





National Veterans Memorial and Museum



National Veterans Memorial and
Museum Project Presentation
Tuesday March 29, 2022 – 1:30pm
ACI National Convention
Orlando, FL



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE





AGENDA

- **INTRODUCTIONS**
 - NIGEL CARTER – Construction Executive, Turner Construction
- **PROJECT PURPOSE**
- **PROJECT TEAM & HISTORY**
- **PROJECT DESIGN/CONSTRUCTION OVERVIEW**
- **CIVIL/STRUCTURAL**
 - **SITE/LOCATION**
 - **CONCRETE SUPERSTRUCTURE, ARCHITECTURAL FINISH**
 - **STEEL FRAMING**
 - **RESHORING**
 - **MOVEMENT & MONITORING**
- **UNIQUE/INNOVATION PROCESS & CONTRACTUAL ITEMS**
 - **PROCESS CONTROL**
 - **LAYOUT INTEGRATION**
 - **3D MODELING / RFI / PRINT**
- **OTHER INTERESTING ELEMENTS**
 - **CUSTOM CURTAIN WALL & ROOF**
 - **CUSTOM FINISHES**
- **Q & A**



HONOR Americans' contributions to our country through military service.



CONNECT civilians with veterans and their experiences.

purpose



EDUCATE schoolchildren about the history and value of service via an interactive permanent exhibition that links directly to portions of educational standards.

INSPIRE visitors to serve their community and nation as active, engaged citizens.

TEAM



allied
works
architecture

Knippers Helbig
Advanced Engineering



OLIN



etc...

RAA



etc...

Turner



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

RECOGNITION

Rob Ford

BAKER[®]
CONCRETE CONSTRUCTION

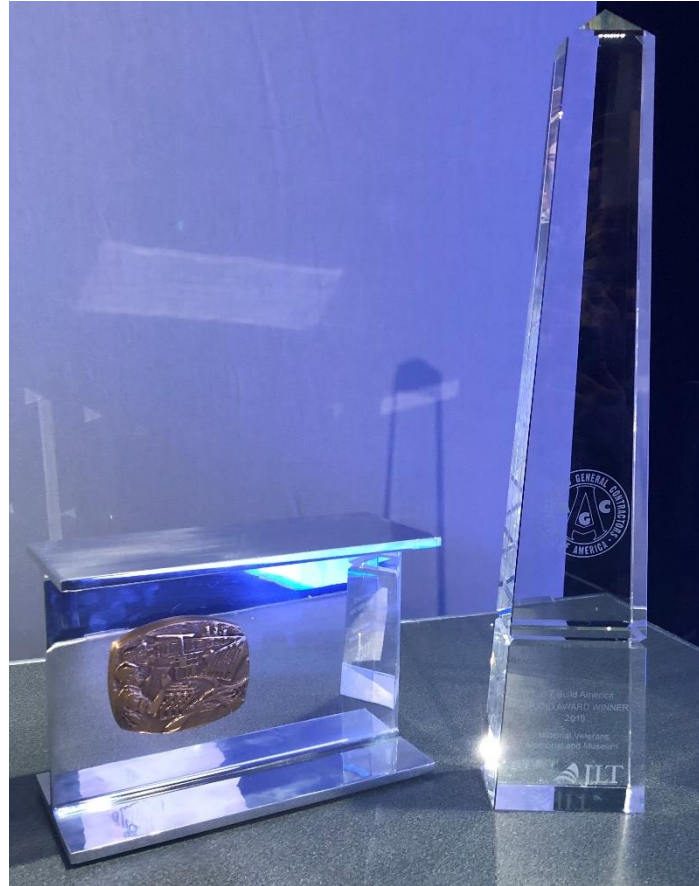
Herb Edwards



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



RECOGNITION



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



PROJECT DESIGN & CONSTRUCTION OVERVIEW



Historic Franklin County Veterans Memorial



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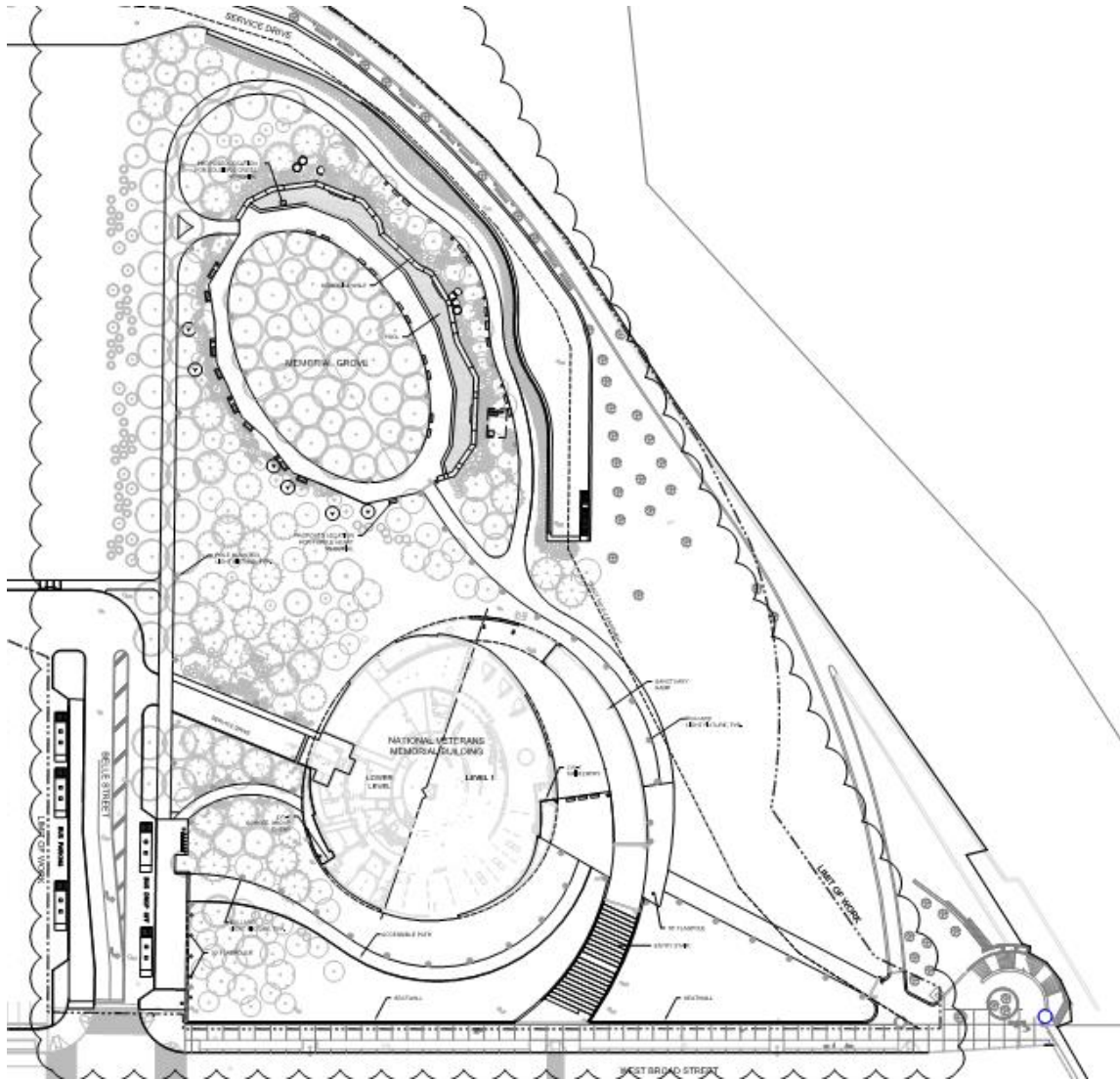
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CONVENTION

PROJECT DESIGN & CONSTRUCTION OVERVIEW



11/1/15

PROJECT DESIGN & CONSTRUCTION OVERVIEW

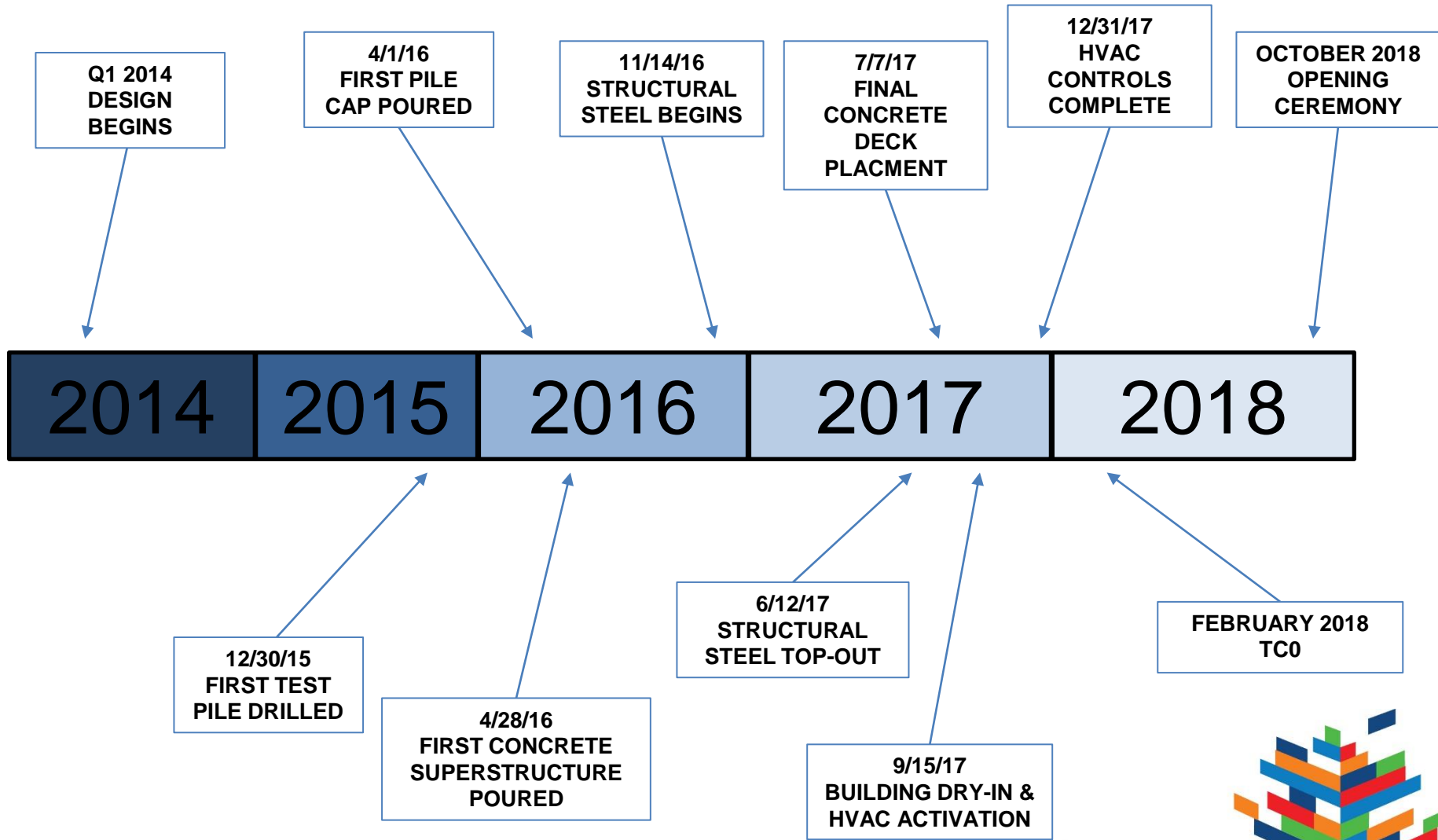


Quick Facts:

- ✓ 8 acre site
- ✓ 55,000 sf building
- ✓ Unique structure with three concentric rings as primary structure
- ✓ Extensive exterior improvements
- ✓ 300' exterior water feature
- ✓ Geothermal HVAC system
- ✓ Processional ramp architectural feature
- ✓ Construction budget vs. project budget
- ✓ Public/private funding
- ✓ 'National' designation
- ✓ 30 month construction schedule

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

PROJECT SCHEDULE OVERVIEW

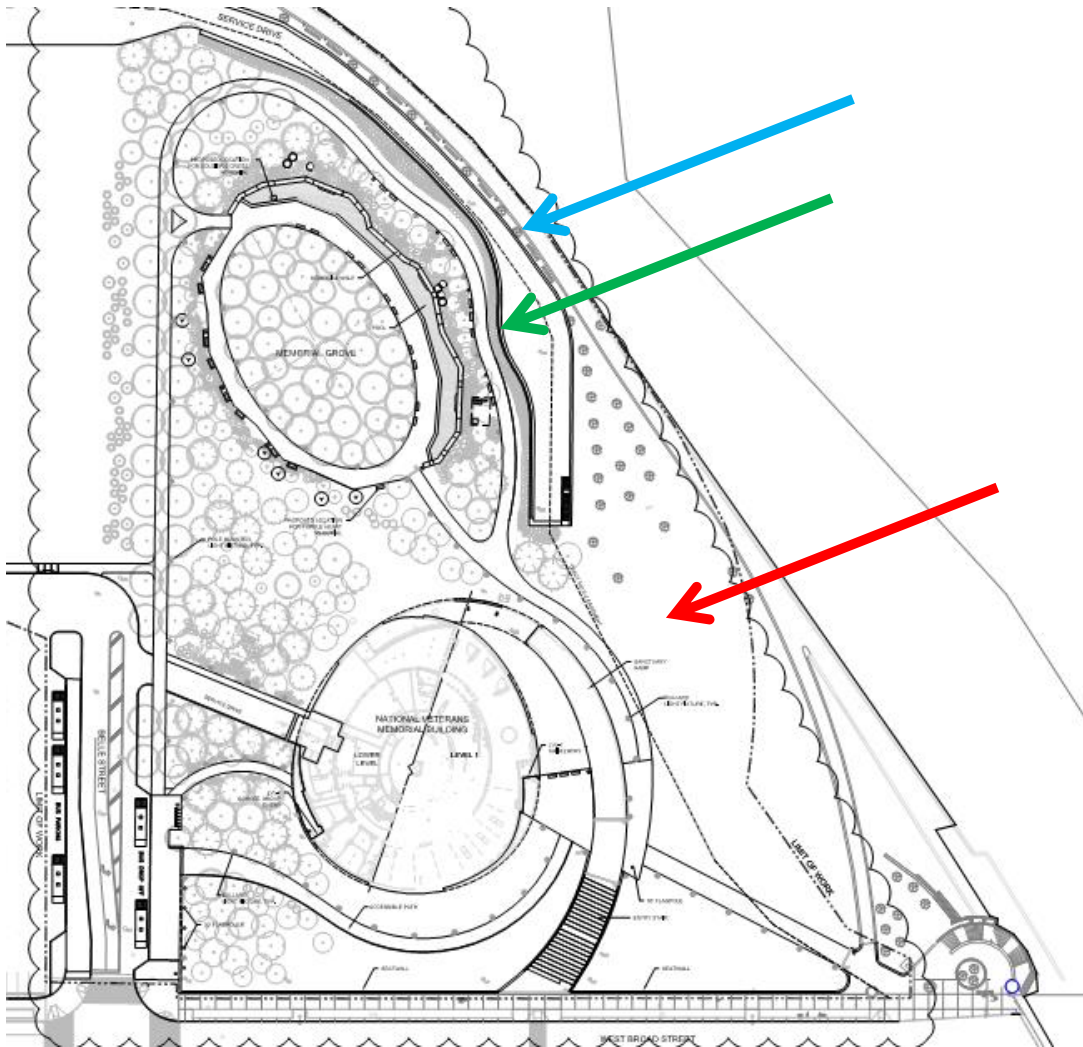




PROJECT DESIGN & CONSTRUCTION OVERVIEW

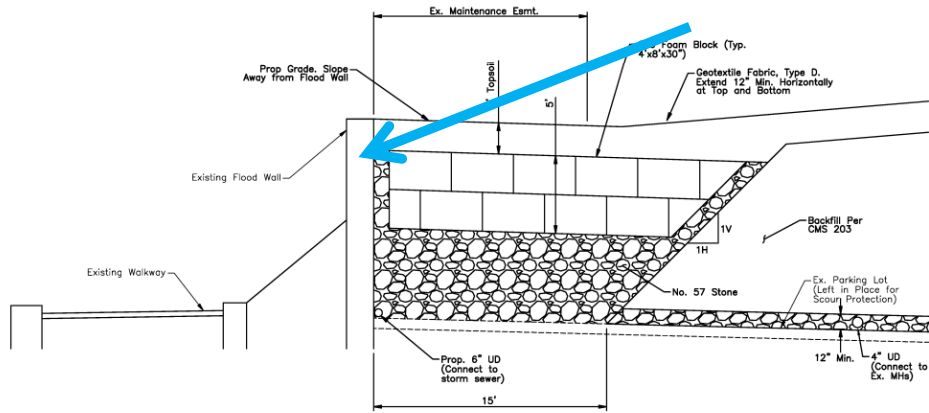
11/28/17

CIVIL/STRUCTURAL – GRADING, **LEVEE**, FLOOD WALL & **RETAINING WALL**



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

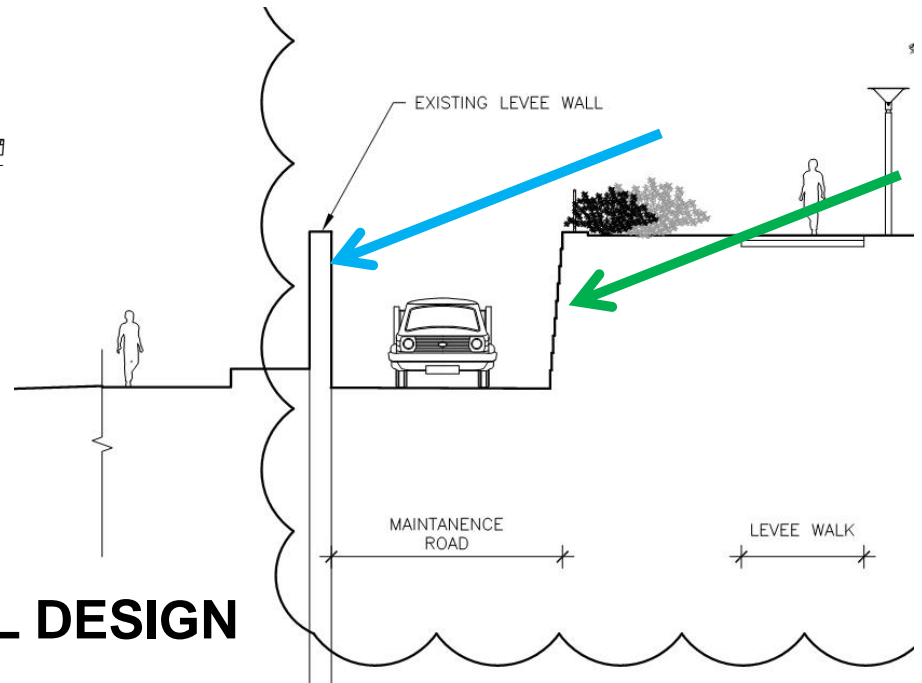
CIVIL/STRUCTURAL – GRADING, LEVEE, FLOOD WALL & RETAINING WALL



ORIGINAL DESIGN

$\frac{1/4''}{1' = 5' - 0''}$

○ Ex. Storm



FINAL DESIGN



CIVIL/STRUCTURAL – GRADING, LEVEE, FLOOD WALL & RETAINING WALL



CIVIL/STRUCTURAL – FOUNDATION SYSTEMS



ROUND?!?!



TORSION?!?!

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DESIGN & PLANNING EVOLUTION



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

DESIGN & PLANNING EVOLUTION QUESTIONS TO ANSWER....



FORM



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

DESIGN & PLANNING EVOLUTION QUESTIONS TO ANSWER...



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DESIGN & PLANNING EVOLUTION



board form



sandblast/acid etch



smooth rubbed/sacked



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE





“as-cast” finish

- no visible grinding**
- aligned plywood joints**
- disappearing tie holes**
- smooth curves**
- minimal surface voids**
- minimize construction joints**
- crisp soffits & chamfers**



Mineral Silicate Sealer
(09 91 33)



COLORS FOREVER.



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THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE





THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

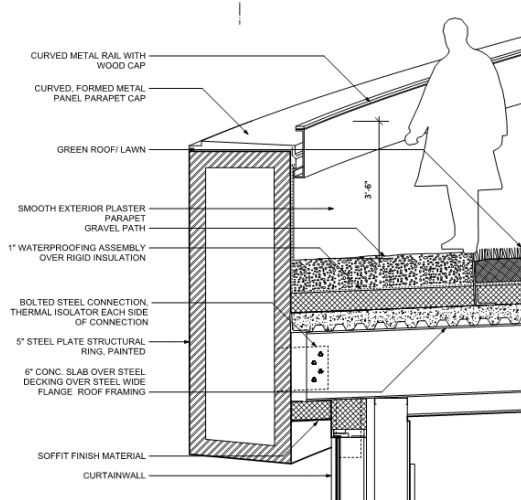
DESIGN & PLANNING EVOLUTION



allied works architecture, inc.
2000 W. 12th Street, Suite 100
Columbus, OH 43219
DesignGroup

OVMM | SD
OHIO VETERANS MEMORIAL MUSEUM
COLUMBUS, OHIO

100% SCHEMATIC DESIGN | 23 MAY 2014



Primary
arch
section

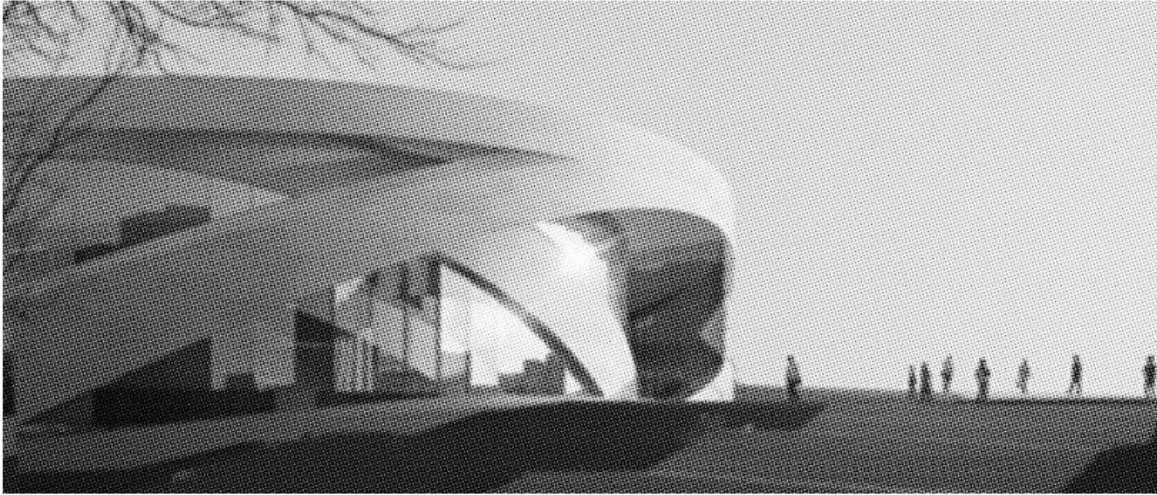
Geometry



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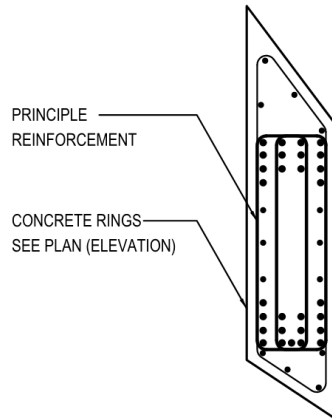
DESIGN & PLANNING EVOLUTION



Geometry

allied works architecture, inc.
ARCHITECTURE INTERIOR DESIGN
PLANNING DD | BOSTON

DesignGroup



Primary arch section

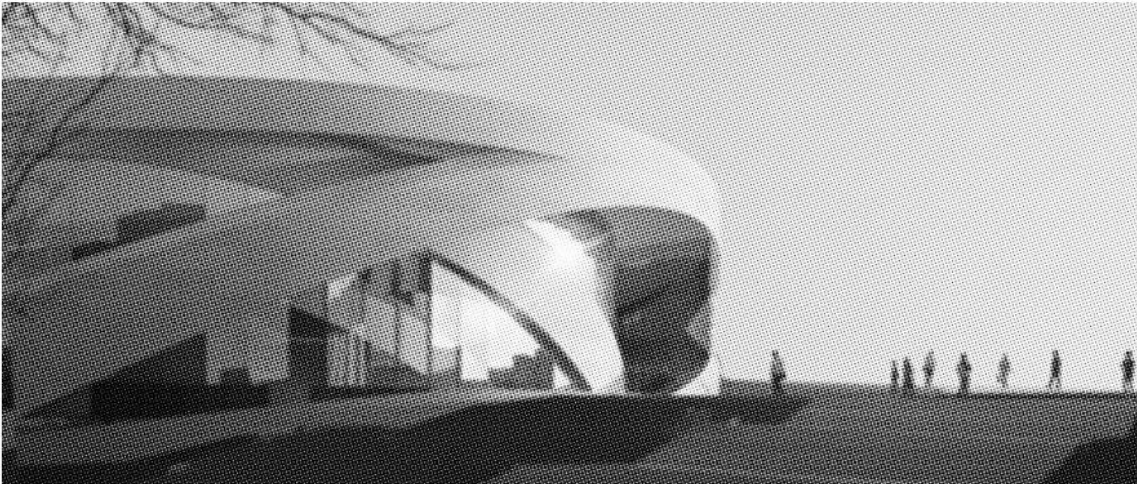
OVMM | DD

OHIO VETERANS MEMORIAL MUSEUM
COLUMBUS, OHIO

100% DESIGN DEVELOPMENT | 5 DECEMBER 2014



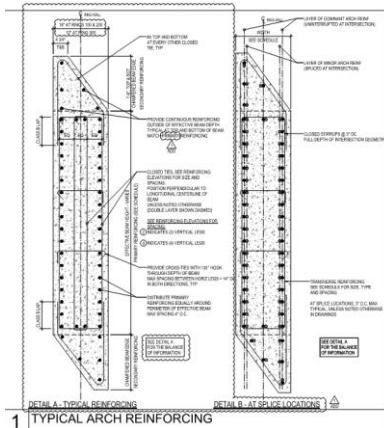
CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE DESIGN DEVELOPMENT



Geometry

allied works architecture, inc.
1001 W. BROADWAY | PORTLAND, OREGON 97207
www.alliedworks.com | 503.251.1100

DESIGN GROUP



OVMM | GMP-2

OHIO VETERANS MEMORIAL AND MUSEUM
COLUMBUS, OHIO

GMP-2 | 15 JULY 2015

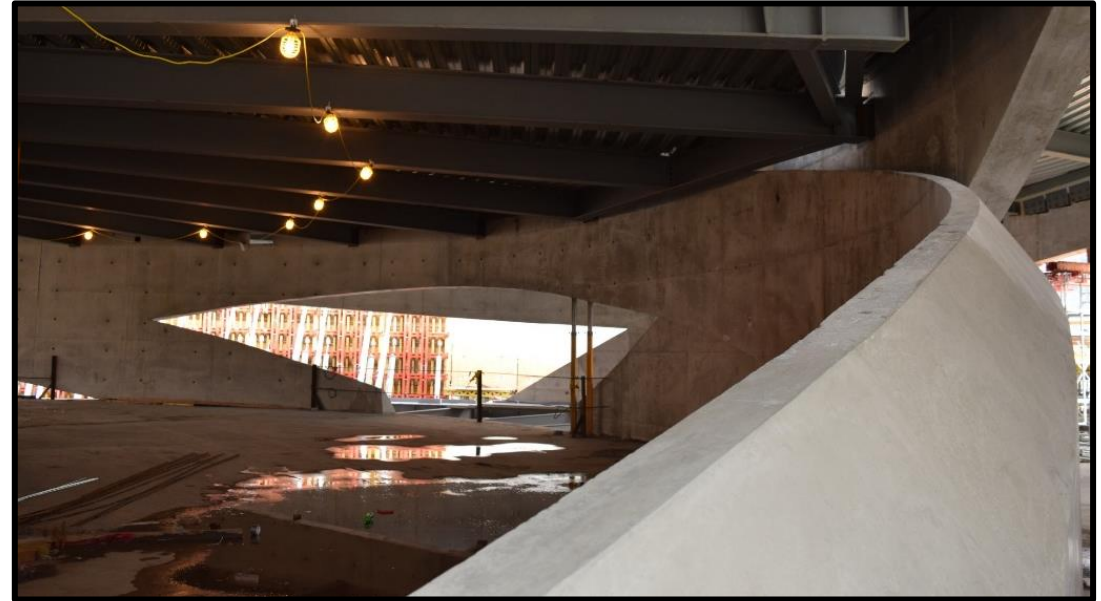
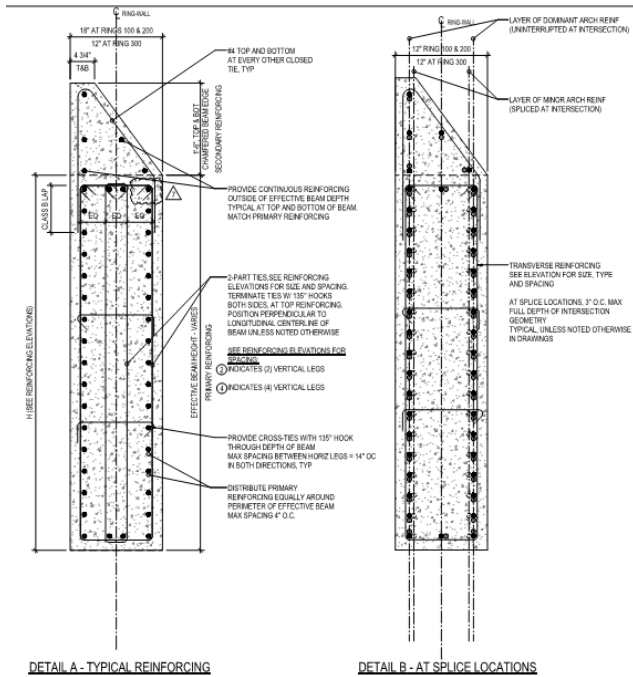
Primary
arch
section

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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DESIGN & PLANNING DEVELOPMENT



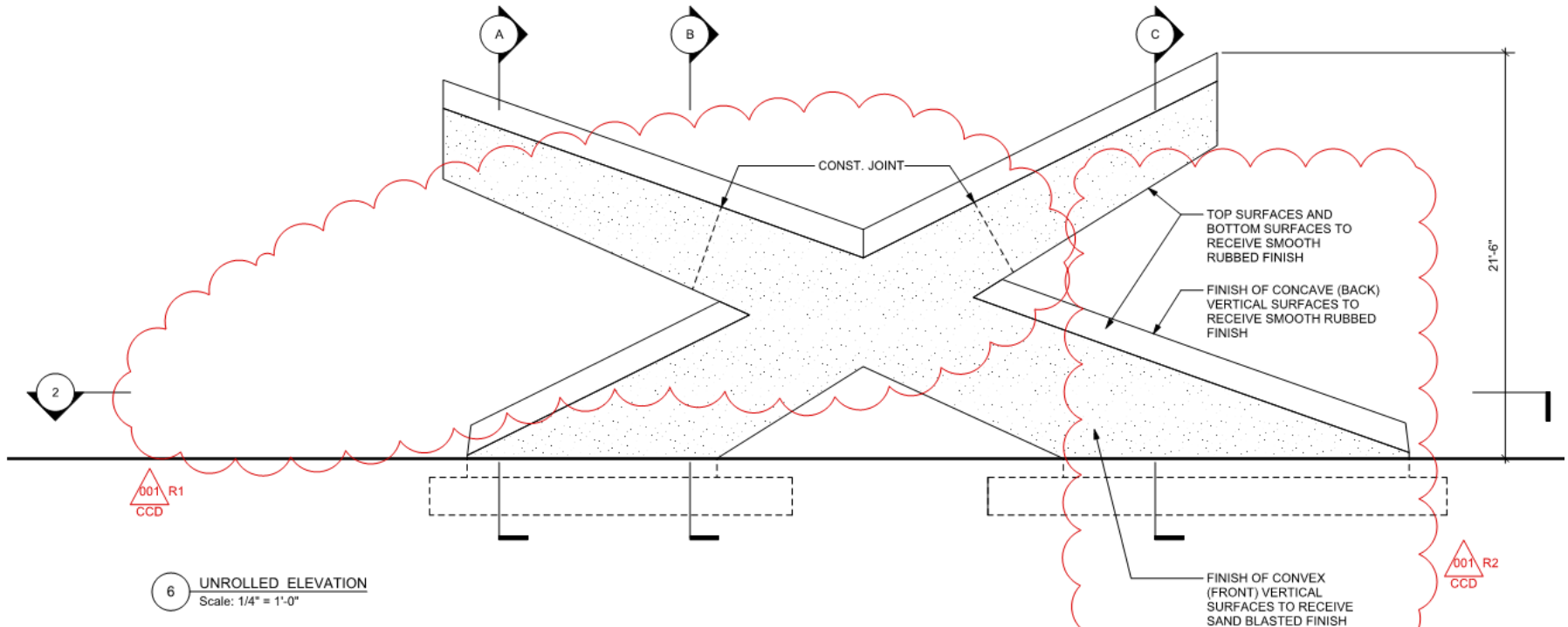
1 TYPICAL ARCH REINFORCING
SCALE: NTS

Primary
arch
section



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SUPERSTRUCTURE MOCK-UP MOCK-UP

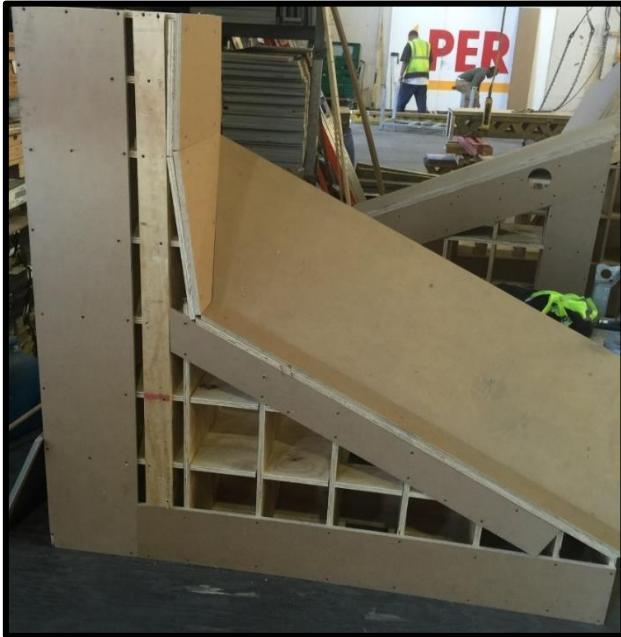


6 UNROLLED ELEVATION
Scale: 1/4" = 1'-0"



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK “BOX-OUTS”

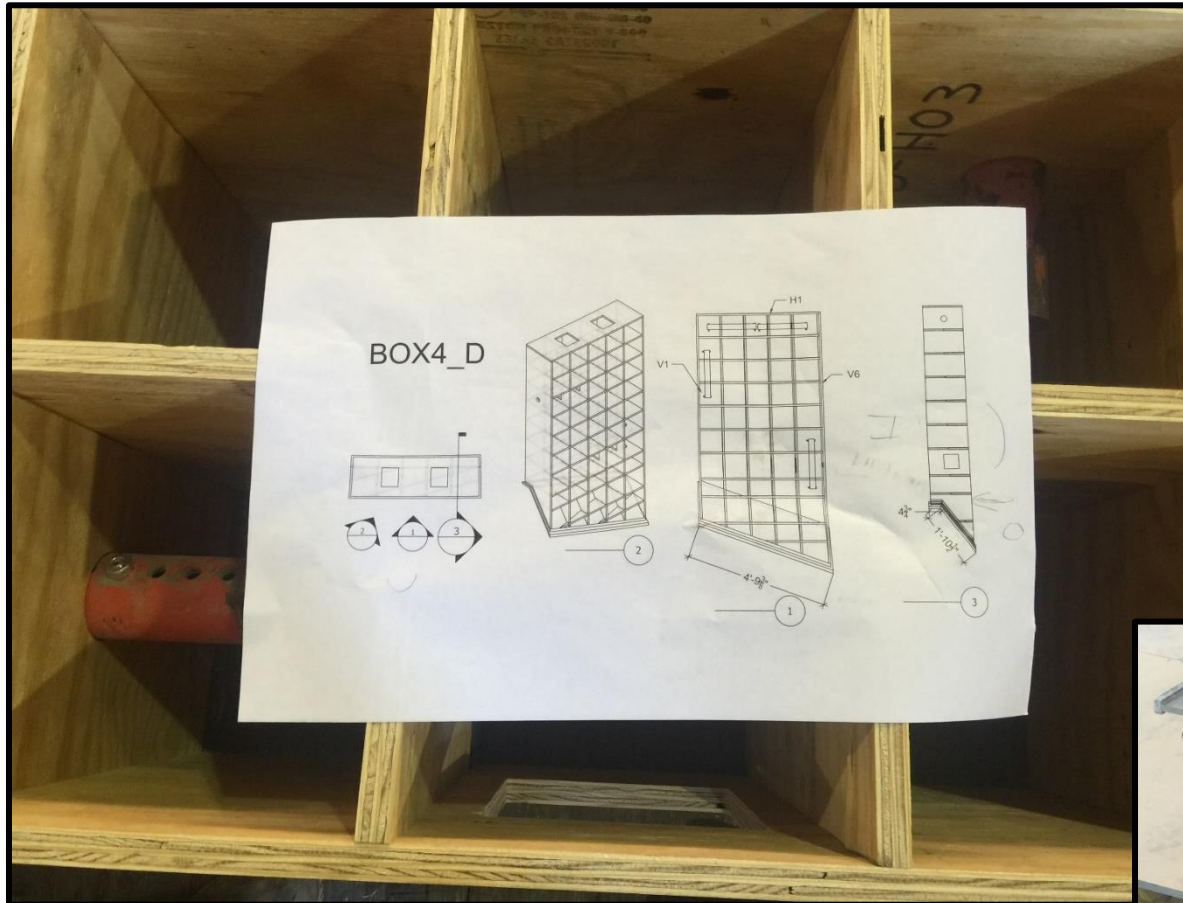


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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP FORMWORK BOX-OUTS & ACCESSORIES



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP FORMWORK & 'NURBS'

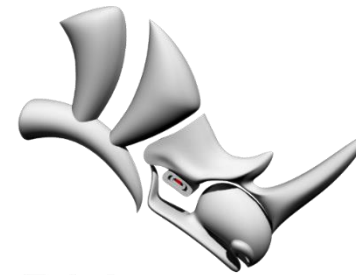
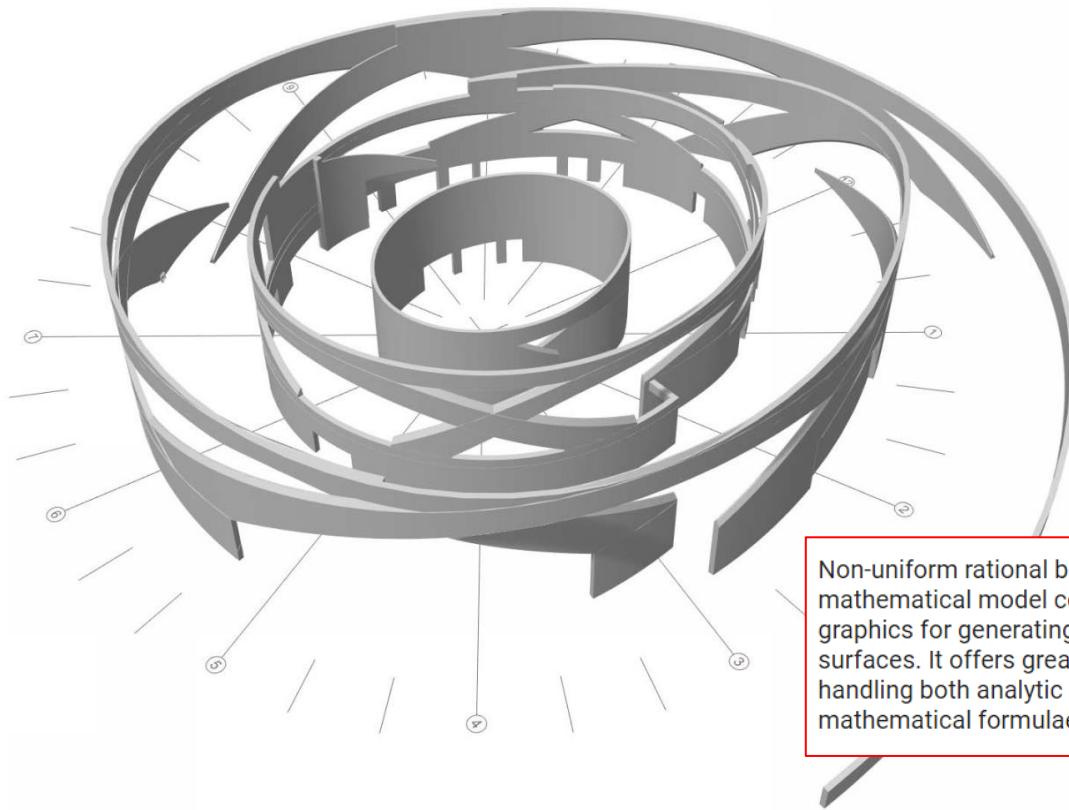


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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

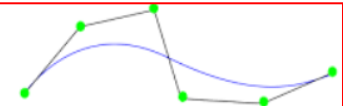
MOCK-UP GEOMETRY REALIZATIONS



RhinoCeros



Non-uniform rational basis spline (**NURBS**) is a mathematical model commonly used in computer graphics for generating and representing curves and surfaces. It offers great flexibility and precision for handling both analytic (surfaces defined by common mathematical formulae) and modeled shapes.



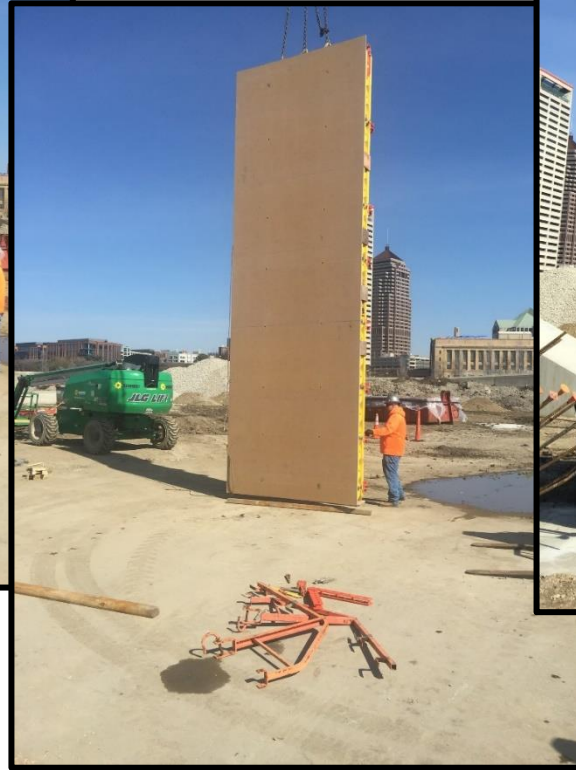
NURBS!?!

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP FORMWORK



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP FORMWORK



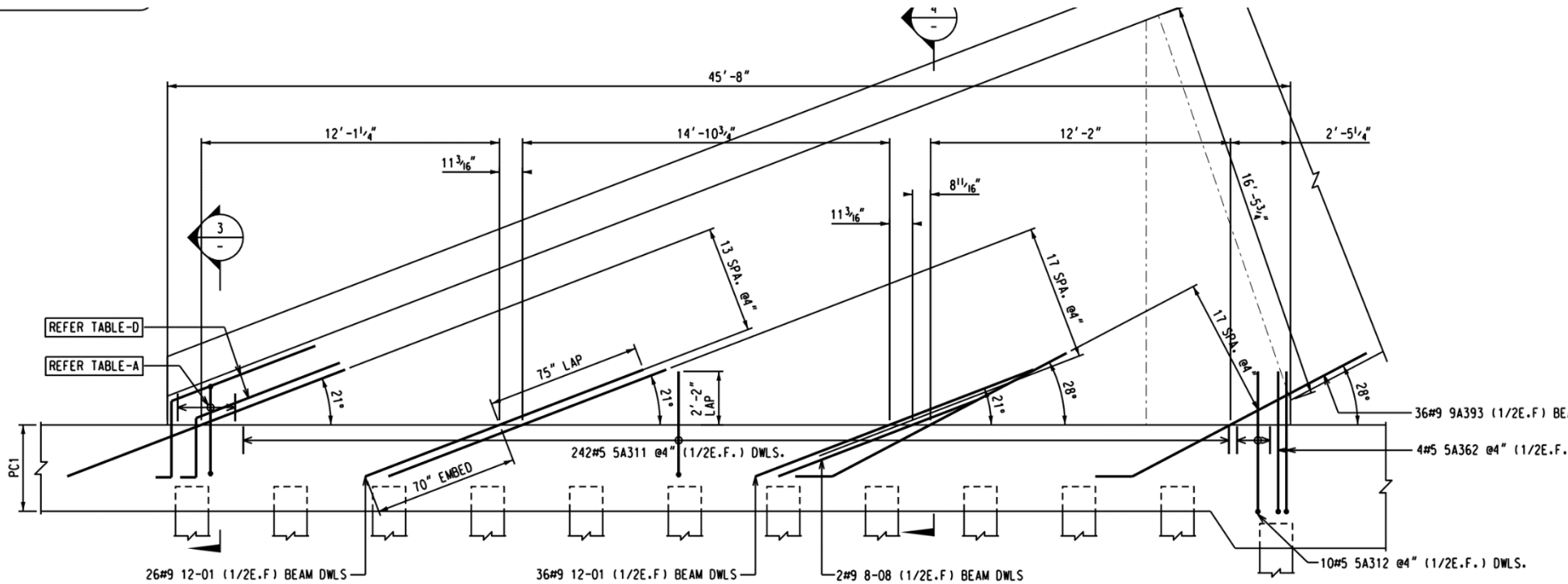
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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP REINFORCING REALIZATIONS



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP FORMWORK



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP REINFORCING REALIZATIONS



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP REINFORCING REALIZATIONS



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP REINFORCING & FORMWORK !!!



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP REINFORCING & FORMWORK !!!

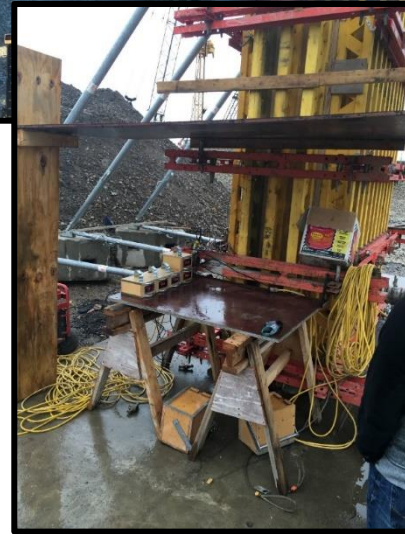


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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CONVENTION**



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP PUMPING, FORMWORK PRESSURE, UPLIFT, ETC.



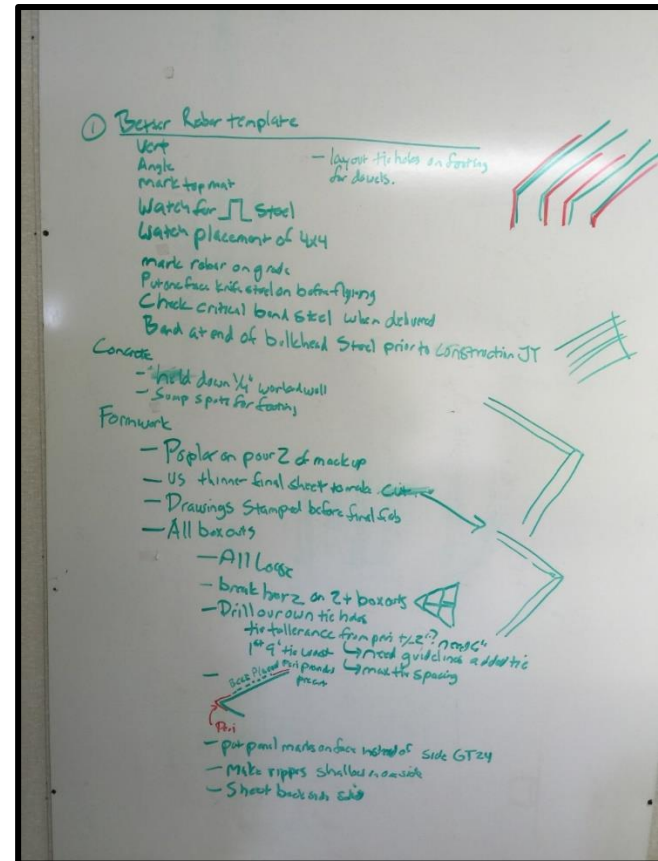
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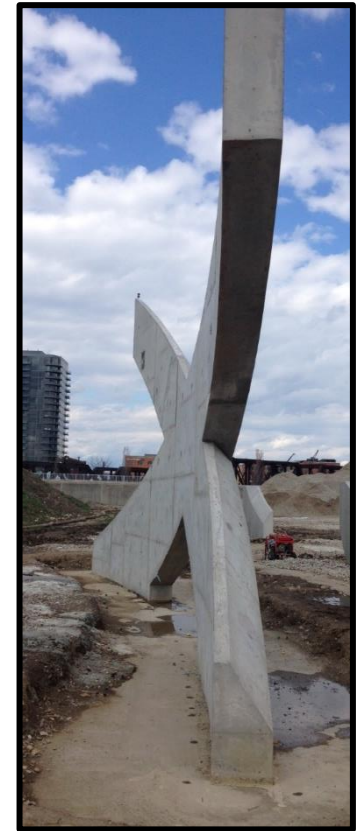


CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

MOCK-UP LESSONS LEARNED



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE MOCK-UP COMPLETION & IMPLICATIONS



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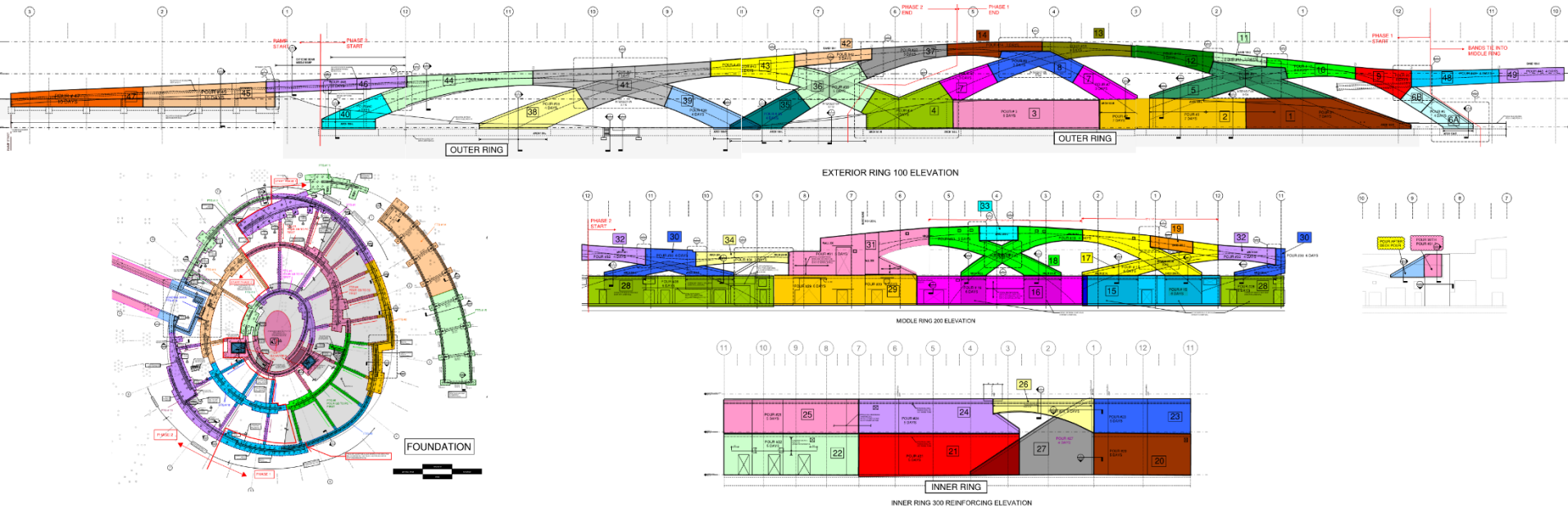




BAKER
CONCRETE CONSTRUCTION

CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

PLANNING & REPLANNING



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

PLANNING & REPLANNING



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SUPERSTRUCTURE & MIX DESIGN





ANDERSON CONCRETE CORPORATION
 400 FRANK ROAD • MAILING ADDRESS: P.O. BOX 338
 COLUMBUS, OHIO 43216-0398
 (614) 443-0123 FAX (614) 443-4001

March 29, 2016

Baker Concrete Construction
 900 N. Garver Road
 Monroe, Ohio 45050-1277

Re: Ohio Veterans Memorial
 300 W. Broad St.

Gentlemen:

The following mix is resubmitted by Anderson Concrete Corp. for use in the above referenced work.

One (1) Cubic Yard:

Class VC	6000 psi	exterior walls	
Cement	560 lbs.		
GGBF Slag	240 lbs.		
Sand	1380 lbs.		
#5CA	1495 lbs.		
Water Reducer	16.0 oz.		
Superplasticizer	52.0 oz.*		
Stabilizer 4R	16.0 oz.		
Total Water	294 lbs.		
Flow	24-28 in.		
W/Cm Ratio	0.368		
Ultra Fiber 500	1.5 lbs.		

Changes in cementitious proportions to help with foaming

SHOP DRAWING REVIEW

APPROVED	<input type="checkbox"/>	APPROVED AS NOTED	<input type="checkbox"/>
DISAPPROVED	<input type="checkbox"/>	RESUBMITTAL REQUIRED	<input type="checkbox"/>

Review is only for general conformance with the requirements of the contract documents. The submitting contractor remains fully responsible for compliance with all conditions of the plans and specifications.

BAKER CONCRETE CONSTRUCTION, INC.

BY: Rob Ford DATE: 3/29/16

W/C ratio reduced due to added viscrete and stabilizer

The aggregate weights shown are for a saturated surface dry condition and will be adjusted for free moisture.

*Viscocrete admixture will be added at the batch plant resulting in a flowing concrete. The concrete should not be accepted or rejected based on the slump.

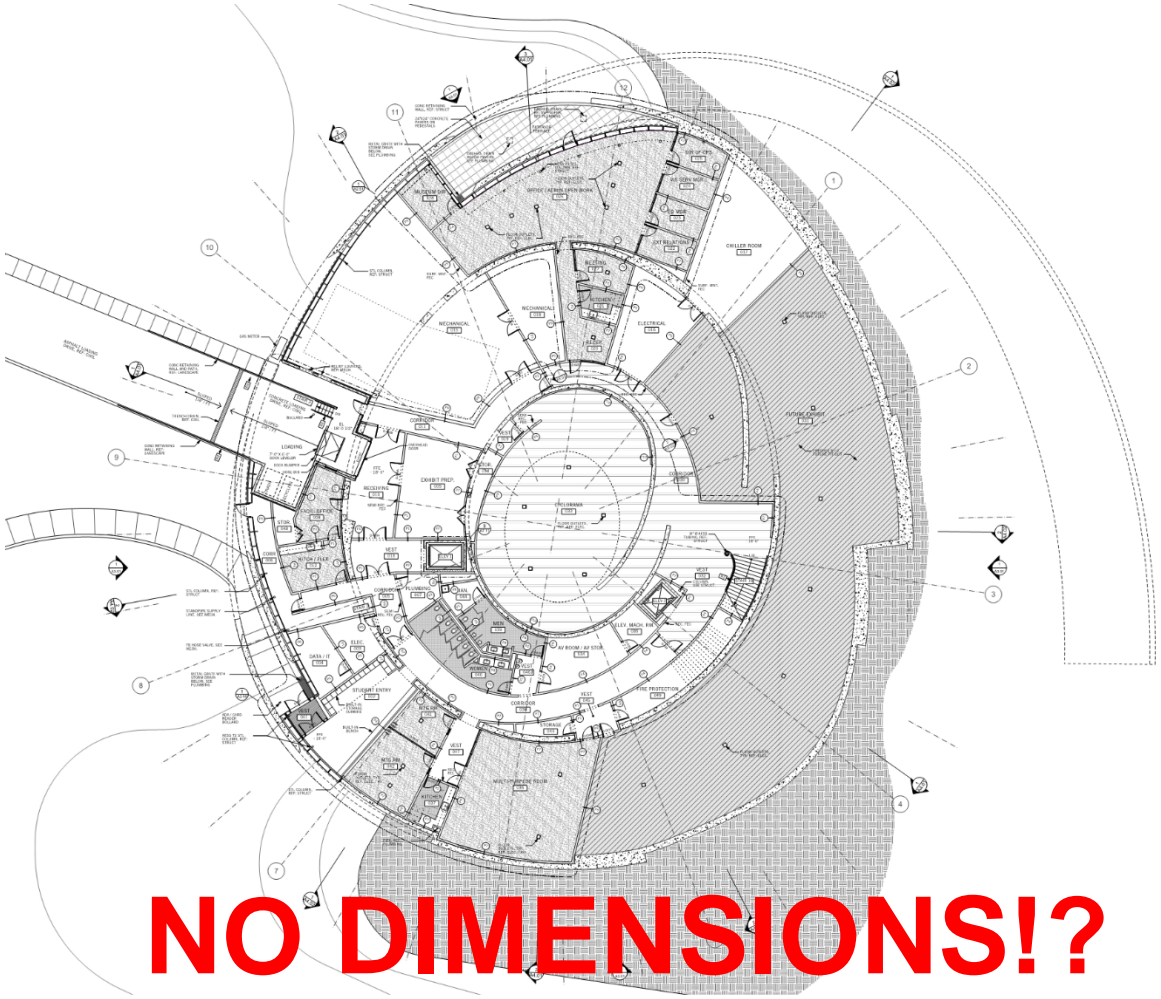
We take no exception to changing from a 40% slag mix to a 30% slag mix as this still remains an 800 lb mix. However, we're not confident that reducing the pozzolan will solve the foaming issue. If foaming persists, another .5 oz (20.0 oz per yard) of VMA is recommended to keep the water reducer from causing the foaming condition. RIta 3/21/16

Very truly yours,
Arthur A. Marchi
 Arthur A. Marchi
 Vice President/Sales

2 of 2

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SUPERSTRUCTURE FORMWORK COMPLEXITY

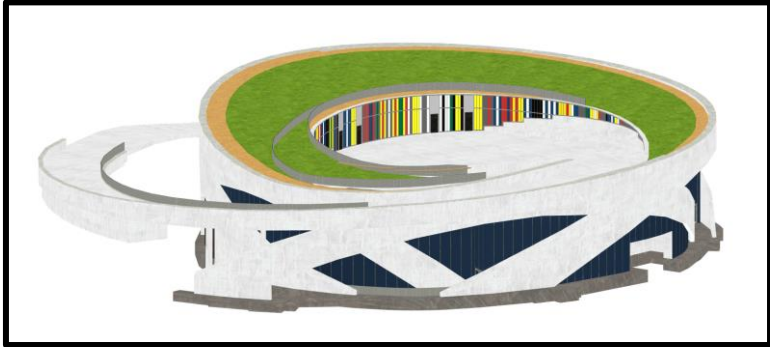
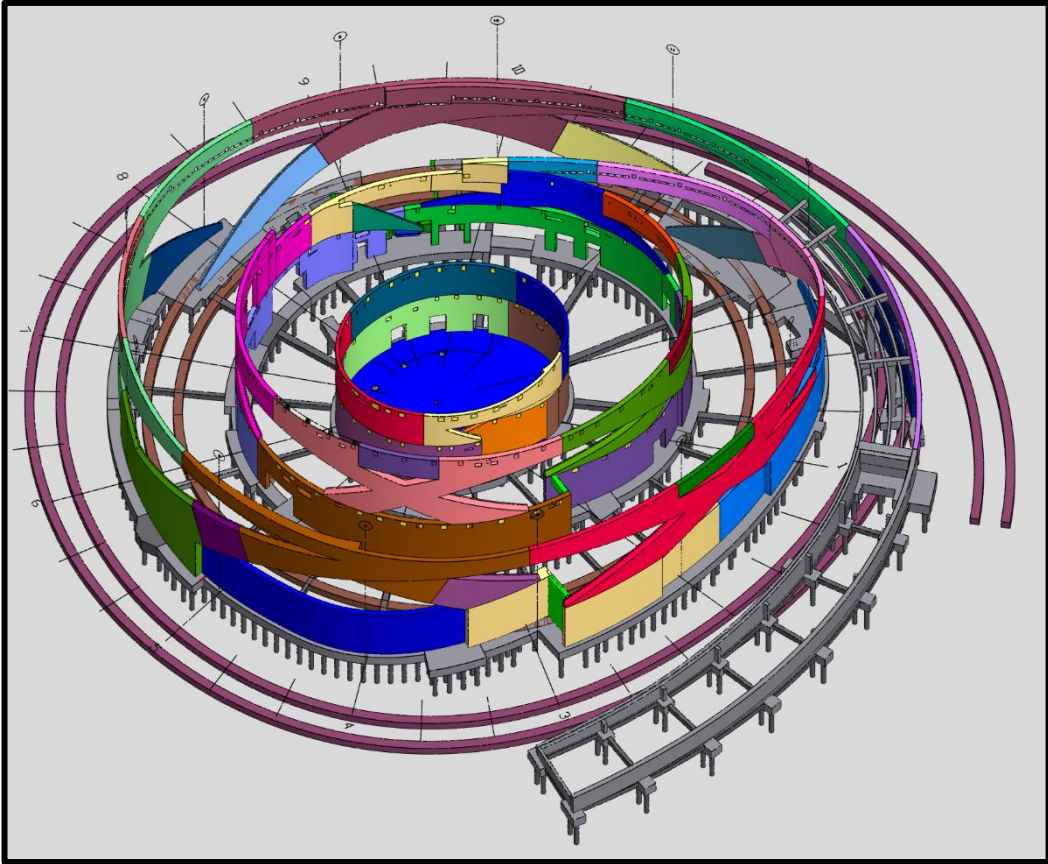


NO DIMENSIONS!?



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY

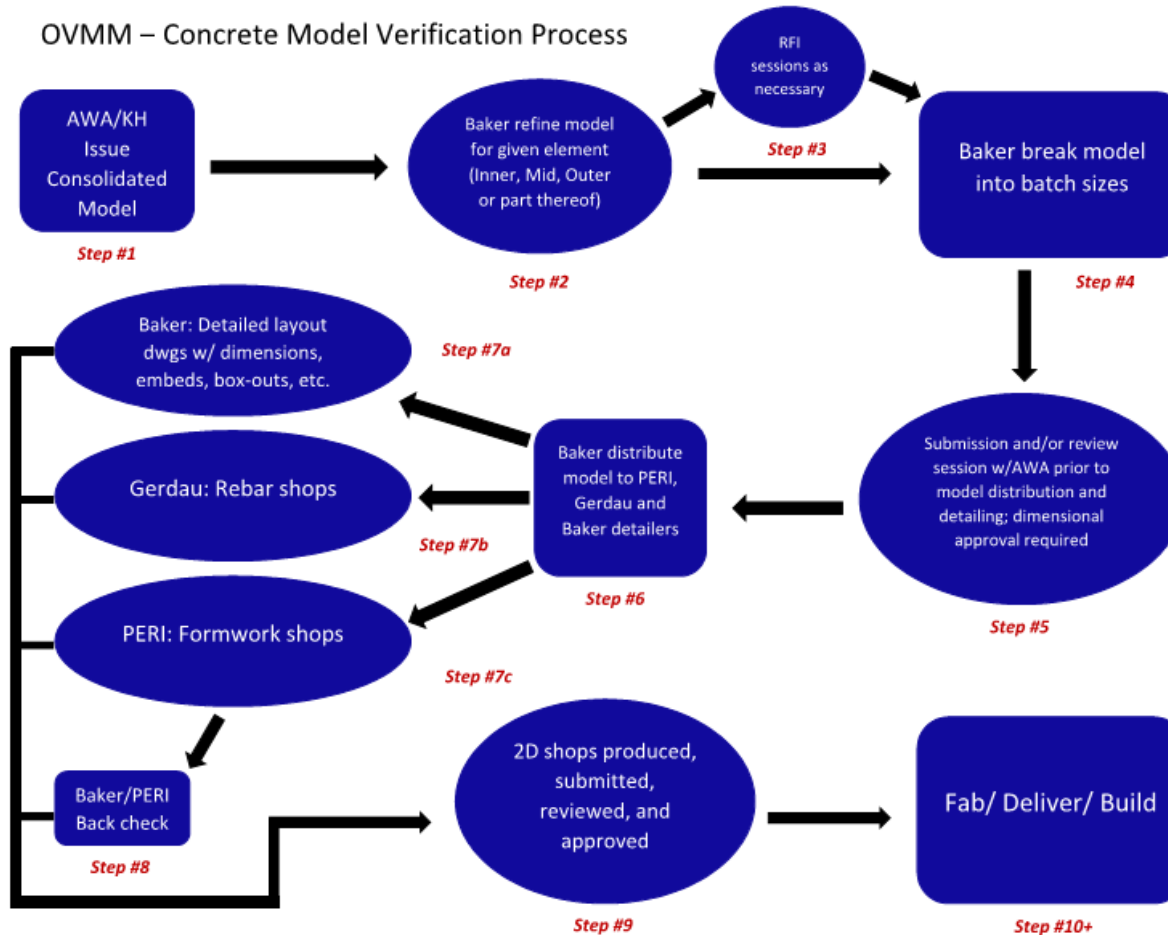


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SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL




CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL

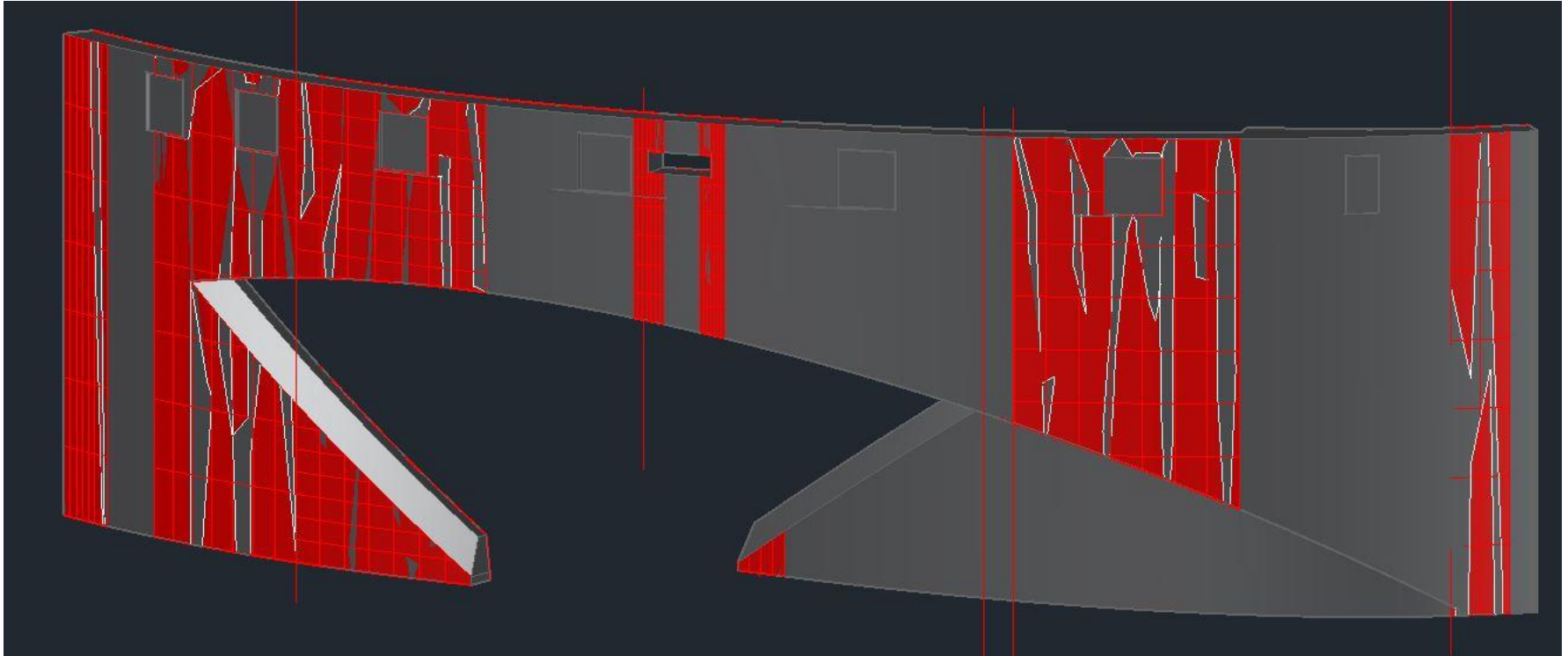
OHIO VETERAN'S MEMORIAL MUSEUM	
Submittal Stamp Page 1 of 2 (3D Submittal)	
Submitted To: Turner Construction 262 Hanover Street Columbus, OH 43215	Submitted By: Name: Wes Edwards Company: Baker Concrete Construction
SUBMITTAL NO: 00246R1	DATE: 7/22/2016
ITEM(S): Concrete Superstructure 3D Model Batch	QUANTITY: N/A
SPECIFICATION SECTION: 03 33 00	
3D FILE SUBMISSION: "Approved", "Approved as Corrected", "No Exceptions Taken", etc. in response from the designer(s) of record confirms that the dimensional information contained within this model are accurate and conform with the intent of the 2D & 3D Contract Documents	
Turner	allied works architecture

3D FILE SUBMISSION: "Approved", "Approved as Corrected", "No Exceptions Taken", etc. in response from the designer(s) of record confirms that the dimensional information contained within this model are accurate and conform with the intent of the 2D & 3D Contract Documents

NOTES: Minor revision made during Batch #5 model development please reference RFI #0137	NOTES: <small>It is the responsibility of the user to determine the accuracy and completeness of these data in dimension and quantity for understanding contractor installation or performance of equipment or systems designed by the Contractor. It is the Contractor's responsibility to coordinate, review and approve the Model, to coordinate the Model with the work of other trades and to perform the Work in accordance with the Contract Documents.</small> <small>By: Kyle Carls, AIA Date: 08/03/2016</small>
	OLIN
NOTES:	NOTES:

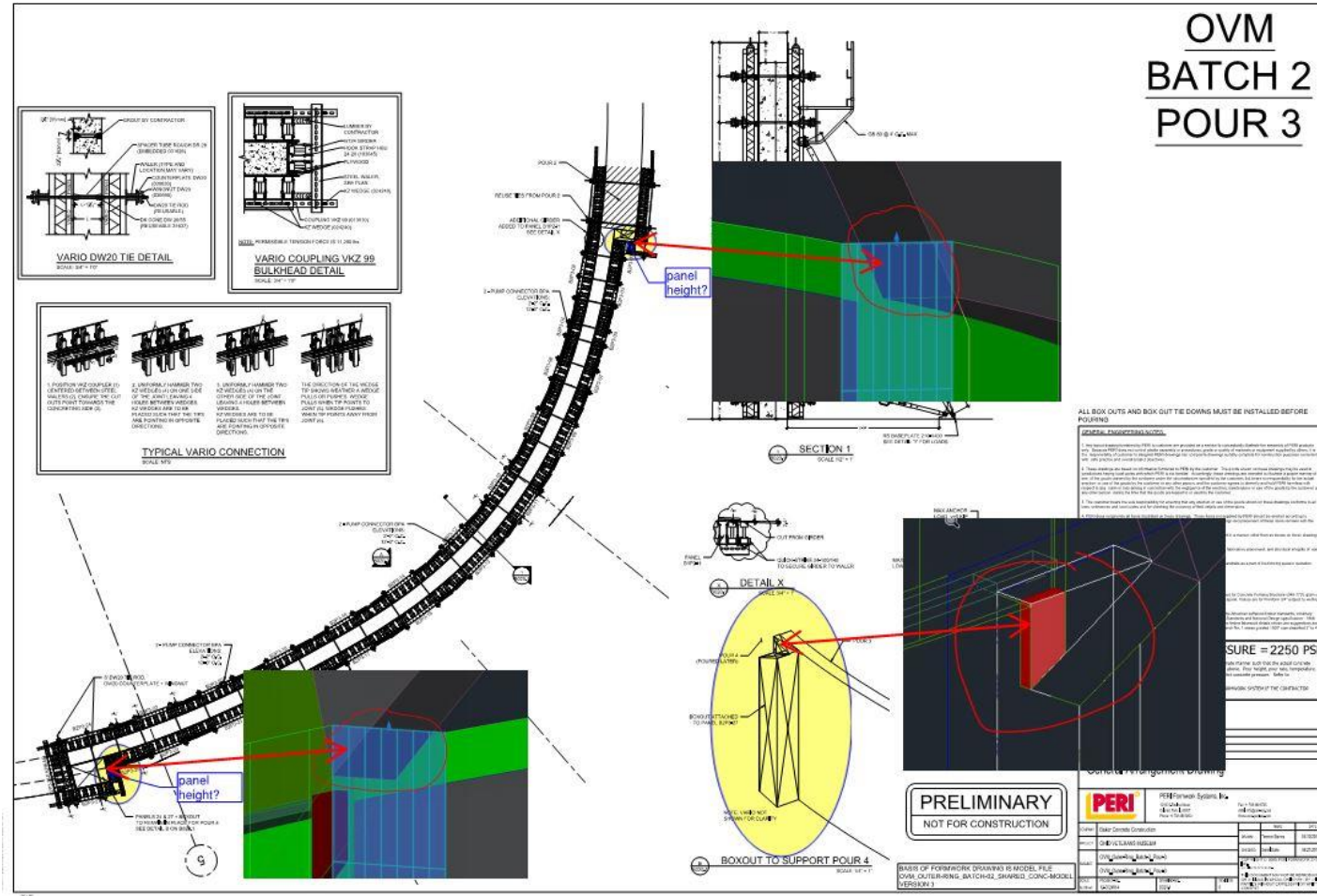
1 of 2

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL

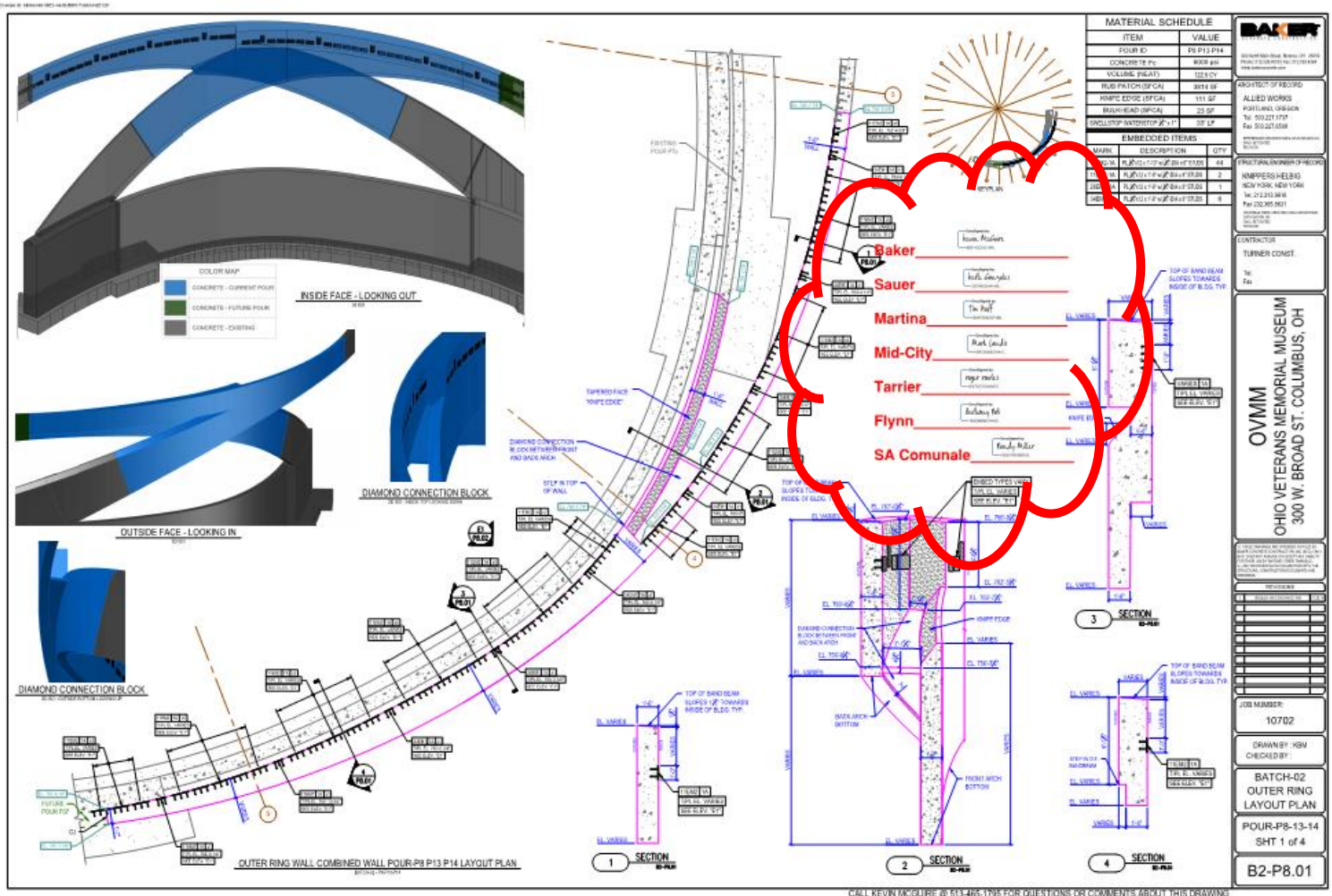


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SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



CALL KEVIN MCQUIRE @ 613-465-1195 FOR QUESTIONS OR COMMENTS ABOUT THIS DRAWING

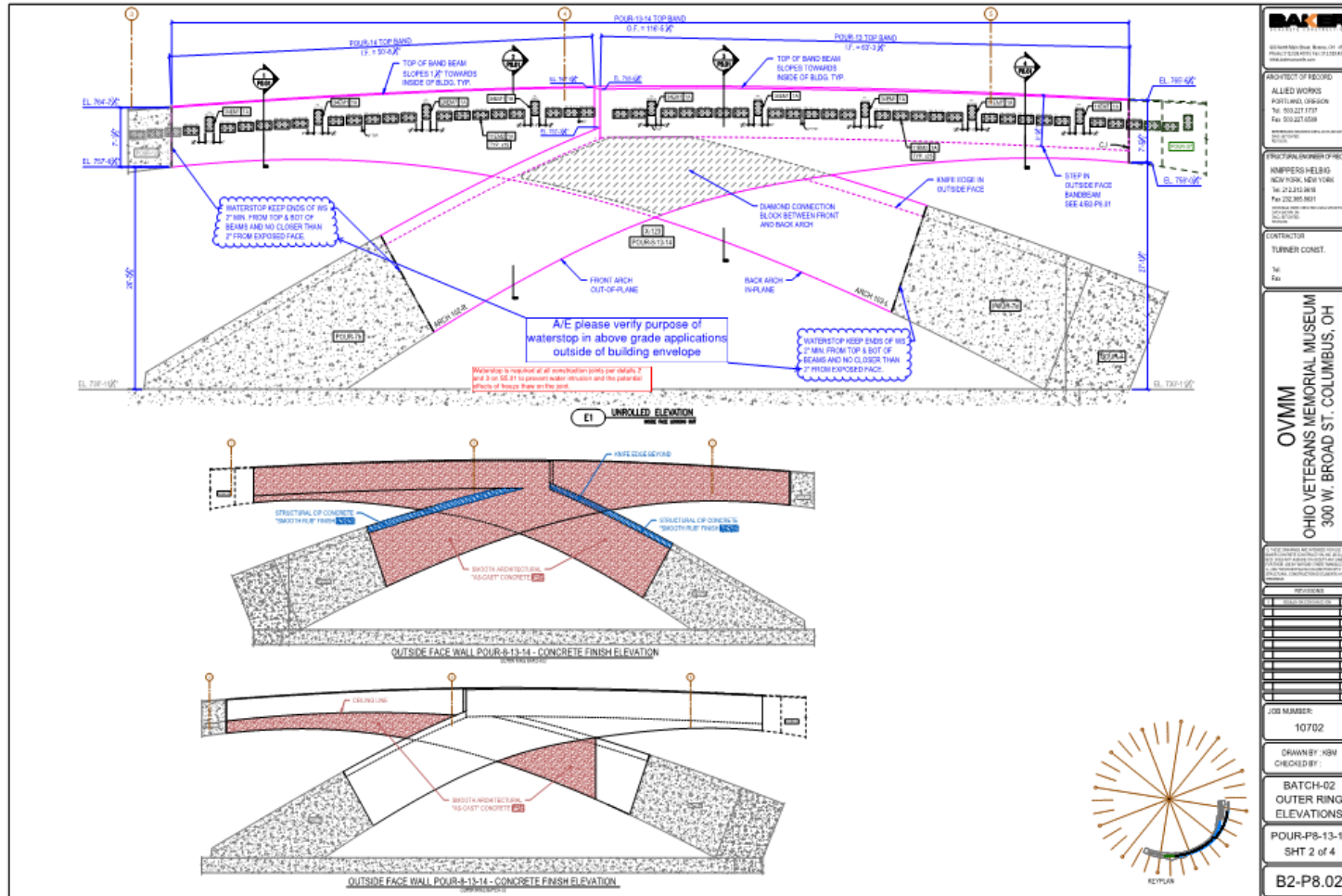
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SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



CALL KEVIN MCGUIRE @ 614-465-1795 FOR QUESTIONS OR COMMENTS ABOUT THIS DRAWING

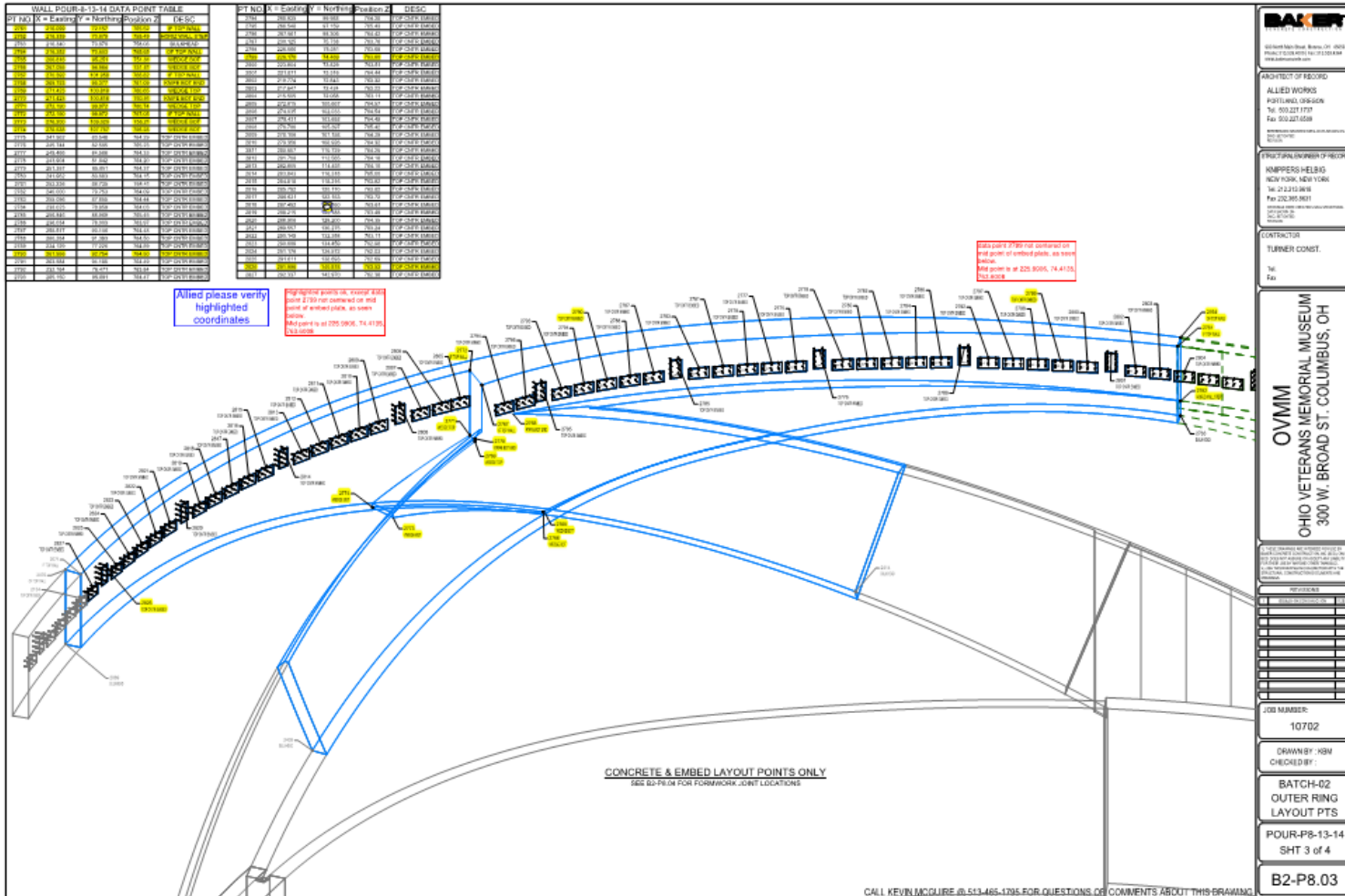
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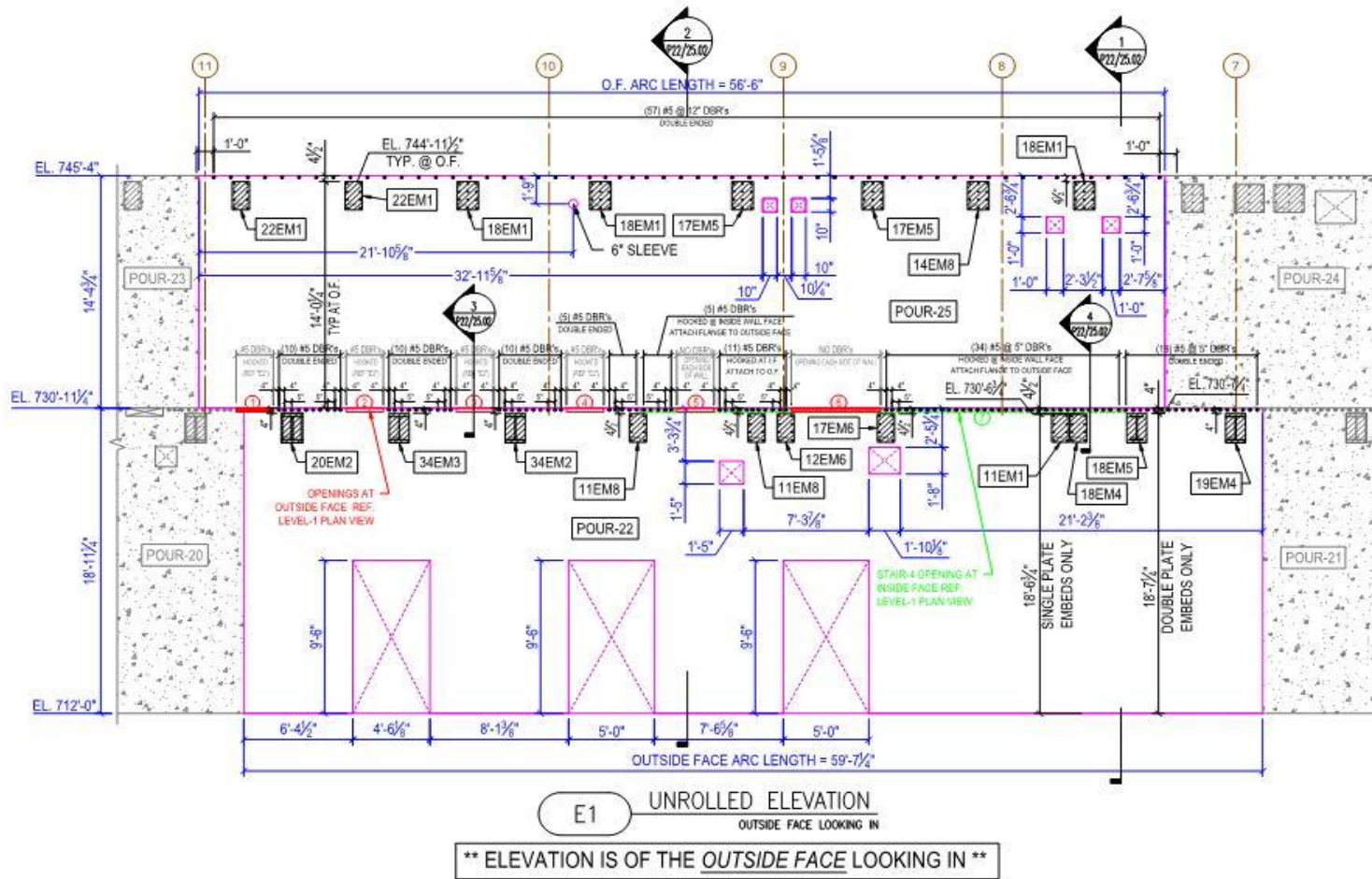
CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY & PROCESS/QC CONTROL



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY

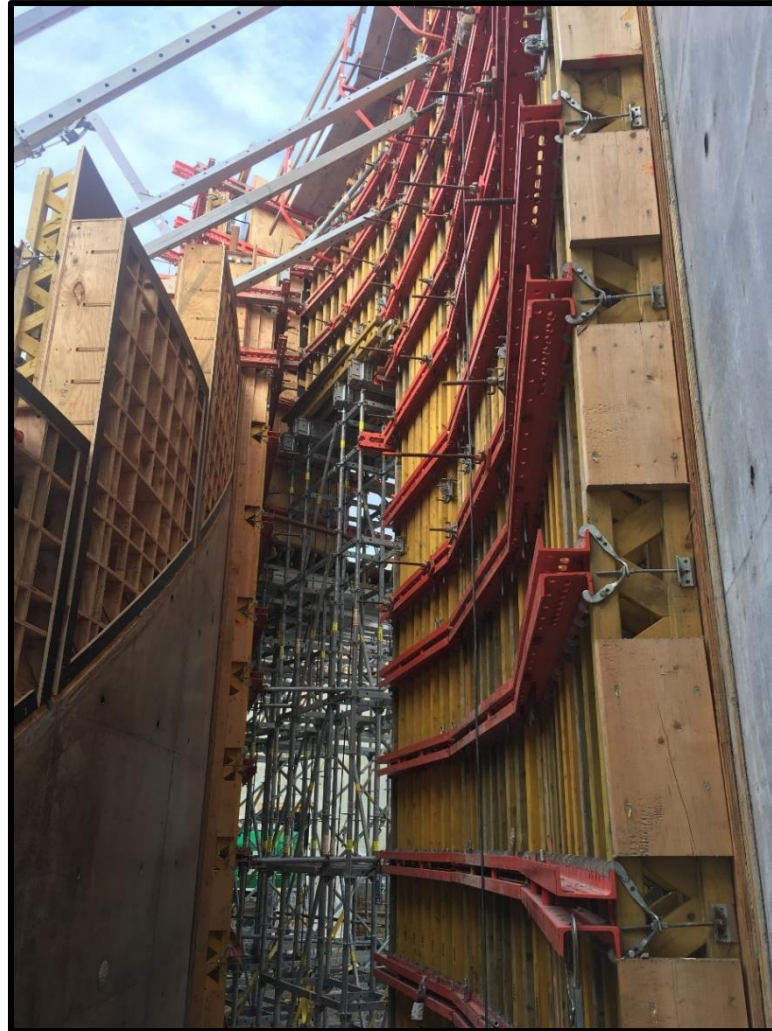


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY



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CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY



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SUPERSTRUCTURE FORMWORK COMPLEXITY



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SUPERSTRUCTURE FORMWORK COMPLEXITY



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CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

aci CONCRETE
CONVENTION



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE FORMWORK COMPLEXITY

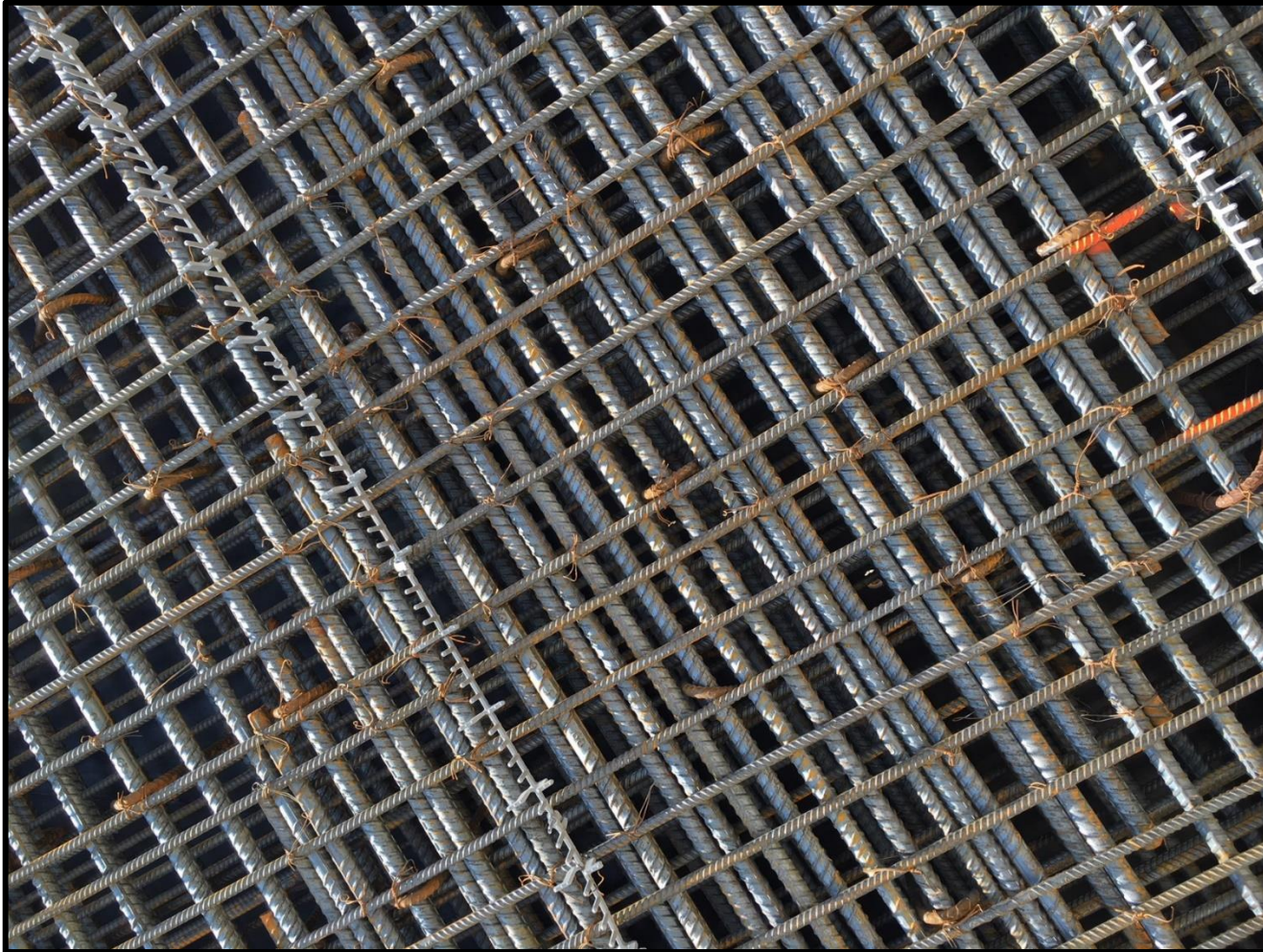


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

 **CONCRETE
CONVENTION**

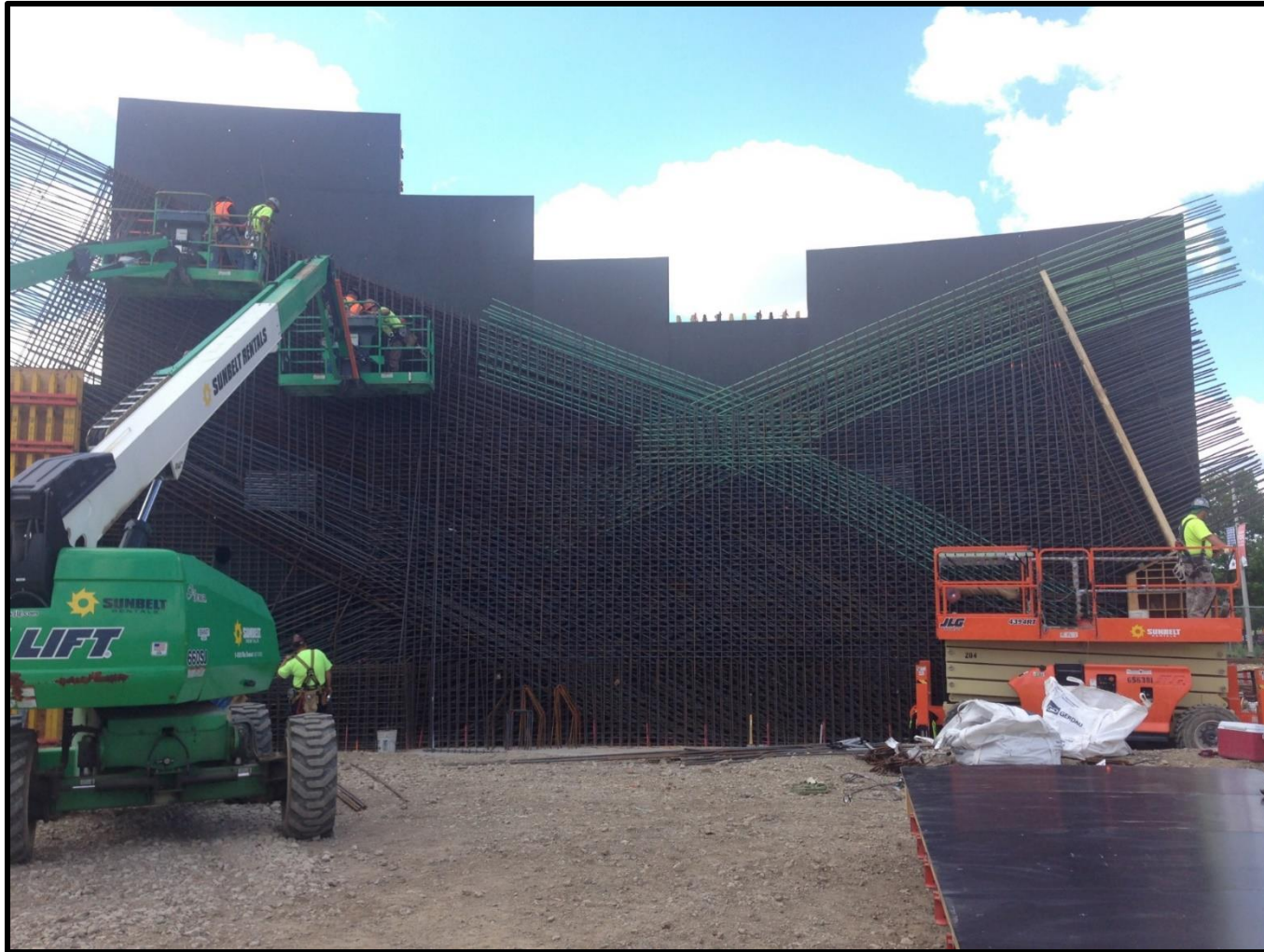


SUPERSTRUCTURE REINFORCING COMPLEXITY & DENSITY



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE REINFORCING COMPLEXITY & DENSITY

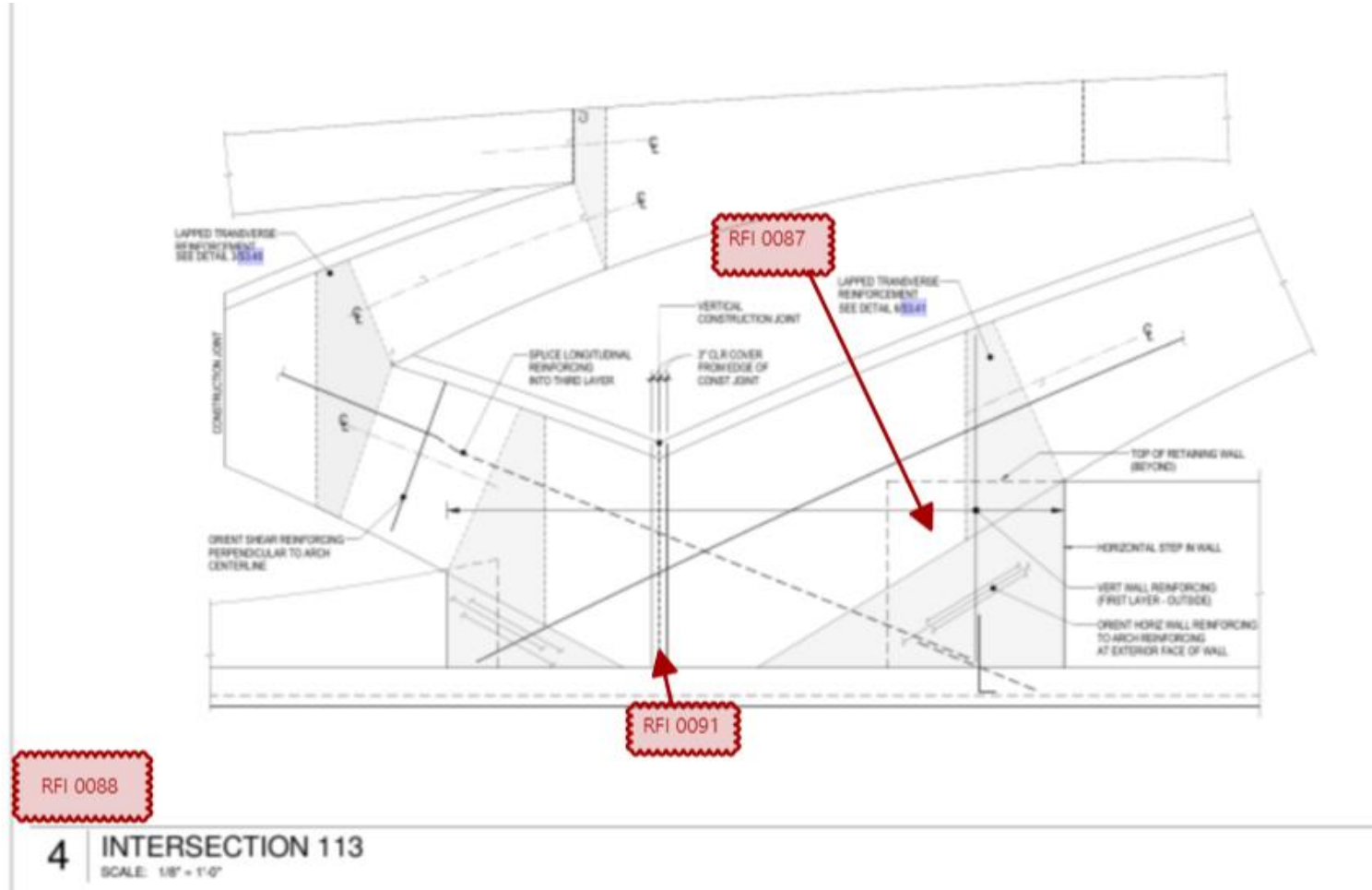


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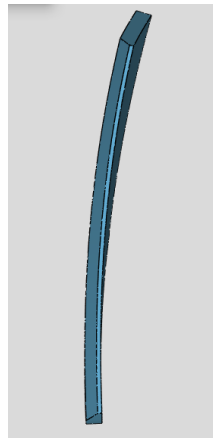
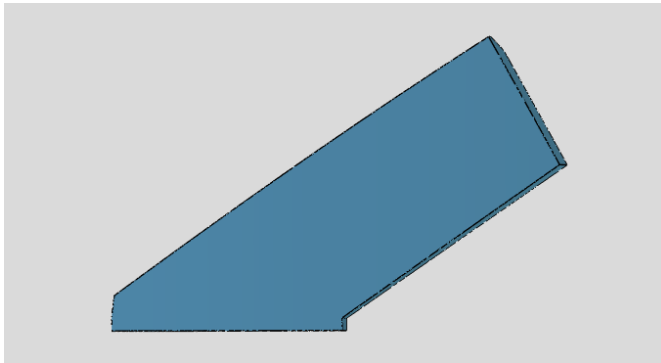
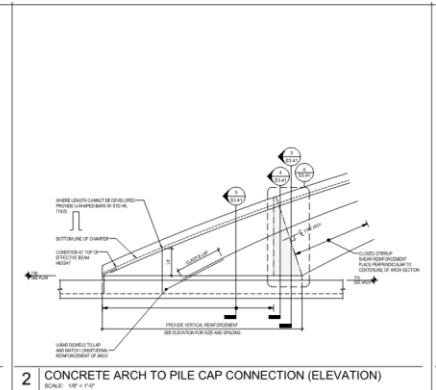
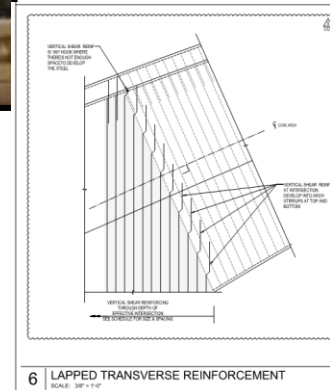
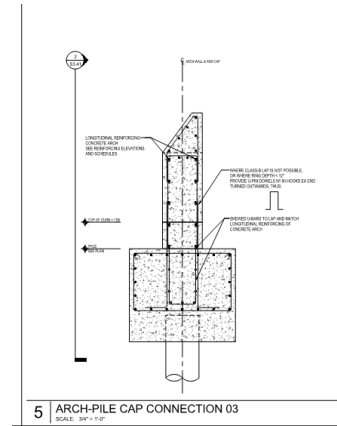


SUPERSTRUCTURE REINFORCING COMPLEXITY & DENSITY



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS



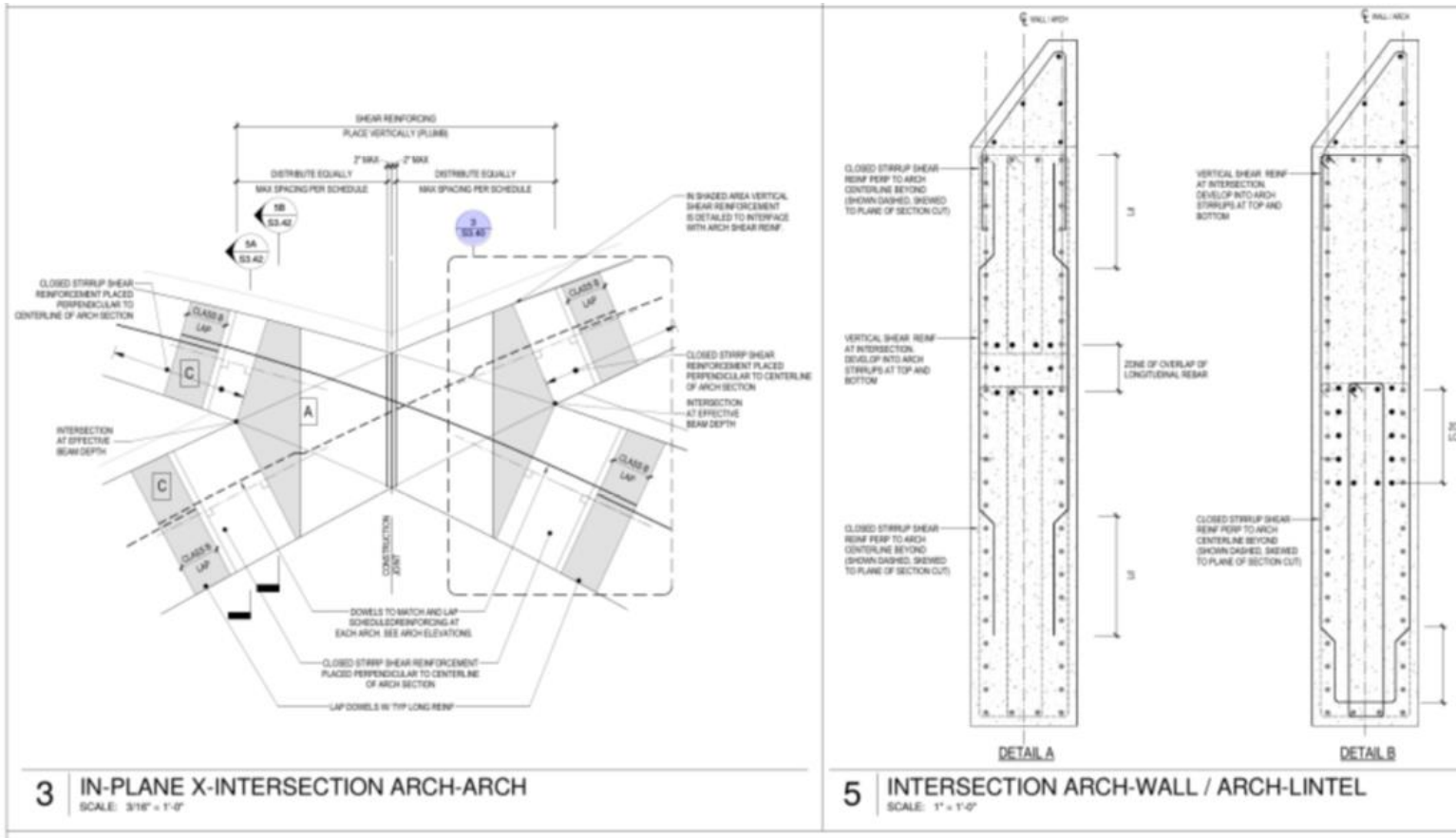
**ARCH FOUNDATION
DOWELS WITH
COMPOUND CURVE,
CHAMFERED TOP AND
SOFFIT BOTTOM**



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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS



ARCH INTERSECTIONS



CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS



ARCH INTERSECTIONS

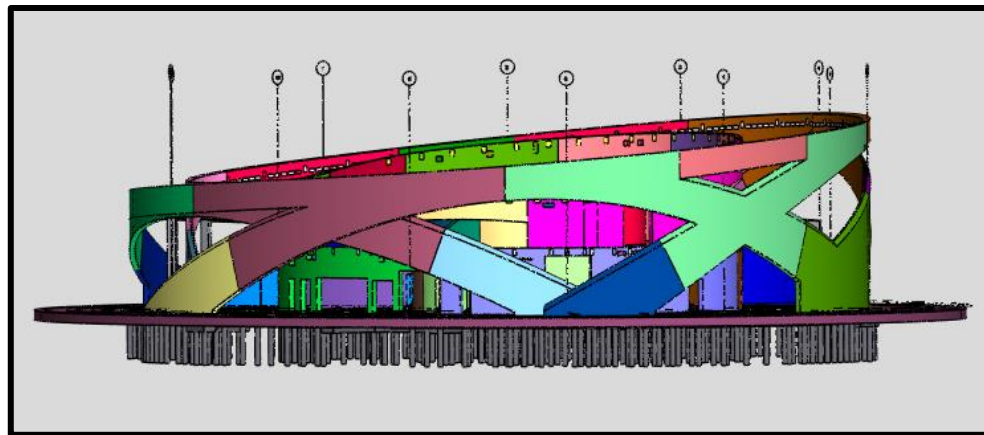
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CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS

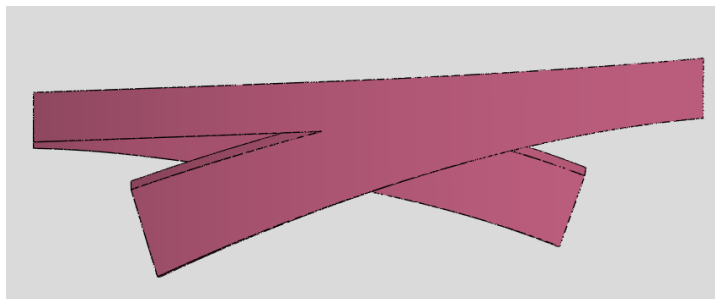
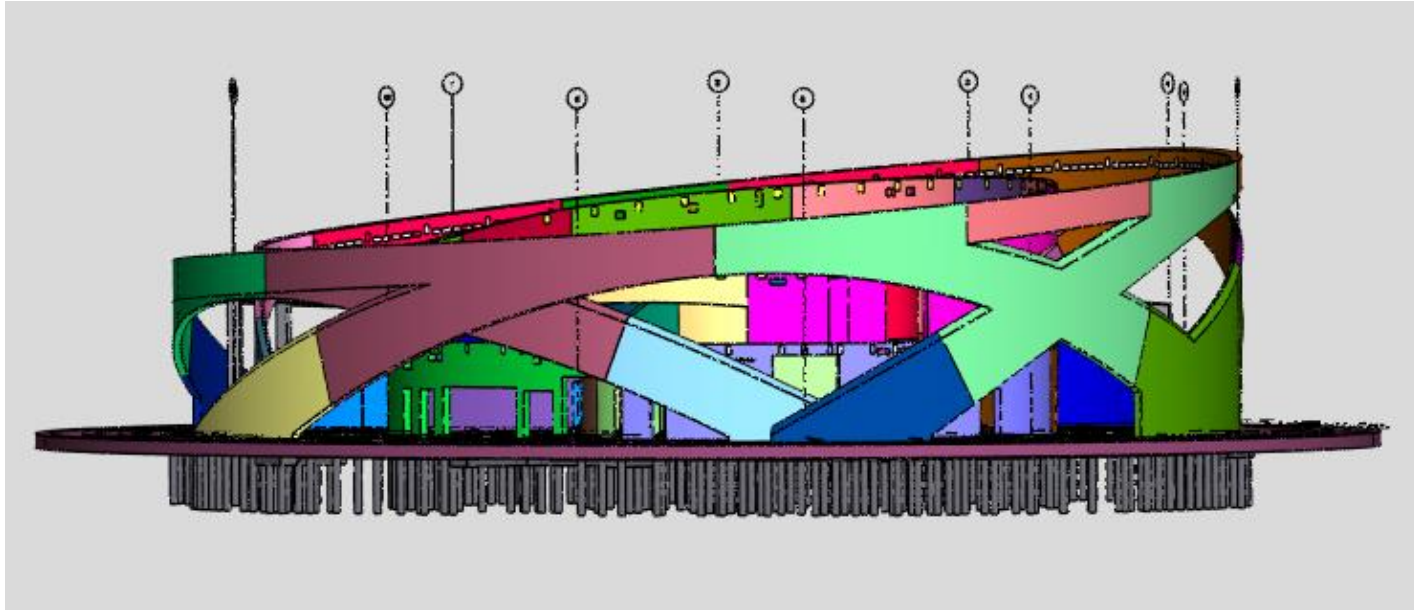


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

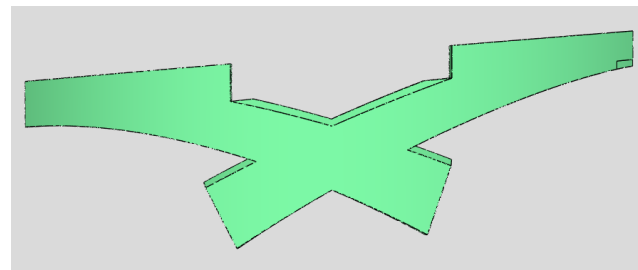
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REINFORCING COMPLEXITY – UNIQUE CONDITIONS



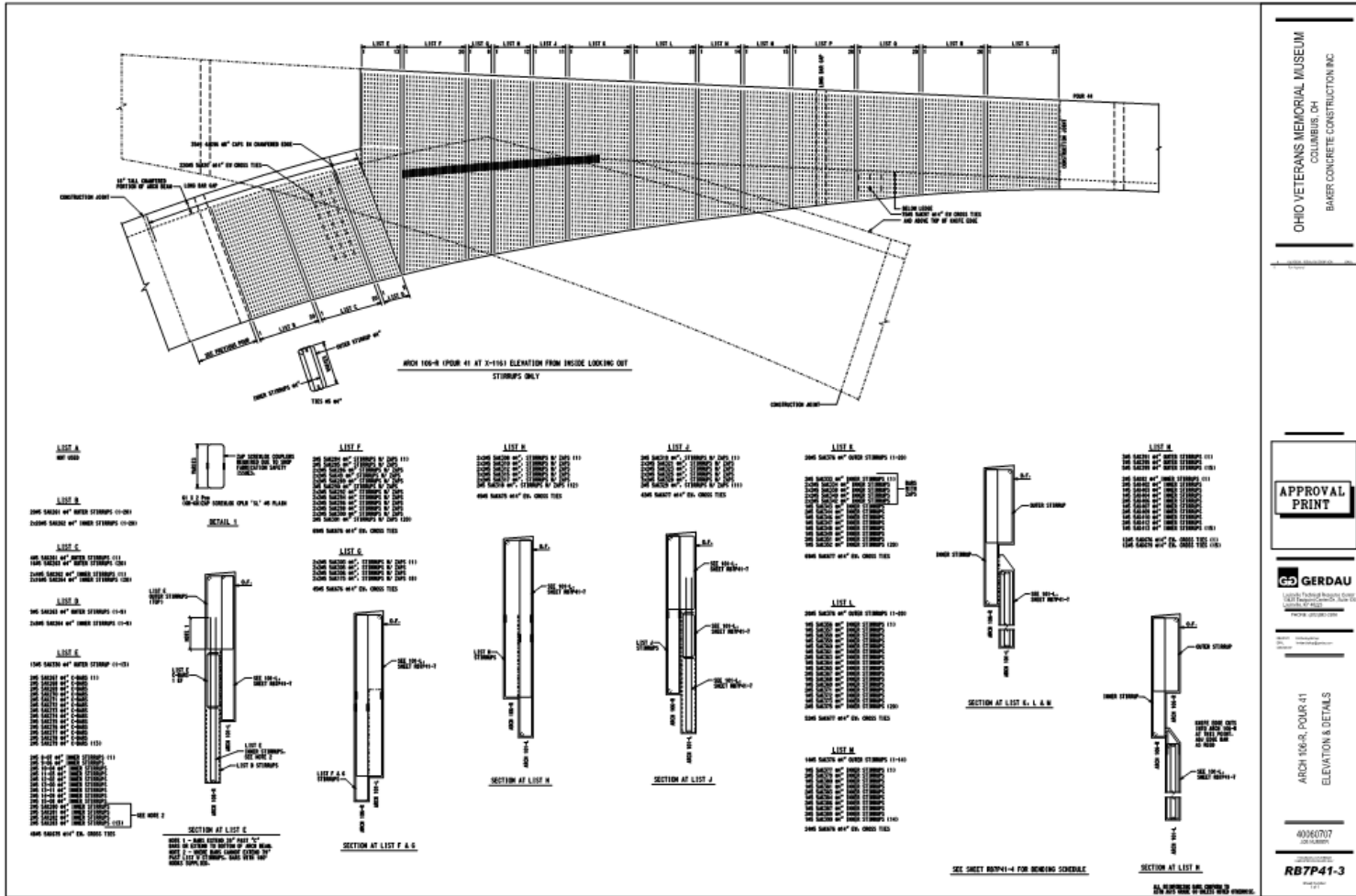
'OUT OF PLANE'



'IN-PLANE'

CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS

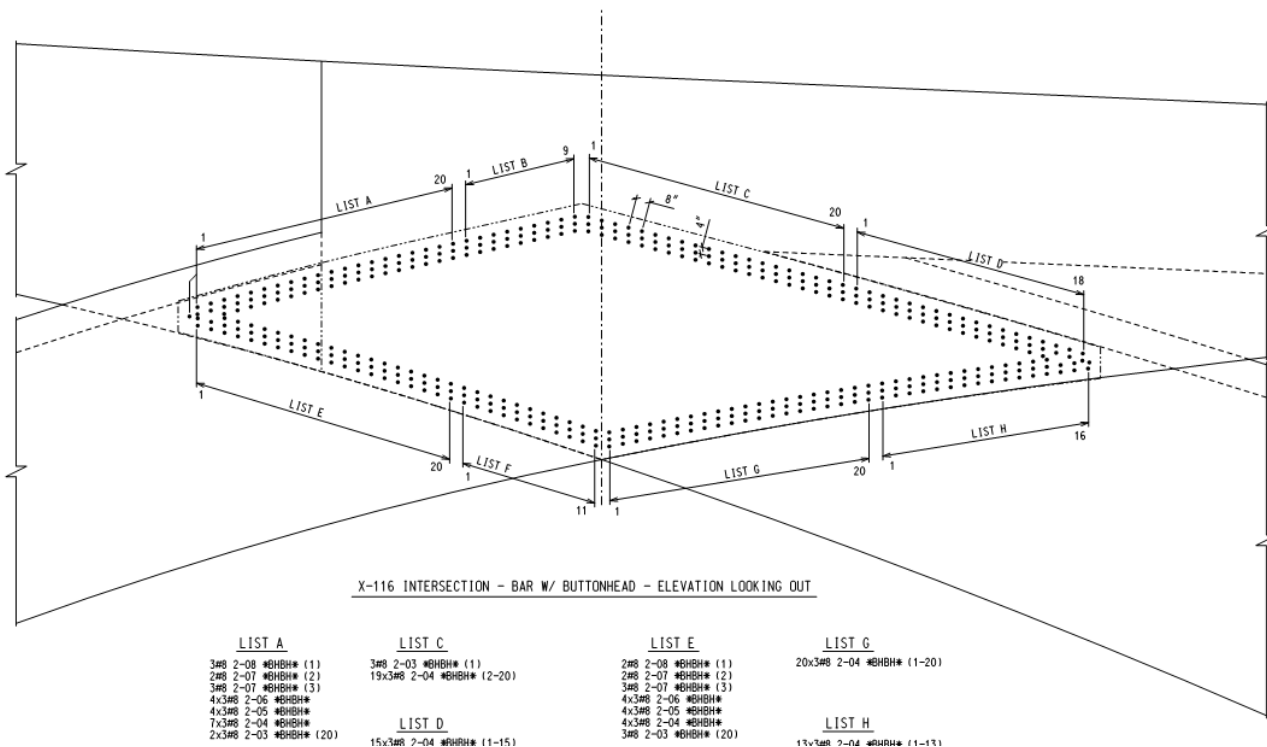


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

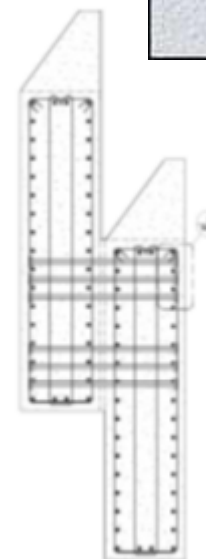


CIVIL/STRUCTURAL – CIP CONCRETE SUPERSTRUCTURE

REINFORCING COMPLEXITY – UNIQUE CONDITIONS

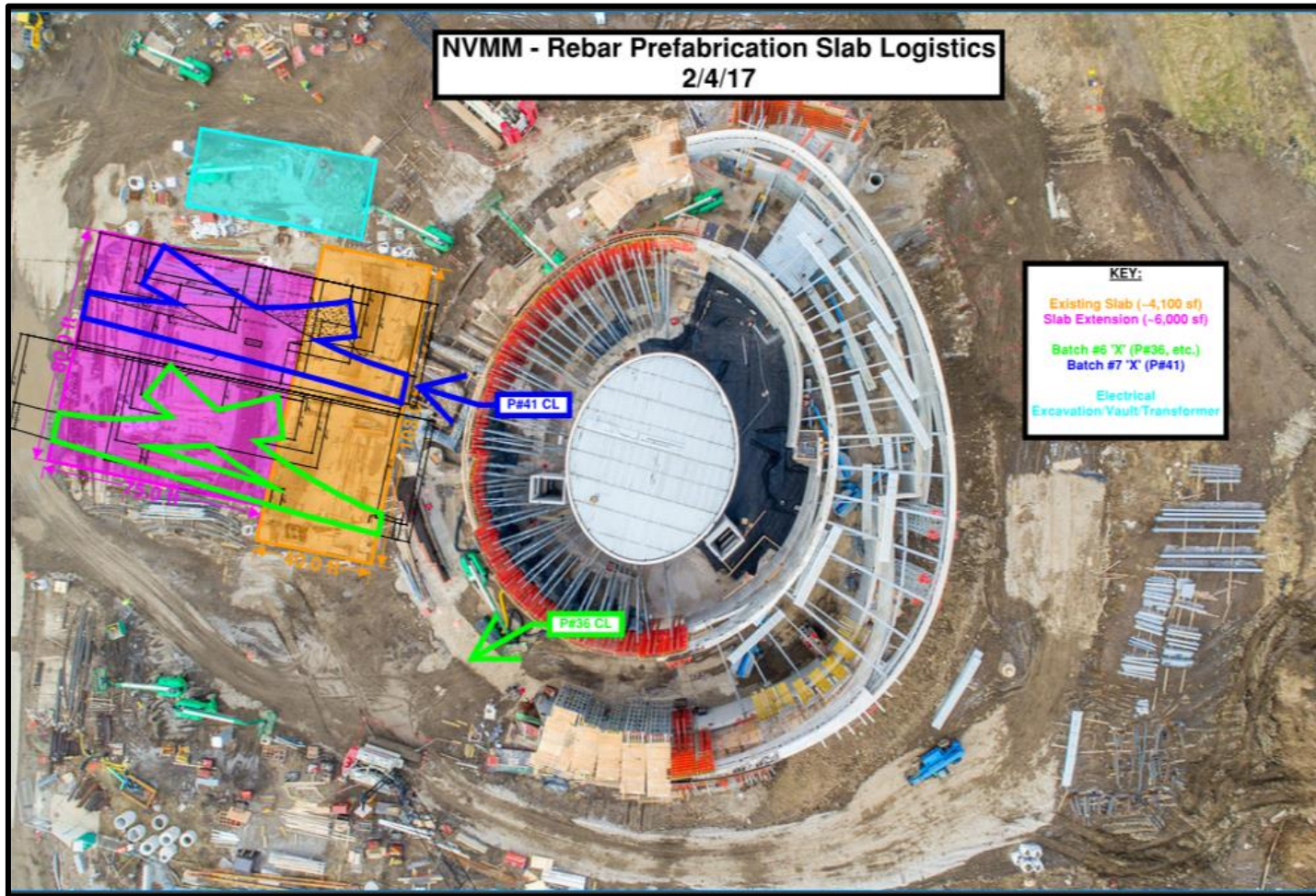


AD
 AB
 BA
 CD
 RB



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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CIVIL/STRUCTURAL – CIP CONCRETE

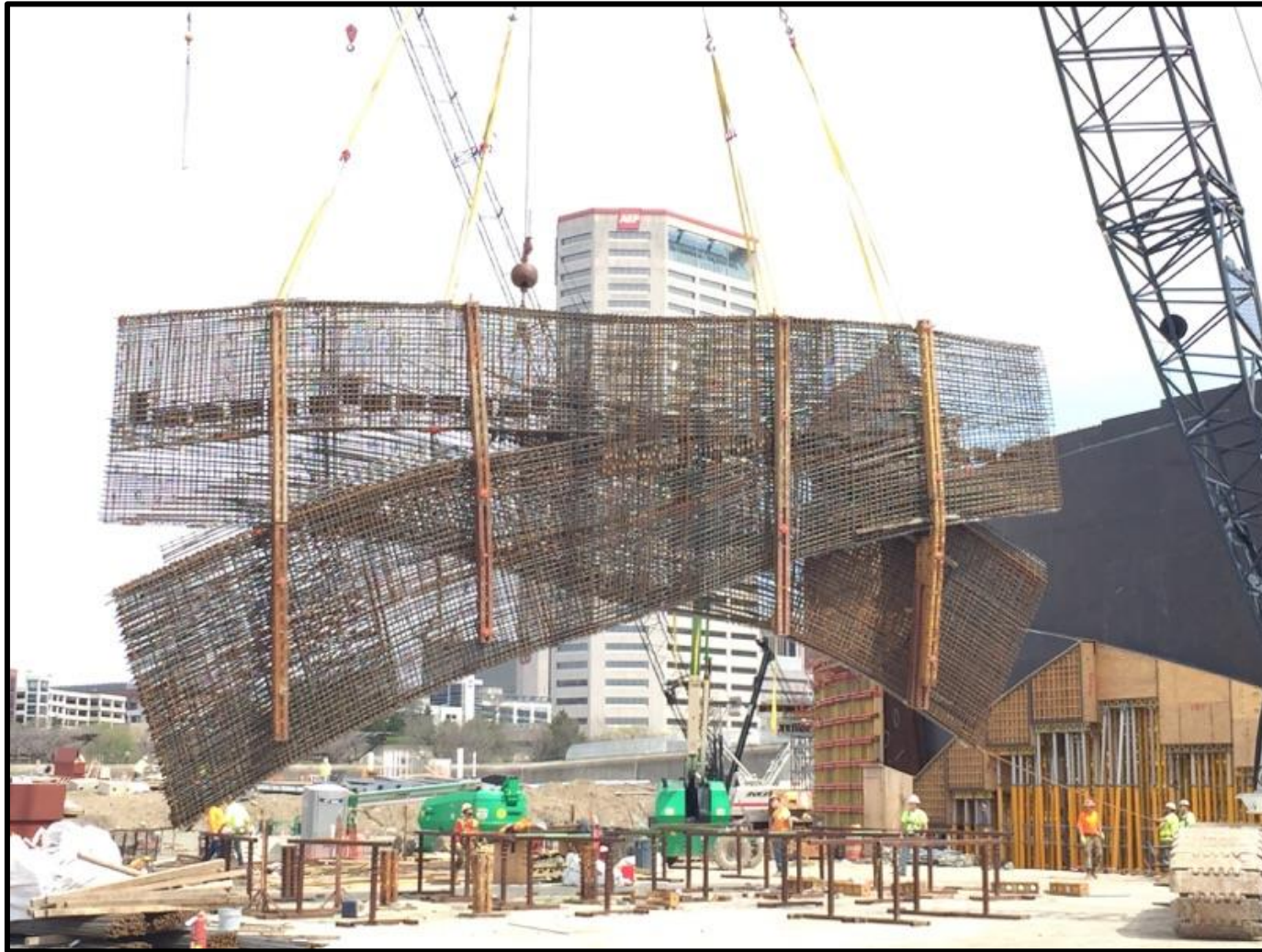
SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



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SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE REINFORCING COMPLEXITY – CONSTRUCTIBILITY/LOGISTICS



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE COMPLEXITY – PLACEMENT EXECUTION



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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CIVIL/STRUCTURAL – CIP CONCRETE

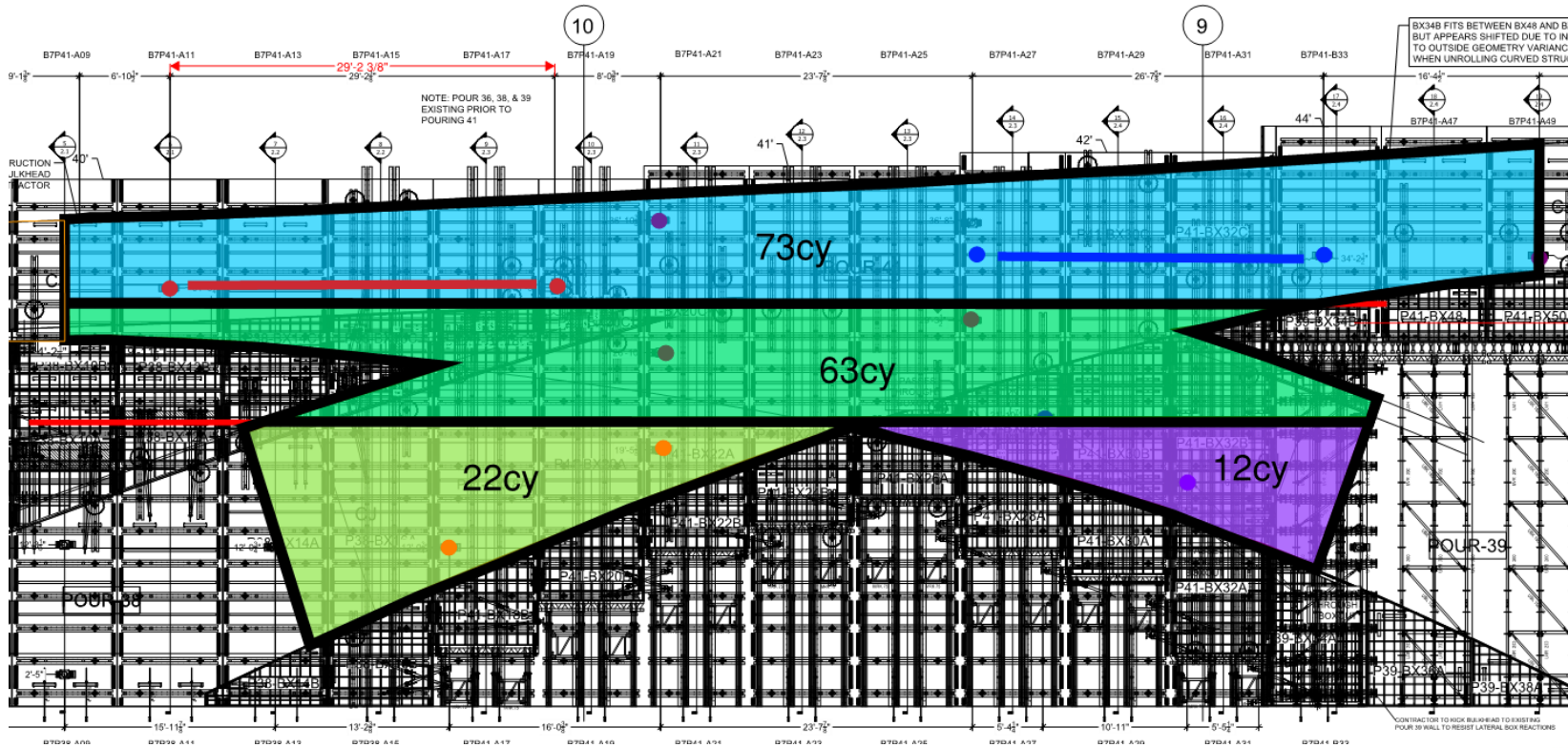
SUPERSTRUCTURE COMPLEXITY – PLACEMENT EXECUTION



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



SUPERSTRUCTURE COMPLEXITY – PLACEMENT EXECUTION



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE

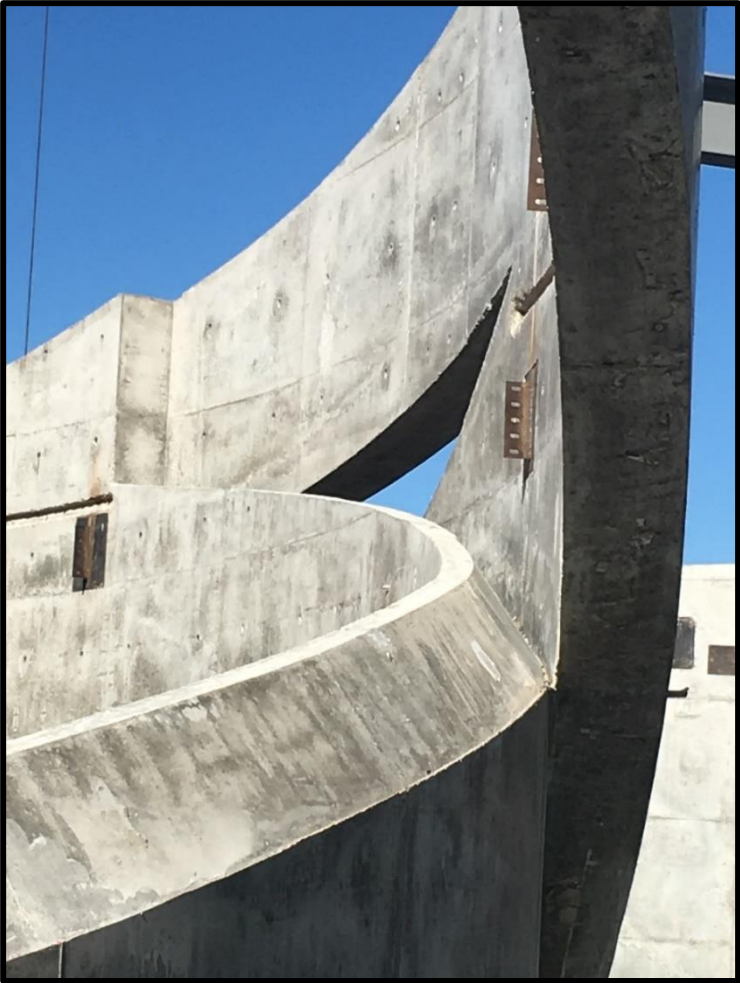


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE



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CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – CIP CONCRETE

SUPERSTRUCTURE

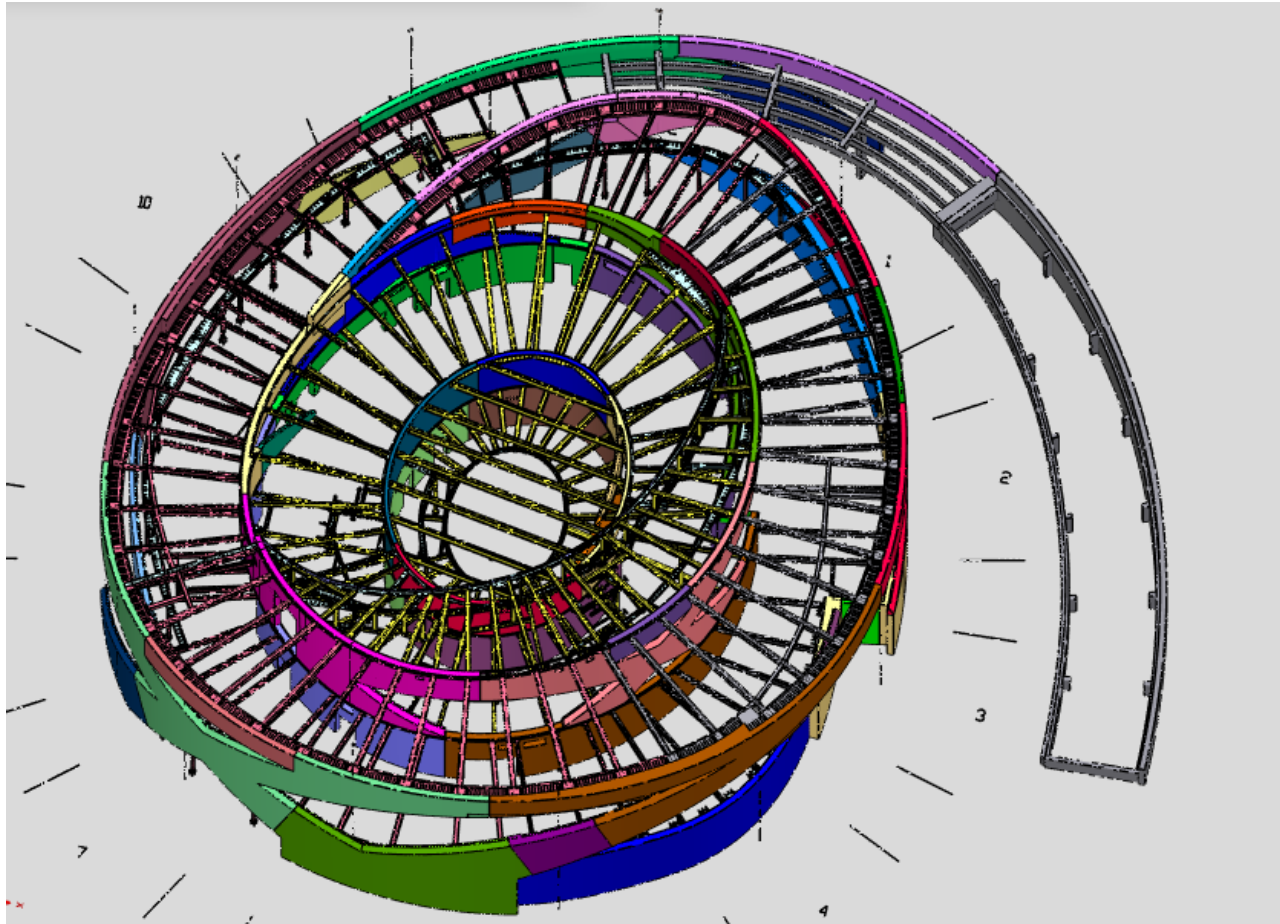


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL

STEEL FRAMING



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CIVIL/STRUCTURAL – STEEL FRAME

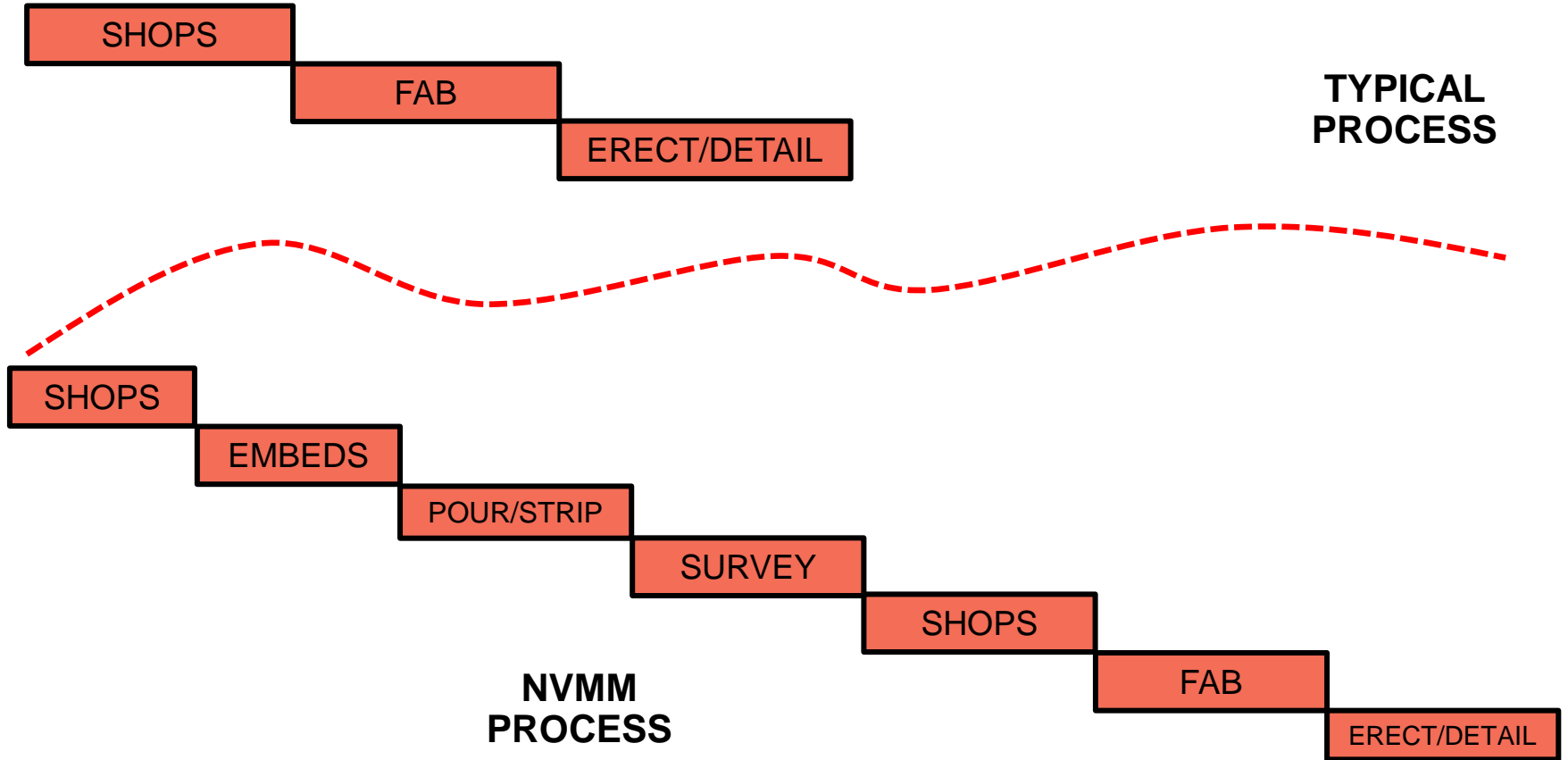
UNIQUE FEATURES – DUAL EMBED FUNCTION



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – FABRICATION PROCESS/TIMELINE



CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – RADIAL DECK PATTERN

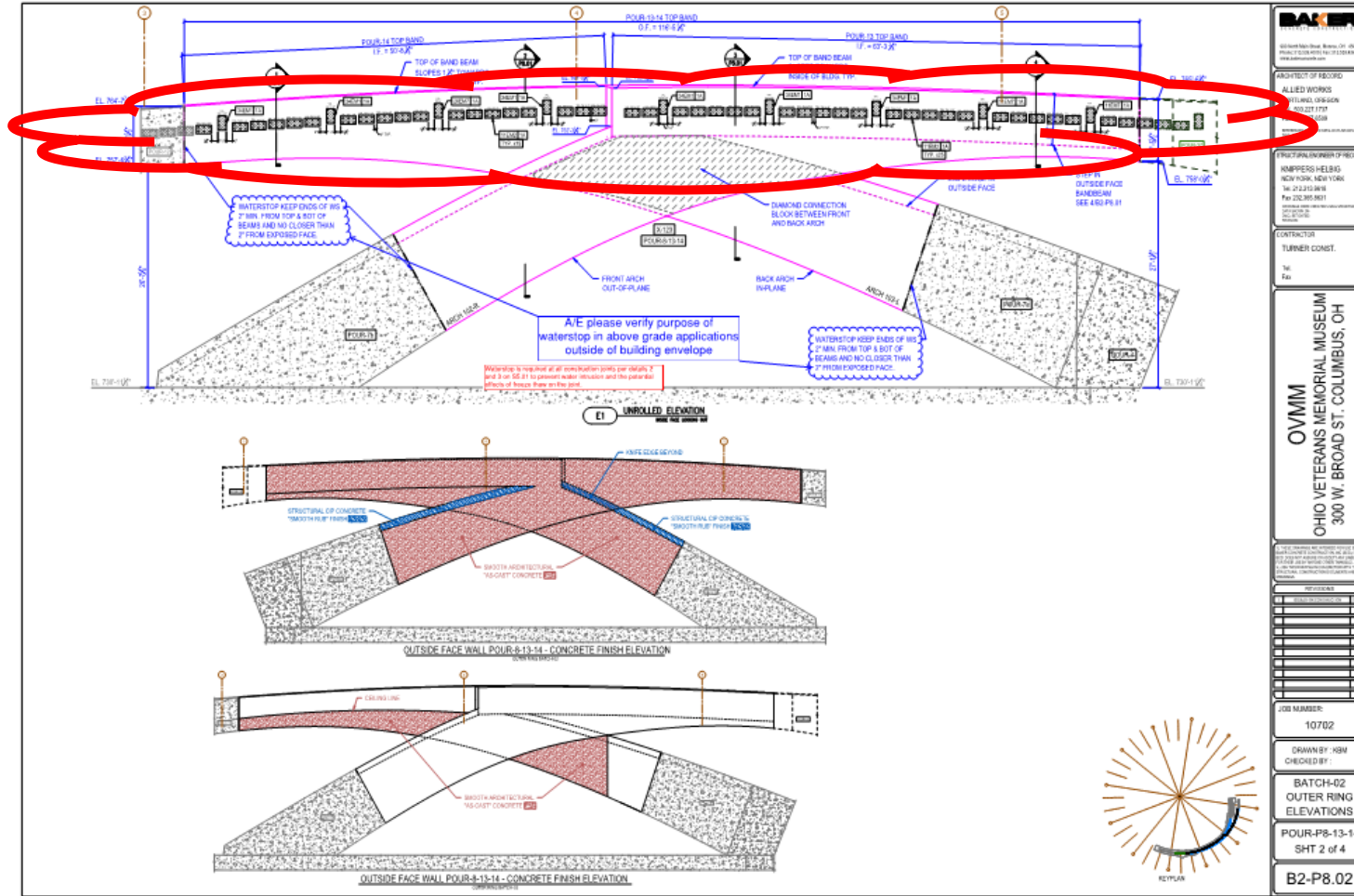


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CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – EMBED DENSITY



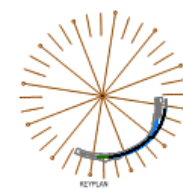
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60 South Main Street, Suite 201, Akron, OH 44308
Phone: 330.933.8200 Fax: 330.933.8201
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ARCHITECT OF RECORD
ALLIED WORKS
ATTN: J. CRISMON
440.232.1100
10000 W. 12th St.
Columbus, OH 43240

CONTRACTOR
TURNER CONST.
Tel: 614.291.1000
Fax: 614.291.1001

OVM M
OHIO VETERANS MEMORIAL MUSEUM
300 W. BROAD ST., COLUMBUS, OH

CONTRACT NUMBER: 10702
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CHECKED BY:
BATCH-02
OUTER RING
ELEVATIONS
POUR-P8-13-14
SHT 2 of 4
B2-P8.02



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CALL KEVIN MCGUIRE @ 614-465-1795 FOR QUESTIONS OR COMMENTS ABOUT THIS DRAWING

CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – EMBED DENSITY



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CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – EMBED DENSITY

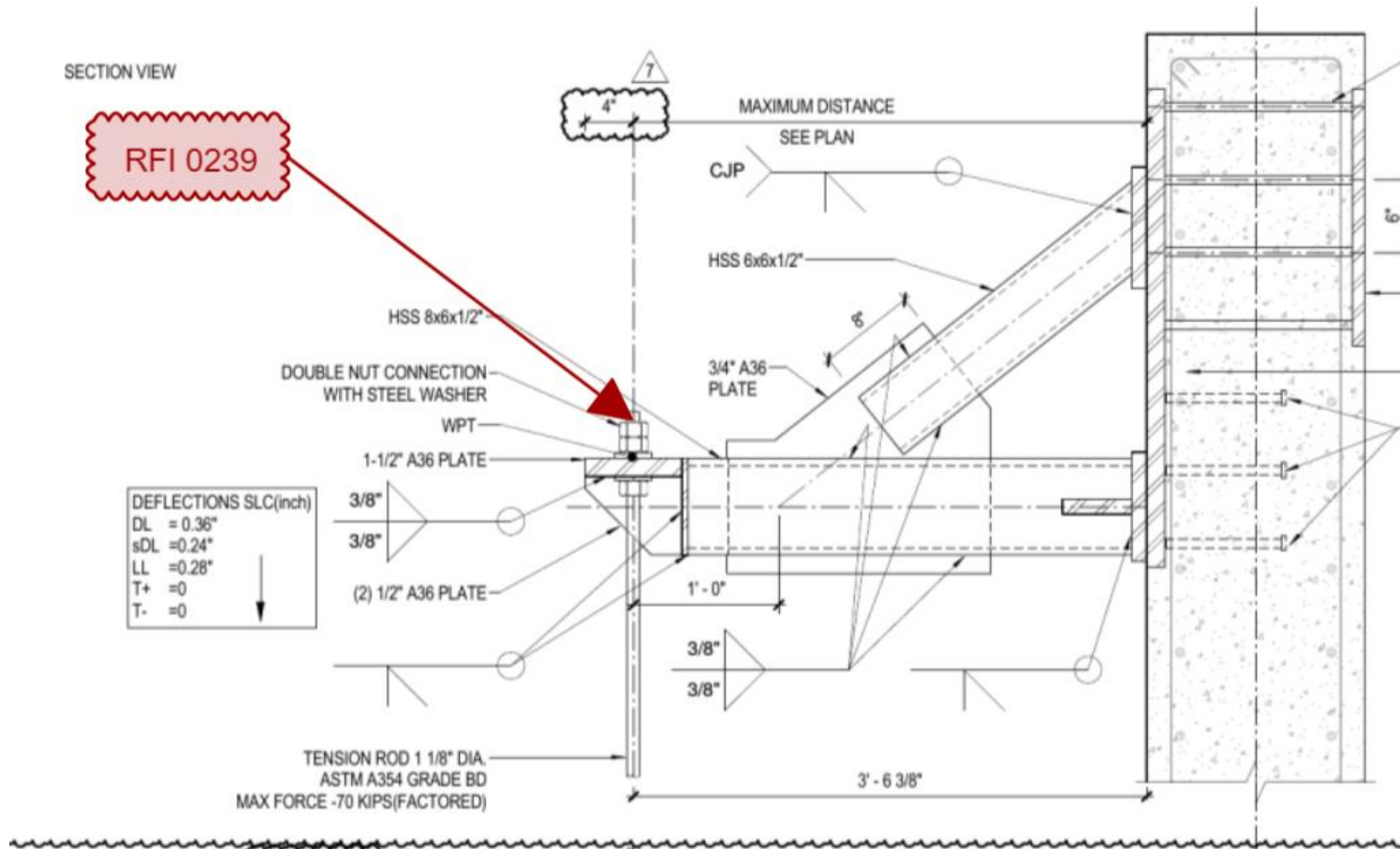


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

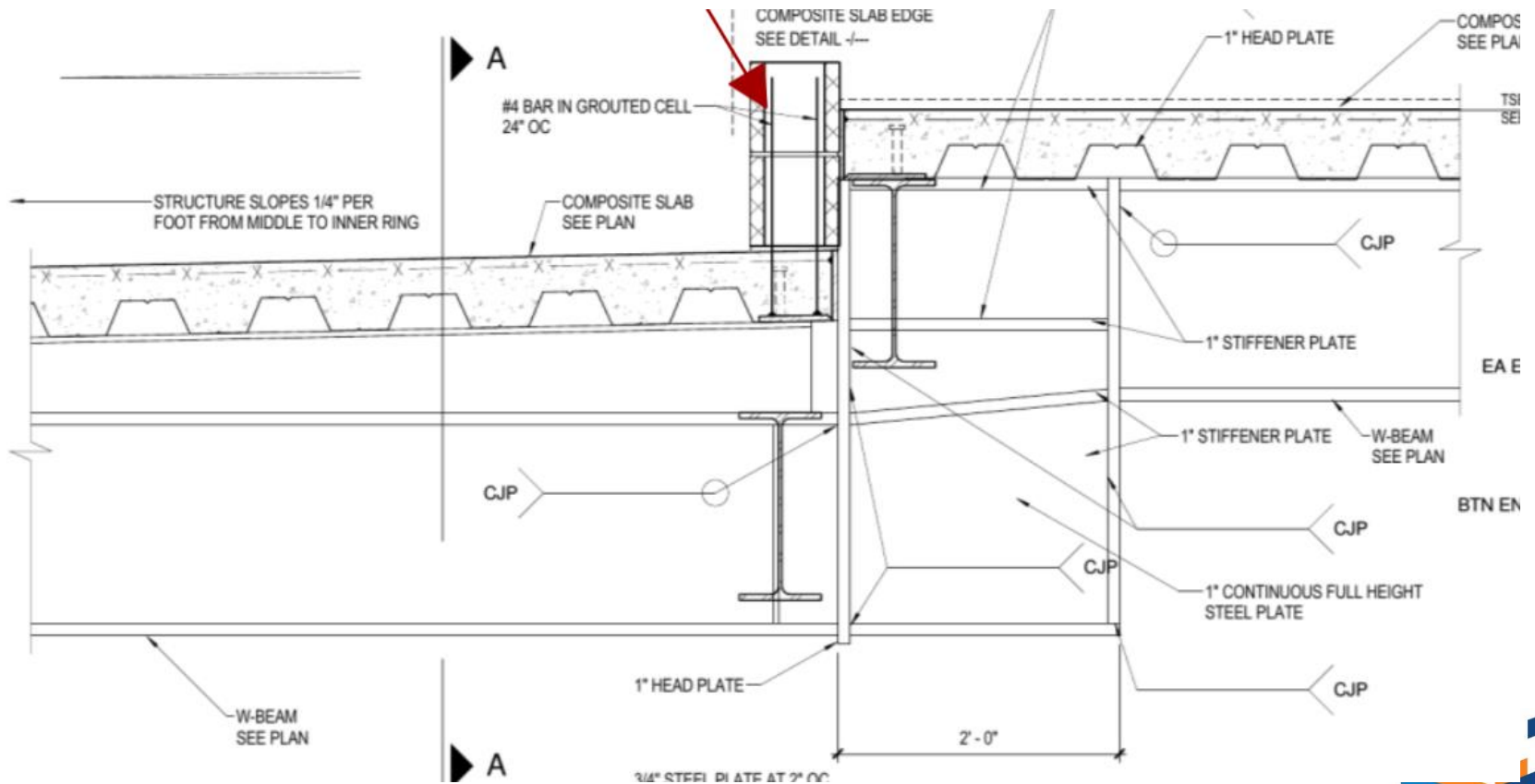


CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – TWO SIDED EMBEDS



CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – ‘STEP BEAMS’



CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – ‘STEP BEAMS’



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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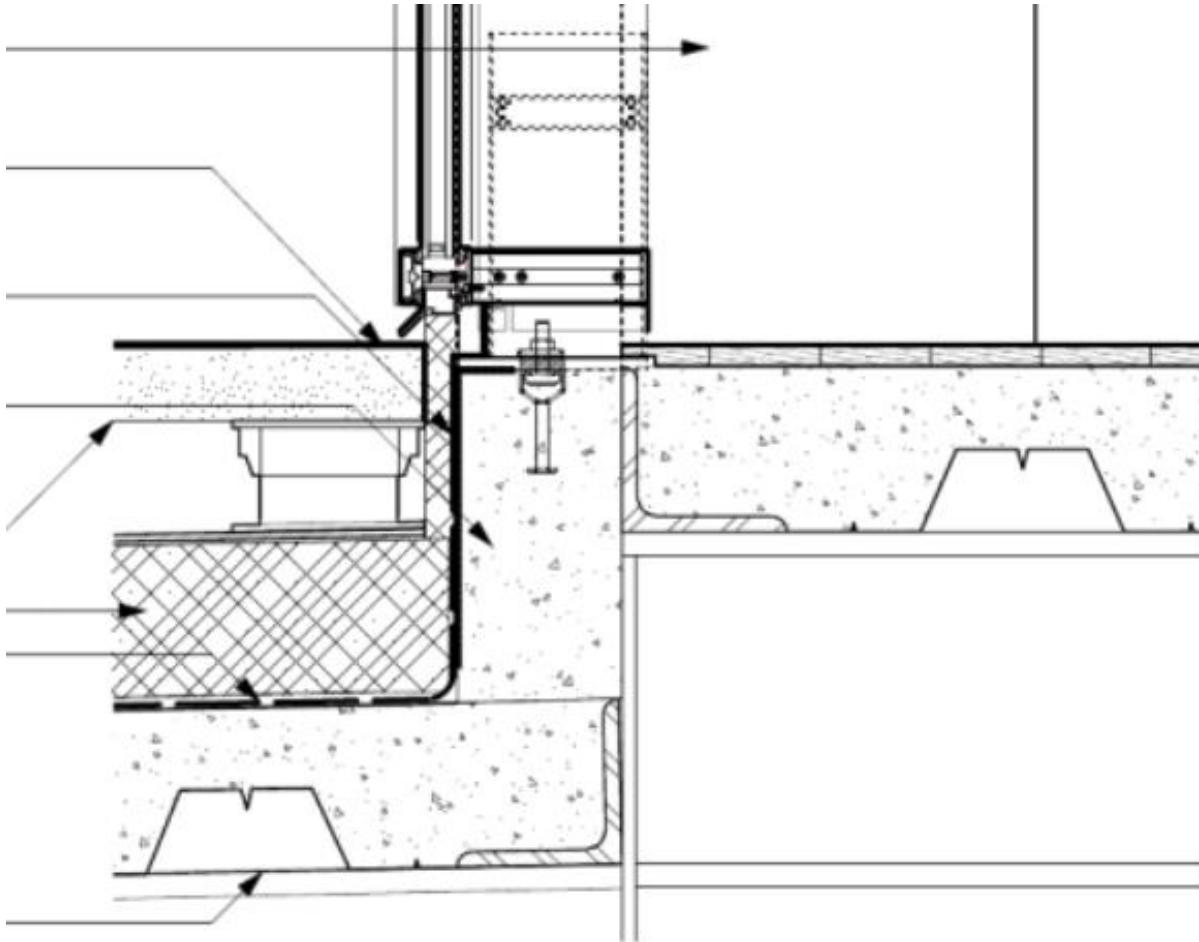


CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – ‘STEP BEAMS’



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – ‘STEP BEAMS’



CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – RADIAL BEAMS



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

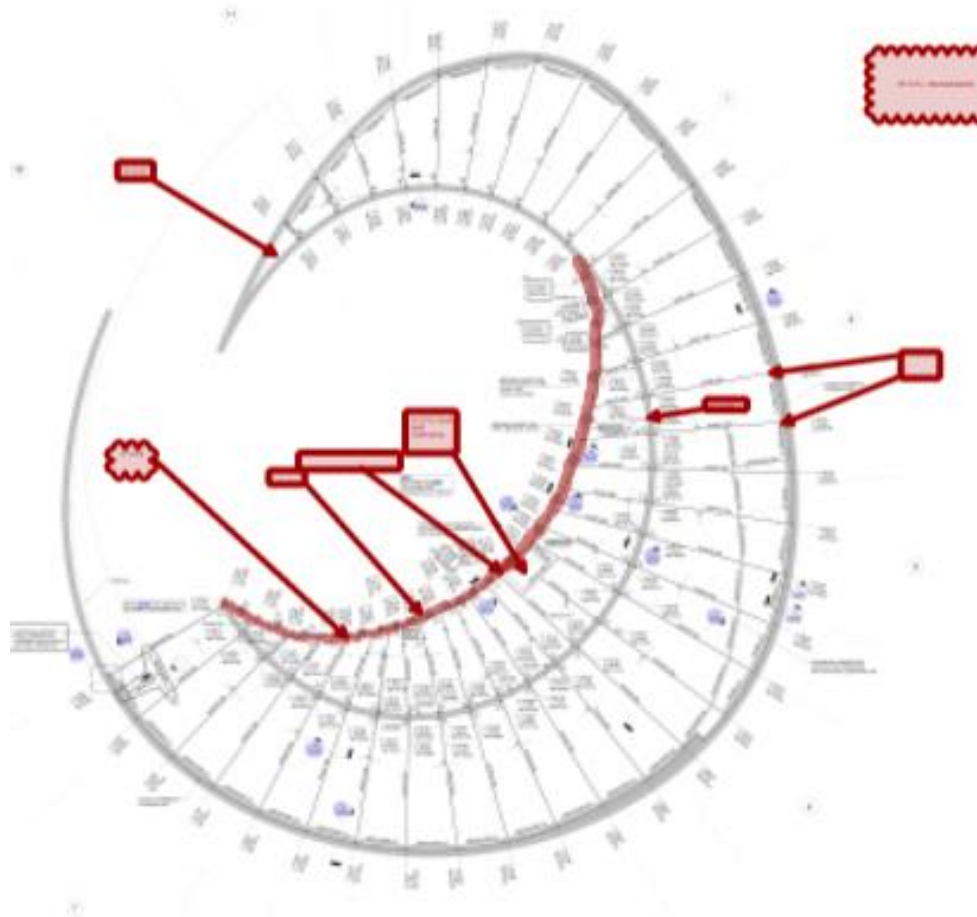


CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – RADIAL BEAMS

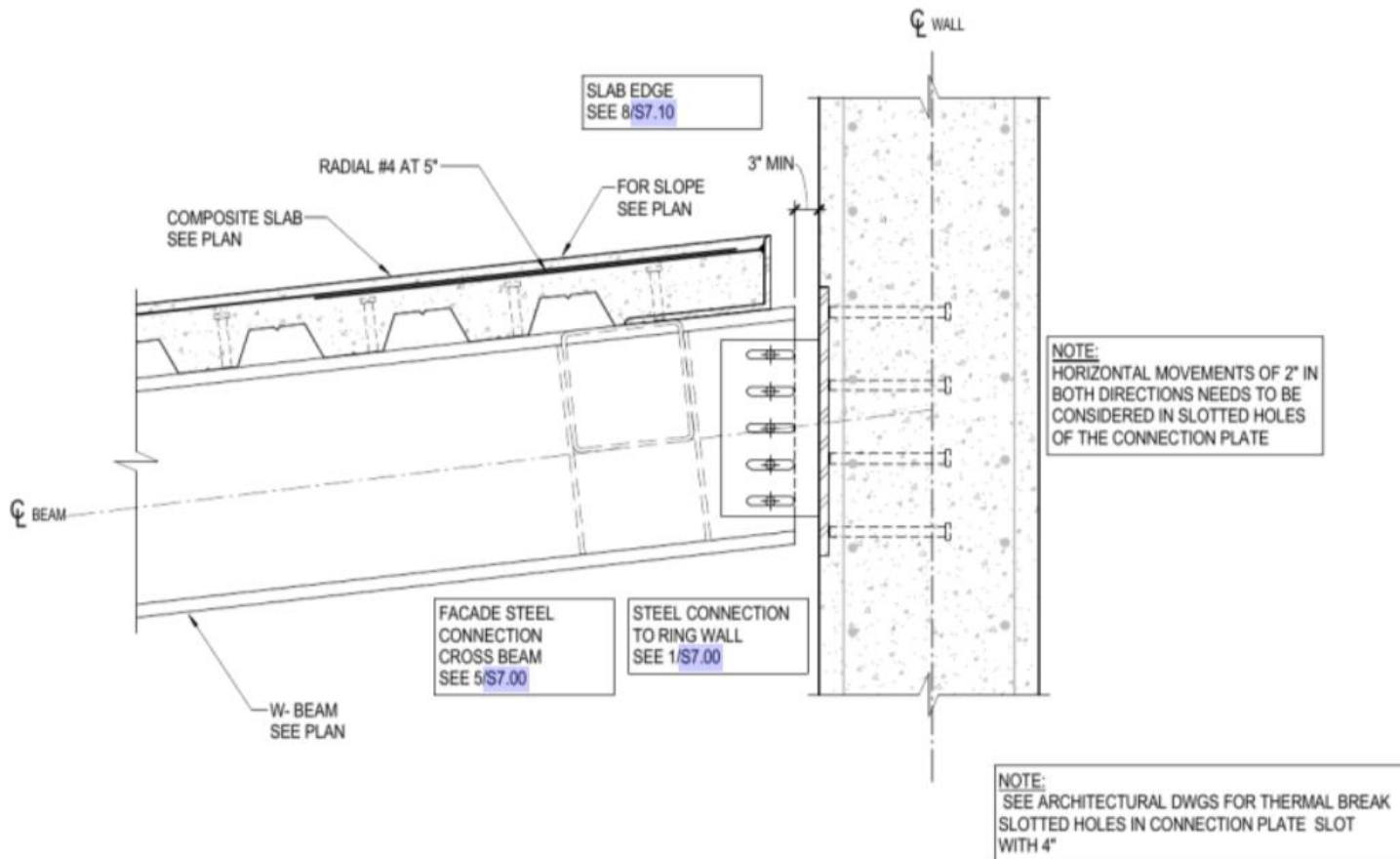


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SLOTTED CONNECTIONS

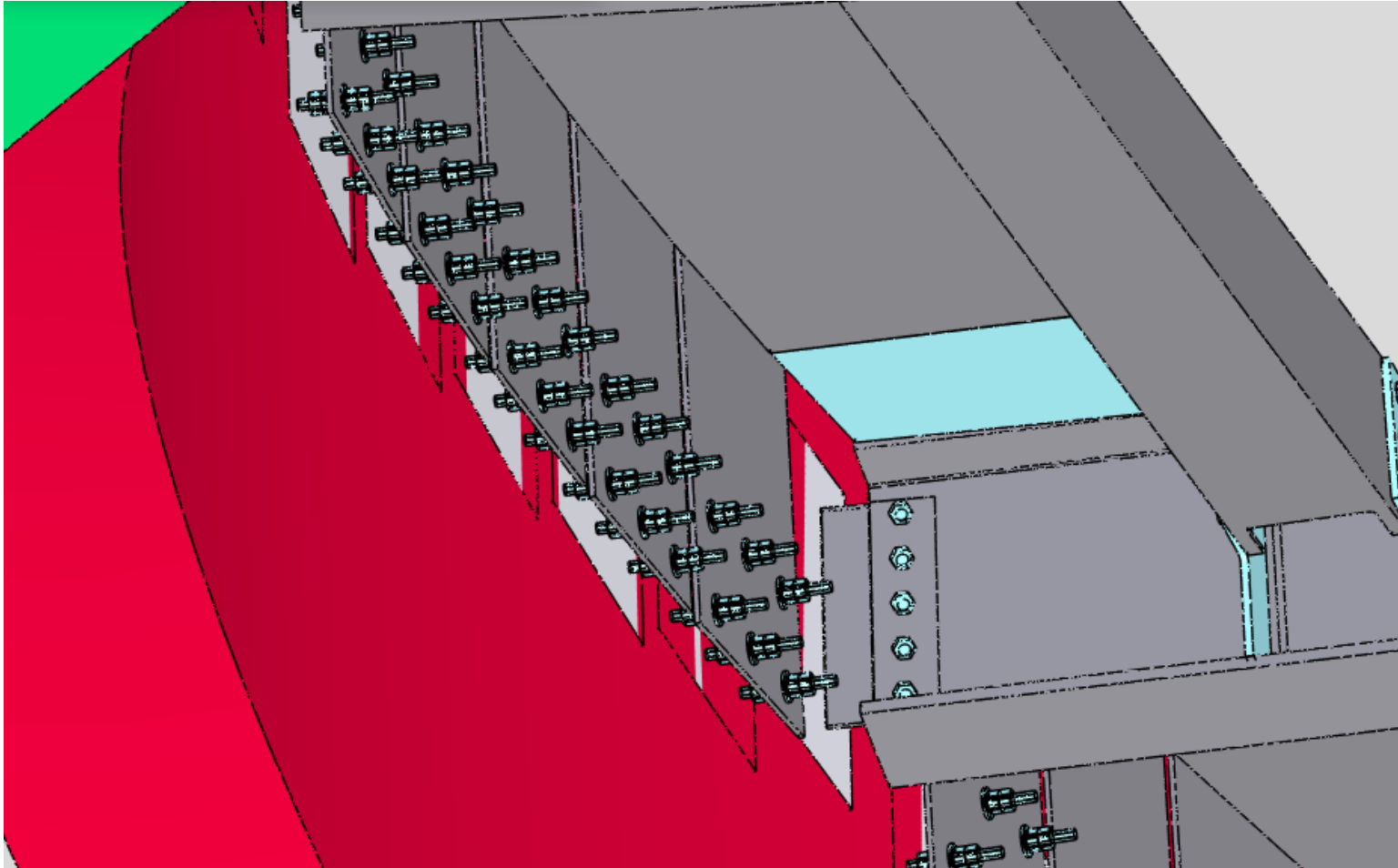


CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SLOTTED CONNECTIONS



CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – SLOTTED CONNECTIONS



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CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – PREDICTED DEFLECTION MOVEMENT

KEY

CASE A: MINIMUM INITIAL DEFLECTION AT THE TIME OF FACADE INSTALLATION

CASE B: MAXIMUM ADDITIONAL DEFLECTION AFTER FACADE INSTALLATION

CASE C: MAXIMUM ADDITIONAL DEFLECTION AFTER FACADE INSTALLATION

MAXIMUM TOTAL DEFLECTION IS SUM OF A AND MAXIMUM OF B OR C

B AND C ARE ALTERNATIVE ESTIMATION METHODS, THE MOST CRITICAL HAS TO BE CONSIDERED

DL 100%xE SELF-WEIGHT DEFLECTION (SHORT TERM)

DL 25%xE SELF-WEIGHT DEFLECTION (SHORT TERM DEFLECTION, PLUS CRACKING, CREEP, AND SHRINKAGE ALLOWANCES)

DL LT SELF-WEIGHT LONG TERM EFFECTS (DL 15%E - DL 100%E)

sDL 100% E APPLIED DEAD LOAD DEFLECTION (SHORT TERM)

sDL 25% E APPLIED DEAD LOAD DEFLECTION (SHORT TERM DEFLECTION, PLUS CRACKING, CREEP, AND SHRINKAGE ALLOWANCES)

LL 50% E LEVELLOAD DEFLECTION (SHORT TERM DEFLECTION PLUS CRACKING)

WL 50% E WIND LOAD DEFLECTION (SHORT TERM DEFLECTION PLUS CRACKING)

TL 50% E TEMPERATURE LOAD DEFLECTION (SHORT TERM DEFLECTION PLUS CRACKING)

ANALYSIS ASSUMPTIONS:

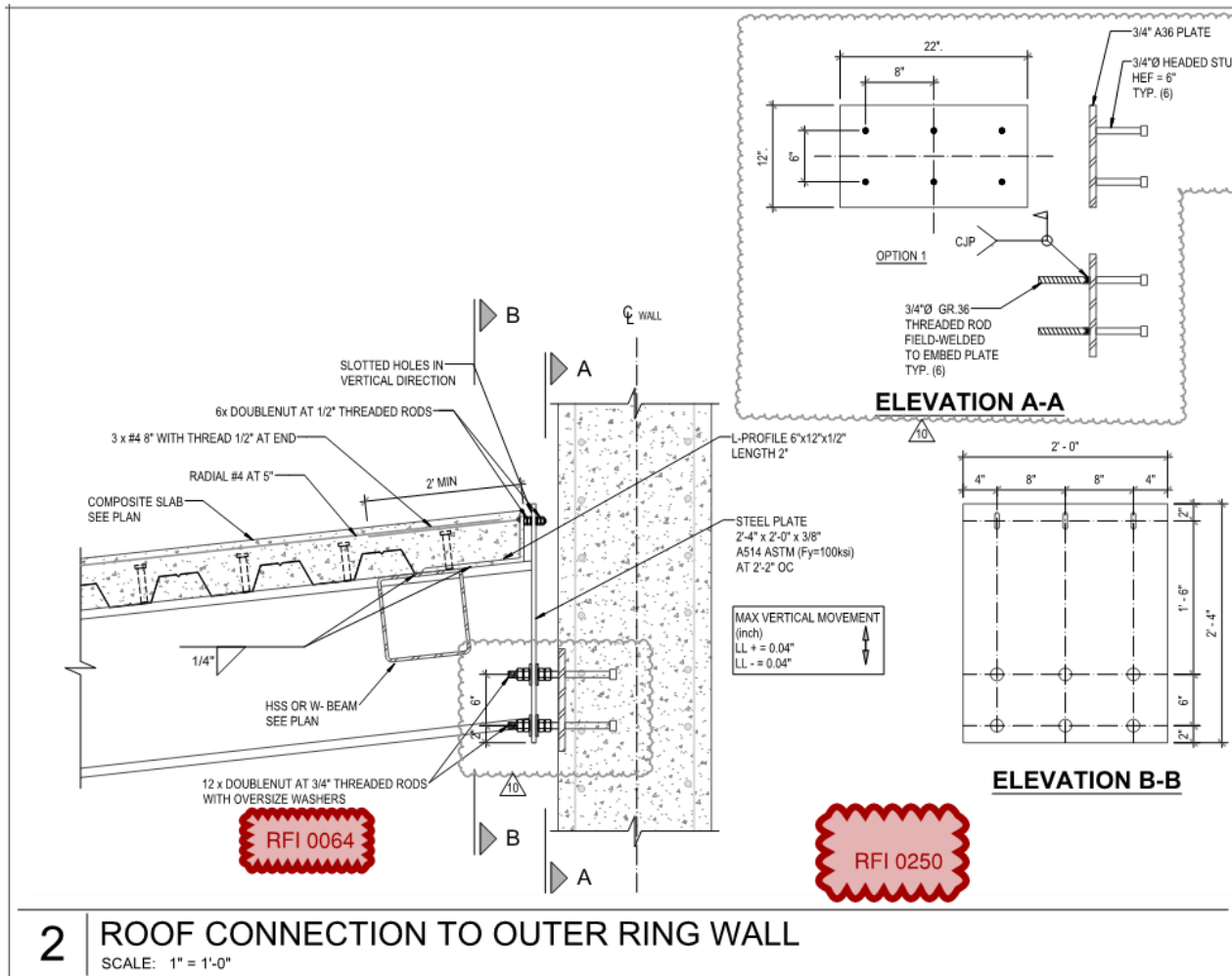
- 1) FACADE IS INSTALLED AFTER BUILDING SELF WEIGHT IS FULLY PRESENT.
- 2) FACADE STEEL MOUNTED TO ACCOUNT FOR SW + sDL DEFLECTIONS.
- 3) ALL FACADE CONNECTION DETAILS TO BE DESIGNED ACCORDING TO MAX. AND MIN. DEFLECTIONS.
- 4) CONCRETE TOLERANCES HAVE TO BE TAKEN INTO ACCOUNT ADDITIONALLY (NOT INCLUDED HERE).
- 5) CONCRETE DEFLECTIONS ARE IMPOSSIBLE TO PREDICT PRECISELY BECAUSE THEY DEPEND ON SOMANY FACTORS OUT OF THE STRUCTURAL ENGINEER'S CONTROL, BUT WILL MOST LIKELY OCCUR INTHE RANGE BETWEEN MIN.TOTAL AND MAX. TOTAL.
- 6) MANY CIRCUMSTANCES HAVE INFLUENCE ON THE DEFLECTIONS THAT CANNOT BE PREDICTED, SO, FINAL DEFLECTION CAN ALSO BE MORE OR LESS THAN GIVEN HERE.

4 BING THE TOPPING DEFLECTION TABLE

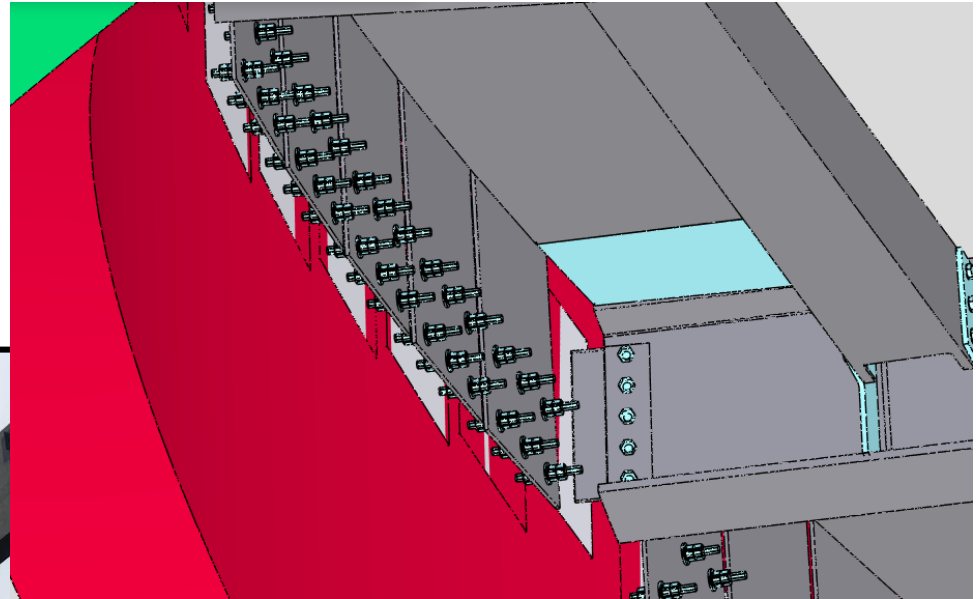
OVMM

93.80

CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SPRING PLATES



CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SPRING PLATES



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SPRING PLATES

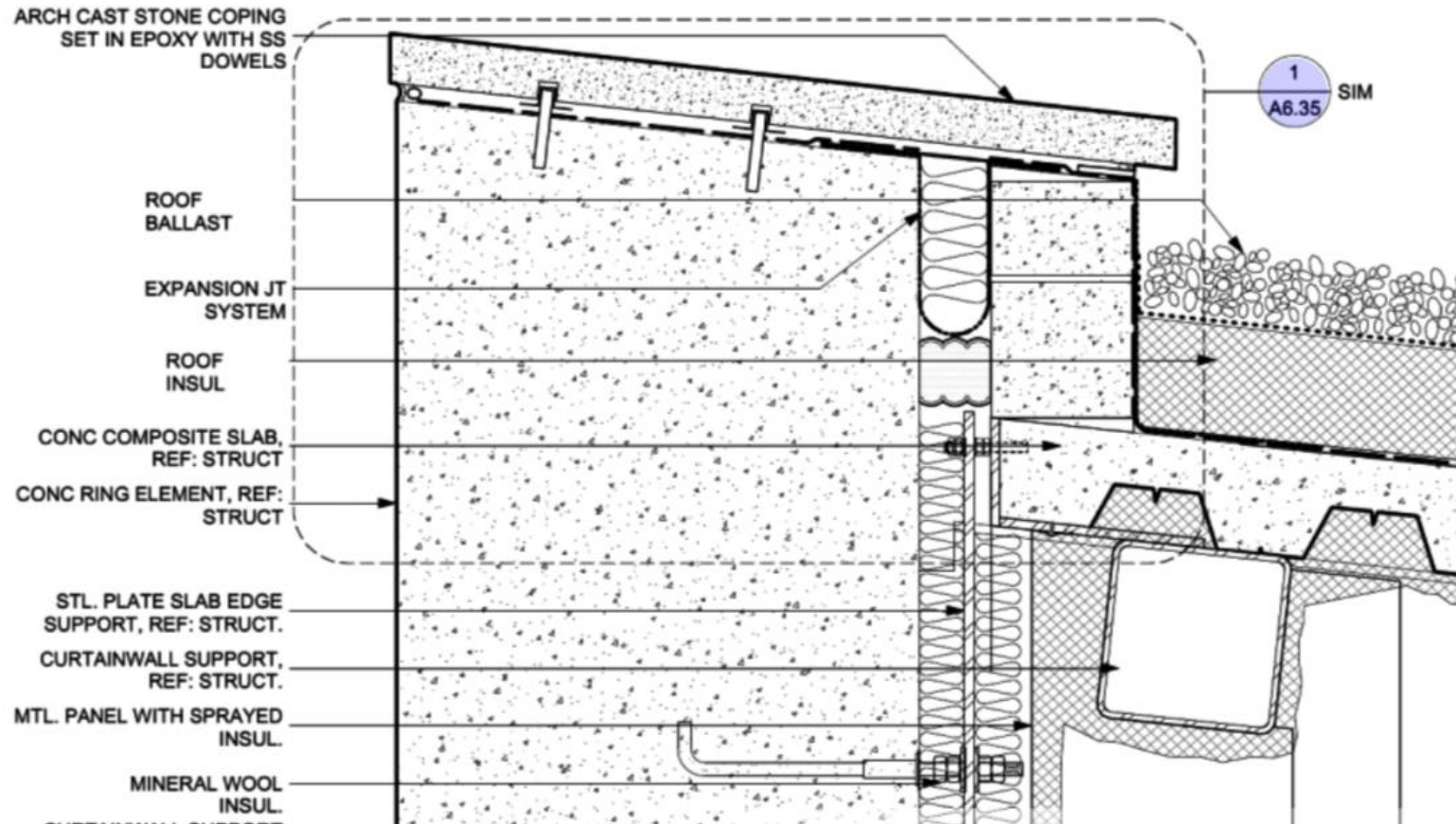


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SPRING PLATES

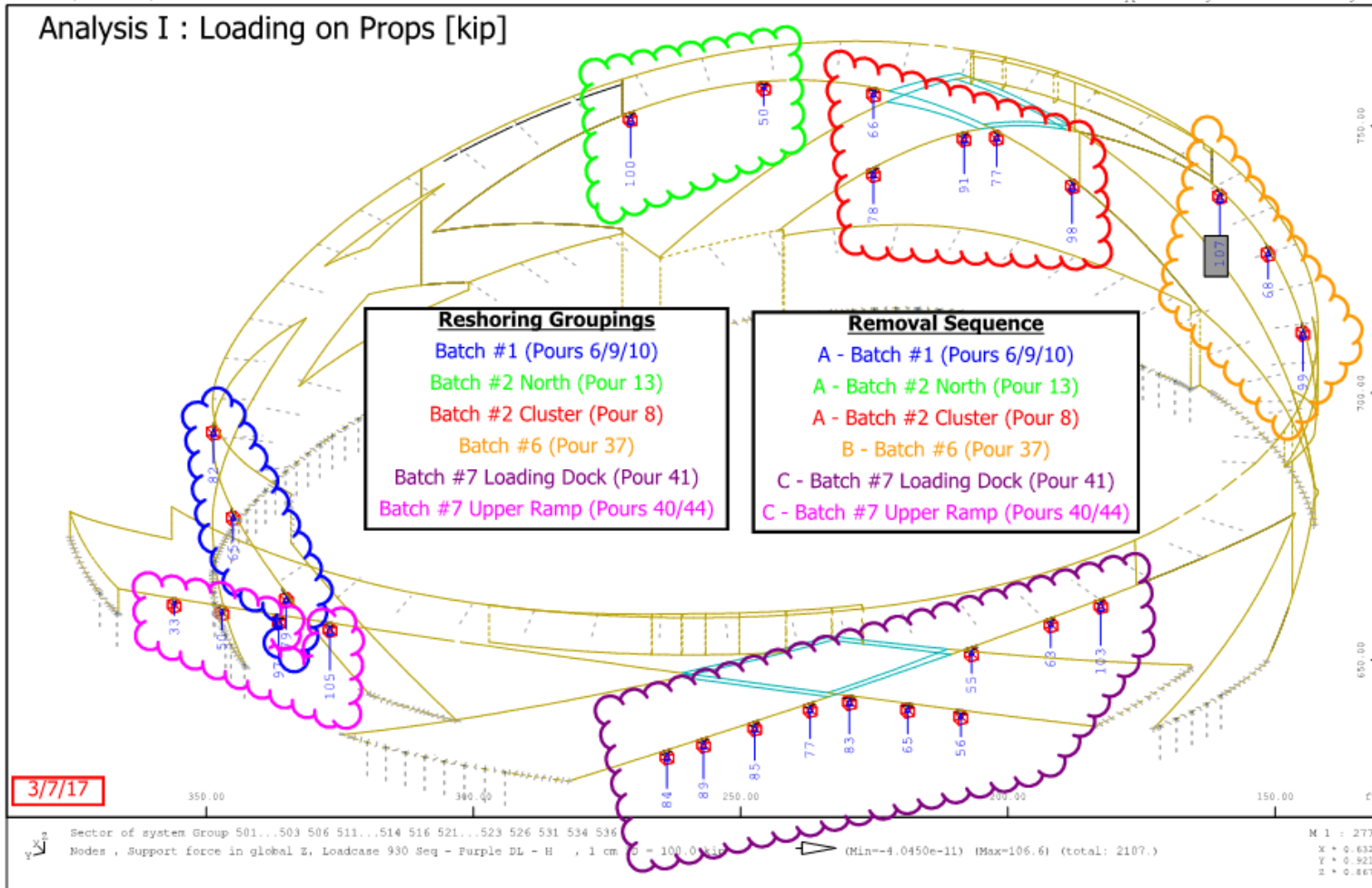


CIVIL/STRUCTURAL – RESHORING

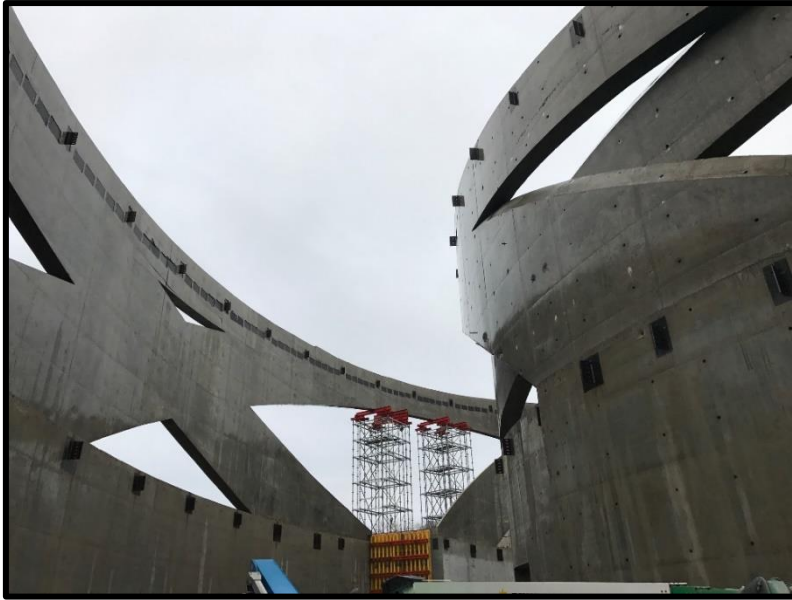
WinGraf (V 17.14-30) 9.09.2016

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Analysis I : Loading on Props [kip]



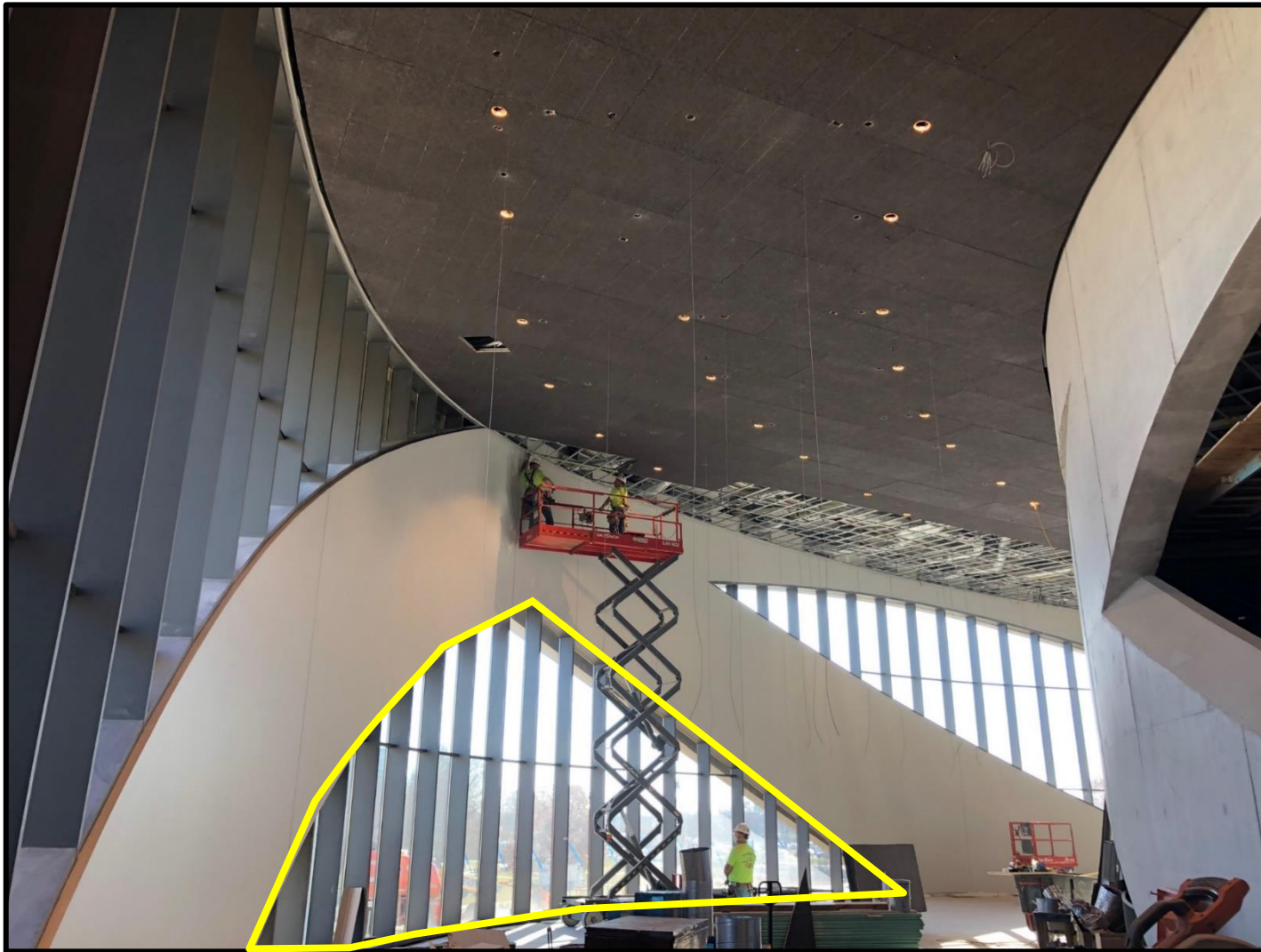
CIVIL/STRUCTURAL – RESHORING



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CUSTOM EXTERIOR WALL

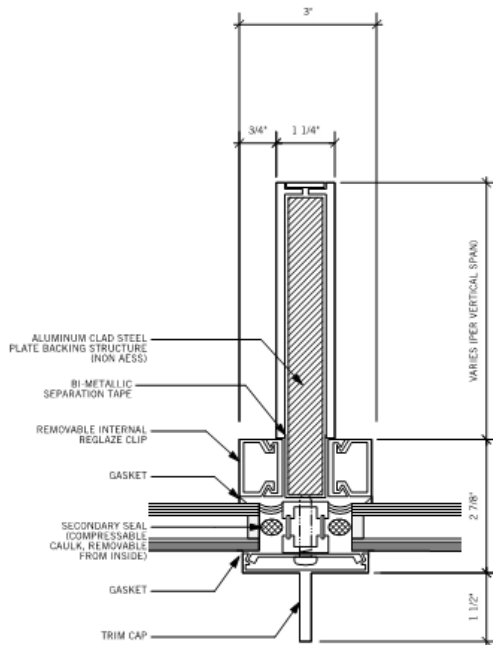


THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

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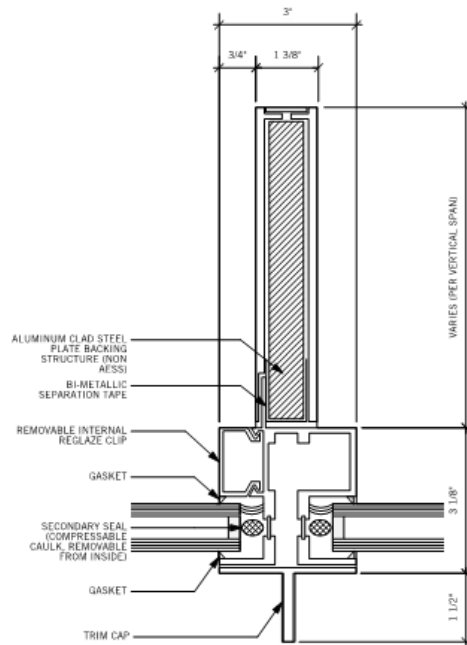


CUSTOM EXTERIOR WALL

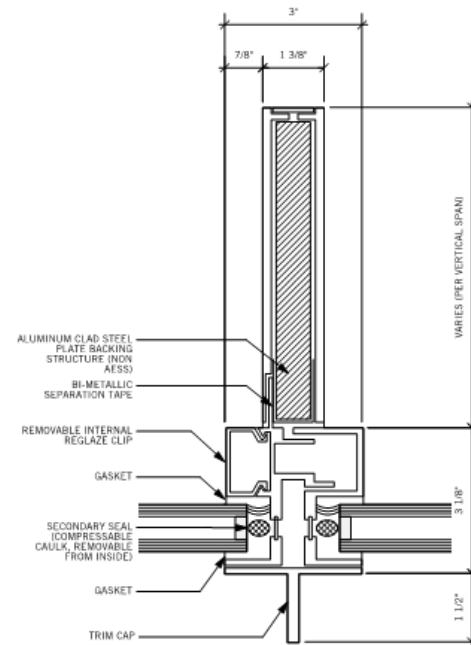


A. COMPONENT SYSTEM

(ALT. DEDUCT - STEEL PLACEMENT PROHIBITS WEEP DRAIN CAVITY)



B. STICK SYSTEM



C. UNITIZED SYSTEM

3 BYPASS CURTAINWALL SYSTEM OPTIONS Scale: Half Actual Size

ALL OPTIONS MEET DESIGN CRITERIA. SYSTEM WILL BE SELECTED THROUGH FURTHER DESIGN DEVELOPMENT AND CONTRACTOR FEEDBACK

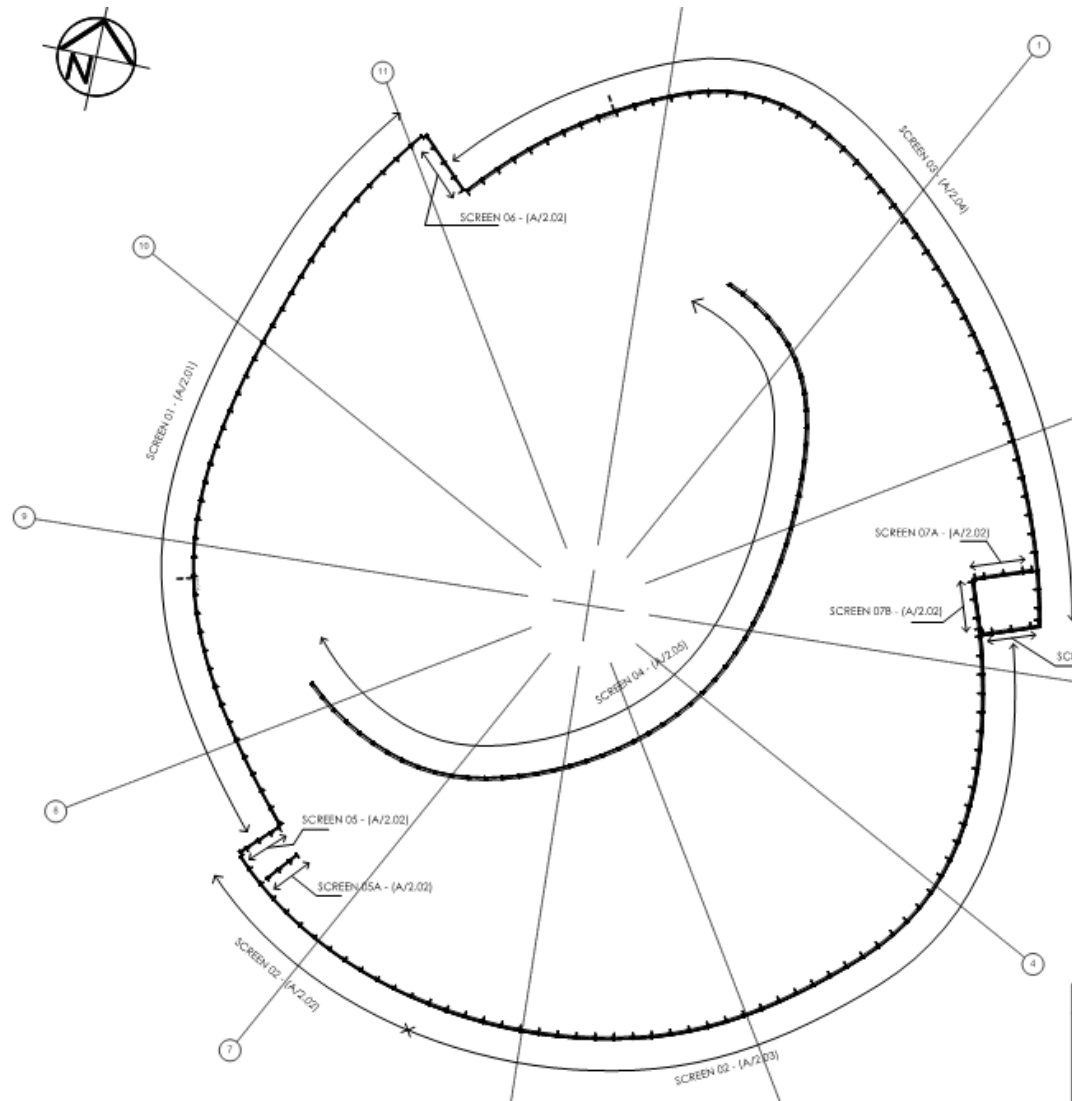
MULLION PROFILES - EARLY DESIGN OPTIONS

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CUSTOM EXTERIOR WALL

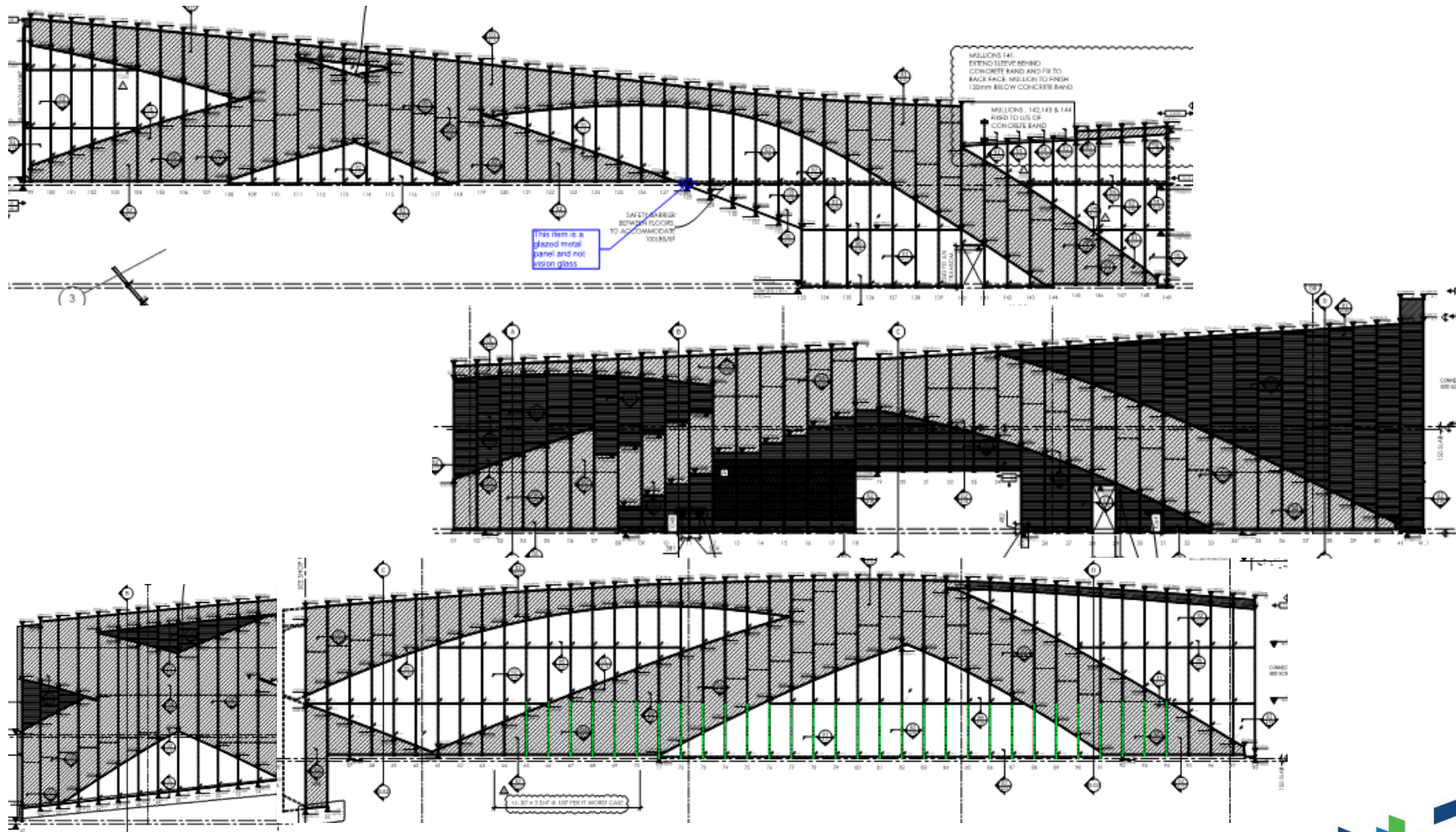


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CUSTOM EXTERIOR WALL



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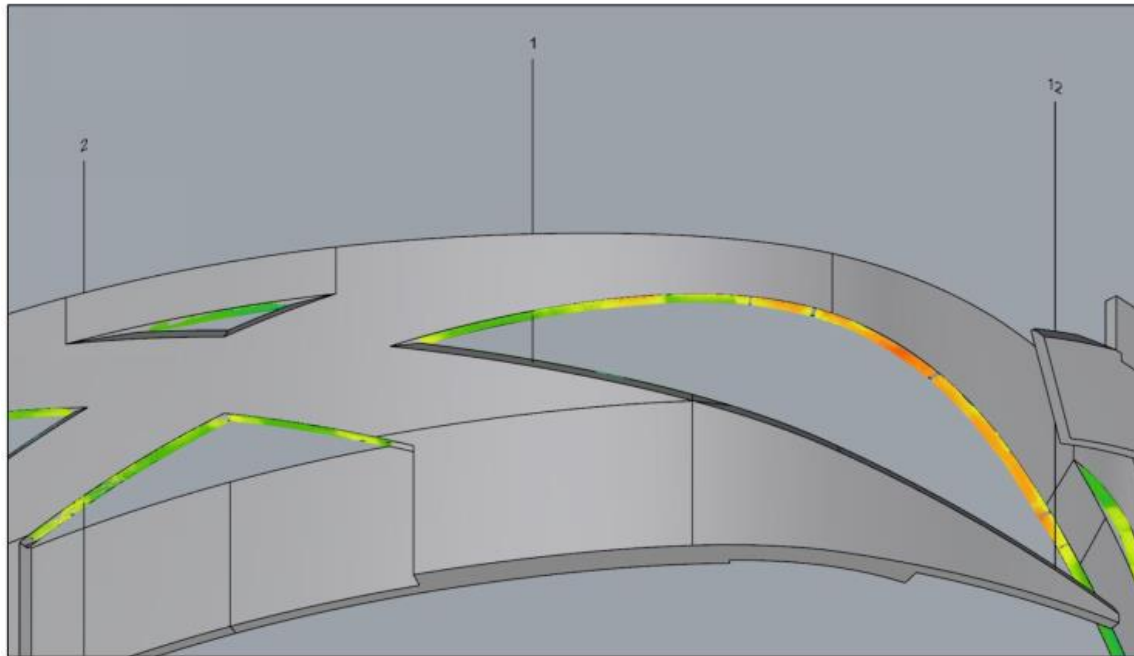
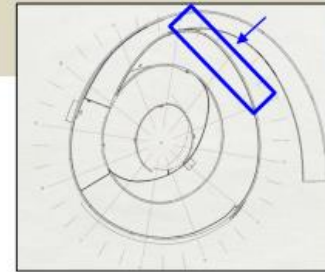
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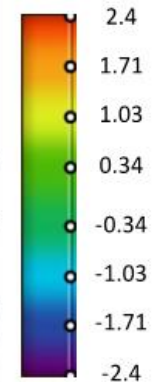
CUSTOM EXTERIOR WALL TOLERANCE DEVIATION REPORTING VIA 3D SCAN

Sloped Concrete Surfaces

- Between gridlines 12 to 2
- Viewed from exterior and below



Scale (inches)



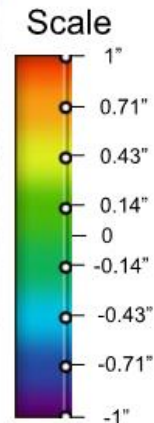
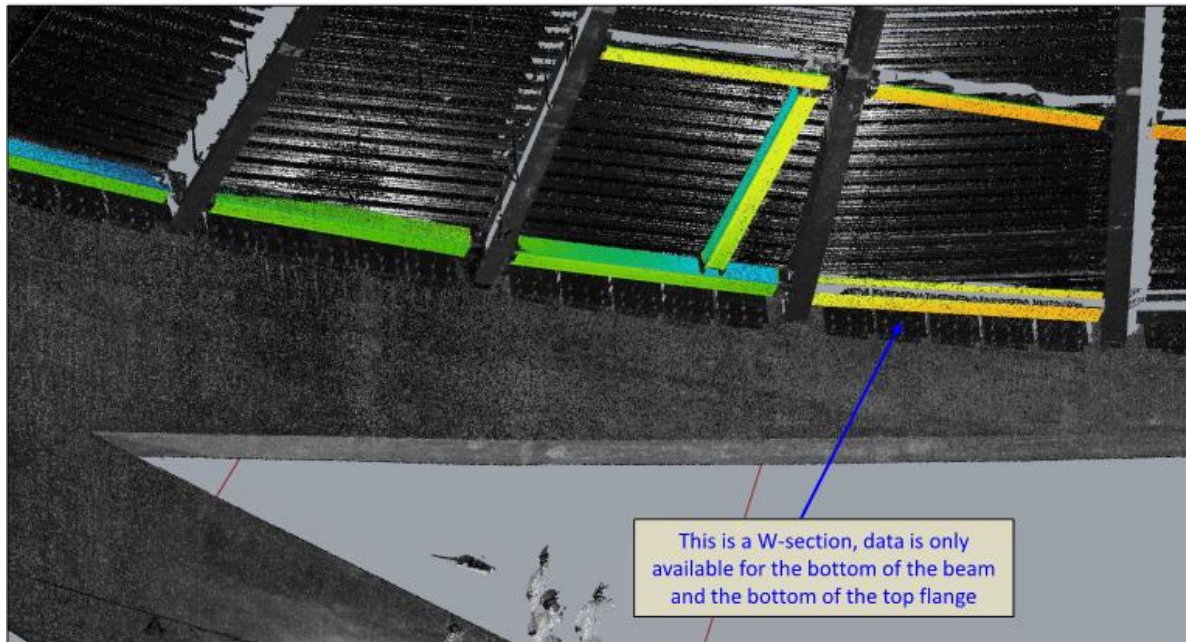
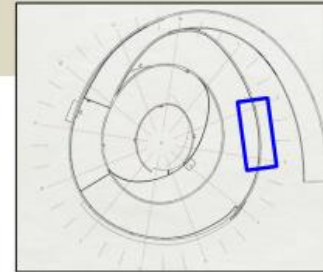
3

CIVIL/STRUCTURAL – STEEL FRAME

UNIQUE FEATURES – SPRING PLATES

Beams Above Top Anchors

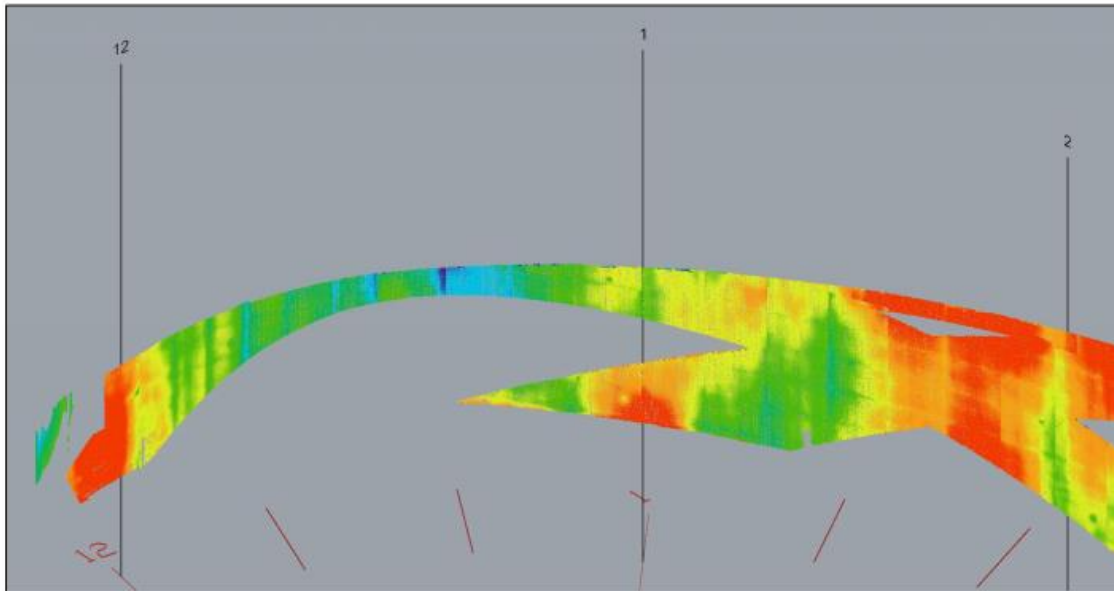
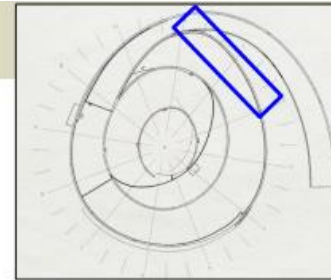
- Between gridlines 2 to 3
- Viewed from below



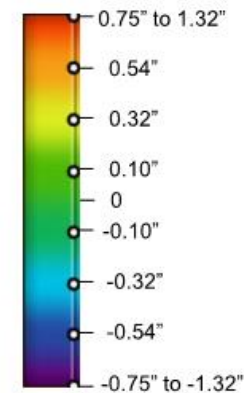
CIVIL/STRUCTURAL – STEEL FRAME UNIQUE FEATURES – SPRING PLATES

Concrete Walls in Front of Mullions

- Between gridlines 12 to 2
- Viewed from above



Scale



CUSTOM EXTERIOR WALL



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CUSTOM EXTERIOR WALL



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

 **CONCRETE
CONVENTION**



CUSTOM EXTERIOR WALL



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



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CUSTOM ROOF



THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE



CUSTOM FINISHES

RADIAL WOOD SLAT ACOUSTIC CEILING



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 **CONCRETE
CONVENTION**



CUSTOM FINISHES

OAK BUTCHER BLOCK FLOORING



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Q & A

THE WORLD'S GATHERING PLACE FOR ADVANCING CONCRETE

