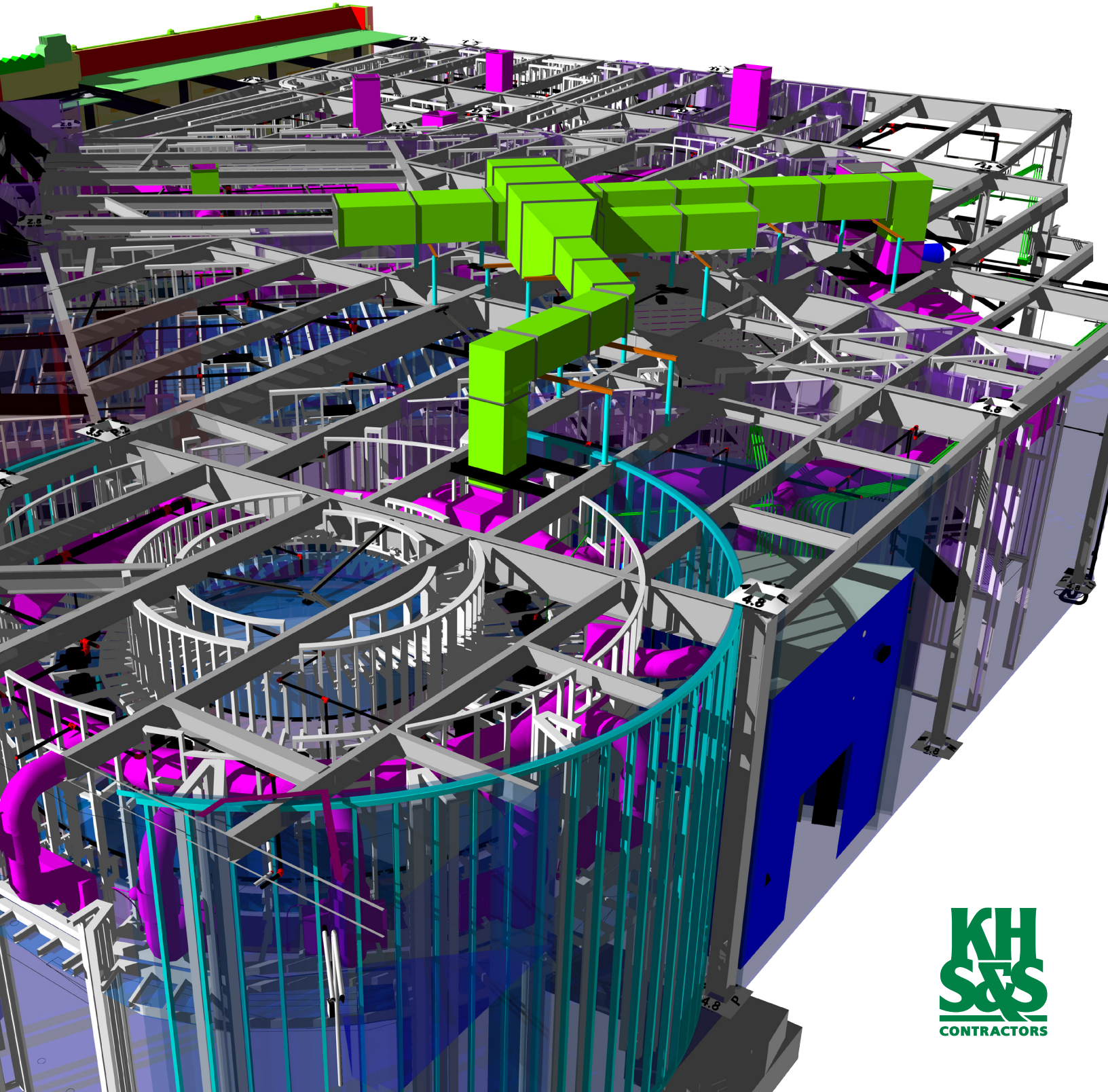
BIM STANDARDS
Level of Framing Detail



KH S&S CONTRACTORS

BUILDING INFORMATION MODELING

Our approach to BIM begins with an extensive project constructability review and design-assistance process, which provides trade specific knowledge and experience to aid the design team. This process generates the project design parameters that inform our 3D model development. Constructability review and design-assistance continue throughout the modeling and coordination process as additional conditions are identified and resolved.

We model planned construction as completely and accurately as possible in an efficient manner. We strive to model actual manufacturer components and assembly details whenever possible, though we have found that there are some uses for no-fly zones that represent the envelopes of rating assemblies or workspaces (i.e. interference walls) to protect critical areas during coordination. Our process employs modeling intelligence and automation by using parametric rules and associations whenever possible. This allows us to efficiently create highly detailed models and make quick adjustments in response to potential design changes and/or coordination solutions.

Ours goals are to impeccably detail and coordinate our work to eliminate unforeseen conditions that cause delays and additional costs to the project. We strive to create efficiencies for our work, as well as the project as a whole, through maximizing coordination, prefabrication opportunities, and value analysis.

50+

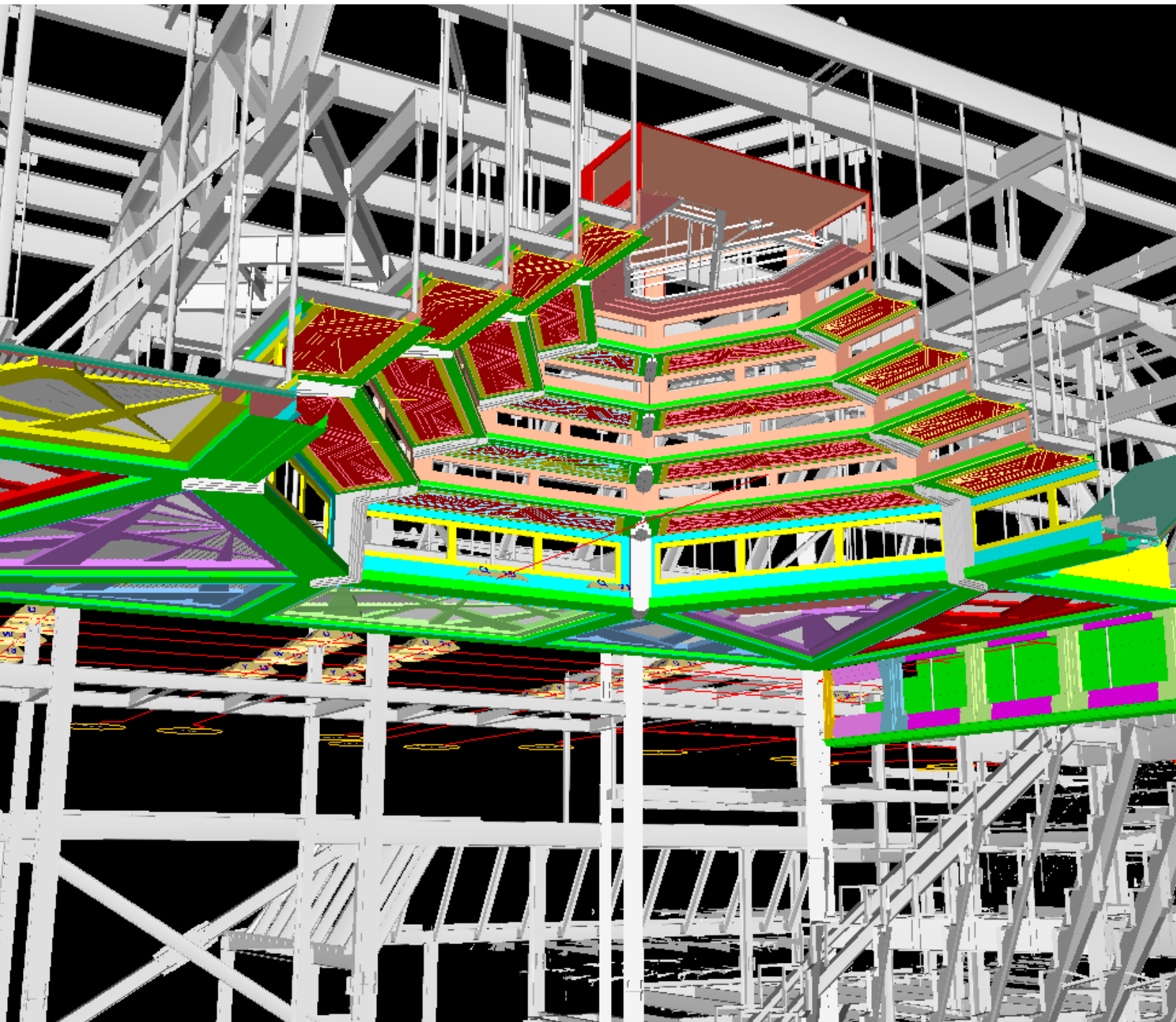
PROJECTS

OUR IN-HOUSE CONSTRUCTION DESIGN DEPARTMENT LEADS THE ADVANCEMENT OF BIM IN CONCERT WITH ALL PROJECT TEAMS.

15+

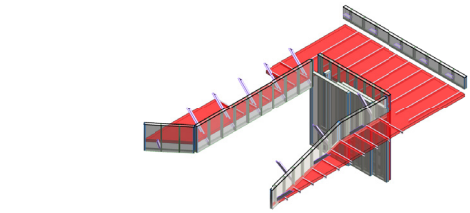
YEARS OF EXPERIENCE

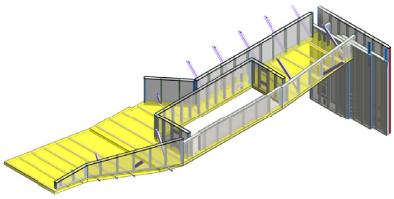
AMONG OUR CONSTRUCTION DESIGN STAFF ARE ARCHITECTS, ENGINEERS, SEASONED CONSTRUCTION VETERANS, AND PRODUCTION MODELERS & DRAFTSMEN.

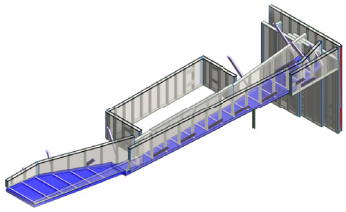


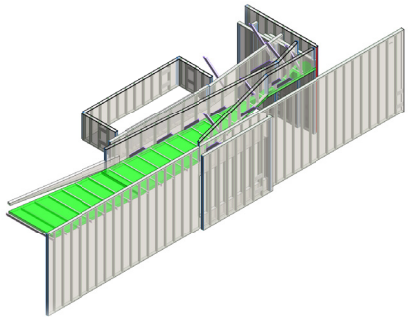
OUR ROLE

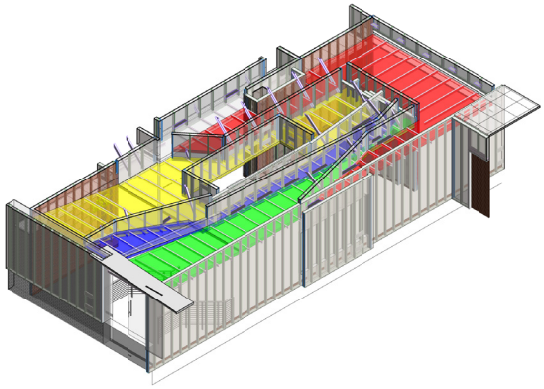
MAXIMIZE THE BENEFITS OF BIM BY INCLUDING KHS&S' FRAMING AND DRYWALL EXPERTS EARLY











A MODEL FOR SUCCESS

KHS&S can play a significant role in projects utilizing BIM. Our role includes the coordination for metal framing with the other trades and in doing so, we raise, and hopefully resolve, issues involving dimensions, wall types, ratings, and structural and general design.

KHS&S has also taken on the role of BIM manager to facilitate and coordinate the model for the entire project including a major themepark expansion and major casino renovation.

HOW WE WORK
Bim In The Field

Our integrated field staff prescribes their construction preferences in means and methods as well as project details that become incorporated in the project. We then work with the other trades to identify clash issues and seek resolutions.

This team involvement allows KHS&S to propose framing changes to accommodate trades and fulfill the design intent. By addressing change orders and request for information (RFIs) as they are presented, we can get an early view of problems before they arise, either correcting them or bringing them to the attention of the field staff.

WHAT WE WORK WITH
Technology

KHS&S utilizes the most advanced technology. The gradual progression of 3D to BIM has produced measurable increases in efficiencies and reductions in RFIs. Leveraging the advantages of BIM has dramatically improved the visualization, coordination, and flexibility of construction.

SOFTWARE

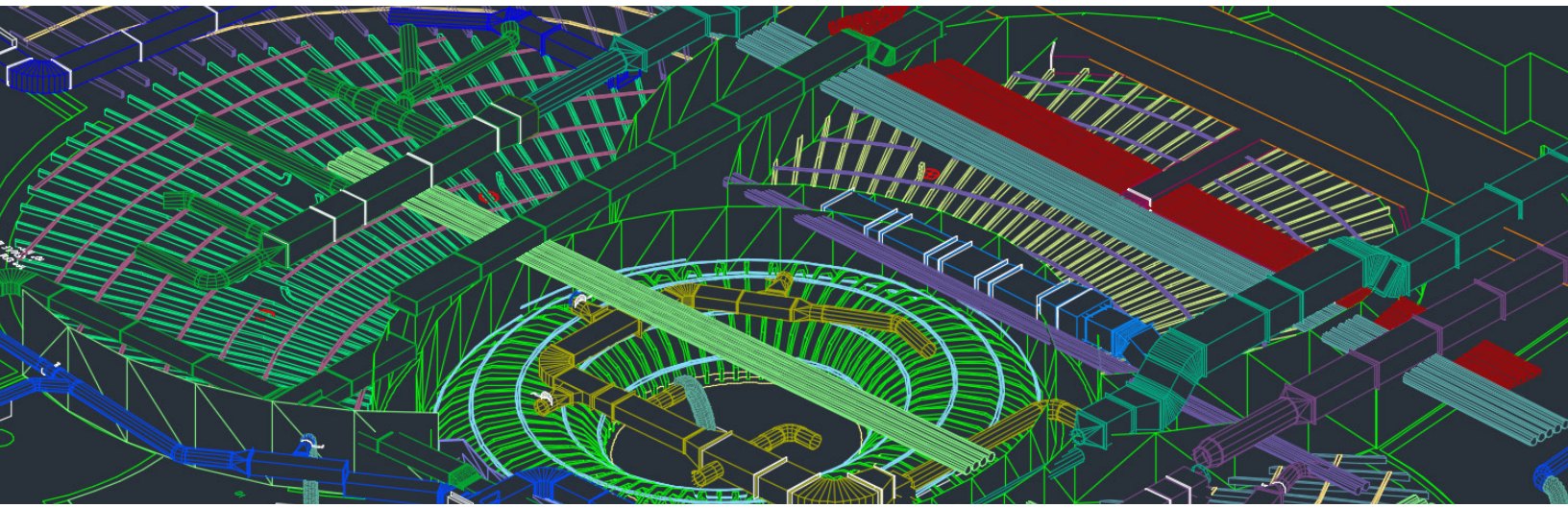
Revit Architecture
Navisworks
AutoCAD Architecture
3DStudioMAX
SolidWorks
ArchiCAD
Zbrush
MWF Pro Suite
GeoMagic
Timberline
Primavera P6
Bluebeam Extreme
PlanGrid

HARDWARE

Knaack Data Vaults
PRO (Project Resource Office) Boxes
Robotic Total Stations
Field Tablets (iPads)
Grabber PANELMax
Kuka Industrial Robots
CNC Bar Bending Machine
Customized Stud Fabricators

OUR CORE BELIEF, "TO DO EVERYTHING BETTER" IS WHAT MAKES KHS&S A LEADER IN BIM

EXPERIENCE



COMMERCIAL

Fountainview at Gonda West
Wallis Annenberg Center for Arts
Jean Georges Steakhouse at Aria, CityCenter
Celgene TI

GAMING / CASINOS

CityCenter
Hakkasan
The Cosmopolitan

HEALTHCARE

Akron Children's Hospital
Anderson Lucchetti Women's & Children's Center
Children's Hospital Los Angeles
Children's Hospital of Orange County
Kaiser Cerritos Medical Office Building
Kaiser Santa Rosa
Palo Alto Medical Foundation, San Carlos Campus
Regional Medical Center of San Jose
San Francisco General Hospital
Santa Barbara Cottage Hospital, Phase IV
Stanford Hospital
Torrance Memorial Medical Center
Virginia Mason Medical Center

PUBLIC / EDUCATION

Las Vegas City Hall
John Wayne Airport, Terminal C Expansion
Long Beach Courthouse
Rady School of Management at UCSD
San Diego New Central Library
Santa Clara Family Justice Center
Smith Center for the Performing Arts
University of Iowa, Children's Hospital
USC Glorya Kaufman School of Dance
USC Heritage Hall, Recapitalization

THEME PARKS

Ariel's Undersea Adventure
Buena Vista Street Improvements
Carsland
Ocean Park Hong Kong
Under the Sea ~ Journey of the Little Mermaid
Universal Special FX Theatre Attraction – Sentosa
Universal Journey to Madagascar Attraction
Wizarding World of Harry Potter
at Universal Studios Hollywood

LEVEL OF FRAMING DETAIL

	LFD 100	LFD 200	LFD 300	LFD 400	LFD 500
COORDINATION	●	●	●	●	●
Trade Specific & Experienced Based Criteria	●				
Attend Limited Coordination Meetings		●			
Attend All Coordination Meetings			●	●	●
Participate in Clash Detection				●	●
TOP & BOTTOM TRACK		●	●	●	●
Wall Heights based on Architecture Model		●			
Wall Heights based on steel and floor above			●	●	●
Priority Walls		●	●	●	●
Rated Walls		●	●	●	●
Non-Rated Walls			●	●	●
CRITICAL STUDS		●	●	●	●
Doors		●	●	●	●
Windows		●	●	●	●
Wall Intersections		●	●	●	●
Wall End Studs		●	●	●	●
HEAD OF WALL		●	●	●	●
NO-FLY ZONES		●	●	●	●
OVERHEAD MODELING (CEILINGS, SOFFITS, KICKERS)			●	●	●
Ceiling Solid, No Framing			●	●	
Ceiling Framed and Coordinated with Openings					●
Soffit Walls and Kickers Framed, Not Coordinated			●		
Soffit Walls and Kickers Framed and Coordinated with Openings				●	●
OVERHEAD COORDINATION			●	●	●
Overhead Penetrations (Larger than 30")			●	●	●
Overhead Penetrations (Larger than +14")				●	●
BEAM POCKET OPENINGS				●	●
COORDINATED INFILL FRAMING LAYOUT				●	●
IN-WALL COORDINATION					●
CONSTRUCTABILITY REVIEW			●	●	●
Basic Detail Review			●	●	●
Detail Review / Suggest Detail Changes and/or Request New Ones				●	●
Full Detail Review. Adjust Existing and/or Create New Ones					●
DOCUMENTATION			●	●	●
Overlay of Architects Drawings with KHS&S Framing			●	●	●
Add Missing/Critical Dimensions, Tags and Annotations				●	●
Additional Sections and/or Details Based on Job Type				●	●
2D Floor Plan Layout Drawings					●
Additional Sections, Elevations and Details for Submittal Purposes					●

● **Included** ☐ **Not Included (Add/Alternate - Additional Cost)**

PARTICIPATE IN BIM COORDINATION PROCESS
NO MODELING PROVIDED

Attend BIM Coordination Meetings and Participate in Discussions
Provide Trade Specific & Experienced Based Coordination Criteria

PROVIDE TYPICAL WALL FRAMING
+DRYWALL MODELING

Top/Bottom Track
Head Of Wall
No-Fly Zones
Basic Coordination

PROVIDE PRACTICAL COORDINATION FRAMING
+DRYWALL MODELING +COORDINATION

Top/Bottom Track
Critical Studs @ Doors, Windows + Wall Intersections
Head Of Wall
No-Fly Zones
Overhead Modeling (Ceilings, Soffit Walls + Kickers)
Critical Overhead Penetrations
Basic Constructability Review
Basic Documentation
Basic Coordination

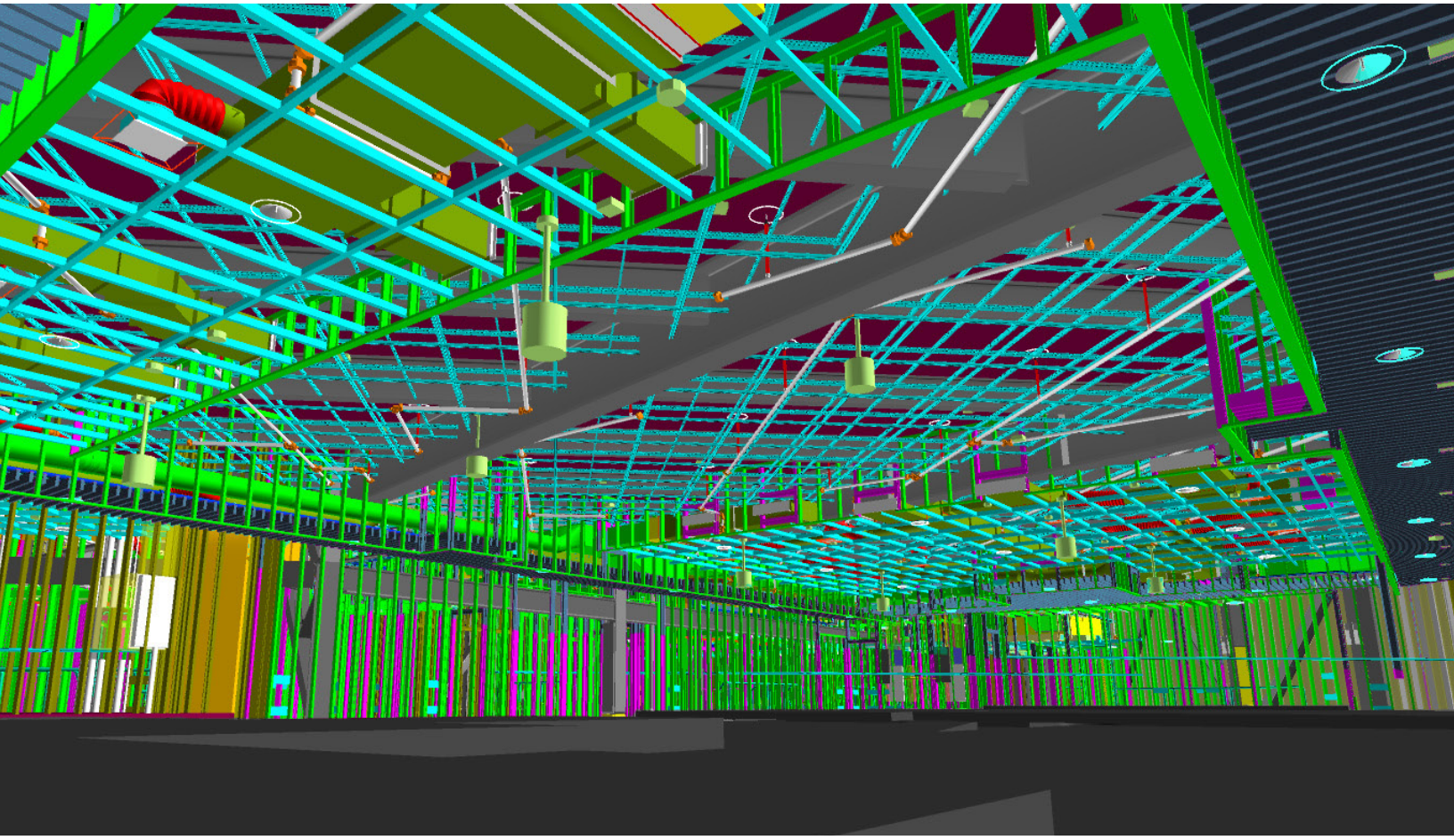
PROVIDE PRACTICAL COORDINATION FRAMING
+DRYWALL MODELING +COORDINATION

Top/Bottom Track
Critical Studs @ Doors, Windows + Wall Intersections
Head Of Wall
No-Fly Zones
Overhead Modeling (Ceilings, Soffit Walls + Kickers)
All Overhead Penetrations
Beam Pockets
Coordinated Infill Framing Layout
Constructability Reviews
Documentation
Full Coordination

PROVIDE DETAILED FRAMING
+DRYWALL MODELING +COORDINATION

Top/Bottom Track
Critical Studs @ Doors, Windows + Wall Intersections
Head Of Wall
No-Fly Zones
Overhead Modeling (Ceilings, Soffit Walls + Kickers)
All Overhead Penetrations
Beam Pockets
Coordinated Infill Framing Layout
In-Wall Coordination
Full Constructability Reviews
Full Documentation
Full Coordination

200 EXAMPLE



HAKKASAN
LAS VEGAS, NEVADA

SOFTWARE
Revit Architecture
Navisworks
AutoCAD Architecture
Bluebeam Extreme

HARDWARE
Field Tablets (iPads)

KHS&S was contracted to provide BIM modeling and coordination at Hakkasan Night Club at the MGM Las Vegas. The work included BIM modeling of our scope of work, weekly “Big Room” meetings, and clash coordination with all trade partners. KHS&S was also contracted to run the “Big Room” meetings and be the lead BIM coordinator. Leading the other trades in identifying all clashes and the direction for resolution. This portion was different from our normal BIM project where we only are responsible for our scope of work. Due to the skill sets that KHS&S has in BIM, the general contractor trusted us to lead and provide the coordination for the entire project.

LFD 200

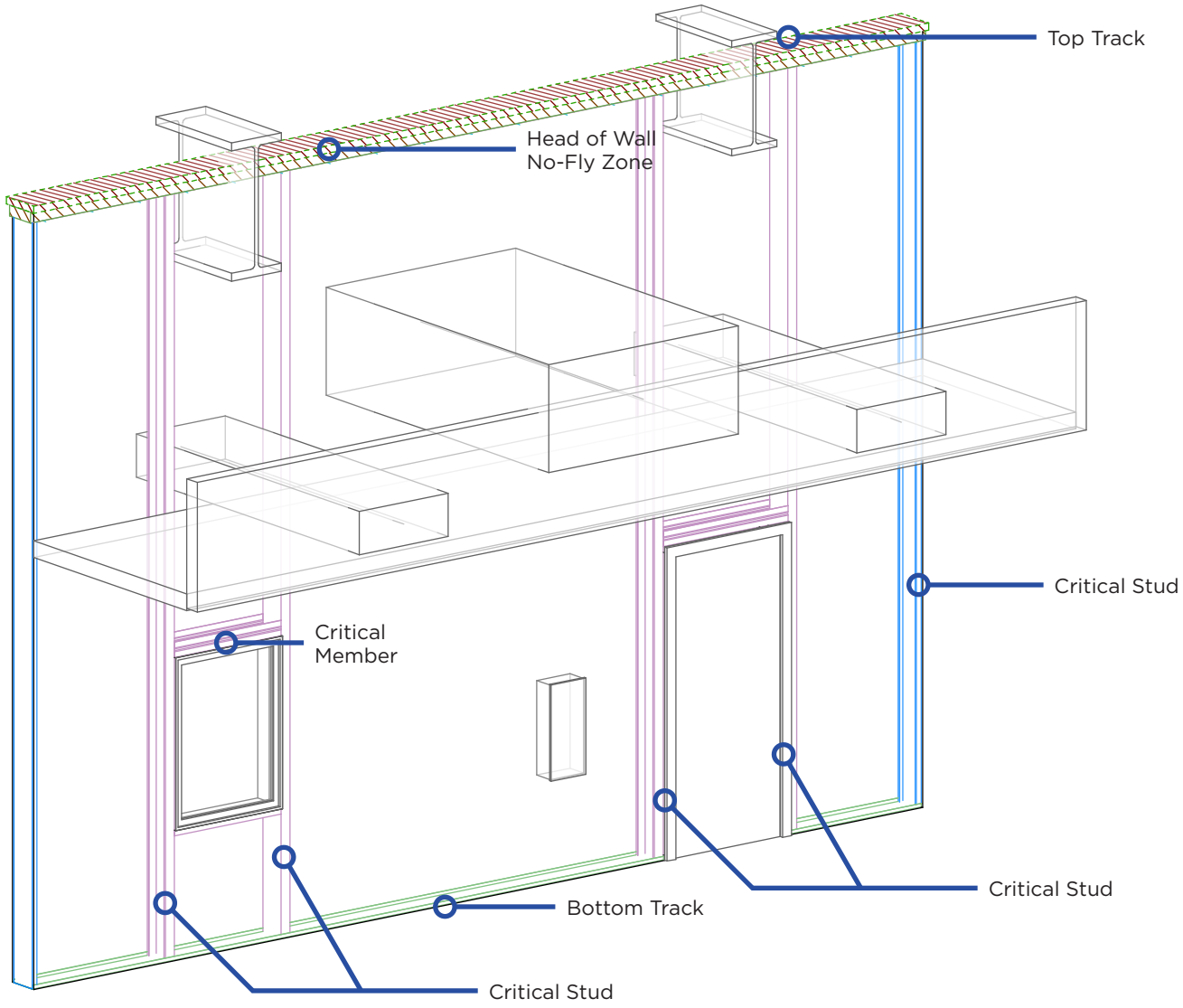
PROVIDE TYPICAL WALL FRAMING + DRYWALL MODELING

INCLUSIONS

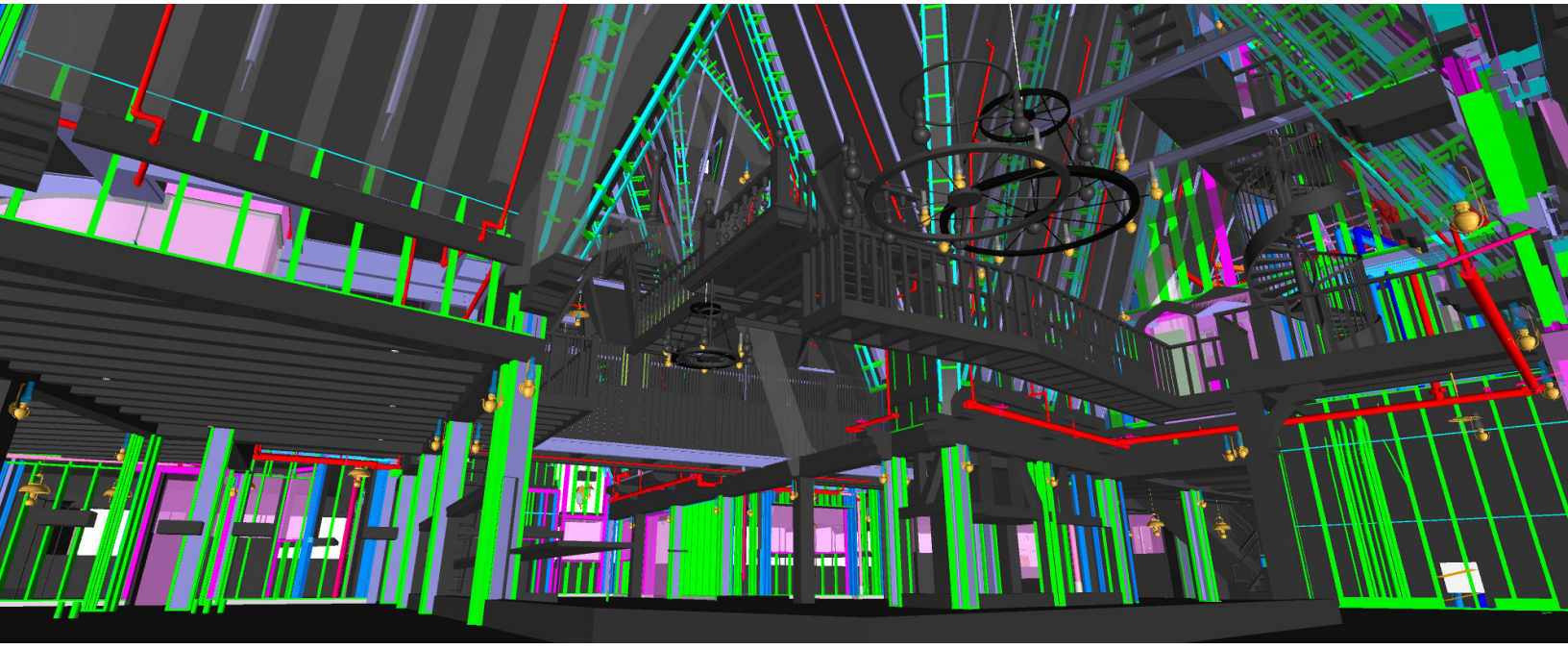
- Top/Bottom Track
  - Wall Heights based on Architectural Model
  - Priority Walls/Rated Walls
- Critical Studs @ Doors, Windows + Wall Intersections
- Head Of Wall
- No-Fly Zones
- Basic Coordination
  - Limited Coordination Meetings

LIMITATIONS (ADD/ALTERNATE – EXTRA COST)

- No Overhead Modeling (Ceilings, Soffit Walls and Kickers)
- No Coordination
- No Documentation
- No Wall Penetrations
- No Infill Studs
- No Constructability Reviews
- No Detailing
- No Detail Verification
- No Coordination Meetings



300 EXAMPLE



SOFTWARE

Revit Architecture
Navisworks
AutoCAD Architecture
3DStudioMAX
SolidWorks
Zbrush
MWF Pro Suite
GeoMagic

HARDWARE

PRO (Project Resource Office) Boxes
Total Station
Field Tablets (iPads)
CNC Bar Bending Machine

WIZARDING WORLD OF HARRY POTTER

UNIVERSAL CITY, CALIFORNIA

The KHS&S contract for the Wizarding World of Harry Potter at Universal Studios Hollywood specified a complete framing model, with coordination and design assistance. The site was divided into two main areas: the Facility and the Land, which included both interior and exterior architectural elements and rockwork construction. Models were consolidated on a weekly basis by the general contractor, who presented issues at the coordination meeting in their office, also accessible on-line. The general contractor also conducted weekly design meetings with the architect, owner's representative, theme fabricator, and KHS&S to resolve issues with structure, design concerns, and theming coordination. Additionally, we were contracted to provide a model including rough representation of windows, doors, millwork, and other themed elements, to ensure a proper fit.

LFD 300

PROVIDE PRACTICAL COORDINATION FRAMING +DRYWALL MODELING +COORDINATION

INCLUSIONS

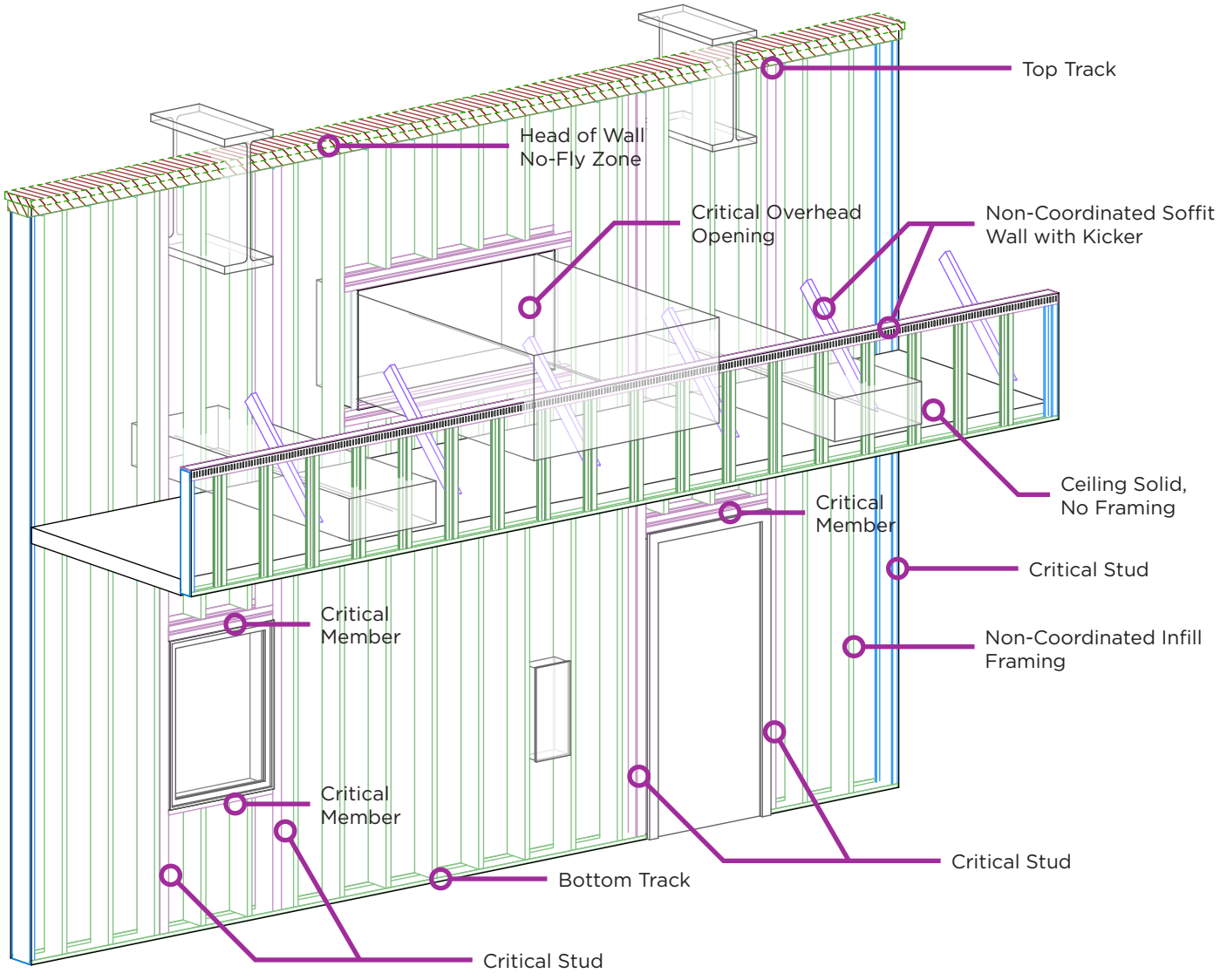
- Top/Bottom Track
  - All Walls
  - Wall Heights Based on Wall Schedule/Steel Beams/Floor Above
- Critical Studs @ Doors, Windows + Wall Intersections
- Head Of Wall
- No-Fly Zones
- Overhead Modeling (Ceilings, Soffit Walls + Kickers)
  - Ceiling Solid, No Framing
  - Soffit Walls and Kickers Framed, Not Coordinated
- Critical Overhead Penetrations
  - Openings Larger Than 30" (2+ Stud Bays)

INCLUSIONS CONTINUED

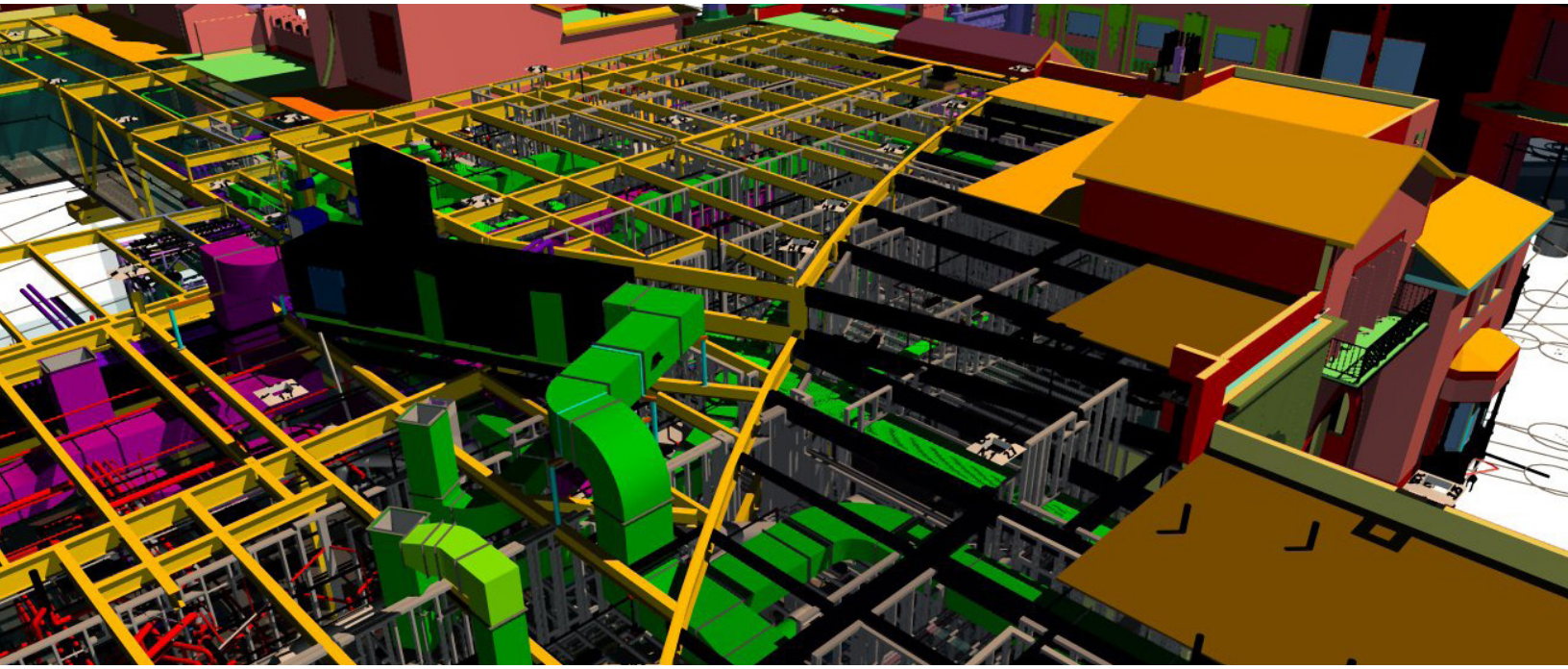
- Basic Constructability Review
  - Basic Detail Review
- Basic Documentation
  - Overlay Of Architects Drawings With KHS&S Framing
  - No Additional Tags, Dimensions Or Annotations
- Basic Coordination
  - Limited Coordination Meetings

LIMITATIONS (ADD/ALTERNATE – EXTRA COST)

- No Infill Framing Coordination
- No In-Wall Coordination



400 EXAMPLE



BUENA VISTA STREET IMPROVEMENTS
ANAHEIM, CALIFORNIA

SOFTWARE
Revit Architecture
Navisworks
AutoCAD Architecture
Bluebeam Extreme

HARDWARE
Field Tablets (iPads)

KHS&S was contracted to provide BIM modeling and coordination at Buena Vista Street California Adventure. BIM modeling of our framing systems and coordination with other trade partners to create one coordinated clash free working model. The 1st phase included weekly “Big Room” meetings at the job site with Disney’s imagineers (their design team) and subcontractors to provide clash resolution and value engineering for interior framing. The 2nd phase to this project was the design and coordination of interior and exterior themed elements. This included weekly meetings with Disney’s imagineers, our global procurement vendors and KHS&S to design, model and create over 700 separate cast elements so that all attachments were hidden, coordinated with the exterior skin to ensure proper fit when the parts arrived on site and provide quality control inspections at the manufacturer before shipping to eliminate or reduce issues during installation.

LFD 400

PROVIDE PRACTICAL COORDINATION FRAMING +DRYWALL MODELING +COORDINATION

INCLUSIONS

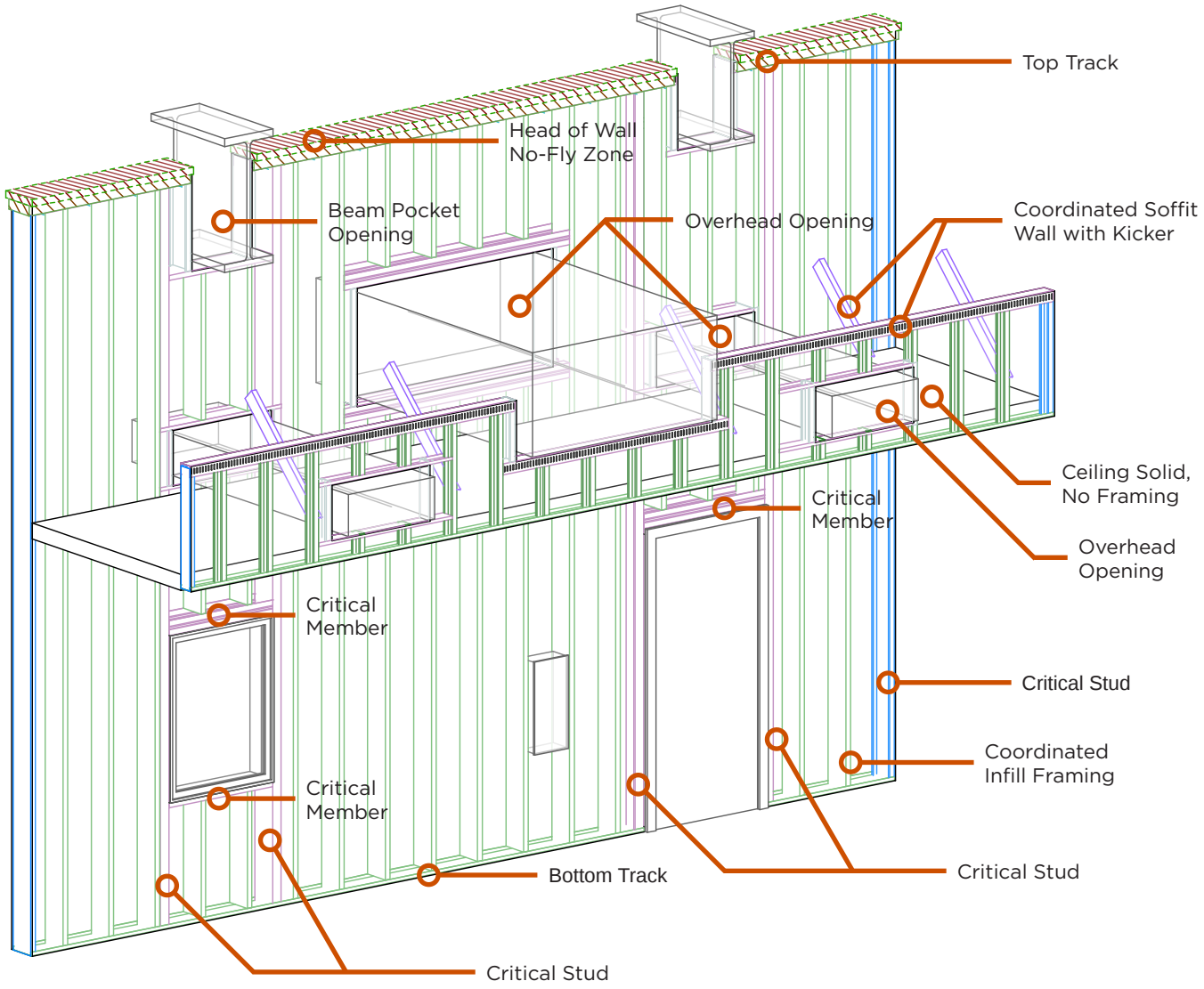
- Top/Bottom Track
  - All Walls
  - Wall Heights Based on Wall Schedule/Steel Beams/Floor Above
- Critical Studs @ Doors, Windows + Wall Intersections
- Head Of Wall
- No-Fly Zones
- Overhead Modeling (Ceilings, Soffit Walls + Kickers)
  - Ceiling Solid, No Framing
  - Soffit Walls and Kickers Framed and Coordinated
- All Overhead Penetrations
  - Openings Larger Than 14" (1 Stud Bay+)

INCLUSIONS CONTINUED

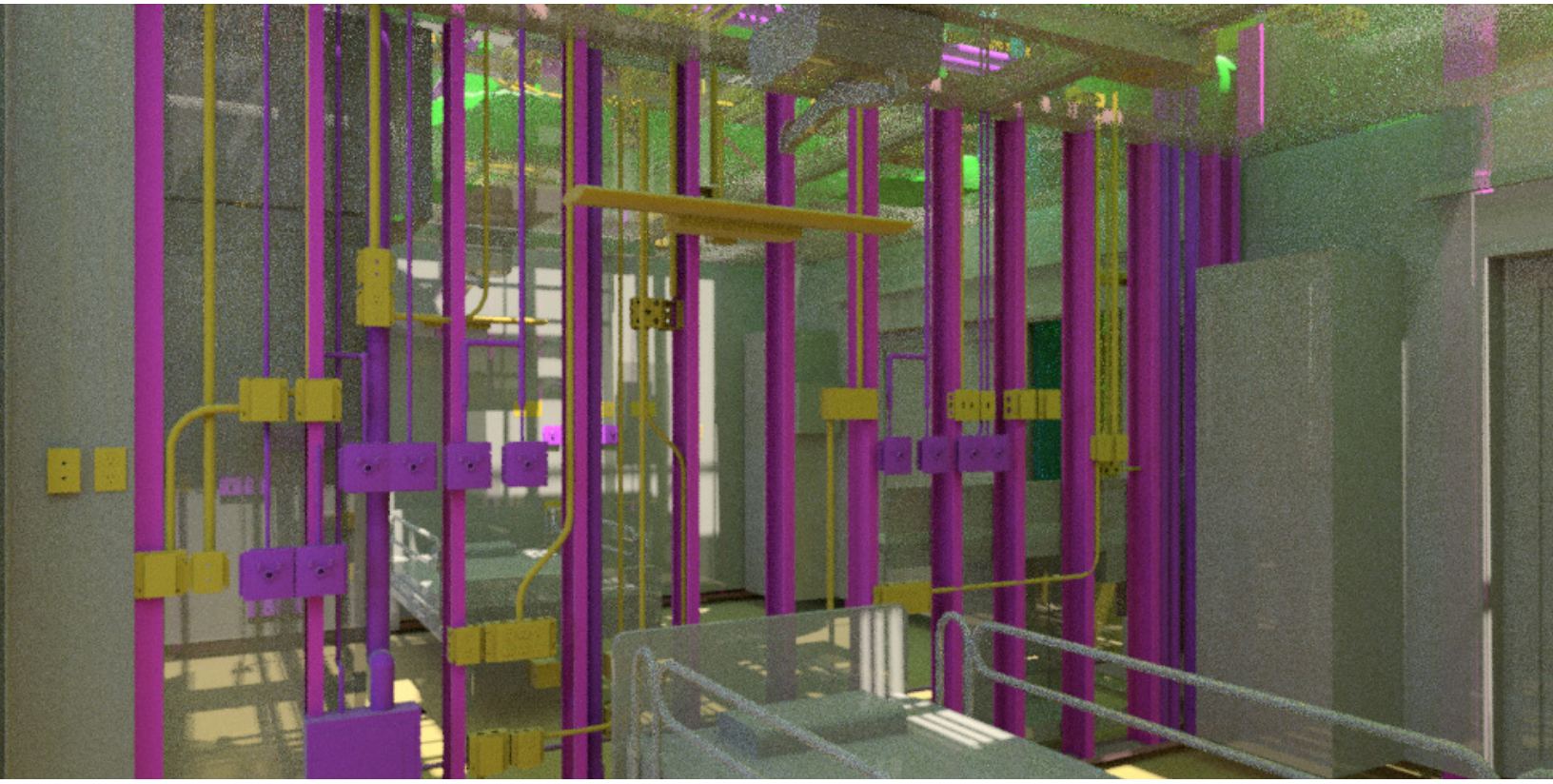
- Beam Pockets
- Coordinated Infill Framing Layout
- Constructability Reviews
  - Detail Review. Suggest Detail Changes and/or New Ones
- Documentation
  - Overlay Of Architects Drawings With KHS&S Framing
  - Add Critical Dimensions, Tags And Annotations
  - Additional Sections
- Full Coordination

LIMITATIONS (ADD/ALTERNATE – EXTRA COST)

- No In-Wall Coordination



500 EXAMPLE



VIRGINIA MASON MEDICAL CENTER
SEATTLE, WASHINGTON

SOFTWARE
Revit Architecture
Navisworks
AutoCAD Architecture
Bluebeam Extreme

KHS&S was contracted to provide interior framing BIM and coordination (walls and ceilings) on the expansion of the Virginia Mason Medical Center. There were weekly coordination meetings on-site and through Webex to detect any major clashes for resolution amongst trades.

The BIM and coordination performed also allowed KHS&S to work with the project's MEP contractors to prefabricate the medical headwalls in the patient rooms. Once a wall was coordinated, KHS&S provided a construction document of each headwall that provided the layout for every framing member. Prefabricating these medical headwalls saved time on the construction schedule and provided a safer, more controlled environment for construction.

LFD 500

PROVIDE DETAILED FRAMING +DRYWALL MODELING +COORDINATION

INCLUSIONS

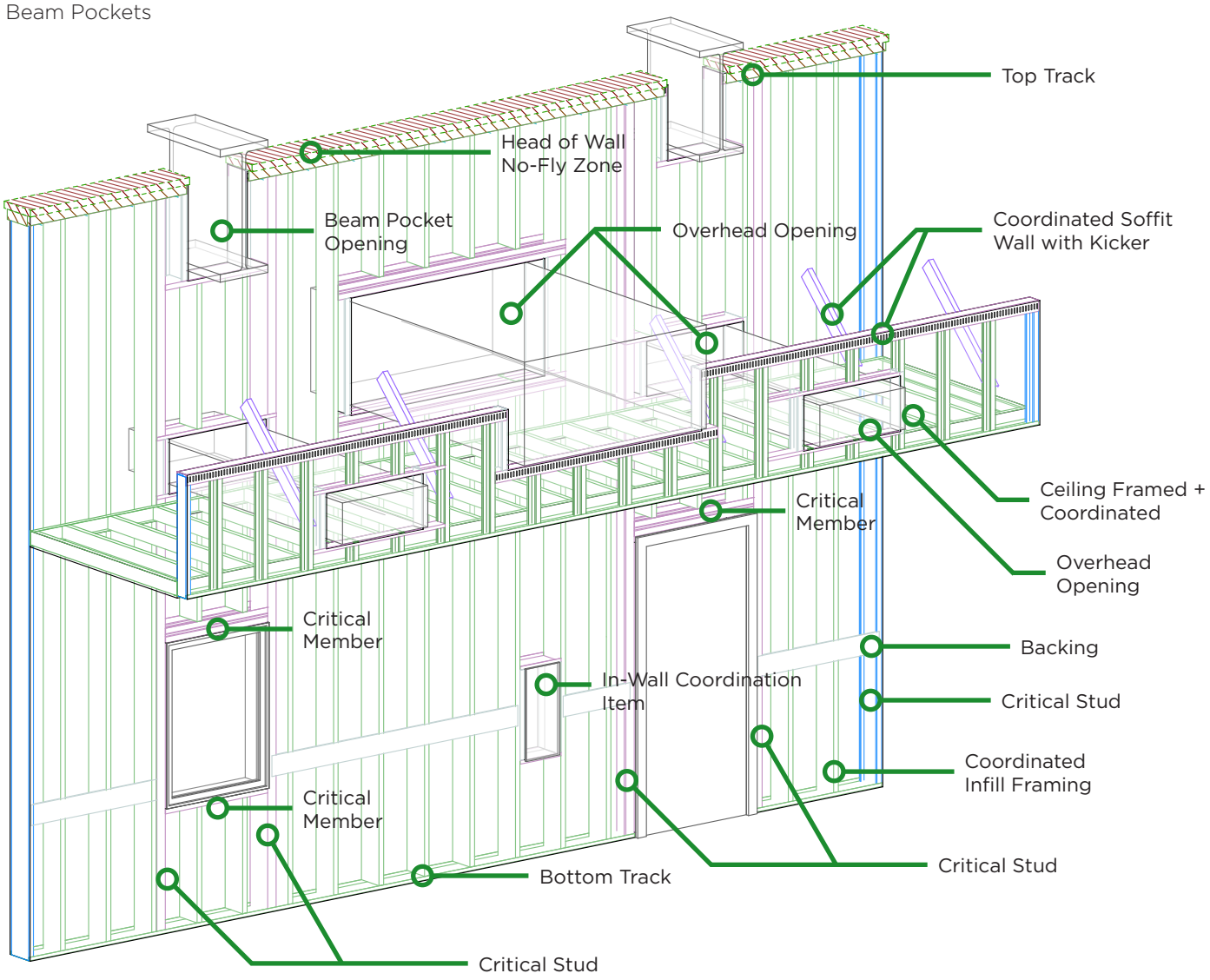
- Top/Bottom Track
  - All Walls
  - Wall Heights Based on Wall Schedule/Steel Beams/Floor Above
- Critical Studs @ Doors, Windows + Wall Intersections
- Head Of Wall
- No-Fly Zones
- Overhead Modeling (Ceilings, Soffit Walls + Kickers)
  - Ceiling Framed Out and Coordinated With Opening
  - Soffit Walls and Kickers Framed and Coordinated
- All Overhead Penetrations
  - Openings Larger Than 14" (1 Stud Bay+)
- Beam Pockets

INCLUSIONS CONTINUED

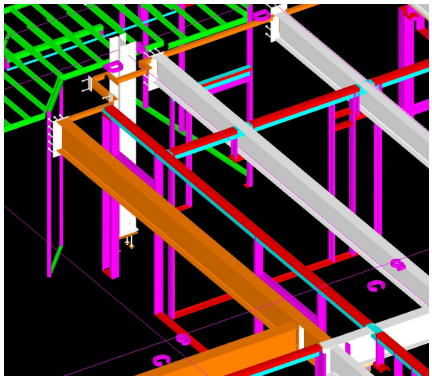
- Coordinated Infill Framing Layout
- In-Wall Coordination
- Full Constructability Reviews
  - Full Detail Review. Adjust Existing and/or Create New Ones
- Full Documentation
  - 2D Floor Plan Layout Drawings
  - Sections, Elevations And Details (For Drawings Submittal Purposes)
- Full Coordination

LIMITATIONS (ADD/ALTERNATE – EXTRA COST)

- None

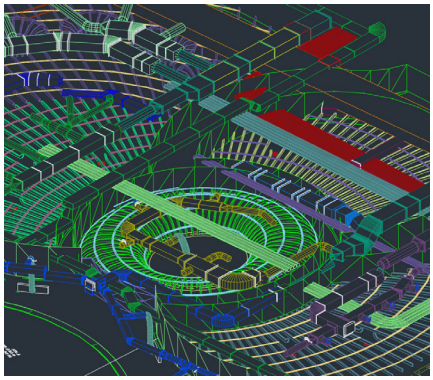


MORE EXPERIENCE MEANS MORE ACCURATE BIM MODELS



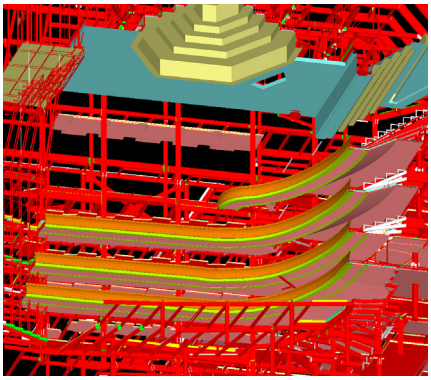
LFD 200

Wallis Annenberg Center for Arts
Beverly Hills, California



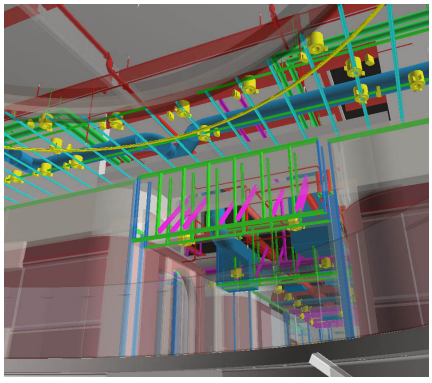
LFD 200

Jean Georges Steakhouse at Aria,
CityCenter | Las Vegas, Nevada



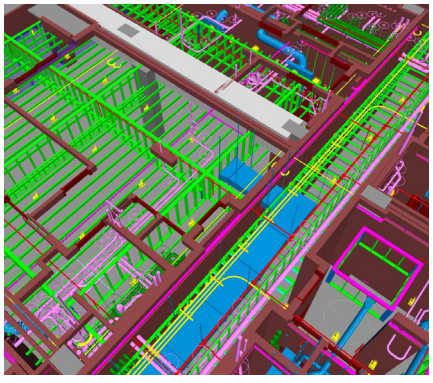
LFD 200

The Smith Center for Performing Arts
Las Vegas, Nevada



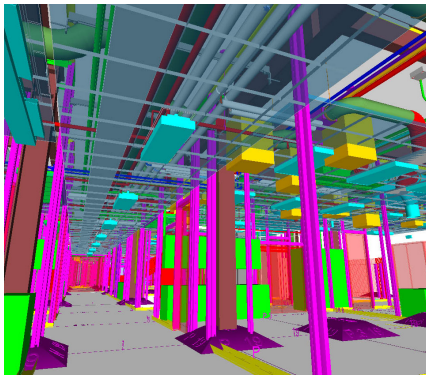
LFD 300

USC Heritage Hall, Recapitalization
Los Angeles, California



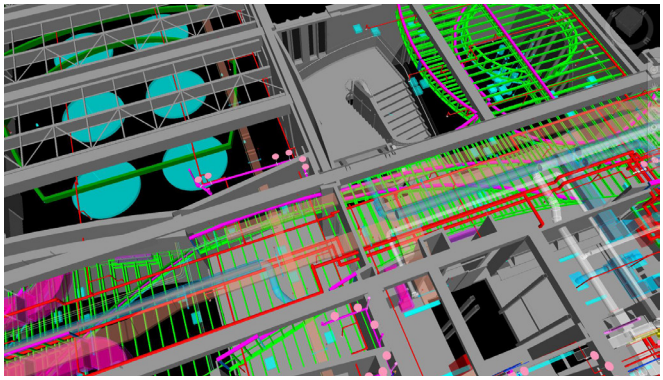
LFD 300

Fountainview at Gonda West
Playa Vista, California



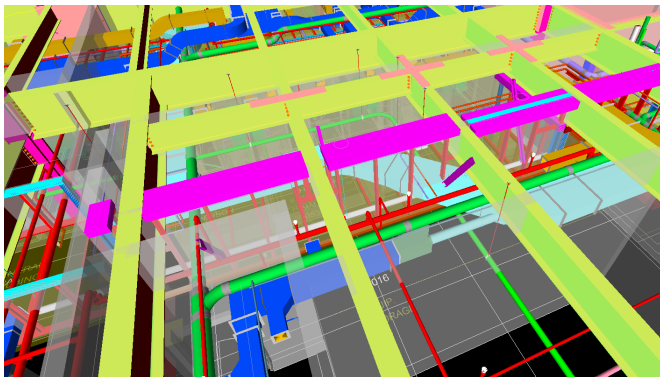
LFD 300

Warren J. Baker Center at Cal Poly
Las Vegas, Nevada



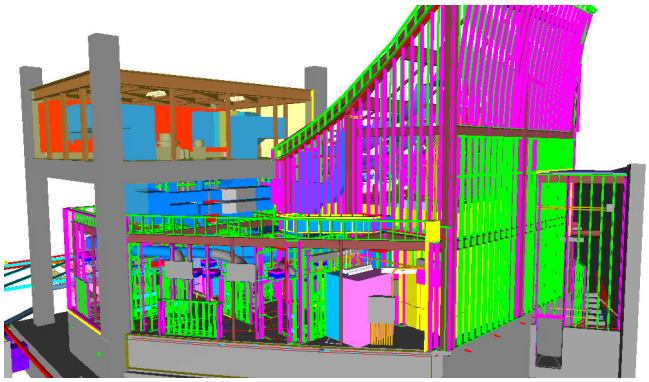
LFD 300

USC Glorya Kaufman School of Dance
Los Angeles, California



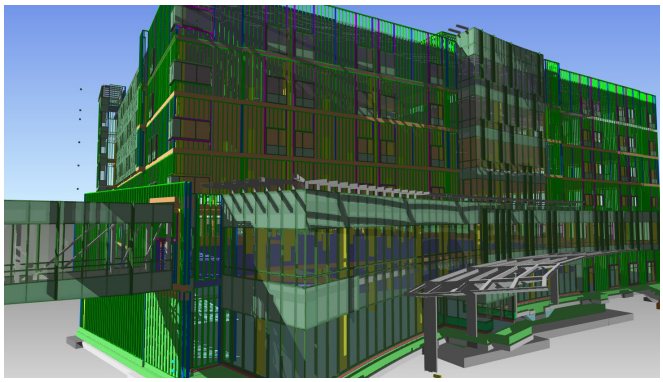
LFD 300

Santa Clara Family Justice Center
Santa Clara, California



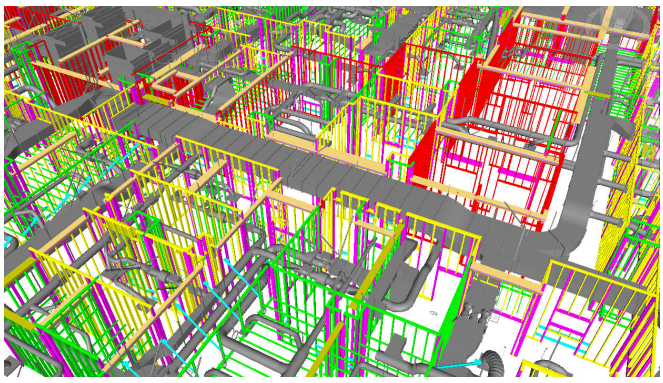
LFD 400

San Diego New Central Library
San Diego, California



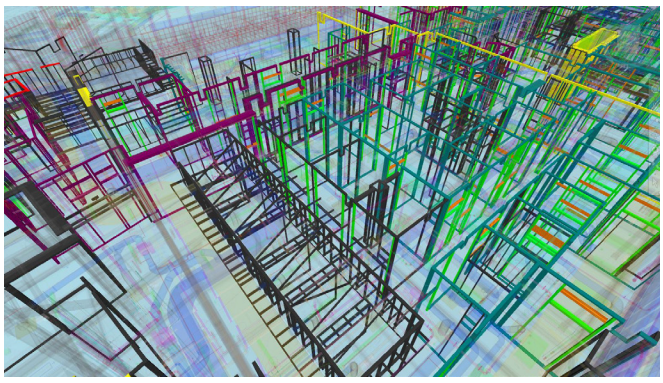
LFD 400

Akron Children's Hospital
Akron, Ohio



LFD 500

San Francisco General Hospital
San Francisco, California



LFD 500

Torrance Memorial Medical Center
Torrance, California