaning, the solvent must be completely driven out by the same techniques used in 5.5.4. The solvent in the ultrasonic bath used for final cleaning shall be compared with a new, clean, unused sample of solvent according to ASTM D-2108-
171 procedures utilizing jars and white light.

6. TECHNIQUES FOR CLEANING

This section describes approved techniques for cleaning to the category specified.

6.1 Class "A"

6.1.1 Class "A" cleaning is intended to render an item or system clean and degreased for oxygen service. The cleanliness level called for in 5.5.1 is ***mandatory***. For details on how the specific techniques are to be applied, refer to Messer Engineering Standard 00000-P-S-080.

6.2 Class "B"

6.2.1 Class "B" cleaning is intended to render an item or system clean and degreased to a point where it would be suitable for cryogenic, or food grade service. The cleanliness level called for in 5.4.2 is required.

6.2.2 The techniques for Class "B" cleaning are the same as for Class "A" cleaning, except special packaging is per 8.2

6.3 Class "C"

6.3.1 Class "C" cleaning is intended to render an item or system clean for normal service throughout an industrial facility. The cleanliness level called for in 5.4.3 is mandatory.

6.3.2 The item or system and components should first be examined. Then techniques to remove rust, slag, dirt, etc., shall be employed (5.5.1, 5.5.2, 5.5.3). The final drying and purging of items and systems shall be with compressed air or nitrogen.

6.3.3 The term compressed air or nitrogen refers to gases which may have been compressed in a lubricated compressor, but from which oil and moisture have been removed by positive means.

6.3.4 Special packaging shall be per 8.3.

6.4 Class "D"

6.4.1 Class "D" cleaning is intended to render a carbon steel item or system clean for use in the lube oil system of rotating machinery. The cleanliness level called for in 5.4.4 above is mandatory

6.4.2 The item or system shall first be examined and if required, techniques to remove rust, slag, dirt, etc., in preparation for acid pickling shall be employed (5.5.1, 5.5.2). Then acid pickling in accordance with 5.5.3 shall be performed. After the final flush and drying, a light coat of turbine oil (without additives) shall be applied to all internal surfaces as a rust inhibitor and preventative.

6.4.3 Special packaging shall be per 8.4.

6.5 Class "U"

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6.5.1 Class "U" cleaning is intended to render items with corrugations, convolutions, inaccessible crevices, etc., clean and degreased for oxygen service. The cleanliness level called for in 5.4.5 is mandatory. For details on how the specific techniques are to be applied, refer to Messer Engineering Standard 00000-P-S-080, also see item 6.5.2..

6.5.2 The item should first be examined. If required, the light application of techniques to remove rust, slag, dirt, etc., shall be employed (5.5.1). This should involve only brushing, shaking or blowing techniques. If an item cannot be made suitable for ultrasonic bath degreasing by such light pre-cleaning then it shall be set aside and brought to the attention of the Messer representative for resolution. ***Sand blasting (5.5.2) or chemical stripping (5.5.3) shall never be utilized as pre-cleaning under this category.***

7. PROTECTION AFTER CLEANING

7.1 After completion of cleaning the contractor shall protect the item or system from re- contamination.

7.2 All free water shall be drained and the item or system thoroughly dried after cleaning. This applies for all categories of cleaning.

7.3 All pipe, valve, tubing ends, etc., shall be closed with metal or plastic caps or plugs of all categories of cleaning. Caps or plugs shall be securely fastened. ***The use of tape either to hold end covers in place or as closure material is not allowed.***

8. PRECAUTIONS AFTER CLEANING

8.1 Components cleaned to Class "A" requirements shall be protected and labelled as specified in Messer Engineering Standard 00000-P-S-080.

8.2 Components cleaned to Class "B" requirement shall be protected and labelled in accordance with Messer Engineering Standard 00000-P-S-080.

8.3 The following special precautions shall be taken for Class "C" cleaned items or systems.

8.3.1 Where a rust inhibitor or preventive coating has been applied the following label shall be attached, stating:-

EQUIPMENT INTERNALS HAVE BEEN TREATED WITH - *"name of substance used"*

8.4 There are **no** special precautions to be taken with **Class "D"** cleaned items.

8.5 Components cleaned to Class "U" requirements shall be protected and labelled as specified in Messer Engineering Standard 00000-P-S-080.

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1. Document Information

1.1 Revision History

Rev.	Date	Remark	By	Chk'd	Approved		
M01	01 Sep 2023	General Revision, Formatting	CK	AK	CK		

1.2 Document Purpose and Scope

a. The purpose of this specification is to provide engineering guidance on the requirements of pressure and leak testing of piping spools. The piping spools may be standalone, small and simple, or portions of larger piping networks with multiple circuits that connect to fixed and rotating equipment.
b. The scope of this specification is the pressure and leak testing of both packaged, pre-fabricated spools in fabrication shops and completed field spools on site.
c. This standard applies only to piping systems, and not to standalone pressure vessels, which are governed by separate standards. Pressure vessels may be an integral part of the testing volume for the piping spools to be tested, but this standard shall not be construed as guidance for the pressure vessels alone. When pressure vessels are part of the piping volume to be tested, it is a prerequisite that the pressure vessel has already successfully passed its own pressure test as required by code.
d. **Warning!** Pressure testing is often the most dangerous point in the lifetime of a piping spool, as the purpose of this step is to determine if there have been gross mistakes made within the fabrication of the pipe spool. While failure of inadequate components during the test is a desired result from a QA standpoint, the component failure can result in the sudden release of large quantities of energy resulting in property damage, injury and loss of life. Sound safety practices must always be observed that protect personnel and property.

2. Messer Reference Documents

a. The following referenced Messer documents apply to their full extent:

Document	Description
00000-P-S-105	Piping System Hydrostatic Testing Specification
00000-P-S-106	Piping System Pneumatic Testing Specification
00000-P-S-107	Piping System Helium Leak Testing Specification
00000-P-C-104	Pressure Test Exclusion Zone Calculator
00000-Z-F-012	Pressure Test Certificate
00000-Z-F-140	Isolation Register

3. Reference Codes and Standards

a. The following referenced codes and standards apply to their full extent:
   i. ASME BPVC Section VIII Division 1 “Rules for Construction of Pressure Vessels”
   ii. ASME B31.3 “Process Piping”
   iii. ASME B31.12 “Hydrogen Piping and Pipelines”
   iv. ASME PCC-2 “Repair of Pressure Equipment and Piping”

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4. Nomenclature, Definitions, Abbreviations and Personnel Roles

a. Nomenclature/Clarification
   i. ASME B31.3 uses the term “leak tests” for which are generally known in the piping industry as “pressure tests.” In this document, a clear distinction is made between a pressure test and a sensitive leak test, as they serve two distinct purposes, but are typically performed in sequence.

b. Definitions
   i. ***Code of Record*** – The code of record for the particular pipe spool in accordance with the piping specifications used for the project
      i. For replacements/repairs of existing pipe spools, the code of record is typically ASME PCC-2
      ii. For the vast majority of process piping, the code of record is typically ASME B31.3 with Normal Fluid Service.
         1. Some low pressure piping systems may be ASME B31.3 with Category D Fluid Service.
         2. Some piping with hazardous/toxic fluids may be ASME B31.3 with Category M Fluid service. These systems shall require the project to involve a Messer piping SME to review the testing plans.
         3. It is the responsibility of the system owner or Messer SME to designate the correct fluid service category. This shall be done before the design phase of the piping project.
      iii. For hydrogen process piping, the code of record may be ASME B31.3 or ASME B31.12 depending on the project.
   ii. ***Design Pressure*** – The listed design pressure of the pipe spool to be tested as indicated on the P&ID, and line lists
   iii. ***Pressure Test*** – A testing procedure at an elevated pressure above the design pressure which helps identify gross fabrication flaws in the assembly and verifies static strength of the piping spool.
   iv. ***Test Pressure*** – The target maximum pressure to which the piping spool(s) will be energized during the normal course of the Pressure Test. The Test Pressure shall be determined by the P&ID, Line List and/or Messer SME.
   v. ***Sensitive Leak Test*** – A testing procedure which helps identify the integrity of piping joints while under pressure. For example, using a bubble forming solution with the piping under pressure with nitrogen or air.
   vi. ***Helium Leak Test*** – A special sensitive leak test which has much higher leak testing sensitivity than traditional methods.
   vii. ***Initial Service Leak Test*** – For systems specifically listed as ASME B31.3 Category D Fluid Service, a Pressure Test may be replaced with an alternative leak test at the normal system operating pressure as part of the initial system commissioning.
   viii. ***Pressure Test Plan*** – A document comprising of the scope of the pressure test which defines the circuit(s) to be tested, the design and test pressures, valve positions, locations of blinds, etc. Often a marked-up P&ID can be used to define the plan.

c. Abbreviations
   i. **ASME** – American Society of Mechanical Engineers
   ii. **MAWP** – Maximum Allowable Working Pressure
   iii. **MDMT** – Minimum Design Metal Temperature

d. Personnel Roles
   i. ***Test Controller*** – The designated person responsible for all aspects of all pressure/leak testing
   ii. ***Test Personnel*** – Person(s) working directly under the Test Controller with express permission to perform pressure testing duties
   iii. ***Bystander*** – Anyone that is not the Test Controller nor Test Personnel, including Messer employees, contractors, and nearby civilians

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5. Overview of Testing Methods

a. Testing Methods
   i. Hydrostatic Test
      i. This method introduces liquid water into the piping spool(s).
      ii. Since water is nearly incompressible, the stored energy of the water in the pipe during the test is typically small.
      iii. For hydrostatic testing, **00000-P-S-105** shall be used in addition to this standard.
   ii. Pneumatic Test
      i. This method introduces a gas into the piping spool(s). This gas is typically Nitrogen or dry compressed air.
      ii. Due to the compressible nature of the gas, the stored energy of the gas in the pipe during the test can be very large and may present multiple hazards.
      iii. For pneumatic testing, **00000-P-S-106** shall be used in addition to this standard.
   iii. Hydro-Pneumatic Test
      i. This method is a combination of the hydrostatic and pneumatic test methods and shall not be used.
   iv. Pneumatic Helium Test
      i. This method is a subset of pneumatic testing and introduces helium gas into the piping spool(s). Typically a mass spectrometer, sniffer, or other form of detection is used in conjunction to measure concentrations of helium gas.
      ii. For pneumatic helium testing, **00000-P-S-107** shall be used in addition to this standard.
   v. Vacuum Decay Test
      i. This method typically requires an inner pressurized volume and an outer shell in which vacuum is pulled. The resulting increase in vacuum pressure can determine the leak rate from the inner vessel to the outer vessel. This method is rarely used.
b. The selected testing method and test pressure shall be indicated on the Pressure Test Plan.
c. General guidance on the selection of test methods:
   i. Piping systems designed for liquid water (e.g. cooling water systems), should typically specify hydrostatic testing, as a matter of practicality.
   ii. Piping systems designed for gaseous air products (e.g. compressed air, GAN, GOX), should typically specify pneumatic testing, as a matter of practicality.
   iii. Piping systems designed for cryogenic service (e.g. LIN, LOX, LAR), should typically specify pneumatic testing. Moisture ingress from hydrostatic testing into cryogenic systems can cause freezing damage in piping and valve internals and should be avoided whenever possible.
   iv. Piping systems designed for higher purity service (e.g. HP, UHP, electronics grades) or with high leakrate fluids such as helium, or neon, should typically specify pneumatic helium testing. Leakage rates in these systems are critical to function, and therefore additional leak testing sensitivity is required.
   v. Piping systems designed inside of enclosures with no easy access for repair such as coldboxes, pump boxes and vacuum jacketed tanks should specify pneumatic testing.
   vi. Piping systems designed for toxic/hazardous fluids with Category M fluid service shall require the review of a Messer piping SME to determine appropriate testing protocols.

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6. Testing Personnel and Safety

a. The **Test Controller** is the Messer employee or designated representative that is fully responsible for all execution aspects of the pressure and leak testing activities. They have the following basic duties:
   i. Ensuring that all testing activities are performed in a safe manner in accordance with Messer standards, and local jurisdictional requirements
   ii. Ensuring that all **Bystanders** are kept outside of the testing area at all times
   iii. Ensuring that all testing is performed in accordance with the **Pressure Test Plan**
   iv. Facilitating pressure ramp-up and ramp-down intervals and rates
   v. Maintaining the Isolation Register
   vi. Providing clear direction to all **Test Personnel** working under the auspices of the **Test Controller**
   vii. Maintaining clear communication to other workers on site and adjacent properties/facilities regarding pressure testing
   viii. Reading testing instruments such as pressure gauges
   ix. Returning the system back to its normal configuration after testing
   x. Providing clear required documentation on the results of the testing

b. The **Test Controller** is responsible for calculating the required test area exclusion zone in accordance with **00000-P-C-104**. This exclusion zone is dependent on the test volume, test pressure and test method. In certain circumstances, the exclusion zone may be large enough to require complete evacuation of a work area, or require Non-Messer owned properties to be impacted. In these circumstances, further investigation is warranted, and it is recommended that the Messer piping SME is contacted for assistance.

c. All personnel participating the testing shall wear all site required PPE (e.g. hard hat, safety glasses, steel toed boots and gloves). It is required that double hearing protection is worn during the test, as large pressure waves from a sudden release can damage or rupture ear drums. Additionally, personnel performing any leak checking on active piping shall consider the use of a face shield.

d. The **Test Controller** is responsible for erecting sufficient signage and barricades to keep unauthorized personnel out of the pressure test area and to inform adjacent work areas that testing is in progress. Large letter signs (24” wide x 18” high) are recommended at prominent locations such as walkways and driveways that state “Warning – Pressure Test in Progress – Keep Out”. In addition, the perimeter of the pressure test area shall be demarcated with red “Danger” tape.

7. Extent of Test Volume

a. All process piping circuits/volumes shall be pressure tested and sensitive leak checked as applicable, in accordance with this specification.

b. Piping volumes may be divided into smaller sub-volumes, bounded by forms of isolation as necessary to:
   i. Systematically test certain piping spools, or zones of a plant
   ii. Limit the amount of stored energy in a single pressure test
   iii. Narrow down the available components, when searching for a leak

c. The following notable exceptions listed below do not require pressure testing nor sensitive leak checking per this piping standard:
   i. Any connecting pressure vessels and/or rotating equipment that can be positively isolated
   ii. Any drain or vent lines, or other types of piping systems that are completely open to atmospheric pressure (such as relief valve discharge lines) are not required to be pressure tested nor sensitive leak checked. These lines are to be visually inspected to ensure completeness of fabrication and freedom from blockage instead.
   iii. Pressure relief valves, burst disks, unrestrained expansion joints, and line instrumentation beyond the root isolation valve shall not be pressure tested nor sensitive leak checked.
   iv. Any line instrumentation piping/tubing volume downstream of the root isolation valve is typically leak checked during commissioning/initial service at normal operating pressure(s).

d. See also **Section 13**, for exceptions to pressure testing for tie-in welds.

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8. Forms of Isolation

a. All forms of isolation shall have a pressure rating greater than or equal to the piping system ***Design Pressure*** at the temperature of the test.
b. Valves
    i. Some valves are inherently better for positive isolation than others. The preparer of the ***Pressure Test Plan*** shall consider the relevant case of the valve's body pressure rating as well as its cross-seat pressure rating and leak tightness rating. The user is cautioned that some valves, such as gate valves have much better sealing characteristics in one direction than the other.
        i. In some cases, it is necessary/required to rely on valves to complete/isolate the piping circuit. When valves leak past the seat and compromise the test leak tightness, the ***Test Controller*** may consider the following courses of action:
            1. If the valve seat leakage is severe; repair or replace the valve and repeat the test
            2. If the valve seat leakage is severe and the valve can be replaced with a blind flange or paddle blind; do so and repeat the test
            3. If the valve leakage is minor and it can be verified via process of elimination that there are no other leaks in the rest of the piping circuit; the ***Test Controller*** can discuss the matter with the Messer piping SME to accept the test as-is and completed. A note shall be added to the test certificate to document this case.
    ii. In the event that valve internals, such as seals are removed from a valve for the pressure test, the valve internals shall be bagged and labelled with the valve tag number, and the valve shall be visibly marked and noted on the isolation register.
    iii. Check, non-return or in-line pressure relief valves shall not be considered a form of isolation.
    iv. Burst disks shall not be considered a form of isolation.
    v. Regulators (pressure reducing or back-pressure) shall not be considered a form of isolation.
    vi. Solenoids shall not be considered a form of isolation unless it is fail-closed and is verified to be de-energized before the pressure test.
c. Blind Flanges
    i. Blind flanges shall match the mating flange size and pressure class.
        i. Warning; some flanges such as ductile iron 125# and carbon steel 150# have the same exact bolt pattern but are different pressure classes, and different pressure ratings.
    ii. In general, blind flanges shall match the material specified in the relevant pipe specification. On a case-by-case basis, different material specifications, such as carbon steel blind flanges may be accepted as a material substitute for the temporary testing blind flanges.
    iii. Sheet gasket material corresponding to the material specification on the relevant pipe specification shall be used for any temporary test gaskets. Under no circumstances shall any rubber nor any unapproved gasket material be used.
    iv. The number and type of stud bolts must be per the relevant piping specification of the circuit.
    v. Blind flanges shall be identified on the isolation register to ensure that they are removed from the system after pressure testing, and before the piping system is put into initial service.
d. Paddle/Pancake Blinds
    i. Paddle/pancake blinds may be used to separate pressure circuits.
    ii. The paddle/pancake blind shall meet all requirements of ASME B16.48.
        i. It should be noted that paddle/pancake blinds shall not be pressure tested to a differential pressure beyond 150% of the corresponding ASME B16.5 pressure rating at 100F.
    iii. The paddle/pancake blind shall be designed to withstand a differential test pressure corresponding to the greater of the two circuits that it separates. (e.g. Do not assume that the paddle/pancake differential pressure is the difference between the two circuits' test pressures.)
    iv. Paddle/pancake blinds shall match the material specified in the relevant pipe specification. On a case-by-case basis, different material specifications, such as carbon steel blind flanges may be

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accepted as a material substitute for the temporary testing paddle/pancake blinds.

v. Installed paddle/pancake blinds shall be identified on the isolation register to ensure that they are removed from the system after pressure testing, and before the piping system is put into initial service. The blind shall have an extended tab painted yellow that projects past the outside diameter of the adjoining flanges, and shall be easily visible.

e. Threaded plugs and caps
   i. Hollow ductile/cast iron plugs shall not be used.
   ii. Threaded plugs and caps shall be at least 3,000# class for all test pressures less than 3,000 psig.
   iii. The plug must have the same male thread type as the mating female socket. A tapered thread plug shall not be used with a parallel thread socket. Note: API and BSP threads appear very similar, but ae not interchangeable.
   iv. No thread compounds shall be applied to any temporary threaded plugs and caps. PTFE pipe tape applied to male threads and compatible with the system's oxygen service requirements are acceptable.

f. Welded covers, plates and caps
   i. Butt welded caps shall be at least the same schedule or wall thickness as the adjoining pipe.
   ii. Temporary welded covers or plates shall be designed as closures (B31.3 304.4) having pressure ratings greater than or equal to the system design pressure at the test temperature.

9. Testing Pre-Requisites

a. Before any pressure or leak testing of piping systems occurs, all of the following shall be true:
   i. The system to be tested has been fully designed, fabricated, installed inspected and examined in accordance with the applicable code of record. This means that all NDE has been successfully completed prior to testing.
   ii. All required inspections, NDE and examinations in accordance with the code of record have been successfully completed
      i. This includes confirmation of bolt torques on flanged equipment and verification of proper fit-up of mechanical fittings such as compression fittings.
   iii. All connecting pressure vessels, static and rotating equipment shall have been successfully pressure tested as required by applicable codes, standards and specifications. All pressure vessels and other equipment that can be positively isolated from the test are
   iv. The pressure test volume and extent of testing has been fully determined.
   v. The pressure test method (hydrostatic, pneumatic, etc) has been fully determined
   vi. The ***Test Pressure*** has been fully determined
   vii. Scope and responsible parties have been fully agreed to and determined
   viii. A ***Pressure Test Plan*** has been produced, reviewed and approved
   ix. A ***Test Controller*** has been designated
   x. The testing exclusion zone has been determined and is clearly visible and labelled.
   xi. All pre-test checks have been recorded on form **00000-Z-F-012** or equivalent

10. General Testing Equipment

a. General Testing Equipment are components that are generally used for every pressure test, regardless of method. For testing equipment specific to certain pressure test methods, see corresponding specifications.
b. It is highly recommended that a Pressure Test Manifold is used between the pressure source and the piping test volume. In order for a pressure test manifold to be used:
   i. The manifold must have clear documentation regarding the design, materials of construction, design pressure/MAWP, NDE, design temperature range, tested pressure and leak tightness. Ideally, at least the design pressure/MAWP is physically stamped on the manifold.

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ii. The cleaning class (per **00000-P-S-080** and **00000-P-S-084**) of the manifold shall meet or exceed that of the tested piping system.
iii. In order to better mitigate fatigue effects, the test manifold must have a design pressure/MAWP at least 150% of the test pressure for the piping to be tested. In order to promote ductility, mitigate possibility of brittle fracture, and avoid the Joule-Thompson cooling effect from pressure sources, the manifold must also have an MDMT of -20F or colder.
iv. The manifold shall have a permanently installed safety relief valve set to a pressure less than or equal to the manifold design pressure/MAWP.
v. The manifold shall have suitable means of isolation on both the inlet and outlet sides.
vi. The manifold shall checked for leaks prior to each use.
vii. Examples of hydrostatic and pneumatic Pressure Test Manifolds are provided in **00000-P-S-105** and **00000-P-S-106** respectively.

c. All temporary testing equipment shall be suitably supported with temporary supports and restraints.
d. Testing hoses
   i. Flexible hoses may be used as part of the test equipment to join the pressure source to the **Pressure Test Manifold**, as well as the Pressure Test Manifold to the Test Volume.
   ii. Use of hoses present a significant safety risk to personnel and property if they become disconnected while under pressure. Therefore, correctly sized anti-whip hoses, or whip-check devices must be used to secure the hose at each end to its termination.
e. Pressure Gauges/Transmitters/Recorders
   i. Multiple pressure gauges/transmitters/recorders may be installed on a given piping circuit volume during a test, but an official testing gauge shall be designated by the **Test Controller** prior to the start of the test. General practice is to have qty(2) independent gauges, one serving as the official gauge and a second as a redundant check.
   ii. The official testing gauge/transmitter/recorder shall be:
      i. Visually checked for suitable condition
      ii. Calibrated within 6 months of use
      iii. Identifiable by a serial number and a calibration date traceable to a calibration certificate
      iv. If using an analog pressure gauge, graduated over a range about double the intended maximum test pressure, but in no case shall the range be less than 1.5 nor more than 4 times that pressure.
         1. Example: Test pressure is 100 psig. Ideal gauge range is 0-200 psig, acceptable gauge ranges would be 0-150 psig and 0-400 psig.
      v. If using an analog pressure gauge, the minimum dial face size shall be a 4” diameter with a 270 degree arc.
      vi. Accuracy of the middle 50% of the gauge span shall be at least 1% of the span (equivalent to an industrial Grade A analog or digital gauge per ASME B40.1 and B40.7).
f. Pressure Relief Valves
   i. At least one pressure relief valve shall be included on the piping test volume to protect from overpressurization from the pressure source.
   ii. The flow capacity of the pressure relief valve shall be sufficient to overcome any flowrates from the overpressurization case.
   iii. The set pressure of the test pressure relief valve shall be lesser of the maximum test pressure multiplied by 110% and the maximum test pressure plus 50 psi. For example:
      i. For a test pressure 0-500 psig, the relief valve shall be set to 110% of the test pressure
      ii. For a test pressure > 500 psig, the relief valve shall be set to the test pressure plus 50 psi
g. Pressure Vent and Drain Valves
   i. It may be necessary to install high point vent valves, low point drain valves, and general pressure vent and blowdown valves on the piping volume to be tested. The type, quantity and location of each of these devices shall be determined during the development of the **Pressure Test Plan**.

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11. Testing Plan and Procedures

a. A typical Pressure Test Plan should be accomplished with a detailed annotation of the system P&ID. Only the latest as-built P&ID revision shall be used.
b. It is highly recommended that the project manager engages a Messer piping SME to either prepare the ***Pressure Test Plan***, or to review it prior to the execution of the test.
c. The ***Pressure Test Plan*** must show or state at a minimum:
    a. The ***Code of Record***
    b. The ***Design Pressure***, the ***Test Pressure*** and test method (hydrostatic, pneumatic, etc)
    c. Clear identification of the piping circuits to be tested with distinct color coding and a legend
    d. The full test volume extent, the termination locations of each circuit
    e. The position of any valves in the circuit, marking **O** for open and **C** for valve closed.
    f. The location of blinds and caps used for testing (blind flanges, paddle/pancake blinds, plugs, etc)
    g. The location of the test fluid injection into the system
    h. The location of the official pressure test gauge
        i. Note that Messer prefers that the official pressure test gauge is physically installed on the piping volume to be tested, rather than on the pressure source/ testing rig.
    i. The location of official pressure test relief valve(s), if located on the piping circuit to be tested
        i. Note that Messer prefers that the pressure test relief valves are physically located on the pressure source/ testing rig and piping volume if possible.
    j. Any equipment that is required to be disconnected from the system prior to the test. For example:
        i. Unrestrained expansion joints are typically removed for pressure testing
        ii. Pressure relief valves are typically removed for pressure testing
        iii. Sensitive instrumentation that cannot be isolated by a root valve
    k. Any special notations as applicable
d. Applicable requirements and procedures in accordance with the test method shall be followed:
    a. For hydrostatic testing, **00000-P-S-105** shall be used in addition to this standard.
    b. For pneumatic testing, **00000-P-S-106** shall be used in addition to this standard
    c. For pneumatic helium testing, **00000-P-S-107** shall be used in addition to this standard.
e. In the event that the **Pressure Test** or **Sensitive Leak Check** fails the acceptance criteria:
    a. The system shall be fully depressurized to atmospheric pressure and/or emptied of testing fluid, before repairs are performed. After applicable adjustments or repairs are performed, the system shall be re-tested with identical procedures.
f. In the event that the **Pressure Test** and **Sensitive Leak Check** both pass the acceptance criteria:
    a. The system shall be fully depressurized to atmospheric pressure and/or emptied of testing fluid unless a Category D **Initial Service Leak Check** was performed. All pressure sources shall be removed or positively isolated.
    b. All forms of isolation shall be returned to their normal states. All temporary testing equipment shall be removed from the piping circuit.
    c. The system shall be returned to cleanliness levels consistent with their state prior to testing.

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12. Testing Documentation Package

a. A typical completed Testing Documentation Package shall include:
   i. The Pressure Test Plan
   ii. An Isolation Register **00000-Z-F-140**
   iii. A Completed Pressure Test Certificate **00000-Z-F-012**
   iv. Any pictures taken during the testing process
   v. Any annotations, notes, redlines, or relevant supplemental information
b. Any completed Testing Documentation Packages are required to be stored electronically in the Messer project specific documentation locations

13. Pressure Testing Alternatives on Closure Welds

a. In certain circumstances, pre-fabricated spools have already been fully pressure and leak checked in accordance with the Code of Record. When these pre-fabricated spools are to be joined together, it is typical that some portion of the existing pipe/tube is cut and one or more tie-in “closure” welds are required to join the two pre-fabricated spools. Instead of performing an additional pressure and leak test for the entire volume, ASME B31.3 allows for an NDE alternative on these “closure” weld(s). This alternative to pressure testing on “closure” weld(s) is permissible, provided all of the following are met:
   i. The Messer piping SME has provided written authorization
   ii. The tie-in weld has been fully successfully visually examined (VT)
   iii. The tie-in weld has been fully in-process examined (IP)
   iv. The tie-in weld has been fully successfully volumetrically examined (e.g. RT or UT)
   v. Please note that if the weld geometry prevents full volumetric examination, such as certain branch welds and socket welds, please contact the Messer piping SME.

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1. Document Information

1.1 Revision History

Rev.	Date	Remark	By	Chk'd	Approved		
M01	01 Sep 2023	New Document	CK	AK	CK		

1.2 Document Purpose and Scope

a. The purpose of this specification is to provide engineering guidance on the requirements of hydrostatic pressure and leak testing of piping spools. The piping spools may be standalone, small and simple, or portions of larger piping networks with multiple circuits that connect to fixed and rotating equipment.
b. The scope of this specification is ***hydrostatic pressure and leak testing*** of both packaged, pre-fabricated spools in fabrication shops and completed field spools on site.
c. This standard applies only to piping systems, and not to standalone pressure vessels, which are governed by separate standards. Pressure vessels may be an integral part of the testing volume for the piping spools to be tested, but this standard shall not be construed as guidance for the pressure vessels alone. When pressure vessels are part of the piping volume to be tested, it is a prerequisite that the pressure vessel has already successfully passed its own pressure test as required by code.
d. **Warning!** Pressure testing is often the most dangerous point in the lifetime of a piping spool, as the purpose of this step is to determine if there have been gross mistakes made within the fabrication of the pipe spool. While failure of inadequate components during the test is a desired result from a QA standpoint, the component failure can result in the sudden release of large quantities of energy resulting in property damage, injury and loss of life. Sound safety practices must always be observed that protect personnel and property.

2. Messer Reference Documents

a. The following referenced Messer documents apply to their full extent:

Document	Description
00000-P-S-104	Piping System Pressure and Leak Testing Specification
00000-P-C-104	Pressure Test Exclusion Zone Calculator
00000-Z-F-012	Pressure Test Certificate
00000-Z-F-140	Isolation Register

b. The user is especially required to use the requirements **00000-P-S-104** in conjunction with this specification

3. Reference Codes and Standards

a. The following referenced codes and standards apply to their full extent:
   i. ASME BPVC Section VIII Division 1 “Rules for Construction of Pressure Vessels”
   ii. ASME B31.3 “Process Piping”
   iii. ASME B31.12 “Hydrogen Piping and Pipelines”
   iv. ASME PCC-2 “Repair of Pressure Equipment and Piping”

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4. Nomenclature, Definitions, Abbreviations and Personnel Roles

a. Nomenclature/Clarification
   i. ASME B31.3 uses the term “leak tests” for which are generally known in the piping industry as “pressure tests.” In this document, a clear distinction is made between a pressure test and a sensitive leak test, as they serve two distinct purposes, but are typically performed in sequence.

b. Definitions
   i. ***Code of Record*** – The code of record for the particular pipe spool in accordance with the piping specifications used for the project
      i. For replacements/repairs of existing pipe spools, the code of record is typically ASME PCC-2
      ii. For the vast majority of process piping, the code of record is typically ASME B31.3 with Normal Fluid Service.
         1. Some low pressure piping systems may be ASME B31.3 with Category D Fluid Service.
         2. Some piping with hazardous/toxic fluids may be ASME B31.3 with Category M Fluid service. These systems shall require the project to involve a Messer piping SME to review the testing plans.
         3. It is the responsibility of the system owner or Messer SME to designate the correct fluid service category. This shall be done before the design phase of the piping project.
      iii. For hydrogen process piping, the code of record may be ASME B31.3 or ASME B31.12 depending on the project.
   ii. ***Design Pressure*** – The listed design pressure of the pipe spool to be tested as indicated on the P&ID, and line lists
   iii. ***Pressure Test*** – A testing procedure at an elevated pressure above the design pressure which helps identify gross fabrication flaws in the assembly and verifies static strength of the piping spool.
   iv. ***Test Pressure*** – The target maximum pressure to which the piping spool(s) will be energized during the normal course of the Pressure Test. The Test Pressure shall be determined by the P&ID, Line List and/or Messer SME.
   v. ***Initial Service Leak Test*** – For systems specifically listed as ASME B31.3 Category D Fluid Service, a Pressure Test may be replaced with an alternative leak test at the normal system operating pressure as part of the initial system commissioning.
   vi. ***Pressure Test Plan*** – A document comprising of the scope of the pressure test which defines the circuit(s) to be tested, the design and test pressures, valve positions, locations of blinds, etc. Often a marked-up P&ID can be used to define the plan.

c. Abbreviations
   i. **ASME** – American Society of Mechanical Engineers
   ii. **MAWP** – Maximum Allowable Working Pressure
   iii. **MDMT** – Minimum Design Metal Temperature

d. Personnel Roles
   i. ***Test Controller*** – The designated person responsible for all aspects of all pressure/leak testing
   ii. ***Test Personnel*** – Person(s) working directly under the Test Controller with express permission to perform pressure testing duties
   iii. ***Bystander*** – Anyone that is not the Test Controller nor Test Personnel, including Messer employees, contractors, and nearby civilians

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5. Overview of Hydrostatic Testing Method

a. The Hydrostatic Testing method introduces liquid water into the piping spool(s). Since water is nearly incompressible, the stored energy of the water in the pipe during the test is typically small. For this reason, it is generally considered much safer than pneumatic testing.
b. The goal of the Hydrostatic Testing method is to ensure that there are no gross defects nor leaks in the materials, or fabrication of the piping spool assembly. Pressure/leak testing is not a substitute for a lack of required inspections or non-destructive examinations.

6. Water Quality and Pressure Source Requirements

a. Only clean fresh drinking-quality water shall be used. Brackish or salt water is strictly prohibited. The water shall be free of sediment, microbes and corrosive substances.
b. Systems that will hold test water for more than 5 days, whether or not the test liquid is pressurized, shall be treated with a corrosion inhibitor and a biocide.
c. The sum of total halide content (chloride + bromide + iodide) shall be less than the quantity listed in the table below, based on material class: (For reference, typical US treated drinking tap water is 1 to 4 mg/L chlorine/chloramine).

Material Group	Max. Total Halides
Ferritic Steels, Unalloyed/low-alloy Carbon Steels ≤9% Cr welded with Ferritic Filler Metal Copper, Brass, Bronze Alloys Plastic and Other Non-metallic Materials	250 mg/L (ppm)
Ferritic-Austenitic Steels (Duplex Steels) Stainless 18-8 Cr-Ni-Mo Steels (e.g. grade 316/316L) Aluminum Alloys	100 mg/L (ppm)
Stainless 18-8 Cr-Ni Steels (e.g. grade 304/304L) Stainless, Ferritic Cr Steels Ferritic Steels, Welded with Austenitic Filler Metals Heat-Resistance, Austenitic Steels (Cr-Ni, Ni-Cr) and Ni-based Alloys	50 mg/L (ppm)

d. If all hydrotest water cannot be fully drained out of a stainless steel system, then then the entire system shall be fully flushed with low chloride (less than 5 ppm) water after test completion, or the system shall be dried with hot air or nitrogen to a dewpoint of -20F or drier.
e. The temperature of the water shall be at least 30F above the systems' highest MDMT. Particular caution should be taken for non-metallic piping such as HDPE and thick non-normalized carbon steels which can have very high MDMT.
f. Where periods of sub 40F weather is expected, a stable anti-freeze solution shall be added to the water.
g. In general, the maximum air or water temperature for hydrotesting should be 100F. Beyond this may require slight adjustments to the test pressure based on the allowable stress at test temperature.
h. Acceptable pressure sources for hydrostatic testing:
    i. Existing water piping or water utility piping with a pressure-reducing regulator
    ii. Manual hydraulic pumps (for small volumes)
    iii. Motorized hydraulic pumps. There are many commercially available hydrostatic testing "skids/manifolds".
i. Pressurization ramp rates shall remain relatively constant and not exceed 100 psi/minute during testing.
j. Jurisdictional environmental water drainage and disposal requirements shall be accounted for.

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7. System Requirements Specific to Hydrostatic Testing

a. All standard testing equipment components including forms of isolation are described in **00000-P-S-104**.
   i. In the case of "standing tests" (≥ 12 hours), the pressure relief valve required for testing shall also consider the case of trapped liquid thermal expansion, as the water may warm-up over time.
   ii. The pressure gauge of record shall be located at the system high point (no static liquid head pressure shall be taken into account for the test pressure). Please note that if the pressure test manifold is located on grade, the pressure reading at the testing manifold will be higher by (H/2.31) psid where H is the height (ft) of the pressure gauge located at the system high point.

b. The piping system shall always have high point vent valve(s) at the top of the hydrostatic systems. Some piping geometries may require multiple high point vents. High point vent valves are required to purge the system of compressible gasses (including air) during the hydrotest, and must remain open during the filling of the test volume. High point vent valves shall also be open before draining the vessel to avoid the formation of vacuum pressures.
   i. Under no circumstances may alternative high point venting schemes be used such as "flanges being cracked open" be allowed without prior written authorization by the Messer piping SME.

c. The piping system shall always have low point drain valve(s) at the bottom of the hydrostatic systems to allow for content drainage after the test. (Possible exceptions include underground HDPE water piping).

d. The additional weight of water in equipment from hydrotesting may not be suitable for foundations which are not early strength mixes or have not undergone the full 28 day cure time.

e. Pipe supports and hangers are typically designed specifically for the fluid medium of service and not hydrotesting. In the case of light liquids and gaseous service piping, hydrotesting may result in weights and loads that exceed support and hanger capacities. This should be checked prior to starting a **Pressure Test Plan**. Before filling takes place, all hanger spring supports shall be locked.

8. Hydrostatic Test Pressure

a. The Hydrostatic **Test Pressure** of a piping system shall be determined by the value provided on the line list and/or P&ID.
   i. If the Hydrostatic **Test Pressure** is not provided on the line list / P&ID, then a Messer piping SME shall be consulted.

b. General Guidance on Hydrostatic **Test Pressure**:
   i. The Hydrostatic **Test Pressure** for all Normal Fluid Service systems shall be per B31.3 345.4.2, as shown below:

$$P_{Test} = \max\left(1.50 * P_{Design}\ ;\ 1.50 * P_{Design} * \frac{S_T}{S}\right)$$

   We note that older editions of ASME B31.3 did not include the lowest allowable stress ratio (LSR) factor, (S_T/S), and simply tested at 150% of design pressure. When the piping maximum design temperature is greater than 100F for certain material classes such as copper, aluminum, and certain stainless steels, Test Pressures greater than 150% may be required. Please consult with the Messer piping SME for questions or explanations.
   ii. When the test volume of the piping system includes a pressure vessel that cannot be practically or positively isolated, and the calculated piping **Test Pressure** exceeds the pressure vessel test pressure, the piping **Test Pressure** may be reduced from the calculated value above to the pressure vessel test pressure, provided that the pressure vessel test pressure is not less than 77% of the calculated piping **Test Pressure**.
      i. For example, piping design pressure is 100 psig, piping test pressure is 150 psig. Vessel MAWP is 100 psig, vessel test pressure is 130 psig. Since 130/150 = 86.6% > 77%, then the piping test pressure may be reduced from 150 psig to 130 psig.

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ii. Warning! Some pressure vessels may be designed for liquids with specific gravities less than 1.00 (lighter than water), and were shop hydrotested in a configuration different than the way they may be currently installed (e.g. horizontal, not vertical). Before hydrotesting any pressure vessel, the suitability of the vessel and its support system shall be verified.

iii. The Hydrostatic **Test Pressure** for all Category D Fluid Service systems subject to an **Initial Service Leak Test**, shall be equal to the normal operating pressure of the system.

9. Hydrostatic Testing Procedure – Normal Fluid Service

a. The Figure below contains a helpful graphic on the pressure-time evolution for hydrostatic testing of piping in Normal Fluid Service.

b. System Pre-Testing Work and Preparation
   i. The **Pressure Test Plan** shall be completed, approved and communicated to all workers
   ii. All valve positions have been verified, all forms of isolation have been verified and logged into the Isolation Register **00000-Z-F-140**.
   iii. The **Appendix A** Hydrostatic Test Check List – Pre-Test Checks portion of the form shall be completely filled out at this point in time.
   iv. Additional double-check verifications recommended prior to filling:
      i. Open high-point vent valve(s) on the system
      ii. Official testing gauges/transmitters/recorders installed on system high point
      iii. Required testing pressure safety valves installed
      iv. Testing manifold leak checked

c. Before proceeding with the test, clear all personnel from the test area exclusion zone. Only the **Test Controller** shall decide when anyone is allowed in the test area. Any required inspectors or witnesses are informed.

d. The piping system shall be filled with hydrotest water at a moderate and consistent flowrate. During the initial filling process (while still not under pressure), the Test Controller will observe the open high point vent valve. When water flows through the open high point vent valve, the system is usually seen as “liquid full”.

e. In some cases, the hydrotest water may be entrained with dissolved gases, such as air. For this reason, it is recommended that once water is flowing out of the high point vent valve, the water source is briefly isolated from the test volume and the high point vent valve is kept open for 5 minutes, allowing bubbles and dissolved gases to escape. At this point, the high point vent valve may be closed, allowing the system to be pressurized.

f. At this point, the hydrostatic pressure in the piping system may be slowly brought up to 15 psig.
   i. The piping assembly shall be isolated from the pressure source. An initial pressure gauge reading shall be noted.
   ii. After holding for at least 10 minutes,
      i. The final pressure gauge reading shall be noted. If the final gauge reading is less than the initial gauge reading, a leak in the system is likely, which shall be found.
      ii. Designated **Test Personnel** shall perform direct visual inspection at all joints for leaks, evidenced by water on the surface of the pipe.
         1. Note: If the pipe is significantly cooler than ambient air, some condensation may have formed on the pipe. In this case, a dry towel/rag may be used to wipe away excess moisture and allow for a more thorough inspection.
         2. If leaks are evident, then the system shall be depressurized, drained of its contents and repaired.
         3. Some leaks which can be easily remedied, such as the tightening of flange bolts shall only be performed with the system depressurized and with the prior approval by the **Test Controller**.
         4. If the system is free of leaks after the Initial Leak Check, then the system may be

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pressurized further according to the schedule in this specification.

g. After, the Initial Leak Check, the pressure in the system may be slowly ramped up into increments of 20% (e.g. 20%, 40%, 60%, 80%) of the test pressure, with a minimum hold time of at least 5 minutes at each 20% interval.
    i. During each 5 minute hold time, the pressure source shall be isolated from the piping system and the initial and final gauge readings shall be noted.
        i. If the gauge reading difference is more than 1%, a leak in the system is likely, which shall be found and repaired. Small fluctuations in the pressure during hold time is normal due to temperature effects, and the equalization of strains in the piping system. Longer hold time intervals may be required for some systems.
        ii. If the gauge reading difference is less than 1% for a given interval, the test may proceed to the next interval.
h. Once the final test pressure has been reached, the pressure source shall be isolated from the piping system. Before the official **Pressure Test** begins, it is common to allow for a 5 minute system settle-out, to be more accurate in any pressure changes that might occur during the test. After the settle-out, the pressure test shall begin by noting the system gauge pressure and time.
    i. The vast majority of systems require a minimum 30 minute hold time during the pressure test.
    ii. Other systems require “standing tests” at longer hold time intervals such as 12-24 hours. In this case, the starting test temperature shall also be noted.
    iii. At the end of the **Pressure Test** hold time interval, the final gauge pressure shall be noted.
        i. If a 30 minute pressure test hold time is used:
            1. If the pressure gauge reading difference is less than 1%, the pressure test result is acceptable.
            2. If the pressure gauge reading difference is greater than 1%, the pressure test result in not acceptable, and leaks are likely.
        ii. If a “standing test” pressure test hold time is used:
            1. If the pressure gauge reading difference is less than 1%, the pressure test result is acceptable.
            2. If the pressure gauge reading difference is greater than 1%, the ending temperature shall be noted. In these cases, it is not unusual for temperature fluctuations throughout the day to have a large effect on the hydrostatic pressure reading. The pressure drop is also influenced by the pipe design (material properties, diameter, wall thickness), as well as the thermal expansion coefficient and bulk modulus of water. In these cases, the Messer piping SME may be able to estimate the temperature effect on the hydrostatic pressure. In other cases, it may be an engineering judgement call as to the acceptance of the pressure test result.
i. Once the pressure test has been completed, the piping system is required to undergo a final leak check at design pressure. The testing pressure shall be reduced from final test pressure to the design pressure, and held for a time period of no less than 10 minutes.
    i. After the 10 minute hold time, the Final Leak Check may be conducted by designated **Test Personnel**. A direct visual inspection at all joints shall take place, looking for leaks as evidenced by water on the surface of the pipe.
        i. Note: If the pipe is significantly cooler than ambient air, some condensation may have formed on the pipe. In this case, a dry towel/rag may be used to wipe away excess moisture and allow for a more thorough inspection.
    ii. If the final leak check is satisfactory (no leaks are found), then the system may be depressurized and drained.
    iii. If the final leak check is unsatisfactory (leaks are found), then the appropriate repairs shall be made and the system shall be re-tested.
j. Once depressurized and drained, all tested piping circuits shall be thoroughly dried using warm dry air or

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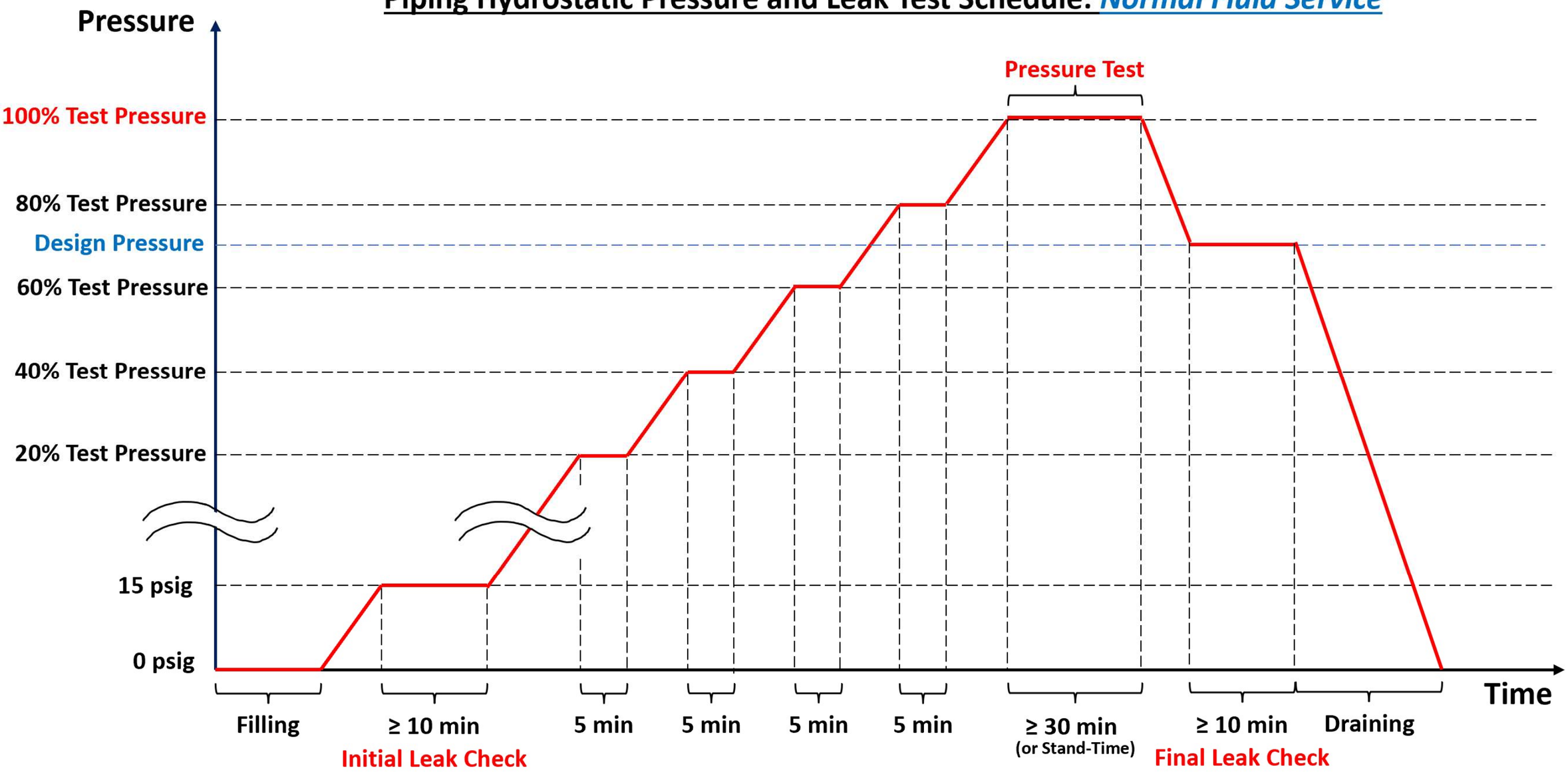
nitrogen, unless the circuits are intended for water service.

k. The system shall be returned to its normal state with respect to forms of isolation, valve positions, and temporary testing equipment removed.

l. All documentation including the **Appendix A** Hydrostatic Test Check List, the Pressure Test Certificate **00000-Z-F-012**, and the Isolation Register **00000-Z-F-140** shall be verified to be accurate and complete.

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Piping Hydrostatic Pressure and Leak Test Schedule: *Normal Fluid Service*



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10. Hydrostatic Testing Procedure – Category D Fluid Service: Initial Service Leak Test

a. The Figure below contains a helpful graphic on the pressure-time evolution for hydrostatic testing of piping in **Category D Fluid Service** with an **Initial Service Leak Test**.
b. System Pre-Testing Work and Preparation
    i. The **Pressure Test Plan** shall be completed, approved and communicated to all workers
    ii. All valve positions have been verified, all forms of isolation have been verified and logged into the Isolation Register **00000-Z-F-140**.
    iii. The **Appendix A** Hydrostatic Test Check List – Pre-Test Checks portion of the form shall be completely filled out at this point in time.
    iv. Additional double-check verifications recommended prior to filling:
        i. Open high-point vent valve(s) on the system
        ii. Official testing gauges/transmitters/recorders installed on system high point
        iii. Required testing pressure safety valves installed
        iv. Testing manifold leak checked
c. Before proceeding with the test, clear all personnel from the test area exclusion zone. Only the **Test Controller** shall decide when anyone is allowed in the test area. Any required inspectors or witnesses are informed.
d. The piping system shall be filled with hydrotest water at a moderate and consistent flowrate. During the initial filling process (while still not under pressure), the Test Controller will observe the open high point vent valve. When water flows through the open high point vent valve, the system is usually seen as “liquid full”.
e. In some cases, the hydrotest water may be entrained with dissolved gases, such as air. For this reason, it is recommended that once water is flowing out of the high point vent valve, the water source is briefly isolated from the test volume and the high point vent valve is kept open for 5 minutes, allowing bubbles and dissolved gases to escape. At this point, the high point vent valve may be closed, allowing the system to be pressurized.
f. At this point, the hydrostatic pressure in the piping system may be slowly brought up to 15 psig.
    i. The piping assembly shall be isolated from the pressure source. An initial pressure gauge reading shall be noted.
    ii. After holding for at least 10 minutes,
        i. The final pressure gauge reading shall be noted. If the final gauge reading is less than the initial gauge reading, a leak in the system is likely, which shall be found.
        ii. Designated **Test Personnel** shall perform direct visual inspection at all joints for leaks, evidenced by water on the surface of the pipe.
            1. Note: If the pipe is significantly cooler than ambient air, some condensation may have formed on the pipe. In this case, a dry towel/rag may be used to wipe away excess moisture and allow for a more thorough inspection.
            2. If leaks are evident, then the system shall be depressurized, drained of its contents and repaired.
            3. Some leaks which can be easily remedied, such as the tightening of flange bolts shall only be performed with the system depressurized and with the prior approval by the **Test Controller**.
            4. If the system is free of leaks after the Initial Leak Check, then the system may be pressurized further according to the schedule in this specification.
g. After, the Initial Leak Check, the pressure in the system may be slowly ramped up into increments of 20% (e.g. 20%, 40%, 60%, 80%) of the normal operating pressure, with a minimum hold time of at least 5 minutes at each 20% interval.
    i. During each 5 minute hold time, the pressure source shall be isolated from the piping system and the initial and final gauge readings shall be noted.
        i. If the gauge reading difference is more than 1%, a leak in the system is likely, which shall be

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found and repaired. Small fluctuations in the pressure during hold time is normal due to temperature effects, and the equalization of strains in the piping system. Longer hold time intervals may be required for some systems.

ii. If the gauge reading difference is less than 1% for a given interval, the test may proceed to the next interval.

h. Once the normal operating pressure has been reached, the pressure source shall be isolated from the piping system. Before the official **Initial Service Leak Test** begins, it is common to allow for a 5 minute system settle-out, to be more accurate in any pressure changes that might occur during the test. After the settle-out, the pressure test shall begin by noting the system gauge pressure and time.
   i. The vast majority of systems require a minimum 30 minute hold time during the test.
   ii. Other systems require “standing tests” at longer hold time intervals such as 12-24 hours. In this case, the starting test temperature shall also be noted.
   iii. At the end of the hold time interval, the final gauge pressure shall be noted.
      i. If a 30 minute pressure test hold time is used:
         1. If the pressure gauge reading difference is less than 1%, the pressure test result is acceptable.
         2. If the pressure gauge reading difference is greater than 1%, the pressure test result in not acceptable, and leaks are likely.
      ii. If a “standing test” pressure test hold time is used:
         1. If the pressure gauge reading difference is less than 1%, the pressure test result is acceptable.
         2. If the pressure gauge reading difference is greater than 1%, the ending temperature shall be noted. In these cases, it is not unusual for temperature fluctuations throughout the day to have a large effect on the hydrostatic pressure reading. The pressure drop is also influenced by the pipe design (material properties, diameter, wall thickness), as well as the thermal expansion coefficient and bulk modulus of water. In these cases, the Messer piping SME may be able to estimate the temperature effect on the hydrostatic pressure. In other cases, it may be an engineering judgement call as to the acceptance of the pressure test result.

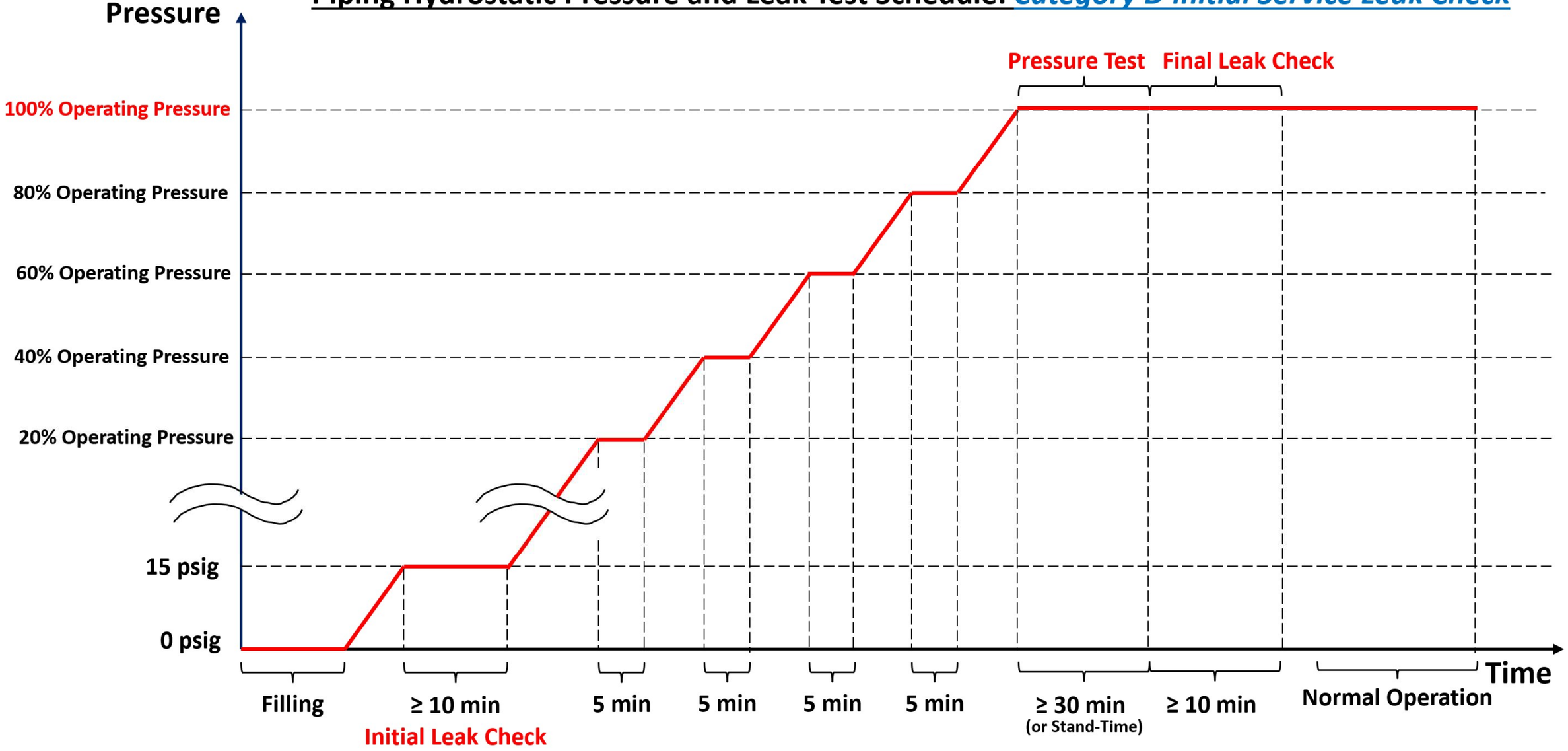
i. Once the specified hold time has been completed, the piping system is required to undergo a final leak check conducted by designated **Test Personnel**. A direct visual inspection at all joints shall take place, looking for leaks as evidenced by water on the surface of the pipe.
   i. Note: If the pipe is significantly cooler than ambient air, some condensation may have formed on the pipe. In this case, a dry towel/rag may be used to wipe away excess moisture and allow for a more thorough inspection.
   ii. If the final leak check is satisfactory (no leaks are found), then the system may be depressurized and drained.
   iii. If the final leak check is unsatisfactory (leaks are found), then the appropriate repairs shall be made and the system shall be re-tested.

j. The system shall be returned to its normal state with respect to forms of isolation, valve positions, and temporary testing equipment removed.

k. All documentation including the **Appendix A** Hydrostatic Test Check List, the Pressure Test Certificate **00000-Z-F-012**, and the Isolation Register **00000-Z-F-140** shall be verified to be accurate and complete.

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Piping Hydrostatic Pressure and Leak Test Schedule: *Category D Initial Service Leak Check*



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Attachment I

Stormwater Management Report

Messer

Air Separation Unit

STORMWATER MANAGEMENT REPORT

566901-C-L-200-001

MESSER
Gases for Life

Bryan, Texas ASU

1096 Boatcallie Road
Bryan, Texas 77808

Project Number 566901



middough®
PROJECT SOLUTIONS

Middough Project No. MEU2510

Rev	Date	By	Checked/Approved	Description
00A	10/17/2025	KPS	KGC	ISSUED FOR APPROVAL
00B	11/14/2025	KPS	KGC	ISSUED FOR BID
00C	04/17/2026	RK	KPS	ISSUED FOR PERMIT

1 TABLE OF CONTENT 2

2 INTRODUCTION 3

2.1 Project Description 3

2.2 Stormwater Management Design Basis 4

2.3 Storm Sewer Design Basis 4

3 DESIGN METHODOLOGY 5

3.1 Project Runoff Estimation Variables 5

3.2 Stormwater Management Design 5

3.3 Storm Sewer Design 7

4 RESULTS 7

4.1 Stormwater Management Summary 7

4.2 HYDROGRAPH TABLE 8

4.3 CONCLUSIONS 8

5 APPENDICES

APPENDIX A 10

APPENDIX B 47

DRAWINGS 54

2 INTRODUCTION

2.1 Project Description

Messer LLC (Messer) is proposing to operate a new Liquified Air Separation Unit (ASU) facility within the Carrabba Industrial Park in Brazos County, Texas. Messer intends to acquire Brazos County Parcel #14501, 12.34 acres along Boatcallie Road together with an adjoining 2.40-acre tract at the current terminus of Roughneck Drive, located north of Boatcallie Road. Messer intends for the subject property to be incorporated into the City of Bryan, Texas prior to construction. This Stormwater Management Report has been prepared to supplement the site improvement drawings related to this project in order to obtain City of Bryan approvals and permits.

Stormwater runoff from Parcel #14501 is located near the drainage divide between the Little Wickson Creek and Carters Creek watersheds. Surface runoff from the development area appears to flow to the northern reaches of the Carters Creek watershed. Per Appendix B of the City of Bryan – Unified Stormwater Design Guidelines, stormwater detention for flood control purposes is required. Based on field surveys performed at the site, there is no existing designated stormwater conveyance pathway established near the property limits. All runoff from the parcel sheet drains to the north onto the adjacent property. Study limits for the conveyance flow path end at the subject property limits. General observations of the surrounding parcel ownership, surface cover and drainage characteristics were made using internet-based mapping sources and are reported for project documentation purposes only.

Boatcallie Road is an asphalt paved roadway with a variable width right-of-way including roadside ditches along each edge, with the roadway generally following a predominant northwest-southeast alignment. Boatcallie Road intersects with Tabor Road approximately 1,250 feet west of the subject parcel and terminates as a dead-end road approximately 800 feet east of the parcel at the City of Bryan Corporation Limits.

There is an existing high point along Boatcallie Road, located at the approximate midpoint of the subject parcel along the road frontage. Starting at current property line (approximately 13 feet north of the pavement edge), the surface within the property limits slopes to the south toward the road where the roadside ditch carries surface water away from the property to the east and west of the high point. There are existing underground gas lines and aerial power/communication lines just north of the property line.

North of the existing property line, the existing surface slopes down northerly away from the roadway. The north-western corner of the property is at the lowest elevation.

Messer intends to construct the ASU plant with trucked product transfers and support facilities on Parcel #14501 and utilize the 2.4 acres for construction access and for required utility extensions. The ASU plant will include new process equipment and steel structures constructed on concrete foundations. Support facilities will include truck and passenger vehicle parking and access ways, a diesel fueling station, a truck scale, a truck maintenance building, an administration building, and an electrical power substation.

The proposed grading will generally conform to the existing drainage patterns. A high point located approximately 34 feet from the existing edge of Boatcallie road will be established parallel to the roadway. This is necessary to maintain proper cover over the existing gas lines and to allow for proper site drainage. Surface drainage south of the high point will be directed toward the existing roadway ditch. Surface drainage north of the high point will be directed toward the low point of the property.

2.2 Stormwater Management Design Basis

The City of Bryan – Unified Stormwater Design Guidelines was used as the design basis.

Data was collected via drone derived georeferenced aerials, field surveys, and internet-based mapping sources.

The data was processed and analyzed using Hydraflow Hydrographs Extension for AutoCAD Civil 3D computer software.

The NRCS Curve Number Method was used to develop the hydrographs.

Rainfall data was obtained using the NOAA Precipation Frequency Data Server (PFDS).

2.3 Storm Sewer Design Basis

The City of Bryan – Unified Stormwater Design Guidelines was used as the design basis.

Data was collected via drone derived georeferenced aerials, field surveys, and internet-based mapping sources.

The data was processed and analyzed using Hydraflow Storm Sewers Extension for AutoCAD Civil 3D computer software.

3 DESIGN METHODOLOGY

3.1 Project Runoff Estimation Variables

Based on the United States Department of Agriculture/NRCS/USDA Soil Survey, the site is entirely underlain by the Zulch fine sandy loam soils, 1 to 3 percent slopes (ZuB). The rating for the runoff class is very high and the Hydrologic Soil Group is “D”. The National Resource Conservation Service (NRCS) runoff cover type for the land associated with the subject development is “Brush – brush-weed-grass mixture” in fair/poor condition.

Parcel #14500, the adjoining property to the northwest of the subject parcel is owned by the City of Bryan and is an operating electrical power substation. Parcel #14499, another adjoining property to the northwest of the subject parcel is privately owned and leased for apparent gas well production purposes.

Parcel #365309, the adjoining property to the east of the subject parcel is undeveloped land.

The 2.4-acre tract located northeast of the subject parcel is a lot-split from Parcel #373896. The land has been seeded as part of the Roughneck Drive extension. This parcel will be utilized for construction access and for required utility extensions. Following completion of construction, Messer intends to restore the surface cover on this parcel to present conditions.

Parcel #14503, the adjoining 54.08-acre property located to the north of the subject parcel and to the west of the 2.40-acre tract is privately owned. A small pond and another small water impoundment are located on this property that are down-gradient from the subject parcel. However, it appears that surface water runoff from the subject development and tract appear to naturally bypass these water features and enter Carters Creek further down-gradient near Marino Road to the northeast.

3.2 Stormwater Management Design

A stormwater management basin is proposed for use during construction (sediment basin) to manage sediment laden stormwater runoff occurring on disturbed areas of the project. This basin will be modified for its permanent use following construction for flood control and conveyance (detention) purposes.

Based on the surface cover variables and design criteria, the required basin size during construction is larger than the permanent basin size. The larger size of the basin captures a larger drainage area. Presently, surface water runoff over this larger drainage area has leaves the project area at two locations, along the northern property line of Parcel #14501, and the other along the north and west property lines of the 2.4-acre tract. Outfall

configurations for the basin's temporary use during construction will maintain these drainage patterns as much as practical.

The location of the primary outfall of the temporary basin is at the same location as the permanent outfall, in the northwest corner of parcel #14501. This primary outfall (Outfall-001) is a concrete weir structure. During the construction period, the weir is configured with a temporary steel plate to constrict water flow at lower basin elevations to first pass through a surface skimmer system located in the basin. The surface skimmer system is connected to a temporary riser and pipe outlet that will pass through the steel plate. This skimmer system is designed to detain and slowly release the stormwater runoff volume calculated for the 2-yr, 24-hour frequency storm event. Runoff exceeding this design storm will crest over the steel plate and concrete weir.

Two (2) aggregate-covered, earthen emergency spillways are proposed, serving as secondary outfalls. The combined discharge is sized for the 25-year, 24-hour frequency storm event. Each outfall location will be protected against erosion using appropriate erosion and sediment control best management practices. The basin is designed to retain some water during construction in the sediment storage zone as a practice to help settle solids carried in the runoff and thereby reduce the total suspended solids (TSS) discharging from the basin.

At the time of final stabilization practices, the portion of the basin and emergency spillway on the 2.4-acre parcel will be filled and re-graded, and the temporary steel plate used at the primary outlet will be removed. The emergency spillway on Parcel #14501 will remain. The final configuration of the SWM basin is sized for the proposed cover conditions on Parcel #14501. Stormwater runoff occurring on this parcel will be collected and routed via stormwater drainage systems to the stormwater management basin.

The primary outfall (Outfall-001) for the post-construction stormwater management basin is a concrete weir. A secondary outfall is an aggregate-covered, earthen emergency spillway (the same configuration and location as used during construction). Each outfall location will be protected against erosion using appropriate erosion and sediment control best management practices. The basin is designed to retain some water as a practice to help settle solids carried in the runoff and thereby reduce the TSS discharging from the basin.

Site plan drawings showing drainage area characteristics have been prepared to aid in the review of the stormwater management. See Section 6.

3.3 Storm Sewer Design

The storm sewer design incorporates typical storm manhole, catch basin and headwall structures and piping.

Site plan drawings showing drainage area characteristics have been prepared to aid in the review of the storm sewer system design. See Section 6.

4 RESULTS

4.1 Stormwater Management Summary

A stormwater management basin has been selected for this project. The basin has been sized considering the additional capacity needed during construction to accommodate storm water volumes and sediment storage.

Pretreatment of the stormwater is provided by grass buffer areas and by drainage channels prior to entering the basin and by incorporating rip-rap as an energy-dissipating measure, at the location of the outfalls.

The basin is designed with the following design parameters:

Bottom Elevation (During & Post-Construction): 356.00’

Top of Basin Elevation: 361.50’, 7‘ wide

3H:1V Side Slopes

Emergency Spillway Elevation: 360.25’ (35’ long by 5’ wide, level crest)

Normal water surface elevation: 358.00' (dry weather)

Concrete Weir Outlet Structure

Cipoletti Weir Crest Elevation: 358.00, 5 feet wide

4.2 Hydrograph Table

Storm Event (year)	Present Conditions Flow Rate (Hydrograph #1) (cfs)	Developed Conditions Flow Rate (Hydrograph #2) (cfs)	Routed Flow Rate (Hydrograph #3) (cfs)	Basin Maximum Water Surface Elevation (feet)	Maximum Storage Volume (cubic feet)
2	20.43	33.09	19.84	359.12	57,127
5	30.56	44.99	27.77	359.41	64,475
10	40.50	56.32	35.70	359.66	71,130
25	55.68	73.37	47.92	360.02	80,604
50	69.22	88.46	58.97	360.30	88,835
100	83.94	104.85	78.84	360.51	95,354

4.3 Conclusions

The project is designed to limit the built-upon area, maximizing dispersed flow and ensuring that stormwater conveyances are vegetated, where practical. The increase in stormwater volume and discharge rate due to this project is managed by a stormwater basin.

During precipitation events, some infiltration may occur through the proposed aggregate and lawn covered surfaces. Any excess runoff is collected and conveyed to the stormwater management basin via the storm water piping system. This runoff would enter the proposed vegetated stormwater management basin (which may allow additional infiltration due to the detention time) and release to designated location serving as outlets for the basin.

The proposed stormwater management basin design provides storage volume sufficient to reduce the developed conditions flow rate for the design storm frequencies (2-yr, 5-yr, 10-year, 25-yr, 50-yr and 100-yr frequency storm events) to below the present conditions flow rate. These conditions satisfy the City of Bryan Unified Stormwater Design Guidelines. This design will reduce the potential for erosion at the stormwater discharge location and help to improve the water quality of the discharge.

5 APPENDICES

Appendix A – Hydraflow Hydrographs Data

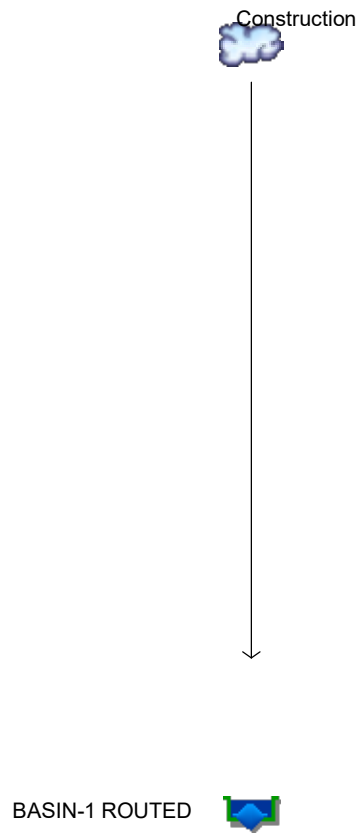
Appendix B – Storm Sewer Calculations

6 DRAWINGS

566901-C-C-009-001	STORMWATER MANAGEMENT SEDIMENT BASIN DRAINAGE AREA
566901-C-C-009-002	STORMWATER MANAGEMENT PERMANENT SWM BASIN DRAINAGE AREA PLAN
566901-C-C-009-003	STORM SEWER SYSTEM DRAINAGE AREA PLAN
566901-C-C-009-004	STORM SEWER SYSTEM DRAINAGE AREA PLAN

APPENDIX A

Watershed Model Schematic



Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	45.52	-------	-------	-------	96.65	-------	-------	Construction
2	Reservoir	1	-------	0.980	-------	-------	-------	38.50	-------	-------	BASIN-1 ROUTED

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

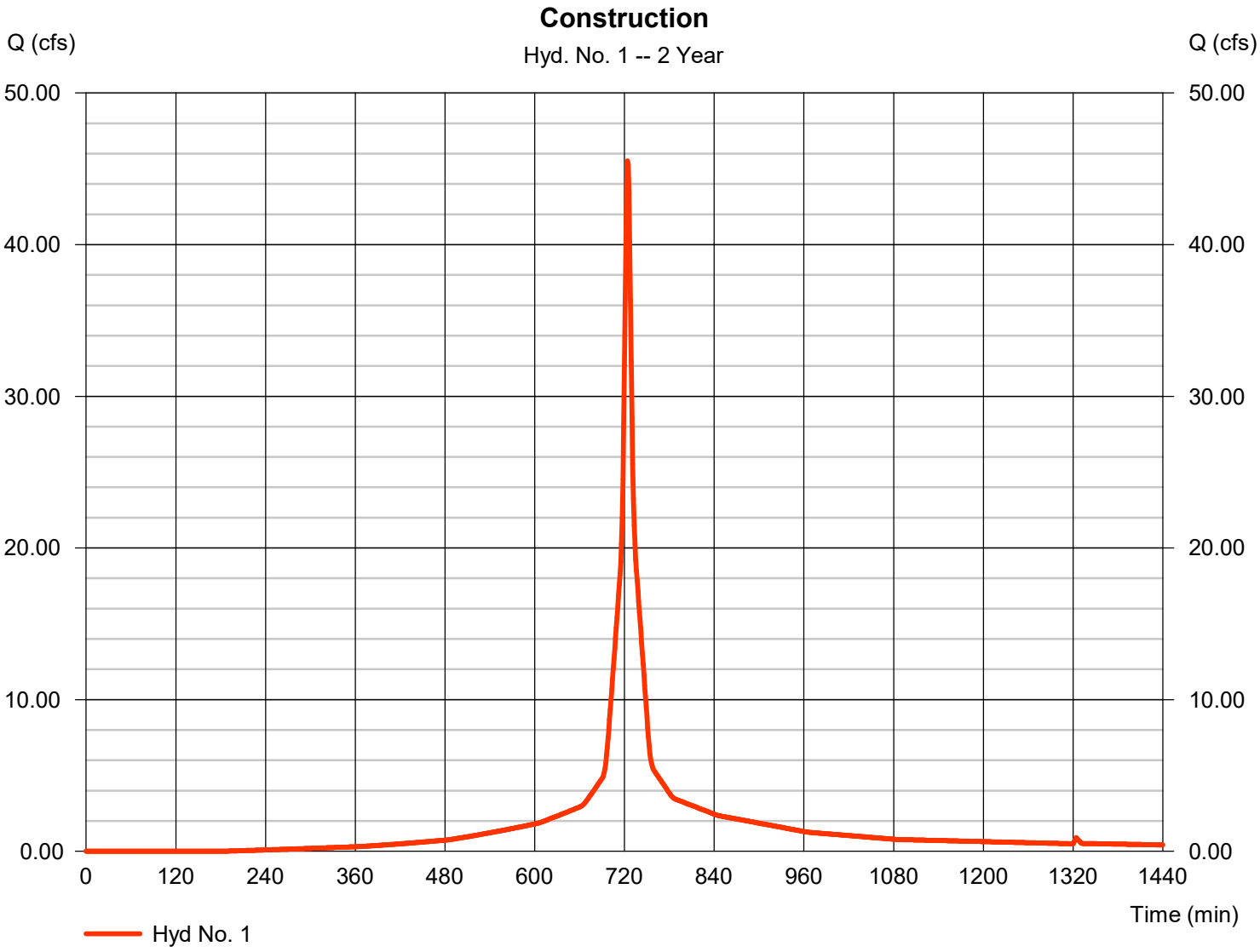
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	45.52	1	724	149,469	------	------	------	Construction
2	Reservoir	0.980	1	1034	154,274	1	359.72	155,534	BASIN-1 ROUTED

Hydrograph Report

Hyd. No. 1

Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.52 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	149,469 cuft
Drainage area	=	11.310 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.21 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



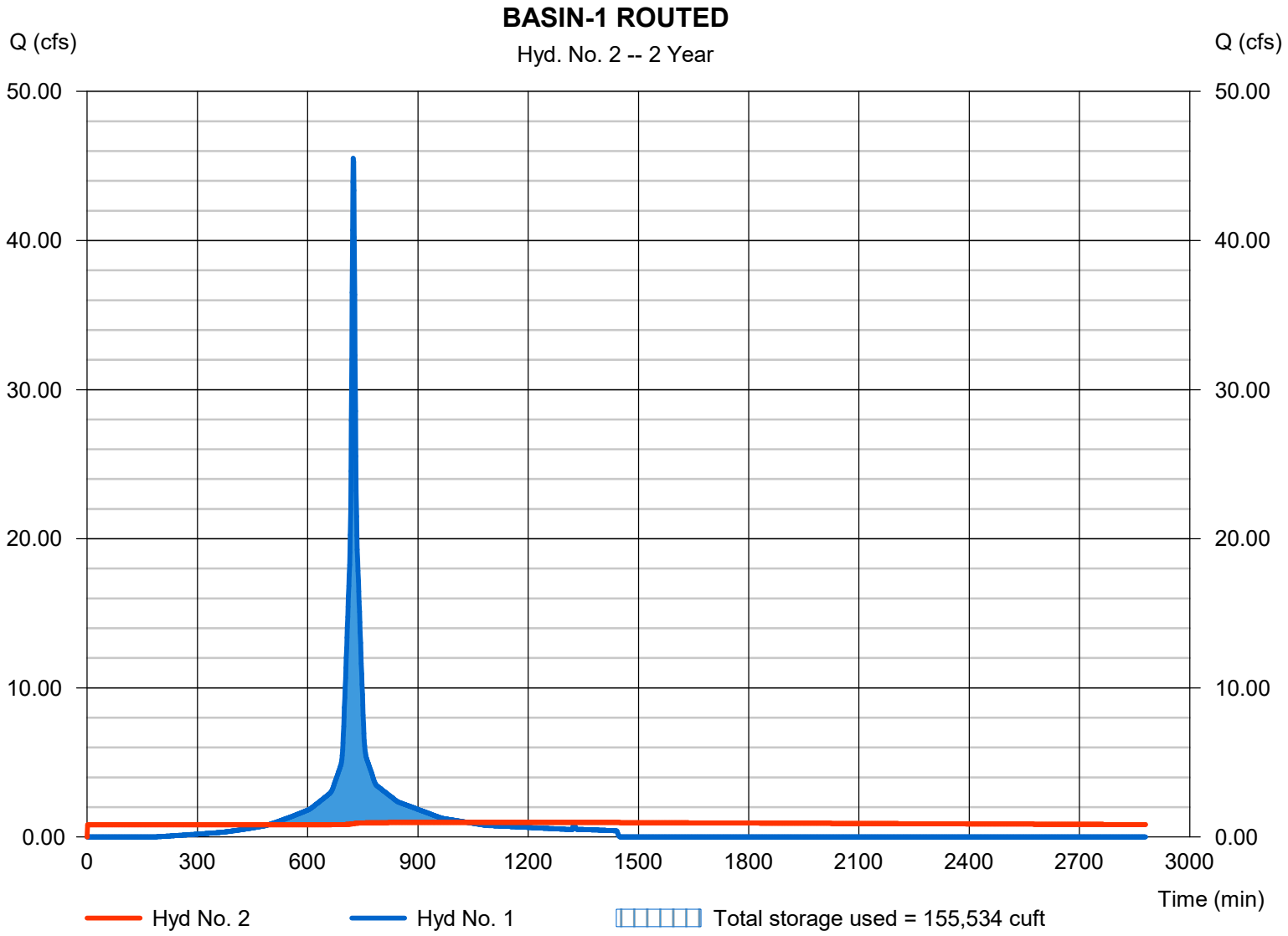
Hydrograph Report

Hyd. No. 2

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	0.980 cfs
Storm frequency	=	2 yrs	Time to peak	=	1034 min
Time interval	=	1 min	Hyd. volume	=	154,274 cuft
Inflow hyd. No.	=	1 - Construction	Max. Elevation	=	359.72 ft
Reservoir name	=	BASIN-1	Max. Storage	=	155,534 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft. Outflow includes exfiltration.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	96.65	1	724	331,467	------	------	------	Construction
2	Reservoir	38.50	1	736	304,988	1	360.50	207,139	BASIN-1 ROUTED

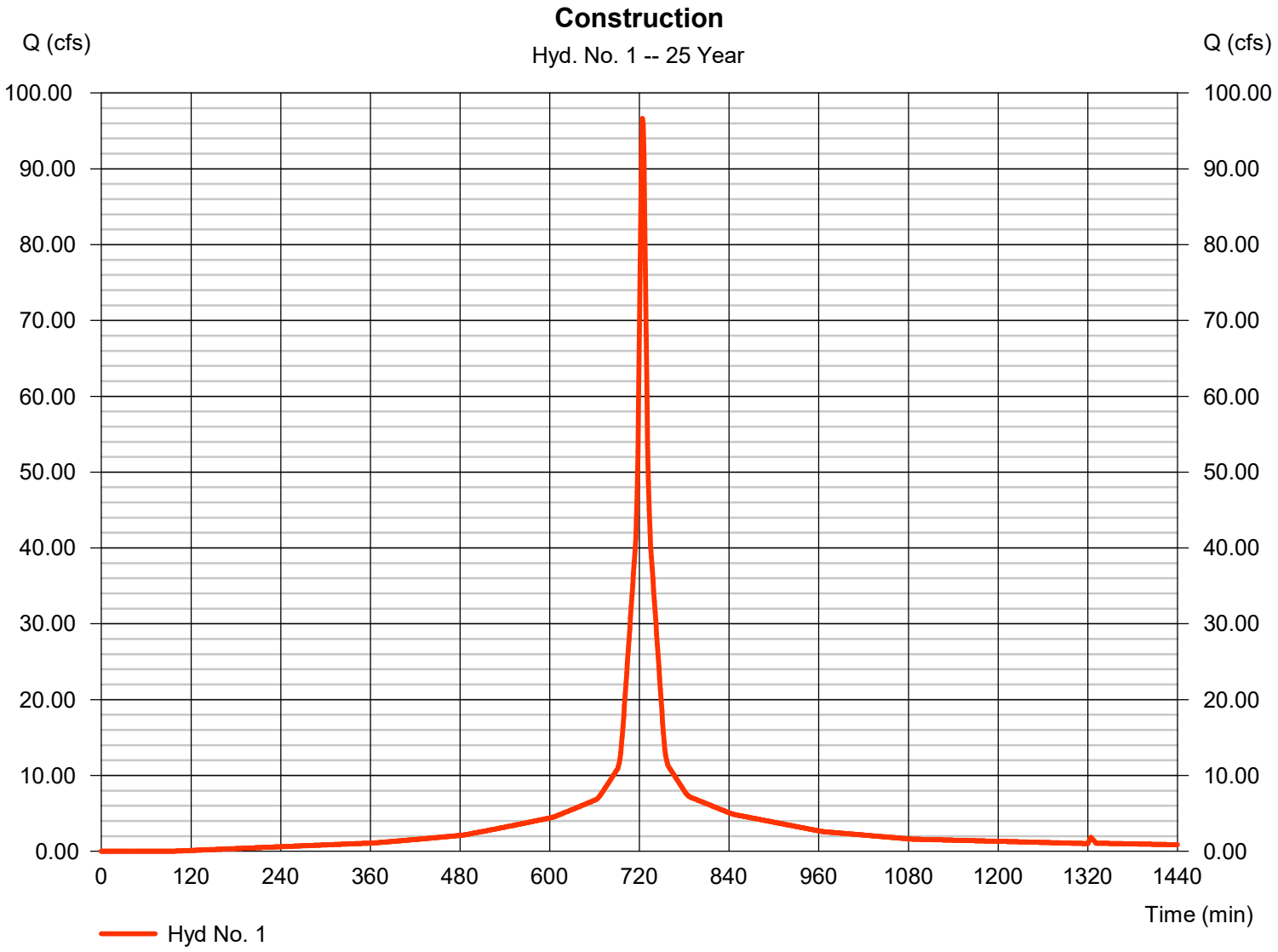
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Construction

Hydrograph type	=	SCS Runoff	Peak discharge	=	96.65 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	331,467 cuft
Drainage area	=	11.310 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

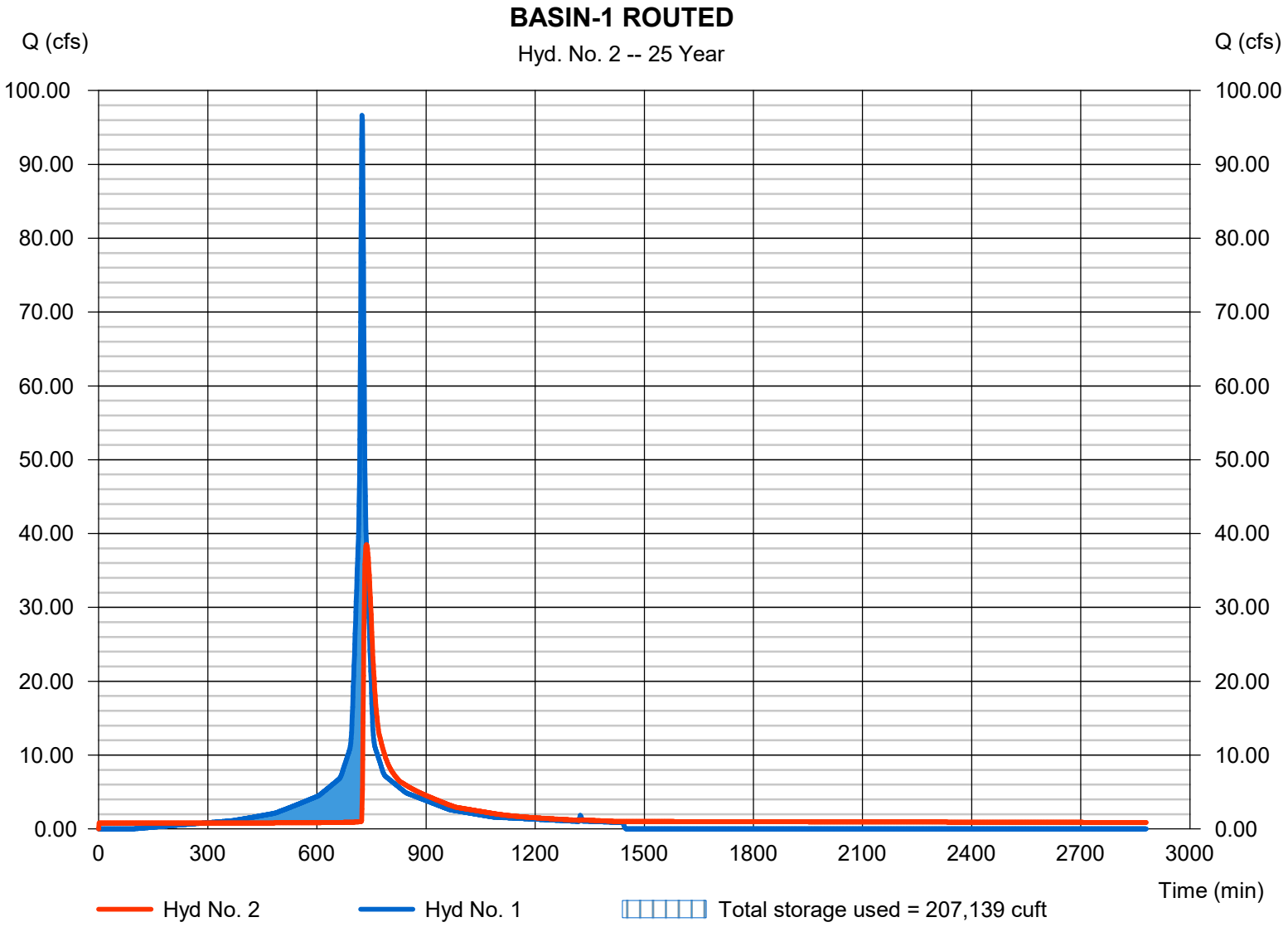
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 2

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	38.50 cfs
Storm frequency	=	25 yrs	Time to peak	=	736 min
Time interval	=	1 min	Hyd. volume	=	304,988 cuft
Inflow hyd. No.	=	1 - Construction	Max. Elevation	=	360.50 ft
Reservoir name	=	BASIN-1	Max. Storage	=	207,139 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Pond No. 1 - BASIN-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 356.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	356.00	17,060	0	0
1.00	357.00	22,937	19,924	19,924
2.00	358.00	51,808	36,402	56,326
3.00	359.00	58,418	55,074	111,401
4.00	360.00	65,054	61,700	173,101
5.00	361.00	71,715	68,351	241,451
5.50	361.50	75,058	36,686	278,138

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	Inactive	Inactive	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 358.00	0.00	0.00	0.00
Length (ft)	= 1.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

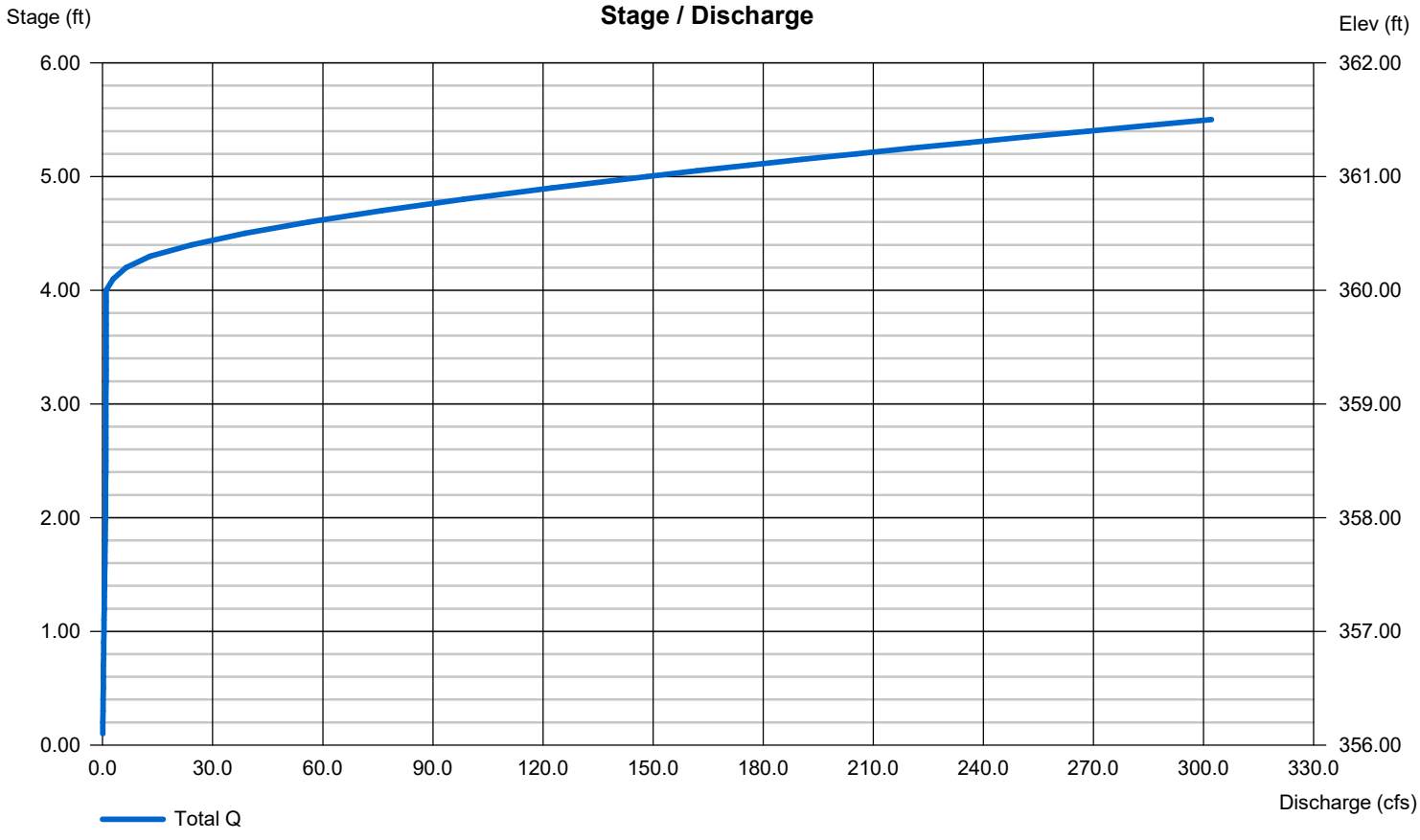
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	35.00	6.00	35.00
Crest El. (ft)	= 360.00	360.25	360.00	360.25
Weir Coeff.	= 3.33	2.60	3.33	2.60
Weir Type	= 1	Broad	Ciplti	Broad
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.670 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Watershed Model Schematic



Present

Developed

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	20.43	-------	30.56	40.50	55.68	69.22	83.94	Present
2	SCS Runoff	------	-------	33.09	-------	44.99	56.32	73.37	88.46	104.85	Developed
3	Reservoir	2	-------	19.84	-------	27.77	35.70	47.92	58.97	78.84	BASIN-1 ROUTED

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	20.43	1	730	80,779	------	------	------	Present
2	SCS Runoff	33.09	1	727	117,309	------	------	------	Developed
3	Reservoir	19.84	1	735	117,304	2	359.12	57,127	BASIN-1 ROUTED

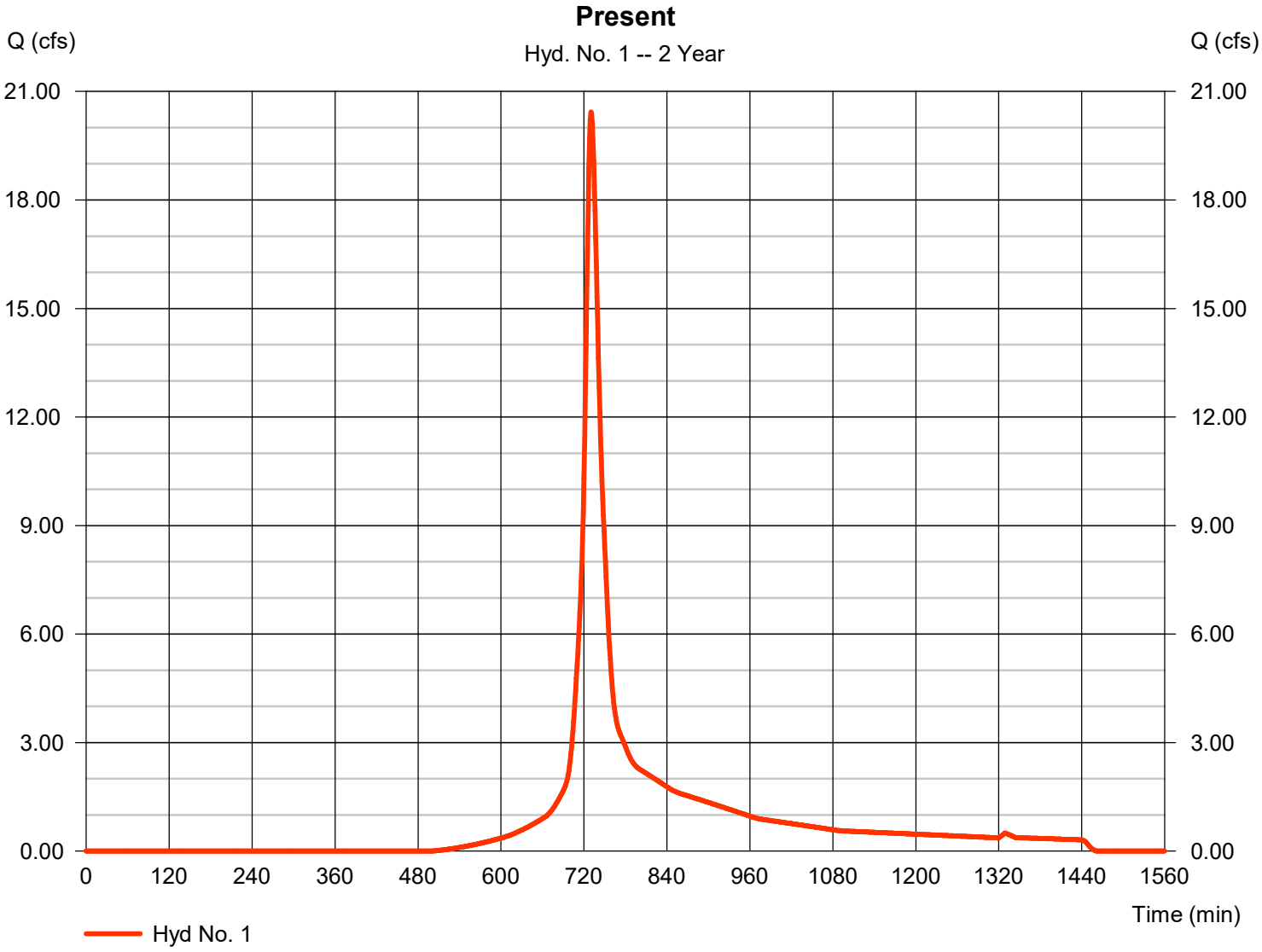
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.43 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	80,779 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	4.21 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



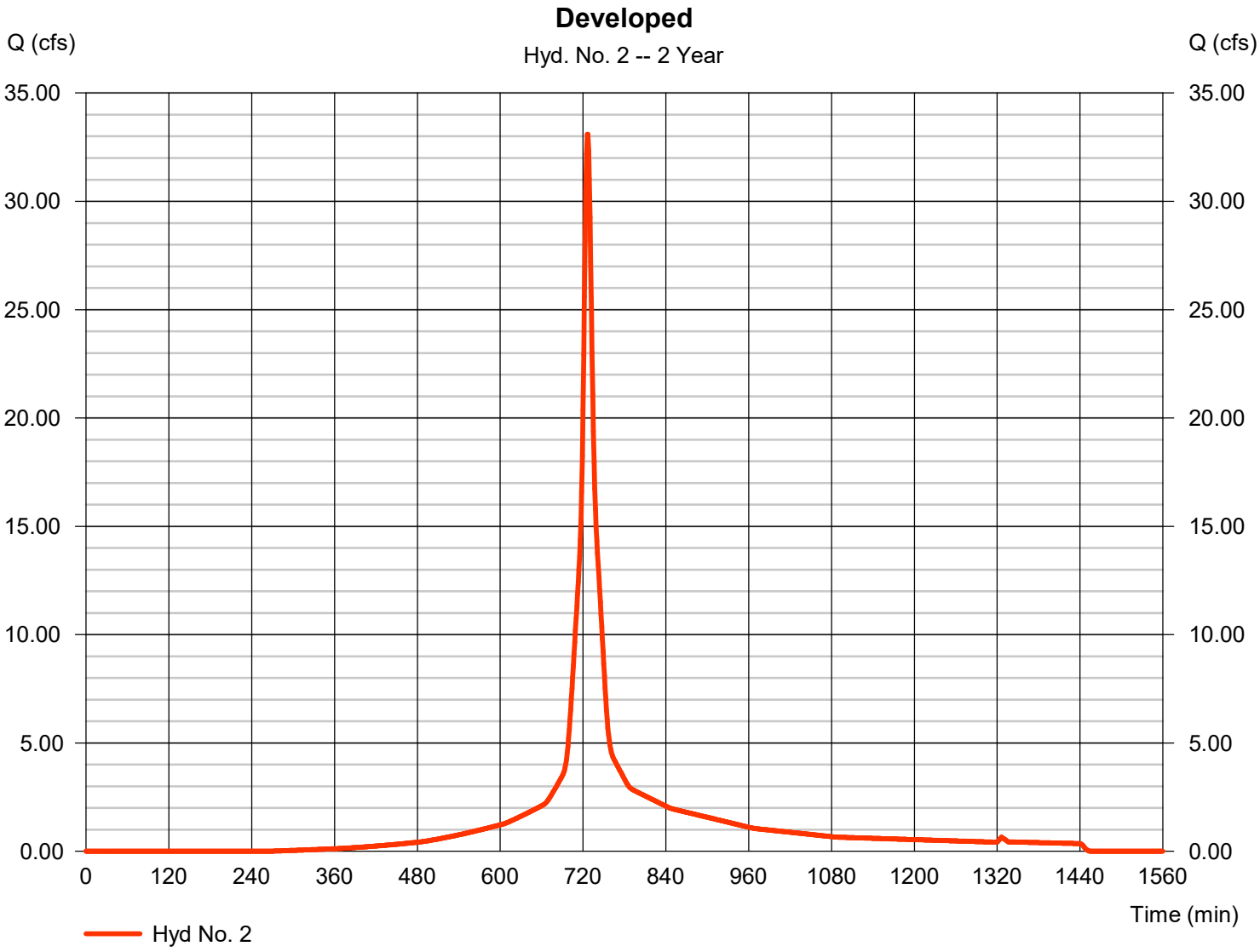
Hydrograph Report

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.09 cfs
Storm frequency	=	2 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	117,309 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	4.21 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

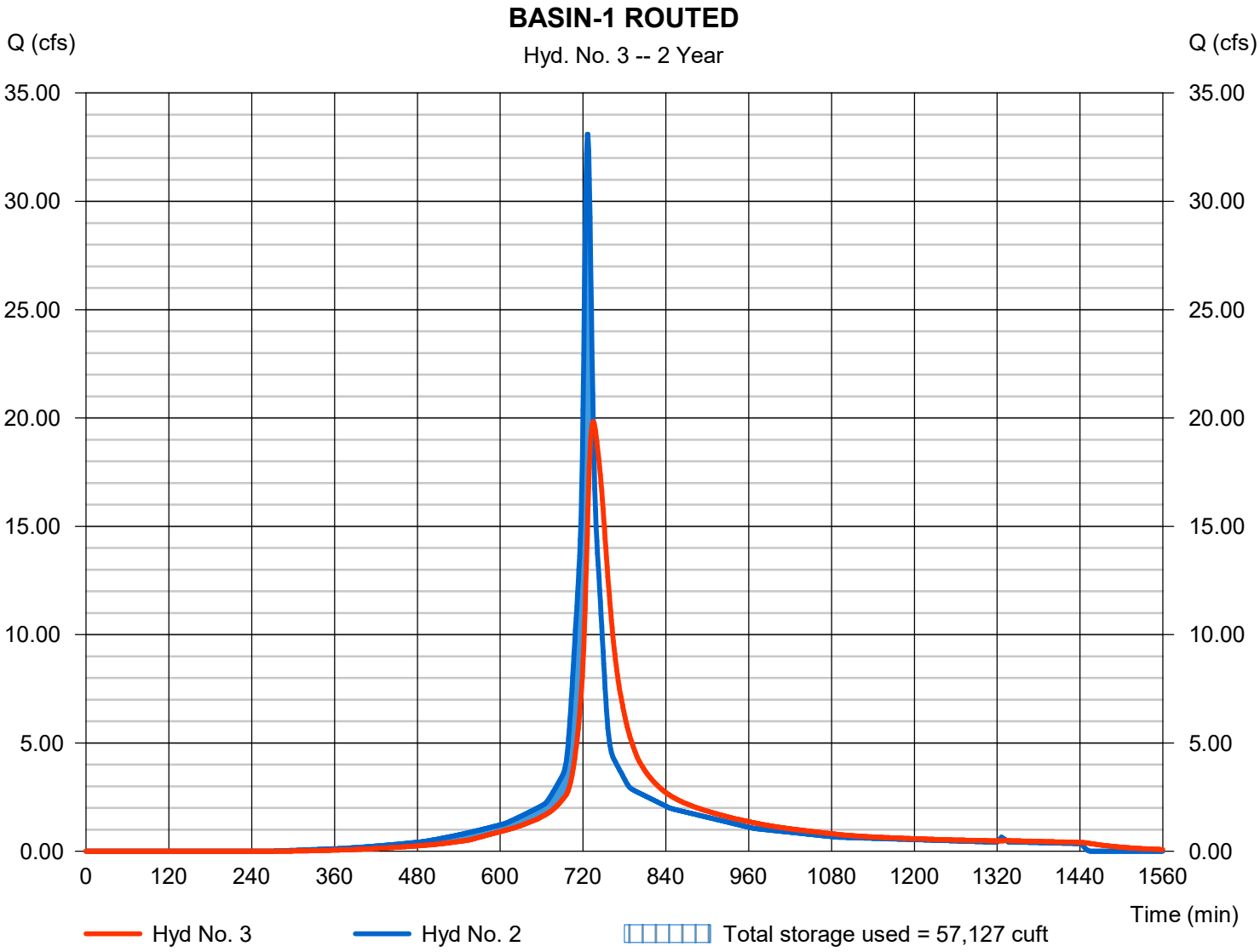
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	19.84 cfs
Storm frequency	=	2 yrs	Time to peak	=	735 min
Time interval	=	1 min	Hyd. volume	=	117,304 cuft
Inflow hyd. No.	=	2 - Developed	Max. Elevation	=	359.12 ft
Reservoir name	=	BASIN-1	Max. Storage	=	57,127 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	30.56	1	730	120,836	------	------	------	Present
2	SCS Runoff	44.99	1	726	162,151	------	------	------	Developed
3	Reservoir	27.77	1	734	162,147	2	359.41	64,475	BASIN-1 ROUTED

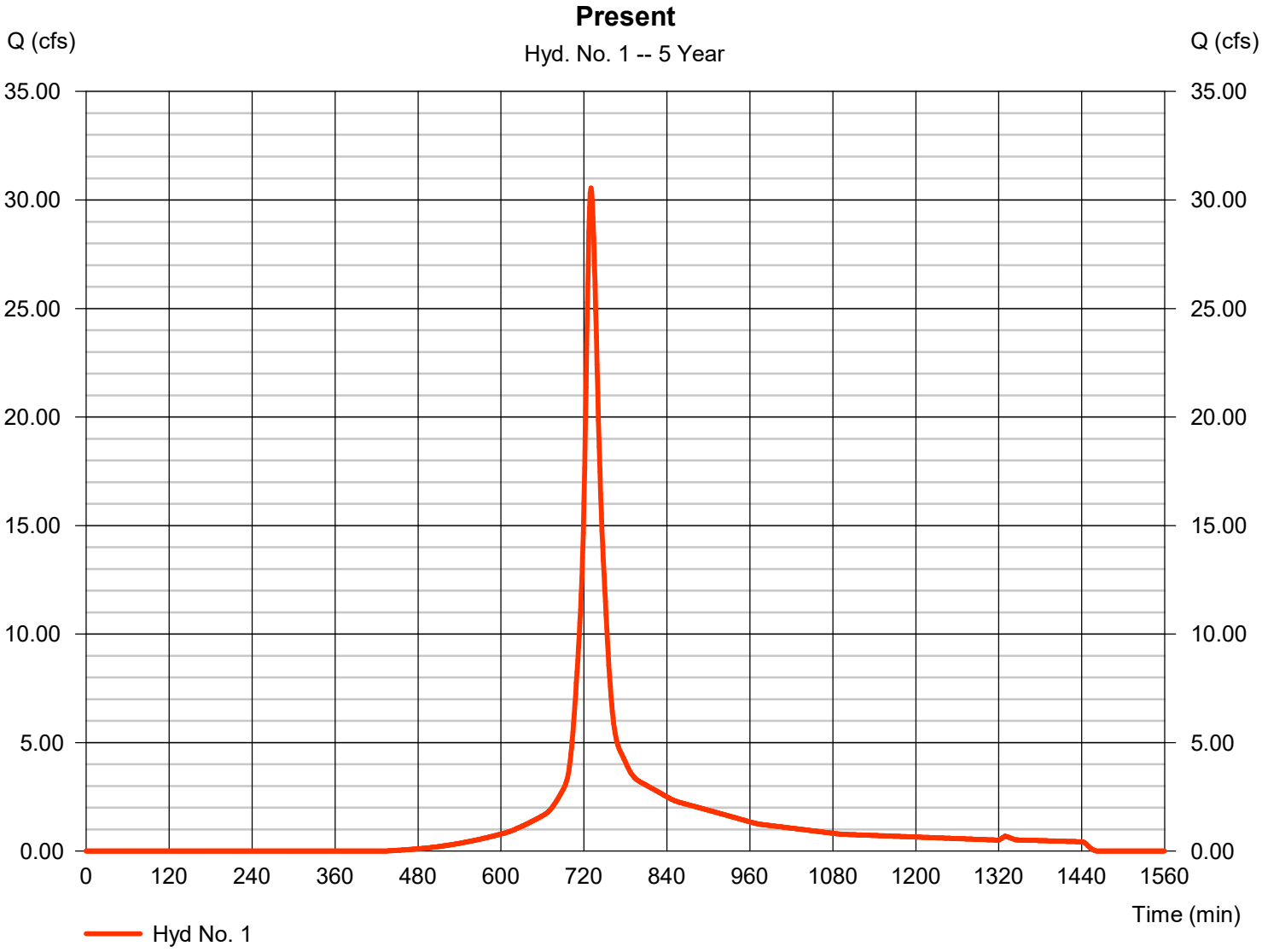
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.56 cfs
Storm frequency	=	5 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	120,836 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	5.48 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

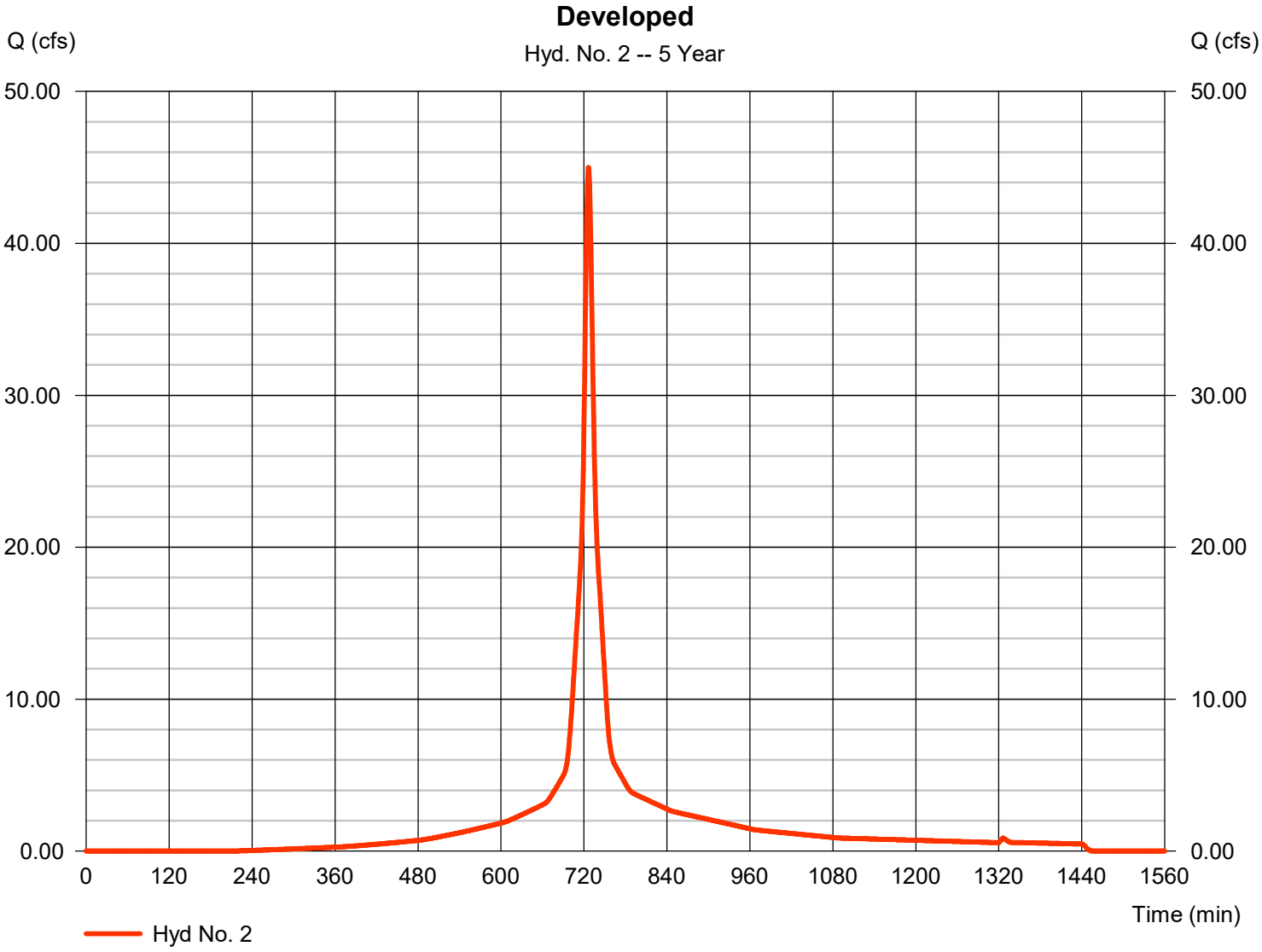
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	44.99 cfs
Storm frequency	=	5 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	162,151 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.48 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

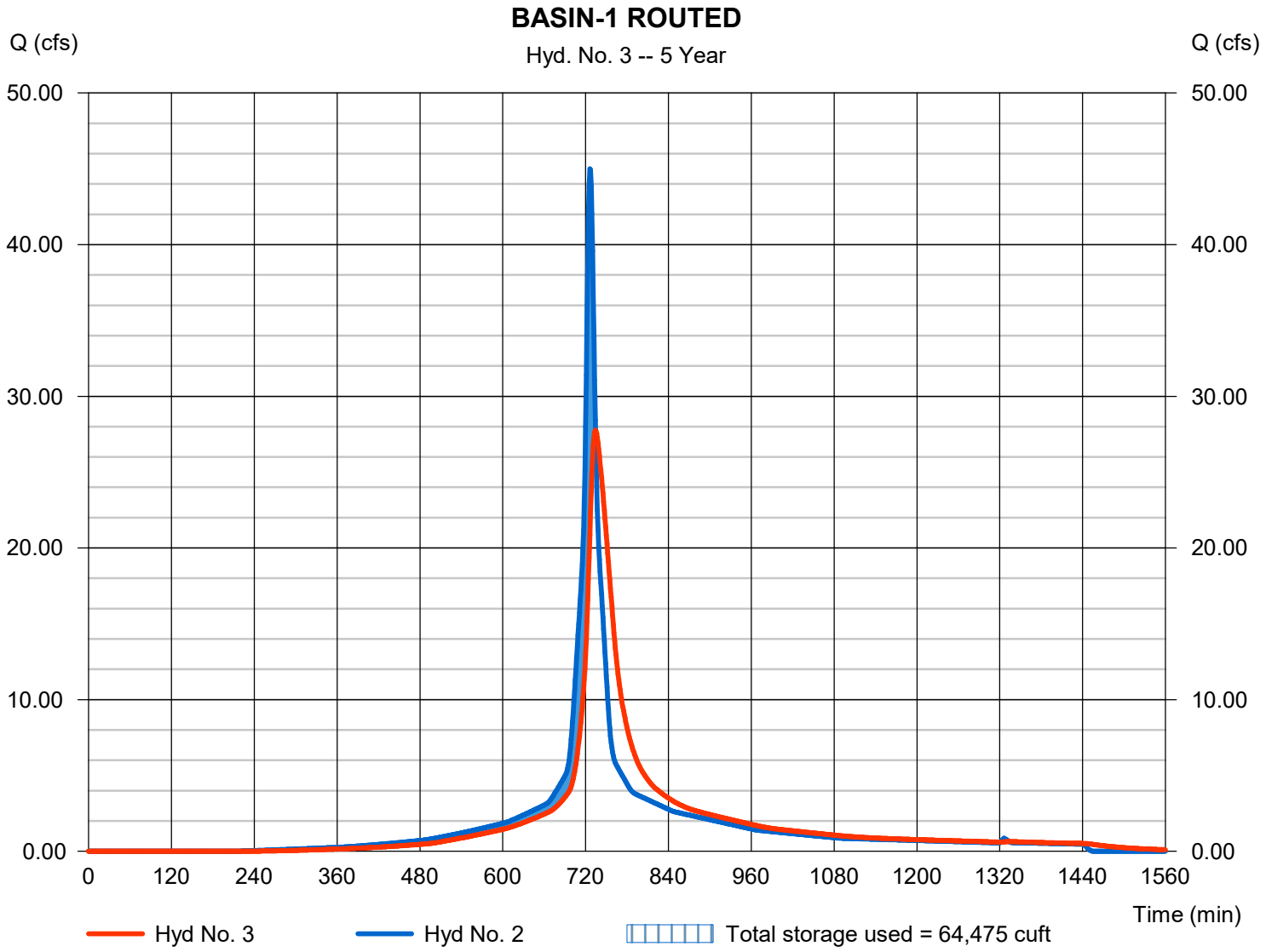
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 27.77 cfs
Storm frequency	= 5 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 162,147 cuft
Inflow hyd. No.	= 2 - Developed	Max. Elevation	= 359.41 ft
Reservoir name	= BASIN-1	Max. Storage	= 64,475 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	40.50	1	730	161,029	------	------	------	Present
2	SCS Runoff	56.32	1	726	205,688	------	------	------	Developed
3	Reservoir	35.70	1	734	205,684	2	359.66	71,130	BASIN-1 ROUTED

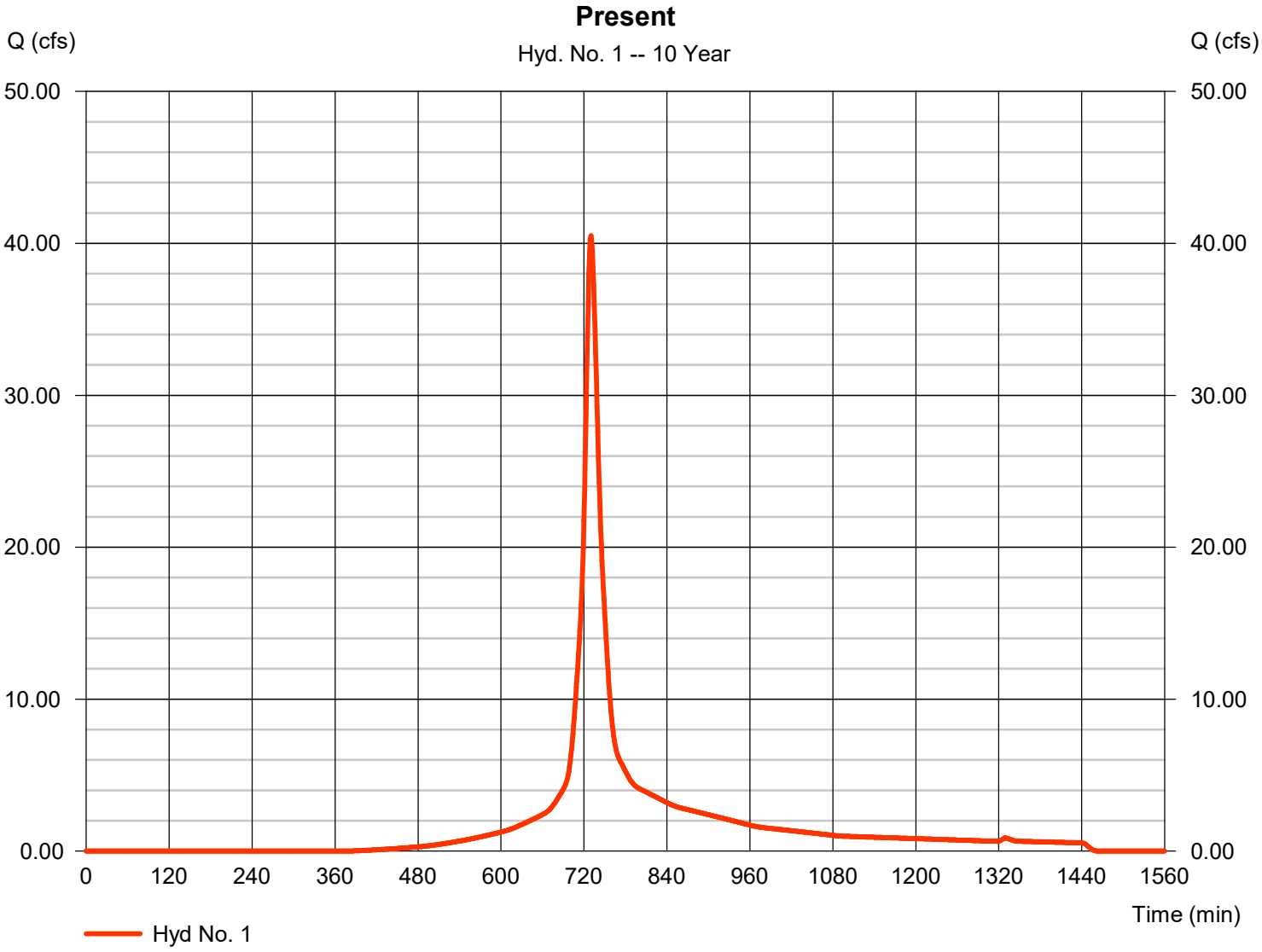
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	40.50 cfs
Storm frequency	=	10 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	161,029 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	6.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

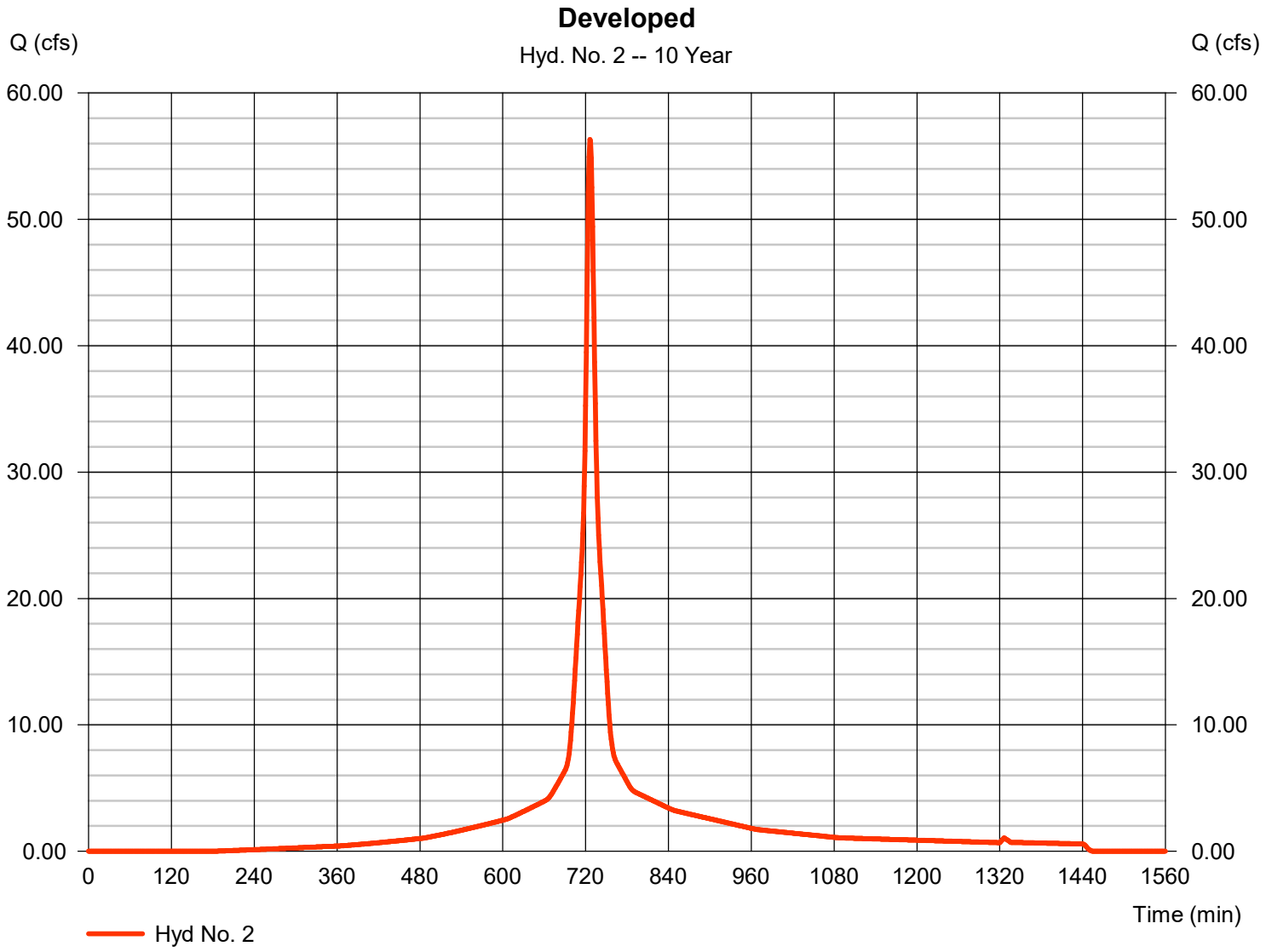
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	56.32 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	205,688 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	6.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

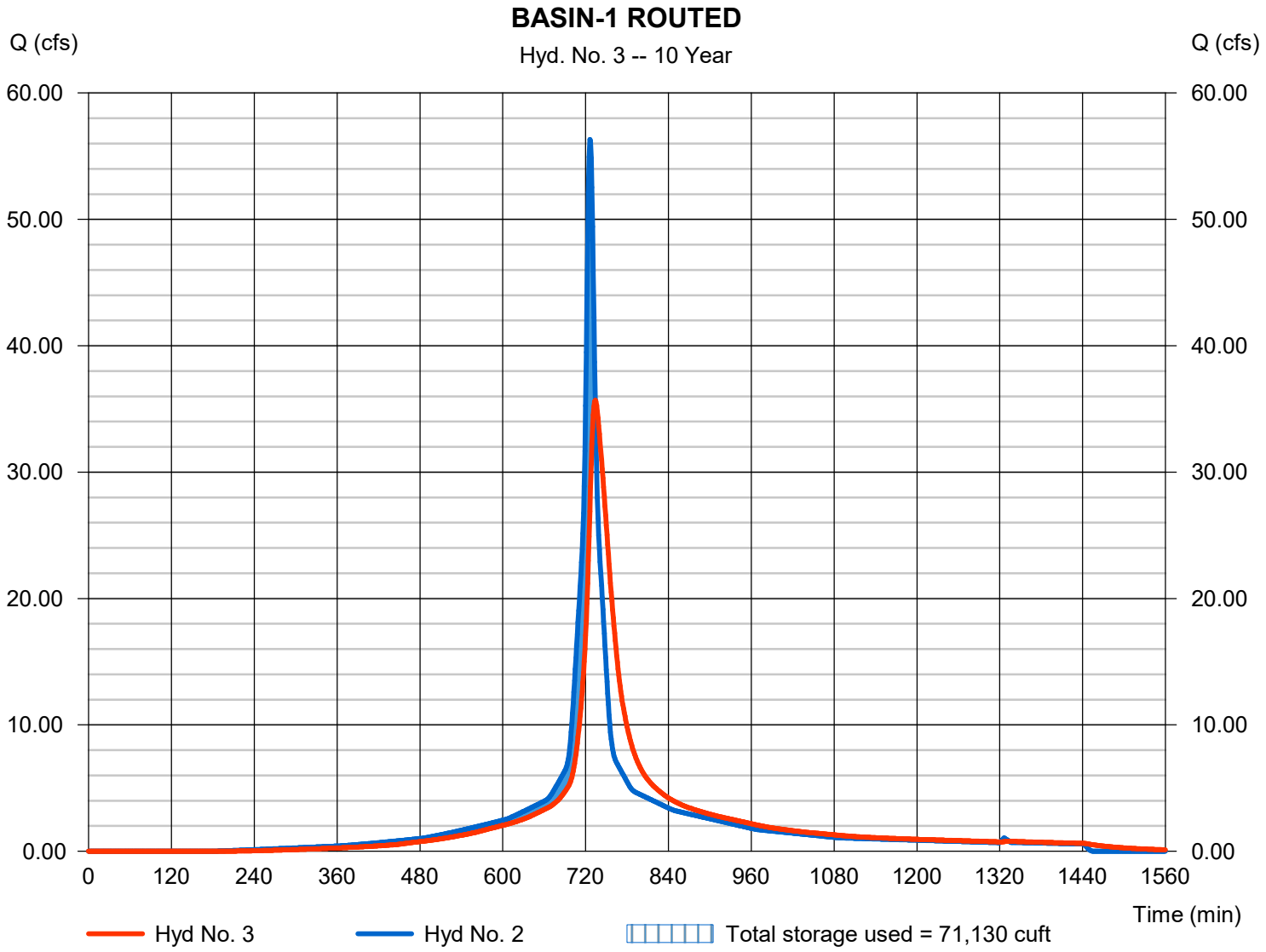
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	35.70 cfs
Storm frequency	=	10 yrs	Time to peak	=	734 min
Time interval	=	1 min	Hyd. volume	=	205,684 cuft
Inflow hyd. No.	=	2 - Developed	Max. Elevation	=	359.66 ft
Reservoir name	=	BASIN-1	Max. Storage	=	71,130 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	55.68	1	730	223,862	------	------	------	Present
2	SCS Runoff	73.37	1	726	272,169	------	------	------	Developed
3	Reservoir	47.92	1	734	272,165	2	360.02	80,604	BASIN-1 ROUTED

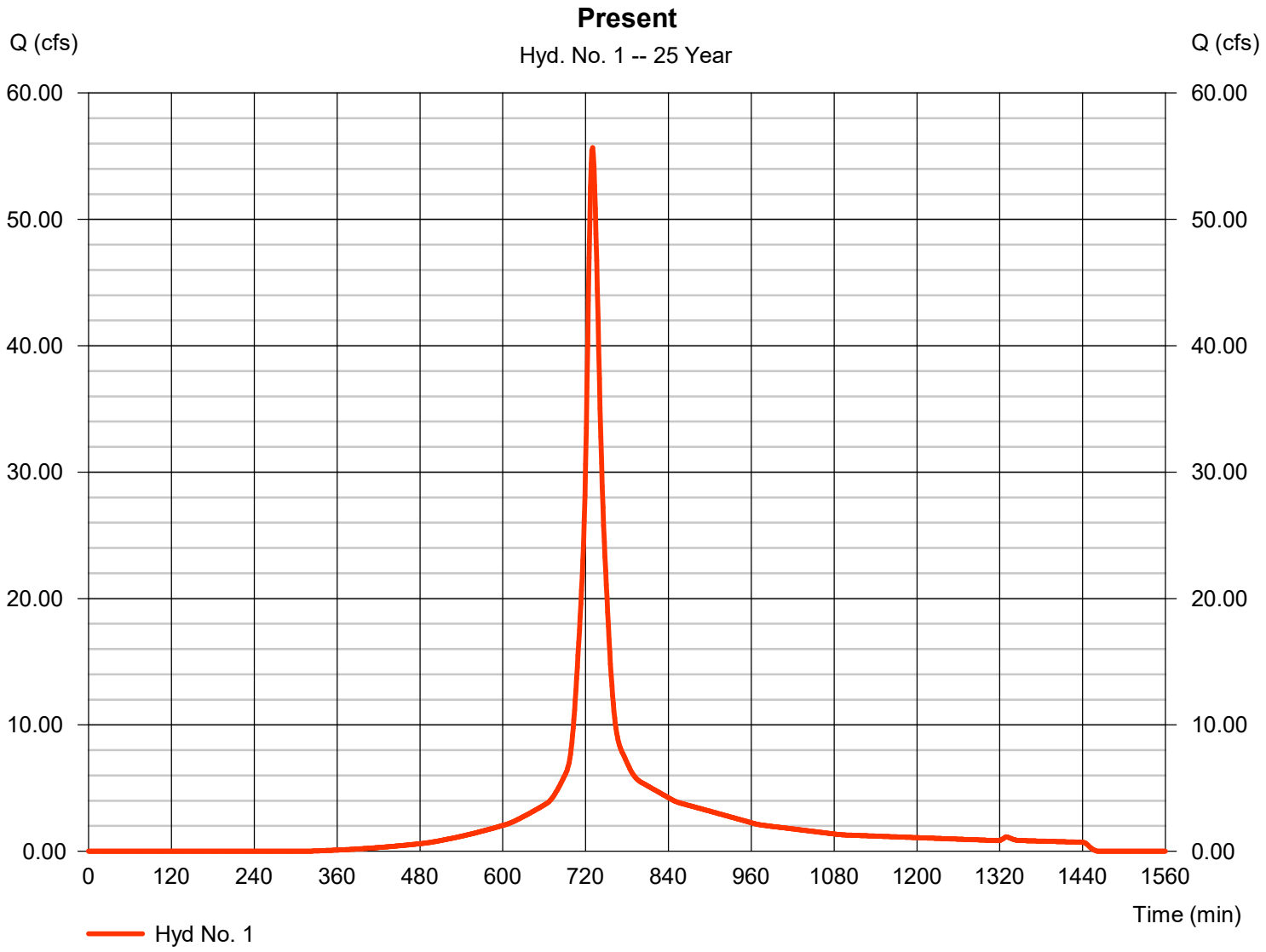
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	55.68 cfs
Storm frequency	=	25 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	223,862 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	8.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

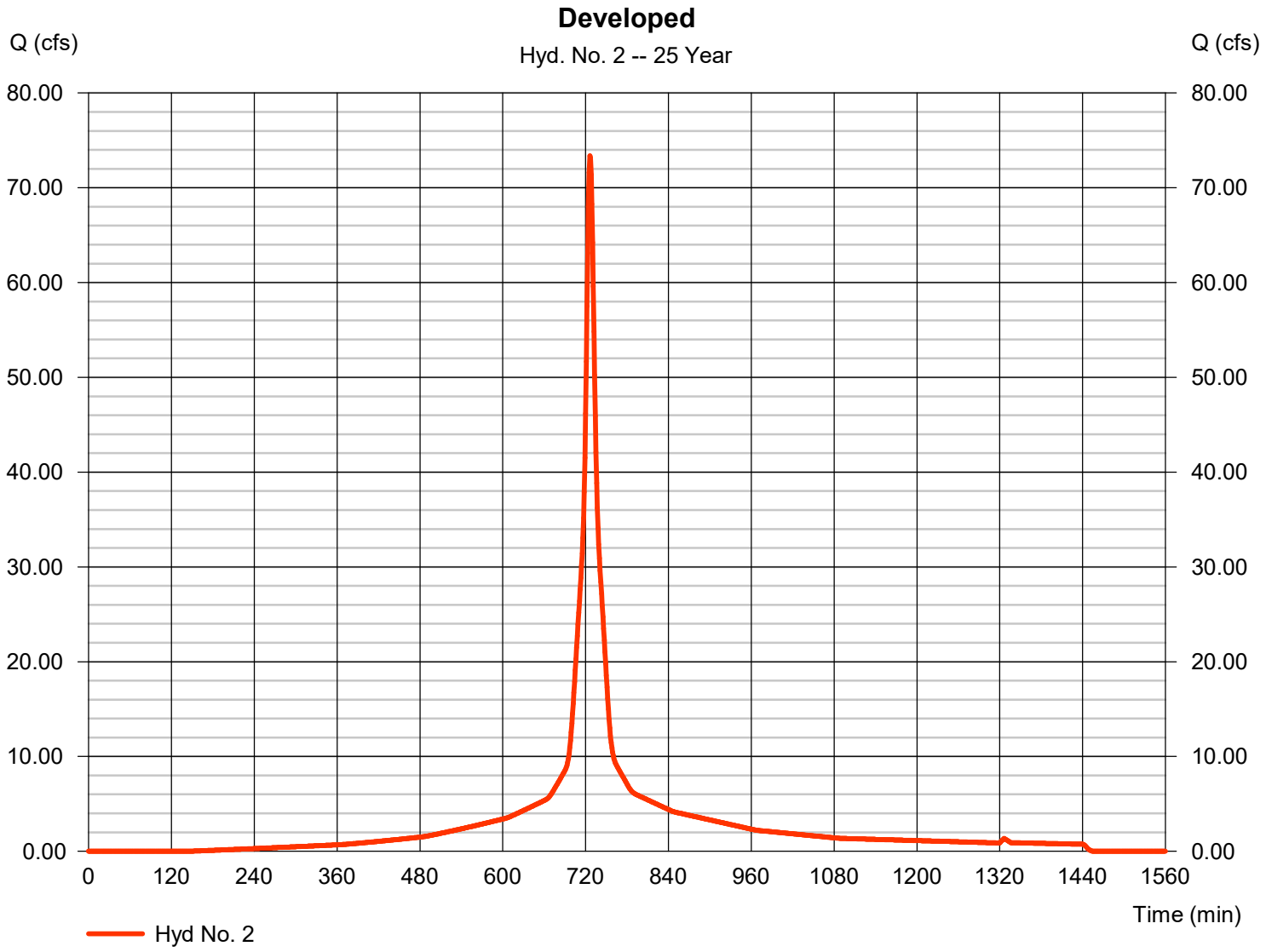
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	73.37 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	272,169 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	8.55 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

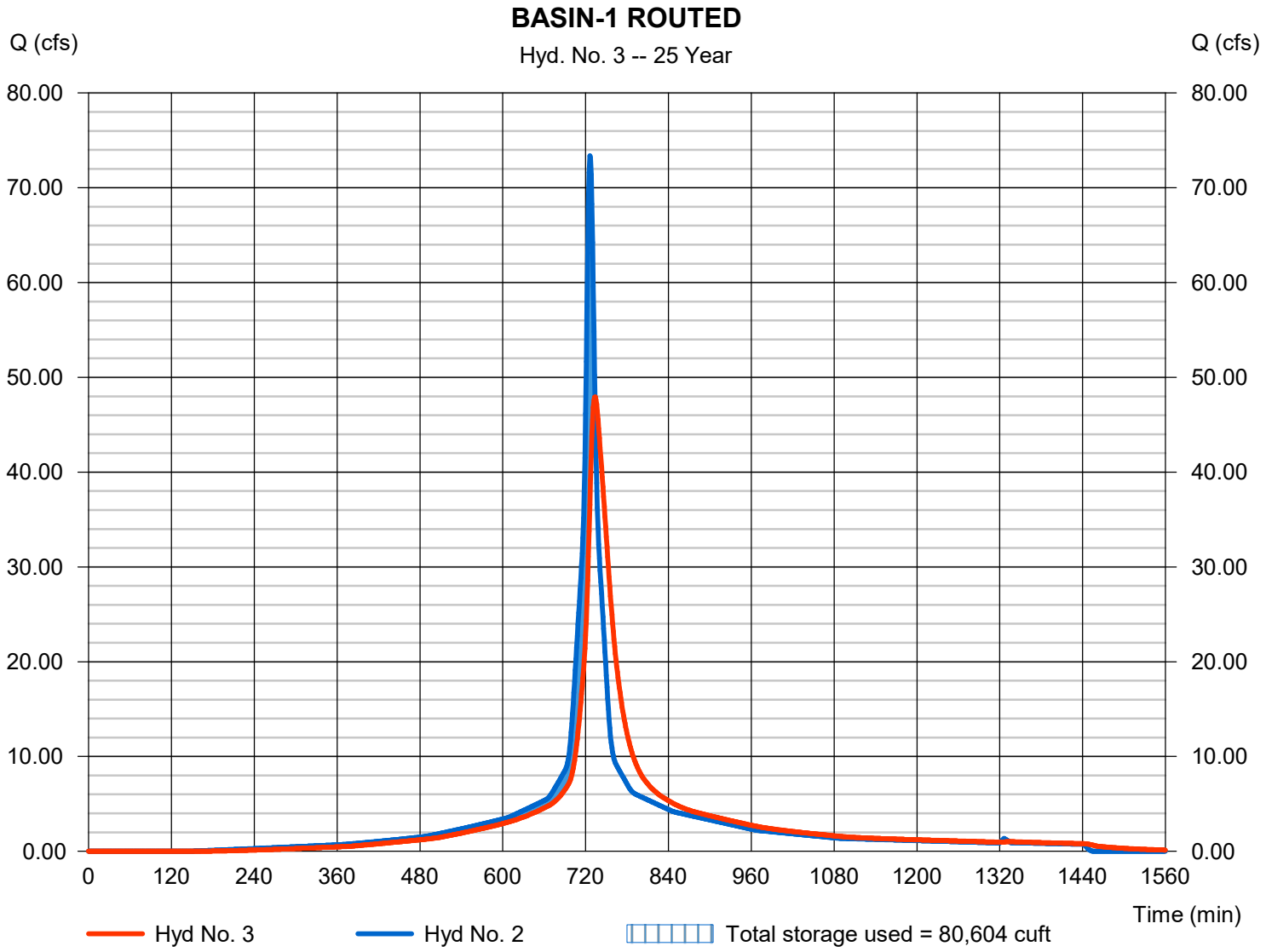
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	47.92 cfs
Storm frequency	=	25 yrs	Time to peak	=	734 min
Time interval	=	1 min	Hyd. volume	=	272,165 cuft
Inflow hyd. No.	=	2 - Developed	Max. Elevation	=	360.02 ft
Reservoir name	=	BASIN-1	Max. Storage	=	80,604 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

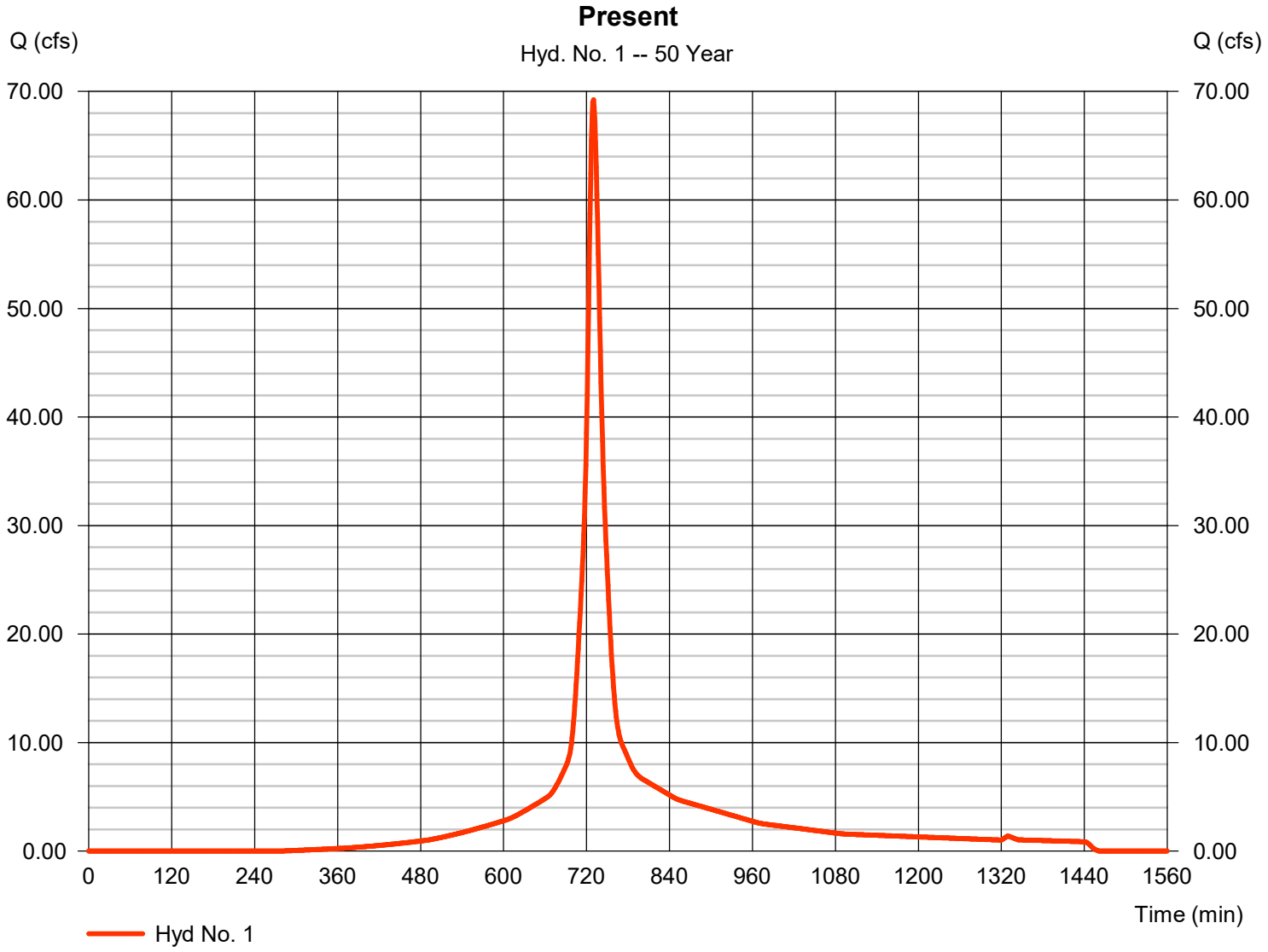
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	69.22	1	730	281,076	------	------	------	Present
2	SCS Runoff	88.46	1	726	331,731	------	------	------	Developed
3	Reservoir	58.97	1	733	331,726	2	360.30	88,835	BASIN-1 ROUTED

Hydrograph Report

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	69.22 cfs
Storm frequency	=	50 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	281,076 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	10.20 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



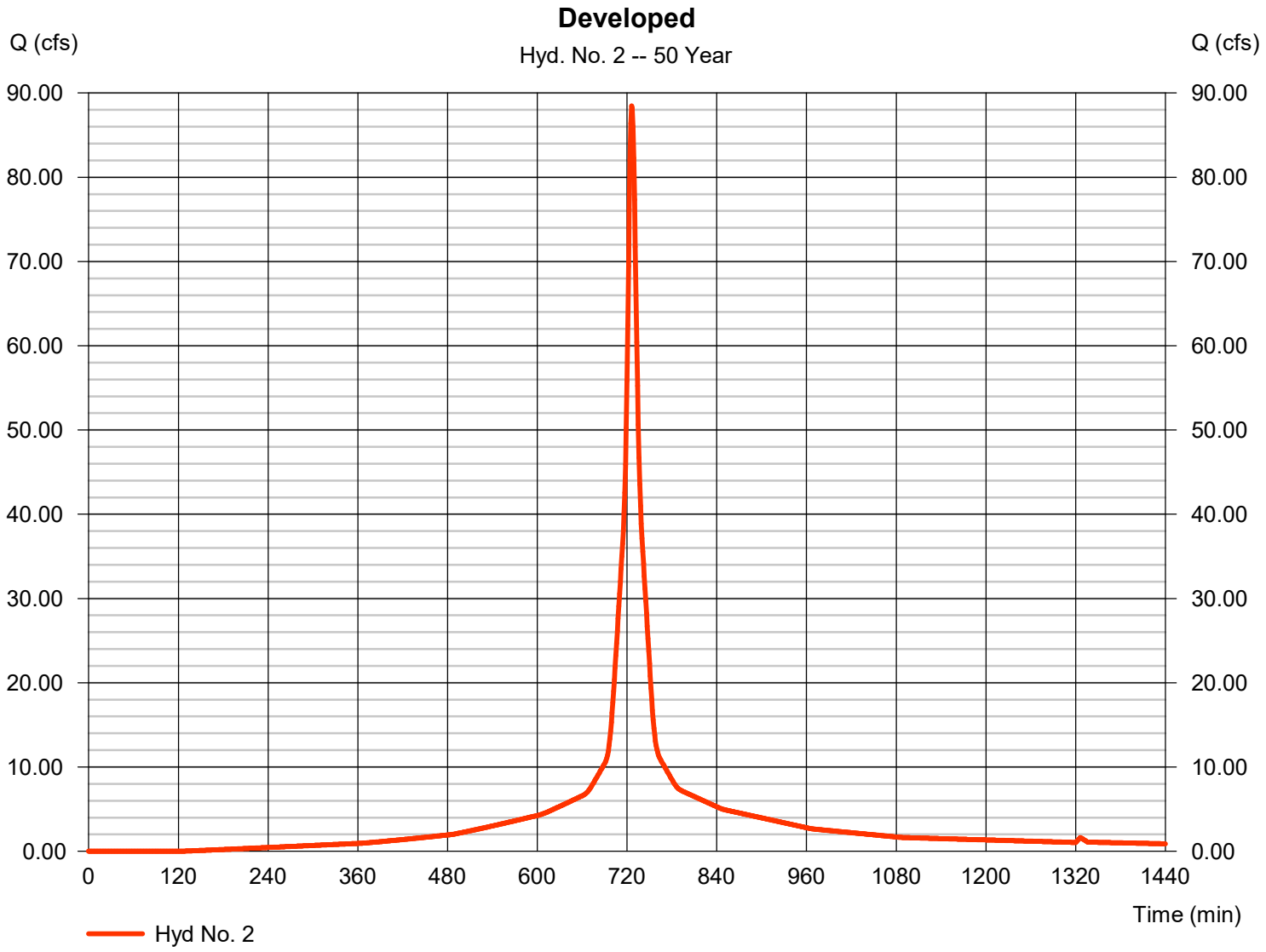
Hydrograph Report

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	88.46 cfs
Storm frequency	=	50 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	331,731 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	10.20 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

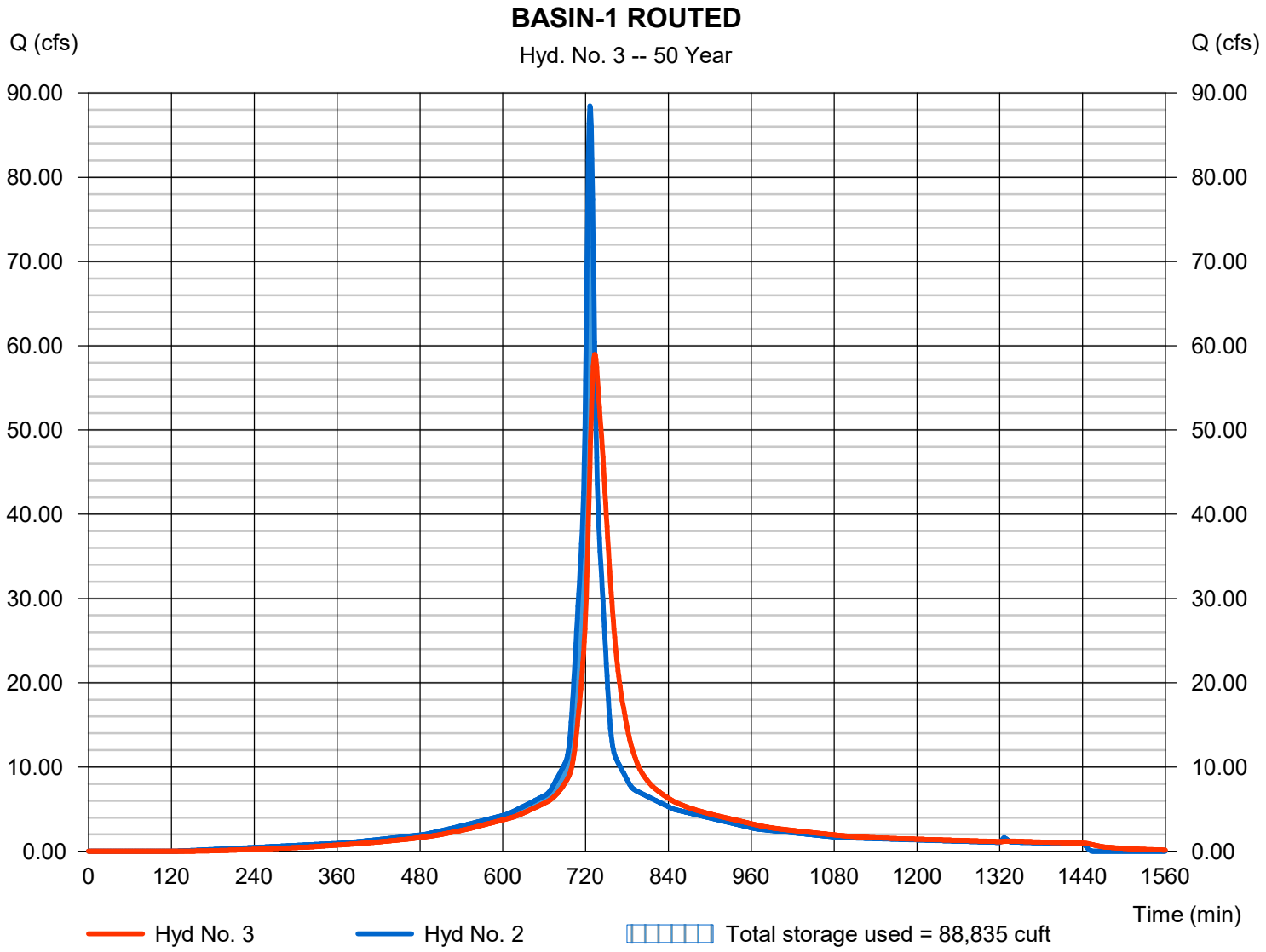
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	58.97 cfs
Storm frequency	=	50 yrs	Time to peak	=	733 min
Time interval	=	1 min	Hyd. volume	=	331,726 cuft
Inflow hyd. No.	=	2 - Developed	Max. Elevation	=	360.30 ft
Reservoir name	=	BASIN-1	Max. Storage	=	88,835 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	83.94	1	730	344,277	------	------	------	Present
2	SCS Runoff	104.85	1	726	396,875	------	------	------	Developed
3	Reservoir	78.84	1	732	396,871	2	360.51	95,354	BASIN-1 ROUTED

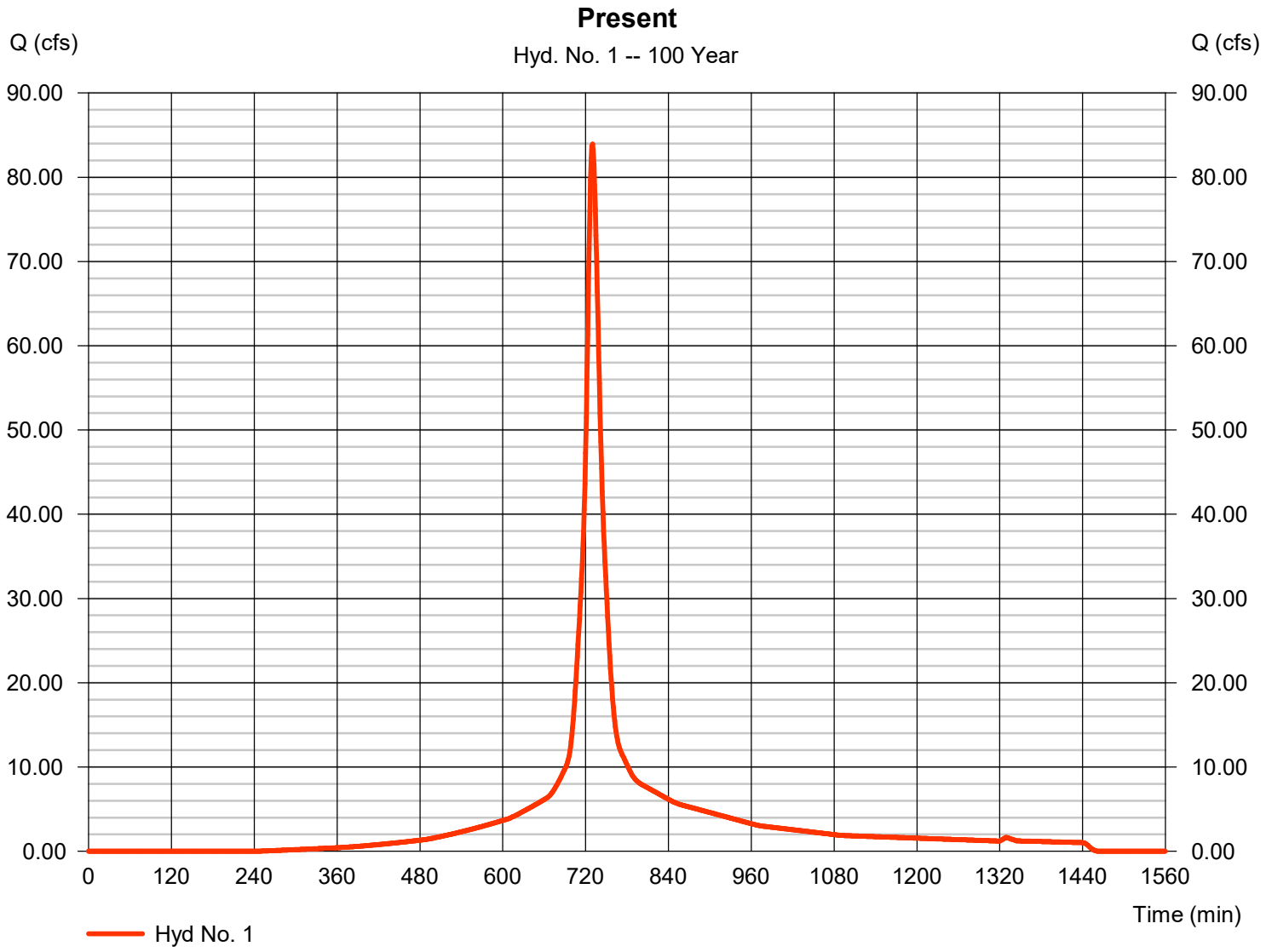
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 1

Present

Hydrograph type	=	SCS Runoff	Peak discharge	=	83.94 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	344,277 cuft
Drainage area	=	10.040 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.60 min
Total precip.	=	12.00 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

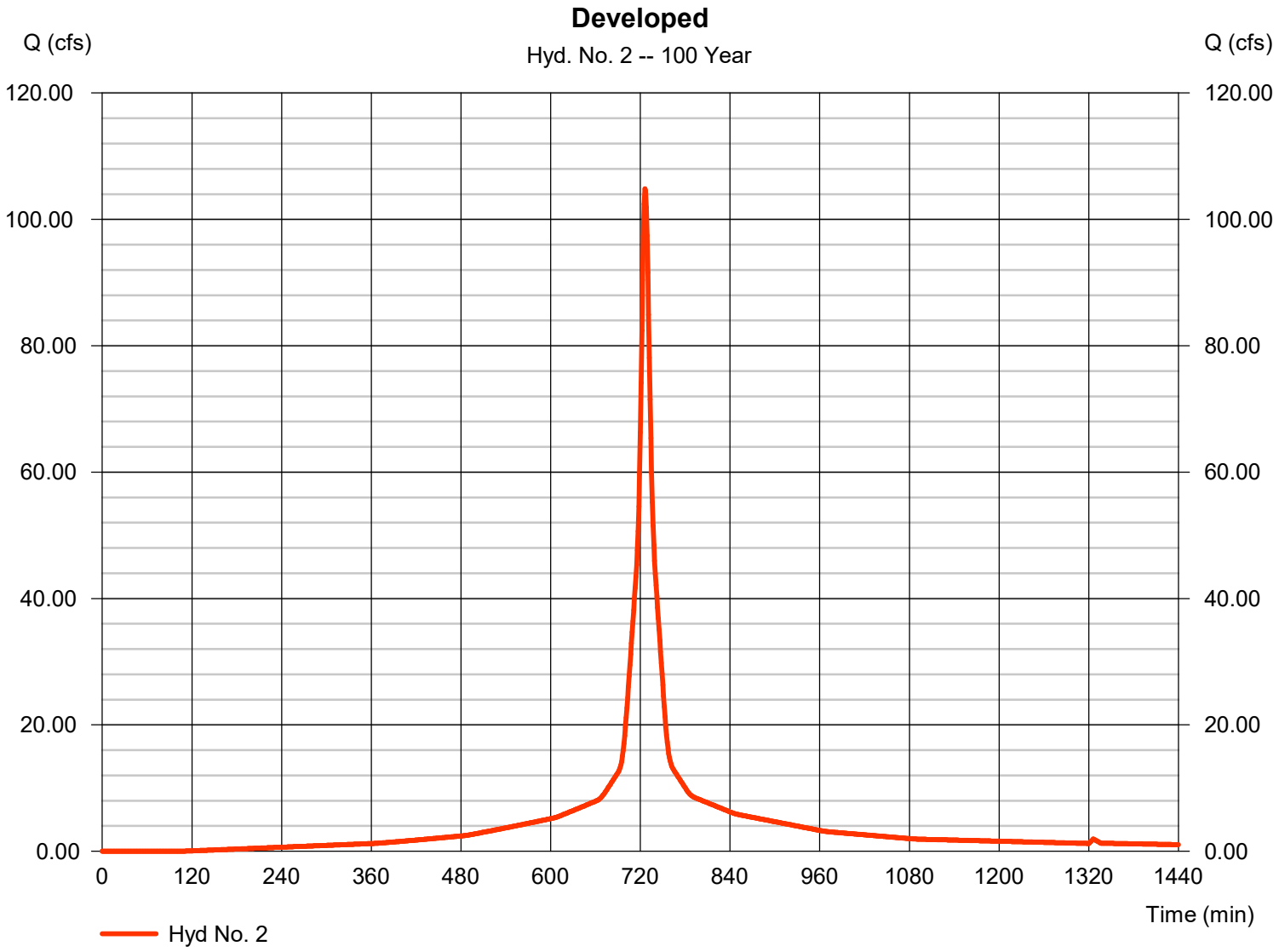
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 2

Developed

Hydrograph type	=	SCS Runoff	Peak discharge	=	104.85 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	396,875 cuft
Drainage area	=	10.040 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	12.00 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.460 x 100) + (1.500 x 91) + (4.870 x 98) + (3.210 x 80)] / 10.040



Hydrograph Report

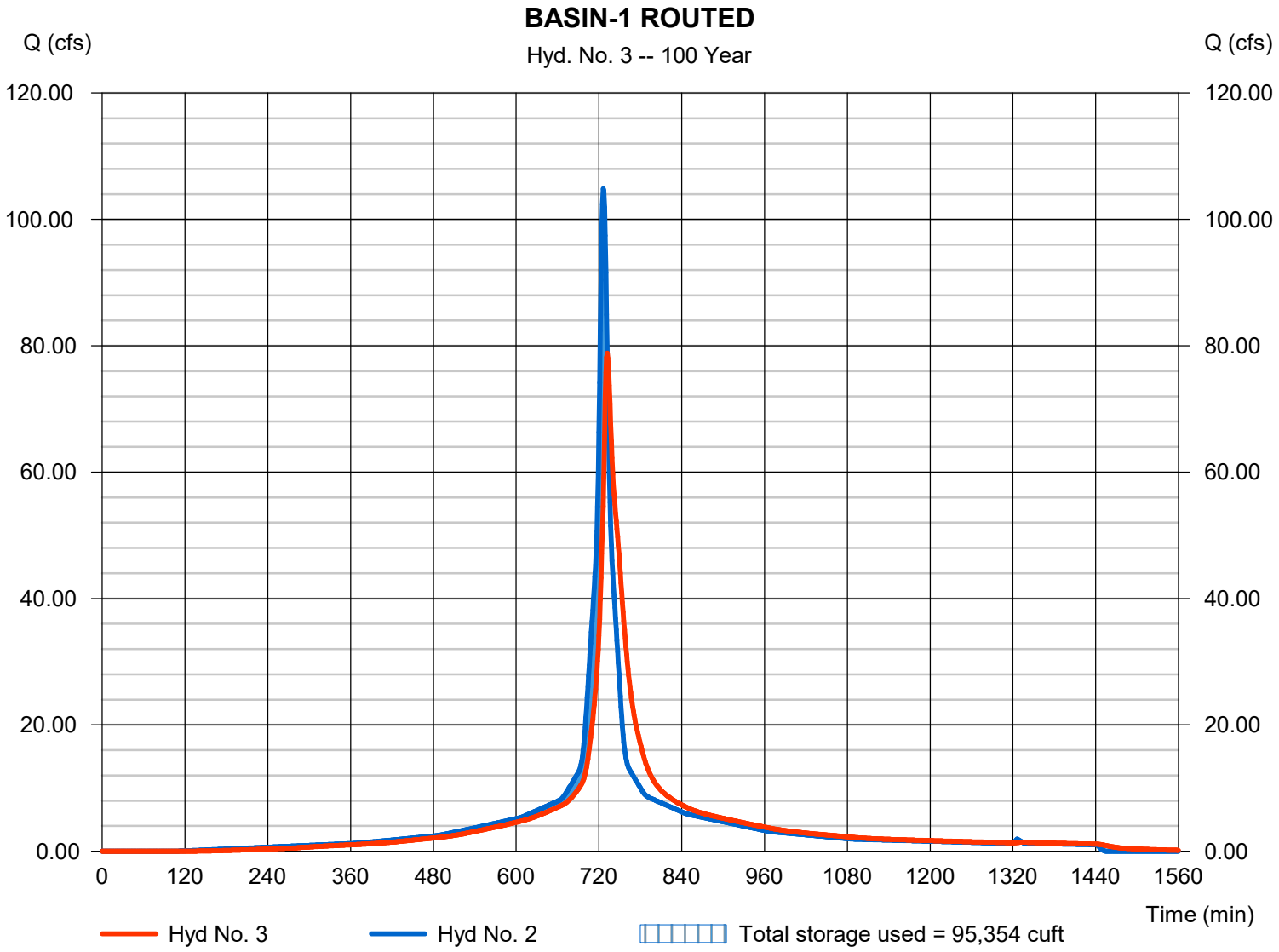
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Hyd. No. 3

BASIN-1 ROUTED

Hydrograph type	=	Reservoir	Peak discharge	=	78.84 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	1 min	Hyd. volume	=	396,871 cuft
Inflow hyd. No.	=	2 - Developed	Max. Elevation	=	360.51 ft
Reservoir name	=	BASIN-1	Max. Storage	=	95,354 cuft

Storage Indication method used. Wet pond routing start elevation = 358.00 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2025 Monday, 10 / 13 / 2025

Pond No. 1 - BASIN-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 356.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	356.00	12,069	0	0
1.00	357.00	16,007	13,990	13,990
2.00	358.00	19,998	17,964	31,954
3.00	359.00	24,000	21,966	53,920
4.00	360.00	28,028	25,985	79,906
5.00	361.00	32,082	30,029	109,935
5.50	361.50	34,121	16,547	126,482

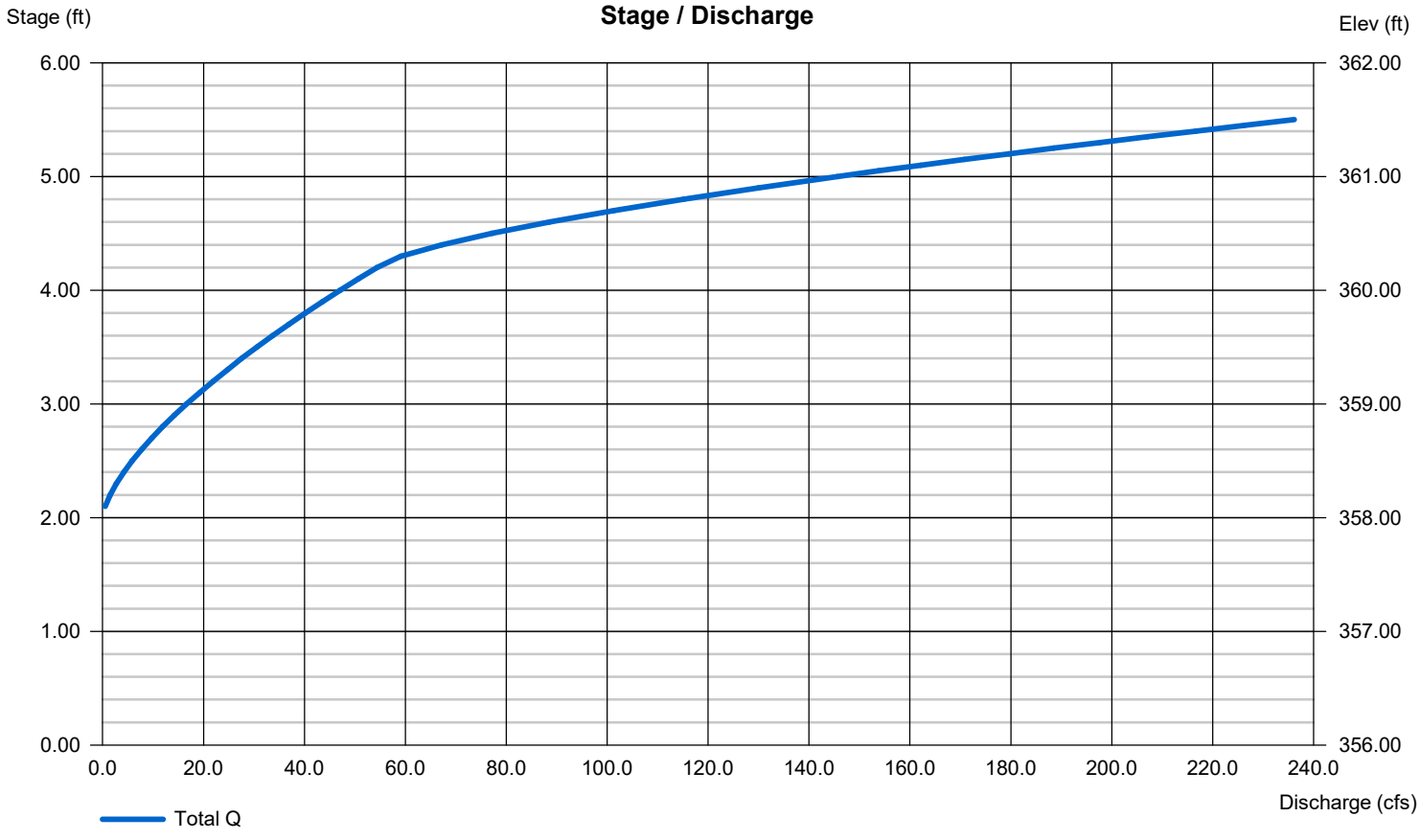
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

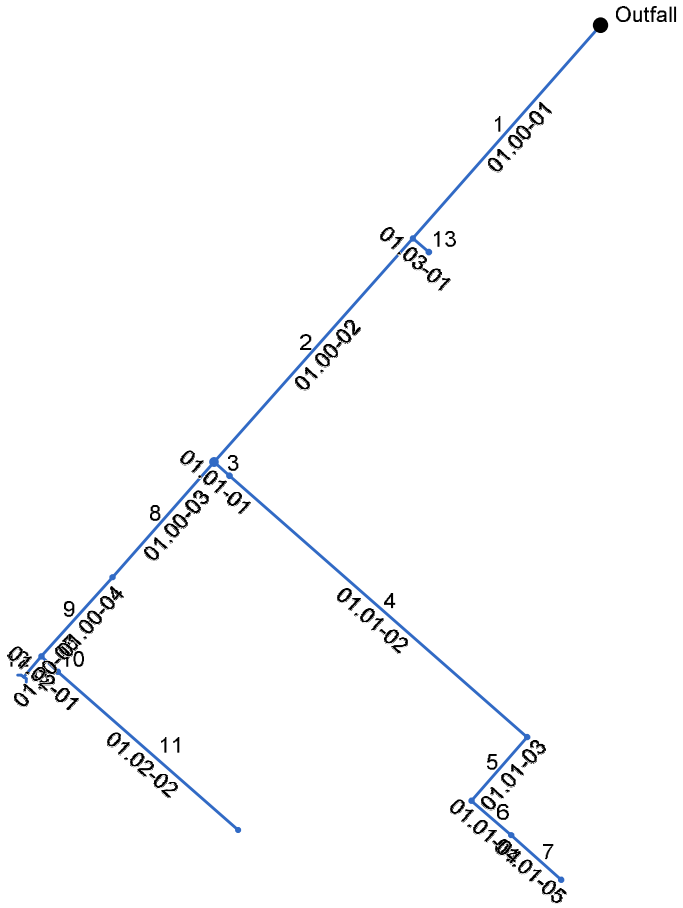
	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	35.00	5.00	0.00
Crest El. (ft)	= 0.00	360.25	358.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	Ciplti	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



APPENDIX B

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: STM01.00.Rev1.stm	Number of lines: 13	Date: 4/17/2026

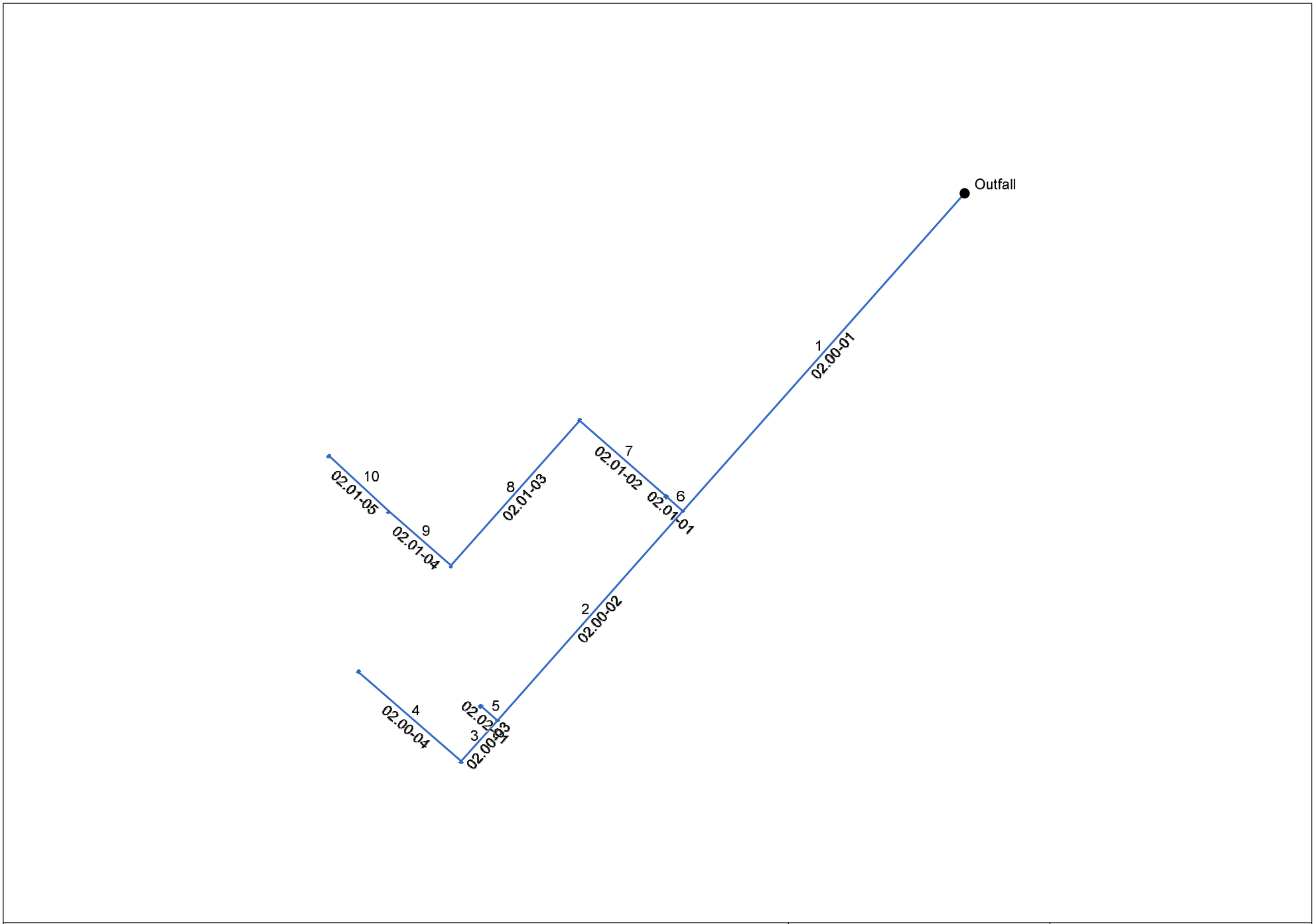
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
13	1	12.485	0.88	0.88	0.85	0.75	0.75	10.0	10.0	7.0	5.22	11.15	5.53	18	0.96	359.82	359.94	360.54	360.82	362.75	364.25	01.03-01
12	9	15.733	0.54	0.54	0.60	0.32	0.32	10.0	10.0	7.0	2.26	2.38	2.88	12	0.38	361.94	362.00	363.05	363.10	364.00	364.08	01.00-05
11	10	139.611	0.30	0.30	0.80	0.24	0.24	10.0	10.0	7.0	1.67	3.35	2.92	12	0.75	362.06	363.11	363.32	363.67	364.25	365.73	01.02-02
10	9	12.491	0.34	0.64	0.85	0.29	0.53	10.0	10.8	6.8	3.58	3.94	4.56	12	1.04	361.94	362.07	363.05	363.16	364.00	364.25	01.02-01
9	8	62.149	0.01	1.19	0.80	0.01	0.86	10.0	10.8	6.8	5.82	8.03	3.42	18	0.50	361.13	361.44	362.63	362.75	363.50	364.00	01.00-04
8	2	88.885	0.51	1.70	0.65	0.33	1.19	10.0	11.1	6.7	7.97	8.00	4.74	18	0.50	360.69	361.13	362.09	362.45	364.31	363.50	01.00-03
7	6	38.844	0.05	0.05	0.80	0.04	0.04	10.0	10.0	7.0	0.28	2.21	1.16	12	0.51	362.20	362.40	362.65	362.69	366.00	366.00	01.01-05
6	5	30.554	0.03	0.08	0.80	0.02	0.06	10.0	10.6	6.8	0.44	2.16	1.13	12	0.49	362.05	362.20	362.62	362.64	366.00	366.00	01.01-04
5	4	48.837	0.07	0.15	0.80	0.06	0.12	10.0	11.0	6.7	0.81	2.16	2.35	12	0.49	361.81	362.05	362.30	362.46	365.50	366.00	01.01-03
4	3	230.115	0.10	0.25	0.85	0.09	0.21	10.0	11.3	6.6	1.36	5.71	0.95	18	0.25	360.73	361.31	362.24	362.27	364.25	365.50	01.01-02
3	2	12.000	1.09	1.34	0.85	0.93	1.13	10.0	15.3	5.8	6.56	6.57	3.83	18	0.33	360.69	360.73	362.09	362.13	364.31	364.25	01.01-01
2	1	174.193	0.00	3.04	0.00	0.00	2.32	0.0	15.4	5.8	13.46	17.32	6.09	24	0.50	359.32	360.19	360.65	361.51	362.75	364.31	01.00-02
1	End	164.274	0.26	4.18	0.80	0.21	3.28	10.0	15.9	5.7	18.73	31.39	6.15	30	0.50	358.00	358.82	359.51	360.29	361.71	362.75	01.00-01

Project File: STM01.00.Rev1.stm | Number of lines: 13 | Run Date: 4/17/2026

NOTES:Intensity = 54.55 / (Inlet time + 8.00) ^ 0.71; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: STM02.00.stm	Number of lines: 10	Date: 4/17/2026

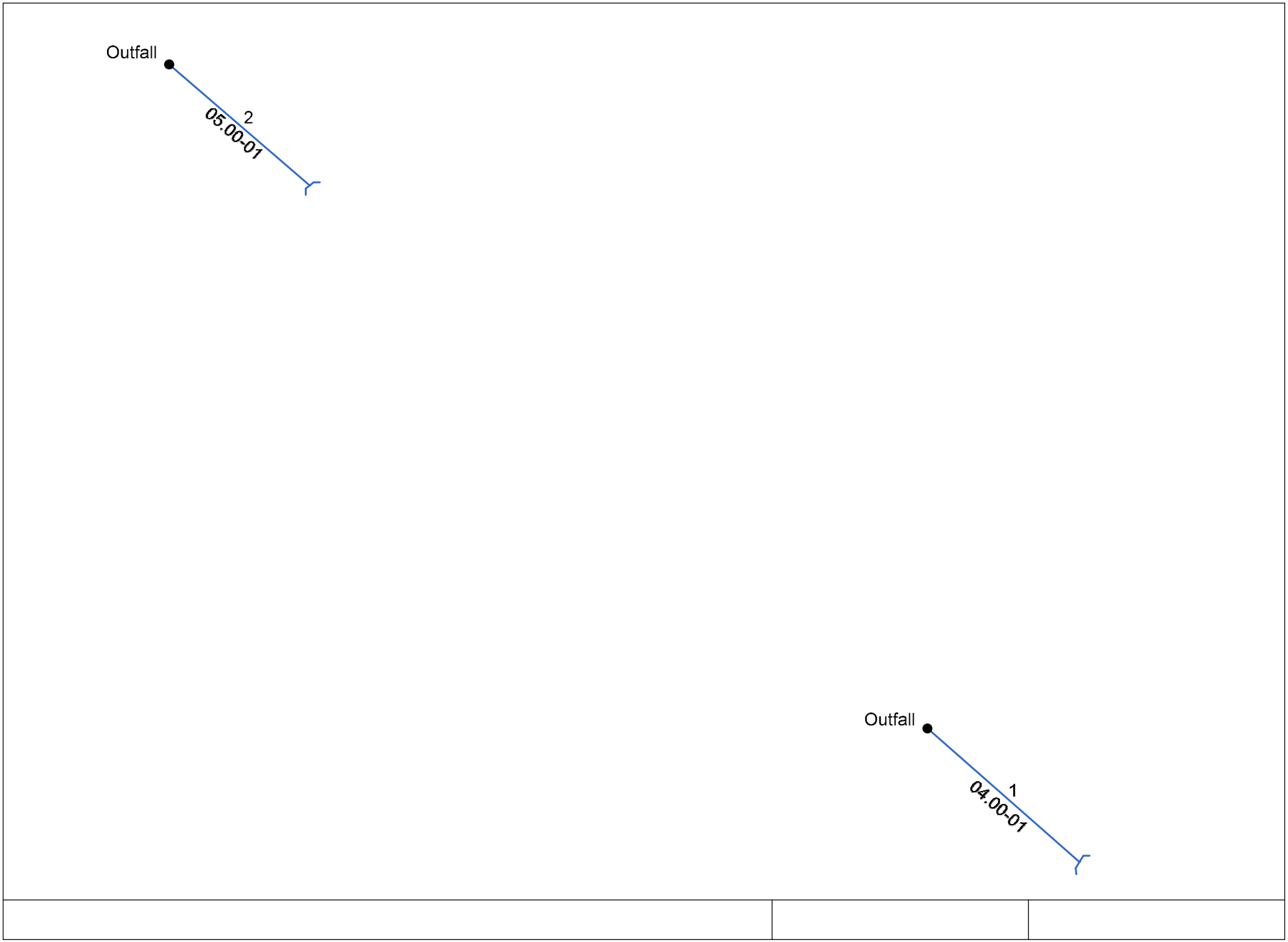
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
10	9	54.180	0.06	0.08	0.85	0.05	0.07	10.0	10.4	6.9	0.47	2.72	2.31	12	0.50	362.47	362.74	362.80	363.02	367.00	366.78	02.01-05
9	8	55.000	0.03	0.11	0.85	0.03	0.09	10.0	10.8	6.8	0.63	2.70	2.38	12	0.49	362.20	362.47	362.63	362.80	365.00	367.00	02.01-04
8	7	128.990	0.06	0.17	0.85	0.05	0.14	10.0	11.2	6.7	0.96	5.67	0.74	18	0.25	361.38	361.70	362.60	362.61	364.85	365.00	02.01-03
7	6	76.000	0.45	0.62	0.85	0.38	0.53	10.0	14.1	6.0	3.18	5.84	2.15	18	0.26	361.18	361.38	362.43	362.48	364.04	364.85	02.01-02
6	1	15.000	0.51	1.13	0.85	0.43	0.96	10.0	14.7	5.9	5.68	7.77	3.89	18	0.47	361.11	361.18	362.29	362.31	364.00	364.04	02.01-01
5	2	15.000	0.38	0.38	0.85	0.32	0.32	10.0	10.0	7.0	2.25	2.64	3.77	12	0.47	362.28	362.35	362.99	363.06	364.50	365.58	02.02-01
4	3	90.400	0.20	0.20	0.60	0.12	0.12	10.0	10.0	7.0	0.84	9.27	2.47	18	0.66	362.65	363.25	363.06	363.59	366.15	366.39	02.00-04
3	2	36.500	0.09	0.29	0.60	0.05	0.17	10.0	10.6	6.8	1.19	11.45	2.25	18	1.01	362.28	362.65	362.99	363.06	364.50	366.15	02.00-03
2	1	185.520	0.02	0.69	0.85	0.02	0.51	10.0	10.9	6.7	3.47	9.03	3.27	18	0.63	361.11	362.28	362.29	362.99	364.00	364.50	02.00-02
1	End	281.920	0.12	1.94	0.85	0.10	1.58	10.0	14.8	5.9	9.30	9.84	6.22	18	0.75	359.00	361.11	360.19	362.29	361.00	364.00	02.00-01

Project File: STM02.00.stm | Number of lines: 10 | Run Date: 4/17/2026

NOTES:Intensity = 54.55 / (Inlet time + 8.00) ^ 0.71; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



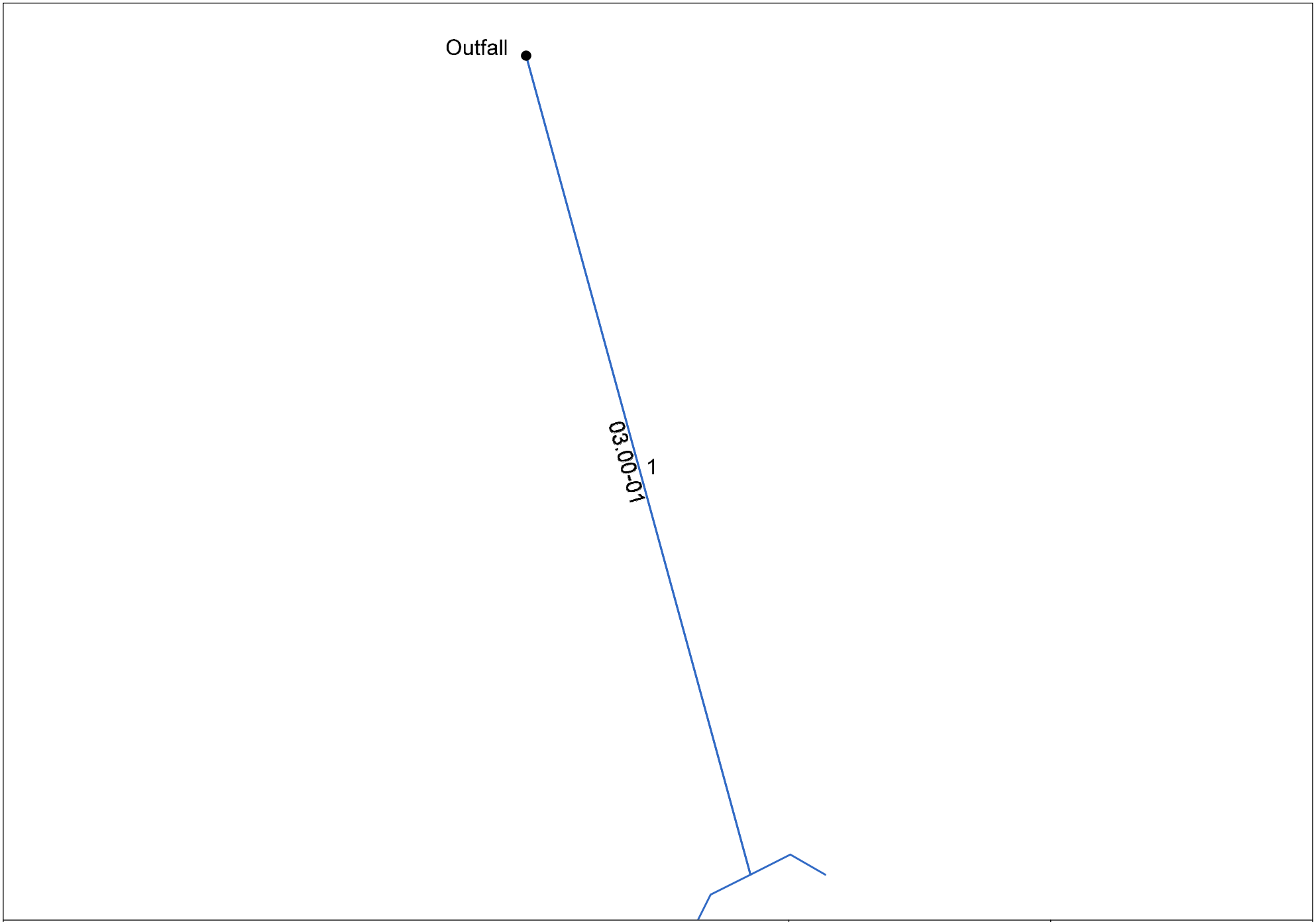
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
2	End	60.000	0.42	0.42	0.80	0.34	0.34	10.0	10.0	7.0	2.34	6.44	3.41	18	0.50	364.13	364.43	364.71	365.10	365.84	366.14	05.00-01
1	End	65.000	0.16	0.16	0.80	0.13	0.13	10.0	10.0	7.0	0.89	6.48	2.58	18	0.51	365.08	365.41	365.43	365.81	367.16	367.11	04.00-01

Project File: New.stm | Number of lines: 2 | Run Date: 4/17/2026

NOTES:Intensity = 54.55 / (Inlet time + 8.00) ^ 0.71; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Nov 14 2025

03.00-01

Invert Elev Dn (ft)	=	358.75
Pipe Length (ft)	=	42.00
Slope (%)	=	0.60
Invert Elev Up (ft)	=	359.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

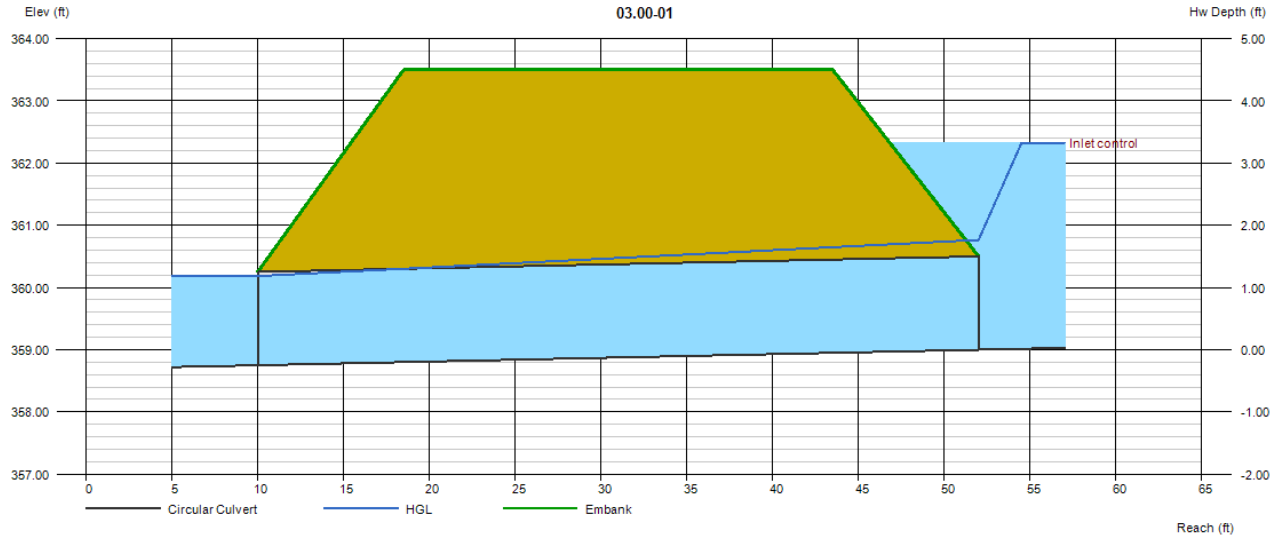
Top Elevation (ft)	=	363.50
Top Width (ft)	=	25.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	0.00
Qmax (cfs)	=	27.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	27.00
Qpipe (cfs)	=	27.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.76
Veloc Up (ft/s)	=	7.64
HGL Dn (ft)	=	360.18
HGL Up (ft)	=	360.77
Hw Elev (ft)	=	362.32
Hw/D (ft)	=	2.22
Flow Regime	=	Inlet Control

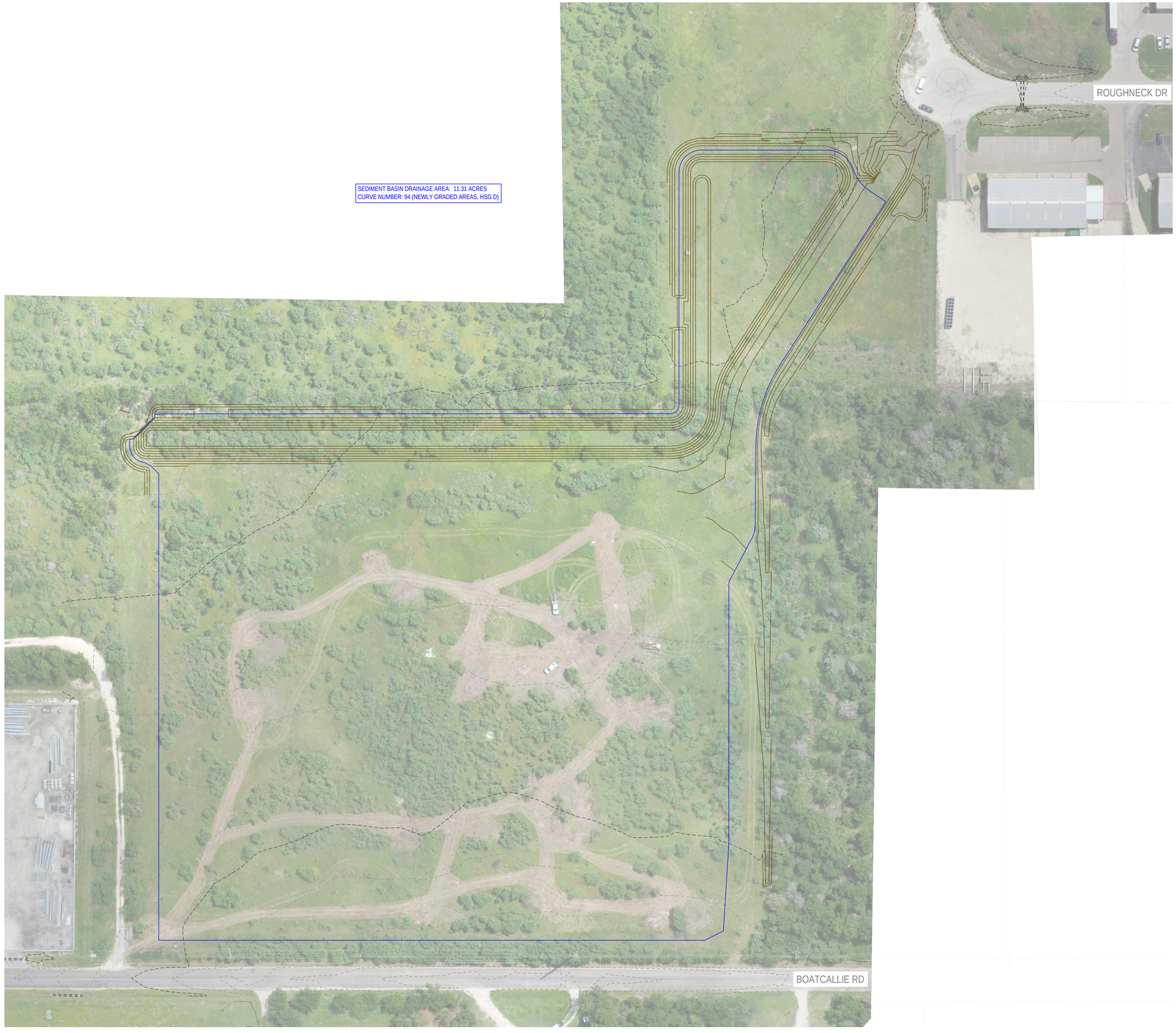


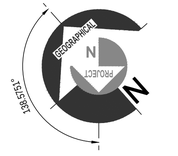
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	42.000	23.60	23.60	0.40	9.44	9.44	54.4	54.4	2.9	27.20	14.04	7.70	18(2b)	0.60	358.75	359.00	360.32	361.26	0.00	0.00	03.00-01

DRAWINGS

SEDIMENT BASIN DRAINAGE AREA: 11.31 ACRES
CURVE NUMBER: 94 (NEWLY GRADED AREAS, HSG D)





0 30 60 120
SCALE (IN FEET)
1 inch = 60 ft.

NO.	DATE	REVISIONS
00B	11/14/25	ISSUED FOR APPROVAL
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER MANAGMENT SEDIMENT BASIN DRAINAGE AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/25

DRAWING NO.: 566901-C-C-901-001
REV.: 00B

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

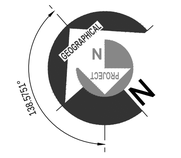
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STORMWATER MANAGEMENT BASIN DRAINAGE AREA: 10.04 ACRES

PRESENT SITE
CURVE NUMBER: 80 (IDLE LANDS, BRUSH-WEEDS-GRASS MIXTURE, FAIR/POOR, HSG D)

DEVELOPED SITE
CURVE NUMBER: 91 (HSG D)
WATER: 0.46 AC, CN=100
AGGREGATE: 1.50 AC, CN=91
IMPERVIOUS: 4.87 AC, CN=98
LAWN: 3.21 AC, CN=80





0 30 60 120

SCALE (IN FEET)
1 inch = 60 ft.

NO.	DATE	REVISIONS
00A	11/14/25	ISSUED FOR APPROVAL
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORMWATER MANAGMENT PERMANENT SMW BASIN DRAINAGE AREA

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/25

DRAWING NO.: 566901-C-C-901-002
REV.: 00B

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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ROUGHNECK DR

OUTFALL-001

STM-HW-01.00-01

MS

MS

MS

SW

SW

STM-HW-02.00-01

STM-CI-01.03-01
DRAINAGE AREA
STM-CI-01.03-01
38274.91 SF
0.88 AC

STM-GI-01.00-01
DRAINAGE AREA
STM-GI-01.00-01
11298.41 SF
0.26 AC

STM-CI-01.01-01
DRAINAGE AREA
STM-CI-01.01-01
47318.36 SF
1.09 AC

STM-GI-01.01-01
DRAINAGE AREA
STM-CB-01.01-01
4363.89 SF
0.10 AC

STM-GI-02.01-01
DRAINAGE AREA
STM-GI-02.01-01
19725.02 SF
0.45 AC

STM-CI-02.01-01
DRAINAGE AREA
STM-CI-02.01-01
22276.87 SF
0.51 AC

STM-GI-02.00-01
DRAINAGE AREA
STM-GI-02.00-01
5366.12 SF
0.12 AC

STM-MH-01.00-01

STM-GI-01.01-03
DRAINAGE AREA
STM-GI-01.01-03
1280.20 SF
0.03 AC

STM-GI-01.01-02
DRAINAGE AREA
STM-GI-01.01-02
1845.43 SF
0.04 AC

DRAINAGE AREA
STM-GI-01.01-04
2025.79 SF
0.05 AC

STM-GI-01.01-04

STM-GI-02.01-02
DRAINAGE AREA
STM-GI-02.01-02
2782.22 SF
0.06 AC

STM-GI-02.01-04
DRAINAGE AREA
STM-GI-02.01-04
2422.68 SF
0.06 AC

STM-GI-01.00-02
DRAINAGE AREA
STM-GI-01.00-02
22342.21 SF
0.51 AC

STM-GI-01.00-03
DRAINAGE AREA
STM-GI-01.00-03
603.51 SF
0.01 AC

STM-GI-02.01-05
DRAINAGE AREA
STM-GI-02.01-05
1041.05 SF
0.02 AC

STM-CI-02.02-01
DRAINAGE AREA
STM-CI-02.02-01
16675.76 SF
0.38 AC

STM-GI-02.01-03
DRAINAGE AREA
STM-GI-02.01-03
1412.56 SF
0.03 AC

STM-CI-01.02-01
DRAINAGE AREA
STM-CI-01.02-01
14981.00 SF
0.34 AC

STM-GI-01.02-01
DRAINAGE AREA
STM-GI-01.02-01
12939.47 SF
0.30 AC

STM-GI-02.00-02
DRAINAGE AREA
STM-GI-02.00-02
1081.46 SF
0.02 AC

STM-HW-01.00-02
DRAINAGE AREA
STM-HW-01.00-02
23634.80 SF
0.54 AC

DRAINAGE AREA
STM-GI-02.00-04
8595.79 SF
0.20 AC

STM-GI-02.00-04

STM-GI-02.00-03
DRAINAGE AREA
STM-GI-02.00-03
3951.07 SF
0.09 AC

STM-SET-05.00-01

STM-SET-05.00-02

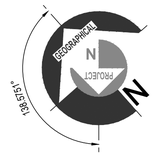
DRAINAGE AREA
STM-SET-05.00-02
11288.71 SF
0.26 AC

STM-SET-04.00-01

STM-SET-04.00-02

DRAINAGE AREA
STM-SET-04.00-02
7048.05 SF
0.16 AC

BOATCALLIE RD



0 25 50 100

SCALE (IN FEET)
1 inch = 50 ft.

NO	DATE	REVISIONS
00C	04/17/26	ISSUED FOR APPROVAL
00B	11/14/25	ISSUED FOR APPROVAL
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA
CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORM SEWER SYSTEM DRAINAGE AREA PLAN

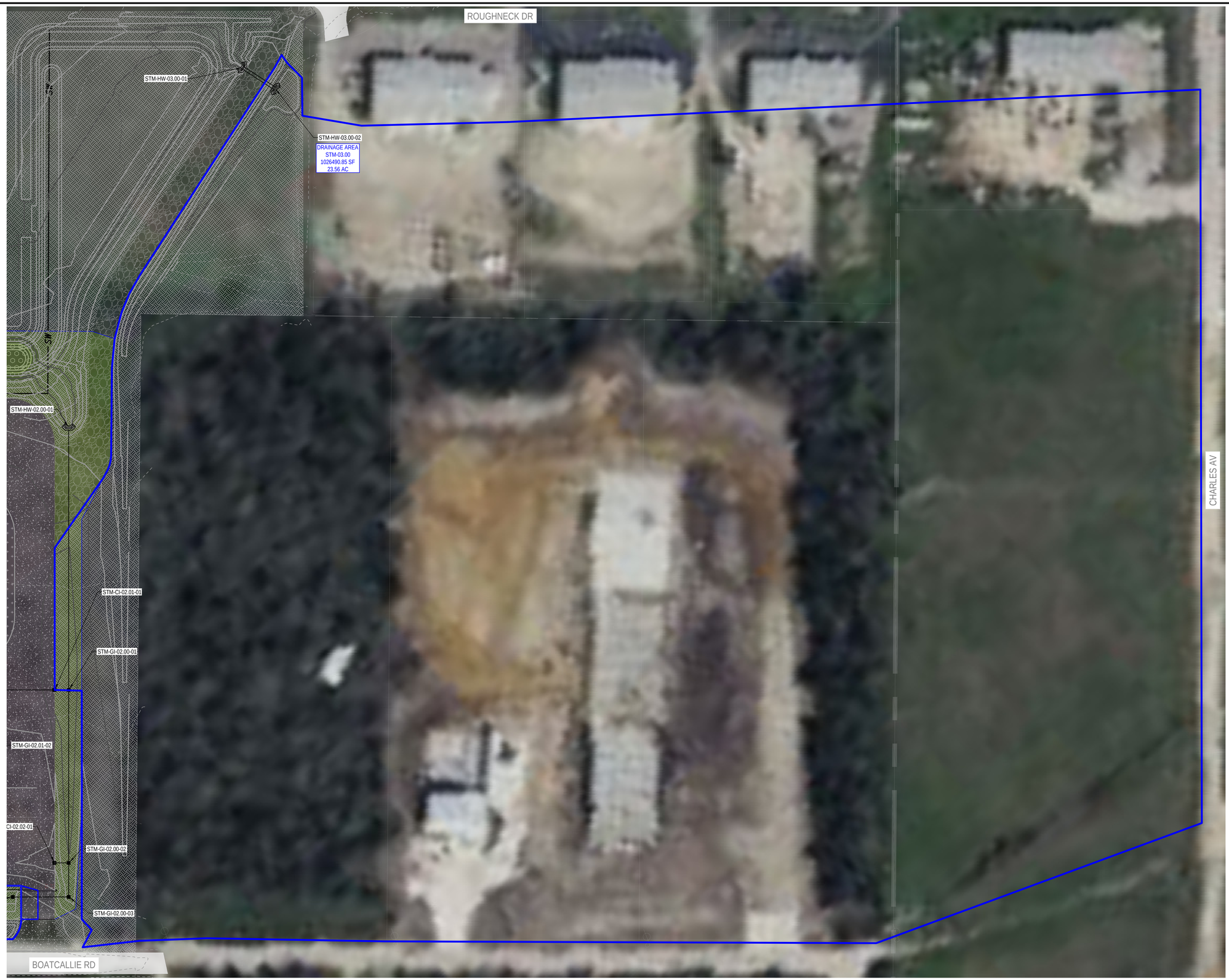
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MIDD	KPS		10/17/25

DRAWING NO.: 566901-C-C-901-003
REV.: 00C

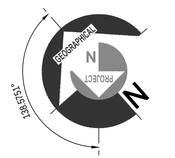
DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510

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0 25 50 100

SCALE (IN FEET)
1 inch = 50 ft.

NO.	DATE	REVISIONS
00B	11/14/25	ISSUED FOR APPROVAL
00A	10/17/25	ISSUED FOR APPROVAL

MESSER Gases for Life

middough PROJECT SOLUTIONS

CLIENT: MESSER NA

CLIENT PROJ #: 566901

PROJECT: BRYAN ASU

DESCRIPTION: STORM SEWER SYSTEM DRAINAGE AREA PLAN

DRAWN BY:	CHECKED BY:	APPROVED BY:	SHEET ISSUE DATE:
MIDD	KPS		10/17/25

DRAWING NO.: 566901-C-C-901-004

REV.: 00B

DRAWING SCALE: AS NOTED

MIDDOUGH PROJ.#: MEU2510