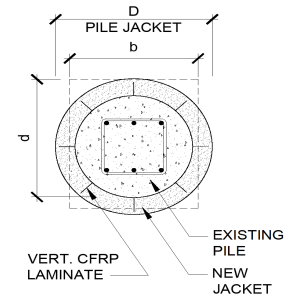


Axial Strengthening of a Concrete Pile using the SCS System

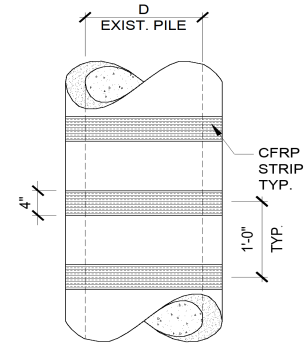
Existing pile size, properties and capacity:

$D_{Existing\ Pile} =$	24 in.	24" Dia. w/ 6 #8 & #3 ties @12"oc
$f'_{c, Existing\ Pile} =$	4,000 psi	Existing concrete compressive strength
$f_y, Existing\ Pile =$	60,000 psi	Yield Strength of existing Reinforcement
$A_s =$	4.71 in ²	Area of existing Reinforcement in tension
$A_g =$	452 in ²	Area of gross section
$\phi =$	0.65	Strength reduction factor
$\phi P_{n, Existing} =$	938 kips	Original Max. Axial Capacity of Existing Pile



New epoxy grout Jacket & CFRP Laminate size & properties:

$D_{pile\ Jacket} =$	32 in.	
Cover =	0.75 in.	FRP Positioner
$A_{PILE} =$	804 in ²	
b_{eq} =	28.35 in	
$f'_c =$	9,500 psi	Compressive Strength (7 Days)
$t_{LAM} =$	0.055 in	Nominal Thickness
$W_{LAM} =$	3.15 in	Nominal Width
$\alpha_{(Deg)} =$	45 Deg.	α = Angle between vert. CFRP Laminate Reinf.
$n =$	8	Number of Vertical Laminate strips
$A_f =$	0.173 in ²	Area Per Laminate
$\Sigma A_f =$	1.386 in ²	Total Area
$E_f =$	23,000,000 psi	Modulus of Elasticity
$I_{LAM, Min} =$	0.14 in ⁴	$I = t_{LAM} \cdot W_{LAM}^3 / 12$
$L_{Lat\ Brog} =$	12.00 in	Spacing Between Confinement Strips



Determine axial compressive strength:

$P_{CR, LAM} =$	225,599 lbs	$P_{CR, LAM} = (\pi^2 \cdot E \cdot I) / L_{Lat\ Brog}^2$
$P_{CR, TOTAL} =$	1,804,794 lbs	$P_{CR, TOTAL} = n \cdot P_{CR, LAM}$
$\phi =$	0.65	Strength Reduction Factor Per ACI 318-9.3.2.2
$\phi \cdot P_{n, Jacket} =$	1173 kips	Design Axial Compression Strength

Comparison of axial strength (Existing pile vs. SCS system):

$\phi P_{n, Existing} =$	938 kips	Axial capacity of existing Pile (Original)
$\phi \cdot P_{n, Jacket} =$	1173 kips	Axial capacity of new SDS jacket system only
$n = P_{n, Jacket} / P_{n, Exist} =$	125%	Axial strength increase ratio (%)