

**Permanent Supportive Housing - South Bend**  
**Storm Drainage Calculations**

**Site Information**  
Gross Site: 3.26 acres  
Project Area: 2.07 acres  
Total Non-impervious areas: 39,798 sq. ft. = 0.91 acres  
Total Impervious areas: 50,371 sq. ft. = 1.16 acres  
Building: 17,898 sq. ft.  
Pavilion: 225 sq. ft.  
Parking: 26,261 sq. ft.  
Walks: 5,987 sq. ft.

Weighted C =  $\frac{(0.91)(0.30) + (1.16)(0.95)}{2.07} = 0.66$

City of South Bend requirements: 10 yr, 6hr storm, I = 0.46

**Modified Rational Method with Infiltration**  
Calculated Infiltration Rate (per Geotechnical report min. 33 in/hr)  
Designed percolation rate = 50% of 33 in/hr  
Ab = Absorption Bed area = 2,260 sf  
Ground Infill Rate =  $\frac{2,260 \text{ sf} (16.5 \text{ in/hr})}{12 / 3600} = 0.863 \text{ cfs}$

| Storm Duration (hrs) | Rainfall Intensity "I" 10 year (in/hr) | Inflow Rate "Q" (cfs) | Ground Infiltration Rate (cfs) | Storage Rate (cfs) | Required Storage (cfs) | Required Storage (acre-Ft) |
|----------------------|--|-----------------------|--------------------------------|--------------------|------------------------|----------------------------|
| 0.083                | 6.400                                  | 8.74                  | 0.863                          | 7.881              | 0.05                   | 2,374                      |
| 0.167                | 5.000                                  | 6.83                  | 0.863                          | 5.968              | 0.08                   | 3,618                      |
| 0.250                | 4.375                                  | 5.98                  | 0.863                          | 5.114              | 0.11                   | 4,641                      |
| 0.500                | 2.950                                  | 4.03                  | 0.863                          | 3.167              | 0.13                   | 5,749                      |
| 1.00                 | 1.850                                  | 2.53                  | 0.863                          | 1.664              | 0.14                   | 6,042                      |
| 2.00                 | 1.150                                  | 1.57                  | 0.863                          | 0.708              | 0.12                   | 5,141                      |
| 3.00                 | 0.800                                  | 1.09                  | 0.863                          | 0.230              | 0.08                   | 2,504                      |
| 6.00                 | 0.460                                  | 0.63                  | 0.863                          | -0.235             | -0.12                  | -5,108                     |
| 12.00                | 0.278                                  | 0.38                  | 0.863                          | -0.483             | -0.48                  | -21,048                    |
| 24.00                | 0.184                                  | 0.22                  | 0.863                          | -0.639             | -1.28                  | -55,665                    |

**STORM DRAINAGE PROVIDED**

GRAVEL BED  
EXCAVATION: 10' W x 226' L x 6' D = 13,560 CU.FT.

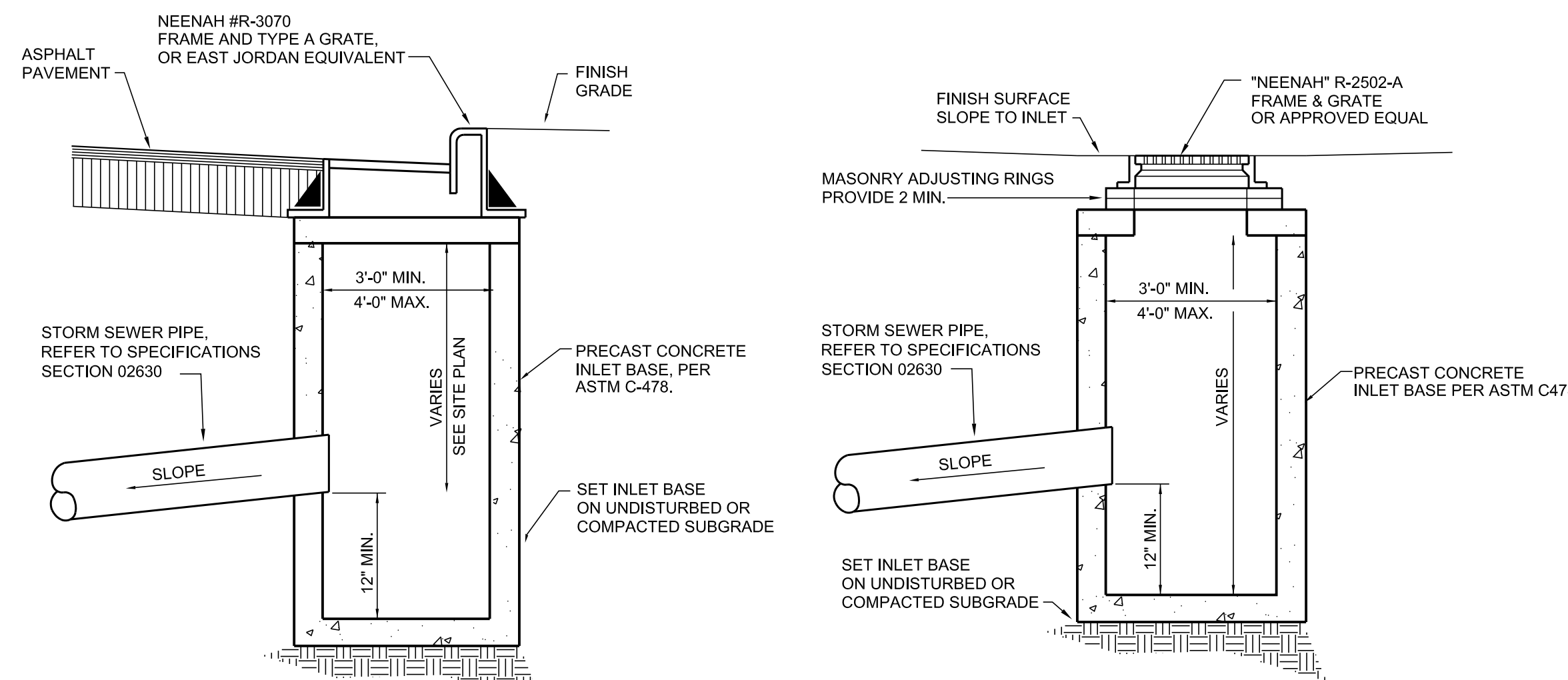
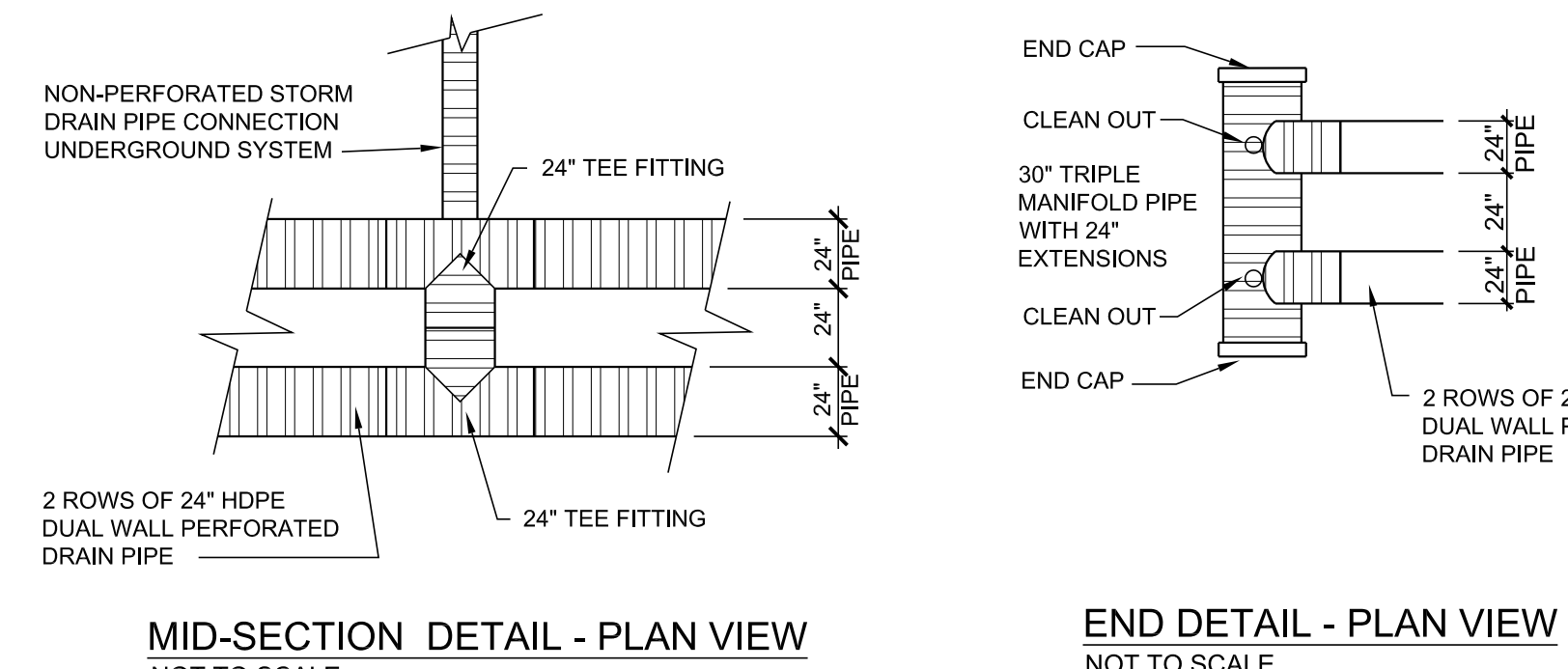
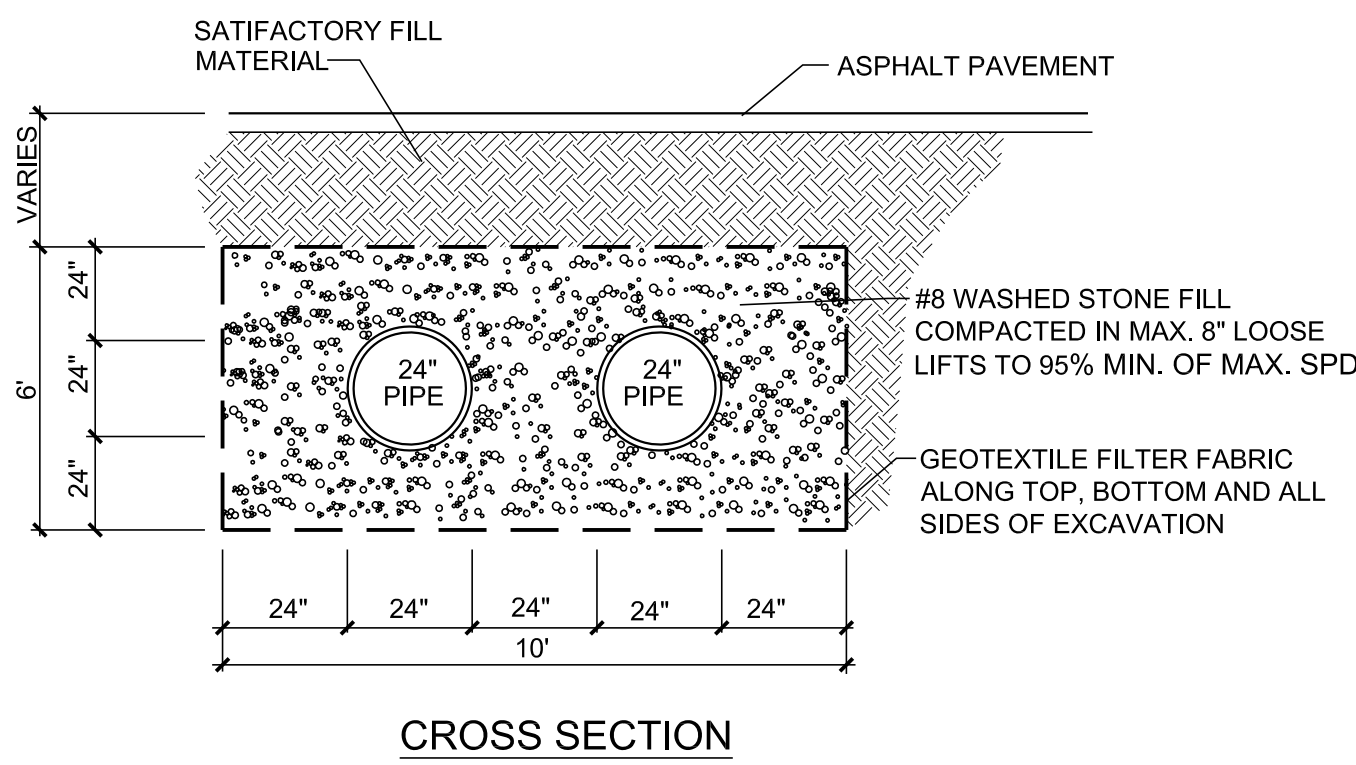
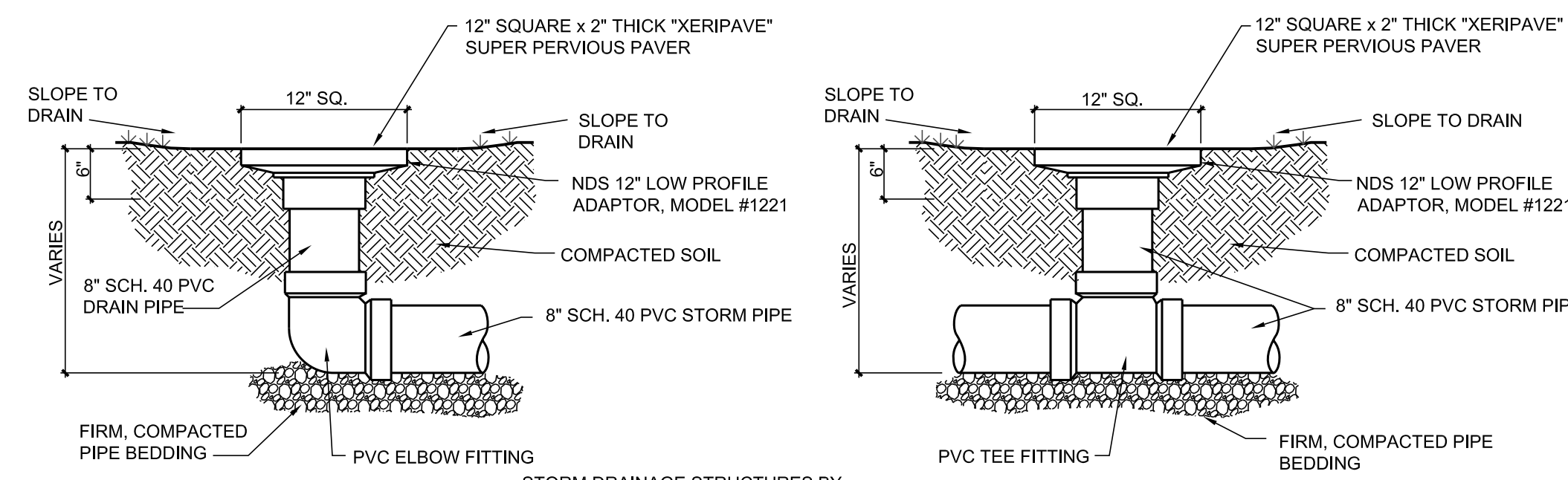
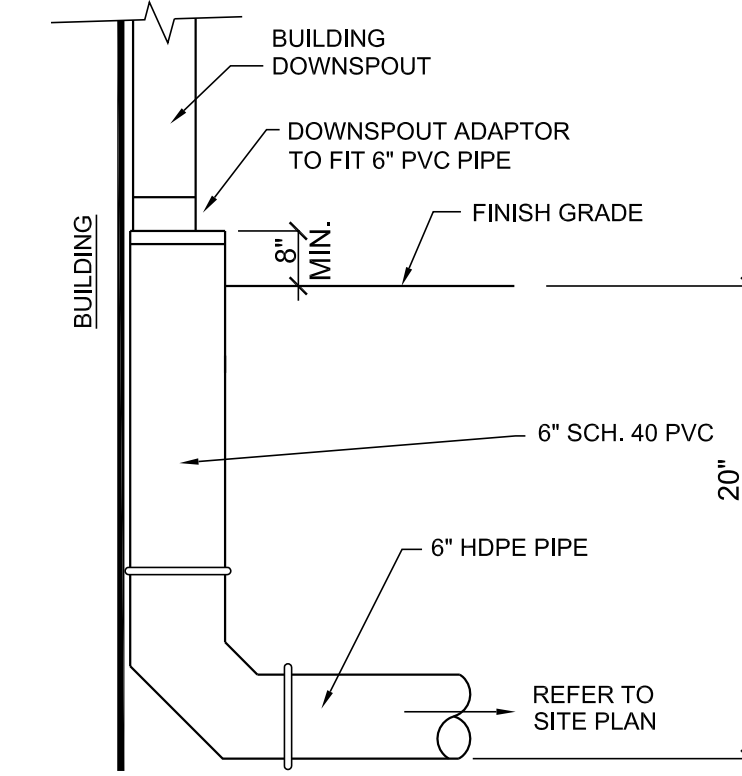
PIPING  
TWO ROWS OF 24" DIA. x 100' LONG = 200 LIN.FT.  
TWO ROWS OF 24" DIA. x 108' LONG = 216 LIN.FT.  
TWO 30" MANIFOLD ENDS x 8' = 16 LIN.FT.

PIPE VOLUME  
24" DIA. = 3.14 SQ.FT. x 416 LIN.FT. = 1,306 CU.FT.  
30" DIA. = 4.91 SQ.FT. x 16 LIN.FT. = 78 CU.FT.  
= 1,384 CU.FT. TOTAL PIPE VOLUME

GRAVEL STORAGE  
EXCAVATION LESS PIPE VOLUME  
= 13,560 CU.FT. - 1,384 CU.FT.  
= 12,176 CU.FT. OF GRAVEL AREA  
= 4,870 CU.FT. STORAGE VOLUME AT 40% VOIDS

TOTAL STORM WATER STORAGE  
4,870 CU.FT. GRAVEL VOLUME  
1,384 CU.FT. PIPE VOLUME  
= 6,254 CU.FT.

STORM WATER STORAGE REQUIRED = 6,042 CU.FT.  
STORM WATER STORAGE PROVIDED = 6,254 CU.FT.



**3 PIPE DRAIN SYSTEM**  
NOT TO SCALE

**4 CURB INLET**  
NOT TO SCALE

**5 CATCH BASIN**  
NOT TO SCALE