Utilization of Advanced Technology (BIM) to Deliver Successful Capital Projects
Agenda

- Evolution of Virtual Design and Construction (VDC)
- College of DuPage Case Study
- Tangible Metrics
Virtual Building Coordination

- Modeled lighting heat zone/installation zone
- Modeled access ladder to above ceiling equip
- Modeled access to all equip panels and clearance zones

Owner facility team integration - understanding access/maintenance
Utilizing VDC in Existing Buildings
College of DuPage – BIC Renovation and SSC Addition: A Case Study

- College of DuPage: $80MM Cost-plus contract with 2 ½ year schedule duration

- Phase 1 - Renovation of BIC Building (420,000 SF of offices, classrooms, and labs) and SSC addition (80,000 SF of student services space, performance space and meeting rooms)

- Phase 2 – Renovation of SRC Building (100,000 SF of classrooms, offices, police dispatch, radio station) and renovation of east half of the BIC
Why use VDC?

- Assist Owner with Making Timely Decisions – Revisions to programming and space needs accompany faculty/administration changes
- Manage Field Conditions – Connections to existing buildings and resulting challenges
- Manage the Schedule – Verification and modeling of existing MEP services for coordination allows for successful prefabrication

**Extensive Planning Eliminates Surprises and Improves Efficiency**
Results

> Efficient Installation – Thorough coordination process facilitates prefabrication.

> Minimizes Change Orders – Revisions are made in advance of install; eliminating re-work.

> Prompt Resolution of Issues – Team experiences faster turnaround on RFI responses.

> Elimination of Surprises – Cross bracing discovered and addressed above ceilings.
Intricate Cross Bracing Coordination
## Demonstrated Value of Virtual Design & Construction

**Example: Fire Protection Main / Owner Lift Conflict**

<table>
<thead>
<tr>
<th>Identified conflict after MEP Coordination and install is complete</th>
<th>$200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue discussed with Owner</td>
<td>$800</td>
</tr>
<tr>
<td>Issue reviewed with Design Team</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

Relocation of existing Fire Protection main after MEP install is complete | $6,000 |

Owner Costs to Order New Lift or Disruption to College Life Safety During Rework after Turnover | Undetermined |

### Avoided Project Cost

$9,000+
## R1 vs. R2

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>R1</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Contractor</td>
<td>Another G.C. not to be named</td>
<td>Mortenson Construction</td>
</tr>
<tr>
<td>Contract Type</td>
<td>CM / GC at Risk</td>
<td>CM / GC at Risk</td>
</tr>
<tr>
<td>Location</td>
<td>Anshutz Medical Campus</td>
<td>Adjacent to R1</td>
</tr>
<tr>
<td>Project Size</td>
<td>2 Bldg – 9 story tower / separate M.R. - 2 story</td>
<td>1 Bldg - 11 story – M.R. with in tower</td>
</tr>
<tr>
<td>Project Square Footage</td>
<td>616,000 sf.</td>
<td>540,000 sf.</td>
</tr>
<tr>
<td>Construction Costs</td>
<td>GMP $ 209 Million</td>
<td>GMP $ 201 Million</td>
</tr>
<tr>
<td>Typical Floor Height</td>
<td>15’-0”</td>
<td>15’-6”</td>
</tr>
<tr>
<td>VDC/BIM Use</td>
<td>N/A – Subcontractors performed 3D coordination during construction</td>
<td>Mortenson Managed VDC during Design &amp; Construction</td>
</tr>
<tr>
<td>Project Duration</td>
<td>36 Months - Planned</td>
<td>32 Months - Planned</td>
</tr>
<tr>
<td>Opportunity</td>
<td>Rare opportunity to compare a <strong>non-integrated</strong> VDC (R1) and an integrated VDC (R2) project</td>
<td></td>
</tr>
</tbody>
</table>
Measured Results

- Reduction in Coordination RFI’s: -37%
- Reduction in Change Orders: -32%
- Reduction in Schedule

*Independent Study from the University of Colorado Construction Research Series*
The Ultimate Goal is to

REDUCE the TIME and COST
of DESIGN and CONSTRUCTION