

Sacramento Airport

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Sacramento Airport



We are analyzing **Central Terminal B** of the Sacramento International Airport in Sacramento, California

This Structure is linked to parking and through a APM Station to Concourse B.



Sacramento Airport Architect & Team



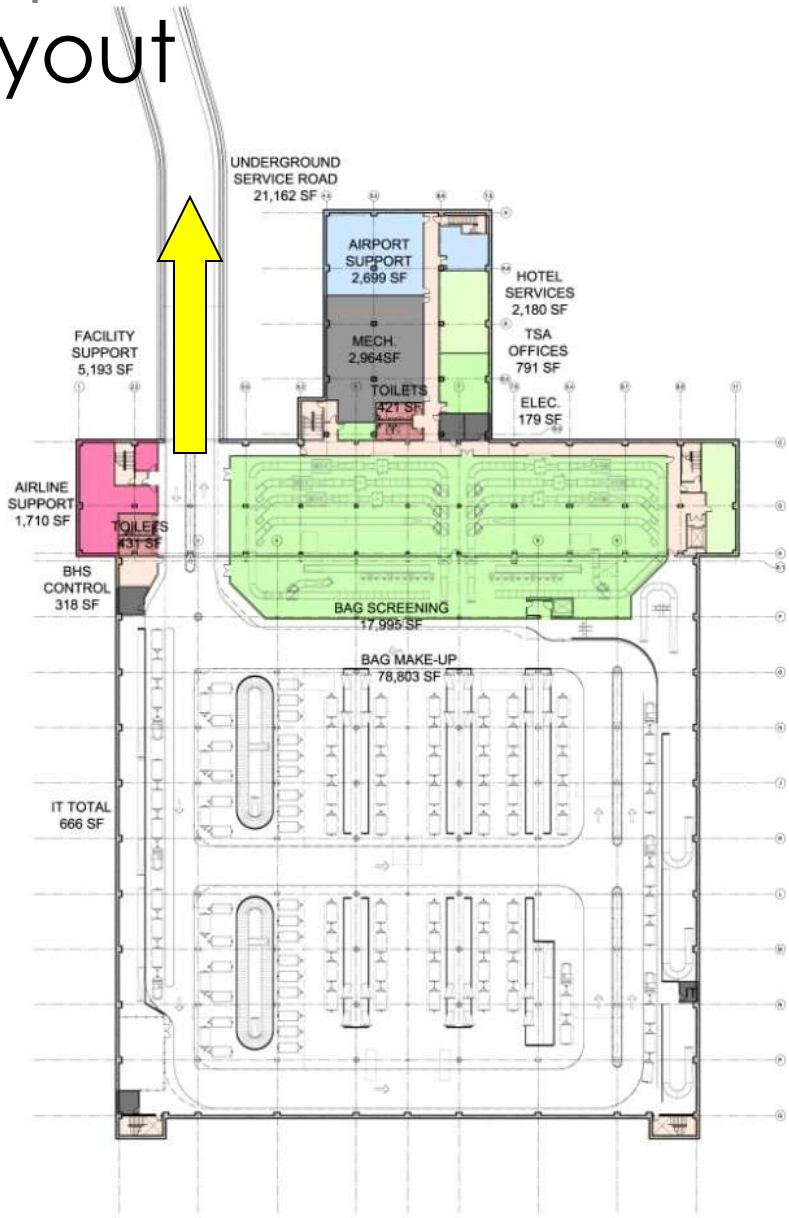
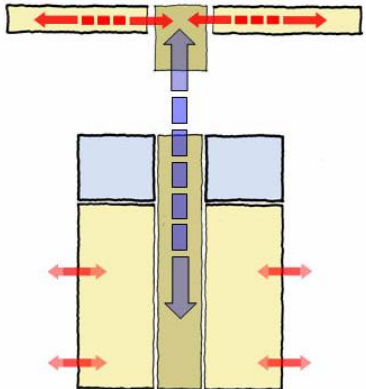
CORGAN was the primary architect.

L.A.Fuess Partners Inc. was the primary structural engineer.

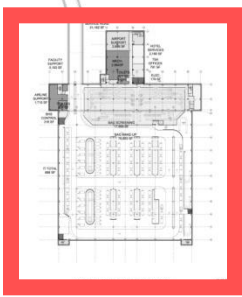
The collaborative design process includes stakeholders, community members, passengers, and airport tenant.

Other local support firms include: **Lionakis Design Group, Dreyfuss and Blackford, Kennedy/Jenks, Capital Engineering, TTE, Hatch Mott MacDonald, Enovity, and Lea+Elliott.**

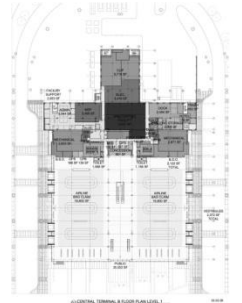
Sacramento Airport Building Layout



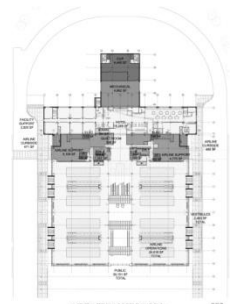
Basement



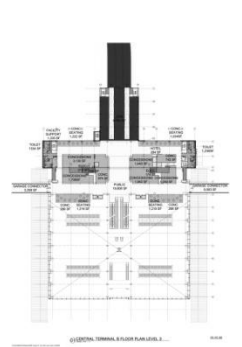
1st Floor



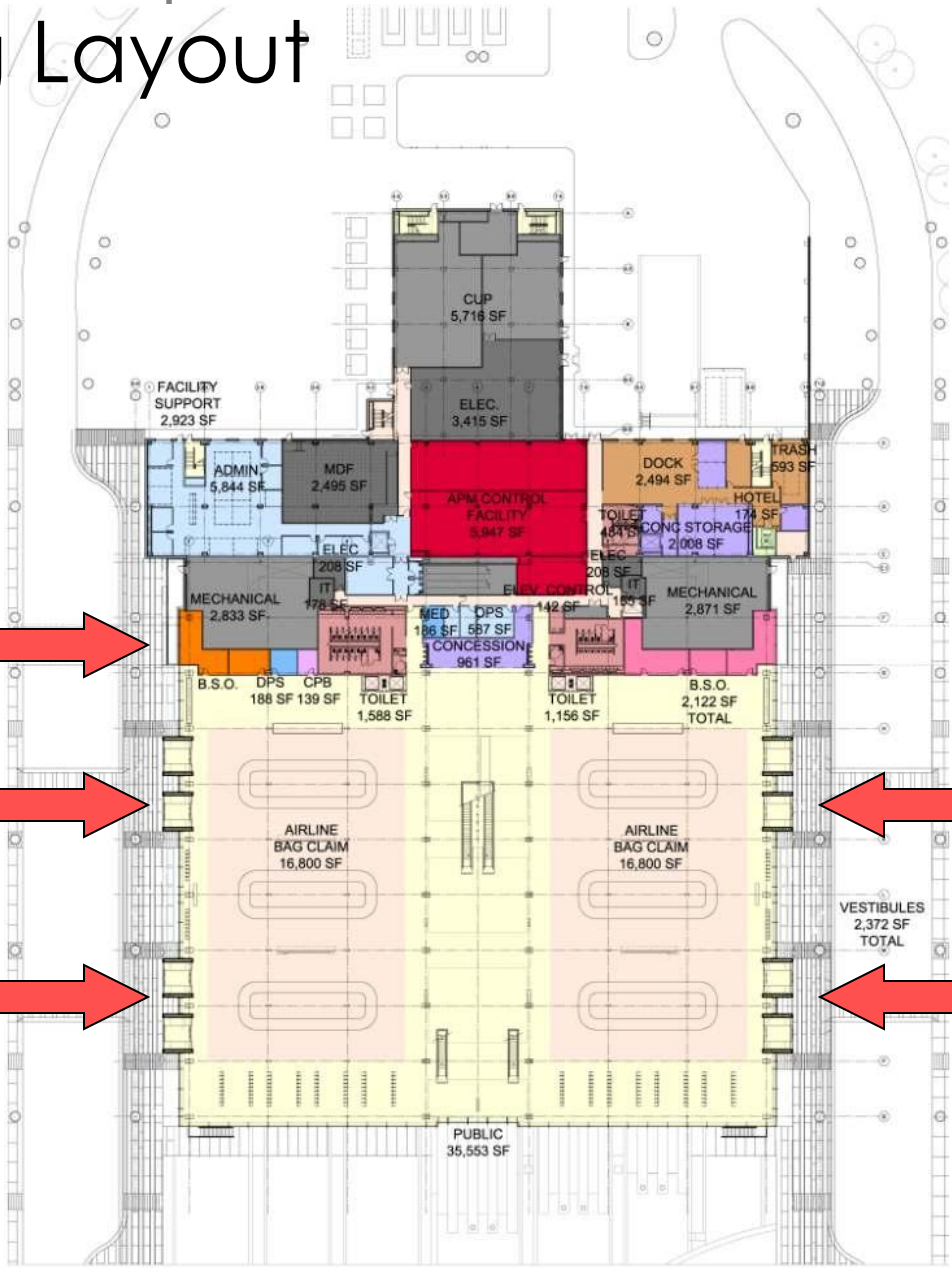
2nd Floor



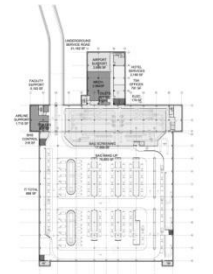
3rd Floor



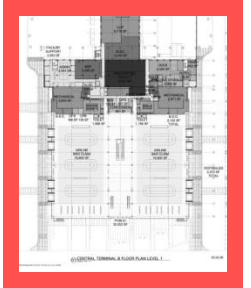
Sacramento Airport Building Layout



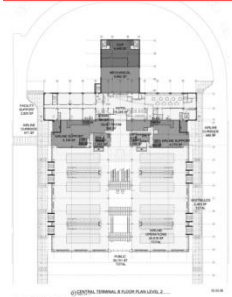
Basement



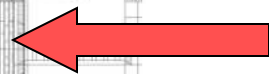
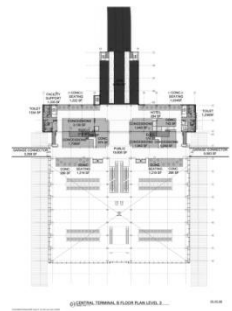
1st Floor



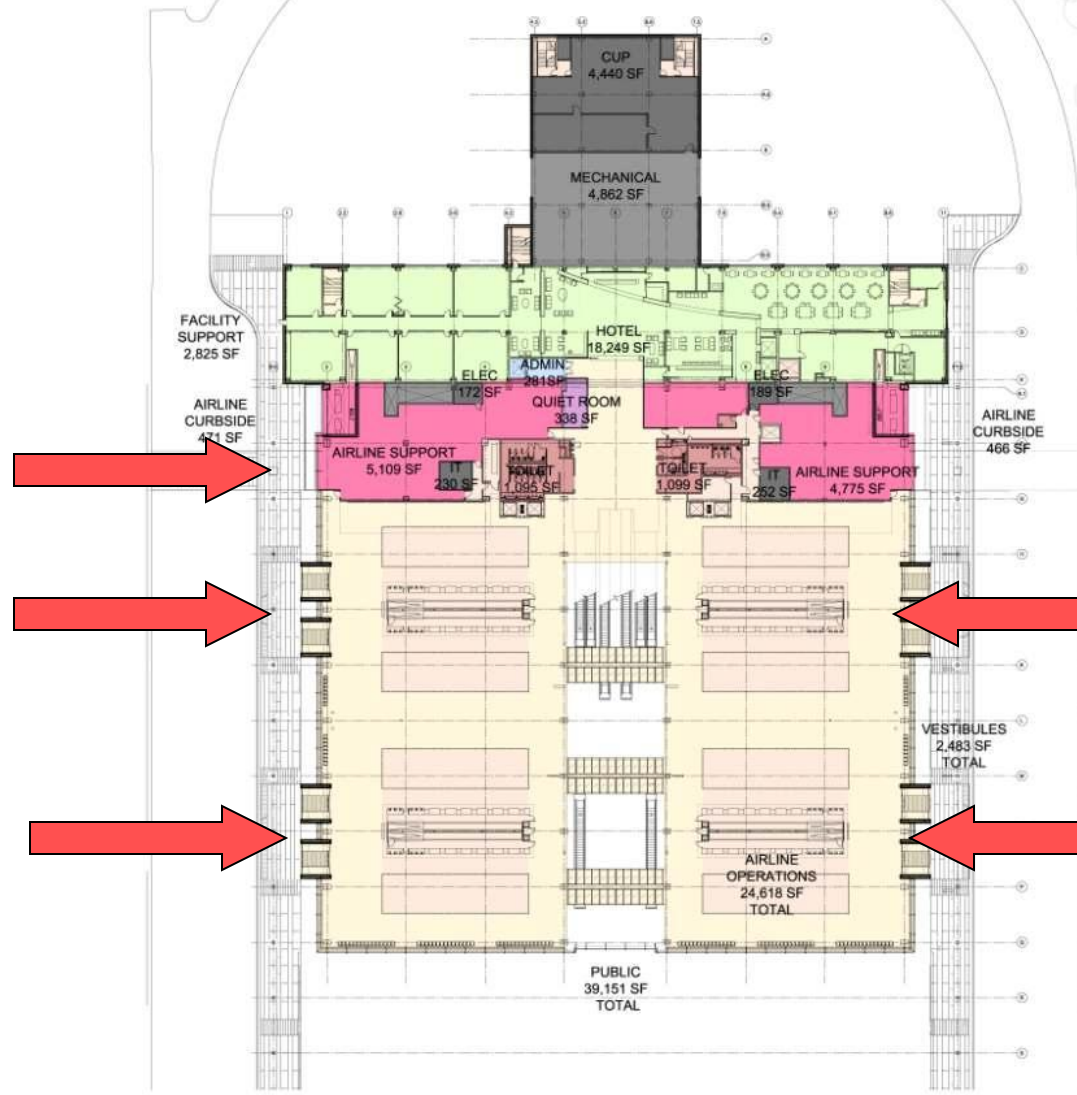
2nd Floor



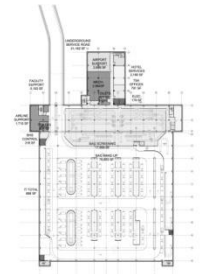
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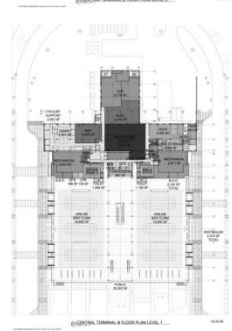
Sacramento Airport Building Layout



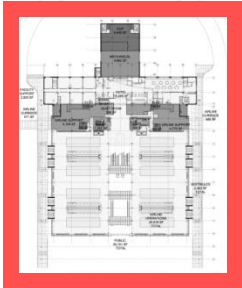
Basement



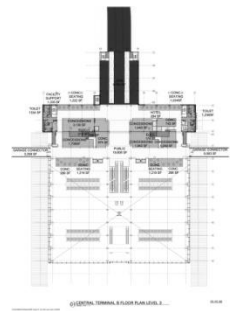
1st Floor



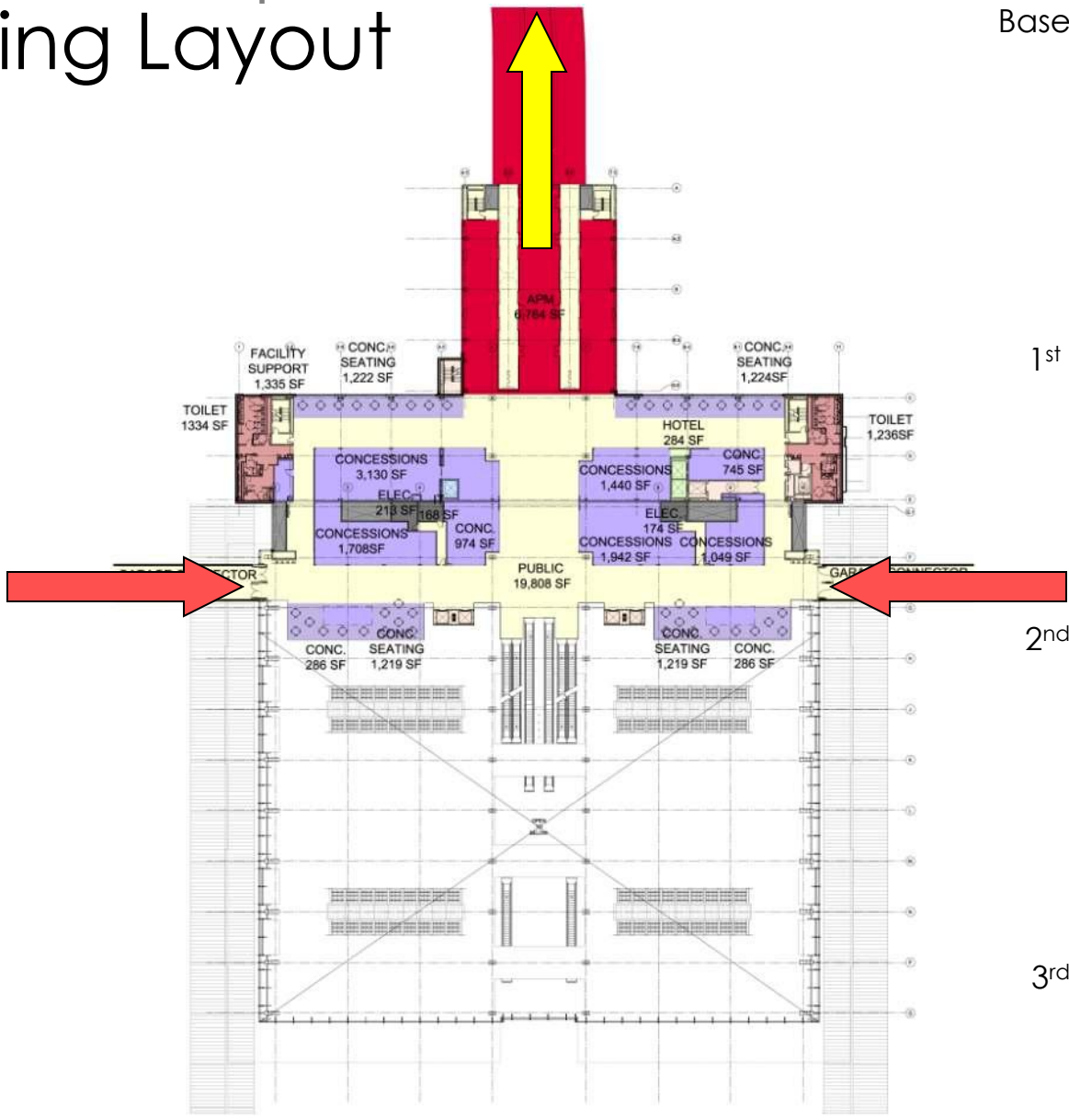
2nd Floor



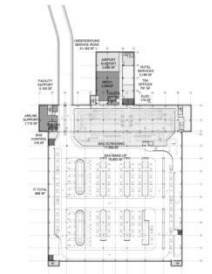
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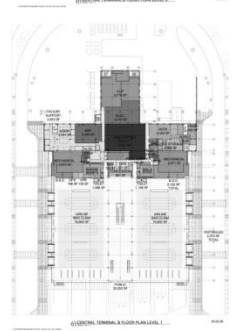
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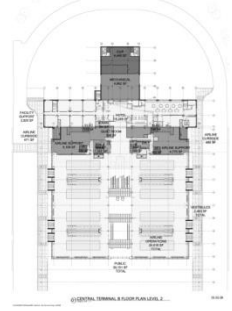
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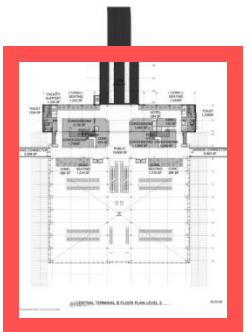
1st Floor



2nd Floor

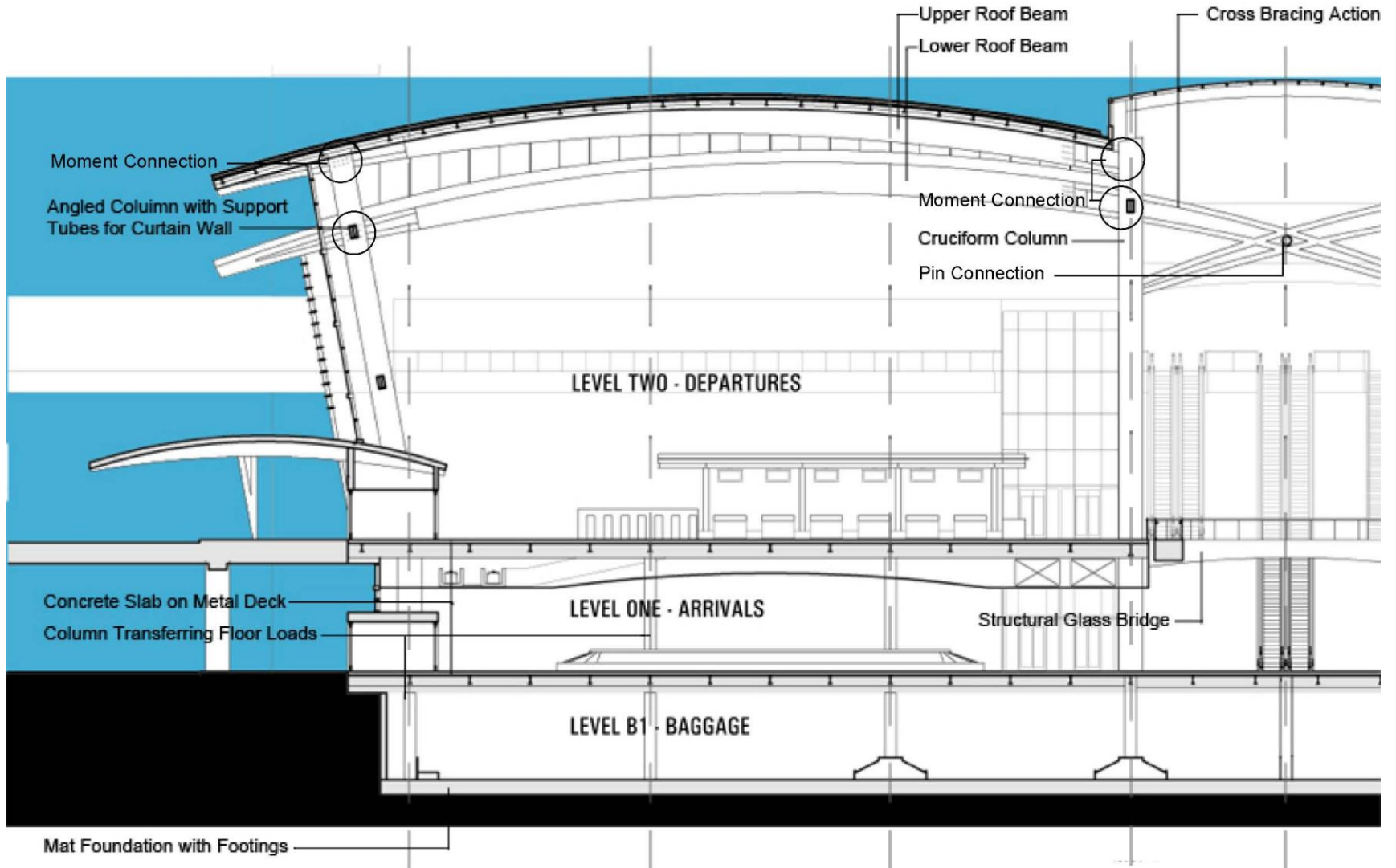


3rd Floor



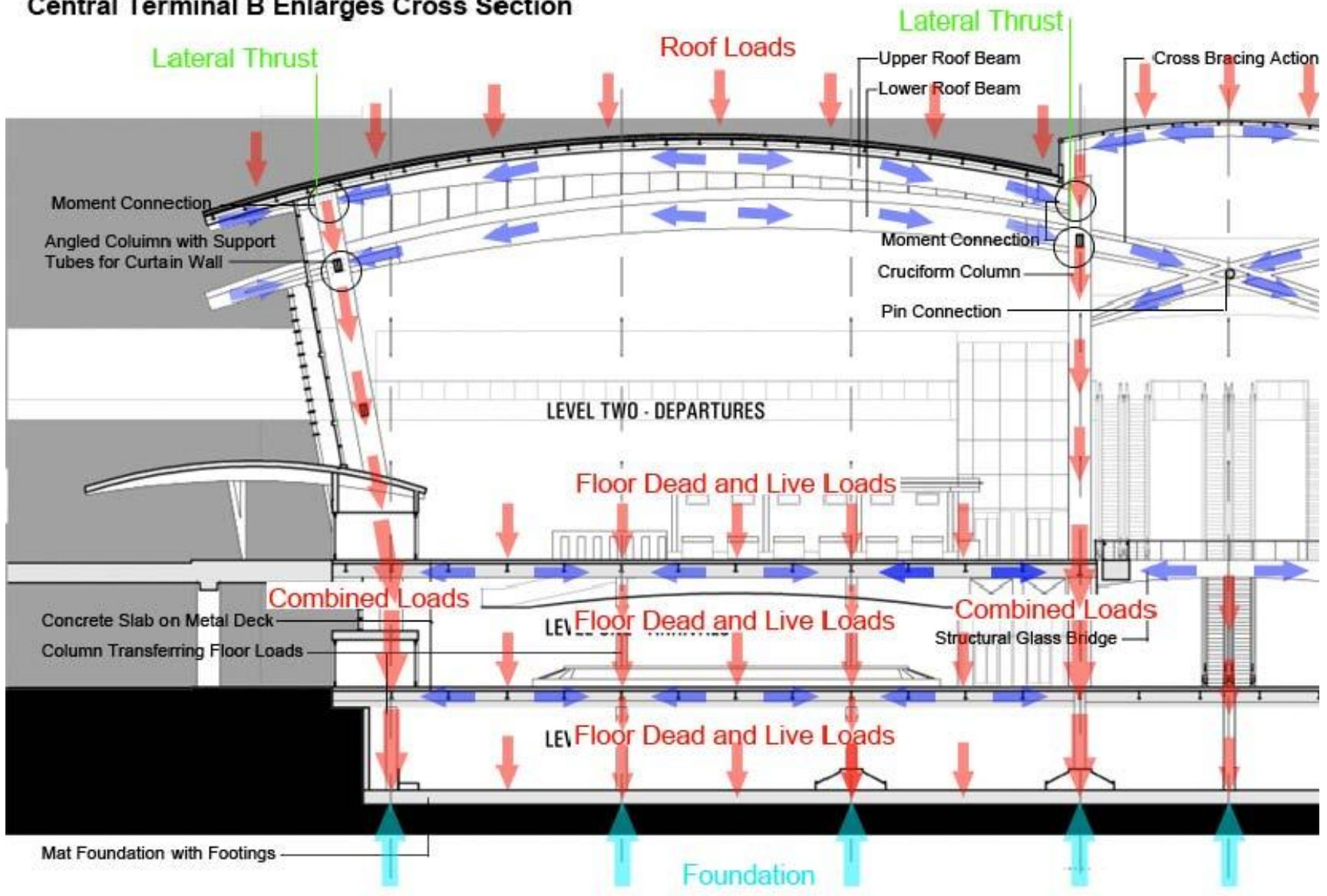
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Central Terminal B Enlarges Cross Section

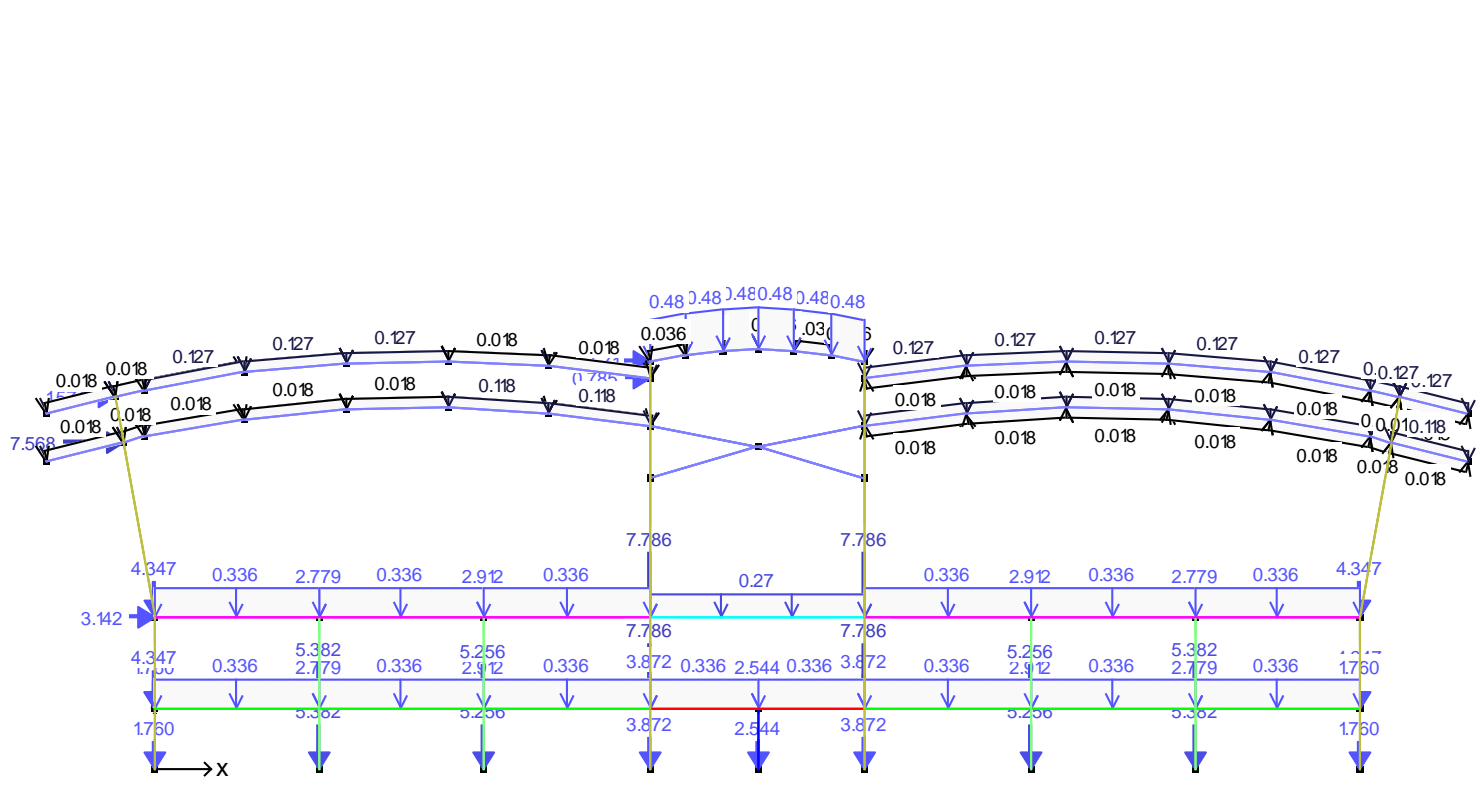


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Central Terminal B Enlarges Cross Section

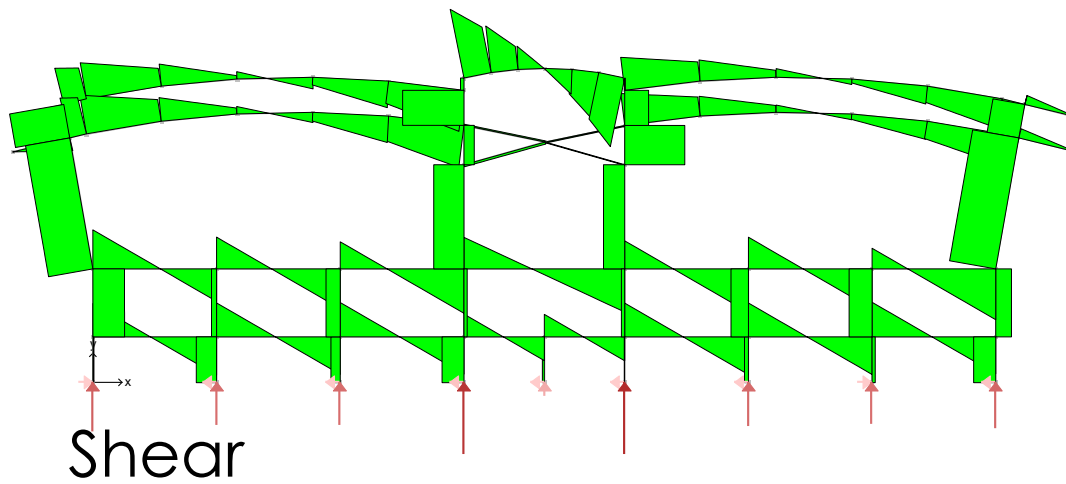
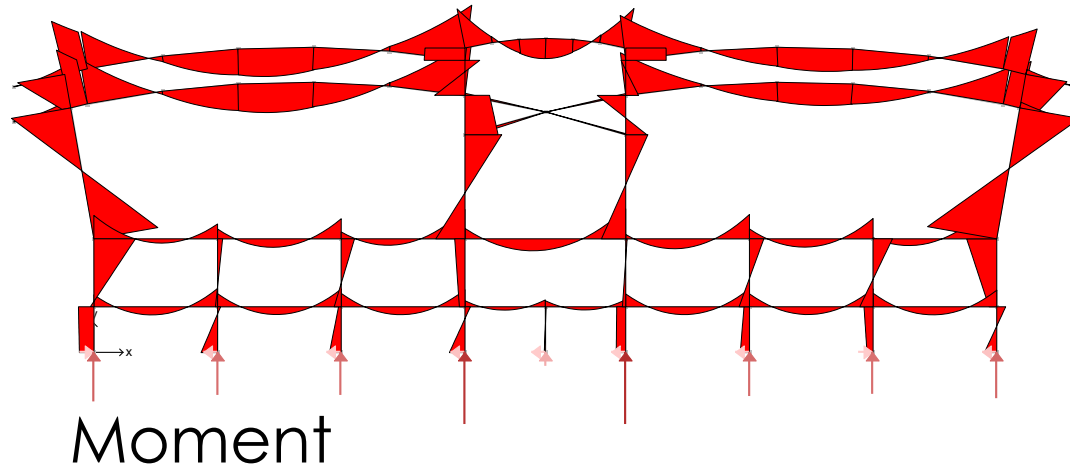


Sacramento Airport Force Diagrams

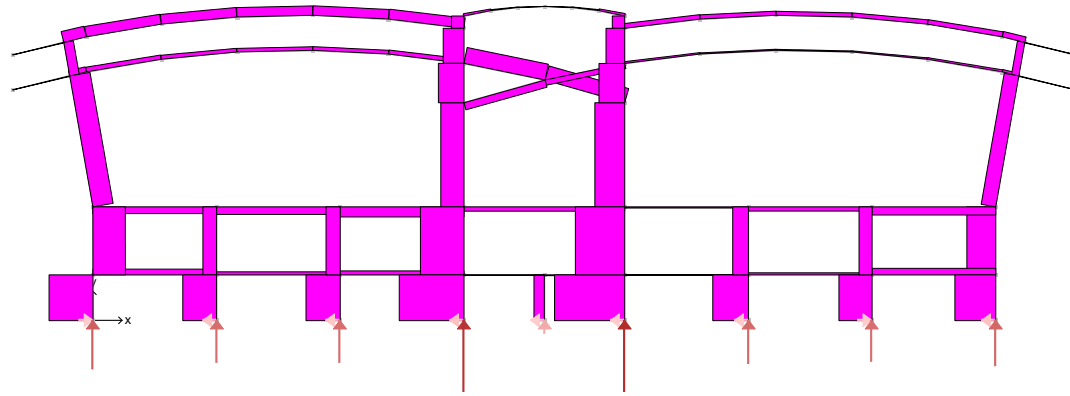


Loads

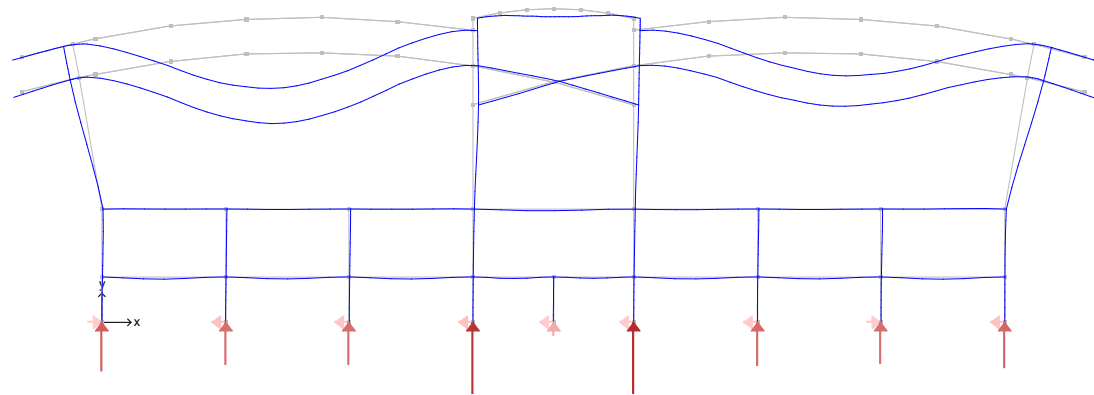
Sacramento Airport Force Diagrams



Sacramento Airport Force Diagrams

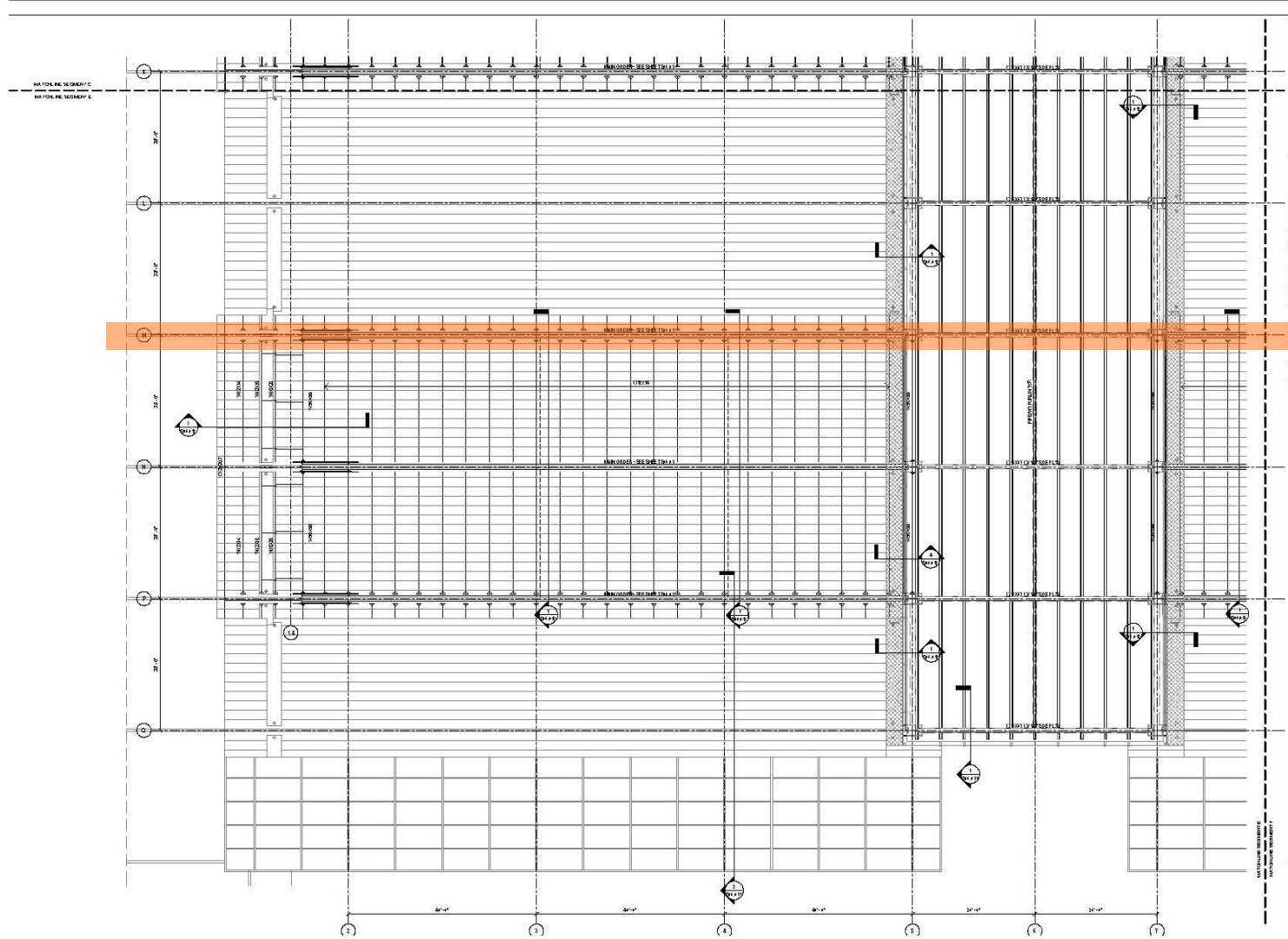


P-Load



Deflections

Sacramento Airport Calculating Loads



Sacramento Airport

Dead Load Calculations



DEAD LOADS

Roof:

- Structure:
 - Central Atrium: (11 members) x (WT 5x 11) x 28' trib. width = $3.3k/52 = .065$
 - Side Upper Roof: (25) x (W12x14) x (18' trib width) = $6.3k = 6k \times 2 \text{ sides} = 12k/140' = .086k/ft$
 - Side Lower Roof : (25) x (W12x14) x (14' trib width) = $4.9k = 5k \times 2 \text{ sides} = 12k/140' = .086k/ft$
 - Overhangs UpRf: [1(W12x14) + 1(W12x16) + 1(W16x26) + 1(W30x99)] x (18' trib width) = $.69k/140' = .005k/ft$
 - Overhang LowRf: [1(W12x14) + 1(W12x16) + 1(W16x26) + 1(W30x99)] x (14' trib width) = $.54k/140' = .0038k/ft$

Total Structure loads:

- Glass & Metal Cover: (NS 3.3 p.1)
 - Structural Glass = (15lb/ft²) x (28' trib width) = $.42k/ft$
 - Upper Metal = (2lb/ft²) x (18' trib width) = $.036k/ft$
 - Lower Metal = (2lb/ft²) x (14' trib width) = $.028k/ft$

Total Roof Loads: **.484k/ft**

Floor Loads

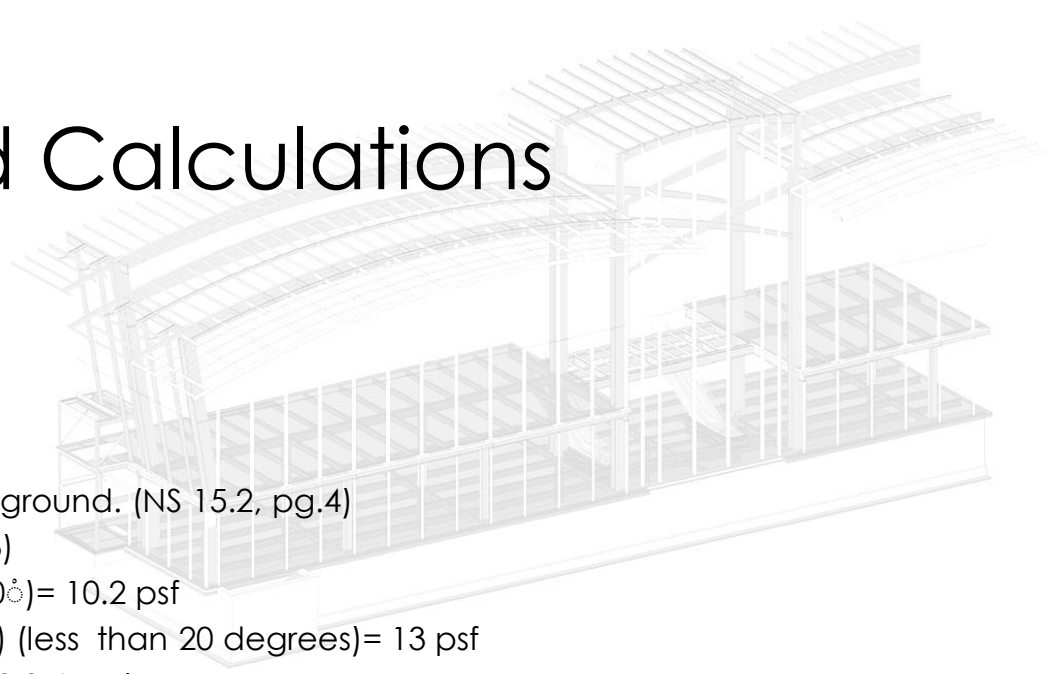
- Reinforced Concrete w/ Steel Decking: (12lb/ft²) x (28' trib width) = $.336k/ft$
- Structural Glass: (15lb/ft²) x (18' width) = $.27k/ft$
- Total Floor Loads (without structural beams): **.606k/ft**

Loading Calculations (Based on section from column grid M)

REFERENCE: Wind : NS 15.3, p.3; NS 15.2, p.4; Material Weights: NS 3.3 p.2 table 17; LI: NS 3.4 p.1

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Live Load Calculations



LIVE LOADS

Wind Loads:

- Wind, 3 sec. gust wind speeds:
 - 85 mph at 30 ft. above the ground. (NS 15.2, pg.4)
- Lateral Wind Load: (NS 15.3, pg. 3)
 - Vertical Projected Wall ($\leq 10^\circ$)= 10.2 psf
 - Wind Uplift, Roof (enclosed) (less than 20 degrees)= 13 psf

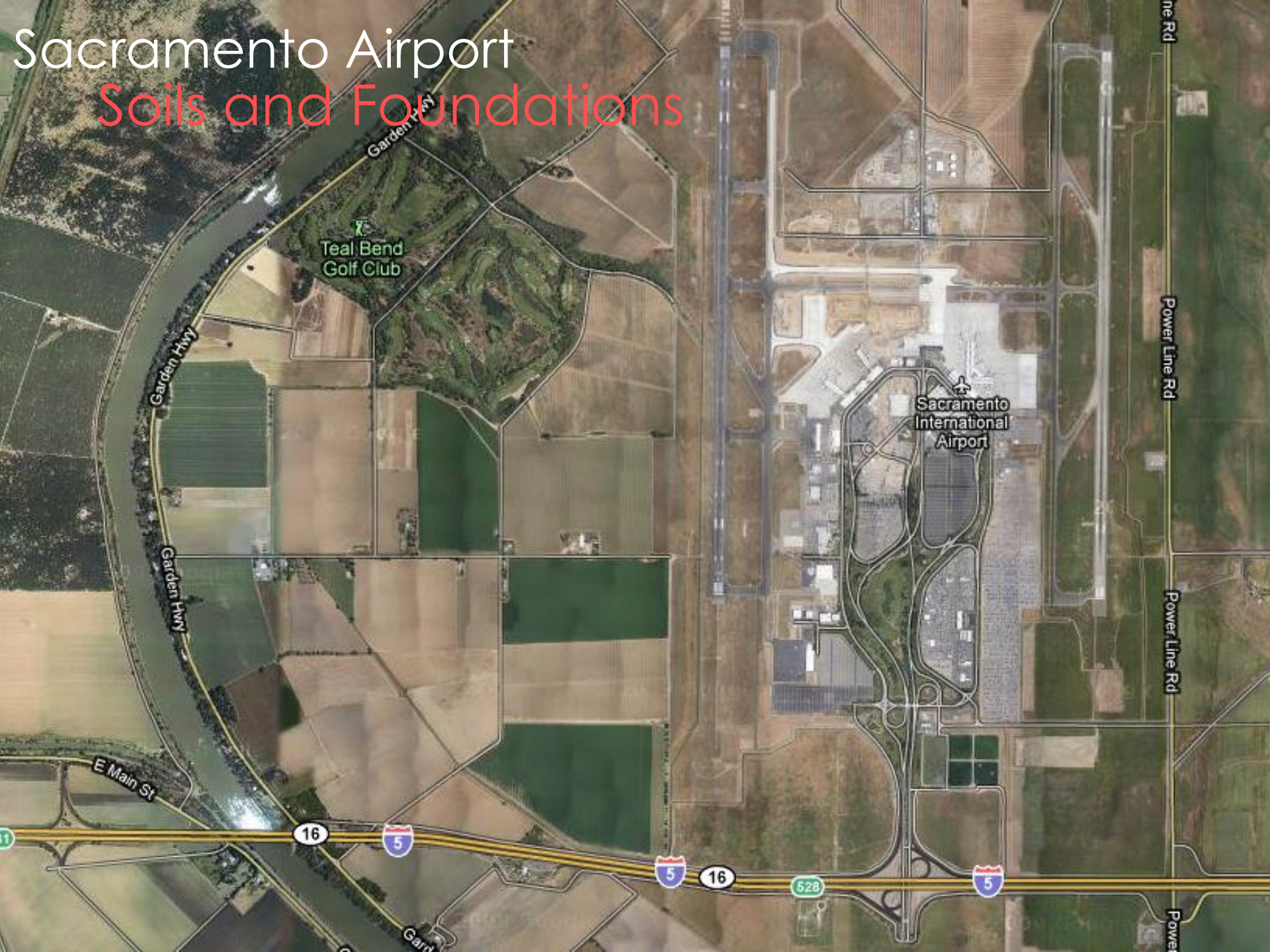
Live Loads: Use lobby occupancy (NS 3.4 p.1)

- $(100\text{lb}/\text{ft}^2) \times [(28'\text{trib width}) \times (302'\text{length}) - (10'\text{hole width}) \times (52'\text{hole length})] = 800\text{k} \times 2\text{ floors} = 1600\text{k}$

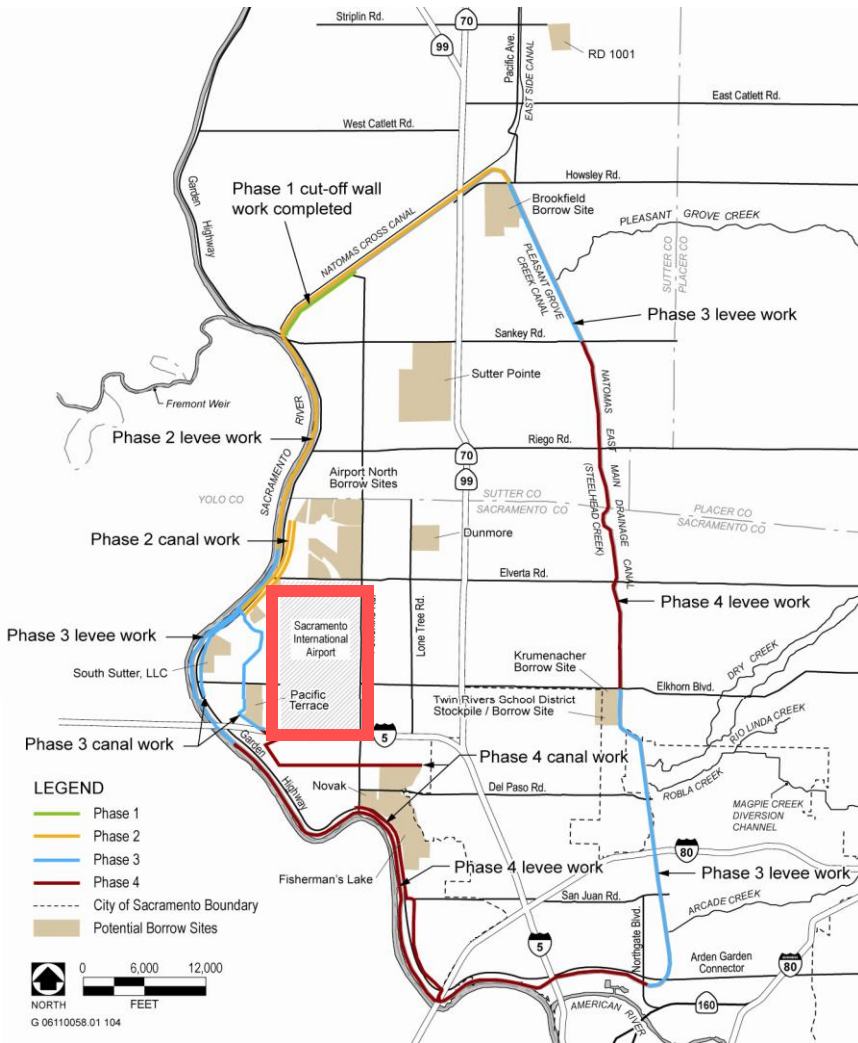
Loading Calculations (Based on section from column grid M)

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Sacramento Airport Soils and Foundations



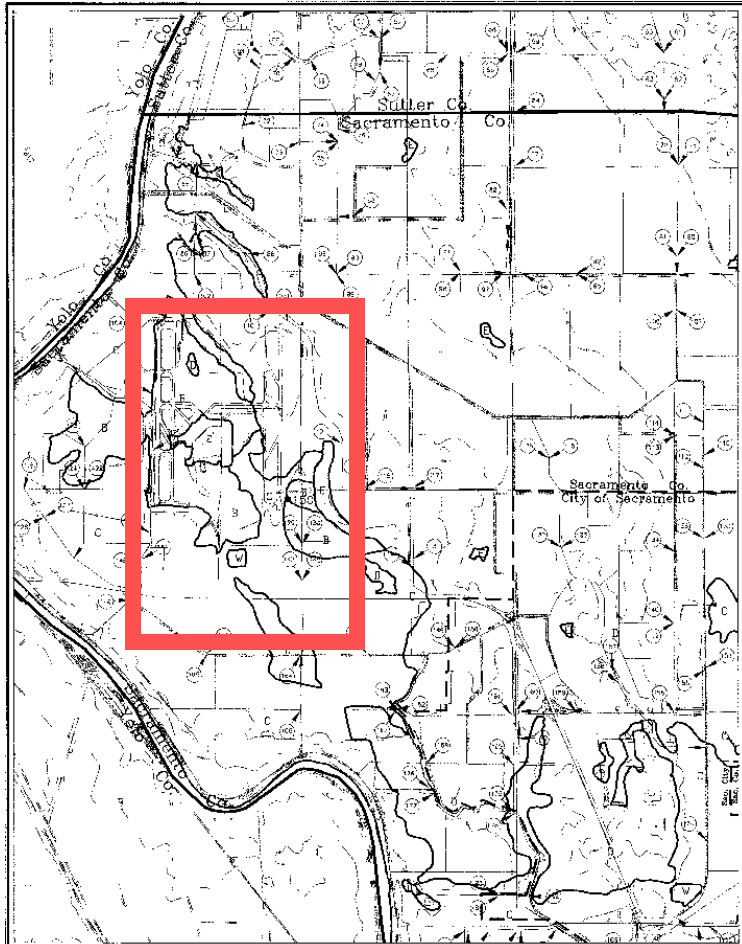
Sacramento Airport Surface Conditions



- Cradled from the West by the Sacramento River
 - Site gently slopes down towards the river
 - The topography is in general flat
- Flood Damage Protection
 - Massive public works project
 - A series of levees and a canal were made in order to divert water away from the airport to downstream of the location.
 - Earth had to be moved into the levees, and excavating from the site was unfeasible since the site was already in a flood plain. The solution was to gather earth from the surrounding areas (as can be seen in the Figure 4) and move it to the protective levees.

Figure 4

Sacramento Airport Subsurface Conditions



- Natural Soils
 - Great farmland, poor foundations
 - Silt, sand, or clay like
 - Figure 5.1 Soils 119 through 145
 - Low bearing strength: near 100kPA
- Important Soil Characteristics
 - Strength, strain resistance, and stability
 - Site's soil now mixed with manmade fillers
 - Figure 5.1 Soils 101 through 105
 - Better drainage, better bearing strength: near 200kPA.

SOIL MAP DESIGNATION: DESCRIPTION

- 101:** Amador-Gillender complex, 2 to 15% slopes
- 102:** Americanos-Urban land complex, 0 to 2% slopes
- 103:** Andregg coarse sandy loam, 2 to 8% slopes
- 104:** Andregg coarse sandy loam, 8 to 15% slopes
- 105:** Andregg-Urban land complex 8 to 15% slopes
- 119:** Columbia sandy loam, clayey substratum, partially drained, 0 to 2% slopes
- 129:** Cosumnes silt loam, drained, 0-2% slopes, occasionally flooded
- 142:** Egbert clay, partially drained, 0-2% slopes, frequently flooded
- 145:** Fiddymont fine sandy loam, 1 to 8% slopes

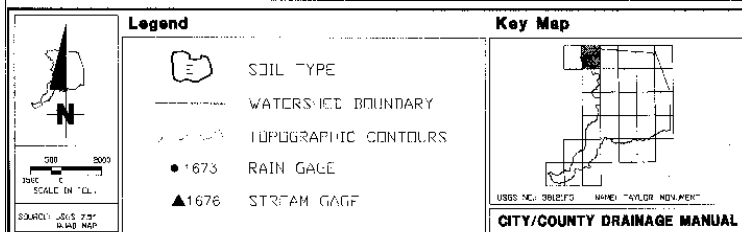


Figure 5.1

<http://soildatamart.nrcs.usda.gov/Report.aspx?Survey=CA067&UseState=CA>

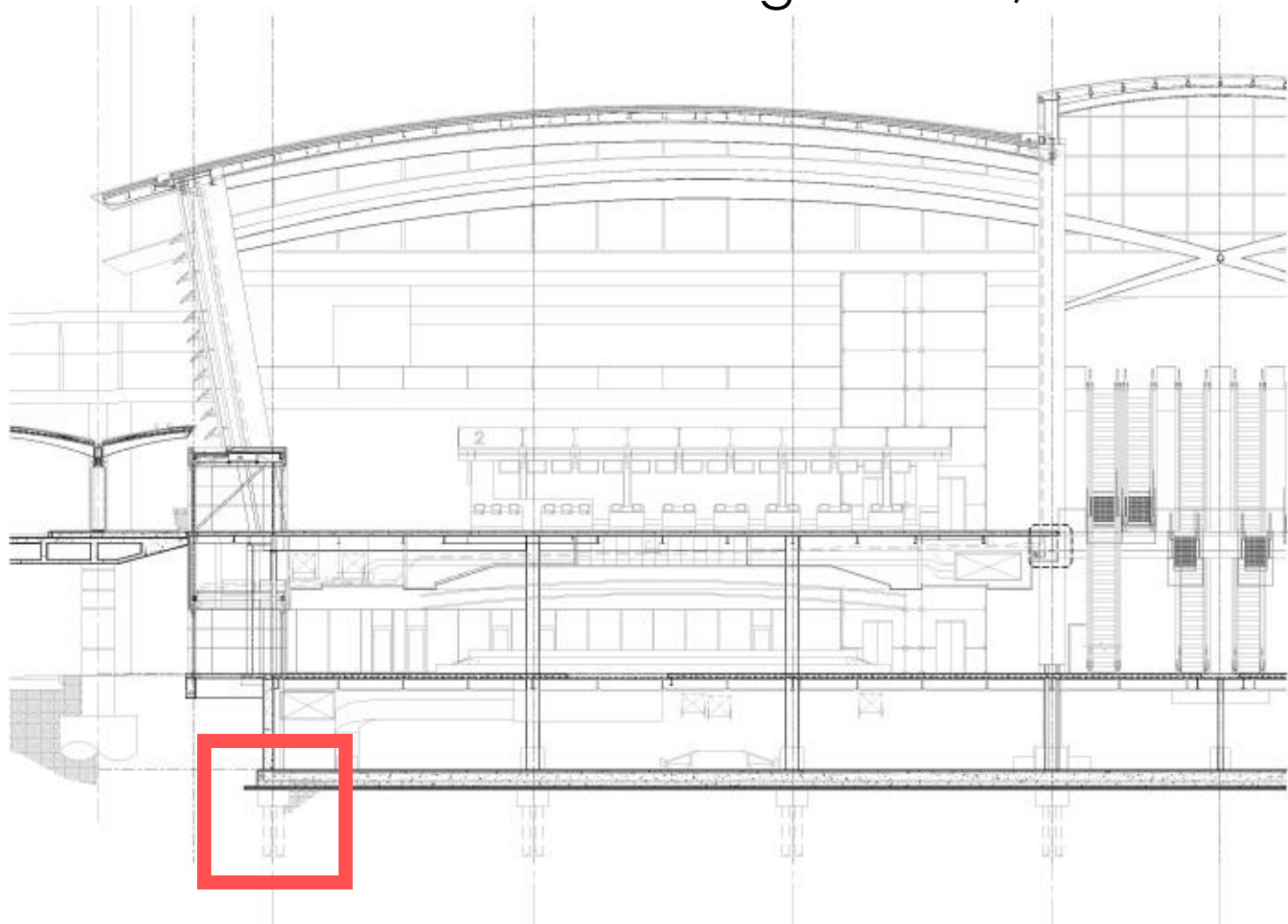
Figure 5.2

<http://www.msa.sacounty.net/waterresources/Drainage/11x17/map02.pdf>

Sacramento Airport Foundations

Large Loads, Weak Soil

- Mat Foundation
 - Distributes the loads over large area
 - Reduces magnitude of force on a given ft^2 of soil.
- Piles
 - Transfers loads from columns down through soil
 - Distributes load by friction.



Sacramento Airport Layout Concept

