

APPENDIX D: HAND STEEL CALCULATIONS UNDER ROOF GARDEN AND WITH NEW COLUMN LAYOUT

Under Roof Garden

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS

STEEL CALCULATIONS UNDER ROOF GARDEN

<p><u>FLOVER CARPET.</u> DL = 10 PSF + 18 PSF LL = neg. SL = 30 PSF TL = 1.2(28) + 1.6(30) = 82 PSF $(82)(18.75) = 1.54 \text{ KLF}$ $M_{MAX} = \frac{1}{2}(1.54)(30^2) = 173.5 \text{ FT-K}$ LRFD MANUAL W14x30 NON-COMPOS. → EXISTING W18x40, W14x30 OK.</p>	<p>DL = 10 PSF + 18 PSF LL = 50 PSF SL = 30 PSF TL = 1.2(28) + 0.5(30) + 1.6(50) = 128.6 PSF 2.42 KLF $M_{MAX} = 272.3 \text{ FT-K}$ W16x40</p>
<p><u>AROMATIC GARDEN</u> DL = 10 PSF + 24 LL = neg. SL = 30 TL = 89 PSF $M_{MAX} = 188 \text{ FT-K}$ W16x31 → USE NON-COMPOSITE SYSTEM</p>	<p>DL = 34 LL = 50 SL = 30 TL = 136 PSF $M_{MAX} = 287 \text{ FT-K}$ W18x40</p>
<p><u>SAVANNAH</u> DL: 46 PSF LL: neg. SL: 30 TL: 104 PSF $M_{MAX} = 220 \text{ FT-K}$ COMPOSITE SYSTEM W/ 3" DECK + 35' CONC. (464) $Y1 = 0, Y2 = 4.72$ → W10x15 (NON-COMPOSITE) W18x35V</p>	<p>COMPOSITE DL: 46 + 60 LL: 50 SL: 30 TL: 104 PSF 219.8 $M_{MAX} = 317 \text{ FT-K}$ ↓ W21x44 $281 / (0.85(4)(3.75)) = 9.184'$ $Y2 = 6.5 - 0.5(1.84) = 5.58$</p>
<p><u>MEADOWS</u> DL: 64 PSF LL: neg. SL: 30 TL: 125 $M_{MAX} = 264 \text{ FT-K}$ → W16x40</p>	<p>DL: 64 + 60 LL: 50 SL: 30 TL: 172 515 $M_{MAX} = 515 \text{ FT-K}$ $Y1 = 0, Y2 = 4.75$ W14x22</p>

With New Column Grid

NEW STEEL LAYOUT

GIRDERS
 30' LONG, 26'-3" TRJB

100 PSF LL
 60 PSF DL + 10
 TL = 244 PSF
 = 640 SKLF
 $M_{MAX} = 720.56 \text{ FT-K}$

W18x55
 W21x48

$a = \frac{40}{(0.85)(4)(12)(3.75)} = 2.745$
 $Y1 = 0, Y2 = 5.15$ ✓

$a = \frac{40}{(0.85)(4)(12)(3.75)} = 2.6209$
 $Y1 = 0, Y2 = 5.19$ ✓

• COLUMNS ROOF TL: 60 PSF OFFICE TL: 244 PSF
 $(30^2)(60 + 4(244)) = 935 \text{ K}$
 13'-4" UNBRACED LENGTH → W12x96
 W14x90