

OWNER

Aggregate Surfacing, Roads and Fencing



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TORUS

[REDACTED], [REDACTED] County, [REDACTED]

ISSUE SUMMARY AND APPROVAL

This page records each issue of SPC-SPC-005. The preparer, reviewer and approver sign for each revision.

Rev.	Date	Issue purpose	Description
A	2026-09-29	Issued for Review	First issue

Contributors

Rev.	Discipline	Prepared by	Reviewed by	Approved by
A	Specifications			

SECTION PC-SPC-005
AGGREGATE SURFACING, ROADS AND FENCING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. The access road: a new 20 ft wide gravel road about 600 ft long from the section-line county road on the east to the main gate (HOLD H-05), with ditches and culverts.
2. The county road driveway approach, and a cattle guard if the landowner requires one, to the County permit conditions.
3. The internal 20 ft roads R-1 to R-7 of MEC-DWG-001, Plot Plan: a U-loop around the process area, the T-101 truck stand served by road R-5, and the R-7 pig handling lane. Outlet lateral line 1042 crosses road R-3 below grade; the road section over it shall follow PIP-DWG-007.
4. Crane pads for the critical lifts of CON-CAL-001: pad A centered at plot coordinates (68, 69) for V-101 and SK-110, and pad B at (192, 172) on road R-3 for H-101.
5. Yard surfacing of the fenced process area with clean crushed stone over geotextile.
6. The station fence: 7 ft chain link with three strands of barbed wire, 250 ft x 200 ft (about 900 ft), two 24 ft double-swing vehicle gates (east main gate at Y = 50 to 74 and west emergency gate at Y = 130 to 154), and two personnel gates (east near B-102 at Y = 10, and north at X = 150).
7. Fence and gate signs, and bond points for fence grounding.

B. Related sections: SPC-SPC-002, Site Preparation, Clearing and Earthwork (subgrade preparation and compaction); SPC-SPC-003, Cast-in-Place Concrete (post footings); SPC-SPC-013, Electrical Installation (grounding conductors and ground rods for the fence).

C. Work by others: county road work beyond the limits of the driveway permit, by County.

1.02 REFERENCES

A. Standards:

1. Standard Specifications for Highway Construction, current edition, sections for aggregate base, culverts and culvert pipe.
2. AASHTO M43, Sizes of Aggregate; AASHTO M288, Geosynthetic Specification for Highway Applications; AASHTO M36 and M274, Corrugated Steel Pipe and Aluminized Type 2 Coating; AASHTO M294, Corrugated Polyethylene Pipe.

3. ASTM D698, D1557 and D6938 (compaction and density); ASTM C131 (Los Angeles abrasion); ASTM C136 and C117 (sieve analysis); ASTM D4318 (Atterberg limits); ASTM D6241 (puncture of geotextiles).
4. ASTM F567, Installation of Chain-Link Fence; ASTM F1043, Industrial Fence Framework; ASTM F1083, Galvanized Pipe for Fence Structures; ASTM A392, Zinc-Coated Chain-Link Fence Fabric; ASTM A121, Barbed Wire; ASTM A824, Tension Wire; ASTM F626, Fence Fittings; ASTM F900, Industrial and Commercial Swing Gates.
5. IEEE 80-2013, Guide for Safety in AC Substation Grounding (surface layer resistivity).
6. 49 CFR 192.707(d), marker lettering.

B. Project documents: GEN-RPT-002, Design Decisions Register; GEN-DB-001, Basis of Design; MEC-DWG-001, Plot Plan; CON-CAL-001, Critical Lift Plans; CIV-DWG-002, Overall Site Plan; CIV-CAL-003, Access and Internal Roads; CIV-CAL-001, Earthwork and Grading; CIV-CAL-002, Hydrology and Drainage; CIV-DWG-003, Grading and Drainage Plan; CIV-DWG-004, Civil Sections and Details (road sections, fence and gates); PIP-DWG-007, Soil-to-Air Transition, Road Crossing and Buried Piping Details; ELE-CAL-005 and ELE-DWG-004, Grounding.

1.03 DEFINITIONS

- A. Type AB: dense-graded crushed stone aggregate base.
- B. Type SC: dense-graded crushed stone surface course with binder fines.
- C. Type YS: clean single-sized crushed stone for yard surfacing, AASHTO No. 57.

1.04 SUBMITTALS

- A. The Contractor shall submit the items in Table 1-1.

Table 1-1: Submittal Schedule

No.	Submittal	Timing	Action
005-01	Aggregate source, gradation (C136, C117), abrasion (C131), plasticity of fines (D4318) and Proctor (D698) for each type	14 days before delivery	Owner approval
005-02	Geotextile product data and certificate of AASHTO M288 Class 2 properties	14 days before delivery	Owner approval
005-03	Culvert product data: material, gauge, coating and joints	14 days before delivery	Owner approval
005-04	Fence and gate shop drawings: post sizes and spacing, footings, fabric, barbed wire, gate hardware, locking and sign layout	21 days before fabrication	Owner approval, EOR review
005-05	Fence material certificates: fabric coating weight, post wall thickness and coating	At delivery	Owner review

No.	Submittal	Timing	Action
005-06	Driveway approach construction records and county inspections	Before the county inspection	Owner review
005-07	Road, yard and crane pad thickness and density test reports	Within 24 hours	Owner review
005-08	Sign proofs: text, size and emergency telephone number	14 days before fabrication	Owner approval

1.05 QUALITY ASSURANCE

A. Density testing shall be performed by the laboratory accepted under SPC-SPC-002.

B. Hold and witness points are listed in 3.06 and compiled in SPC-SPC-019.

1.06 MEASUREMENT AND PAYMENT

A. Pay items are listed in Table 1-2.

Table 1-2: Surfacing and Fencing Pay Items

Pay item	Unit	Measurement and inclusions	Exclusions
05.01 Access road	Linear foot	Centerline length from the county road right-of-way line to the main gate, complete with geotextile, base, surface course, shoulders, ditches, compaction and testing	Culverts (05.03); driveway approach (05.06); subgrade earthwork (02.03)
05.02 Internal road and yard aggregate surfacing	SY	Plan area of each section type (roads, turnaround, crane pads, yard stone), measured in place	
05.03 Culverts	Linear foot	Length along the flow line, by diameter, including end sections, bedding, backfill and riprap aprons	
05.04 Chain-link fence	Linear foot	Length along the fence at grade between gate posts, gate openings excluded, complete with posts, footings, fabric, barbed wire, tension wire, bond points and signs	Grounding conductors and rods (13.02)
05.05 Gates	Each	Each 24 ft double vehicle gate or 4 ft personnel gate, complete with posts, footings, hardware, drop rods, keepers and lock provisions	
05.06 County road driveway approach and cattle guard	Lump sum	Approach, culvert, cattle guard where required, and county permit compliance and inspection	County permit fee (Owner)

PART 2 PRODUCTS

2.01 AGGREGATES

- A. Aggregates shall be Contractor-furnished and shall meet the gradations of Table 2-1. Type AB is intended to match Type A aggregate base; where the current gradation differs, the Contractor shall submit the Type A gradation for approval.

Table 2-1: Aggregate Gradations, Percent Passing

Sieve	Type AB base	Type SC surface	Type YS yard stone (No. 57)
2 in	100		
1-1/2 in	90 to 100		100
1 in		100	95 to 100
3/4 in	60 to 90	90 to 100	
1/2 in			25 to 60
3/8 in	40 to 75	55 to 85	
No. 4	25 to 55	40 to 65	0 to 10
No. 8			0 to 5
No. 10	15 to 40	30 to 50	
No. 40	8 to 25	15 to 30	
No. 200	4 to 12	8 to 15	0 to 2

- B. Aggregates shall also meet Table 2-2.

Table 2-2: Aggregate Properties

Property	Type AB	Type SC	Type YS
Material	Crushed limestone, dolomite or granite	Crushed limestone	Crushed limestone or granite, washed
Los Angeles abrasion loss, maximum	40 %	40 %	40 %
Plasticity index of the fraction passing No. 40	10 maximum	4 to 10	Non-plastic
Fractured faces	90 %, one face	90 %, one face	100 %, one face
Deleterious material (shale, clay lumps, organics)	2 % maximum	2 % maximum	1 % maximum

- C. Yard stone shall provide the surface layer resistivity assumed by the grounding design in ELE-CAL-005, because the step and touch voltage limits of that design depend on it. Where a value is stated there, the Contractor shall submit a wet resistivity test of the stone made to the IEEE 80 guidance.

2.02 GEOTEXTILE

- A. Geotextile shall be nonwoven needle-punched polypropylene meeting AASHTO M288 for separation, Class 2 with elongation of 50 % or more: grab strength at least 157 lb, tear strength at least 56 lb, puncture strength (ASTM D6241) at least 310 lb, apparent opening size No. 30 (0.60 mm) or finer, permittivity at least 0.02 s⁻¹, and UV stability of 50 % retained strength after 500 hours. Rolls shall be at least 12.5 ft wide.

2.03 CULVERTS

- A. Culverts shall be corrugated steel pipe to AASHTO M36, aluminized Type 2 to M274, at least 16 gauge for 18 to 24 in diameters; or corrugated HDPE to AASHTO M294 Type S with a smooth interior; with soil-tight joints.
- B. The minimum diameter shall be 18 in, and the driveway culvert shall meet the county permit.
- C. Outlets shall have flared end sections or Type I riprap aprons 12 in thick on geotextile, as shown.

2.04 FENCE AND GATES

- A. Fence and gate components shall meet Table 2-3.

Table 2-3: Fence and Gate Components

Component	Requirement
Overall height	7 ft: 6 ft of fabric plus a 1 ft barbed wire extension of three strands on angled 45° outward
Fabric	ASTM A392 Class 2 zinc coated (2.0 oz/ft ²), 9 gauge (0.148 in) core wire, 2 in mesh, knuckled bottom selvage, twisted top selvage
Line posts	ASTM F1043 Group IA, 2.375 in OD, 3.65 lb/ft, hot-dip galvanized, at no more than 10 ft centers
Terminal, corner and pull posts	Group IA, 2.875 in OD, 5.79 lb/ft
Posts for 24 ft double gates (two 12 ft leaves)	4.0 in OD, 9.11 lb/ft minimum, to the ASTM F900 table for the leaf width
Personnel gate posts	2.875 in OD
Top rail	1.660 in OD, 2.27 lb/ft, with 6 in sleeve couplings at no more than 21 ft
Brace rails	1.660 in OD at terminal posts, with 3/8 in truss rods and turnbuckles
Bottom tension wire	7 gauge, ASTM A824, zinc coated
Barbed wire	ASTM A121, two-strand 12-1/2 gauge, four-point barbs at 5 in, Class 3 coating
Extension	Pressed steel or malleable iron, galvanized, three wires, 45° outward away from the station

Component	Requirement
Fittings and ties	ASTM F626, galvanized; 9 gauge aluminum or galvanized ties at 12 in on line posts and 24 in on rails
Vehicle gates	ASTM F900 double swing, two 12 ft leaves, 7 ft high with barbed wire, welded 1.90 in OD frame, fabric to match the fence, diagonal truss rods, heavy industrial hinges with 180° swing, center drop rod and ground keeper, hold-open keepers for both leaves, and a latch accepting both the Owner's and the receiving pipeline operator's padlocks in a daisy chain
Personnel gates	4 ft wide, swinging outward in the direction of egress, with a latch operable from inside without a key and a padlock hasp outside
Post footings	Class E concrete (SPC-SPC-003): line posts 10 in diameter x 36 in deep; terminal and corner posts 12 in x 42 in; gate posts 18 in x 48 in; posts embedded 34, 40 and 46 in; tops crowned to shed water

B. Fence materials shall be Contractor-furnished.

PART 3 EXECUTION

3.01 ROAD, CRANE PAD AND YARD SECTIONS

A. Road, crane pad and yard sections shall follow CIV-CAL-003 and CIV-DWG-004. Where the drawings are silent, the sections of Table 3-1 shall be used.

Table 3-1: Surfacing Sections

Area	Section, top down
Access road, internal roads R-1 to R-7, T-101 truck stand and R-7 pig lane	2 in Type SC over 8 in Type AB in two 4 in compacted lifts, over geotextile, over 12 in of compacted subgrade (SPC-SPC-002)
Crane pads A and B	12 in Type AB in three lifts over geotextile over proof-rolled subgrade, extending at least 3 ft beyond the mat footprint of the lift plan
Process yard inside the fence, non-traffic	4 in Type YS over geotextile over compacted subgrade
Parking and loadout pad at T-101	As the access road

B. Crane pads are built with the thicker 12 in base because the outrigger mats of CON-CAL-001 impose about 1,100 psf, over half of the assumed 2,000 psf bearing value of the clay (HOLD H-07), and the aggregate spreads the load and keeps the clay from softening in wet weather.

3.02 PLACEMENT AND COMPACTION

A. Geotextile shall be placed on the accepted subgrade smooth and taut, with overlaps of at least 18 in (24 in where the subgrade CBR is below 3). No traffic shall run directly on the geotextile.

- B. Base shall be placed in lifts no thicker than 6 in compacted, moisture conditioned to OMC ± 2 %, and compacted to 98 % of the ASTM D698 maximum dry density, or 95 % of D1557 where the laboratory uses modified effort. The laboratory shall state which.
- C. The surface course shall be placed, watered, compacted to 98 % of D698 and proof-rolled, then finished to crown.
- D. Yard stone shall be spread and tracked in with light equipment to at least 4 in thick and level. It shall not be compaction tested, because a single-sized stone has no meaningful Proctor density.
- E. The access road and internal roads shall have a 3 % $\pm$ 0.5 % crown to each side, or a single cross-slope where shown, with 2 ft shoulders at 6 % and ditch side slopes of 3H:1V. Yard surfacing shall slope as CIV-DWG-003 shows, at least 1 %, with no ponding.
- F. Aggregate shall be placed in an area only after the underground work there (piping, conduit, ground grid and cathodic protection cable) is complete, tested and surveyed, so that the finished surfacing is not disturbed later.

3.03 CULVERTS

- A. The culvert trench shall be the outside diameter plus 24 in wide, with 6 in of compacted Type AB bedding shaped to the pipe.
- B. Backfill shall be placed in 6 in lifts on both sides at once and compacted to 95 % of D698 with Type AB or select fill. Cover shall be at least 12 in to the top of the road surface, or the manufacturer's minimum for construction loads if greater.
- C. The flow line shall be within 0.05 ft of design, with no sags.
- D. The driveway approach and its culvert at the county road shall be built to the County driveway permit (HOLD H-05), including any county inspection.

3.04 FENCE AND GATES

- A. The fence shall be installed to ASTM F567 and CIV-DWG-004 on survey stakes, 1 ft inside the lease line or as shown.
- B. Posts shall be plumb within 1/4 in in 7 ft and set in concrete footings, braced, and left for 72 hours of curing before fabric is stretched.
- C. Fabric shall be on the outside face of the posts, stretched so that it deflects no more than 1 in under hand pressure at mid-panel, with its bottom no more than 2 in above finished grade. Where grade dips leave gaps over 4 in, the grade shall be corrected or extra wire or a bottom rail added.
- D. Barbed wire shall be stretched taut on the , with the top strand 12 in above the fabric.
- E. Gates shall hang true, level and plumb, swing freely through their full arc with no more than 2 in bottom clearance, and have center stops and keepers set in concrete. The surfacing at gates shall be graded so that the leaves clear it through the full swing.
- F. Fence grounding bond points shall be provided at every corner post, at both posts of each gate, on each side of any power line crossing, and at the intervals of ELE-DWG-004. Gate leaves

shall be bonded to their posts with flexible tinned copper braid. Connections to posts shall be exothermic welds or listed compression clamps installed by the electrical crew under SPC-SPC-013. The fence shall be bonded to the station ground grid where the grounding design requires it for step and touch voltage.

G. Reflective aluminum signs shall be fixed at each gate and on each side of the fence facing public access, at no more than 100 ft spacing, reading “WARNING -HIGH PRESSURE NATURAL GAS - NO SMOKING - NO OPEN FLAMES”, with the Owner’s name and 24-hour emergency telephone number, and a “DANGER -AUTHORIZED PERSONNEL ONLY” sign. Letters shall be at least 1 in high with an approximately 1/4 in stroke on a sharply contrasting background, consistent with 49 CFR 192.707(d). Text and numbers shall be as approved under submittal 005-08.

3.05 FIELD QUALITY CONTROL

A. Testing shall be performed at the frequencies of Table 3-2.

Table 3-2: Testing Frequencies

Test	Frequency	Standard
Gradation of each aggregate type	1 per 1,000 tons or per change of source, at least 2 per type	C136, C117
Plasticity of fines, Types AB and SC	1 per 2,000 tons, at least 1 per type	D4318
Base and surface density and moisture	1 per 150 ft of road per lift; 1 per 2,500 ft ² of pads per lift; at least 3 per lift; every crane pad lift	D6938
Thickness	Test hole every 150 ft of road and every 2,500 ft ² of yard, before the surface course; at each crane pad	Measurement
Crown and cross-slope	Every 50 ft of road	Level or survey
Surface smoothness	10 ft straightedge every 50 ft	Straightedge
Fence post plumbness and spacing	All visually; 10 % measured	Level, tape
Fence fabric coating	Certificate per shipment; spot check by magnetic gauge	A392

3.06 HOLD AND WITNESS POINTS

A. The hold and witness points in Table 3-3 apply.

Table 3-3: Hold and Witness Points

ID	Activity	C	O	E	W	Record
HP-05-01	Aggregate and geotextile sources approved before delivery	P	H	-	-	Submittals 005-01, 005-02
HP-05-02	Underground work in the area complete and surveyed before aggregate is placed	P	H	-	-	QF-05-01 area release

ID	Activity	C	O	E	W	Record
WP-05-03	Base course density and thickness tests	P	W	-	-	QF-05-02 road test record
WP-05-04	Culvert bedding and flow line before backfill	P	W	-	-	QF-05-03
WP-05-05	County driveway inspection	P	W	-	-	County permit sign-off
HP-05-06	Crane pad acceptance (thickness, density, proof-roll, extent) before the crane sets up for a critical lift	P	H	R	-	QF-05-04 crane pad record
WP-05-07	Fence and gate final inspection: height, fabric tension, gaps, gate swing, locks, signs and grounding bonds	P	W	-	-	QF-05-05 fence checklist

3.07 ACCEPTANCE

A. The work is accepted when it meets Table 3-4.

Table 3-4: Acceptance Criteria

Parameter	Criterion	Method
Aggregate gradation	Within Table 2-1	C136, C117
Base and surface density	98 % of D698 (or 95 % of D1557) at every test	D6938
Thickness	Not less than design minus 1/2 in at any test; average not less than design	Test holes
Crown	3 % ± 0.5 %	Level
Road smoothness	Gap under a 10 ft straightedge of 3/4 in or less	Straightedge
Road grade	±0.10 ft from design, with no ponding	Survey
Culvert flow line	±0.05 ft, with positive grade	Survey
Fence height	7 ft ± 2 in to the top strand; fabric 6 ft ± 1 in	Tape
Posts	Plumb within 1/4 in in 7 ft; spacing 10 ft maximum	Level, tape
Fabric ground gap	2 in maximum	Tape
Gates	Swing the full arc; latch and lock with both parties' padlocks; drop rods seat	Functional check
Grounding bonds	Present at every required point; continuity verified under SPC-SPC-013	Visual and test
Signs	Present, legible and showing the correct emergency number	Visual

END OF SECTION