

SKANSKA

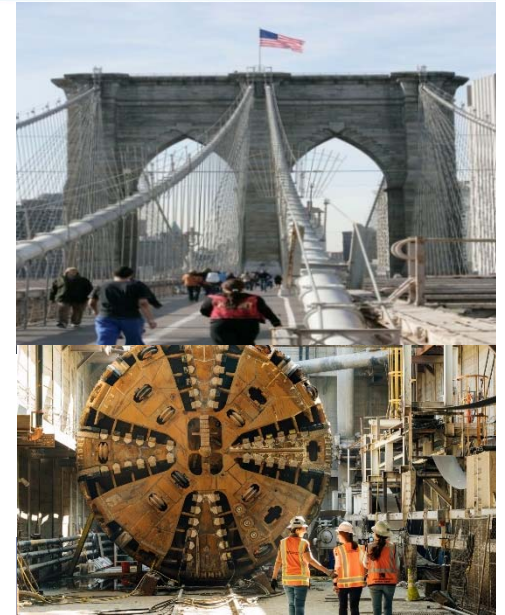
Evolution of BIM in Bridges & Structures

February 27, 2018

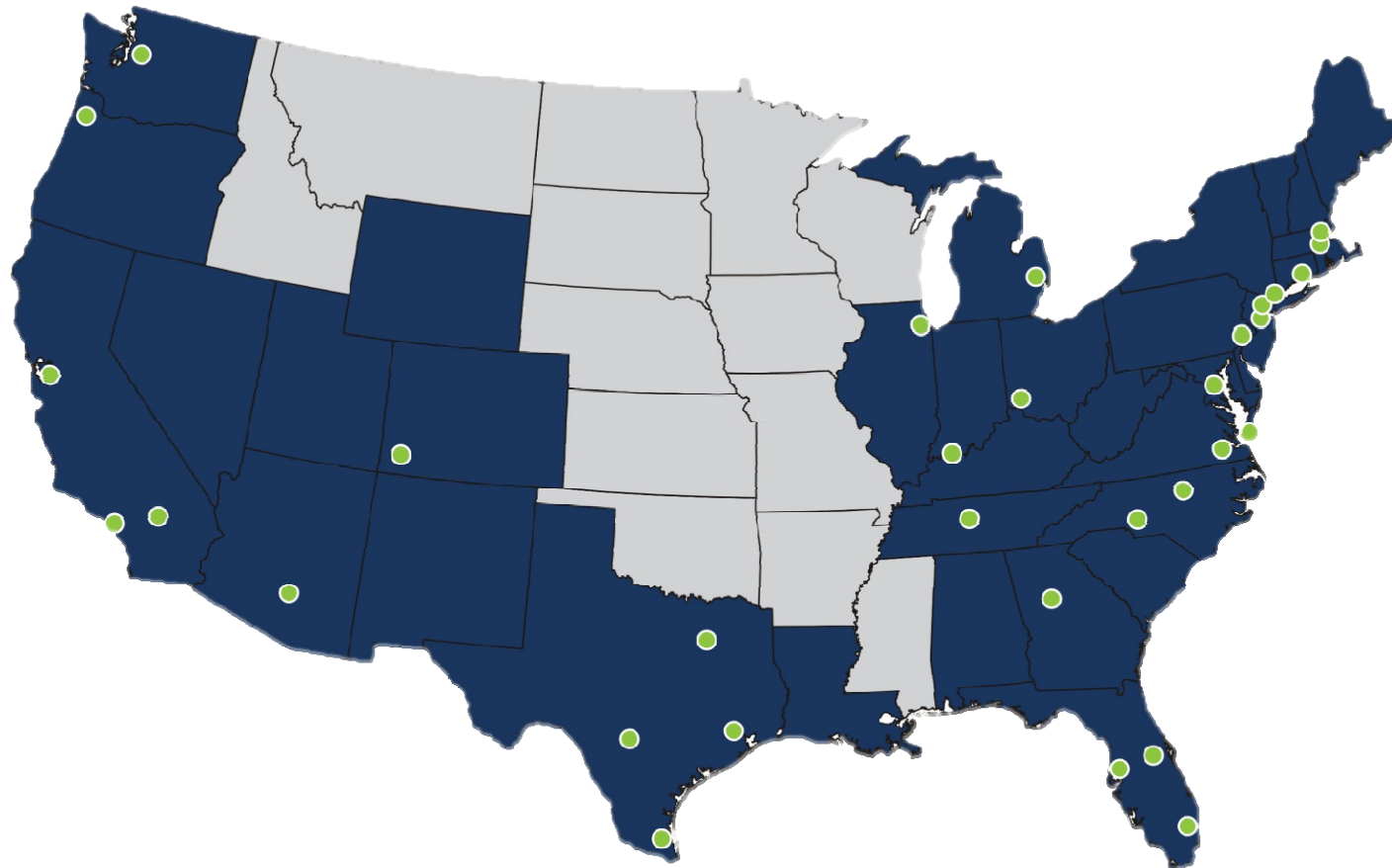


Skanska USA

- Four business units operate in the U.S.
 - Building
 - Civil
 - Commercial Development
 - Infrastructure Development
- Revenues of \$2.29 billion in 2017
- 10,000+ employees in 31 metro areas
- Headquarters in New York, NY



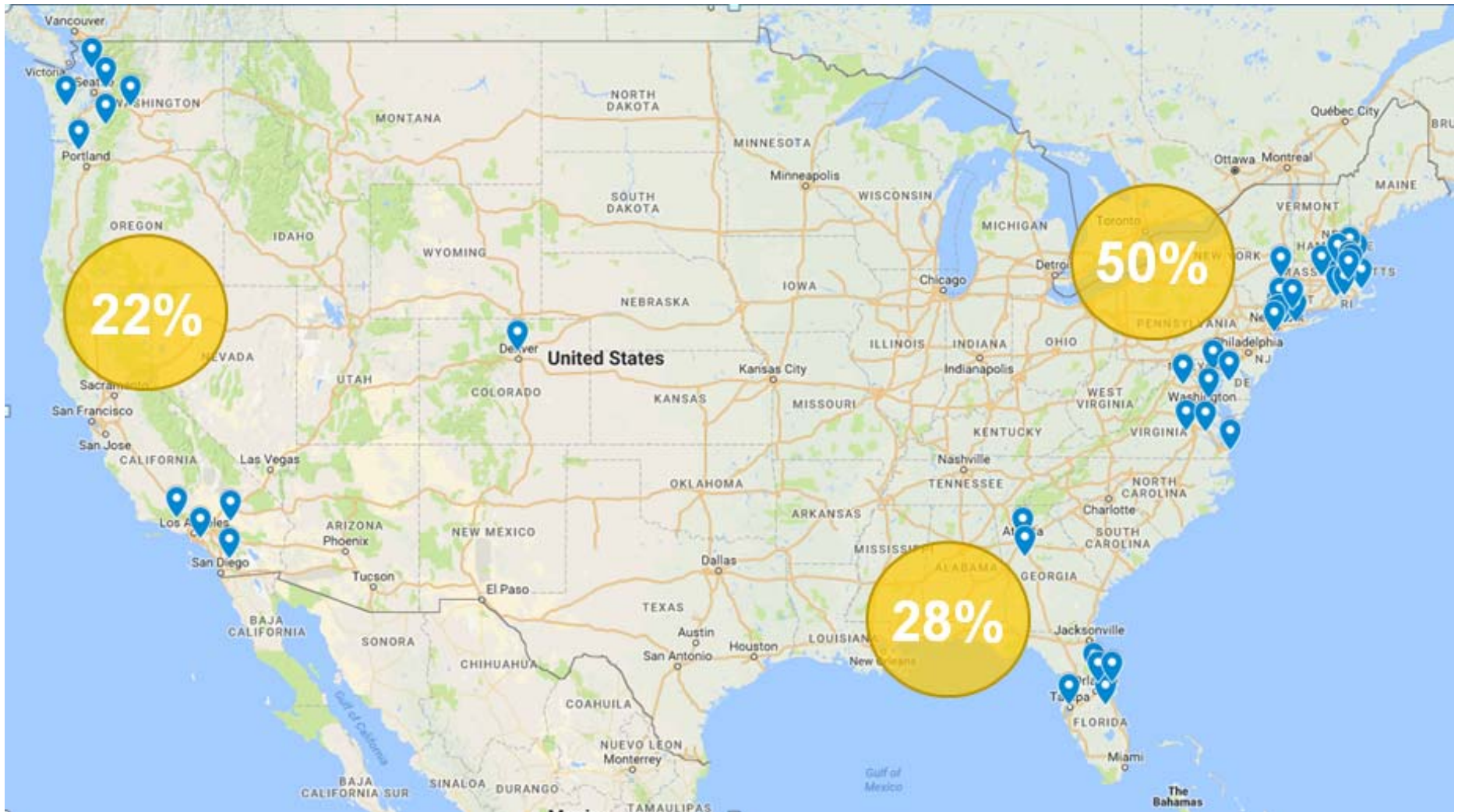
Our Geographic Reach



Green
represents
cities where
we have offices.

Dark Blue
represents
states where
we have active
projects.

Where is the VDC Work ...



2017 Jobs

Skanska BIM/VDC

BUILDING DESIGN + CONSTRUCTION

2017 Giants
300 Report

TOP 85 BIM CONSTRUCTION FIRMS

RANK	COMPANY	2016 BIM REVENUE
1	Turner Construction Co.	\$7,623,103,019
2	Gilbane Building Co.	\$4,164,458,000
3	Whiting-Turner Contracting Co., The	\$4,022,160,500
4	Skanska USA	\$3,760,525,735
5	Clark Group	\$3,695,483,301

Christopher Hersey, LEED AP, CS VDC Operations Manager



Twenty years of experience in project management for heavy civil and vertical construction projects. Preconstruction, BD, estimating, proposals, project operations.

10 Years in Vertical Construction

10 Years in Heavy Civil

Christopher Hersey, LEED AP, CS VDC Operations Manager



Experience on Multiple Types of Contracts:

- Design Bid Build
- Design Build
- Progressive Design Build
- GMP
- Chapter 149A
- CM / GC
- PPP

Project Type Allocation of VDC ...

- Design Bid Build 10%
- CM/GC 20%
- PPP 20%
- Design Build 50%



Project Procurement Process

Business
Development

Teaming

Design-Build
Planning

Estimating

Proposal
Production

Execution

Operations &
Maintenance

PREVIOUS

DESIGN

HCSS

In-Design

Document
Control

CURRENT

Graphics for
Proposal

SKANSKA

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BIM Model –
**Constructability
Analysis**



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BIM Model – Design Assist

Civil 3D, 3dsMAX

DESIGN



Project Procurement Process

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Constructability

Design Assist

BIM Model – Quantities

Civil 3D, 3dsMAX

DESIGN

Civil 3D, Revit

HCSS

Project Procurement Process

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Constructability

Design Assist

Quantities

BIM Model – **Visualization**

Civil 3D, 3dsMAX

4D Simulation
3dsMAX
Renderings

DESIGN

In-Design

Civil 3D, Revit

HCSS

Project Procurement Process

Business Development Teaming Design-Build Planning Estimating Proposal Production Execution Operations & Maintenance

PREVIOUS

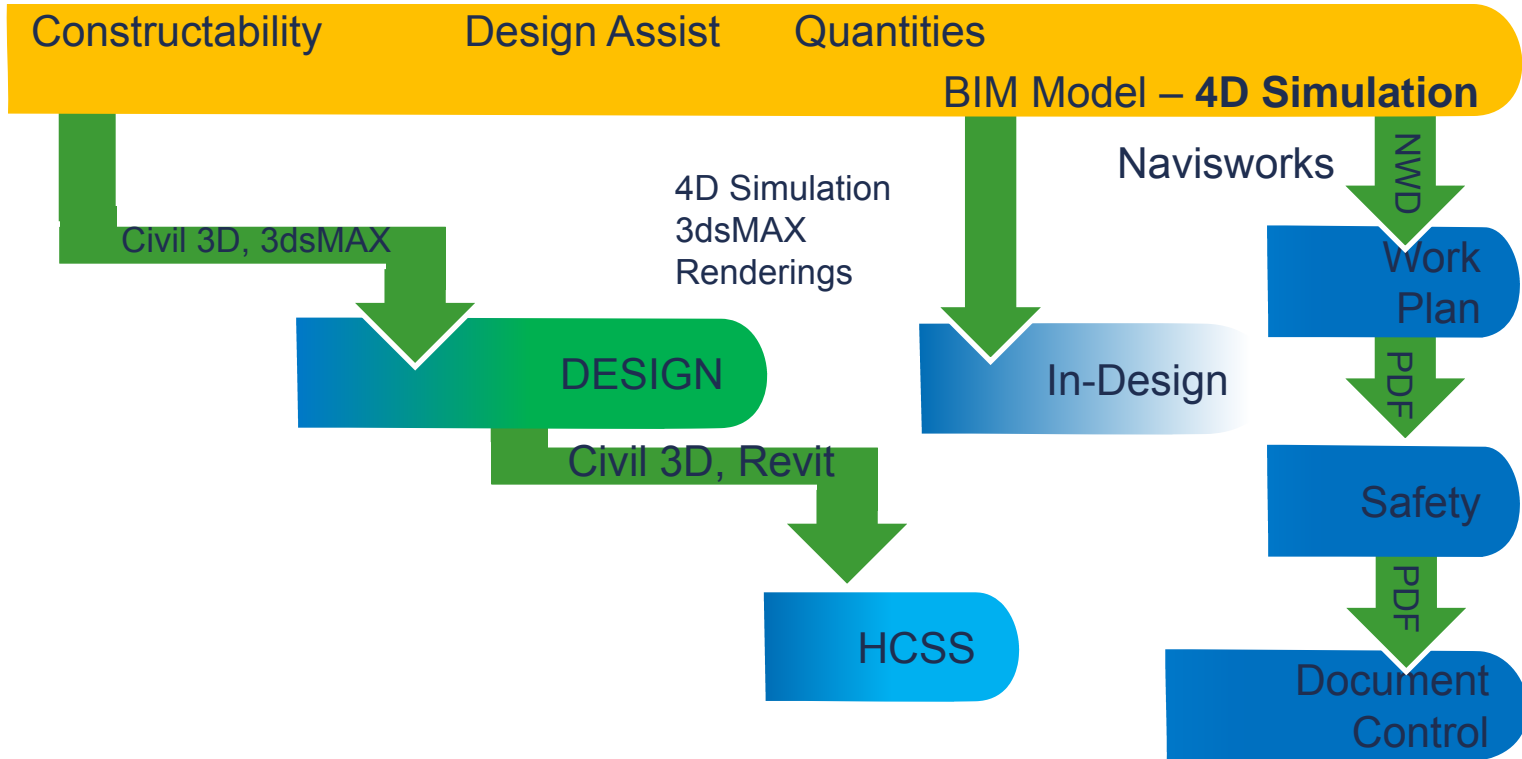
DESIGN

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Project Procurement Process

Business Development Teaming Design-Build Planning Estimating Proposal Production Execution Operations & Maintenance

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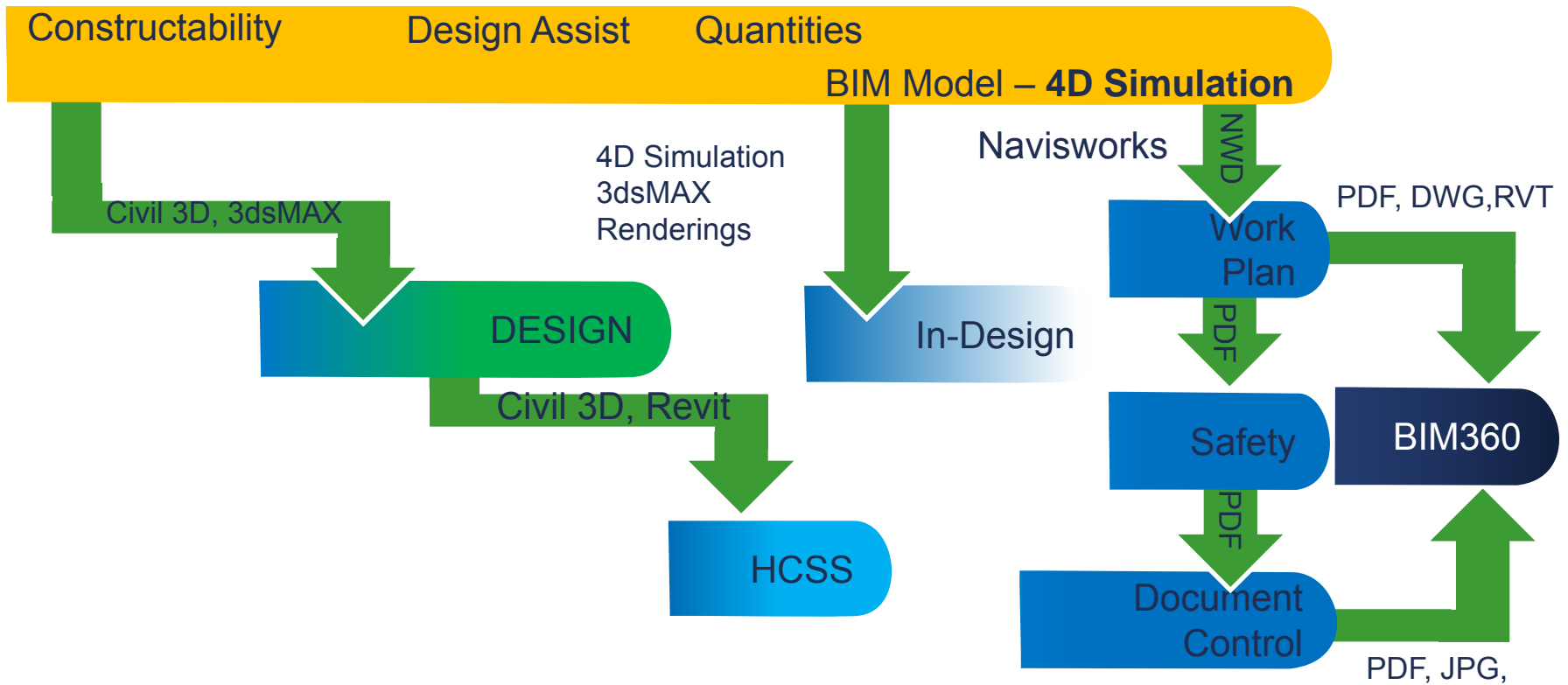
DESIGN

HCSS

In-Design

Document Control

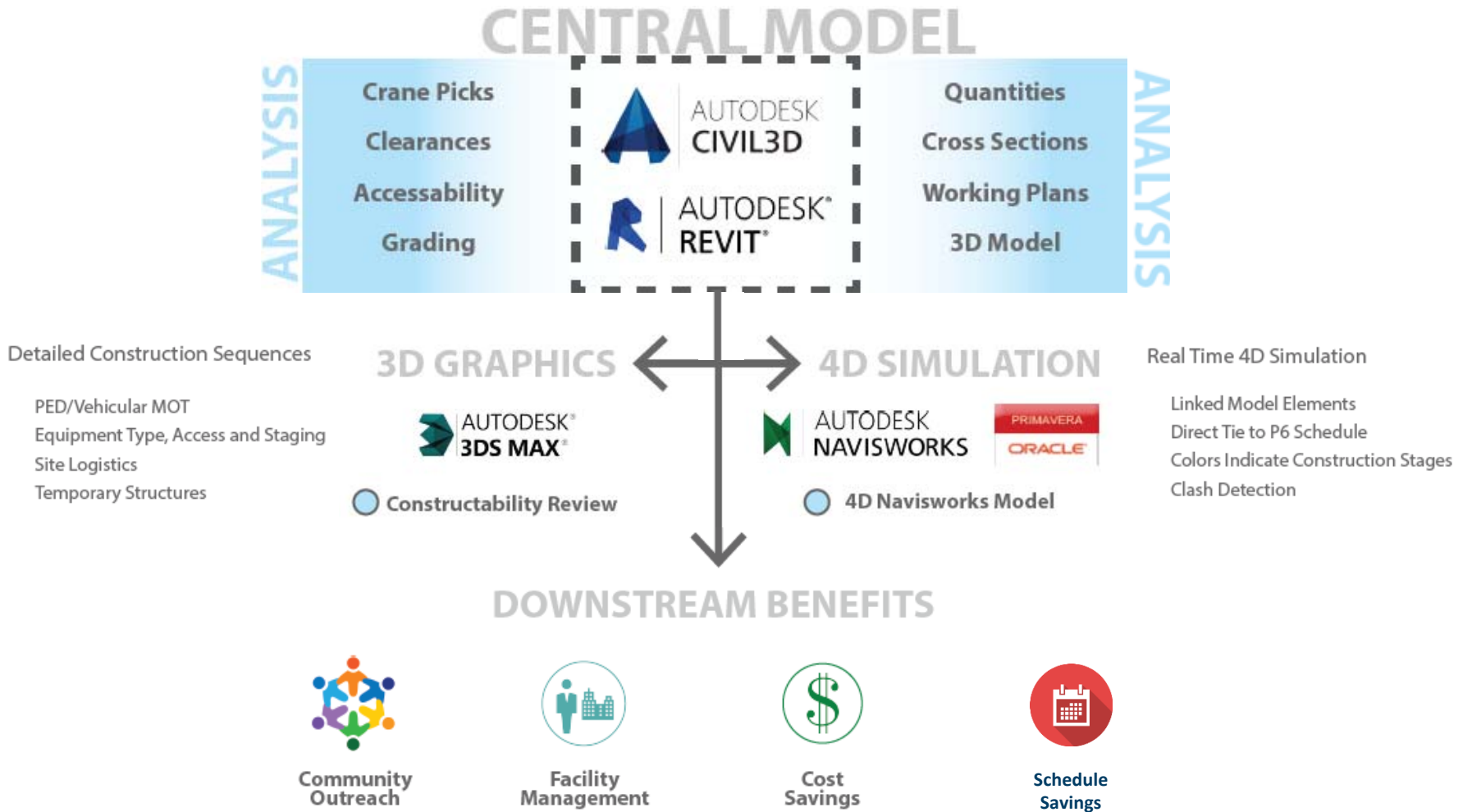
CURRENT



SOFTWARE WE USE:

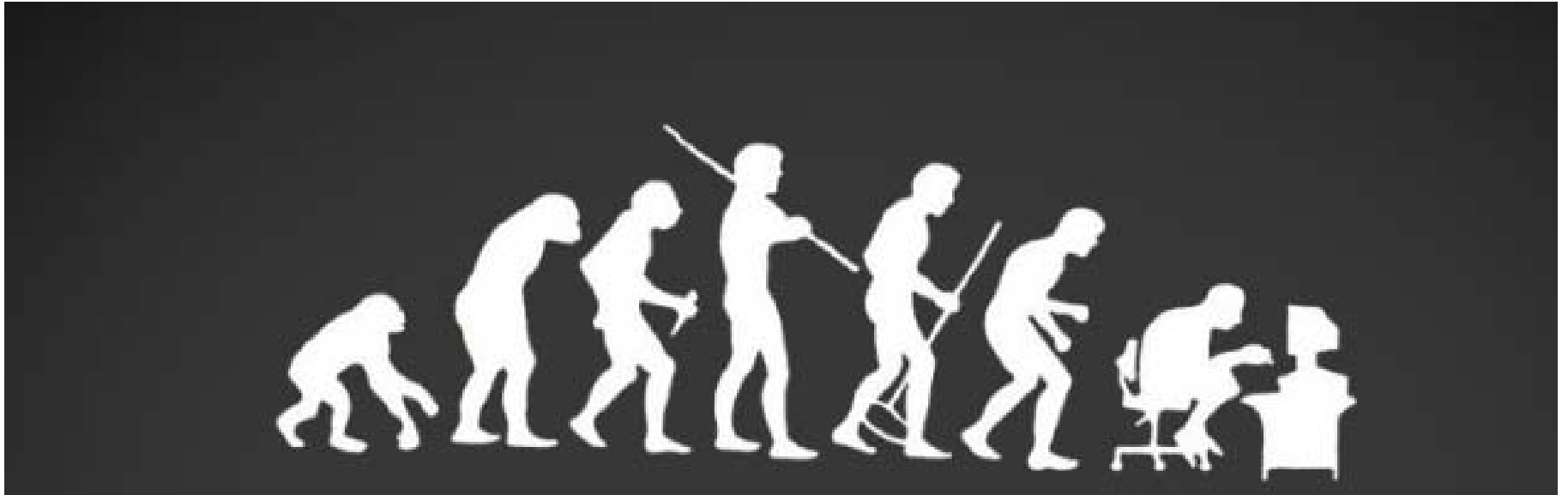
- Civil 3D
- 3DS Max
- Navisworks
- Premier
- Revit
- Synchro
- Tekla
- Rhino
- BIM360
 - Glue
- Micro Station
- Bluebeam
- DropBox
- VR
 - Iris
 - Stingray
 - Fusor

Workflow Analysis



BIM and VDC Coexist *(But are not the same)*

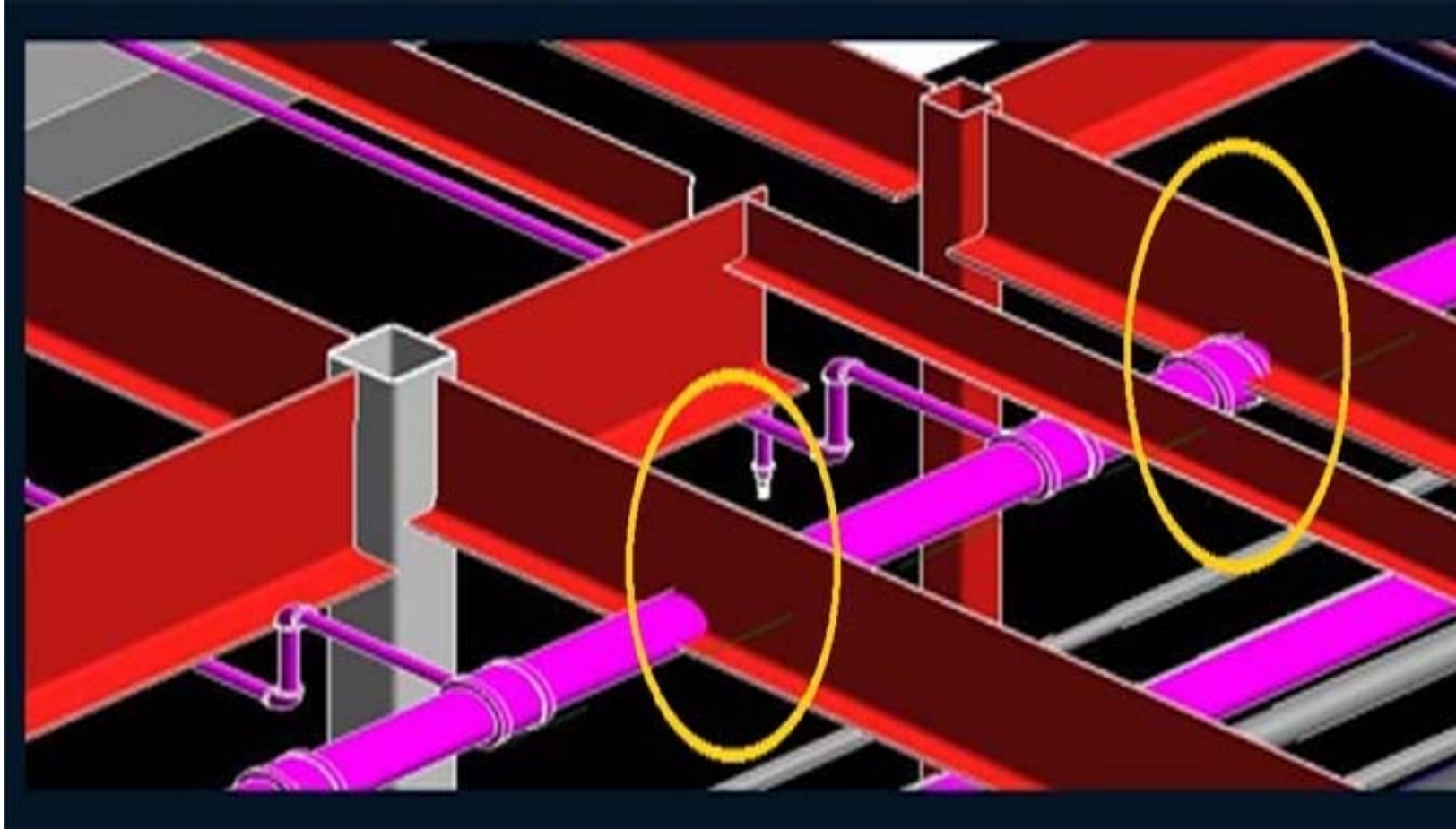
- BIM = Smart Models with Information Sharing
- The transition has been from BIM as a primary tool into a process used in VDC
- ***VDC is our new Standard***
- ***Digital Model Integration*** of Preconstruction, Proposals, Design, Estimating, Lidar & Survey, Construction, Document Control , As-Builts, Closeout & Operations and Maintenance (FM) is the next standard. *(Model Life Cycle)*



BIM / VDC Evolution

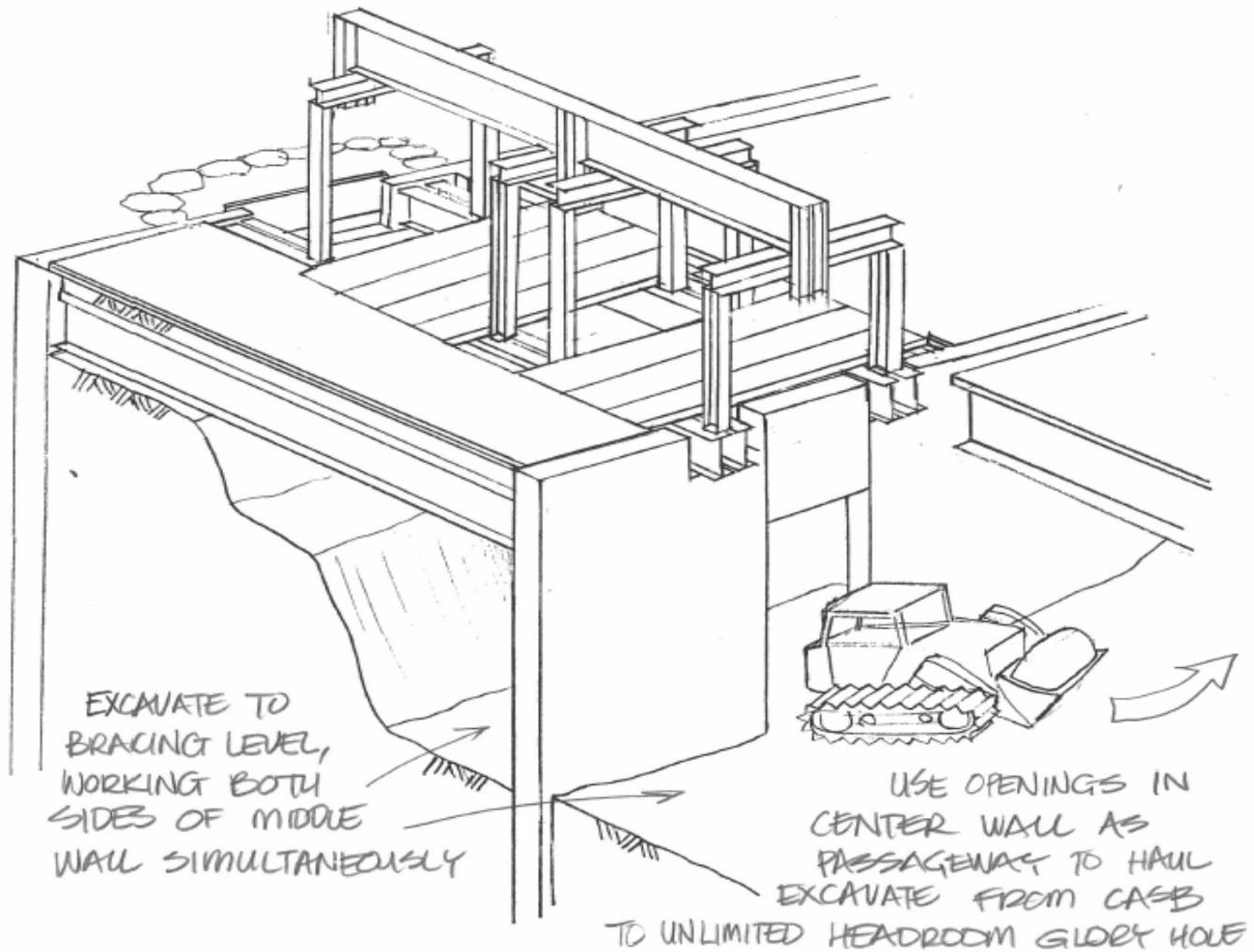
Where
we
were...

Where we were ...



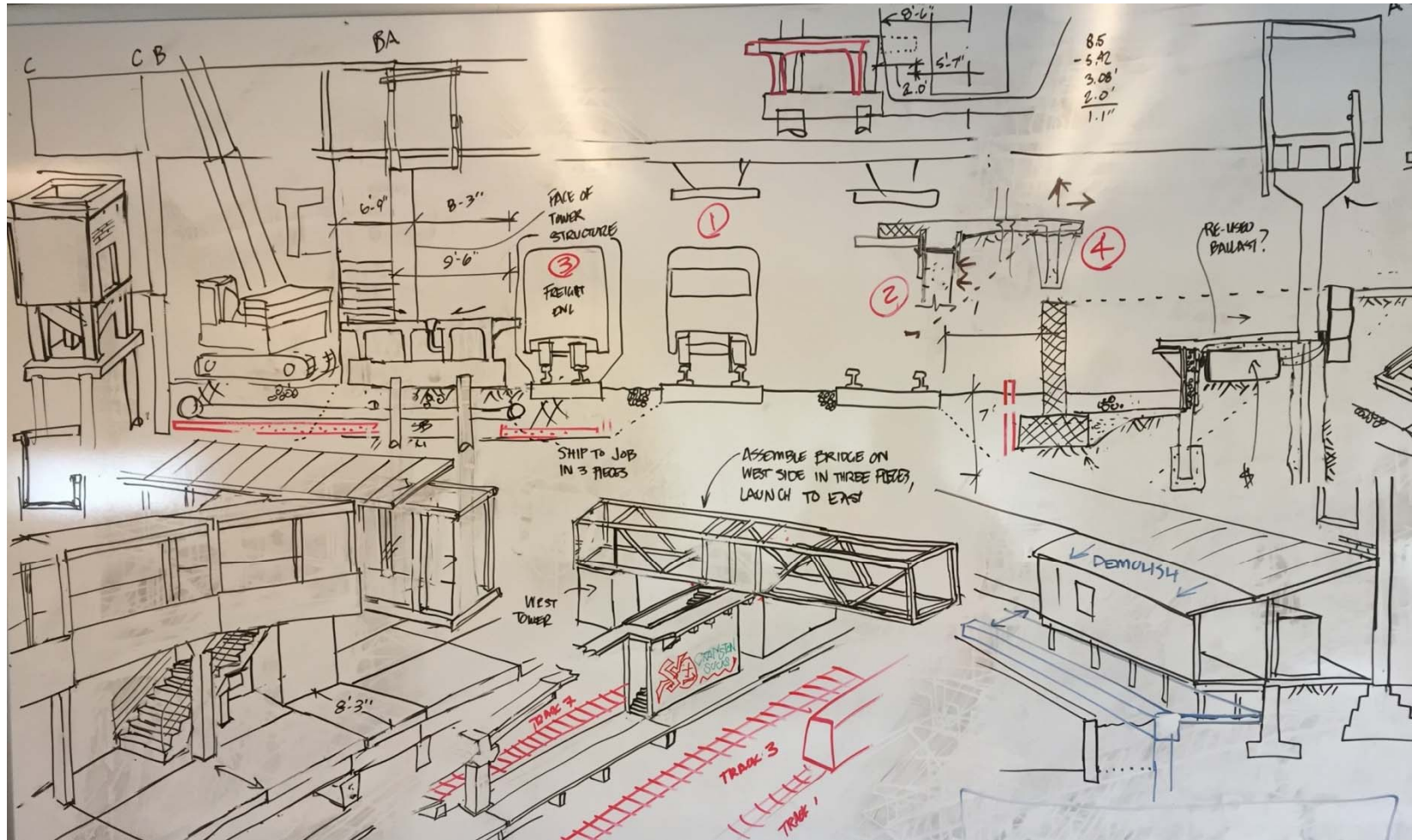
Clash Detection

Where we were ...



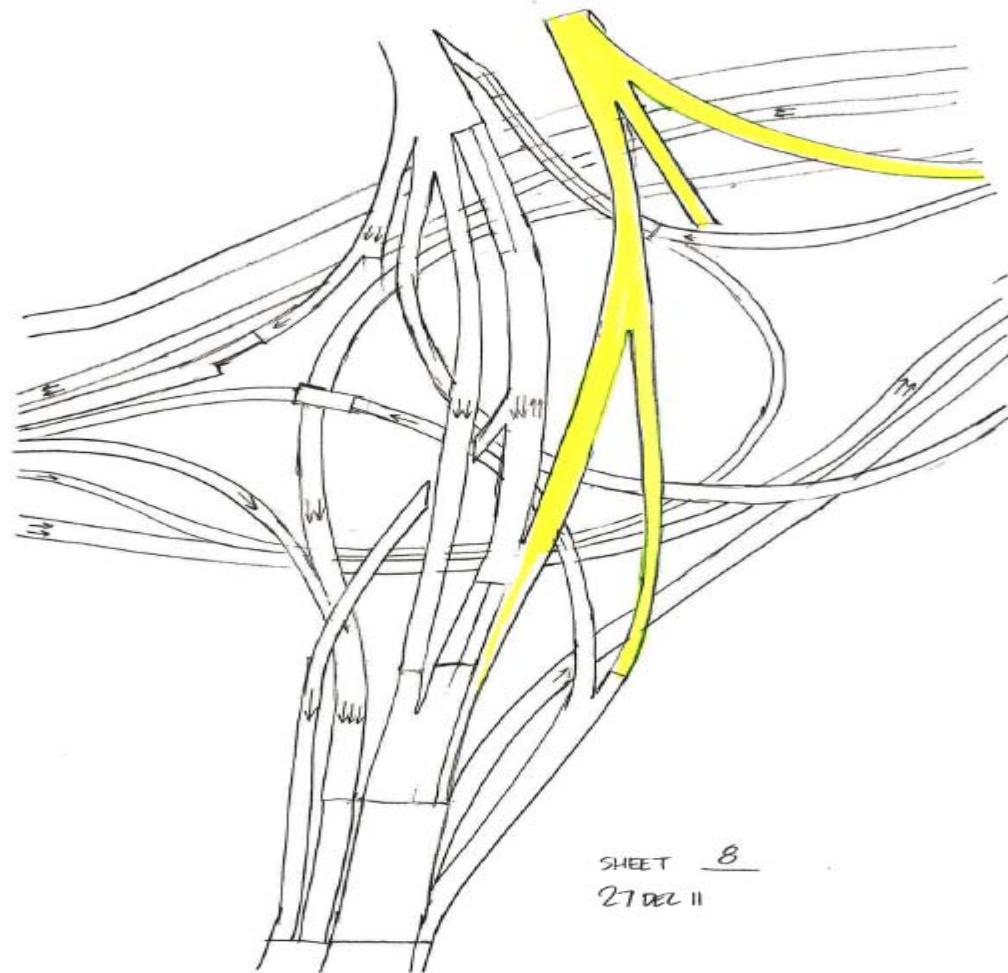
3D Hand Sketches (Central Artery)

Where we were ...



White Board Sessions (Pawtucket Station)

Where we were ...



ATC Sessions (Ohio River Bridge)

Where
we
are...

Where we are...



Visualizing ATC's

Where we are...

Autodesk Revit 2017 - ATC-1_Pawtucket_Station_Opt2.rvt - 3D View: Perspective 3D

Project Browser - ATC-1_Pawtucket_Station_Opt2.rvt

- Walkway Bracing
- Walkway Level
- West Ramp End Elevation
- West Stair Bottom Elevation
- Zero
- Ceiling Plans
- 3D Views
 - 01 - Existing
 - 02 - Demo
 - 3D View 1
 - 3D View 2
 - 3D View 3
 - 3D View 4
 - B10 - Superstructure
 - B20 - Exterior Enclosure
 - C10 - Interior Construction
 - C20 - Interior Finish
 - E20 - Furnishings
 - Foundation Plan
 - Perspective 3D (3D)
- Elevations (Building Elevation)
- Sections (Building Section)

Properties

3D View

Cameras (1) Edit Type

Graphics

- Detail Level: Medium
- Parts Visibility: Show Original
- Visibility/Graphics Overrides: Edit...
- Graphic Display Options: Edit...
- Discipline: Architectural
- Default Analysis Display S...: None
- Sun Path:

Extents

- Crop View:
- Crop Region Visible:
- Far Clip Active:
- Far Clip Offset: 1000' 0"
- Section Box:

Camera

Render Settings: Edit

Properties help

<Structural Foundation Schedule>						
A	B	C	D	E	F	
Family	Type	Count	Length	Width	Volume	
Foundation	5' x 9' x 2'-4"	17	9' - 0"	9' - 0"	62.58 CF	
Foundation	6'-11" x 2' x 2'-4"	2	6' - 11"	2' - 0"	91.88 CF	
Pile-Steel Pipe	6-50" Diameter 2	47				
Foundation	11' x 2' 6.5" x 2'-4"	23	11' - 0"	2' - 7"	97.46 CF	
Foundation	17' x 9' 6" x 2'-4"	3	9' - 6"	17' - 0"	493.75 CF	
Pile-Steel Pipe	30" Diameter	40				

Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

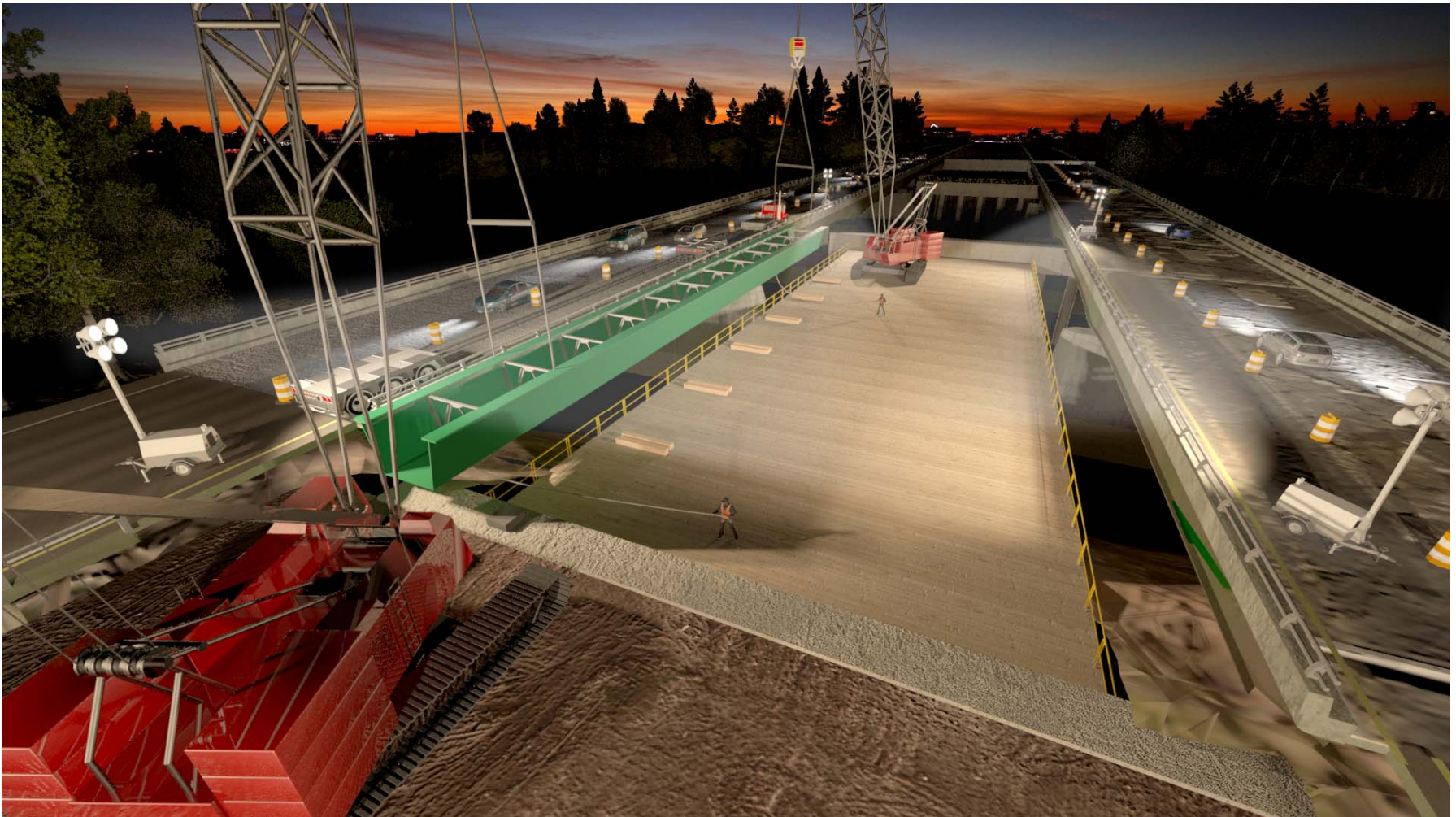
Model Sharing and QTO Takeoffs

Where we are...



Full Design and Model Sharing in 3D (Revit and Civil 3D)

Where we are...



Accurate Geolocated ATC's, Work Plans and Sequencing

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Where we are...



Visualization of Complex Work Zones

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Where we are...



4D

Where We Are... Kosciuszko Bridge 4D



Where We Are ...



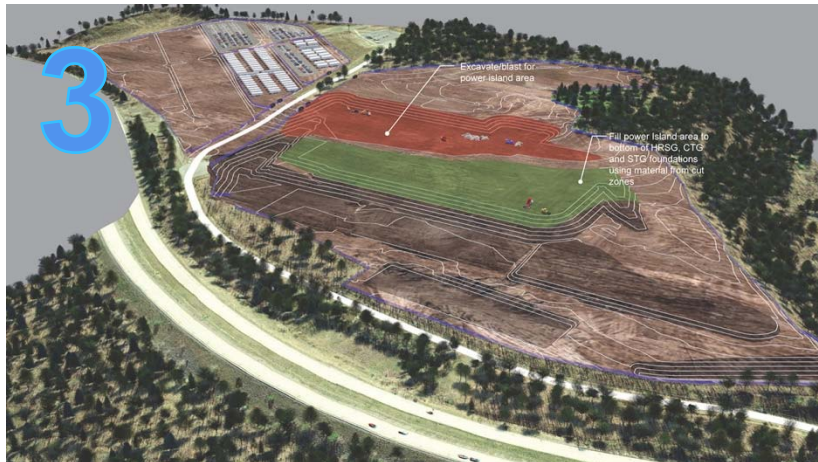
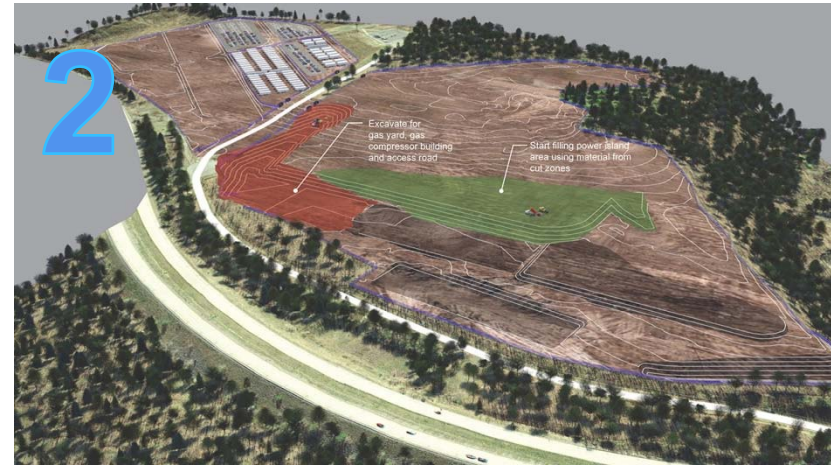
3D Sequences and High Quality 4D

Where we are...



Phasing and Design

Where we are...



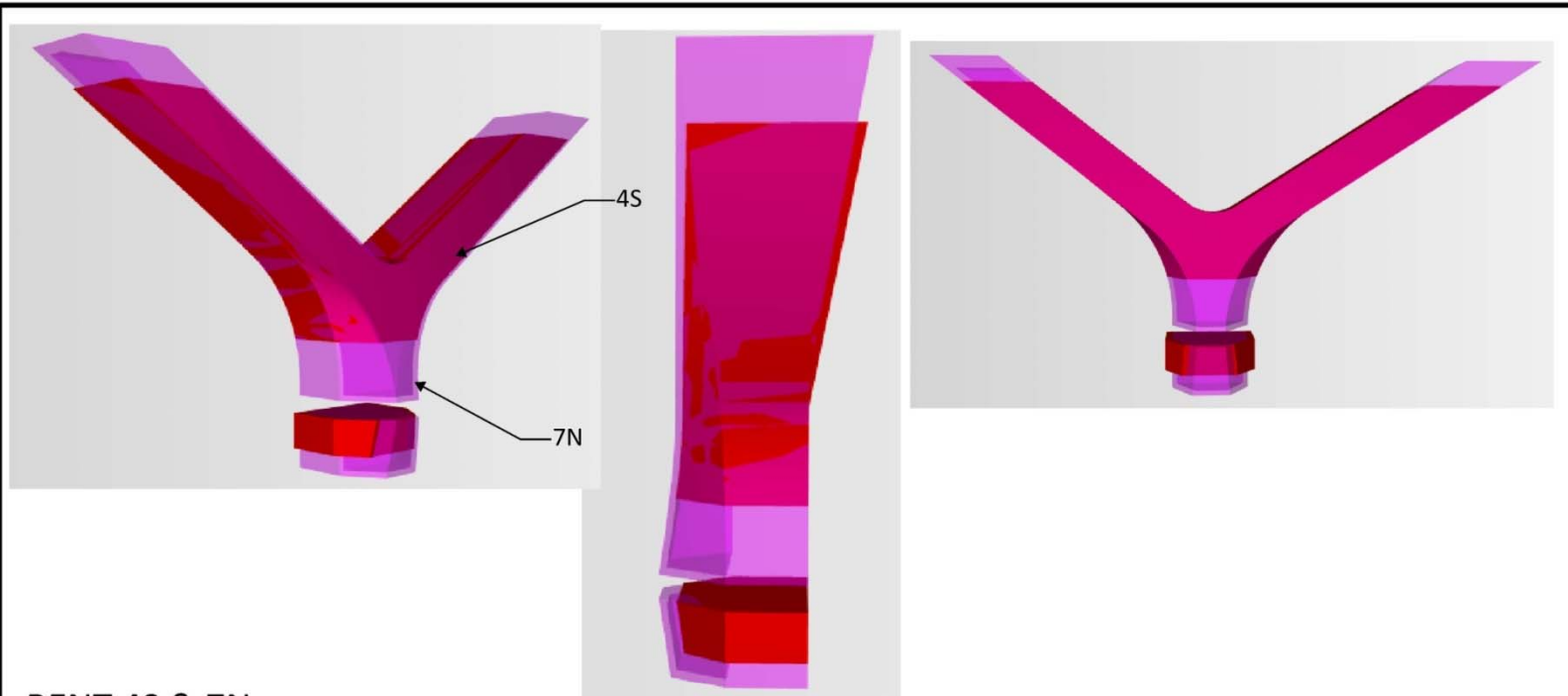
QTO and Cut / Fills

Where we are...



Design, Coordination and Lift Drawings (6th Street Bridge)

Where we are...



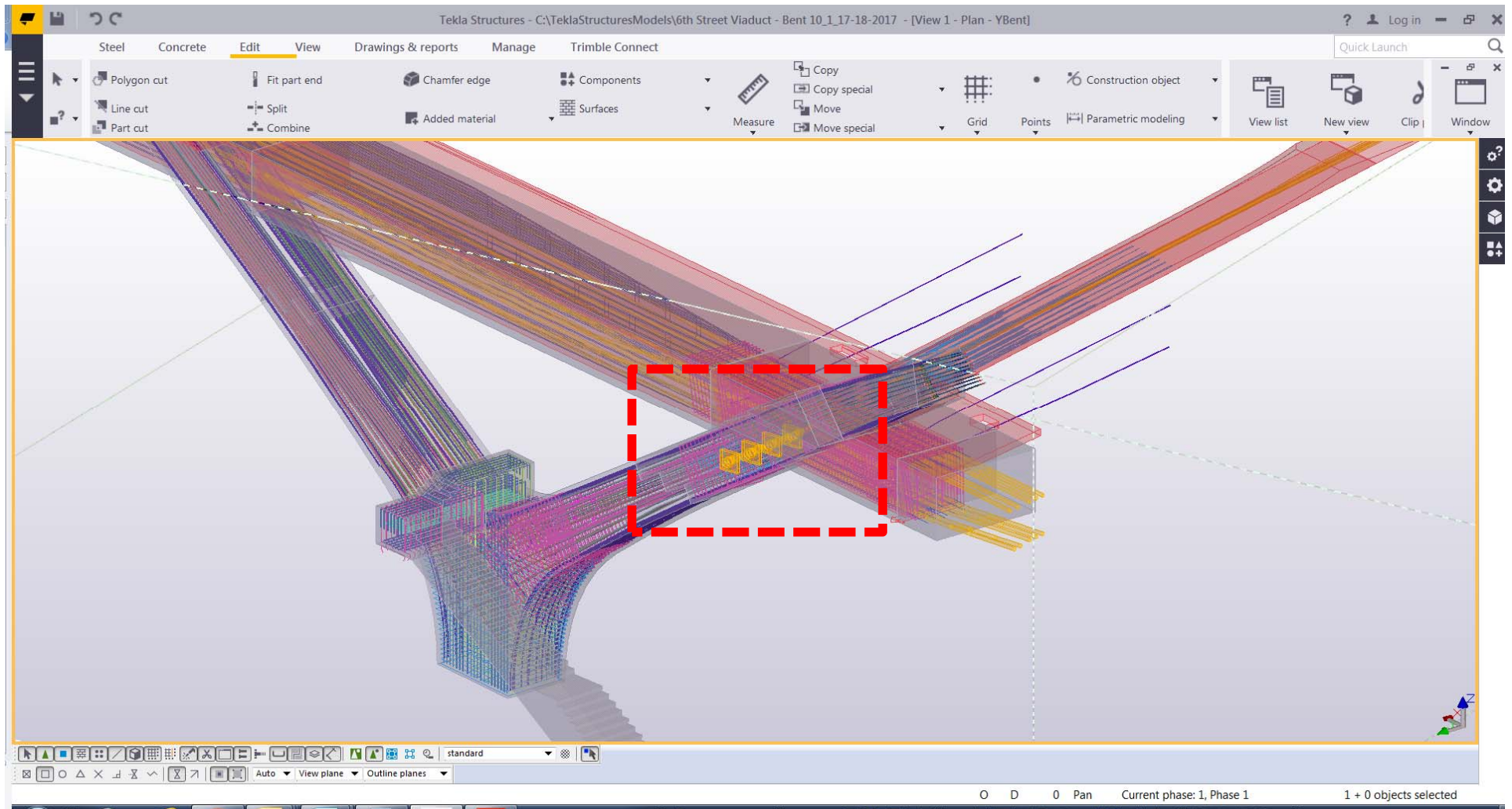
BENT 4S & 7N

Form #	Location		Looking NORTH		MIRROR		Torso Ht (to Level Line)	Shaft Ht	"B"	Radius "R5"	"B" @ Pile Cut-off	Y-Bent Top Control Point West		Y-Bent Top Control Point East		Y-Bent Bottom Control Point		Pile Cutoff Elevation	Bottom of Torso	
			αW	αE	αE	αW						Elevation	Ht above Cutoff	Elevation	Ht above Cutoff	Elevation	Ht above Cutoff		Elevation	Ht above Cutoff
2	4	South			38.00	32.00	27.99	4.41	5.50	200.00	4.80	283.98	34.48	283.98	34.48	262.18	12.68	249.50	255.99	6.49
2	7	North	38.00	32.00			38.73	6.91	6.17	240.00	5.08	295.72	47.72	295.72	47.72	270.23	22.23	248.00	256.99	8.99

			SIXTH STREET VIADUCT Y-COLUMNS								
REV.	DATE	DESCRIPTION	DRAWN BY:	DATE:	1/9/15	SCALE:	SHOWN	SHEET	2	OF	2

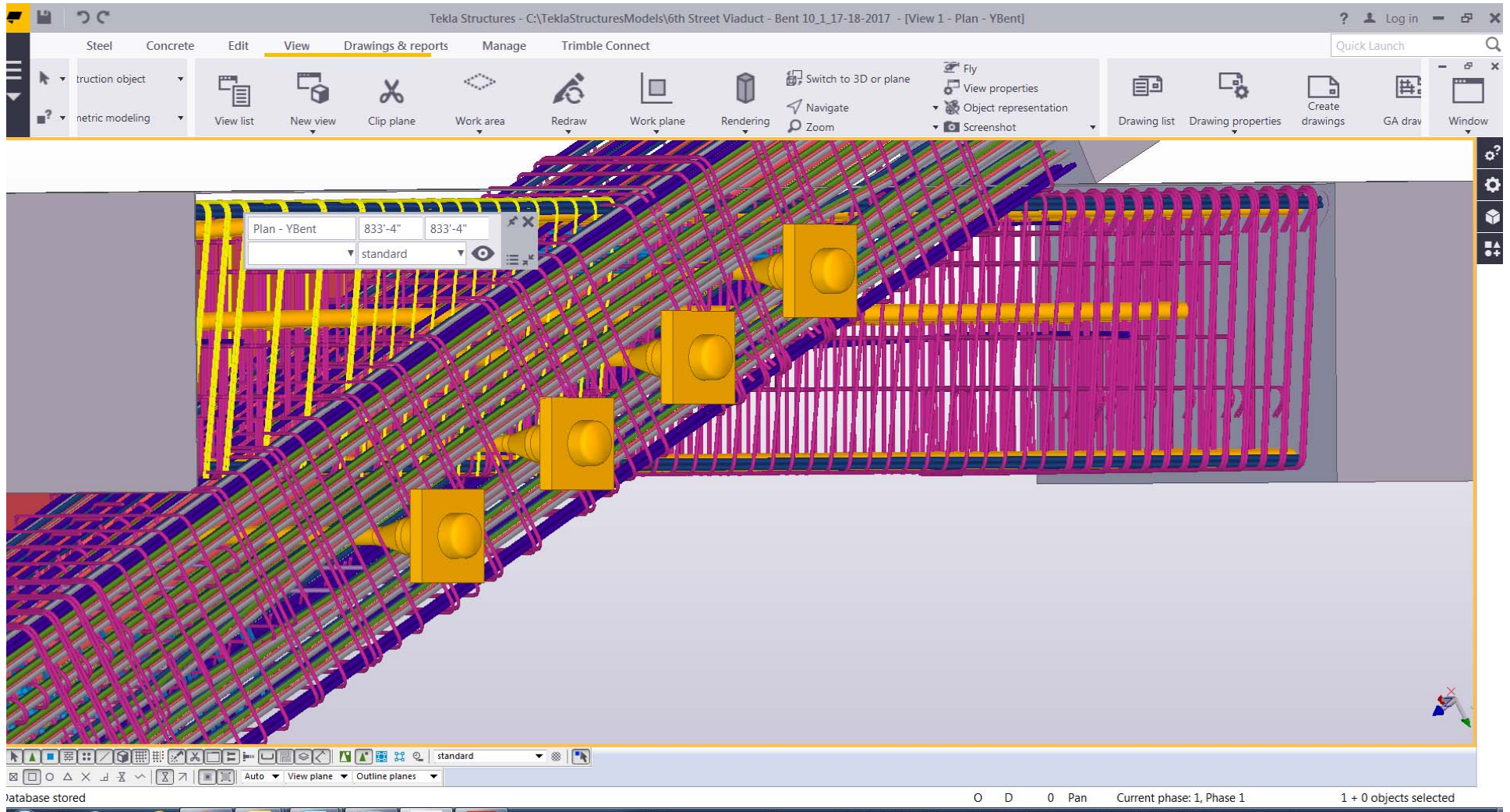
Design, Coordination and Lift Drawings

Where we are...



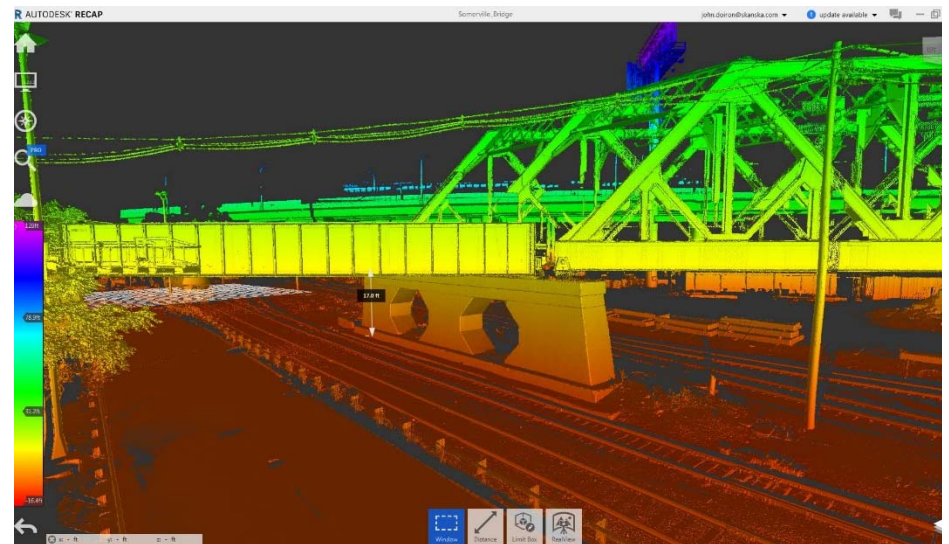
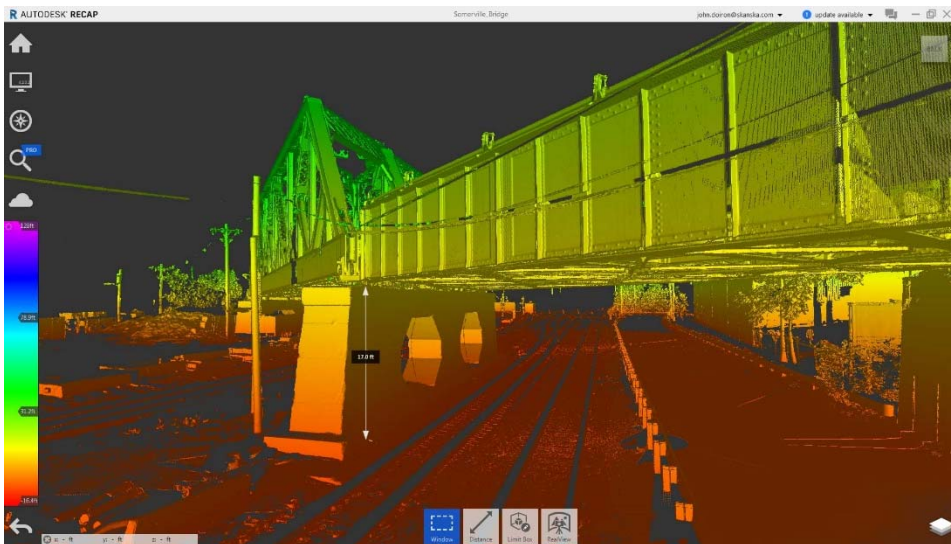
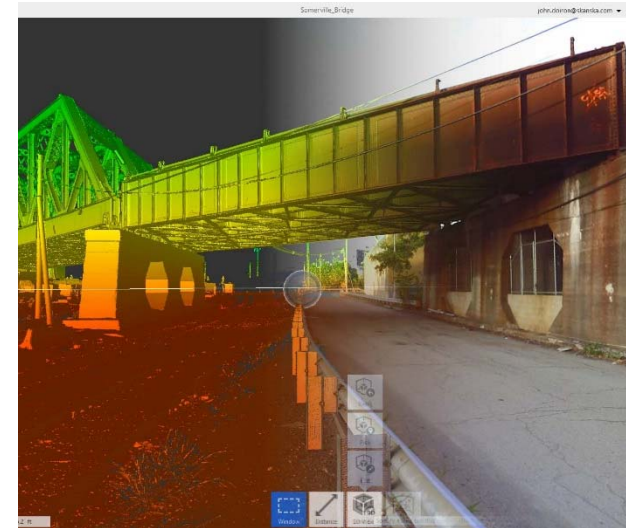
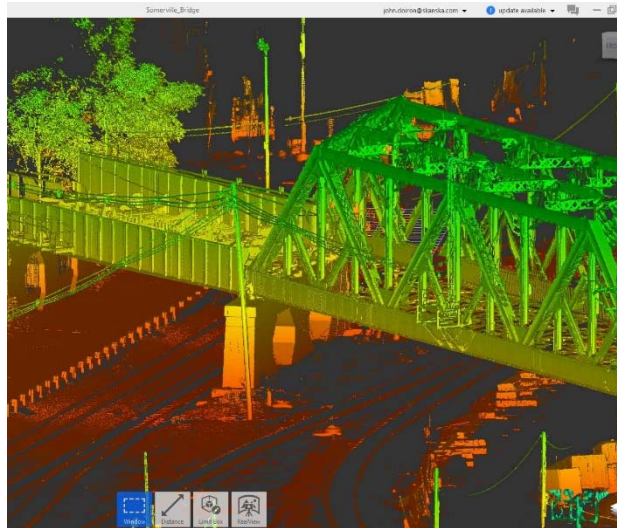
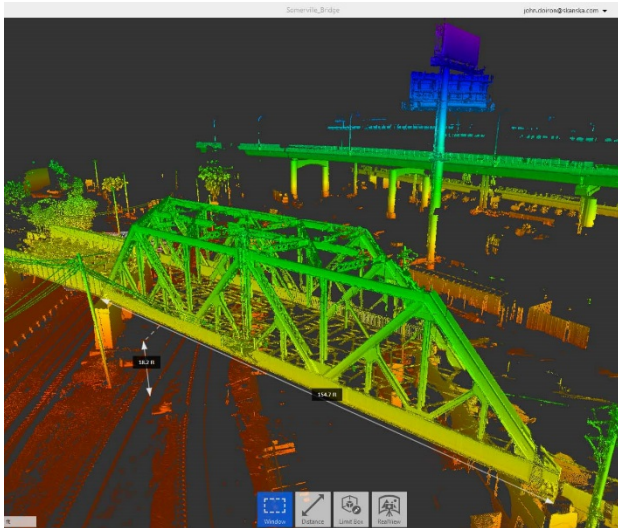
Design, Coordination and Lift Drawings

Where we are...



Design, Coordination and Lift Drawings

Where We Are ... Bundled Bridge LIDAR



Where we
are
going...

North Washington Street Bridge

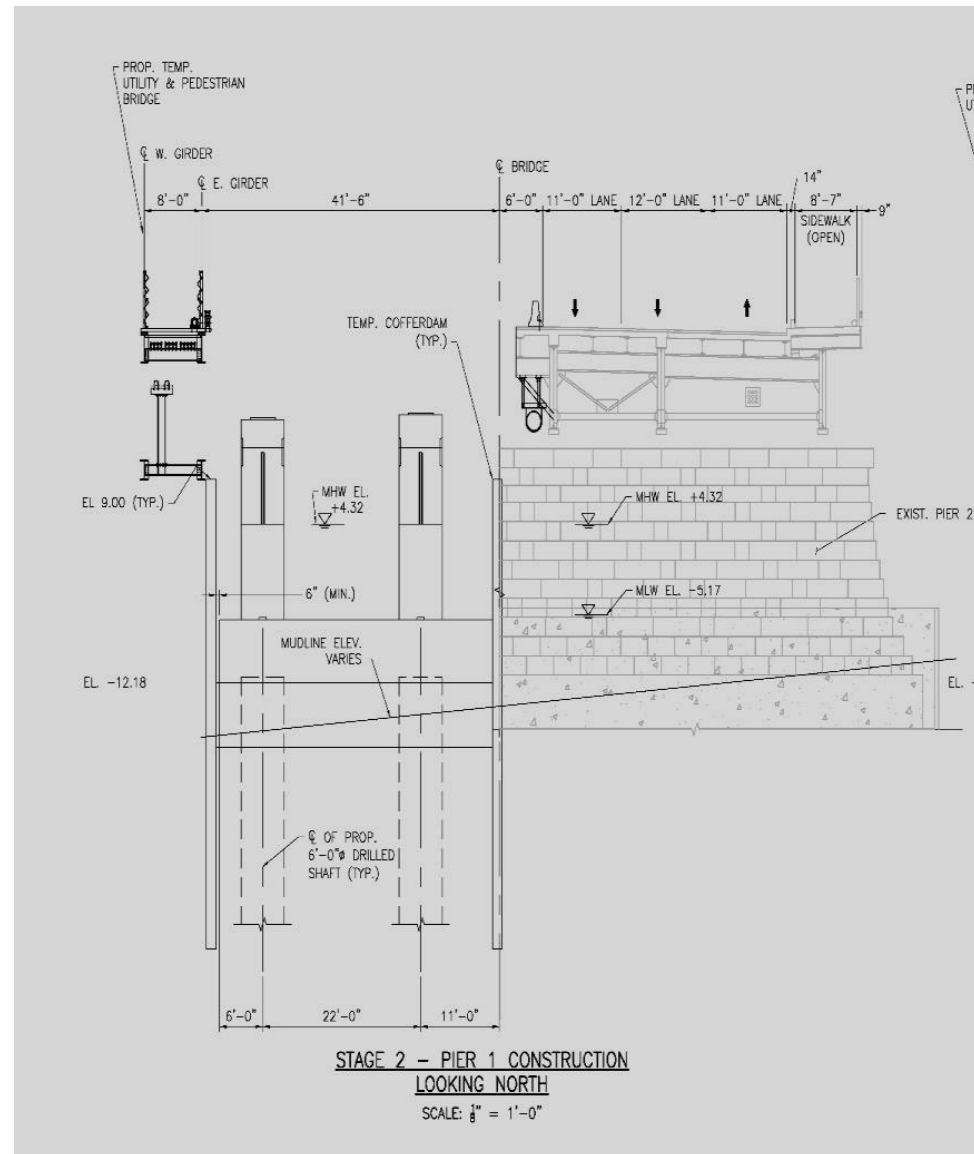


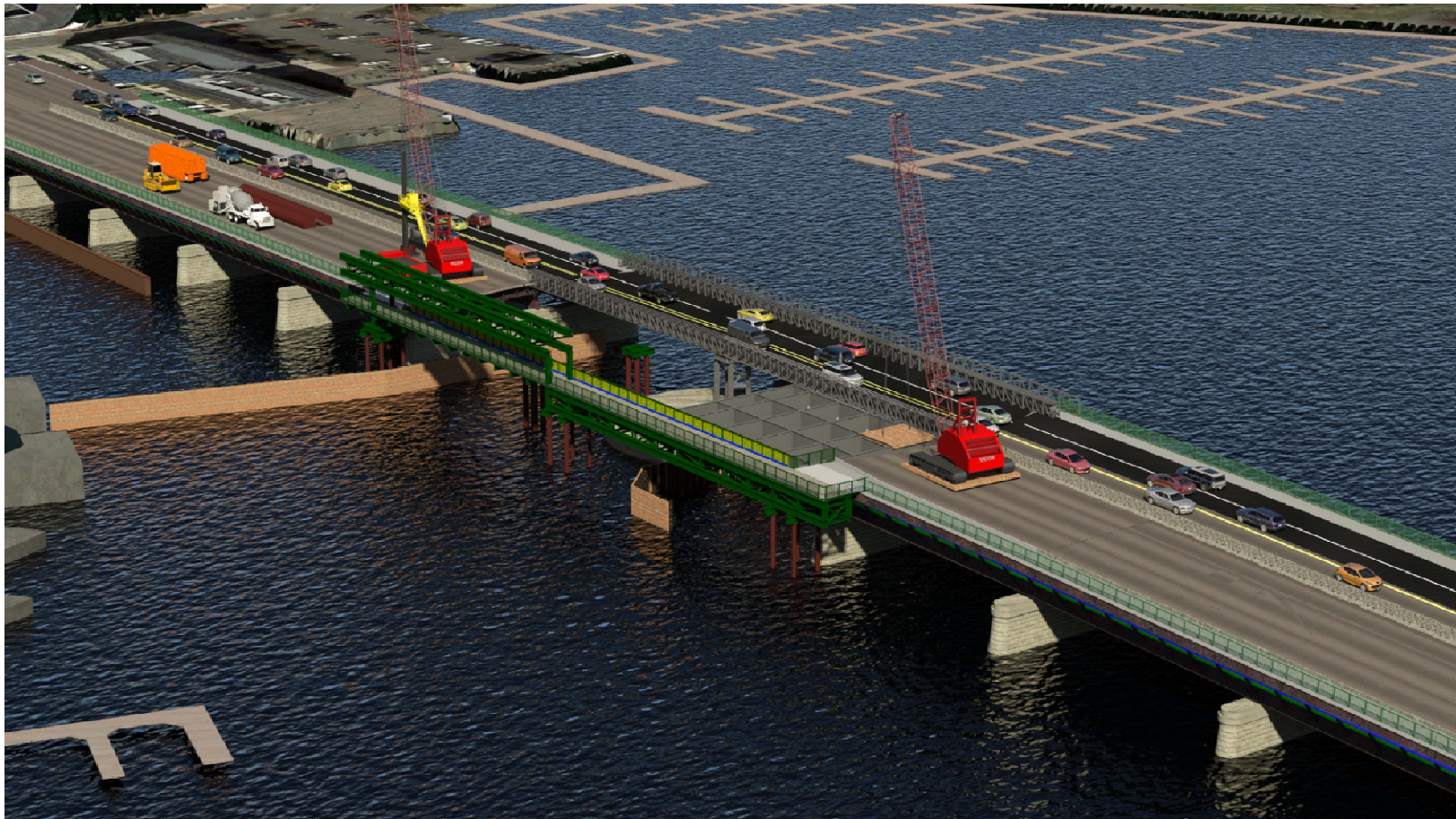
RISK

- The BTC called for the demolition of half of the existing piers in order to install the new piers
- We would be sawing cutting 117 year – old piers, leaving a sheer face, and running traffic on the remaining section for 2 years

Conclusion:

- Work from existing bridge to install shafts





Install Drilled Shafts for New Bridge from Existing Bridge Instead of Partial Demolition of Piers



Design Gantry Support Rails to be Above the Connecting Plate Between Stage 2 and Stage 3 Tub Girders



Gantry Support Rail Placed On A-Line Sidewalk Slab
Utilities Relocated to a New Beam

Analysis of B & C Line Girders

- In order to determine the capacity of the existing bridge girders to support the steel, we provided the graphics to a 3rd Party engineer so she knew exactly how we intended to build the job
- We gave her contact drawings, including repair details
- We also provided her with photos from site visits by foot and water

