

Master Plan Recreation Center



Reck'n Crew



Our Team

Construction Management:

Kate Lundy
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Structural:

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Geotechnical:

Gustavo Cardona



Agenda

- Project Definition
- Building Architecture and Program
- Geotechnical
- Structural
- Construction Management



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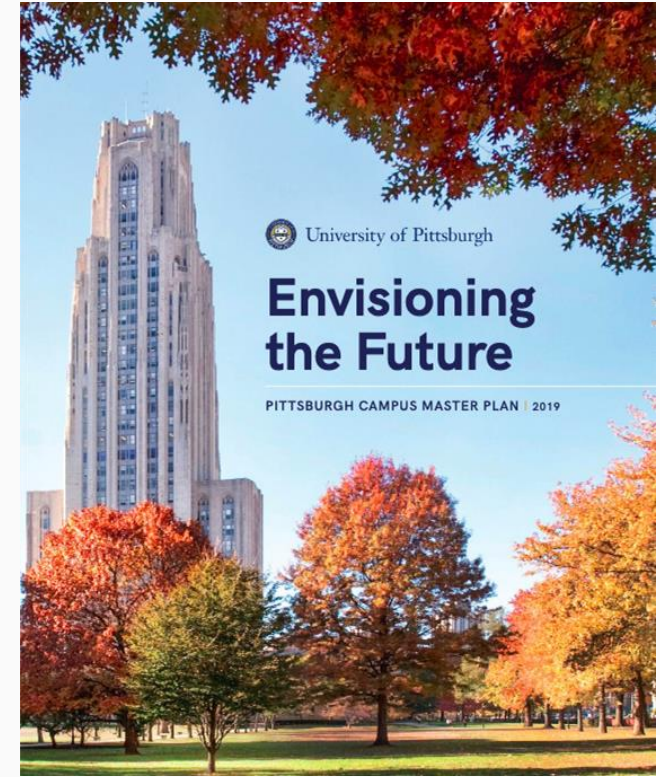
Pitt Master Plan

Client: **University of Pittsburgh**

20-30 year project to enhance the University

5 Core Ideas

1. A Place of Academic Excellence and Innovation
2. An Enriching Student Experience
3. A Distinctive Welcoming, and Attractive Urban Campus
4. A More Connected, Outward-Looking, Engaging University
5. A Place That Seeks Synergy and Efficiency



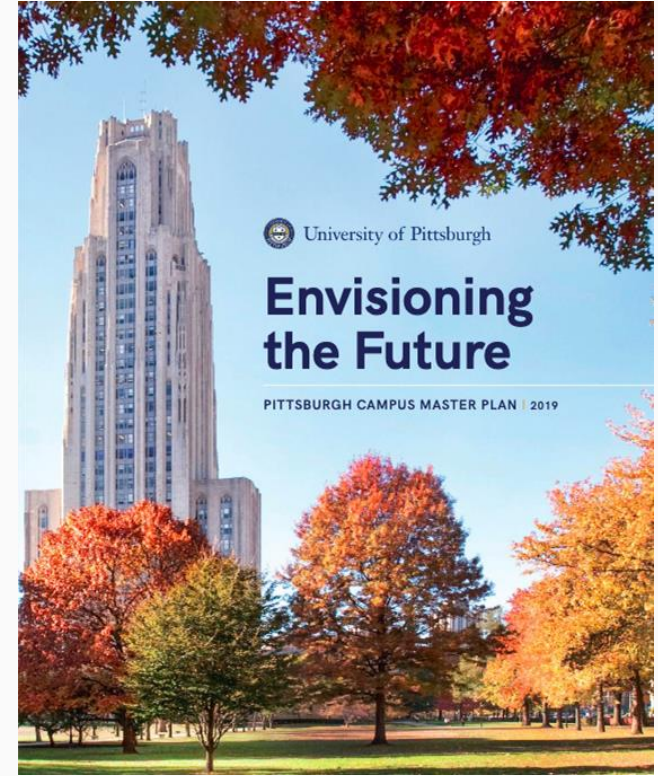
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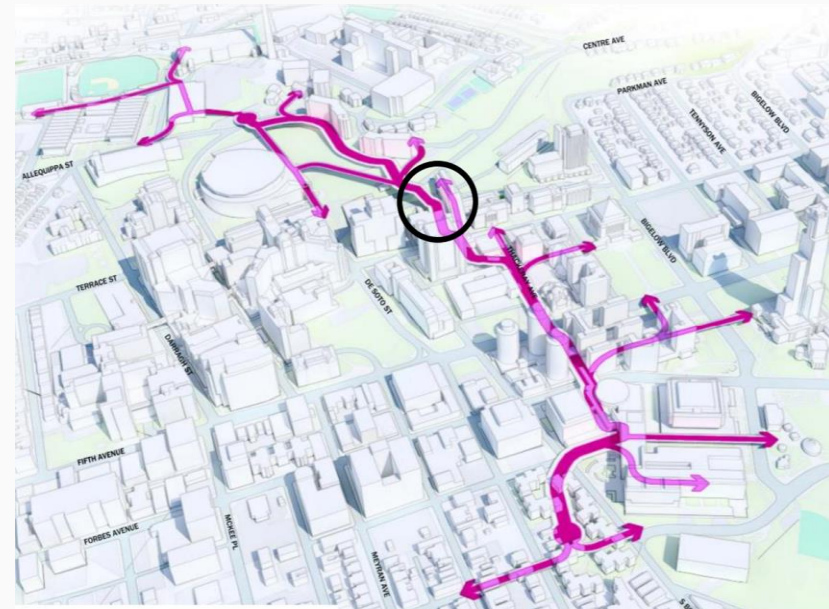
Rec Center – Purpose/Goals

2. Enrich Student Experience

- Unify upper and lower campus
 - Currently 8 recreation spaces scattered around campus
 - Majority on Upper Campus
 - Low satisfaction with location, quality, size

3. Create a Distinctive, Welcoming, and Attractive Urban Campus

- Create an engaging space
 - Currently 2 student life facilities
 - O'Hara Student Center
 - William Pitt Union

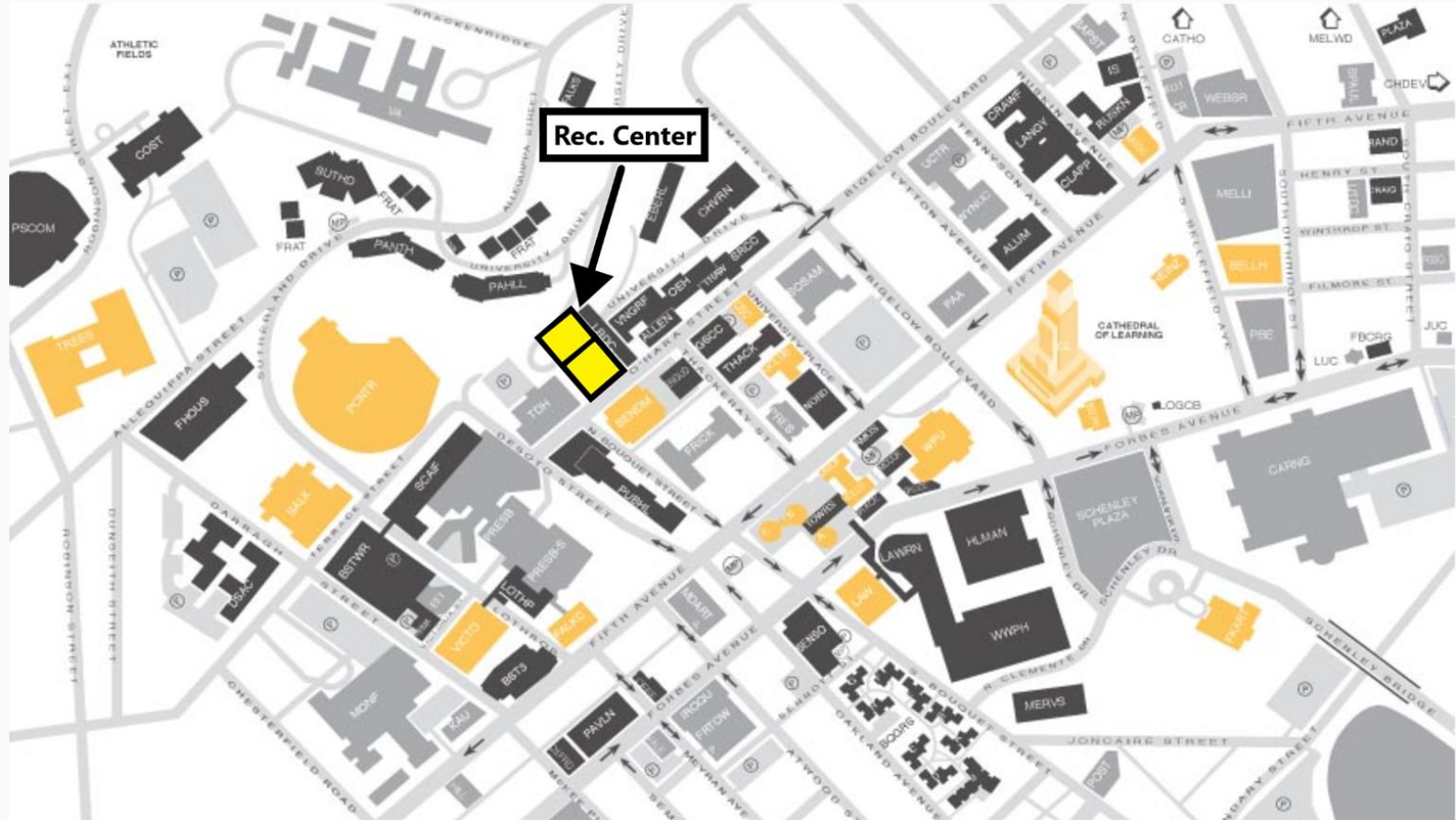


Project Scope

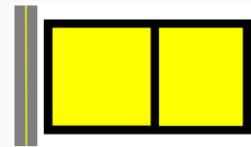
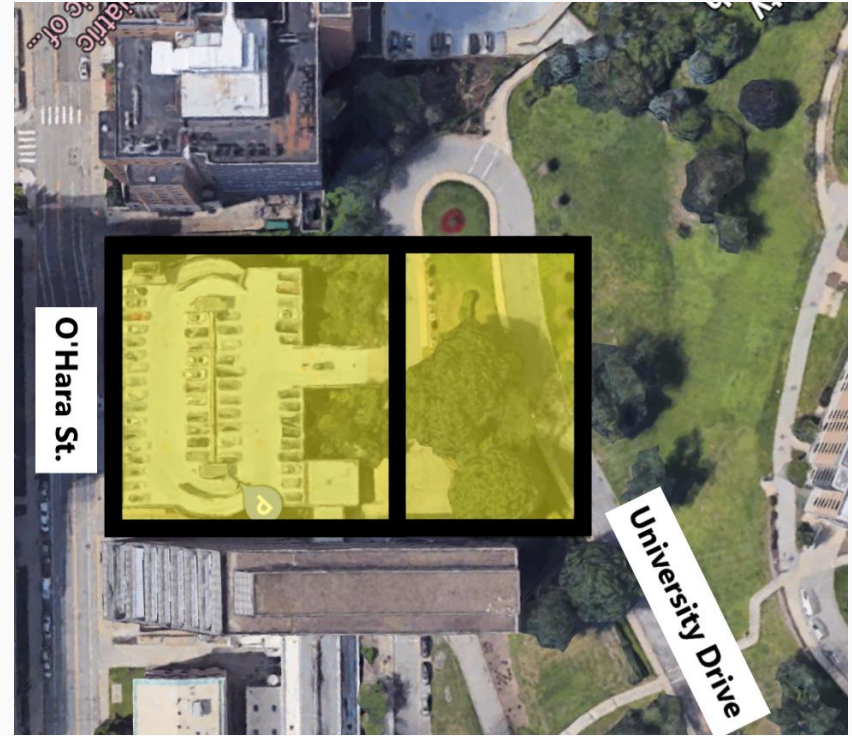
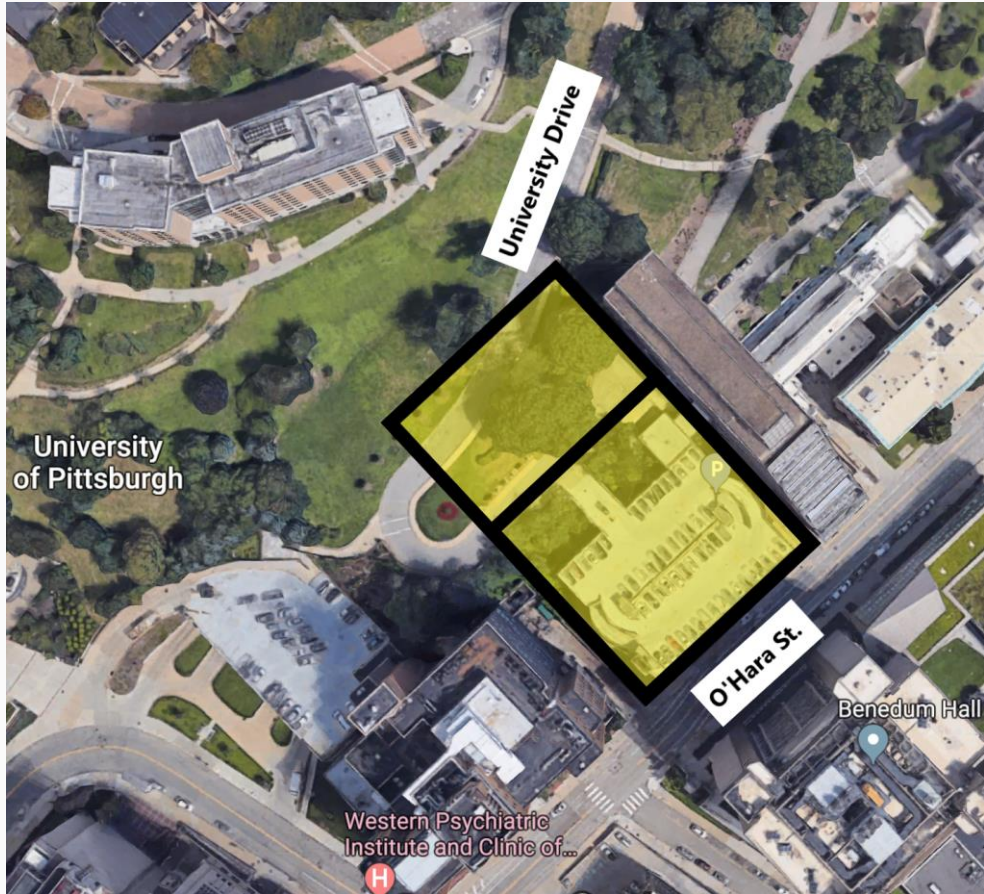
- Demolish O'Hara Parking Garage and LRDC
- Construct recreation center with integrated parking garage and occupied green roof
- Construct terraced lawn feature from O'Hara St to lower University Dr A



Site Location



Site Orientation

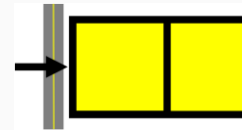
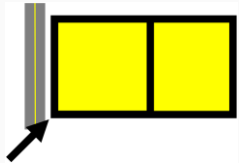
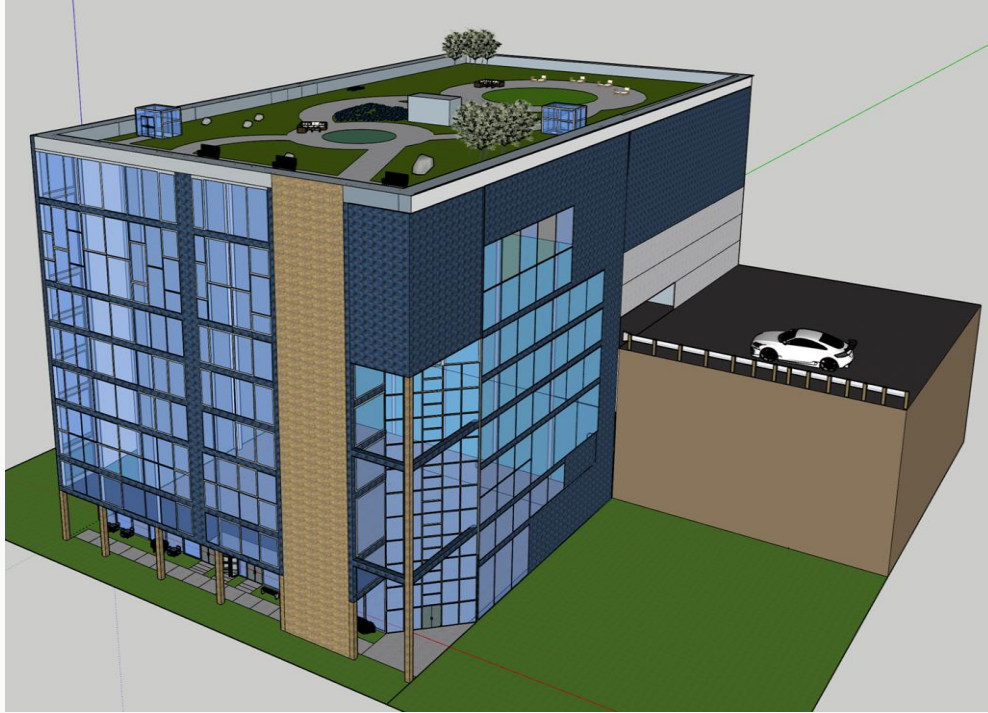


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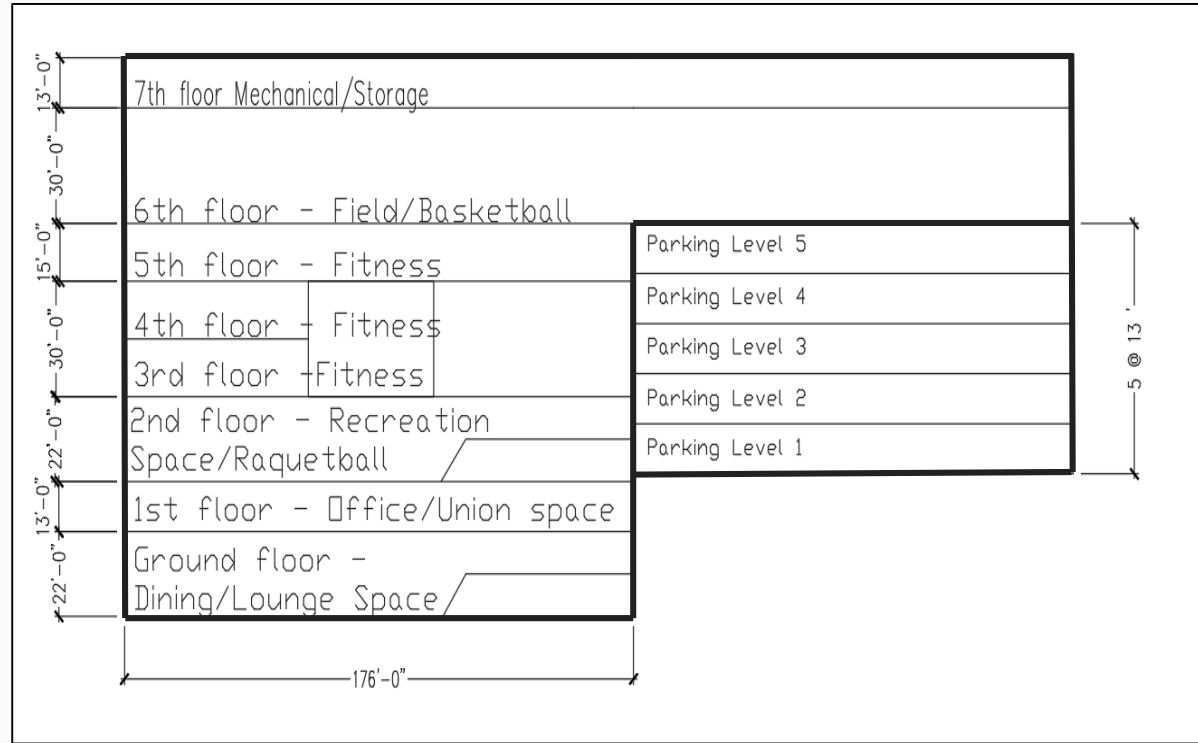


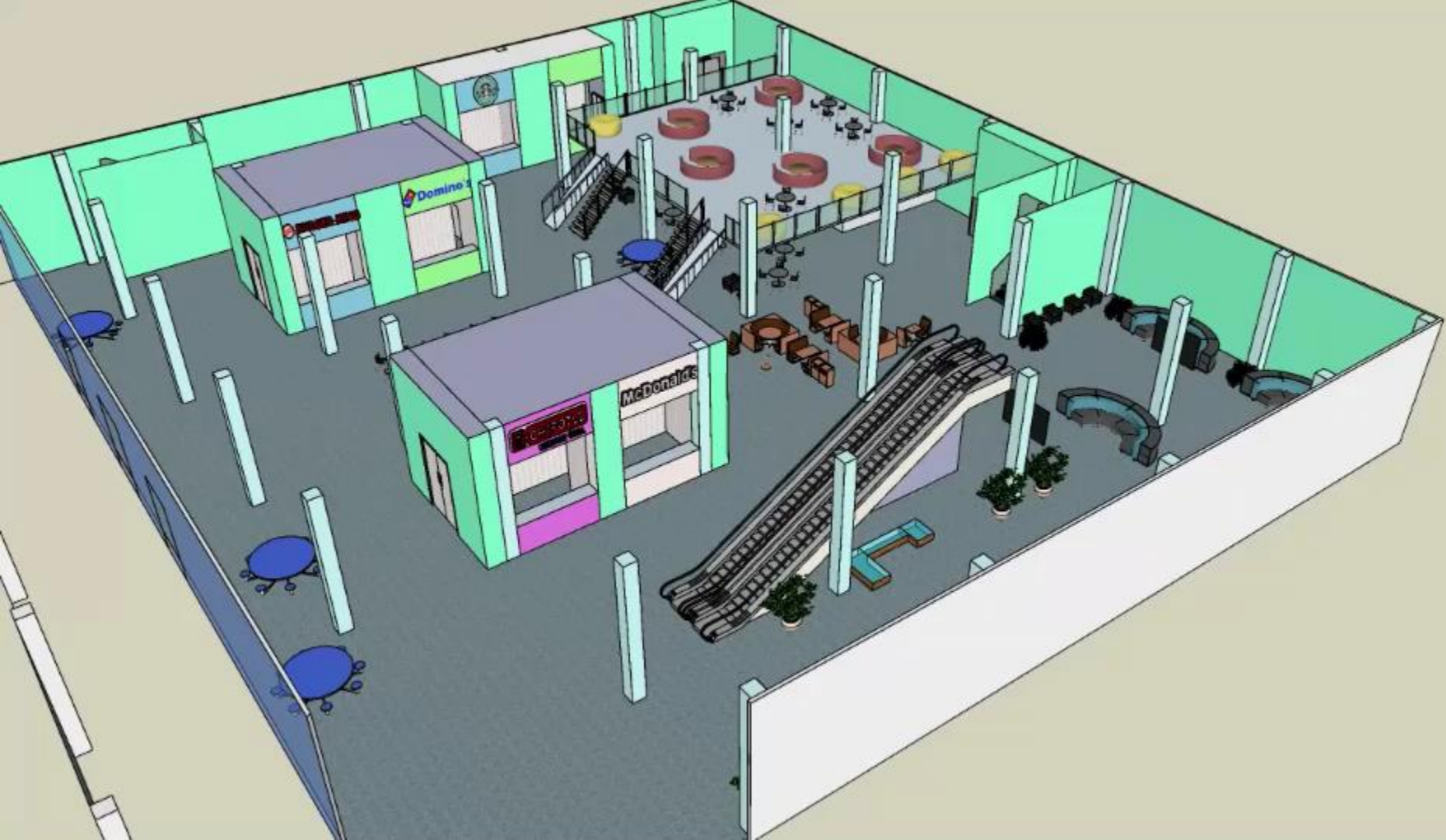
3D Model



Recreation Center Features

- Wellness Spaces
- Turf Field/Track
- Fitness/Studio Space
- Administrative Space
- Racquetball Courts
- Climbing Wall
- Basketball Courts
- Food Courts
- Green Roof

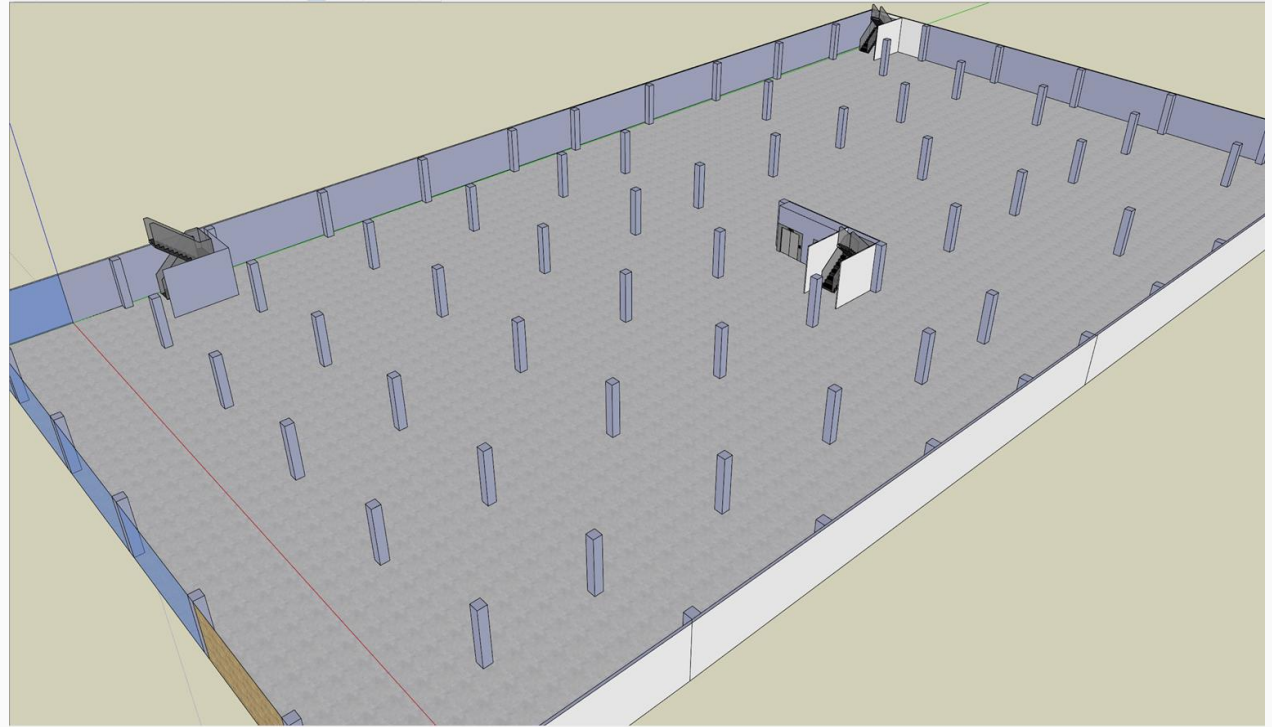




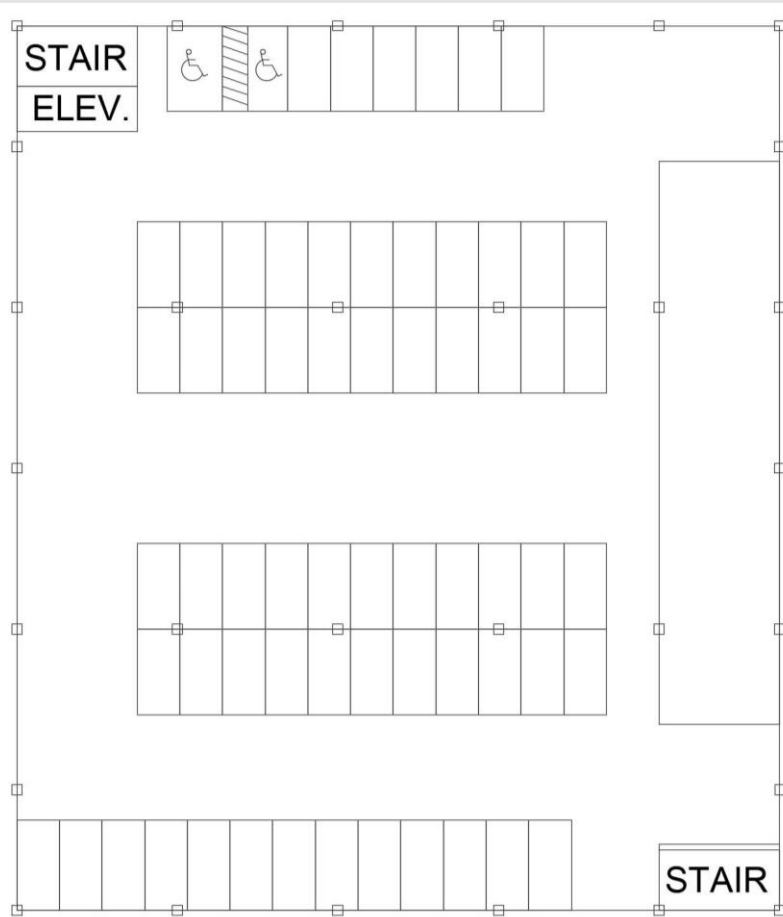
Recreation Center Drawings - Floor 7

Mechanical Floor:

- Central heating/cooling
- Ventilation
- Ducts
- Electrical



Parking Garage Drawings

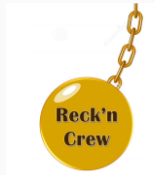


5 floors

65 spots/floor (325 total)

2 stairwells

1 elevator



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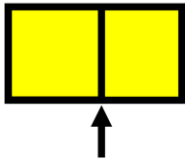
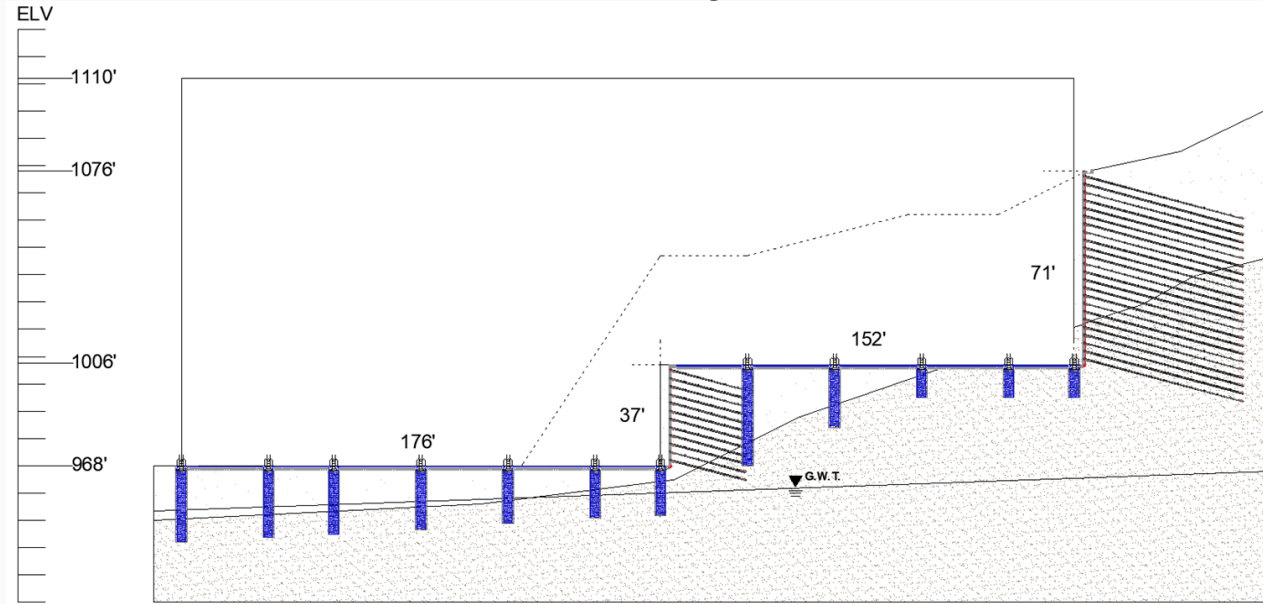


Geotechnical Project Scope

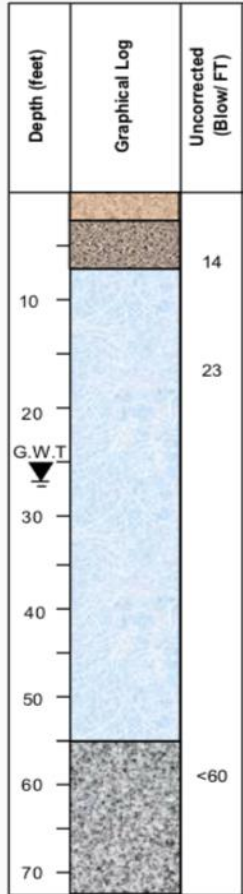
Calculations and Designs

- Retaining Walls
- Deep Foundation
- Pile Caps
- Structural Slab-on-Grade
- Shear Wall Support

Overall Geotechnical Design: Side Profile



Soil Analysis (Assumed Initial Conditions)



-> Top Soil & Organic

-> Fill

-> Alluvial
(Sand, Gravel, Clay)

-> Bedrock
(Sandstone, Siltstone)

Design Parameters:

Topsoil, Fill, Alluvial Soil

Effective Friction Angle: **30**

Moist Unit Weight: **130 pcf**

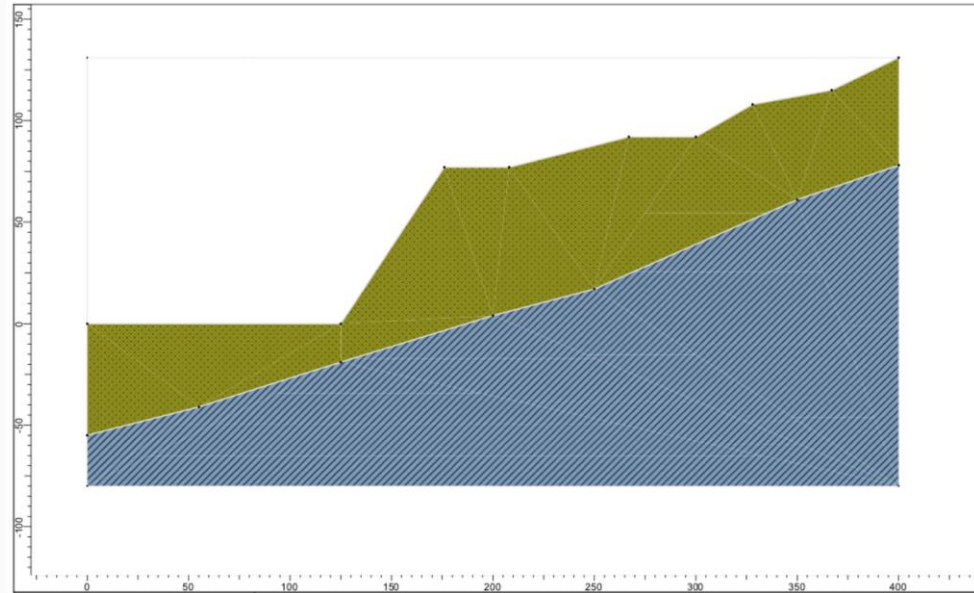
Effective Cohesion: **100 psf**

Rock

RQD: **50%**

Rock U.C Strength: **5,500 psi**

Unit Weight: **165 psi**



Considerations

Pittsburgh Coal Seam

- Approximate elevation ranging from 1060 to 1075 ft

Rock Excavation

- Hydraulic hammering
- May be reused as fill

Soil Compaction

- Compacted to at least 95% of the maximum dry density as per ASTM D-1557

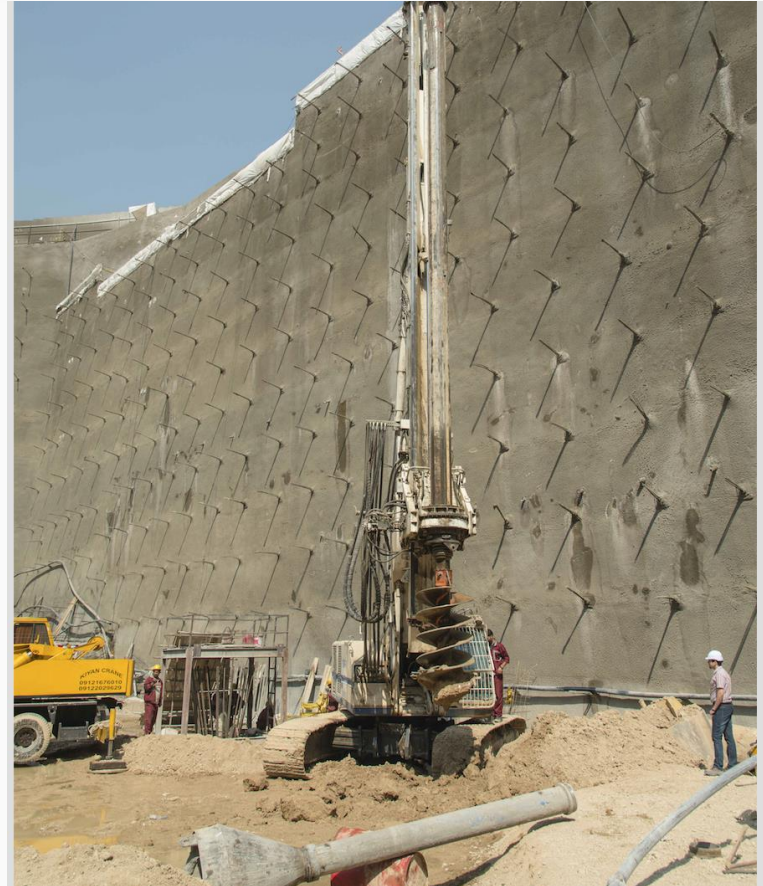


Pittsburgh Coal Seam-Oakland (GIS)

Soil Retaining Walls

Design Options

- Cast-In-Place
- MSE (Mechanically Stabilized Earth)
- Soldier Pile Wall
- Soil Nail Wall



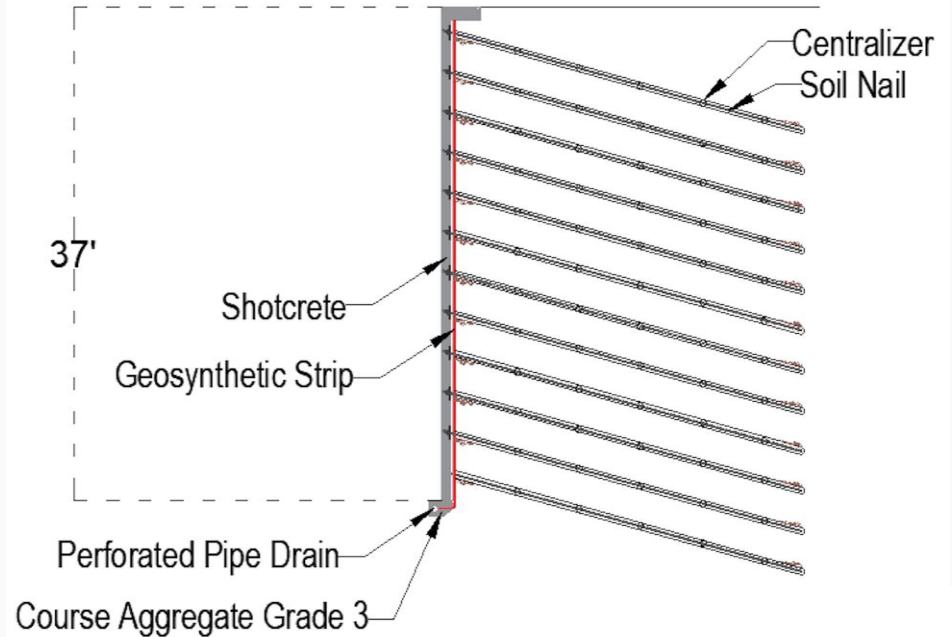
Soil Nail Wall

Designed using "AASHTO Soil Nail Wall Reference Manual"

Determining Height of Lifts

$$H_c = \frac{4c_u T \tan(45 - \frac{\phi}{2})}{\gamma_{sat} T \tan^2(45 - \frac{\phi}{2}) F.S.} = 3.1'$$

Soil Nail Wall: Side Profile of Lower Wall



Soil Nail Wall

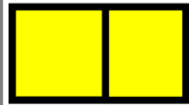
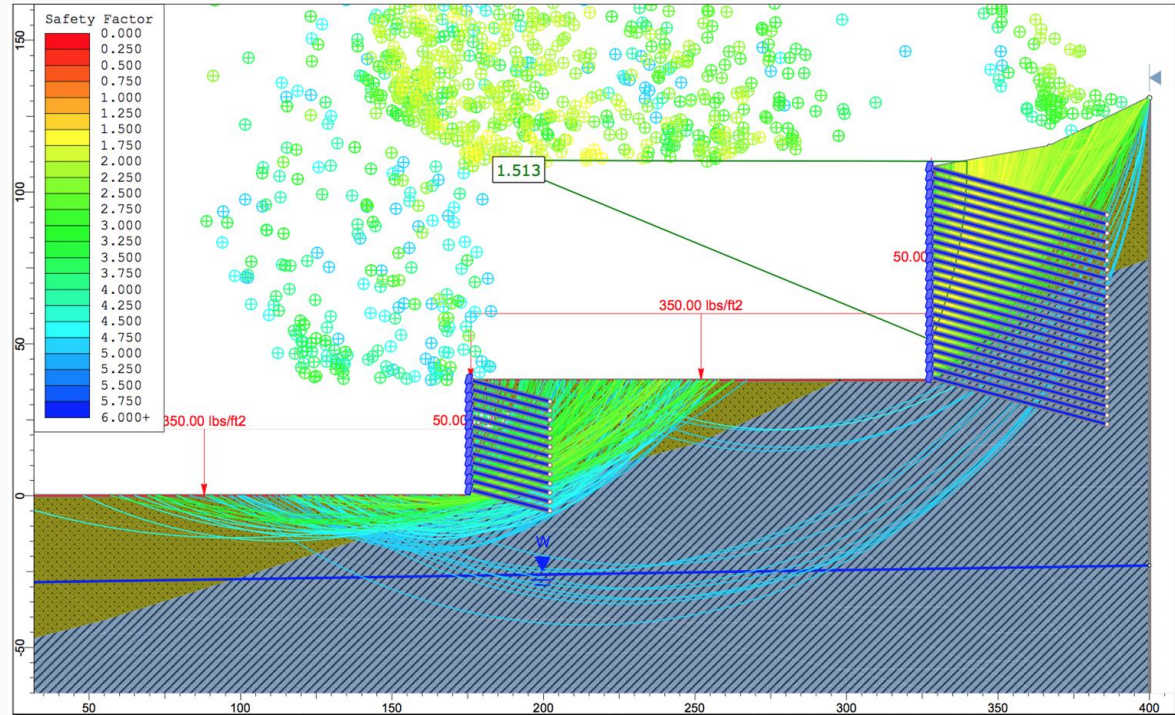
Global Stability

Factor of Safety

F.S.(71' wall) = 1.513

F.S.(37' wall) = 2.132

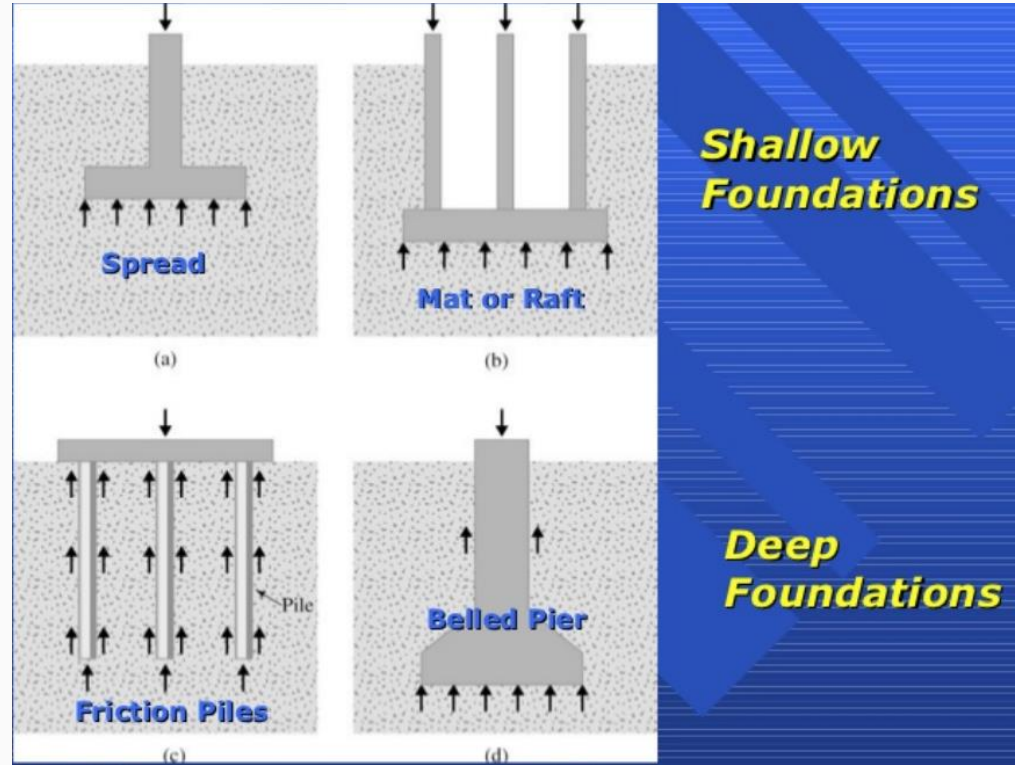
RocScience Slides



Vertical Support

Design Options

- Shallow Foundation
 - Raft Foundation
 - Shallow Footings
- Deep Foundation
 - Driven Piles
 - Auger Piles
 - Caissons

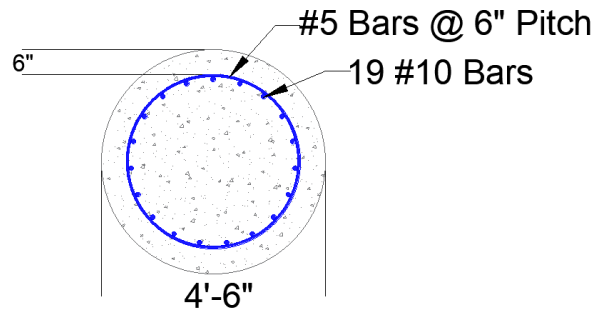


Caisson Drilled Shaft

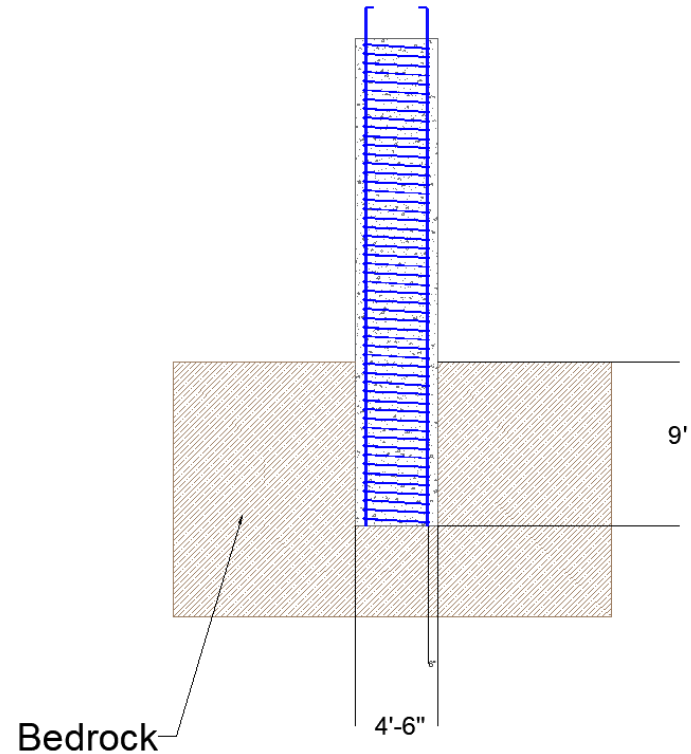
54" Diameter Piles

- Design Load: 1991.7 Kips
- Max Settlement: 0.07 in
- DownDrag: 0

Plan View



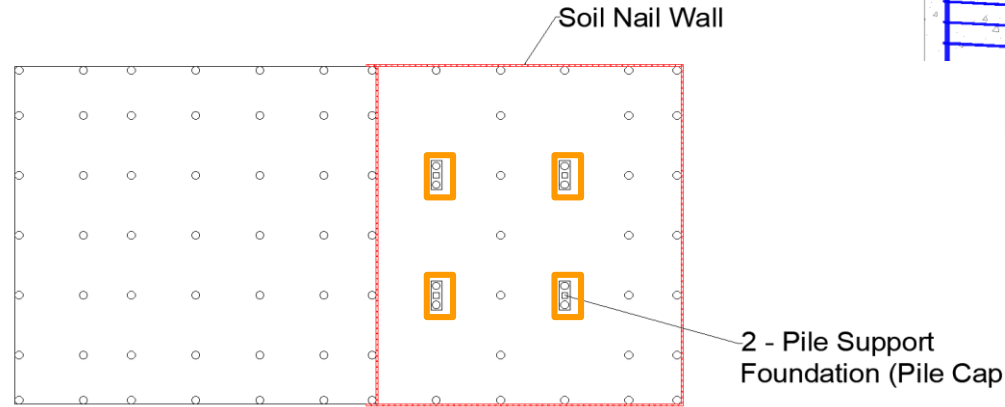
Cross-Section View



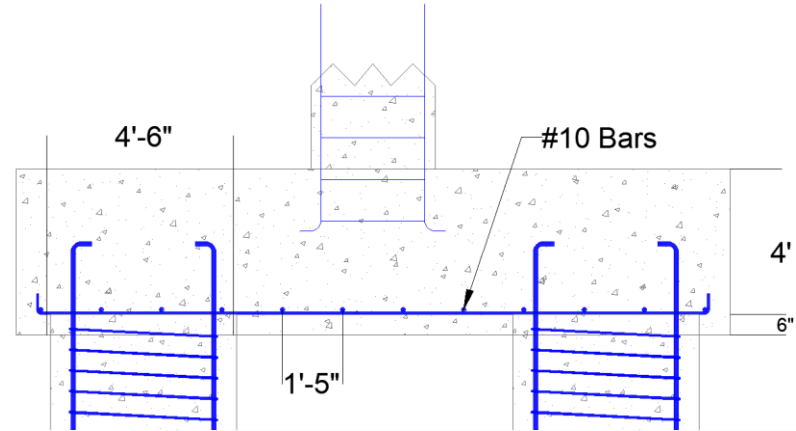
Pile Supported Foundation

2 - Pile Support System

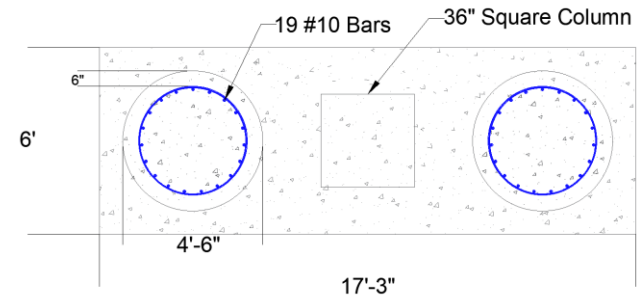
- Concentrated loads of 2959 Kips



Cross-Section View



Plan View

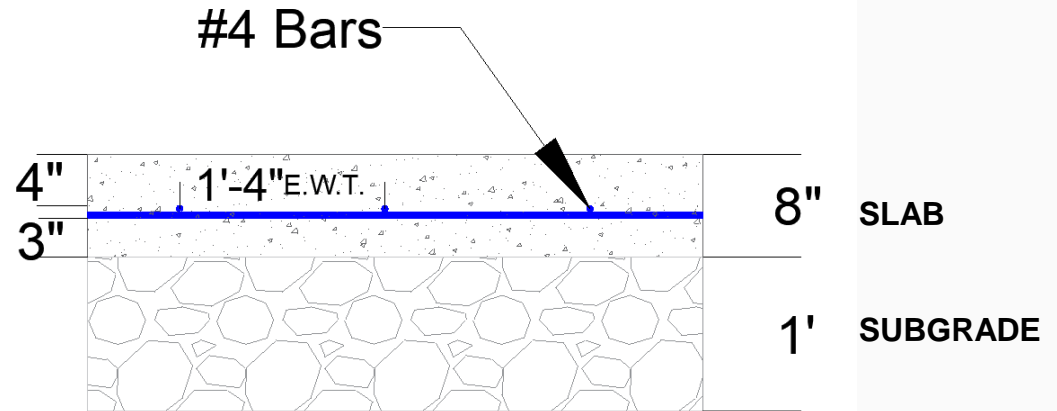


Slab-on-Grade

Slab Design (ACI 360R-10)

- Isolated from columns and load bearing walls
- Moisture barrier between subgrade and slab
- Concentrated design loads of 2,000 lbs

Cross-Sectional View

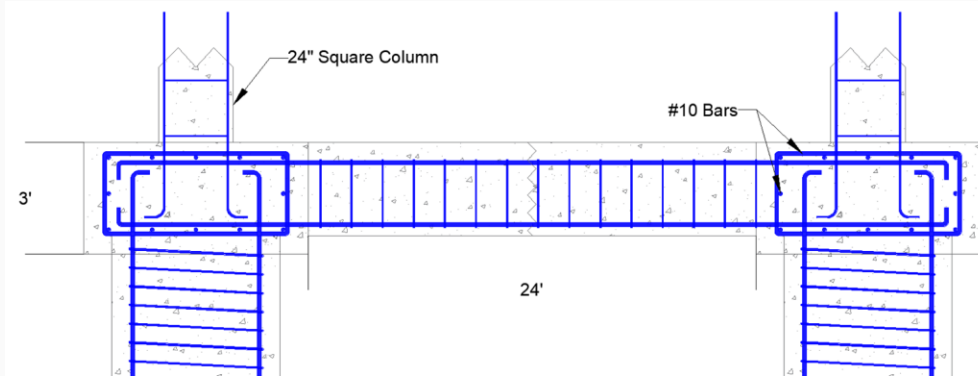


Shear Wall (LFRS) Support

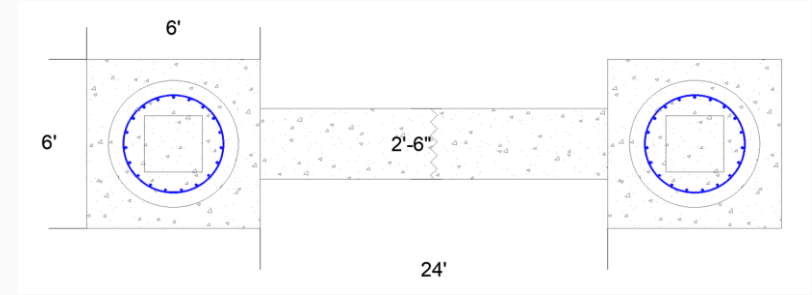
30' Shear Wall

- Design Load
 - Columns: 806 Kips
 - Wall: 146 Klf
- Differential Settlement:
 $0.034\text{in} < 0.5\text{in O.K!}$

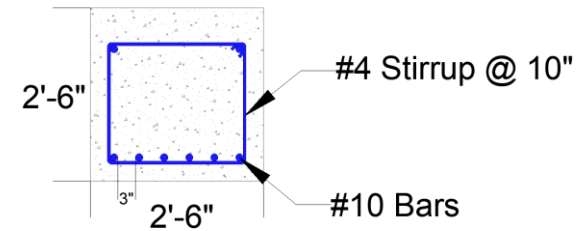
Cross-Section View



Plan View



Ground Beam Cross-Section



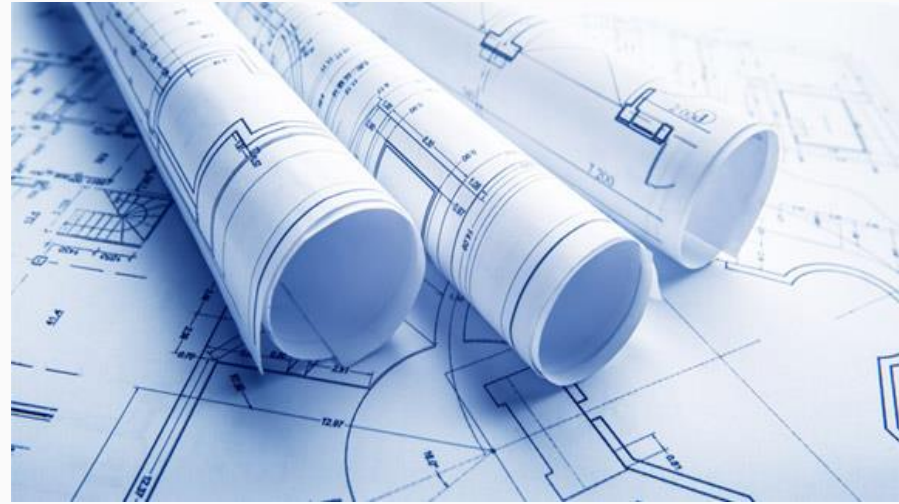
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Structural Project Scope

- Shear Walls
- Floor System (Parking Garage)
- Floor System (Recreation Center)
- Trusses
- Columns



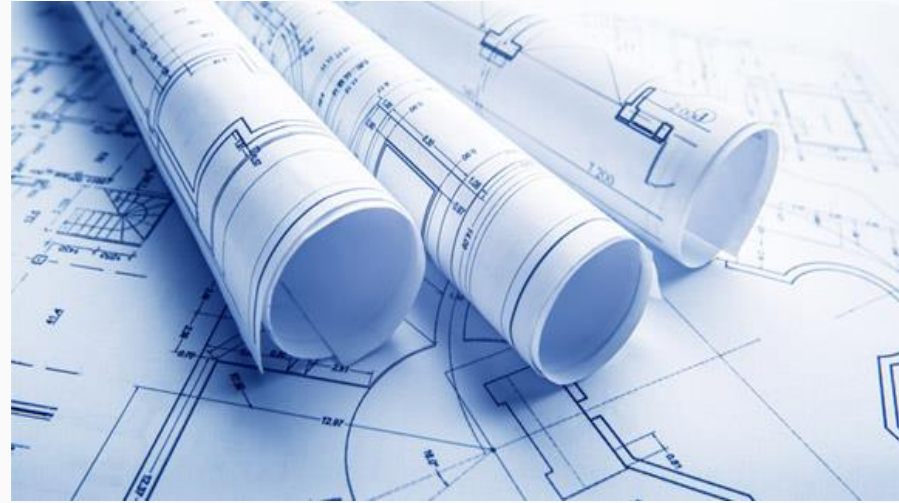
Structural Design Considerations

- Requirements
 - Functional
 - Serviceability
 - Safety
 - Economic
 - Constructability
 - Aesthetics

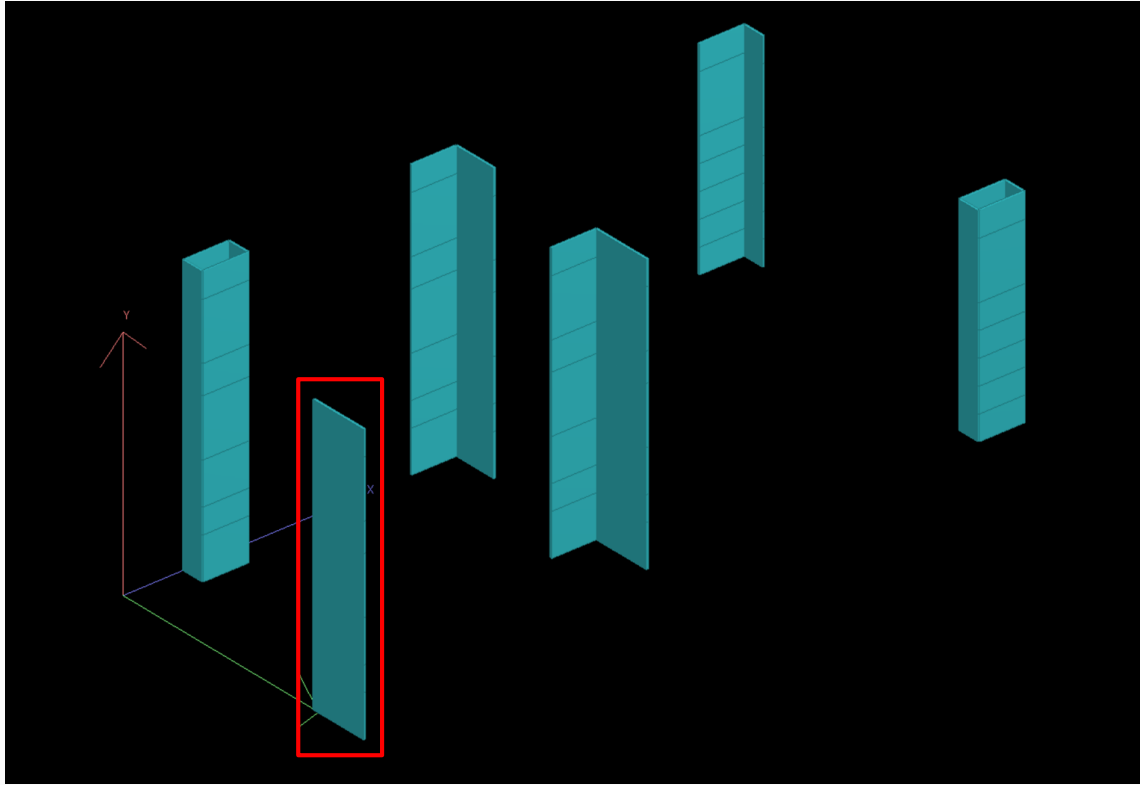


Structural Project Scope

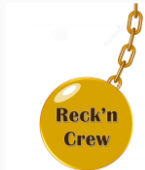
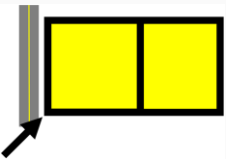
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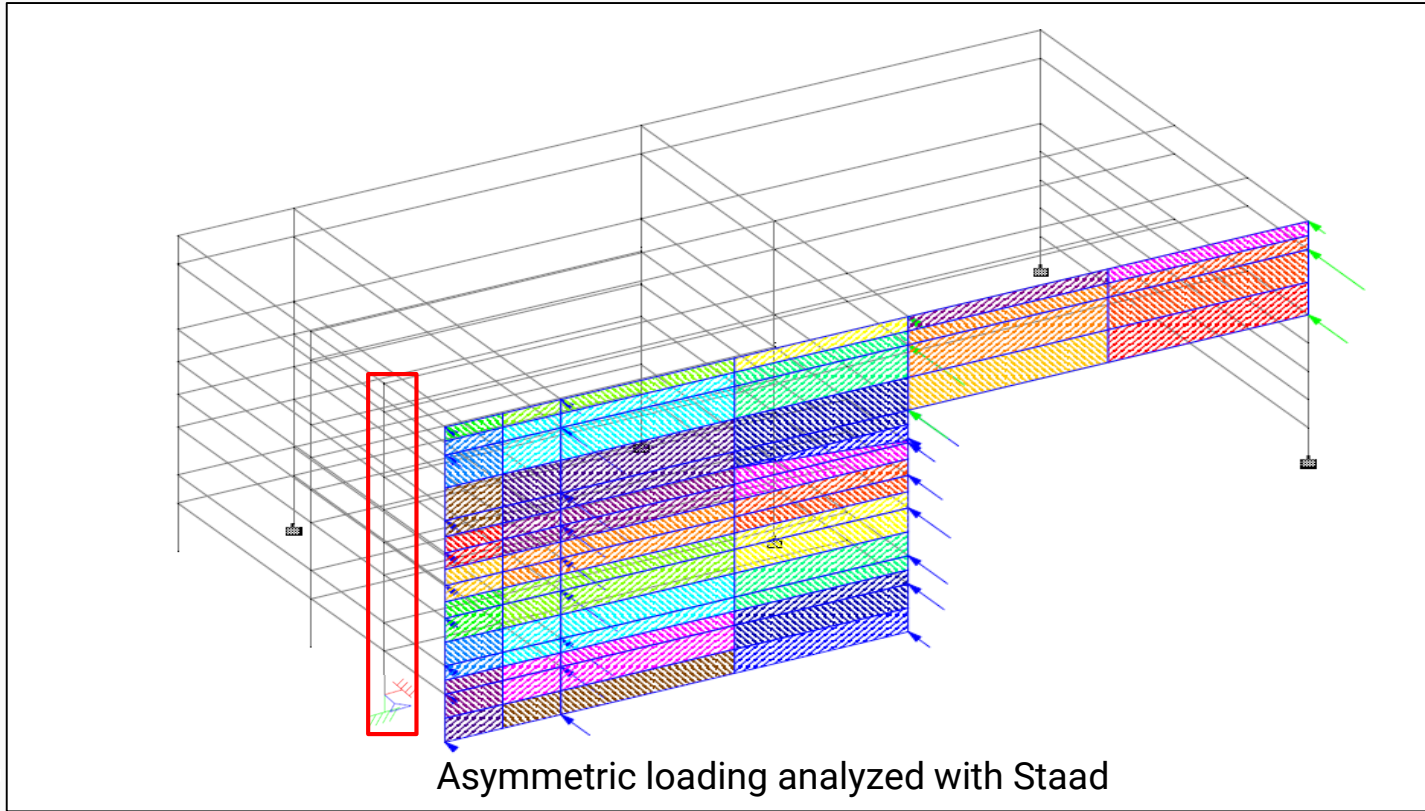


Lateral Force Resisting System (LFRS)

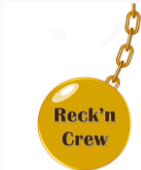
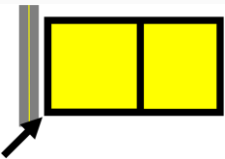
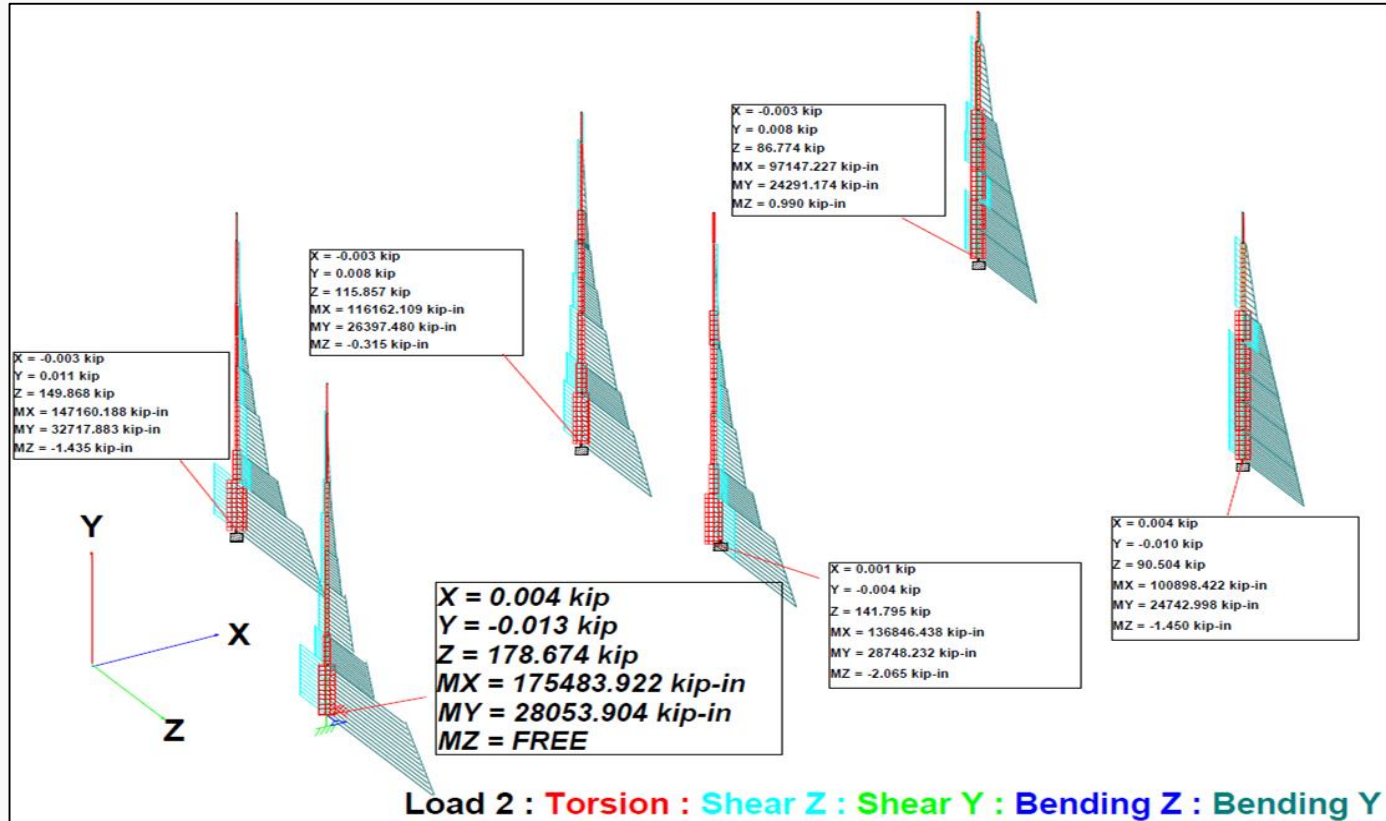


Shear wall layout



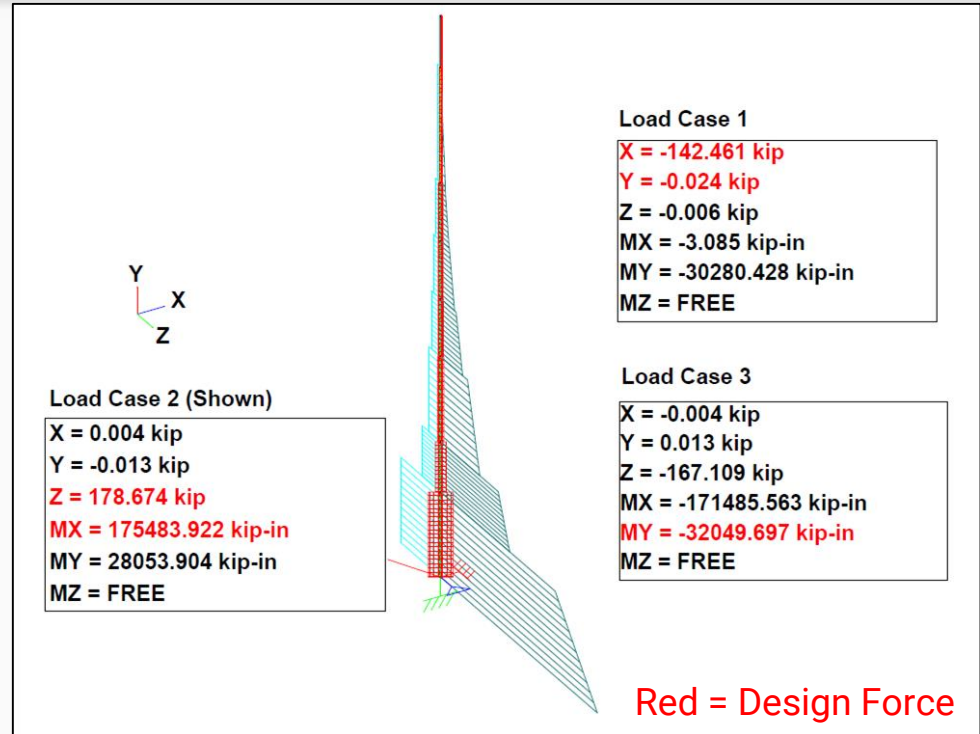


Shear Wall Analysis



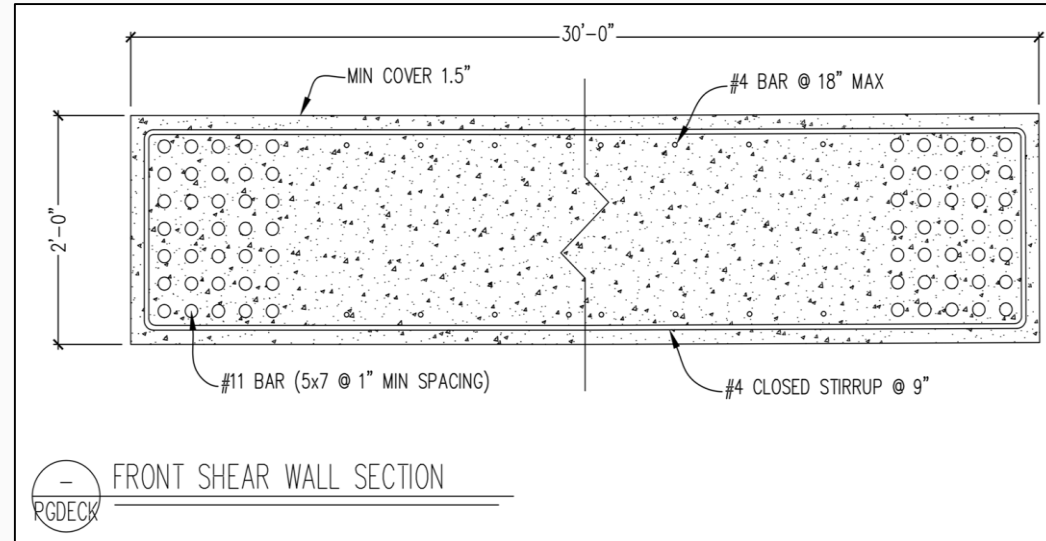
Shear Wall Design

- Designed as cantilever beam
 - Flexure/Shear
 - Tension/Compression
- The shear wall is load bearing
 - Self-Weight
- Axial Load-Moment Interaction Diagram



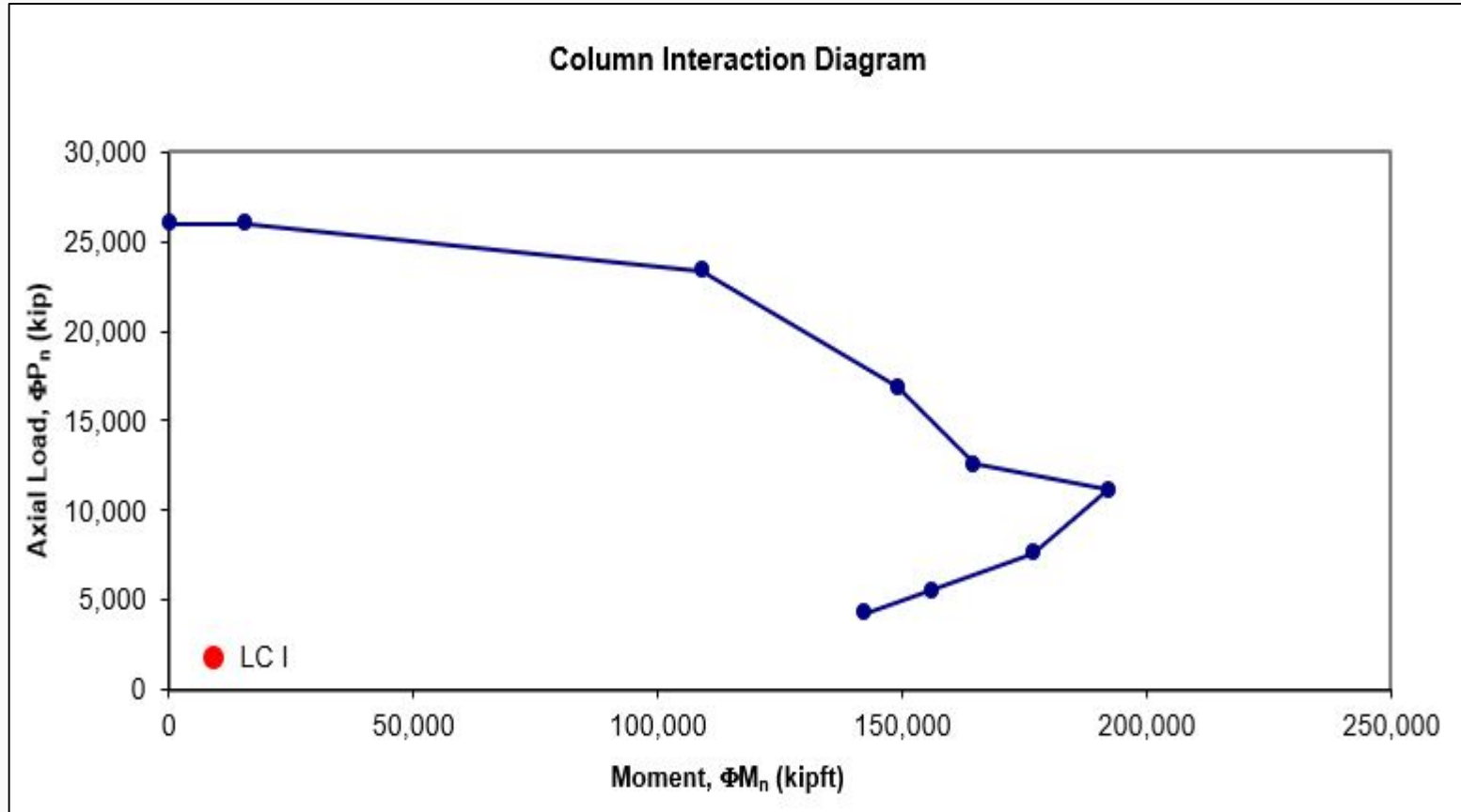
Example Shear Wall Design

- 30 ft long, 102 ft tall shear wall
- Steel reinforcement:
 - Longitudinal: 35 #11 bars at both ends of cross-section
 - Satisfies flexural and axial load requirements
 - Transverse: #3 stirrups at 9 in.
 - Satisfies shear requirement



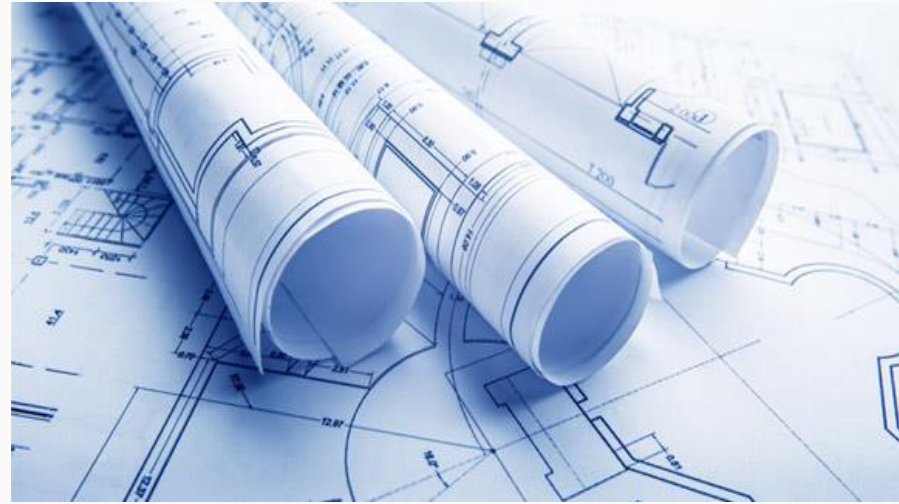
*Supporting ties not shown

Axial Load-Moment Interaction Diagram

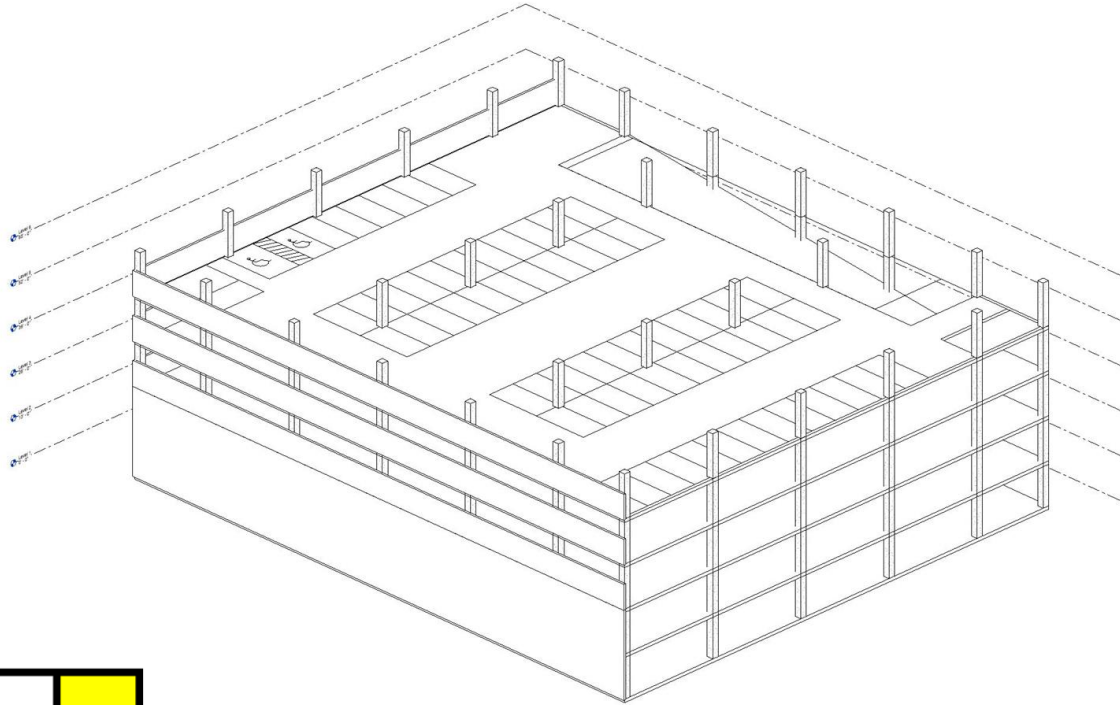


Structural Project Scope

- Shear Walls
- Floor System (Parking Garage)
- Floor System (Recreation Center)
- Trusses
- Columns



Parking Garage Background



- 5 levels, 325 spaces
 - ADA
- Stairwell and Elevator Requirements
- Partial open design



Slab Selection

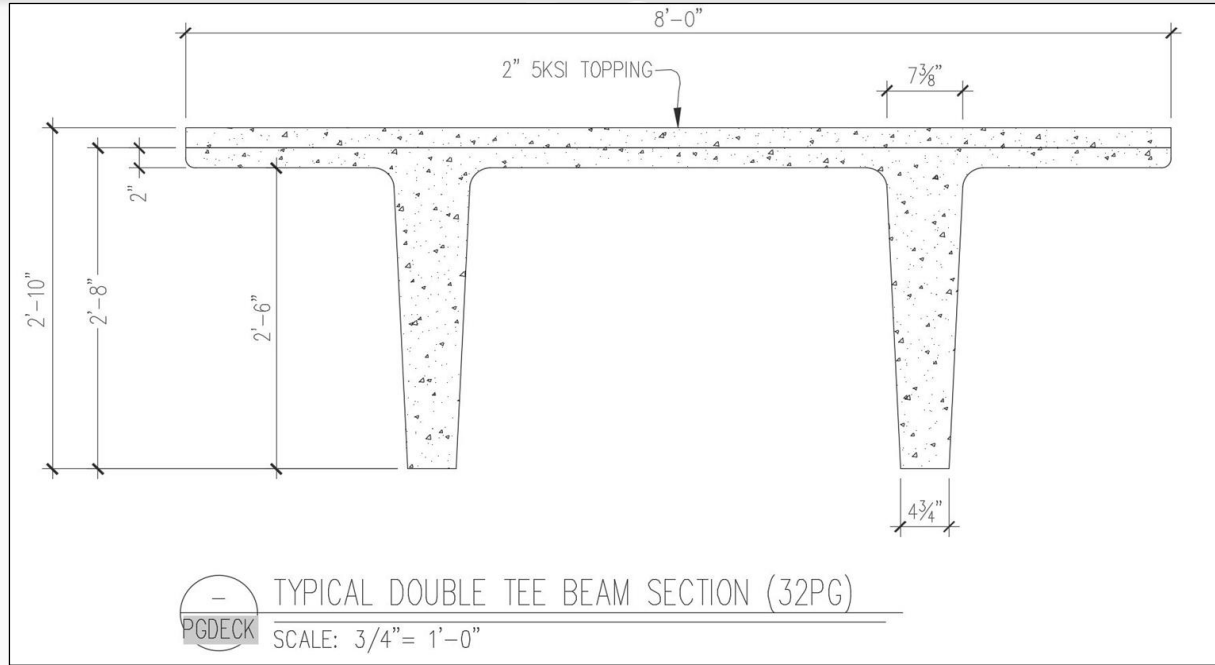


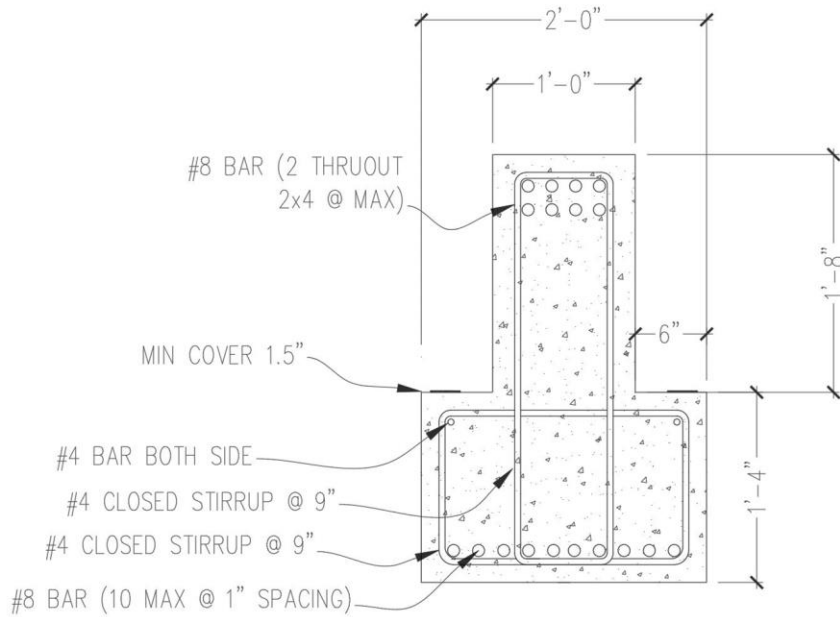
Table of safe superimposed service load, lb/ft², and cambers, in.

2 in. Normalweight Topping

Strand pattern	y _s (end) y _s (center) in.	Span, ft																										
		42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	
128-S	7.00	270	240	214	190	170	152	136	121	108	97	86	76	67	56	47	38	30										
	7.00	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	0.9	0.7	0.6									
148-S	7.00	289	259	232	208	187	168	152	137	123	111	100	88	77	66	57	47	39	31									
	7.00	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.6	1.5	1.4	1.3	1.2	1.0									
		1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.0	0.9	0.7	0.5	0.2	-0.2	-0.6	-1.0	-1.5									



Girder/Beam Design

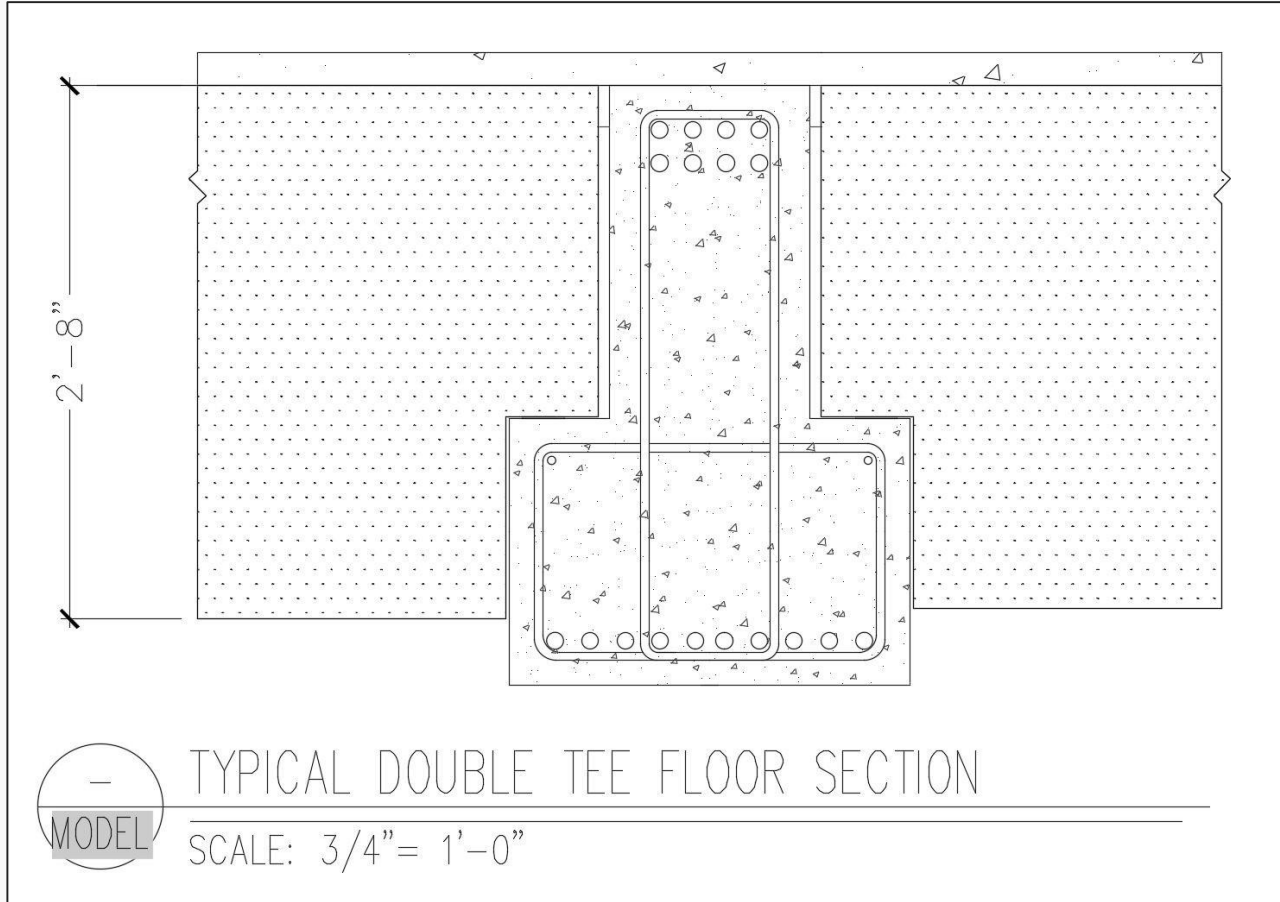


— TYPICAL INVERTED TEE BEAM SECTION (P.G.)
 MODEL SCALE: 3/4" = 1'-0"

	Clear Span (ft)	Dead Load (psf)	Live Load (psf)	LRFD (plf)
32' span	30	115	40	8910
24' span	22	115	40	8910

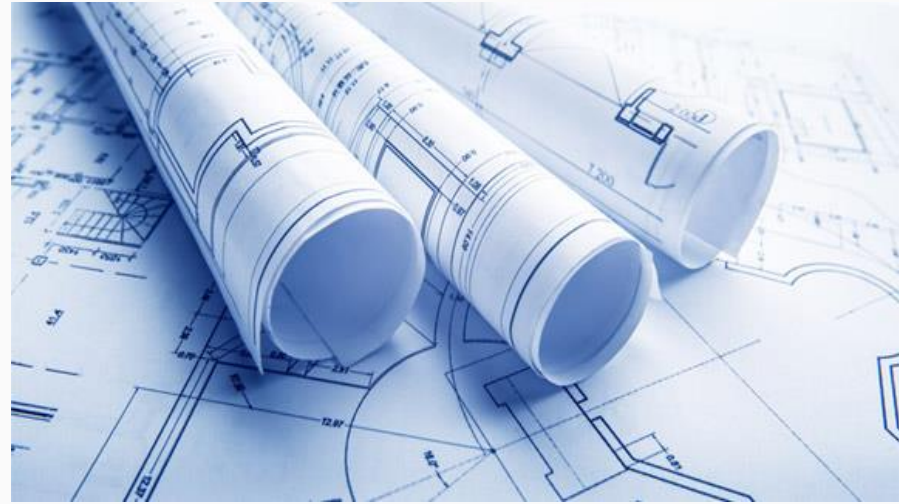


Typical Floor Section



Structural Project Scope

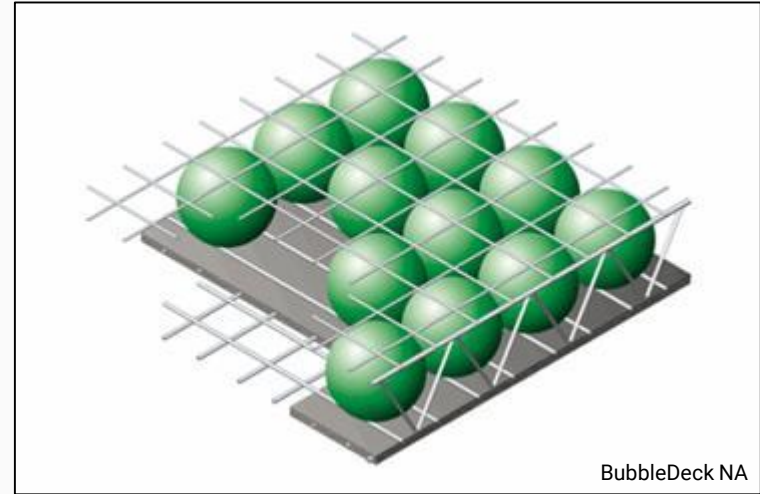
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Slab Considerations



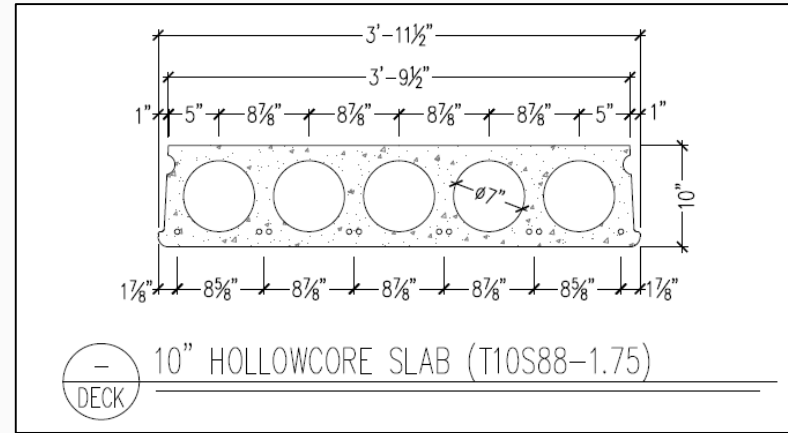
**Precast, Pretensioned
Hollowcore Plank**



Semi-Precast Voided Slab System

Slab Selection

Slab Schedule				
Length	LL (psf)	Selected Plank	LL _{Allow} (psf)	Self Weight (psf)
31'	160	T10S88-1.75	~170	69
23'	160	T8S58-1.75	~170	63
31' (Mech)	168	T10S88-1.75	~170	69
23' (Mech)	168	T8S58-1.75	~170	63



Hollow Core Plank Advantages:

Locally Manufactured

Quick Erection

109 psf DL Reduction (16" Solid Deck)



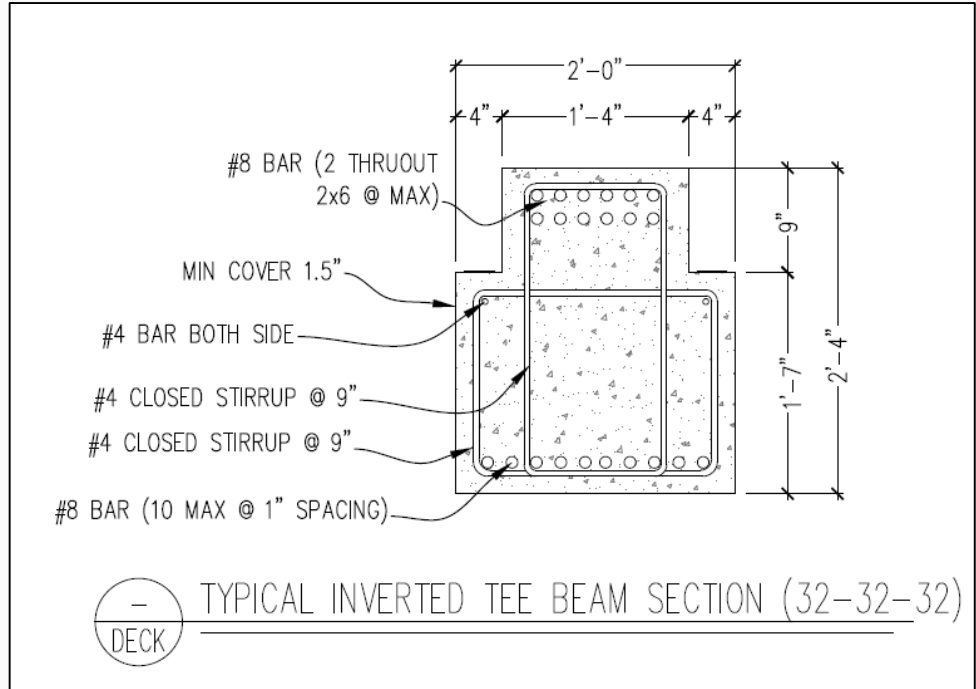
CIP Girder/Beam Design

Girder/Beam Schedule			
ID	Clear Span (ft)	LRFD (plf)	Self Weight (plf)
IT 32-32-32	30	7228	620
IT 32-24-32	30	6429	630
IT 24-32-32	22	7506	620
IT 24-24-32	22	6688	630
L 32	33	3971	380
L 24	22	4167	380
S 32	30	2520	290
S 24	30	2520	290

CIP Advantages:

Exposed connections more aesthetically pleasing.

Continuous beams easily developed through columns.



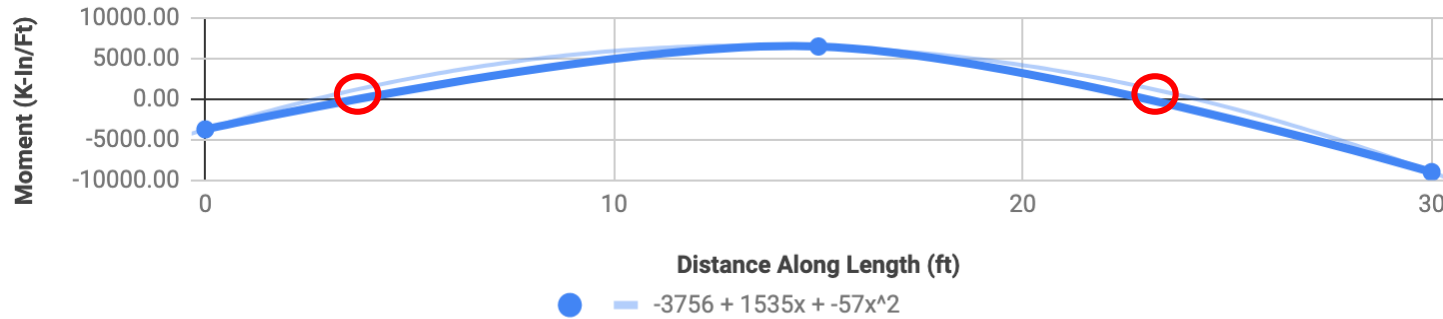
Reinforcement detailing designed with Strut and Tie Method



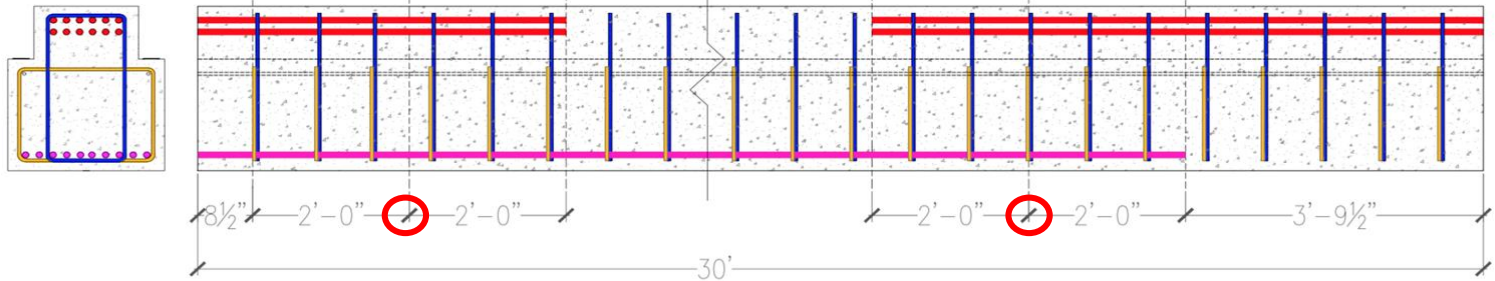
CIP Girder Reinforcement

Approximated Moment Diagram

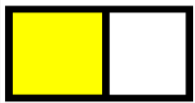
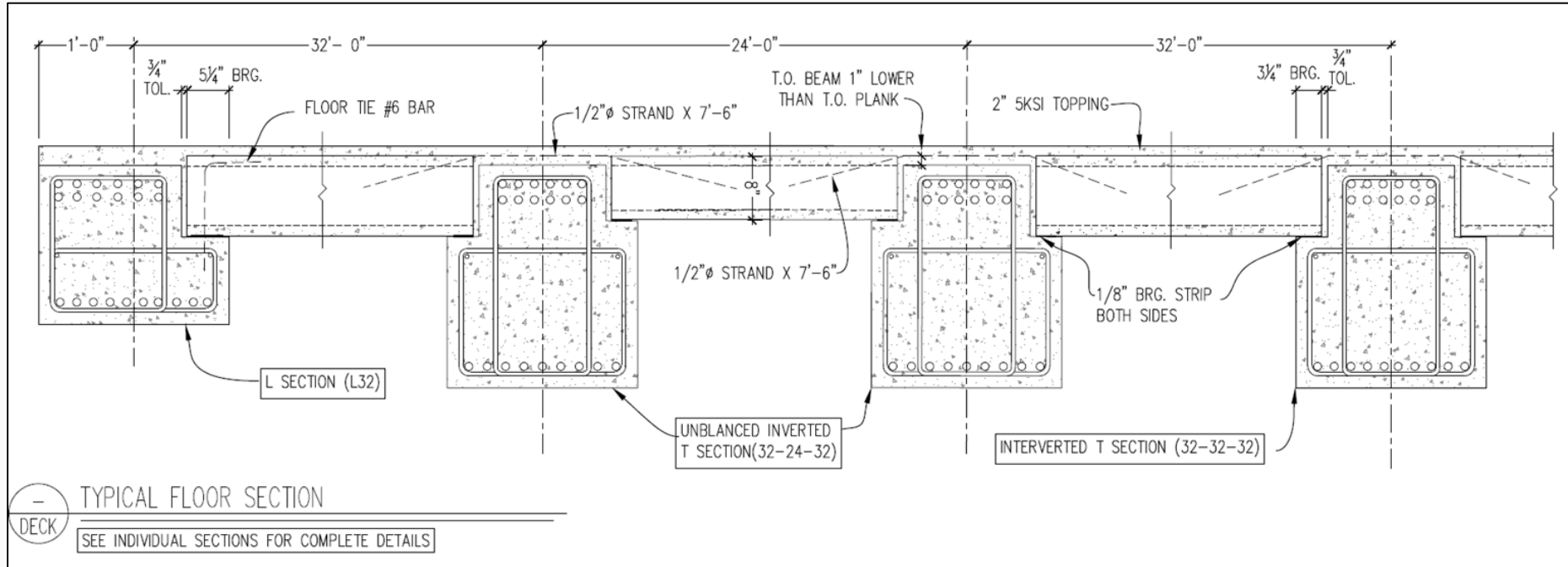
32' Balanced Inverted Tee - First Bay



Reinforcement Diagram

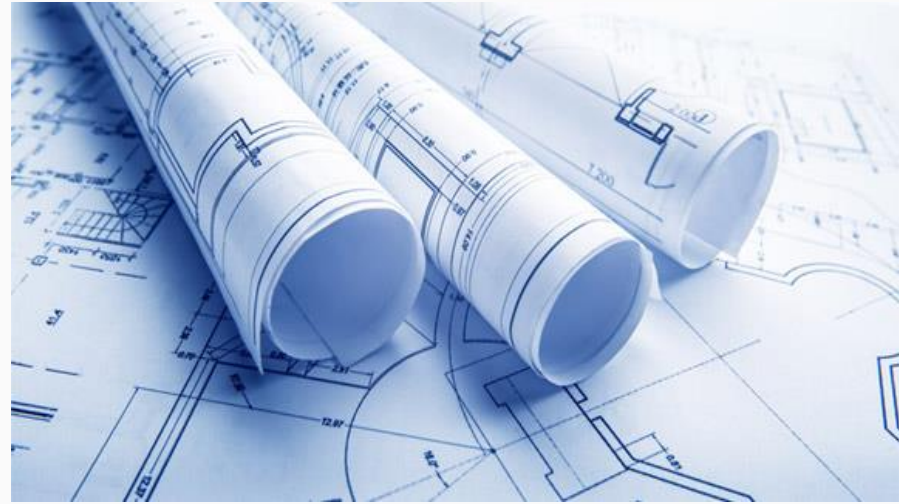


Typical Floor Section

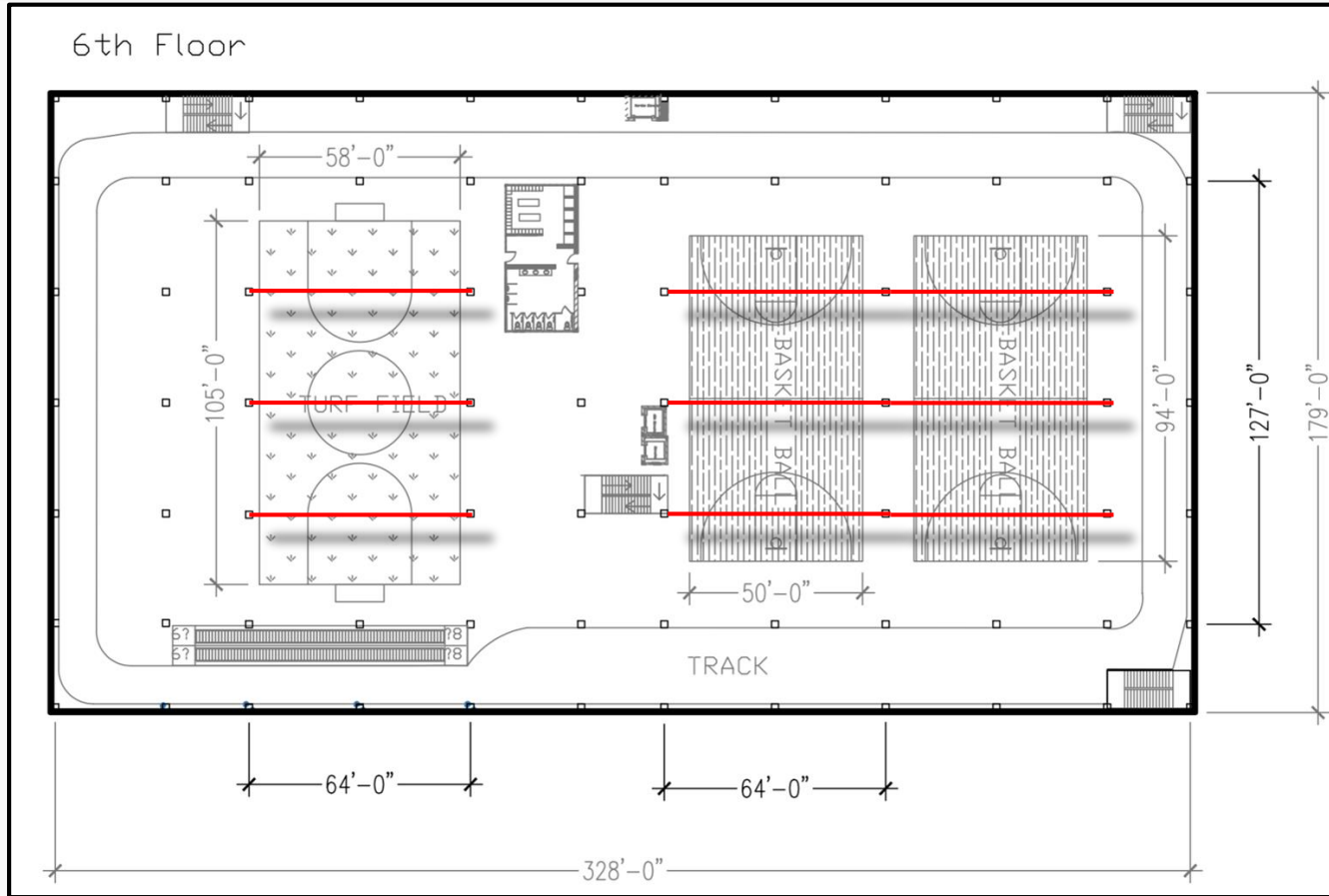


Structural Project Scope

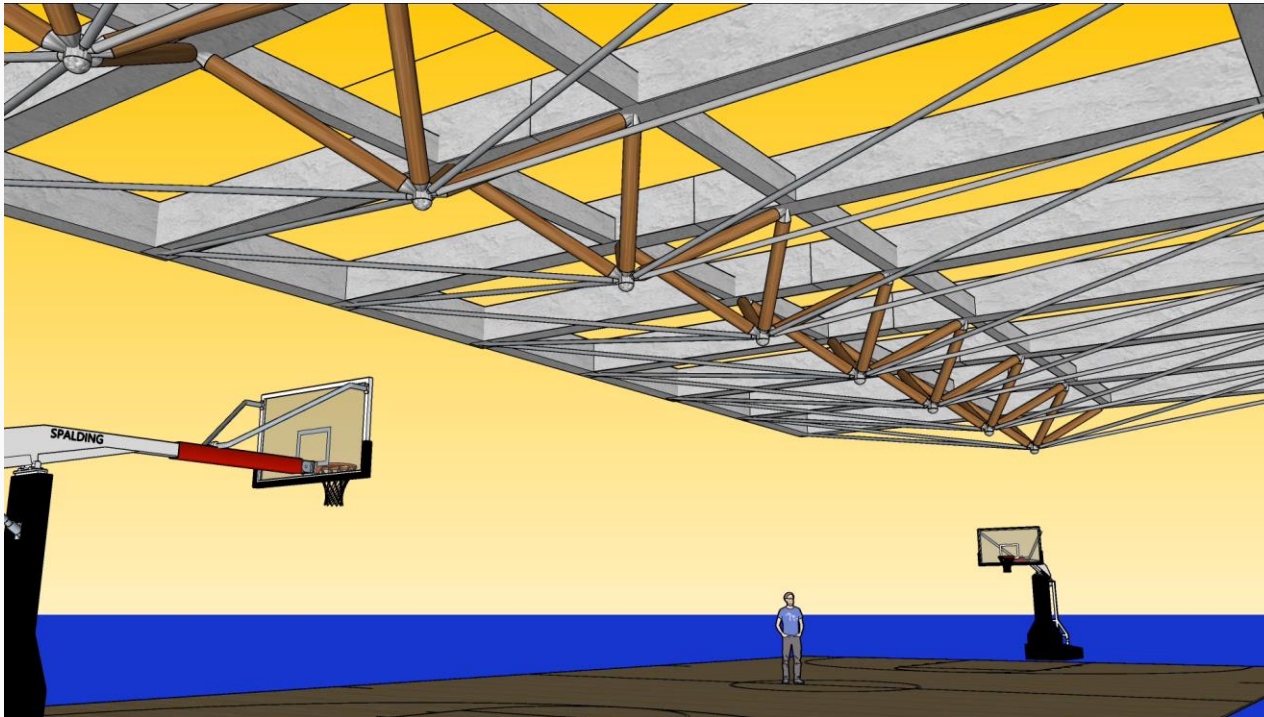
- Shear Walls
- Floor System (Parking Garage)
- Floor System (Recreation Center)
- Trusses
- Columns



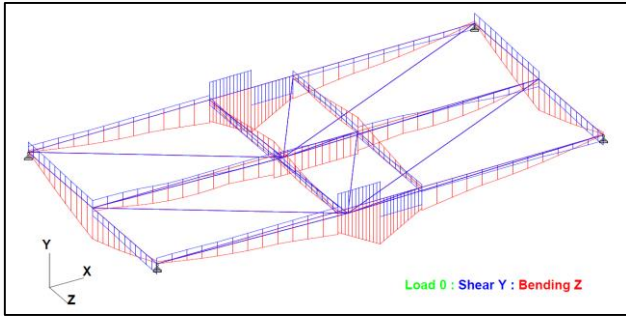
Long Span Support



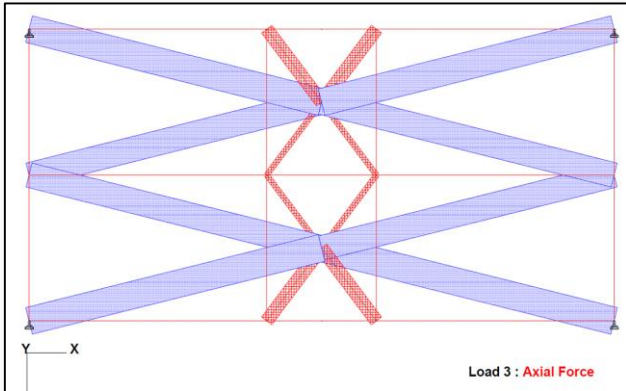
Zipper Truss



Zipper Truss

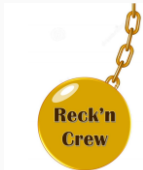


10' Long, 8" Diameter Glulam Compression Members
(NDS-WC 2015)



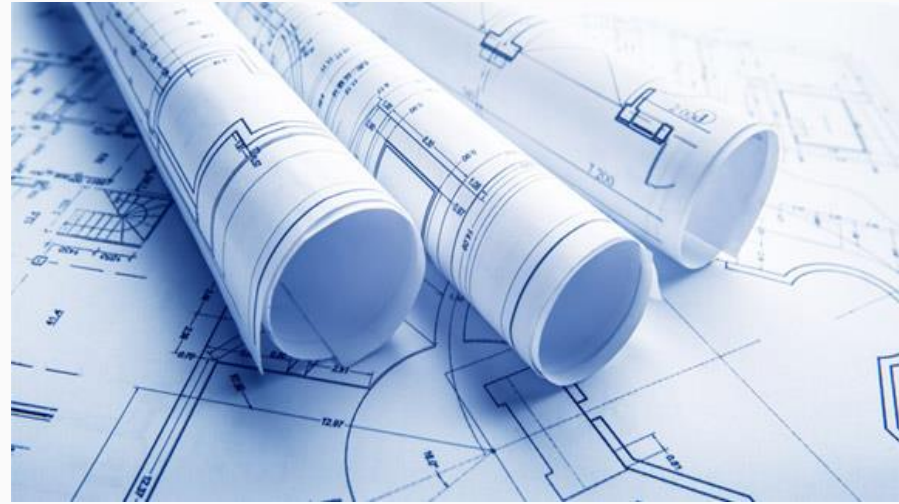
34' Long, 3.5" Diameter Steel Tension Members
(SCM)

Supporting Reinforced Concrete Beams Designed for Flexure
(ACI-318)

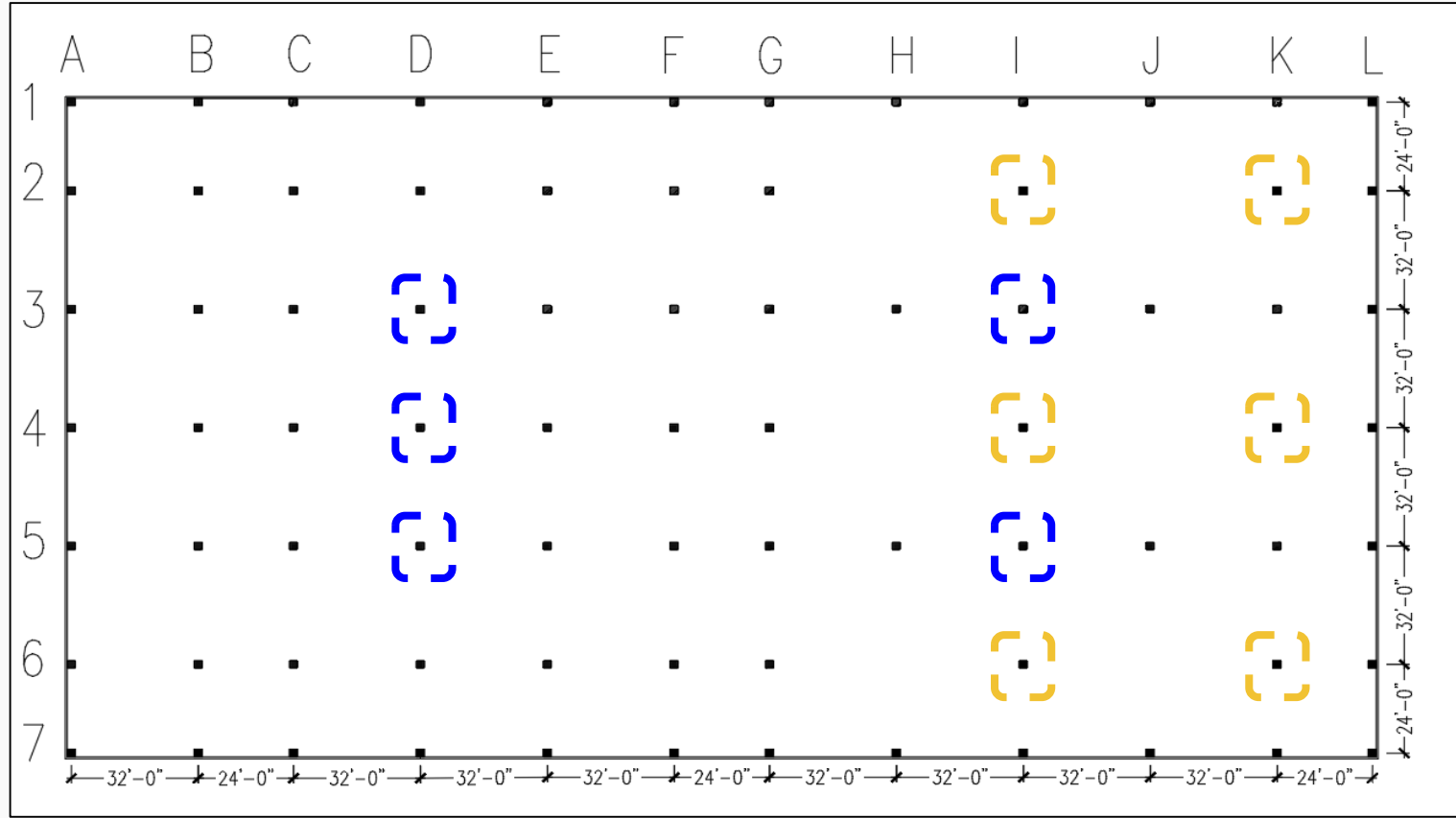


Structural Project Scope


- Shear Walls
- Floor System (Parking Garage)
- Floor System (Recreation Center)
- Trusses
- Columns



Column Layout




Floor 1 to
Floor 6


Floor 6
to Roof

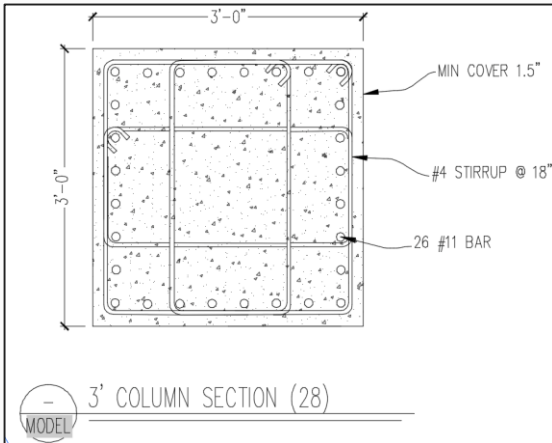
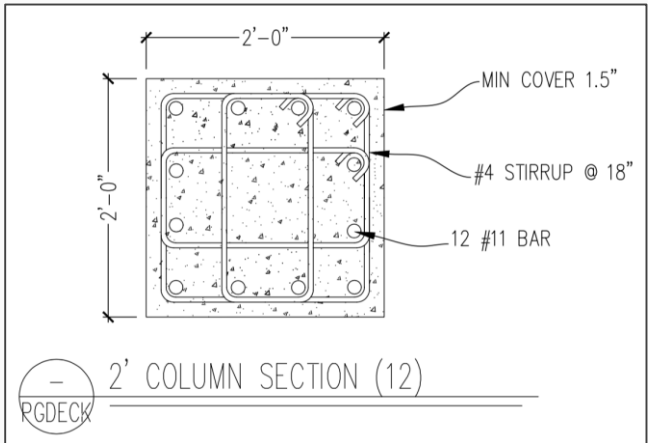
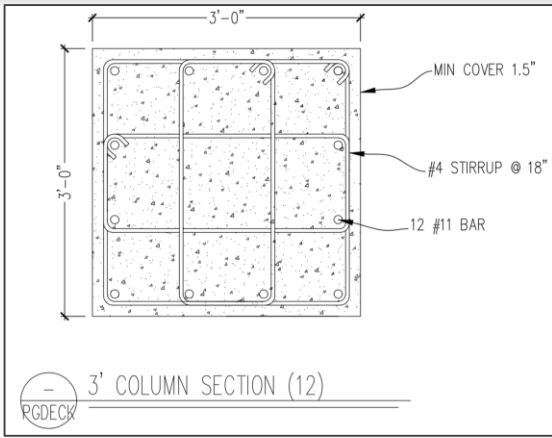
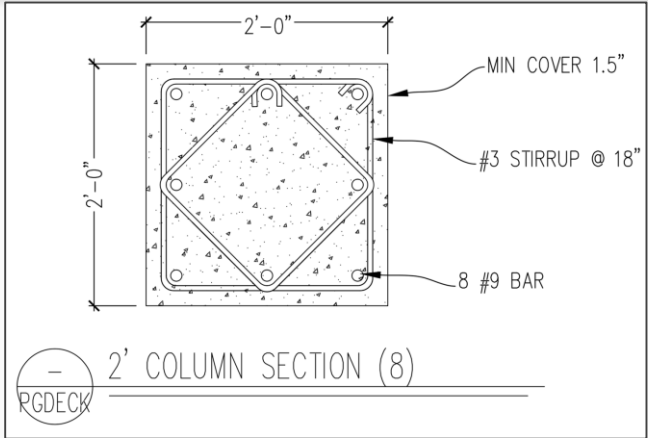


Column Design Summary

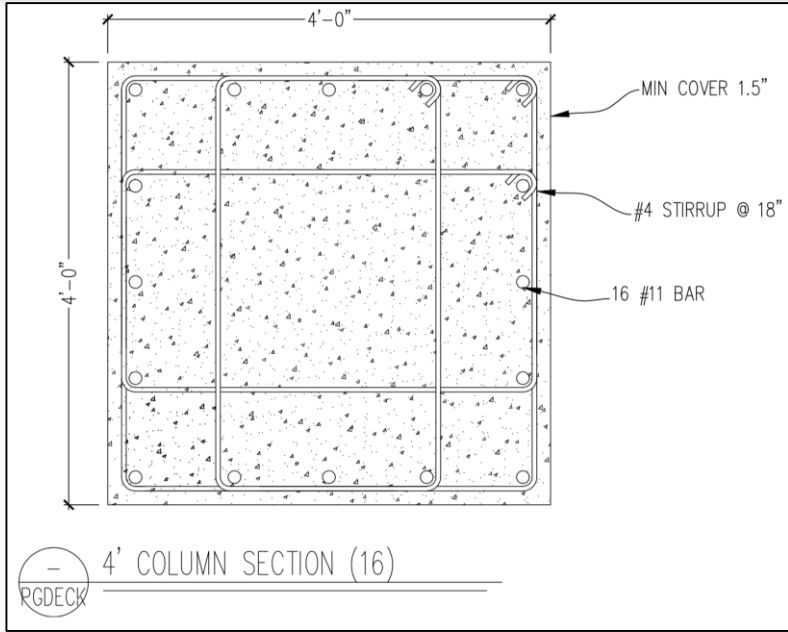
Column Size	Longitudinal Reinforcement	Transverse Reinforcement	Number of Columns
2 ft x 2 ft	8 #9 bars	#3 ties at 18 in.	52
2 ft x 2 ft	12 #11 bars	#4 ties at 18 in.	2
3 ft x 3 ft	12 #11 bars	#4 ties at 18 in.	18
3 ft x 3 ft	28 #11 bars (Floor 1) 12 #11 bars (Other Floors)	#4 ties at 18 in.	2
4 ft x 4 ft	16 #11 bars	#4 ties at 18 in.	1



Column Cross-Sections

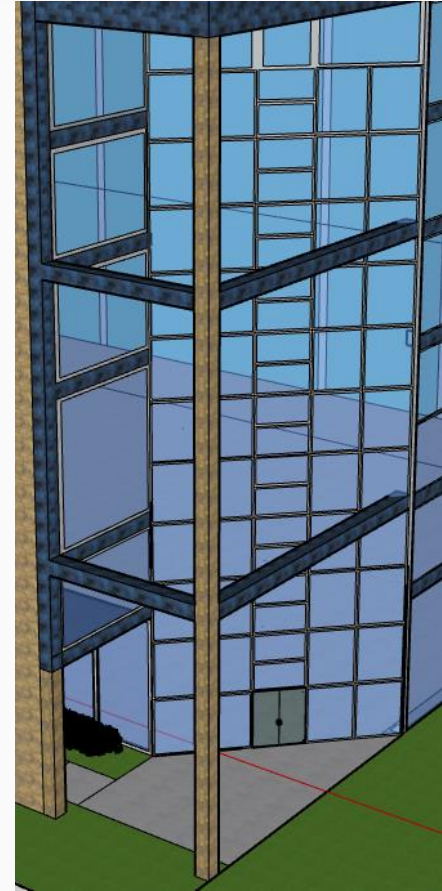


4 ft x 4 ft Column



Design Load < Critical Buckling Load

$$P_{cr} = \frac{\pi^2 EI}{(KL)^2}$$



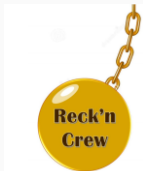
Agenda

- Project Definition
- Building Architecture and Program
- Geotechnical
- Structural
- Construction Management



Construction Management Project Scope

- Logistics
- Demolition Plan
- Construction Plan
- Comprehensive Schedule
- Health and Safety Plan
- Risk Management Plan
- Cost Estimate

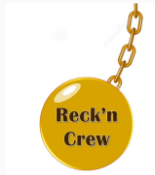
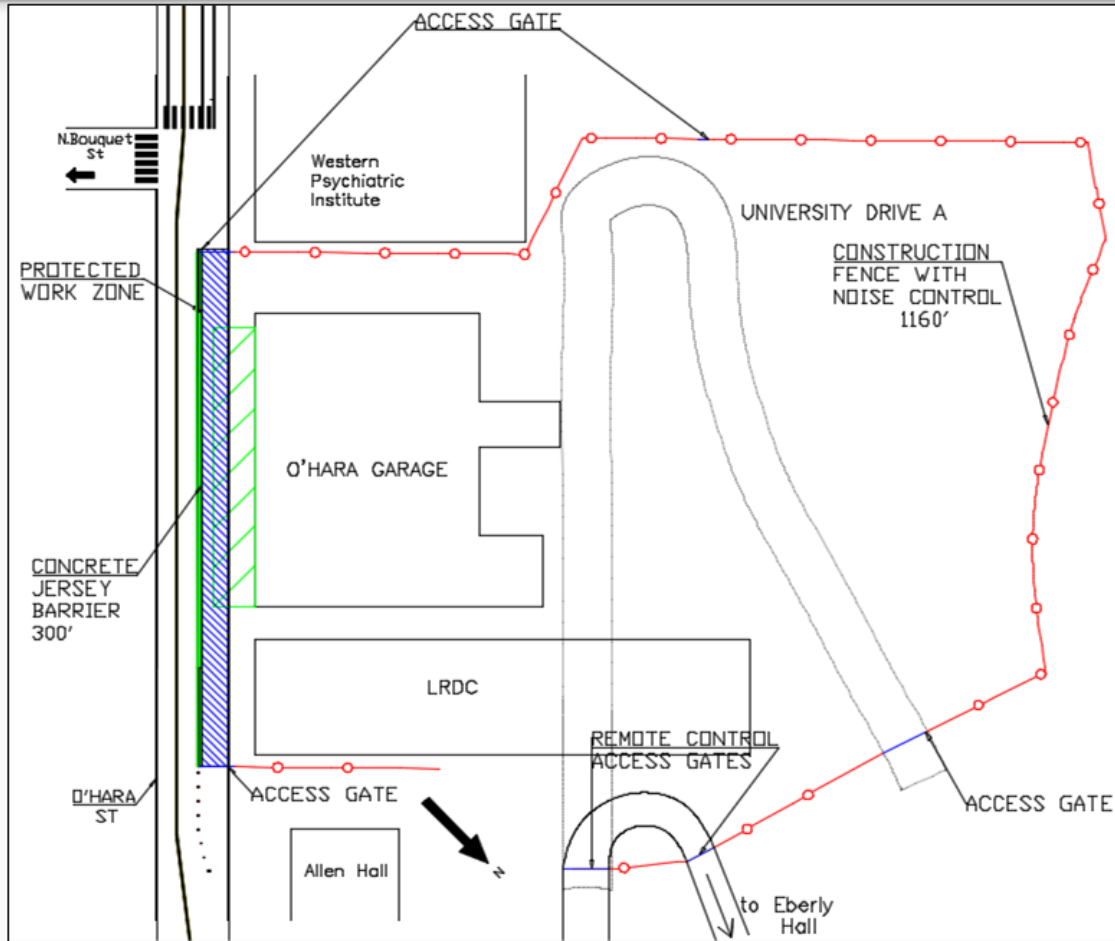


Construction Management Project Scope

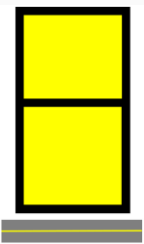
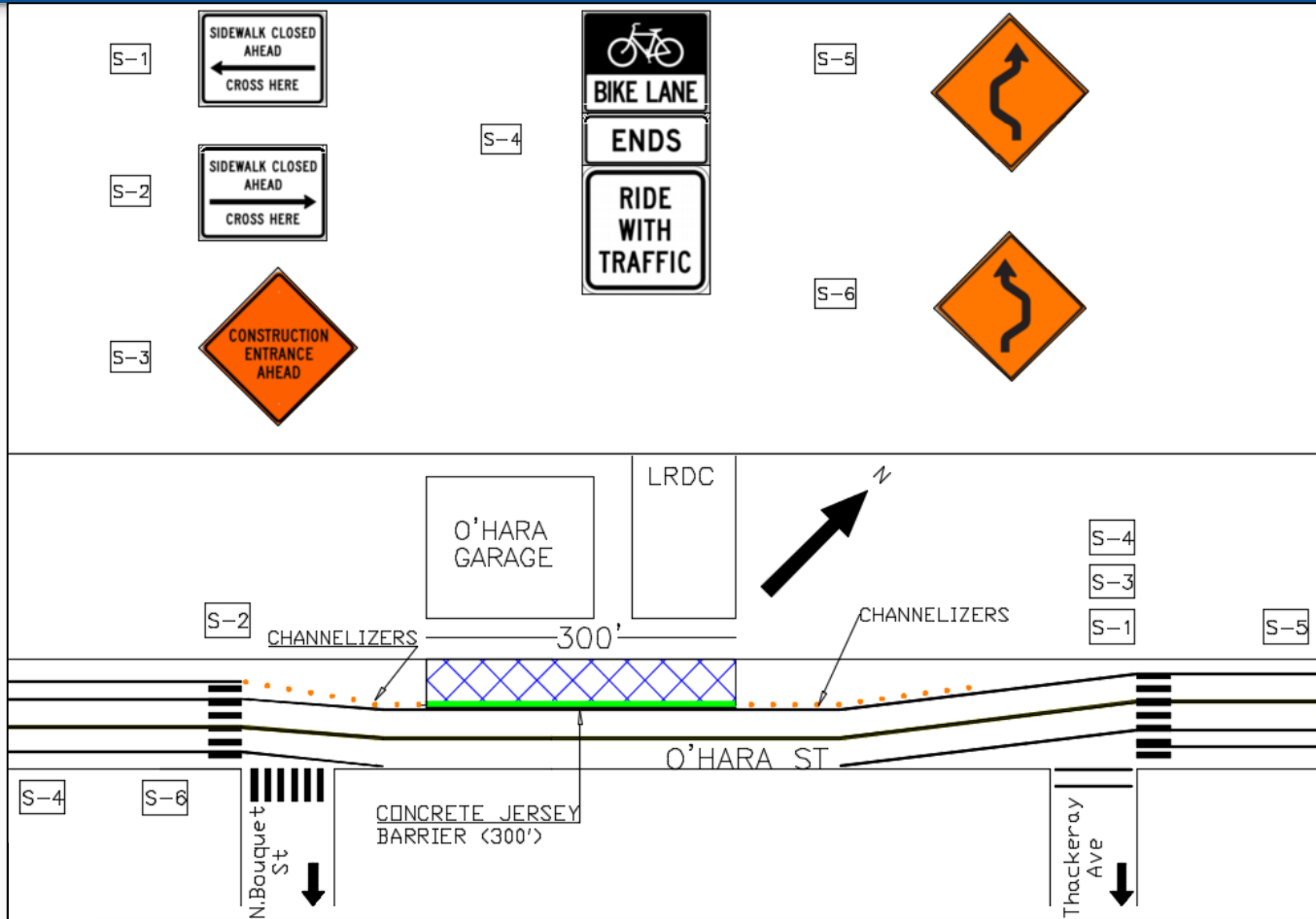
- Logistics
 - Demolition Plan
 - Construction Plan
- (The first three items are enclosed in a dashed yellow box)
- Comprehensive Schedule
 - Health and Safety Plan
 - Risk Management Plan
 - Cost Estimate



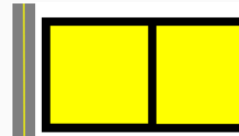
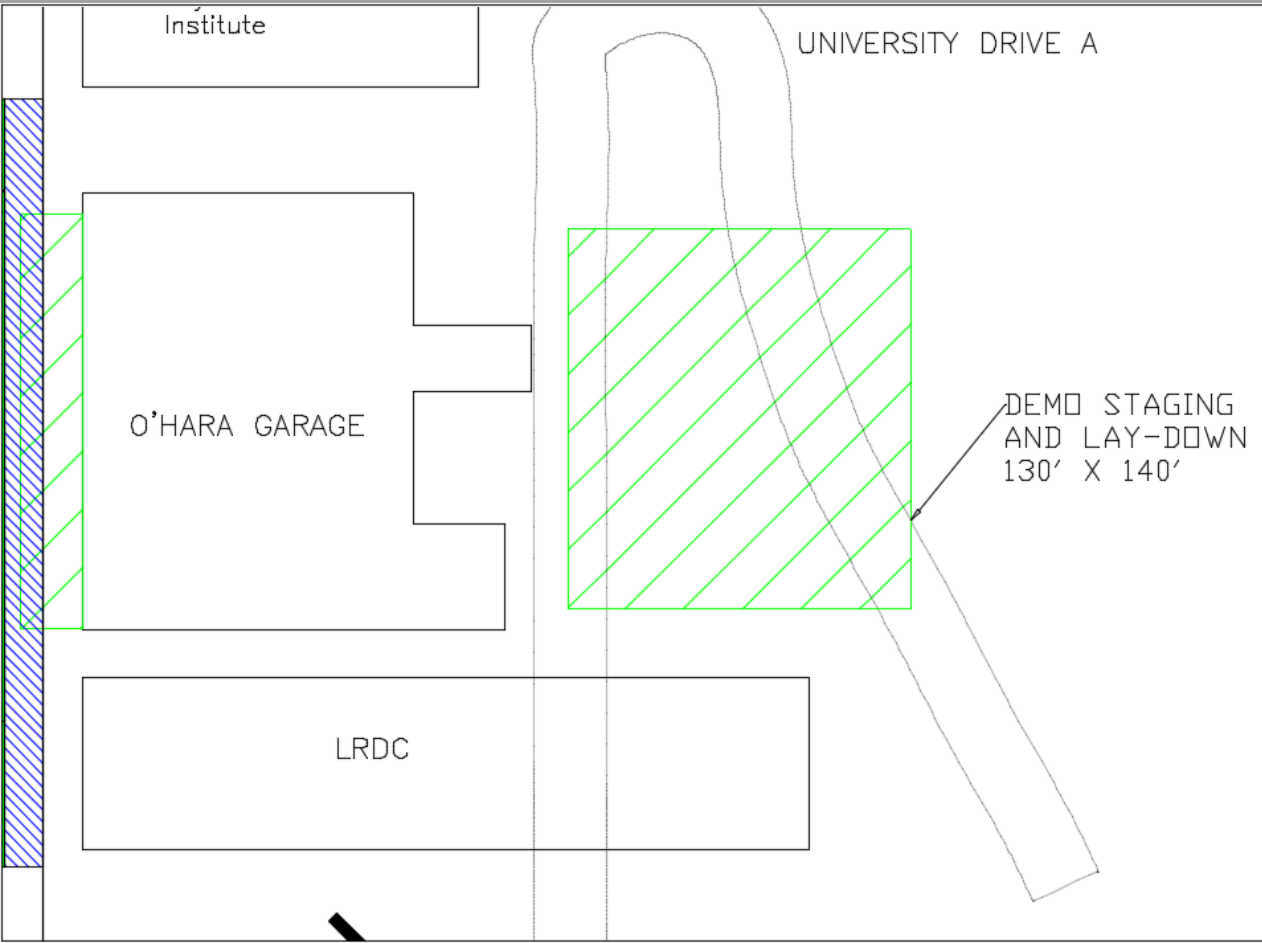
Site/Civil - Fencing Plan



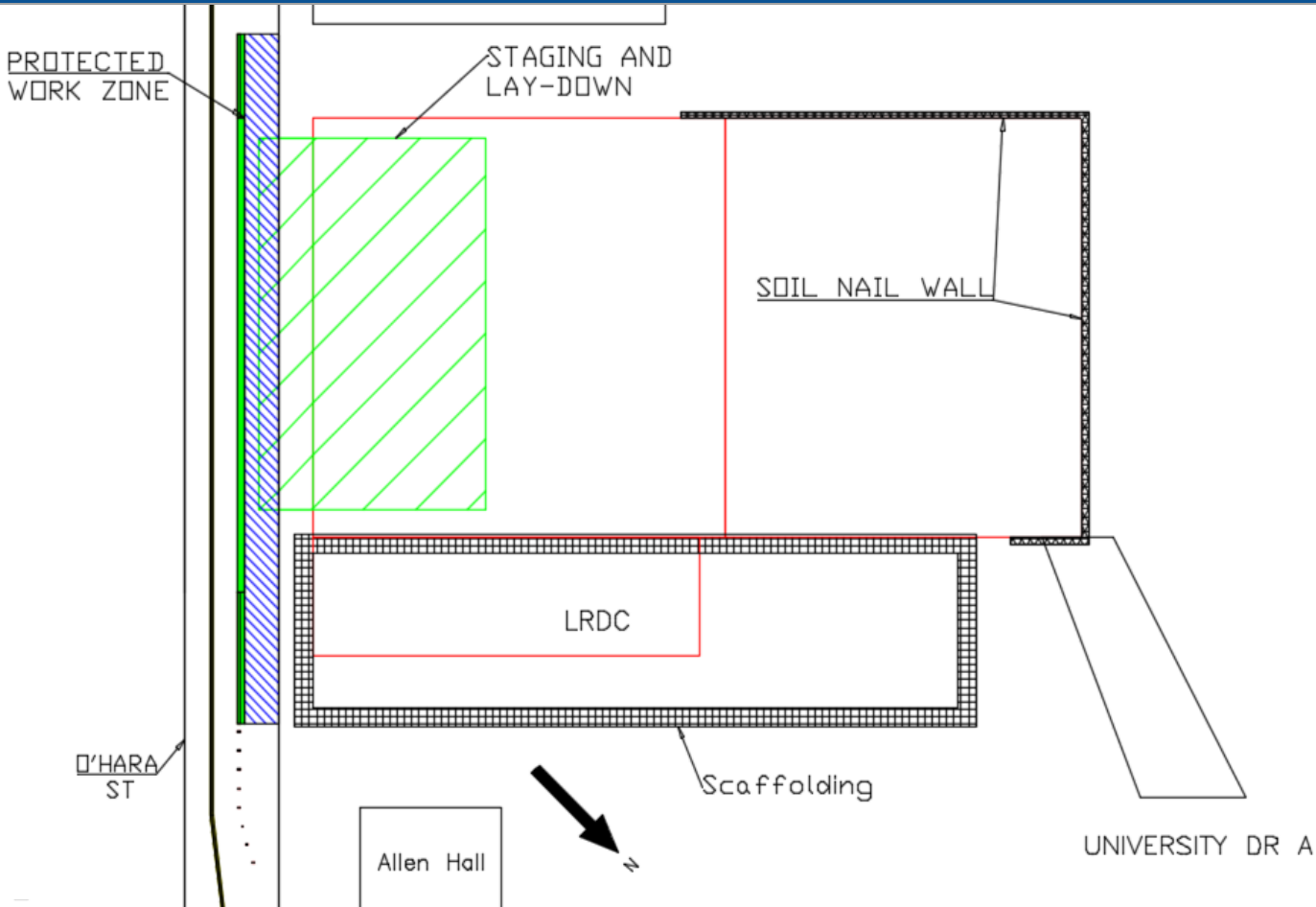
MPT

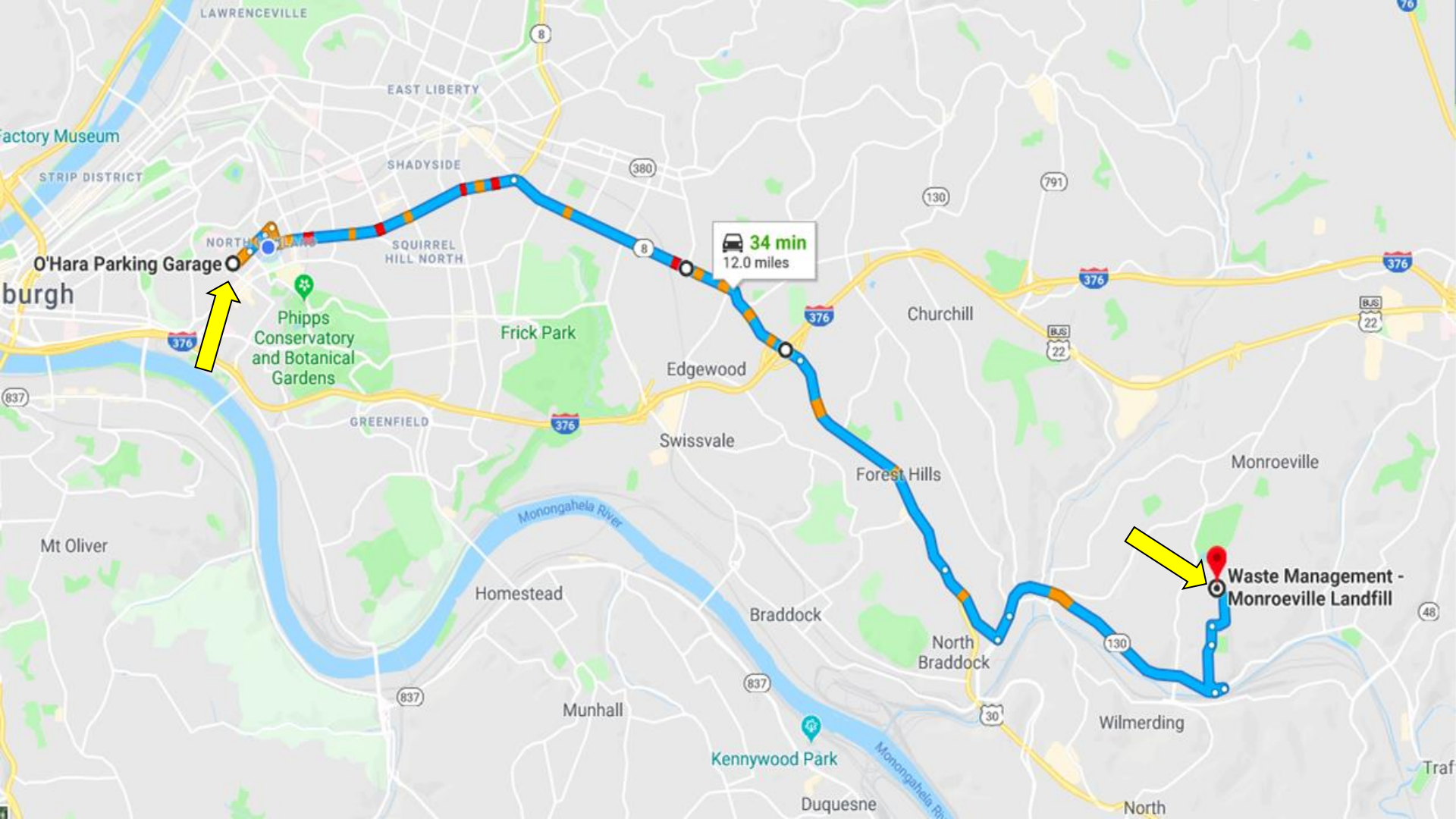


Demolition Plan - Part I



Demolition Plan - Part II

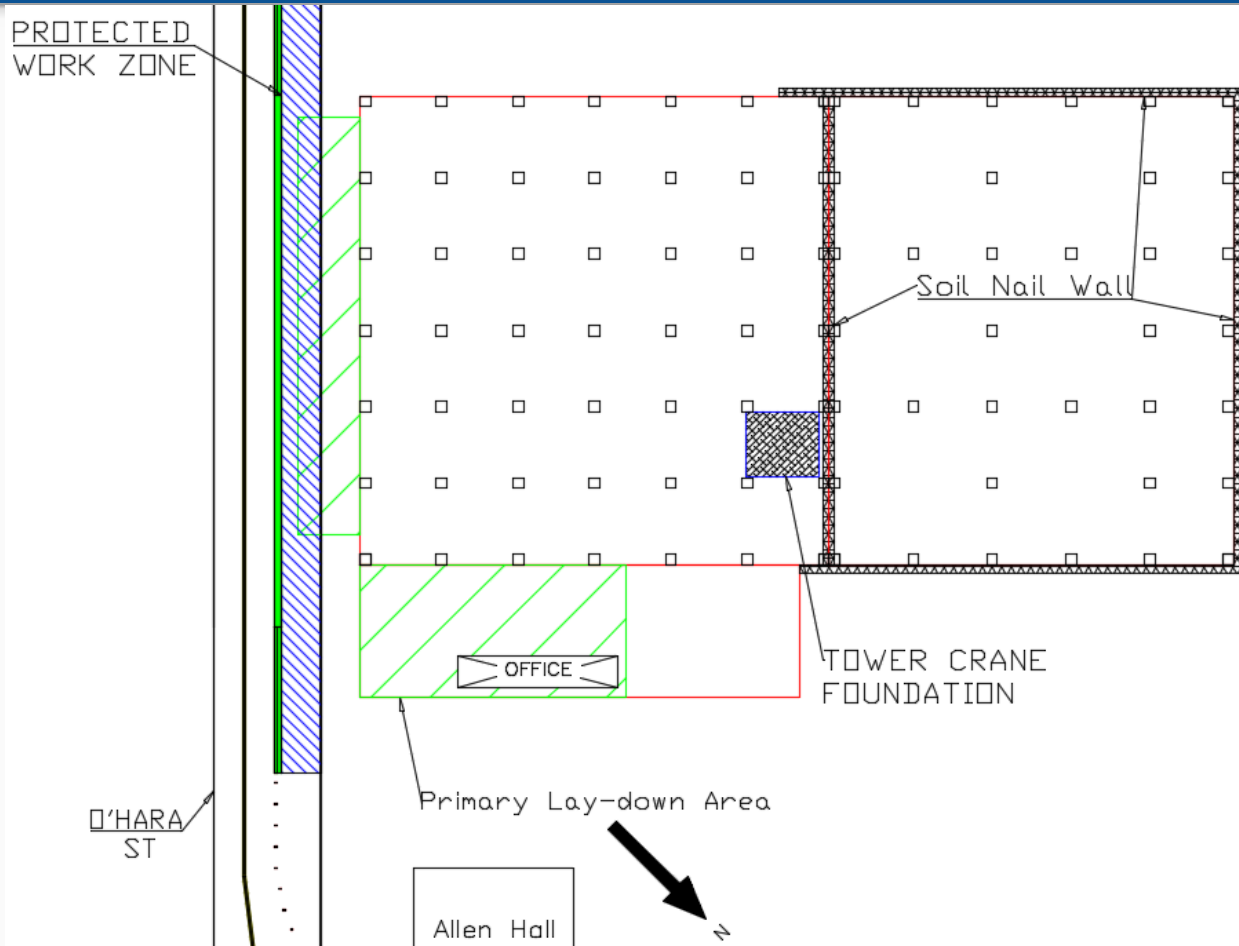




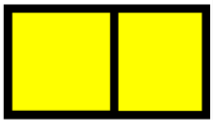
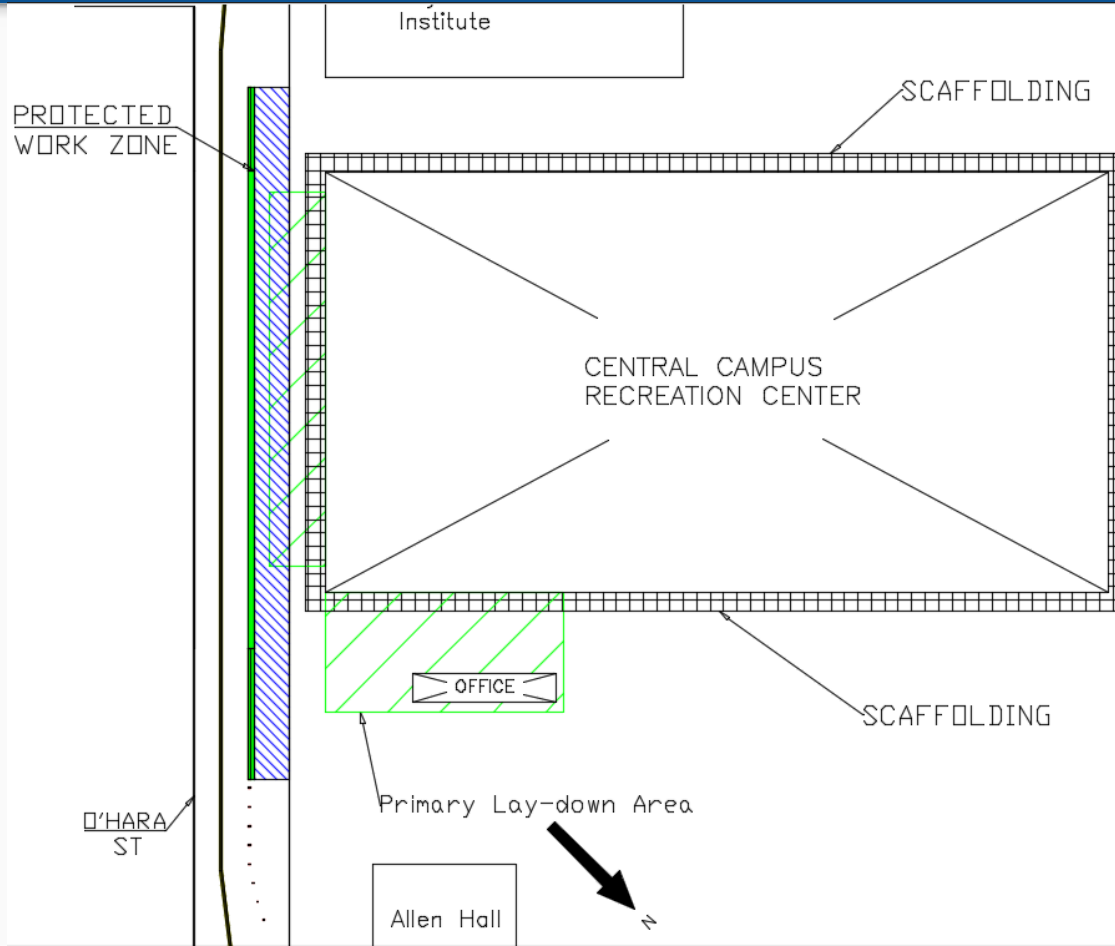
34 min
12.0 miles



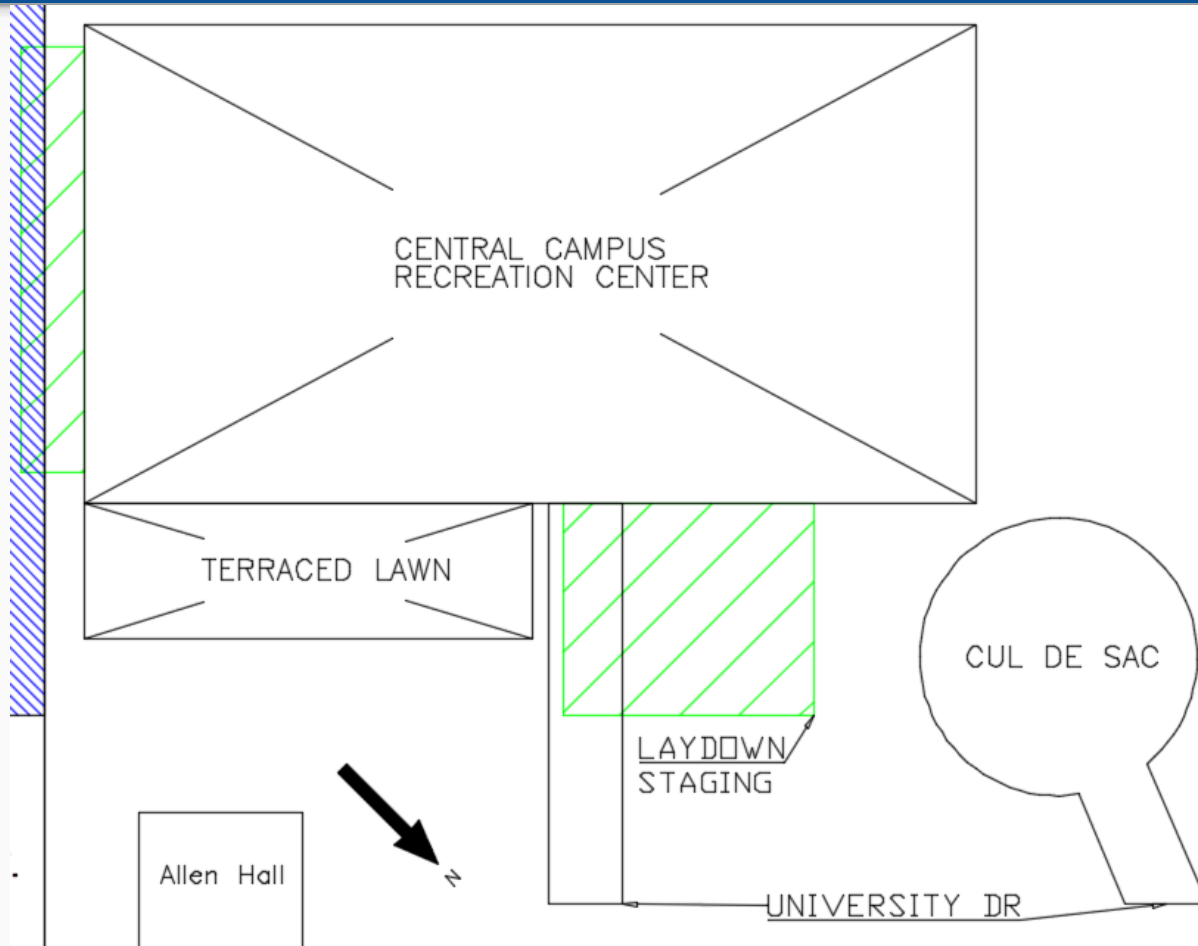
Lay Down / Staging



Lay Down / Staging

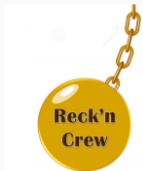


Lay Down / Staging



Construction Management Project Scope

- Logistics
- Demolition Plan
- Construction Plan
- Comprehensive Schedule
- Health and Safety Plan
- Risk Management Plan
- Cost Estimate



Schedule Close Up – Abatement, Demo, Sitework

ES	EF	OD	2020												2021																
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
LRDC	25-Jan-21	110																													
Preparatory	25-Sep-20	40																													
03-Aug-20	14-Aug-20	10																													
17-Aug-20	25-Sep-20	30																													

ES	EF	OD	2020												2021															
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Abatement	10-Nov-20	42																												
14-Sep-20	16-Sep-20	3																												
14-Sep-20	18-Sep-20	5																												
21-Sep-20	30-Sep-20	8																												
21-Sep-20	30-Sep-20	8																												
01-Oct-20	12-Oct-20	8																												
01-Oct-20	12-Oct-20	8																												
13-Oct-20	22-Oct-20	8																												
13-Oct-20	22-Oct-20	8																												
23-Oct-20	03-Nov-20	8																												
23-Oct-20	03-Nov-20	8																												
04-Nov-20	10-Nov-20	5																												

ES	EF	OD	2020												2021															
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Demolition	25-Jan-21	59																												
13-Oct-20	15-Oct-20	3																												
16-Oct-20	19-Oct-20	2																												
20-Oct-20	21-Oct-20	2																												
22-Oct-20	26-Oct-20	3																												
27-Oct-20	02-Nov-20	5																												
03-Nov-20	09-Nov-20	5																												
10-Nov-20	16-Nov-20	5																												
17-Nov-20	23-Nov-20	5																												
24-Nov-20	30-Nov-20	5																												
01-Dec-20	09-Dec-20	5																												
14-Dec-20	22-Dec-20	5																												
23-Dec-20	04-Jan-21	5																												
05-Jan-21	13-Jan-21	5																												
18-Jan-21	19-Jan-21	2																												

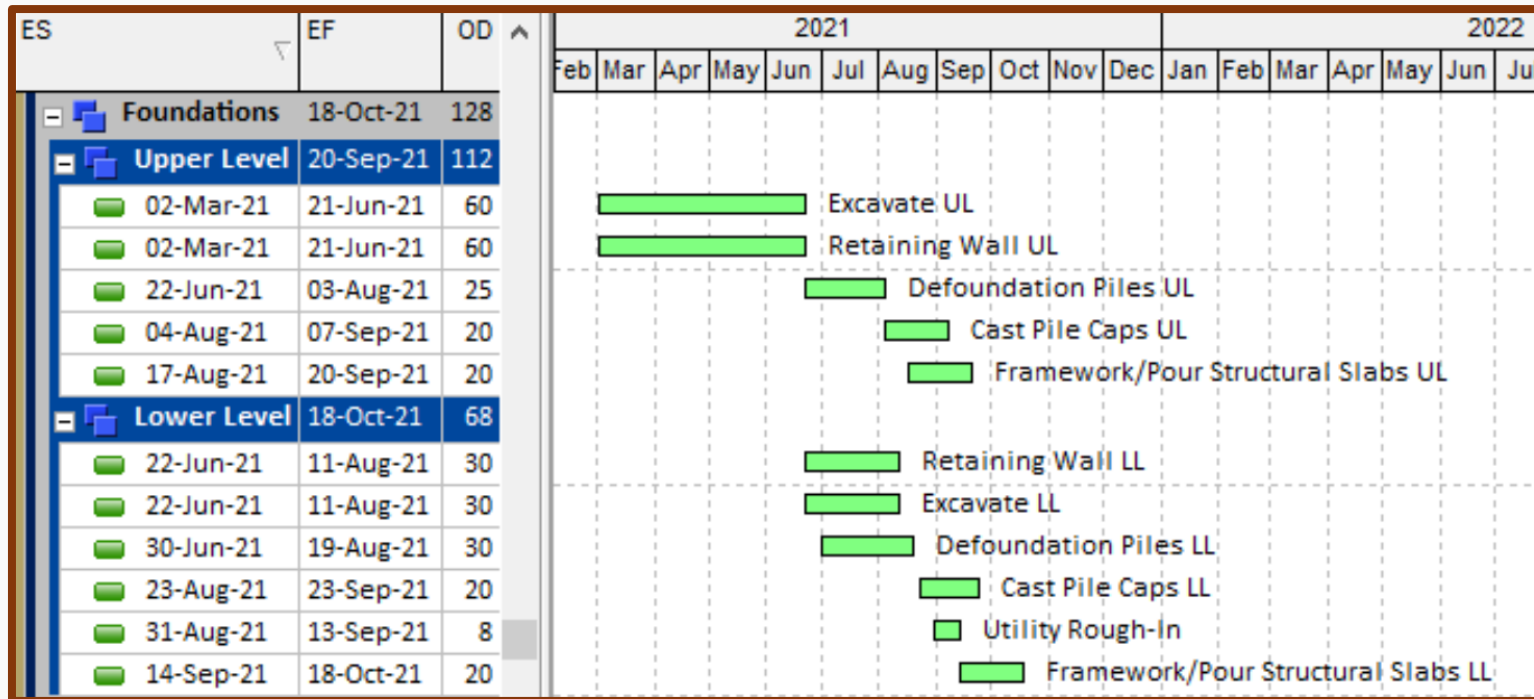
ES	EF	OD	2020												2021															
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Existing Garage	06-Oct-20	37																												
Preparatory Work	21-Aug-20	5																												
17-Aug-20	18-Aug-20	2																												
19-Aug-20	21-Aug-20	3																												

ES	EF	OD	2020												2021															
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Demolition	06-Oct-20	32																												
24-Aug-20	25-Aug-20	2																												
26-Aug-20	15-Sep-20	15																												
16-Sep-20	06-Oct-20	15																												

ES	EF	OD	2020												2021															
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Site Wide	01-Mar-21	125																												
03-Aug-20	07-Aug-20	5																												
17-Aug-20	18-Aug-20	2																												
07-Oct-20	27-Oct-20	15																												
26-Jan-21	01-Mar-21	15																												
08-Feb-21	01-Mar-21	10																												



Schedule Close Up – Foundations



Schedule Close Up – Envelope

ES	EF	OD	2022											
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Envelope	28-Dec-22	140												
FL G	03-Aug-22	35												
16-Jun-22	29-Jun-22	10												
16-Jun-22	29-Jun-22	10												
30-Jun-22	13-Jul-22	10												
30-Jun-22	06-Jul-22	5												
07-Jul-22	13-Jul-22	5												
14-Jul-22	03-Aug-22	15												
14-Jul-22	18-Jul-22	3												
19-Jul-22	19-Jul-22	1												
FL 1	24-Aug-22	40												
30-Jun-22	13-Jul-22	10												
30-Jun-22	13-Jul-22	10												
14-Jul-22	27-Jul-22	10												
14-Jul-22	20-Jul-22	5												
21-Jul-22	27-Jul-22	5												
04-Aug-22	24-Aug-22	15												
FL 2	14-Sep-22	45												
14-Jul-22	27-Jul-22	10												
14-Jul-22	27-Jul-22	10												
28-Jul-22	10-Aug-22	10												
28-Jul-22	03-Aug-22	5												
04-Aug-22	10-Aug-22	5												
25-Aug-22	14-Sep-22	15												
FL 3	05-Oct-22	50												
28-Jul-22	10-Aug-22	10												
28-Jul-22	10-Aug-22	10												
11-Aug-22	24-Aug-22	10												
11-Aug-22	17-Aug-22	5												
18-Aug-22	24-Aug-22	5												
15-Sep-22	05-Oct-22	15												

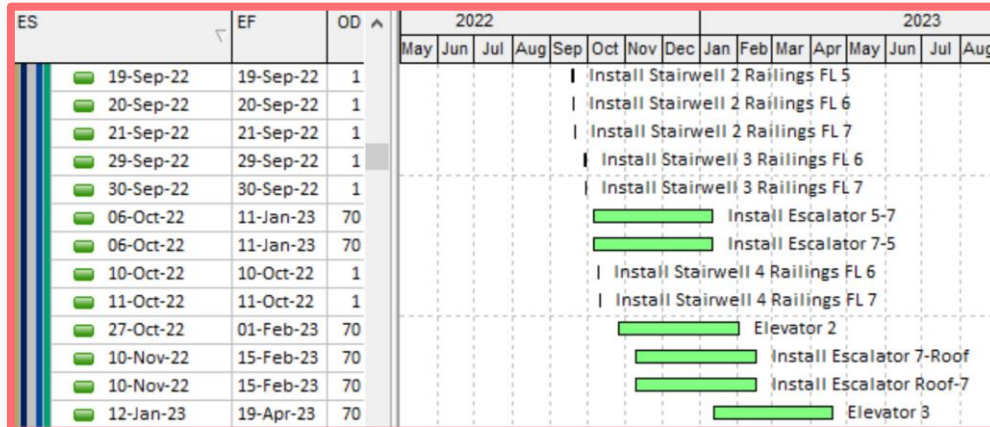
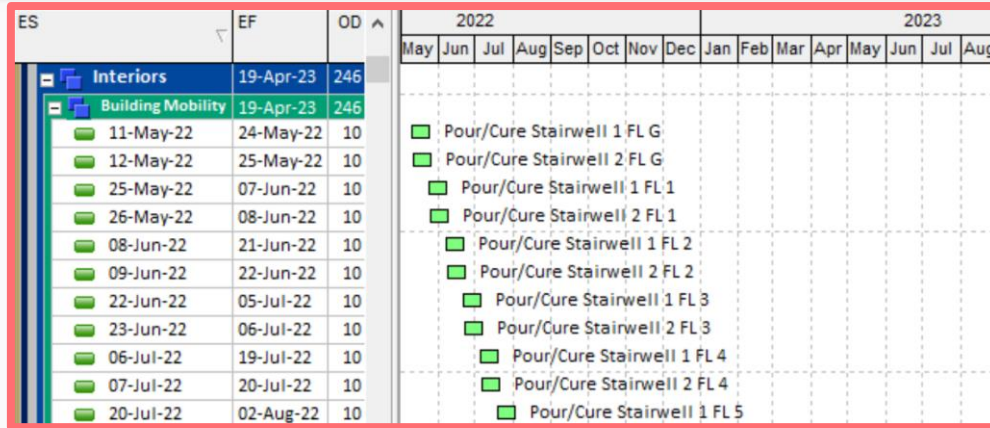
■ Framing Brick FL G
■ Framing Glass FL G
■ Install Glass Curtainwall FL G
■ Install Moisture Protection FL G
■ Install Insulation FL G
■ Lay Brick FL G
■ Install Glass Doors
■ Install Revolving Door
■ Framing Brick FL 1
■ Framing Glass FL 1
■ Install Glass Curtainwall FL 1
■ Install Moisture Protection FL 1
■ Install Insulation FL 1
■ Lay Brick FL 1
■ Framing Brick FL 2
■ Framing Glass FL 2
■ Install Glass Curtainwall FL 2
■ Install Moisture Protection FL 2
■ Install Insulation FL 2
■ Lay Brick FL 2
■ Framing Brick FL 3
■ Framing Glass FL 3
■ Install Glass Curtainwall FL 3
■ Install Moisture Protection FL 3
■ Install Insulation FL 3
■ Lay Brick FL 3

ES	EF	OD	2022											
			Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
"Envelope"	05-Oct-22	60												
FL 1	10-Aug-22	20												
14-Jul-22	20-Jul-22	5												
21-Jul-22	22-Jul-22	2												
25-Jul-22	27-Jul-22	3												
28-Jul-22	10-Aug-22	10												
FL 2	24-Aug-22	25												
21-Jul-22	27-Jul-22	5												
28-Jul-22	29-Jul-22	2												
01-Aug-22	03-Aug-22	3												
11-Aug-22	24-Aug-22	10												
FL 3	07-Sep-22	30												
28-Jul-22	03-Aug-22	5												
04-Aug-22	05-Aug-22	2												
08-Aug-22	10-Aug-22	3												
25-Aug-22	07-Sep-22	10												
FL 4	21-Sep-22	35												
04-Aug-22	10-Aug-22	5												
11-Aug-22	12-Aug-22	2												
15-Aug-22	17-Aug-22	3												
08-Sep-22	21-Sep-22	10												
FL 5	05-Oct-22	40												
11-Aug-22	17-Aug-22	5												
18-Aug-22	19-Aug-22	2												
22-Aug-22	24-Aug-22	3												
22-Sep-22	05-Oct-22	10												

■ Framing Brick FL 1
■ Install Moisture Protection FL 1
■ Install Insulation FL 1
■ Lay Brick FL 1
■ Framing Brick FL 2
■ Install Moisture Protection FL 2
■ Install Insulation FL 2
■ Lay Brick FL 2
■ Framing Brick FL 3
■ Install Moisture Protection FL 3
■ Install Insulation FL 3
■ Lay Brick FL 3
■ Framing Brick FL 4
■ Install Moisture Protection FL 4
■ Install Insulation FL 4
■ Lay Brick FL 4
■ Framing Brick FL 5
■ Install Moisture Protection FL 5
■ Install Insulation FL 5
■ Lay Brick FL 5



Schedule Close Up – Interiors



Schedule Close Up – Interiors (Cont.)

ES	EF	OD	2022												2023						
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul				
FL G	11-Oct-22	79																			
23-Jun-22	29-Jun-22	5																			
30-Jun-22	20-Jul-22	15																			
30-Jun-22	20-Jul-22	15																			
30-Jun-22	13-Jul-22	10																			
30-Jun-22	13-Jul-22	10																			
14-Jul-22	20-Jul-22	5																			
14-Jul-22	20-Jul-22	5																			
21-Jul-22	25-Jul-22	3																			
21-Jul-22	03-Aug-22	10																			
26-Jul-22	08-Aug-22	10																			
04-Aug-22	15-Aug-22	8																			
09-Aug-22	22-Aug-22	10																			
09-Aug-22	22-Aug-22	10																			
09-Aug-22	15-Aug-22	5																			
15-Aug-22	15-Aug-22	1																			
15-Aug-22	15-Aug-22	1																			
23-Aug-22	12-Sep-22	15																			
23-Aug-22	29-Aug-22	5																			
13-Sep-22	14-Sep-22	2																			
13-Sep-22	22-Sep-22	8																			
13-Sep-22	14-Sep-22	2																			
23-Sep-22	06-Oct-22	10																			
07-Oct-22	10-Oct-22	2																			
07-Oct-22	07-Oct-22	1																			
10-Oct-22	10-Oct-22	1																			
10-Oct-22	11-Oct-22	2																			

		2022												2023							
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul					
█	Install Mezzanine FL G																				
█	Electrical Rough-in FL G																				
█	Mechanical Rough-in FL G																				
█	Plumbing Rough-in FL G																				
█	Spinkler Rough-in FL G																				
█	Security System FL G																				
█	Communication System FL G																				
█	Install Perimeter Insulation FL G																				
█	Paint Ceiling FL G																				
█	Hang & Tape Perimeter Drywall FL G																				
█	V Baffle FL G																				
█	Prime Perimeter Drywall FL G																				
█	Glass Railings FL G																				
█	Electrical Finishes - Ceiling FL G																				
	Mechanical Finishes FL G																				
	Sprinkler Finishes FL G																				
█	Install Tile FL G																				
█	Carpet FL G - Mez																				
	DFH FL G																				
█	Millwork FL G																				
	Plumbing Finishes FL G																				
█	Paint FL G																				
	Install Equipment/Appliances FL G																				
	Electrical Finishes - Wall FL G																				
	Furniture FL G																				
	Building Accessories FL G																				

ES	EF	OD	2022												2023						
			May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul				
Bathroom FL G	19-Sep-22	58																			
30-Jun-22	06-Jul-22	5																			
05-Jul-22	11-Jul-22	5																			
05-Jul-22	07-Jul-22	3																			
07-Jul-22	13-Jul-22	5																			
07-Jul-22	08-Jul-22	2																			
14-Jul-22	14-Jul-22	1																			
15-Jul-22	26-Jul-22	8																			
27-Jul-22	05-Aug-22	8																			
04-Aug-22	05-Aug-22	2																			
05-Aug-22	05-Aug-22	1																			
05-Aug-22	05-Aug-22	1																			
08-Aug-22	17-Aug-22	8																			
18-Aug-22	25-Aug-22	6																			
26-Aug-22	26-Aug-22	1																			
26-Aug-22	26-Aug-22	1																			
29-Aug-22	07-Sep-22	8																			
08-Sep-22	14-Sep-22	5																			
15-Sep-22	15-Sep-22	1																			
16-Sep-22	16-Sep-22	1																			
19-Sep-22	19-Sep-22	1																			

		2022												2023							
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul					
█	Install Framing FL G																				
█	Electrical Rough-in FL G																				
	Plumbing Rough-in FL G																				
█	Mechanical Rough-in FL G																				
	Spinkler Rough-in FL G																				
	Install Insulation FL G																				
█	Hang & Tape Drywall FL G																				
█	Install ACT FL G																				
	Electrical Finishes - Ceiling FL G																				
	Mechanical Finishes FL G																				
	Sprinkler Finishes FL G																				
█	Prime Drywall FL G																				
█	Install Tile FL G																				
	Install Sink Counters FL G																				
	Electrical Finishes - Wall FL G																				
█	Paint FL G																				
█	Plumbing Finishes FL G																				
	Bathroom Partitions FL G																				
	DFH FL G																				
	Bathroom Accessories FL G																				



Schedule Close Up – Landscaping & Closeout

ES	EF	OD	2023																			
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec											
Green Roof	01-Jun-23	44																				
03-Apr-23*	14-Apr-23	10																				
17-Apr-23	21-Apr-23	5																				
24-Apr-23	28-Apr-23	5																				
01-May-23	05-May-23	5																				
08-May-23	10-May-23	3																				
11-May-23*	12-May-23	2																				
15-May-23	16-May-23	2																				
17-May-23	18-May-23	2																				
19-May-23	22-May-23	2																				
23-May-23	24-May-23	2																				
25-May-23	31-May-23	5																				
01-Jun-23	01-Jun-23	1																				

- Green Roof
- Install Glass Stair Casing 1
- Install Glass Stair Casing 2
- Install Glass Escalator Casing
- Define Planting Beds
- Waterproof Membrane
- Root Barrier
- Drainage Layer
- Filter Cloth
- Growing Medium
- Plants
- Furniture Roof



ES	EF	OD	2023																			
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec											
Terrace	20-Jun-23	57																				
03-Apr-23*	14-Apr-23	10																				
03-Apr-23	14-Apr-23	10																				
17-Apr-23	28-Apr-23	10																				
17-Apr-23	28-Apr-23	10																				
01-May-23	10-May-23	8																				
11-May-23	12-May-23	2																				
15-May-23	24-May-23	8																				
25-May-23	26-May-23	2																				
29-May-23	29-May-23	1																				
29-May-23	29-May-23	1																				
30-May-23	19-Jun-23	15																				
20-Jun-23	20-Jun-23	1																				

- Slope UL Terrace
- Retaining Wall UL
- Retaining Wall LL
- Slope LL Terrace
- Pour/Cure Stair UL
- Pave Terrace UL
- Pour/Cure Stair LL
- Pave Terrace LL
- Install Railings UL
- Install Railings LL
- Landscaping
- Furniture

ES	EF	OD	2023																			
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec											
Closeout	28-Jun-23	50																				
20-Apr-23	03-May-23	10																				
20-Apr-23	21-Jun-23	45																				
04-May-23	05-May-23	2																				
21-Jun-23	27-Jun-23	5																				
28-Jun-23	28-Jun-23	1																				

- Final Rec/Garage Punchlist
- Closeout Documents
- Final Clean
- Landscaping Punchlist
- Turnover

Schedule Summary

Task	Approx. Duration	2020					2021												2022												2023						
		Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Deoccupy	2 w																																				
Abatement	8 w																																				
Demolition	18 w																																				
Sitework/Set up	25 w																																				
Foundations	26 w																																				
Structural																																					
Rec Center	44 w																																				
Garage	19 w																																				
Envelope																																					
Rec Center	28 w																																				
Garage	12 w																																				
Interiors																																					
Rec Center	49 w																																				
Garage	25 w																																				
Landscaping																																					
Green Roof	9 w																																				
Terrace	11 w																																				
Closeout	10 w																																				

Start Date: August 3, 2020
Finish Date: June 28, 2023

Duration: 35 Months



Construction Management Project Scope

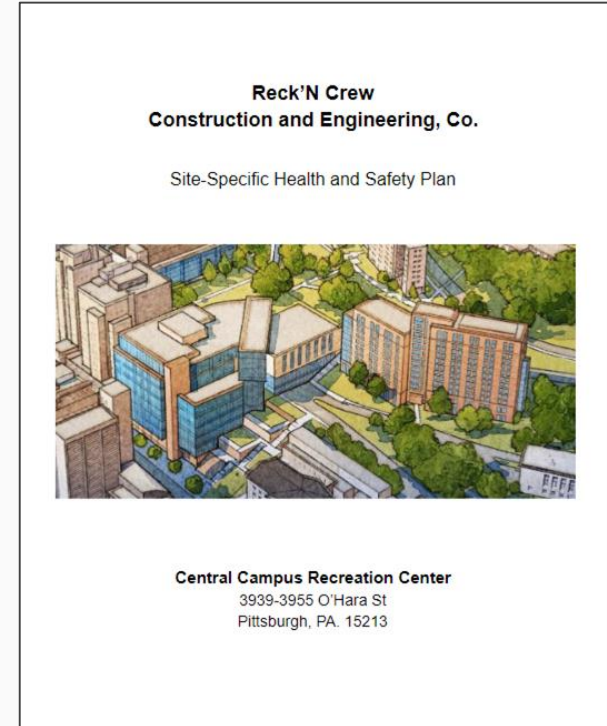
- Logistics
- Demolition Plan
- Construction Plan
- Comprehensive Schedule
- Health and Safety Plan
- Risk Management Plan
- Cost Estimate



Health and Safety Plan

Purpose/Goals

- Display our commitment to health and safety
- Remove or reduce the risks on site
- Summarize Scope of Work
- Emergency Response Plan
- Determine Required PPE
- Outline Responsibilities:
 - Management
 - Employees
 - Contractors
 - Visitors



Risk Management Plan

Risk Matrix						
PROBABILITY	Very High	5	10	15	20	25
	High	4	8	12	16	20
	Medium	3	6	9	12	15
	Low	2	4	6	8	10
	Very Low	1	2	3	4	5
		Very Low	Low	Medium	High	Very High
IMPACT						



Risk Management Plan (Continued)

Types of Risks	Probability (1-5)	Impact (1-5)	Consequence (1-25)	Can We Prevent This?	Estimated Cost	Probability (0-100%)	Contingency	Contingency Plan
Drawing inconsistencies and errors.	4	4	16	No	\$175,000	80%	\$140,000	Will have to adapt inconsistencies into model and build around them, while constantly updating design
Project costs go over budget.	2	5	10	Yes	\$875,000	40%	\$350,000	Mitigate risk by holding monthly or even weekly budgetary meetings.
Failure to attain required permits (gas, water, electric)	1	5	5	Yes	\$500,000	10%	\$50,000	-



Total	\$8,295,000
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Risk Type	Amount
Critical	7
Medium	25
Low	9
Total	41



Cost Estimate (Labor)

Labor							
Role	# of Workers	# of Hours	# of Hours (Adjusted)	Wages per Hr	Fringes per Hr	(Wages + Fringes) / Hr	Total
Project Manager	2	5,440	6,528	\$35.00	\$21.00	\$56.00	\$731,136
Assistant Project Manager	2	5,440	6,528	\$17.50	\$10.50	\$28.00	\$365,568
Estimator	8	5,440	6,528	\$27.00	\$16.20	\$43.20	\$2,256,077
Project Superintendent	2	5,440	6,528	\$33.08	\$19.85	\$52.93	\$691,028
Project Engineer	10	5,440	6,528	\$27.00	\$16.20	\$43.20	\$2,820,096
Abatement	10	352	422	\$40.21	\$24.72	\$64.93	\$274,264
Abatement Laborer	10	352	422	\$22.65	\$17.60	\$40.25	\$170,016
Equipment Operator (1)	12	5,440	6,528	\$35.09	\$20.95	\$56.04	\$4,389,949
Equipment Operator (2)	12	5,440	6,528	\$29.90	\$20.15	\$50.05	\$3,920,717



Total	\$56,306,651
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Cost Estimate (Materials)

Materials				
Product	Unit	Price/Unit	Quantity	Cost
Structural Materials				
Concrete	cy	\$115.00	13,547	\$1,557,933
Structural Steel	ton	\$773.00	4,000	\$3,092,000
Rebar	ls	\$300,000.00	1	\$300,000
Soil Nail Wall	lf	\$35.00	196,000	\$6,860,000
Brick (& materials)	sf	\$3.25	62,504	\$203,138
Exterior Glass	sf	\$22.45	57,576	\$1,292,581
Thermal & Moisture Protection	sf	\$9.45	350,000	\$3,306,800
Membrane Roofing	sf	\$4.48	57,728	\$258,621
GWB	sf	\$0.50	50,000	\$25,000
Insulation	sf	\$1.00	435,000	\$435,000



Total	\$55,791,470
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Cost Estimate (Equipment/Other)

Equipment					
Type	Unit	Cost/unit	Quantity	# of units	Total Cost
Scaffolds	sf	\$8.00	1	39,052	\$312,416
Concrete Boom Pump	hr	\$390.00	1	6,480	\$2,527,200
Crane(s)	ea	\$270,000.00	3	1	\$810,000
Lifts	ea	\$47,000.00	1	2	\$94,000
caisson auger	month	\$3,200.00	1	6	\$19,200
On-Highway Light Duty Truck	hr	\$18.10	1	23,760	\$430,056
On-Highway Flatbed Truck	hr	\$34.50	1	23,760	\$819,720
On-Highway Rear Dump Truck	hr	\$89.90	2	23,760	\$4,272,048
Off-Highway Rear Dump Truck	hr	\$176.60	2	23,760	\$8,392,032

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Total	\$30,692,955
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Cost Estimate (Permitting)

Permit Cost					
	Permit	Unit Cost	Quantities	Units	Cost
	<u>Building Permit</u>	\$0.48	435,000	sq. ft.	\$208,800
	(+) Zoning Filing Fee	\$50.00	1	permit	\$50
	(+) State Fee	\$4.50	1	permit	\$5
	<u>Board of Appeals</u>	\$300.00	-	-	\$300
	<u>Occupancy Load Placards</u>				
	- Occupancy Permit	\$40.00	1	permit	\$40
	- Scanning Fee	\$3.00	5	page	\$15
	<u>Electrical Permit</u>				
	- Receptacles (< 30 Amps)	\$72.00	70	ea	\$5,040
	- Receptacles (30 Amps +)	\$6.00	15	ea	\$90
	- Luminaires	\$52.00	336	ea	\$17,472

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Total	\$619,480
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Cost Estimate (Summary)

Summary	Cost	Comments
<i>Labor (+20%)</i>	\$67,600,000	+20% for unexpected labor cost
<i>Materials</i>	\$55,800,000	
<i>Permits</i>	\$620,000	
<i>Equipment/Other</i>	\$30,700,000	
Sub Total	\$154,700,000	
<i>Bonds/Insurance (1.5%)</i>	\$2,400,000	1.5% of Sub-Total
<i>Contingency</i>	\$8,300,000	Taken from RMP
<i>Profit (3%)</i>	\$4,700,000	3% of Sub-Total
Total	\$170,100,000	



Project Summary

Where & Why?

- Rec-Center in place of O'hara Garage & LRDC
- Part of Pitt Master Plan
- Link upper and lower campus

What's Inside?

- Eight floors (Food, Athletic, Student Space)
- Parking Garage (five levels)
 - Integrated with Rec-Center

When & How Much?

- 35 month project (August 2020 - June 2023)
- Final Project Cost = \$170 million



Thank You

Pitt Facilities Management:

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Dr. Andrew Bungler

Dr. Kent Harries

Thank You!



Questions?

