TBWall Report

Project Information
- Designed By
- Organization
- Date: 7/2/2017
- Project
- Job #
- Client

Number of Tieback Levels: One
Units System: ft

Geometry:
- a: 7.0 ft
- b: 12.8 ft
- h: 19.8 ft
- L: 21.7 ft

Properties:
- E: 29000 ksi
- fy: 50 ksi

Max. Deflection: 0.7 in

Beam Shape: W16X57

Tieback Data:
- Angle1: 20
Design Philosophy

The analysis is based on "Equivalent Beam Method" first proposed by Blum and explained in detail in "Foundation Design" Teng, 1962, 1st & only edition or in "Foundation Engineering" Jumikis, 1987 2nd ed.

The design is based on classical structural analysis:

* This program uses classic-beam-theory beam elements to solve the multispans tieback design.

* The equivalent nodal loads for each span are determined by numerical integration of the beam equations to allow for the non uniform loads.

* The equivalent nodal loads, the stiffness matrix, and the support conditions are used to solve for the support reactions and the support rotations.

* The support reactions are then used to numerically integrate the entire span for values to display in the plots, and to find the max/min values.

* Steel Shapes only include compact sections, If noncompact sections are desired, additional design checks are required.

* The deflection output is based on structural analysis but an independent check should be made by Finite Element method or by site surveying.
Reaction 1  Reaction 2
-51.60 kips  -18.35 kips

Maximum Shear  -29.1 kip at 7.00 ft
Maximum Moment  78.9 kip-at 7.00 ft
Maximum Deflection  -0.0727 in at 15.39 ft

Required Aw  1.45 in2 Adequate for Shear
Required Zx  31.62 in3 Adequate for Bending
Utilized Ix  11% Adequate for Deflection

Tieback Force  54.9 kips
Unbonded Tieback Length  15.0 ft
Test Load  73.0 kips

Lateral Torsional Buckling Check
\begin{align*}
L_b & = 153 \text{ in} \\
C_b & = 1 \\
r_y & = 1.60 \text{ in} \\
I_y & = 43.10 \text{ in}^4 \\
h_0 & = 15.68 \text{ in} \\
J & = 2.22 \text{ in}^4 \\
\text{rts} & = 1.9 \text{ in} \\
L_p & = 67.8 \text{ in} \\
L_r & = 219.4 \text{ in} \\
F_{cr} & = 60 \text{ ksi} \\
M_n/Q & = 205 \text{ kip-ft}
\end{align*}

Axially-Loaded Member Check
\begin{align*}
P & = 0 \text{ kips} \\
L & = 13 \text{ ft} \\
K & = 0.8 \\
A & = 16.8 \text{ in}^2 \\
KL/r & = 76.5 \\
F_e & = 49 \text{ ksi} \\
F_{cr} & = 33 \text{ ksi} \\
P_n/Q & = 328 \text{ kips}
\end{align*}

Required Embedment  12.05 ft
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Combined Forces Utilization  38%