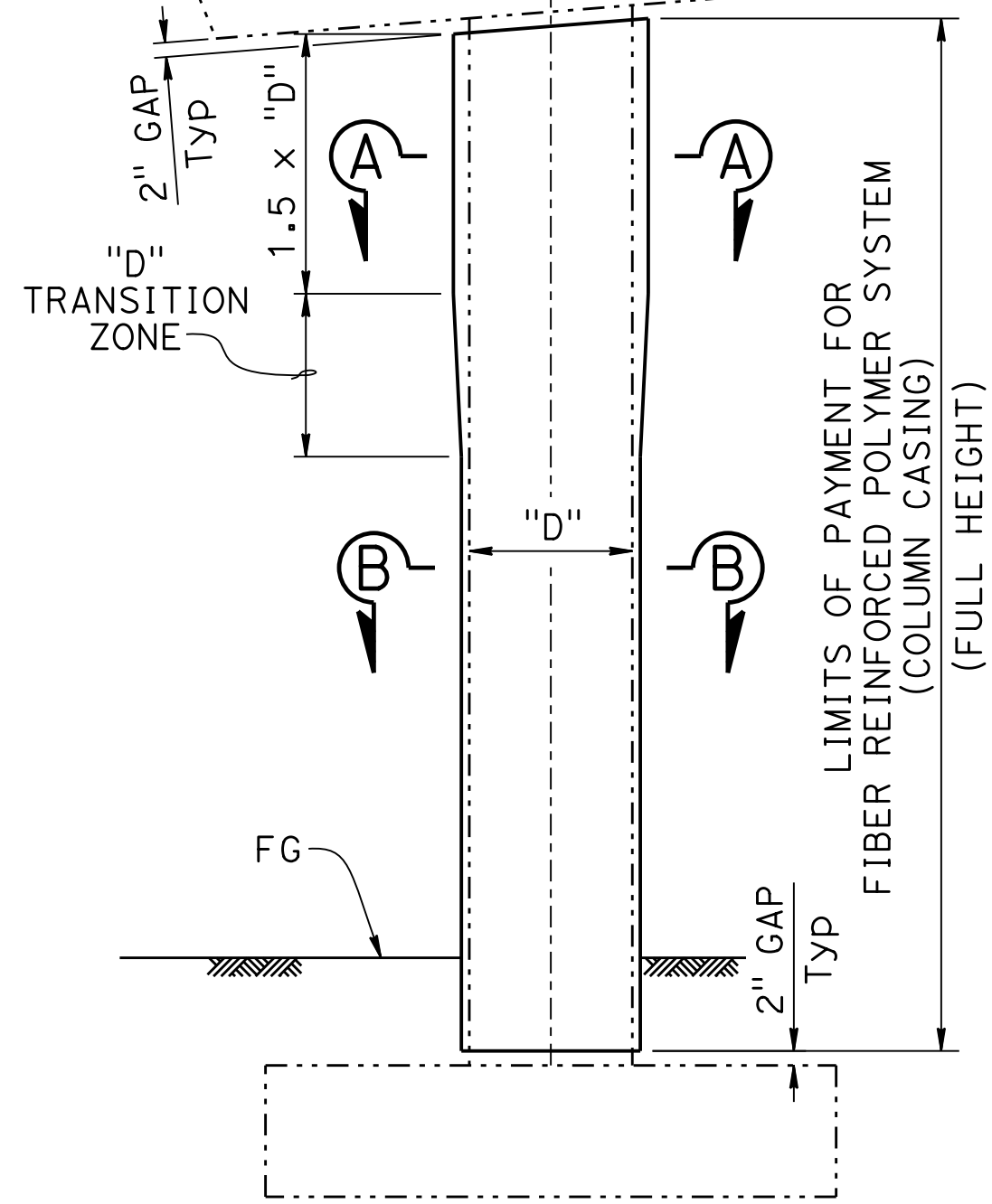
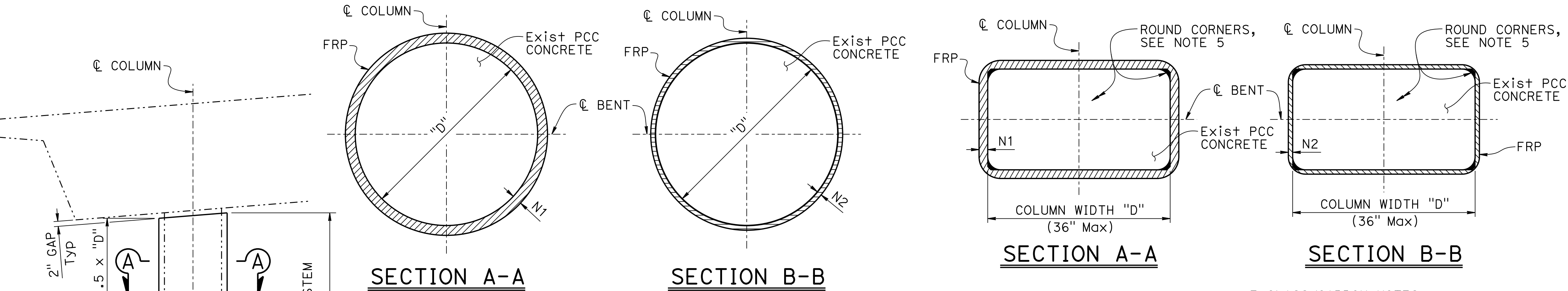




E-GLASS FRP SYSTEM		
ROUND COLUMN, NUMBER OF LAYERS (Min)		
COLUMN DIAMETER	N1	N2
12"	3	2
18"	5	3
24"	6	3
36"	9	5
48"	11	6
60"	14	7
72" Max	17	9

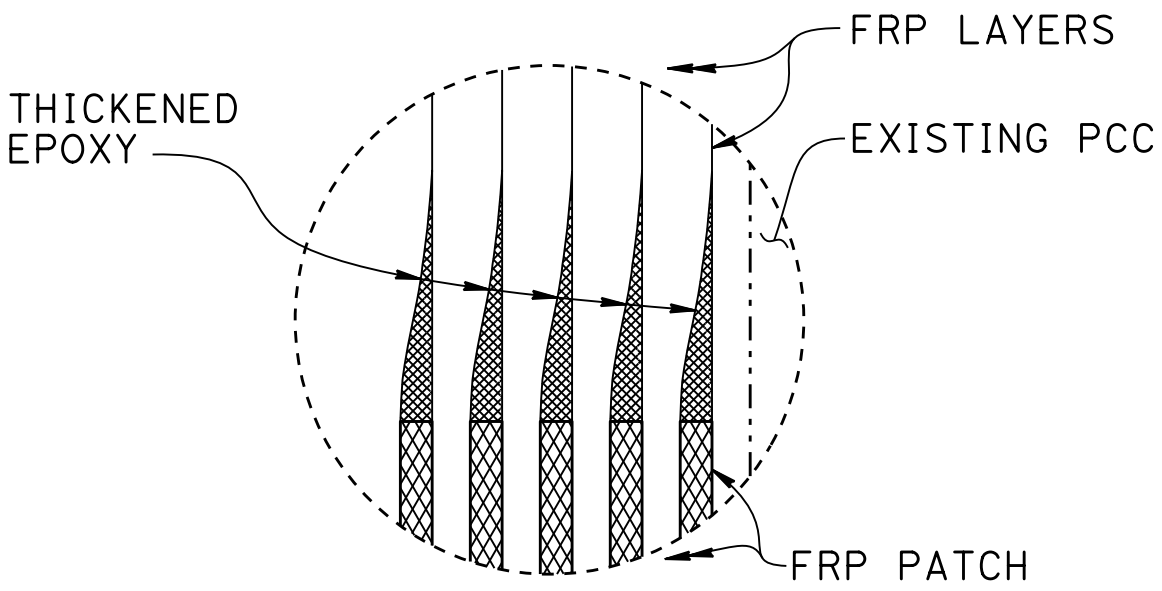
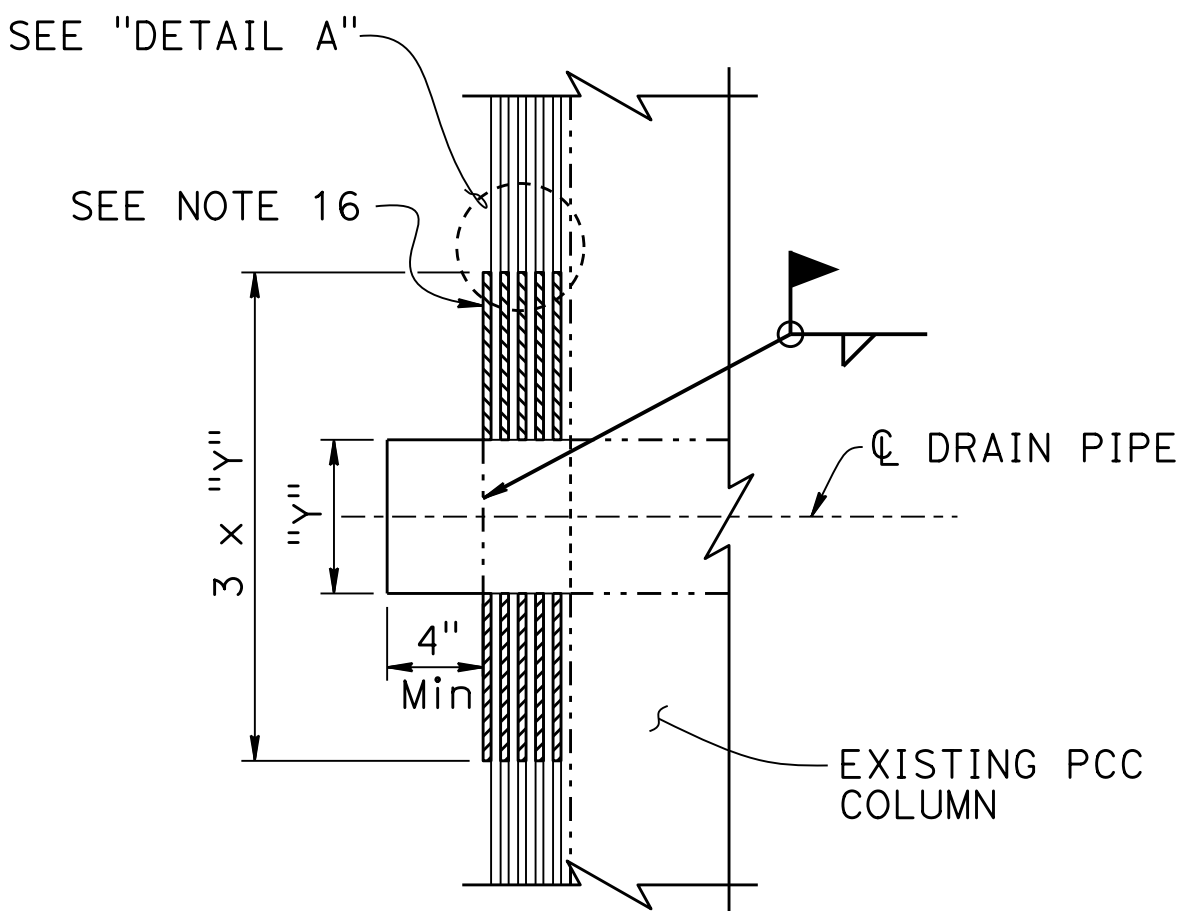
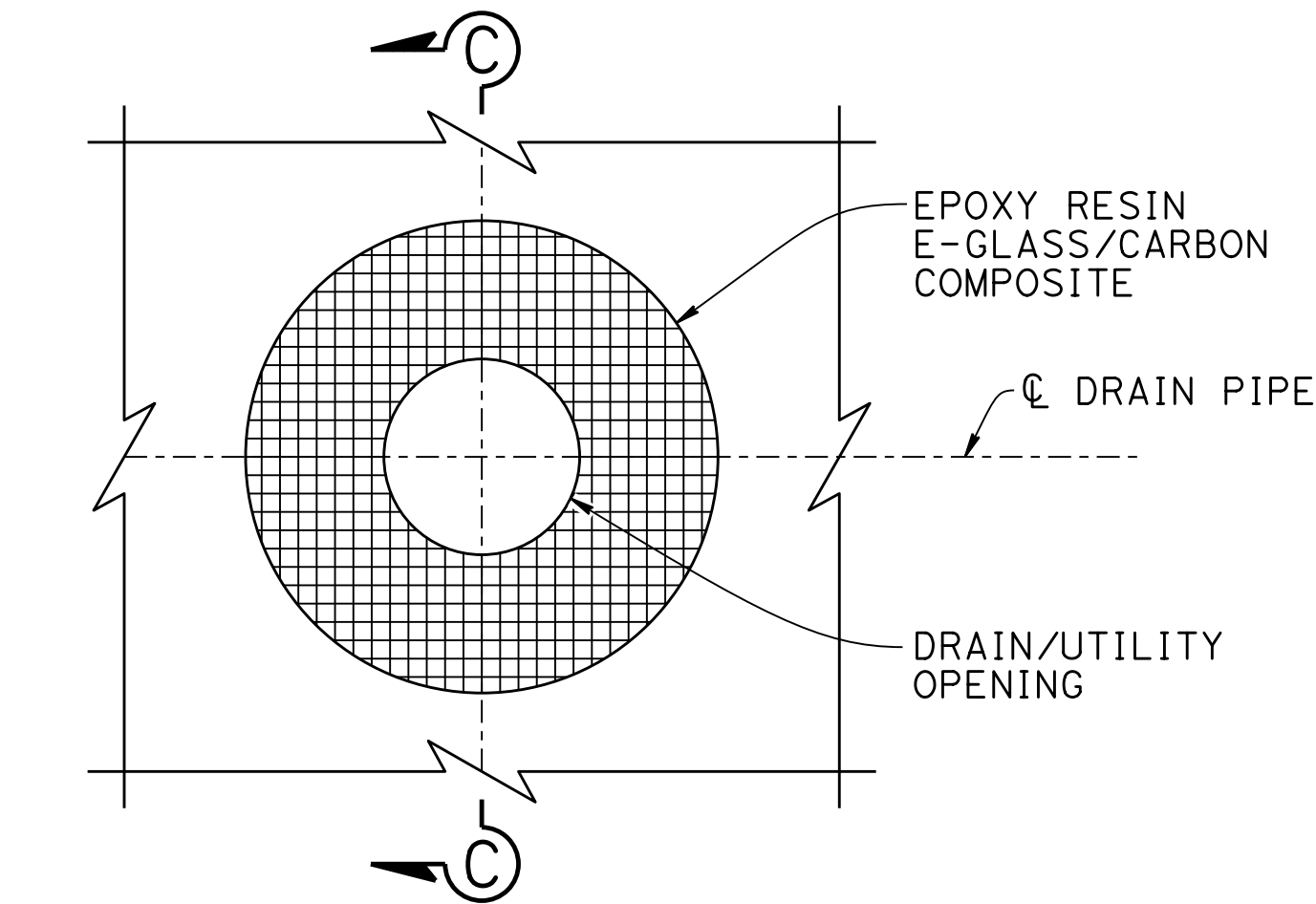
CARBON FRP SYSTEM		
ROUND COLUMN, NUMBER OF LAYERS (Min)		
COLUMN DIAMETER	N1	N2
12"	2	1
18"	3	2
24"	3	2
36"	5	3
48"	6	3
60"	8	4
72" Max	9	5

E-GLASS FRP SYSTEM		
RECTANGULAR COLUMN, NUMBER OF LAYERS (Min)		
COLUMN WIDTH	N1	N2
12"	5	3
18"	7	4
24"	9	5
30"	11	6
36" Max	13	7

CARBON FRP SYSTEM		
RECTANGULAR COLUMN, NUMBER OF LAYERS (Min)		
COLUMN WIDTH	N1	N2
12"	3	2
18"	4	2
24"	5	3
30"	6	3
36" Max	7	4

E-GLASS/CARBON NOTES:

- For all subsequent notes, surfaces shall be defined as the surface to receive the composite. Fabric refers to the unidirectional or bidirectional fiber. Fiber Reinforced Polymer (FRP) composite is either E-Glass or Carbon fiber and Epoxy resin.
- All surfaces shall be prepared for bonding by means of abrasive blasting or grinding.
- All surfaces shall be cleaned by hand or by oil-free compressed air. All surfaces shall be free of moisture, oils, loose material, debris, or dust.
- All cutting of fabrics, mixing of epoxy, and wetting out of fabric and handling, shall be done in a manner to ensure that the composite materials are free of moisture, oils, debris or dust.
- For non-circular columns remove any sharp corners/edges to a 1/2" radius minimum.
- A primer coat of epoxy shall be applied to the surface and allowed to cure for a minimum of one hour before the application of the FRP composite, or when a tacky surface is obtained.
- Surfaces shall be free of voids, protrusions, and sharp edges. Any voids or uneven surfaces shall be filled with a thickened epoxy.
- E-Glass or Carbon composite system used shall be selected from a list of Caltrans Prequalified composite systems.
- Fabric shall be completely saturated prior to application to the surface. No dry fiber placement is allowed, unless fabric used has removable backing or procedure has been approved by prequalification.
- The composite casing shall adhere firmly to the existing column surface.
- Detail/feather all fabric edges, including termination points, edges and seams with a thickened epoxy; no fiber or cross stitching shall protrude from the surface. Detailing/feathering shall extend a minimum of 6".
- Each composite section shall be wrapped using continuous fabric not less than 2'-0" in height. All wraps of continuous weave shall be terminated a minimum of 12" past the starting point of the initial wrap. Subsequent wraps shall be started (butted) at the ending point of the last wrap.
- The casing thickness shall taper evenly over the full length of the transition zone.
- For non-circular columns use number of layers specified in the "RECTANGULAR COLUMN" table.
- Existing non-circular column surfaces shall be straight or slightly convexed outward at all areas, otherwise, the surface shall be filled with thickened epoxy.
- Drainage opening reinforcement shall be the same fiber and resin material used for the column casing. Alternate continuous layer with local bi-axial weave patch at drainage opening.
- Minimum number of layers for the FRP System is based on minimum nominal composite layer thickness of 0.05" for E-Glass, and 0.04" for carbon.



- LEGEND:
- Existing Structure
 - Epoxy Resin E-Glass/Carbon Composite
- N1, N2 Minimum number of layers inside the plastic hinge zone and outside the plastic hinge zone