

1.0 SCOPE

- 1.1 This specification covers the design criteria, material specifications, and construction methods for the installation of flexible base roads and drainage on CenterPoint Energy's (CNP) projects.

2.0 ACCESS ROAD DESIGN CRITERIA

- 2.1 The Generator shall design a 24-foot-wide access road with a maximum 1% slope or as designated by CNP representative. Refer to Exhibit A, "Primary Access Road" cross-section detail.
- 2.2 Minimum turning radius of 60 degrees shall be provided for all turns. 90-degree turns shall be avoided, if possible.
- 2.3 Base material shall be designed to a minimum depth of 8 inches.
- 2.4 Subgrade treatment shall be specified to a minimum depth of 6 inches.
- 2.5 Minimum 5-foot-wide shoulders shall be provided on both side of the road or as designated by CNP representative.
- 2.6 Generator shall exhaust all reasonable options to avoid locating access road inside a delineated FEMA floodplain or flood zones determined by hydrology study performed by Generator.
- 2.7 If locating road inside floodplain is inevitable, access road grading elevations shall be designed to avoid flooding during heavy rain events.
- 2.8 Access roads shall be all-weather roads and shall maintain 24/7 access to CNP facilities during storm events.
- 2.9 An electronic copy and georeferenced CAD files of the "Plan and Profile" drawings shall be submitted to CNP representative for review and approval prior to construction.
- 2.10 Generator shall coordinate with CNP representative the grading elevations of sections of the road connecting to CNP facilities.
- 2.11 Drawings shall be designed and stamped by a Professional Engineer with a license in the state of Texas.

3.0 GENERAL

- 3.1 The paving work shall be done in accordance with the CNP approved drawings, this specification and any drawings or specifications provided by CNP's designated representative for a specific project.
- 3.2 In case of a conflict, the order of precedence shall be the directions given by CNP's representative, this specification, and the CNP drawings.
- 3.3 The Generator shall maintain on the job site a complete and readable set of all specifications and any drawings approved by CNP.
- 3.4 No deviation from this specification will be permitted without authorization from the CNP representative.

4.0 GRUBBING AND EXCAVATION

- 4.1 The area to be paved shall be cleared and grubbed to a minimum depth of 4 (four) inches. All stumps, logs, brush, roots, vegetation, rubbish, designated trees, and other objectionable material shall be removed and disposed of offsite.

- 4.2 Soft or unstable materials that are deemed unfit to meet compaction requirements shall be removed as directed by CNP representative and replaced with an approved fill material.
 - 4.3 All holes, ruts, and depressions shall be filled with material approved by the CNP representative.
 - 4.4 Excavated material shall not be used as fill without specific authorization of the CNP representative and prior geotechnical studies.
 - 4.5 The Generator shall exercise care when grubbing and/or excavating, to stay clear of power lines, structures, pipe, septic tanks, fences, grounding mats or any underground facility installed before the start of construction.
 - 4.6 The Generator shall reimburse CNP for the repair or replacement of any previously identified facilities he damages.
- 5.0 SELECT FILL MATERIAL
- 5.1 TYPE A FILL MATERIAL
 - 5.1.1 TYPE A fill material shall conform to CL or SM soil classification as designated in ASTM D-2487. Atterberg Limits for TYPE A material shall be as follows:

Liquid Limit	30 – 45
Plasticity Index	7 – 15
 - 5.2 TYPE B FILL MATERIAL
 - 5.2.1 TYPE B fill material shall conform to a CL or SM soil classification as designated in ASTM D-2487. Atterberg Limits for TYPE B material shall be as follows:

Maximum Liquid Limit	45
Maximum Plasticity Index	20
- 6.0 CEMENT STABILIZED SOIL
- 6.1 Soil stabilization with cement shall be done in accordance with the State Department of Highways and Public Transportation (SDHPT) 1982 Standard Specifications for Construction of Highways, Streets, and Bridges – Item 270.
 - 6.2 The cement shall be Type 1 of a standard brand of Portland cement and shall conform to the requirements of ASTM – C150.
 - 6.3 The subgrade conditions shall be approved by the CNP representative prior to the application of cement.
 - 6.4 The soil to be cement stabilized shall be limited to the designated area and depth shown on the approved drawings or as designated by the CNP representative.
 - 6.5 Upon completion of final compaction, the stabilized soil shall be cured for a minimum of 24 hours prior to the placement of fill or base materials.
 - 6.6 CNP or a Geotechnical representative will specify the amount of Portland cement to be utilized as required by the soil conditions.
 - 6.7 The Generator shall assume responsibility for damages resulting from cement that has washed or blown off the subgrade.

7.0 LIME STABILIZED SOIL

- 7.1 Soil stabilization with lime shall be done in accordance with SDHPT Items 260 and 264, and the 10/91 Special Provision to Item 260, and the 12/87 Special Provision to Item 264.
- 7.2 The subgrade conditions shall be approved by the CNP representative prior to the application of lime.
- 7.3 The lime shall be furnished in a slurry form (Type B, Commercial Lime Slurry) or (pellet) pebbled form (Type C, Quicklime, Grade DS).
- 7.4 The soil to be lime stabilized shall be limited to the designated area and depth shown on the approved drawings or as designated by the CNP representative.
- 7.5 CNP or a Geotechnical representative will specify the amount of lime to be utilized as required by the soil conditions.
- 7.6 The Generator shall assume full responsibility for damages resulting from lime that has washed or blown off the subgrade.

8.0 BASE MATERIALS

- 8.1 The base material used for the surface course shall be limestone and/or cement stabilized limestone and conform to SDHPT Items 247 and 274 respectively.

8.2 LIMESTONE

- 8.2.1 The aggregate used for yard paving shall conform to the following size requirements:

AGGREGATE TYPE	U.S. STANDARD SIEVE SIZE	PERCENT RETAINED BY WEIGHT	MAX. LIQUID LIMIT	MAX. PLASTIC LIMIT
Limestone (Type A, Grade 1)	1 3/4" Sieve	0		
	7/8" Sieve	10 - 35		
	3/8" Sieve	30 - 50		
	No. 4 Sieve	45 - 65		
	No. 40 Sieve	70 - 85	35	10

WET BALL

Maximum Amount 40%

Increase Passing No. 40 20%

8.3 CEMENT STABILIZED LIMESTONE

- 8.3.1 The aggregate used for road paving shall conform to the following size requirements:

AGGREGATE TYPE	U.S. STANDARD SIEVE SIZE	PERCENT RETAINED BY WEIGHT	MAX. LIQUID LIMIT	MAX. PLASTIC LIMIT
Limestone (Type A, Grade 1)	1 3/4" Sieve	0		
	7/8" Sieve	10 - 35		
	3/8" Sieve	30 - 50		
	No. 4 Sieve	45 - 65		
	No. 40 Sieve	70 - 85	35	10

- 8.3.2 The cement content shall be 5% by dry weight and the minimum compressive strength shall be 650 psi at 7 days.
- 8.3.3 The cement shall be Type 1 of a standard brand of Portland cement and shall conform to the requirements of ASTM – C150.
- 8.3.4 The cement stabilized base courses shall not be mixed or placed when the air temperature is 40 degrees Fahrenheit (or below) and falling. The material may be placed if the air temperature is 35 degrees Fahrenheit and rising.
- 8.4 The aggregate shall be free from excess salt, alkali, vegetable matter, clay, or otherwise objectionable matter.

9.0 COMPACTION

- 9.1 Select fill shall be compacted in lifts not to exceed eight (8) inches.
- 9.2 The subgrade or subbase shall be “proof rolled” prior to the placement of paving materials.
- 9.3 All select fill materials, scrubber base, stabilized soil, existing flexible base paving, and excavated areas shall be compacted to 95% of the maximum density established by the Standard Proctor Density Test, ASTM D-698, with a moisture content within –2% or +3% of optimum.
- 9.4 At the discretion of the CNP representative, in-place density testing will be performed.

10.0 CONCRETE PIPE

- 10.1 All storm sewer piping and culverts shall be reinforced concrete, manufactured to comply with ASTM C-76, Class III, Wall B, or equivalent corrugated plastic pipe approved by Texas Department of Highways.

11.0 GRADING

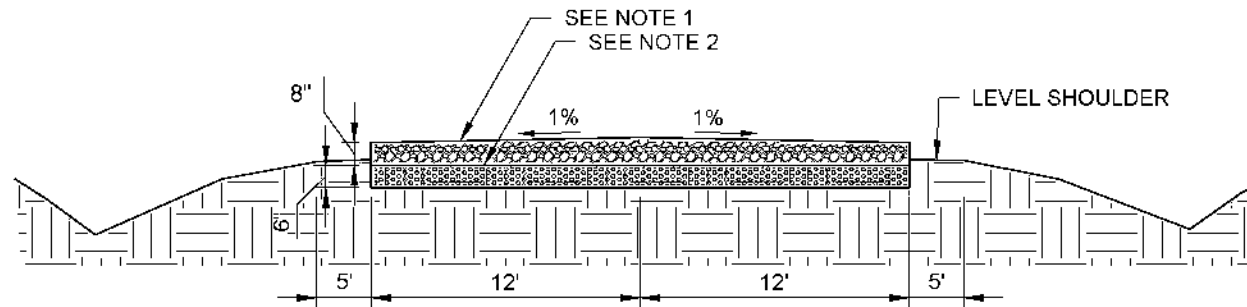
- 11.1 The Generator shall surface grade the access road as shown on the approved drawings or as directed by the CNP representative to provide a smooth finish and good positive drainage.
- 11.2 When grading, it shall be the Generator’s responsibility to stay clear of power lines and structures. Care shall be taken to avoid damage to any existing pipelines, septic tanks, telephone lines, etc. If these structures are damaged due to the Generator’s negligence, they shall be repaired or replaced at his expense.
- 11.3 All unpaved areas shall be surface graded as necessary to provide a smooth surface for proper drainage, and to allow mowing.

12.0 CONSTRUCTION METHODS

- 12.1 12.1 The Generator shall install limestone base material to a maximum depth of 0.8 ft, and cement stabilized limestone to a maximum depth of 0.8 ft, unless otherwise directed by the drawings or the CNP representative. However, in no case shall the base material be placed in lifts greater than 0.5 ft or less than 0.25 ft.
- 12.2 The subgrade shall be graded and compacted prior to placement of base materials. All weak spots shall be corrected with a suitable material.

- 12.3 The base material shall be installed on a dry, uniformly compacted subgrade.
- 12.4 The finished shape of the base course shall be smooth and conform to the established lines and grades shown on the approved drawings or as directed by the CNP representative.
- 12.5 During compaction the Generator shall use a vibratory plate compactor when within five (5) feet of any structure or in areas determined by CNP to be hazardous due to electrical clearances or crowded conditions.
- 12.6 Self-propelled vibratory rollers are prohibited within twenty (20) feet of any electrical structure.
- 12.7 All paving areas with “nests” of segregated coarse or fine material shall be corrected by scarifying or removing and replacing with a well-graded material. The material shall be placed and compacted to meet the requirements as stated in Section 9.0 of this specification.
- 12.8 The stabilized base shall be compacted to a density of not less than 95% of the maximum density established by the Standard Proctor Density Test ASTM D-689. After completion of compaction, the surface that forms the road and ramp paving shall be thoroughly wetted.
- 12.9 Prior to each day’s construction, a straight joint shall be formed by cutting back into the entire depth of the previously placed material to form a true vertical face, free of loose and shattered materials.
- 12.10 Not more than one (1) hour shall elapse from the time the cement stabilized limestone arrives on site and the compaction begins.
- 12.11 The compaction of cement stabilized limestone shall be completed within three (3) hours of the time water is added to the mixture.
- 12.12 The cement stabilized limestone shall be protected against rapid drying for a period of 72 hours.
- 12.13 The CNP representative may at his discretion reject any base material that he deems is not in accordance with the requirements of this specification.
- 12.14 The Generator shall erect and maintain sufficient barricades to prevent traffic on newly paved area(s) for a period of 72 hours or as directed by the CNP representative.

EXHIBIT A



NOTES:

1. **BASE MATERIAL** - BASE MATERIAL SHOULD BE COMPOSED OF CRUSHED LIMESTONE OR CRUSHED CONCRETE MEETING THE REQUIREMENTS OF TXDOT 2014 STANDARD SPECIFICATIONS ITEM 247, TYPE A, GRADE 1. THE BASE MATERIAL SHOULD BE COMPACTED TO AT LEAST 95 PERCENT OF THE MODIFIED EFFORT (ASTM D 1557) MAXIMUM DRY DENSITY AT MOISTURE CONTENT WITHIN 2 PERCENT OF THE OPTIMUM MOISTURE CONTENT.
2. **LIME TREATED SUBGRADE** - WE ANTICIPATE THAT THE PAVEMENT SUBGRADE WILL GENERALLY CONSIST OF ON-SITE MEDIUM TO HIGH PLASTICITY CLAY SOILS. THE PAVEMENT SUBGRADE SHOULD BE TREATED WITH LIME IN ACCORDANCE WITH TXDOT 2014 STANDARD SPECIFICATIONS ITEM 260. BASED ON THE CLASSIFICATION TEST RESULTS, WE RECOMMEND THAT APPROXIMATELY 8 TO 10 PERCENT LIME BY DRY WEIGHT BE USED FOR ESTIMATING AND PLANNING. THE PERCENTAGES ARE GIVEN AS APPLICATION BY DRY WEIGHT AND ARE TYPICALLY EQUIVALENT TO ABOUT 40 TO 50 POUNDS OF LIME PER SQUARE YARD PER 6-INCH DEPTH. THE ACTUAL QUANTITY OF LIME SHOULD BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON LIME DETERMINATION TESTS CONDUCTED USING BULK SAMPLES OF THE SUBGRADE SOILS. THE PULVERIZATION, MIXING, AND CURING OF THE LIME TREATED SUBGRADE IS OF PARTICULAR IMPORTANCE FOR THE ON-SITE CLAY SOILS. THE SUBGRADE SHOULD BE COMPACTED TO A MINIMUM OF 95 PERCENT OF THE STANDARD EFFORT (ASTM D 698) MAXIMUM DRY DENSITY AT A MOISTURE CONTENT BETWEEN OPTIMUM AND 4 PERCENT WET OF THE OPTIMUM MOISTURE CONTENT.

PRIMARY ACCESS ROAD (24')

NOT TO SCALE

