

# PSB Structural Investigation & Design Option



Dane County  
Jail Consolidation Project

Public Safety Building

October 3, 2018  
DCPW Project #318003

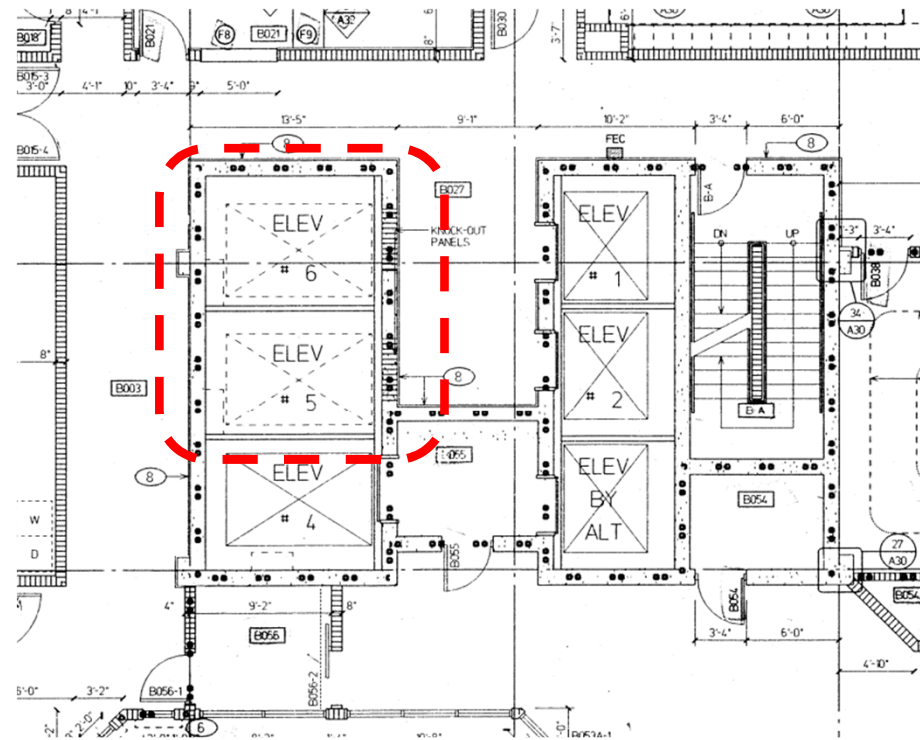
# AGENDA

- PSB Original Design
- PSB Structural Design Analysis
- PSB Structural Design Analysis Findings
- Structural Strengthening Techniques
- Design Option – South Addition

## Original Design for Adding Future Floors on Top of PSB

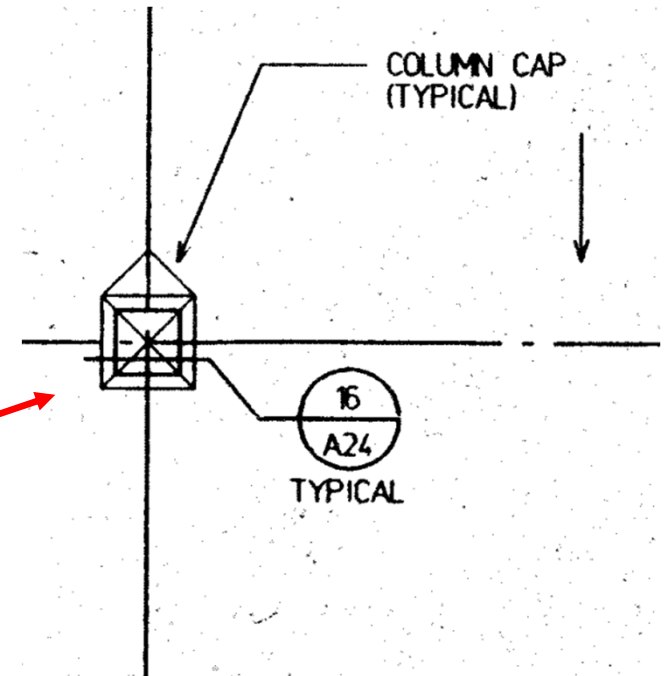
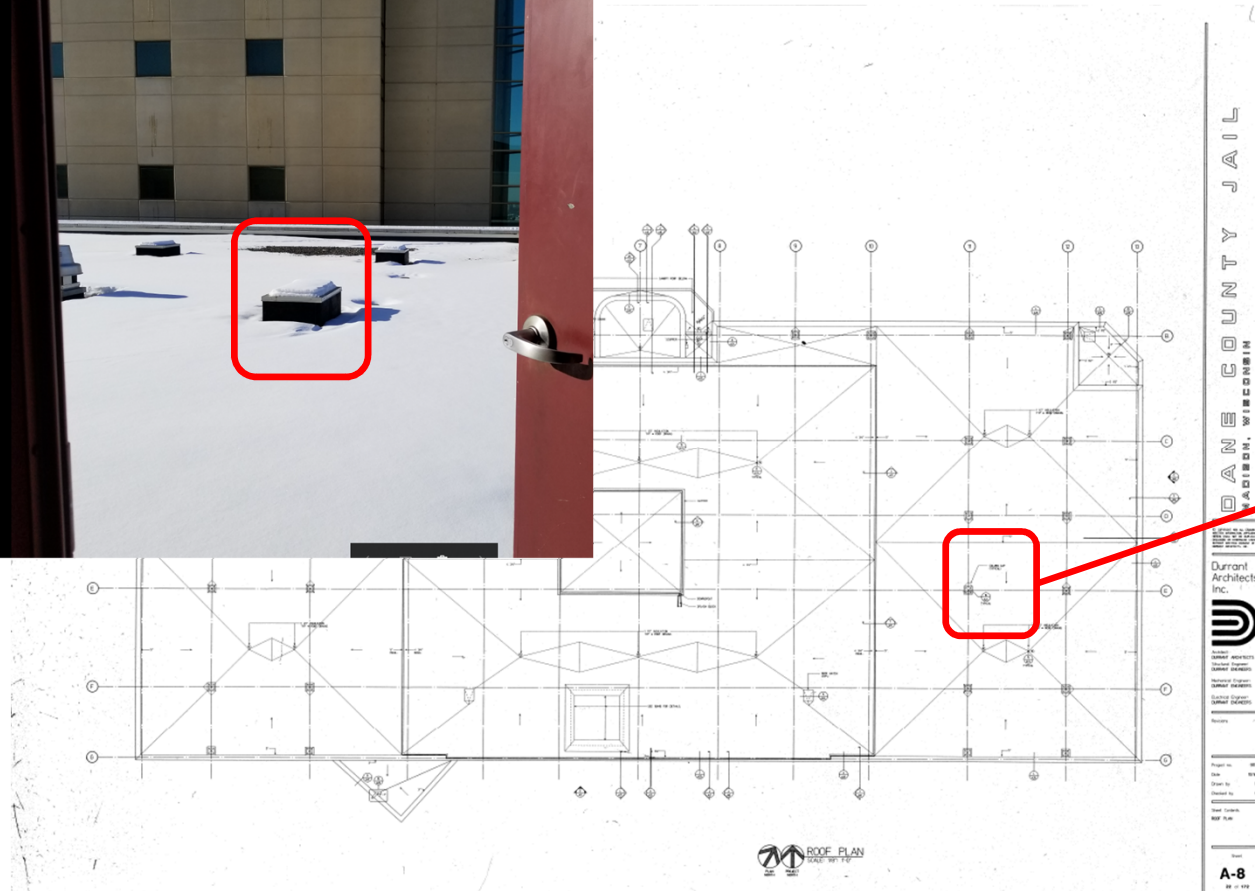
- Two Empty Elevator Shafts for Future Elevators
- Columns extend up above roof for Future Columns
- Zoning PUD (GDP) Documents & Drawings
- Zoning PUD (SIP) Documents & Drawings
- Structural Record Drawings

## Two Empty Elevator Shafts for Future Elevators





# Columns Extend Above Roof for Future Columns



A-8

# Zoning PUD (GDP) & (SIP) Documents - Future Floors



HELENE M. NELSON  
Director of Administration

COUNTY OF DANE  
DEPARTMENT OF ADMINISTRATION

210 Martin Luther King, Jr. Boulevard, Madison, Wisconsin 53709  
608/266-4172

GAYLORD R. PLUMMER  
Facilities Analyst

August 11, 1992

Return recorded documents to:  
Gaylord R. Plummer  
Room 425 City-County Bldg  
Madison, WI 53709

2382515

VOL 19799 PAGE 8

To Whom It May Concern:

The attached set of plans and documents represent the approved P.U.D.(G.D.P.) project drawings and related zoning documents for the Dane County Jail Project, a jail and public safety facility project located in Madison, Wisconsin on the 100 block of West Doty Street, more particularly described as:

Lots 1 through 6, Lot 9 and the Northeast 1/2 of Lot 10, Block 71, Original Plat of the City of Madison.

Sincerely,

Helene M. Nelson  
Director of Administration

Attachments

Subscribed and sworn before me this  
17th day of August  
1992.

Notary Public

My commission expires: 5-30-93

8/11/92

Document # 2382515  
Vol. 19799  
Pg. 8

76, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000


## Page 5 Excerpt

The building plan also assumes the initial design and construction will be such that the building can be expanded for maximum and/or minimum security jail purposes in the future, for a total of 1,000 beds, plus the central jail holding capacity mentioned earlier.


## Page 6 Excerpt

The initial facility will consist of six stories with later addition of three more stories. Two stories, the basement and sub-basement, will be partially exposed. No portion of the building, including elevator and/or utility penthouses, is expected to exceed the 187.2 foot, City datum, height restriction.

# Zoning PUD (GDP) Drawings – Future Floors



ZONING MAP



LOCATION MAP

DANE COUNTY JAIL

100 BLOCK of WEST DOTY STREET

MADISON, WISCONSIN

**FEB. 5, 1992**  
REVISED REVISED FEB. 26, 1992

**APPROVAL SIGNATURES:**

Zoning Administrator	<i>Kathy Heck</i> 6-17-92
City Engineering	<i>Andy Holmann</i> 6-29-92
Traffic Engineering	<i>Mike Hagg</i> 6-21-92
Water Utility Manager	<i>Greg Braken</i> (SS) 6-17-92
Fire Marshall	<i>Bob Marshall</i> 6-17-92
Plan Commission	<i>Bill Roberts</i> 6-17-92

**CODE ANALYSIS**

1. Occupancy: Chapter 58 Detention & Correctional  
Chapter 54 Office and Mercantile  
Chapter 59 Hazardous Occupancies (Parking Garage)

2. Construction Class - Type 1, Fire Resistant A

3. Fire Protection - Fully Sprinkled, Fire Alarm, and Smoke detected

4. AREAS:

sub-basement	34,000 sq. ft.	parking
basement	30,500 sq. ft.	mechanical, support
1st	30,500 sq. ft.	booking, holding
2nd	30,500 sq. ft.	sheriff
3rd	30,500 sq. ft.	housing, (200 bed)
4th	30,500 sq. ft.	housing, (200 bed)
penthouse	12,000 sq. ft.	mechanical

5. Building Height: 5 Stories + Sub-basement = 81'-3" - Initial  
9 Stories + Sub-basement = 143'-2" - Future

6. Exit Distance - less than 150 feet

7. Maximum Allowable Floor Area - unlimited

**SHEET INDEX:**

SS-1 Survey

SS-2 Survey

SS-3 Survey

SL-1 Site Landscape Plan

SA-1 Site Plan

SA-2 Site Grading Plan

A-1 Building Section

A-2 Housing Plan - Initial Project

A-3 Housing Plan - Future

**SITE DATA:**

1. Lot Size: 10,000 S.F. ± 1.38 acres

2. Building Coverage: 30,500 S.F. Initial + 5,500 S.F. Future Building

3. Floor: 5,200 S.F.

4. Parking & Storage: 10,000 S.F.

5. Open Area: 10,000 S.F. Initial, 5,500 Future


6. Parking: 10,000 S.F. Initial, 5,500 Future

7. Surface Parking: 20

8. Bicycle Parking: 20

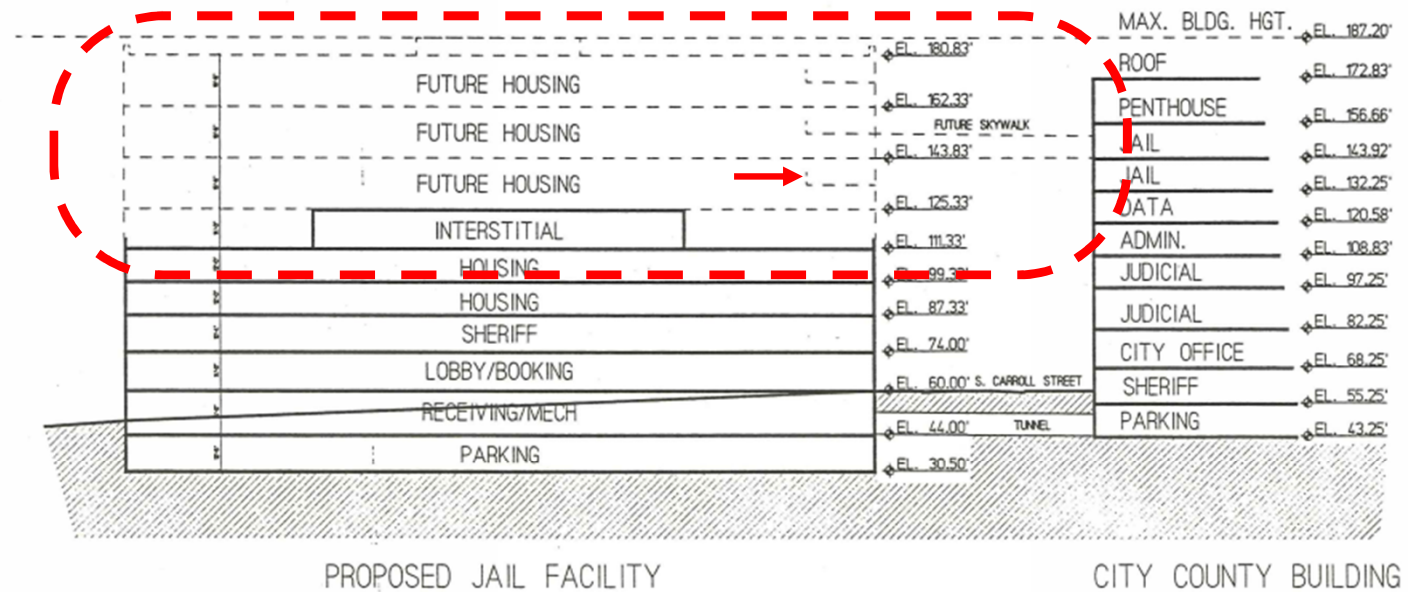
**ARCHITECT & ENGINEER:**

Durrant Group, Inc.



VOL 19799 PAGE 36

# GDP - Building Section Showing 3 Future Floors with Mezzanine Levels



BUILDING SECTION A



PLAN 1

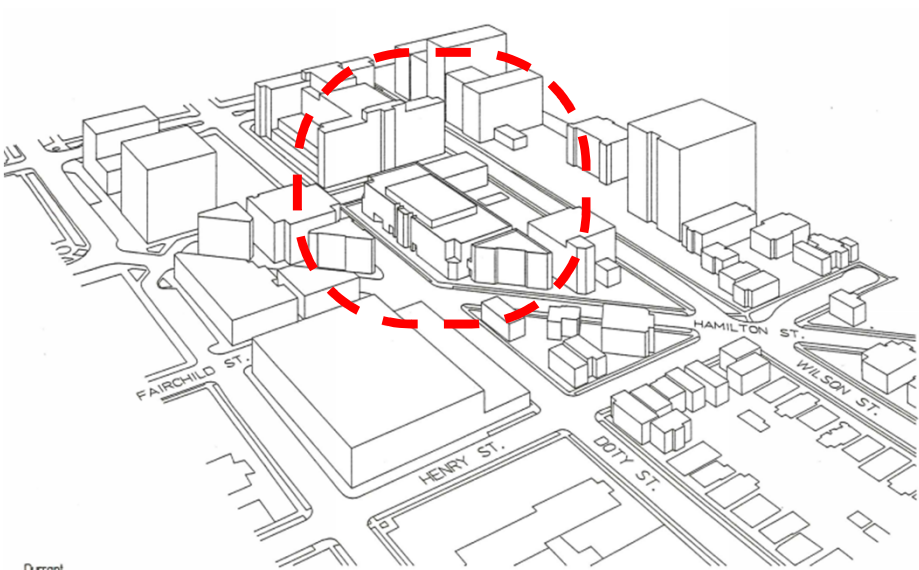
DANE COUNTY JAIL  
MADISON, WI 2/26/92



Durrant  
Architects,  
Inc.

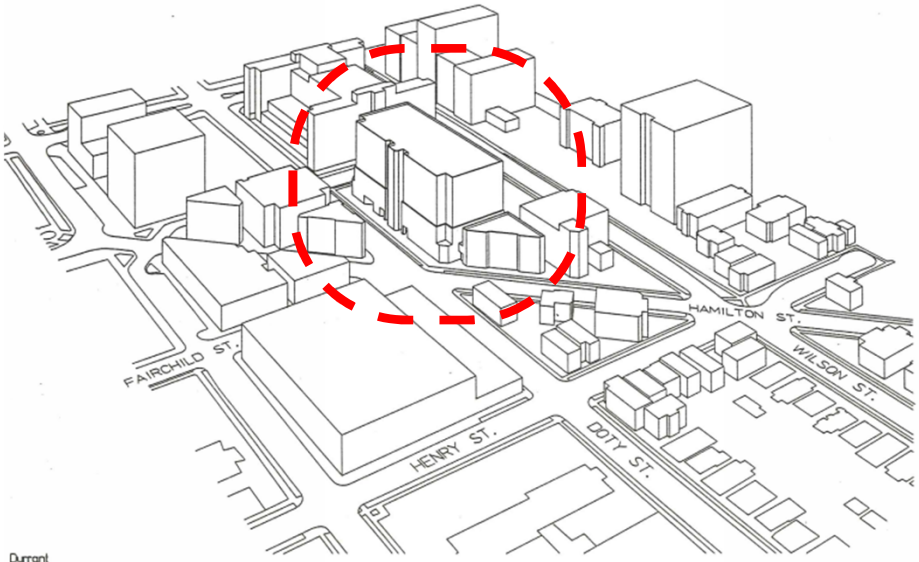


# GDP 3D Drawing Showing Future Floors



DANE COUNTY JAIL

VOL 19799 PAGE 44

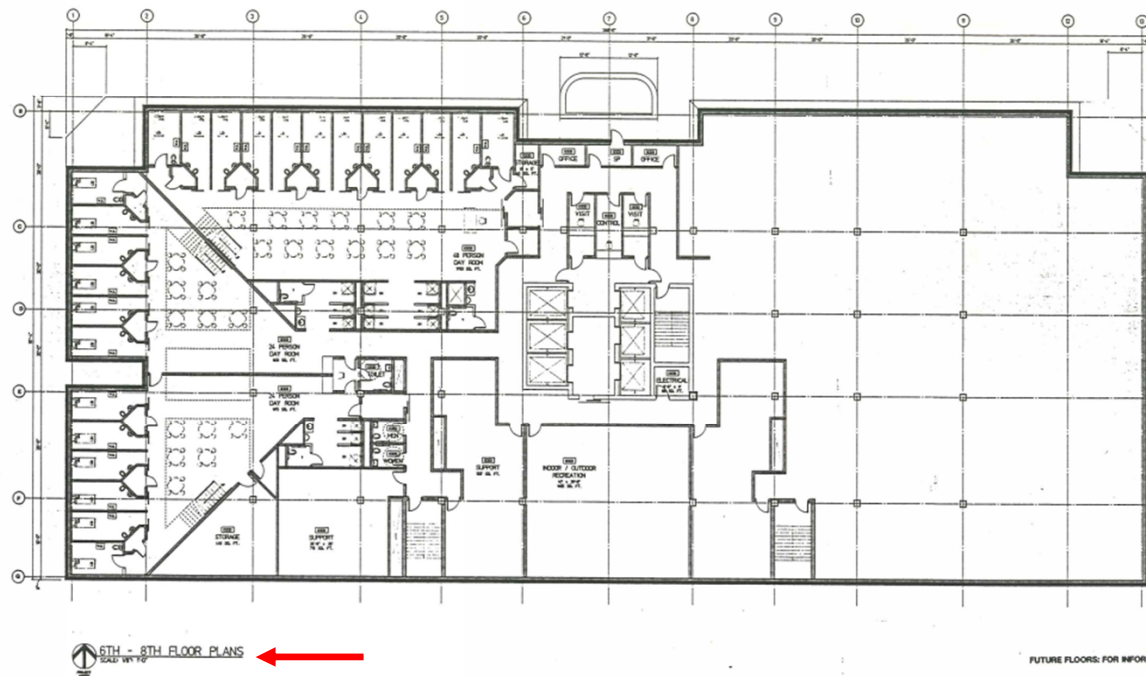


DANE COUNTY JAIL

VOL 19799 PAGE 45

# PUD (SIP) Drawing – 6<sup>th</sup> , 7<sup>th</sup> & 8<sup>th</sup> Future Floor Plans

VOL 20089 PAGE 2



FUTURE FLOORS: FOR INFORMATION ONLY

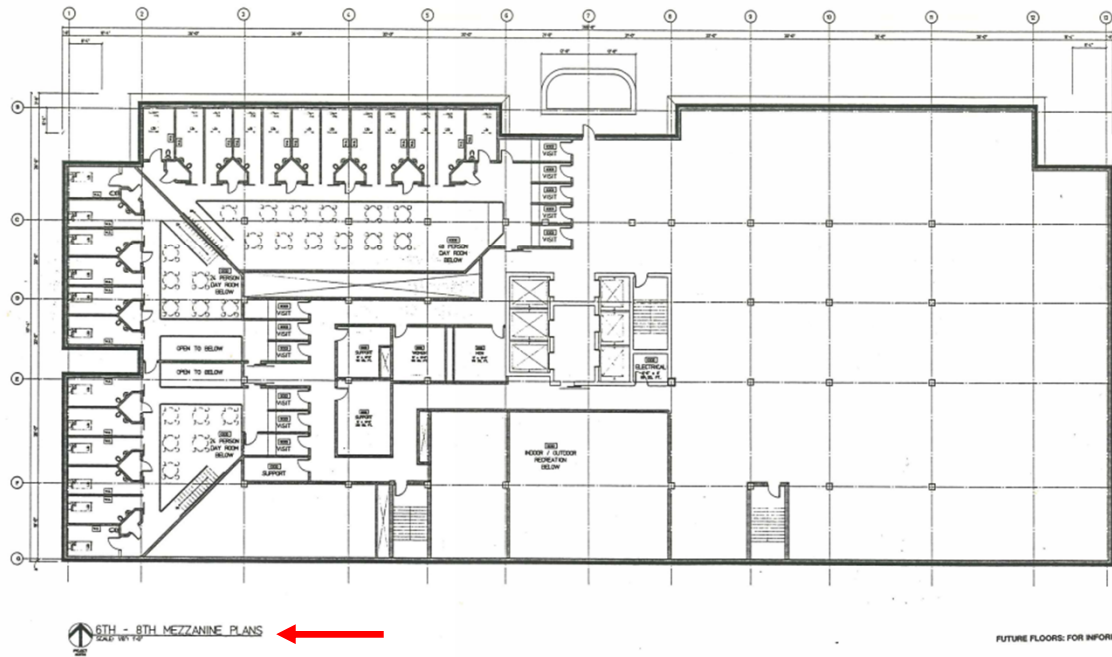
**PRELIMINARY**  
NOT FOR CONSTRUCTION  
DATE: 10/15/08  
BY: JAC/STP/JS

DANE COUNTY JAIL  
MADISON, WISCONSIN  
Durrant Architects, Inc.  
Project: 0803P  
Date: 10/15/08  
Drawn by: JAC  
Checked by: STP  
Scale: As Shown  
Sheet: A-7



# PUD (SIP) Drawing – 6<sup>th</sup> , 7<sup>th</sup> & 8<sup>th</sup> Future Mezzanine Floor Plans

VOL 20089 PAGE 3



FUTURE FLOORS: FOR INFORMATION ONLY

**PRELIMINARY**  
NOT TO BE CONSIDERED  
FOR CONSTRUCTION

DANE COUNTY JAIL  
MADISON, WISCONSIN

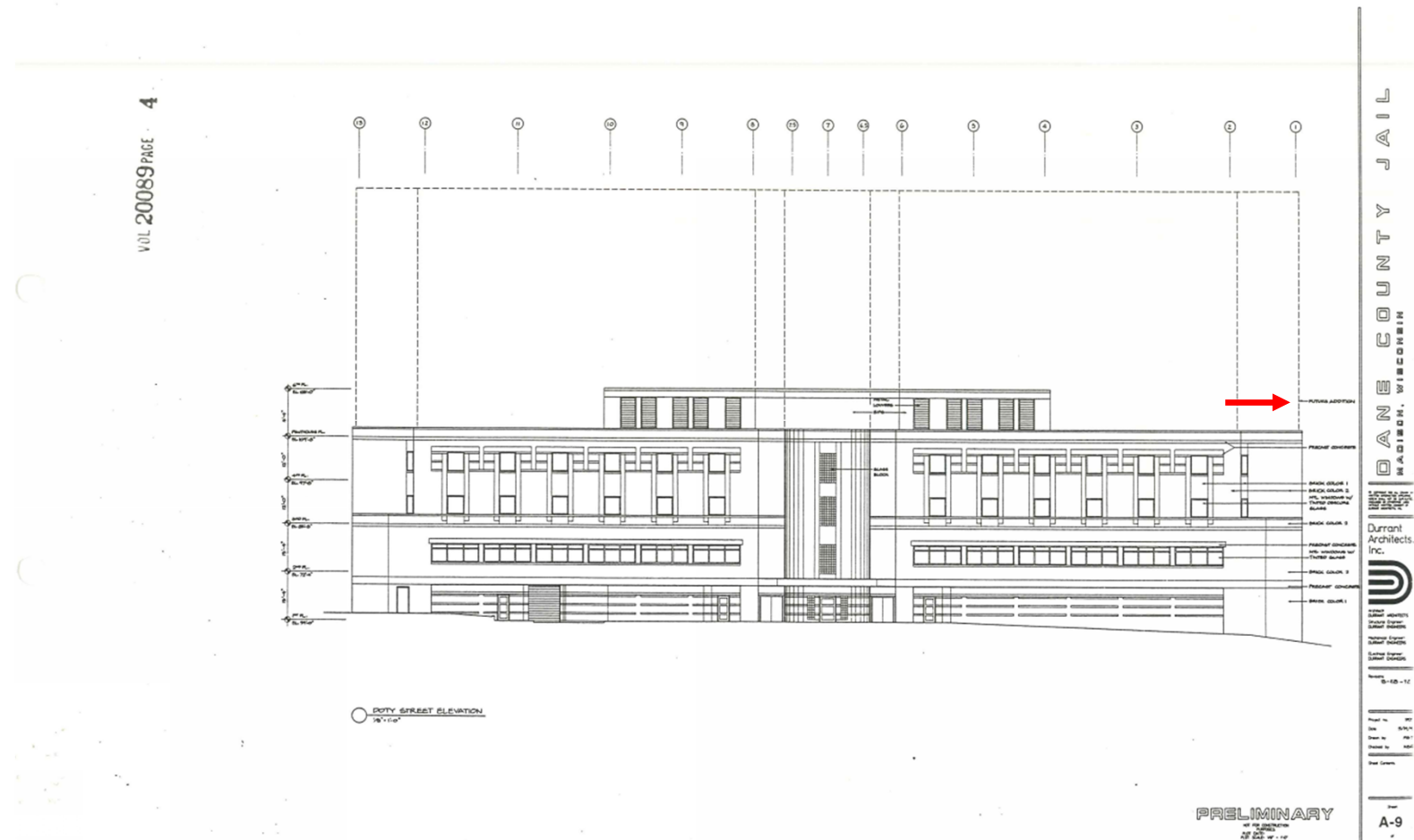
Durant  
Architects,  
Inc.

Project No. 0000  
Date 01/01/00  
Sheet No. 001  
Drawing No. 001  
Scale 1/8" = 1'-0"

Project No. 0000  
Date 01/01/00  
Sheet No. 001  
Drawing No. 001  
Scale 1/8" = 1'-0"

A-8

# PUD (SIP) Drawing – Elevation Future Addition

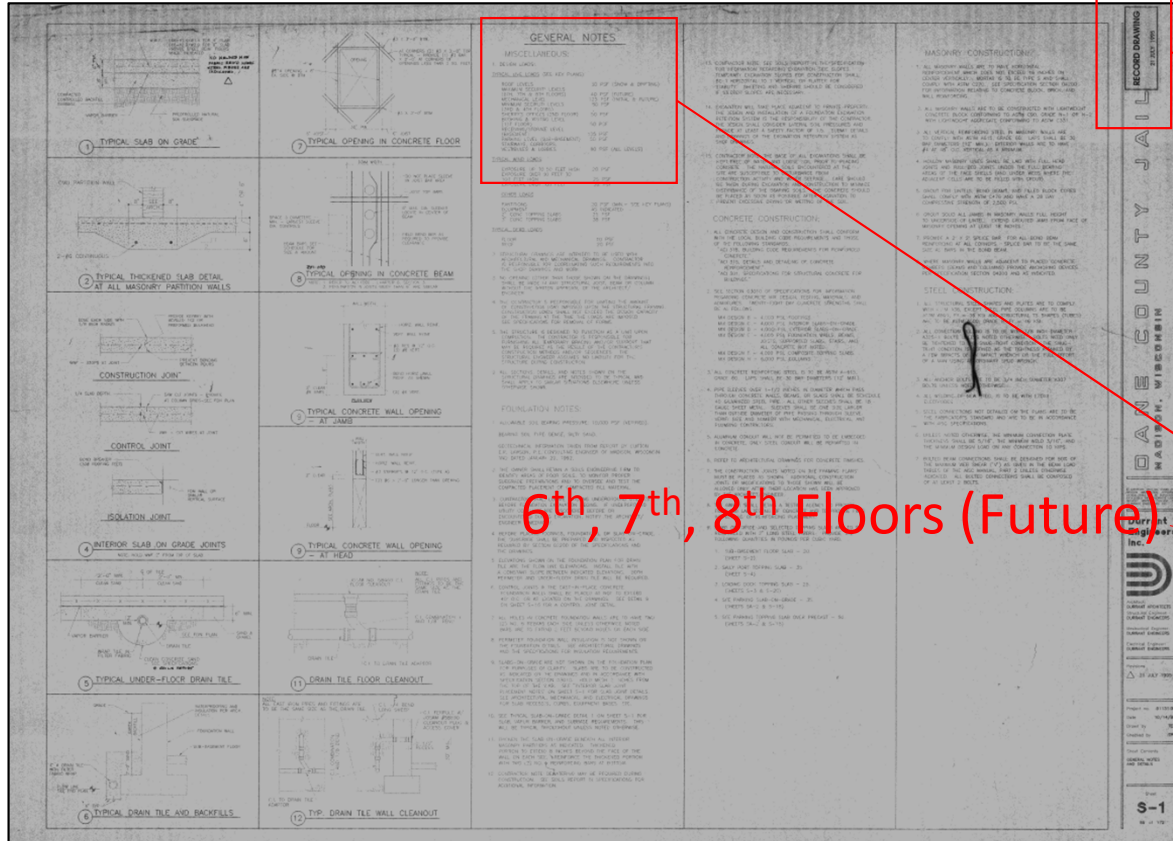


# PUD (SIP) Section Drawing – Future Floors with Mezzanines

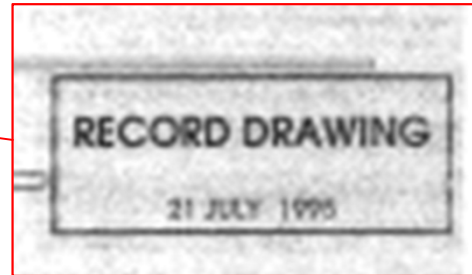
VOL 20089 PAGE 7



# Structural Record Drawings – Future Floors



6th, 7th, 8th Floors (Future)



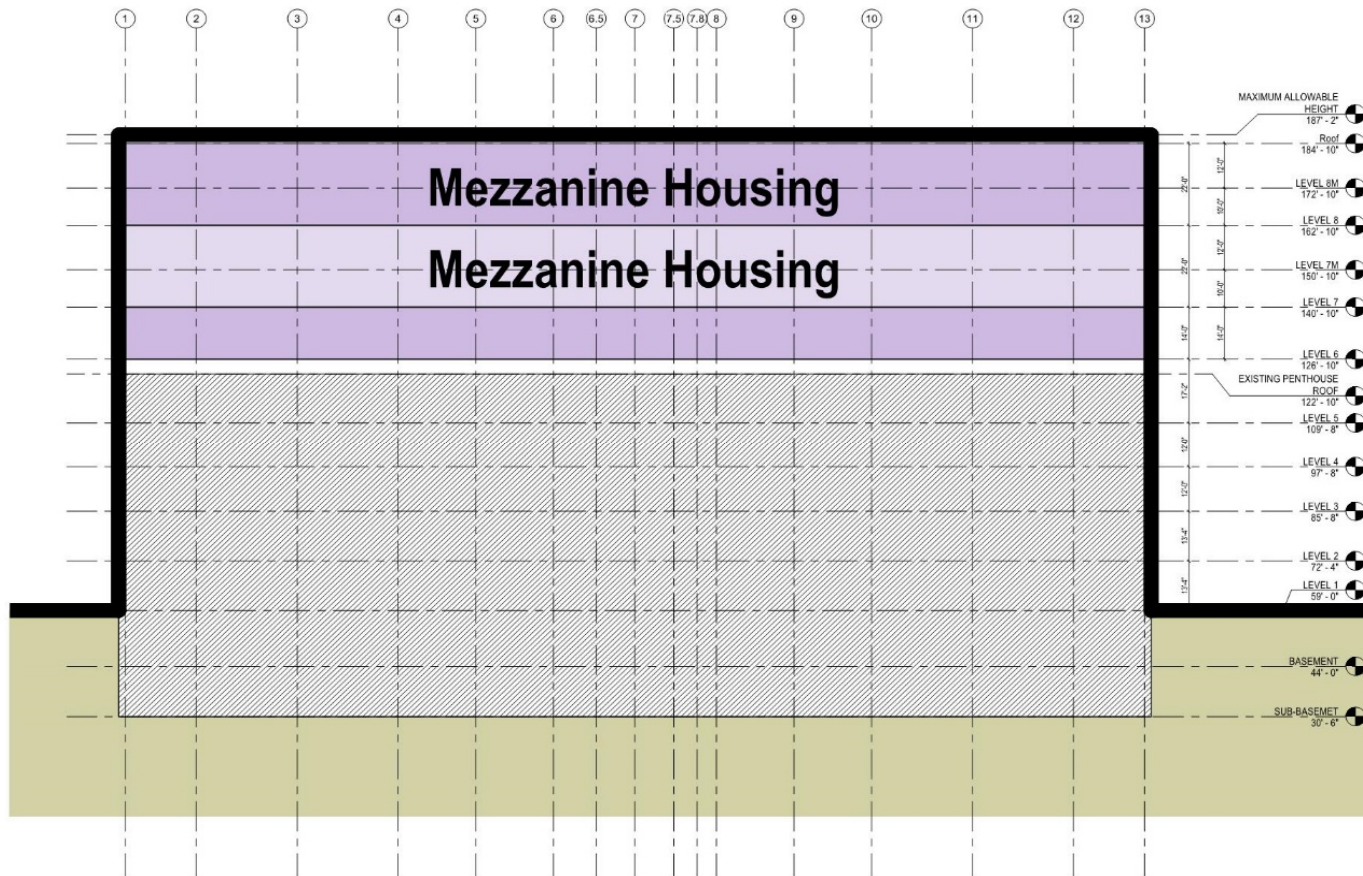
GENERAL NOTES	
MISCELLANEOUS:	
1. DESIGN LOADS:	
<b>TYPICAL LIVE LOADS (SEE KEY PLANS)</b>	
ROOF LEVELS	30 PSF (SNOW & DRIFTING)
MAXIMUM SECURITY LEVELS (6TH, 7TH & 8TH FLOORS)	40 PSF (FUTURE)
MECHANICAL LEVEL	125 PSF (INITIAL & FUTURE)
MINIMUM SECURITY LEVELS (3RD & 4TH FLOORS)	80 PSF
SHERIFF'S OFFICES (2ND FLOOR)	50 PSF
BOOKING & VISITING LEVEL (1ST FLOOR)	50 PSF
RECEIVING/STORAGE LEVEL (BASEMENT)	125 PSF
PARKING LEVEL (SUB-BASEMENT)	50 PSF
STAIRWAYS, CORRIDORS, VESTIBULES & LOBBIES	80 PSF (ALL LEVELS)

## Structural Analysis & Findings

- Structural Analysis Approach
- Structural Loading
- Structural Analysis Findings
- Structural Strengthening Techniques

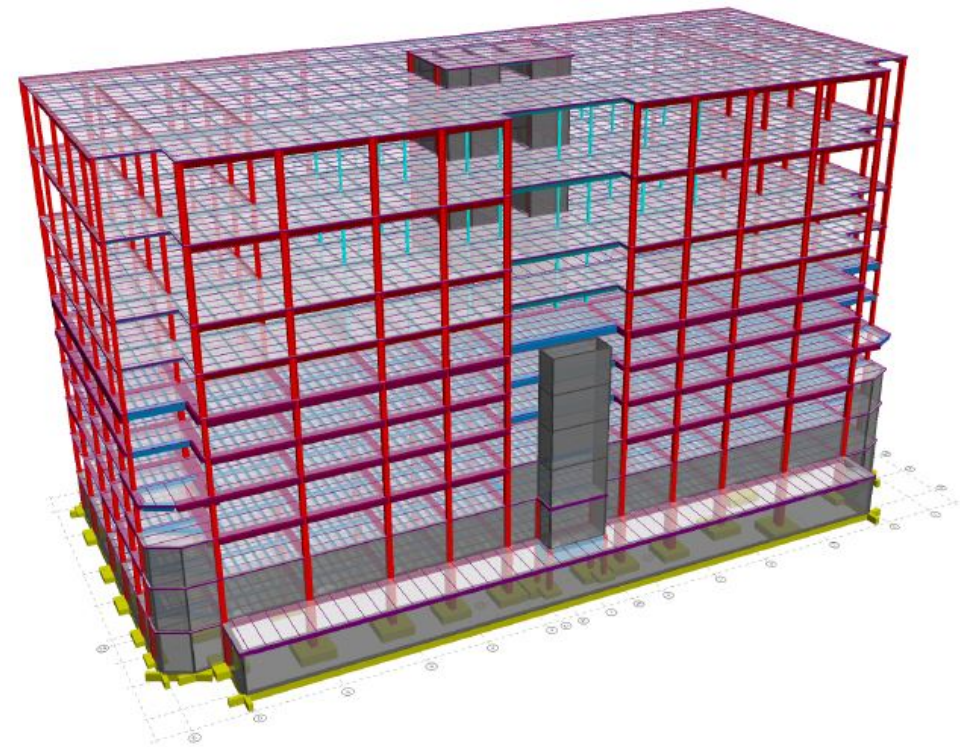
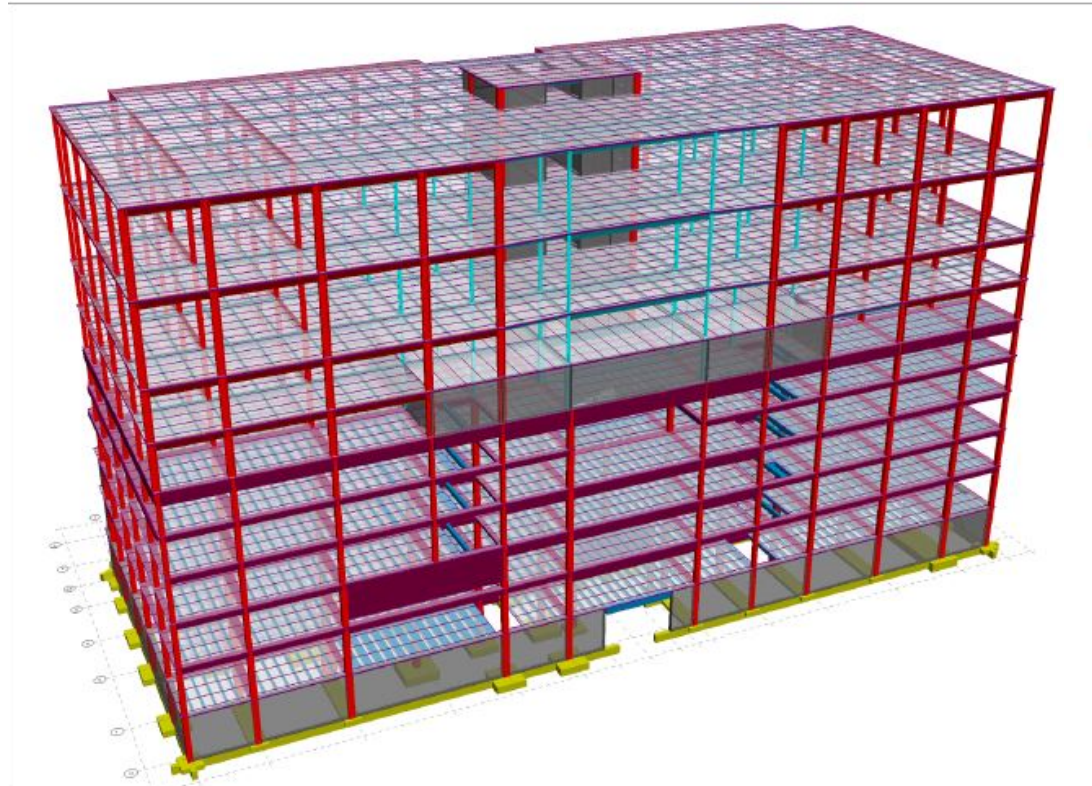


# PSB Structural Analysis – 3 Additional Floors Added

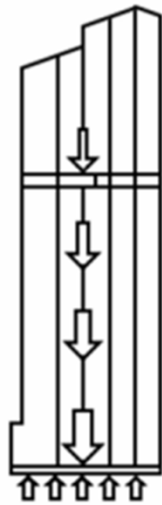




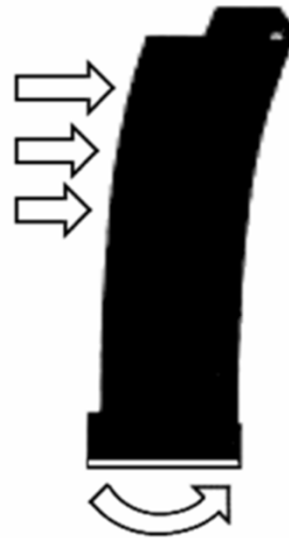
# PSB Structural Analysis 3D Model



# Structural Loading



**GRAVITY LOADS**



**LATERAL LOADS**

## Structural Findings

- Beams – North South Direction
- Foundations
- Columns



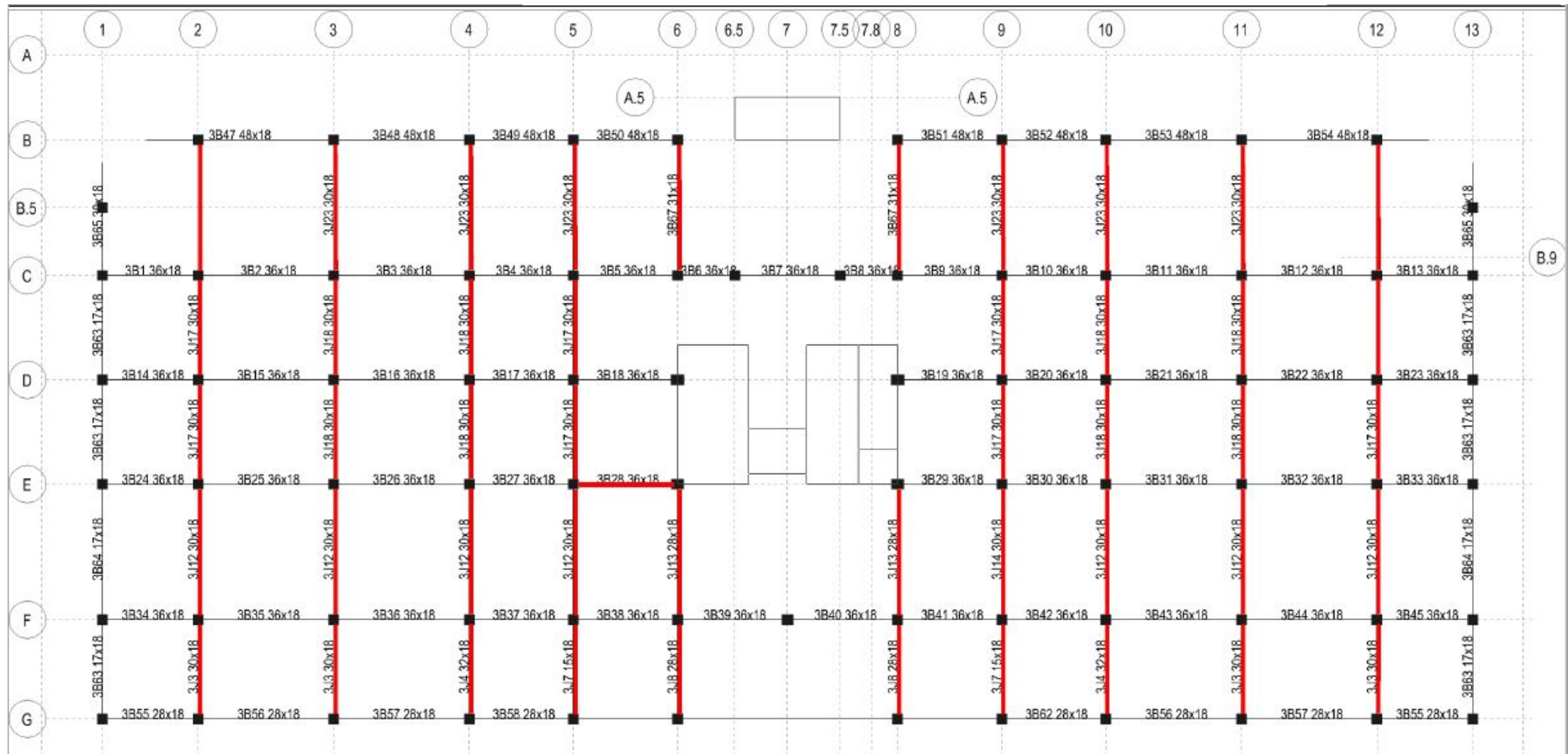




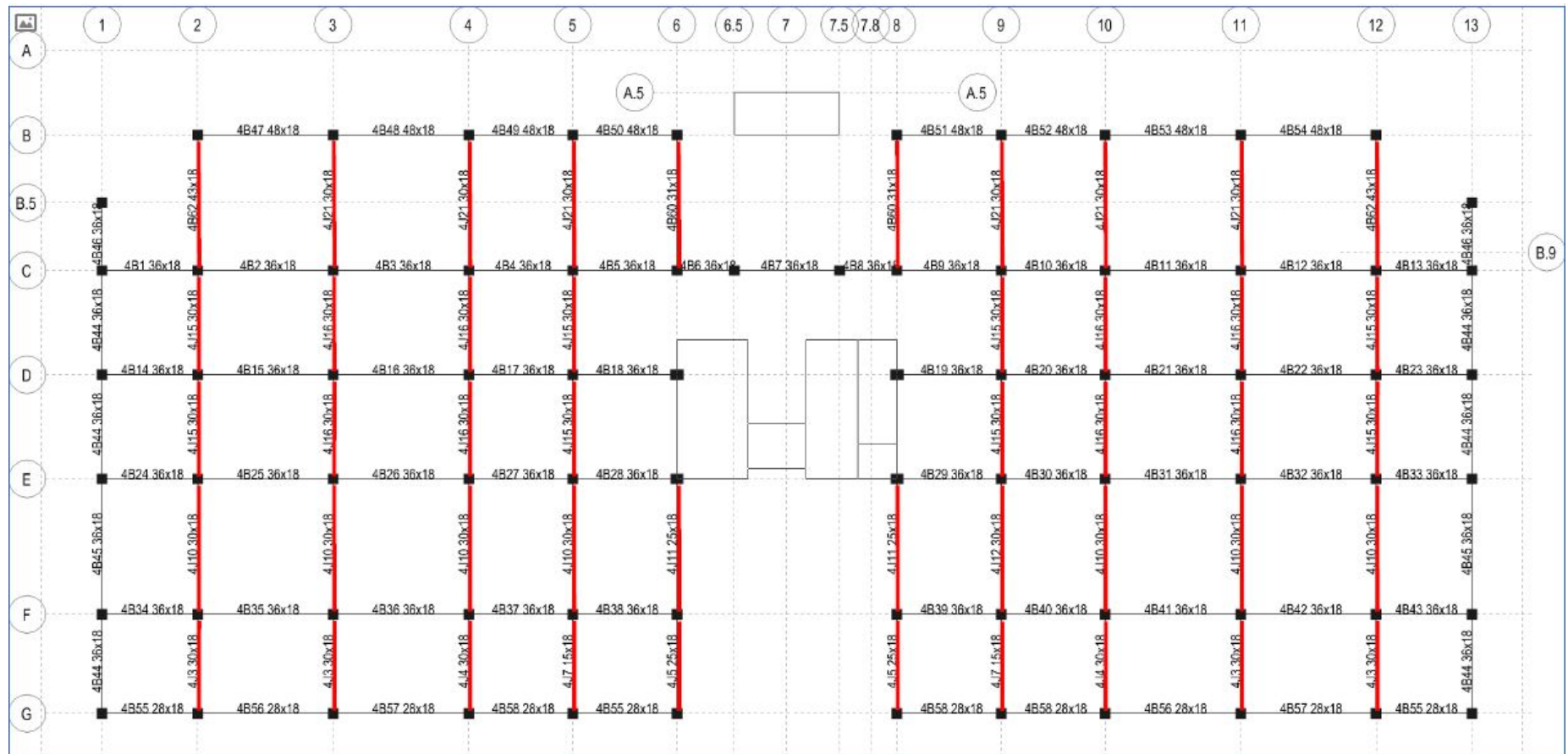




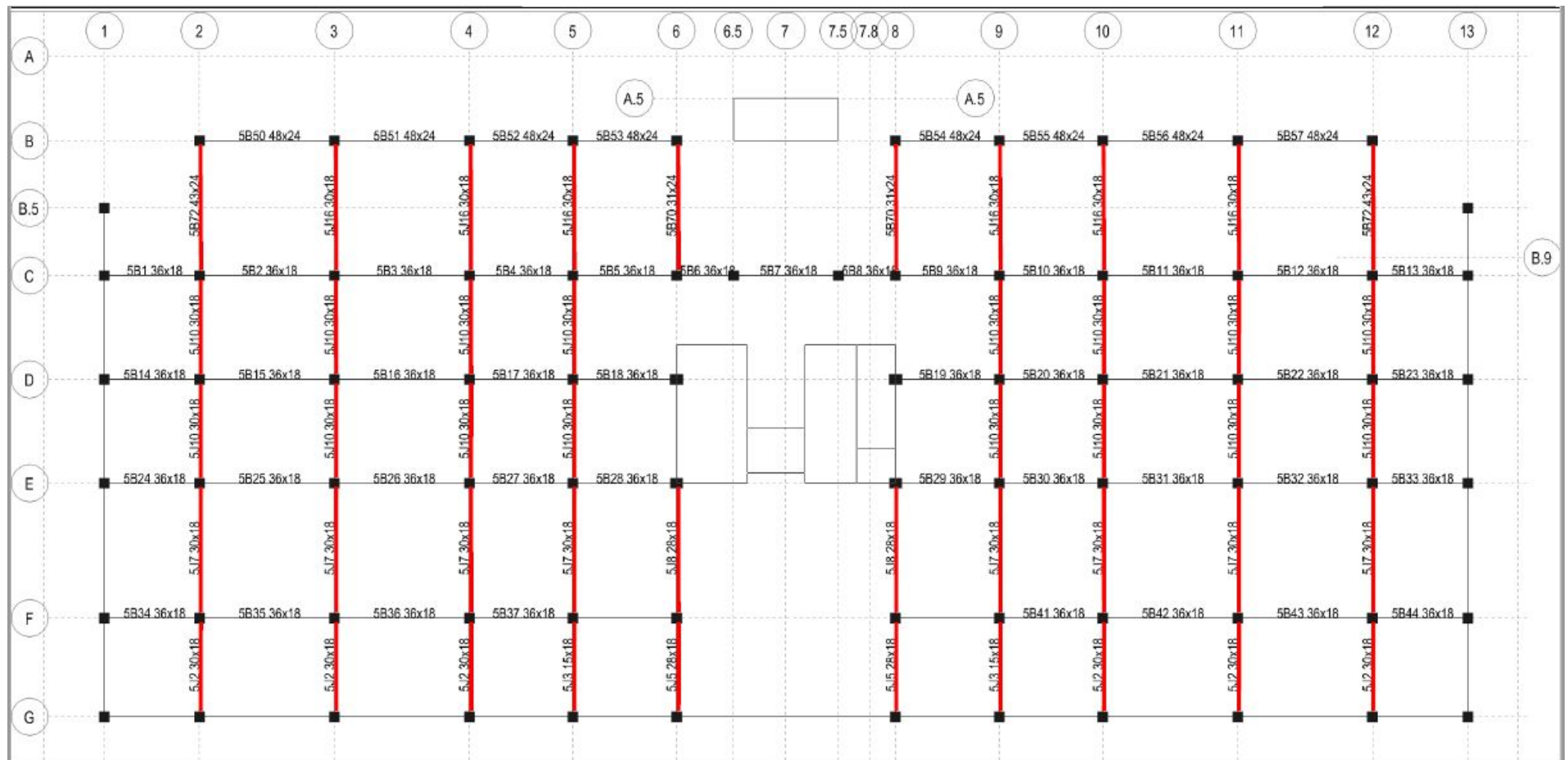
# Concrete Beam Interaction – Third Level



# Concrete Beam Interaction – Fourth Level

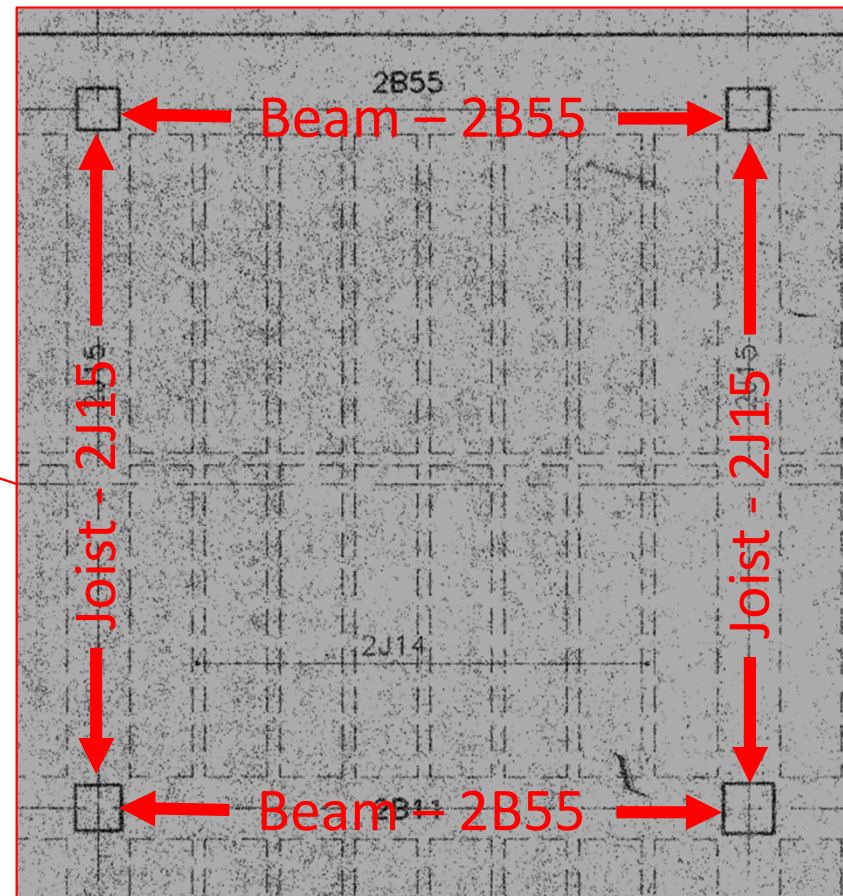
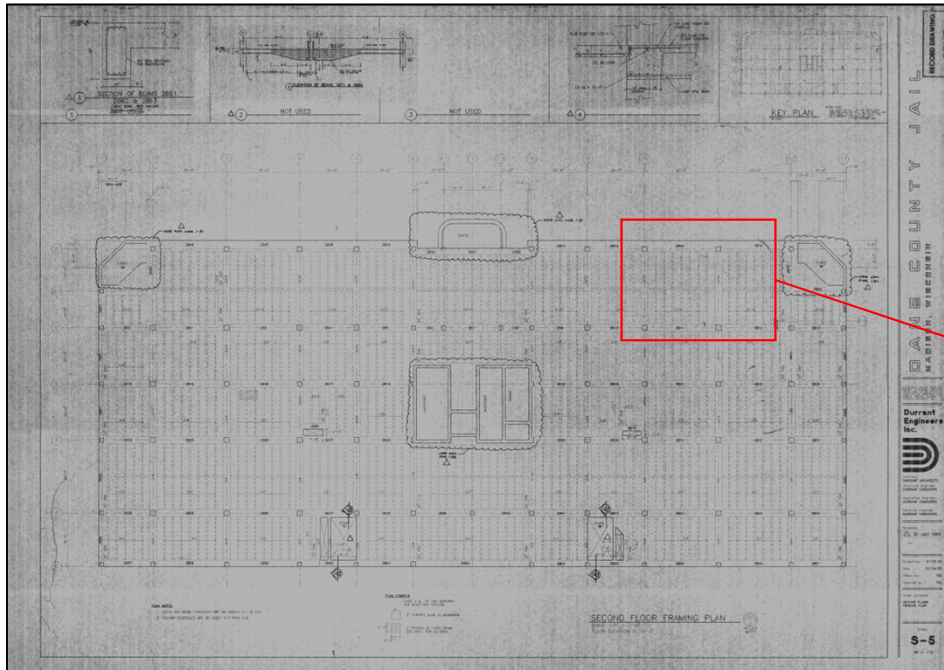


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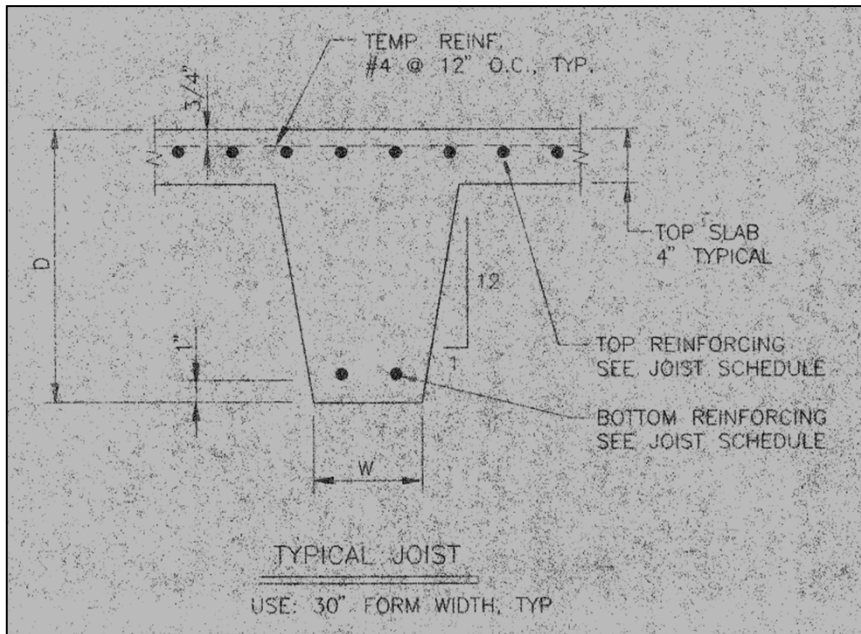




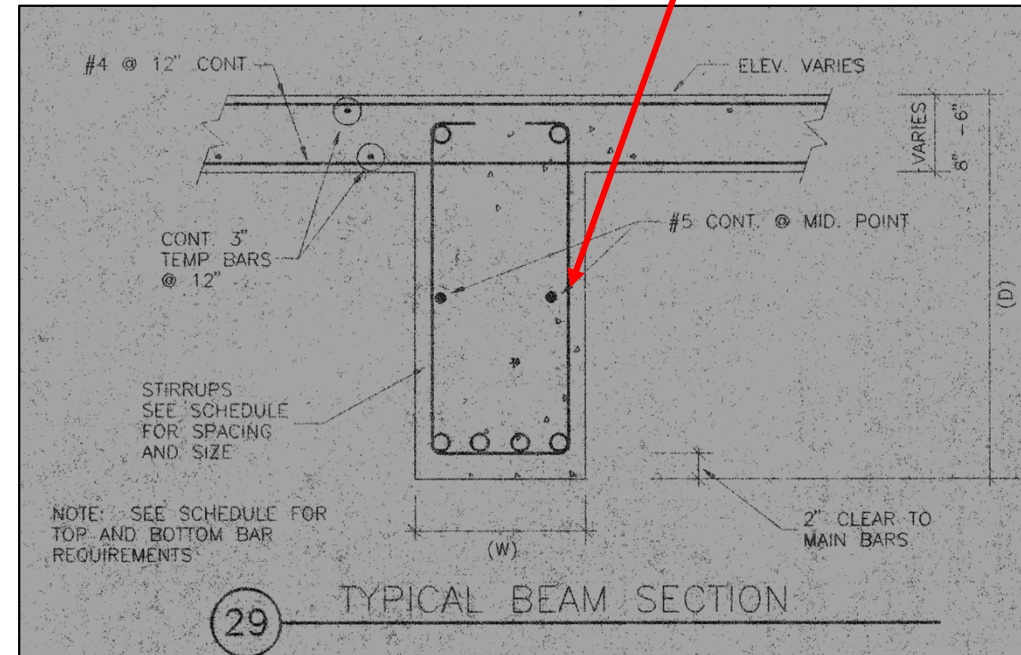
# Joists vs. Beams in the North South Direction



## Sheet S – 10 & 12 : Joist vs. Beam Section



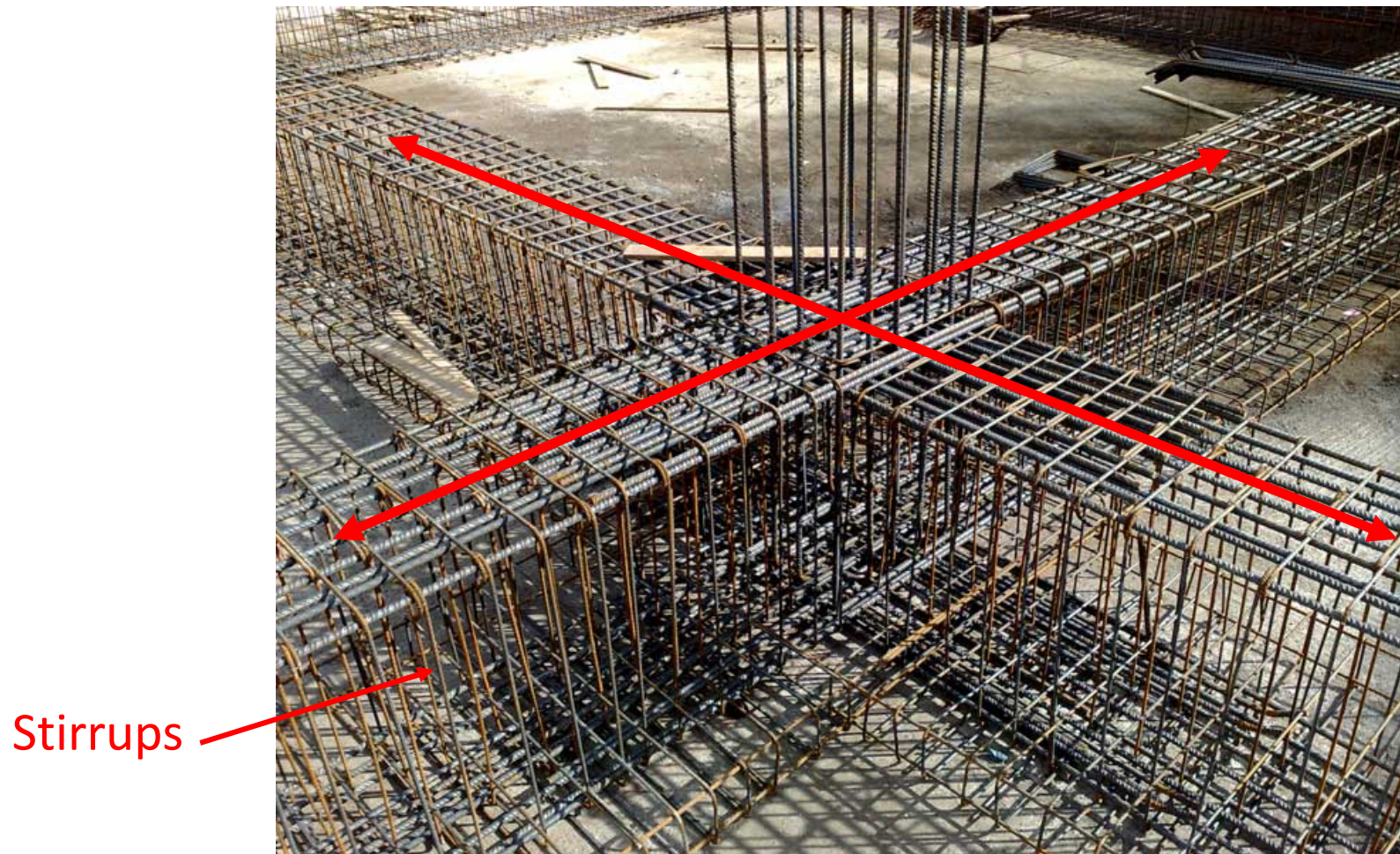
Joist Section



Beam Section



## Beam Steel Reinforcement in Both Directions





# Beam Strengthening Techniques



CARBON FIBER-REINFORCED  
POLYMERS (CFRP) WRAP

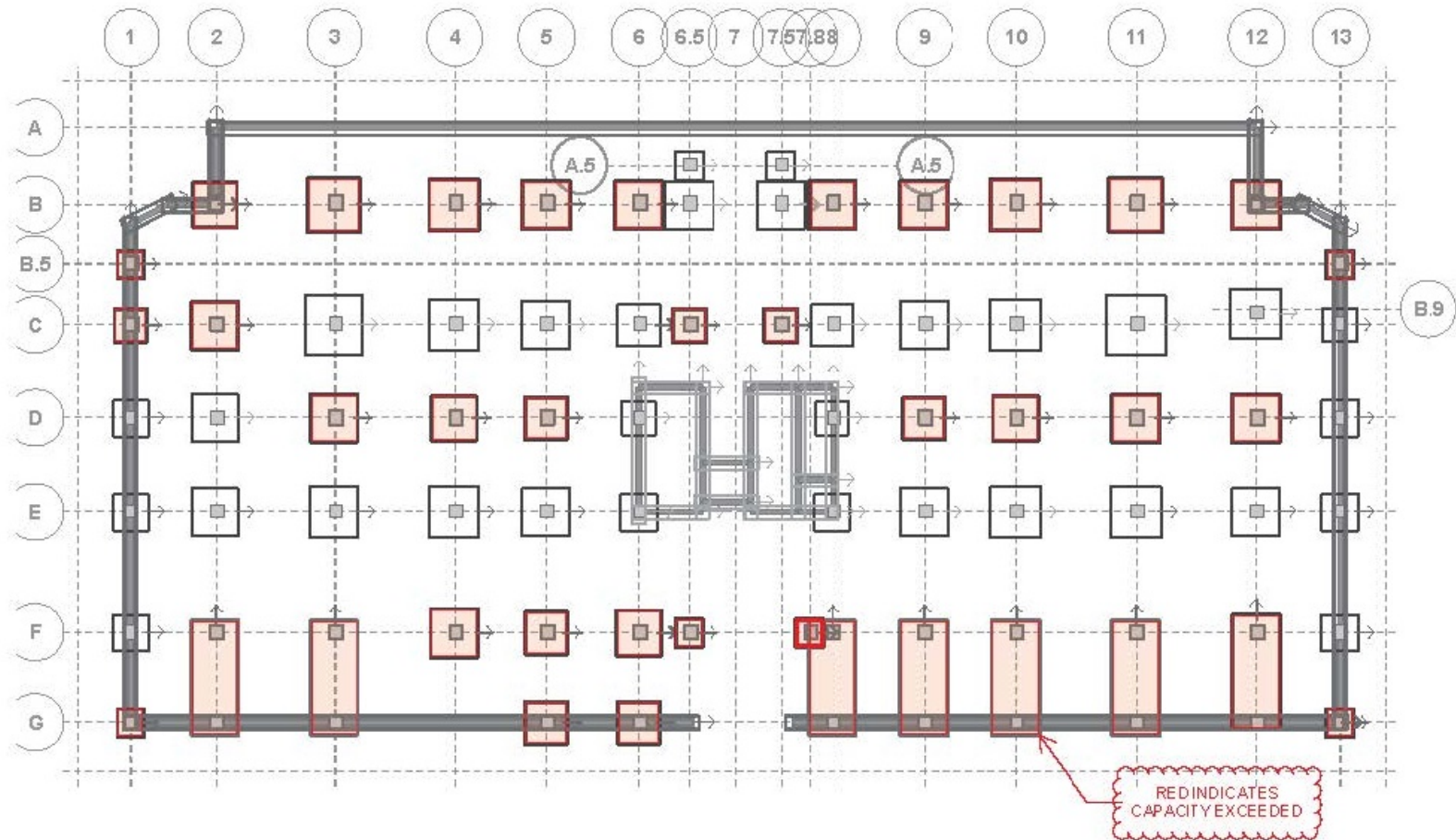


INCREASE BEAM  
SECTION  
DIMENSIONS



EXTERNAL POST-  
TENSIONING APPLICATION

# Concrete Foundation Interaction





# Foundation Underpinning & Mitigation

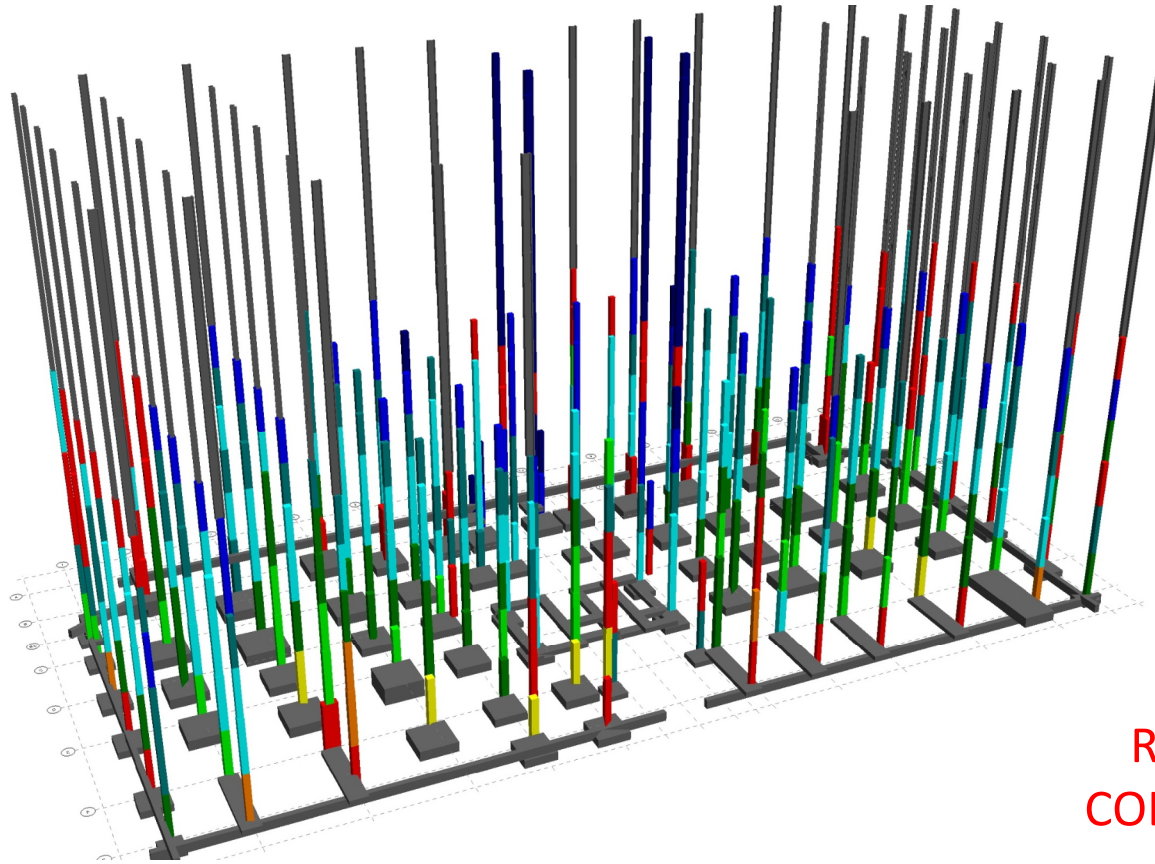


UNDERPINNING  
FOUNDATION



INCREASE  
FOUNDATION

# PSB Structural Analysis 3D Model



RED INDICATES  
COLUMN CAPACITY  
EXCEEDED



# Column Strengthening Techniques



CARBON FIBER-REINFORCED POLYMERS  
(CFRP) WRAP



STEEL JACKETING



INCREASE COLUMN PLAN  
DIMENSIONS

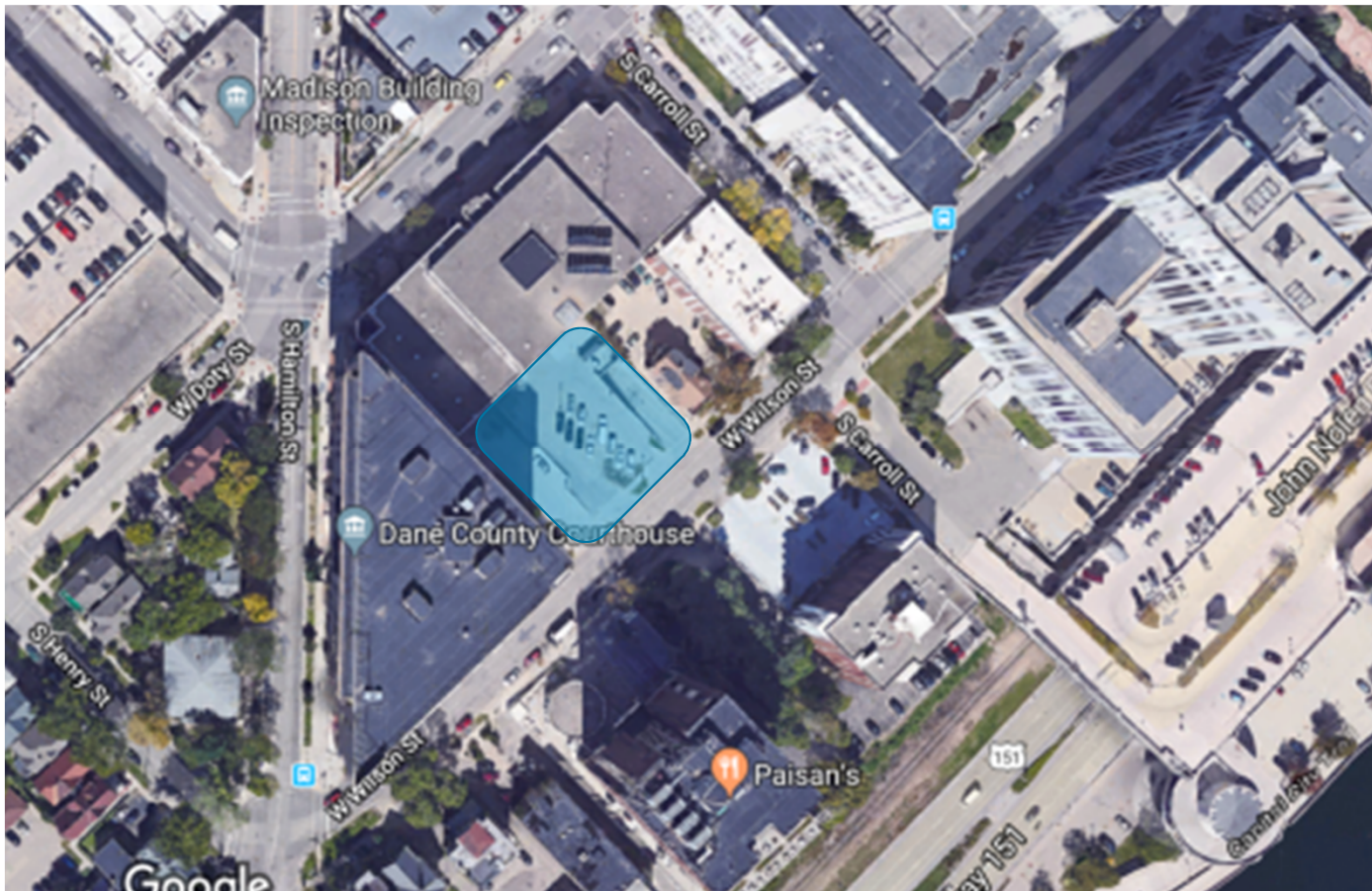
## Structural Mitigation Needed

- Beams – North South Direction
- Foundations
- Columns

**Questions?**



## Design Option – South Addition

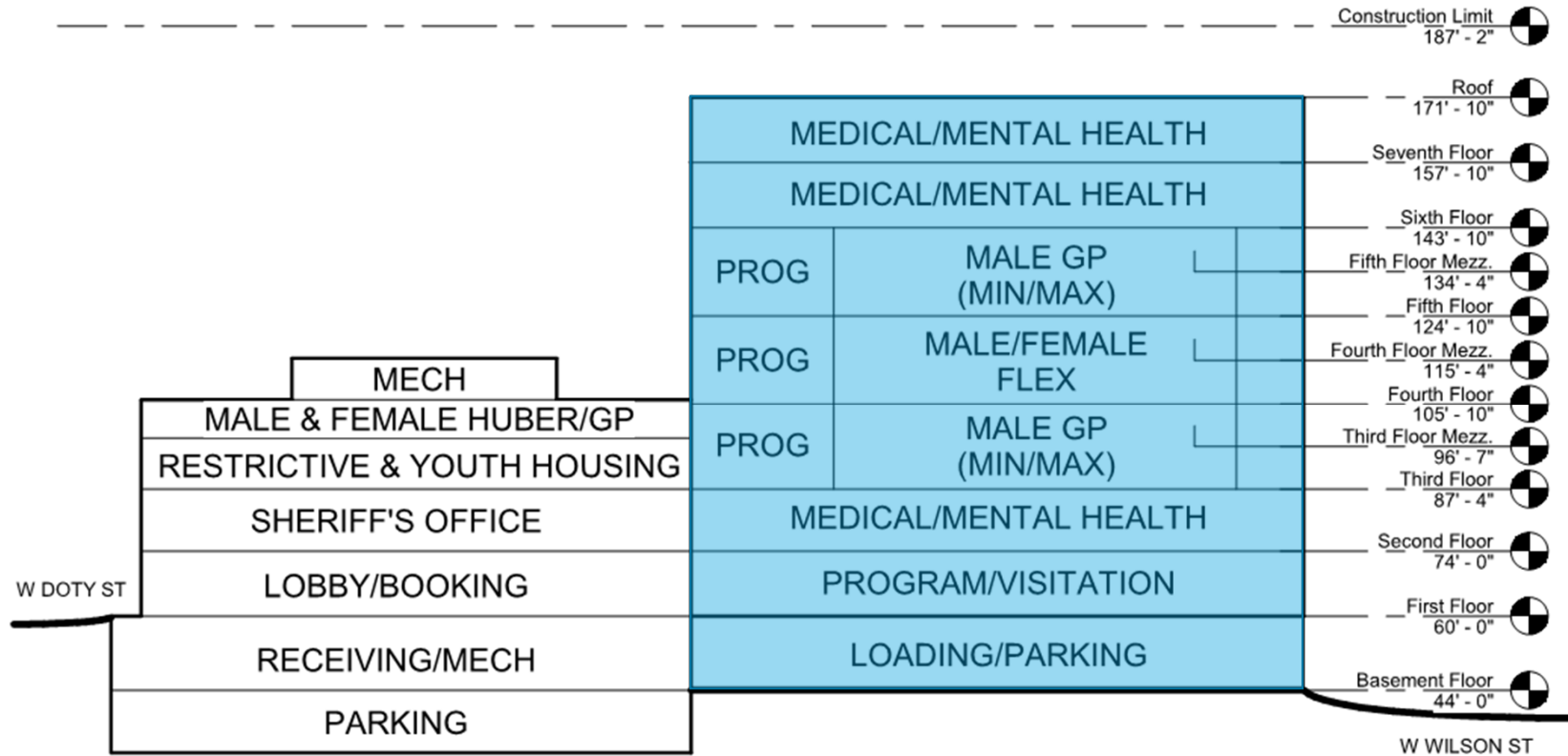




# PSB South View



# Design Option - Building Section (North - South)



**Questions?**

**Thank you.**