Popayán, 2 de julio de 2024

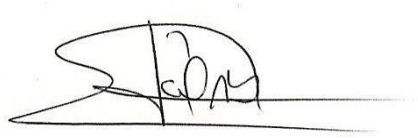
Ingeniero
**DIEGO FELIPE CUERVO**
Municipio de Popayán

**Ref. REPORTE ESTRUCTURAL DE MUROS DE CONTENCIÓN EN CONCRETO REFORZADOESTABLECIMIENTO DE SALUD PUERTO VALENCIA**

Cordial saludo,

Por medio de la presente, me permito presentar la verificación estructural de los muros en concreto reforzado para confinamiento de suelo de cimentación del Establecimiento de Salud Puerto Valencia.

Atentamente,

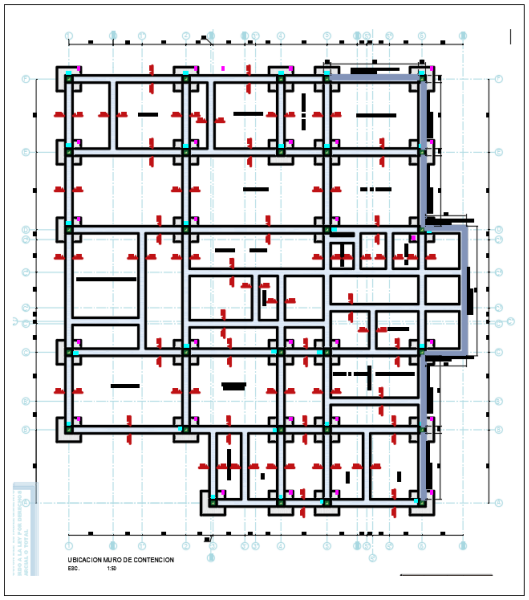


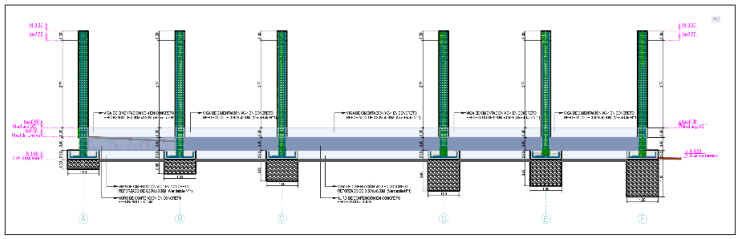
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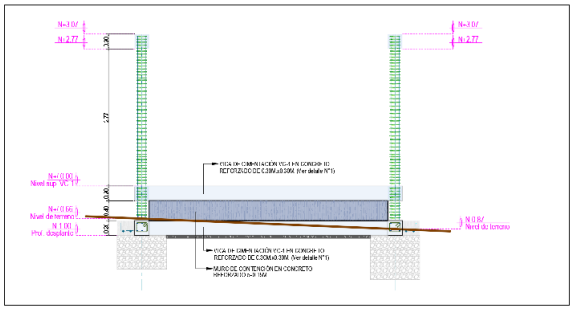
CARLOS ARIEL HURTADO ASTAIZA.
Ingeniero Civil – M.Sc. Estructuras
M.P. 19202-31021 CAU

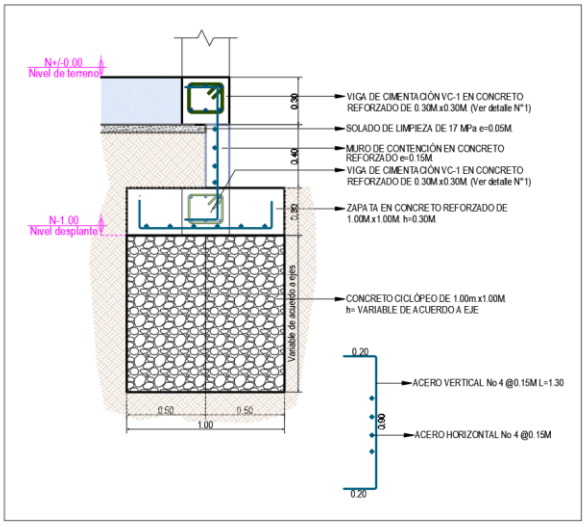
## VERIFICACIÓN DE PANTALLAS E.S EL RODEO

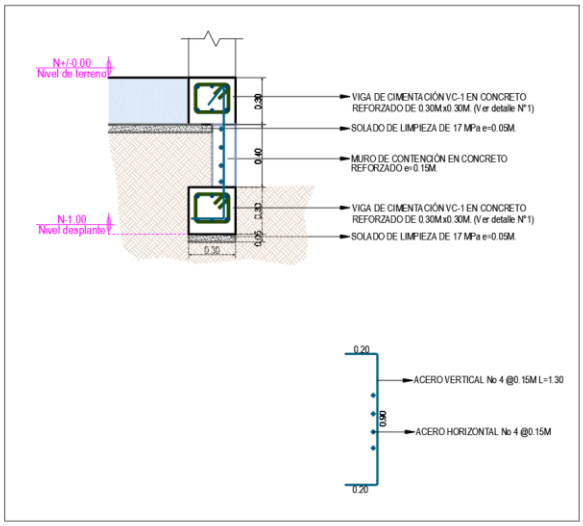
Se presenta en las siguientes imágenes la información inicial de las pantallas en concreto reforzado con espesores (e=15cm) de altura 40cm constante y libres entre vigas de cimentación y vigas de contrapiso







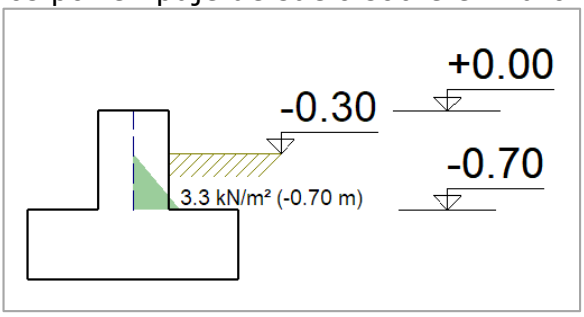

Concreto ciclópeo = 2500 PSi

## LISTADO DE COMPROBACIONES

Las pantallas de altura constante h=0.40m y espesor (e=15cm) cumplen satisfactoriamente con las solicitaciones. Los refuerzos de las pantallas cumplen con una parrilla centrada con barras #4 vertical y #4 horizontal cada 15cm indicada en planos.

Nivel de desplante del muro: -0.70m
Nivel de coronación del muro: -0.30m
Altura efectiva a empuje: 0.40m
Ángulo de talud: 0°
Densidad aparente: 15.40 kN/m3
Angulo de rozamiento interno: 28°
Evacuación por drenaje: 100%

Diagrama de esfuerzos por empuje de suelo sobre el muro




## Comprobaciones

| Muro M1: Longitud: 630 cm [Nudo inicial: 14.77;8.36 -> Nudo final: 14.77;14.66] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 58.46 | -18.46 | 256.15 | -7.29 | 2.07 | 0.70 | 5.41 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 79.43 | -18.46 | 256.15 | -7.29 | 2.07 | 0.70 | 5.41 | --- | --- |
| | Arm. vert. izq. | 50.04 | -14.82 | 208.81 | -23.79 | -0.30 | 0.56 | 5.83 | --- | --- |
| | Arm. horz. izq. | 72.84 | -14.80 | 251.02 | -25.50 | -0.30 | 0.77 | 5.18 | --- | --- |
| | Concreto | 62.06 | 16.83 | -1.57 | -95.97 | 2.94 | 1.65 | 4.56 | --- | --- |
| | Arm. transve. | 73.86 | -13.05 | 188.32 | -29.92 | --- | --- | --- | 2.54 | 71.73 |

| Muro M2: Longitud: 397 cm [Nudo inicial: 10.80;14.66 -> Nudo final: 14.77;14.66] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 35.42 | 118.08 | 40.54 | -21.55 | 0.75 | -0.14 | -1.04 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 35.89 | -7.15 | 120.44 | 20.19 | 0.14 | -0.54 | 2.56 | --- | --- |
| | Arm. vert. izq. | 28.38 | 16.16 | -3.37 | -69.85 | -1.38 | -0.25 | 0.35 | --- | --- |
| | Arm. horz. izq. | 39.60 | -7.89 | 144.19 | 3.84 | -0.65 | -0.54 | 2.27 | --- | --- |
| | Concreto | 29.45 | -8.28 | 4.21 | 49.80 | -1.40 | -0.36 | 2.06 | --- | --- |
| | Arm. transve. | 20.17 | 39.87 | 55.67 | -13.64 | --- | --- | --- | -20.23 | -28.76 |

| Muro M3: Longitud: 187.2 cm [Nudo inicial: 14.77;8.36 -> Nudo final: 16.64;8.36] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 33.94 | 49.63 | -85.08 | -59.75 | 0.00 | 0.34 | -2.67 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 23.82 | 35.60 | -44.75 | -27.13 | 0.00 | 0.38 | -3.21 | --- | --- |
| | Arm. vert. izq. | 44.50 | 36.96 | -31.49 | -4.88 | -2.14 | 0.40 | -3.04 | --- | --- |
| | Arm. horz. izq. | 27.86 | 29.45 | 31.53 | 26.28 | -1.25 | 0.19 | -2.52 | --- | --- |
| | Concreto | 37.19 | 49.63 | -85.08 | -59.75 | 0.00 | 0.34 | -2.67 | --- | --- |
| | Arm. transve. | 9.59 | -60.60 | -21.98 | 31.29 | --- | --- | --- | 20.97 | -31.33 |

| Muro M5: Longitud: 527.4 cm [Nudo inicial: 16.49;3.09 -> Nudo final: 16.49;8.36] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 53.28 | 151.20 | 44.25 | 26.83 | 1.93 | 0.64 | 1.13 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 26.20 | 151.20 | 44.25 | 26.83 | 1.93 | 0.64 | 1.13 | --- | --- |
| | Arm. vert. izq. | 26.96 | 147.35 | 43.84 | 24.19 | 0.00 | 0.60 | 1.20 | --- | --- |
| | Arm. horz. izq. | 11.01 | 81.60 | 33.48 | 8.84 | 0.00 | 0.46 | 1.18 | --- | --- |
| | Concreto | 19.31 | 14.00 | -5.40 | 16.86 | 0.35 | 0.55 | 1.71 | --- | --- |
| | Arm. transve. | 5.06 | -11.54 | 11.11 | -6.96 | --- | --- | --- | 18.34 | -7.70 |

| Muro M6: Longitud: 171.8 cm [Nudo inicial: 14.77;3.24 -> Nudo final: 16.49;3.24] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 40.32 | 29.38 | -42.23 | -6.24 | 1.97 | -0.41 | 2.88 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 34.22 | 15.39 | 13.28 | 26.28 | 0.58 | 1.15 | 3.01 | --- | --- |
| | Arm. vert. izq. | 32.41 | 41.61 | -90.26 | -62.61 | 0.00 | -0.36 | 2.56 | --- | --- |
| | Arm. horz. izq. | 23.60 | 34.00 | -42.12 | -50.45 | 0.00 | -0.19 | 2.75 | --- | --- |
| | Concreto | 36.83 | 40.92 | -90.68 | -57.45 | 0.00 | -0.39 | 2.68 | --- | --- |
| | Arm. transve. | 18.63 | 12.96 | 8.93 | 2.63 | --- | --- | --- | 5.31 | 44.97 |

| Muro M7: Longitud: 630 cm [Nudo inicial: 14.77;-3.06 -> Nudo final: 14.77;3.24] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| N-0.7 - Nivel +0.00 | Arm. vert. der. | 60.82 | 33.05 | 46.62 | 32.35 | 2.25 | -1.51 | -5.82 | --- | --- |
| (e=15.0 cm) | Arm. horz. der. | 84.03 | -18.67 | 266.94 | 24.01 | 1.85 | 1.70 | -5.53 | --- | --- |
| | Arm. vert. izq. | 53.49 | 33.05 | 46.62 | 32.35 | 0.00 | -1.51 | -5.82 | --- | --- |
| | Arm. horz. izq. | 73.61 | -18.55 | 247.75 | 37.01 | -0.37 | 1.60 | -5.69 | --- | --- |

| Muro M7: Longitud: 630 cm [Nudo inicial: 14.77;-3.06 -> Nudo final: 14.77;3.24] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Planta | Comprobación | Aprovechamiento (%) | Críticos | | | | | | | |
| | | | Nx (kN/m) | Ny (kN/m) | Nxy (kN/m) | Mx (kN·m/m) | My (kN·m/m) | Mxy (kN·m/m) | Qx (kN/m) | Qy (kN/m) |
| | Concreto | 62.18 | -22.14 | 9.21 | 79.58 | 3.32 | 0.93 | -4.91 | --- | --- |
| | Arm. transve. | 60.80 | -20.96 | 285.48 | 23.28 | --- | --- | --- | -0.80 | -59.09 |

Aprovechamiento: Nivel de esfuerzos (relación entre el esfuerzo máximo y el admisible). Equivale al inverso del coeficiente de seguridad.
Nx : Axial vertical (kN/m).
Ny : Axial horizontal (kN/m).
Nxy: Axial tangencial (kN/m).
Mx : Momento vertical (alrededor del eje horizontal) (kN·m/m).
My : Momento horizontal (alrededor del eje vertical) (kN·m/m).
Mxy: Momento torsor (kN·m/m).
Qx : Cortante transversal vertical (kN/m). Qy
: Cortante transversal horizontal (kN/m).