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MEMORANDUM

TO: James Tye –The Clean Lakes Alliance Executive Director

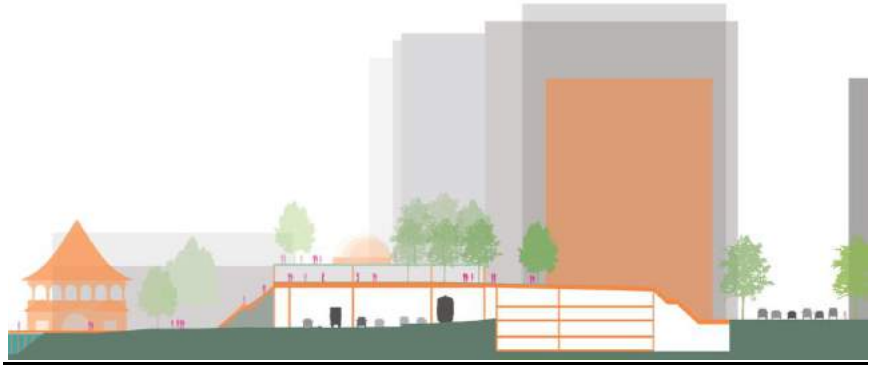
FROM: GRAEF

DATE: March 14, 2018

SUBJECT: Nolen Waterfront Feasibility Study
Monona Terrace and Law Park Expansion Feasibility
GRAEF Project I.D. 2017-5012.00
Dane County

Introduction

In May 2018, the Madison Community Foundation, as part of their 75th Anniversary celebration, awarded a grant to the Clean Lakes Alliance for the preparation of a preliminary engineering feasibility study and schematic engineering opinion of probable cost of the Madison Design Professionals Workgroup vision for expanding Law Park by decking over John Nolen Drive and the railroad corridor. GRAEF was hired to conduct the feasibility study with the assistance of Findorff, who assisted with the preparation of the opinion of probable cost. This study is based on the concept illustrated in the plan and section below. The GRAEF study is limited to preliminary engineering design of foundations and decks for two structures proposed to span over the highway and rail corridor including the expansion of Monona Terrace and an elevated park deck. Roads, bicycle paths, landscaping, park elements, shoreline reconfiguration, waterfront structures and the Frank Lloyd Wright Boathouse are not included as part of the study. The results of the GRAEF study are summarized in the attached technical memorandum.



Study Area

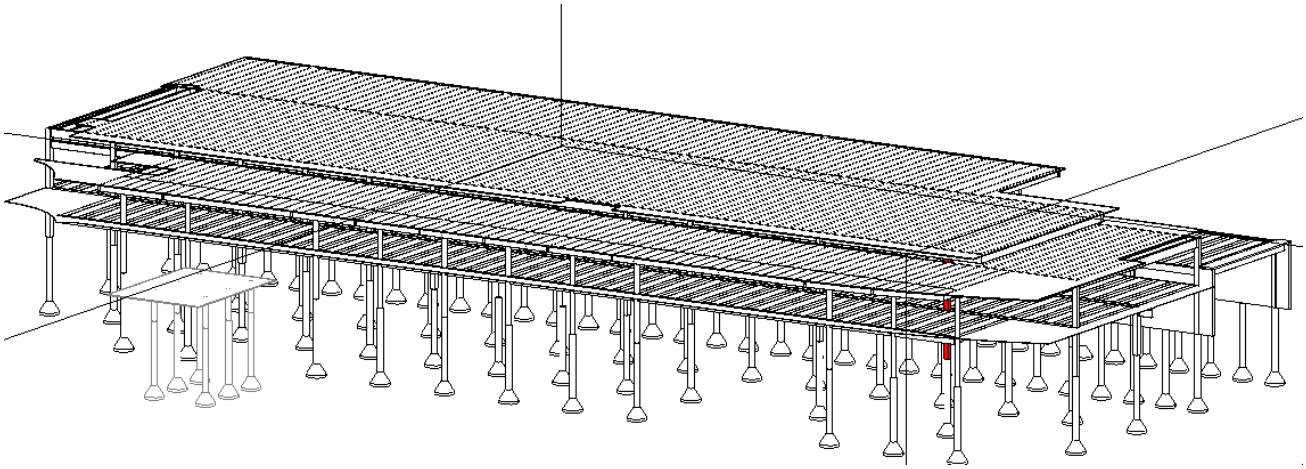
The purpose of this study was to structurally frame the Monona Terrace eastern expansion, Rooftop Park and railroad enclosure for the purpose of estimating probable construction cost. Additional loading criteria for all areas can be found in appendix A and additional structural information can be found on the plans located in appendix B.

Monona Terrace Eastern Expansion

The expansion would consist of two stories with one being a convention floor and the other supporting a terrace roof space. The roof structure consists of concrete composite deck with a total thickness of 6.5" with W-section steel beams. There will be soil planter (3'-0" soil depth) or paver terrace areas throughout the roof top area and the entire terrace area is design as a public assembly area (100psf). The beams frame into W-section steel girders which are supported off the concrete columns.

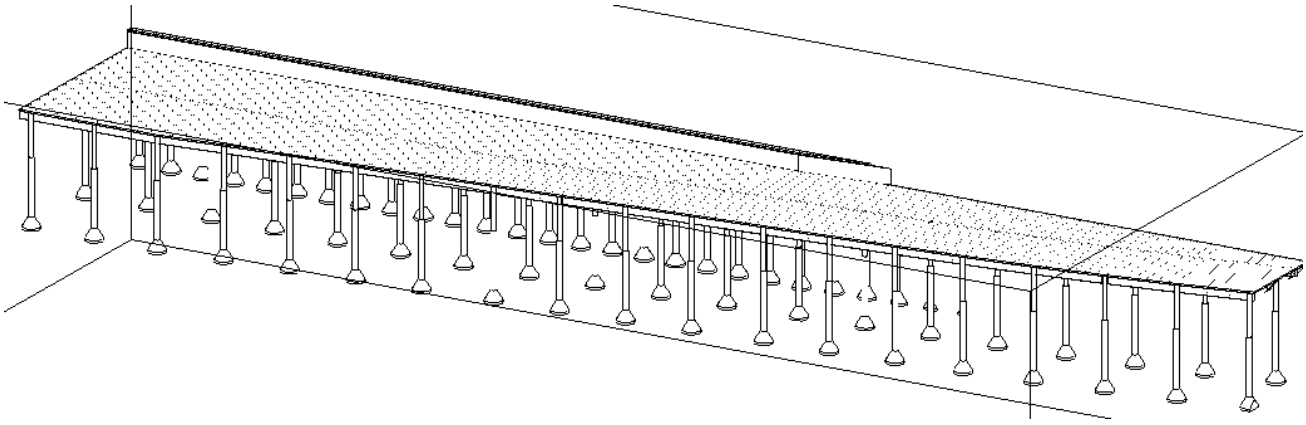
The convention floor consists of 34" deep precast double tees that are pre-topped with 2" structural topping. Insulation and a non-structural topping slab are located over the whole floor and designed to accommodate public assembly loading (100psf). The double tees are supported by precast spandrels that span column to column. The columns are 24" diameter round concrete columns.

The foundations will need to follow a non-disruptive construction methodology to keep the road and railways in use for the majority of the construction. Due to this and the soil conditions a deep foundation system of concrete drilled piers is suggested. Concrete drilled piers that are 24" in diameter with a belled bottom under each column or spaced at 8'-0" on center under the concrete wall.



Rooftop Park Above John Nolen Drive

It was assumed that there would be 3'-0" of soil over the entire park structure and it is also designed to accommodate public assembly loading (100psf). The park is supported by concrete composite slab with a total thickness of 6.5" with W-section beams framing perpendicular to W-section girders or concrete walls. Where steel girders are used they are supported by 24" diameter concrete columns. The foundation system will be the same as was used for the Monona Terrace eastern expansion.



Railroad Enclosure

The railroad enclosure supports the continuation of the roof top park. It was designed to support 3'-0" of soil over the entire structure and to accommodate public assembly loading (100psf). A similar structural system was used as the roof top park except that the beams would frame into concrete walls on both sides and that the steel beam system would also span over a vehicle access drive for the redeveloped buildings along East Wilson Street. The concrete walls are supported on the same concrete drilled pier system as the Monona Terrace eastern expansion.

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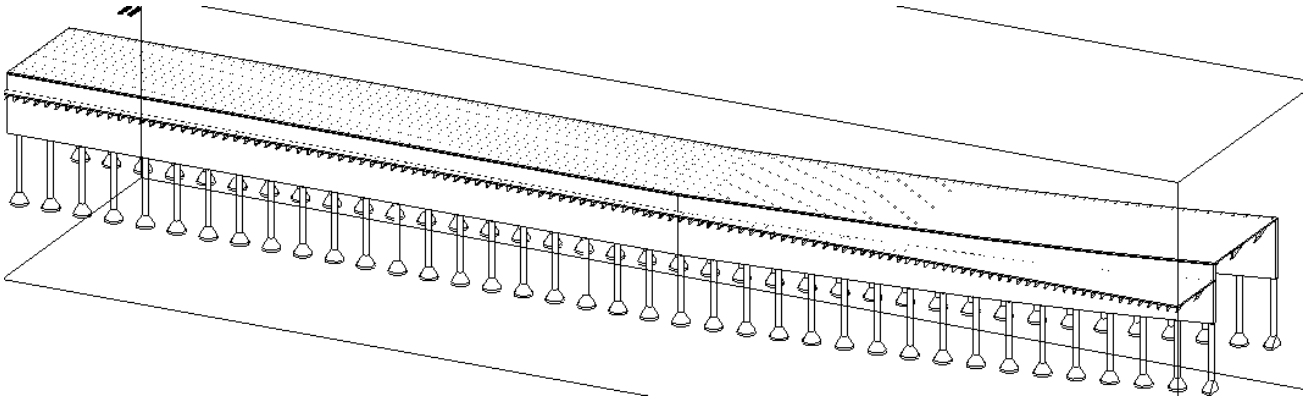

Probable Construction Cost

The probable cost of construction was determined to be $18.3 million. The estimate includes the structural elements but **does not** include any slab on grade, traffic control, earthwork, architectural finishes, shoreline work, landscaping and park features.

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Appendices

Appendix A – Design Criteria
Appendix B – Drawings
Appendix C – Estimate of Probable Cost

APPENDIX A

DESIGN CRITERIA

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Building Codes:

The building codes for the City of Madison, WI are the International Building Code 2012 (IBC 2012) and the Wisconsin Commercial Building Code.

A. Design Loads

1. Live Loads
2. Snow Loads
3. Wind Loads
4. Seismic Loads
5. Dead Loads

B. Load Combinations

C. Material Strengths/Soils Criteria

D. Structural Systems

1. Foundations
2. Slabs On Ground
3. Typical Floor
4. Roof

E. Special Design Criteria

F. Lateral Force Resisting System Concepts

G. Future Expansion

STRUCTURAL NARRATIVE

A. Design Loads

1. Live Loads

The structure is designed for live loads in accordance with IBC 2012 and ASCE 7-10 as outlined below:

a. Floor Live Load
Assembly Areas 100 psf

Offices	50 psf
Stairways	100 psf
Lobbies	100 psf
Corridors (On "At Grade" Levels)	100 psf
Corridors (On Other Levels)	80 psf
Partitions	15 psf
Mechanical Rooms	150 psf [1]

[1] = But not less than 40 psf + Equipment Weight

b. Roof Live Load

Rain	20 psf
Snow	23.1 psf + drifting snow provisions per ASCE 7-10
Soil (2' of soil for Monona Terrace Roof)	260 psf
Soil (3' of soil for Park Slab)	390 psf

c. Parking Garage Live Load — 40 psf uniform load or 2000 lb point load over xx in^2

Live load reduction per IBC 2012 Section 1607.10

2. Snow Loads

a. Roof Snow Load (IBC 2012 and ASCE 7-10)

Risk Category	III
Importance Factor	I_s = 1.1
Ground Snow Load	P_g = 30 psf
Flat Roof Snow Load	P_f = 23.1 psf
Exposure Factor	C_e = 1.0
Thermal Factor	C_t = 1.0

3. Wind Loads

a. Wind Load (IBC 2012 and ASCE 7-10)

Risk Category	III
Importance Factor	I_w = 1.0
Basic Wind Speed	V = 120 mph
Exposure	D
Internal Pressure Coefficient	G_{pi} = +/- 0.18
Components and Cladding	N/A

4. Seismic Loads

a. Seismic Load (IBC 2012 and ASCE 7-10)

Risk Category	III

Importance Factor	$I_e = 1.25$
Spectral Response Accelerations	$S_S = 0.085$
	$S_1 = 0.046$
Spectral Response Coefficients	$S_{DS} = 0.068$
	$S_{D1} = 0.052$
Seismic Response Coefficient	$C_s = 0.035$
Response Modification Factor	R = 3.5
Soil Site Class (Assumed)	C
Seismic Design Category	A
Basic Seismic Force Resisting System	Steel Moment Frame
Analysis Procedure	Equivalent Lateral Force Procedure
Design Base Shear	0.024W

5. Dead Loads (Precast Double Tee & Composite Slab On Metal Deck)

a. Typical Floor = 34” Precast Double Tee 10’-0” wide + 2” (minimum) Structural Slab

34” Precast Plank (2” Pretopped)	89 psf
4” (minimum) Toppingl Slab	50 psf
Rigid Insulation	5 psf
Mechanicals	5 psf
Miscellaneous	3 psf
Flooring	3 psf
Ceiling	3 psf
Total	**158 psf**

b. Roof = 4.5” NW Concrete Slab On 2” Composite Metal Deck (6.5” Total Thickness)

4.5” Slab Over 2” Deck	70 psf
Fire Proofing	3 psf
Mechanicals	5 psf
Miscellaneous	3 psf
Insulation and Membrane	5 psf
Ceiling	3 psf
Total	**89 psf**

B. Load Combinations

1. Steel Design	IBC 2012 ASD/LRFD
2. Concrete Design	ACI 318-11

3. Lateral Bracing — IBC 2012 ASD/LRFD

4. Soils — IBC 2012 ASD

C. Material Strengths/Soils Criteria

1. Concrete**:**

Drilled Piers	3000 psi
Footings	4000 psi
Grade Beams	4000 psi
Slabs on Ground	4000 psi
Piers	4000 psi
Columns	4000 psi
Foundation Walls	4000 psi
Shear Walls	4000 psi
Joists and Beams	4000 psi
Structural Slab Systems	4000 psi
Slabs On Metal Deck	3500 psi
Topping Slabs	4000 psi
Precast Planks	5000 psi

2. Reinforcing Steel

Rebar: ASTM A615, Grade 60	F_y = 60 ksi

3. Structural Steel

W-Shapes: ASTM A992, Grade 50	F_y = 50 ksi
Channels: ASTM A36	F_y = 36 ksi
Angles and Plates: ASTM A36	F_y = 36 ksi
HSS Square and Rectangular Sections:	
ASTM A500, Grade B	F_y = 46 ksi
HSS Round Sections:	
ASTM A500, Grade B	F_y = 42 ksi
Steel Pipe: ASTM A500, Grade B	F_y = 42 ksi
Headed Studs: ASTM A108	F_u = 65 ksi
Bolts: ASTM A325	F_u = 120 ksi
Anchor Bolts: ASTM F1554, Grade 36	F_y = 36 ksi

4. Soil Properties (assumed)

Allowable Soil Bearing Pressure (Deep Foundation)	30000 psf
Active Equivalent Fluid Pressure	42 pcf

At-Rest Equivalent Fluid Pressure	63 pcf
Passive Equivalent Fluid Pressure	439 pcf
Soil Unit Weight	135 pcf

D. Structural Systems

1. Foundations

Drilled Piers with a belled end

2. Slabs On Ground

Pavement by others

3. Typical Floor

Monona Terrace Expansion

34” by 10’-0” precast concrete double tees with 2” concrete structural topping framing into precast concrete spandrel beams supported by concrete columns

4. Roof

Monona Terrace Expansion

W-section steel beams with concrete composite deck (4.5” concrete over 2” metal deck) framing into W-section steel girders supported by concrete columns/ walls

Law Park Expansion

W-section steel beams with concrete composite deck (4.5” concrete over 2” metal deck) framing into W-section steel girders supported by concrete columns/ walls

E. Special Design Criteria

1. Spandrel Beam Deflections

Spandrel beams have been designed for a superimposed load vertical deflection limit of 0.30”.

The superimposed load shall include superimposed dead loads and live loads.

F. Lateral Force Resisting System Concepts

Concrete diaphragms at the floors
Concrete diaphragm at the roof

G. Future Expansion

None

APPENDIX B

DESIGN SPECIFICATIONS

- DESIGN IS IN ACCORDANCE WITH THE STATE OF WISCONSIN AND THE 2009 INTERNATIONAL BUILDING CODE.
- MINIMUM 28 DAY CONCRETE CYLINDER STRENGTH SHALL BE:

DRILLED PIERS	4000 PSI
FOOTINGS	4000 PSI
GRADE BEAMS	4000 PSI
SLABS ON GROUND	4000 PSI
PIERS	4000 PSI
COLUMNS	4000 PSI
FOUNDATION WALLS	4000 PSI
SHEAR WALLS	4000 PSI
JOISTS AND BEAMS	4000 PSI
STRUCTURAL SLAB SYSTEMS	4000 PSI
SLABS ON METAL DECK	4000 PSI

- REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
- STRUCTURAL STEEL W-SHAPES SHALL CONFORM TO ASTM A992 GRADE 50.
- STRUCTURAL STEEL PLATES, ANGLES, CHANNELS, AND OTHER ROLLED MEMBERS SHALL CONFORM TO ASTM A36.
- RECTANGULAR OR SQUARE HSS MEMBERS SHALL CONFORM TO ASTM A500 GRADE B.
- ROUND HSS MEMBERS SHALL CONFORM TO ASTM A500 GRADE B.
- STEEL PIPE SHALL CONFORM TO ASTM A53 GRADE B.
- ASSUMED BEARING CAPACITY FOR SPREAD FOOTINGS IS ____ PSF, BASED UPON SOILS REPORT DATED ____, AS PREPARED BY ____.
- REQUIRED BEARING CAPACITY FOR DRILLED PIERS IS ____ PSF, BASED UPON SOILS REPORT DATED ____, AS PREPARED BY ____. ALLOWABLE SIDE FRICTION GIVEN IN REPORT IS ____.
- DESIGN LOADS:

FLOOR LIVE LOADS (IBC 2009)

ASSEMBLY AREAS	100 PSF
OFFICES	50 PSF
STAIRWAYS	100 PSF
LOBBIES	100 PSF
CORRIDORS (ON "AT GRADE" LEVELS)	100 PSF
CORRIDORS (ON OTHER LEVELS)	80 PSF
PARTITIONS	20 PSF
MECHANICAL ROOMS	125 PSF (OR 40 PSF + EQUIPMENT WEIGHT)
MINIMUM ROOF LIVE LOAD	20 PSF

LIVE LOAD REDUCTION PER IBC 2009 SECTION 1607.9 IS INCLUDED

ROOF SOIL LOAD

2'-0" SOIL DEPTH	260 PSF
3'-0" SOIL DEPTH	390 PSF

ROOF SNOW LOAD (ASCE 7-05)

OCCUPANCY CATEGORY	I
IMPORTANCE FACTOR	I_s = 1.1
GROUND SNOW LOAD	P_g = 30 PSF
FLAT ROOF SNOW LOAD	P_f = 23.1 PSF
EXPOSURE FACTOR	C_e = 1.0
THERMAL FACTOR	C_t = 1.0

BUILDING HAS BEEN DESIGNED FOR RAIN LOADS PER IBC 2009 AND ASCE 7-05.

WIND LOAD (ASCE 7-05)

OCCUPANCY CATEGORY	I
IMPORTANCE FACTOR	I_w = 1.0
BASIC WIND SPEED	V = 90 MPH
EXPOSURE	D
INTERNAL PRESSURE COEFFICIENT	GC_{pi} = +/- 0.18

SEISMIC LOAD (IBC 2009)

OCCUPANCY CATEGORY	I
IMPORTANCE FACTOR	I_e = 1.25
SPECTRAL RESPONSE ACCELERATIONS	S_S = 0.089 g S_1 = 0.046 g
SPECTRAL RESPONSE COEFFICIENTS	S_{DS} = 0.068 g S_{D1} = 0.052 g
SEISMIC RESPONSE COEFFICIENT	C_s = 0.035
RESPONSE MODIFICATION FACTOR	R = 3.5
SOIL SITE CLASS (ASSUMED)	A
SEISMIC DESIGN CATEGORY	C
BASIC SEISMIC FORCE RESISTING SYSTEM	CONCRETE SHEAR WALLS

- RESISTANCE TO LATERAL LOADS ON STRUCTURE IS PROVIDED BY FLOOR DIAPHRAGMS, AND ROOF DIAPHRAGMS. CONTRACTOR SHALL PROVIDE SUFFICIENT TEMPORARY BRACING UNTIL ALL LATERAL SUPPORT SYSTEMS ARE IN PLACE AND FUNCTIONAL.
- ALL STRUCTURAL FRAMING AND CONNECTIONS HAVE BEEN DESIGNED FOR THE FINAL COMPLETED CONDITION AND HAVE NOT BEEN INVESTIGATED FOR POTENTIAL LOADINGS ENCOUNTERED DURING ERECTION AND CONSTRUCTION. ANY INVESTIGATION OF THE STRUCTURAL FRAMING AND CONNECTIONS FOR ADEQUACY DURING THE ERECTION AND CONSTRUCTION PROCESS IS THE RESPONSIBILITY OF THE CONTRACTOR.
- CONTRACTOR IS RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION AND JOB SITE SAFETY.
- PROVISIONS ARE INCLUDED FOR THE FOLLOWING FUTURE ADDITIONS:

GENERAL NOTES

EARTHWORK

- FOOTINGS SHALL BE CAST ON UNDISTURBED SUBSOIL. IF DESIGN CAPACITY IS NOT ENCOUNTERED AT THE ELEVATIONS SHOWN, FOOTINGS MUST BE LOWERED. CONSULT ENGINEER BEFORE PROCEEDING.
- NO HOLES, TRENCHES OR DISTURBANCES OF THE SOIL SHALL BE ALLOWED WITHIN THE VOLUME DESCRIBED BY 45 DEGREE LINES SLOPING FROM THE BOTTOM EDGE OF THE FOOTING. IF SUCH ARE REQUIRED, FOOTINGS MUST BE LOWERED.
- BACKFILL EVENLY ON EACH SIDE OF FOUNDATION WALLS AND RETAINING WALLS.
- DO NOT BACKFILL AGAINST BASEMENT WALLS UNTIL FLOOR SYSTEM IS IN PLACE AND FASTENED OR UNTIL WALLS ARE ADEQUATELY BRACED. BRACING SHALL BE DESIGNED BY THE CONTRACTOR.
- TOPSOIL AND FILL BELOW SLABS ON GROUND SHALL BE REMOVED. AGGREGATE BASE COURSE UNDER SLABS ON GROUND SHALL BE BANKRUN GRAVEL COMPACTED TO 6-INCH LAYERS (EXCEPT WHERE LOOSE FILL IS INDICATED ON DRAWINGS).
- BACKFILL AGAINST INTERIOR FOUNDATION WALLS SHALL BE BANKRUN GRAVEL COMPACTED TO MAXIMUM 6-INCH LAYERS.
- BACKFILL AGAINST EXTERIOR FOUNDATION WALLS SHALL BE BANKRUN GRAVELCOMPACTED TO MAXIMUM 6-INCH LAYERS.
- PROVIDE MINIMUM 24 INCHES OF FREE DRAINING AGGREGATE, AS SPECIFIED, OVER ALL DRAIN TILES AND 4 INCHES BELOW.

CONCRETE

- FORMWORK SHALL BE DESIGNED IN ACCORDANCE WITH THE ACI "MANUAL OF CONCRETE PRACTICE", LATEST EDITION.
- REINFORCING STEEL SHALL BE DETAILED AND PLACED IN ACCORDANCE WITH THE ACI "MANUAL OF CONCRETE PRACTICE", LATEST EDITION, UNLESS OTHERWISE NOTED.
- LAP ALL WALL BARS 30 DIAMETERS UNLESS OTHERWISE DETAILED. LAP WELDED WIRE MESH 6 INCHES.
- PROVIDE COLUMN AND WALL DOWELS OF THE SAME SIZE AND NUMBER AS THE RESPECTIVE COLUMN AND WALL REINFORCING UNLESS OTHERWISE DETAILED.
- PROVIDE TWO #4 BARS AS STIRRUP CARRY BARS WHERE NO TOP STEEL IS AVAILABLE TO HOLD STIRRUPS.
- WHEREVER AN APPROVED PIPE OR CONDUIT EXTENDS THROUGH A BEAM, PROVIDE ONE ADDITIONAL STIRRUP ON EACH SIDE OF THE OPENING.
- CONCRETE PROTECTION FOR REINFORCING BARS SHALL BE IN ACCORDANCE WITH THE "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE", ACI 318-08.
- SLABS ON GRADE SHALL BE CAST ALLOWING A SUFFICIENT NUMBER OF JOINTS TO ADEQUATELY CONTROL SHRINKAGE CRACKING. SAWCUTTING SHALL BE DONE AS SOON AS SAWCUT WILL NOT RAVEL CONCRETE OR WITHIN 24 HOURS MAXIMUM OF INITIAL POURING OPERATION. MAXIMUM SIZE OF PANELS SHALL BE 15 FEET BY 15 FEET. GENERALLY, JOINTS SHALL OCCUR ON COLUMN CENTERLINES.
- ALLOW AT LEAST 24 HOURS BEFORE POURING ADJACENT WALL SECTIONS BETWEEN CONSTRUCTION JOINTS. MAXIMUM LENGTH OF POUR TO BE 40 FEET, UNLESS CRACK INDUCERS ARE USED AS DETAILED ON THE DRAWINGS.
- CONSTRUCTION JOINTS IN BEAMS, JOISTS OR SLABS TO BE LOCATED BETWEEN THE 1/4 POINT AND CENTERLINE OF SPAN, OR AS DIRECTED BY THE ENGINEER.
- DO NOT PLACE OR CUT HOLES IN CONCRETE SLABS, BEAMS, WALLS OR COLUMNS WITHOUT PRIOR APPROVAL OF THE ENGINEER.
- EXTERIOR EXPOSED CONCRETE SHALL BE AIR-ENTRAINED. AIR CONTENT SHALL BE 6 PERCENT (+/-1 1/2 PERCENT).
- CAMBER CONCRETE MEMBERS FOR DEAD LOAD DEFLECTION BY ADJUSTING FORMS.
- PIPES AND CONDUITS EMBEDDED IN OR PASSING THROUGH STRUCTURAL MEMBERS MUST BE APPROVED BY THE STRUCTURAL ENGINEER. PIPE AND CONDUITS EMBEDDED IN CONCRETE SHALL NOT BE LARGER THAN 2 INCHES IN OUTSIDE DIAMETER AT THEIR WIDEST POINT OR FITTING OR 1/3 OF THE THICKNESS OF THE SLAB, BEAM OR WALL.
- ELECTRICAL CONDUIT OR PIPES EMBEDDED IN OR PASSING THROUGH SLABS, BEAMS OR WALLS SHALL BE LOCATED AND PLACED SO THAT:
  1. THEY ARE NOT CLOSER THAN THREE DIAMETERS ON CENTER.
  2. THE CONCRETE COVER IS NOT LESS THAN 2 INCHES.
  3. THEY RUN BETWEEN REINFORCING AND DO NOT DISPLACE IT IN ANY MANNER.
- ALUMINUM CONDUITS SHALL NOT BE PLACED IN CONCRETE.
- CHAMFER ALL EXPOSED CONCRETE CORNERS. SEE ARCHITECTURAL/STRUCTURAL DRAWINGS FOR REQUIREMENTS.
- CONCRETE SHALL BE TESTED BY THE OWNER'S TESTING LAB. REFER TO SPECIFICATIONS FOR REQUIREMENTS.
- PROPER CURING PROCEDURES SHALL BE USED FOR SLAB ON GRADE TO PREVENT CURLING.
- CALCIUM CHLORIDE SHALL NOT BE USED IN CONCRETE MIXES.
- PROVIDE WATERSTOPS AT ALL CONSTRUCTION JOINTS BELOW THE WATER TABLE AND AS SHOWN ON DRAWINGS. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.

PRECAST CONCRETE

- PRECAST CONCRETE MEMBERS SHALL BE DESIGNED IN ACCORDANCE WITH THE "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE", ACI 318-08.
- PRECAST CONCRETE SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE ACI "MANUAL OF CONCRETE PRACTICE", LATEST EDITION, AND THE AFOREMENTIONED CONCRETE PROVISIONS.
- PRECAST CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER DESIGN AND REINFORCING OF PRECAST CONCRETE FOR HANDLING AND ERECTION STRESSES.
- PRECAST MEMBERS SHALL BE ATTACHED AND SUPPORTED BY THE STRUCTURE AS INDICATED ON THE DRAWINGS. DEVIATION FROM THESE LOCATIONS WILL CONSTITUTE MEANS FOR REJECTION OF MEMBERS.
- PRECAST MEMBERS SHALL BE DESIGNED AND REINFORCED FOR SELF-WEIGHT AND ALL SUPERIMPOSED LOADS SHOWN ON THE DRAWINGS.
- PRECAST MEMBERS SHALL BE CAPABLE OF SAFELY SUPPORTING ANY CONCENTRATED LOADS INDICATED BY THE STRUCTURAL, MECHANICAL, AND ARCHITECTURAL DRAWINGS.
- PRECAST CONTRACTOR SHALL FURNISH AND INSTALL ALL MATERIALS (HANGERS, CLIPS, PLATES, HEADERS, ANCHORAGES, ETC.) WHICH MUST BE PRECAST INTO THE CONCRETE UNLESS OTHERWISE NOTED OR REQUIRED FOR CONNECTION OF PRECAST TO STRUCTURE.
- CONTRACTOR SHALL COORDINATE LOCATIONS OF ALL HOLES OR OPENINGS WITH RESPECTIVE TRADES BEFORE FABRICATION. ANY DEVIATION FROM THESE LOCATIONS OR ADDITIONAL OPENINGS MUST BE APPROVED BY THE FABRICATOR.
- FIRE RATING OF PRECAST FLOOR PLANK SHALL BE 1 HOUR.
- GROUT IN PRECAST MEMBER KEYWAYS SHALL BE SAND-CEMENT GROUT. MINIMUM COMPRESSIVE STRENGTH SHALL BE 2500 PSI.
- FIRE RATING OF PRECAST WALL PANELS SHALL BE 1 HOUR.
- WALL PANEL JOINTS SHALL BE FILLED WITH APPROVED FIRE STOP MATERIAL AND POLYURETHANE JOINT SEALANT.

STRUCTURAL STEEL

- STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE AISC "STEEL CONSTRUCTION MANUAL", THIRTEENTH EDITION, AND THE AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", MARCH 18, 2005 EDITION.
- WHERE INDICATED ON DRAWINGS, STRUCTURAL AND MISCELLANEOUS STEEL WHICH SHALL REMAIN EXPOSED TO VIEW SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC "SPECIFICATION FOR ARCHITECTURALLY EXPOSED STRUCTURAL STEEL", LATEST EDITION, WITHOUT GAPS OR OPEN JOINTS.
- STEEL DECK FABRICATION AND ERECTION SHALL CONFORM TO THE STANDARD SPECIFICATIONS OF THE STEEL DECK INSTITUTE.
- ALL WELDING SHALL COMPLY WITH AWS D1.1 USING E70XX ELECTRODES. ALL WELDING TO BE DONE BY AWS PREQUALIFIED WELDERS, CERTIFIED FOR WELDS MADE. PROVIDE CONTINUOUS MINIMUM SIZED WELDS PER AISC REQUIREMENTS, UNLESS NOTED OTHERWISE.
- THE MINIMUM SIZE OF FILLET WELDS SHALL BE AS SPECIFIED IN TABLE J2.4 IN THE AISC "STEEL CONSTRUCTION MANUAL".
- MINIMUM STRENGTH OF WELDED CONNECTIONS: UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL SHOP AND FIELD WELDS SHALL DEVELOP THE FULL TENSILE STRENGTH OF THE MEMBER OF ELEMENT JOINED. ALL MEMBERS WITH MOMENT CONNECTIONS, NOTED ON THE DRAWINGS, SHALL BE WELDED TO DEVELOP THE FULL FLEXURAL CAPACITY OF THE MEMBER, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- BOLTED CONNECTIONS SHALL BE MADE WITH ASTM A325 HIGH STRENGTH BOLTS (MINIMUM 3/4-INCH DIAMETER).
- BEAM-TO-COLUMN AND BEAM-TO-BEAM CONNECTIONS SHALL BE MADE WITH DOUBLE ANGLES UNLESS OTHERWISE DETAILED.
- MINIMUM NUMBER OF BOLTS FOR END SHEAR REACTIONS ARE AS FOLLOWS:
  1. W8, W10 OR W12: 2 3. W21 OR W24: 4 5. W33, W36 OR W40: 6
  2. W14, W16 OR W18: 3 4. W27 OR W30: 5 6. W44: 7
- BEAMS SHALL BE EQUALLY SPACED IN A BAY UNLESS NOTED OTHERWISE ON PLAN.
- ALL STRUTS, HANGERS, AND BRACES SHALL HAVE CONNECTIONS DESIGNED TO DEVELOP THE FULL ALLOWABLE TENSILE STRENGTH OF THE MEMBER UNLESS THE DESIGN FORCE IS INDICATED ON THE DRAWINGS, IN WHICH CASE THE CONNECTIONS SHALL BE DESIGNED FOR THE FORCE INDICATED.
- COLUMN BASE PLATES SHALL HAVE OVERSIZED HOLES WITH PLATE WASHERS (MINIMUM 3/8-INCH THICK) PROVIDED WITH ANCHOR RODS.
- GROUT UNDER BASE PLATES IN ACCORDANCE WITH THE "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", MARCH 18, 2005 EDITION.
- WHERE BEAMS SUPPORT JOISTS FROM ONLY ONE SIDE, JOIST SEAT SHALL EXTEND 1-INCH BEYOND BEAM CENTERLINE.
- STEEL FLOOR DECK SHALL BE AS SHOWN ON THE DRAWINGS.
- STEEL FLOOR DECK SHALL BE SECURELY FASTENED TO ALL STRUCTURAL SUPPORTS BY WELDING IN THE 1ST, 2ND, 3RD, AND 4TH RIBS OF 36-INCH WIDE DECK (36/4 WELD PATTERN), UNLESS SHOWN OTHERWISE ON THE DRAWINGS. WELDS SHALL BE MADE WITH 5/8-INCH DIAMETER PUDDLE WELDS.
- STEEL FLOOR DECK SHALL BE SECURELY FASTENED TO ALL PERIMETER STRUCTURAL SUPPORTS BY WELDING IN EVERY RIB. WELDS SHALL BE MADE WITH 5/8-INCH DIAMETER PUDDLE WELDS. IN NO CASE SHALL WELDS BE SPACED GREATER THAN 12 INCHES ON CENTER.
- STEEL FLOOR DECK SIDELAPS TO BE WELDED AT MIDSPAN UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
- DECK END LAPS SHALL BE 2-INCH MINIMUM AND SHALL OCCUR AT SUPPORTS. LOCATE AT VALLEYS AND RIDGES.
- WHERE CONTINUOUS DIAPHRAGM CHORD ANGLES ARE INDICATED, PROVIDE A FULL PENETRATION WELD AT THE SPLICE LOCATIONS.
- CLEAN, PREPARE, AND SHOP PRIME EXTERIOR EXPOSED STRUCTURAL STEEL MEMBERS IN ACCORDANCE WITH SSPC STANDARDS SP-1 AND SP-6.
- CLEAN, PREPARE, AND SHOP PRIME INTERIOR EXPOSED STRUCTURAL STEEL MEMBERS IN ACCORDANCE WITH SSPC STANDARDS SP-1 AND SP-3.
- WHILE THE DESIGN DOCUMENTS MAY REFERENCE OSHA, THEY ARE NOT INTENDED TO SPECIFICALLY IDENTIFY ALL APPLICABLE OSHA REQUIREMENTS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND COMPLY WITH ALL APPLICABLE OSHA REQUIREMENTS.
- ALL STRUCTURAL STEEL PERMANENTLY EXPOSED TO THE WEATHER, INCLUDING MASONRY SHELF ANGLES, SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123, UNLESS OTHERWISE NOTED.
- REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL MISCELLANEOUS STEEL.

SHEET INDEX

S000	GENERAL NOTES
S001	OVERALL PLAN
S010A	FOUNDATION PLAN - AREA A
S010B	FOUNDATION PLAN - AREA B
S011A	LEVEL 1 FRAMING PLAN - AREA A
S011B	LEVEL 1 FRAMING PLAN - AREA B
S012A	LEVEL 2 FRAMING PLAN - AREA A
S012B	LEVEL 2 FRAMING PLAN - AREA B
S013	LOW ROOF FRAMING PLAN
S014	HIGH ROOF FRAMING PLAN
S030	SECTIONS
S050	DETAILS

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PROJECT TITLE:

NOLEN WATERFRONT

ISSUE:

PRELIMINARY - FOR REFERENCE ONLY
NOT FOR CONSTRUCTION

PROJECT INFORMATION:

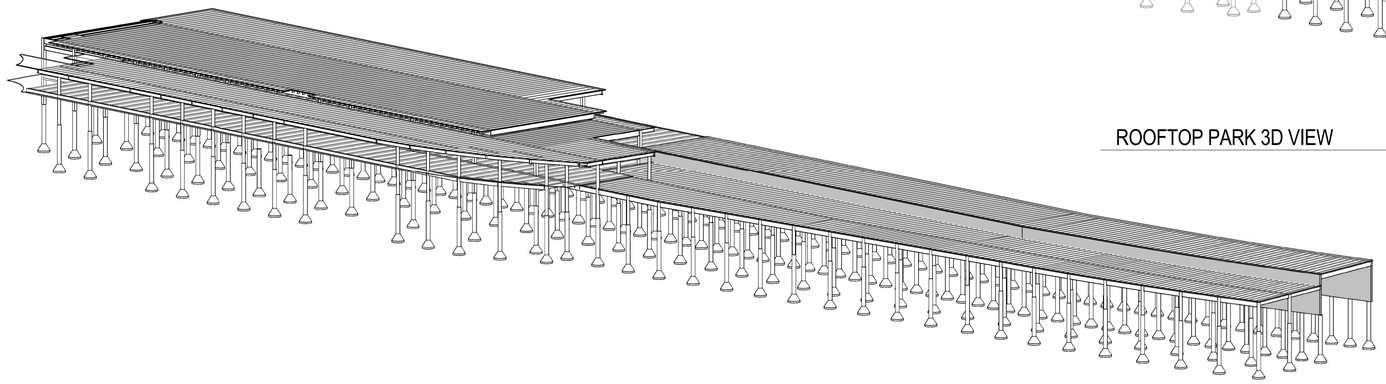
PROJECT NUMBER:	2017-5012.01
DATE:	2018-02-01
DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

SHEET TITLE:

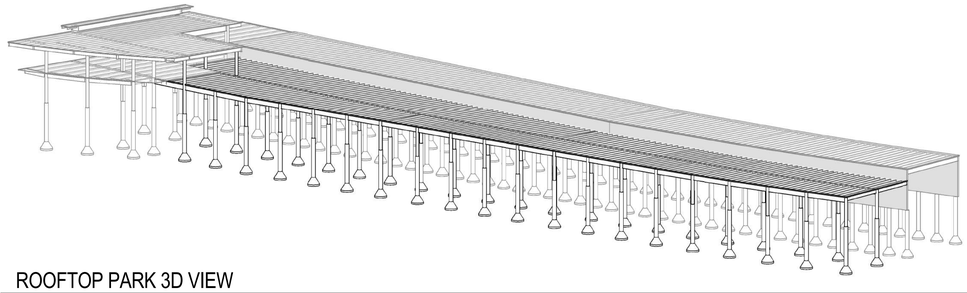
GENERAL NOTES

SHEET NUMBER:

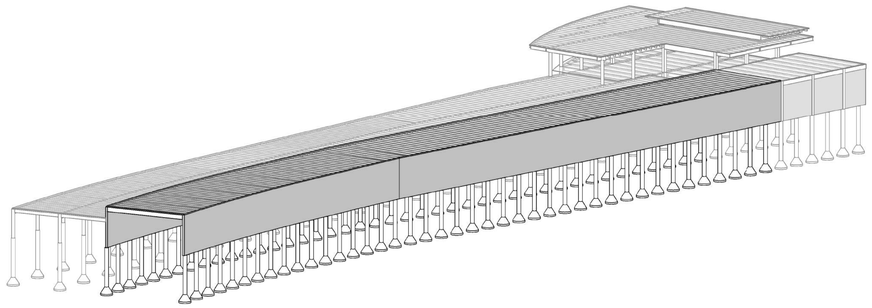
S000



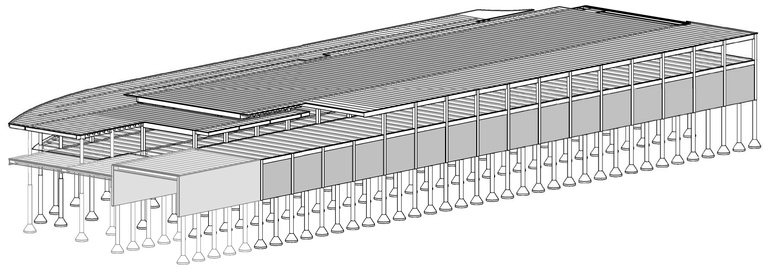
OVERALL 3D VIEW



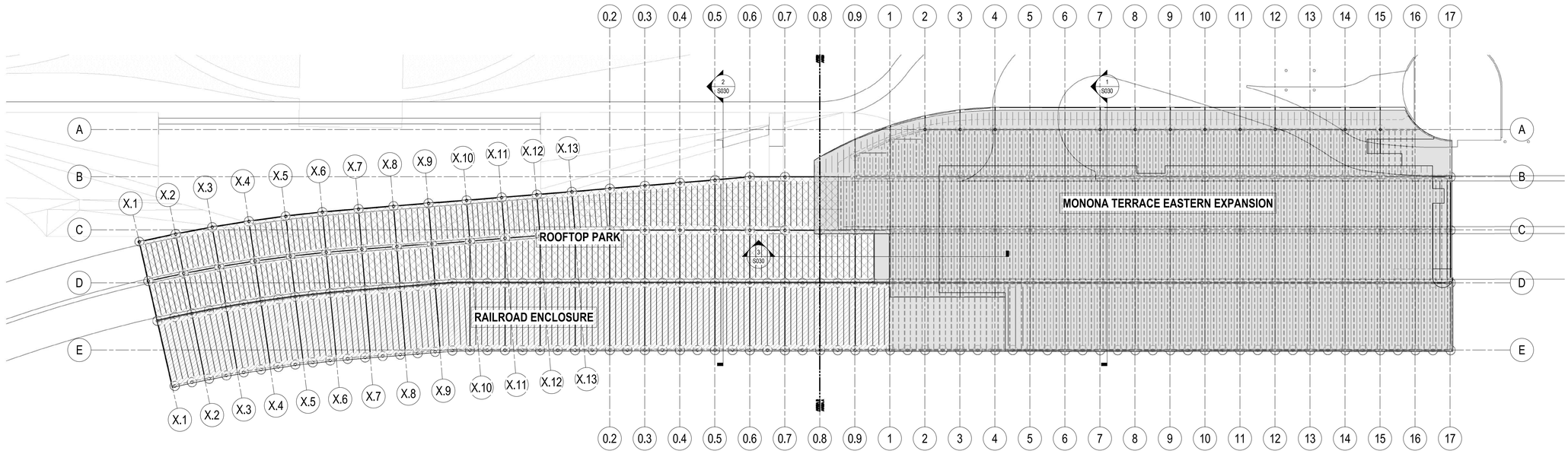
ROOFTOP PARK 3D VIEW



RAILROAD ENCLOSURE 3D VIEW



MONONA TERRACE EASTERN EXPANSION 3D VIEW



OVERALL PLAN

1" = 40'-0"

TRUE NORTH

PLAN NORTH

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SCALE:	AS NOTED

SHEET TITLE:

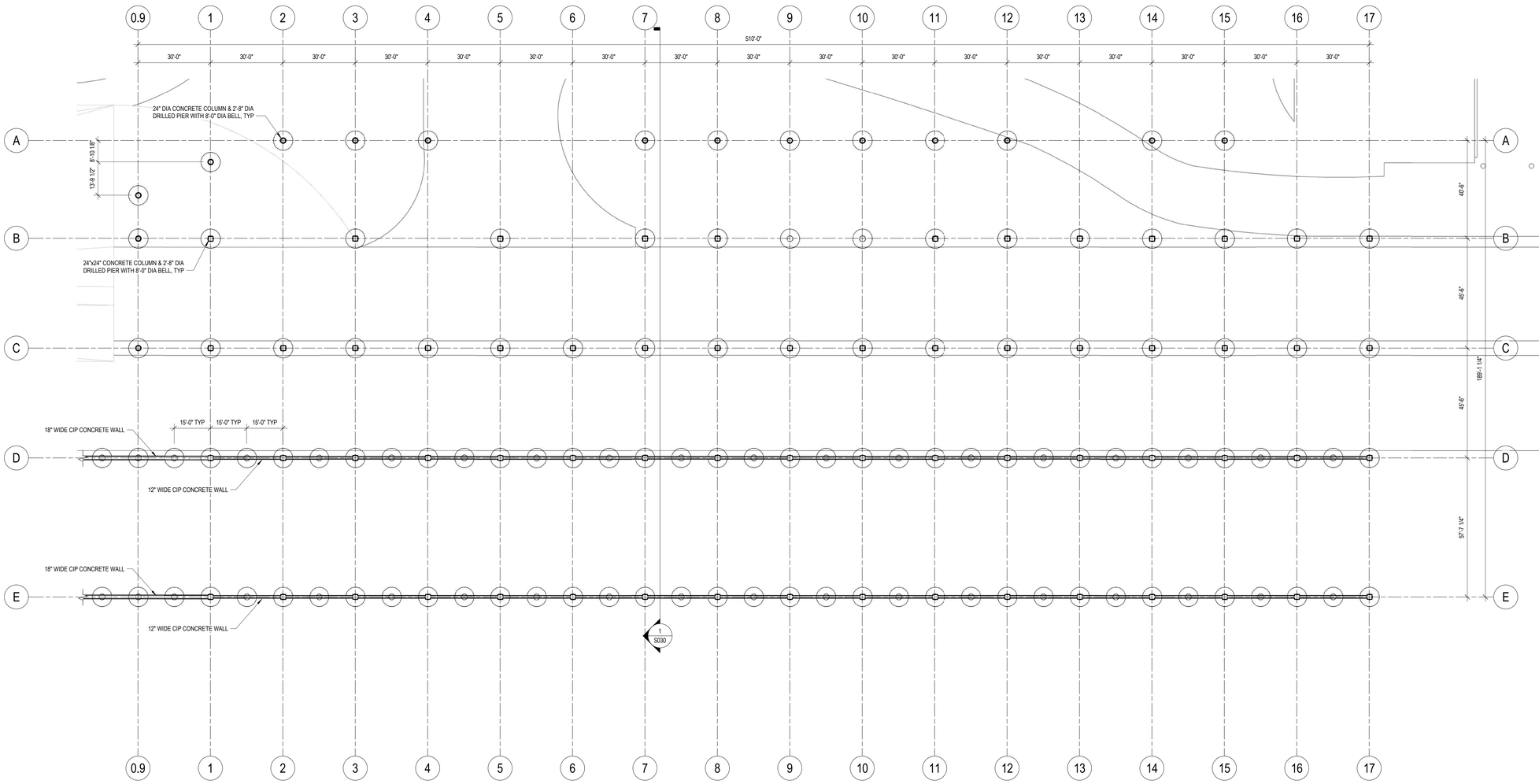
OVERALL PLAN

SHEET NUMBER:

S001

C:\Users\1784\Documents\2017\5012.01_S17_1784.rvt
2/1/2018 8:31:11 AM

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



FOUNDATION PLAN

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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PROJECT INFORMATION:	
PROJECT NUMBER:	2017-5012.01
DATE:	2018-02-01
DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

SHEET TITLE:

FOUNDATION PLAN - AREA A

SHEET NUMBER:

S010A

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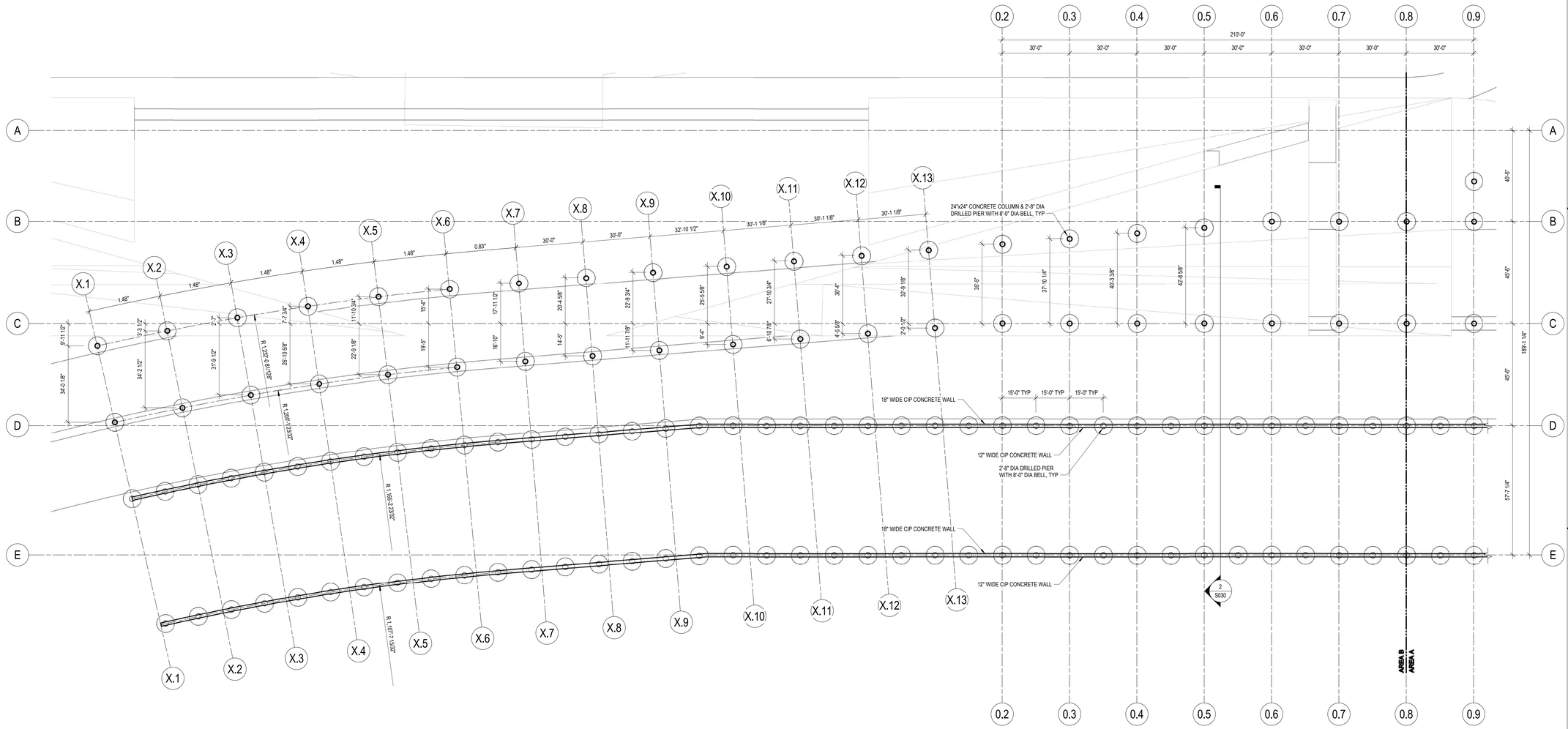
2/1/2018 8:31:14 AM

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



FOUNDATION PLAN

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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DATE:	2018-02-01
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CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

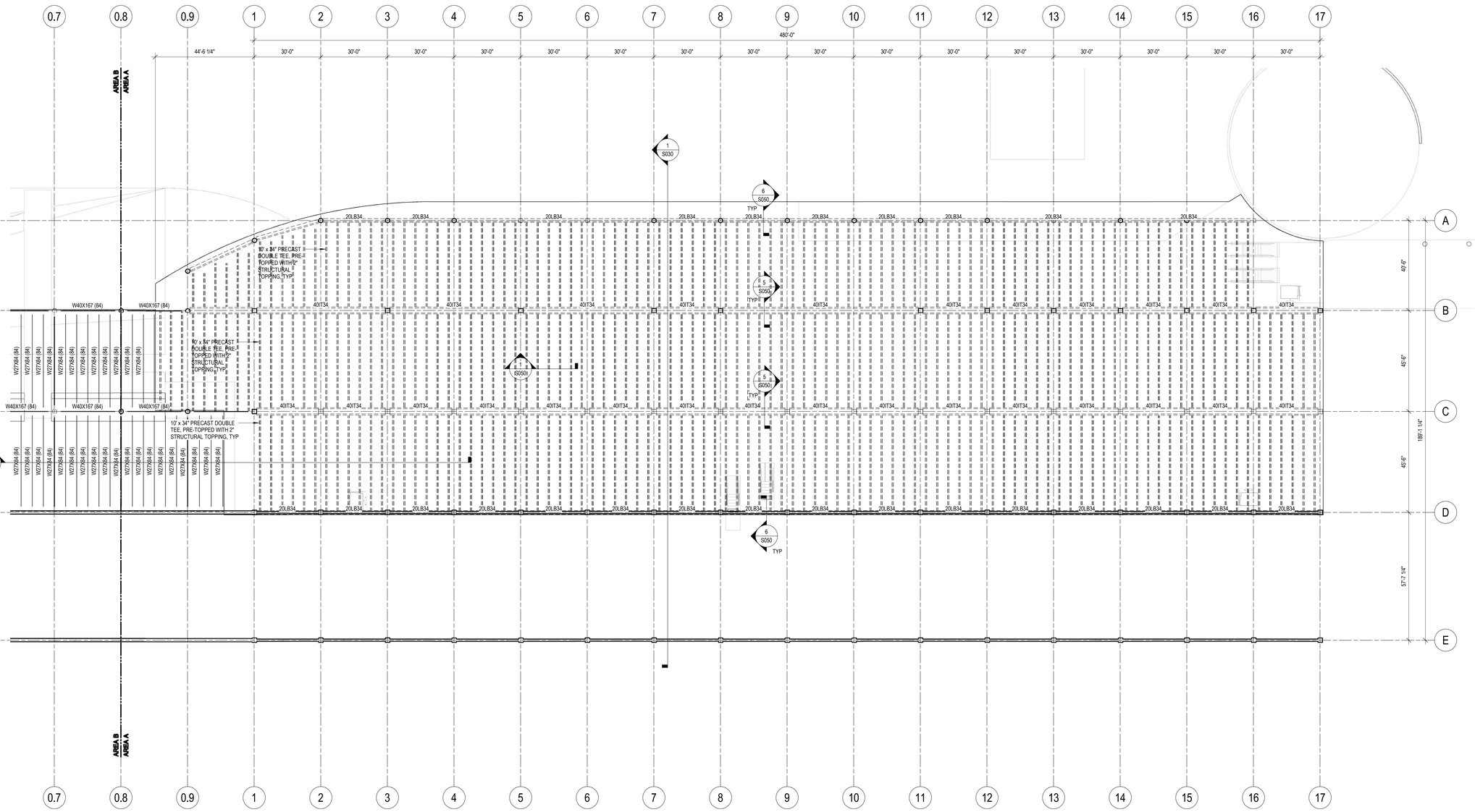
SHEET TITLE:

FOUNDATION PLAN - AREA B

SHEET NUMBER:

S010B

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



LEVEL 01 FRAMING - AREA A

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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SHEET TITLE:

LEVEL 1 FRAMING PLAN - AREA A

SHEET NUMBER:

S011A

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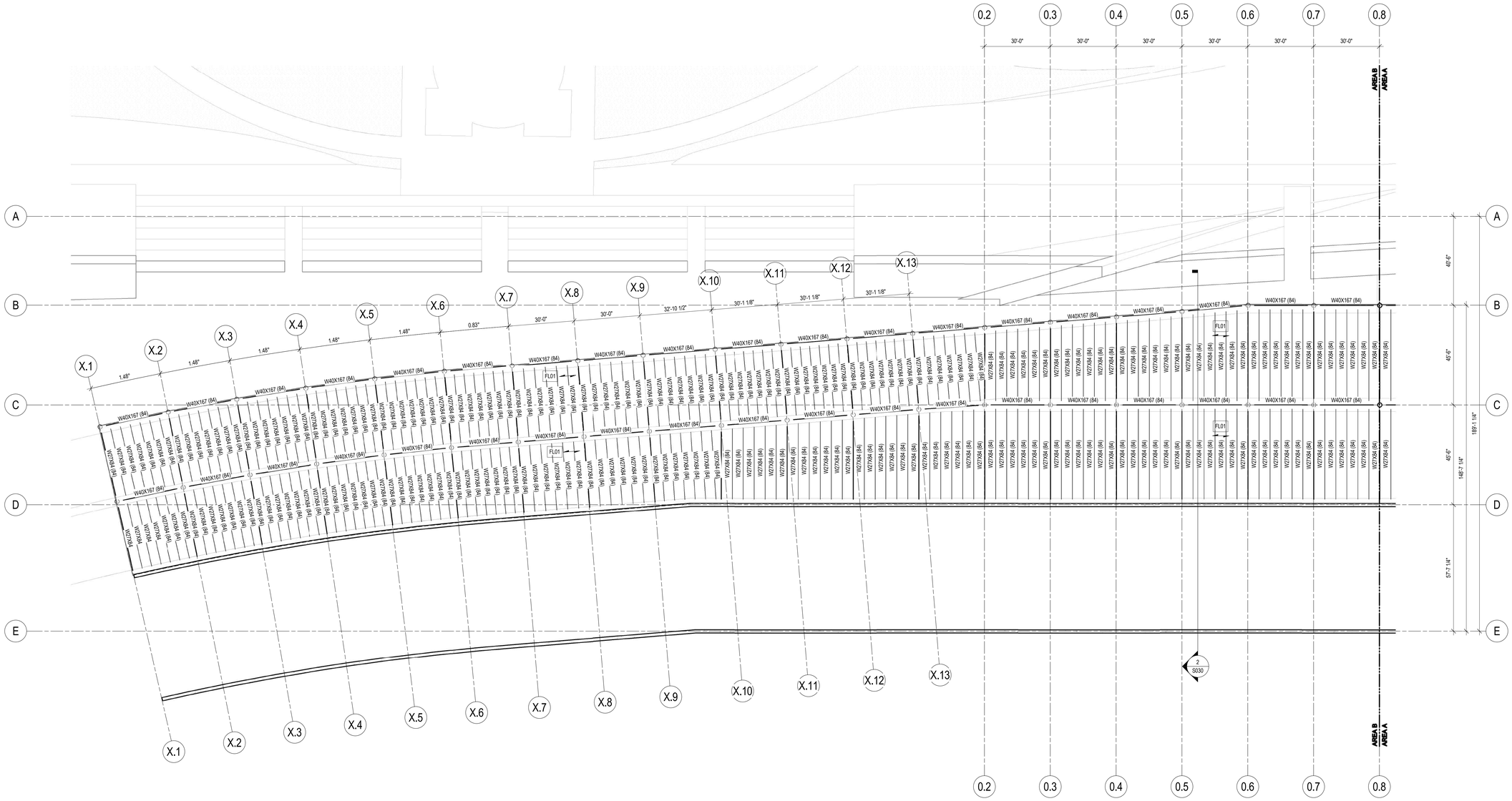
2/1/2018 8:31:22 AM

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



1 LEVEL 01 FRAMING - AREA B

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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PROJECT INFORMATION:

PROJECT NUMBER:	2017-5012.01
DATE:	2018-02-01
DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

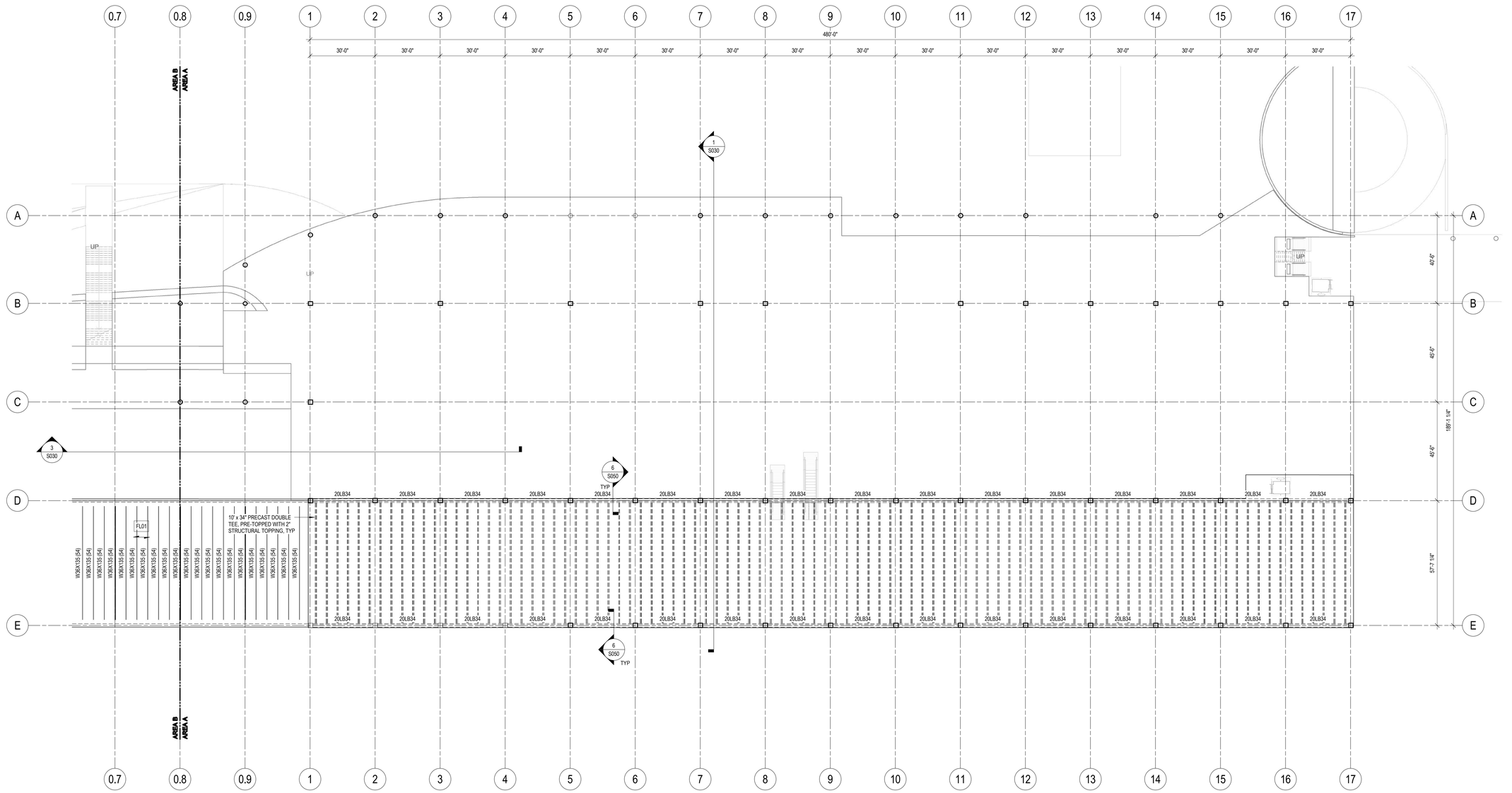
SHEET TITLE:

LEVEL 1 FRAMING PLAN - AREA B

SHEET NUMBER:

S011B

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



LEVEL 02 FRAMING - AREA A

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

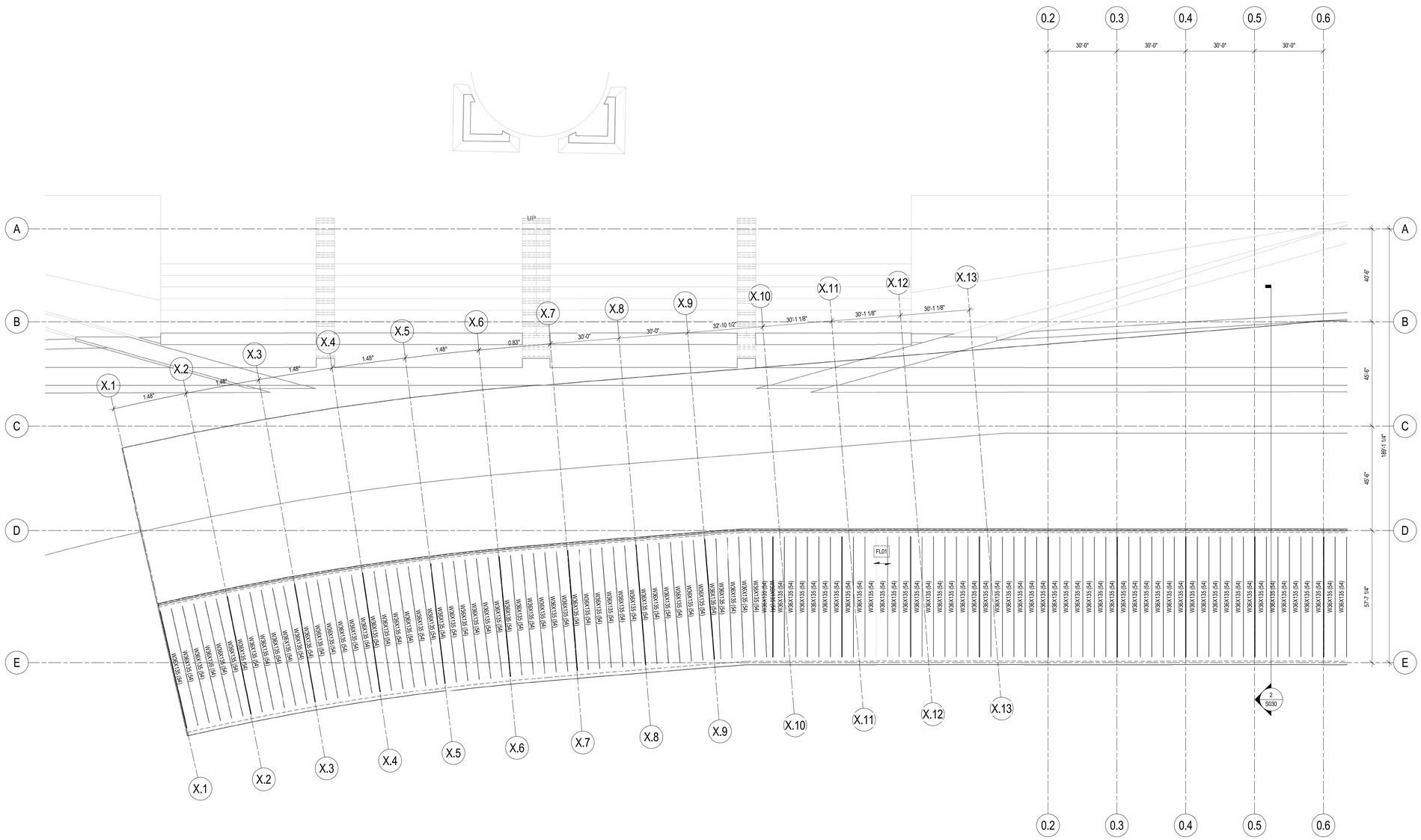
SHEET TITLE:

LEVEL 2 FRAMING PLAN - AREA A

SHEET NUMBER:

S012A

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



LEVEL 02 FRAMING - AREA B

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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DATE:	2018-02-01
DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

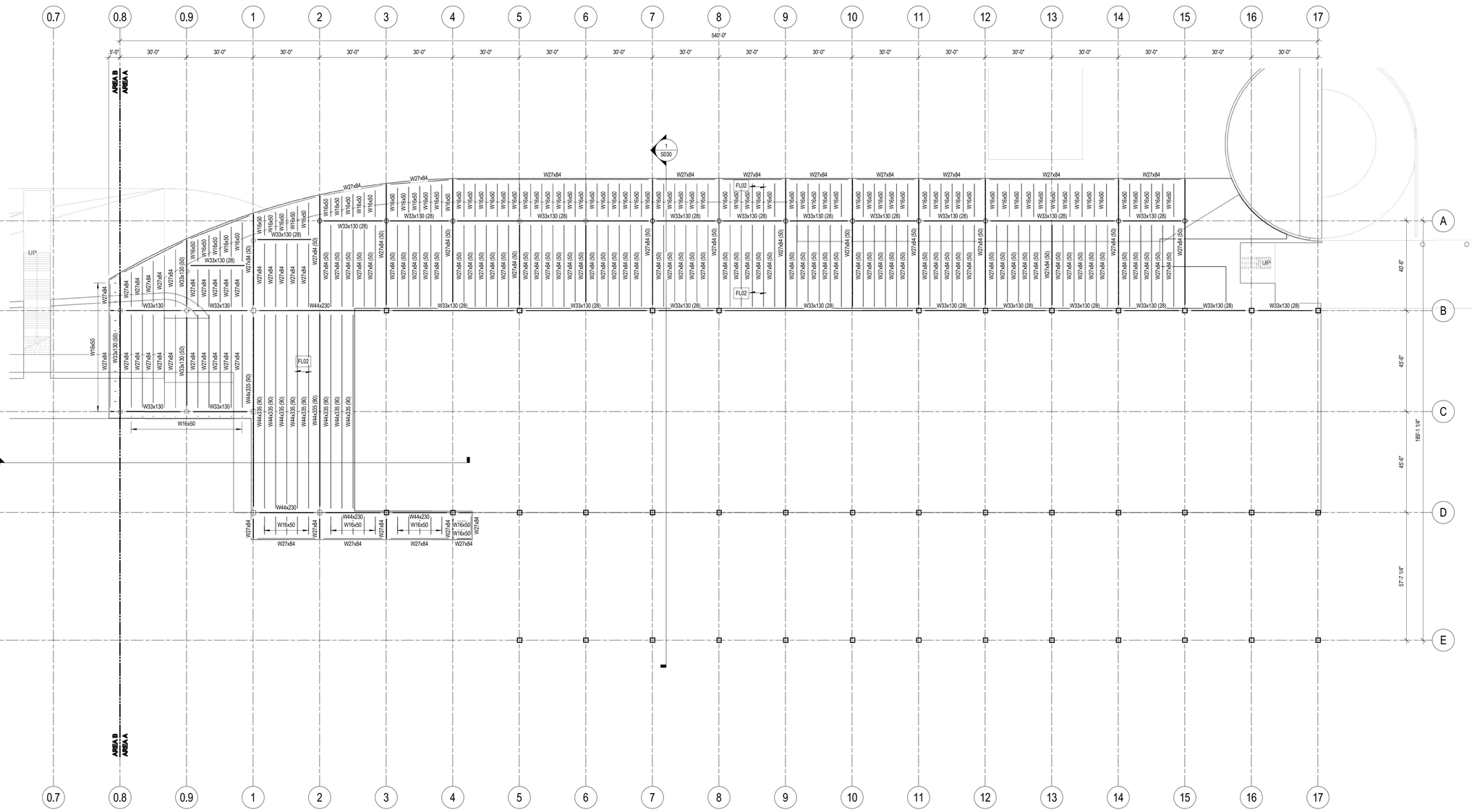
SHEET TITLE:

LEVEL 2 FRAMING PLAN - AREA B

SHEET NUMBER:

S012B

FLOOR / ROOF SCHEDULE		
WT	DESCRIPTION	REMARKS
FL01	5" NORMAL WEIGHT CONCRETE OVER 3" x 18 GAGE COMPOSITE METAL DECK (8" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	
FL02	3" NORMAL WEIGHT CONCRETE OVER 2" x 18 GAGE COMPOSITE METAL DECK (5" TOTAL THICKNESS) REINFORCED WITH SYNTHETIC MACRO FIBERS WITH #4 REBAR OVER EACH FLUTE	



LOW ROOF FRAMING

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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PROJECT INFORMATION:

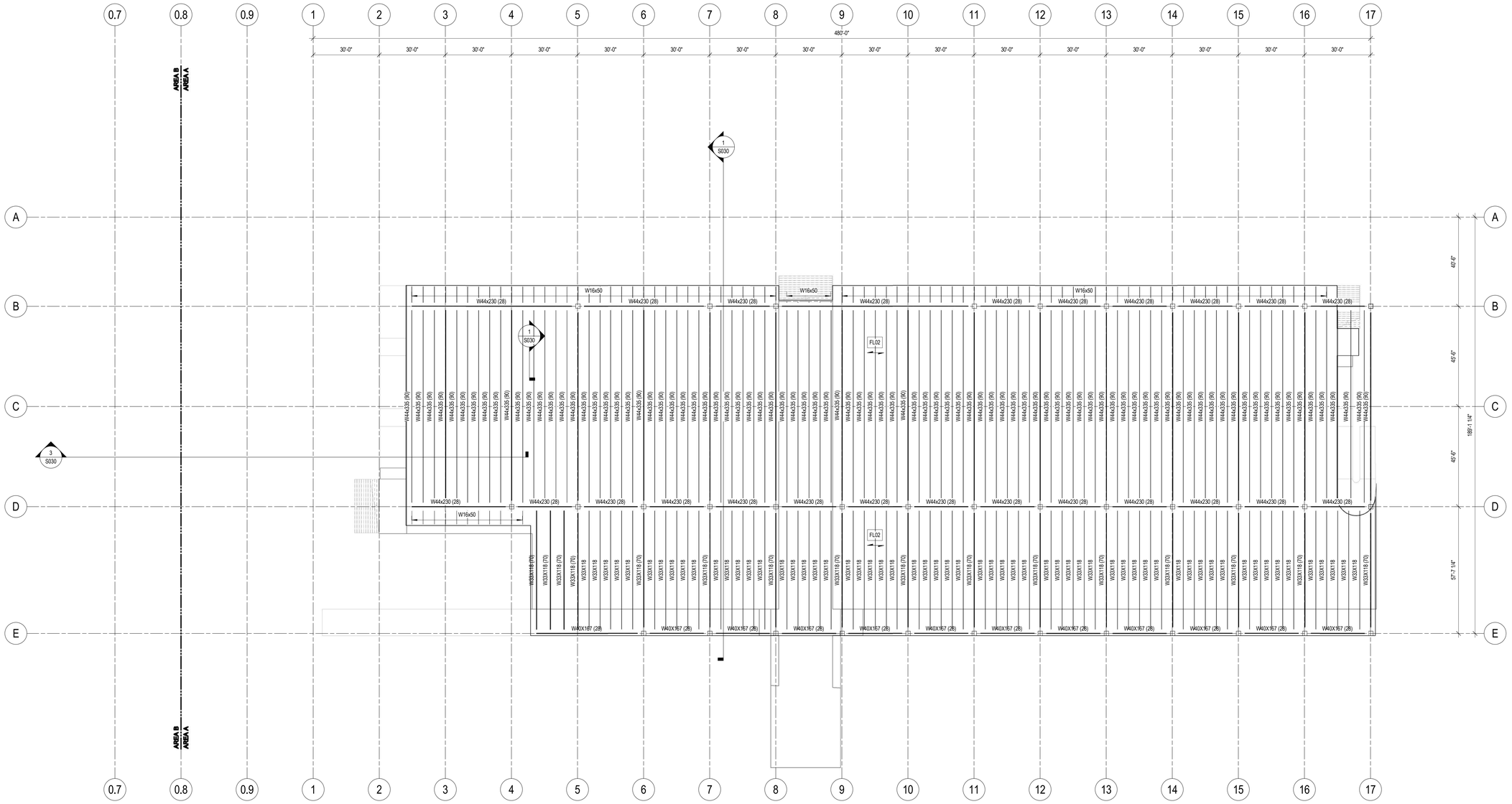
PROJECT NUMBER:	2017-5012.01
DATE:	2018-02-01
DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

SHEET TITLE:

LOW ROOF FRAMING PLAN

SHEET NUMBER:

S013



HIGH ROOF FRAMING

1" = 20'-0"

TRUE NORTH

PLAN NORTH

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DATE:	2018-02-01
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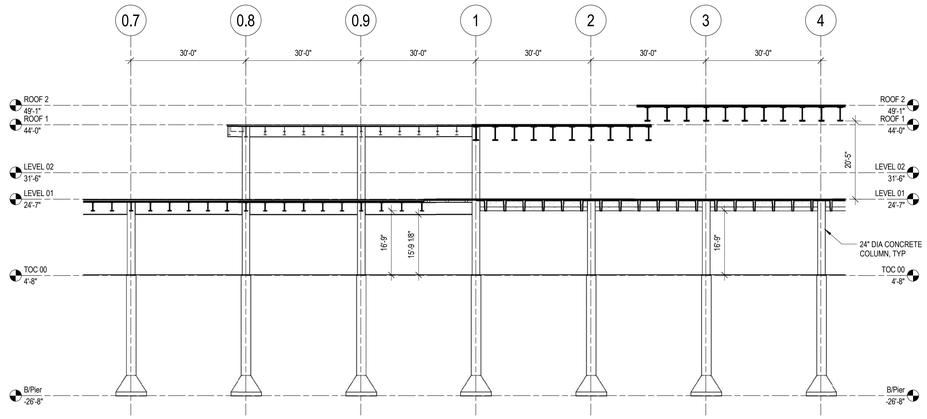
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

SHEET TITLE:

HIGH ROOF FRAMING PLAN

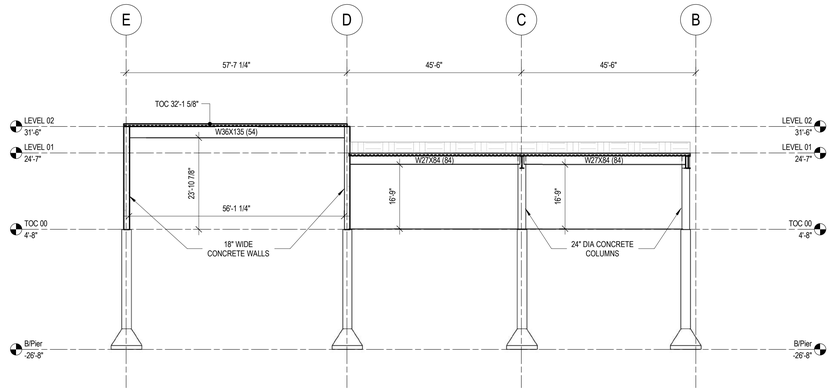
SHEET NUMBER:

S014



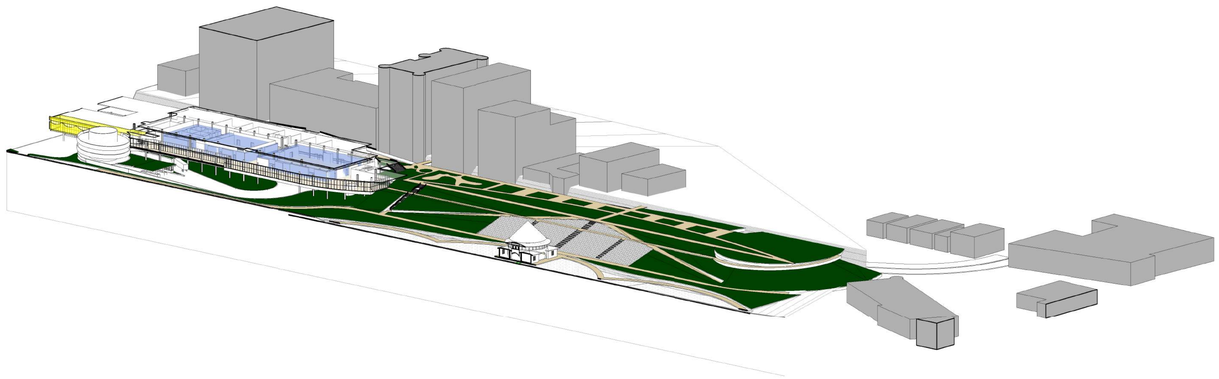
3 SECTION

1/16" = 1'-0"

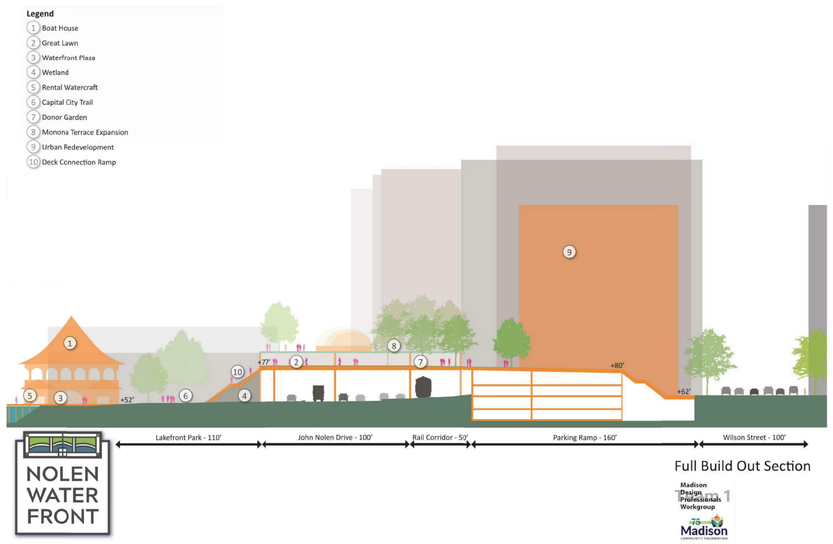


2 SECTION

1/16" = 1'-0"

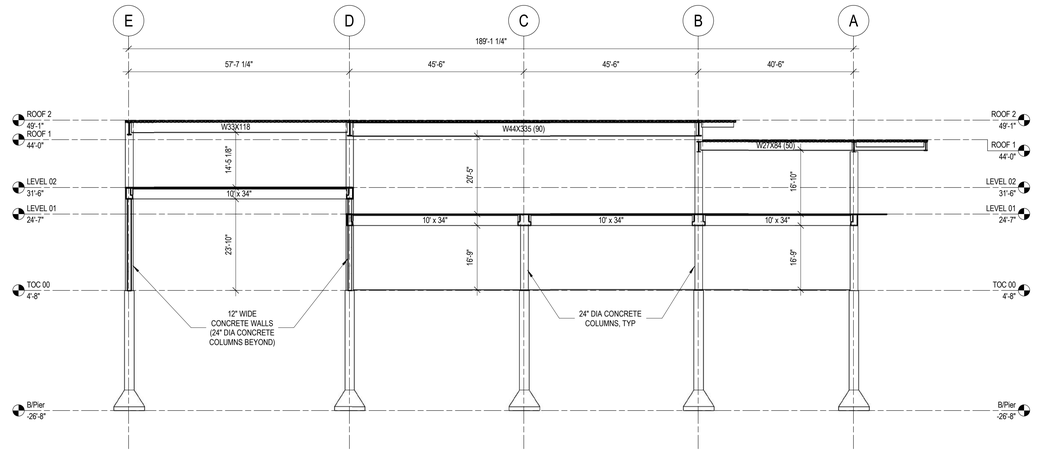


5 ARCHITECTURAL 3D VIEW



4 ARCHITECTURAL SECTION

NTS



1 SECTION

1/16" = 1'-0"

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PROJECT NUMBER:	2017-5012.01
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DRAWN BY:	KRN
CHECKED BY:	GEW
APPROVED BY:	LB
SCALE:	AS NOTED

SHEET TITLE:
SECTIONS

SHEET NUMBER:
S030

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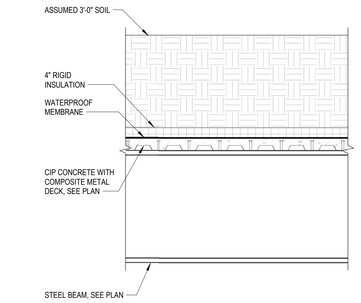
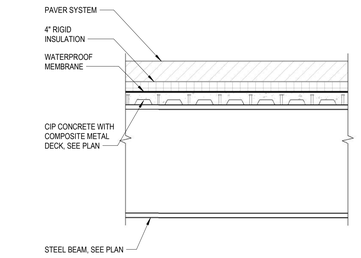
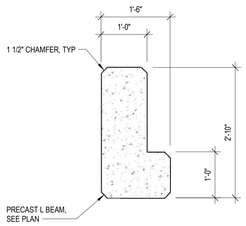


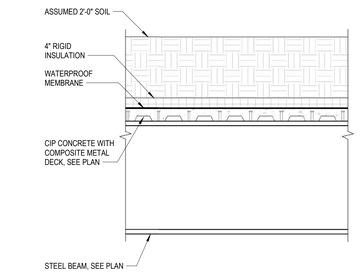
4 PARK SECTION
1/2" = 1'-0"



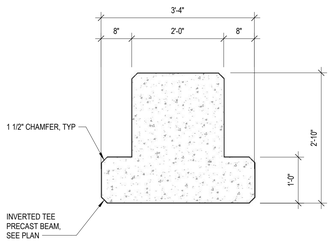
3 TERRACE ROOF PAVER SECTION
1/2" = 1'-0"



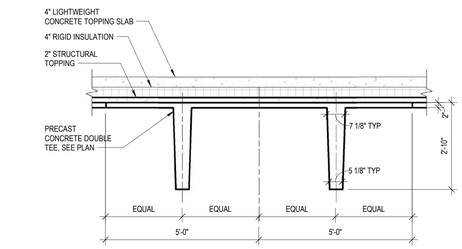
6 SECTION
3/4" = 1'-0"



2 TERRACE ROOF PARK SECTION
1/2" = 1'-0"



5 SECTION
3/4" = 1'-0"



1 SECTION
1/2" = 1'-0"

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SCALE:	AS NOTED

SHEET TITLE:
DETAILS

SHEET NUMBER:
S050

Legend

1. Boat House
2. Great Lawn
3. Waterfront Plaza
4. Parking & Drop-off
5. Lakefront Lawn
6. Swim Beach
7. Wetland
8. Rental Watercraft
9. Transient Dock
10. Terrace Waterfront Edge
11. Capital City Trail
12. Hillside Seating
13. Monona Terrace Expansion
14. Donor Garden
15. Urban Redevelopment
16. Deck Connection Ramp

Pinckney Street
Butler Street
Hancock Street
Franklin Street
Blair Street
Wilson Street
Williamson Street

Full Build Out Concept

NOLEN WATER FRONT

Madison Design Professionals Workgroup

Team 1

75 YEARS Madison COMMUNITY FOUNDATION

LAKE MONONA DATUM
SUMMER MINIMUM WATER LEVEL: 844.7'
SUMMER MAXIMUM WATER LEVEL: 845.2'
WINTER MINIMUM WATER LEVEL: 842.2
HISTORIC HIGH: 847.86 (2008)

0 20' 50' 100'

APPENDIX C

Findorff
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OPINION OF PROBABLE COST

180105 Monona Terrace

Description	Quantity	Cost/Unit	Total Amount
A STRUCTURE			
A10 FOUNDATIONS			
A1020 SPECIAL FOUNDATIONS			
Caissons - shown on plans	1,117 cy	500.00 /cy	558,600
Caissons - not on plans	1,156 cy	500.00 /cy	578,200
A1020 SPECIAL FOUNDATIONS			**1,136,800**
A1030 SLAB ON GRADE			
Slab on Grade - Excluded	***sf***	***/sf***	
A10 FOUNDATIONS			**1,136,800**
A20 BASEMENT CONSTRUCTION			
A2010 BASEMENT EXCAVATION			
Earthwork - Excluded	***cy***	***/cy***	
A2020 BASEMENT WALLS			
Foundation Walls	57,620 sf	32.00 /sf	1,843,840
A2020 BASEMENT WALLS			**1,843,840**
A20 BASEMENT CONSTRUCTION			**1,843,840**
A STRUCTURE			**2,980,640**
B SHELL			
B10 SUPERSTRUCTURE			
B1010 FLOOR CONSTRUCTION			
Concrete Columns	275 cy	850.00 /cy	233,750
Concrete Columns - Round	150 cy	950.00 /cy	142,500
Precast Double T Structure	90,571 sf	26.00 /sf	2,354,846
Structure - Below Topping not Indicated	8,153 sf	32.00 /sf	260,896
Topping Slab on Precast	98,724 sf	3.00 /sf	296,172
Misc. Concrete	283,057 sf	0.25 /sf	70,764
Misc. Steel	283,057 sf	0.50 /sf	141,529
Steel Fireproofing - Excluded	***sf***	***/sf***	
B1010 FLOOR CONSTRUCTION			**3,500,457**
B1020 ROOF CONSTRUCTION			
Structural Steel (22 psf per plan)	2,028 tn	3,500.00 /tn	7,096,810
Metal Roof Deck - 2" Deck	101,064 sf	2.50 /sf	252,660
Metal Roof Deck - 3" Deck	83,269 sf	3.00 /sf	249,807
Nelson Studs	27,650 ea	5.00 /ea	138,250
Topping Slab - 3"	101,064 sf	3.50 /sf	353,724
Topping Slab - 5"	83,269 sf	4.50 /sf	374,711
B1020 ROOF CONSTRUCTION			**8,465,962**
B10 SUPERSTRUCTURE			**11,966,418**
B SHELL			**11,966,418**

Findorff
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OPINION OF PROBABLE COST

180105 Monona Terrace

Estimate Totals

Description	Amount	Totals	Rate
	14,947,058	14,947,058	
General Conditions	1,195,765		8.00 %
Estimating Contingency	1,614,282		10.00 %
Contractor's Fee	532,713		3.00 %
Total		***18,289,818***	