DBIA Rocky Mountain Region

2016 Regional Conference

"The Culture of Integration: Great Teams Make Great Projects"

Culture of Integration Track

Sponsored By:

BECK

Transformative Communication and Collaboration

Track 2: Culture of Integration

IRON HORSE ARCHITECTS
RESPONSIBLE DESIGN

Iron Horse Architects

Employees

11 Architects
10 Designers
5 Support Staff

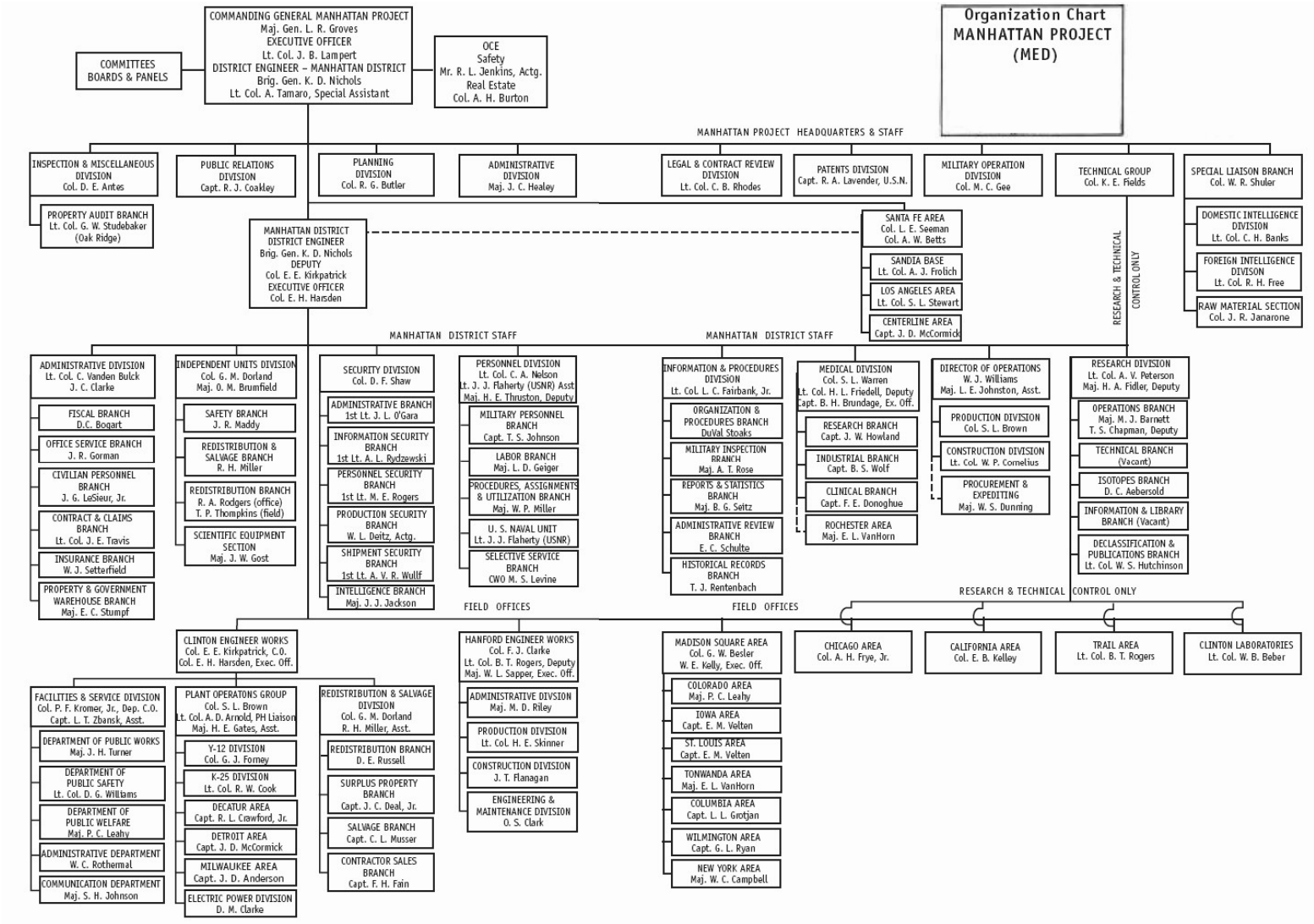
Markets

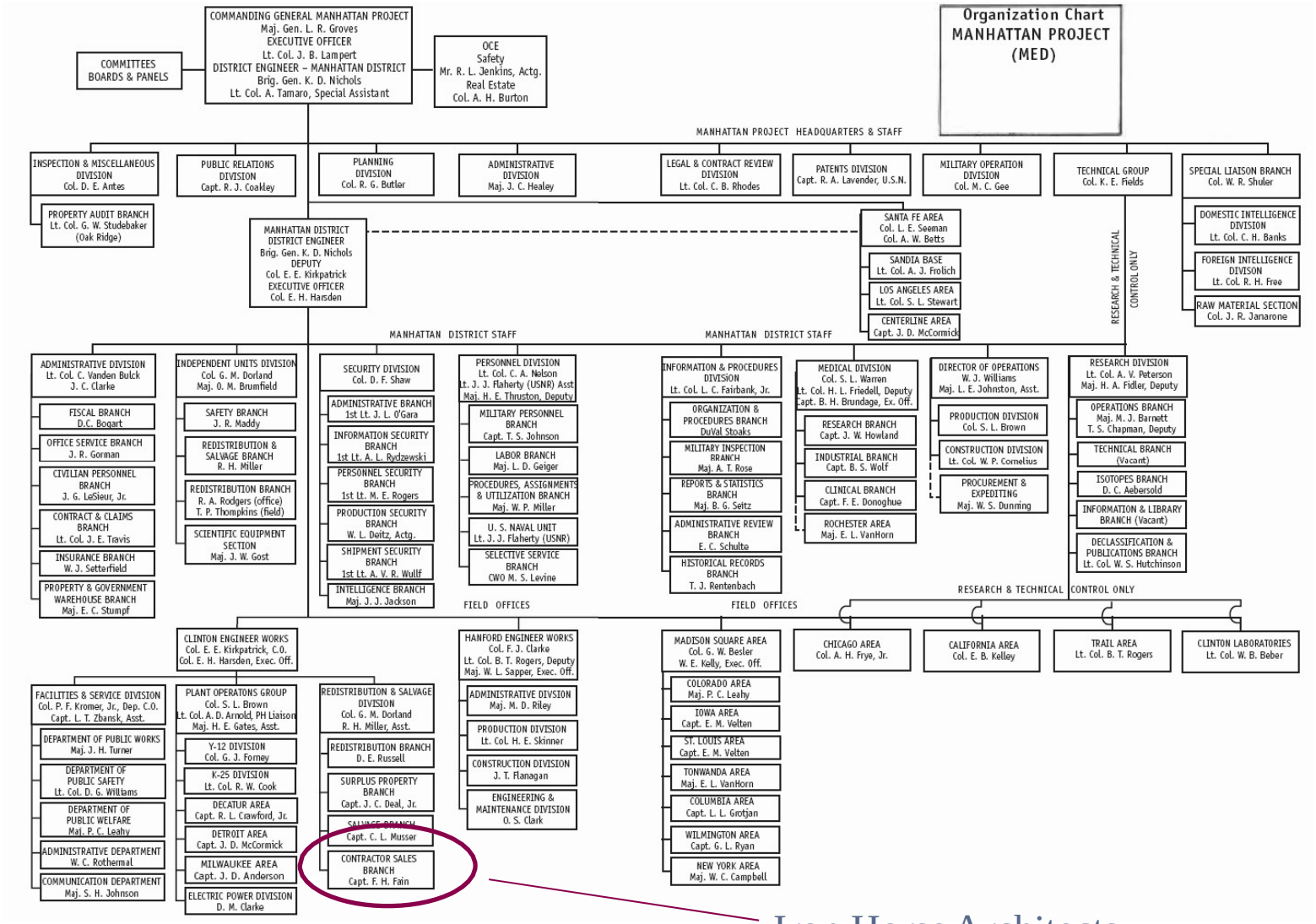
Infrastructure Design
Aviation
Science & Technology
Transit Oriented Development

Locations

Denver, CO
Washington, DC

Projects Nationwide


Organization Chart
MANHATTAN PROJECT
(MED)
COMMITTEES
BOARDS & PANELS
COMMANDING GENERAL MANHATTAN PROJECT
Maj. Gen. L. R. Groves
EXECUTIVE OFFICER
Lt. Col. J. B. Lampert
DISTRICT ENGINEER – MANHATTAN DISTRICT
Brig. Gen. K. D. Nichols
Lt. Col. A. Tamaro, Special Assistant
OCE
Safety
Mr. R. L. Jenkins, Actg.
Real Estate
Col. A. H. Burton
MANHATTAN PROJECT HEADQUARTERS & STAFF
INSPECTION & MISCELLANEOUS DIVISION
Col. D. E. Antes
PROPERTY AUDIT BRANCH
Lt. Col. G. W. Studebaker (Oak Ridge)
PUBLIC RELATIONS DIVISION
Capt. R. J. Coakley
PLANNING DIVISION
Col. R. G. Butler
ADMINISTRATIVE DIVISION
Maj. J. C. Healey
LEGAL & CONTRACT REVIEW DIVISION
Lt. Col. C. B. Rhodes
PATENTS DIVISION
Capt. R. A. Lavender, U.S.N.
MILITARY OPERATION DIVISION
Col. M. C. Gee
TECHNICAL GROUP
Col. K. E. Fields
SPECIAL LIAISON BRANCH
Col. W. R. Shuler
DOMESTIC INTELLIGENCE DIVISION
Lt. Col. C. H. Banks
FOREIGN INTELLIGENCE DIVISON
Lt. Col. R. H. Free
RAW MATERIAL SECTION
Col. J. R. Janarone
MANHATTAN DISTRICT DISTRICT ENGINEER
Brig. Gen. K. D. Nichols
DEPUTY
Col. E. E. Kirkpatrick
EXECUTIVE OFFICER
Col. E. H. Harsden
SANTA FE AREA
Col. L. E. Seeman
Col. A. W. Betts
SANDIA BASE
Lt. Col. A. J. Frotich
LOS ANGELES AREA
Lt. Col. S. L. Stewart
CENTERLINE AREA
Capt. J. D. McCormick
RESEARCH & TECHNICAL CONTROL ONLY
MANHATTAN DISTRICT STAFF
MANHATTAN DISTRICT STAFF
ADMINISTRATIVE DIVISION
Lt. Col. C. Vanden Bulck
J. C. Clarke
FISCAL BRANCH
D.C. Bogart
OFFICE SERVICE BRANCH
J. R. Gorman
CIVILIAN PERSONNEL BRANCH
J. G. LeSieur, Jr.
CONTRACT & CLAIMS BRANCH
Lt. Col. J. E. Travis
INSURANCE BRANCH
W. J. Setterfield
PROPERTY & GOVERNMENT WAREHOUSE BRANCH
Maj. E. C. Stumpf
INDEPENDENT UNITS DIVISION
Col. G. M. Dorland
Maj. O. M. Brumfield
SAFETY BRANCH
J. R. Maddy
REDISTRIBUTION & SALVAGE BRANCH
R. H. Miller
REDISTRIBUTION BRANCH
R. A. Rodgers (office)
T. P. Thompkins (field)
SCIENTIFIC EQUIPMENT SECTION
Maj. J. W. Gost
SECURITY DIVISION
Col. D. F. Shaw
ADMINISTRATIVE BRANCH
1st Lt. J. L. O'Gara
INFORMATION SECURITY BRANCH
1st Lt. A. L. Rydzewski
PERSONNEL SECURITY BRANCH
1st Lt. M. E. Rogers
PRODUCTION SECURITY BRANCH
W. L. Deitz, Actg.
SHIPMENT SECURITY BRANCH
1st Lt. A. V. R. Wullf
INTELLIGENCE BRANCH
Maj. J. J. Jackson
PERSONNEL DIVISION
Lt. Col. C. A. Nelson
Lt. J. J. Flaherty (USNR) Asst
Maj. H. E. Thruston, Deputy
MILITARY PERSONNEL BRANCH
Capt. T. S. Johnson
LABOR BRANCH
Maj. L. D. Geiger
PROCEDURES, ASSIGNMENTS & UTILIZATION BRANCH
Maj. W. P. Miller
U. S. NAVAL UNIT
Lt. J. J. Flaherty (USNR)
SELECTIVE SERVICE BRANCH
CWO M. S. Levine
INFORMATION & PROCEDURES DIVISION
Lt. Col. L. C. Fairbank, Jr.
ORGANIZATION & PROCEDURES BRANCH
DuVal Stoaks
MILITARY INSPECTION BRANCH
Maj. A. T. Rose
REPORTS & STATISTICS BRANCH
Maj. B. G. Seitz
ADMINISTRATIVE REVIEW BRANCH
E. C. Schulte
HISTORICAL RECORDS BRANCH
T. J. Rentenbach
MEDICAL DIVISION
Col. S. L. Warren
Lt. Col. H. L. Friedell, Deputy
Capt. B. H. Brundage, Ex. Off.
RESEARCH BRANCH
Capt. J. W. Howland
INDUSTRIAL BRANCH
Capt. B. S. Wolf
CLINICAL BRANCH
Capt. F. E. Donoghue
ROCHESTER AREA
Maj. E. L. VanHorn
DIRECTOR OF OPERATIONS
W. J. Williams
Maj. L. E. Johnston, Asst.
PRODUCTION DIVISION
Col. S. L. Brown
CONSTRUCTION DIVISION
Lt. Col. W. P. Cornelius
PROCUREMENT & EXPEDITING
Maj. W. S. Dunning
RESEARCH DIVISION
Lt. Col. A. V. Peterson
Maj. H. A. Fidler, Deputy
OPERATIONS BRANCH
Maj. M. J. Barnett
T. S. Chapman, Deputy
TECHNICAL BRANCH
(Vacant)
ISOTOPES BRANCH
D. C. Aebersold
INFORMATION & LIBRARY BRANCH (Vacant)
DECLASSIFICATION & PUBLICATIONS BRANCH
Lt. Col. W. S. Hutchinson
RESEARCH & TECHNICAL CONTROL ONLY
FIELD OFFICES
FIELD OFFICES
CLINTON ENGINEER WORKS
Col. E. E. Kirkpatrick, C.O.
Col. E. H. Harsden, Exec. Off.
FACILITIES & SERVICE DIVISION
Col. P. F. Kromer, Jr., Dep. C.O.
Capt. L. T. Zbansk, Asst.
DEPARTMENT OF PUBLIC WORKS
Maj. J. H. Turner
DEPARTMENT OF PUBLIC SAFETY
Lt. Col. D. G. Williams
DEPARTMENT OF PUBLIC WELFARE
Maj. P. C. Leahy
ADMINISTRATIVE DEPARTMENT
W. C. Rothermal
COMMUNICATION DEPARTMENT
Maj. S. H. Johnson
PLANT OPERATONS GROUP
Col. S. L. Brown
Lt. Col. A. D. Arnold, PH Liaison
Maj. H. E. Gates, Asst.
Y-12 DIVISION
Col. G. J. Forney
K-25 DIVISION
Lt. Col. R. W. Cook
DECATUR AREA
Capt. R. L. Crawford, Jr.
DETROIT AREA
Capt. J. D. McCormick
MILWAUKEE AREA
Capt. J. D. Anderson
ELECTRIC POWER DIVISION
D. M. Clarke
REDISTRIBUTION & SALVAGE DIVISION
Col. G. M. Dorland
R. H. Miller, Asst.
REDISTRIBUTION BRANCH
D. E. Russell
SURPLUS PROPERTY BRANCH
Capt. J. C. Deal, Jr.
SALVAGE BRANCH
Capt. C. L. Musser
CONTRACTOR SALES BRANCH
Capt. F. H. Fain
HANFORD ENGINEER WORKS
Col. F. J. Clarke
Lt. Col. B. T. Rogers, Deputy
Maj. W. L. Sapper, Exec. Off.
ADMINISTRATIVE DIVSION
Maj. M. D. Riley
PRODUCTION DIVISION
Lt. Col. H. E. Skinner
CONSTRUCTION DIVISION
J. T. Flanagan
ENGINEERING & MAINTENANCE DIVISION
O. S. Clark
MADISON SQUARE AREA
Col. G. W. Besler
W. E. Kelly, Exec. Off.
COLORADO AREA
Maj. P. C. Leahy
IOWA AREA
Capt. E. M. Velten
ST. LOUIS AREA
Capt. E. M. Velten
TONWANDA AREA
Maj. E. L. VanHorn
COLUMBIA AREA
Capt. L. L. Grotjan
WILMINGTON AREA
Capt. G. L. Ryan
NEW YORK AREA
Maj. W. C. Campbell
CHICAGO AREA
Col. A. H. Frye, Jr.
CALIFORNIA AREA
Col. E. B. Kelley
TRAIL AREA
Lt. Col. B. T. Rogers
CLINTON LABORATORIES
Lt. Col. W. B. Beber



Iron Horse Architects

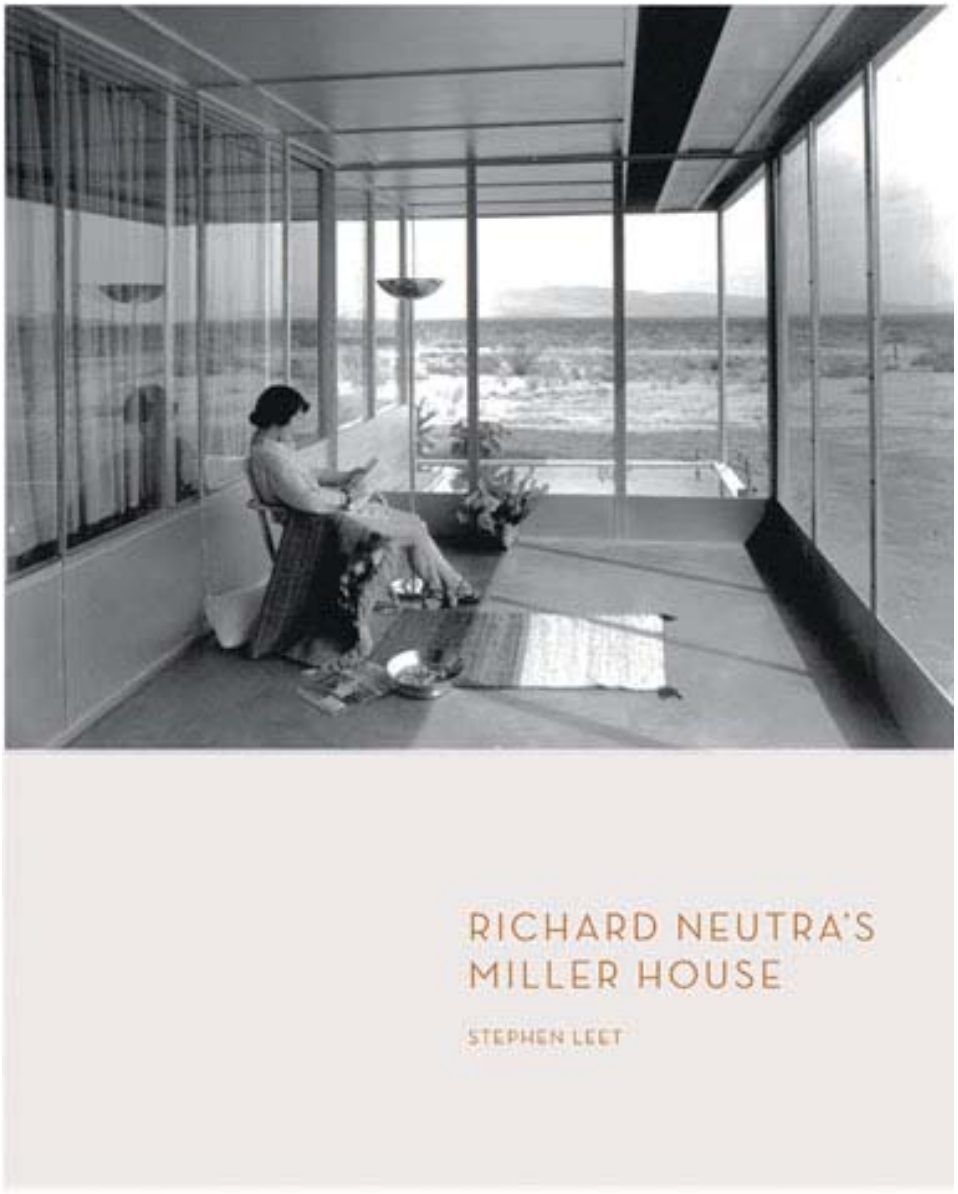
Technology and Communication

The People Factor

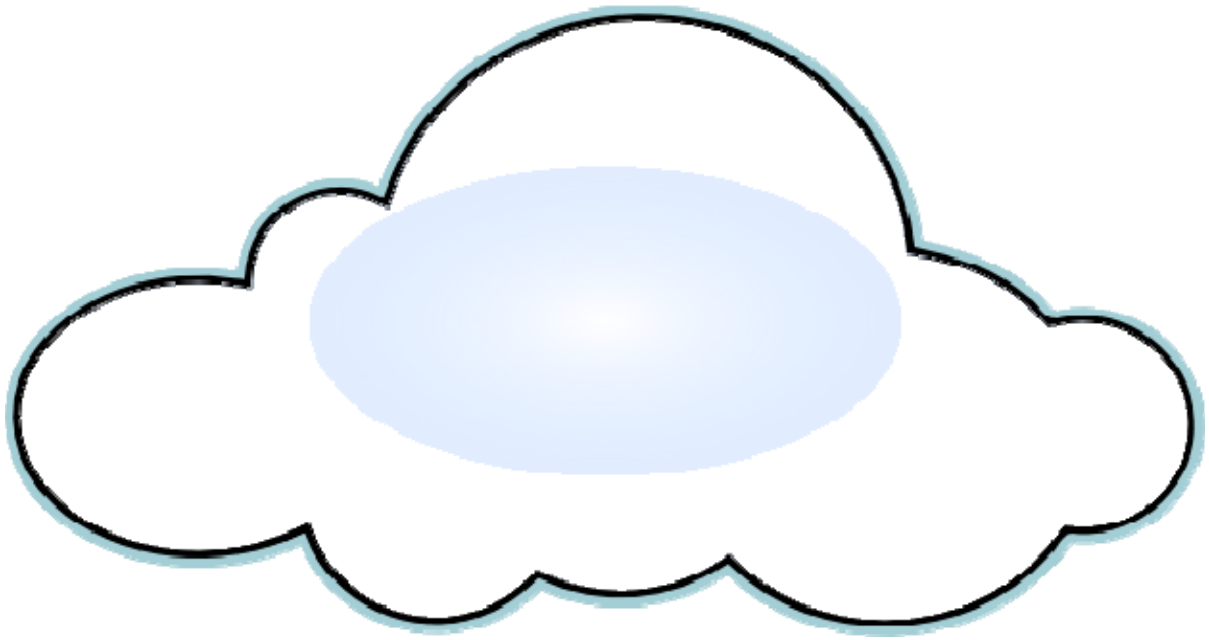
Building a Collaborative Team

Examples

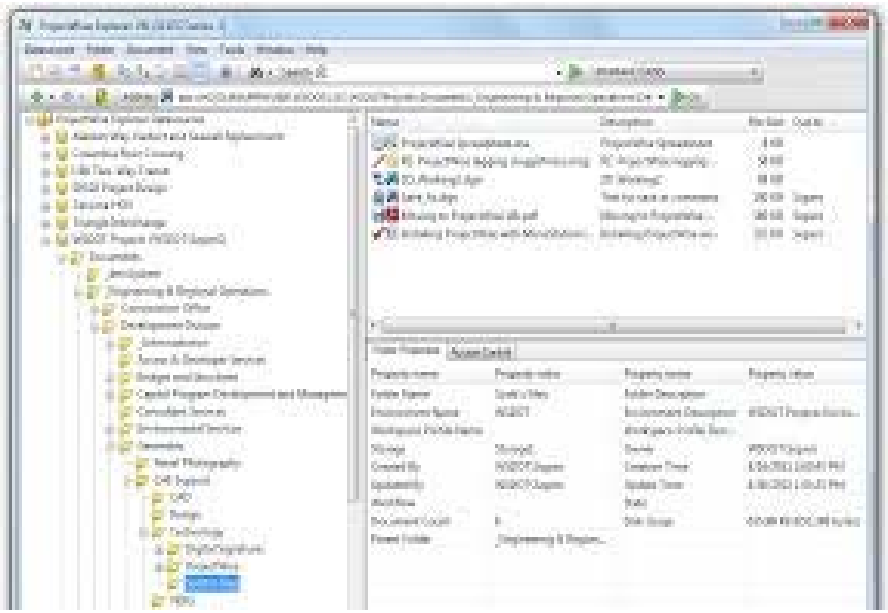
Technology and Communication

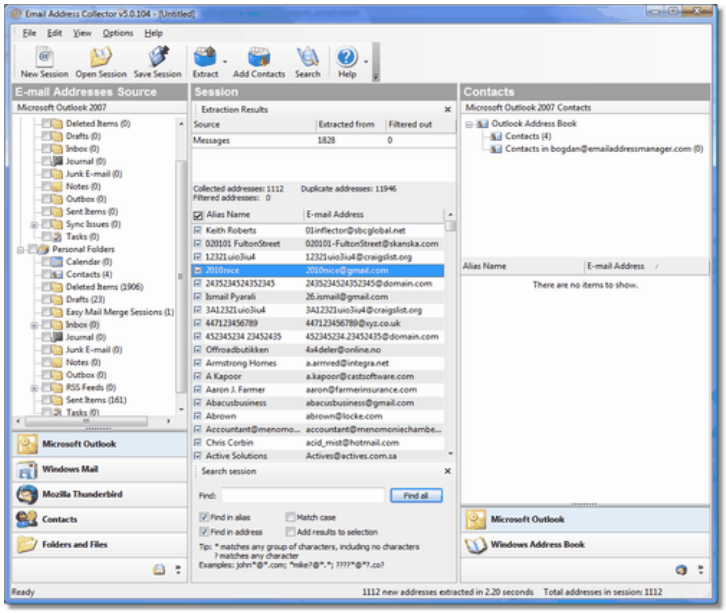


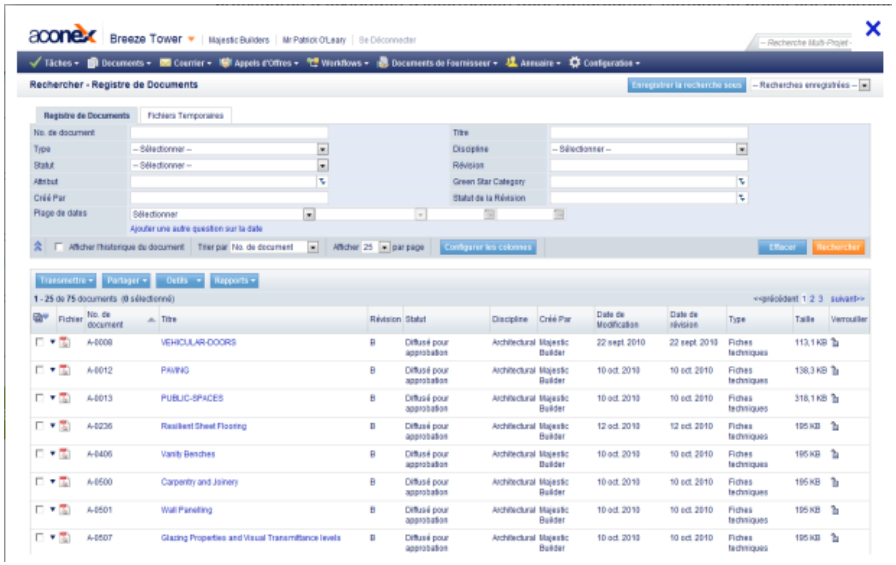
Technology and Communication

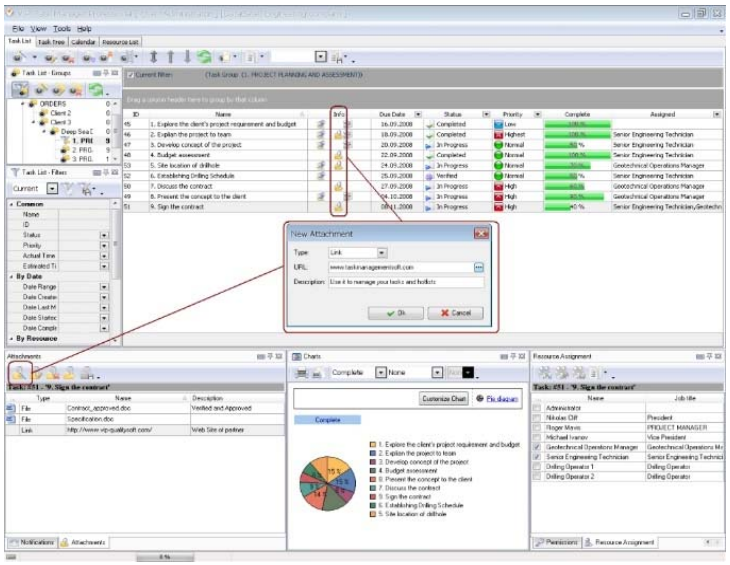


The Cloud





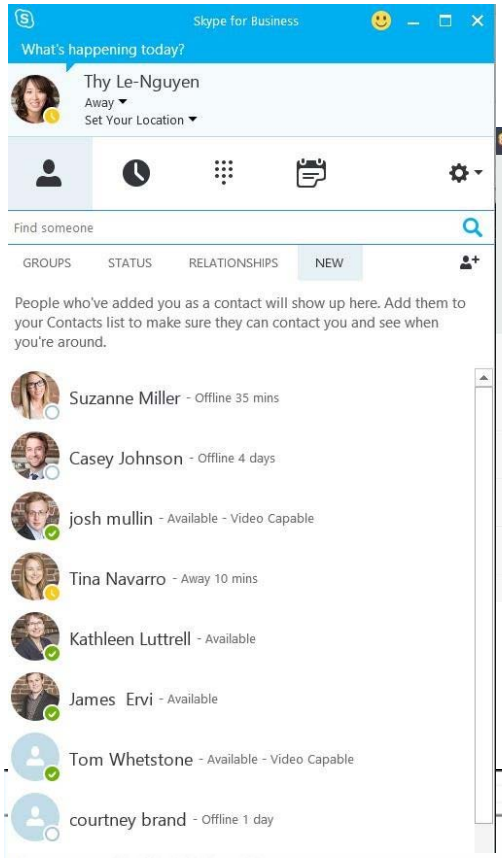


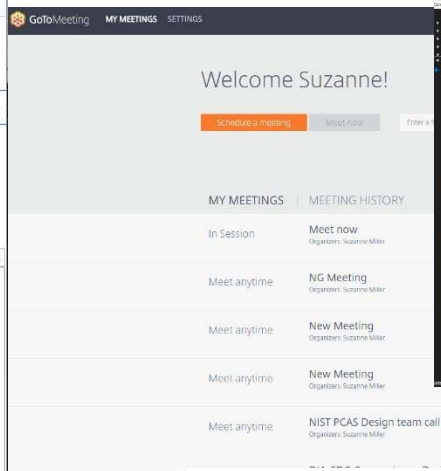


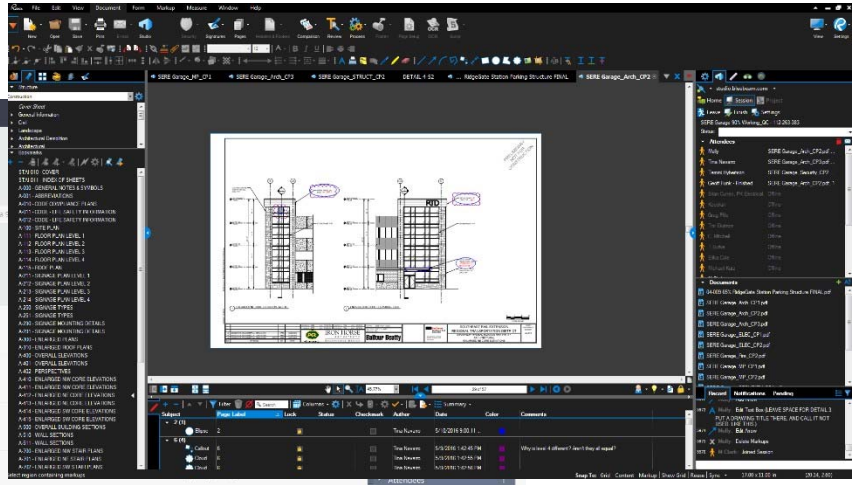
Correspondence

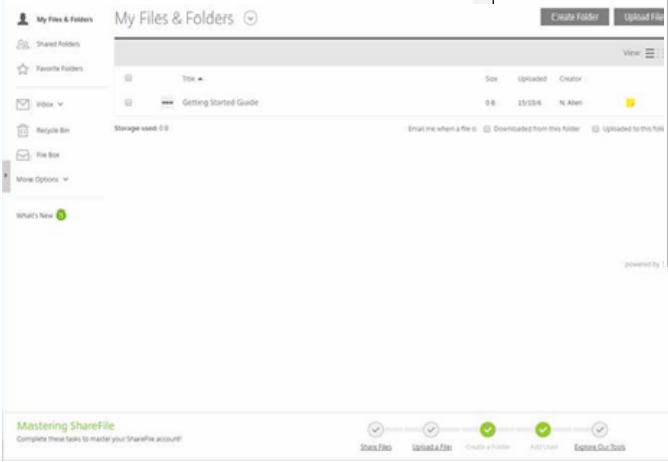
Document Control

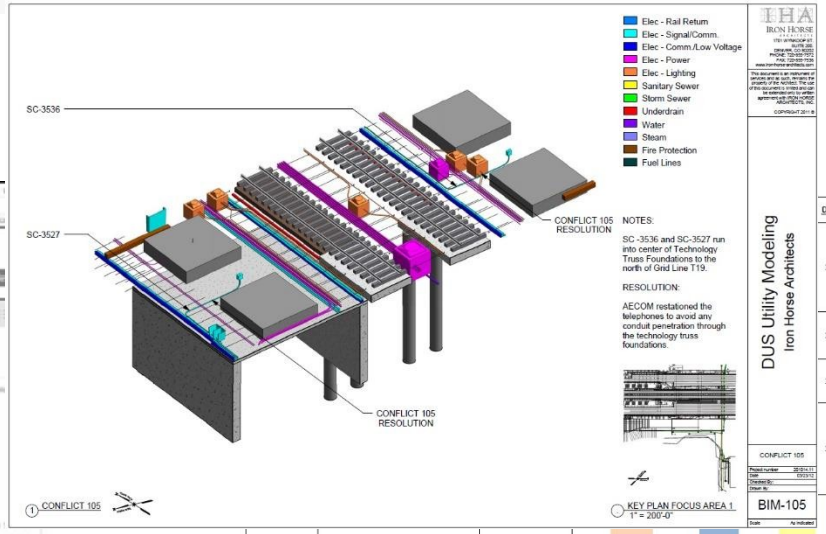
File Management











107	SC-3806 does not have enough room to go above East Bus Ramp Top slab and B.O. Platform slab and meets requirements for depth below EVA Lane. *Current Solution has max. 270 degree bends. Is any leeway needed for connection to DUS?*	RFC NDC #59 JE-0601		Support		Primary		Support	11.17.11
107A	SC-3661, LV-1486, LV-1483 conflict with TD ST7.5. Verify acceptable depth under E.V.A. lane to determine if Duct bank needs to route through East Bus Ramp Wall as well.	DUS-J-JE001CONDCRT		Support		Primary		Support	12.22.11

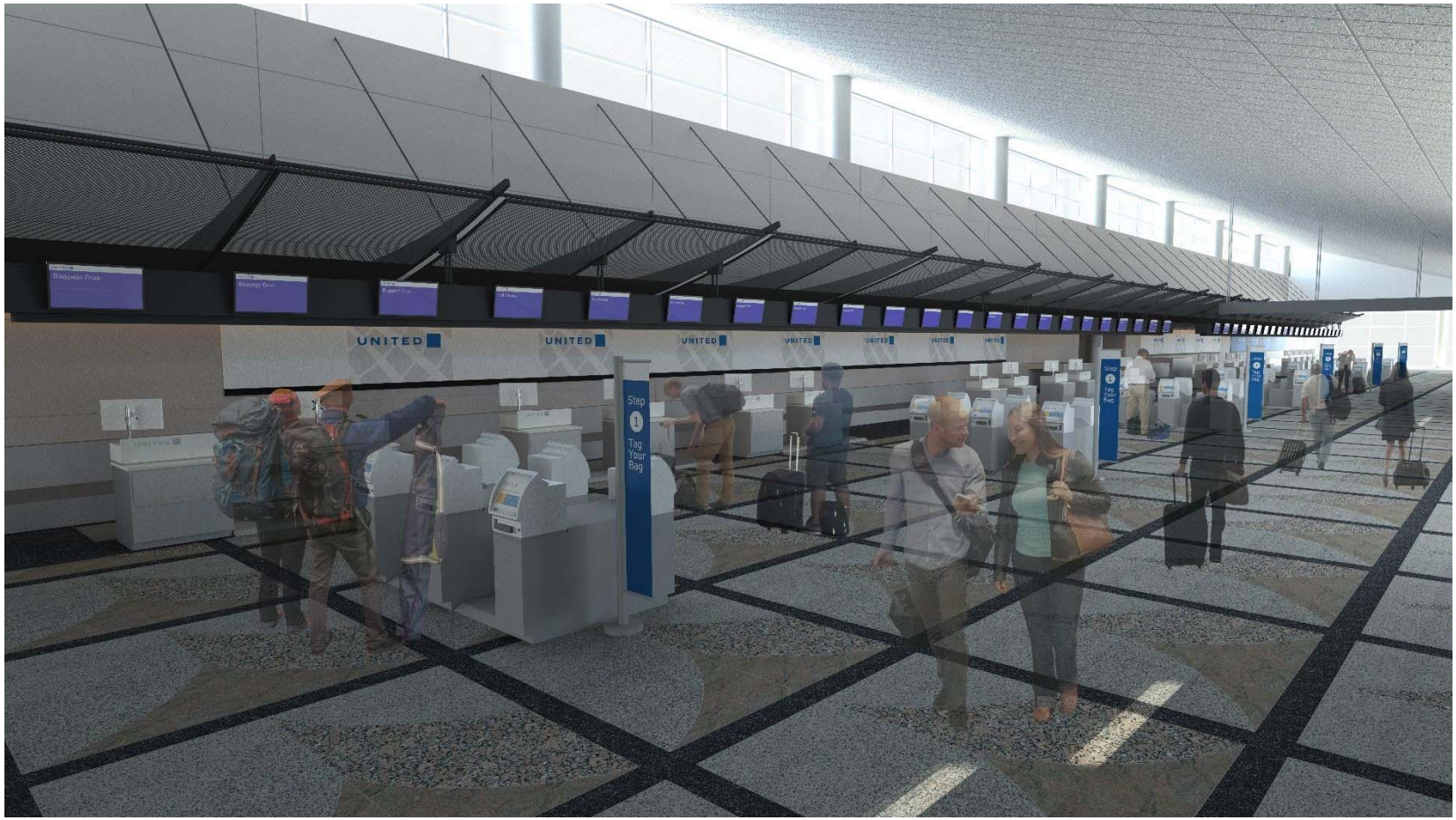
Due Date	Resolution Date	Coordination Notes	Resulting Documentation
11.03.11	12.13.11	Structural confirmed on 10.28.11 that detail exists for this condition. Information received from Ray Nickle via email on 12.13.11 contained Structural Details for East Bus Ramp Wall.	RFC STRUCTURAL PACKAGE E 5-1374, RFC NDC #105 5-1375
11.10.11		Pending Redesign - New stationing point.	Pending - RFC NDC #185 to be issued.
12.22.11			
11.10.11		RTD Minimum depth information per meeting with Dave Center/Chris Lisberg on 10.31.11. New standard depth of 36" established at Clash Detection Meeting on 11.08.11.	Pending - Standard depth to be communicated in RFC NDC #185 (to be issued).
		Information received from Dave Center via Chris Lisberg at meeting on 11.08.11 shows intention to run conduit through East Bus Ramp Foundation Walls. Confirm all details for Wall penetrations are coordinated. Reference to the wall penetration will be added on S-1374. Standard penetration reinforcing and waterproofing details on S-1362, S-1711, and S-1712.	ASI #2 and Structural Detail for Wall Penetration
		Discussion at Clash Detection meeting on 12.15.11 determined conduits to be field fit to run below Trench Drain.	

Model Development

Coordination

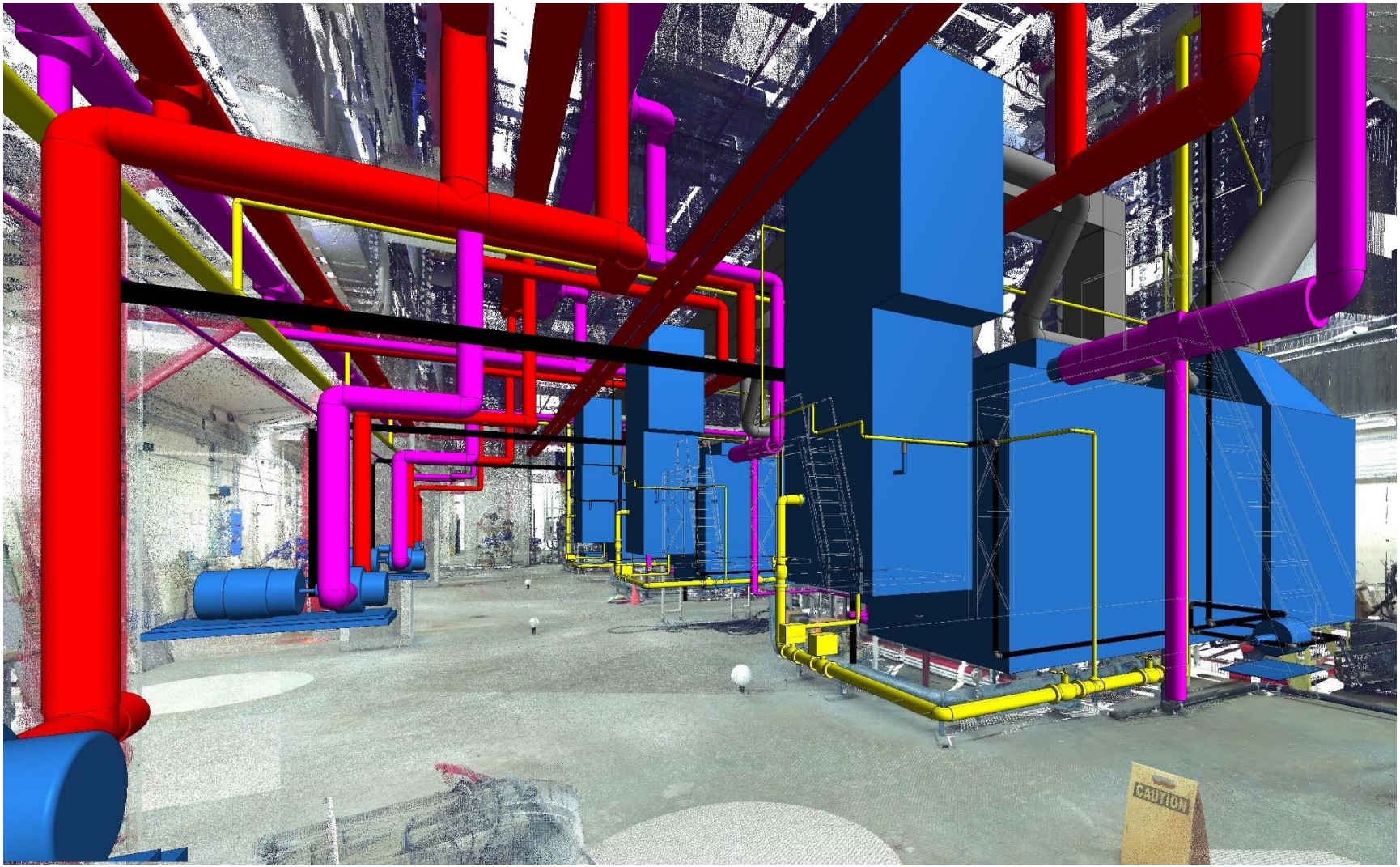
Collaboration

BIM = Data

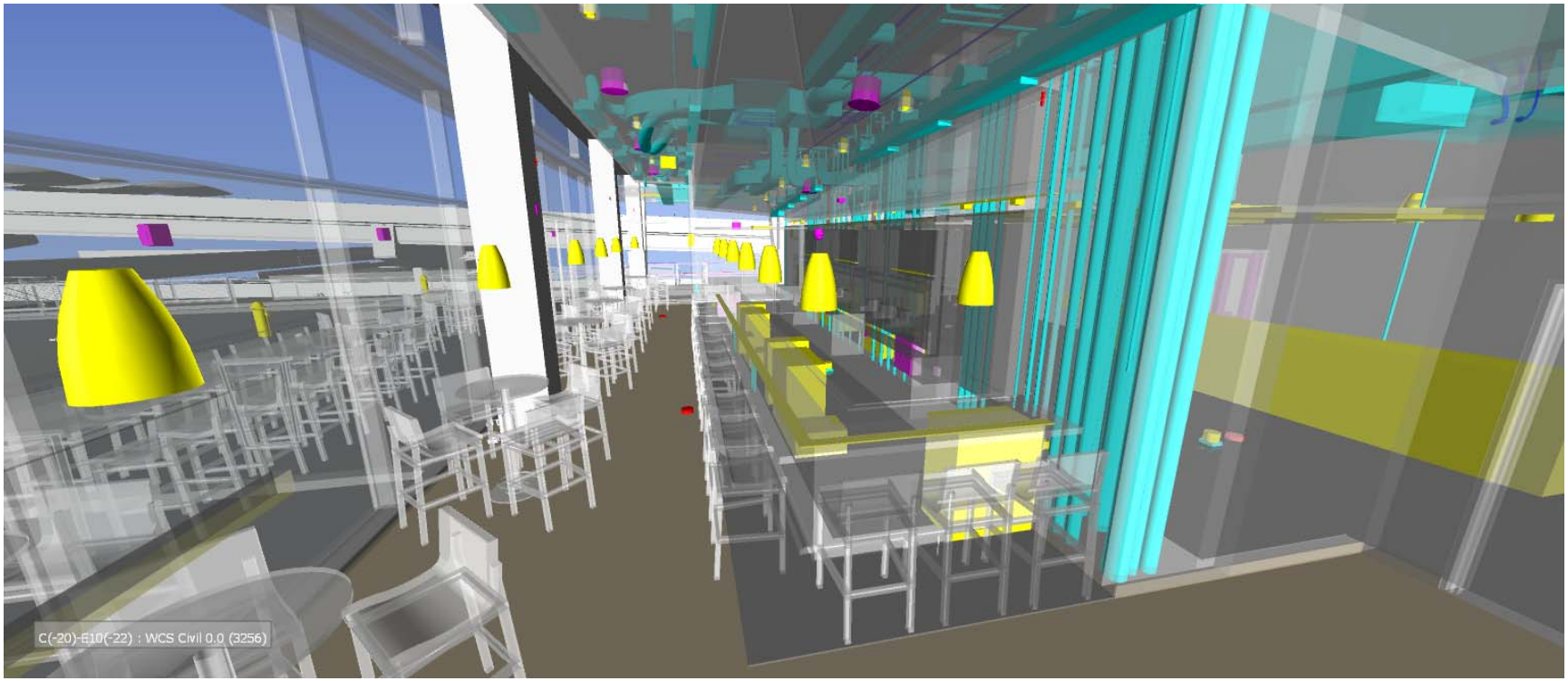


BIM = Rendering

BIM: Design Visualization



BIM: Laser Scanning



BIM – Spatial Coordination

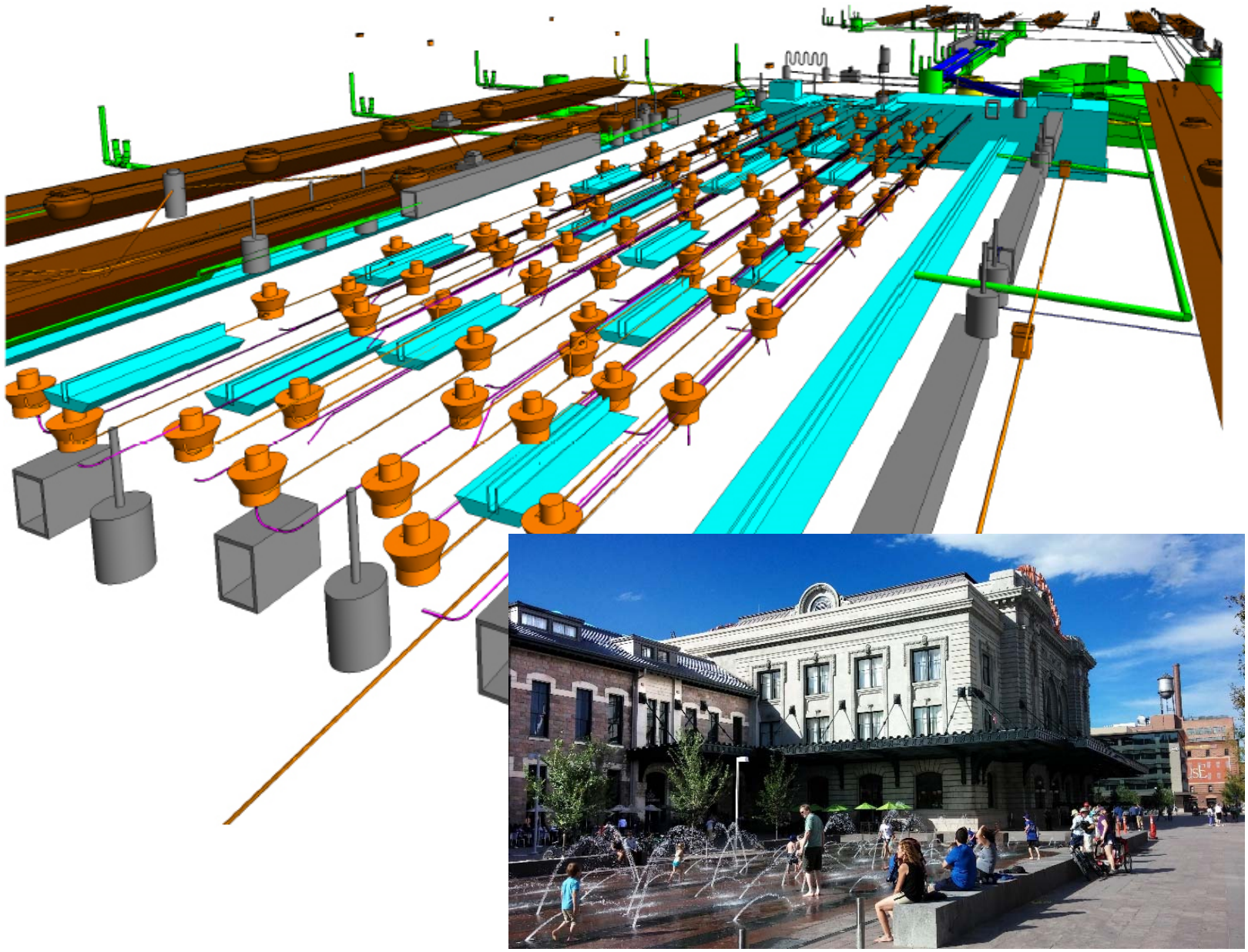
Tag View 1335

Status New
User 13498
Text FP line in structure @ Grid G/W7
2013/1/10
Status New
User 13498
Text Telecom lines need to run north one bay to miss sump pit location @ Grid G/W7
2013/1/10
Status New
User 13498
Text Sanitary line conflict with FP line @ Grid G/W7
2013/1/10

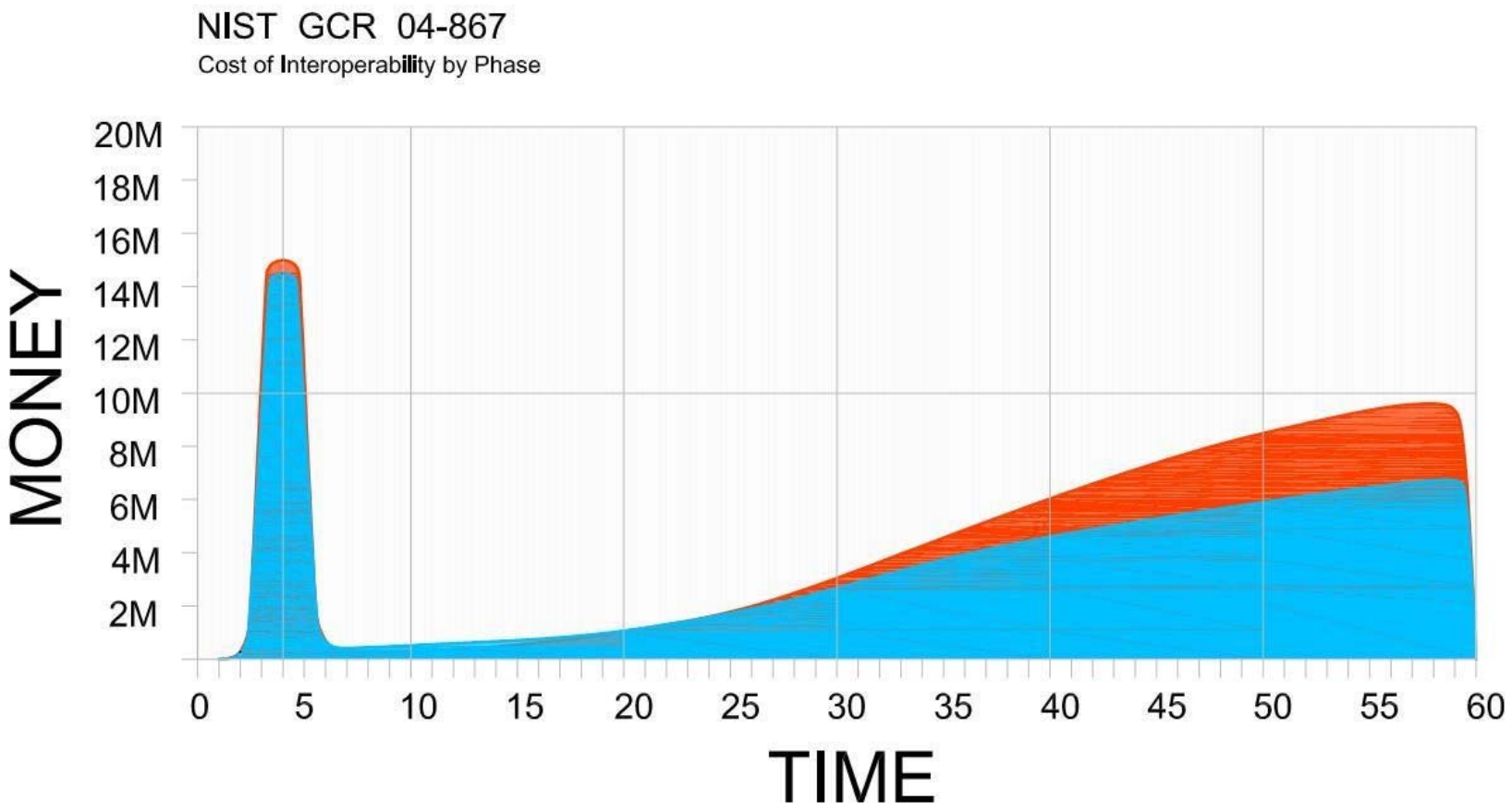
DUS Utility Modeling Coordination Matrix

Conflicts	Issue	Reference Documents	Coordination By: Struct.	Mech.	Elec.	Plumb.	Civil	Due Date	Resolution Date	Coordination Notes	Resulting Documentation/Action
101	OCS Foundation on Grid Line T44 at Platform 1, conflicts with Storm Sewer Line ST7.2b - ST7.2b2.	RFC NDC #121, S-3103; RFC NDC #80, S-3157; RFC NDC #59, D-3017; DUS-UD01prutilMA.dwg	Support				Primary	11.03.11	10.28.11	**Closed** - Information received from Steve Lind on 10.28.11 verified OCS foundation is clear of Storm Line.	N/A
102	Train Hall Foundation at T18 conflicts with East Bus Ramp Foundation Wall and Roof Slab.	RFC NDC #121 S-3108, S-3132; RFC Structural Package E C-3104	Primary		Primary			11.03.11	12.13.11	**Closed** - Structural confirmed on 10.28.11 that detail exists for this condition. Structural Details for East Bus Ramp Wall received from Ray Nickle via email on 12.13.11.	RFC STRUCTURAL PACKAGE E S-1374, RFC NDC #105 S-1375
103	SC MH-1014 conflicts with Track 1 Wall.	RFC NDC #162 JE-0618; RFC NDC #59 JE-0504; RFC Structural Package E S-3301	Review		Primary			11.10.11	01.25.12	**Closed** - New stationing points to be provided by BHA for all Manhole/Handhole Stationing changes. AECOM to verify.	RFC NDC #185
104	Main Storm Line ST7.1 - ST7.5 doesn't connect with the following Under drains and Storm Line per Profile invert locations: UD8.3 - UD8.4, UD5.4 - UD5.5, UD4.4 - UD4.5, ST7.2e2 - ST8.5, UD1.3 - UD1.4.	RFC NDC #163 D-3012, D-3035; RFC CRT B_WTS129 D-3030; RFC NDC #59 D-3017, D-3038; RFC NDC #80 D-3019					Primary	11.10.11	11.03.11	**Closed** - Discussion at Clash Detection Meeting on 11.03.11 clarified that Under drains will be field fit.	N/A
104A	Underdrain Cleanout UD8.3 conflicts with Storm Line ST7.2 - ST7.3.	RFC NDC #163 D-3012, D-3035					Primary	11.10.11	12.12.11	**Closed** - Information received from Dave Center at meeting on 11.10.11 confirmed to move UD8.3 4' due plan South from stationed location.	RFC NDC #201
105	SC -3536 and SC-3527 run into center of Technology Truss Foundations to the north of Grid Line T19.	RFC NDC #121 S-3102; RFC NDC #80 S-3152; RFC NDC #59 JE-0601	Support		Primary			11.10.11	11.03.11	**Closed** - Discussion at Clash Detection Meeting on 11.03.11 clarified that this general condition is acceptable. AECOM restationed the telephones to avoid any conduit penetration through the technology truss foundations.	N/A
105A	SC-3537 and SC-3648 run into Amtrak Canopy Foundation due North of T35 on Platform 2.	RFC NDC #162 JE-0602; RFC NDC #80 S-3152; RFC NDC #121 S-3103	Support		Primary			11.10.11	11.03.11	**Closed** - Discussion at Clash Detection Meeting on 11.03.11 clarified that this general condition is acceptable.	N/A
105B	Power Conduits penetrate Structural Footing at Platform 2. Overall issue with many Electrical Conduits conflicting with Structural Footings.	RFC NDC #185 EP-3053	Support		Primary			12.22.11		Electrical to Update per Redlines submitted to Kathleen Hunter via email on 03.07.12, confirmed to be acceptable by Adnan Baksh via emailed documents on 03.15.12.	Pending NDC
106	Duct banks and Handholes at CRT Platform currently conflict per RTD standard depth information. Note: RE: Concern 209, Inconsistency 313, Constructability 405.	RFC NDC #59 JE-0507, JE-0601			Primary			11.10.11	01.25.12	**Closed** - RTD Minimum depth information per meeting with Dave Center/Chris Lisberg on 10.31.11. New standard depth of 36" established at Clash Detection Meeting on 11.03.11.	Updated standard depth communicated by Sheet Note in RFC NDC #185
107	SC-3806 does not have enough room to go above East Bus Ramp Top slab and B.O. Platform slab and meets requirements for depth below EVA Lane.	RFC NDC #59 JE-0601	Support		Primary		Support	11.17.11		Information received from Chris Lisberg at meeting on 11.08.11 shows intention to run conduit through East Bus Ramp Foundation Walls. Reference to the wall penetration will be added on S-1374. Standard penetration reinforcing and waterproofing details on S-1362, S-1711, and S-1712.	Structural Details for Wall Penetration, ASI #10

BIM - Clash Detection



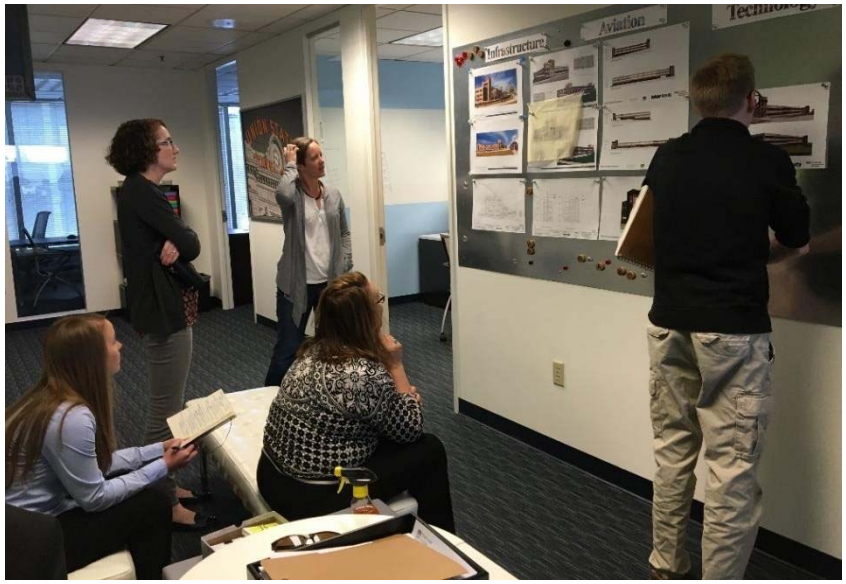
BIM – VDC and 4-D Modeling



BIM – FM, Operations and Maintenance

BIM – Construction Documents

The People Factor

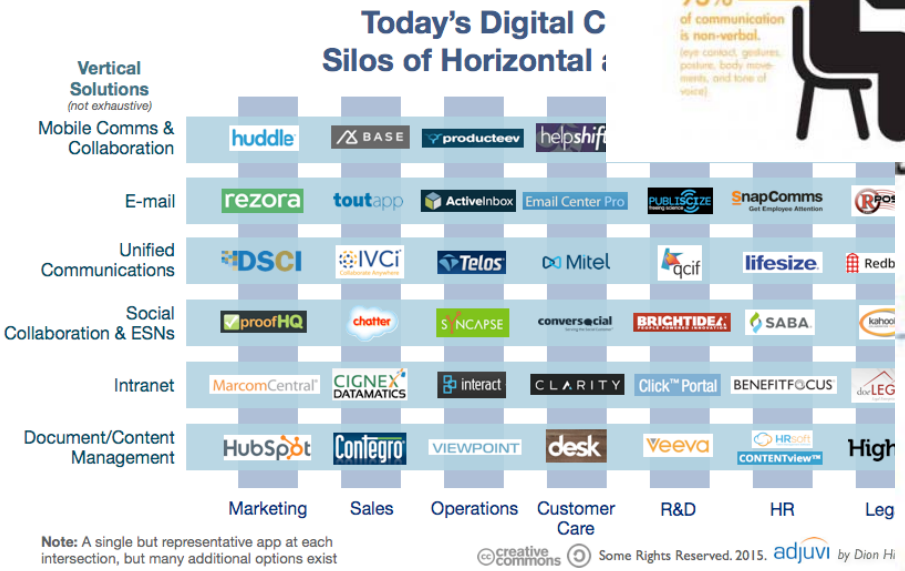


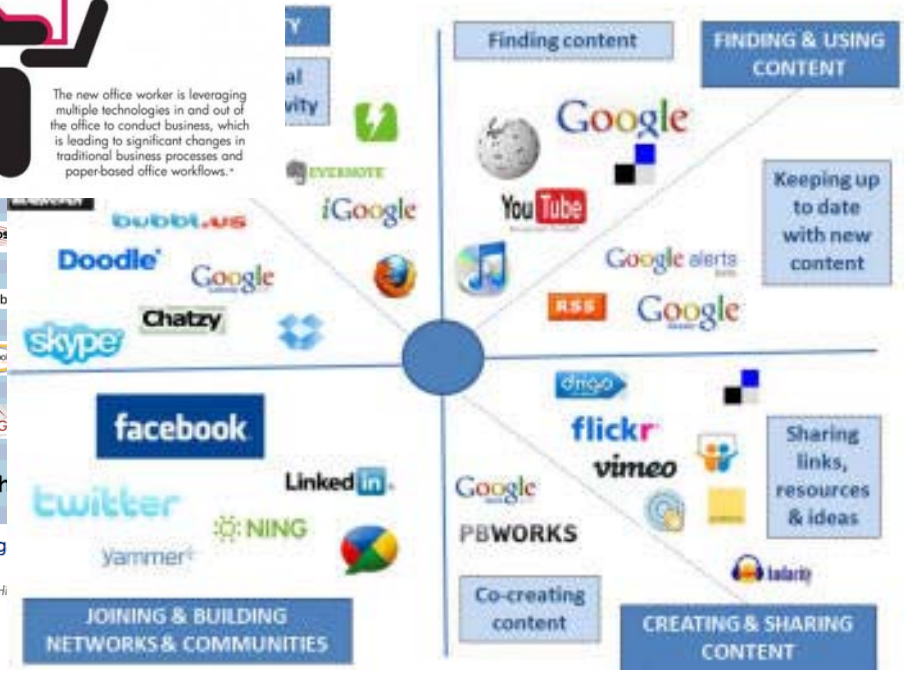
We love our work

Old School and New School

"THE ARCHITECT SAYS YOU DON'T NEED DIMENSIONS ON THE DRAWING WHEN YOU CAN SIMPLY QUERY THE COMPUTER MODEL"

What is the end goal?

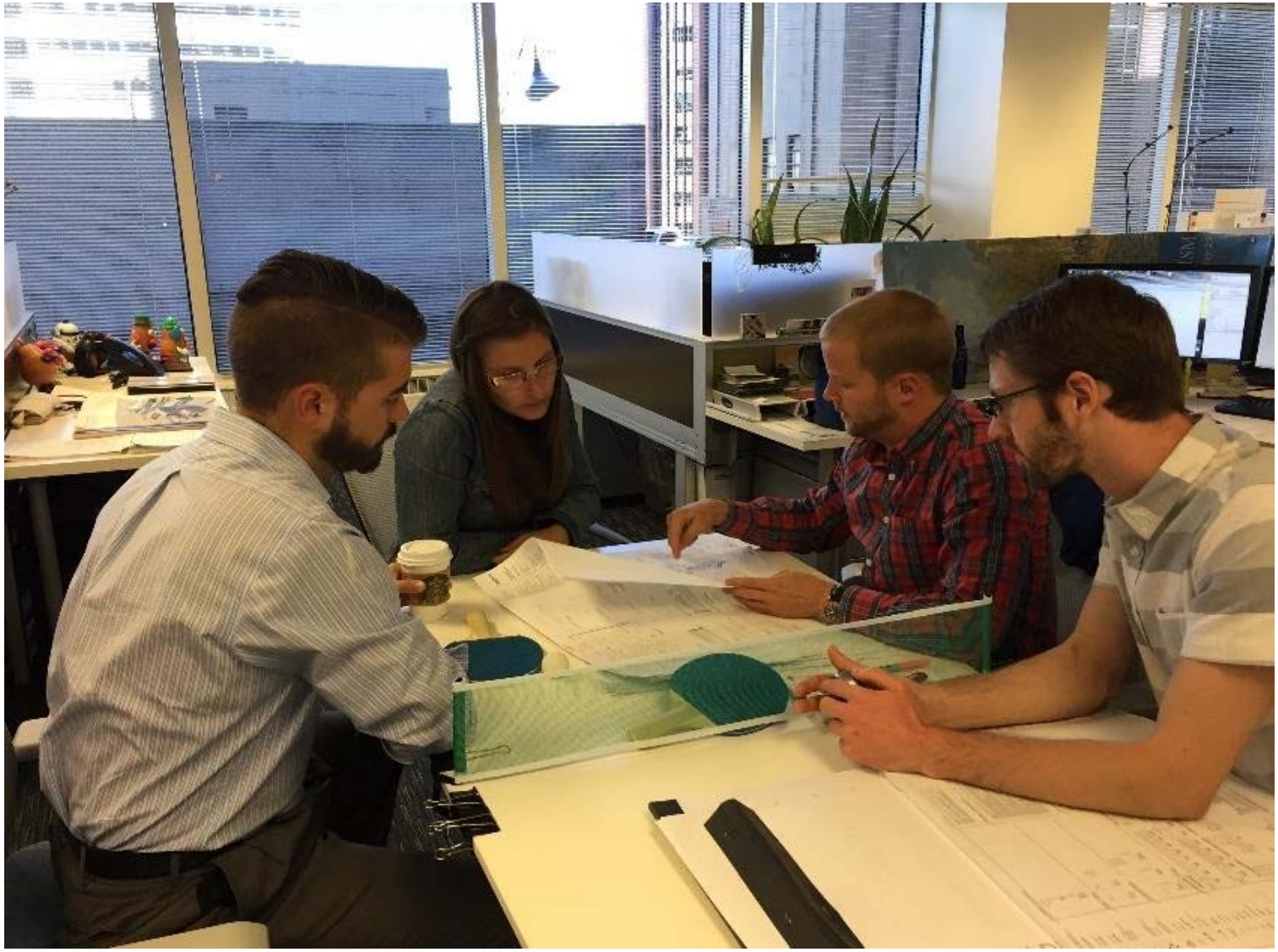




Change is Unrelenting

Building a Collaborative Team

Yes



Team Members

Project Stakeholders

Federal Agencies

Energy and the Environment


Owner

Neighborhood Groups

Planning Department


Developer

Professional Associations

Elected Officials


Financier

Utilities Providers


Designers

Building officials


Contractor


Architects

Historic Preservation

Land Owners


Engineers


Other Subconsultants

Special Interest Groups

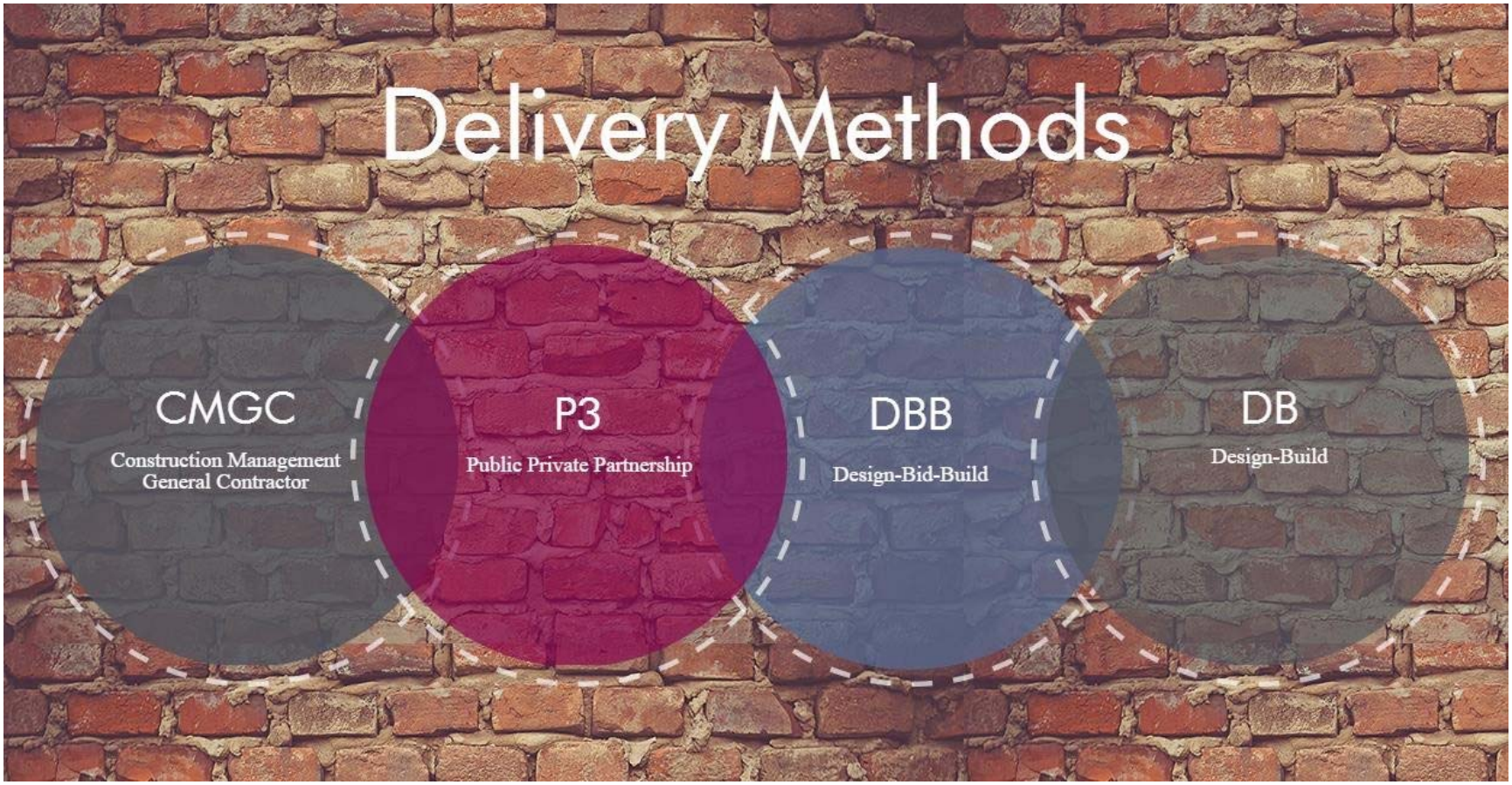

Community Members

Regional infrastructure

Transportation Agencies


MWDBE Firm

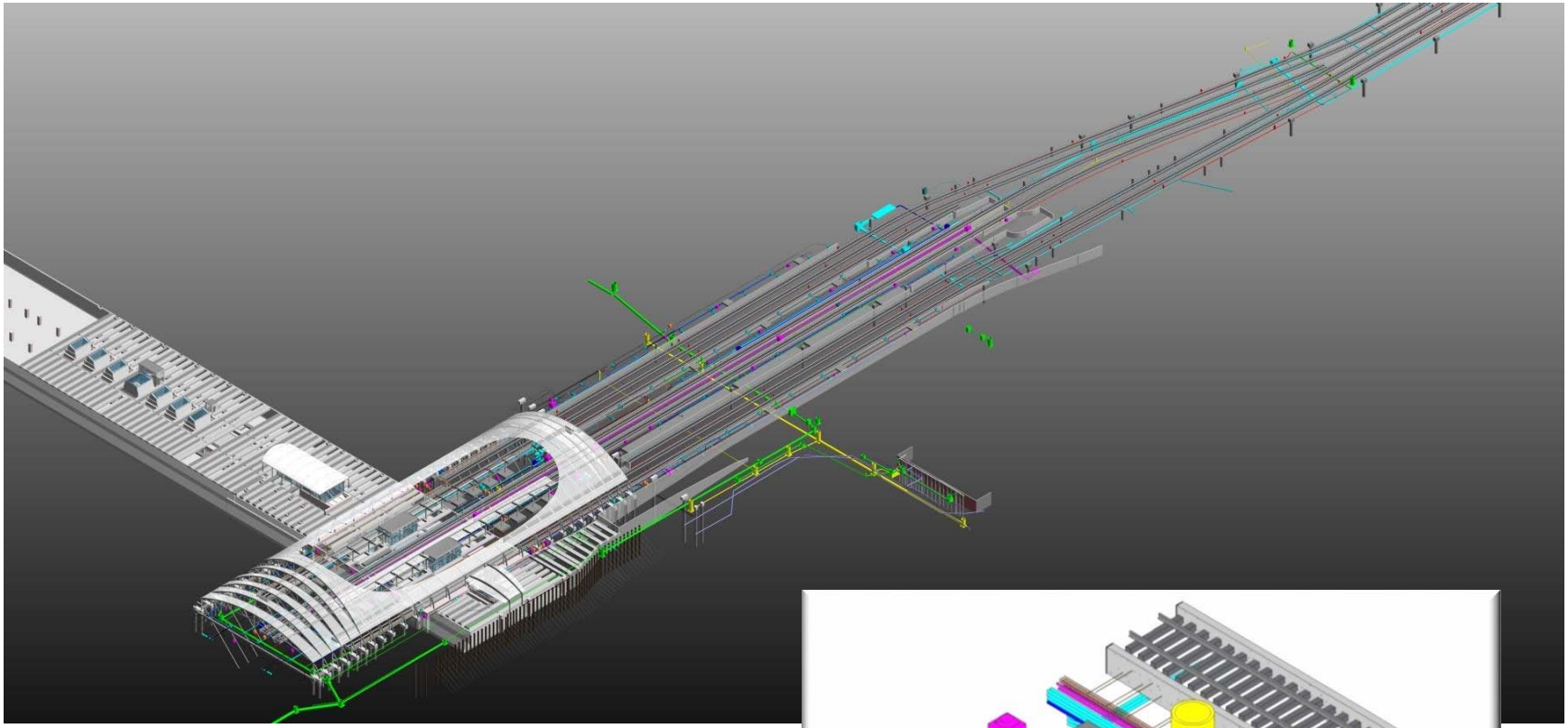
Select Wisely

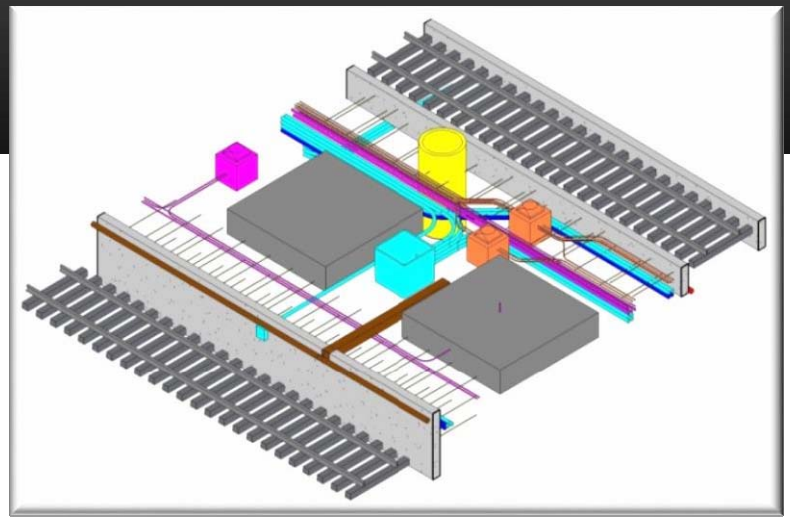


Contract Wisely

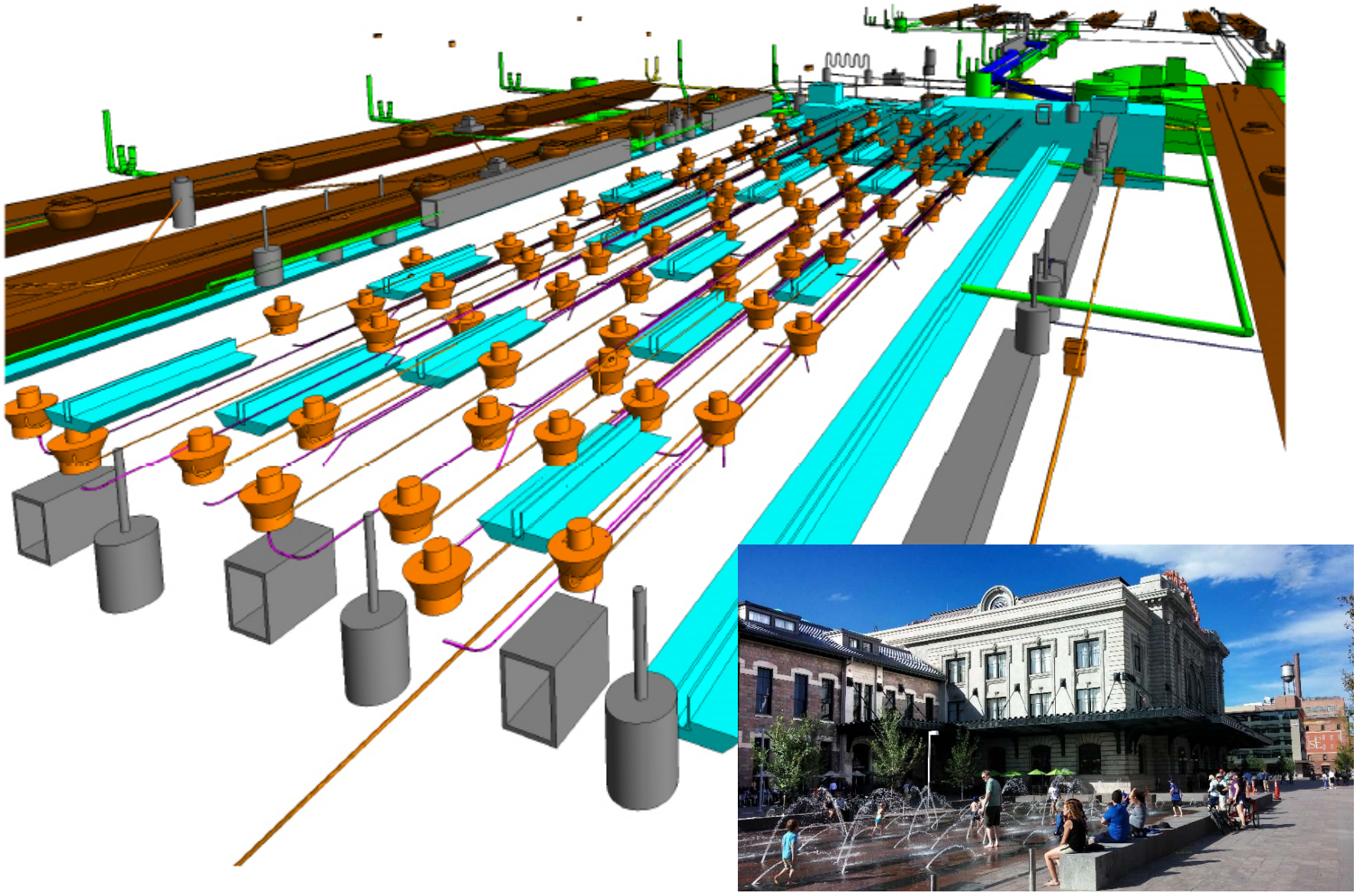
Contract Wisely

Examples



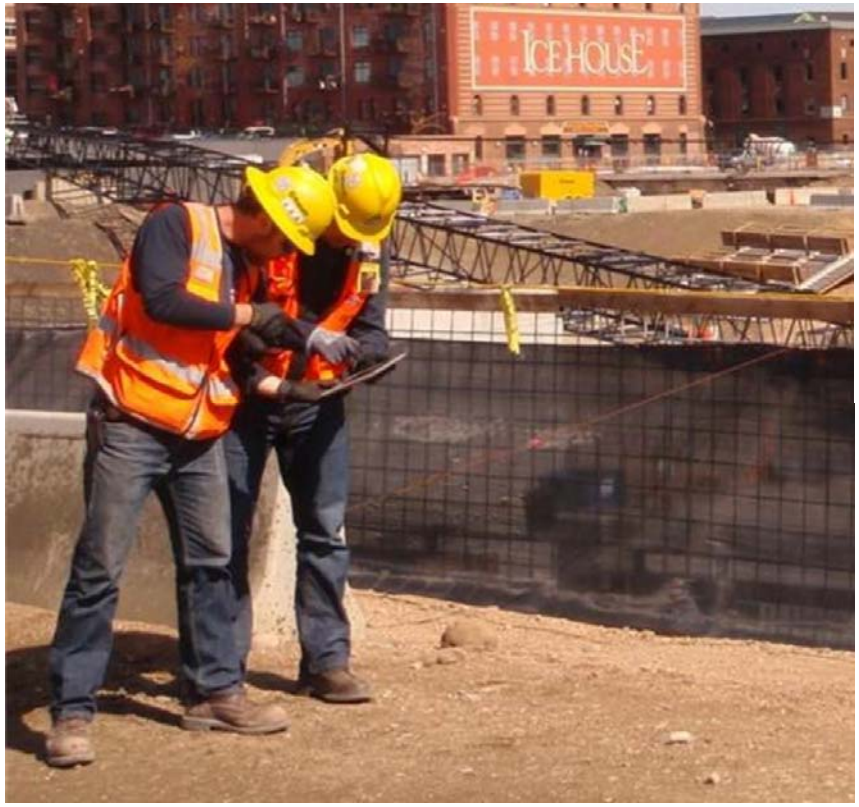


Denver Union Station – Utility Modeling

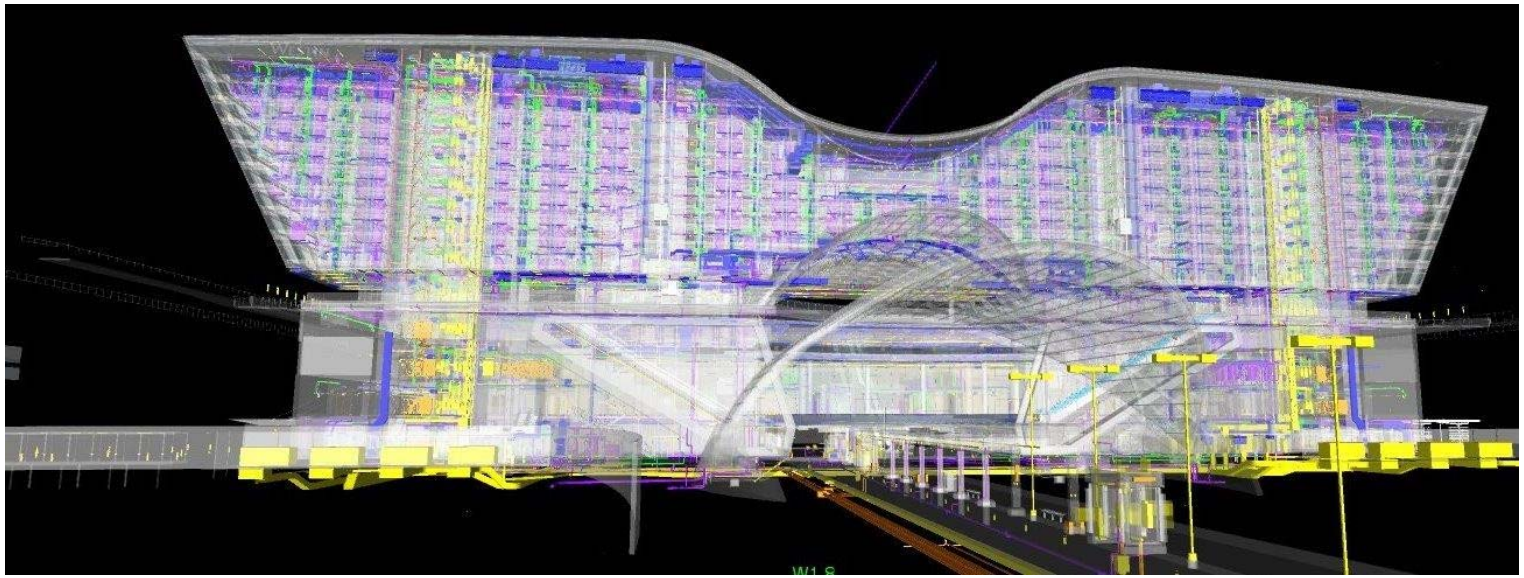


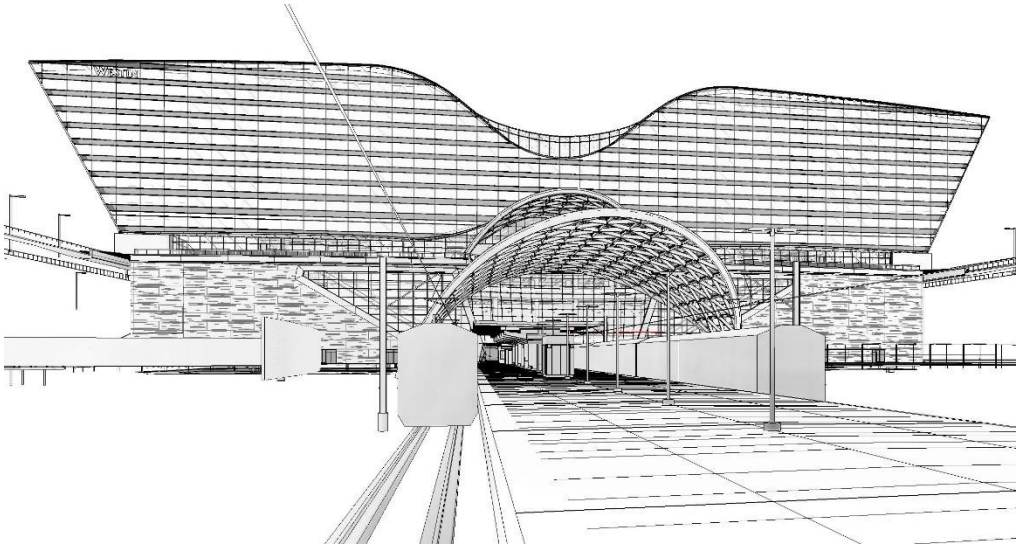
Denver Union Station – Utility Modeling

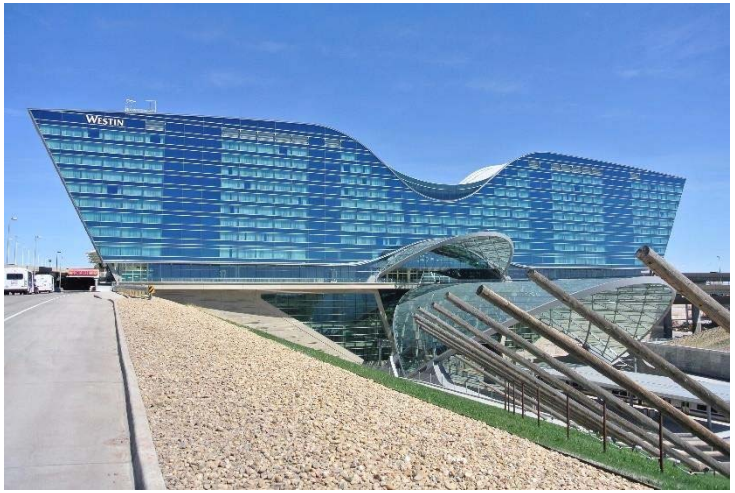
- Design and Construction Data Sharing
  - Live Quantity Take-offs
  - Virtual Coordination
  - VDC Modeling
- Construction Scheduling
  - 4D Model
- Prefabrication
  - Off Site Construction



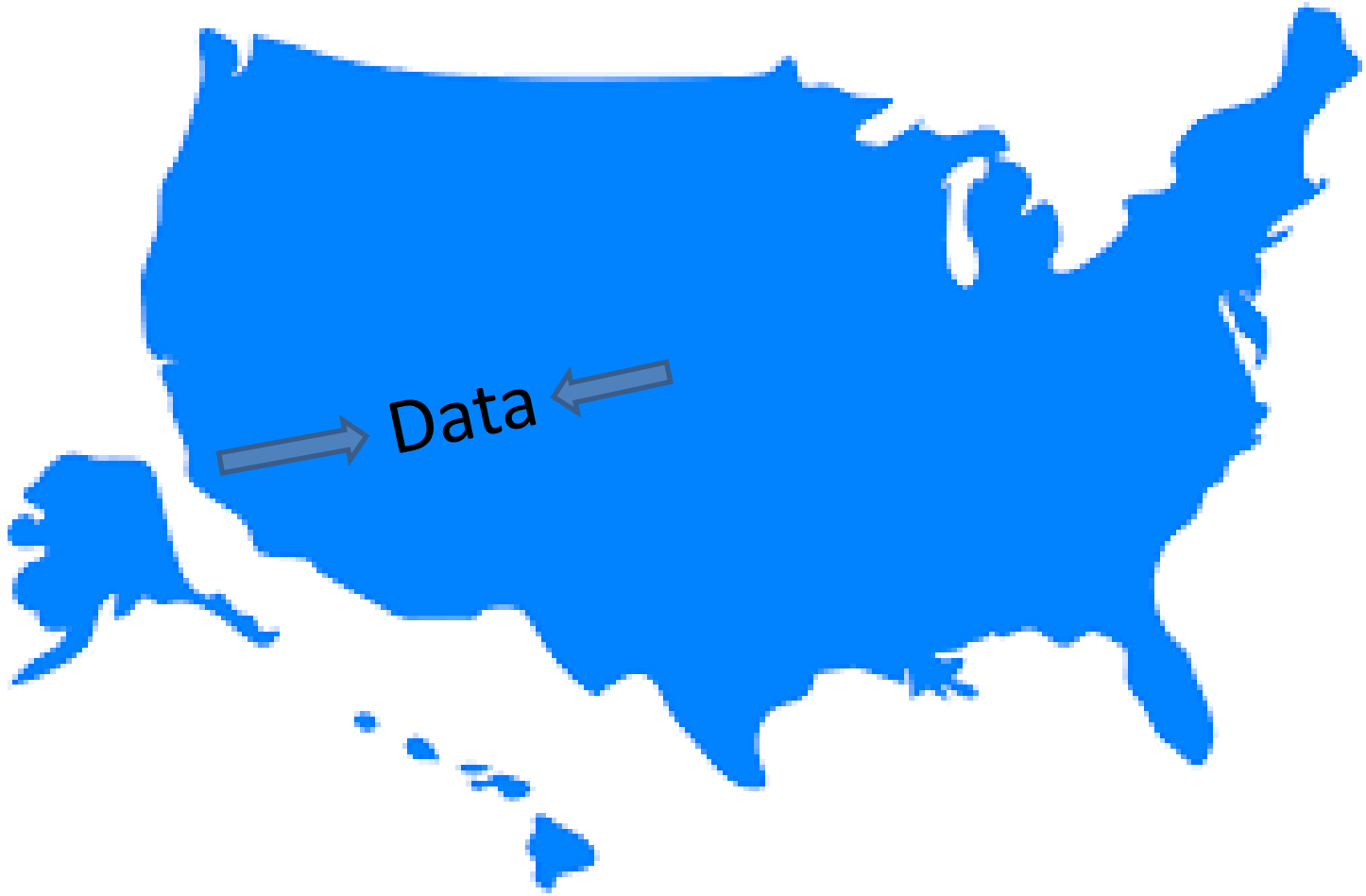
Denver Union Station – Utility Modeling



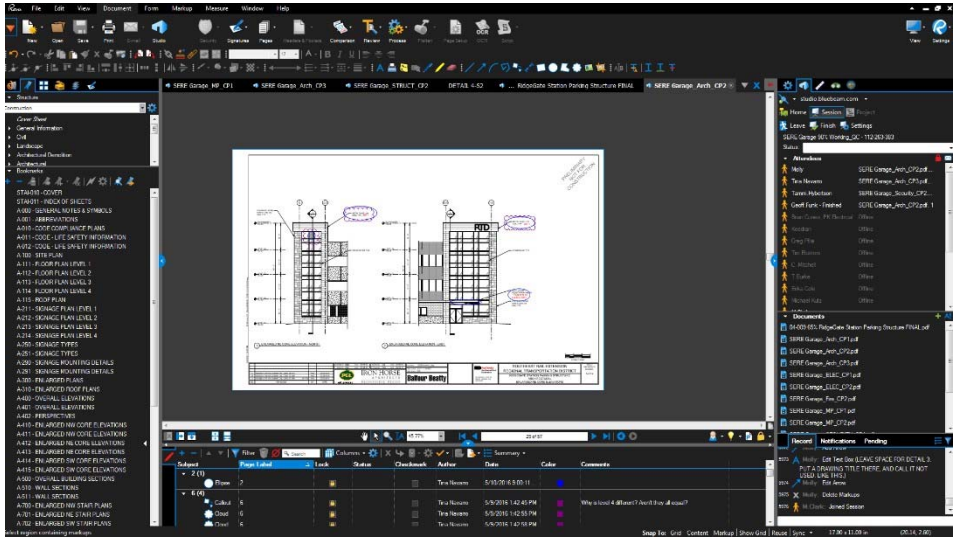




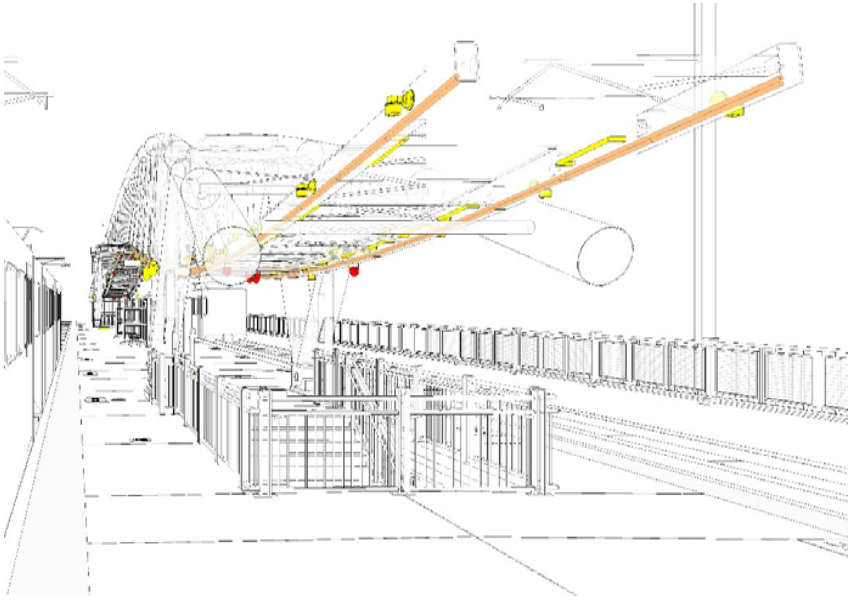
Denver International Airport Hotel and Transit Center

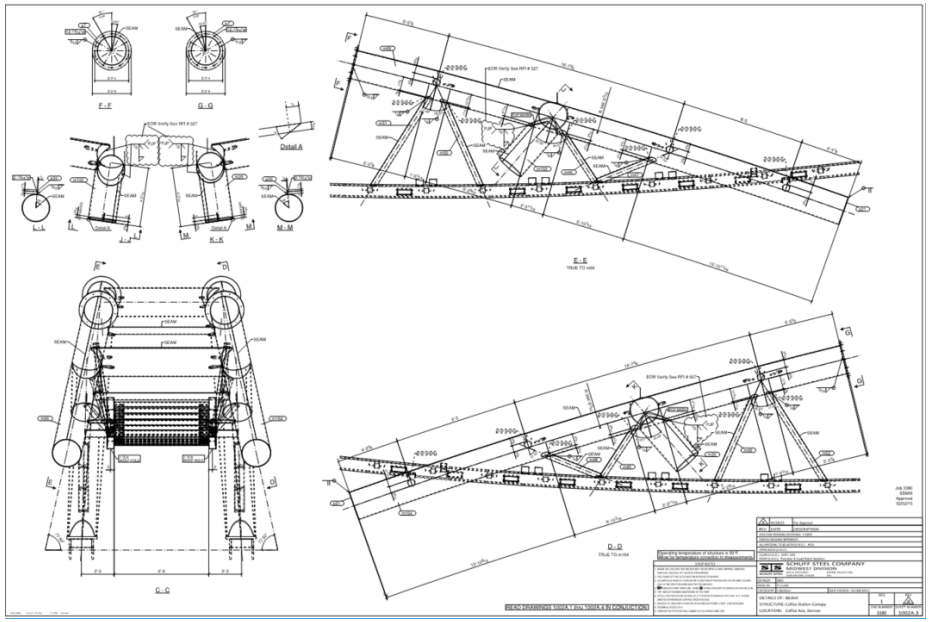


Denver International Airport Hotel and Transit Center



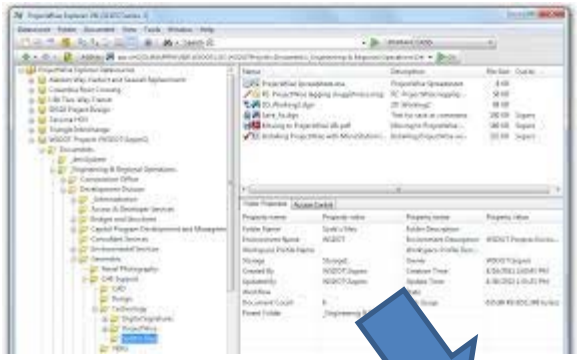
Denver International Airport Hotel and Transit Center

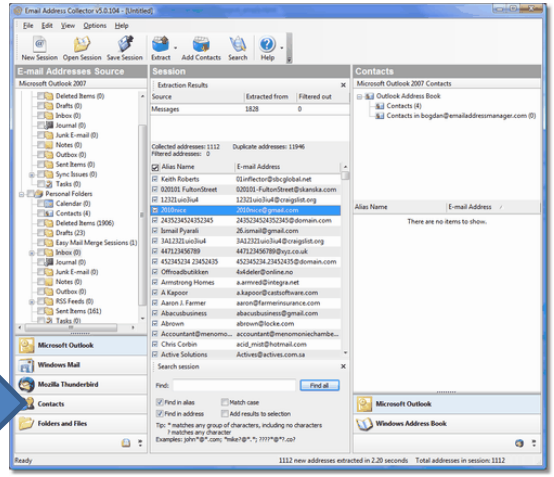


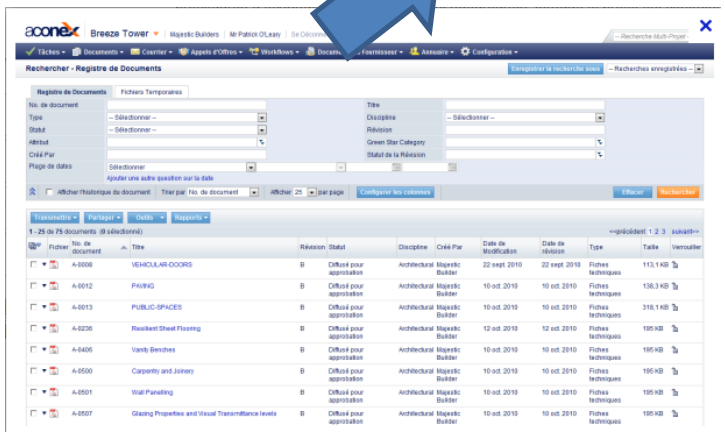


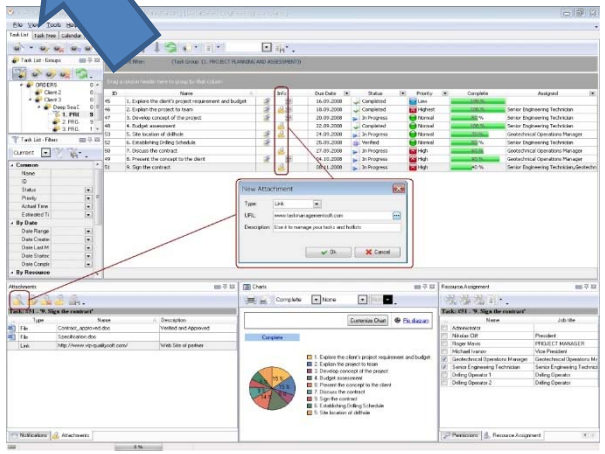
RTD I-225 Light Rail

What’s Next



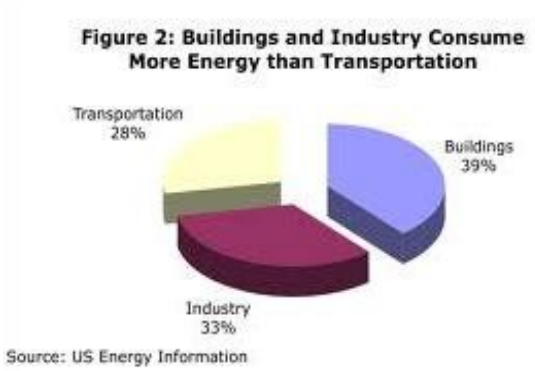




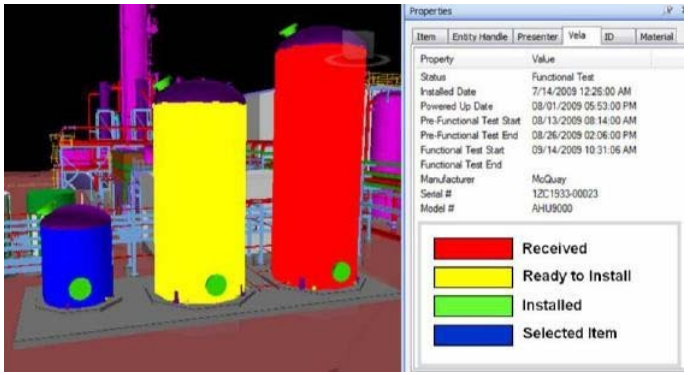


Communication

Energy Management



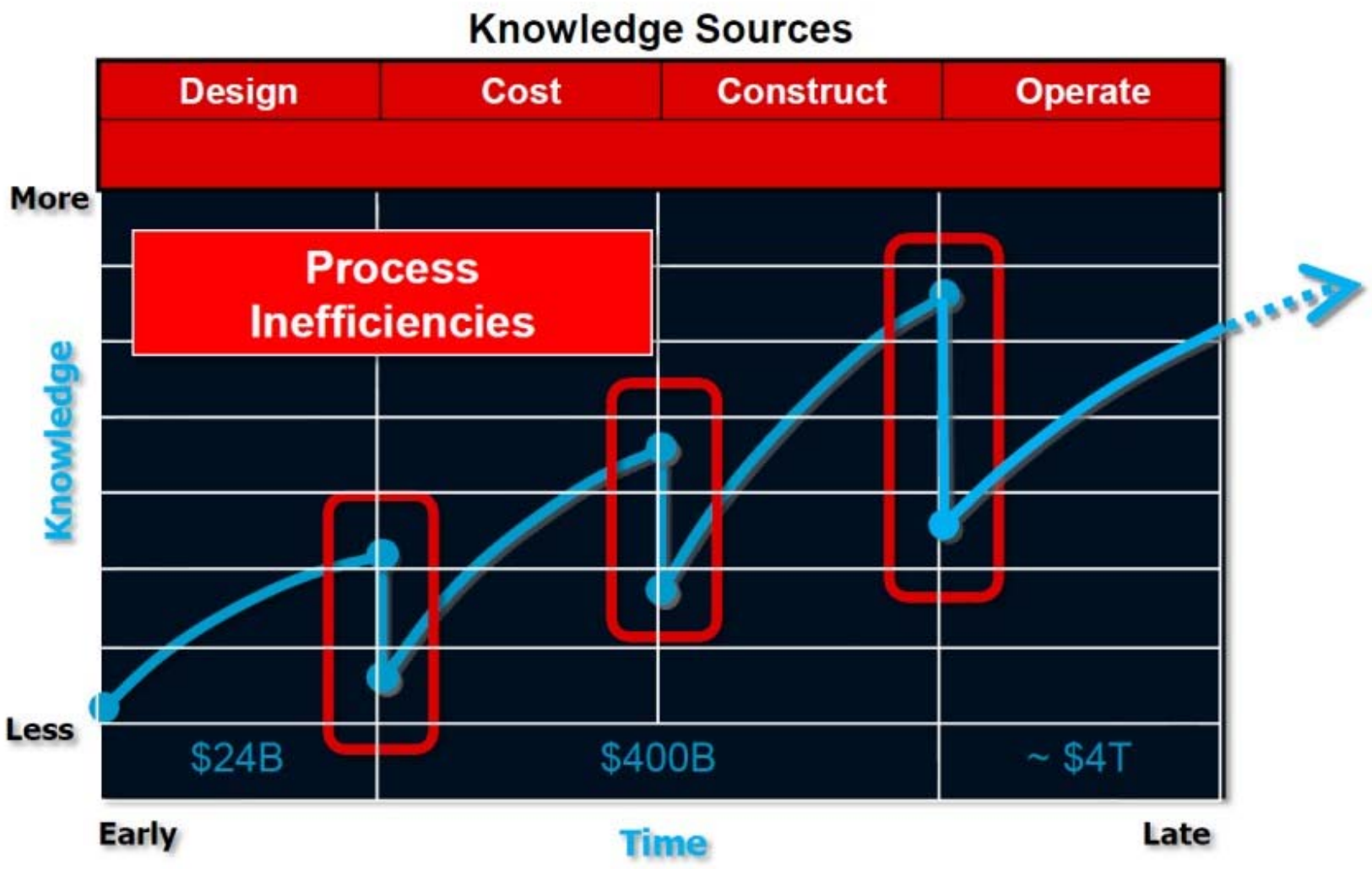
Performance Criteria



Construction Operations Building Information Exchange (COBie)

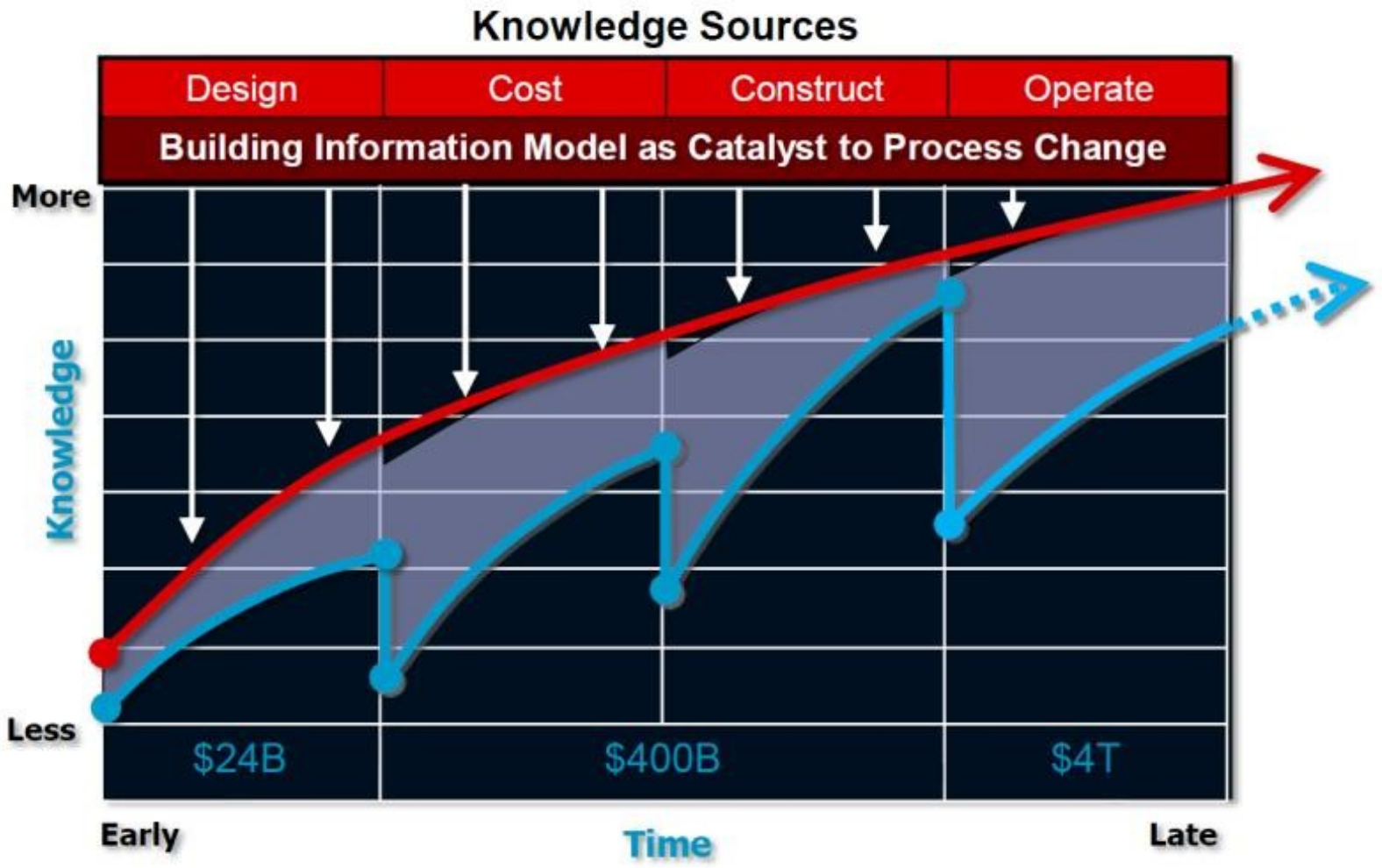
More Data

TIME    MONEY



Chuck Mies – Autodesk – BIM Forum 2012

Cost Savings



Chuck Mies – Autodesk – BIM Forum 2012

Cost Savings

Questions?