

Company
PENTA

Firm size
<500

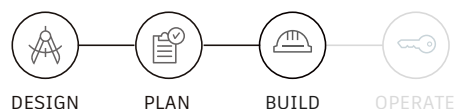
Firm type
General contractor

Revenue
\$700 million

Focus areas
Commercial

HQ
Las Vegas, NV, US

Phase



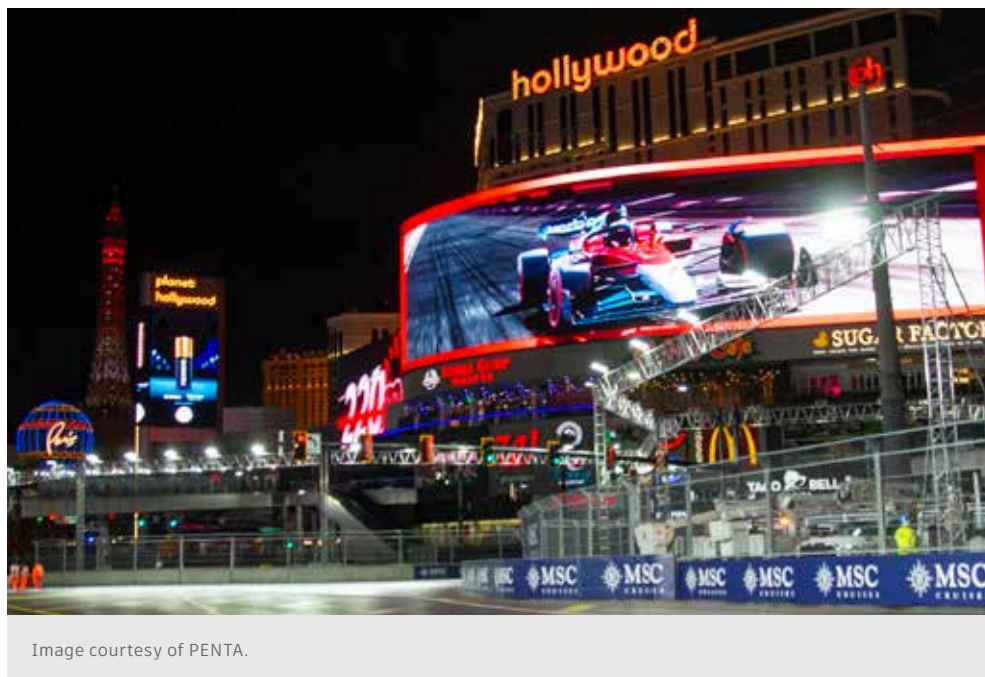
Capabilities

- Coordination
- Project management
- Safety management
- Document management
- Field collaboration

Outcome



How PENTA Built a Formula 1 Racetrack in Record Time



When you work on the first-ever Formula 1® racetrack in Las Vegas, you have to “get in and get out as fast as possible without any mistakes.”

For Cliff Cole, Director of Virtual Design and Construction at The PENTA Building Group, that meant building a marquee, 3.8-mile racetrack in under a year, plus the supporting infrastructure and concessions around some of the busiest streets in the world.

As a company that pushes innovation to exceed quality standards across its project portfolio, PENTA managed the complex details with Autodesk Forma, formerly Autodesk Construction Cloud. Using Forma Build and Autodesk Forma Design Collaboration to keep all stakeholders on the same page, PENTA completed this massive racetrack in just 11.5 months.

80-90%

estimated reduction in carbon emissions with digitized scheduling processes

2,400

increase in design team usage with Autodesk Forma Design Collaboration

3.8

miles of racetrack and surrounding infrastructure completed in under one year

The Formula 1 project

Formula 1 (F1) has been a global spectacle for seven decades, with racers driving the fastest regulated road-course racing cars worldwide. In the 2023 season, there were 22 Grand Prix racing events, with Las Vegas introduced as the newest location. The Heineken Silver Las Vegas Grand Prix would be a night race around the Las Vegas Strip past the Bellagio Fountain, Caesar's Palace, and other famous landmarks.

PENTA was responsible for upgrading the asphalt road, and constructing the 17-turn track and surrounding infrastructure. This included barriers and lights, electrical hookups for the TV cameras, hospitality suites, grandstands, temporary vehicular bridges, pedestrian bridges, and a 300,000-square-foot-square-foot pit building with a tunnel underneath to ease pedestrian foot traffic.

This was one of the most complex projects PENTA had ever undertaken, with a finite delivery date and teams scattered across the country. PENTA's solution to this significant challenge was using Forma Design Collaboration and Forma Build to quickly share and update information that design teams, field teams, and others needed.

"[Forma] has been a tremendous tool to help us to collaborate with our trade and design partners in one environment," says Cliff. "It's the first thing we're starting up in the field and the last thing we use before turnover; it's critical to everything on F1."

Getting teams on the same page

Being an early adopter of Forma on a project of this magnitude is daunting. However, PENTA and Autodesk worked together closely to integrate Forma Design Collaboration and Forma Build into PENTA's workflow.

This included creating customized training sessions that were staggered across the three crews working on the jobsite 24 hours and developing a project template specific to F1. The ease of onboarding teams to Forma was highlighted during a site visit that Cliff gave to PENTA's customer success manager and account executive from Autodesk.

"Our field team doesn't have a lot of time to learn new software. Their job is to get the project built, stay on schedule, and maintain safety on site," says Cliff. "One of our night foremen shared how easy it was for him to use Forma Build to pull up any drawing that he needs, understand the markups, and communicate with the day shift what has happened, what has changed, and what they need to look out for."

While there are always learning curves when adopting new technology, hearing the foreman's story demonstrated Forma Build's intuitiveness and value across PENTA's teams.

Connecting and protecting teams

With an 11.5-month construction schedule, 2,400 workers across the project, and 500 people on the jobsite at its peak, working from a single source of truth was critical. In addition to the construction team, project owner, and trade partners, PENTA was also working with the city council, numerous casinos along the track, police and fire departments, and the regional transportation commissions.

"Pedestrian safety was the highest priority for the F1 team," says Cliff. "At any point, a team member could log into Forma Build and see the latest and most accurate information, so there's no guessing."



Image courtesy of PENTA.

Having up-to-date project information in Forma Build allowed PENTA to communicate with the city and all the casinos around street closures. With the latest project updates, city officials and companies could determine where pedestrians and vehicles could pass through the track. This not only maintained safety but also minimally disrupted business operations for area business.

"Las Vegas is the city that never sleeps, and we need to ensure that the work we're doing doesn't impact what's happening on the Strip," says Cliff. "It was crucial to update that information in one common data environment so public entities could disperse it to the community. We're working 20-24 hours to maintain the schedule, and we don't have time to fix any issues in the technology."

Keeping up with designs in real time

Because of the significant coordination and design collaboration needed on F1, using Forma Data Management as a central hub to store models was paramount for project success. Using Forma Data Management, Cliff could share project photos, drone images, laser scans, and other information with project and community partners.



Image courtesy of PENTA.

These features came in handy when the client requested the addition of an underground tunnel below the paddock to help move both pedestrian traffic and VIP guests through the paddock area. The tunnel addition came about halfway through the project's timeline and was expected to take four months to complete, in addition to the already planned work.

The tunnel would also be constructed under two buildings and initially be comprised of two separate segments (one 102 feet long with 19 precast pieces, the other 264 feet long with 45 precast pieces). Once both segments were completed, the PENTA teams would connect them at an expansion joint to form one complete tunnel.

"We had to be flexible and shift gears fast," says Cliff. "We were building as the tunnel was being designed."

Using the clash detection feature in Forma Design Collaboration, PENTA could quickly view design changes and update stakeholders by producing real-time documents at meetings to make more informed decisions with trade partners about schedule impact, material procurement, estimates, and other planning.

"Having accurate and up-to-date documentation allows us to operate more efficiently," says Cliff. "Being able to go into the model and see if any drawings are attached or changes in the 3D views is the biggest game-changer for our teams. It's been a tremendous tool to help streamline the coordination process."

Managing schedules in the cloud

The project management workflows within Forma Build helped PENTA deliver the project on time, especially the RFI module. Ahead of installing a seven-foot sanitary/sewer manhole on Harmon Avenue, trade workers discovered an existing electrical duct bank inches from where they planned to add the new manhole.

With this new information, they ended up shifting the new structure two feet to the left to so it could still connect with an existing sanitation/sewer line, but without having to relocate the electrical duct bank.

"With Forma Build, we've streamlined that process, saving us time," says Cliff. "Everybody can see the RFI that we receive from our design team, from the field to the trades."

Project schedules are uploaded to the scheduling module, so the entire team can access the latest milestones and activities. PENTA can digitally reference issues and other project data and use the comparison tool in the schedule module to pinpoint the changes to stay on track.

"It's straightforward for our teams to go back and review what we've talked about in the meetings and maintain that information so that they can go find solutions or complete the task in a timely manner," says Cliff. "This has been revolutionary for us."

By moving to a fully digitized process, PENTA reduced its carbon footprint by an estimated 80 to 90 percent. Previously, copies of meeting minutes were printed and passed out—and typically left on a table. This also resulted in a lack of follow-up on action items, which occasionally wasn't communicated properly to the people responsible for getting the task done.

Looking to the future

Following the inaugural 2023 race, The Las Vegas Grand Prix will be held annually through 2034. To help rebuild the track for future races, PENTA recorded its teams practicing how to assemble and disassemble all the barriers, temporary bridges, and pedestrian walkways. PENTA also captured progress 360-degree photos so teams can see how the structures should look as they're assembled, and can also monitor building conditions and utilities with laser scanning.

"For years to come, we'll have a digital blueprint in [Forma] that documents how all the parts and pieces to the F1 track and its supporting infrastructure come together," says Cliff. "This will equip our teams to assemble the track and infrastructure for future events faster."

Providing its field teams with the tools and information they need to be successful enables PENTA to maintain the high standards that clients expect. The focus is not on simply choosing a tool but instead on providing an innovative solution to increase efficiency and productivity while making their jobs easier.

"[Forma] is what a truly collaborative platform looks like; it's a staple across all our projects," says Cliff. "At the end of the day, Forma Design Collaboration and Forma Build allow us to provide a better client experience, and that's what we strive for."

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-Cliff Cole
Director of Virtual Design and Construction,
PENTA