



Index Map

KMLP Area

2.5 Bcf Area

■ Map Page

Third Party Area

Access Road (to be constructed by third party, not associated with this permitting action)

Jefferson County, TX USGS 7.5' Quadrangle: Port Arthur South, TX, 29093-

NAD 1983 UTM Zone 15N 29.758°N 93.9266°W

Base Map: ESRI ArcGIS Online, accessed July 2025 Updated: 7/24/2025 Project No. 94507 Layout: 2 Index Map Aprx: 94507_kmlpManifoldStation

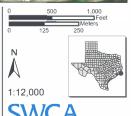
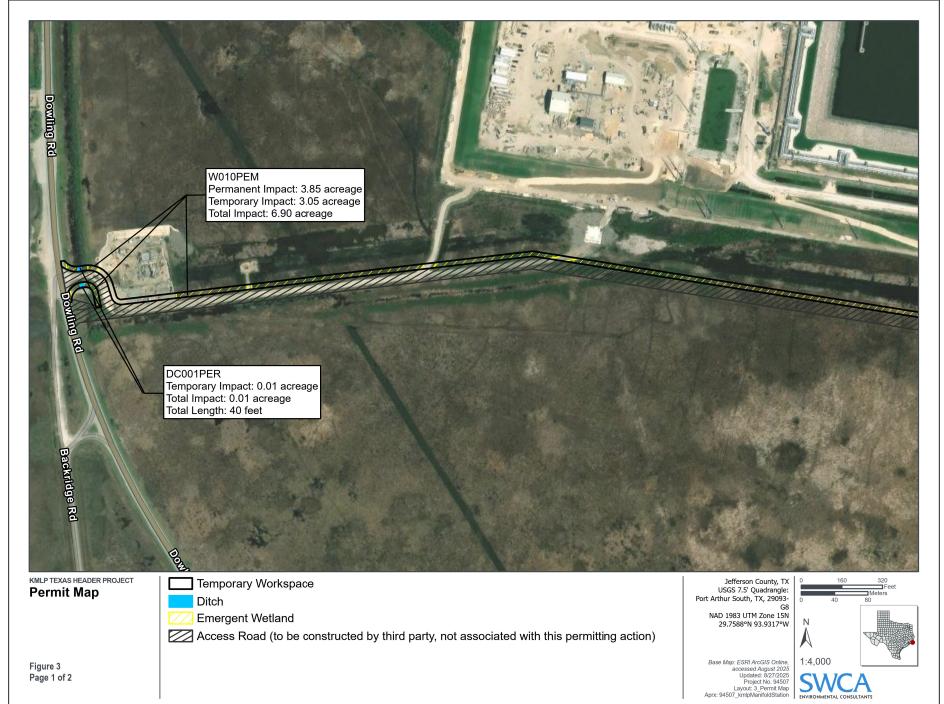
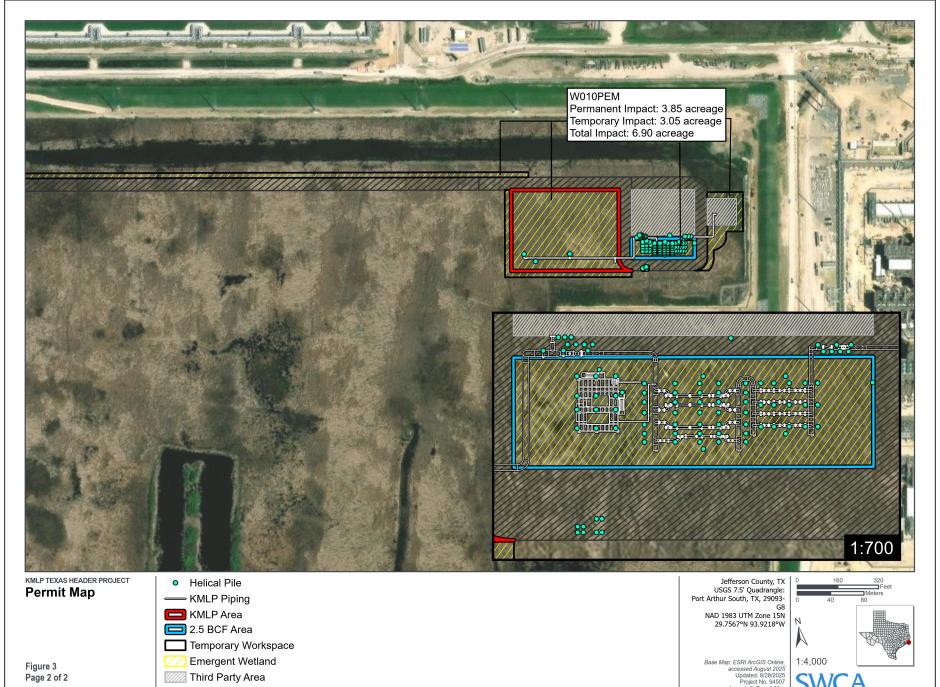


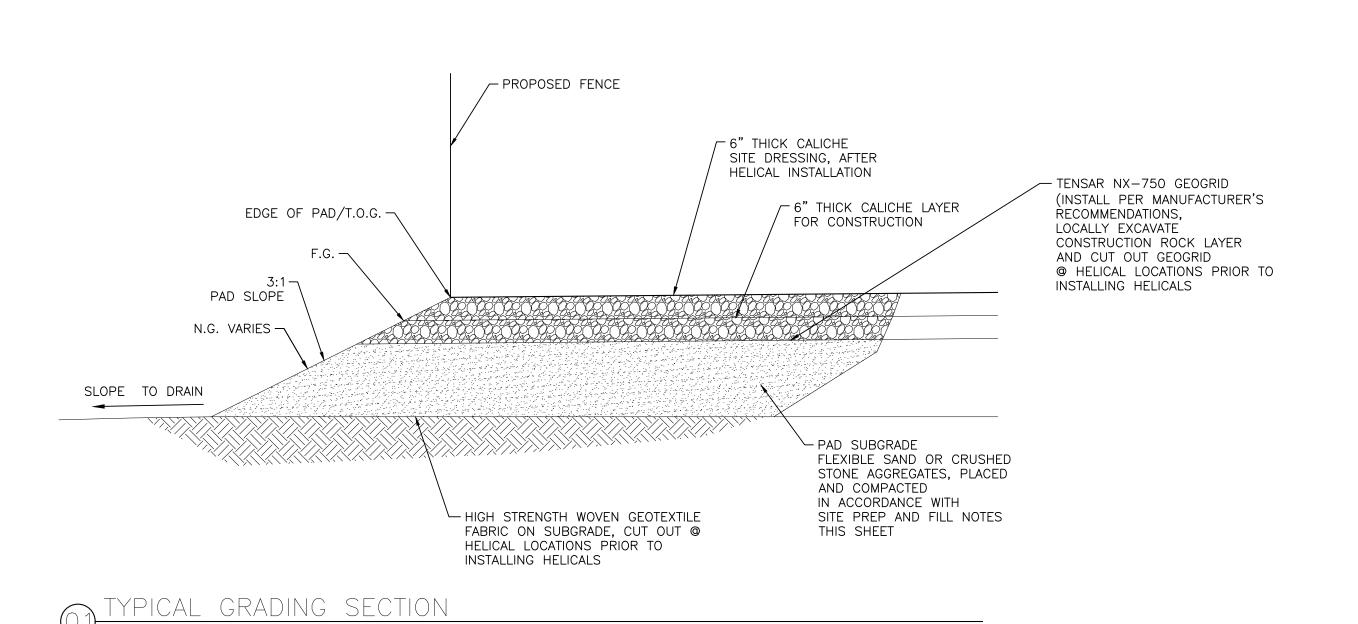
Figure 2



Layout: 3_Permit Map Aprx: 94507_kmlpManifoldStation



Access Road (to be constructed by third party, not associated with this permitting action)



fypical carrier pipe bedding detail

Project ID

Date

~39'-8" EXCAVATION LIMITS 6" THICK CALICHE TENSAR NX-750 GEOGRID SITE DRESSING, AFTER (INSTALL PER MANUFACTURER'S HELICAL INSTALLATION RECOMMENDATIONS, LOCALLY EXCAVATE -6" THICK CALICHE LAYER CONSTRUCTION ROCK LAYER FOR CONSTRUCTION AND CUT OUT GEOGRID @ HELICAL LOCATIONS PRIOR TO INSTALLING HELICALS MATCH FINAL GRADE (REF. PLAN) BORDERO BORDE NATURAL GRADE +1'-0" NAVD88 (TYP LIGHTWEIGHT — SHALE AGGREGATE BOTTOM OF PIPE -3'-0" NAVD88 (TYP) ø48" CARRIER PIPE BOTTOM OF DITCH $-\overline{3'-8''}$ NAVD88 (TYP) ~16'-4" ~16'-4" PIPE Ø PAD SUBGRADE -FLEXIBLE SAND OR CRUSHED - HIGH STRENGTH WOVEN GEOTEXTILE STONE AGGREGATES, PLACED FABRIC ON SUBGRADE, CUT OUT @ AND COMPACTED HELICAL LOCATIONS PRIOR TO IN ACCORDANCE WITH INSTALLING HELICALS SITE PREP AND FILL NOTES THIS SHEET

SITE PREP AND FILL NOTES:

GRADING DESIGN BASED ON MUESER RUTLEDGE CONSULTING ENGINEERS (MRCE) REPORT DATED JULY 21, 2025 (MRCE FILE 15086.

ACCESS ROAD FILL PROFILE:

1. TWE PROVIDED TWO ALTERNATIVE FILL APPROACHES FOR ACCESS ROAD FILL, UTILIZING A HS20 TRUCK LOADING. THESE WERE: CHEMICAL STABILIZATION WITH GRANULAR FILL. MIXING CEMENT INTO THE TOP 4 FT OF EXISTING SOIL (8% PORTLAND CEMENT BY DRY

WEIGHT OF SOIL) TO INCREASE STRENGTH, FOLLOWED BY A 20 IN

- THICKNESS OF AGGREGATE SURFACE. MECHANICAL STABILIZATION WITH GEOSYNTHETIC REINFORCEMENT. TWE CONSULTED WITH MATERIAL MANUFACTURER TENSAR TO EVALUATE ALTERNATIVES FOR ACCESS ROAD DESIGN. TENSAR RECOMMENDED PLACING HIGH STRENGTH TENSAR NX750 INTERAX GEOGRID (OR EQUAL) OVER EXISTING SOIL SUBGRADE, COVERED WITH 24 IN THICKNESS OF CLEAN SAND GRANULAR SUBBASE, FOLLOWED BY A SECOND HIGH STRENGTH GEOGRID COVERED WITH 16 IN THICKNESS OF CRUSHED AGGREGATE GRANULAR BASE, FOR A TOTAL FILL THICKNESS OF 40 IN. GEOGRID JOINTS PERPENDICULAR TO THE ROAD ALIGNMENT WOULD HAVE A 3 FT OVERLAP.
- MRCE RECOMMENDS MECHANICAL STABILIZATION OVER CHEMICAL STABILIZATION BECAUSE THE RIGID CEMENT STABILIZED LAYER IS INCOMPATIBLE WITH FLEXIBLE LONG-TERM SETTLEMENT ANTICIPATED FOR THE UNDERLYING SOFT CLAY SOIL PROFILE. ALSO, THE MECHANICALLY STABILIZED GRANULAR FILL SUGGESTED BY TENSAR WILL FACILITATE RAPID CONSTRUCTION AND ACCELERATE THE ABILITY TO USE THE ACCESS ROAD TO SUPPORT YARD AREA DEVELOPMENT.
- 3. FOR COST SAVINGS, MRCE SUGGESTS SUBSTITUTING A HIGH-STRENGTH WOVEN GEOTEXTILE WITH SEWN JOINTS FOR THE LOWER GEOGRID PLACED ON EXISTING CLAY SUBGRADE. GEOTEXTILE WILL BETTER SEPARATE THE SAND-SIZED GRANULAR SUBBASE FROM THE SOFT CLAY SUBGRADE, AND PROVIDES SUPERIOR TENSILE STRENGTH. GEOTEXTILE CAN BE SUPPLIED IN LARGE PRE-SOWN SHEETS, FOLDED FOR SITE DEPLOYMENT. AS GEOTEXTILES DO NOT HAVE THE IN-PLANE STIFFNESS BENEFIT OF TENSAR'S NX750 INTERAX GEOGRID, FILL PLACEMENT REQUIRES THE GEOTEXTILE TO BE HELD IN TENSION WHEN COVERED WITH FILL. SEE FIG. 5A, 5B, AND 6.
- 4. THE TENSAR SUGGESTED MECHANICAL STABILIZATION APPLIED TO THE KM ACCESS ROAD PROFILE IS ILLUSTRATED IN FIG 5A. MRCE RECOMMENDS BUILDING THE 40 INCH TENSAR PROFILE AND COVERING IT WITH A CROWNED GRANULAR WORKING SURFACE. RE-GRADE AND ADD ADDITIONAL WORKING SURFACE GRANULAR MATERIAL AS NEEDED TO ACCOMMODATE SETTLEMENT OR FOR RUT REPAIR. AS THE ROAD SETTLES (SAY YEAR 2 OR YEAR 3), PLACE ADDITIONAL GRANULAR FILL TO OBTAIN AND MAINTAIN THE KM PROFILE ELEVATION AND CROWN.
- THE LOWER REINFORCING LAYERS SHOULD BE PLACED IN THE TRANSVERSE DIRECTION PERPENDICULAR TO THE ROAD ALIGNMENT. ARRANGE OVERLAP JOINTS IN SHINGLE FASHION AND CONTROL FILL GRADING DIRECTION TO PREVENT LIFTING THE SYNTHETIC LAYER EDGES. FOR COST SAVINGS, AND TO INCREASE COVERAGE, USE HOG TIES TO MECHANICALLY CONNECT GEOGRID LAYERS AT JOINTS, AND REDUCE THE JOINT OVERLAP TO 6 INCHES MIN. PLACE STAINLESS STEEL HOG TIES AT 12 INCH (OR CLOSER) SPACING ON THE OVERLAPPED GRIDS. FOR GEOTEXTILE, SEWN JOINTS WITH TENSILE STRENGTH EQUAL TO THE GEOTEXTILE (5% STRAIN) ARE RECOMMENDED, OR OVERLAP 12 INCHES OR MORE (SHINGLE FASHION) AND PLACE 12 INCH LONG STAPLES AT 24 INCH SPACING TO SECURE THE OVERLAP JOINT. PLACE FIRST LIFT BY DUMPING RATHER THAN PUSHING, AND PLACE STAPLES AS NEEDED TO SECURE FABRIC IN PLACE.
- CONCEPTUAL DETAILS FOR PLACING ACCESS ROAD FILL OVER GEOTEXTILE ARE PROVIDED IN FIGS. 5A AND 5B. THE DETAIL OF FIG. 5B CAN BE USED IF GEOGRID REINFORCEMENT IS USED, BUT GEOGRID STIFFNESS MAY MAKE TENSION ANCHORING LESS NEEDED.
 - UNFOLD THE GEOTEXTILE (OR PRE-SEWN GEOTEXTILE SHEET) AND SPREAD OUT TO COVER THE ROAD SUBGRADE, OVERLAP /SHINGLE WITH PREVIOUS SHEET. PULL THE GEOTEXTILE TIGHT AND SECURE EDGES WITH SAND BAGS.
- ii. PLACE A CRUSHED GRANULAR SUBBASE 12" THICK X 10 FT WIDE ANCHOR PENINSULA AT BOTH OUTSIDE EDGES OF THE ACCESS ROAD DETAIL BY CASTING. GRANULAR SUBBASE WILL PROVIDE A STABLE TEMPORARY ANCHOR AND IMPROVE LONG-TERM ACCESS ROAD SLOE TOE STABILITY. THE PENINSULA FILL WILL ANCHOR THE GEOTEXTILE IN TENSION AHEAD OF INTERIOR FILL PLACEMENT.
- iii. USE LIGHTWEIGHT TRACK EQUIPMENT TO PLACE INTERIOR FILL BETWEEN THE ANCHOR PENINSULAS PLACING IN MAXIMUM 8 INCH THICK LIFTS. BUILD UP BOTH ANCHOR PENINSULA AND INTERIOR FILL THICKNESS UNIFORMLY.
- iv. THE LEADING FACE OF THE INTERIOR FILL SHOULD BE RELATIVELY FLAT, SAY 1V:4H TO REDUCE THE RISK OF BEARING CAPACITY FAILURE AT THE EDGES AND/OR MUDWAVE FAILURE AHEAD OF THE ADVANCING INTERIOR FILL.

2.5 BCF AREA: PIPE BEDDING:

FILL: 2,562 CU YD (FLEXIBLE SAND OR CRUSHED STONE AGGREGATE)

FILL: 385 CU YD (STEEL PIPE)

FILL: 1696 CU YD (LIGHTWEIGHT SHALE AGGREGATE)

HELICAL PILES: FILL: 648 CU YD

YARD AREA FILL:

MECHANICAL STABILIZATION RECOMMENDED FOR ACCESS ROAD CONSTRUCTION IS ALSO APPROPRIATE FOR YARD AREA DEVELOPMENT. ALTERNATIVELY, CONSTRUCT THE ACCESS ROAD DETAIL AT THE PERIMETER OF THE YARD AREA TO PROVIDE EQUIPMENT ACCESS AND MATERIAL LAYDOWN FOR YARD AREA CONSTRUCTION.

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- MRCE UNDERSTANDS THE NEW 42" GAS MAIN WILL ENTER THE CENTER OF THE YARD AREA, WITH RISER SECTIONS TO BRING THE PIPE ABOVE GRADE AT EACH END OF A PILE SUPPORTED METER PLATFORM. PLACE LIGHTWEIGHT FILL (FILL WIDTH = 2.5 X PIPE DEPTH) ON GEOTEXTILE ABOVE THE BURIED PIPE ALIGNMENT BELOW THE YARD AREA FILL TO REDUCE SETTLEMENT OF THE BURIED PIPE AT THE PILE SUPPORTED PLATFORM
- 3. THE YARD INTERIOR AREA CAN BE CONSTRUCTED BY WORKING FROM THE ACCESS ROAD TO FILL OVER THE ENCLOSED INTERIOR. PLACE AND TENSION THE GEOTEXTILE, AND ANCHOR WITH FILL, AS DESCRIBED FOR ACCESS ROAD: PLACE 12 INCH THICK "PENINSULA" ANCHOR FILL BY CASTING AT REGULAR INTERVALS SAY 50 FEET) AHEAD OF THE INTERIOR FILL. AS FOR THE ACCESS ROAD (SEE FIG. 6) THE LEADING FACE OF THE INTERIOR FILL SHOULD BE RELATIVELY FLAT, SAY 1V:4H TO REDUCE THE RISK OF BEARING CAPACITY FAILURE AT THE EDGES AND/OR MUDWAVE FAILURE AHEAD OF THE ADVANCING INTERIOR FILL.
- 4. THE YARD AREA SHOULD HAVE AN UPPER GEOGRID BELOW THE AGGREGATE WORKING SURFACE WHERE EQUIPMENT TRAVEL / EQUIPMENT OPERATION WILL BE PERFORMED.
- THE SYNTHETIC LAYERS SHOULD BE CUT TO FACILITATE PILE PENETRATIONS. IT MAY BE FEASIBLE TO CUT THE LOWER GEOTEXTILE OR GEOGRID USING AN AUGER WITH DRAG TEETH BECAUSE THE LOWER LAYER IS HELD IN PLACE BY THE OVERLYING FILL. HOWEVER, THE UPPER SHALLOW GEOGRID SHOULD BE EXPOSED AND CUT (KNIFE, SAW, OR TORCH) BECAUSE THE WEIGHT OF THE WORKING SURFACE IS INSUFFICIENT TO SECURE HIGH STRENGTH TENSAR NX750 GEOGRID IN PLACE.
- USE OF CLAY FOR THE INTERIOR FILL IS DISCOURAGED, AS CEMENT OR LIME STABILIZED CLAY WILL CRACK AND LOSE STRENGTH WITH PILE DRIVING DISPLACEMENT AND DIFFERENTIAL SETTLEMENT. USE OF COMPACTED CLAY (WITHOUT LIME OR CEMENT) REQUIRES COMPACTION TO 98% STANDARD PROCTOR MAXIMUM DENSITY 1% TO 3% WET OF OPTIMUM MOISTURE CONTENT, AND COVERING WITH AN EVAPORATION BARRIER AND COVER FILL TO PREVENT SWELL RELATED HEAVE AND DRYING RELATED SHRINKAGE.

GENERAL NOTES:

- 1. ALL PAD ELEVATIONS SHOWN ARE FOR FINISHED GRADE AND DO INCLUDE 6" OF CALICHE.
- 2. ALL SIDE SLOPES TO BE 3:1 UNLESS OTHERWISE NOTED. SLOPES CAN BE DECREASED AS NEEDED TO USE UP SURPLUS MATERIAL TO BRING PAD BACK TO NATURAL GRADE.
- 3. REFERENCE TENSAR TRIAX INSTALLATION PROCEDURES FOR SUB-BASE PREPARATION AND FINAL COVER INSTALLATION.
- ALL SURVEY & COORDINATES SHOWN ARE BASED UPON SURVEY DATA, NAD 83, TEXAS STATE PLANE SOUTH CENTRAL ZONE, US SURVEY FOOT.

2.5 BCF AREA: TOTAL (PAD SITE BALANCE): AREA: 27,869 SQ FT

CUT: 0 CU YD

FILL: 2,562 CU YD

NET: 2,562 CU YD (FILL)

TOTAL (PAD GRAVEL 6" CALICHE - CONSTRUCTION LAYER):
AREA: 27,869 SQ FT

CUT: N/A FILL: 517 CU YD

TOTAL (PAD GRAVEL 6" CALICHE - FINISH LAYER): AREA: 27,869 SQ FT

CUT: N/A FILL: 517 CU YD

KMLP AREA: TOTAL (PAD SITE BALANCE): AREA: 139,712 SQ FT

CUT: 2 CU YD

FILL: 7,333 CU YD

NET: 7,335 CU YD (FILL)

TOTAL (PAD GRAVEL 6" CALICHE - CONSTRUCTION LAYER):
AREA: 132,786 SQ FT

CUT: N/A | FILL: 2,459 CU YD

TOTAL (PAD GRAVEL 6" CALICHE - CONSTRUCTION LAYER): AREA: 132,786 SQ FT

CUT: N/A FILL: 2,459 CU YD

> EARTHWORK VOLUMES ARE APPROXIMATE AND DO NOT ACCOUNT FOR CLEARING AND GRUBBING, OR CALICHE SITE DRESSING.

> > rawing No:

ISSUED FOR PERMIT



FOR REVIEW ONLY HEATH E. REYNOLDS P.E. 113232 NOT TO BE USED FOR CONSTRUCTION PURPOSES

HEATH E. REYNOLDS, P.E. #113232

2.5 BCF/KMLP METER STATION: Facility Nam :Reference Drawings

GRADING DETAILS ISSUED FOR PERMIT CIVIL/STRUCTURAL DRAWING

TEXAS PIN No: JEFFERSON Scale: NOTED Category: CIVIL le Name: 002-200-001.4.dwg

002-200-001.4

JEFFERSON COUNTY, TX

2.5 BCF METER STATION

PROJECT

AFE-241066 2.5 BCF/KMLP METER STATION

Е	RE-ISSUED FOR PERMIT	AFE-241066	08/28/2025
D	RE-ISSUED FOR PERMIT	AFE-241066	08/15/2025
С	RE-ISSUED FOR PERMIT	AFE-241066	08/01/2025
В	ISSUED FOR PERMIT	AFE-241066	06/27/2025
Α	ISSUED FOR APPROVAL	AFE-241066	06/20/2025

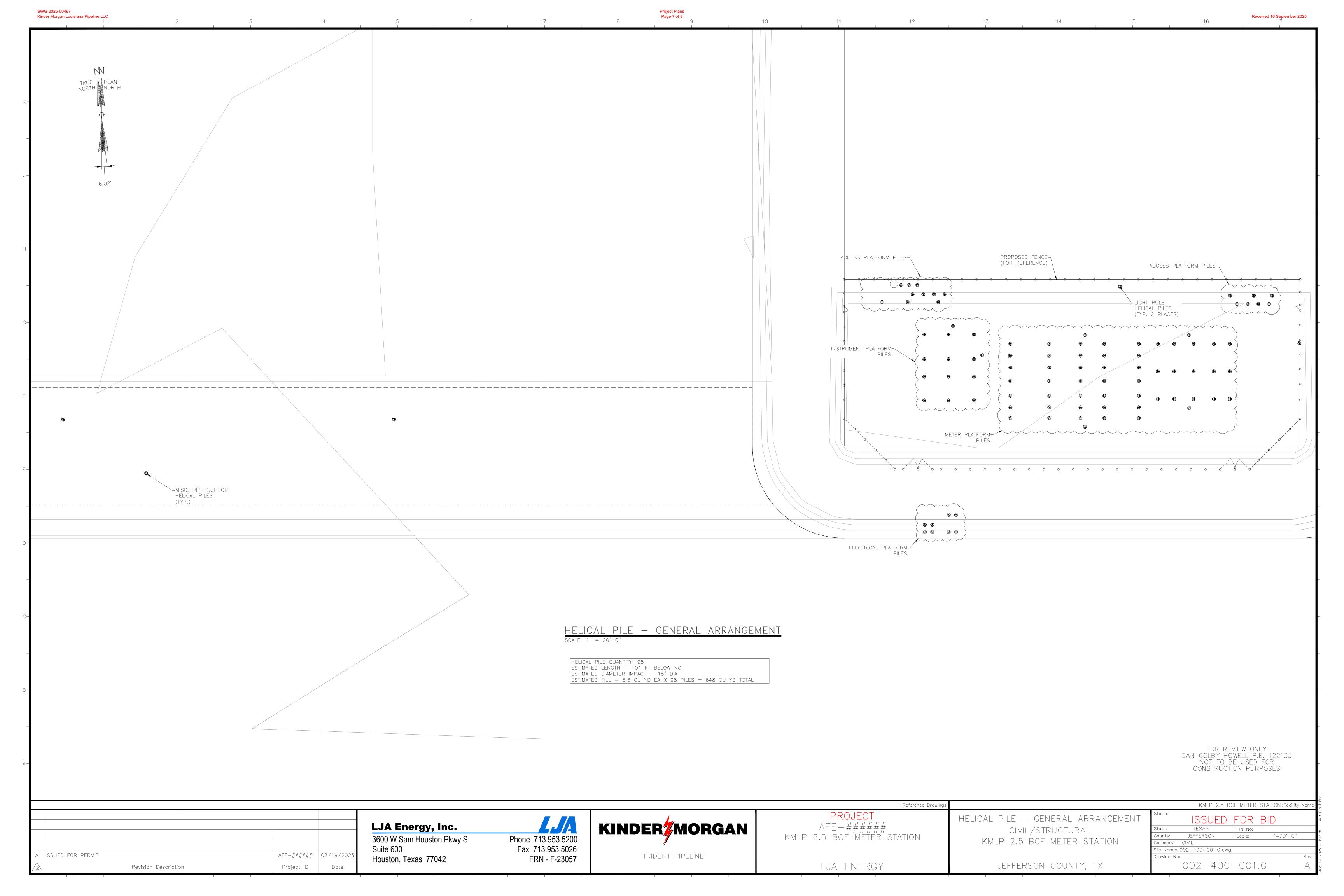
Revision Description

SCALE: 3/8" = 1'-0"

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KINDER MORGAN TRIDENT PIPELINE

LJA ENERGY



Project Plans
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